Introduction

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THIS VOLUME BRINGS TOGETHER a wide range of methodologies and techniques applied to data from prehistoric archaeological sites in Port au Choix, northwestern Newfoundland (Figure 1). Palaeo-environmental, geophysical, and archaeological approaches are brought to bear on different aspects of two closely related questions: (1) how did prehistoric peoples adapt to, and impact, the Port au Choix environment, and (2) how did the landscape and climate change over the past 6000 years of human occupation? The purpose of the volume is to bring the results of this research, which would normally appear only in specialist journals, to a broader audience.

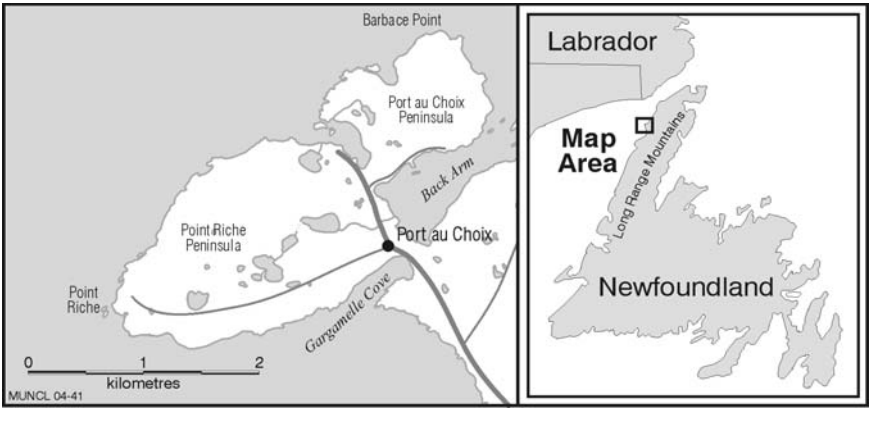

Figure 1. Location map of Port au Choix in Newfoundland and Labrador.

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Port au Choix is one of the richest archaeological areas in northeastern North America. Newfoundland lies at the intersection of subarctic and more temperate regions and, commensurate with this geography, populations of two Amerindian and two Palaeoeskimo cultural traditions occupied Port au Choix for significant periods of time: Maritime Archaic Indians (6290-3340 cal BP), Groswater Palaeoeskimos (2950-1820 cal BP), Dorset Palaeoeskimos (1990-1180 cal BP), and Recent Indians (2110-680 cal BP). All were drawn to the rich marine resources of the region, in particular the migratory harp seal herds. A major economic focus for most groups was the late winter-early spring harp seal hunt during which time the animals were available not far off the Point Riche Peninsula, at the ice edge.

For most of these prehistoric populations, Port au Choix was a central place in their economy and identity. The Maritime Archaic Indians buried their dead along a sandy terrace of what was then an island. Small groups of Groswater Palaeoeskimos hunted harp seals on a regular seasonal basis from a nearby headland. The Dorset Palaeoeskimos were more intensive harp seal hunters, and several families together spent their winters in substantial dwellings at a seasonally permanent hunting location. They buried at least some of their dead in nearby caves and rockshelters. While our knowledge of the Recent Indians is at a preliminary stage, we know they camped at Port au Choix during the summer and/or early fall.

As the abundant marine resources of Port au Choix attracted prehistoric peoples, so did the rich archaeological resources attract researchers, starting in 1929 with William Wintemberg of the Victoria Memorial Museum (later the National Museum of Canada and now the Canadian Museum of Civilization), followed in 1949-50 and 1961-63 by Elmer Harp, initially a PhD student of Harvard University and later a faculty member of Dartmouth College, and in 1967-68 by James A. Tuck of Memorial University. The combined results of their research culminated in the designation of the area as Port au Choix National Historic Site in 1970. With the assistance of Parks Canada, Priscilla Renouf of Memorial University conducted a survey of the area's archaeological sites in 1984. Over the following twenty years she has carried out excavation at a number of sites in the area. Initially her research questions had to do with the ways in which different cultures adapted to the Port au Choix environment; however, in 1997 she began collaboration with Trevor Bell of Memorial University and together they started to examine the landscape context of human occupations at a variety of spatial scales. The results of this collaboration form the basis of several of the papers in this volume.

One of the challenges for archaeologists and geographers working in the past is how to establish chronological control of their data. They rely on radiocarbon dates of organic material; however, these dates are inexact, each having a probability range which is usually between 80 and 220 years. In addition, radiocarbon dates are expressed in radiocarbon years which must be adjusted, or calibrated, to bring them in line with calendar years. Table 1 presents the cultural chronology of Port au Choix. The date ranges for each culture are based on all available radiocarbon

Table 1. Age ranges for prehistoric culture periods at Port au Choix based on bracketing radiocarbon dates from archaeological sites. Calibrated calendar age ranges are also provided.

Cultures	Bracketing radiocarbon dates and laboratory numbers	Median probability calibrated age range	1σ calibrated age range	2σ calibrated age range
MAI	5440 ± 50 (Beta 134151) 3200 ± 100 (Beta 132364)	6240-3430	6290-3340	6390-3160
Groswater	2760 ± 90 (Beta 23979) 1960 ± 80 (Beta 66438)	2880-1910	2950-1820	3140-1720
Dorset	1970 ± 60 (Beta 23977) 1370 ± 90 (Beta 66436)	1920-1290	1990-1180	2110-1170
Recent Indian	2080 ± 40 (Beta 134147) 840 ± 90 (Beta 66440)	2050-780	2110-680	2150-660
Cow Head	2080 ± 40 (Beta 134147) 1480 ± 70 (Beta 134150)	2050-1380	2110-1300	2150-1290
Beaches	1420 ± 70 (Beta 49754) 1340 ± 80 (Beta 66442)	1330-1250	1390-1180	1520-1070
Little Passage	1020 ± 60 (Beta 66441) 840 ± 90 (Beta 66440)	940-780	1050-680	1060-660

dates, excluding those in poor context, those that are anomalous, or those with a probability range greater than ±110 years. In Table 1 and throughout most of this volume dates are expressed in calibrated calendar years before present (cal BP), where "present" is defined as AD 1950 for the purposes of radiocarbon dating. Calendar dates are represented by their one-sigma probability range and have been calibrated using the computer program *Calib 4.4*. Each date is followed by the lab identification number in brackets, e.g., (Beta 134151).

The physical and cultural landscapes of Port au Choix are inextricably linked. Just as the cultural history of Port au Choix is rich and diverse so too is its physical evolution. For example, at the end of the last glaciation roughly 15,000 years ago, Port au Choix was ancient seabed, lying at the bottom of a sea that stretched almost to the front of the Long Range Mountains. Over time, the land has slowly risen from the sea to reveal the contemporary landscape. Appropriately then the history of coastal emergence and changing geography are the subject of the opening paper in this volume by Bell, Smith, and Renouf. They use a combination of radiocarbon-dated fossil evidence and raised marine landforms to reconstruct the record of changing sea level and coastal configuration for the Port au Choix region over the last 14,500 years. Bell et al. describe how the emerging coastline influenced settlement patterns of ancient cultures at Port au Choix.

The papers by Hodgetts and Wells are based on the identification, analysis, and interpretation of animal bones from archaeological sites. Faunal data can tell us about subsistence, the season of site occupation, and site function. In her paper, Wells examines the animal bones from the Groswater Palaeoeskimo site of Phillip's Garden West. Seal bones represent the bulk of the material, demonstrating that this species was the site's economic focus. Based on the presence of seasonally available bird and seal species Wells concludes that the site was occupied during the winter and spring. Interestingly, this interpretation of site seasonality is contrary to other archaeological evidence which suggests a summer occupation, and it highlights the crucial role faunal material plays in establishing site seasonality. Hodgetts fine-tunes the interpretation of site seasonality, using three faunal assemblages from the Dorset Palaeoeskimo site of Phillip's Garden. Through measurement of harp seal femura and comparisons with femur measurements from a modern harp population of known age composition, she establishes the age classes represented in her archaeological samples. The age composition of harp seal herds differs between the early and late winter migration and Hodgetts's results indicate that seals were exploited during both migratory periods. While the late winter-early spring seal hunt can be identified through the presence of newborn seals, previous to Hodgetts's study the early winter hunt was archaeologically invisible.

Evidence of past environments and of climatic change comes in a variety of forms but by far the most widely used data for prehistoric reconstructions are proxy records. The term proxy is used to refer to any line of evidence that provides an indirect measure of former climates or environments. Four papers in this special volume

use microscopic fossil material as proxy evidence for a variety of past environmental conditions, including lake water temperature, salinity, and nutrient status, as well as vegetation composition and dynamics. The use of fossil evidence in environmental reconstruction relies on the well-known aphorism "the present is the key to the past," meaning that sufficient is known about the ecological affinities and associations of many modern species to make inferences about former climatic and environmental conditions.

Smith, Bell, and Renouf employ diatom analysis of lake sediments in the study of sea-level change. Diatoms are microscopic unicellular algae that live in a variety of aqueous environments, their distribution being controlled by a range of environmental variables including acidity, temperature, and salinity. In this study, diatoms are used to identify the transition from marine through brackish to freshwater sediments in lake basins during coastal emergence of the Port au Choix region.

A link between climate change and cultural history at Port au Choix has been an intriguing but elusive argument, limited by the availability of local, rather than regional, palaeoclimatic data on which to build meaningful correlations. Rosenberg, Walker, and Macpherson present a 9000-year proxy record of summer surface water temperature for Port au Choix using the remains of aquatic midge (Chironomidae) preserved in local lake sediments. They document a gradual decrease in summer temperature from a prolonged maximum during Maritime Archaic occupation to a short-lived minimum around Groswater Palaeoeskimo time. A relatively rapid but variable increase in summer temperature coincided initially with Dorset and later Recent Indian occupations, although there is significant overlap in their records. Fossil midges also revealed the salinity history of Bass Pond, which is explained in terms of sea-level history.

Pollen and spores constitute one of the most widely used proxy data sources for inferring former environmental conditions. Bell, Macpherson, and Renouf combine pollen and spore analysis with charcoal and algal remains to reconstruct the vegetation history of two sites, one distant from and one adjacent to the Palaeoeskimo sites at Phillip's Garden in Port au Choix. Whereas the distant site records a fairly typical postglacial vegetation succession for the Northern Peninsula, the adjacent site documents a distinct period of vegetation disturbance, followed by sustained high lake nutrient levels, coincident with first Groswater and then Dorset occupations of the Phillip's Garden sites. Bell et al. interpret these disturbance events in terms of human impacts on the environment as Palaeoeskimos inhabited and altered the natural landscape of Port au Choix for more than 500 years.

Deal looks at preserved plant remains at archaeological sites, identification of which adds an important dimension to our knowledge of the diet and activities of the site occupants, as well as site seasonality. Deal identifies a limited variety of macrofossils from the Maritime Archaic and Recent Indian contexts of the multi-component Gould site. Both cultures ate berries, used fir and spruce for fuel, and possibly used fir and spruce branches for bedding. There were seeds of various

wild grasses in the Maritime Archaic context, which might reflect the use of basketry and cordage. The presence of raspberries in both cultural contexts indicates a summer-early fall site occupation.

Geophysical exploration techniques have become increasingly important as non-invasive methods of subsurface analysis of archaeological sites. They represent a rapid, cost-efficient approach to mapping a broad surface area in a non-destructive manner. Three of the most common methods, ground-penetrating radar (GPR), magnetometry, and resistivity, are applied for the first time to sites at Port au Choix and their results are reported here by Eastaugh and Taylor and by Bell, Daly, Kelley, and Renouf. GPR has recently gained wide acceptance in the archaeological community for its ability to define shallow buried features and stratigraphy in three dimensions. Bell et al. demonstrate these advantages in their application of the technique to the Gould site. With prior knowledge of site stratigraphy from test trenching and limited excavation, they demonstrate that GPR can successfully delineate the main stratigraphic units, including bedrock, beach gravel and peat, and generate a coarse subsurface topographic map of the buried site. More importantly, they are able to identify the Recent Indian cultural horizon within the upper peat and map its discontinuous occurrence across the site. Subsequent excavation substantiated their distribution map in one area of the survey site.

Eastaugh and Taylor address the questions of the number and distribution of Dorset Palaeoeskimo sites at Point Riche using magnetometer and resistivity surveys. Numerous depressions along a raised marine terrace were suspected to indicate the remains of Palaeoeskimo dwellings; however, the occurrence of solution hollows on the surface of the underlying limestone bedrock present a potential alternative explanation. They found that of the two approaches magnetometry appeared to be more successful at identifying cultural features, including dwellings and middens, whereas resistivity emphasized the natural depressions.

The interdisciplinary approach illustrated by the papers in this volume is valuable for understanding human societies in their environmental context. Because of the closely integrated intellectual approach to formulating and testing research questions, the environment is not merely a backdrop to human activities but is a multi-dimensional set of factors that influences the decisions human populations make and which are in turn defined by and impacted by the resultant human activities.

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