Haida Gwaii

Pacific Rim Archaeology

This series is an initiative of UBC Laboratory of Archaeology and UBC Press. It provides a source of scholarly reporting on significant new archaeological research along the entire Pacific Rim, spanning the region from Southeast Asia to western North America and Pacific Latin America. The series will publish reports on archaeological fieldwork in longer monograph form as well as edited volumes of shorter works dealing with contemporary themes.

The general editors of the series are Michael Blake and David Pokotylo, both faculty members in the Department of Anthropology and Sociology at the University of British Columbia.

Other books in the series include *Hidden Dimensions: The Cultural Significance of Wetland Archaeology,* edited by Kathryn Bernick; *Since the Time of the Transformers: The Ancient Heritage of the Nuu-chah-nulth, Ditidaht, and Makah,* by Alan D. McMillan; and *Emerging from the Mist: Studies in Northwest Coast Culture History,* edited by R.G. Matson, Gary Coupland, and Quentin Mackie.

Edited by Daryl W. Fedje and Rolf W. Mathewes

Haida Gwaii: Human History and Environment from the Time of Loon to the Time of the Iron People

UBCPress · Vancouver · Toronto

15 14 13 12 11 10 09 08 07 06 05 5 4 3 2 1

Printed in Canada on ancient-forest-free paper (100% post-consumer recycled) that is processed chlorine- and acid-free, with vegetable-based inks.

Library and Archives Canada Cataloguing in Publication

Haida Gwaii : human history and environment from the time of loon to the time of the iron people / edited by Daryl W. Fedje and Rolf W. Mathewes.

(Pacific Rim archaeology, ISSN 1483-2283)
Includes bibliographical references and index.
ISBN-13: 978-0-7748-0921-4
ISBN-10: 0-7748-0921-3

1. Queen Charlotte Islands (B.C.) – Antiquities. 2. Paleoecology – British Columbia – Queen Charlotte Islands. 3. Queen Charlotte Islands (B.C.) – History. I. Fedje, Daryl W. II. Mathewes, Rolf W. III. Series.

FC3845.Q3H35 2005 971.1'2 C2005-903358-4

Canada

UBC Press gratefully acknowledges the financial support for our publishing program of the Government of Canada through the Book Publishing Industry Development Program (BPIDP), and of the Canada Council for the Arts, and the British Columbia Arts Council.

This book has been published with the help of a grant from the Canadian Federation for the Humanities and Social Sciences, through the Aid to Scholarly Publications Programme, using funds provided by the Social Sciences and Humanities Research Council of Canada.

Printed and bound in Canada by Friesens
Set in Stone by Artegraphica Design Co. Ltd.
Copy editor: Francis Chow
Proofreader: Gail Copeland
Indexer: Noeline Bridge

UBC Press
The University of British Columbia
2029 West Mall
Vancouver, BC V6T 1Z2
604-822-5959 / Fax: 604-822-6083
www.ubcpress.ca

Contents

Illustrations

Figures

Tables

Foreword

Guujaaw

It Was Told

At the time before people, these islands were under water. The Supernaturals occupied the first rock to come above those waters. Our ancestors came later, from the sea.

Our people knew the time when it was like twilight and there was little difference between night and day. Our people told of *Kaalga Jaad* (Ice Woman) hovering in front of a glacier in what is now Skidegate Inlet. When the waters left Hecate Strait, our people hunted and lived there in the treeless landscape. Our relatives saw the first tree and recount floods and tidal waves in their time and before. In one instance, they were saved by the rings on *Qingi*'s hat; in another, the ones who had dogs on their rafts were not upset by the bears; in another, they found salvation in the mountains of *Duu Guusd*.

We have a song of the grizzly bear that came down to kill people, even though grizzly bears don't exist here, and a story of a young hero who slays a mountain lion near Copper Bay.

This was all myth, of course, comparable to fairytales put together to make some sense of things – at least until a few years ago.

For years the scientific community has debated whether these islands had been entirely covered by ice during the last ice age or had contained an ice-free refuge. Scientists have now concluded that while there was an ice-free and inhabitable corridor where Hecate Strait now lies, and while we were clear of the continental ice field, there were indeed local glaciers. They know that our people were here before cedar; in fact, they know the precise sequence of the arrival of plants, as generations of our people would have witnessed. In our west coast mountains were found the grizzly bear bones that are now in the hands of science.

Science has come to see that the ice age came to an end much more abruptly than previously thought. We can now look beneath the waters at the sea floor and appreciate the effects of the great meltwaters and the havoc

unleashed upon our people as the lands were swallowed by the sea. We all know now that in addition to floods, tsunamis had been, and will continue to be, a reality of coastal life.

It isn't science, however, but the Tibetans who also remember the time when they lived in twilight. As we have known *Sgulhgu Jaad* (Seafoam Woman), the Egyptians and people of Peru knew of a "god" called "Seafoam" in their own languages. The Hopi talk about their people coming out of the earth; we told them that it was *Nangkilstlas* who stomped his feet to call the different tribes from the earth.

Science is coming of age, and while there is a convergence and a reconciling of science with our histories, scientists may have to take our word on certain facts.

It was because Raven fooled around with his uncle's wife that *Gahllns Kun* (his uncle) spun his hat and caused the water to rise, accounting for one of the floods.

Scientists are still trying to figure out how the sun and the moon got up there, and while they have theories, give them time and they will come back to us. And we can tell them, because it was told ...

Foreword

Knut Fladmark

I would like to thank Daryl Fedje and Rolf Mathewes for asking me to contribute to this volume, albeit from the largely historical perspective of someone who has had no involvement with archaeological or paleoenvironmental research in Haida Gwaii since 1970. As I read this book, my first reaction was a sense of awe about how much more is now known about the natural and human history of those islands than when I began exploring those topics thirty-four years ago. Although archaeologists routinely deal with the effects of time on human knowledge, it still seems remarkable when such a profound increase in data occurs on one's own intellectual doorstep over such a relatively short period. I also cannot help wondering how my original research perspectives and efforts might have differed if only a fraction of the information contained in this volume had been available.

This represents a major advance in knowledge and sets a very high standard for future multidisciplinary archaeological-paleoecological projects. Only thirty to forty years ago, for the general public, Quaternary scientists, and archaeologists alike, the Queen Charlotte Islands (Haida Gwaii) were one of the least accessible and least understood parts of the province of British Columbia. Before regular ferry connections with Port Hardy and Prince Rupert began in the early 1970s, very few mainlanders of any professional orientation had ever visited them. Indeed, their human story was so poorly known that I remember being told as a student in the mid-1960s that they had probably been uninhabited before about 2,500 years ago, because the boat-building capabilities needed for people to reach them would not have existed before then.

In the early to mid-1960s, a fairly recent age for initial human occupation of Haida Gwaii also seemed to be supported (or at least not denied) by all existing archaeological information from those islands. That consisted, however, of only four to five individual publications, none particularly informative. They included the results of Harlan I. Smith's pioneering excavations at the Yakan Point village site in 1919, now in a heavily forested part of

Naikoon Park at the northeastern end of Graham Island. He thought that the village must have been abandoned at least "several centuries ago" on the basis of the size of its trees, but other information about the site was very limited (Smith 1929:42, 46). Smith also commented on a series of peculiar low-lying rectangular earthworks that he saw in 1919 in a pioneer homestead north of Yakan Point, among the sand dunes of Rose Spit. He thought that they were anthropogenic features, possibly representing Haida garden-plots, also implying a recent age (Smith 1927:111). The first modern archaeological excavations in Haida Gwaii were small-scale efforts conducted in the historical Haida village site of Ninstints at the southern end of the archipelago in 1956 and 1957 (Duff and Kew 1958:50-54). While they demonstrated some depth of midden deposits, artifacts were infrequent and dominated by European trade goods, all still compatible with a relatively recent overall age of human occupation of the islands.

Reflecting the marked increase in archaeological research throughout the entire province since the mid-1960s, the level of published archaeological data from Haida Gwaii is now vastly larger. We now can be certain that those islands were first occupied by people at least as early as any other part of the British Columbia coast, as demonstrated by the archaeological chapters in this volume. Also, a count of all the different references cited by the contributors to this volume, plus my own bibliographic files, indicates that currently there are at least forty-seven journal articles, professional monographs, and graduate theses bearing directly on the archaeology of these islands. There also are a great many unpublished reports filed in the Provincial Archaeologist's Office, which simply did not exist in the 1950s and 1960s.

My first contact with Haida Gwaii was in the summer of 1967, when as a student fieldworker with George MacDonald's North Coast Archaeological Project, based in Prince Rupert, I participated in a ten-day trip to those islands. We spent most of our time excavating a large test unit in the deep Honna River shell midden near Queen Charlotte City. While the resulting artifact assemblage was small, two associated radiocarbon dates (the first from any archaeological site in Haida Gwaii) demonstrated that people had definitely lived on those islands for at least 3,000-3,300 years (MacDonald 1969:249). We also explored the road-accessible portions of northern Haida Gwaii, finding the Skoglund's Landing site near Masset. It displayed a simple unifacial lithic industry in an apparent non-shell midden context, unlike any other site then known on the northern British Columbia coast and suggestive of a substantial age. Involvement in that discovery made me aware of the possibility of a very early human record in Haida Gwaii and fuelled a personal interest in conducting further archaeological investigations on those islands.

As a result, after entering graduate studies at the University of Calgary, I directed excavations at Skoglund's Landing and three other island sites in

the summers of 1969 and 1970, supported by a total of budget of $5,000. My field crews of about four to five people each year (largely unpaid volunteers, with little or no previous field experience) had to survive very primitive living conditions and unvarying canned-food diets. Minimal resources also were reflected in the kinds of research that we were able to accomplish, emphasizing very basic cultural-historical and cultural-ecological goals. Also, because we could afford no air charter or practical water transport, our areal coverage was restricted entirely to the road-accessible portions of eastern Graham and northeastern Moresby Islands. This was unfortunate because, as clearly demonstrated in this book, the greater physiographical and environmental diversity of the South Moresby–Gwaii Haanas region seems to have retained a longer, richer, and more complete paleoecological and archaeological record.

The amount of published information about past (and present) environments of Haida Gwaii available to me in 1969 and 1970 was also very small, being limited only to Dawson (1880), Heusser (1955, 1960), Sutherland-Brown and Nasmith (1962), Foster (1965), Sutherland-Brown (1968), and Calder and Taylor (1968). Those pioneering works provided only preliminary suggestions about the chronology and effects of past glaciations, sea level changes, and other natural factors that could have affected past human occupations. Nevertheless, they still offered hints of a unique biological and environmental history for those islands, including a role as a late Wisconsin biotic refugium. As a result, by 1969 increasing awareness that a chain of similar refugia along the outer Pacific coast could have been used by early human migrants moving south from Beringia alerted me to the possibility that Pleistocene-aged archaeological sites might be found on those islands. As represented by this volume, today there is a vastly greater stock of paleoenvironmental and archaeological information about Haida Gwaii than in 1969 and 1970. Counting the contributions in this volume and the different sources that they cite, plus other references that I am aware of, there are now at least 118 articles and monographs bearing on this topic. One of their most significant conclusions is that indeed there are now strong indications that a late Wisconsin biotic refugium existed somewhere around these islands, most likely on the emergent continental shelf.

A unique and much debated aspect of the natural history of Haida Gwaii has been its potential role as a late Pleistocene biotic refugium. Some biologists have argued in favour of that concept because of the unique array of disjunct and endemic species or subspecies of plants and animals found today on those islands. Their degree of divergence from mainland counterparts has been thought to indicate the survival of distinct populations of ancestral plants and animals on those islands during all or part of the last glaciation (e.g., Heusser 1955:446, 1960:201-203; Calder and Taylor 1968:112). As stated in Chapter 5 of this book, "genetic data of a mid-Pleistocene split

of vertebrate taxa and geographic distribution of the mitochondrial lineages of stickleback, black bear, marten, and short-tailed weasel cumulatively suggest that a refugium existed on the continental shelf off the central coast of British Columbia. Genetic data are consistent with geological and stratigraphic data demonstrating that the continental shelf separating Haida Gwaii from the mainland contained a large ice-free area during the glacial maximum."

I think that one of the most important suggestions made in this volume is that older ice-free areas probably existed on the now submerged continental shelf adjacent to the islands, particularly in the "Hecatian" area. Plans apparently are under way to seriously investigate this possibility, and I suspect that if anyone has the resources and expertise needed to locate and effectively study such deeply submerged terrestrial surfaces (and hopefully any associated archaeological sites), it is Daryl Fedje and his research team.

At the risk of breaking scientific conventions, I would like to make one final comment. This involves a subjective impression that I think arises in virtually anyone who spends much time in Haida Gwaii, particularly in wilderness areas in close interaction with the natural environment. I suspect that it also underlies the personal interests and research perspectives of at least some of the contributors to this volume, although it would not be considered appropriate to mention in scientific discussions. It is the sense of being in a truly special place – an awareness that one is in a very insular realm that has always followed its own unique directions distinctly removed from those of the adjacent continent. As far as I know, the Queen Charlotte archipelago is the most disjunct large landmass associated with the continent of North America. Newfoundland, the Kodiak group, and the Caribbean Islands are all separated from the adjacent mainland by shorter minimal water distances, often involving steps across intervening smaller islands.

Haida Gwaii, particularly the Gwaii Haanas area, is also a remarkably beautiful place, with wisps of clouds weaving through dense dark forests. It cannot help but evoke a sense of spiritual power, however one wishes to define that concept, even to the most agnostic of observers. When this feeling happens to coincide with the arrival of a large raven, loudly asserting his command of the landscape, modern scientific perspectives merge with older views stretching back to the arrival of the first people on these islands, sometime before 10,000 years ago. If the coastal migration route hypothesis is correct, then Haida Gwaii may well have been the first part of modern Canada to hear human voices.

Knut Fladmark
Simon Fraser University

Preface and Acknowledgments

Daryl W. Fedje and Rolf W. Mathewes

The human history of Haida Gwaii (the Queen Charlotte Islands), and the environmental context within which this history has unfolded, is a story of dramatic long-term change. People have lived in this archipelago for at least 10,500 radiocarbon years. During the time of human occupation, they saw glaciers retreat, climate change over millennia, and sea levels rise high over their grandparents' villages and then fall back so that new villages could be built on their ancestors' fishing grounds. They saw forests develop and then change their composition. They saw the first cedar tree and the last Dawson caribou, the first European and the last sea otter. Over time they have seen brown bears replaced by black bears in response to environmental change, and the black bears, in turn, change their diet from land to ocean and change in stature. Over this time, people developed new tools, such as microblades, slotted antler harpoons, and ground stone adzes, and they came to live in big houses, carve monumental art, and paddle their seagoing canoes the length of the coast. The Haida people have seen and been part of a long-term process of environmental transformation and cultural change. In oral histories they remember the history of the islands.

Haida Gwaii is an archipelago with a combined land mass of approximately 10,000 square kilometres. The archipelago includes two large islands (Graham Island to the north and Moresby Island to the south), and more than 100 smaller islands. Adjacent waters are the open Pacific Ocean to the west, Hecate Strait to the east, and Dixon Entrance to the north. Haida Gwaii is separated from continental North America by at least 70 kilometres in any direction, making it the most isolated archipelago on the west coast of the Americas. Over the long term, Haida Gwaii has been both slightly smaller and considerably larger due to sea level change. The archipelago includes three major physiographic regions: the Queen Charlotte Ranges, the Skidegate Plateau, and the Queen Charlotte Lowland (Sutherland-Brown and Yorath 1989). Haida Gwaii is dominated by temperate rain forest in which

spruce, western hemlock, and western red cedar are dominant. Endemic large mammals are limited to black bear and a now-extinct caribou, while the surrounding waters are rich in fish, shellfish, marine mammals, and sea birds. Haida Gwaii is the home of the Haida people, whose history is known through both oral tradition and archaeology.

This volume builds on the publication *The Outer Shores* (Scudder and Gessler 1989), which provided synthetic summaries of environmental and human histories as then understood. In the years since *The Outer Shores* was published, much new and exciting research has taken place in Haida Gwaii and Hecate Strait. Now a grand story is emerging of the long-term human and environmental history of Haida Gwaii, a story this book attempts to tell in a precise, approachable, and sensitive manner.

This book is a compendium of paleoenvironmental, traditional, and archaeological records for Haida Gwaii and adjacent areas of Hecate Strait. The forewords are by Guujaaw and Knut Fladmark. Guujaaw, currently president of the Haida Nation, is a strong environmental advocate with considerable expertise in Haida history. Knut Fladmark conducted extensive fieldwork and analysis of the archaeology of Haida Gwaii in the 1960s and 1970s and developed a theory of a coastal migration route from Asia to southern North America. The chapters of this book represent the latest research results and interpretations of current research into the long-term human and natural history of these islands. The chapters are presented grouped in three parts, each introduced by a short introductory chapter. Paleoenvironmental histories are presented in Part 1, traditional histories in Part 2, and archaeological histories in Part 3.

The editors wish to express their thanks to all those who helped bring this volume to publication. We appreciate the support of the editors of the Pacific Rim Archaeology Series, Michael Blake and R.G. Matson, who reviewed an early draft and encouraged us to submit the manuscript for inclusion in the series. Knut Fladmark and two anonymous reviewers are thanked for providing comment on the volume. We are also grateful to Quentin Mackie and Marty Magne, who, in addition to contributing to chapters in this volume, provided comments on several archaeological chapters and on the more general integration of the cultural and environmental histories presented. We wish to thank the staff at UBC Press, in particular Jean Wilson, who guided the manuscript through the review process, and Darcy Cullen, who oversaw the editing and production of the book. Frank Chow's role as copy editor was invaluable, as he managed to ensure consistency of style throughout the collection. We also wish to acknowledge the funding provided for the index by the University Publications Committee at Simon Fraser University.

We are grateful to Guujaaw, president of the Council of the Haida Nation, for maintaining a strong interest in the archaeology and paleoecology of Haida Gwaii and Hecate Strait, for giving insightful comments on select chapters, and for preparing a foreword that brings a Haida perspective to the volume. We thank Knut Fladmark for his foreword, which represents a Western perspective, and note that his contribution to Pacific Rim archaeology is profound and ongoing: while much new information about Haida Gwaii has come to light over the past few decades, it is remarkable how well it all fits into the archaeological and environmental framework Knut devised over thirty years ago. Working with better tools and a multidisciplinary team has allowed us to expand and enhance this story but most key tenets are unchanged. Captain Gold of Skidegate has played a vital role in the archaeology and history of Haida Gwaii since the early 1970s. We thank him for his participation in, and encouragement of, the archaelogy program and his willingness to share his perspectives on the connections between archaeology, environmental reconstructions, and traditional history. Parks Canada managers Ernie Gladstone, Marty Magne, and Ron Hamilton were key supporters of the Gwaii Haanas Archaeology and Paleoecology Project and without their support much of the research presented here would not have taken place. And, of course, a big thanks to the efforts of all the contributors who shared with us their knowledge so that this fascinating history could be told.

To Donna, Kimberley, and Brooke – thanks for all the times I was in the field and you had to look after the chores at home. – *Rolf*

To Joanne, Edana, Freia, and Erika – for all your time with me in Gwaii Haanas and for keeping the home fires burning when I was up there without you. – *Daryl*

And in fond memory of Tucker Brown (K̲'oyas), Captain of the Parks Canada vessels *Shearwater* and *Gwaii Haanas*. Tucker will be remembered by those who were fortunate enough to cross his path for his knowledge, humour, and endless stories, and for always getting the "Archy's" to where they needed to go. Howa.

A Note on Radiocarbon Dating

In this book dates are presented in radiocarbon years before present (BP) unless otherwise indicated. For technical reasons, radiocarbon years are not the same as calendar (solar) years, and the relationship between these two scales varies across the centuries. Corrections – or calibrations – are now available for late glacial and Holocene time (Stuiver et al. 1998), which convert one scale into another. The following table is derived from CALIB 4.1 derived using the CALIB 4.1 program (Stuiver et al. 1998). The calibrated age is the median age derived from the program, and the Christian era age is obtained by subtracting the present, which is fixed at AD 1950. From this, the term *years ago* would be the calibrated age plus the number of years before AD 1950. For example, a radiocarbon age estimate of 3000 BP is calibrated at 3,180 calendar years ago (3,180 cal yrs ago), or a calendar date of 1230 BC.

Radiocarbon Calibration Table

Radiocarbon years	*Calibrated age*	*Calendar date*
1000 BP	930 cal yrs ago	1020 AD
2000 BP	1,940 cal yrs ago	10 AD
3000 BP	3,180 cal yrs ago	1230 BC
4000 BP	4,490 cal yrs ago	2540 BC
5000 BP	5,730 cal yrs ago	3780 BC
6000 BP	6,820 cal yrs ago	4870 BC
7000 BP	7,810 cal yrs ago	5860 BC
8000 BP	8,870 cal yrs ago	6920 BC
9000 BP	10,190 cal yrs ago	8240 BC
10,000 BP	11,400 cal yrs ago	9450 BC
11,000 BP	13,000 cal yrs ago	11,050 BC
12,000 BP	14,060 cal yrs ago	12,110 BC

13,000 BP	15,630 cal yrs ago	13,680 BC
14,000 BP	16,790 cal yrs ago	14,840 BC
15,000 BP	17,940 cal yrs ago	15,990 BC
16,000 BP	19,090 cal yrs ago	17,140 BC
17,000 BP	20,240 cal yrs ago	18,290 BC
18,000 BP	21,390 cal yrs ago	19,440 BC
19,000 BP	22,540 cal yrs ago	20,590 BC
20,000 BP	23,690 cal yrs ago	21,750 BC

Part 1
Paleoenvironmental History

The great mystery of the peopling of the Americas, once thought to be solved by the "Clovis-first" scenario, is once again reopened as a focal point of argument, speculation, and a host of new scientific data. Of special interest to us on the Pacific coast is the growing evidence for early native populations with strong maritime adaptations, which almost certainly included boat building as well as marine foraging strategies. How early such peoples were present on the coast is a key question that has yet to be answered, but it is highly probable that they predate the beginning of the Holocene. The current search for evidence of these early coastal colonists is well described by Dixon (1999) and most recently in *Lost World, Rewriting Prehistory: How New Science Is Tracing America's Ice Age Mariners* by Tom Koppel (2003). In order to theorize rationally about the possible timing of early coastal migrations, we need to first understand the physical and biological environments along the Pacific coast during the late glacial and early Holocene time periods. Much of the evidence that Koppel discusses was gleaned from discussions with and publications of contributors to this book.

Since publication of *The Outer Shores* in 1989, significant advances have been made regarding the glacial history, sea level history, archaeology, and paleoecology of the Pacific Northwest Coast. In order to improve the current state of knowledge about past environments along the coastal strip of British Columbia, data from pollen analysis and plant macrofossils need to be expanded, synthesized, and integrated with other lines of evidence. Several studies not reviewed in *The Outer Shores* have since been published, and they provide intriguing, although preliminary, insights into the now submerged "Lost World" that has played an important role in the biological recolonization of British Columbia since the last glacial maximum. The "Lost World" terminology (Mathewes 2000a, 2000b) is used, with apologies to Sir Arthur Conan Doyle, since it is now clear that large portions of the continental shelf of the Pacific Northwest Coast were emergent during the Fraser Glaciation, and that these landscapes were subsequently "drowned" due to rising postglacial sea levels. A key element of current interest in this submerged landscape is the evidence that the earliest migration of humans to the Americas could have occurred along the coastal corridor during deglaciation, if not earlier. Hence, the nature of the plant cover and terrestrial environment of the Lost World becomes important not only as a clue to paleoclimates and wildlife habitats but as a potential source of food, fibres, and medicines for early human occupants.

Intimately linked to the emerging interest in the coast as a biotic migration corridor is the long-standing controversy regarding the possibility that plants and animals may have survived along the coast during the last glacial maximum in ice-free refugia. This controversy is not yet settled, but new lines of evidence regarding molecular data of genetic divergence

have recently become available for plants, insects, and terrestrial vertebrates. Although the search for continuously unglaciated refugia on the coast has gone on for over forty years, the critical evidence for such a site has not yet been presented. Along the Vancouver Island coast, radiocarbon-dated evidence of non-glacial environments is restricted to the intervals before about 16,000 BP (radiocarbon years) and after about 14,000 BP (Ward et al. 2003; see also Lian et al. 2001 – Port Moody Interstade). On Haida Gwaii, deglaciation was under way by 15,000 BP, following conditions that peaked sometime between 21,000 and 16,000 BP. In southeastern Alaska, fossil ringed seal and arctic fox bones dating through the glacial maximum hint at a productive marine environment, and possible refugia in the Alexander Archipelago.

Recent research suggests that the best possibility of a continuous refugium is around Haida Gwaii on the now-submerged continental shelf in Hecate Strait, east of north Moresby Island and Graham Island ("Hecatia" in Fladmark 1975). Studies are ongoing to examine the terrestrial vegetation and paleoenvironment of Hecate Strait and Queen Charlotte Strait to the south. Long cores of lake sediments on northern Vancouver Island and in the Gwaii Haanas National Park Reserve have been dated and studied (Lacourse 2004), and the pollen profiles will be compared with the late glacial portions of cores taken from submerged lakes on the continental shelf. These studies will emphasize the interval between 15,000 and 10,000 BP, which includes the probable time of human migration from the north. Evidence so far points to expanses of treeless shrub-tundra vegetation between 15,000 and 12,500 BP. Forests of pine and spruce expanded rapidly over the landscape after 12,500 years ago (12,500 BP) but were flooded on the lowlands when sea levels rose quickly after 12,000 BP (Lacourse et al. 2003). The optimum interval for human migration was likely between 13,500 and 12,000 BP, when the landscape was open and climatic conditions supported a diverse and relatively productive plant cover (Mathewes 2000a).

History of Investigation

In the late 1800s, Dawson (1880) explored the archipelago and reported extensively upon the geological and environmental history of Haida Gwaii. His reports provide a plethora of information and include descriptions of evidence for glacial history and sea level as well as sedimentary history, biology, and anthropology. After a long hiatus, interest in the late Pleistocene environments of the Pacific coast was rekindled by the publication of a seminal report by Calvin Heusser (1960). Based on cores collected in numerous peat bogs from the Aleutian Islands to California, Heusser provided pioneering information on postglacial vegetation succession and climate for the Pacific Northwest. Subsequent refinements in pollen analytical techniques and radiocarbon dating have greatly expanded our ability to

reconstruct environmental histories, but we owe a great deal to these early investigations.

The next comprehensive synthesis of the geology and environmental history of Haida Gwaii was prepared by Sutherland-Brown (1968), who conducted extensive fieldwork in the archipelago. He provided substantial interpretation of structural geology and glaciation, including discussions of glacial deposits, ice movement, paleontology, sea levels, and refugia. His interpretation of glacial history left little opportunity for organisms to have survived on Haida Gwaii during the last glaciation, contrary to the interpretations of many biologists who argued from the presence of endemic plants and animals that glacial refugia must have been present (Heusser 1960, 1989; Calder and Taylor, 1968). A breakthrough paper published in the journal *Science* (Warner et al. 1982) provided the first radiocarbon-dated evidence for early deglaciation on Haida Gwaii, suggesting that ice-free areas existed near Cape Ball on Graham Island by 15,000 BP, with accompanying evidence of a tundra-like terrestrial vegetation cover by that time (Mathewes 1989a).

With respect to both human and glacial history, a seminal report was published by Knut Fladmark in 1975. Based on his doctoral dissertation, Fladmark's "Paleoecological Model for Northwest Coast Prehistory" set the scene for many subsequent investigations into the paleogeography, oceanography, sea level history, and archaeology of Haida Gwaii. His sea level curves for the North Coast (Fladmark 1975, figure 6) were the first to document that relative sea levels during the late glacial on Haida Gwaii were lower than they are today, setting the scene for the problem of recovering archaeological evidence from a much larger but now drowned landscape, a theme that appears in several of the chapters in this book. Similarly, he concurred with Heusser's earlier findings (1960) that during the last glacial period lower sea levels and incomplete glaciation provided a possible chain of refugia that might have been used by early human travellers between coastal Alaska and the south. Updates on many of these issues are summarized in the various chapters of *The Outer Shores* by Scudder and Gessler (1989) and in the following chapters of this book. Nevertheless, new information relating to paleoenvironments and the potential for early human migration along the coast appears regularly (e.g., Ward et al. 2003; Hetherington and Reid 2003), and interested individuals need to monitor the primary scientific literature to keep up with new developments.

The six chapters that follow build on data already available in *The Outer Shores* to provide an overview of physical and biological conditions that humans may have encountered in their settlement of the Haida Gwaii region. In Chapter 1, Vaughn Barrie and colleagues document the late Quaternary geology of Haida Gwaii and the surrounding marine areas, with an

emphasis on processes and timing of sedimentation, glaciation, and deglaciation. In Chapter 2, Daryl Fedje and colleagues outline the long-term history of sea level change, showing how at different periods sea level has been both much lower and somewhat higher than it is today. This chapter lays a baseline for the book as a whole. By knowing the size and shape of Haida Gwaii at any given time, we can better reconstruct environment and potential for human occupation. This theme is elaborated in Chapter 3, in which Terri Lacourse and Rolf Mathewes outline the terrestrial paleoecology of Haida Gwaii and the adjacent continental shelf, paying special attention to the problems and prospects of the late Pleistocene environment for human subsistence and as a potential migration corridor into the Americas. This is followed by a more focused study by Richard Hebda and colleagues, who examine in detail data from Anthony Island (*SGang gwaay*) to focus attention on long-term vegetation history, climate change, and their relationship to human settlement. Since the ancient village of Ninstints is a UNESCO World Heritage Site, this study of Anthony Island provides an important environmental link to understanding the human history of this special place. Haida Gwaii has long been known for its unique biota, and the final two chapters outline the evolution of endemic species and paleontological evidence of the vertebrate faunal history.