PRE-CONTACT FISH WEIRS: A CASE STUDY FROM SOUTHWESTERN NOVA SCOTIA

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By

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ABSTRACT

Fish weirs have a wide distribution in Nova Scotia, and are present on most primary watersheds found in southwestern Nova Scotia. However, little systematic archaeological research has been undertaken to delineate these structures as to architecture, function and likely geographic location in an ancient landscape setting. Fish weir technology has been employed by humans since at least the Mesolithic period and has persisted in its basic form into the present. Variability in architecture is evident and it appears that at least four types of weir structures were utilized by pre-contact populations to harvest multiple fish species in southwestern Nova Scotia. This research demonstrates that a detailed archaeological inspection of fish weirs is warranted for purposes of providing a broader understanding of their use in Nova Scotia. Petersen and others (1994:198) noted that while other facilities can be found at residential sites, fish weir structures are tied to a location, defined as a place where extractive tasks such as food or raw material gathering are undertaken. Fishing has always been a important integral part of the economy of pre-contact aboriginal populations in the Maritimes. As a result, this research allows for a more detailed inspection of a pre-contact fishing technology and provides an opportunity to increase our understanding of subsistence, settlement, mobility and land and resource use patterns for this region.

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THESIS ORGANIZATION

While the fish weir is one of the most enduring of facilities utilized by pre-contact populations to meet subsistence requirements very little is known about them. This thesis presents information to amend this situation. Chapter 1 provides background information essential to conceptualizing the pre-contact history of fish weirs. A problem statement is provided, and the implication of the paucity of fish weir information and research literature for this region is outlined. This, along with the methodology and objectives of the research, as well as the theoretical basis for this thesis provides the context for information presented in later chapters. Chapter 2 provides the environmental and cultural context of the study area. It also includes information on historical and modern weir use. A summary of previous archaeological research in the study area is offered in Chapter 3, which includes a review of regional settlement and subsistence models that consider the overlapping of seasonally available resources in highly productive and interconnected habitats. Chapter 4 presents information related to the research of weirs. It also includes data on weir descriptions, geographical placement, and includes discussion of the value of Mi'kmaq legends and place names in discerning resource and exploitation areas in the region. Chapter 5 integrates the results of the fieldwork by providing a rationale and models for fish weir use in southwest Nova Scotia.

CHAPTER ONE

1.0 Introduction

This thesis is intended to address an obvious gap in the regional archaeological record for weir technology. The fish weir is the most unique and enduring of pre-contact facilities utilized to meet subsistence requirements and yet very little is known about them. The term weir is a generic term used to describe an obstruction located in the water, which had been made or modified by humans and designed to impede or impound fish for capture (Lutins 1992). Rostalund (1952:101) noted that many weir structures included in their architecture a trap which served to impound fish so that they could not escape. Similar fish weir characteristics were observed for fish weirs in southwestern Nova Scotia.

Weir use is one of the oldest human fishing practices that involve the use of barriers on rivers to secure fish. Subsequently, they represent a significant application of human ingenuity to the exploitation of fish for sustenance purposes. While the earliest type of weir can be traced back to at least the Mesolithic period, it is believed that the weir in its most basic form developed in the Neolithic and its design and function has persisted through to the present (Bannerman and Jones 1999:70). What are the implications of weir use?

1. Restricted movement of fish;
2. Sedimentological implications;
3. Altered river courses;
4. Seasonal barring of estuaries/rivers; and
5. Shifting of fishing strategies.

While fish weirs have a wide distribution in Nova Scotia, and are now a recognizable component of the archaeological resource, few have been documented or subjected to detailed archaeological research. Remnants of this ancient fishery technology can be found in eleven primary watersheds of southwestern Nova Scotia shown in Figure 1. These features consist of a series of stone "v-shaped" configurations of distinct architecture, form, and dimension and their placement on the landscape suggests a deliberate and planned land and resource use strategy.

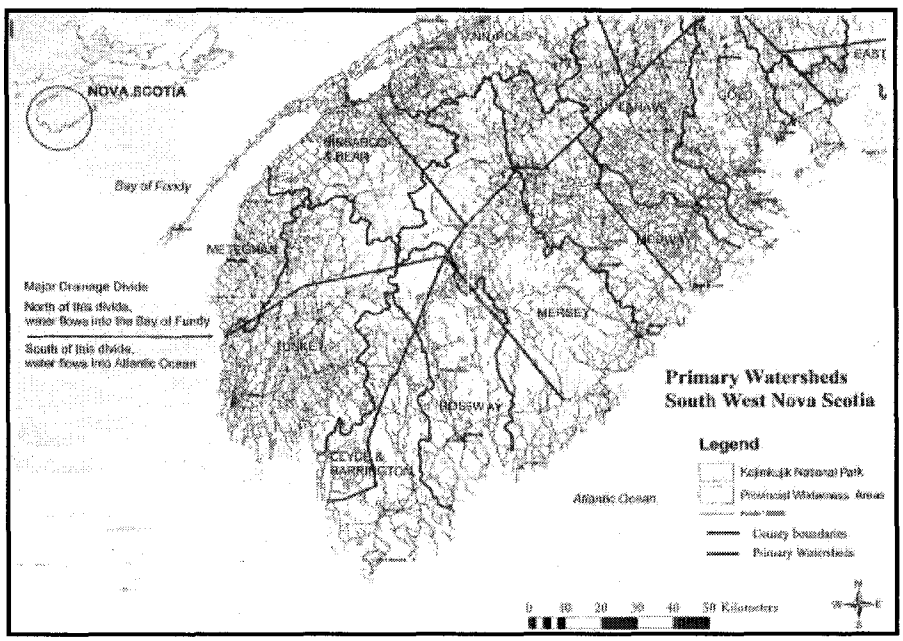

Figure 1: Watershed of SW Nova Scotia (Davis and Browne (1996)

The northwest coast of North America has long been the centre of research into fishery technology and gear forms employed by pre-contact populations to take advantage of the availability of fish for subsistence purposes (Stevenson 1999). This study provides

not only a rare opportunity to examine technological aspects of a pre-contact fishery, but also an opportunity to understand fish weir use in pre-contact Nova Scotia.

The current conceptualization of fish weir architecture for this region derives primarily from four sources. Subsequently, our understanding and interpretation of fish weirs in Nova Scotia is significantly influenced by these sources:

(i) Bolyston Street fish weir, in Boston, Massachusetts (Johnson 1942, 1949, and Kaplan *et al.* 1990: Radiocarbon dates 4720 ± 70 BP to 1790 ± 90 BP),

(ii) Sabasticook Lake, Maine (Petersen *et al.* 1994: Radiocarbon dates 6100 ± 120 BP to 1760 ± 70 BP),

(iii) Atherley Narrows fish weir, Ontario (Johnston and Cassavoy 1978: Radiocarbon dates 4560 ± 115 BP to 4375 ± 95 BP),

(iv) Pre-contact weir studies in eastern North America compiled by Lutins (1992).

1.1 Problem Statement

It has been thought that stationary, non portable artifacts of composite construction are unusual in the archaeological record and non-diagnostic. Their wide distribution in southwestern Nova Scotia suggests otherwise. Lutins (1992:04) pointed out three primary reasons why fish weirs remain relatively ignored in the archaeological literature; (1) the paucity of existing weir literature, (2) lack of ethnographic reports, and (3) lack of interest in weir technology.

The paucity of weir literature in this region can be attributed to the fact that weirs have only just recently been recognized for their interpretive value in the reconstruction of pre-contact life-ways. Little is known of the technological aspects of this ancient fishing

practice. Few have been recorded, mapped or subjected to detailed archaeological investigation. For the large part, there is a general lack of information of and familiarity with this fishing strategy from which to construct a meaningful interpretation of weir utilization in this province. With the exception of the Lower Eel Weir feature found at Kejimkujik National Park and National Historic Site of Canada (KNPNHS), no other weirs have been mapped, recorded or investigated in the province.

Few ethnographic references have been made of fish weirs. The earliest recorded accounts of fish weir utilization were provided by Denys (1908), Lescarbot (1914) and Deirèville (1968) and they are referenced in the legend *Kitpooseagunow: the Avenger,* (Rand 1913) and *Tracking Doctor Lonecloud; Showmen to Legend Keeper* (Whitehead 2002). Secondary ethnohistorical narratives are also somewhat ambiguous providing only cursory reference of Mi'kmaq settlement locations, place names, as well as general fishing practices for the late eighteenth and nineteenth century.

The most obvious reason for the paucity of fish weir data for this region is that they have simply escaped the attention of local historians and archaeologists. They have been thought to be non-diagnostic. A recent fish weir investigation at Sabasticook Lake has proven this to be otherwise (Petersen *et al.* 1994).

Fishing has always been an important and integral part of the economy of pre-contact aboriginal populations in the Maritimes and this is especially so in the province of Nova Scotia. While this research initiative is intended to address gaps in fish weir research for this region, it also provides an opportunity to increase our understanding of subsistence, settlement, mobility patterns, as well as land and resource use of early pre-

contact populations in the province. To this end, I have attempted to identify and conduct a detailed, systematic delineation of fish weirs in southwestern Nova Scotia.

The objective was to interpret them as to architecture and function; understand their complexities and evolution over time; and provide an explanation for their geographical locations.

1.2 Methodology

Because so little is known of fish weirs in Nova Scotia, the basic objective of this research was to collect a broad set of information about pre-contact fish weir architecture and utilization. A wide range of investigative techniques, including informant interviews, archival research, and traditional archaeological methods were used to assemble the information that serves as the basis for this thesis.

The project objectives are outlined below:

(i) to collect and assemble existing data on the architecture of weirs in southwestern Nova Scotia, and compile comparative information from other parts of eastern North America;

(ii) to include a representative sample of fish weirs in southwestern Nova Scotia by expanding the research parameters to include adjacent watersheds for this area;

(iii) to map and record known and recently discovered fish weir structures;

(iv) to evaluate fish weir structures as to architecture, form, and function and geographic locations; and

(v) to determine probable seasonality of fish weir use and likely targeted fish species through species distribution analysis.

This research resulted in:

(i) the collection of sufficient data from which to conduct a logical comparative analysis of fish weir architecture, construction techniques, form and function;

(ii) the compilation of sufficient data from which to determine like geographic location of fish weir structures and the identification of other potential fish weir sites;

(iii) a clearer understanding of variability in weir architecture and the rationale for that variability;

(iv) the recognition that the pre-contact fishery was more organized and deliberate than previously realized; and

(v) an understanding of the seasonality of weir use and of targeted fish species.

Together this information provides for a clear statement of fish weir use, architecture, seasonality, variability, and generally contributes to our understanding of fish weir use and their geographic placement.

Because human impacts (e.g., river impoundment, settlement, and increased recreational use of the lands, rivers, and lakes) have altered estuary and interior river systems it was necessary to extend the sampling area to include eleven primary watersheds in southwestern Nova Scotia. This strategy resulted in the identification of a representative sample of fish weirs and the recognition that various types of fish weir structures existed in differing but overlapping habitat areas.

It was not possible to conduct an exhaustive inventory of fish weirs for the entire province. However, comprehensive data on fish weir facilities for the Maritime/Atlantic

Region is important but beyond the scope of this project. This research provides a detailed and localized narrative of fish weir use in southwest Nova Scotia, and hopefully will influence future fish weir research in the region.

Dating of stone fish weirs is problematic as they are generally constructed in river channels floored in bedrock and bouldery till and riverbed geology. It is unlikely that fence-stake fish weirs would have been used on only estuary or coastal settings. While no pre-contact fence-stake weirs have been reported, ethnographic literature confirms their existence and use at time of European contact.

1.3 Theoretical Orientation

This research uses a liberal interpretation of principles imported from the broader canopy of cultural ecology. The theoretical basis for this project is based on the assumption that a reciprocal relationship exists between human populations and the environment in which they find themselves. This relationship existed in the past, exists in the present and will continue to exist into the future. Subsequently, this relationship influenced how populations have and will organize themselves socially, economically and technologically. This relationship, from a broader perspective, impacts settlement, subsistence and mobility strategies. A life-cycle concept is introduced to illustrate the organizational schematic of this relationship (Figure 3). It provides a visual model of what is unique about this aboriginal view of land and the human relationship to it. Environment and human populations are invariably linked. That relationship dictates or influences social, economic, and technological organization, technological strategies, activity distribution and final artifact distribution.

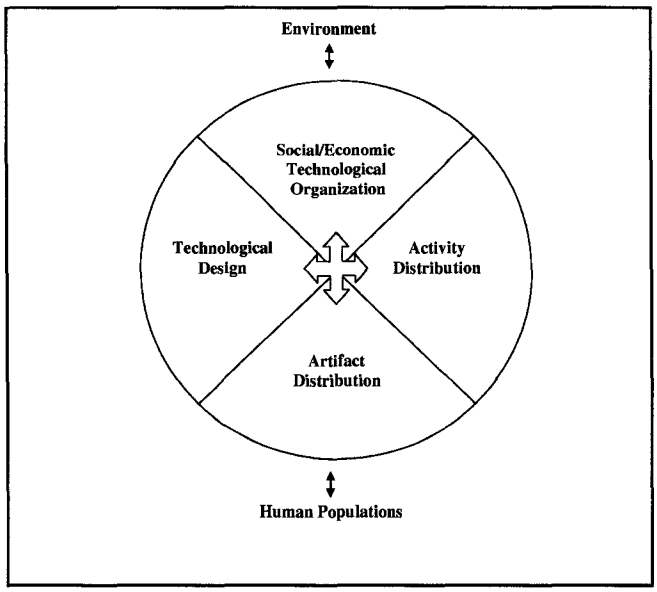

Figure 2: Relationship between Mi'kmaq and their environment (Lewis 2003)

The development and implementation of fish weir technology for procurement purposes is one manifestation of that relationship. An analysis of existing literature of fish weirs for northeastern North America, the northwest coast, as well as current fish weir site investigations support this notion. The fish weir is an unmistakably effective technological strategy designed and implemented to allow pre-contact populations to realize the full potential of selected marine habitats. However, what is often overlooked is that many fish weir site locations are generally bounded by rich and productive boundary terrestrial habitats. That these facilities are found at activity sites where extractive tasks such as food or tool maintenance are undertaken significantly increases their interpretative value when attempting to understand the broader context of pre-contact land and resource use.

1.4 Relationship between Human Populations and Environment

This study focused on the importance of fish weir research as a means of

understanding the inter-relatedness between pre-contact populations and the environment. Environments have always played a substantial role in human affairs. Coastal, intertidal areas, estuarines, riverine and lacustrine habitats are generally attractive locations for settlement. The foremost attraction of these habitats was a diversified, seasonally available resource base. These habitats are significant components of the "cultural landscape" used by pre-contact populations for subsistence and settlement, as well as other purposes. They occur widely throughout Nova Scotia, but vary according to the region where they are found (Davis and Browne 1996). These habitats and their boundary terrestrial environments have been shown archaeologically to have been consistently exploited by early populations (Hoffman 1955; Davis 1986; Nash, Stewart and Deal 1991; Christianson 1976). A reciprocal relationship between pre-contact Mi'kmaq populations and environment is reflected in land and resource use, as well as settlement, subsistence and procurement strategies.

1.5 Technological Organization

Archaeological research has increasingly turned to questions about organization in all aspects of culture. Some of these studies were concerned with economic behaviour and how this influenced the implementation of technological strategies. Elements of those studies considered the dynamics of plans and strategies which guide technology and are responsive to resource availability and environmental conditions (Earle 1980:1-4). Earle also noted that subsistence activity is best understood through the plans and strategies that facilitate it. Subsequently, it is these strategies that link a cultural group with its environment and they are not restricted to a single resource or habitat. They can be

extended or modified from their basic form to exploit multiple resources in a succession of habitats. The use of fish weirs suggests such a pattern. While they have a basic universal function, fish weir architecture differs depending upon the environment in which they are found and types of resources they are intended to target. This is certainly the case for southwest Nova Scotia where four fish weir types have been noted.

For example, fence-stake fish weirs have been identified through the ethnographic record as existing in coastal and inter-tidal habitats. Smaller up-stream oriented stone weirs tended to be located in the lower reaches of estuarine habitats. Rectangular and/or semi-circular stone weirs have been identified just above the head of tide, with larger down-stream stone walled weirs restricted to interior riverine/lacustrine settings.

The organization of technology and knowledge of environment and resources suggests that land and resource utilization was planned and deliberate. The strategic geographic placement of fish weir location in selected habitats supports this statement. In the course of this investigation it also became apparent that this strategic placement of fish weirs allowed for a fluidity of movement or a floating pattern of gather and dispersal between coastal and interior sites. Regional models of pre-contact subsistence patterns in Nova Scotia (Christianson 1979; Davis 1986; Nash, Deal and Stewart 1991) suggest this.

There are many possibilities to fulfill subsistence needs. Resources may be secured by either a singular or several extractive processes which vary according to the number and types of resources exploited. To illustrate this point, you need only to look at hunting practices versus fishing practices. While terrestrial animals are generally assumed to be constantly available, it is difficult to predict capture locations. Therefore, extractive

processes required a consideration of a combination of strategies for search, pursuit and capture (Earle 1980:07). Fish, on the other hand, can be taken through the use of a single extractive strategy (i.e., fish weir) which could be modified to account for environmental and geographical considerations and a diversity and availability of resources.

Rostlund (1952:102) commented that at time of contact, fish weirs were more widely used than any other fishing method (spears, hooks and line, poisons, etc.) to recover fish resources, although nets or baskets have generally been used in conjunction with them. In terms of production, he felt that *"fish weirs were clearly the most important means of harvesting fish"*.

1.6 Settlement and Subsistence Models

Most regional pre-contact settlement and subsistence models hypothesized for Nova Scotia consider environmental factors and the seasonal availability of resources. All conclude that populations tended to be located near their principle resources and employed several extractive strategies to gather them. These resources were generally identified as being located in productive and diverse interconnected ecosystems which make up a larger and more diversified catchment area.

Hoffman (1955:724) presented a "seasonal round" hypothesis which provided the impetus for looking at subsistence and settlement patterns of pre-contact populations in Nova Scotia. Unfortunately, his hypothesis was based on the literal interpretation of sixteenth and seventeenth ethnographic sources to explain the seasonal round of pre-contact populations. He suggested that fish, sea mammals, and other marine products were basic to Mi'kmaq existence, with hunting activities only becoming important during the

three months of the winter.

Christianson (1979) expanding upon Hoffman interprets the settlement and subsistence cycle of pre-contact populations as being contingent upon the availability of higher concentrations of species at a particular season. The exploitation of seasonally available food resources was possible by employing differing exploitation strategies (i.e., hunting, trapping, fishing, spearing, and netting). The pre-contact fish weir fishery falls within the realm of this interpretation.

Davis (1986:4) suggested a settlement and subsistence pattern that centred on the exploitation of interconnected habitat zones (i.e., inshore marine, intertidal, riverine-lakes, and forest) for St. Margaret's Bay. He referred to this as a "contiguous model." The underlying assumption of the "contiguous model" is that interconnected habitat zones can be seen as contributing to settlement patterns. The four interconnected habitat zones are not discrete, that is, relevant species can occur in more than one habitat zone within any particular season. Davis also suggested that the highest concentration of sites in Nova Scotia occur along the coast, the majority of which represent locations of long-term occupation with exploitative patterns extending into four interconnected habitat zones which offered the greatest diversity of resources. Interior sites were seen as being specialized locations used to take advantage of seasonally high concentrations of single resources.

Nash, Deal and Stewart (1991) presented the "site catchment" principle as a plausible explanation of settlement and subsistence patterns along the Gaspereaux River Drainage System. The underlying assumption of the "site catchment" principle is that sites

will be located in those areas that offer the greatest diversity of resources aquatic zones (marine-intertidal-estuaries-riverine-lakes) and terrestrial ecotones (bottomlands-uplands-ravines-thickets-bogs-swamps). As one moves outward from the site, environment types change and the exploitation of resources becomes increasingly energy expensive.

The models presented consider the overlapping of seasonally available resources in highly productive and interconnected ecotones bounded by rich terrestrial habitats. That these ecosystems would have been routinely exploited indicates that land and resource use was organized.

The density of remnant fish weir features in southwestern Nova Scotia would suggests that fishing was more important than realized.

CHAPTER TWO

2.0 Environmental Context of the Study Area

The study area is located in southwestern Nova Scotia. Since this part of the province shares similar geological and environmental characteristics, an overview is provided of the natural history of the KNPNHS. KNPNHS is representative of the Atlantic Coastal Uplands natural region of the province. The gently rolling hills of the province's interior represent a land of folded metamorphic rock, polished and grooved by retreating glaciers that exposed stony, shallow soil and left behind erratics that were carried by the migrating ice and deposited as the ice melted. The numerous shallow lake basins in this part of the province are glacially scoured. Most of the approximately 6000 lakes

documented in the province can be here because of the abundance of granite and quartzite bedrock (Davis and Browne 1997).

The forests of southwest Nova Scotia are made up of both coniferous and deciduous tree species, designated Acadian forest (Drysdale 1986). Within these forest and wetland habitats a variety of terrestrial mammals, birds, reptiles, and amphibians can be found. The fish inventory is less significant (Drysdale 1986) which allows for a reasonably definitive accounting of seasonality of fish weir use. As mentioned earlier in this text, one significant and revealing geological characteristic of watersheds in this part of the province is the fact that they are generally floored in bedrock and littered with bouldery till which has prevented down cutting.

This is important in understanding fish weir technology. For example, a fish weir on a southwestern Nova Scotia watershed such as the Mersey River has not been impacted by geological influences. Subsequently, the fish weir feature itself and its associated activity site have remained relatively intact.

2.1 Biodiversity

The ecology of southwestern Nova Scotia is strongly influenced by the ocean. Subsequently, the primary watersheds have afforded early populations access to a rich marine ecosystem supplemented by equally rich boundary terrestrial habitats. This biological diversity was likely the area's foremost attraction for pre-contact populations. An overview is provided below of marine resources;

Cetaceans

Whales, dolphins, and porpoises are highly mobile species which overwinter in the

warm waters surrounding Nova Scotia, and also exploit these biologically productive waters as summer feeding grounds. The smaller toothed whales, such as the dolphin and porpoise feed on smaller schooling fish, with eel being their primary food source. While Christianson (1976) does not list the dolphin or porpoise as subsistence species, Leighton (1936) in a short documentary entitled "Porpoise Oil" documents its subsistence value among historic Mi'kmaq populations in the area.

Pinnipeds

Five species of seals occur off Nova Scotia, with grey and harbour seals being the most widely observed (Davis and Browne 1996). Christianson (1976) identifies only the grey seal as a subsistence species. The grey seal has a seasonal range from January to June. They breed on ice or land from late December to February, and haul out on land from May to June to molt.

Seals are quite common along the coast of Nova Scotia, feeding mostly in areas where schooling fish occur and at mouths of rivers (Davis and Browne 1996). Foods types eaten by seals vary seasonally and reflect more the availability of prey rather then food preference.

Marine Fishes

Because certain species move freely between systems, the line between freshwater and marine fishes is not always easy to draw (Davis and Browne 1996). Marine fishes have been subdivided into five groups:

(i) fishes of estuary and tidal inlets;

(ii) groundfish;

(iii) pelagic species;

(iv) mesopelagic species; and

(v) exotic warm-water and eastern arctic species

For the purpose of this discussion, I have concentrated only on those fishes generally found in estuary and tidal inlets. The associated shallow waters of these environments offer greater species diversity (Davis and Browne 1996). Twenty fish species have been identified in estuary waters.

These include those species which remain in these environments for their entire life cycle and those that leave for short periods of time to spawn in freshwater waterways.

Anadromous fish species passing through these systems to reach spawning grounds located in the upper extents of estuaries and in freshwater include: the gaspereau (*Alosa pseudoharengus)*; Atlantic salmon (*Salmo salar*); American shad (*Alosa sapidissima*); winter flounder (*Pleuronectidae*); striped bass (*Morone saxatilis*); Atlantic sturgeon (*Acipenser oxyrinchus)*; Atlantic tomcod (*Microgadus tomcod*); and rainbow smelts (*Osmerus mordax).*

Species that typically occur in freshwater (i.e., brown trout (*Salmo trutta*), brook trout, (*Salvelinus fontinalis*) and four species of the stickleback family (*Gasterosteidae*) often exploit coastal estuaries during parts of the year. The American eel *(Anguilla rostrata)* is the only catadromous species; born at sea returning to estuaries and freshwater environments to mature. These occur in intertidal, estuary, and freshwater riverine habitats and are seasonally available.

2.2 Habitats

Habitats are defined on the landscape as mappable units that include both biotic and abiotic characteristics (Davis and Browne 1996:386). They occur widely in the province but vary according to the region where they are found. Within any habitat, a diversity of interesting micro-habitats is found.

The areas of transition from one habitat to another are called ecotones and it is these productive edge areas that are thought to offer the greatest diversity of resources. Davis and Browne (1996) provide the following description of habitats for Nova Scotia in Table 1.

Table 1: Habitat Classification: Natural History of Nova Scotia (1996)

Description	Location	Includes
Offshore	Open-water offshore	Sea-bottom, inlets, bays
Coastal		Rocky, boulder, cobble shores, estuaries, mud flats, tidal Marsh, and dune
Freshwater	Open-water lotic	Rivers and streams
	Open-water lentic	Lakes and ponds
	Bottom lotic	Rivers and streams
	Bottom lentic	Lakes and ponds
	Waters edge lotic	Rivers and streams
	Waters edge lentic	Lakes and ponds
Freshwater Wetlands		Bogs, fen, swamp, freshwater marsh
Terrestrial Unforested		Barrens, oldfield cliff and bank, cave, talus slope
Forest		Hardwood, softwood, mixed forest

2.3 Fish Distribution of Interior Southwestern Nova Scotia

Davis and Browne (1996) noted that 43 species of fish have been recorded in the lakes and stream of Nova Scotia. Bony fish (*Osteichthyes)* are subdivided into five

categories:

(i) freshwater species;

(ii) euryhaline/marine species - which occasionally venture up into estuaries;

(iii) diadromous species - fishes that migrate between fresh and salt water;

(iv) anadromous species - fish that mature at sea and spawn in freshwater; and

(v) catadromous species, which mature in freshwater and spawn at sea.

Seventeen purely native freshwater species have entered Nova Scotia waters since the retreat of the last glacial ice. Twelve fish species have been recorded for KNPNHS and include exotic species introduced at the turn of the century, as well as the American eel. Tables 2, 3, 4, 5, and 6 show species types and seasonality.

Table 2: Anadromous Species in Nova Scotia (Davis and Browne 1996 and Coad 1995)

Species	Scientific Name	Origin	Stratega	Seasonality
Sea lamprey	*Petromyzon marinus*	Native	Anadromous	Spring and summer
Atlantic Sturgeon	*Acipenser oxyrinchus*	Native	Anadromous	Spring to summer
Blueback Herring	*Alosa aestivalis*	Native	Anadromous	May
Gaspereau	*Alosa pseudoharengus*		Anadromous	Spring to summer
American Shad	*Alosa sapidissima*	Native	Anadromous	May to June
Atlantic Whitefish	*Coregonus canadensis*	Native	Anadromous	September to November
Atlantic Salmon	*Salmo salar*	Native	Anadromous	Spring to Autumn
Rainbow Smelt	*Osmerus mordax*	Native	Anadromous	February to June
Atlantic Tomcod	*Microgadus tomcod*	Native	Anadromous	November to February
Striped Bass	*Morone saxatiliss*	Native	Anadromous Catadromous	July to October

Table 3: Catadromous Species in Nova Scotia (Davis and Browne 1996 and Coad 1995)

Species	Scientific Name	Origin	Stratega	Seasonality
American Eel	*Anguilla rostrata*	Native	Catadromous	August to November
Striped Bass	*Morone saxatiliss*	Native	Anadromous Catadromous	July to October

Table 4: Freshwater Species in Nova Scotia (Davis and Browne 1996 and Coad 1995)

Species	Scientific Name	Origin	Stratega	Seasonality
Lake Chub	*Couesius plumbeus*	Native	Freshwater	Cape Breton
Brook Trout	*Salvelinus fontinalis*	Native	Freshwater-streams, lakes	Common -spawn August to December
Yellow Perch	*Perca flavescens*	Native	Freshwater-lakes, rivers (with low turbidity)	Common - spawn April to May *
White Perch	*Morone americana*	Native	Freshwater-brackish	Year round - spawn May to June
Lake Trout	*Salvelinus namaycush*	Native	Freshwater-lake	Solitary Lake species
Northern Redbelly Dace	*Phoxinus eos*	Native	Freshwater	Minnow class
Golden Shiner	*Notemigonus*	Native	Freshwater-lake and embayments	Year round - spawn May to July *
Common Shiner	*Luxilus cornutus*	Native	Freshwater-rivers, streams, lake edge	Year round - spawn may to July *
Blacknose Shiner	*Notropis hetrolepis*	Native	Freshwater	Minnow class
Blacknose Dace	*Rhinichthys atraulus*	Native	Freshwater	Minnow class
Creek Chub	*Semotilus* atromaculatus	Native	Freshwater	Year round - spawn April to July
Pearl Dace	*Margaricus margarita*	Native	Freshwater	Minnow class
White Sucker	*Catostomus commersoni*	Native	Freshwater	Year round -spawn May to July
Brown Bullhead	*Ictalurus nebulosus*	Native	Freshwater	Year round - spawn May to July
Banded Killifish	*Fundulus diaphanus*	Native	Freshwater	Minnow class
Four Spine Stickleback	*Apeltes quadracus*	Native	Freshwater/Marine -Euryhaline	Minnow class
Nine Spine Stickleback	*Pungitis pungitis*	Native	Freshwater (Brackish)	Minnow class
Three Spine Stickleback	Gasterosteidae	Native	Freshwater/Marine -Euryhaline	Minnow class
Brook Stickleback	*Culaea inconstans*	Native	Freshwater	Minnow class

Table 5: Euryhaline-Marine Species (Davis and Browne 1996 and Coad 1995)

Species	Scientific Name	Origin	Stratega	Seasonality
Three Spine Stickleback	See Table 2.7			

Four Spine Stickleback	See Table 2.7			
Atlantic Silverside	*Menidia menidia*	Native	Euryhaline-Marine	Common-Schools to spawn April to July
Mummichog	*Fundulus hetroclitus*	Native	Euryhaline-Marine Bury in Mud-winter	Common-spawns May to June

Table 6: Interior Freshwater Species in Southwest Nova Scotia (Kerekes1975)

Species	Scientific Name	Origin	Stratega	Seasonality
Lake Whitefish	*Coregonous clupeaformis*	Introduced late 19th century	Freshwater lake	Cold water spawners
Brown Trout	*Salmo trutta*	Introduced 1884	Anadromous	Stream and river dwellers, lakes
Brook Trout	*Salvelinus fontinalis*	Native	Cool freshwater streams, lakes	Common Spawn August to December
Golden Shiner	*Notemigonus crysoleucas*	Native	Freshwater lake and embayments	Minnow class
Creek Chub	*Semotilus atromaculatus*	Native	Freshwater	Minnow class
White Sucker	*Catostomus commersoni*	Native	Freshwater	Year round Spawn May to July
Brown Bullhead	*Ictalurus nebulosus*	Native	Freshwater	Year round Spawn May to July
American Eel	*Anguilla rostrata*	Native	Catadromous	August to November
Banded Killifish	*Fundulus diaphanus*	Native	Freshwater	Minnow class
Nine-spine Stickleback	*Pungitis pungitis*	Native	Freshwater (brackish)	Minnow class
White Perch	*Morone americana*	Native	Freshwater (brackish)	Year round Spawn May to June
Yellow Perch	*Perca flavescens*	Native	Freshwater - lakes, rivers (with low turbidity)	Common Spawn April to May

Table 7: Shellfish Commonly Associated with Coastal Archaeological Sites

Species	Scientific Name	Origin	Stratega	Seasonality
Quahog	*Mercenaria mercenaria*		Mud Flats, Sandy to Muddy Flats, Sublittoral Limits	Spring/summer
Blue Mussel	*Mytilus edulis*		Mud Flats, Sandy to Muddy Flats, Sublittoral Limits	Spring/summer
Ribbed Mussel	*Geukensia demissa*		Mud Flats, Sandy to Muddy Flats,	Spring/summer

Species	Scientific Name	Origin	Stratega	Seasonality
			Sublittoral Limits	
Soft Shelled Clam	*Mya arenaria*		Mud Flats, Sandy to Muddy Flats, Sublittoral Limits Sandy to Muddy Flats, Sublittoral limits	Spring/summer
Sea or Hen Clam	*Spinsula solidissima*		Mud Flats Sandy to Muddy Flats, Sublittoral Limits	Spring/summer
Oyster	*Crassostrea Virginia*		Mud Flats Sandy to Muddy Flats, Sublittoral Limits	Spring/summer
Horse Mussel	*Modiola modiolus*		Mud Flats Sandy to Muddy Flats, Sublittoral Limits	Spring/summer
Moon Shell	*Lunatia hoeros*		Mud Flats Sandy to Muddy Flats, Sublittoral Limits	Spring/summer
Boat Shell	*Crepidula fornicata*		Mud Flats, Sandy to Muddy Flats, Sublittoral Limits	Spring/summer

CHAPTER THREE

3.0 Cultural Context:

The following provides the cultural context of and evidence of pre-contact occupation in areas where diagnostic artifacts have been recovered. Fish weirs are generally associated with these areas. While the direct dating of stone fish weirs is difficult, dates can be assumed based upon dating by site association and artifact recovery from fish weir sites.

Archaeological evidence in southwestern Nova Scotia suggests at least a 4,000 year plus history of traditional land and resource use (Christianson 1986; Ferguson 1986). Major cultural periods ranging from Middle Archaic to the 20th century are represented. Deal and Rutherford (2001:141-152) have provided a general overview of the occurrences

of three types of Late Archaic manifestations thought to have occurred in Nova Scotia: 1) the Coastal Archaic Tradition (Moorehead or the Maritime Archaic Tradition), 2) Interior Archaic Tradition (Laurentian), and 3) the Transitional Archaic.

Christanson and Ferguson (2001) included in their analysis those artifact classes considered diagnostic of the archaic period in the Maine/Maritimes region and only materials from known sites. While they noted that a variety of chipped stone artifacts are known throughout the province, the only diagnostic Archaic artifact forms are: 1) the stemmed biface which included large, side notched points, 2) small triangular points (eared points), 3) narrow and small stemmed points, and 4) broad-bladed, stemmed points. The distribution of these artifact types were primarily at riverine/lacustrine locations.

Ground stone artifacts of five classes were also considered: 1) ground slate projectile points, 2) bayonets, 3) gouges, 4) full grooved axes, 5) atlatl weights, 6) ulus and 7) plummets. Artifacts from these classes have generally been found along the coast, and at riverine/lacustrine locations. The gouge is the most common, yet poorly recorded Archaic artifact class. A few have been found near the coast with the remainder being located on large interior lakes.

Petersen and Sanger (1991) have provided a seven-part subdivision and temporal scale for the Ceramic/Woodland Period (see Table 8). The ceramic periods are distinguished by stylistic trends in ceramic designs. While it is difficult to differentiate between each period, archaeologists generally agree there is an unbroken cultural sequence of 1,500 years prior to European contact. Four common ceramic styles appear: 1) pseudo-scallop shell, 2) dentate, 3) cord wrapped and 4) fabric paddled.

Table 8: Temporal Equivalents for the Ceramic Period (Petersen and Sanger 1991)

Ceramic Period Subdivision	Temporal Equivalents	Alternative Designation
Ceramic Period 1	ca. 3050-2150 BP	Early Ceramic-Woodland
Ceramic Period 2	ca. 2150-1650 BP	Early Middle Ceramic-Woodland
Ceramic Period 3	ca. 1650-1350 BP	Middle Middle Early Ceramic-Woodland
Ceramic Period 4	ca. 1350-950 BP	Late Middle Early Ceramic-Woodland
Ceramic Period 5	ca. 950-650 BP	Early Late Early Ceramic-Woodland
Ceramic Period 6	ca. 650-400 BP	Late Late Early Ceramic-Woodland
Ceramic Period 7	ca. 400-200 BP	Contact (Early Historic) Period

The Woodland Period is characterized by a more widespread use of local lithic materials, an increase in small scraping tools, and a marked decrease in groundstone tools. Projectile points in the early-middle ceramic/woodland phase consist of small straight contracting stem points, which evolves during the late ceramic/woodland period and are distinguished primarily by corner notched and side notched varieties of points. Shellfish exploitation increases and there are more simple primary burials (Davis 1991).

At least four ceramic periods have been recorded for southwest Nova Scotia by Deal and others (1995; see Table 9 and 10).

Table 9: Direct Association Dates for Sites in Southwestern Nova Scotia (Deal *et al.* 1995)

Site Number	Lab Number	Uncal. Date BP	Cal. Date BP	Source
BfDa-1 (St. Croix Site)	B- 49257	2500 ± -120	2712 – 2545	K1992:52
A1Dm-1 (Bain Site)	B- 28029	2030 ± -80	2039 – 1953	K-1992:56 P/S1991:14 S/D1991:61
A1Dm-1 (Bain Site)	B- 28027	2000 ± -80	2035 – 1949	as above
BbDh-6 (Eel Weir Site)	B- 8128	830 ± -90	735	K1992:48-49
BbDh-6 (Eel Weir Site)	B- 8126	680 ± -90	668	K1992:48
BbDh-6 (Eel Weir Site)	B- 8129	670 ± -140	667	K1992-50
B1Cj-1	I- 9695	465 ± -80	517	N1978:141

Site Number	Lab Number	Uncal. Date BP	Cal. Date BP	Source
(Indian Point)				
BbDh-6 (Eel Weir Site)	B-8127	430 ± -50	509	K1992-49

Table 10: General Date Associations for Sites in Southwestern Nova Scotia (Deal *et al.* 1995)

Site Number	Lab Number	Uncal. Date BP	Cal. Date BP	Source
A1Df-1 (Port Mouton)	GAK-1271	2640 ± -70	2754	K1992:55 W1978:155
BdDk-1 (Bear River)	S-158	2125 ± -65	2120-2082	K1992:54 P/S1991:142 W1978:154
BgDb-2 (Melanson)	B-17908	1760 ± -60	1695-1634	K1992:51
BcDb-1 (Weihnacht Cove)	S-183	1290 ± -75	1264-1193	P/S1991:147 N1978:156
BbDh-6 (Eel Weir Site)	B- 6364	910 ± -80	880-796	K1992:48 M1983:52
BcDb-1 (Weihnacht Cove)	S-154	900 ± -50	817-794	P/S1991:155 W1978:156
BbDh-6 (Eel Weir Site)	B- 6363	790 ± -100	693	P/S1991:154
BgDb-7 (Melanson)	B-17909	790 ± -60	693	K1990:117 K1992:51 NS1990:190
BbDh-6 (Eel Weir Site)	B- 6362	470 ± -60	518	P/S1991:162
BgBb-7 (Melanson)	B- 17910	560 ± -60	616-547	K1990:117 K1992:51 NS1990:190

Table 11 provides an overview of cultural sequences for KNPNHS, where at least one pre-contact weir complex is located. The Late Archaic period sites appear to be restricted to multi-component sites identified along the Lower Eel Weir site on the Mersey River and at Merrymakedge Beach on Kejimkujik Lake. A Susquehanna sequence is restricted to an isolated find. There is substantial evidence of Woodland occupation centred on the Lower Eel Weir site, with a small clustering of satellite sites to be found along Kejimkujik Lake and its peripheral rivers. Eleven historical Mi'kmaq sites associated

with the 1847 Fairy Lake Indian Reservation, and 3 major petroglyph sites can be found at KNPNHS as well. Twelve sites of unknown cultural affiliation have been identified. Site locations appear to favour the shoreline of Kejimkujik Lake, and along primary and peripheral waterways. The majority of recorded sites are associated with the Late Ceramic/Woodland period (ca. 950 BP to 400 BP) with some overlap into the Contact or Early Historic period (ca. 400 to 200). The Lower Eel Weir site has been radiocarbon dated to represent a range from the Middle Ceramic/Woodland to Late Ceramic/Woodland period (ca. 1350 to 430 BP) (Ferguson 1986).

The sites found at the Lower Eel Weir section of the Mersey River are interpreted as being multi-seasonal base camps. It now appears that these sites are more likely specialized procurement sites, occupied and used for a limited period of time (mid to late September to mid to late October) depending on the timing of the annual eel runs to the sea.

Table 11: Cultural Sequence for KNPNHS (Ferguson 1986)

Late Archaic	Susquehanna	Woodland/Ceramic	Contact	Unknown Affiliation
Eel Weir V	Eel Weir VI	Eel Weir I (M-L)	Eel Weir III	Eel Weir XI
Eel Weir VI		Eel Weir II (M-L)	Eel Weir V	Loon Island I
Loon Island I		Eel Weir V	Merrymakedge	Rogers Brook
Merrymakedge		Eel Weir VI (E-L)	Fairy Bay	Grafton lake
Little River		Eel Weir VII (E-L)	Peter Point	Big Muise Island
Frozen Ocean I		Eel Weir III (M-L)	Grafton Lake	Meadow Beach
Frozen Ocean III		Eel Weir X (E-L)	Luxie Cove	Frozen Ocean II
		Eel Weir XII (E-L)	Jim Charles Point	Frozen Ocean III
		Loon Island I (M-L)	Mill Bay	Peskawa Portage
		Merrymakedge (E-L)	Luxie Cove	Pebbleloggitch Portage
		Luxie Cove (E-L)	Frozen Ocean I	Pebbleoggitch Lake
		Pine Tree (L)		
		Ell Island (E)		
		Atkins Brook (W)		
		White Beach (M-L)		
		Frozen Ocean (W)		

3.1 Ethnographic Context

Primary ethnographic information about weirs for this province is limited. But the information that does exist, supports the use of fish weirs in intertidal, estuary and interior riverine environments. The following sources provide accounts of fish weir use at time of contact: 1) Denys (1908), 2) Lescarbot (1914), and 3) Dièreville (1938). Secondary sources (local histories) provide other useful information. A literature review of 20 local southwest Nova Scotia historical publications identified 8 possible occupational and fish weir sites, as well as other information relevant to historic Mi'kmaq fishery activity.

Lescarbot (1914:234) observed and recorded this account of a Native fishery at time of contact and provides the following description of a fish weir:

"our said savages, who know the haunt of each (fish) and the time of their return, go and wait for them in true devotion to bid them to return...here, while waiting for the spawning runs to begin, the Indians...replaced their weirs and fishing traps that had been carried away by the winter ice and storms...the latter were placed across the mouths of streams and along the banks of rivers and bays, and consisted of stakes driven side by side...which they place erect, propped up by wooden bars, like buttresses, with a space therein for the fish to pass, which find themselves caught at the fall of the tide in such numbers that the savages allow them to rot."

Hoffman (1955) quotes Hakluyt (1599-1600, Vol.3, p.192), and provided this description of a fish weir:

"these weirs were also sometimes made partly of stone... as were observed by the crew of the Marigold at the northern tip of Cape Breton Island in 1593".

Denys (1908) recorded fish weirs as being located at the narrowest places in a river, where there was minimal water flowage. These weirs were constructed by placing a

fence of stakes across the river to hinder the passage of fish. In the middle was an opening where a bag-net was placed to capture fish.

Dièreville (1933:113-4) noted that during seasons when the fish are running, they were caught in quantities by Natives and settlers by use of a fish weir. These were described as:

"stakes being driven, side by side, at the mouth of streams and rivers, into which the sea rises. Fish would pass over these devices at high tide on their way to feed in estuaries and marshes...when the sea has run quite far out and the fish begin to lack water, they follow the ebb or reflux and being no longer able to pass over the stakes, because the water is too low, they are arrested and can be taken."

Nine stone flume weirs were reported as being observed on the upper reaches of the Tusket and adjoining Quinan Rivers (Chute 1996:2). These were described as features constructed of stone and oriented downstream in successive v-shaped formations along the waterways. Chandler (pers. comm 2003) described similar stone flume features on these waterways. The orientation and distance from estuary and tidal waters would imply that these features were likely interior riverine fish weirs.

While Campbell (1972) in his account of the history of Yarmouth County, does not specifically reference the use of fish weirs, his use of Mi'kmaq place names, such as Cheggogin (*Isegogin* or place of weirs), and Eel Brook (*Ooptomagogin* or place of eels) suggests that they were likely used at these sites.

Brown (1995) in a sequel to Campbell's (1972) *History of Yarmouth County* referenced a manuscript written by Father Rasles (1691), which recorded additional Mi'kmaq place names. Examples taken from that text include: *1) Kamiskwanagachit* or

place where they spear salmon, *2) Nahumkeag* or place for eels, and *3) Nahamouk* or place of many eels.

There were no references to interior weir structures in the reviewed literature. By the time the first recorded trip through the interior of southwest Nova Scotia occurred traditional land and resource use had probably abated and populations were now centred closer to non-Native settlements scattered along the coast.

While the following are not regional accounts of weirs, it is important to include them to illustrate the universality and importance of fish weir use in what was then New France. Thwaites (1925:69) in Journals of Jesuit travels and explorations in Quebec between 1633 and 1634, recorded the following:

"in regards to eels, they fish for them in two ways, with a weir and with a harpoon. They make the weirs ingeniously, long and broad, capable of holding five or six hundred eels. When the water is low, they place these upon the sand in a suitable and retired spot, securing them so that they are not carried away by the tides. At the two sides they collect stones, which extend out like a chain or a little wall on both sides; so that this fish, which always swims towards the bottom, encountering this obstacle, will readily swim toward the mouth of the net, to which these stones guide it."

Lescarbot (1914) observed that nets used in conjunction with weirs resembled the large bag-nets used in France. These bag nets were held open vertically by a hoop and were stretched horizontally by the current of the water. Bag nets could also be used with a pole for dip netting.

Thwaites (1925: 454) in Journals of Jesuit travels and explorations among the Iroquois and Ottawas, of Lower Canada from 1669 to 1671, writes:

"in the Vilage the Svages call Saky (Sacs), whose people were beginning a work that well deserves to have its place here..from one bank of the river to the other they make a

barricade by driving down large stakes in two brasses of water, so that there is a kind of bridge over the stream for the fishermen, who, with the help of a small weir, easily catch the sturgeon and every other kind of fish - which this dams stops, although the water does not cease to flow between the stakes. They call this contrivance *Mitihikan*, and it serves them during the spring and part of the summer."

The word *Mitihikan* used by Thwaites to describe a weir is similar to the Mi'kmaq place name for what is now Meteghan *(Mithikan)*, Nova Scotia, meaning place of fish weirs. He also mentions the fish weir located at the outlet of Lake Simcoe (Atherley Narrows) as described by Champlain in 1615: "at this place still may be seen in the water some of the stakes used in making a weir."

Thwaites (1925:161) in Journal of Jesuit travels in Lower Canada, 1656 - 1657 reported:

"one must be astonished by the fertility of these lakes...the fish most commonly found in them are the eels and the salmon, which are caught in them from spring to autumn. Our savages construct their dams and sluices so well, that they catch at the same time, eels that descend, and salmon that always ascends...in the lakes, they catch fish in a different manner; they spear them with a trident by the light of a bituminous fire, which they maintain in the bows of their canoes."

From the Journals of Jesuit travels of Lower Canada, among the Iroquois and Ottawas, between 1671 and 1672, Thwaites (1925) noted a device constructed of stakes that reached from bank to bank in the river. At the apex of this device he noted a bag net.

Thwaites (1925:70) from the Journals of Travels and Explorations of Jesuit Missionaries in Quebec 1633-1634, noted:

"the savages dry these long fish in smoke. After they are brought into their cabins, they let them drain a little while cutting off their heads and tails, they open them up at the back, and after they are cleaned, they are cut with slits; so that the smoke may thoroughly penetrate them. The poles of their cabins are loaded with these eels. After being well smoked, they are piled together in large packages, about a hundred being placed in each."

3.2 Mi'kmaq Place Names

The Mi'kmaq language is exceedingly expressive, containing words arising from sensations of visible objects, activities, or places. Mi'kmaq place names describe a locality to which it was affixed. Some have been lost over time, becoming separated from the localities to which they were associated and these served to anchor activities and experiences to places and things on the landscape (Brown 1995).

There are several examples of Mi'kmaq place names that relate to resource extraction. These are the literal translations as taken from the researchers who compiled them:

(i) *Nesakunechkik* (Onslow, Nova Scotia) is translated to mean "eel weir"

(ii) *Nesogwaakade* (Paradise, Nova Scotia) meaning place of "eel weirs"

(iii) *Nesogwode,* a place near Liverpool, Nova Scotia, is known as place of "eel pots"

(iv) *Nesogwakade*, (Lawrencetown, Nova Scotia), has been translated to mean "place of eels or eel traps"

(v) *Nesogwitk or Nesoogwitk*, the point jutting out between Starr's Point and Cornwallis, Nova Scotia, was known as "eel point" (Rand 1919:58)

(vi) *Isagogin*, now Cheggogin has been translated to mean "place for weirs"

(vii) *Ooptomagogin*, or Eel Brook or "place for eels"

(viii) *Wipkomegakum*, "place of eels, but they are poor and lean" and

(ix) *Ponamagotty,* now known as Salmon River meaning "place for frost fish" (Campbell 1972).

Brown (1995) provides these accounts of Mi'kmaq place names (all of which are in Yarmouth County) and were recorded from the writings of Father Rasles (ca. 1691).

(i) *Kamiskwanangchit* means "place where they spear salmon"

(ii) *Ammoscoggin* is translated as "many fish coming"

(iii) *Mitihikan, now* Meteghan means place of the "wooden fence weir"

(iv) *Agouam* meaning "smoked fish", *Mouskegouahook* as "river where there are fish"

(v) *Mouskegouiahougook* "river where there are many fish" and

(vi) *Nahamouk* as place of "many eels.

Frame (1892) offered the following:

(i) *Caydybunnygek* now thought to be Boot Island, Horton, Nova Scotia, translated to mean "clam diggings" and

(ii) *Kakagwek*, now Hantsport, Nova Scotia, translated to mean "the place of dried meat".

The extent, and intensity of fishing activity is apparent through a simple analysis of Mi'kmaq place names in Nova Scotia. These place names are attached to places where such activity as extractive and harvesting tasks have taken place and are appropriately associated with productive resource locations.

3.3 Mi'kmaq Legends

Oral traditions which represent unique relationships between culture and the natural environment manifest themselves in the form of histories, songs, and legends. Legends represent an organized system of knowledge that is based on observations

consolidated to give meaning to events that happened in the past, physical and spiritual matters, relationships, or of how a particular place came to be. They are more than a body of stories to be recorded and stored away and under the surface of many of these narratives lies a wealth of information about animal behaviour, the location of resources, hunting techniques, or instructions on expected behaviour (Whitehead 2002:56). It is still possible to access some of the ancient weirs since legends abound with references regarding their locales (Chute 1998). One such legend entitled "*Kitpooseagunow: The Avenger*" serves to illustrate this (Rand 1971).

"A young boy went in search of the Great Chief, whom he believed would direct his good work among men. The story began when he was seized from his family at an early age by the evil giant "*Kookwes*". It was after he found his only brother that *Kitpooseagunow*, went in search of *Glooscap*. All those who were evil, knew that one day this brave would be a helper of *Glooscap* and together they would overcome the evils of mankind.

Kitpooseagunow's first act was to avenge the death of his mother who was killed by the *Kookwes*. Having accomplished that, he set out to fight against all other evil spirits, and to destroy them. He fought and destroyed the evil frog, *Ablegemoo*, who caused great suffering among his people. The frog held great amounts of water from the people in large bark dishes. In the battle, he bent the giant frog over his knee and crumbled its back and from that day on, the race of greedy frogs have crumbled backs. As soon as the wicked frog was dead, *Kitpooseagunow*, released the water held in the large bark dishes. The water then filled all the rivers, lakes, and streams and never again

was water to be taken from his people.

He visited the lodge of *Noogmee"*, his grandmother. He asked if she would make him a small canoe which he needed to complete his journey. He travelled many streams, rivers, and at the turn of one, he saw another evil giant. The giant stood and brandished a spear pretending to be looking for fish. In reality, the giant's intent was to protect his territory from *Kitpooseagunow's* people. *Kitpooseagunow* shot his arrow and the giant fell dead.

He continued his journey, until he came to a large weir that belonged to another evil giant. He seized and destroyed it. He knew through that act, the whole family of these evil beings would be destroyed. The evil giant, *Kookwes* went to the see what he had trapped and instead of the usual supply of fish, he found his weir broken. The giant became so angry that his weir has been destroyed and as punishment for not watching it, he caused the deaths of his family. After slaying his family, he realized that he was alone. The *Kookwes*, had known that the weir was after all his own to watch and he then killed himself.

Kitpooseagunow, continued his journey across the land until he came to the land of the porcupine who were also his enemy. He knew that if he wasn't careful, they would kill him with kindness. After he had killed the wicked among the porcupine, he entered the land of the race of mice. They placed before him a great feast that was poisoned. Knowing that he pretended to feed and after the feast, he left the land of the mice unharmed.

He then entered the territory of the red squirrel. These people were under the

control of *Glooscap*, and welcomed him. After another feast, where all had met as friends, *Kitpooseagunow*, entered his canoe and set out finally for the lodge of *Glooscap*.

He had no more enemies to conquer, and knew then that he was close to the home of the master. He travelled until he reached a body of water that swept far about a high point of land covered with giant trees. There were also great red cliffs leading out of the water to a point of land high above.

Kitpooseagunow, knew that *Glooscap* lived there. "There dwells, the one I seek" he said "there dwells the Great Chief, who will direct me in my work." He landed his canoe where the red bank was the lowest, and climbed the steep cliff, until at last he reached the forest above. From there high on the land of *Glooscap*, he looked out over the world at his feet.

Great courage overcame his heart, for there before him was the world where he would fight his battles to conquer evil - and close beside him would be the Great Chief, *Glooscap*, from whom he would receive his powers. With that *Kitpooseagunow*, entered the wigwam of the Great Chief."

A wealth of information can be derived from that narrative. It symbolizes local knowledge of the landscape and resources and peoples relationship to it. It defined topography, and recorded two elements of fishing technology (i.e., spearing and weirs). While there is little doubt the narrative had its own purpose and meaning, what is central to story is that it is anchored to experiences, places, things and events.

This point is further illustrated in the following story of Chief Jerry Lonecloud, who lived for a number of years at Upper Carlton Lake, Yarmouth County, Nova Scotia.

During the mid to late 1800's, he recounted the following for the late Clara Dennis:

"up that lake could be found Kluskap's weir"and without first honouring Kluskap, no trout, gaspereau, salmon, or fish of any kind could be caught..." (Whitehead 2002:56).

3.4 Weir Use in North America

A review of fish weir literature for other parts of North America identifies fish weirs in the following locations. Lutins (1992) identified a number of V-shaped stone traps throughout northeastern North America. These were designed to guide and hold for capture large numbers of fish. Lutins (1999) recorded collections of down stream oriented V-shaped walls of river cobbles and boulders on the Passaic River (Fair Lawn/Petersen fish weir) also in New England.

Petersen *et al* (1994) identified a complex of multiple fence-stake weirs at Sabasticcook Lake, Maine. This complex of weirs was constructed in a riverine environment and was used to procure both catadromous and anadromous fish for subsistence.

Johnson and Cassavoy (1978) recorded wood post-fence stake fish weirs on Lake Simcoe at Atherley Narrows in Ontario. The French name for Lake Simcoe, which drains through Atherley Narrows, was Lac aux Claies which translates as Lake of Hurdles or Fences, or Lake of Fish Weirs.

Stevenson (1999) identified converging tidal traps on the Fraser River in British Columbia. These were described as stakes pounded into the inter-tidal margins of a river. Branches or boughs attached horizontally to the stakes and latticework. Mobley and

McCallum (2001) recorded the Sandy Beach, Woody Island, McDonald Arm and Blind Slough fish weir sites. These wood-stake and rock alignments are thought to represent the remains of coastal fish traps.

Chute (1998:2) observed an assemblage of stone fish weirs on the upper reaches of Tusket River and adjoining Quinan River in southwest Nova Scotia. These stone alignments projected downstream in successive v-formations.

3.5 Discussion

Bannerman and Jones (1999:2) reported that the earliest types of fish weirs can be traced to at least the Mesolithic. Dates associated with the Sabasticook Lake Weir (6100 ± 120 BP, B-71298 - Specimen No. VC93-01:84/89) established that they could very well have been used for at least 4000 years (Petersen *et al* 1994).

The existing weir literature illustrates the importance of weir technology in North America, and clearly communicates that environmental and geographical factors played a significant role in their geographical placement over the landscape.

Bannerman and Jones (1999:2) while addressing the taxonomy of fish traps also noted that fish weir technology represented an application of human ingenuity that was designed to maximize the exploitation of fish and that application of that creativity resulted in a wide variety of structures. They also observed that topography of the shore, its geologically associated substrates, and other environmental considerations usually influenced the construction and configuration of a weir. For example, waterways of southwest Nova Scotia are floored in bedrock and bouldery till, therefore it is impossible to construct a true fence-stake weir in these types of settings. The only alternative was to

construct stone fish weirs.

Elements of fish weir construction and architecture are dictated by geographical characteristics, habitat, resource availability, and the availability of building materials, tidal movement, and river flow.

3.6 Weir and Site Descriptions

While coastal/lower riverine fence-stake fish weirs at river mouths were utilized by early Mi'kmaq populations at the time of contact none have been identified in the province. Based on the ethnographic record and studies from other parts of North America it is very likely that Figures: 4 and 5 best illustrate their architecture.

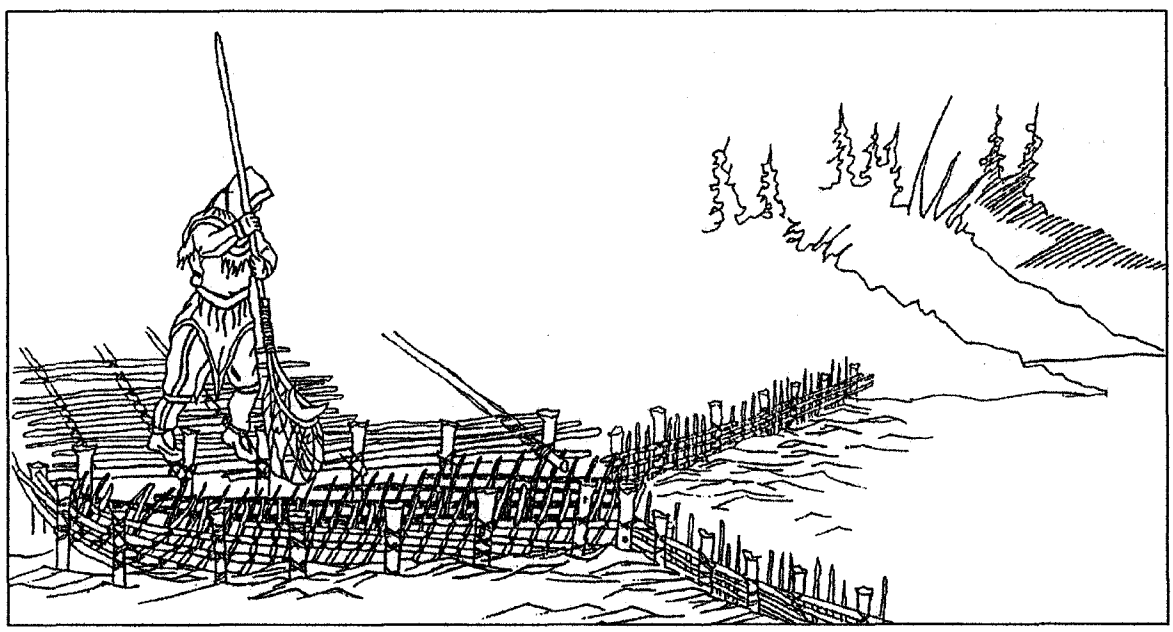

Figure 3: Fence-stake weir (Farard 2001)

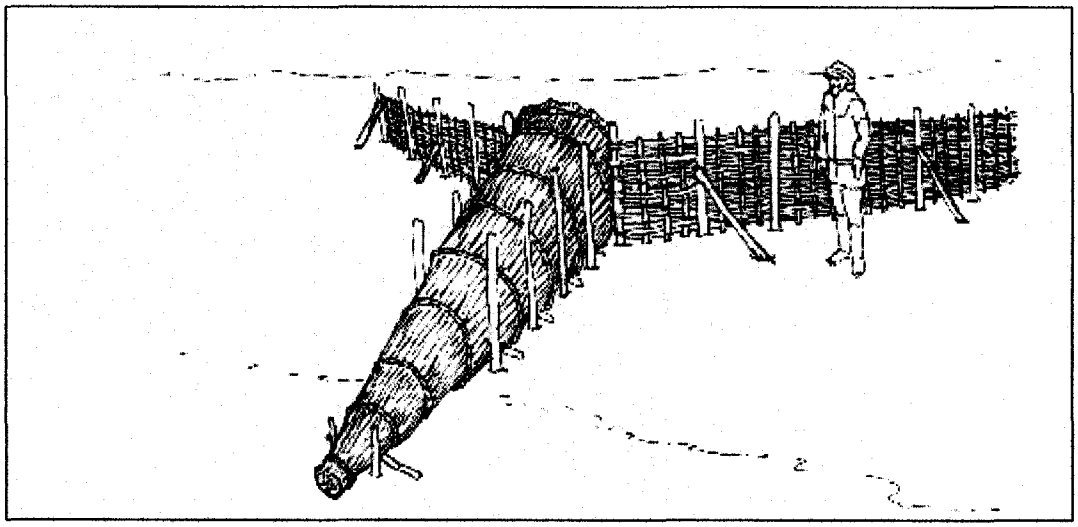

Figure 3: Fence-stake weir – basket net (Bannerman and Jones 1999)

Fence-stake fish weirs were constructed at the mouths of estuary rivers, intertidal channels or stretches of rivers where there was an adequate tidal range. They probably would have been subject to continuous modifications to accommodate changes in their immediate surroundings, such as erosional effects, and sea level changes. They were designed to capture or entrap those anadromous, catadromous and euryhaline fish species that migrated in and out for feeding or spawning purposes.

Mobley and McCallum (2001:6) noted that the contemporaneity of fish weir features in these types of environment may be difficult to establish. The question they have asked is whether or not a long, wide, wood stake alignment date from a single construction and use phase or does it represent centuries of use and repair? The latter was suggested

for the Bolyston Street fish weirs. It seems that felt that stake alignments uncovered at Bolyston Street represented a continuous period of use and repair (Decima and Dicauze 1998).

No intertidal, estuary pre-contact fence-stake weirs have been identified in the province. However, ethnographic references (i.e., Denys, Lescarbot, and the Jesuit Accounts of their travels) offer a detailed picture of their use and function at the time of European contact. Documentary reference also provides a fairly accurate statement of seasonality of use. An analysis of the seasonality and availability of anadromous, catadromous, euryhaline-marine and freshwater fish species suggests that fence-stake weirs would have been utilized on a year round basis.

Smaller stone fish weirs or enclosures such as those shown in Figures 5 and 6 have been identified in the intertidal extents of primary rivers, as well as tertiary and secondary estuary channels. These may have been utilized in conjunction with fence-stake weirs to harvest smaller fish species such as the American smelt, tomcod, gaspereau, and blueback herring, as well as eels. Maintenance requirements are minimal and these features are generally constructed of stones and smaller boulders readily available from river beds.

Figure 5: Tusket River, Yarmouth County, Nova Scotia (Lewis 2003)

Figure 6: Annis River, Yarmouth County, Nova Scotia (Lewis 2003)

Large rectangular/ovate stone salmon weirs or enclosures (Figures 7 and 8) were identified in the portions of the Mersey River just above the head of tide. The architecture of these types of fish weirs suggests that they were designed to hold fish such as salmon in the large shallow pools contained within the structure. Spearing or netting would have likely been the preferred method of procuring fish entrapped in these enclosures.

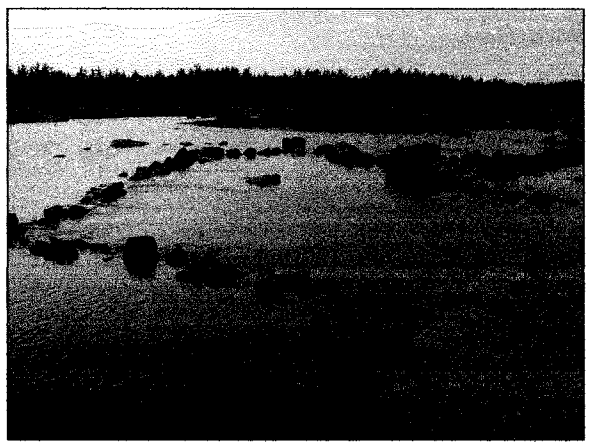

Figure 7: Mersey River, Queens County, Nova Scotia (Lewis 2004)

Figure 8: Remnant rectangular fish weir Mersey River (Lewis 2004)

Larger hand-layered and stacked stone fish weirs such as those shown in Figures 9 and 10 were identified at the outlets of interior lakes. Leads forming at the shoreline extend to the centre of the river channel forming an apex at the head of a large deep embayment.

Figure 9: Lower Eel Weir Site – Mersey River (PCA 1992)

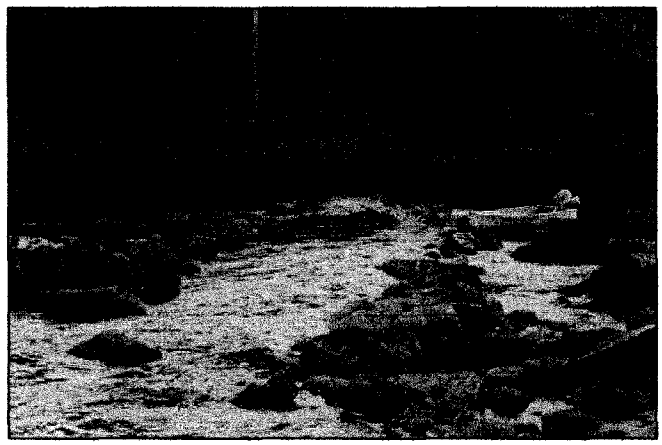

Figure 10: Medway River, Queens County, Nova Scotia (Lewis 2003)

In 2004, the Nova Scotia Power Corporation drew down the Mersey River as part of their dam reburbishment project and as a result a number of remnant stone fish weirs were exposed and recorded along the Mersey River. Figure 11 represents a complex of eight stone fish weirs. Figure 12 shows remnant stone fish weirs just below this site. All are downstream oriented.

Figure 11: Below Dam 2 on the Mersey River (Lewis 2004)

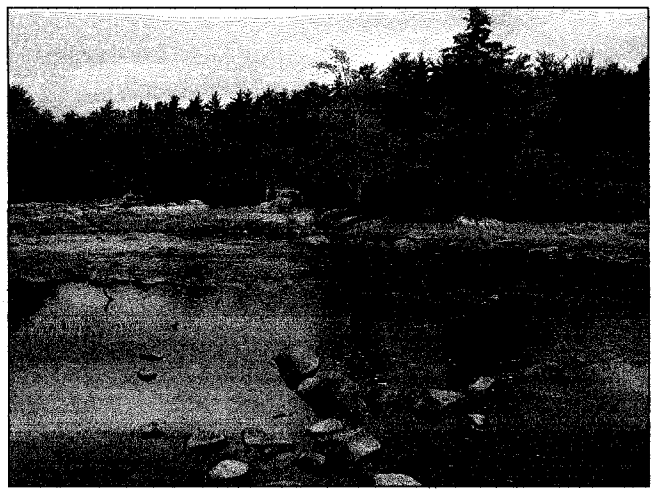

Figure 12: Weir structures on the Mersey River below Dam 2 (Lewis 2004)

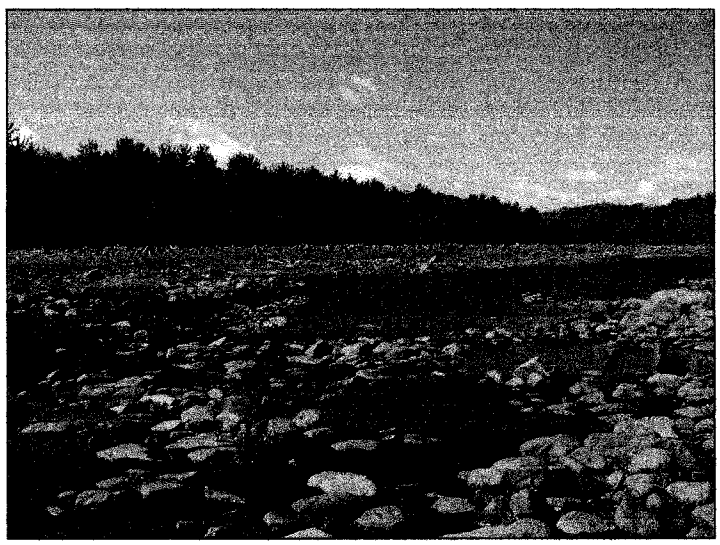

Figure 13: Remnant weir on Mersey River below Indian Gardens (Lewis 2004)

Descriptions of three large stone fish weirs are used in this analysis. Average stone weir lead lengths, widths, depth and materials for three weirs are shown in Table 11.

Table 12: Lead length descriptions

Weir Location	Lead Length	Lead Width	Lead Depth	Lead Materials #
Mainland Bridge	27.4m 18.3m	35.5cm 41cm	30.5cm	Stone / Boulders 108 Stones 74 Stones
Mersey River (KNPNHSC)	22.5m 24.6m	41cm 46cm	30cm	Stone/Boulders 102 Stones 84 Stones
Mersey River (KNPNHSC)	22.8m *21.4m*	*61cm*	*65cm*	*Stone/Boulders* *185 Stones* *98 Stones*

3.7 Construction

Three notable characteristics of stone fish weir architecture are their permanence, durability, and simplicity. The construction of stone weirs and enclosures was relatively simple despite the belief that their construction was labour intensive. Rocks incorporated into the leads and enclosures are both stationary and movable with boulders in their natural position being employed in their design. They have absolutely no rivals and require little maintenance once they have been constructed. Unlike fence-stakes weirs which would have to be continuously mended (i.e. stakes needing to be replaced, enclosures repaired, and materials gathered) the stone weir required only the repositioning of the occasional stone that became displaced or dislodged even after the break up of

spring ice.

The materials used in all these weirs ranged from small, medium to large sized boulders or stones. There were no wooden elements associated with stone fish weir construction, other than what may have been required to hold the bag or basket net in place. Leads and enclosures were free standing, hand-layered or stacked. Gravity held the structure together which allowed them to withstand the forces of water currents. They were larger at the base and slowly tapering to the top as height increased. On average leads and enclosures would have measured about 90cm at their base tapering to 60cm at the top. These ran roughly parallel to each other from the shoreline, narrowing to form an apex at the head of a large deep embayment. Eastern hemlock (*Tsuga canadensis*) boughs, because they are the most pliable and flexible of softwood boughs, were used to fill spaces and crevices between the layered stones.

While the existing weir literature (Lutins 1992 and 1994; Petersen et al. 1994) suggest the need for large groups to construct, repair, maintain and process catch at a fish weir, it is very likely that this was not the case. Two or three people could have accomplished this task quite easily. The difficulty of weir construction is dependent upon its location, availability of materials to be used in its construction and targeted fish species.

In 2004, this author accompanied and observed Louis Wambolt of Molega, Nova Scotia construct an eel weir on the Medway River. This weir contained basic architectural features as found in a pre-contact weir. The only exception is that a slat fence is put in place to guide eels into a rectangular wooden box trap.

This particular weir, as are many other contemporary weirs, is removed from the river at the end of each season and re-constructed just prior to the beginning of the next. It took Mr. Wambolt two days to re-construct this weir and on the third night it was operational.

The remnants of a large stake-lattice fence weir are still visible in the tidal flats of Annapolis Basin adjacent to the Port Royal Habitation site. The owner of that weir was identified. Mr. Littlewood (pers. communication 2002) advised that he built that weir 40 years ago. It was constructed in the early spring using young tree saplings and functional within in two to three days.

Generally associated with riverine fish weir features are circular pits between 2 to 3 metres in diameter. Wamboldt (pers. comm. 2002) has been fishing eels for approximately 30 years and offered that these circular pit features would be either smoking or eel cleaning pits. These pits are are lined with coarse sand or gravel. A fire hearth may be present or absent depending upon its function.

Smoking pits would have been lined with coarse sand or gravel, with a hearth evidenced within the confines of the pit. The bedding and associated hearth feature would be intermixed with a noticeable oily matrix. These were generally one to two metres in diameter and may have been topped with a shallow roof to hold the smoke down and allow for an even dissipation of heat and smoke to cure the meat.

The vertebrae of the eel are disengaged by grasping its head and tail and pulling in opposite directions. The outer skin is removed and the meat is split and hung to allow it

to drain of oil and for smoke to penetrate it.

The smoking fire in the pit is fueled by chip pieces of hardwood such as alder (*Alnus incana*). Softwoods such as pine (*Pinus strobus*), black spruce (*Picea mariana*), and red spruce (*Picea rubens*) would not have been used because they discharge a turpentine like chemical which causes the flesh to become very bitter in taste.

3.8 Geographic Placement of Fish Weirs

Inshore marine, intertidal, estuary, riverine, and lacustrine habitats are important components of the regional landscape used by pre-contact Mi'kmaq populations. It is within these habitats that the greatest diversity of resources can be found (Davis and Browne 1996). The importance of these settings should be considered when trying to establish likely geographical locations of weirs. An examination of existing weir archaeological site locations for southwestern Nova Scotia show that weir site locations favor one or all of the following geographical locations; coastal, estuarine, riverine and lacustrine environments because these offer the greatest diversity of resources. The placement of fish weirs appears to favour river outlets, heads of tides, portions of rivers just above the head of tide, and outlets of lakes.

An analysis of weir locations for fish weir sites in northeastern North America validates the importance of geographic location. For example, the geographic setting of the Bolyston Street fish weir, found in Boston shoreline, was at one time over its long history situated in an estuary environment (Johnson 1942, 1949; Kaplan *et al.*, 1990). The

Archaic period fish weir complex found at Sabasticook Lake, Maine, was situated in the transitional periphery of a riverine-lacustrine setting. It lies at the mouth of the East Branch of the Sabasticook River, 120 kilometres above the tidal Merrymeeting Bay (Petersen *et al.* 1994).

By contrast the fence-stake weir of Atherley Narrows, was found in an interior river channel that connected Lake Simcoe with Lake Couchiching, Ontario (Johnston and Cassavoy 1978).

Despite the tendency to view weirs in generalized terms, variability in their architecture is discernable. Geographic placement of weir facilities is recognizable as favouring the transitional margins of the habitat areas shown in Table 12.

Table 13: Habitats locations where stone fish weirs are likely to be located.

Coastal	Estuary	Riverine	Lacustrine
Intertidal	Tidal	Downstream	River/Lake
	Marshes	Upstream	
	Tertiary Channels		

A local resident (Chase Hearne pers. comm 2002) reported that similar features could be found on some interior lakes of Yarmouth County, Nova Scotia. Channels between small drumlin islets are interconnected by a series of v-shaped stone configurations. Unfortunately, this could not be confirmed. What may have been interpreted as possible weir structures may in fact be naturally occurring glacial litter that is characteristic of the area. Until further investigations of this alignment of stones is

undertaken, there is no way of determining whether these features do or do not represent actual weirs. Naturally occurring geological features in rivers are very erratic and irregular, while the alignment of culturally placed stones forming weir walls or leads are more linear and uniform.

3.9 Modern Fish Weir Use

This synopsis of modern weir use is provided as a result of time spent with Mr. Louis Wambolt, during the operation of an interior commercial fish weir. Contemporary fish weirs incorporate elements of design found in all pre-contact stone fish weirs. Like pre-contact stone fish these are orientated downstream, targeting a single out migrating fish species (the Americam eel). The only other fish species observed entrapped in his fish weir were juvenile gaspereau, and the occasional young small trout and salmon.

The eel harvesting season for southwest Nova Scotia runs for four to five weeks usually from late September to late October. It is dependent upon suitable climatic conditions. Eels begin their out-migration to sea when water temperatures drop to between 10° C to 15° C. In temperatures below 10° C to 15° C eels become tepid and settle down in river sediments. Eels run in large numbers from dusk to midnight, after which movement tapers off. The standard rule of thumb is; the darker and dirtier the night, the better your return will be. Fittingly, locals refer to these nights as periods of the black moon.

In the run of an evening, the average capture of eels can exceed one-hundred

pounds and in some cases has been reported as high as two-hundred pounds. Mr. Wambolt's fish weir had to be re-constructed at the beginning of the season and dismantled immediately upon its closure. His take of eels at the conclusion of a four to five week season, exceeded 2400 pounds.

This is an astonishing number of eels and illustrates the effectiveness of a weir as a means of taking fish. The average weight of an eel is approximately 0.25 kilograms (depending upon the waterway from which they were taken). For the example, eels taken on the Medway River, the location of his fish weir operation, tend to be larger than those taken from the adjoining Mersey River. They are approximately 7.5 cm in diameter and about 0.75 m in length. Larger eels were preferred over the smaller eels for their meat and for the time saved in processing and smoking them.

Once the fish weir was constructed, the leads or enclosures serve to guide eels towards the apex of the weir where they then entered either bag nets, basket nets or another form of trap. Because of the accumulation of debris along the guide and in the trap itself, the fish weir had to be checked and cleaned at least once about mid-evening. Any build up of debris causes the water levels to rise around the weir allowing eels to escape over or around the guides. Mr. Wambolt's fish weir is shown in Figure 15.

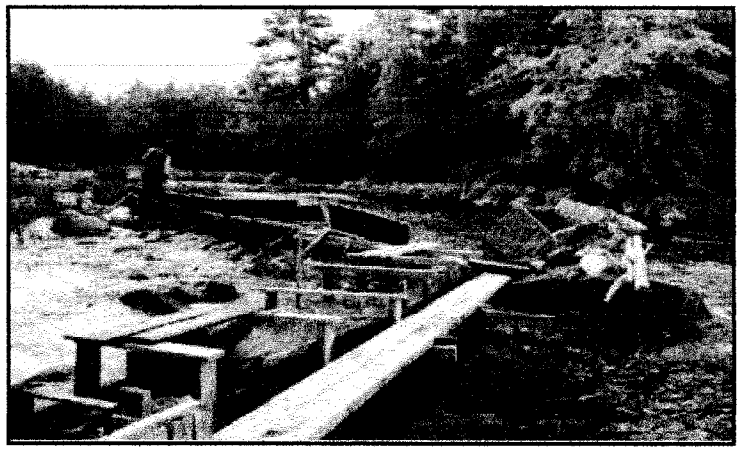

Figure 14: Wambolt Weir, Medway River, SWNS (Lewis 2003)

Weirs can be intrusive devices, taking any fish species that happens in its way. Because of conservation regulations a trap or bag/basket net must be removed or opened at dawn to allow the passage of other fish species and a small sluice must be left along the shoreline portion of the leads or enclosures.

Louis Wambolt (pers.comm. 2003) noted that the smell of decomposing fish is very overwhelming at fish weir sites that have been left unattended. This reinforces the hypothesis that fish weir sites were generally removed from habitation sites and any site identified in the general vicinity of a weir was likely a processing site.

Mr. Wambolt reports that today eels can be easily transported and there is little requirement to hold them for more then a couple of days. However, in days gone-by, he reported that eels were transferred to larger holding baskets which would then be sunk in deep pools and still waters until they could be utilized for later consumption usually over

winter.

CHAPTER FOUR

4.1 Conclusion

The purpose of this thesis has been:

(i) to collect and compile all the data about fish weir architecture in southwestern Nova Scotia and from other part of North America,

(ii) to use this data to construct a framework of fish weir technology for southwestern Nova Scotia,

(iii) to map and record known and recently discovered fish weirs structures in southwestern Nova Scotia,

(iv) to evaluate these existing interpretations to produce a representative narrative of fish weir technology and use for southwestern Nova Scotia,

(v) to evaluate fish weir facilities as to architecture, function, and likely geographic placement on the landscape,

(vi) to establish seasonality of fish weir use in southwestern Nova Scotia and to integrate these into a broader regional perspective.

In this chapter, I will summarize the data collected and discuss the implications of this research for a regional model of fish weir utilization in the province.

4.2 Summary

While many aspects of pre-contact lifeways have been investigated, fish weir research in Nova Scotia has been non-existent. The potential of fish weir use has been routinely ignored despite the fact that forty-four primary watersheds can be found in the province. They offer significant interpretative opportunities for development of a greater understanding of pre-contact land and resource use for this area.

Fish weirs documented as a result of this research represent the most intact fish weir system recorded thus far in Nova Scotia. As future field investigations document additional fish weirs our understanding and knowledge of these facilities will become better developed. The potential and importance of fish weirs to pre-contact populations and productivity of watersheds has been illustrated. The foundation and context for fish weir use has been outlined. This involved the examination of existing fish weir and ethnographic literature, watershed surveys, fish distribution analyses, as well as analyses of past and present archaeological and environmental data. Together these indicate that pre-contact land and resource use along primary watersheds was more organized then expected. Recent watershed surveys in southwestern Nova Scotia suggest extensive exploitation and habitation as early as the Middle Archaic period in four distinct geographical locations.

Of forty-four watersheds found in Nova Scotia, eleven were physically surveyed (see Table 13). Forty intact or remnant fish weirs (Appendix A) and associated intact activity sites with extant diagnostic archaeological materials were identified. All fish

weirs have linear leads that are either oriented upstream or downstream. Two have rectangular/ovate leads. Four sites appear to represent a complex of weirs that have been modified over time to account for changes in stream flow. There seems to be a direct correlation between terrestrial sites and the high density of fish weir sites. For example, fish weirs on the Mersey River are formed in association with habitation sites.

Table 14: Watercourses in Southwestern Nova Scotia (Davis and Brown 1996)

Watershed #		Major Rivers	Total Area (km2)		
			Land	Water	Total
1	1DA	Meteghan	570	41	611
2	1DB	Sissiboo and bear	1349	79	1428
3	1DC	Annapolis	2209	70	2279
4	1DD	Gaspereau	1316	57	1375
5	1DE	St. Croix	1306	61	1368
6	1DF	Kennetcook	1116	9	1125
7	1DG	Shubenacadie and Stewiacke	2540	73	2614
8	1DH	Salmon and Debert	1164	4	1168
9	1DJ	Economy	790	3	793
10	1DK	Parrsboro	856	2	858
11	1DL	Kelley, Maccan and Hebert	1295	9	1304
12	1DM	Tidnish and Shinimicas	475	4	479
13	1DN	Philip and Wallace	1475	19	1494
14	1DO	John	1111	6	1117
15	1DP	East, Middle, West (Pictou)	1190	7	1197
16	1DQ	French	735	1	736
17	1DR	South and West (Antigonish)	898	9	907
18	1DS	Tracadie	580	6	586
19	1EA	Tusket	1982	194	2177
20	1EB	Barrington and Clyde	1243	79	1322
21	1EC	Roseway and Sable and Jordan	1350	84	1435
22	1ED	Mersey	2690	339	3030
23	1EE	Medway	1845	166	2012
24	1EF	LaHave	1611	89	1700
25	1EG	Gold	972	57	1029
26	1EH	East and Indian	695	69	765
27	1EJ	Sackville	924	71	996
28	1EK	Musquodoboit	1316	93	1409
29	1EL	Tangier	974	111	1086
30	1EM	East (Sheet Harbour)	914	74	988
31	1EN	Liscomb	1136	66	1202

32 1EO	St. Mary's	1505	43	1549
33 1EP	Country Harbour	550	18	569
34 1EQ	New Hbr./Salmon (Guys.)	1019	70	1089
35 1ER	Clam Habour/St. Francis	517	14	532
36 1FA	Inhabitants	1193	10	1204
37 1FB	Margaree	1308	67	1375
38 1FC	Cheticamp	802	3	806
39 1FD	Wreck Cove	1057	15	1072
40 1FE	Indian	882	7	890
41 1FF	North, Baddeck, and Middle	764	2	767
42 1FG	Denys and Big	792	2	794
43 1FH	Grand	739	33	772
44 1FJ	Salmon and Mira	2779	134	2914
	Isle Madame	145	6	151

Four fish weir types similar in architecture but distinct in function were found in four variant but interconnected habitat areas. This research illustrates the organized nature of pre-contact exploitation strategies. This research also shows that fish weirs were not that unusual in the archaeological record and the interpretative value of these facilities is vastly understated.

4.3 Implications of Research

The information collected and analyzed during this research demonstrates that fish weir facilities offer a great opportunity to understand the broader picture or pre-contact land and resource use. It appears that these fish weir sites were utilized over long periods of time, and were not short term casual activity sites. Most fish weir sites produced a variety of materials ranging from Archaic to Woodland artifactual materials. As mentioned, the geographical placement of these fish weirs also illustrates a deliberate and organized use of the environment and knowledge of the availability of resources.

Although fish weirs are somewhat similar in architecture each was designed for a specific purpose. Watersheds in SWNS are not restricted to a single group of resources which accounts for the variability in fish weir structures. It became obvious that pre-contact populations were routinely exploiting coastal, estuarine, intermittent and interior riverine locations. This was clearly evident on the Mersey River and other watersheds in SWNS. This research has implications for significant and fresh interpretations of pre-contact land and resource use for the following reasons:

(i) the interpretative value of fish weirs and watersheds offer a broader understanding of pre-contact lifeways and how people organized themselves over the landscape to take advantage of a diverse collection of available resources;

(ii) fish weirs are diagnostic facilities from which to make interpretations of subsistence related activities; and

(iii) fish weir architecture is dictated by their geographic location; and

(iv) by the resource targeted. As mentioned in earlier discussions, it is not practical to build a fence/stake fish weir in rivers floored on bedrock, and this explains the density of stone fish weirs in southwest Nova Scotia.

The evidence presented in this thesis challenges the notion that fish weirs are non-diagnostic and required significantly large numbers of people to construct and maintain them. The information collected indicates that fish weir architecture, seasonality of use, land and resource use patterns is easily discernable through investigative analyses of fish weir facilities. While four fish weir facilities have been

identified in four distinct habitat areas their architecture and use has remained relatively static over time and encompasses all cultural periods for the province. Even if not all fish weirs were identified, the density of existing fish weir sites suggests that the watersheds of southwestern Nova Scotia were heavily fished in pre-contact times.

4.3 Rationale for Fish Weir Use in Southwestern Nova Scotia

The rationale for fish weir use in southwestern Nova Scotia can be attributed to four reasons:

(i) diversity of resource areas

(ii) accessibility to those resources

(iii) mobility

(iv) predictability and reliability of available resources.

All primary watersheds in southwestern Nova Scotia are separated by a drainage divide that runs approximately east to west through the mainland portion of the province. As a result, they are directly or indirectly influenced by the Bay of Fundy or the Atlantic coast. In addition to being very biologically productive, they served as principle routes of transportation for pre-contact populations. Accessibility favours extensive year round coastal and estuarine exploitation with forays into the intermittent and interior portions of a river system for more specialized harvest requirements. This accessibility would also allow for a suggestion that movement in and out of each system was very fluid and

would be best described as a floating pattern of gather and dispersal.

The availability of a diverse resource base is demonstrated by the overlapping of aquatic resources which extend seasonally into varying habitat areas. A review of species distribution show that many fish species overlap in terms of availability and that annual fish runs are predictable. While some suggest that the economic base of pre-contact populations cannot be fully reconstructed, it appears that the fishery component of subsistence activity is of foremost importance. This activity was in turn supplemented by resources that could be obtained from equally productive boundary terrestrial habitats. The diversity of aquatic resources could be exploited simultaneously using one procurement strategy that can be easily modified to accommodate immediate subsistence requirements.

Fence-stake weirs which function with the rise and fall of the tide have been documented as having been located at the mouths of rivers with notable tidal regimes. Numerous large and small catadromous and anadromous fish species enter and exit these habitat areas to feed or spawn. Smaller linear up and downstream oriented stone fish weirs were identified in the lower estuarine or head of tide portions of watersheds. Davis and Browne (1996) have indicated that estuaries are the most productive of ecosystems in the province. Because they are open to the sea, they allow mobile species of fish to migrate unencumbered into these habitats to feed and spawn. The circulatory nature of these environments provide for rich food supplies and a relative absence of predators. Most food fish are linked to these habitats and at times an aggregate of fish resources can be found here. These fish weir types were designed to

harvest those smaller catadromous and anadromous fish species which pass unencumbered through the larger fence-stake weirs found at mouths of rivers.

Large rectangular/ovate stone fish weirs were documented for the intermittent portions of rivers just above the heads of tide. These particular types of weir appear to have been utilized to harvest salmon before they begin the long laborious journey to interior spawning locations. The basic design of the fish weirs also suggests that they could have been used to harvest out-migrating eels as well.

Interior down-stream oriented stone fish weirs appear to favour the transitional areas between open water lake and streams and rivers and streams. These v-shaped configurations tend to be found in downstream sloping rivers. The apexes of these structures drain into large pools and ponds and appear to have been designed to harvest a single resource (the American eel). These and intermittent fish weir sites appear to be represent seasonal exploitation activity. Conversely, both coastal and estuary fish sites are suggestive of year round exploitative activity.

Variability in fish weir architecture and what appears to be the strategic placement of these facilities in selected habitat areas suggests deliberate rather then coincidental land and resource use. The fishery appears to have been a well organized and planned practice. It appears that pre-contact populations were intent on realizing the full extent of the environment and its resources. While various models have been proposed for settlement and subsistence patterns for Nova Scotia, all consider environment and the seasonal availability of resources as being factors desirable to site location. In keeping with this premise it is suggested that fish weirs represent a

sophisticated fishing technology.

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Appendix A

Pre-contact Fish Weirs for SWNS

Reference	River	County	Province
TUSRW-1	Tusket River	Yarmouth County	Nova Scotia
AARW-1	Annis River	Yarmouth County	Nova Scotia
MERW-1	Mainland Bridge	Annapolis County	Nova Scotia
MERW-2	Mersey River	Queens County	Nova Scotia
MERW-3	Mersey River	Queens County	Nova Scotia
MERW-4	Mersey River	Queens County	Nova Scotia
MERW-5	Mersey River	Queens County	Nova Scotia
MERW-6	Mersey River	Queens County	Nova Scotia
MERW-7	Mersey River	Queens County	Nova Scotia
MERW-8	Mersey River	Queens County	Nova Scotia
MERW-9	Mersey River	Queens County	Nova Scotia
MERW-10	Mersey River	Queens County	Nova Scotia
WESRW-1	West River	Shelburne County	Nova Scotia
WESRW-2	West River	Shelburne County	Nova Scotia

EASRW-1	Easr River	Shelburne County	Nova Scotia
MEDRW-1	Medway River	Queens County	Nova Scotia
MEDRW-2 Louis Wambolt	Medway River	Queens County	Nova Scotia

Mersey River Draw Down 2004

MERW-11 – 20T0345537/4899131

MERW-12 – 20T0345543/4889119
MERW-13 – 20T0345549/4889094

MERW-14 – 20T0345629/4889094

MERW-15 – 20T0345622/4889007

MERW-16 – 20T0346255/4887954

MERW-17 – 20T0346321/4887875

MERW-18 – 20T0346891/4887269

MERW-19 – 20T0347956/4886399

MERW-20 – 20T0352352/4883456

MERW-21 – 20T0352384/4883441

MERW-22 – 20T0352397/4883445

MERW-23 – 20T0352477/4883474

MERW – 24 – 20T3525568/4883437

MERW-25 – 20T0352720/4883327

MERW-26 – 20T0352758/4883305

MERW-27 – 20T0352768/4883320

MERW-28 – 20T0352853/4883322

MERW-29 – 20T0352850/4883302

MERW-30 – 20T0352858/4883270

MERW-31 – 20T0352881/4883272

MERW-32 – 20T0352551/4883509

MERW-33 – 20T0352679/4883394