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REPORT ON

AN ARCHAEOLOGICAL OVERVIEW OF THE NORTH COAST TIMBER SUPPLY AREA

Submitted to:

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MANAGEMENT SUMMARY

This report describes the results of an archaeological overview assessment (AOA) of the North Coast Timber Supply Area (TSA). The study was undertaken on behalf of the Ministry of Forests (North Coast District), with substantial assistance and input provided by the MoF, the North Coast licensees (Interfor, West Fraser Mills, and Pacific Cascade), several North Coast First Nations, the Archaeology Branch, and Heather Moon (H.L. Moon Heritage Consultant).

The objectives of the study were to summarize and evaluate existing information about archaeological sites in the study area and to develop a series of predictive models to help evaluate the need for archaeological assessments (impact assessments or reconnaissance) prior to land development. The project involved four main phases: (1) background research, including a review of previous archaeological, historical, and ethnographic reports and publications; (2) GIS analysis of terrain and known archaeological site characteristics; (3) development and implementation of the models to assess the archaeological site potential of the study area; and (4) recommendations for appropriate archaeological resource management strategies for the North Coast TSA.

The project is GIS-based, providing a mapped representation of areas of potential archaeological concern that can be viewed or plotted at various scales. Information derived from the study will help the Ministry of Forests and other government agencies, including First Nations, to integrate archaeological resource management with other land use planning decisions so that heritage sites may be preserved or managed according to the *British Columbia Heritage Conservation Act,* the *Forests Act,* the *Forest Practices* Code *Act,* and other relevant legislation and protocol agreements.

Predictive models were developed according to archaeological site type. Models were created for coastal and inland habitation sites, and culturally modified trees (CMTs). Modelling involved dividing the entire study area into 10 metre grids and predicting the archaeological site potential of each grid cell, based on a series of rules. Model results were tested by evaluating the degree to which they correctly predicted the locations of recorded archaeological sites. No field testing has been undertaken to date.

The coastal and inland habitation models correctly predicted the locations of 98% of recorded habitation sites. The CMT model predicted 80% of recorded CMT sites, and an additional 24 CMT sites (14%) were captured by the habitation models. Overall, 94% of recorded CMT sites were accounted for by one of the models.

The models ranked all lands according to three classes, with Class I lands predicted to have the greatest archaeological potential and Class III lands the lowest. Site potential can also be viewed as relative site density, in which the highest density and greatest variation of sites equates with highest site potential (Class I). Given the severe terrain of much of the North Coast, it was expected that moderate to high site potential ratings would cover a relatively small portion of the study area land mass. The models predict that 5.5% of the study area (107,666 hectares) falls within the Class I category (highest site potential), while 16.5% (323,537 hectares) fall within Class II lands. This suggests that the vast majority of archaeological sites in the North Coast TSA should occur in 22% of the land mass. A significant portion of this area is designated Class II for CMT sites only. Additional field data may reduce the area encompassed by these models,

The model results can be used to guide future archaeological resource management efforts. It is recommended that archaeological field assessments (either preliminary field reconnaissance [PFR] or archaeological impact assessment [AIA]) be undertaken in all Class I or Class II lands prior to any land-altering developments. A PFR may be adequate to assess Class II areas, or field observations may indicate that a more detailed impact assessment is warranted. No archaeological fieldwork is recommended for Class III lands, although it is cautioned that occasional sites may be present in those areas. If an archaeological site is encountered during development, it is recommended that all land-altering activity cease in the immediate vicinity of the site until the Archaeology Branch and local First Nations are contacted to develop a site management plan.

In addition to risk managing, the results of this AOA can be used as a planning tool, to help prioritize archaeological assessment requirements over a period of years. One value of mapped archaeological information is that multi-year development plans can be compared against the predictive model results to evaluate archaeological requirements over time, such as a five year plan. Areas of high archaeological sensitivity, First Nations concern, or operational urgency can be addressed well in advance, reducing the potential for unexpected delays and costs. Further, advance knowledge of potential archaeological concerns may allow the Ministry or licensees to better incorporate archaeological management into the annual business planning or funding cycle. This report also presents a number of more general recommendations relating to the AOA and future refinements to the models.

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1.0 INTRODUCTION

Archaeological sites and related cultural heritage resources may be protected under the *Heritage Conservation Act,* and are recognized in the *Forest Act* and *Forest Practices Code* as valuable components of the forested environment. A range of forestry activities, from road and landing construction, through timber harvesting, to silviculture, involve land alterations that can damage archaeological sites. The first step in managing heritage resources is to identify known and potential site locations so that a strategy can be developed to facilitate their protection and management. Archaeological overview assessments (AOAs) help to address this problem by identifying known archaeological sites and predicting where unrecorded sites are most likely to exist. This information allows land managers to assess the risk of impacting archaeological sites during development.

Archaeological sites and other types of heritage resources are non-renewable resources that are important for a number of reasons. The majority of archaeological sites in British Columbia are of aboriginal origin, and many aboriginal people maintain strong spiritual, cultural, and social connections with these places. In addition, archaeological sites are becoming increasingly important as legal evidence, as illustrated in several recent court rulings. There is widespread public interest in the past, and archaeological sites can represent a unique educational resource. Through interpretive programming, some archaeological sites can provide a basis for understanding aboriginal cultures and the histories of B.C. First Nations.

Many types of cultural heritage sites in British Columbia are currently protected under legislative or policy measures, most notably the *Heritage Conservation Act* (HCA) and the *Forest Practices Code Act* (FPCA). The HCA provides automatic protection to all archaeological sites older than 1846, as well as to certain more recent sites, if they are deemed to have heritage value. Protection, in terms of the HCA, does not necessarily imply that a site cannot be altered, or even destroyed; rather, it means that any alteration to such sites requires a permit issued by the Archaeology Branch (Ministry of Small Business, Tourism and Culture) under the appropriate section of the HCA. Heritage inspection and investigation permits are issued under Section 14 of the Act, while site alteration permits are issued under Section 12.

The HCA does not afford automatic protection to most types of sites that post-date 1846, or to spiritual or traditional land use sites where no physical evidence of human use or occupation exists. Certain site types, including burial places and rock art, are automatically protected under the HCA regardless of age. Protection for post-1846 sites not covered under the HCA may be provided under the Forest Act, Forest Practices Code or by agreement. Other government policies and protocol agreements, such as the Ministry of Forests/Ministry of Small Business, Tourism and Culture *Protocol Agreement on the Management of Cultural Heritage Resources* also afford a measure of protection to heritage sites.

The Ministry of Forests, North Coast District, retained Golder Associates Ltd. (Golder) to undertake an archaeological overview assessment of the North Coast TSA (Figure 1) to assist with the identification of potential conflicts between forestry operations and archaeological sites (Ministry of Forests Consulting and General Service Contract IN2000DNC-01). Although this study considered traditional land use information, where available, and included some First Nations participation, the project focus was on archaeological sites, and the study is not intended to fulfill Ministry consultation requirements or to serve as a traditional land use study.

1.1 Study Objectives

The objectives of the North Coast TSA Archaeological Overview Assessment were to:

- summarize available information about archaeological sites and aboriginal land use in the study area;
- develop predictive models based on known and inferred archaeological site characteristics on the North Coast;
- produce GIS coverages indicating areas of relative predicted archaeological site potential; and
- provide management recommendations for appropriate levels of archaeological investigation prior to land-altering developments in areas of predicted archaeological sensitivity.

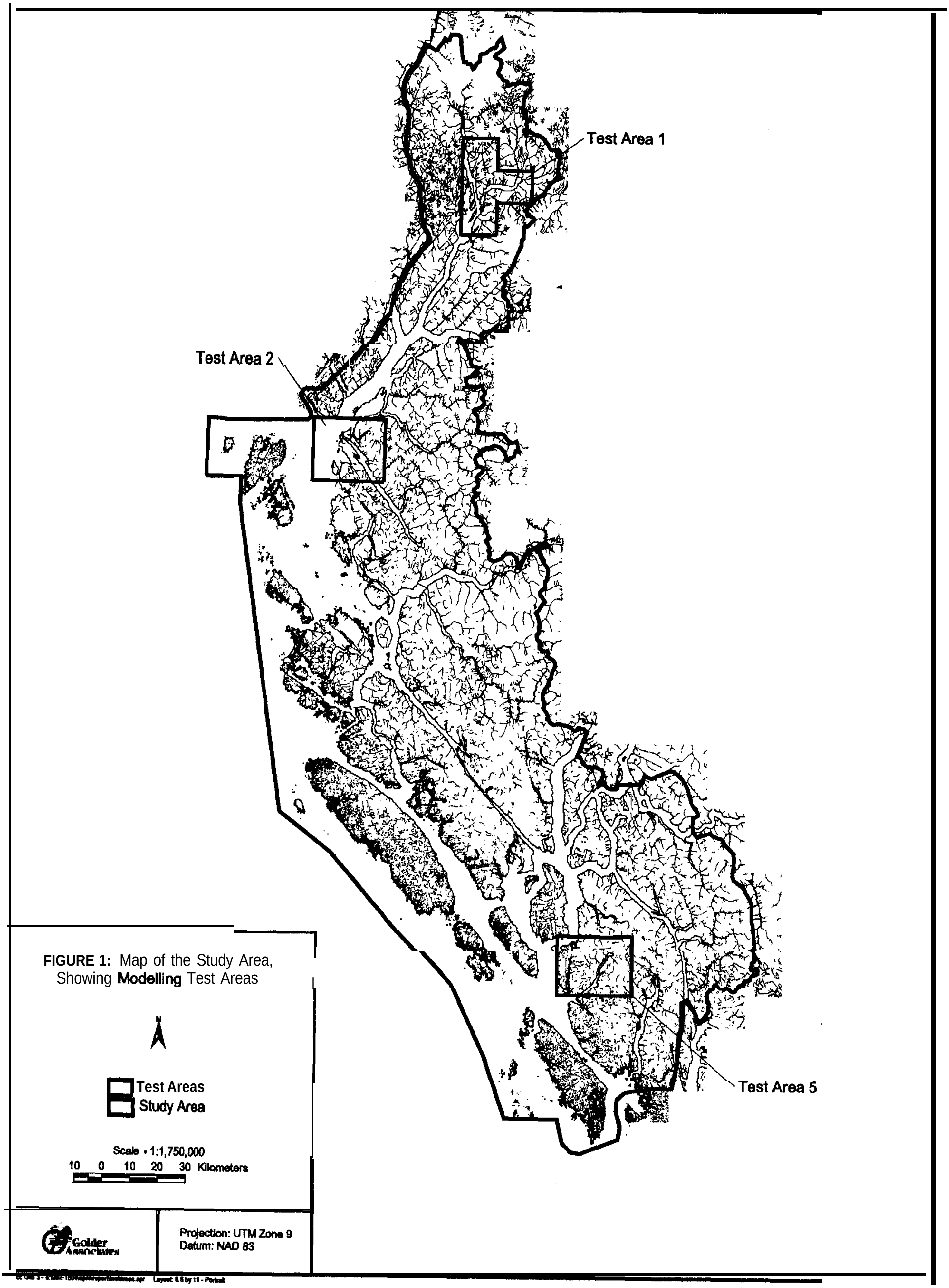

FIGURE 1: Map of the Study Area, Showing **Modelling** Test Areas

Information derived from the study will help the Ministry of Forests, First Nations, and forestry companies to integrate archaeological resource management with other land-use planning requirements so that heritage sites may be preserved or otherwise managed according to legislation and protocols.

1.2 The Archaeological Overview Assessment (AOA) Process

Archaeological overview assessments are planning tools designed to assist resource managers in assessing the risk of adversely impacting archaeological sites when planning land developments. Through the use of "site sensitivity" (or "risk index") maps, an AOA defines areas that have relatively high, moderate or low predicted archaeological site potential, or sensitivity. The cultural resource sensitivity ratings are based on predictive models which, in turn, are derived from information about past use of the landscape and the characteristics of documented archaeological sites. The predictive models are not designed to pinpoint specific archaeological site locations, but rather to delineate areas where archaeological sites are most likely to be present, preserved and identifiable. Fieldwork in the form of impact assessments, reconnaissance surveys or inventories must be conducted in order to locate, record and evaluate actual sites.

An AOA is intended to be a resource management tool and its use should not preclude other resource management measures, including direct consultation with First Nations. Land-use managers can overlay development plans with the archaeological sensitivity maps to assess which proposed development areas are most likely to come into conflict with archaeological sites. The AOA report and site sensitivity maps can also be used to assess where archaeological field work (i.e., an archaeological impact assessment [AIA] or preliminary field reconnaissance [PFR]) is required to obtain more detailed information.

This AOA consists of several successive components, each of which is described below.

1.2.1 Data Acquisition

An AOA begins with the collection and synthesis of relevant archaeological, historical, environmental, and other information about the study area. Because most archaeological sites in the province are of aboriginal origin, early involvement of First Nations communities is important. Shortly after contract award, contact was initiated with First

Nations whose traditional territories encompass the study area. Several sources of information regarding First Nations' past and present uses of the North Coast were consulted for this study, including direct consultation, ethnographies, historic journals, published and unpublished reports, articles, and monographs, maps, and archival documents. Most of the involved First Nations communities were visited in mid-January 2000 to introduce the project and to discuss heritage issues and concerns. Specific archaeological and traditional land use information was collected, where possible.

In addition to cultural information, data regarding the environment of the study area must also be reviewed. Sources of terrain, stream, climate and vegetation information gathered for this study include Terrain Resources Information Maps (TRIM), biogeoclimatic maps, and forest cover data.

The data acquisition phase also involves the review of known archaeological site data for the study area. Recorded archaeological sites are valuable sources of information because they relate specific cultural activities to particular places on the landscape. For example, most (though not all) recorded aboriginal village sites recorded on the Central and North Coast occur in areas of moderate terrain, near a source of fresh water and within a short distance of the ocean. This type of information is essential to the predictive model building phase of an AOA. A database of recorded archaeological sites, taken from the Provincial Heritage Register Database (PHRD), scanned archaeological site sketch maps, and a GIS point coverage of archaeological site locations were provided in digital format by the Archaeology Branch.

The Ministry of Forests provided several sources of data, including digital TRIM and forest cover mapping, and paper maps showing predicted archaeological potential polygons from a previous AOA project completed in the North Coast District (Commonwealth Historic Resource Management Ltd. and Millennia Research 1996).

1.2.2 Data Preparation and Predictive Model Development

The second component of the AOA involves preparing and analyzing all data sources. Digital data were prepared in a GIS, using ARC/INFO and ArcView software. Data preparation involved developing a digital elevation model (DEM), calculating elevations and slope classes, buffering hydrology, creating polygons representing waterbodies, and clipping the data to separate water from land. The large size of the study area dictated that the data be divided into subsets to allow for efficient processing. Five geographically-defined sections were created, and data preparation was completed section-by-section.

The GIS analyses provide the base data for developing computer models to predict archaeological site potential. The objective of modelling is to develop a set of criteria, or rules, to describe places where archaeological sites are most likely to occur, and to apply those rules across the study area. In the absence of extensive probabilistic archaeological inventory data, modelling usually relies on existing archaeological site data and the collective expertise of the study team and First Nations participants. Since different kinds of sites (e.g. culturally modified trees, shell middens, and fish traps) represent different cultural activities, it is important to develop discrete modelling rules for specific site types, rather than a single general model that is intended to account for all sites.

For the North Coast TSA, predictive models have been developed for coastal and inland habitations (including villages, shell middens, and resource camps), and culturally modified trees (CMTs). Models produced for the Central Coast LRMP AOA for trails, pictographs and petroglyphs were ineffective due to data limitations, and consequently they were not implemented in this study. However, the Central Coast study showed that many petroglyph and pictograph sites were accounted for by the coastal habitation model, suggesting a correlation between habitation and rock art site locations. Detailed descriptions of each model are provided in Section 8 below.

The archaeological and GIS teams worked together to create digital coverages (computer-generated layers) of the study area that contain information relevant to model development.

1.2.3 Archaeological Site Sensitivity Mapping and Reporting

The third phase of the AOA involves presentation of the study results in a way that is useful to land-use managers. One presentation tool is the archaeological sensitivity map, or predicted site potential map. An archaeological sensitivity map graphically illustrates areas considered to have relatively high, moderate or low potential for certain archaeological site types to be both present and preserved. Relative potential rankings are used, with the acknowledgment that all areas have some potential for archaeological sites, but that certain areas have greater constraints against human use or archaeological site preservation.

For the North Coast AOA, areas that meet the most stringent criteria of a predictive model were given a Class I designation and are considered to have the highest potential for the presence of that specific archaeological site type. Areas assigned a Class II designation are those that could support the same site type, but do not contain the optimal conditions for doing so. Consequently, these areas are considered to have moderate site potential. Class II lands are typically adjacent to Class I lands, but further from prime resource locations or from preferred landscape features. Class III lands are considered to have relatively low archaeological site potential due to severe constraints on human occupation and use, or on archaeological site preservation. Recommendations are provided for adequate levels of archaeological assessment for each land class designation (see Section 11).

Archaeological potential maps generated for the North Coast TSA AOA should be used with forestry and other development plans to identify potential conflicts with predicted archaeologically sensitive areas. The potential maps were produced at a scale of 1:20,000 and submitted as plot files and GIS coverages to the North Coast Forest District. The model results may be stitched into a contiguous coverage for the study area or clipped to correspond with the TRIM grid or other administrative boundaries. An overview-scale plot file was also provided to the Ministry of Forests.

1.3 First Nations Participation in the North Coast TSA Archaeological Overview

At the outset of this study, the First Nations with expressed hereditary interests in the study area were contacted and invited to participate. Five First Nations groups were identified by the Ministry of Forests as having interests in the study area, based on Statements of Intent and other information sources. These First Nations are the;

- Nisga'a First Nation
- Tsimshian First Nation
- Gitanyow First Nation
- Haisla First Nation, and

- Heiltsuk First Nation.

On the direction of the Ministry of Forests, the Gitanyow First Nation was not contacted, because only a small portion of their identified traditional territory lies within the North Coast TSA, all of which consists of ice fields with no potential for forestry operations.

Given funding and time constraints, face-to-face consultation with First Nations in their home communities was limited. Consequently, First Nations representatives were contacted by telephone, fax and courier to discuss the project goals, progress, and plans for implementing the study results.

From January 17 to January 21, 2000, representatives of Golder Associates and the North Coast Forest District visited with 6 of the First Nations whose territories encompass the northern portions of the study area. These Nations included the Kitselas, Kitsumkalum, Kitkatla, Metlakatla, Kitamaat, and Lax-Kw'Alaams. A meeting was also held with the Tsimshian Tribal Council. A brief description of the meetings is included below.

A meeting was held with Mr. Bruce Watkinson, Resource Officer for the Kitkatla First Nation, on January 17, 2000. The overall scope and schedule of the project was discussed, and Mr. Watkinson provided some general information regarding known resource use areas within Kitkatla territory. These areas were marked on the relevant 1:50,000 scale NTS maps. Mr. Watkinson accepted an offer to review the results of modeling for test areas.

Mr. Bob Hill, of the Tsimshian Tribal Council also met with the study team on January 17, 2000. Mr. Hill suggested that we continue to contact individual communities directly and offered to assist where possible.

On January 18, 2000, a meeting was held with Mr. Alec Bolton, Chief Negotiator for the Kitsumkalum First Nation. Mr. Bolton stated that Mr. Alan Bolton, GIS technician and TUS worker for the band, had left some information with him but that we should contact Alan Bolton at a later date to get copies of TUS maps and other relevant information. Some information regarding landscape use patterns was shared by Mr. Bolton.

Mr. Morris Mason of the Kitselas First Nation met with the study team on the afternoon of January 18, 2000. The GIS and TUS workers were out of the office but Mr. Mason agreed to review test maps and provide input into the AOA via the submission of relevant TUS knowledge.

At a meeting on January 19 2000, Mr. Harold Leighton and Mr. Marcel Pepin of the Metlakatla First Nation discussed the overall scope and timing of the project as well as some of their concerns regarding information confidentiality. It was agreed that, time permitting, the Metlakatla GIS and TUS team would review maps of model results for test areas and provide input.

A meeting with the Kitamaat First Nation was held on January 20, 2000. The Kitimaat Nation was represented by Mr. Amie Smith, Executive Director of the Kitamaat Village Council, Mr. Morris Amos, Resource Management Director, and Mr. Whitney Lukuku, Forester and member of the Resource Management Team. Following a discussion of the project purpose and scope, it was concluded that, at this time the Kitamaat do not have staff available to participate directly in the project. Funding of $2,000 to $3,000 would be required if the MoF wished to have Kitamaat participate fully in the project. It was decided that the Kitamaat would be interested in seeing the test maps but, if detailed analysis was requested, they would have to bill the project for their time. It was agreed that the test maps would be submitted as soon as possible, with no less than two weeks allowed for review.

On Friday January 21, 2000, a meeting was held with all nine hereditary Chiefs of the Lax-Kw'Alaams First Nation, as well as and Chris Turner (TUS and GIS Technician), and Susan Marsden, curator of the Prince Rupert Museum and contributor to the TUS. James Bryant, spokesperson for the hereditary Chiefs, chaired the meeting. In general, the Chiefs determined that the scope and timeline of the project was inadequate. There was concern expressed regarding the level of consultation with the Lax-Kw'Alaams. Mr. Turner indicated that it was his opinion that the Chiefs should attempt to have the MoF withdraw the project contract and renegotiate a more thorough and lengthy study. The meeting concluded with the Chiefs decision to meet with the District Manager to discuss the scope of the project. That meeting would be attended by Mr. Bryant, Ms. Marsden and Mr. Turner. Another Chief noted that the project should provide employment for members of the Lax-Kw'Alaams people.

Due to a scheduling misunderstanding, the Golder and MoF representatives missed a meeting with Ben Haisimsque of the Nisga'a Nation. Later telephone conversations resulted in an agreement to send a package complete with project description and study area map for Mr. Haisimsque to present to the relevant committee.

The study team was unable to arrange a meeting with representatives of the Gitga'at (Hartley Bay) Nation while in Prince Rupert, however, Golder met with Chief Councillor Pat Sterritt on January 27, 2000 in Vancouver. Chief Sterritt stated that the Gitga'at would like to participate in the project and requested that we send a letter detailing what level of information would best suit the needs of the project. Upon her return to Hartley Bay, Chief Sterritt will speak with the Gitga'at forester and, if time permits, arrange to send maps to Golder. At minimum, the Gitga'at were interested in reviewing the test maps.

A meeting with representatives of the Heiltsuk First Nation was held on February 15, 2000 in Waglisla, BC. During this meeting it was noted that the Heiltsuk had yet to review the Central Coast AOA plot files and maps. The Heiltsuk stated they were particularly concerned about the CMT model, as, in the case of the Central Coast AOA, they were unsure whether the CMT data collected in the Heiltsuk AOA was being used in the models for the North Coast. There was some concern that, since the North Coast AOA was building upon the models used in the Central Coast AOA, that the Central Coast maps should be reviewed first. To this end, Golder's cultural sciences and GIS staff worked with the Heiltsuk GIS team to access and print the Central Coast AOA plot files. A test map was printed and the Heiltsuk team stated they would like to have time to review the Central Coast maps before making any statements about whether or not they supported the ongoing North Coast AOA. However, the Heiltsuk requested a copy of the North Coast AOA test map and draft report for review.

On February 18, 2000, Golder met with Percy Starr and Ben Robinson of the Kitasoo First Nation. The meeting took place in Vancouver at the downtown offices of the Kitasoo Tribal Council. After a brief introduction, the Kitasoo representatives stated that they would like Golder to forward a letter to the Kitasoo Chief and Council explaining the project in lay terms and clearly outlining what kind of information would be useful for an AOA. The Kitasoo also requested that the letter include the project deadline and a description of how the AOA maps would be used. Mr. Starr and Mr. Robinson stated they would also like to have the opportunity to review the draft map and report but would also have to present it to the rest of the community before providing comments. A letter containing the requested information was sent from Golder to the Kitasoo Band Council on February 24, 2000.

Due to scheduling difficulties, many of the meetings with First Nations took place much later in the project schedule than would have been desired. This made it impossible for most of the communities to review and respond to the draft report and overview map in time for their input to be incorporated into this report. However, draft and final copies of this report and the accompanying 1:250,000 scale overview map were provided to each First Nation in the study area, and community input can be accommodated through the MoF consultation process. As this AOA is an evolving planning tool, additional opportunities for First Nations involvement, including participation in field assessments, should be available in the future.

1.4 Report Structure

This report is organized in general accordance with Archaeology Branch guidelines for archaeological overview assessments (Apland and Kenny 1998). This introductory section has explained the AOA process and the context and objectives of the project. The second section describes a number of forestry development types that could potentially impact archaeological sites. Section 3 summarizes the physical setting of the study area, with discussions about the climate, vegetation, and physiography, both today and in the past. Section 4 briefly describes the traditional cultures of the First Nations of the study area, based on published information. Section 5 deals with the culture history sequence of the North Coast, and describes the main archaeological sites types and their expected spatial distribution across the landscape, as presently understood. Section 5 also presents a review of previous archaeological research in the study area. Section 6 presents the results of GIS analyses of the terrain and recorded sites in the study area. Sections 7 through 9 explain the methods and results of the predictive modelling component of the study, including a description of the data, the individual models, and the variables used to develop them. Section 10 briefly discusses the study results, and Section 11 provides archaeological resource management recommendations linked to the predictive modelling results. Appendices include a glossary of technical terms (Appendix 1), and attribute data for the recorded archaeological sites in the study area (Appendix 2).

2.0 POTENTIAL IMPACTS TO ARCHAEOLOGICAL SITES

Many forestry-related activities have the potential to damage archaeological resources, particularly culturally modified trees (CMTs). Direct impacts may include, but are not limited to, artifact breakage or displacement, destruction of features, and disturbance of stratified deposits. Examples of indirect impact include increased public access (which may lead to site looting or vandalism, or more gradual impacts from heavy use of an area) and possible increased rate of natural degradation (e.g., increased erosion following vegetation removal).

One goal of this study is to help identify archaeologically-sensitive areas so proper management measures can be implemented prior to ground disturbance. The following sections summarize some of the forest development activities that may affect the integrity of archaeological sites, based in part on discussions by Eldridge (1990) and Mackie and Eldridge (1992).

2.1 Falling

Different logging methods can create varying levels of disturbance to archaeological sites, although logging itself is often less destructive than associated developments such as road building and landing construction. Since all logging methods will destroy culturally modified trees, this discussion is most pertinent to buried or surficial archaeological deposits and features.

Hand falling has relatively little effect on buried archaeological deposits, and it may indeed be less destructive than windfalls, which can turn up sediments containing archaeological materials. Heavy equipment used in mechanical falling, in contrast, may severely impact archaeological sites or features lying on or near the surface.

2.2 Yarding

With the exception of helicopter logging, yarding activities have greater potential to impact archaeological sites than does falling. A skyline system or standard high-lead yarding may reduce the potential for damage to archaeological sites by lifting logs at least partially clear of the ground. The use of a carriage to increase clearance is beneficial, and a high-lead system is generally preferable to a low-lead. However, the use of heavy equipment at landing areas associated with this yarding technique can significantly disturb archaeological sites. Grapple yarding can add an additional source of ground disturbance through the use of a backspar to traverse areas without roads.

Skidders can cause severe ground disturbance, and even horse skidding can cause some surficial damage to archaeological sites. However, this problem — and those associated with many other yarding techniques — can be mitigated by restricting operations in archaeologically-sensitive areas to winter, when the ground is frozen and preferably covered with snow. Moreover, horse skidding may offer more flexibility in avoiding visible archaeological features.

2.3 Access Roads

Logging roads, and particularly mainlines, pose one of the most serious threats to archaeological sites because they often cover large areas, and they tend to follow subdued terrain where possible, which often has archaeological site potential. Many logging roads undoubtedly follow aboriginal trails and some have destroyed archaeological sites located along the trails. Road building severely disturbs the ground, and can completely destroy archaeological sites. Eldridge (1989) showed that road locations tend to correspond more closely with CMT locations than a random sample from nearby areas, and recent field assessments in the Fraser Canyon support this assertion (Golder Associates 1998). This suggests that ease of access may have been an important factor in aboriginal forest utilization. A potential indirect impact of road construction is increased public access to archaeological sites. Site vandalism is a serious concern in many regions of British Columbia, and it is an issue of great importance to many First Nations.

2.4 Associated Developments

Ancillary developments, such as log landings and sorting grounds can impact archaeological sites through terrain levelling and heavy equipment traffic. Artifact displacement and breakage are common types of damage associated with these developments Coastal log dumps often coincide with shell midden or aboriginal village locations, and ground disturbance can impact the upper levels of cultural deposits.

2.5 Silviculture

Certain reforestation techniques can be extremely damaging to archaeological deposits. Slash piling using bulldozers and skidders, stump removal, and scarification can severely disturb the ground. Tree planting, thinning, and pruning, in contrast, should have relatively little effect on archaeological sites, as long as skidding is not involved.

3.0 PHYSICAL SETTING

3.1 Modern Environment

The North Coast TSA covers an area of approximately 1.95 million hectares, from Meyers Passage (near Klemtu) north to Stewart. Much of the landscape along the coast is rugged, featuring narrow fjords and channels that rise steeply to glacier-covered mountains. Access to inland portions of the TSA from the coast is limited. Several large islands, including Princess Royal, Banks, Pitt and Porcher, are within in the TSA, as are the lower reaches of the Nass and Skeena rivers.

3.1.1 Biogeoclimatic Zones

Most of the TSA falls within various subzones of the Coastal Western Hemlock (CWH) biogeoclimatic zone, with the Mountain Hemlock (MH) zone occurring at higher elevations, and Alpine Tundra (AT) prevailing above the tree line. A very minor amount of the Engelmann Spruce-Subalpine Fir (ESSF) is also present. Figure 2 shows the biogeoclimatic zones of the North Coast TSA.

CWH Zone

The CWH zone covers low to middle elevations throughout the North Coast, extending from sea-level to about 400-450 metres a.s.l. Pojar et al. (1991) provide a thorough description of the plant and animal species characteristic of the Coastal Western Hemlock zone. The forests of the CWH zone are dominated by Western hemlock and Pacific silver (or amabilis) fir, but Western redcedar and Yellow cedar are often abundant. The understory in the CWH zone is generally lush, and it contains a number of food species important to First Nations' traditional diets.

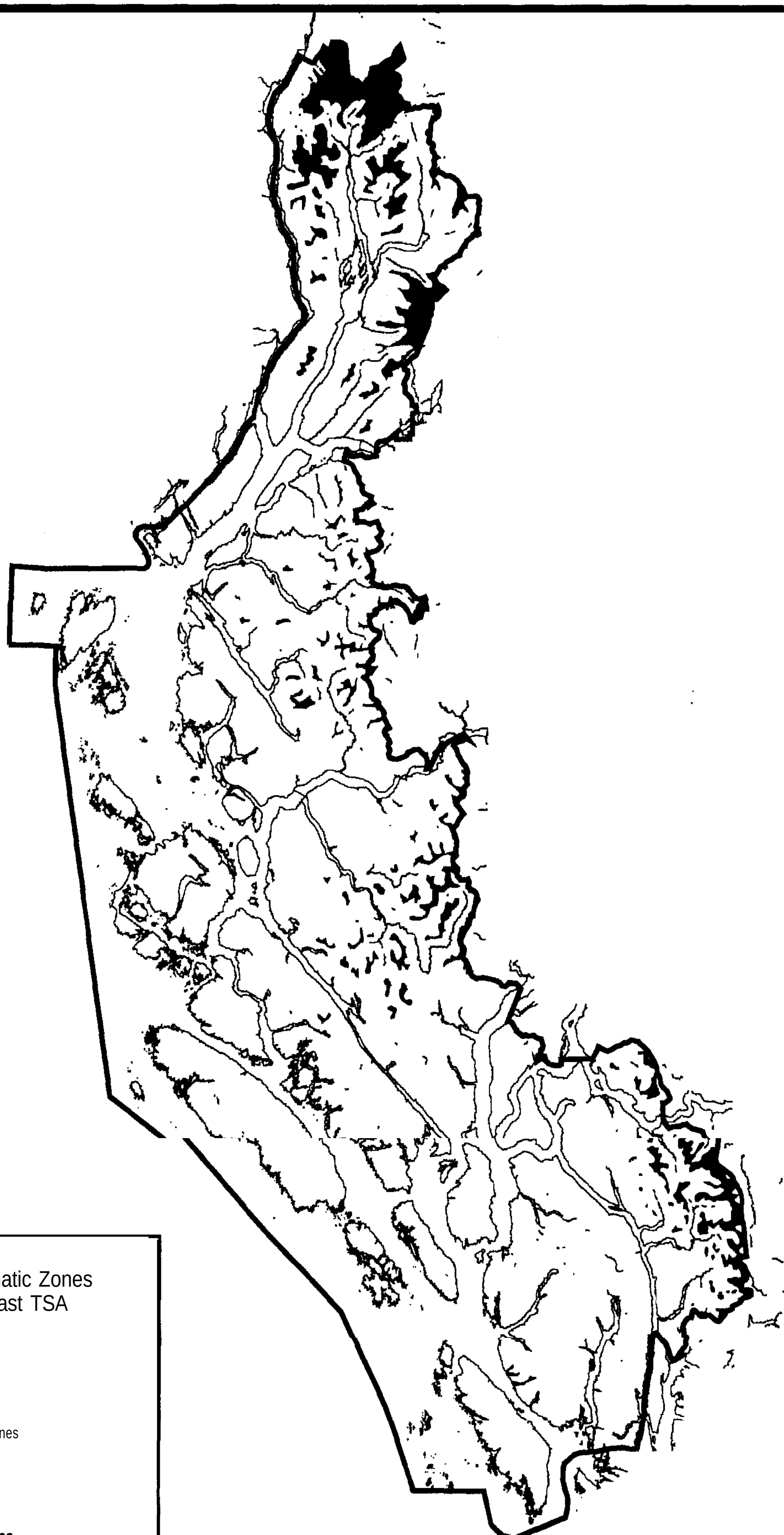

FIGURE 2: Biogeoclimatic Zones
of the North Coast TSA

N

Study Area

Biogeoclimatic Zones
AT
CWH
MH
ESSF

scab - 1:1,750,000
10 0 10 20 30 Kilometers

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Projection: UTM Zone 9
Datum: NAD 83

oject: GIS 3 - c:\992-1504\apps\report\biogeo.apr Layout: 8.5 by 11 - Portrait

Economically-important mammal species include marten, mule deer, black bear, grouse, mountain goat, and various species of waterfowl. Low-lying areas near tidal inlets are inhabited by sea mammals such as harbour seals and Steller sea lions. Throughout the CWH zone, streams and rivers provide spawning habitat for salmon and other fish, such as the economically important eulachon. Intertidal invertebrates are diverse, and include economically significant species such as mussel, cockle, abalone, limpets, butter clam, little-neck clam, octopus and sea cucumber.

Mountain Hemlock (MH) Zone

The Mountain Hemlock (MH) biogeoclimatic zone is characteristic of montane slopes and subalpine areas of the Coast Mountains above the CWH zone, at elevations between about 400 and 1,100 metres (Allen Banner-man, pers. comm. 2000). The characteristics of this zone are surmnarized in Pojar et al. (1991).

Dominant tree species in the MH zone include mountain hemlock, Western hemlock and amabilis fir, with redcedar, yellow cedar and subalpine fir found in smaller proportions. Common shrubs in the MH zone include Alaskan and oval-leafed blueberry, black huckleberry, salmonberry, bunchberry and lady fem. Due to the long period of snowpack, the diversity of animal species is low. Notable mammals include snowshoe hare, black bear, mule deer, Roosevelt elk and mountain goat.

Alpine Tundra (AT) Zone

The Alpine Tundra (AT) biogeoclimatic zone, which characterizes the highest elevations of the mountains of the North Coast, consists of treeless meadows, windswept ridges, snowfields and icefields in high elevation mountainous terrain (Pojar and Stewart 1991). Harsh conditions prevail in the AT zone and much of this area lacks vegetation, being typically covered with rock, ice and snow.

Engelmann Spruce-Subalpine Fir (ESSF) Zone

The Engelmann Spruce-Subalpine Fir zone lies below the Alpine Tundra on the eastern side of the Coast Mountains. Abundant plant and animal resources made the ESSF zone important to aboriginal economies. Tiger lily, avalanche lily, cow parsnip, and saskatoon berry are some of the ESSF zone plant species used by First Nations groups for food, and common juniper, stinging nettle and other plants were used in traditional medicines. The extent of ESSF zone in the North Coast TSA is almost negligible.

3.2 Palaeoenvironment

Four aspects of the palaeoenvironment are particularly relevant to archaeological site distribution: (1) deglaciation, which dictated when the environment was capable of sustaining human settlement; (2) sea level changes after deglaciation, which influenced the locations of ancient shoreline sites; (3) changes in the tree line and associated resources, which may have affected high elevation site locations; and (4) the establishment of cedar forests, which contributed to the development of the sophisticated wood working tradition of Northwest Coast First Nations. Each of these factors is discussed below in terms of its potential influence on archaeological site distribution.

3.2.1 Deglaciation

Like most of British Columbia, the North Coast was covered by ice during the glacial maximum of the Pleistocene approximately 16,000 years ago. According to Clague et al. (1982), the parts of the coastline were buried beneath as much as 2,000 m of ice, but glaciers on the outer coast were not as thick (Clague 1985). It is generally accepted that the outer coast was essentially ice free by about 13,000 years ago, although glaciers remained in the fjords and valleys. Based on these data, it can be inferred that the coastal fringe and marine islands could have been occupied by about 13,000 years ago.

3.2.2 Relative Sea Level

An understanding of variations in relative sea level over time is important for interpreting early human occupation of the coast. The initial settlement of the New World may have followed a southward route along the edge of the northwest coast, and there is potential for very early sites in this region. If early coastal cultures relied on the sea for subsistence and transportation, settlement locations likely would have been concentrated along the shoreline (Easton and Moore 1991). The following discussion examines relative sea levels since the end of the Pleistocene, and the implications for archaeological site distribution.

The term "relative sea level" is used to distinguish between localized shoreline conditions and global eustatic sea levels. Relative sea level reflects a combination of actual sea level changes and the effect of isostatic rebound (the rising of land that was previously depressed by the weight of ice). Tectonic plate movement is also a minor factor, but it is not considered significant within the time frame discussed here. Because ice build up was not uniform along the coast, isostatic rebound may have been the dominant factor in regional variations in relative sea level. The magnitude of rebound was greater in the fjords and valleys, where the thickness of glacial ice was greatest. This means that archaeological sites on ancient beaches or sea terraces generally would be found at higher elevations in the fjords than on the coast, assuming similar ages.

Relative sea levels have varied significantly since deglaciation at the end of the Pleistocene (ca. 13,000-10,000 B.P. [before present]), but data specific to the North Coast are sparse and localized (Archer 1998). In general, relative sea levels were lower than today during the late Pleistocene, due to the capture of water in glaciers, and some coastal areas that are currently submerged would have been exposed at that time (Josenhans et al. 1995). Relative sea levels were significantly higher during the period of deglaciation between about 15,000 and 10,000 years ago on the North Coast (Blaise et al. 1990), although the maximum level reached during this time is not known.

Archer (1998) has proposed a sea level curve for the Prince Rupert area, based on a small sample of dated raised beach deposits and archaeological evidence. He proposes that the basic post-glacial sea level pattern for the area is clear, but that some minor questions remain unresolved (e.g., relative sea level between 8,000 and 5,000 years ago). A dated beach deposit at Port Simpson shows that ±12,400 years ago the sea level was 50 m higher than today. Between ±12,400 and ±12,100, the sea level dropped rapidly to about 13 m above present (a drop of 37 m in only about 300 years). Over the next 3,000 years or so, sea levels dropped slowly, to a level about 5 m above present by ±8,000 years ago. No data are available for the North Coast between ±8,000 and ±5,000 years ago, but elsewhere on the coast, the sea level dropped to slightly below modern levels (Archer 1998). If Archer's interpretations are correct, then early sites in the Prince Rupert area could be found on sea terraces or raised beaches up to about 50 m above current sea level.

In contrast, marine deposits radiocarbon dated to about 10,500 B.P. at the heads of fjords in the Kitimat Trough are 200 metres above present sea level (Clague 1985). This

B.P. on the North Coast (Matson and Coupland 1995).

probably indicates significantly greater isostatic rebound in the Kitimat area than in Port Simpson, due to heavier Pleistocene ice loading. Presumably, post-glacial beaches and terraces older than ±10,500 years in the Kitimat Trough would be at even higher elevations. These data suggest that late-Pleistocene and early-Holocene archaeological sites, if present, will tend to be at higher elevations in coastal river valleys and fjords than on the coast. For the North Coast TSA, palaeoshorelines may be present from just above the present sea-level, up to about 200 metres a.s.l.

3.2.3 Tree Line

Throughout the Holocene, forests expanded and contracted in response to climate shifts. During cooler periods, the tree line would have been lower than today, and during warmer climatic episodes the tree line would have been higher than today. Archaeological sites associated with subalpine parklands at the upper forest fringe, if present, may now be in the forest or in the alpine.

3.2.4 Establishment of Cedar Forests

Western redcedar and, to a lesser extent, yellow cedar, have long been the primary materials used by the aboriginal people of the Northwest Coast to build houses and to make canoes, boxes, basketry, clothing and a host of other utilitarian and ceremonial items. However, the establishment of western redcedar and yellow cedar on the North Coast appears to be relatively recent, in archaeological terms. Hebda and Mathewes (1984) used palaeobotanical data to document the expansion of western redcedar in coastal forests between approximately 6,000 and 2,500 B.P. Their data indicate that cedar gradually expanded into the North Coast beginning ±6,000 years ago, but it did not become a major species in the Prince Rupert region until about after 4,000 years ago.

These findings correspond with early archaeological evidence for the development of woodworking technology among northwest coast aboriginal cultures, which suggests that specialized woodworking tools, such as adzes, were not common until about 3,500 years B.P. on the North Coast (Matson and Coupland 1995).

4.0 FIRST NATIONS OF THE NORTH COAST

4.1 Introduction

The following section provides a brief summary of the First Nations cultures on the North Coast. This review is not exhaustive, and it emphasizes aspects of the aboriginal cultural systems that are most likely to leave physical traces that can be identified archaeologically. This summary may not necessarily express the views of the First Nations people it describes. Many of the linguistic and cultural links described below are anthropological classifications, and they do not necessarily reflect how contemporary First Nations would define their past.

It is important to note that the use of the past tense to describe traditional cultural practices in the following sections reflects the use of ethnographic and historic sources and is not intended to imply that these activities no longer occur. Many of the traditions described in this report remain integral to the cultures of First Nations throughout the North Coast area.

4.2 First Nations Communities in the North Coast TSA

Based on First Nations' Statements of Intent submitted to the B.C. Treaty Commission and additional information provided by the Ministry of Forests, the North Coast TSA falls within the traditional lands of the Tsimshian, Nisga'a, Haisla, Heiltsuk, and Gitanyow Nations. Aboriginal communities within the TSA include the Tsimshian villages of Lax-Kw'alaams, Metlatkatla, Kitkatla, and Hartley Bay, as well as the Nisga'a villages of Kincolith and Greenville. The Kitasoo village of Klemtu is just south of the TSA boundary. Some aspects of the cultures of these First Nations are summarized below under the generalized headings of Tsimshian (Coast Tsimshian, Southern Tsimshian and Nisga'a), Haisla, and Heiltsuk. On the direction of the North Coast Forest District, the Gitanyow were not included in this study because, according to the Ministry of Forests, no operable forest areas of the North Coast TSA fall within Gitanyow Statement of Intent lands.

4.2.1 Tsimshian

Significant linguistic and cultural variation is evident among the First Nations of the North Coast, but general similarities exist, particularly in terms of socioeconomic organization and material culture. For this reason salient aspects of Coast Tsimshian, Southern Tsimshian and Nisga'a culture are discussed collectively under the general heading of "Tsimshian". After a brief introduction to the local groups that comprise these three broader cultural groupings, aspects of Tsimshian culture are summarized,.

4.2.1.1 Coast Tsimshian

The Coast Tsimshian are comprised of ten local groups that historically had winter villages on the lower reach of the Skeena River, below Kitselas Canyon. These local groups were known as the Gitwilgyot, Gitzaklalth (Gidzalaal), Gitsees (Git'tsiis), Ginakangeek (Ginaxangiik), Ginadoiks (Gitandoyks), Gitandau (Git'andoo), Gispakloats (Gispaxloats), Gilutsau, Gitlan, and Gitwilkseba. Prior to the arrival of Europeans in the region, these groups expanded coastward and established winter villages on the islands of Venn (Metlakatla) Pass. During the summer, the local groups returned to their territories on the Skeena to participate in the salmon fishery (Halpin and Seguin 1990).

Other groups that are considered Coast Tsimshian include the Kitselas, who now live in two villages at Kitselas Canyon on the Skeena River, and the Kitsumkalum, who lived below the Kitselas at the mouth of the Kitsumkalum River (Halpin and Seguin 1990) and now live near Terrace. These two groups are also members of the Tsimshian Tribal Council.

4.2.1.2 Southern Tsimshian

The Southern Tsimshian are comprised of three local groups, the Kitasoo, Kitkiata (also known as the Gitga'at or Hartley Bay Band), and the Kitkatla (Halpin and Seguin 1990). The original village of Kitkiata was abandoned in the late 1800s as people left to join Reverend William Duncan's mission village of Metlakatla (and later New Metlakatla in Alaska). The present village of Kitkiata is located at a new site (Hartley Bay) and is inhabited by the descendents of those who did not follow Duncan to his New Metlakatla in Alaska (Halpin and Seguin 1990).

4.2.1.3 Nisga'a

According to Halpin and Seguin (1990), the Nisga'a living along the lower reach of the Nass River were divided into two groups — the Gitkateen and the Gitgigenik — and the Nisga'a of the upper Nass were divided into two more groups — the Gitwunksithk and the Gitlakdamiks. These latter two groups were also known as the kitanwili•'ks, "the people staying temporarily". This name was in reference to their downstream migration during the annual eulachon fishery (Halpin and Seguin 1990). Today, the main Nisga'a communities are known as Gingolx (Kincolith), Lakalzap (Greenville), Gitwinsilkw (Canyon City), and Gitlakdamiks (New Aiyansh).

4.2.1.4 Tsimshian Culture

Introduction

The following is a summary of Tsimshian and Nisga'a ethnographic information largely derived from Halpin and Seguin (1990) and the Kitasoo/Xaixais First Nations Resource Mapping Project (1995). Other materials that were consulted include the Marius Bar-beau and William Beynon microfilm collection currently stored at the British Columbia Archives and Records Service in Victoria and the ethnographic review provided in the North Coast Forest District Cultural Heritage Mapping Project (Commonwealth Historic Resource Management Ltd. and Millennia Research 1996). For more detailed information on Tsimshian language, kinship, ceremony and other cultural aspects consult Halpin and Seguin (1990), Garfield (1939, 1966, 1984).

Language

The Coast Tsimshian, Southern Tsimshian and Nisga'a each spoke their own distinct languages. While the Coast Tsimshian and Southern Tsimshian languages were common in many respects and clearly related, it is not clear if they were mutually intelligible. The Nisga'a spoke a language that was different from their coastal neighbours, but they also spoke Coast Tsimshian to facilitate communication with their Coast Tsimshian neighbours to the west (Halpin and Seguin 1990).

Settlement Pattern and Subsistence System

Among the Tsimshian, winter villages were typically inhabited year-round by at least a portion of the community. Their locations were generally sheltered from strong winter winds and somewhat protected from attack. Village sites were also usually near a source of fresh water and had plant and food resources nearby (Halpin and Seguin 1990).

Throughout the year, segments of the village population would travel to temporary or semi-permanent resource camps to collect seasonal resources. For example, at end of winter, before spring break up (February-April), the annual eulachon fishery took place at fishing camps on the Nass River.

In the late winter or early spring, herring roe was gathered on grass, kelp, or submerged branches. In addition, the inner bark of redcedar, used for a variety of purposes, was gathered during this time, as was the edible cambium of several tree species.

In the early spring (May), the Coast and Southern Tsimshian gathered and dried seaweed for approximately one month at special seaweed camps along the coast. The Nisga'a obtained seaweed, which was not locally available to them, through trade with the coastal groups. While at these camps, men fished for halibut and women processed the meat. Men would also troll for the first salmon that would appear in the tidal waters during early spring. It has been suggested that for the Coastal Tsimshian peoples, halibut was second only to salmon in terms of dietary importance (Beynon 1929-30 in Barbeau Collection [B-F-168.2]).

In early summer the people moved to traditional fishing sites along the rivers to fish primarily for the five species of salmon. Women would also use the summer months to harvest a wide variety of berries (including salmonberries, wild crabapples, and high bush cranberries in autumn), roots, and shoots.

Much of the early autumn was spent smoke drying and preserving salmon. Following the preservation of winter foods, small groups of hunters would proceed to their hunting territories in search of sea and land mammals. Game taken by the Tsimshian included deer, elk seal, sea lion, sea otter, mountain goat, mountain sheep, bear, marmot, porcupine, mountain lion, hare, lynx, swans, geese, ducks, and other waterfowl (Halpin and Seguin 1990). Due to their inland setting, the Nisga'a had a greater emphasis on land mammal hunting.

Winter was the season of ceremony and rest. Potlatches and other major ceremonies would take place in the winter villages. While the villagers depended upon stored salmon and other preserves, some hunting also took place. Shellfish, always an abundant and accessible resource, were also gathered in the winter months (Halpin and Seguin 1990).

Habitation Structures

The largest Tsimshian structure at the time of contact was the winter house, which was comprised of massive planks split from redcedar logs attached to a post and beam frame. Winter houses were roughly 15 m to 18 m long, with chiefly families occupying cubicles at the rear and other families having quarters along the side walls. These dwellings usually featured plank-lined pits about 1.5 m deep and 9 m square, which formed the central living space and contained a central hearth for warmth and cooking. Platforms above the living area were used for living and storage purposes. House fronts were painted with crest designs, and wooden screens, painted with sacred designs, were erected inside at the rear of the house.

The winter house frames were left in place year round, but the planks were sometimes removed and carried to spring and summer camps for use in temporary summer house structures. Other structures typically used by Tsimshian peoples included menstrual huts, sweat lodges, summer houses, and underground food caches (Halpin and Seguin 1990).

Material Culture

The Tsimshian are noted for their fine basketry. On the coast, women used cedar bark for basketry and mats; upriver, women used additional materials, including maple, birch bark, and spruce roots (Halpin and Seguin 1990). Utilitarian items, including storage boxes, canoes, woodworking tools, and fishing and hunting gear were manufactured from various types of wood, but cedar was a dominant material.

Woodworking tools, fishing and hunting gear, and ceremonial items were also fashioned from stone, bone, antler, shell, and mountain goat horn.

Post Contact History

The Southern Tsimshian were the first division of the Tsimshian to come into contact with Europeans. In 1787, a fur-trading expedition run jointly by Duncan and Colnett is believed to have visited the village of Kitkatla and, in 1792, the Spanish explorer Jacinto Caamaño visited a village on Pitt Island. Captain Vancouver explored Coast Tsimshian waters and sailed up Portland Canal into Nisga'a territory in 1793. The Hudson's Bay Company's Fort Simpson was established on the Nass River in 183 1.

The continuing presence of the fur traders and the influx of European settlers and missionaries had a profound effect on the aboriginal inhabitants of the coast and, despite the attempts of missionaries to assimilate Native cultures, Tsimshian culture remained resilient. There were, however, changes to Tsimshian lifeways that resulted from the shift to trapping for trade, a minor gold rush along the Skeena, disease, the establishment of commercial salmon canneries, and migration of some Tsimshian peoples to Alaska.

4.2.2 Haisla

Introduction

The following summary of Haisla culture is largely derived from Hamori-Torok (1990). Other useful sources concerning Haisla ethnography include Drucker (1940, 1950), Lopatin (1945), Olson (1940), and Robinson (1962). Haisla territory is situated in the upper reaches of Douglas Channel and Gardner Canal on the inner north coast of British Columbia. In the 19th Century there were two main divisions of Haisla: the Kitamaat who resided in the Douglas Channel area, and the Kitlope of Gardner Canal (Hamori-Torok 1990:306).

Language

The Haisla speak a northern variant of the Wakashan language (sometimes known as Northern Kwakiutl), though they are somewhat isolated from their nearest linguistic relatives, the Haihais (Xaixais), Heiltsuk, and Oweekeno. It should be noted however, that some Kitamaat and the Kitasoo XaiXais people today are also Tsimshian speakers.

Settlement Pattern and Subsistence System

Similar to the Tsimshian groups to the north, the Haisla occupied principal winter villages year-round, with segments of the population traveling seasonally to various resource sites.

The Haisla harvested all five species of salmon, but coho, chum, and pink were the most important. Salmon were caught in salt water using stone tidal pounds and in fresh water rivers using weirs and traps. The Haisla also used leisters, harpoons, dip nets, and trawl nets (Hamori-Torok 1990). Like the Tsimshian, eulachon was very important to the Haisla, who traveled to the major rivers to catch it.

Land mammals were an important resource for the Haisla. In the alpine, hunting dogs were used to drive mountain goats into enclosed areas where they could be speared. Similarly deer were driven into water using dogs, and marmots, black bears, and grizzly bears were caught using dead fall traps (Hamori-Torok 1990).

Women gathered berries and other plant foods. Berries were considered very important, and the Haisla conducted controlled burns to enhance berry growth. The Kitlope area of Haisla territory was well-known for wild crab apples, and people from other territories also had harvesting rights (Hamori-Torok 1990).

Habitation Structures

The largest of Haisla structures was the winter house which was a beam and ridge pole structure with vertical wall planks, a gabled roof and a painted façade. The centre of the house contained a fire pit used for cooking and heating. The walls of the sleeping areas were lined with cedar bark mats (Hamori-Torok 1990).

Material Culture

Haisla men carved a variety of wooden utilitarian items including boxes and chests. They also wrapped twining and made burden and storage baskets (Hamori-Torok 1990:308). Women made basketry and wove mats and fabric for clothes. Typical clothing consisted of spruce root rain hats and woven yellow cedar bark robes or sewn hides. The women wore shredded cedar bark or buckskin aprons, and, when travelling overland, people wore protective leggings.

Transportation in Haisla territory was primarily by canoe. Though most canoes were made of cedar, those used on rivers were occasionally made of cottonwood. The Haisla also made and used snowshoes.

Post Contact History

It is unclear when first contact between Europeans and the Haisla took place. Members of Jacinto Caamaño's crew took a boat up Douglas Channel during the Spanish exploration of the area in 1792, and members of the George Vancouver expedition of 1793 explored both Douglas Channel and Gardner Canal. Although they were probably somewhat affected by the maritime fur trade, it wasn't until the early 1830s that the Haisla were trading and selling directly to the Hudson's Bay Company at Fort McLoughlin, established near Dean Channel in 1833 (Hamori-Torok 1990).

The Haisla were first introduced to Christianity by Charlie Amos, a Kitamaat native converted in Victoria in 1876 (Hamori-Torok 1990). The breakdown of Kitamaat religious and sociopolitical structures was initiated by the establishment of Kitimaat mission by the Reverend George Raley of the Methodist Church in 1893. A Roman Catholic mission was established among the Kitlope people at Kemano shortly after (Hamori-Torok 1990). The government ban on the potlatch and associated practices resulted in the further breakdown of traditional Haisla social organization.

In the late 19th and early 20th centuries, the Kitamaat and Kitlope bands were allotted several reserves, and in the 1930s the two bands amalgamated. During the early half of the century and extending to the 1950s, commercial fishing and cannery work became the main sources of employment for the Haisla peoples. Commercial hand-logging and trapping also served as other sources of income. In the 1950s, the establishment of the Alcan aluminum smelter and the town of Kitimat brought another major change in the local economy. By the 1970s the smelter and associated businesses in Kitimat were the major employers of many local Haisla people.

4.2.3 Heiltsuk

Introduction

The following summary of Heiltsuk culture is based on Hilton (1990) and the summary in Millennia Research (1997a,b). Other ethnographic sources include Boas (1928, 1932), Olson (1955), and Storie and Gould (1973a, 1973b).

The Heiltsuk Nation is comprised of a number of local groups that owned and used villages and resource sites on the coastal islands and on the mainland. Today, five local groups are recognized: the ‘Yidsaitxv of Dean Channel and Burke Channel, the ’Wúyalitxv of the Fitzhugh Sound area, the ’Qvúqvayitxv north of Waglisla, from Milbanke Sound up Spiller Channel and Spiller Inlet, the ’WúíʌitxV of Roscoe Inlet, and the ʸXíxís from Milbanke Sound up the channels as far north as Kynoch and Klekane Inlet (Heiltsuk Cultural Education Centre cited in Millennia Research 1997b).

Language

The Heiltsuk language is considered a part of the northern branch of the Wakashan language group.

Settlement and Subsistence System

Similar to First Nations to the north, the Heiltsuk settlement and subsistence pattern changed with the availability of seasonal resources within local group territories. The primary settlement site was the winter village which was likely occupied by some villagers throughout the entire year. However, as specific resources became available (e.g., the salmon fishery) a large segment of the population moved to semi-permanent camps associated with these resource sites. These locations were owned by families, local groups, or crest groups. In the winter, families returned to permanent villages to celebrate the ceremonial season and manufacture or repair equipment (Hilton 1990).

The Heiltsuk used a wide variety of subsistence technologies to fish and to collect shellfish and marine plants. Salmon were caught using stone wall traps or wooden stake weirs and traps, harpoons, dipnets, and clubs. Sea foods such as clams, abalone, and seaweed were gathered during resource harvesting expeditions. Sea mammals, including seals, sea lions, and sea otters, were hunted using harpoons, clubs, and the bow and arrow. Land animals, such as mountain goat and deer were hunted with dogs and either snared or speared, and bears and small game were caught in deadfall traps. Archaeological evidence of these pursuits may include artifacts (stone, bone or wood artifacts), remains of deadfall traps, or stone or wood fish traps and weirs.

Habitation Structures

Heiltsuk winter villages featured rectangular cedar plank houses with gabled roofs, double ridge poles, vertical wall planks permanently attached to the house frame, carved interior posts, a central smoke-hole, and mat-lined walls in the sleeping compartments. Less elaborate, but similar, plank houses were also built at major seasonal resource sites in areas where seasonally available marine and riverine resources were abundant. Bark houses were used at hunting stations and minor camps (Hilton 1990).

Material Culture

Heiltsuk clothing and adornment styles were similar to those of neighbouring groups. The most distinctive practice was the combination of the northern custom of wearing labrets (reserved for high-status women) and the practice of cranial modification. Labrets are sometimes found in archaeological sites, and cranial deformation may be evident in human burials.

Heiltsuk society also had a strong tradition of highly skilled artisans, noted for the production and decoration of bentwood boxes, chests, canoes, and horn spoons and ladles. Such items are sometimes preserved archaeologically.

The canoe was the principal mode of transportation, with a cedar dugout style used for sea travel and a bark canoe used on lakes. While wooden canoes are infrequently recovered in archaeological sites, evidence of their manufacture may include aboriginally-logged trees, canoe blanks, and wood working tools.

Trade

Within the North Coast Forest District, Heiltsuk lands border those of the Tsimshian and Haisla. Trade in eulachon grease, clams, herring roe, and seaweed was a vital part of relations between neighbouring groups. Material items associated with subsistent trade may be found in archaeological sites.

Post Contact History

The first recorded contact with Europeans occurred in 1793, when two explorers separately entered Heiltsuk territory. Captain George Vancouver surveyed local channels and inlets while heading north, while Alexander Mackenzie traveled overland down the Bella Coola Valley and into Dean Channel. Soon after these initial explorations, maritime fur traders seeking valuable sea otter pelts entered Heiltsuk territory, often stopping at Milbanke Sound to trade. The fur trade instigated a period of rapid social and economic change for the Heiltsuk and other First Nations along the Coast. In 1833, the Hudson's Bay Company established a second major trading center, at Fort McLoughlin on Campbell Island, and it remained the only fort and trading store on this part of the British Columbia coast for many years. The establishment of two trading centers (Milbanke Sound and Fort McLoughlin) within their territory allowed the Heiltsuk to position themselves as middlemen and to exert control on the competition between the British and the Americans.

While the fur trade provided some economic benefits for northwest coast First Nations, European diseases, most notably smallpox, swept through the region, causing a massive decline in aboriginal populations. Boyd (1994) reports smallpox epidemics in the late 1770s, 1801-02, 1836-38, 1853, and 1862-63. The extensive 1770s epidemic reportedly affected the entire Pacific Northwest (Boyd 1990), while subsequent outbreaks were more localized. For example, the 1836-38 epidemic apparently affected the 'Yídsáitxv and 'Xíxís sub-tribal groups more drastically than other Heiltsuk groups, due to the distribution of vaccines to those groups from Fort McLoughlin. Using culturally modified tree data, Lepofsky and Pegg (1995) documented evidence that this epidemic also affected the Haisla to the north. In 1862 a devastating smallpox epidemic spread from Victoria and nearly decimated the Heiltsuk (Millennia Research 1997b).

5.0 ARCHAEOLOGICAL CONTEXT

5.1 Expected Archaeological Site Types and Distributions

An archaeological site is a location containing physical evidence of past human activity, usually in the form of artifacts or cultural features. Artifacts are human-made or modified objects, such as tools of stone, bone, shell, antler and wood. Cultural features are modifications to the landscape that cannot be moved without altering them: fire hearths, culturally modified trees, and trails, for example.

Artifacts of metal and stone are the most resistant to decay and are most often preserved in archaeological sites. Other relatively durable materials include shell, bone, antler, and horn, especially when contained within non-acidic soil matrices, such as shell middens. Wood and other plant materials are rarely well preserved in archaeological sites, except under specific conditions, such as waterlogged deposits. This significantly limits the amount of information that can be recovered archaeologically, especially on the northwest coast, where aboriginal technologies relied heavily on wood, bark, and other plant materials.

The following is a summary of the major types of archaeological sites that can be expected in the North Coast study area.

5.1.1 Culturally Modified Trees

Oral histories, ethnographies, and archaeological reports clearly show that western redcedar wood and bark were extremely important raw materials for northwest coast aboriginal cultures. Although most wooden implements are not archaeologically preserved, there is abundant archaeological evidence of bark and wood harvesting in the form of culturally modified trees (CMTs). CMTs are trees that have been altered by aboriginal people as part of their traditional use of the forest (Ministry of Forests 1998). The most important tree species to the First Nations of the North Coast was the western redcedar, but yellow cedar, cottonwood, western hemlock, western yew, and other trees were also used (Turner1998).

The First Nations of the North Coast are well-known for their sophisticated woodworking and cedar bark-working technologies. Trees were felled, trimmed and rough-hewn with wedges and then pulled out of the forest and towed to the village for more refined working. Prior to felling, a hole was often chopped into the trunk of the tree to test the soundness of the heartwood, a consideration that was particularly important when looking for a tree suitable for a canoe or planks. Stone mauls and chisels with bits of stone, bone, and antler were the traditional means of felling trees until the post-contact period, when iron chisels and axes became abundant. Planks were split from felled logs, wind-fallen trees, and standing trees by a notch-and-wedge technique. Log sections were shaped into canoes in the forest. Due to their size, stumps of various types (dependant on the felling technique employed), planks, planked logs and windfall, tested trees, and unfinished canoes all have the potential to survive several hundred years in the forest and to be identifiable as archaeological sites (Ministry of Forests 1998).

The inner bark of the cedar was collected by pulling long, narrow strips beginning from a cut near the base of the tree, which was preferably young and devoid of lower branches. The outer bark was discarded at the harvest site and the inner bark transported to the village for processing. On the North Coast, large slabs of outer cedar bark (sometimes called bark boards) were used for the roofing of temporary shelters and the covering of canoe logs in the forest (Ministry of Forests 1998). Because the trees survive the bark-stripping event, evidence of harvesting is identifiable as an archaeological site for as long as the tree survives, and for some time after.

Expected Distribution

Little research has been undertaken regarding the association of CMTs with other site types, but preliminary indications are that CMT sites may correlate with shoreline villages, middens, drainages, and trails (Millennia Research 1996, Archer 1990, Turner 1998). Recent impact assessments in the Kumealon Inlet and Work Channel areas suggest that wood and bark procurement sites (represented by CMTs) tend to be in close proximity to known habitation sites (Arcas Consulting Archeologists 1998). However, given the predominant use of western redcedar and the wide distribution of cedar within the study area, forest utilization sites have also been found in other contexts.

CMTs are often identified near the foreshore area, but they have also been recorded several kilometres inland, and on landforms ranging from flat beaches to steep slopes. According to The Bastion Group (1996a), culturally modified trees occur randomly within the Hevenor Inlet area, but are present in greater densities near lakeshores. Turner (1998:77) indicates that different cultural groups had individual bark collection strategies, but that the general pattern involved travelling "long distances along creeks and into the mountains to find trees with suitable bark for harvesting".

In Kitkatla territory, Archer (1990) reported that virtually no information was available in the ethnographic literature regarding logging and bark stripping locations, but that these sites would be included in the "exploitation territory of an occupation site". In other words, most CMT sites should be accessible from habitation sites.

While CMTs of red and yellow cedar, as well as hemlock, have been found on the North Coast, the vast majority of recorded CMTs are western redcedars. Due to the extent of past logging, intact CMT sites are most commonly found in stands of old growth forest.

5.1.2 Habitations and Shell Midden Sites

Habitation sites are locations that were used for permanent, semi-permanent, or short-term residence, and they may be characterized by features such as house depressions, platforms, caves and rockshelters, hearths, and refuse deposits, such as shell middens.

Shell midden sites most often represent household refuse deposits resulting from the extended use of a habitation site, but they may also indicate non-habitation shellfish harvesting and preparing areas. The primary component of middens is shell, generally dominated by clam or mussels, but also including other species. Other common constituents of habitation-related midden deposits include animal and fish bone and fire-cracked rock. The midden soil matrix is typically highly organic, black, and greasy, with a high ash or charcoal content.

In their description of two midden sites in Kiltuish Inlet, Mackie and Eldridge (1988) noted that 90% of the matrix was composed of crushed mussel shell, cockle, marine snail, barnacle and charcoal. A small portion of the midden consisted of fire broken rock. In addition, they noted that, unlike many other shell middens, fish and mammal bone were not present in large numbers. In the Prince Rupert Harbour area however, shell middens indicate a broad hunting-fishing-gathering subsistence base, characterized by a shifting focus on various resources throughout time (Fladmark et al. 1990).

Midden deposits are frequently found in association with other archaeological components, such as house platforms, burials, and canoe runs. The size of a midden is widely assumed to reflect the length or intensity of occupation, although this may not always be the case (see Hobler 1990).

Due to their inferred use as refuse dumps, artifacts (typically broken) are commonly recovered from shell middens, although usually in small numbers. However, artifact density varies greatly between middens, and in some cases artifact totals can be exceptionally high. Because of their range of cultural materials and long periods of deposition, shell midden sites can be important for the development of cultural chronologies. The possibility of discovering temporally diagnostic artifacts in datable stratigraphic contexts makes middens an extremely significant site type.

Human remains are also often associated with shell midden deposits, indicating that not all middens are refuse dumps. Carlson (1998) suggests that shell or shellfish may have been used as offerings to the dead, and that some shell middens should be considered sacred sites.

Expected Distribution

Along the coast, the majority of habitation sites, especially those occupied during the windy winter season, are expected to be located on beaches, near sources of fresh water, in protected locales suitable for landing canoes.

Archer (1990) notes that Kitkatla winter village sites were located on salt water, facing the ocean. Preferred localities were relatively level and well-drained, with a beach suitable for landing canoes. No mention is made of fresh water being a requirement for site location.

The Bastion Group reports that habitation sites, including villages, camps, and processing areas (i.e., shell middens) are generally located on well-developed landform features near shorelines and rivers (The Bastion Group 1996b). These locations were chosen to take advantage of a variety of factors such as "1) the supply of fresh water, 2) the relatively easy access to land-based resources provided by the low slope of the surrounding hinterland 3) the presence of a suitable canoe beaching area, 4) a nearby defensible position, and 5) shelter from wind and heavy weather" (Halpin and Seguin 1990).

Drucker (1943:29) also reported that village sites are found along the shoreline, stating "One need not wonder that the natives were beach dwellers who penetrated the woods but rarely. Dwelling along the shore, they were conveniently situated to exploit the vast aquatic food resources of the area – fish (salmon of five species, herring, eulachon, halibut, etc.), mollusks, and for variety, various marine mammals, and birds". Specifically, he mentions a midden at McLoughlin Bay on Campbell Island that extends about 1,000 feet from the mouth of a creek, flowing into the bay (Drucker 1943: 105).

Harlan Smith mentions numerous shell midden sites on islands on the North Coast (in Capes 1976). Burial caves are reportedly present near several midden sites. Villages sites are also reported along the Skeena River, although most or all of these are outside the North Coast Forest District study area.

Defensive sites are special purpose habitations that were used as refuges during times of conflict. These sites are usually located on small islands or peninsulas with steep cliffs and a single access corridor. Although there may be exceptions, defensive sites typically do not show evidence of long-term intensive habitation. Drucker (1943: 105) described a defensive site on Chatfield Island as follows: "At Raven Cove on the northwest end of Chatfield Island, near the southern entrance of Return Channel, a midden is located on a small isolated knoll connected to the main island by a narrow low saddle. The beach is very rocky. The site conforms to ethnographic descriptions of refuge island settlements".

Further inland, major habitation sites are expected to be closely associated with major rivers, such as the Nass and Skeena, while seasonal resource camps may be found on lake shores (fishing, hunting, or plant collecting camps), along smaller rivers (fishing camps), or in the subalpine or alpine (hunting or plant collecting camps). Gentle terrain and a source of water are expected to be important factors for site location.

For the Tsimshian, Archer (199 1) reports that eulachon fishing sites were occupied at the mouth of the Nass River between February and early April, after which stored eulachon were taken back to the permanent winter villages. In late summer, fishing camps were set up on the lower reaches of salmon streams.

5.1.3 Artifact Scatters

Artifact scatters consist of formed stone, bone, antler, and horn implements or tools and the waste materials resulting from their manufacture. Scatters may be found on or below the ground surface. On the coast, most artifact scatters are quite small, and contain a low density of artifacts. However, some scatters can extend for hundreds of meters, or include numerous raw materials and tool types.

Most known artifact scatters in the study area have been found along the coastline, but they could exist almost anywhere that people undertook activities that could result in the discard or loss of material items. Inland artifact scatters, if present, may be very difficult to locate in the dense coastal forest.

5.1.4 Canoe Runs

Canoe runs are sections of beach that have been cleared of rocks to allow the safe landing of canoes. Canoe runs are often associated with habitation and/or shell midden sites.

5.1.5 Stone Wall Fish Traps

Stone wall fish traps consist of loosely piled rock walls that were used to impede the movement of fish with the falling tide. Some fish traps may have incorporated additional perishable components such as stakes, nets or basket traps, and they occasionally show complex histories of repair and expansion. Fish traps occur in the intertidal zone, sometimes near habitation sites, and often near the mouths of rivers. I.R. Wilson Consultants (1994) report that a Hartley Bay elder indicated that most fish-bearing creeks within bays, coves and inlets contain fish traps.

5.1.6 Fish Weirs

Fish weirs commonly consist of a line of wooden stakes protruding above the river floor and are thought to have been designed exclusively to trap spawning salmon (Hobler 1990). Only three fish weir sites have been recorded in the study area, all of which occur along the coastline, at or near the mouths of streams.

5.1.7 Rock Art

Rock art can consist of pictographs (paintings on rock), petroglyphs (rocks with carvings or etchings), or petroforms (man-made alignments or piles of rocks or boulders).

Pictographs are generally located on vertical rock exposures or boulders along the coastline or on lakeshores, while petroglyphs tend to be found on horizontal or vertical sedimentary rock faces along the shoreline.

5.1.8 Burial Places

Burial places contain material evidence and features associated with mortuary practices, including human skeletal remains and the burial pits, mounds, cairns, boxes, trees, and caves in which they are found, as well as grave goods and grave markers. Most of the 23 recorded burial sites in the study area are located within a few metres of the coastline, near habitation sites, or on islands. Burials are often found in rock crevices associated with cliff formations along shorelines or inland rock falls close to traditional village sites (the Bastion Group 1996b:3).

5.1.9 Trails

Overland trail routes were important for reaching inland resource collection areas and for interacting with inland First Nations. Major eulachon trading trails, known as "Grease Trails" are well-known in the Nass River area.

Overall, trails tend to follow subdued terrain, although segments may be steep. Trails can be expected to connect habitation sites with inland resource localities in various environmental zones. Trading trails will serve as a link between neighbouring cultural groups.

5.2 Previous Archaeological Investigations in the North Coast Region

While the North Coast has seen considerable archaeological research, most of it has been geared toward specific site types (e.g., rock art), or narrow geographic zones (e.g., Prince Rupert Harbour and Skeena River Valley). The major research and cultural resource management (CRM) projects in the North Coast region are reviewed in Commonwealth

Historic Resource Management Ltd. and Millennia Research (1996) and are not repeated here.

According to Equinox Research and Consulting Ltd. (1997), just over 1700 hectares of the North Coast Forest District had been adequately assessed for archaeological sites as of the end of 1996. Of those, almost all were near the coast and within the CWH biogeoclimatic zone. The Equinox report recommended that 1% or 4,000 (whichever is less) hectares should be inventoried from each of the CWH, MH and AT zones to provide more representative data for the TSA. That goal has not been satisfied to date.

Since the early 1990s, much of the archaeological focus in the North Coast TSA has been on cultural resource management in relation to forestry developments. Archaeological impact assessments (AIAs) and, more recently, less-intensive preliminary field reconnaissance (PFR) have become common components of forestry planning. In reviewing previous archaeological work for this AOA, forestry-related CRM reports were emphasized, as those data were considered most pertinent to the study objectives.

Copies of archaeological reports commissioned by the Ministry of Forests, Interfor, and Pacific Cascades were provided by the Ministry and licensees. West Fraser Mills provided a list of archaeological permits covering work completed for their operations, and the reports were obtained from the Heritage Resource Centre. Table 1 summarizes the reports reviewed for this study. All assessed cutblocks from these reports were digitized in ArcView. These areas encompass 4,512 hectares of land, or 0.23% of the TSA. Twenty-two archaeological sites were identified in these assessments, which equates to 0.005 sites per hectare, or 5 sites per 1,000 hectares inventoried.

Table 1
Summary of Archaeological Assessments for Forestry Clients in the North Coast TSA

Year of Field Work	General Location	Development Type	Level of Work
1986	Kitkiata Inlet	floating barge camp	Monitor
1989	Gardner Canal	general area	AIA
1991	Alpha Creek, Ogden Channel	5 blocks	AIA
1991	Alder Creek	10 cutblocks	PFR/inventory
1991	Crow Lagoon, Steamer Passage	5 blocks, road, dump, camp	AIA
1992	Captain Cove, Pitt Island	4 blocks, road, dump, bridges	AIA
1992	Chute Lake	8 cutblocks	inventory/AIA
1992	Drake Inlet	"several blocks"	AIA
1993	Kennedy Island	4 blocks, road, dump	AIA
1993	Goat Harbour and Fishtrap Bay	"several blocks in two areas"	AIA
1993	Hevenor Lagoon	general logging area	INV
1993	Chapple Inlet	9 cutblocks, haulroad, dryland sort	AIA/inventory

Table 1
Summary of Archaeological Assessments for
Forestry Clients in the North Coast TSA (cont'd)

Year of Field Work	General Location	Development Type	Level of Work
1994	Fan-ant Island	1 block, 2km road, dump	AIA
1994	Devon Lake. Pitt Island	8 blocks	AIA
1994	Somerville Island	3 blocks	
1994	Khutzeyrnateen Inlet (McGregor Point)	3 blocks	AIA
1994	Leavitt Lagoon (Pitt Island)	1 block	AIA
1994	Douglas Channel (Bardon Creek, Stair Creek)	3 blocks	AIA
1994	Cornwall Creek	8 cutblocks, road, log sort and dump	AIA
1994	Marion Lake	6 cutblocks, haul road	AM/inventory
1995	Walskakul Point, Khutzevmateen Inlet	1 block	AIA
199.5	Halfwav Creek	13 cutblocks	AIA
1995	Bill Creek, Work Channel	2 blocks, road, bridge, dump	AIA
1995	Ayton Creek	12 cutblocks, haul road	AIA/inventory
1995	Hawkesbury Island	4 cutblocks, 7.2km road, 2 bridges, 1 log dump and sort area	PFR/AIA
1996	Rix Island	1 block	AIA
1996	Heavenor Inlet	1 block, road, log dump	AIA
1996	Verney Passage	1 block	AIA
1996	Newcombe Harbour	1 block	AIA
1996	Payne Channel, Pitt Island	1 block	AIA
1996	Cornwall Inlet	2 blocks	AIA
1996	Steamer Passage/Somerville Island	23 blocks	AIA
1996	Kennedy Island	3 blocks, road, 2 bridges	AIA
1996	Gribbell Island and Silver Creek	13 cutblocks, 1 log dump	AIA
1996	Kiskosh Inlet	7 blocks	AIA
1996	Kumealon Inlet, Grenville Channel	12 cutblocks, 13 km haul road	AIA
1996	McShane Creek, McNeil River	9 cutblocks, 7.950km road	
1996	Kitkiata Inlet	road	monitor
1997	Pitt Island	8 cutblocks	AIA

Table 1
Summary of Archaeological Assessments for Forestry Clients in the North Coast TSA (cont'd)

Year of Field Work	General Location	Development Type	Level of Work
1997	various locations	66 cutblocks, 25.7 km road	AFR/AIA
1997	Captain Cove, Pitt Island	2 blocks, 6 km road	AIA
1997	Porcher Inlet	2 blocks, 5 km road	
1997	Alan Reach, Gardner Canal	3 blocks, 7 km road, dump	AFR/AIA
1997	Gribbell Island	1 block, road, dump	AIA
1998	Kumealon Inlet	7 blocks	AIA
1998	Kumealon Inlet	9 blocks	AFR
1998	Work Channel	15 blocks	AIA
1998	Work Channel	2 blocks	AFR
1998	Work Channel	11 cutblocks	AFR/AIA
1998	Bums Bay, Mink Trap, Banks Island	9 cutblocks	AIA
1998	Tag Creek	general area	AFR/inventory
1998	Work Channel, Denise Inlet	29 cutblocks	AIA
1998	Princess Royal Island	22 cutblocks	AFR/AIA
1998	Union Inlet	log dump, 3.9 km road	AIA
1999	Smith Island	2 blocks, 1 road	AIA
1999	Bear Lake, Princess Royal Island	1 cutblock (H3022)	AIA
1999	Bear Lake	1 cutblock (H3037)	AIA
1999	Cougar Lake, Princess Royal Island	1 cutblock (H6002)	AIA
1999	Bear Lake	1 cutblock (H6003)	AIA
1999	Cougar Lake, Princess Royal Island	1 cutblock (H6004)	AIA
1999	Cougar Lake, Princess Royal Island	1 cutblock (H6006)	AIA
1999	Surf Inlet	dryland sort, Dam M/L, and West Dam M/L	AIA
1999	Surf Inlet	1 cutblock (6200)	AIA
1999	Kumealon Inlet	4 blocks	Review of CMTs
1999	Cougar Lake, Princess Royal Island	1 cutblock (6210)	AIA

Since 1986, forestry-related assessments have identified 11 shell midden sites, 1 pictograph site, 1 petroglyph site, 1 lithic site, and 99 CMT sites. Nineteen CMT sites have been described in reports, but were not officially recorded as sites, following common procedure prior to about 1994. These CMT sites were digitized during the present study, and they are included in the total of 99 CMT sites. Several consulting firms have undertaken CRM work in the North Coast TSA, and differing levels of field effort and widely varying reporting standards are evident.

5.3 The North Coast Archaeological Sequence

The archaeological sequence for the North Coast has been developed primarily on research work in the Prince Rupert Harbour and Kitselas Canyon areas. No archaeological sites older than 5,000 years B.P. have been found on the North Coast, but it is unlikely that earlier sites are absent, Very early sites have been found on the Queen Charlotte Islands, in southern Alaska, and on the Central Coast, suggesting that such sites should be present on the North Coast. As discussed in Section 3.2.2, sites older than 5,000 years may be either submerged or on elevated shorelines associated with historic changes in relative sea level.

Based on current information, the following archaeological sequence is proposed for the North Coast region. As more information becomes available, revisions to this sequence can be expected. Unless otherwise noted, this summary is based on Matson and Coupland’s (1995) synthesis of Northwest Coast prehistory.

5.3.1 Early Period (Initial Occupation to ±5,000 B.P.)

According to Matson and Coupland (1995), the earliest clear archaeological complex on the North Coast is the North Coast Microblade Tradition, which prevailed from northern Vancouver Island to the Alaska Panhandle between about 9,000 and 5,000 B.P. Characterized by the use of microblades and pebble tools, and the absence of chipped biface technology, this archaeological tradition contains evidence of shellfish and ocean fish consumption. Despite rapid changes in sea levels and forest succession, the limited archaeological information to date suggests cultural stability throughout this period. It should be emphasized, however, that no archaeological sites dating to this period have been reported for the North Coast TSA. The only dated site with a North Coast Microblade component near the study area is the Paul Mason site at Kitselas Canyon, on the Skeena River. This is an inland riverine site with an early component dating to between 5,000 and 4,300 B.P., at the end of the Early Period. This period has been designated the Bornite Phase at Kitselas Canyon (Coupland 1988).

5.3.2 Prince Rupert Harbour Period III / Skeena Valley Bornite, Gitaus, and Skeena Phases (5,000 to 3,500 B.P.)

The first known occupation of Prince Rupert Harbour took place in this time period, known archaeologically as Period III. Matson and Coupland (1995) assert that distinctive coastal cultures first emerged in Period III, with numerous “archaeological cultures” developing where the more homogeneous North Coast Microblade tradition previously prevailed. Major changes are evident in the artifact record: microblades disappear, and bone and ground stone tools become abundant by the end of Period III.

Excavated animal remains indicate a generalized subsistence at this time, with a relatively high proportion of land mammals, as well as marine mammals and fresh and salt water fish (Matson and Coupland 1995). Shell middens are small, and salmon, though present, do not appear to have been intensively harvested or stored. No house remains dating to this period have been excavated, but Matson and Coupland (1995) cite the lack of heavy woodworking tool and the small size of excavated postholes as evidence that large plank houses were not used at the time, possibly indicating a small, mobile population.

Three archeological phases have been defined in the Skeena Valley during this time span, based on excavations at the Paul Mason and Gitaus sites in Kitselas Canyon. The Bornite phase persisted from the Early Period well into Period III. At about 4,300 B.P., the Gitaus Phase began, signaled by the disappearance of microblades and the appearance of chipped bifaces and an increased in the use of ground stone tools (Matson and Coupland 1995). Between about 3,600 and 3,200 years ago, changes in lithic raw material types and evidence for a well-developed chipped stone industry identify the onset of the Skeena Phase (Matson and Coupland 1995). While some researchers (e.g., Ives 1987) have interpreted these archaeological changes to a population incursion from the Interior, Coupland (1988) argues for a coastal population, with seasonal movements inland and an increasing emphasis on land mammal hunting.

5.3.3 Prince Rupert Harbour Period II / Skeena Valley Paul-Mason and Kleanza Phases (±3,500- ±1,500 B.P.)

In Prince Rupert Harbour, Period II sites represent the first clear archaeological evidence of a relationship with ethnographically-known cultures (Matson and Coupland 1995). Winter villages, large shell middens with varied shellfish remains, new fishing technologies, salmon storage, increased reliance on marine resources at the expense of land mammals, and differential (ascribed) status of individuals have been inferred from the archaeological record during this period. In the Skeena Valley, evidence of large rectangular houses and salmon storage appear at the Paul Mason site this time, which is represented locally by the Paul Mason phase. Throughout the North Coast, populations appear to have grown rapidly during Period II/the Paul Mason Phase.

Between about 2,500 and 1,400 years ago, the Developed northwest Coast Pattern was fully achieved. Artifact assemblages dated to late Period II are similar to those of Early Period II, but with greater variety, indicating an expansion of material culture throughout the period. Exotic materials, such as dentalia, obsidian, and copper suggest long distant trade systems existed. Matson and Coupland (1995:229, 23 1) cite evidence of a possible "warfare complex" at Prince Rupert Harbour, which they say is in contrast with Central Coast evidence, which lacks indications of conflict.

5.3.4 Prince Rupert Harbour Period I (±1,500- ±150 B.P.)

Several archaeological sites in the Prince Rupert Harbour area have components dating to Period I. The historically known Tsimshian culture is fully developed by this time. Material items indicate general cultural continuity with late Period II sites, although several new artifact types were introduced in Period I. Subsistence continued to focus heavily on marine resources and salmon, and large winter villages with permanent houses were occupied. Defensive sites seem to have been introduced in Period I, indicating continued or increasing warfare. Little research has been completed on non-villages sites dating to Period I, and consequently our knowledge of the seasonal round is limited.

6.0 GIS ANALYSIS OF THE NORTH COAST TSA LANDSCAPE

A number of GIS analyses were completed to characterize the North Coast landscape. Variables that were believed to be important for predicting archaeological site locations were assessed in terms of their overall distribution in the study area. These analyses, taken together with the analysis of recorded archaeological sites, helped to evaluate the model variables. Data for the major modelling variables are discussed in the following sections.

6.1 Test Areas

Three areas, each comprised of 4 TRIM sheets, were selected by representatives of the Ministry of Forests and Golder's GIS team for testing the predictive models prior to applying them to the entire TSA (Figure 1). Test Area 1 consists of map sheets 103P 032, 042, 043 and 052 in the Alice Arm area. Test Area 2 includes map sheets 103J 058, 059, 068, and 069, in the vicinity of Port Simpson. Test Area 3 is in the Surf Inlet area, and consists of TRIM sheets 103A 095 and 096, and 103H 005 and 006. The test areas were selected to represent different geographic sectors of the study area.

Terrain analyses were not completed specifically for the test area, as it was not certain that they were statistically representative of the entire study TSA. Instead, the test areas were used to evaluate the results of models that were developed on the basis of terrain and recorded archaeological site data from the entire TSA.

6.2. North Coast TSA

6.2.1 Slope

Slope was considered a highly important variable, particularly for predicting habitation site locations. Table 2 shows the distribution of various slope classes across the North Coast study area. Note that the percentages cannot be summed, due to overlap in the categories. These data clearly illustrate the steep, rugged nature of much of the northwest coast. Figure 3 shows the slope characteristics of the North Coast.

Table 2
Slope Classes in the Study Area

Slope	Area (ha.)	% of Study Area
0-20%	447,074	22.7
0-30%	662,087	33.6
0-40%	874,096	44.4
0-70%	1,487,021	75.5
0-90%	1,716,662	87.2

These data show that about two-thirds of the study area lies on a slope of more than 30%, and more than half of the TSA has a gradient of more than 40%. Since these conditions are not conducive for most types of habitation sites, slope is considered to be a useful variable for predicting habitation site locations.

6.2.2 Elevation

Elevation was used in concert with slope to help identify shoreline locations with habitation potential, and also as a supplement to biogeoclimatic zone data for CMT site analyses. Table 3 shows the breakdown of elevation classes in the North Coast TSA. The vast majority of the TSA is more than 100 m asl, and approximately 10% may be above the tree line. This information, combined with an analysis of elevation ranges of known archaeological sites, is useful for predictive modelling.

Table 3
Elevation Ranges in the Study Area

Elevation	Area (ha.)	% of Study Area
0-10 m asl	19,943	1.0
O-20 m asl	73,283	3.7
O-100 m asl	432,867	22.0
O-300 m asl	881,772	44.8
O-400 m asl	1,046,802	53.1
O-1000 m asl	1,740,277	88.4
0-1100 m asl	1,806,093	91.7

6.2.3 Distance to Coast

Distance to the shoreline was considered a very important modelling variable, since the First Nations of the study area have largely maritime-oriented cultures. With the exception of CMT sites and resource camps on lakes or inland reaches of rivers, most archaeological site types are expected to be associated with foreshore or near shore contexts. Table 4 represents the study area in terms of distance to the coastline.

Table 4
Distance to Coast in the Study Area

Distance to Coast	Area (ha.)	% of Study Area
O-100 m	69,705	3.5
O-200 m	122.702	6.2
O-300 m	169,369	8.6
O-500 m	252.326	12.8
O-1000 m	427,492	21.7
O-2000 m	706,625	35.9
200-2000 m	570,215	28.9

While most recorded habitation sites are near the coastline, Table 4 shows that most of the TSA is distant from the coastline. This means that the majority of habitation sites is found within a small portion of the study area, in terms of distance to salt water. Consequently, distance to coast should be a good variable for predicting habitation site locations.

6.2.4 Islands

Approximately 986,950 ha. of the North Coast study area lies on islands. Marine islands account for almost 784,000 ha. (about 40% of the study area), of which about 8,275 ha. are islands smaller than 50 hectares. Fresh water islands in lakes and rivers comprise an additional 2,950 ha.

6.2.5 Proximity to Fresh Water

Four categories of fresh water were considered in the analysis: two-line rivers (>20 m bank-to-bank), definite rivers, intermittent rivers, and lakes. Lakes were defined as those

5 ha. in area or larger. Table 5 provides a breakdown of the amount of the study area within various buffers of fresh water sources.

Table 5
Proximity to Nearest Fresh Water in the Study Area

Water Source	Buffer	Area (ha.)	% of Study Area
Two Line River	100 m	18,897	1.0
	200 m	35,211	1.8
	300 m	51,914	2.6
Definite River	100 m	272,214	13.8
	200 m	526,088	26.7
	300 m	720,274	36.6
Intermittent River	100 m	564,606	28.7
	200 m	1,010,037	51.3
	300 m	1,313,236	66.7
Lake	100 m	47,812	2.4
	200 m	97,911	5.0
Nearest Fresh	100 m	1,008,778	51.2
	200 m	1,412,191	71.7
	300 m	1,592,515	80.8
	500 m	1,692,047	85.9

This table shows that more than half of the study area is within 100 metres of a source of fresh water. Taken on its own, distance to fresh water probably would not be a robust modelling discriminator, because there is a strong chance that any given location will be near a fresh water source. However, combined with other variables, distance to fresh water may be a useful factor, especially in light of ethnographic and archaeological reports of habitation and CMT sites being associated with fresh water sources.

6.2.6 Cedar Content

Presence of cedar was considered crucial to the CMT model, which focused on bark-stripped and aboriginally logged cedar CMTs. According to the forest cover data, 1,089,620 ha. of the study area (55.3%) contains at least 1% cedar (Figure 4), and

617,781 ha. (31.4%) contains 50% or more cedar. In order to be useful for predictive modelling, it would be necessary to combine cedar content with other variables.

6.2.7 Age and Height Class

The age and height classes of cedar stands are important for evaluating the probability of CMTs being present. The models focused on age classes 7 through 9 (>121 years) because CMTs are most likely to be intact in older (i.e., un-logged) stands. This does not imply that CMTs did not previously exist in stands that have been logged or otherwise impacted, but simply that they are less likely to remain intact.

Height class was considered to be important for excluding stunted stands that probably would not be valuable for bark or timber. Table 6 and Figure 5 show the distribution of the relevant age and height classes within cedar stands.

Table 6
Age and Height Class Distribution of Cedar Stands in the Study Area

Stand Class	Area (ha.)	% of Study Area
Age Class 8+	1,127,721	57.3
Age Class 7+	1,149,9956	58.4
Age Class 6-t	1,162,172	59.0
Height Class 4+	237,064	12.0
Height Class 3+	564,505	28.7
Height Class 2+	874,177	44.4

The age class analysis shows that over half of the forestry polygons in the study area are old enough to be considered old growth (age class 8+; see Figure 5). In isolation, age class does not appear to be a good discriminator, but combining age with height class improves the predictive power. For example, 58.4% of the study area contains cedar of age class 7 or older, but adding a height class requirement of 3 or greater reduces this area to about 24%.

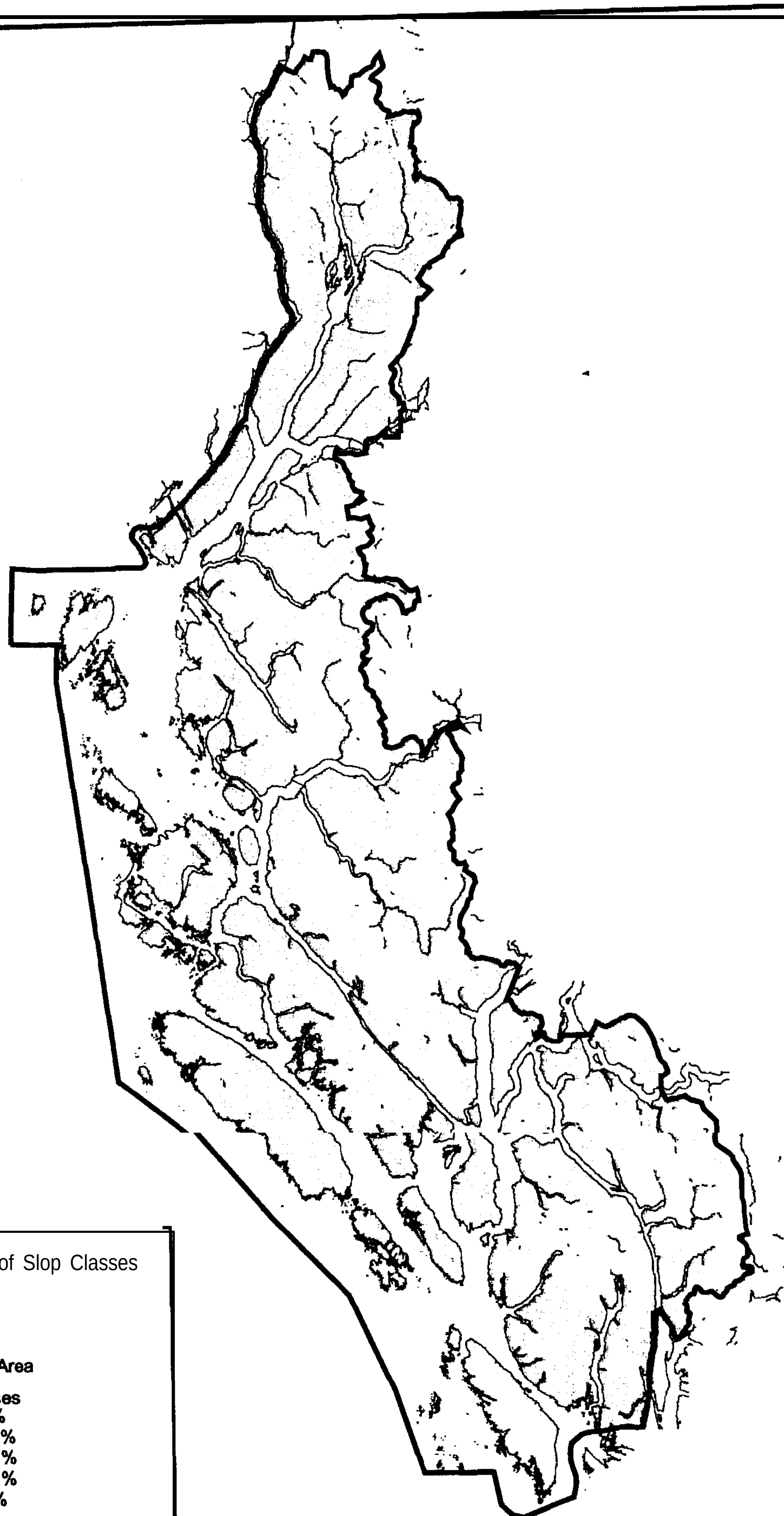


FIGURE 3: Distribution of Slop Classes

N

Study Area

Slope Classes
0-20 %
21-30 %
31-40 %
41-70 %
> 71 %

scab-1:1,750,000
10 0 10 20 30 Kilometers

Golder Associates

Projection: UTM Zone 9
Datum: NAD 83

Layout: 8.5 by 11 - Portrait

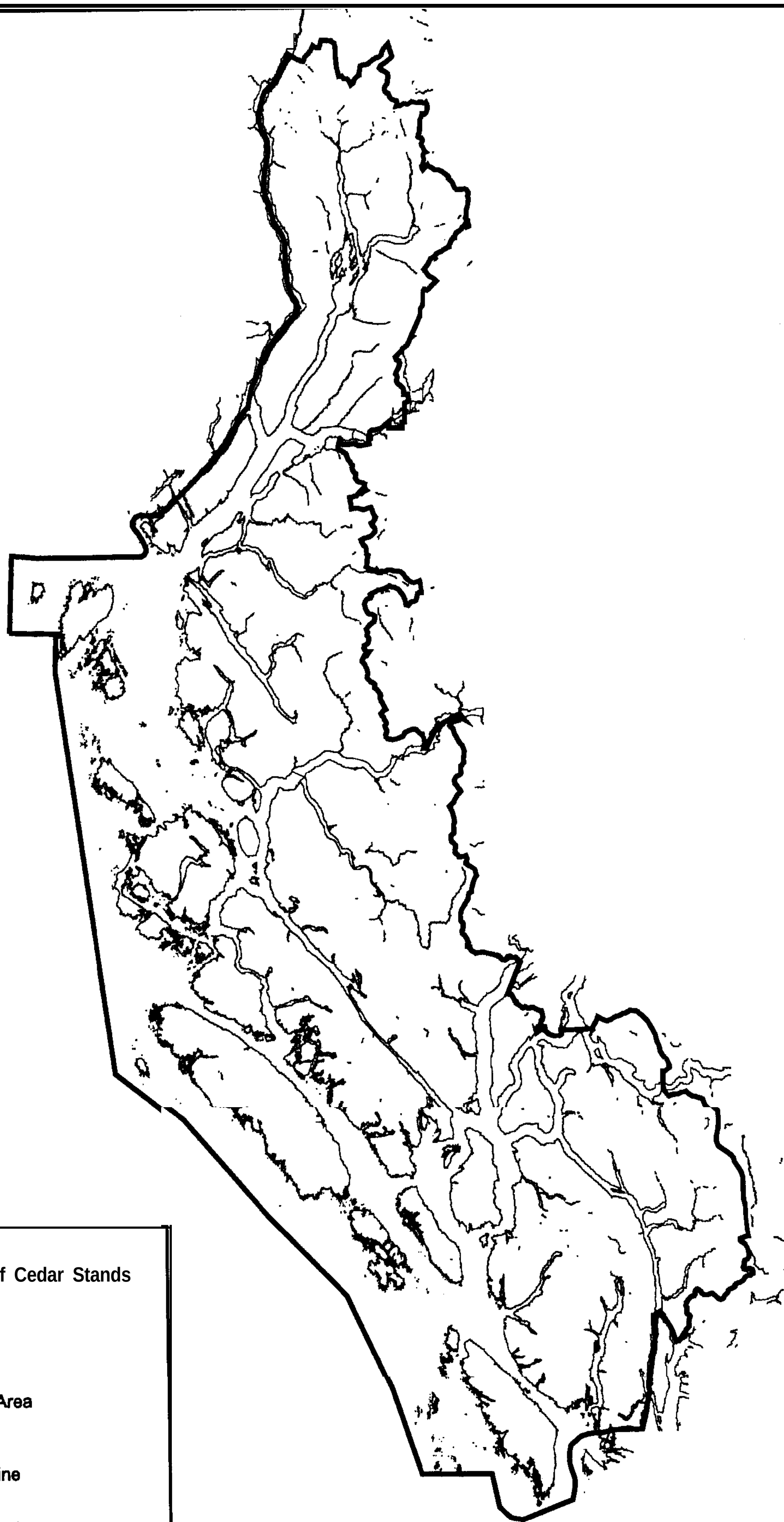


FIGURE 4: Distribution of Cedar Stands

N

Study Area

Cedar

Coastline

Scale - 1:1,750,000

10 0 10 20 30 Kilometers

Golder Associates

Projection: UTM Zone 9
Datum: NAD 83

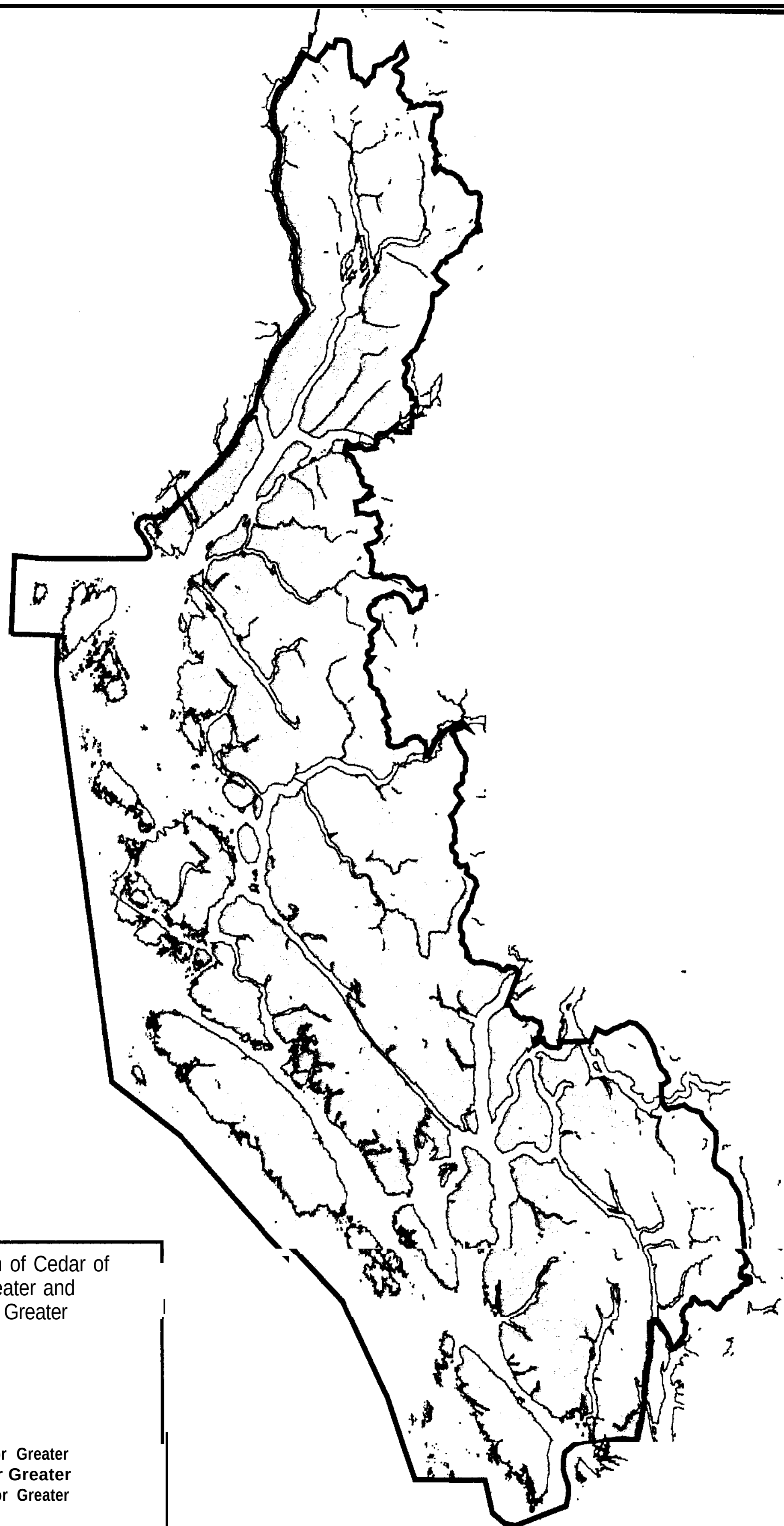


FIGURE 5: Distribution of Cedar of Age Class 6 or Greater and Height Class 3 or Greater

Golder Associates

Projection: UTM Zone 9
Datum: NAD 83

Layout: 8.5 by 11 - Portrait

7.0 GIS ANALYSIS OF RECORDED SITES

GIS analyses of the spatial characteristics of recorded sites in the TSA and immediately adjacent areas were used to help develop predictive models for estimating archaeological site potential. The following sections present the GIS results of the analyses of recorded sites.

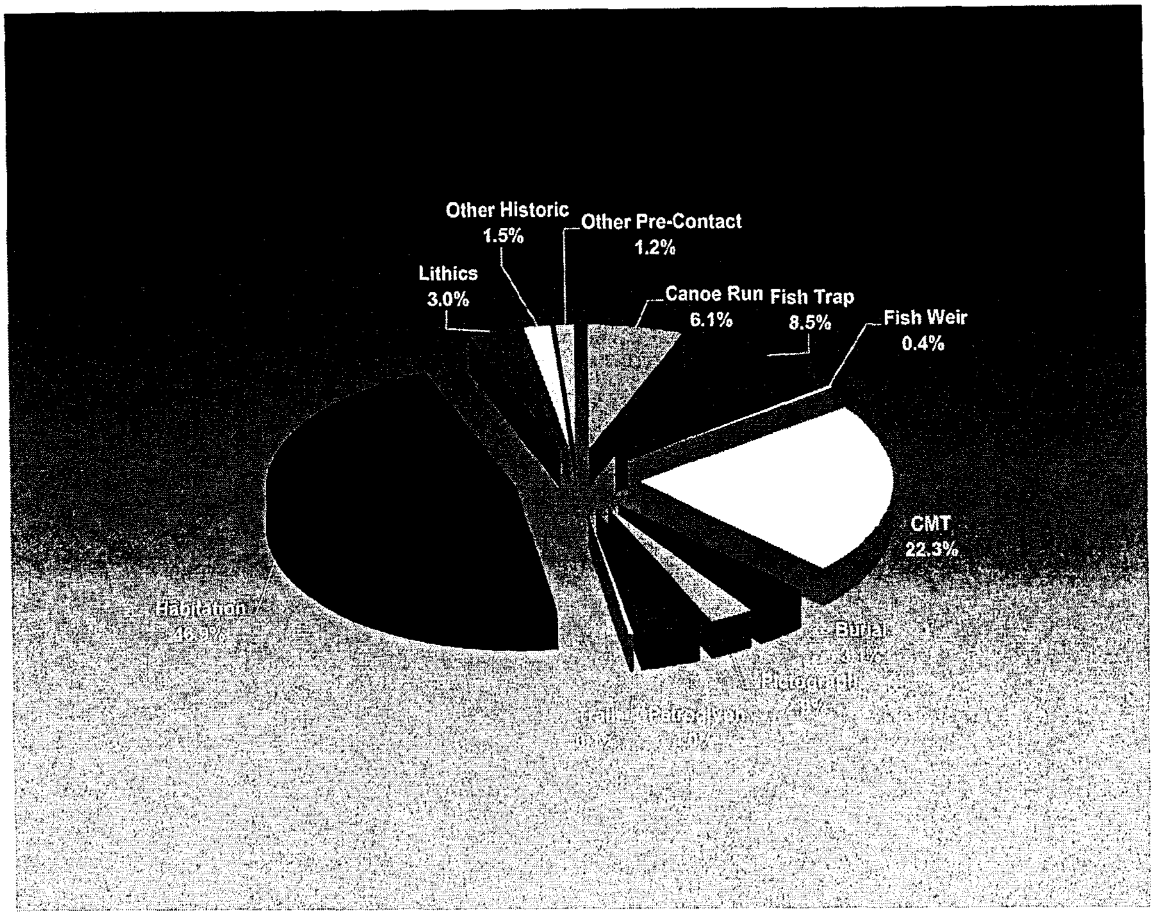
The slope, elevation, distance to the coastline, and distance to the nearest source of fresh water (major river, definite river, intermittent river, or lake), cedar content, and forest stand age and height class were calculated for each site (Appendix 2). The sites were then broken down by site type to summarize the data. These analyses, together with the landscape information, were used to evaluate the applicability of archaeological models previously developed for the Central Coast LRMP area (Golder Associates 1999a) and for a portion of TFL 25 (Golder Associates 1999b).

7.1 Overall Site Analysis

Analyses were performed on recorded archaeological sites in the TSA as well as a small surrounding buffer, which was included to increase the sample size. According to information supplied by the Archaeology Branch, the TSA and adjacent areas contained 732 recorded archaeological sites. Of these, 343 (46.9%) have habitation components (including shell middens, "villages" and house depressions), and 164 (22.4%) contain CMTs. There are 62 fish traps, 21 pictographs, 3 fish weirs, 45 canoe runs, 25 burials, 29 petroglyphs, 22 lithic scatters, 12 historic sites, 1 trail, and 5 sites with inadequate records to determine site type. Figure 6 shows the relative frequency of the major site types in the North Coast, as presently known. Note that some sites have multiple components, so the total number of site components shown in the figure is greater than the number of recorded sites.

Overall, the recorded sites tend to be found along the coastline or on islands, reflecting the history of archaeological research in the region. The following sections describe the spatial and terrain characteristics of the recorded sites in the study area. Table 7 and Figures 6 through 20 summarize the data.

Figure 6 - Relative Frequency of Major Components in the North Coast TSA



7.1.1 Slope

Slope values for the sites ranged from virtually flat (less than 1%) to 148%, with a median of 10%. Almost half (47%) of the sites are on slopes between 0% and 10%, and 69% are on gradients less than or equal to 20%.

7.1.2 Elevation

The sites range in elevation from sea level to 520 metres asl. The median elevation is 12 metres, and 78% of the sites lie between 0 and 30 metres asl.

7.1.3 Distance to Coastline

Most site types show a strong correlation with the coastline. The sites range from less than I metre from the shore to more than 2 km inland, but the median distance is only

16 metres from shore. This site distribution pattern is consistent with the strong maritime emphasis of North Coast First Nations cultures. However, the high proportion of shell midden and village sites in the current recorded sites database also indicates an historical bias toward archaeological investigations of shoreline contexts rather than inland areas. As more inland sites, including CMTs, are located, this median value can be expected to increase somewhat.

7.1.4 Distance to Fresh Water

A weak relationship is indicated between recorded archaeological sites and fresh water sources. Although the median distance from a site to the nearest TRIM-coded fresh water source is 222 m, only 48% are within 200 m of fresh water, and 27% are more than 500 m distant. This apparent pattern may be partially a function of the resolution of hydrology mapping in TRIM, and partially due to the inclusion of all site types in the analysis, some of which (e.g., pictographs, petroglyphs, and burials) may not correlate with fresh water. A more detailed evaluation shows that 98% of the sites are within 200 m of either salt water or fresh water.

Table 7
North Coast Test Area Site Characteristics (Median Values, All Site Types)

Terrain Variable	North Coast Test Area Sites
Slope	10%
Elevation	12 m asl
Distance to Salt Water	16 metres
Distance to Fresh Water	222 metres

While the overall site analysis provides a general perspective on recorded site characteristics, an analysis by site type is more useful for assessing site distribution patterns. Site-type analysis was limited to habitations and CMTs, due to sample size considerations and because these site types (particularly CMTs) were deemed best suited to modelling and most likely to be impacted by forestry operations. Other site types were not modelled, but their expected distributions are discussed in Section 5.1.

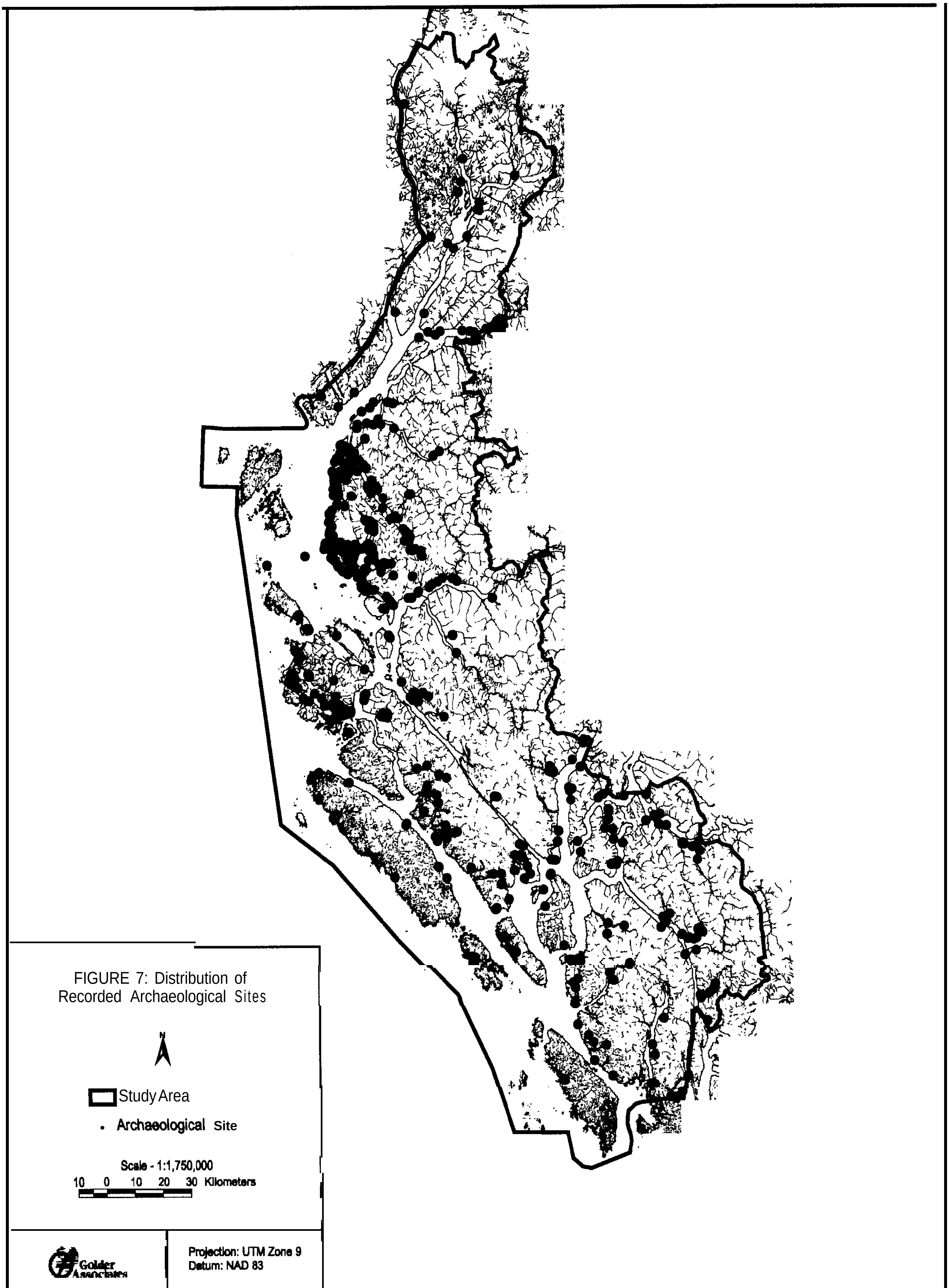


FIGURE 7: Distribution of Recorded Archaeological Sites

7.2 Site Type Analyses

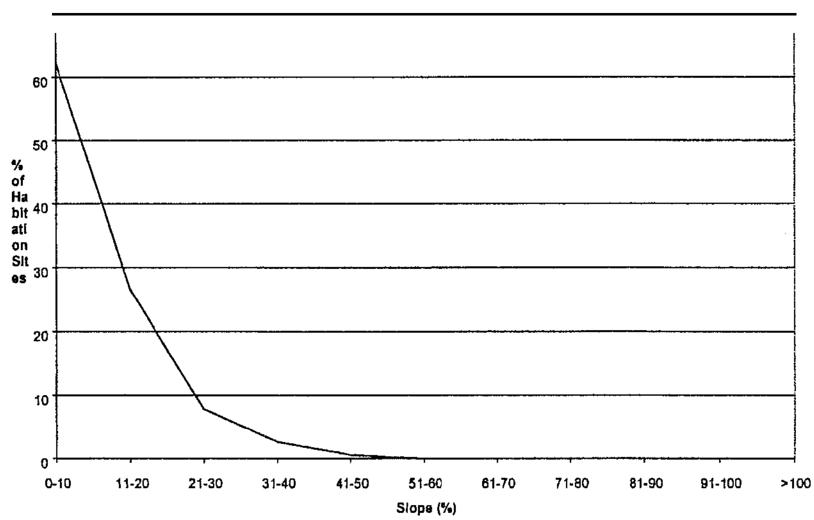
7.2.1 Habitation Sites

A total of 343 habitation sites were used for the analysis. Table 8 compares the attributes of these habitation sites with those of the Central Coast LRMP area to the south, using median values. In general, the site distribution pattern is very similar to that of the Central Coast, where coastal villages and shell midden sites tended to occur on islands and in sheltered bays along the mainland coast (Figures 8 through 12).

Slope

The slope of each habitation site was determined from the GIS grid values, and frequencies were calculated for slope ranges (Figure 8). Habitation site slopes range from less than 1% to 47%, with a median of 8%. Sites with slope values of less than or equal to 10%, total 214 (62%), and 305 (89%) are on slopes of 20% or less. On the Central Coast, slopes ranged from 0% to 129%, with a median of 15%.

Figure 8
Slope Ranges for Habitation Sites



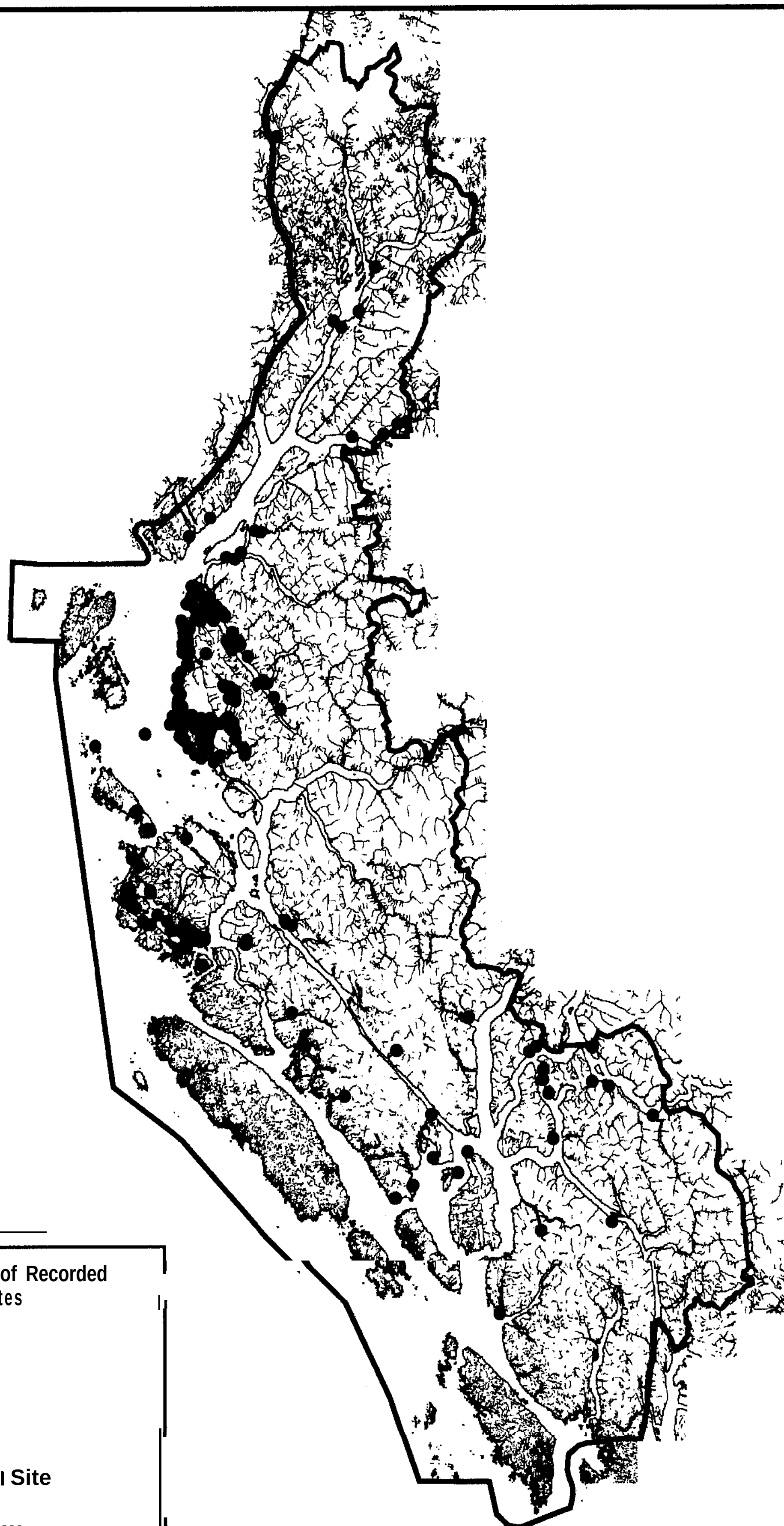
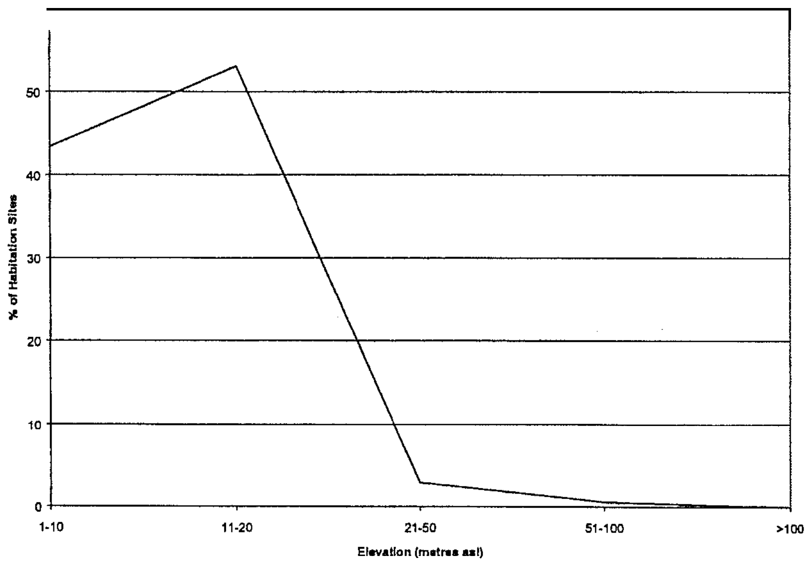


FIGURE 9: Distribution of Recorded Habitation Sites

Elevation

Elevations for the habitation sites ranged from 1 m to 51 m asl, with a median of 11 m. Forty-three percent of the sites are between sea level and 10 m asl, and 96% are between 0 m and 20 m asl (Figure 10).

Figure 10
Elevation Ranges for Habitation Sites



Distance to Salt Water

As expected, almost all of the test area habitation sites (95%) are within 100 metres of salt water and coastal habitations are within 300 metres (Figure 11). The remaining 5 sites (1.5%) are more than 2 km inland and are considered inland habitations.

Distance to Fresh Water

There appears to be little correlation between habitation sites and fresh water sources (Figure 12). The median distance from a habitation site to the nearest source of fresh water is 409 metres. Only 22% of the sites fall within 100 metres of fresh water, and just 31% are within 200 metres. Almost half (43%) of recorded sites fall more than 500 metres from a source of fresh water, possibly indicating that water was carried in to the site (defensive sites, for example), or that rain water was collected during winter storms. Alternatively, the water source may not have been correctly coded on the TRIM base maps.

Figure 11
Distance from Habitation Sites to Coast Line

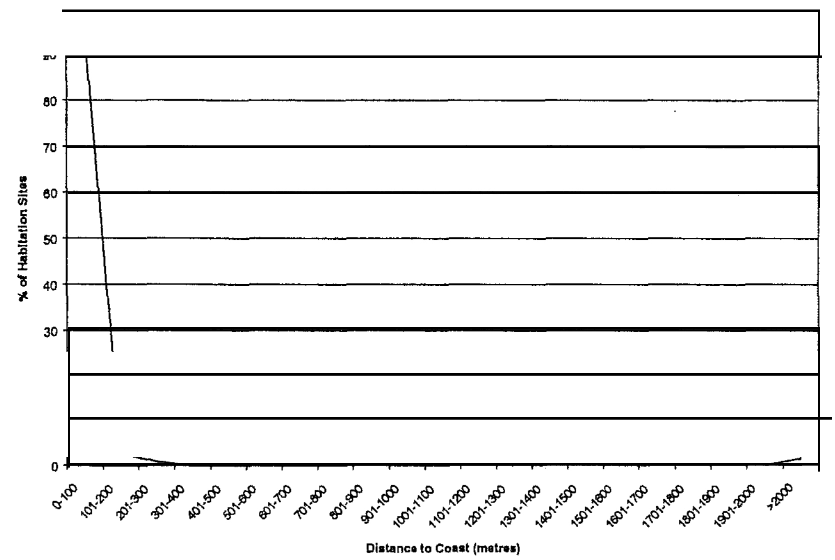


Figure 12
Distance from Habitation Sites to Fresh Water

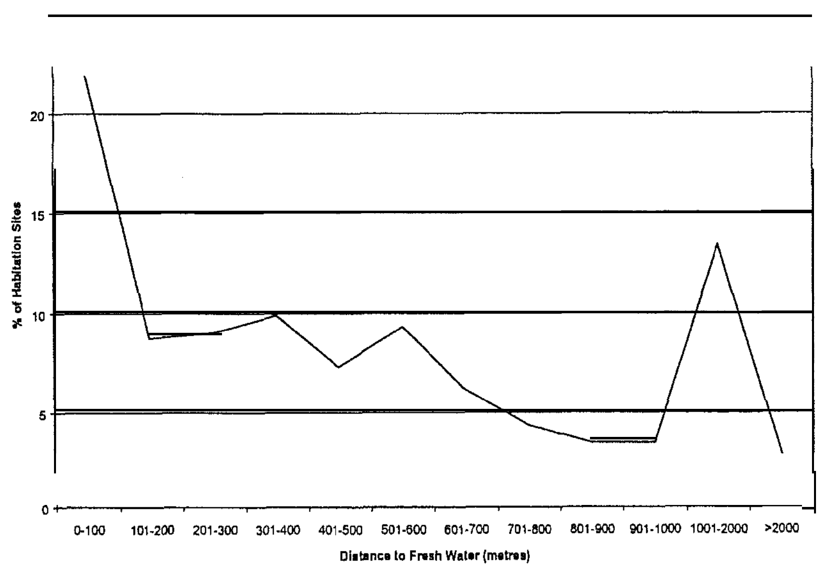


Table 8
Comparison of GIS Analyses for Habitation Sites

	NORTH COAST TSA SITES	NORTH COAST TEST AREA SITES	CENTRAL COAST SITES
Number of Sites	343	72	957
Slope	8%	10%	15%
Elevation	11 m asl	11 m asl	5 m asl
Distance to Salt Water	7 metres	6 metres	30 metres
Distance to Fresh Water	409 metres	105 metres	297 metres

This summary shows that, with the exception of the fresh water variable, the analyzed site characteristics for the test areas were representative of the entire population of habitation sites in the TSA. Some differences are seen between the TSA habitation sites and those on the Central Coast, but the median values for most variables are within a narrow range. The differing sample sizes may contribute to this difference, or it may be a reflection of cultural or geographic variability.

7.2.2 CMT Sites

One hundred and fifty-eight CMT sites were included in the site analysis, and an additional 19 CMT sites were subsequently digitized from information provided in archaeological reports. The CMT sites are found primarily along the mainland coast and on islands (Figure 13), probably as a function of archaeological survey coverage. Site characteristics are summarized in Figures 13 through 19 and Table 9.

Slope

The CMT sites are found on slopes between 1% and 148%, with a median of 19%. Eighty-seven sites (56%) are on slopes of 20% or less, while 73% are between 0% and 30%. Figure 13 shows the distribution of recorded CMT sites, and Figure 14 shows their slope ranges.

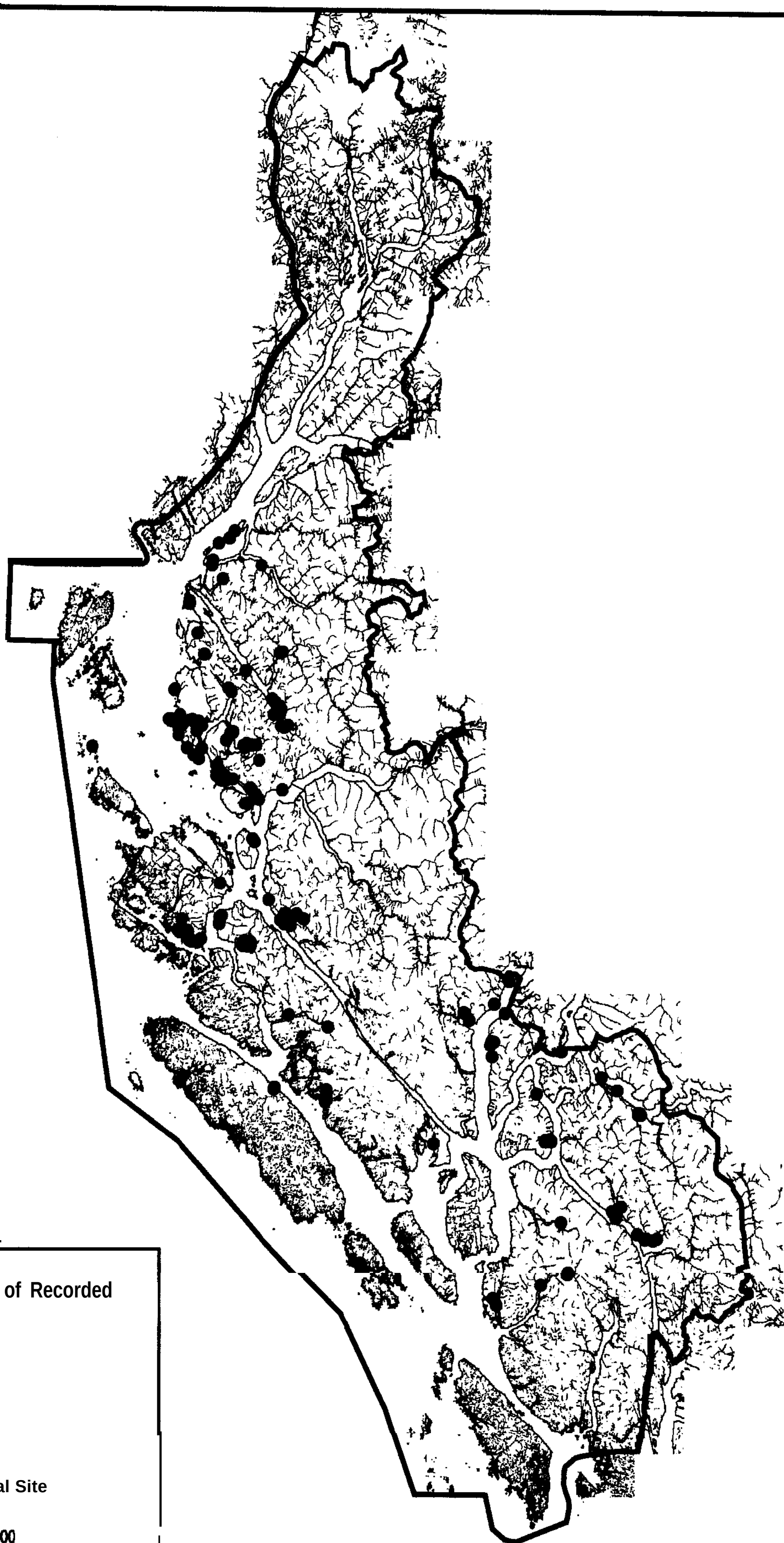


FIGURE 13: Distribution of Recorded CMT Sites

N

study Area

• Archaeological Site

Scale - 1:1,750,000

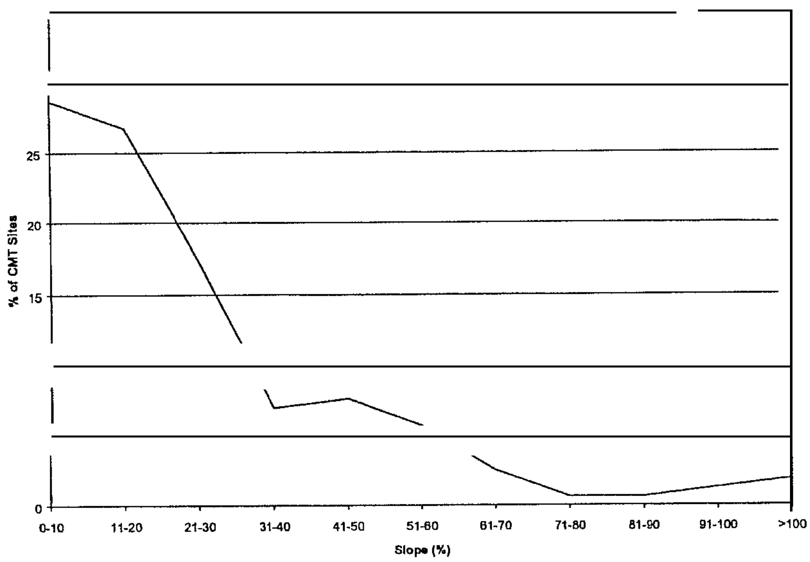
10 0 10 20 30 Kilometers

Golder Associates

Projection: UTM Zone 9
Datum: NAD 83

Layout: 8.5 by 11 - Portrait

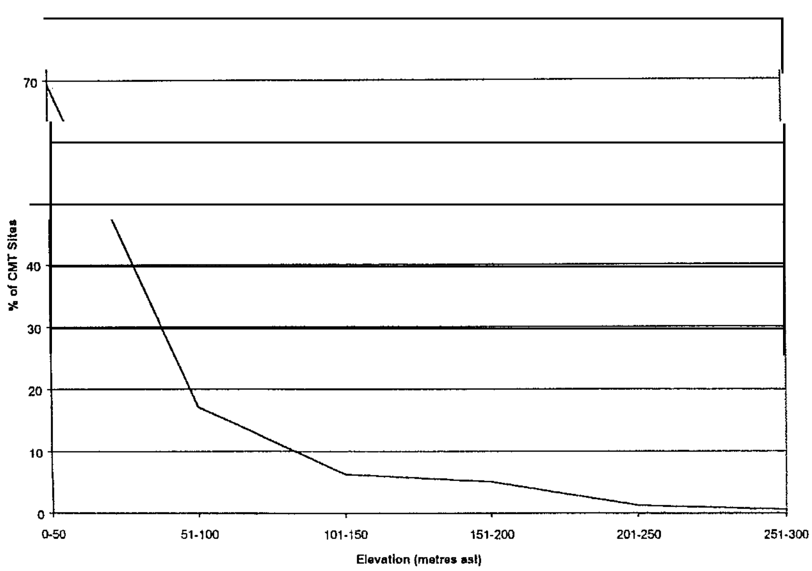
Figure 14 - Slope Ranges of CMT Sites



Elevation

CMT sites range in elevation from sea level to 261 m asl, with a median of 22 m. This pattern may be a result of limited archaeological inventory of higher elevations. Figure 15 shows the elevation ranges for CMT sites.

Figure 15 - Elevation Ranges of CMT Sites



Distance to Coastline

The CMT sites vary from 1 m from shore to over 2000 m, with a median distance of 69 m (Figure 16). Of the 32 CMT sites located more than 500 m from shore, 24 (88%) are within 200 m of a fresh water source.

Distance to Fresh Water

The correlation of CMT sites with fresh water is not clear. Seventy-five percent (n=119) are within 400 m of a source of fresh water, but only 34% are within 100 m (Figure 17). Based on a range from 1 m to over 2000 m, the median distance from a CMT site to fresh water in the test area is 163 m.

Forest Cover

The height class, age class and cedar content (expressed as a percentage of the stand) was determined for each CMT site, using Ministry of Forests forest cover data (Figures 18 through 20). Seventeen sites did not have forest cover attributes, because they are within TFL 25, for which forest cover data were not obtained. These sites were excluded from the analyses. Most (76%) of the CMT sites are in height classes 3 and 4, while an additional 16% are height class 2. Age class exhibits a clearer pattern, with 90% of the sites falling in age class 8 or 9 stands, which together are generally defined as old growth forest. Cedar composition ranged from 0% to 95%, with a median of 40%. Sites labelled as having 0% cedar apparently are mis-coded in the forest cover data.

Figure 16 -Distance from CMT Sites to Coast Line

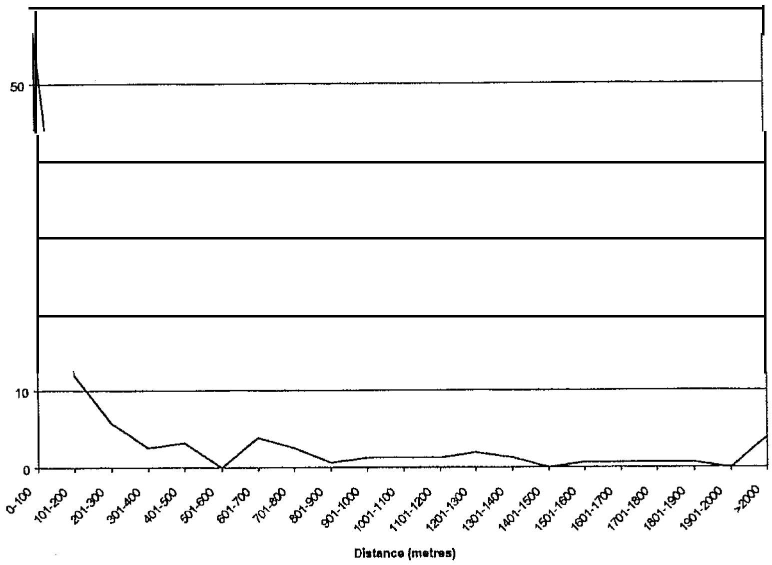


Figure 17 -Distance from CMT Sites to Fresh Water

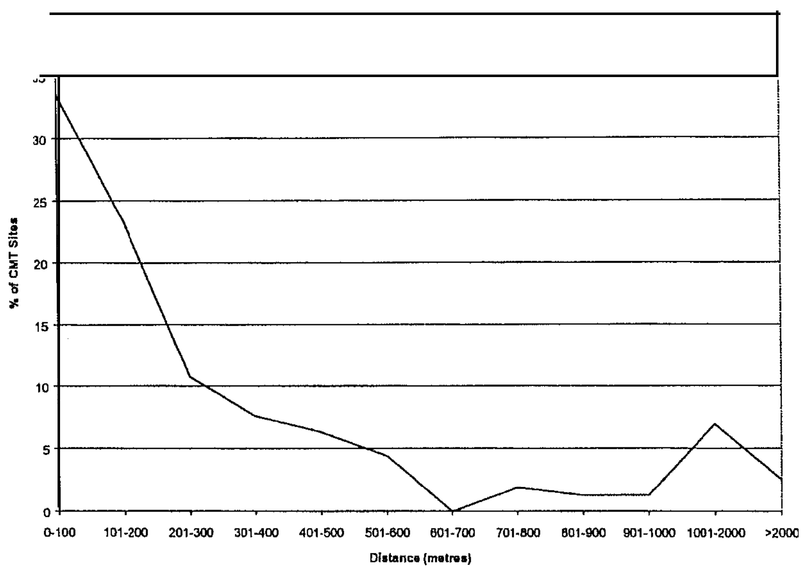


Figure 18 - Height Classes of CMT Sites

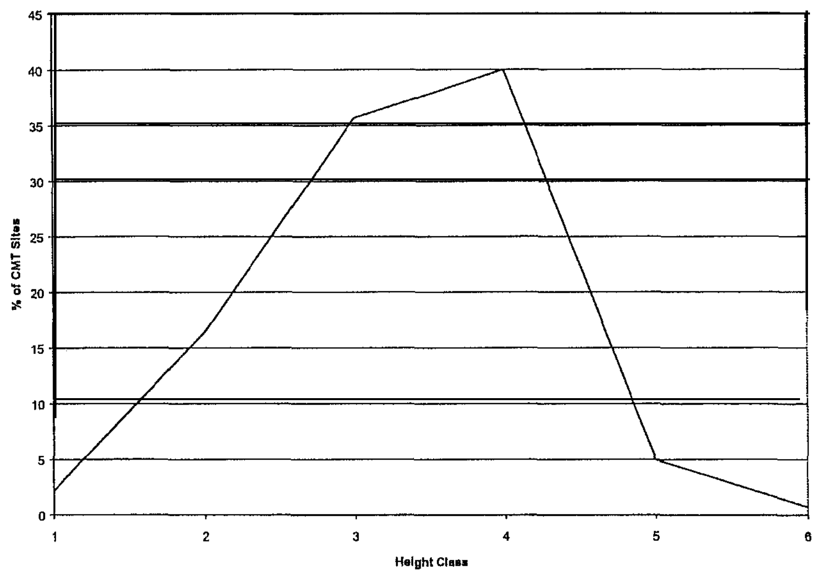


Figure 19 - Age Classes of CMT Sites

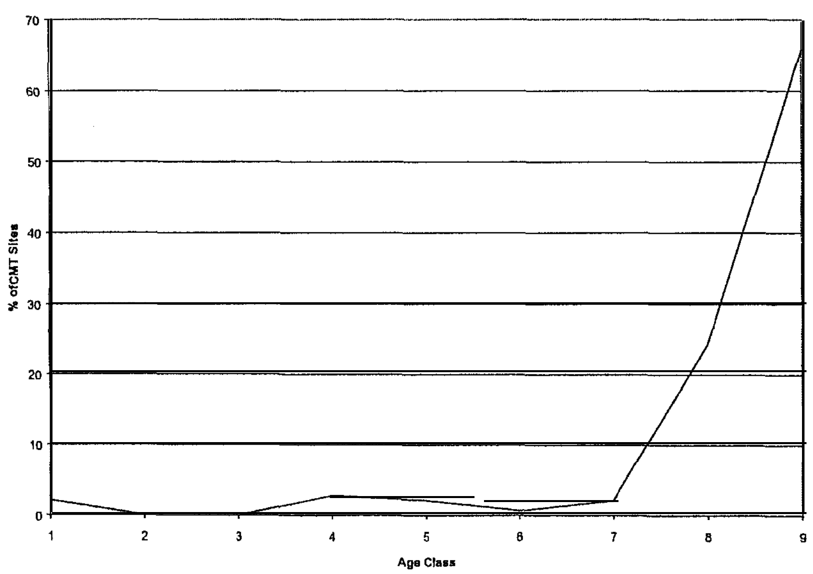


Figure 20 – Cedar Content of CMT Sites

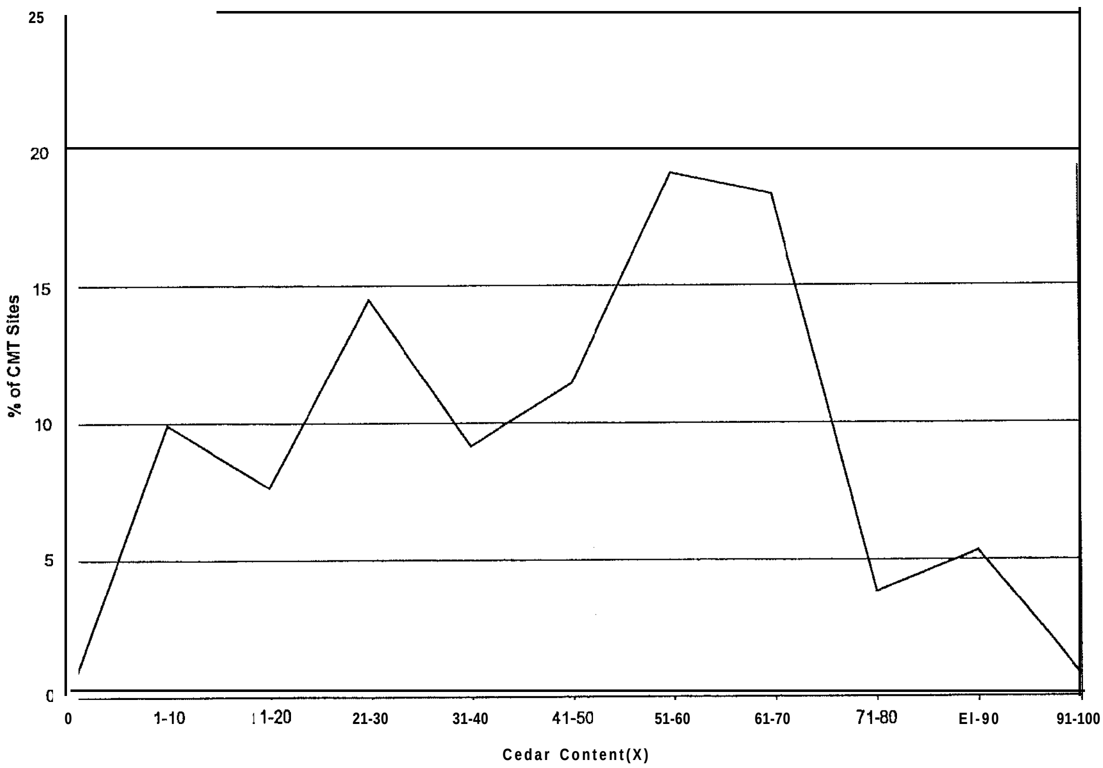


Table 9
Comparison of GIS Analyses for CMT Sites

	North Coast TSA Sites	North Coast Test Area Sites	Central Coast Sites
Number of Sites	158	7	194
Slope	19%	20%	23%
Elevation	22 m asl	46 m asl	19 m asl
Distance to Salt Water	69 metres	163 Metres	52 metres
Distance to Fresh Water	163	75 metres	169 metres
% Cedar	40	40	20
Age Class	9	9	8
Height Class	3	3	3

Although the sample sizes for CMT sites are relatively small, the terrain analyses show remarkable similarities between the North and Central Coast sites. On the basis of currently available data, it is difficult to determine whether this is a true spatial pattern, or whether similar timber harvesting strategies in the two areas have focussed archaeological assessments on similar types of terrain.

7.3 Summary

The GIS analyses indicate that site distribution patterns are similar in the North Coast TSA to those observed on the Central Coast. Taken together, these two data sets provide a fairly substantial body of information for modelling, although the degree to which the data represent the entire study area, rather than selective archaeological inventory locations, has not been demonstrated. For this reason, it is important to attempt to incorporate some level of deductive reasoning into predictive models, and to avoid the temptation to model strictly on the basis of numerical data from known sites. The following section attempts to combine an inductive method, based on quantifiable landscape and site data, with a deductive approach based on an interpretation of past human activities and the environmental factors that influenced them.

8.0 PREDICTIVE MODELLING

Following a review of archaeological literature and other relevant documents, and GIS analysis of the landscape and recorded archaeological sites in the study area, it was concluded that predictive models developed for the Central Coast should be generally applicable to the test areas. The coastal habitation, inland habitation, and CMT models were initially run on the three test areas. As explained in the Central Coast AOA report (Golder Associates 1999a), the pictograph, petroglyph, and trails models were not successful, and they were not used for this study. As with the Central Coast models, the coastal and inland habitation models are general enough to account for a range of site types that tend to be spatially associated with habitations (e.g., rock art, burials, canoe runs, intertidal lithic scatters). The Central Coast subalpine model was also excluded, for three reasons: (1) only a small amount of subalpine parkland exists in the North Coast TSA, and access to it is difficult (Allen Banner, MoF, pers. comm. 2000); (2) the ethnographic and archaeological literature does not indicate substantial use of the subalpine; and (3) forestry impacts to high elevation parklands are minimal.

Model rules were divided into two classes, based on predicted archaeological site potential. The highest site potential rating (Class I) was assigned to locations that would best support the aboriginal cultural activities that are believed to have created archaeological sites. Similar, but slightly less optimal conditions resulted in a Class II (moderate site potential) rating. For example, the difference between Class I and Class II might be based on wider water buffers, a broader slope range, or inclusion of additional biogeoclimatic zones.

Modelling proceeded in an iterative manner, with the models being revised and re-run several times. Each time a model was run, the results were reviewed to ensure that the GIS was accurately reflecting what the model was intended to represent. For example, review of the first model run showed that the method used to calculate slope was not correctly identifying steeply rising shorelines in certain fjords. Adjustments were made to the model, and it was re-run. Ultimately, the habitation models were run four times.

The first generation CMT model was fairly general, and it predicted that a significant amount of land in the test areas had potential for CMTs. During a project meeting involving the MoF, the Archaeology Branch, and Heather Moon (an independent consultant retained to review the project), it was generally agreed that the CMT results for the test areas indicated significantly more site potential than had been predicted for nearby coastal areas in B.C, and that an alternative model approach should be explored.

For the second CMT model, four separate scenarios were developed to represent potential for coastal and inland bark-stripped trees, aboriginally logged trees, and yellow cedar CMTs. Biogeoclimatic zones and subzones were added to the model to assist with the identification of appropriate forest stands, and hydrology buffers were adjusted. Overall, the second model run was considerably more specific than the first.

Following an evaluation of the results of both models, the second model was slightly revised and re-run. Results of this third model run were then extended to the entire study area. Following review by the Ministry of Forests, it was felt that the third CMT model was too exclusive, and that it may under-represent CMT site potential. Ultimately, the first generation CMT model was run on the entire study area, and it was found that the inferred over-representation inferred from the test areas was not indicative of the entire TSA. As a result, the first CMT model, which was initially developed for the Central Coast LRMP overview and later applied to the northern part of TFL 25, was adopted for this study.

The final CMT and Habitation models are defined below.

8.1 CMT Model

Previous archaeological work has shown that CMTs, and particularly bark-stripped trees, may occur in low frequencies almost anywhere on the landscape (Eldridge and Stafford 1996, Stryd and Eldridge 1993). However, some patterning is apparent, with the highest density of CMTs found to date being near the shoreline (but set back from the immediate foreshore), in major valley bottoms, near aboriginal village sites or other occupation sites, or along trails (Stryd and Eldridge 1993) Elevation was introduced because the distributions of red and yellow cedar are elevation-dependent.

Cedar content was considered to be important because the majority of recorded CMTs are cedars. Although CMTs on hemlock and other species have been reported, relatively little is known about their ages or distribution, and it was therefore considered prudent to exclude them from modelling. Management considerations for these species are discussed in Section 11. The CMT model predicts that CMT site density will increase with cedar content, simply because more cedars are available for harvesting. However, this relationship requires field testing, and there is some evidence to suggest that CMT site potential is highest in areas with few cedars (Millennia Research 1996, Allen Banner, pers. comm. 2000).

Due to the extensive history of logging on the northwest coast, it was reasoned that the majority of intact CMTs will be found in older forest stands. Since the cutoff date for automatic protection under the Heritage *Conservation* Act is A.D. 1846, an emphasis was placed on age class 8 and 9 stands (141 years old and older) for identifying the zones with highest predicted CMT potential. GIS analyses of recorded CMT sites in the North Coast TSA generally supported these interpretations. Age classes 6 and 7 were added to the Class II model based on the forestry characteristics of recorded CMT sites. It should be noted that more recent CMTs may require management consideration under the *Forest Act* and/or the Forest Practices Code, as possible evidence of aboriginal rights.

Height class limits were set to exclude stunted trees at the upper limit of the cedar range, because these trees are often twisted and short, and therefore are less likely to have been used for aboriginal logging or bark stripping. It is noted that some recorded CMT sites in the study area are in stands less than 101 years old (age class 6), but they are relatively rare.

Slope, elevation, and distance to salt or fresh water were included on the basis of relationships inferred from the spatial distribution of known CMT sites in the study area and adjacent regions, and information found during the literature review. Cutoff values for the models were based on analyses of recorded CMT sites, with the exception of distance to fresh water, which was inferred from the literature (e.g., Turner 1998).

8.1.1 Model Variables

Based on the literature review, GIS analyses, and inferences about the physical requirements of bark stripping and logging, the following variables were predicted to correlate with the occurrence of recorded CMT sites:

- species composition (cedar percentage as defined by forest cover data)
- height class
- age class
- elevation
- slope
- distance to a river or lake, and
- distance to the coast

8.1.2 Model Rules

Based on the landscape characteristics of recorded CMT sites in the North Coast TSA and the Central Coast LRMP area, a review of literature pertaining to bark stripping and aboriginal logging, and an evaluation of other CMT models in coastal settings (e.g., Arcas Consulting Archeologist 1998, Millennia Research 1999), the model shown in Table 10 was developed for culturally modified trees.

Table 10
Predictive Model for Culturally Modified Tree Sites

Class I (Highest Potential	
Forest Type	Species Composition >= 50% Cw or Yc AND Height Class >= 3 AND Age Class >= 8
	AND
Terrain	Slope = 0-30% AND elevation = O-l 100 metres asl
	AND
Hydrology Buffers	Distance to coast = O-300 metres OR distance to two line river or definite river or intermittent river or lake = O-200 metres
Class II (Moderate Potential)	
Forest Type	Species Composition >0% Cw or Yc AND Height Class >= 3 AND Age Class >= 6
	AND
Terrain	Slope = 0-90% AND elevation = O-l 100 metres asl
	AND
Hydrology Buffers	Distance to Coast = O-1000 metres OR distance to two line river or definite river or intermittent river = O-300 metres OR distance to lake = 200 metres

8.2 Coastal Habitation Model

For the purposes of modelling, coastal habitation sites were considered to include villages, shell middens (with or without clear evidence of settlement), and house depression, within 2 kilometres of the coastline. Similar sites further inland were considered under the inland habitation model. Ethnographic information and existing archaeological data suggest that, with the exception of sites on the few major rivers and large lakes in the study area, the vast majority of habitation sites will be on or near the coastline. In an overview of Heiltsuk traditional territory, all recorded shell midden sites are within 2.4 kilometres of the coast line (Millennia Research 1997b), and this distance was considered in setting the arbitrary 2 kilometre cut-point to distinguish between coastal and inland habitation sites. The GIS analyses discussed above support these interpretations.

8.2.1 Model Variables

Given the maritime focus of North Coast First Nations cultures, it was assumed that most coastal habitation sites would be located on relatively flat landforms near the shoreline (but beyond the storm tide zone) and usually near a source of fresh water. Many of the recorded sites in the North Coast area are in sheltered bays on islands, and some ethnographic and archaeological references describe village sites on beaches on islands at the mouths of rivers (Capes 1976). It is recognized that there will be exceptions to these patterns, such as defensive/refuge sites, which may be surrounded by steep terrain, and to which water may have been transported from another source (Lepofsky 1985).

The variables used for the coastal habitation model were:

- slope
- elevation
- distance to coastline
- distance to fresh water (lake, river or stream), and
- size of island

8.2.2 Model Rules

Based on recorded site and landscape data, and inferences from archaeological and ethnographic information, the model shown in Table 11 was developed for coastal habitation sites.

Table 11
Predictive Model for Coastal Habitation Sites

'lass I (Highest Predicted Potential)		
Case 1: Mainland Coast and Islands Larger than 50 ha.		Distance to coastline = O-100 m O R Distance to definite or intermittent river (IF within 200 m of coast) = O-100 m O R Distance to double line rivers = O-100 m OR Distance to lakes (IF larger than 5 ha.) = O-100 m
	AND	Slope = 0%-30%
	AND	Elevation = O-30 m asl
Case 2: Small Coastal Islands (<=50 ha.)		Distance to coastline = O-100 m
	AND	Slope = 0%-20%
	AND	Elevation = O-30 m asl
Class II (Moderate Predicted Potential)		
Case 1: Mainland Coast and Islands Larger than 50 ha.		Distance to coastline = O-300 m O R Distance to lake (IF greater than 5 ha.) = O-200 m O R Distance to double line river = O-200 m
	AND	Slope = 0%-30%
	AND	Elevation = O-30 m

Table 11
Predictive Model for Coastal Habitation Sites (cont'd)

Case 2: Islands (no size restriction. Includes fresh water islands)		Distance to coastline = O-200 m
	ANI	Slone = 0%-30%
	ANI	Elevation = O-30 m asl
Class II (Moderate Predicted Potential)		
Case 3: Mainland River Valleys (lower reaches)		Distance to coastline = 200-2000 m
	AND	Distance to double line river = O-100 m
	AND	Slope = 0%-30%
Class III		
(Lowest Potential)		All other lands

8.2.3 Inland Habitation Model

Habitation sites further than 2 km from the coastline were considered inland sites. Only 5 such sites have been recorded in the North Coast TSA to date, two of which are on small rivers, one is on a two line river, and one is on a lake. It was hoped this approach might help to highlight differences in settlement patterns between the riverine-adapted Nisga'a and their more maritime-adapted neighbours, and account for resource camps that may exist on lake shores. An all-encompassing habitation model designed to account for all types of habitations in the study area would have to be very general and likely would result in exaggerated site potential in many locations.

The information reviewed for this study suggests that, with the exception of sites on major rivers and possibly large lakes, inland habitations will be relatively rare. Where present, it is assumed that settlement sites would require level, well-drained ground and a source of fresh water. Most inland habitations can be expected to have associated trails, especially where canoe access is restricted.

8.2.4 Model Variables

For the purposes of this study, all inland habitation sites are, by definition, at least 2 km from salt water, and marine islands are excluded. Additional variables used in the model are slope and distance to fresh water (lakes and double line, definite, and intermittent rivers). The model focuses on confluences of rivers and inlets and outlets of lakes, where slope conditions are appropriate for habitation.

8.2.5 Model Rules

Based primarily on inferences from archaeological and ethnographic information from other areas of the province, the following simple model (Table 12) was developed for inland habitations:

Table 12
Predictive Model for Inland Habitation Sites

Class I (Highest Predicted Potential)		
		Slope = 0-20%
	AND	Distance lake (IF > 5 ha.) = O-100 m IF distance to definite river = O-100 m OR Distance to two line river = O-100 metres IF distance to definite River = 0-100 m O R Distance to two line river = O-100 metres IF distance to lake = O-100 m
	AND	Distance to coastline > 2000 metres
Class II (Moderate Predicted Potential		Slope = 0-20%
	AND	Distance lake (IF > 5 ha.) = O-200 m IF distance to definite river = 0-100 m O R Distance to two line river = O-200 metres IF distance to definite River = O-100 m O R Distance to two line river = O-200 metres IF distance to lake = O-200 m
	AND	Distance to coastline > 2000 m
Class III		All other lands

9.0 RESULTS

Two datasets were produced: Dataset I consists of grids representing predicted archaeological site potential, and an accompanying database, and Dataset II consists of a database of recorded and reported archaeological sites. Recorded sites are presented as an ArcInfo point coverage.

9.1 Dataset I

Archaeological site potential was ranked as Class I, Class II or Class III, in order of relative predicted site potential. As defined in Section 1.2.3, Class I lands meet the most stringent model criteria, and are considered to have the highest site potential. It is also likely that these areas will have the greatest density and variety of sites. Overall, the risk of impacting an archaeological resource is greatest for developments within this zone.

Class III lands represent the lowest predicted site potential, and should hold few sites and a narrow range of site types. These lands are predicted to have the greatest physical constraints against human occupation or the preservation of archaeological sites. It is important to reiterate that not all site types could be modelled, and some sites may exist in Class III zones. However, it is expected that such sites will be relatively rare, and the risk of impact is considered to be lowest in Class III.

The total modelled area encompasses 1,969,723 hectares. The study area was divided into a 10 metre grid and each cell was assigned a score for each model. The grid values correspond with Class I, Class II and Class III archaeological potential classifications. The habitation site models were overlain on the CMT mode results for plotting, so that areas predicted to have potential only for CMTs are easily identified.

9.2 Area Results

The model results predict that 47,809 ha (2.4% of the study area) have high potential (Class I) for coastal habitations sites and 3 1,228 ha. (1.6%) have moderate predicted potential (Class II). For the CMT model, 69,823 ha. (3.6%) fall in Class I and 303,456 ha. (15.5%) are ranked as Class II. The inland habitation model predicted that 6,251 ha. (0.3%) have high site potential and 4,674 ha. (0.2%) have moderate site potential. The data are summarized in Table 13.

The model results cannot be simply summed, as there is considerable overlap between the habitation models and the CMT model (>32,000 ha, or 1.6% of the study area). The coastal habitation and inland habitation models do not overlap. The combined model results indicated that 107,666 hectares (5.5% of the study area) falls within Class I lands. Class II model results account for an additional 323,537 hectares (16.5% of the study area), for a total of 43 1,193 hectares of Class I or Class II lands (22% of the study area).

Table 13
Summary of Predictive Modelling Results

Archaeological Land Class	Area (Hectares)	% of Land
Class I	107,666	5.5
Class II	323,537	16.5
Class III	1,526,704	78

9.3 Capture Rates

The results of the predictive models were compared against the database of recorded sites to assess their success rate. Even though the models were based partially on the characteristics of recorded sites, a 100% success rate cannot be expected, as only a few spatial characteristics of the sites were used in the models, and any number of additional factors may have influenced site locations.

The initial capture rate calculations used non-buffered point coverages, which may underestimate the performance of the models. In the GIS point coverages, sites are represented by hypothetical points on the landscape. Using UTM coordinates taken to three decimal points, this point could actually represent only about a one centimetre area on the land. A second capture rate analysis used 100 metre buffers on the site points, effectively giving all sites a 100 metre radius.

Table 14 shows the success rates of the habitation and CMT models, using both points and buffered points. Where sites are less than 200 metres apart, the buffers overlap, creating a single polygon. For this reason, the number of habitation site polygons shown in Table 14 is smaller than the total number of sites. For CMTs, some sites with missing forest cover data were excluded from the point analysis. In some cases, nearby sites with overlapping buffers provided relevant forestry data for the shared polygon; consequently, the number of buffered CMT sites is greater than the number of raw points. The percentage values for points and buffered points are directly comparable. Coastal and inland habitations were combined for the analysis, because only five inland sites have been recorded.

Table 14
Capture Rates of Predictive Models

Model	No. of Sites *	Class I Capture Rate (Points)	Class II Capture Rate (Points)	Total Capture (Points) (n)	Total Capture (Points) (%)	No. of Buffered Sites	Capture Rate (Buffers) (n)	Total Capture (Buffers) (%)
Coastal or Inland Habitation	343	287	34	321	94%	299	293	98%
CMT	167	45	72	117	70%	173	138	80%

In addition to the 80% of buffered CMT sites correctly predicted by the model, 24 CMT sites fell within areas predicted to have high or moderate potential for habitation sites. Consequently, 94% of recorded CMT sites are in locations predicted to have archaeological site potential.

The model results were visually compared with mapped areas identified by the Kitselas First Nation as having cultural importance While not all the areas were predicted by the models as having site potential, at least portions of each area were properly identified.

The model results were also compared with "non-site", or "null" data from locations that have been inspected in the field with no archaeological sites found. This information was obtained from consultants' reports and digitized. In cases where only a sample of the development are was inspected in the field, it was necessary to assume that the level of assessment was adequate to state that no sites were present in the remainder of the area.

As noted in Section 5.2, the digitized cutblocks encompass 4,512 hectares, within which 22 archaeological sites were identified. All areas outside the sites are considered to be "non-sites". According to the model results from the present study, only 2,299 hectares (51%) would have required field assessments. Based on buffered sites, all

22 archaeological sites in the assessed cutblocks were correctly predicted. Using raw points, 73% were correctly predicted.

9.4 Dataset II Recorded Archaeological Sites

Dataset II consists of a database of recorded and reported archaeological sites and trails. Recorded sites are presented as an ArcInfo point coverage. Reported and recorded trails are presented as a separate line coverage within Dataset II.

10.0 EVALUATION AND DISCUSSION

As intended, the model results indicated that the highest archaeological potential for most site types is near the coastline and on islands. This pattern is consistent with the ethnographically-reported Northwest Coast subsistence and settlement system, which focused heavily on marine resources. The CMT model results suggest that inland site potential may be considerable, despite the maritime orientation of the North Coast First Nations, and it is suspected that existing ethnographic and archaeological information under-emphasizes aboriginal use of these zones. For the more riverine-oriented Nisga'a, inland site potential is predicted to be greater than for the Coast Tsimshian, largely due to their geographic position.

Following review of a draft version of this report, one of the licensees expressed concern regarding the CMT model. One concern was with respect to the use of fresh water buffers in general, and specifically about the lack of stream differentiation based on navigability or fisheries values. As noted in this report, the history of archaeological inventory in the North Coast is strongly oriented to coastal areas, and relatively little work has been completed inland. This lack of representative sampling, combined with ethnographic references to the collection of bark well up drainages, indicated that a conservative approach to CMT modelling was warranted, until such time that additional data can be collected for inland areas. Following discussion with the Ministry of Forests, this approach was adopted, with the knowledge that the model probably over-predicts CMT potential.

Another comment related to the consideration of detailed information that may not have been available for the AOA. For example, licensees may be aware of localized forest cover or terrain conditions that are not adequately reflected in the TRIM or forest cover data. Similarly, First Nations may have knowledge of archaeological resources or culturally important areas that have not been formally recorded. These types of information could be incorporated into future model refinements, which should take place on a more localized scale. Specific information could be digitized and made available for land use planning, subject to potential confidentiality issues regarding culturally significant locations.

10.1 Study Limitations

This study provides a good basis for making archaeological resource management decisions in the North Coast TSA, and for guiding future archaeological inventory and impact assessment studies. However, the results are limited by certain factors, which are discussed below.

1. There was no field component to this study and consequently, the predictive models are untested.

2. Only GIS-ready data were used for this study, and the quality of the data varied. Some additional information sources, such as salmon, shellfish, and mountain goat habitat, prevailing wind directions, beach types, and traditional land use data could be useful for modelling, but they would require digitizing and/or authorization for use.

3. The modelling results are affected by the resolution and accuracy of the digital elevation model, TRIM base map data, and forest cover data. It has been shown elsewhere (e.g., Golder Associates 1998, Arcas Consulting Archeologists 1999), that stand-level forest cover data may be insufficiently detailed for identifying small cedar stands that contain CMTs.

4. The existing archaeological site inventory for the area is very limited and biased toward shoreline sites. Archaeological information for inland areas is negligible.

5. Not all archaeological site types were modelled, due to inadequacies in baseline data. It is anticipated that certain un-modelled site types will be accounted for by the habitation and CMT models, but this assumption has not been tested.

The project would have benefited from more direct involvement of members of the First Nations whose territories encompass portions of the North Coast TSA. For example, traditional use information may have provided a more complete picture of aboriginal land/resource use in the study area.

11.0 RECOMMENDATIONS

The following recommendations relate to polygons of archaeological potential identified in Dataset I of the GIS component of this AOA. It is important to note that an archaeological overview assessment is an evolving planning tool that is subject to revision and update as new or better data become available. For this reason, some of the following recommendations are geared toward ground truthing and model refinement.

Outlined below are specific recommendations regarding Class I, Class II and Class III archaeological potential ratings, followed by general recommendations regarding future archaeological work in the North Coast TSA. The three land classes can be viewed as "risk indices" whereby the risk of impacting archaeological sites is predicted to be highest in Class I lands and lowest in Class III lands. In the absence of detailed field investigations, no location can be considered to be completely risk-free.

11.1 Class I Lands

Class I lands are those that satisfy most of the environmental criteria predicted to be associated with archaeological sites. Further archaeological assessment should be undertaken prior to development in any Class I zone. As a first step, a qualified archaeologist may undertake a field reconnaissance to field truth the terrain data used for modelling, and to visually assess the site potential of the development area. We recommend that such an assessment be conducted under a *Heritage Conservation* Act permit so that an impact assessment may be undertaken immediately, if warranted. If the field reconnaissance suggests that archaeological sites are unlikely to exist in the project area, then no further archaeological work would be necessary for that location.

All field assessments should meet or exceed Archaeology Branch guidelines, and should involve consultation with, and if possible, involvement of the appropriate First Nation(s). For cost effectiveness and scheduling purposes, it may be possible for an archaeologist to obtain a single permit for a number of planned developments (commonly known as a "blanket permit"). This approach may reduce the permit review and issuance time, and would streamline reporting by eliminating redundancy.

Areas rated as Class I for culturally modified trees only may receive a Preliminary Field Reconnaissance (PFR), in accordance with Archaeology Branch guidelines.

Reconnaissance typically involves less-intensive ground coverage than an AIA and does not include subsurface testing or other invasive techniques (and therefore does not require a Heritage Conservation Act permit). CMT reconnaissance should be conducted by a professional archaeologist or other individual with adequate training in CMT identification and recording (e.g., a trained local First Nations person or forestry worker). The objective of a PFR is to search for visible evidence of archaeological sites, and to evaluate the site potential of the local environment. A PFR may be adequate to assess a development area, or a detailed impact assessment may be recommended. A PFR should be adequate to locate and document any CMTs present.

One advantage of the PFR approach is that a permit is not required (as long as no subsurface testing is undertaken), and therefore it may be possible to expedite the assessment process. However, if dating of CMTs by a destructive method (e.g., increment borer or stem-round sample) is desired, it is strongly recommended that a permit be obtained. It is unlawful to alter an archaeological site with evidence of pre-1846 use or occupation without a permit, and invasive dating techniques constitute an alteration. Since it cannot be known in advance whether pre-1846 CMTs are present at a *site, we* recommend that dating be completed under permit to remove the risk of accidentally contravening the *Heritage Conservation Act.*

If site types other than CMTs are encountered during a PFR, an impact assessment should be conducted under permit by a qualified archaeologist.

It must be emphasized that the models are based on an assessment of the suitability of the terrain to contain preserved archaeological sites, but not all Class I lands will necessarily have sites.

11.2 Class II Lands

Areas rated as Class II are considered to have moderate archaeological potential and should also receive archaeological field inspection. A PFR is considered an appropriate level of investigation for all Class II lands, including those rated by the models as having potential for CMTs only. A PFR may lead to a recommendation for an impact assessment, or additional work may not be warranted.

Class II lands are predicted to have moderate site potential. It is predicted that fewer sites and fewer site types will be found in this zone than in Class I. From a risk management perspective, this land class offers the greatest challenges because the information available for modelling was generally inadequate to make a firm prediction.

A significant amount of land falls within the Class II CMT designation and, depending on the amount of development planned for these areas, it may not be feasible to conduct field studies over 100% of this area. If this is the case, three main risk management approaches are suggested:

1. a ground-truthing inventory of a sample of Class II lands could be undertaken to assess the model results. Based on the inventory results, the CMT model should be adjusted, if necessary
2. archaeological impact assessments could be required for a sample of the Class II lands. For example, 50% of proposed roads and cutblocks falling within Class II lands could be selected for PFR, with the results serving as ground truthing inventory.
3. the District Manager may decide to manage only Class I CMT lands, accepting the risk associated with waiving the requirements for field assessments of lands ranked as Class II for CMT sites.

Option 3 is the least preferred of these strategies and carries the greatest risk to the Ministry of Forests. It is strongly recommended that any management approach that does not involve field assessment of all Class II lands should be developed in consultation with First Nations and the Archaeology Branch.

11.3 Class III Lands

Class III areas are considered to have relatively low archaeological potential due to environmental constraints on human use or on site preservation. No archaeological assessment is recommended for Class III lands. It should be noted however, that all site potential classes defined in this report are relative. Low potential does not mean *no* potential, and there is always the possibility that unanticipated archaeological sites may occur in Class III areas. Should field observations, consultation with local First Nations or other information sources indicate the potential for archaeological sites to be present in a Class III or any other area, a field reconnaissance should be undertaken by a qualified archaeologist to evaluate the site potential of the area.

If archaeological materials are accidentally discovered during development, all work in the immediate area should be stopped or altered such that the archaeological site is not impacted. The District Manager, the Archaeology Branch and local First Nations should be contacted immediately to discuss appropriate site management measures. Emergency impact management measures, such as artifact collection, controlled excavation or CMT sampling, may be required to mitigate damage to any newly identified site(s).

11.4 Un-Modelled Site Types

Several site types were not specifically modelled due to a lack of information about their distributions, or limitations in the GIS data. Many of these site types, such as burials, lithic scatters, and possibly rock art will be relatively well accounted for by the habitation and CMT models. For the Central Coast LRMP area, over 80% of pictograph sites fell within areas predicted to have potential for habitation sites.

High elevation sites other than CMTs in the North Coast TSA may not be adequately considered by the models. If developments are planned in the limited subalpine parkland zone or in the alpine, archaeological reconnaissance should be considered in areas of gentle terrain. Forestry crews or engineers should be aware of the possibility of aboriginal trails, stone quarries/lithic reduction areas (represented by large amounts of flaked stone), cairns/bunting blinds, and cultural depressions (earth ovens or cache pits) in these areas, and should report them to the District Manager if encountered. We recommend that the District Manager require an archaeological impact assessment in such cases.

Non-cedar CMTs are likely to exist in the TSA, but current information is insufficient for modelling their distributions. Bark-stripped hemlock CMTs, in particular, are likely to be found, primarily near the shoreline, but possibly inland as well. Blazes (usually trail, trapline or territory markers), carvings (dendroglyphs) or paintings (dendrographs) on bark-stripped trees could exist in the area. Dendroglyphs and dendrographs would be rare, and of particular significance. Their locations should be reported to the District Manager, local First Nations, and the Archaeology Branch.

Maple, cottonwood and other trees were also used by aboriginal people, and some evidence of their use may be encountered. In most cases, cultural modifications of non-cedar trees either heal over or become otherwise undetectable in relatively short periods, so the probability of finding non-cedar CMTs of adequate age to be protected under the *Heritage Conservation* Act may be low. Nonetheless, the locations and characteristics of such trees should be recorded when they are encountered, and we recommend that First Nations be informed of their presence. If the modifications are recent, they may represent ongoing use of the resource, which could be subject to aboriginal rights issues.

11.5 General Recommendations

Ground Truthing and Field Data Collection

- The predictive models developed and implemented in this study have not been field tested. It is strongly recommended that a sample of Class I, Class II and Class III lands be inventoried, preferably using a probabilistic field approach, to provide reliable site and non-site data that can be used to test and refine the models. First Nations consultation and involvement should be an integral component of the inventory program.

- In addition to, or as part of the ground truthing inventory, a sample of old growth forests should be selected for probabilistic inventory to provide a larger CMT dataset for predictive modeling. We recommend that the sample focus on areas with red or yellow cedar, but other areas could be considered, in consultation with First Nations, to collect information on aboriginal use of other tree species.

- All archaeological impact assessments in the study area should include revisiting and updating site information (including mapping to current standards) for any recorded sites within the AIA study area.

- All future archaeological field assessments in the study area should include clear reporting of the terrain characteristics of examined areas, including slope, distance to water, forest cover and other variables used in predictive modelling, regardless of whether any archaeological sites are found. Survey coverage and site/non-site locations should be clearly mapped.

Data Improvement

- Ideally, individual CMT locations should be digitized where this information is available. This could greatly increase the amount of CMT data available for modelling.

Model Refinement

- The predictive models should be re-evaluated and refined as new data become available. It was not possible to exhaust all possible information sources or to digitize all mapped information for this AOA, but the models could be tailored and made more specific for particular operational areas.

- Future incorporation of traditional land use information could significantly benefit cultural resource modelling efforts. If made available by First Nations, the results of traditional land use studies should be added to Dataset II of this overview. If available in digital form, the TUS data could be compared against the model results to help refine their predictive ability.

First Nations Consultation and Training

- Ongoing consultation with First Nations regarding cultural heritage issues is of great importance. Detailed consultation was not undertaken for this project, but the AOA results can be used as a joint planning tool during government-First Nations consultation, allowing First Nations to view and comment on the assessed archaeological site potential relevant to specific proposed developments. Some First Nations have expressed an interest in training for local archaeological crews. This approach could provide a corps of knowledgeable personnel that can provide preliminary assistance in situations requiring rapid response, as well as assisting professional archaeologists with field projects.

- An archaeological overview was previously completed for the Heiltsuk Nation's traditional territory (Millennia Research 1997b). That study involved considerable in[put form the Heiltsuk Nation, and its recommendations should be considered when planing developments in Heiltsuk territory.

The results of this AOA should be of benefit to the MoF and the North Coast licensees for long-term planning, to prioritize archaeological management requirements over a period of years (the five year planning cycle, for example). In some cases, it may be possible to plan forestry developments in ways that avoid or minimize impacts to Class I or Class II lands, thereby reducing assessment costs. By using the AOA maps as a consultation tool, the MoF could work with First Nations to identify or confirm locations that have particular cultural significance, so that consultation and field assessments, if necessary, can be completed well in advance of development. All of these applications of the AOA deliverables could result in cost reductions, improved relations with First Nations, and more effective development planning.

12.0 CLOSURE

This report was prepared for the use of the Ministry of Forests and the Archaeology Branch. While its use by First Nations or other appropriate agencies is encouraged, any decisions made on the basis of the report by third parties are the responsibility of such third parties. This study was not intended to address issues of traditional land use or aboriginal rights or title, and it is presented without prejudice to land claims or treaty negotiations.

We trust that this report meets with your current requirements. Should you have any questions, or require further information, please contact the undersigned.

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APPENDIX 1

GLOSSARY OF TECHNICAL TERMS

Aboriginally-logged tree: A tree that has been felled, planked or otherwise modified to obtain wood by First Nations people.

Adze: A woodworking tool typically consisting of a wedge-shaped ground stone blade hafted or bound onto a wooden handle.

Archaeology: The study of human cultures though the material remnants of their activities.

Artifact: A portable object manufactured or intentionally modified by human action. Examples include stone tools, cedar baskets and wooden utensils.

A.S.L.: Above Sea-Level, based on the position of the sea's surface at mean level between high and low tide.

Bark-strip scar: A section of a tree in which the outer bark has been removed, exposing the underlying wood.

Biface: A general term for stone artifacts that have been modified on two opposing sides, or faces. Examples include stone projectile points and knives.

Biogeoclimatic zone: An ecosystem classification scheme based on vegetation, soils, topography and climate.

Blazed tree: A tree displaying chop marks used to indicate a boundary, trail, trapline or other feature on the landscape.

Borden Number: A system for numbering archaeological sites which divides Canada into a series of rectangles based on latitude and longitude. Each rectangle (or Borden block) is given a four letter code and sites are numbered sequentially as they are recorded in each block. For example, FcSm-11 is the Borden number for the Tsini Tsini site near Bella Coola, B.C.

B.P.: Before Present; a dating convention often used with radiocarbon dating. "Present" is universally considered to be A.D. 1950.

Burial Site: A site used for the placement of human remains. Some sites referred to as "burials" do not actually involve burying the dead. A number of different burial practices were used by aboriginal people, including cremation, interment in trees, rockshelters, grave houses and cemeteries. In many cases, the remains were placed in cedar boxes prior to interment.

Cache pit: An underground storage feature, usually used to preserve dried food, but also sometimes used to store tools and other items.

Canoe run: A long narrow beach area cleared of rocks to facilitate the landing of boats on shore.

Cobble Tool: A tool produced by striking flakes from the edge of a cobble to produce a working edge.

Culture: 1. A pattern of human activity transmitted between individuals by teaching; includes both material culture (e.g., artifacts and features) and non-material culture (e.g. practices and beliefs). 2. A term used by some archaeologists to refer to an assemblage of cultural material recurring in a restricted geographic area within a specified time period.

Culture History: An archaeological construct used to describe cultural changes over time, often based on variations in artifact styles.

Culturally Modified Tree (CMT): A tree that has been intentionally altered by First Nations people as part of their traditional use of the forest. Examples of CMTs include bark stripped trees, blazed trees, planked trees and notched trees.

Dendroglyph: A carved tree used for a traditional First Nations purpose, such as marking an important cultural location or a territorial boundary. Also sometimes called an arborglyph/arboriglyph.

Dendrograph: A painted tree used for a traditional First Nations purpose. Also sometimes called an arborgraph/arborigraph.

Dentalium: A long, thin mollusk shell used for ornamentation by Northwest Coast cultures; considered a wealth item and sometimes used as a form of currency. Dentalium is known to have been traded widely in pre-contact times.

Ethnography: A detailed descriptive study of a culture through participant-observation techniques, including interviews with community members.

Ethnohistory: The study of the past using both non-western, indigenous historical records (particularly oral traditions) and early historic written records.

Eulachon: A fatty type of smelt, highly valued by First Nations along the Northwest Coast. Various other spellings are common, including oolichan and ooligan.

Eustatic: Pertaining to changes in absolute sea-level on a global scale, and not regional changes produced by localized movements of land or the sea floor.

Excavation: The controlled and systematic removal and exploration of subsurface archaeological deposits.

Fauna1 Remains: The remains of animals, fish or shellfish, found in archaeological deposits which have not been intentionally modified for use as tools, ornaments, etc.

Feature: A cultural component of an archaeological site, such as a housepit or hearth, that cannot be removed intact from the site.

Fire-cracked rock: Stone that has been altered as a result of rapid or alternate heating and cooling, caused, for example, by stone boiling or in campfires.

Fish trap: A wall of loosely piled stones used to capture fish feeding in the intertidal zone, sometimes incorporating perishable components such as stakes, nets and basketry traps.

Fjord: A long, steep-sided coastal inlet produced as a result of intense glaciation of a previously existing river valley.

Flake: A piece of stone intentionally removed from a core during the manufacture of stone tools. Flakes were sometimes used as expedient tools and may show evidence of retouch or use wear.

Geographic Information System (GIS): A computerized database and analysis system with the primary functions of capturing, storing and manipulating geographic information. Geographic information contains a combination of location, attribute and topographical data.

Glacier: An extended ice mass that originates as compacted snow at high mountain elevations. When the ice achieves a certain depth it will begin to move from its point of origin.

Grease trail: A trail used by aboriginal people as part of a regional exchange system; the term is a reference to eulachon oil, a commonly-traded commodity.

Groundstone: A class of stone tools, manufactured by pecking, grinding and polishing to achieve the desired shape.

Ground truthing: Field investigations designed to assess the accuracy of inferences or predictions made about a dataset. Ground truthing is often used in cultural resource management to test the results of predictive modelling studies.

Historic site: A site dating from the period following early contact between First Nations and European or Euro-American cultures. Includes sites produced by Native and non-Native activities.

Holocene: A geological term referring to the post-glacial period spanning approximately the past 10,000 years, following the Pleistocene Ice Age.

Impact Assessment: In archaeology, a study designed to assess possible impacts of proposed developments on archaeological resources. Impact assessments typically incorporate documentary research, field inspections, and other lines of inquiry. Recommendations regarding the significance of any archaeological resources encountered and resource management strategies are usually provided.

Inventory: The compilation of information on archaeological resources within a given project area, through documentary research and field investigations, often supplemented with interviews. Inventory does not typically include an assessment of the significance of these resources or of potential development-related impacts upon them.

Isostatic: Pertaining to sea-level changes resulting from the tendency of the earth's crust to maintain a state of equilibrium, in which forces tending to elevate balance with those tending to depress. For example, continental plates may be depressed under the weight of glacial ice, and rebound following ice melting, resulting in variations in relative sea-level.

Lithic: Of, or pertaining to, stone. In archaeology, a general term for stone tools and debitage.

Microblade: A small parallel-sided blade removed from a core using a distinctive "punch" technique. Microblades were typically set into bone or wood handles to form cutting tools.

Midden: A deposit of soil and cultural debris produced as byproducts of human activities. Middens of clam and mussel shell, often containing artifacts, are common on the coast of British Columbia.

Mitigation: Archaeological work required to lessen the impact of a development on an archaeological site; typically consists of the excavation of the site or a representative sample thereof.

Old growth: Natural stands of old and young trees and their associated plants, animals and ecological systems, that have remained essentially undisturbed by human activity. The age and structure of old growth forests varies by forest type and between biogeoclimatic zone.

Oral history: A method by which aspects of an individual's life experience and cultural knowledge are collected by an interviewer.

Oral tradition: A non-material process of creating, transmitting and preserving cultural knowledge across generations.

Overview: An assessment of the archaeological resources present in a defined study area. Typically includes an assessment of the potential for unexplored areas to contain archaeological sites

Pebble Tool: A common term synonymous with "cobble tool". A pebble tool may be bifacially or unifacially worked, often with the original rounded cortical portion opposite the working edge left unmodified.

Petroform: An alignment of rocks intentionally produced by human activity, such as a stone wall fish trap or canoe run.

Petroglyph: An image carved or pecked into a rock surface, sometimes enhanced with pigments.

Pictograph: An image painted on a rock surface, typically using red ochre pigments.

Planked tree: A log or tree from which a long, flat piece of timber has been removed.

Pleistocene: The most recent geological period of glaciation, beginning about 1.6 million years ago and continuing until the onset of the Holocene between 13,000 and 10,000 B.P.

Post-contact: The period of time following early contact between First Nations and European cultures. Contact occurred intermittently over a period of approximately 50 years, between the late eighteenth and early nineteenth centuries. Written documents, in conjunction with archaeological data and oral tradition, can be used to study this period.

Potlatch: A feasting complex that is the central social and political institution among First Nations of the Northwest Coast and portions of the adjacent Interior Plateau, which employs the reciprocal redistribution of material goods to establish and reinforce sociopolitical order.

Pre-contact: The period of time prior to the earliest contact between First Nations and European cultures, for which written documents are unavailable. Research into this time period relies on archaeological information and oral tradition. Contact occurred intermittently over a period of approximately 50 years, between the late eighteenth and early nineteenth centuries.

Predictive Model: A construct developed to make inferences about unobserved phenomena based on the observed characteristics of similar phenomena. In archaeology, models are often used to predict site distributions in areas that have not been examined in the field.

Probabilistic survey: Archaeological field inventory involving the random selection of survey units with the intention of eliminating judgmental biases regarding site distribution and location normally inherent in archaeological survey. Typically, the study area is divided into units of high, moderate and low archaeological potential, based on topography, physiography, and other factors, and specific units are then randomly selected for field inspection.

Projectile Point: A sharpened implement used to tip a projectile such as a spear, arrow or dart. Projectile points were typically made from stone, bone, wood, shell or metal.

Quarry: A source area for lithic materials used in the production of stone tools. Such areas are often characterized by dense concentrations of flaking or chipping debris.

Radiocarbon Dating: A technique used to determine the age of organic material through analysis of the proportions of naturally-occurring radioactive carbon isotopes.

Reconnaissance: Non-intensive field investigation designed to assess the archaeological site potential of landforms within a prescribed area. Reconnaissance typically does not involve subsurface testing.

Rockshelter: A small cave or rock overhang used for shelter, habitation, or human burials.

Significance: In cultural resource management, the relative scientific, cultural, public, economic and historic importance of an archaeological site.

Site: A place exhibiting physical evidence of past human activity.

Stratigraphy: The layering of natural and cultural subsurface deposits in archaeological sites.

Subsistence strategy: A cultural system for obtaining and processing food and raw materials.

Tapered bark-strip: A relatively long bark removal feature which narrows to a point at the upper end.

Test hole: A deep cut or chop into a tree, to check the soundness of heartwood. Test holes have been found on standing trees, on windfallen trees, and on sections of aboriginally logged trees

Topography: The physical features of an area, for example mountains and rivers.

Traditional Territory: An area used by a cultural group for subsistence, ceremonial and other cultural practices.

Traditional Use Area: A natural area used by First Nations people to practice traditional activities including, but not limited to, resource gathering (e.g., plant gathering, hunting, fishing, etc.), raw material procurement (e.g. stone quarries, timber or bark harvesting areas, etc.) and ceremonial or spiritual activities. Traditional use sites may lack physical evidence of their use, but maintain cultural significance to a living community of people.

Uniface: An artifact that has been modified, usually through the removal of flakes, on one face or side of its cutting edge only.

Weir: A type of fish trap consisting of a line of wooden stakes placed at the mouth of a river designed to trap spawning salmon, often incorporating additional elements such as nets or basketry traps.

APPENDIX 2

RECORDED ARCHAEOLOGICAL SITE DATA

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GeTr-006	6.500	2001.000	2001.000	969.496	0.129	0.129	T		T									T			8	5	0	13.294	8.183	CWH vm
FeTg-001	3.010	2001.000	287.478	0.384	397.178	0.384	T			T											9	3	80	16.418	7.103	CWH vh 2
GcTh-010	2001.000	0.422	387.322	307.444	379.404	0.422															0	0	0			MH mm 1
GcTe-019	5.062	2001.000	1614.913	1109.992	0.500	0.500	T											T			8	5	20	10.851	3.517	CWH vh 2
FiTi-003	32.975	2001.000	1211.328	0.617	217.723	0.617	T			T											9	3	65	6.793	17.845	CWH vh 2
FjTp-003	4.901	2001.000	149.281	0.803	3.058	0.803	T			T											8	2	65	16.371	3.375	CWH vh 2
GcTa-012	2001.000	2001.000	2001.000	0.963	544.671	0.963	T		T									T			0	0	0	12.532	10.214	CWH vh 2
GcTo-030	0.712	2001.000	2001.000	419.820	0.968	0.968	T											T			0	0	0	8.969	1.076	CWH vh 2
FlTa-001	630.299	1.000	587.320	4.032	351.035	1.000	T						T						T		9	4	40	6.073	5.964	CWH vh 2
FeTg-002	2.733	2001.000	166.205	1.314	591.240	1.314	T			T											9	3	80	11.789	9.009	CWH vh 2
GdTo-051	7.277	2001.000	2001.000	2001.000	1.597	1.597	T											T			5	2	70	13.332	11.502	CWH vh 2
FlTc-002	279.560	2001.000	762.015	118.699	1.710	1.710															0	0	0	156.850	18.173	CWH vm 1
FdTe-004	43.940	2001.000	122.741	1.879	1292.708	1.879															9	2	86			CWH vh 2
GcTh-001	10.425	2001.000	2001.000	2.174	318.750	2.174	T											T			1	1	0	5.621	32.695	CWH vh 2
GcTo-042	2001.000	942.535	17.803	2.337	178.299	2.337							T					T			9	3	40	33.874	4.739	CWH vh 2
GbTh-010	2001.000	2.354	674.679	55.414	444.054	2.354															0	0	0			MH mm 1
GcTh-008	2001.000	2.688	418.568	273.779	421.570	2.688															0	0	0			MH mm 1
GcTn-002	5.750	2001.000	894.185	2.833	875.647	2.833	T											T			2	2	0	7.385	8.223	CWH vh 2
FjTg-001	2.538	2001.000	2001.000	3.183	131.399	3.183	T									T	T	T			9	5	20	1.417	9.738	CWH vh 2
FlTc-001	320.390	2001.000	1432.942	61.262	3.370	3.370															0	0	0	102.183	34.124	CWH vm 1
GdTs-002	5.000	3.866	1116.952	1296.823	230.389	3.866	T											T			9	4	30	12.847	13.634	CWH vh 2
GgTt-001	32.796	1888.569	2001.000	1986.520	4.228	4.228	T									T	T				8	4	5	0.563	30.586	CWH wm
GdTo-039	0.844	2001.000	739.898	1989.991	4.984	4.984	T											T			9	2	90	11.454	10.961	CWH vh 2
GcTo-046	6.171	2001.000	2001.000	5.021	293.715	5.021	T											T			6	3	0	5.255	0.789	CWH vh 2
GbTo-079	4.742	2001.000	942.974	912.437	5.178	5.178	T						T					T			9	3	85	11.890	1.053	CWH vh 2
GcTn-001	5.975	2001.000	1221.401	5.207	234.378	5.207	T		T	T			T					T			9	4	70	17.154	5.459	CWH vh 2
GbTn-055	788.244	2001.000	1605.797	13.983	5.267	5.267							T								4	3	0	140.495	49.823	CWH vh 2
GbTh-013	2001.000	75.602	1374.407	150.596	5.730	5.730															9	6	30			MH mm 1
FlTp-004	4.900	2001.000	496.807	6.010	470.203	6.010	T			T											0	0	0	7.534	4.387	CWH vh 2
FkTl-001	3.901	2001.000	1117.057	6.163	85.388	6.163	T			T											0	0	0	-1.197	5.863	CWH vh 2
FhTj-006	5.220	2001.000	416.784	6.500	507.826	6.500	T			T											0	0	0	14.317	6.225	CWH vh 2
GdTo-019	2.937	2001.000	2001.000	1353.212	6.510	6.510	T											T			9	3	50	7.096	14.492	CWH vh 2
FjTp-004	6.840	2001.000	457.117	7.000	686.549	7.000	T				T										0	0	0	9.027	10.812	CWH vh 2
GdTo-036	9.053	2001.000	1872.756	938.462	7.329	7.329	T											T			7	2	50	9.396	12.057	CWH vh 2
FhTj-001	49.299	2001.000	63.799	7.500	199.882	7.500	T									T	T	T	T		9	4	35	3.359	2.498	CWH vh 2
FiTm-001	207.415	2001.000	352.368	7.567	593.013	7.567							T								9	4	40	26.793	12.783	CWH vh 2
FgTk-004	1.557	2001.000	174.771	243.853	7.673	7.673	T							T							8	3	55	18.413	3.498	CWH vh 2
GgTj-005	2001.000	7.715	2001.000	1134.115	576.106	7.715	T							T							2	2	0	2.769	15.476	CWH ws 1
GcTo-024	5.344	2001.000	1057.379	7.759	1342.387	7.759	T			T											0	0	0	11.667	1.777	CWH vh 2
GeTs-002	12.643	2001.000	1143.554	8.037	424.169	8.037	T											T			9	4	30	14.155	29.829	CWH vm
GdTo-020	7.725	2001.000	2001.000	1594.091	8.088	8.088	T											T			8	2	80	12.123	32.896	CWH vh 2
GcTm-003	6.535	2001.000	2001.000	8.503	958.134	8.503	T		T							T	T	T			8	4	50	6.148	18.786	CWH vh 2
GcTs-016	7.885	2001.000	2001.000	1365.937	8.732	8.732	T											T			9	4	80	7.183	15.457	CWH vh 2
FlTp-014	4.795	2001.000	362.937	8.808	617.827	8.808	T			T											0	0	0	6.279	6.178	CWH vh 2
GcTn-008	1.500	2001.000	1249.668	1088.370	8.816	8.816	T											T			0	0	0	18.585	6.099	CWH vh 2
FlTp-017	8.732	2001.000	315.223	8.862	438.971	8.862	T			T									T		0	0	0	3.858	3.002	CWH vh 2
GdTo-034	9.511	2001.000	2001.000	492.378	9.126	9.126	T											T			6	3	50	12.499	11.001	CWH vh 2
GbTl-010	2001.000	92.987	850.262	10.000	1059.199	10.000															0	0	0	6.456	8.388	MH mm 1
GeTn-003	9.804	2001.000	2001.000	10.038	145.225	10.038	T												T		0	0	0	10.173	2.643	CWH vm
GbTn-056	678.719	2001.000	1698.511	10.040	96.892	10.040							T								4	3	0	117.935	17.673	CWH vh 2
GdTo-018	6.862	2001.000	769.021	351.018	10.217	10.217	T		T							T		T			9	3	60	11.428	9.833	CWH vh 2
GbTn-053	15.549	2001.000	1751.798	839.705	10.516	10.516							T								9	4	30	16.348	18.984	CWH vh 2
GeTo-005	6.177	2001.000	2001.000	10.751	82.062	10.751							T								9	3	40	9.059	10.958	CWH vm
FiTf-008	1718.941	372.167	39.943	11.582	10.997	10.997							T								8	3	90	104.506	6.135	CWH vh 2
GbTh-012	2001.000	123.736	821.888	11.180	147.423	11.180															6	4	0			MH mm 1
GdTn-010	4.595	2001.000	2001.000	11.417	82.010	11.417	T		T									T			9	4	50	6.350	14.269	CWH vh 2
FeTt-005	23.884	2001.000	481.633	11.463	322.261	11.463															9	3	60			CWH vh 2
GbTo-080	3.941	2001.000	454.699	598.150	11.632	11.632	T											T			9	3	40	11.389	4.882	CWH vh 2
GbTk-001	2001.000	11.657	2001.000	92.266	531.341	11.657															0	0	0	9.111	1.130	MH mm 1
GgTj-001	2001.000	15.424	2001.000	1007.793	11.776	11.776		T													5	4	0	1.044	3.392	CWH ws 1
FhTj-007	10.413	2001.000	965.438	12.233	75.922	12.233	T			T											0	0	0	8.119	4.461	CWH vh 2
FgTd-001	55.270	12.449	1309.507	1347.922	535.952	12.449	T			T											0	0	0	12.573	3.297	CWH vm 1
GdTo-017	7.000	2001.000	1082.922	12.939	356.013	12.939	T											T	T		9	4	60	6.936	3.694	CWH vh 2
GdTn-009	6.796	2001.000	2001.000	13.010	320.222	13.010	T		T							T	T				9	4	50	8.367	7.958	CWH vh 2
GcTn-005	7.207	2001.000	1547.553	13.205	644.096	13.205	T											T			8	3	30	14.861	8.088	CWH vh 2
GdTo-052	7.500	2001.000	1252.891	13.240	362.376	13.240	T			T											8	2	80	7.630	2.931	CWH vh 2
GcTh-009	2001.000	79.351	13.380	93.071	235.404	13.380															2	2	0			MH mm 1
FlTe-011	8.445	2001.000	1226.389	13.751	771.025	13.751	T			T											0	0	0	8.922	1.695	CWH vh 2
GbTm-004	56.788	2001.000	1944.705	2001.000	14.273	14.273		T													9	5	10	11.748	17.941	CWH vh 2
GgTj-004	2001.000	14.524	2001.000	1806.047	711.284	14.524															6	2	0	14.331	55.186	CWH ws 1
GbTh-003	2001.000	14.636	155.740	232.751	338.141	14.636															0	0	0			MH mm 1
FdTe-011	146.150	14.857	476.967	165.066	205.082	14.857															0	0	0	11.469	2.856	CWH vh 2
GcTn-011	6.000	2001.000	1901.859	224.129	14.869	14.869	T											T			9	3	80	13.037	17.336	CWH vh 2
GbTl-002	74.562	2001.000	1029.109	89.682	15.190	15.190															0	0	0	15.375	24.464	MH mm 1
GdTn-006	5.555	2001.000	1798.519	15.266	143.919	15.266	T		T									T			9	4	60	8.118	9.866	CWH vh 2
GcTh-018	2001.000	121.916	516.310	15.656	323.801	15.656															0	0	0			MH mm 1
FkTm-001	1276.890	15.853	466.344	350.158	303.813	15.853							T								8	3	70	19.531	5.823	CWH vh 2

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTA	HISTORIC	CANOE_RU	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GbTm-002	2001.000	2001.000	16.155	152.759	312.267	16.155															0	0	0	36.101	2.613	CWH vh 2
GgTj-006	2001.000	16.211	2001.000	312.500	241.700	16.211	T					T				T					0	0	0	7.174	1.055	CWH ws 1
GgTj-002	2001.000	169.000	1718.903	1433.420	16.316	16.316		T								T					8	4	0	7.607	1.069	CWH ws 1
FiTe-001	205.700	17.062	212.961	56.646	103.593	17.062	T											T			0	0	0	7.482	3.457	CWH vm 1
FjTl-001	13.430	2001.000	214.110	17.443	305.382	17.443	T			T											0	0	0	7.536	6.956	CWH vh 2
GbTo-069	27.213	2001.000	495.810	274.041	17.610	17.610	T						T					T			8	3	60	9.843	4.297	CWH vh 2
FlTc-014	11.102	2001.000	288.608	17.931	1969.111	17.931	T			T											0	0	0	8.650	14.445	CWH vh 2
FgTg-001	0.478	2001.000	594.626	18.144	622.870	18.144	T			T											0	0	0	10.794	25.184	CWH vh 2
GgTj-008	2001.000	18.500	2001.000	442.393	1263.251	18.500															8	6	0	4.028	0.895	CWH ws 1
GeTn-008	5.512	2001.000	1103.714	2001.000	18.547	18.547							T								9	4	60	16.233	17.134	CWH vm
GjTi-001	7.469	2001.000	2001.000	1063.586	18.568	18.568	T							T							8	3	40	9.562	23.294	CWH wm
GhTl-002	3.293	2001.000	1368.932	18.628	243.063	18.628		T													9	5	20	5.291	8.363	CWH wm
FgTe-001	31.259	2001.000	550.037	19.071	101.581	19.071	T											T			0	0	0	12.760	11.130	CWH vh 2
GbTo-026	1.434	2001.000	1034.491	1507.299	19.422	19.422	T		T							T	T	T			5	3	20	15.918	4.498	CWH vh 2
GbTm-003	3.597	2001.000	1385.102	1942.089	19.449	19.449	T												T		4	3	40	9.478	15.805	CWH vh 2
FjTh-003	14.061	19.592	1177.284	97.550	460.262	19.592	T					T			T	T		T			3	1	10	8.283	0.865	CWH vm
FeTd-002	9.486	2001.000	1181.470	1221.049	19.629	19.629															0	0	0			CWH vh 2
GdTo-021	6.274	2001.000	2001.000	1392.554	20.049	20.049	T											T			8	4	30	11.101	11.331	CWH vh 2
FjTl-007	7.555	2001.000	1160.805	20.380	237.138	20.380	T				T										0	0	0	8.883	5.505	CWH vh 2
FeTb-001	37.813	2001.000	1386.084	1442.256	20.461	20.461															9	4	70			CWH vm 1
FkTo-007	9.864	2001.000	590.792	21.095	42.412	21.095	T											T			9	3	75	13.998	4.377	CWH vh 2
FiTd-009	26.092	650.408	2001.000	21.741	137.511	21.741															9	3	65	6.817	10.325	CWH vm 1
GcTo-021	1.118	2001.000	1072.407	2001.000	22.306	22.306	T											T			8	3	30	9.924	3.591	CWH vh 2
GbTn-007	242.416	2001.000	22.858	167.043	620.044	22.858	T											T			9	2	80	19.437	15.371	CWH vh 2
FiTi-005	6.282	2001.000	1097.475	1441.462	22.859	22.859	T											T			9	4	35	8.909	3.492	CWH vh 2
FjTj-002	2.800	2001.000	997.090	953.789	23.336	23.336	T								T						9	5	10	9.995	16.879	CWH vh 2
GdTo-023	3.549	2001.000	647.231	2001.000	23.400	23.400	T											T			8	3	20	6.322	7.369	CWH vh 2
FgTd-004	192.326	2001.000	2001.000	23.438	69.716	23.438							T								0	0	0	116.367	83.983	CWH vm 1
GcTh-007	2001.000	24.475	388.157	146.973	415.577	24.475															0	0	0			MH mm 1
GdTn-005	11.066	2001.000	1434.742	24.871	699.128	24.871	T											T			8	3	60	15.187	26.782	CWH vh 2
FfTf-001	16.897	2001.000	282.390	25.181	232.352	25.181	T			T											0	0	0	9.499	14.073	CWH vh 2
GfTi-001	2001.000	87.915	2001.000	25.482	558.182	25.482															8	5	0	4.981	3.817	CWH vm
FjTp-002	4.562	2001.000	214.982	26.552	1065.740	26.552	T		T	T											0	0	0	16.305	3.383	CWH vh 2
FgTd-003	468.377	2001.000	2001.000	110.832	27.192	27.192							T								0	0	0	260.508	63.477	CWH vm 1
FkTm-007	776.317	27.324	417.879	565.486	185.952	27.324							T								8	3	70	20.047	18.638	CWH vh 2
FhTh-004	139.670	2001.000	958.451	27.610	1586.170	27.610	T			T											9	4	80	9.989	17.330	CWH vh 2
FjTh-007	263.765	2001.000	509.718	154.658	28.500	28.500							T								9	4	10	52.636	61.058	CWH vh 2
FgTl-002	56.759	42.212	76.722	29.275	1090.884	29.275	T			T											8	2	60	18.245	13.891	CWH vh 2
GiTl-003	26.651	2001.000	941.691	29.438	1416.495	29.438	T									T	T				4	2	0	22.045	27.593	CWH wm
FeTd-004	7.875	2001.000	990.498	1009.832	29.622	29.622															9	4	80			CWH vh 2
GdTl-002	14.208	2001.000	2001.000	1479.883	29.824	29.824															0	0	0	-6.051	25.328	CWH vm
FhTi-001	13.085	2001.000	75.582	30.048	267.407	30.048	T											T			9	4	35	6.841	14.676	CWH vh 2
FhTi-003	41.888	2001.000	647.332	75.960	30.198	30.198	T			T											9	4	44	12.805	10.546	CWH vh 2
GcTh-017	2001.000	173.098	492.864	30.317	230.759	30.317															8	4	0			MH mm 1
GbTk-004	2001.000	140.000	1971.007	30.435	536.027	30.435															0	0	0	10.613	2.929	MH mm 1
FkTm-004	960.551	30.820	416.326	539.080	268.520	30.820							T								8	3	70	21.779	24.090	CWH vh 2
GeTo-003	43.017	2001.000	1291.303	893.767	31.921	31.921		T								T					8	2	40	22.739	47.473	CWH vh 2
FfTc-004	308.474	2001.000	1224.042	319.262	32.377	32.377															0	0	0	163.391	74.649	CWH vm 1
GcTh-006	2001.000	32.432	612.970	34.041	385.851	32.432															0	0	0			MH mm 1
GcTh-015	2001.000	32.742	603.539	738.062	114.952	32.742															5	2	0			MH mm 1
FgTc-001	11.101	429.873	1350.379	33.114	589.802	33.114															0	0	0	4.082	3.651	CWH vm 1
FiTk-003	12.137	2001.000	234.628	35.047	112.611	35.047	T			T								T			9	5	0	13.979	11.398	CWH vh 2
GgTj-003	2001.000	35.164	2001.000	1832.026	532.725	35.164	T							T							6	2	0	23.404	55.839	CWH ws 1
FlTm-001	19.473	2001.000	2001.000	35.232	127.991	35.232	T											T			9	4	60	9.884	14.825	CWH vh 2
FhTl-001	29.309	2001.000	1473.562	1244.190	35.485	35.485	T					T									8	4	0	18.043	47.234	CWH vh 2
GcTn-007	6.560	2001.000	1820.227	35.983	248.785	35.983	T											T			9	3	40	5.084	10.890	CWH vh 2
FiTf-010	63.397	941.413	592.892	37.244	371.623	37.244	T						T					T			9	4	90	18.907	17.903	CWH vh 2
GbTn-051	158.006	2001.000	2001.000	37.307	624.484	37.307							T								9	4	70	50.559	32.694	CWH vh 2
GcTh-013	2001.000	37.639	735.851	216.186	117.500	37.639															9	5	0			MH mm 1
FiTi-002	11.706	38.339	517.473	1168.955	50.434	38.339	T														9	4	50	6.600	5.148	CWH vh 2
GcTh-012	2001.000	38.406	103.973	206.149	188.816	38.406															0	0	0			MH mm 1
GiTi-004	23.427	2001.000	650.961	38.581	2001.000	38.581	T			T											0	0	0	12.811	6.006	CWH wm
FjTi-004	11.830	2001.000	131.786	39.803	766.341	39.803	T									T		T			9	4	40	7.525	3.572	CWH vh 2
GcTn-019	202.208	2001.000	1968.265	40.064	40.064	40.064							T								9	5	30	39.933	22.774	CWH vh 2
GbTn-052	791.138	2001.000	1344.626	76.335	40.247	40.247							T								9	4	50	135.816	47.318	CWH vh 2
FiTk-002	20.086	2001.000	659.275	40.364	57.751	40.364	T			T											0	0	0	10.176	9.103	CWH vh 2
FdTd-002	14.558	2001.000	1065.174	40.933	657.617	40.933															9	3	75			CWH vh 2
GbTo-005	5.329	2001.000	746.392	1658.533	41.617	41.817	T											T	T		8	3	60	16.975	12.836	CWH vh 2
FgTd-002	35.970	2001.000	1936.803	42.154	201.020	42.154	T			T											0	0	0	9.930	7.556	CWH vm 1
FlTm-005	164.359	2001.000	1303.285	1124.897	43.297	43.297							T								9	4	65	46.656	26.789	CWH vh 2
GbTh-002	2001.000	44.201	205.674	249.490	322.263	44.201															0	0	0			MH mm 1
FkTn-006	172.873	44.304	602.855	297.065	368.794	44.304							T								8	3	70	8.564	19.357	CWH vh 2
GcTn-007	7.457	2001.000	1435.810	353.215	45.775	45.775	T											T			1	1	29	10.336	34.093	CWH vh 2
FgTl-004	2001.000	996.983	46.003	826.438	858.878	46.003							T								8	4	60	51.196	41.858	CWH vh 2
FlTe-001	23.926	47.395	587.196	164.741	292.705	47.395	T			T											0	0	0	8.992	4.604	CWH vm 1
GbTl-006	534.725	47.608	951.291	1076.872	699.596	47.608															9	4	30	1.355	6.152	CWH vh 2
FlTm-002	1251.429	2001.000	1598.254	48.000	312.043	48.000							T								0	0	0	36.567	24.286	CWH vh 2

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
FiTc-001	22.775	2001.000	2001.000	48.157	425.829	48.157															0	0	0			CWH vm 1
GeTo-004	17.909	48.357	1169.490	603.938	446.487	48.357	T			T						T					0	0	0	4.180	13.594	CWH vh 2
GcTh-001	2001.000	105.621	48.455	98.838	507.225	48.455															0	0	0			MH mm 1
FiTl-007	1568.008	264.216	48.626	54.212	101.700	48.626							T								9	4	40	84.450	17.811	CWH vh 2
FkTm-006	976.029	694.636	48.871	474.915	267.206	48.871							T								8	3	5	54.826	55.394	CWH vh 2
FgTr-003	880.270	1458.826	1606.038	800.595	49.583	49.583															0	0	0	454.714	69.684	CWH vm 2
GeTo-033	2.569	2001.000	2001.000	280.084	49.681	49.681	T											T			6	2	20	6.336	4.476	CWH vh 2
GbTm-001	2001.000	2001.000	327.505	282.679	49.833	49.833	T							T							9	2	67	195.559	32.841	CWH vh 2
GeTn-003	0.420	2001.000	2001.000	50.041	1773.996	50.041	T											T			8	4	10	7.716	12.070	CWH vh 2
FeTd-001	3.412	2001.000	788.592	50.160	211.000	50.160															9	1	40			CWH vh 2
FfTc-001	58.033	2001.000	1489.097	1556.296	51.318	51.318							T								9	4	50			CWH vm 1
FjTl-002	7.770	2001.000	316.774	51.917	387.173	51.917	T			T											0	0	0	10.575	3.697	CWH vh 2
GbTo-013	54.604	2001.000	1755.658	1476.082	52.413	52.413	T											T			4	4	0	15.281	12.030	CWH vh 2
FhTk-001	12.000	2001.000	312.899	53.574	402.101	53.574	T								T						9	4	60	4.499	4.969	CWH vh 2
GeTn-005	2001.000	53.729	490.673	186.672	426.445	53.729															0	0	0			MH mm 1
FhTj-008	23.000	2001.000	89.024	53.952	167.870	53.952	T			T											0	0	0	5.233	9.176	CWH vh 2
GfTk-002	2001.000	503.863	1235.695	1856.607	54.030	54.030															2	1	10	18.395	8.459	CWH wm
GaTn-002	1671.945	2001.000	54.917	382.144	134.670	54.917							T								9	4	30	25.076	30.488	CWH vh 2
GaTn-001	152.152	2001.000	467.217	1813.868	55.000	55.000							T								9	4	10	40.294	42.215	CWH vh 2
GbTn-010	4.384	2001.000	2001.000	1189.916	55.283	55.283	T											T			8	2	60	15.460	14.994	CWH vh 2
FkTn-002	1329.157	55.324	432.507	347.457	205.141	55.324							T								8	3	70	22.994	14.073	CWH vh 2
GbTn-007	441.013	2001.000	55.388	227.629	415.348	55.388							T								8	2	90	140.202	16.202	CWH vh 2
FkTm-008	1310.195	446.205	621.523	55.453	537.222	55.453							T								9	4	50	53.220	36.269	CWH vh 2
FjTl-005	17.090	2001.000	135.735	55.695	276.368	55.695	T			T											0	0	0	10.187	16.040	CWH vh 2
FjTe-003	15.634	2001.000	1416.534	2001.000	56.892	56.892	T							T							0	0	0	20.959	60.655	CWH vm 1
GbTn-001	9.741	2001.000	1342.250	1326.385	57.175	57.175	T											T			2	2	0	10.783	18.200	CWH vh 2
GcTn-004	3.354	2001.000	1082.861	540.369	57.460	57.460	T											T			9	3	30	21.099	10.532	CWH vh 2
GcTn-004	99.335	2001.000	1082.861	540.369	57.460	57.460	T											T			9	3	30	21.099	10.532	CWH vh 2
FiTd-004	87.307	633.608	2001.000	123.569	57.965	57.965							T								9	4	76	29.462	28.742	CWH vm 1
GdTi-001	730.682	58.596	2001.000	126.267	335.651	58.596															5	4	0	8.354	4.080	CWH vm
FkTn-002	6.373	1208.472	788.459	59.164	115.141	59.164	T						T					T			8	3	80	4.709	10.825	CWH vh 2
FjTg-002	1140.199	119.663	419.204	316.982	59.718	59.718							T								9	4	30	24.796	13.661	CWH vm
FjTj-001	1.203	2001.000	199.491	164.534	59.898	59.898	T			T						T					9	4	0	4.254	9.038	CWH vh 2
FiTi-001	0.877	2001.000	1012.631	1151.410	60.191	60.191	T			T											0	0	0	7.002	7.088	CWH vh 2
GbTk-003	2001.000	183.250	2001.000	60.835	145.984	60.835															9	3	28	14.919	16.056	MH mm 1
FjTl-008	65.522	2001.000	865.964	61.013	149.109	61.013	T			T			T					T			9	4	20	23.147	27.191	CWH vh 2
GkTm-001	174.860	61.499	1489.113	814.967	412.678	61.499		T								T					8	3	10	13.238	5.580	CWH wm
GdTn-013	30.349	2001.000	1301.497	495.381	62.008	62.008							T								9	3	10	18.682	28.116	CWH vm
FlTc-003	398.876	2001.000	1404.317	557.689	63.573	63.573															0	0	0	245.306	22.659	CWH vm 1
GbTh-011	2001.000	64.345	183.265	294.389	567.661	64.345															0	0	0			MH mm 1
FiTl-004	77.818	2001.000	787.417	877.315	64.634	64.634							T								9	4	20	63.675	62.261	CWH vh 2
GgTl-002	80.868	2001.000	2001.000	64.858	311.685	64.858		T													9	5	30	7.024	4.211	CWH wm
GcTh-011	2001.000	115.960	256.047	66.521	465.062	66.521															3	3	0			MH mm 1
GbTo-003	11.322	2001.000	169.282	67.348	848.372	67.348	T		T							T		T			0	0	0	7.655	3.092	CWH vh 2
GcTn-009	29.703	2001.000	1363.389	912.994	67.981	67.981	T									T	T	T			9	2	60	19.082	3.611	CWH vh 2
GbTk-002	2001.000	174.665	1878.463	69.060	399.809	69.060															3	3	30	14.380	0.593	MH mm 1
GbTo-025	158.164	2001.000	72.832	145.369	248.611	72.832	T									T	T	T			7	2	30	18.914	5.043	CWH vh 2
FiTm-009	55.606	2001.000	1143.225	867.204	73.209	73.209							T								9	5	15	14.977	39.805	CWH vh 2
GaTm-004	39.451	2001.000	293.829	726.582	73.720	73.720							T								8	3	20	36.132	119.749	CWH vh 2
FjTf-001	183.127	2001.000	1904.665	73.981	272.030	73.981	T									T	T	T			9	3	80	50.679	21.637	CWH vh 2
FiTn-010	3.701	2001.000	2001.000	862.166	74.439	74.439	T		T									T			9	4	55	14.905	21.414	CWH vh 2
GdTo-053	2001.000	2001.000	789.260	74.629	104.726	74.629							T								0	0	0	97.825	44.214	CWH vh 2
FkTn-003	1233.973	75.370	310.000	239.621	370.575	75.370							T								8	3	70	27.890	25.795	CWH vh 2
GcTn-003	2001.000	75.482	86.770	79.045	512.919	75.482															0	0	0			MH mm 1
GbTl-003	104.314	75.534	1029.583	1456.385	523.822	75.534															9	4	30	49.045	78.682	CWH vh 2
FjTn-005	1024.002	76.768	832.303	92.194	269.195	76.768							T								9	4	50	21.574	8.607	CWH vm
GcTm-008	191.382	2001.000	1325.883	78.290	880.128	78.290							T								1	1	20	81.738	51.352	CWH vh 2
FiTc-005	349.615	348.669	2001.000	78.320	99.613	78.320							T								9	2	55	68.686	57.685	CWH vm 1
GcTn-014	13.279	2001.000	1318.725	1148.972	79.667	79.667	T											T			9	4	40	18.055	9.283	CWH vh 2
GbTm-006	45.561	2001.000	1897.540	2001.000	82.206	82.206							T								4	3	40	18.388	13.376	CWH vh 2
GbTo-092	5.047	2001.000	1115.079	1574.814	82.572	82.572							T								8	3	50	12.946	7.249	CWH vh 2
GeTp-001	84.736	2001.000	767.237	82.804	526.662	82.804	T			T											9	3	60	30.097	29.855	CWH vh 2
FeTl-002	1.281	2001.000	255.332	82.816	164.865	82.816	T			T											9	3	80	14.574	8.462	CWH vh 2
FfTg-001	2.631	2001.000	388.401	83.436	1533.504	83.436	T			T											0	0	0	11.229	5.430	CWH vh 2
FhTe-001	240.075	2001.000	1085.262	985.609	83.629	83.629							T								0	0	0	172.779	34.630	CWH vh 2
FfTc-006	353.342	2001.000	1268.036	1290.463	85.051	85.051															0	0	0	183.457	50.564	CWH vm 1
GcTm-009	269.616	2001.000	1306.405	85.102	531.047	85.102							T								9	4	60	59.925	30.639	CWH vh 2
GcTh-014	2001.000	85.170	628.448	669.166	182.803	85.170															5	3	0			MH mm 1
FgTl-003	4.635	453.976	533.254	86.373	395.718	86.373	T											T			9	5	60	4.188	10.307	CWH vh 2
GbTi-001	2001.000	87.767	110.232	118.808	571.534	87.767															0	0	0			MH mm 1
GaTk-001	2001.000	88.166	1366.115	1435.532	303.124	88.166															8	4	30	57.103	88.167	MH mm 1
FlTh-003	12.449	2001.000	1257.655	89.008	130.009	89.008	T							T							8	3	85	16.048	36.792	CWH vh 2
GaTn-001	819.821	2001.000	571.173	213.551	89.709	89.709							T								9	3	77	49.936	17.386	CWH vh 2
FgTi-001	10.569	1906.799	176.317	90.850	2001.000	90.850	T			T											0	0	0	12.254	3.628	CWH vh 2
GfTj-001	2001.000	1115.805	2001.000	91.797	438.805	91.797															2	2	0			CWH ws 1
FjTl-003	9.878	2001.000	475.466	91.907	509.456	91.907	T			T											0	0	0	15.507	7.026	CWH vh 2
FkTe-005	11.500	417.226	1339.686	280.303	92.302	92.302							T								0	0	0			CWH vm

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GdTp-016	4.289	2001.000	2001.000	972.393	94.372	94.372	T		T												8	2	80	6.346	13.456	CWH vh 2
GbTl-008	2001.000	134.508	2001.000	1608.685	95.377	95.377															0	0	0	25.740	56.589	CWH vh 2
FlTc-005	245.234	2001.000	904.734	96.299	96.473	96.299															0	0	0	67.972	57.493	CWH vm 1
GcTh-004	2001.000	96.683	207.600	159.397	243.656	96.683															9	6	0			MH mm 1
GbTl-007	2001.000	139.366	2001.000	711.480	97.009	97.009															9	2	65	59.604	35.214	CWH vh 2
GaTm-003	48.219	2001.000	425.346	699.834	97.035	97.035							T								9	4	10	39.451	148.137	CWH vh 2
FiTk-004	15.733	2001.000	588.109	198.872	97.810	97.810	T			T											0	0	0	13.992	7.438	CWH vh 2
GbTj-001	2001.000	222.067	744.493	99.000	239.463	99.000															8	3	45	14.255	7.726	MH mm 1
GeTa-007	20.594	2001.000	2001.000	2001.000	99.746	99.746							T								9	4	60	8.068	14.672	CWH vm
FgTc-002	4.799	100.117	926.477	521.849	512.563	100.117															0	0	0	15.162	32.260	CWH vm 1
FiTi-004	35.135	2001.000	455.356	605.049	100.564	100.564	T			T											0	0	0	12.752	11.382	CWH vh 2
GbTn-064	43.458	2001.000	1596.622	1033.507	102.412	102.412							T								9	3	30	25.856	45.075	CWH vh 2
GfTm-001	35.807	2001.000	1613.478	102.880	854.318	102.880	T			T											0	0	0	1.798	12.986	CWH vh 2
FlTi-001	2001.000	1988.643	852.836	103.101	163.827	103.101							T								9	6	10	77.617	24.289	CWH vh 2
GdTo-015	4.538	2001.000	2001.000	104.094	676.076	104.094	T		T							T		T			8	2	60	5.784	1.876	CWH vh 2
FlTm-007	116.935	2001.000	2001.000	890.737	106.157	106.157							T								9	4	55	47.069	14.033	CWH vh 2
GdTo-004	4.920	2001.000	1015.757	1042.404	106.395	106.395	T									T		T			9	3	80	11.586	26.822	CWH vh 2
FkTn-004	29.718	834.181	1513.330	106.978	204.942	106.978	T						T					T			8	4	30	11.951	13.661	CWH vh 2
GeTo-006	3.707	2001.000	2001.000	1354.397	108.419	108.419							T								9	4	40	8.148	8.748	CWH vm
FlTm-011	834.873	2001.000	1271.400	319.298	109.413	109.413							T								3	3	30	59.868	14.567	CWH vh 2
FgTn-002	20.404	2001.000	251.897	110.274	1174.295	110.274	T			T											0	0	0	12.879	5.119	CWH vh 2
GfTk-003	601.647	112.884	2001.000	2001.000	172.178	112.884															2	2	0	8.273	9.329	CWH wm
GeTm-002	52.580	2001.000	573.448	1051.342	113.504	113.504							T								9	3	30	22.023	24.102	CWH vh 2
GcTl-020	2001.000	115.488	393.061	346.441	391.184	115.488															0	3	0			MH mm 1
FgTe-005	195.725	2001.000	2001.000	235.086	115.317	115.317							T								0	0	0	119.917	101.449	CWH vm 1
FgTf-001	13.081	2001.000	878.728	115.710	672.943	115.710	T			T											0	0	0	7.672	24.233	CWH vh 2
GeTm-001	225.744	116.158	1276.995	446.851	217.623	116.158		T								T					0	0	0	10.078	2.751	CWH vm
GbTm-020	40.531	2001.000	230.433	118.018	896.621	118.018	T														0	0	0	9.546	5.591	CWH vh 2
GcTm-020	199.856	2001.000	864.659	119.532	120.195	119.532							T								9	5	30	87.654	49.058	CWH vh 2
FlTo-002	18.051	607.388	296.639	120.056	851.114	120.056	T											T			9	3	30	9.484	15.182	CWH vh 2
FjTh-001	6.958	801.669	1728.997	950.147	120.249	120.249	T			T			T		T						1	1	0	-3.345	24.480	CWH vh 2
FkTe-001	142.357	2001.000	1946.412	127.751	120.286	120.286	T									T		T			0	0	0			CWH vm
FlTd-007	31.358	791.160	2001.000	120.662	154.566	120.662							T								9	4	20	2.472	4.741	CWH vm 1
FlTa-001	107.541	415.077	943.210	427.604	120.930	120.930															0	0	0			CWH vm 1
FdTc-002	13.694	2001.000	720.425	121.165	181.232	121.165															0	0	0			CWH vh 2
FjTi-003	54.323	350.266	333.252	121.419	331.062	121.419	T											T			0	0	0	23.938	23.709	CWH vh 2
FiTd-003	369.666	2001.000	1248.200	202.941	121.815	121.815							T								5	3	10	98.241	18.709	CWH vm 1
FjTl-006	1.268	2001.000	1150.392	598.092	122.502	122.502	T							T							9	3	50	8.505	17.768	CWH vh 2
FhTh-001	106.694	2001.000	1241.902	122.548	1479.928	122.548	T											T			9	4	60	18.562	21.403	CWH vh 2
FiTf-011	102.156	2001.000	1740.923	122.606	260.448	122.606							T								6	3	70	61.624	27.224	CWH vh 2
FlTp-015	6.738	2001.000	600.829	123.795	484.558	123.795	T			T											0	0	0	8.232	2.087	CWH vh 2
GhTl-001	2.397	2001.000	2001.000	124.306	536.888	124.306	T			T								T			8	3	90	6.707	5.217	CWH wm
GbTl-005	2001.000	124.846	2001.000	317.333	276.217	124.846															9	2	40	65.195	94.938	CWH vh 2
FlTm-003	488.874	2001.000	1773.174	244.562	125.000	125.000							T								9	3	53	44.526	33.415	CWH vh 2
GbTn-039	17.505	2001.000	454.634	155.527	126.042	126.042							T								8	2	50	9.129	16.465	CWH vh 2
FjTe-002	148.526	127.966	783.197	620.999	366.961	127.966	T											T			0	0	0	58.651	39.656	CWH vm 1
GbTn-029	7.745	2001.000	1414.105	1211.651	129.985	129.985	T											T			9	4	60	16.522	19.169	CWH vh 2
FdTe-012	21.243	453.476	132.289	421.458	260.686	132.289															9	3	80	25.601	55.360	CWH vh 2
FjTf-008	224.017	2001.000	1096.367	627.884	132.363	132.363							T								0	0	0			CWH vh 2
GdTn-008	5.853	2001.000	2001.000	134.205	294.155	134.205	T											T			9	2	80	11.223	18.286	CWH vh 2
GcTo-045	2.409	2001.000	2001.000	460.712	134.383	134.383	T											T			8	4	0	4.110	5.494	CWH vh 2
GbTn-015	16.008	2001.000	502.350	517.810	136.088	136.088	T											T			9	2	70	16.590	21.752	CWH vh 2
FiTh-001	30.899	2001.000	1131.801	1238.219	136.346	136.346	T							T							9	4	70	29.836	82.838	CWH vh 2
FjTf-004	58.176	2001.000	1962.593	1070.947	136.750	136.750							T								0	0	0			CWH vh 2
FgTd-007	251.907	2001.000	2001.000	327.755	137.074	137.074							T								0	0	0	195.478	54.197	CWH vm 1
GbTl-001	2001.000	138.224	2001.000	820.586	331.749	138.224															9	2	65	56.654	44.237	CWH vh 2
FiTo-001	0.069	2001.000	194.130	138.350	538.945	138.350	T			T											0	0	0	15.792	16.704	CWH vh 2
FlTm-004	73.819	2001.000	2001.000	369.361	140.771	140.771							T								9	4	60	25.075	32.130	CWH vh 2
GcTm-005	0.726	2001.000	1456.484	613.796	141.670	141.670	T		T									T			0	0	0	7.143	33.053	CWH vh 2
FiTf-006	97.236	2001.000	2001.000	1161.080	142.118	142.118	T							T							0	0	0	-10.975	13.499	CWH vh 2
FeTe-001	18.218	2001.000	885.685	283.166	142.354	142.354															0	0	0	5.786	4.818	CWH vh 2
GcTo-020	4.631	2001.000	1514.498	1191.593	142.482	142.482	T											T			3	2	30	12.887	7.788	CWH vh 2
FiTf-009	67.048	923.585	587.909	143.198	368.262	143.198							T								9	4	90	17.996	20.281	CWH vh 2
GcTh-016	2001.000	143.364	385.672	177.725	227.122	143.364															0	0	0			MH mm 1
GdTo-040	0.337	2001.000	650.472	2001.000	146.536	146.536	T									T		T			8	3	10	6.823	11.279	CWH vh 2
FgTd-006	163.922	2001.000	2001.000	148.743	217.965	148.743							T								[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CWH vm 1
FiTd-006	93.567	782.734	1962.104	152.191	343.356	152.191							T								9	4	20	33.205	25.541	CWH vm 1
FjTh-004	1161.510	2001.000	1031.338	152.637	190.223	152.637							T								9	5	10	54.908	17.767	CWH vh 2
FhTi-004	15.125	2001.000	230.2[illegible]	154.600	394.022	154.600	T									T		T			0	0	0	4.548	4.104	CWH vh 2
FdTd-006	26.625	2001.000	540.682	546.331	154.811	154.811															8	2	80	26.386	76.505	CWH vh 2
GbTm-009	98.589	2001.000	1750.545	156.032	513.382	156.032							T								9	4	70	91.813	44.628	CWH vh 2
FlTp-001	1.925	2001.000	640.095	156.228	504.984	156.228	T								T						9	5	50	7.072	5.611	CWH vh 2
FgTc-004	1010.116	659.168	842.307	1142.394	156.383	156.383															0	0	0	519.754	104.716	CWH vm 2
FiTl-006	30.396	2001.000	1121.350	771.081	156.851	156.851							T								9	3	70	17.602	48.223	CWH vh 2
FeTh-001	15.464	2001.000	428.228	1136.762	158.001	158.001															0	0	0	11.431	6.262	CWH vh 2
FiTh-002	82.004	2001.000	1108.083	941.276	158.372	158.372	T							T							0	0	0	-15.623	25.958	CWH vh 2

APPENDIX 2: SITE ATTRIBUTES

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GaTp-004	17.371	2001.000	896.311	1070.193	160.134	160.134	T											T			9	3	50	9.338	7.465	CWH vh 2
FgTk-003	32.683	2001.000	160.380	281.318	1130.760	160.380							T								8	3	55	19.299	5.953	CWH vh 2
FkTm-005	688.799	777.898	260.618	254.949	160.722	160.722							T								9	3	45	90.384	39.761	CWH vh 2
FiTd-002	38.507	864.281	2001.000	299.659	162.092	162.092							T								9	4	20	16.973	20.223	CWH vm 1
FjTl-002	177.714	2001.000	1772.476	524.215	162.780	162.780	T							T							9	3	70	105.710	22.898	CWH vh 2
GcTm-006	13.447	2001.000	1556.573	163.109	460.757	163.109							T								9	3	90	16.142	51.413	CWH vh 2
FjTh-006	619.188	2001.000	1009.471	165.504	306.091	165.504							T								9	5	10	55.655	33.235	CWH vh 2
GgTi-002	2001.000	519.415	1139.030	166.025	563.724	166.025	T														0	0	0			CWH ws 1
GbTn-023	11.382	2001.000	1201.958	2001.000	166.579	166.579	T														6	3	10	3.101	10.816	CWH vh 2
FgTf-005	85.228	541.122	277.146	166.813	229.083	166.813							T								4	3	10	23.019	28.056	CWH vh 2
FhTh-002	20.407	2001.000	882.243	168.239	1269.226	168.239	T			T											0	0	0	11.419	4.842	CWH vh 2
GbTm-010	317.648	2001.000	1356.551	169.636	955.325	169.636							T								9	4	30	222.714	57.943	CWH vh 2
GdTo-037	0.309	2001.000	1551.640	1559.877	169.823	169.823	T											T			0	0	0	15.328	10.331	CWH vh 2
GbTo-056	5.570	2001.000	170.368	2001.000	695.461	170.368	T											T			8	2	40	13.029	27.717	CWH vh 2
FjTp-001	0.520	2001.000	170.730	180.680	442.831	170.730	T					T									9	2	45	13.525	1.061	CWH vh 2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	176.099	176.099															0	2	60	119.993	27.401	CWH vh 2
FkTg-001	396.750	2001.000	1368.855	2001.000	177.623	177.623							T								9	[illegible]	30	206.656	51.249	CWH vh 2
FlTm-006	188.505	2001.000	1755.456	1303.506	178.149	178.149							T								9	3	53	60.507	15.162	CWH vh 2
GdTo-054	210.035	2001.000	2001.000	1333.473	178.569	178.569							T								9	2	60	45.113	18.025	CWH vh 2
GbTh-001	2001.000	181.930	191.464	278.771	410.174	181.930															6	2	30			MH mm 1
FlTp-016	6.290	2001.000	570.719	183.293	511.248	183.293	T			T											0	0	0	9.137	5.698	CWH vh 2
GcTn-013	15.736	2001.000	1740.092	184.510	778.263	184.510	T											T			8	3	30	4.013	1.991	CWH vh 2
FkTo-027	3.881	2001.000	599.591	709.288	184.602	184.602	T											T			9	4	60	11.933	5.442	CWH vh 2
FeTg-003	15.811	2001.000	636.772	499.519	185.940	185.940															8	2	75	12.880	13.588	CWH vh 2
FfTn-001	0.500	2001.000	2001.000	186.533	205.766	186.533	T			T											0	0	0	9.368	7.151	CWH vh 2
FfTe-009	27.617	1446.112	640.618	187.601	561.470	187.601	T			T											0	0	0	12.437	5.707	CWH vh 2
FdTe-008	2001.000	2001.000	250.543	189.184	1250.790	189.184															0	2	86			CWH vh 2
FdTd-004	22.000	2001.000	311.122	358.309	189.283	189.283															9	4	70	9.732	5.162	CWH vh 2
GbTo-068	138.629	2001.000	563.847	485.837	189.833	189.833	T									T	T	T			8	2	40	20.927	5.200	CWH vh 2
GaTk-003	2001.000	313.728	582.970	190.323	630.872	190.323															9	4	40	47.023	33.857	MH mm 1
GbTo-078	1.844	2001.000	820.845	895.573	191.437	191.437	T									T	T	T			9	3	85	11.155	6.410	CWH vh 2
GbTo-081	4.945	2001.000	314.720	575.167	192.631	192.631	T											T			9	3	40	15.945	7.463	CWH vh 2
FlTp-013	2.572	2001.000	975.801	193.361	600.396	193.361	T											T			8	2	60	7.689	2.820	CWH vh 2
FlTm-008	165.762	2001.000	1029.274	1080.930	193.777	193.777							T								9	5	60	59.659	14.184	CWH vh 2
GcTn-017	1.374	2001.000	1758.996	1037.799	193.939	193.939	T											T			4	3	0	5.328	15.354	CWH vh 2
GaTo-001	12.333	2001.000	2001.000	2001.000	194.004	194.004	T					T						T			9	3	10	12.031	18.688	CWH vm
GaTo-008	5.273	2001.000	1045.958	732.110	199.531	199.531	T											T			9	2	80	9.419	4.118	CWH vh 2
GcTo-044	1.132	2001.000	2001.000	527.946	199.724	199.724	T						T					T			8	4	0	4.792	6.192	CWH vh 2
GbTo-032	37.285	2001.000	1133.246	1189.493	200.041	200.041	T												T		8	4	0	18.269	18.189	CWH vh 2
FjTl-006	132.564	2001.000	1798.185	265.454	200.132	200.132							T								0	0	0			CWH vh 2
FlTp-003	5.001	2001.000	439.274	200.600	439.160	200.600	T											T			8	2	80	5.481	9.935	CWH vh 2
GfTl-001	166.065	200.660	1449.903	2001.000	434.881	200.660															0	0	0	10.936	3.080	CWH wm
FkTo-028	23.244	2001.000	697.646	202.655	1284.996	202.655	T			T											0	0	0	9.503	5.727	CWH vh 2
FdTe-005	1.318	2001.000	421.576	204.455	311.752	204.455															9	2	86			CWH vh 2
GdTo-025	9.429	2001.000	1937.235	1865.414	205.236	205.236	T											T			8	2	80	9.270	8.793	CWH vh 2
FgTo-003	21.193	2001.000	786.372	206.477	208.533	206.477	T			T											0	0	0	2.263	5.820	CWH vh 2
FgTk-002	36.589	2001.000	207.000	1268.803	1041.568	207.000															8	2	55	20.790	23.982	CWH vh 2
FjTl-007	37.806	2001.000	278.851	207.162	235.211	207.162							T								9	3	62	28.039	61.936	CWH vh 2
FhTm-001	7.412	2001.000	439.066	212.429	829.361	212.429	T					T									9	4	60	7.435	2.966	CWH vh 2
GbTo-084	4.956	2001.000	358.020	212.713	920.855	212.713	T											T			9	3	30	13.766	11.499	CWH vh 2
FhTj-003	12.560	2001.000	475.846	437.242	215.258	215.258	T														8	2	75	10.030	15.812	CWH vh 2
FiTe-002	33.889	2001.000	994.937	677.170	216.696	216.696	T											T			9	4	50	12.021	19.640	CWH vm 1
GdTo-026	1.078	2001.000	1734.362	1237.638	220.756	220.756	T										T	T			7	2	60	8.531	12.330	CWH vh 2
GcTo-026	0.642	2001.000	1253.215	1451.607	222.489	222.489	T											T			8	3	20	16.276	3.779	CWH vh 2
GbTn-027	6.763	2001.000	1536.756	1124.951	223.750	223.750	T												T		8	2	50	15.385	9.010	CWH vh 2
GbTn-045	177.092	2001.000	742.951	719.621	226.014	226.014							T								8	4	20	103.436	36.628	CWH vh 2
FxTe-004	94.974	1955.329	1862.495	449.971	226.948	226.948	T						T								0	0	0			CWH vm
GbTo-070	5.500	2001.000	227.238	589.099	611.552	227.238	T						T				T	T			9	3	40	13.254	8.018	CWH vh 2
GbTl-004	104.041	2001.000	1234.856	524.149	227.405	227.405															9	4	35	30.918	27.858	MH mm 1
GiTl-001	34.234	228.524	1767.971	561.446	264.956	228.524	T										T				4	4	0	12.998	1.684	CWH ws 1
FiTo-012	25.501	557.983	401.942	233.036	866.491	233.036	T			T											0	0	0	7.650	3.272	CWH vh 2
FiTo-013	11.493	2001.000	862.141	233.836	652.304	233.836	T		T				T			T	T	T			9	4	50	9.022	10.726	CWH vh 2
FxTn-001	23.684	1310.080	604.852	233.881	238.312	233.881	T											T			8	3	80	10.999	15.800	CWH vh 2
GbTo-034	37.788	2001.000	1157.862	1237.046	234.738	234.738							T								8	4	0	15.099	5.441	CWH vh 2
GcTo-006	5.717	2001.000	1424.776	235.131	699.752	235.131	T									T	T	T			8	3	85	17.428	5.464	CWH vh 2
GiTl-003	187.932	2001.000	523.300	237.119	790.011	237.119															7	2	20	76.434	53.270	CWH wm
GcTm-011	1036.484	2001.000	428.030	287.308	238.577	238.577							T								1	1	10	153.537	21.418	CWH vh 2
FiTg-003	1.117	2001.000	240.565	330.333	1124.333	240.565	T							T							9	3	90	16.049	15.476	CWH vh 2
FiTm-002	27.641	2001.000	717.696	240.769	604.800	240.769							T								9	3	70	19.946	19.661	CWH vh 2
GcTe-034	8.000	2001.000	2001.000	565.608	243.344	243.344	T		T				T					T			8	4	0	14.307	3.849	CWH vh 2
GcTe-034	80.571	2001.000	2001.000	565.608	243.344	243.344	T						T					T			8	4	0	14.307	3.849	CWH vh 2
GdTe-049	7.153	2001.000	2001.000	2001.000	243.746	243.746	T											T			5	2	70	16.274	7.277	CWH vh 2
GdTe-038	3.791	2001.000	952.045	1888.925	244.665	244.665	T											T			9	2	90	8.694	8.000	CWH vh 2
GbTm-008	32.641	2001.000	1877.149	858.792	245.161	245.161							T								9	4	60	21.897	60.058	CWH vh 2
FjTf-007	264.002	2001.000	1744.913	865.743	250.752	250.752							T								0	0	0			CWH vh 2
FiTf-005	70.176	2001.000	1110.586	936.640	252.446	252.446							T								9	3	70	47.522	45.291	CWH vh 2
FiTc-002	37.000	2001.000	2001.000	1575.532	254.139	254.139															0	0	0	3.779	34.049	CWH vm 1

APPENDIX 2: SITE ATTRIBUTES

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAPH	PETROGLYPH	HABITATION	DEPRESSION	SHELL_MIDDEN	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GbTn-030	1.812	2001.000	1159.945	1059.893	254.621	254.621	T											T			9	4	60	13.026	4.276	CWH vh 2
FlTi-003	451.245	1938.875	258.516	339.826	575.658	258.516							T								0	0	0	72.431	14.252	CWH vh 2
FiTc-004	8.459	2001.000	2001.000	258.629	362.123	258.629															0	0	0	8.367	6.765	CWH vm 1
GbTn-002	0.828	2001.000	1962.557	1529.269	260.412	260.412	T											T			0	0	0	12.845	9.840	CWH vh 2
GbTn-018	131.011	2001.000	260.688	1721.372	1380.450	260.688	T									T		T			8	3	20	17.219	10.488	CWH vh 2
GcTm-010	715.480	2001.000	1072.783	500.968	261.790	261.790							T								0	0	0	102.261	20.626	CWH vh 2
FkTn-003	23.950	938.610	977.810	516.624	261.951	261.951							T								9	4	30	7.861	6.836	CWH vh 2
GbTo-064	5.690	2001.000	1579.008	1924.954	264.516	264.516	T									T	T	T			7	4	10	17.647	11.299	CWH vh 2
FiTl-001	61.000	2001.000	886.595	266.093	824.565	266.093	T											T			7	3	25	21.155	24.578	CWH vh 2
GbTo-047	0.086	2001.000	655.160	268.264	1091.848	268.264	T					T									9	3	40	14.877	4.661	CWH vh 2
GbTo-020	13.319	2001.000	268.494	1782.361	428.602	268.494	T					T						T			4	3	10	5.970	3.578	CWH vh 2
FdTc-005	0.549	2001.000	593.068	269.216	357.767	269.216															0	0	0	14.255	14.174	CWH vh 2
FlTp-008	1.393	2001.000	733.383	403.598	271.748	271.748	T											T			9	4	60	12.704	16.090	CWH vh 2
FhTj-004	7.781	2001.000	446.817	273.783	649.666	273.783	T											T			9	4	45	14.936	9.751	CWH vh 2
FiTg-002	26.294	2001.000	1926.700	1494.382	275.123	275.123	T							T							9	4	40	20.514	60.740	CWH vh 2
FgTj-001	10.625	2001.000	275.592	390.242	1684.516	275.592	T					T									8	3	50	10.341	13.027	CWH vh 2
GbTi-008	32.000	2001.000	2001.000	278.095	500.848	278.095	T											T			0	0	0	15.768	3.322	CWH vh 2
GbTi-047	91.016	2001.000	278.813	1588.345	481.144	278.813							T								9	2	75	10.156	1.320	CWH vh 2
GbTi-036	55.139	2001.000	312.950	280.705	471.886	280.705							T								8	2	50	12.560	9.505	CWH vh 2
GbTo-051	2.762	2001.000	281.309	1767.777	420.599	281.309	T								T						4	3	10	5.537	2.518	CWH vh 2
GbTo-012	80.016	2001.000	1519.018	1660.020	281.513	281.513	T											T			9	4	30	19.126	7.730	CWH vh 2
FlTg-001	186.821	2001.000	[illegible]	[illegible]	[illegible]	[illegible]	T														[illegible]	[illegible]	30	[illegible]	[illegible]	[illegible]
GbTn-009	18.568	2001.000	2001.000	342.737	284.837	284.837	T											T			9	2	7	13.393	24.347	CWH vh 2
FiTl-003	18.377	1215.392	1142.903	841.670	288.733	288.733	T			T											0	0	0	[illegible]	[illegible]	[illegible]
FgTh-002	31.587	2001.000	1179.496	288.867	452.832	288.867	T			T											0	0	0	7.607	6.969	CWH vh 2
GdTn-012	4.294	1081.509	406.690	292.055	473.001	292.055	T		T									T			9	3	79	11.260	11.355	CWH vh 2
FkTo-002	39.817	2001.000	418.434	292.338	725.295	292.338	T											T			0	0	0	11.665	7.779	CWH vh 2
GcTn-006	4.712	2001.000	1715.061	296.608	503.686	296.608	T											T			8	3	30	14.238	13.129	CWH vh 2
GbTl-011	210.111	2001.000	1343.659	740.290	297.669	297.669															9	4	40	121.675	35.015	MH mm 1
GbTl-003	43.254	2001.000	1131.790	356.645	298.522	298.522															9	4	35	11.200	19.830	MH mm 1
GdTo-035	4.546	2001.000	2001.000	684.498	298.563	298.563	T											T			6	2	40	13.363	10.179	CWH vh 2
FlTo-009	3.000	2001.000	1730.333	1445.498	299.284	299.284	T											T			9	3	75	7.855	10.859	CWH vh 2
GcTo-038	19.241	2001.000	1791.460	301.284	692.356	301.284	T			T											0	0	0	11.308	6.742	CWH vh 2
FiTk-001	8.931	2001.000	341.232	306.810	525.199	306.810	T					T									8	4	80	12.957	37.182	CWH vh 2
GbTo-009	4.953	2001.000	1995.923	806.252	308.247	308.247	T									T	T	T			8	3	30	15.926	9.181	CWH vh 2
GbTo-017	11.439	2001.000	541.014	311.004	638.810	311.004	T					T						T			0	0	0	12.769	12.474	CWH vh 2
GaTo-001	13.000	2001.000	312.469	363.141	727.761	312.469	T											T			9	2	85	16.433	22.597	CWH vh 2
GiTk-002	13.285	2001.000	2001.000	312.695	1336.920	312.695	T				T										0	0	0	14.380	16.563	CWH wm
GbTo-052	3.336	2001.000	732.810	1539.558	312.884	312.884	T								T						8	2	80	8.899	8.674	CWH vh 2
FeTd-003	105.475	2001.000	716.995	314.396	508.980	314.396															9	4	80			CWH vh 2
GaTk-002	2001.000	426.918	661.252	317.670	661.918	317.670															9	5	5	90.811	39.164	MH mm 1
GeTo-041	9.427	2001.000	2001.000	619.016	319.033	319.033	T						T					T			8	4	0	12.370	1.861	CWH vh 2
GbTo-001	10.233	2001.000	324.550	1093.132	522.171	324.550	T											T			0	0	0	5.474	4.584	CWH vh 2
FgTd-008	170.217	2001.000	1105.505	325.762	478.652	325.762							T								0	0	0	179.088	99.177	CWH vm 1
GdTn-004	3.204	2001.000	1224.258	489.086	326.476	326.476	T		T									T			9	5	10	13.965	38.837	CWH vh 2
FeTn-002	5.637	2001.000	2001.000	628.063	327.051	327.051	T			T											0	0	0	18.152	42.667	CWH vh 2
GcTn-010	0.655	2001.000	2001.000	1060.236	328.339	328.339	T					T						T			0	0	0	13.226	1.295	CWH vh 2
GbTn-022	0.778	2001.000	1041.852	330.173	336.219	330.173	T											T			2	2	0	16.567	30.304	CWH vh 2
[illegible]	2.937	2001.000	[illegible]	[illegible]	330.030	330.030	T												T		7	2	30	16.297	14.254	CWH vh 2
GhTn-043	6.737	2001.000	331.490	488.346	625.339	331.490	T														[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CWH vh 2
FeTk-008	273.520	2001.000	1716.752	2001.000	332.082	332.082															0	0	0			CWH vh 2
GeTn-004	6.096	1395.040	2001.000	1084.033	333.059	333.059	T											T			0	0	0	[illegible]	[illegible]	[illegible]
FdTe-007	112.253	2001.000	333.861	391.536	613.233	333.861															9	2	88			CWH vh 2
GbTn-012	20.374	2001.000	422.529	499.446	339.150	339.150	T									T		T			9	4	50	9.912	14.795	CWH vh 2
GdTo-005	6.940	2001.000	1312.948	1409.132	339.209	339.209	T											T			9	2	50	8.832	13.569	CWH vh 2
FlTo-006	6.101	2001.000	339.518	351.463	1917.322	339.518	T						T					T			9	3	50	12.045	11.245	CWH vh 2
GcTh-019	2001.000	341.603	411.319	434.435	701.669	341.603															8	3	0			MH mm 1
FkTo-025	13.734	2001.000	343.147	631.367	1036.456	343.147	T											T			9	4	40	17.007	16.684	CWH vh 2
FlTo-010	6.960	2001.000	1283.700	1448.770	344.929	344.929	T											T			8	2	45	3.744	7.232	CWH vh 2
GaTo-009	40.506	2001.000	828.372	345.250	536.098	345.250															9	2	50	13.717	18.338	CWH vh 2
FlTc-007	23.600	2001.000	1780.976	794.300	348.032	348.032															0	0	0	19.101	13.899	CWH vm 1
FiTd-001	5.119	2001.000	2001.000	348.973	479.443	348.973	T	T							T	T					0	0	0	2.206	9.428	CWH vm 1
FlTo-011	10.151	2001.000	1441.203	1595.777	350.896	350.896	T											T			9	3	35	3.837	10.739	CWH vh 2
GdTo-022	1.370	2001.000	1976.498	2001.000	351.324	351.324	T											T			8	3	10	11.782	8.676	CWH vh 2
GgTl-009	2001.000	427.689	2001.000	356.438	1309.841	356.438															0	0	0	4.050	2.892	CWH ws 1
FbTj-005	8.750	2001.000	592.668	356.942	712.348	356.942	T											T			8	3	55	9.144	5.664	CWH vh 2
FlTh-001	43.775	357.159	954.014	999.341	452.939	357.159															0	0	0			CWH vm 1
FiTi-007	67.372	2001.000	1117.392	1243.861	358.457	358.457	T						T								0	0	0	4.741	1.278	CWH vh 2
FgTi-001	23.488	2001.000	359.512	661.037	1340.212	359.512	T						T							T	9	3	30	19.300	3.288	CWH vh 2
GdTo-024	10.109	2001.000	1487.999	718.193	361.453	361.453	T											T			0	0	0	11.256	7.211	CWH vh 2
FiTf-005	114.815	1777.234	1456.726	1046.933	361.744	361.744	T							T							0	0	0	0.000	18.136	CWH vh 2
GdTo-050	8.260	2001.000	1171.435	1961.437	363.665	363.665	T											T			8	3	60	9.640	9.114	CWH vh 2
GcTo-053	10.595	2001.000	1380.373	1355.243	363.758	363.758	T											T			8	3	20	14.484	5.887	CWH vh 2
FdTe-001	3.626	2001.000	365.658	393.610	771.758	365.658															9	4	75			CWH vh 2
GbTn-010	6.634	2001.000	1096.849	1023.144	368.096	368.096	T		T									T			0	0	0	11.365	12.313	CWH vh 2
GgTn-001	131.436	2001.000	870.569	370.139	530.857	370.139		T													9	4	20	20.717	5.038	CWH vh 2
GbTo-065	10.046	2001.000	1549.189	2001.000	370.742	370.742	T						T				T	T			7	4	0	11.820	3.033	CWH vh 2

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
FiTd-008	135.500	1019.030	2001.000	619.940	370.890	370.890							T								9	4	20	68.194	38.944	CWH vm 1
FkTa-023	10.561	2001.000	373.372	829.927	1169.576	373.372	T											T			9	4	40	13.535	7.110	CWH vh 2
GcTo-052	15.281	2001.000	1817.090	1180.927	373.642	373.642	T									T	T	T			8	3	20	12.962	10.610	CWH vh 2
GdTo-032	3.291	2001.000	374.042	2001.000	673.235	374.042	T		T									T			8	3	70	13.801	19.189	CWH vh 2
GcTo-013	5.622	2001.000	1897.202	377.369	706.534	377.369	T											T			7	2	30	8.261	9.351	CWH vh 2
FlTk-005	53.793	2001.000	379.414	496.418	776.928	379.414							T								9	3	62	31.141	48.597	CWH vh 2
GbTo-048	5.882	2001.000	1383.117	1856.095	381.157	381.157	T											T			8	3	50	15.310	6.801	CWH vh 2
FhTd-001	296.490	2001.000	929.086	381.769	884.200	381.769							T								0	0	0	172.501	53.724	CWH vm 1
GgTj-007	2001.000	385.134	2001.000	401.395	593.396	385.134	T									T					7	5	0	2.431	1.654	CWH ws 1
GcTo-043	10.699	2001.000	1405.524	390.388	528.676	390.388	T											T			9	3	40	17.553	9.213	CWH vh 2
FkTa-024	3.740	2001.000	390.499	750.289	1052.395	390.499	T											T			9	3	30	9.887	9.586	CWH vh 2
GbTo-028	6.320	2001.000	391.232	1435.722	877.373	391.232	T						T			T	T	T			9	2	50	9.444	8.489	CWH vh 2
GbTo-041	8.742	2001.000	393.962	1898.174	556.920	393.962							T								0	0	0	13.293	11.333	CWH vh 2
GdTo-030	14.134	2001.000	956.804	1666.265	394.725	394.725	T											T			8	4	0	16.200	9.188	CWH vh 2
GdTo-014	4.244	2001.000	2001.000	395.144	860.990	395.144	T		T							T		T			9	4	10	6.609	3.928	CWH vh 2
GbTn-041	52.625	2001.000	447.627	510.105	400.134	400.134							T								9	2	60	8.874	7.783	CWH vh 2
FhTd-002	290.772	2001.000	2001.000	2001.000	401.967	401.967							T								0	0	0	158.874	9.691	CWH vm 1
GbTo-040	5.223	2001.000	1115.425	1636.361	403.598	403.598	T								T						8	3	60	14.754	9.299	CWH vh 2
GbTn-036	35.059	2001.000	450.869	404.085	504.157	404.085							T								7	4	30	11.681	6.769	CWH vh 2
GbTo-021	19.747	2001.000	1638.163	1695.570	405.654	405.654	T										T	T			7	4	10	16.783	0.763	CWH vh 2
FfTg-004	162.793	2001.000	680.319	407.625	817.709	407.625							T								9	4	30	53.775	13.795	CWH vh 2
GdTo-006	5.184	2001.000	1183.805	1282.068	408.850	408.850	T											T			9	4	80	9.261	5.150	CWH vh 2
GbTn-043	51.739	2001.000	410.041	888.334	749.511	410.041							T								9	2	60	16.796	19.858	CWH vh 2
GbTn-037	38.588	2001.000	547.982	556.887	411.242	411.242							T								9	2	55	18.003	28.657	CWH vh 2
GaTp-005	30.024	2001.000	741.239	839.226	419.996	419.996	T											T			9	2	70	17.100	34.462	CWH vh 2
GbTn-040	16.435	2001.000	881.954	720.370	421.827	421.827							T								8	2	70	6.108	1.001	CWH vh 2
FlTp-002	5.130	2001.000	546.843	423.418	1049.589	423.418	T											T			8	3	65	3.619	6.806	CWH vh 2
GbTo-049	17.639	2001.000	429.694	1328.815	461.001	429.694	T					T						T			0	0	0	15.674	6.178	CWH vh 2
GdTo-027	7.314	2001.000	1529.917	2001.000	433.847	433.847	T											T			8	3	80	9.757	5.534	CWH vh 2
GbTo-019	13.627	2001.000	435.503	2001.000	620.207	435.503	T									T	T	T			0	0	0	9.360	8.449	CWH vh 2
FdTe-002	17.713	2001.000	442.709	474.925	987.561	442.709															0	0	0			CWH vh 2
FlTo-004	8.751	2001.000	1298.991	445.261	651.993	445.261	T											T			9	4	15	9.971	4.696	CWH vh 2
GcTo-007	4.201	2001.000	445.635	495.954	803.161	445.635	T								T						8	5	22	17.694	9.715	CWH vh 2
GbTo-077	1.615	2001.000	743.357	1050.870	446.432	446.432	T									T	T	T			9	3	85	5.191	7.852	CWH vh 2
GcTo-032	2.500	2001.000	1555.838	482.545	447.602	447.602	T											T			0	0	0	8.644	8.218	CWH vh 2
GbTo-045	4.786	2001.000	622.669	801.568	448.275	448.275		T													9	3	30	11.042	6.335	CWH vh 2
GbTo-006	2.366	2001.000	453.444	1626.426	524.140	453.444	T		T							T	T	T	T		8	3	60	8.993	12.814	CWH vh 2
GbTn-028	9.639	2001.000	833.781	633.640	454.782	454.782	T												T		8	2	60	18.699	11.608	CWH vh 2
GcTo-015	6.475	2001.000	1787.774	806.630	457.443	457.443	T											T			8	5	20	16.131	10.029	CWH vh 2
GcTo-001	1.183	2001.000	458.521	477.875	829.166	458.521	T									T	T	T			8	5	22	12.766	11.514	CWH vh 2
GdTo-041	3.271	2001.000	459.421	2001.000	474.393	459.421	T											T			7	2	90	8.748	8.196	CWH vh 2
FeTl-001	25.823	2001.000	608.043	459.739	764.505	459.739															9	6	5	8.071	2.298	CWH vh 2
GbTn-005	1.624	2001.000	799.524	675.680	462.895	462.895	T											T			9	2	60	15.051	6.754	CWH vh 2
GbTk-001	2.682	2001.000	1271.082	497.241	463.473	463.473	T									T					4	1	40	11.487	15.546	CWH wm
FdTd-003	2.313	2001.000	600.217	1332.139	465.800	465.800															9	3	80	15.929	11.254	CWH vh 2
GcTo-040	1.098	2001.000	927.467	879.888	466.445	466.445	T											T			0	0	0	17.132	6.704	CWH vh 2
FkTo-006	0.500	2001.000	1012.723	468.497	1478.347	468.497	T						T					T	T		9	4	65	8.873	8.773	CWH vh 2
FlTf-003	21.584	2001.000	468.891	486.890	968.410	468.891	T							T							9	3	50	17.935	28.824	CWH vh 2
GbTn-050	689.891	2001.000	472.071	501.157	676.947	472.071							T								9	2	50	64.485	8.260	CWH vh 2
FdTe-010	15.645	1100.435	640.865	473.143	536.117	473.143															0	0	0	12.046	2.363	CWH vh 2
FlTc-006	2.911	2001.000	501.593	473.922	931.859	473.922	T											T			9	3	60	6.779	6.563	CWH vh 2
GaTp-003	17.733	2001.000	1038.338	1327.204	474.499	474.499	T											T			9	3	50	6.274	5.314	CWH vh 2
FjTh-002	4.638	2001.000	1135.978	842.986	475.549	475.549	T							T							9	3	80	13.619	46.581	CWH vh 2
GiTk-005	14.929	2001.000	874.000	475.559	1524.256	475.559		T													4	2	20	17.594	22.024	CWH wm
FdTe-003	26.105	2001.000	475.559	533.828	580.125	475.559															8	2	68			CWH vh 2
FkTa-022	17.320	2001.000	476.445	942.826	1343.329	476.445	T											T			9	4	40	11.096	14.738	CWH vh 2
FdTe-009	2001.000	2001.000	526.539	480.951	945.736	480.951															0	0	0			CWH vh 2
GbTo-074	6.163	2001.000	2001.000	1435.134	481.599	481.599	T											T			9	2	90	16.181	1.036	CWH vh 2
FiTc-003	17.404	1754.616	990.042	485.084	488.001	485.084															0	0	0	3.227	8.993	CWH vm 1
GbTo-044	2.013	2001.000	489.411	1627.995	553.110	489.411	T								T						8	3	60	13.335	13.018	CWH vh 2
GbTn-006	31.602	2001.000	1681.594	1201.065	489.993	489.993	T											T			0	0	0	14.709	2.090	CWH vh 2
GbTo-034	6.688	2001.000	491.574	642.580	767.542	491.574	T		T			T			T	T	T	T			9	4	60	16.743	2.555	CWH vh 2
GbTn-042	29.826	2001.000	517.552	667.938	494.347	494.347							T								9	2	60	8.621	4.091	CWH vh 2
GbTn-035	49.330	2001.000	496.841	973.123	781.299	496.841							T								9	2	95	11.208	6.893	CWH vh 2
GdTo-033	1.823	2001.000	2001.000	734.385	499.808	499.808	T											T			6	2	50	9.552	9.127	CWH vh 2
GbTo-061	7.750	2001.000	510.399	2001.000	1015.556	510.399	T								T						0	0	0	8.706	3.068	CWH vh 2
GdTn-001	7.071	512.462	1492.800	1526.513	735.211	512.462	T		T							T		T			0	0	0	11.614	21.955	CWH vh 2
GbTo-008	4.862	2001.000	1595.663	513.125	882.709	513.125	T									T	T	T			8	3	20	16.654	10.152	CWH vh 2
GbTm-005	160.665	2001.000	524.271	1347.361	513.202	513.202							T								9	3	70	58.543	20.707	CWH vh 2
GdTo-028	11.958	2001.000	1278.030	2001.000	513.973	513.973	T											T			6	1	70	13.984	5.442	CWH vh 2
GdTo-055	39.765	2001.000	2001.000	2001.000	515.261	515.261							T								8	2	70	19.320	19.937	CWH vh 2
FlTp-007	7.189	2001.000	754.638	567.117	516.486	516.486	T											T			9	3	90	5.899	14.861	CWH vh 2
GbTo-082	8.157	2001.000	517.688	629.511	558.996	517.688	T						T					T			9	2	70	6.850	4.323	CWH vh 2
FlTo-003	17.509	2001.000	967.843	518.094	934.016	518.094	T											T			9	3	90	10.808	1.600	CWH vh 2
GcTo-051	2.007	2001.000	2001.000	1109.194	518.487	518.487	T									T	T	T			5	3	0	14.666	3.787	CWH vh 2
GbTo-042	15.360	2001.000	1442.455	1935.153	518.567	518.567	T								T						8	4	10	14.464	5.720	CWH vh 2
GbTn-044	54.073	2001.000	518.809	1253.315	641.642	518.809							T								9	2	60	20.592	1.755	CWH vh 2

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTACT	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAPH	PETROGLYPH	HABITATION	DEPRESSION	SHELL_MIDDEN	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GdTo-013	5.051	2001.000	2001.000	520.787	859.973	520.787	T		T							T	T	T			9	3	30	11.658	21.514	CWH vh 2
GbTo-035	8.136	2001.000	1226.075	1496.979	521.294	521.294	T		T							T		T			8	3	60	15.203	7.537	CWH vh 2
GdTo-029	13.037	2001.000	1173.697	2001.000	524.274	524.274	T											T			8	3	60	18.607	9.741	CWH vh 2
FiTo-008	6.179	2001.000	900.678	528.933	936.321	528.933	T											T			9	3	75	10.605	1.374	CWH vh 2
FiTt-005	57.023	2001.000	2001.000	989.438	531.241	531.241			T				T								0	0	0	28.300	28.266	CWH vh 2
GcTo-039	22.236	2001.000	1029.366	994.438	536.641	536.641	T									T	T	T			8	4	30	11.597	16.640	CWH vh 2
GbTe-075	1.078	2001.000	2001.000	1571.753	540.473	540.473	T											T			9	2	90	15.647	11.166	CWH vh 2
GbTo-031	12.110	2001.000	780.097	545.643	1163.330	545.643	T											T			9	4	30	7.701	6.619	CWH vh 2
GeTe-026	2.837	2001.000	1836.524	679.491	546.054	546.054	T											T			8	4	0	15.006	6.691	CWH vh 2
GbTe-020	15.501	2001.000	1576.586	2001.000	546.948	546.948	T								T		T	T			8	4	10	11.356	4.037	CWH vh 2
FgTe-001	9.343	2001.000	916.128	945.359	547.891	547.891	T											T			8	2	45	6.115	2.967	CWH vh 2
GeTe-031	5.391	2001.000	1449.594	869.401	548.135	548.135	T											T			0	0	0	6.194	3.655	CWH vh 2
GeTe-014	7.046	2001.000	1717.273	550.542	649.037	550.542	T									T	T	T			8	2	30	9.384	5.153	CWH vh 2
FiTt-002	35.541	2001.000	553.895	576.722	801.503	553.895	T									T	T	T			9	4	70	15.185	24.246	CWH vh 2
GbTe-016	17.252	2001.000	555.265	1250.916	754.978	555.265	T											T			9	3	50	14.684	14.566	CWH vh 2
GbTe-007	22.163	2001.000	556.064	838.955	582.210	556.064	T		T							T	T	T			0	0	0	12.598	6.214	CWH vh 2
FiTe-007	17.548	1815.248	727.021	558.737	746.262	558.737	T						T					T			9	4	40	8.952	6.400	CWH vh 2
GbTi-017	1.517	2001.000	713.739	559.041	587.209	559.041	T											T			8	2	60	12.982	7.959	CWH vh 2
GbTe-058	4.337	2001.000	1027.512	1482.883	562.336	562.336	T								T						8	2	50	14.675	7.348	CWH vh 2
GcTe-029	5.285	2001.000	2001.000	564.392	763.661	564.392	T											T			9	4	20	7.725	1.269	CWH vh 2
GcTi-018	37.429	2001.000	2001.000	774.411	567.821	567.821							T								7	3	30	38.339	77.739	CWH vh 2
FiTi-002	33.587	2001.000	1463.276	1598.464	570.040	570.040	T											T	T		9	4	70	10.328	19.906	CWH vh 2
GbTo-088	1.761	2001.000	859.565	575.209	1450.002	575.209	T											T			8	4	0	6.685	6.394	CWH vh 2
GbTo-085	5.762	2001.000	586.847	594.467	1139.736	586.847	T											T			0	0	0	9.116	0.753	CWH vh 2
GbTo-093	85.027	2001.000	830.814	586.943	815.336	586.943	T											T			9	3	40	17.038	13.055	CWH vh 2
GbTo-087	6.887	2001.000	590.361	753.414	955.378	590.361	T											T			9	4	30	9.327	0.672	CWH vh 2
GbTo-011	6.081	2001.000	1000.257	1662.256	590.765	590.765	T											T			0	0	0	8.637	3.000	CWH vh 2
GiTi-001	20.563	2001.000	2001.000	592.062	1680.539	592.062		T													5	5	0	18.421	4.909	CWH wm
GdTo-031	0.280	2001.000	593.199	2001.000	955.612	593.199	T											T	T		9	3	70	11.497	8.940	CWH vh 2
GdTo-014	5.039	2001.000	604.210	1548.773	773.478	604.210	T		T									T			4	2	20	4.775	3.769	CWH vh 2
GbTo-076	21.000	2001.000	1625.736	607.315	981.072	607.315	T									T		T			8	3	20	16.918	5.930	CWH vh 2
GdTo-012	6.888	2001.000	2001.000	610.292	1008.917	610.292	T		T							T		T			9	3	30	13.084	9.066	CWH vh 2
GeTn-005	2.613	1662.529	2001.000	1369.392	615.773	615.773		T													8	5	0	13.487	24.628	CWH vm
GbTo-022	11.249	2001.000	1932.694	1544.136	620.263	620.263	T											T			0	0	0	14.480	1.071	CWH vh 2
FeTc-002	362.516	2001.000	1242.419	1365.092	620.267	620.267															0	0	0			CWH vh 2
GbTa-019	137.333	2001.000	621.176	2001.000	1819.991	621.176	T					T						T			0	0	0	12.495	1.240	CWH vh 2
GcTa-003	4.500	2001.000	2001.000	939.256	623.859	623.859	T								T			T			7	4	0	13.131	3.966	CWH vh 2
GdTa-046	3.497	2001.000	1133.061	1008.940	626.065	626.065	T									T		T			8	3	40	10.754	8.329	CWH vh 2
GcTa-050	4.180	2001.000	2001.000	1151.043	626.857	626.857	T											T			0	0	0	12.992	1.468	CWH vh 2
GcTa-009	7.715	2001.000	2001.000	999.055	632.396	632.396	T								T						7	4	0	13.589	2.361	CWH vh 2
GbTa-038	5.564	2001.000	634.773	2001.000	1166.727	634.773	T								T						8	3	70	9.643	11.679	CWH vh 2
GcTa-037	3.736	2001.000	1254.943	2001.000	636.871	636.871	T											T			5	4	0	8.270	3.618	CWH vh 2
GbTa-073	2.481	2001.000	2001.000	1648.837	644.858	644.858	T											T			8	2	40	17.026	11.891	CWH vh 2
GaTa-002	4.325	2001.000	1218.020	1524.860	645.079	645.079	T											T			9	3	50	7.693	5.802	CWH vh 2
GdTa-009	2.915	2001.000	2001.000	1851.746	648.735	648.735	T									T		T			8	3	50	13.329	21.154	CWH vh 2
GbTi-002	44.753	649.576	1289.223	763.265	1486.452	649.576		T								T					4	3	0	20.193	11.730	CWH wm
GbTa-066	6.190	2001.000	1591.847	2001.000	653.150	653.150	T											T			8	4	10	14.569	2.512	CWH vh 2
FiTq-002	5.249	2001.000	720.748	666.399	895.860	666.399	T									T	T	T			9	4	85	9.300	1.380	CWH vh 2
GbTa-002	16.005	2001.000	667.648	2001.000	1191.254	667.648	T								T			T	T		8	3	70	14.476	2.627	CWH vh 2
FiTa-012	13.674	2001.000	833.866	668.186	2001.000	668.186	T											T			5	3	45	11.702	3.003	CWH vh 2
GbTa-018	18.594	2001.000	853.167	673.071	1480.837	673.071	T					T						T			8	4	0	3.727	13.857	CWH vh 2
GbTa-021	11.520	2001.000	1130.588	1150.635	680.732	680.732	T											T			8	0	0	5.498	4.132	CWH vh 2
GbTa-071	11.564	2001.000	693.813	832.233	1660.573	693.813	T											T			9	4	30	11.948	0.738	CWH vh 2
GeTa-002	2.652	2001.000	2001.000	784.851	699.841	699.841	T											T			9	4	40	2.577	3.738	CWH vh 2
FiTq-007	10.256	2001.000	773.159	701.755	1195.082	701.755	T											T			0	0	0	7.092	1.086	CWH vh 2
GfTi-002	68.050	2001.000	1576.561	1704.778	702.798	702.798															8	4	10	10.774	25.511	CWH wm
GdTo-011	4.836	2001.000	2001.000	703.849	1027.860	703.849	T		T									T			9	3	30	16.664	10.162	CWH vh 2
GeTo-023	2.583	2001.000	1607.731	1146.829	703.878	703.878	T											T			9	4	30	14.837	22.651	CWH vh 2
FkTe-008	10.969	2001.000	791.189	705.136	746.125	705.136	T											T			9	3	60	11.479	14.283	CWH vh 2
GcTo-037	8.586	2001.000	2001.000	1179.442	705.304	705.304															5	3	0	16.273	7.173	CWH vh 2
GcTo-036	5.602	2001.000	1122.392	1945.071	709.162	709.162	T											T			8	5	0	8.743	2.180	CWH vh 2
GbTo-053	19.901	2001.000	1363.607	1111.885	713.066	713.066	T												T		9	4	5	13.864	16.390	CWH vh 2
GcTn-007	444.331	2001.000	1169.719	1038.266	718.069	718.069							T								9	2	70	179.651	17.627	CWH vh 2
GbTo-037	8.273	2001.000	1770.475	1877.689	727.008	727.008	T											T			0	0	0	10.280	11.209	CWH vh 2
FiTi-004	137.152	2001.000	731.001	1290.858	1459.588	731.001	T							T							9	2	90	96.487	32.590	CWH vm 1
GbTo-027	48.584	2001.000	731.837	1531.805	795.604	731.837															0	0	0	6.597	8.298	CWH vh 2
GbTo-089	4.730	2001.000	1741.507	2001.000	734.389	734.389	T									T	T	T			8	4	10	13.855	11.407	CWH vh 2
FdTc-001	3.500	2001.000	744.558	858.958	779.660	744.558															0	0	0			CWH vh 2
FdTe-006	57.500	2001.000	748.010	748.744	1436.012	748.010															8	3	60			CWH vh 2
GbTo-010	15.454	2001.000	1295.931	1854.644	752.216	752.216	T											T			0	0	0	9.802	4.214	CWH vh 2
FiTp-005	1.721	2001.000	1138.607	1272.710	752.636	752.636	T		T									T			9	2	90	5.218	2.577	CWH vh 2
FiTh-004	15.906	2001.000	2001.000	984.700	759.190	759.190	T							T							9	2	70	19.808	53.593	CWH vh 2
GcTo-049	9.290	2001.000	2001.000	1222.949	763.225	763.225	T											T			5	3	0	17.779	7.217	CWH vh 2
FiTo-010	15.076	2001.000	1363.003	768.741	1170.477	768.741	T						T					T			9	3	75	7.090	12.392	CWH vh 2
FiTi-006	34.076	2001.000	1207.754	831.570	774.406	774.406	T							T	T						9	3	70	26.160	62.630	CWH vh 2
GdTo-008	8.694	2001.000	2001.000	1576.330	785.147	785.147	T		T												0	0	0	11.709	12.167	CWH vh 2
FkTo-021	3.281	2001.000	1466.079	1505.471	785.240	785.240	T											T			8	3	65	11.717	10.882	CWH vh 2

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DIST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GdTo-010	6.403	2001.000	2001.000	1202.970	785.362	785.362	T									T		T			8	1	80	17.575	9.802	CWH vh 2
FaTo-002	8.127	2001.000	788.558	823.362	833.057	788.558	T			T											0	0	0	11.262	8.330	CWH vh 2
GbTo-054	19.167	2001.000	1097.446	1147.953	790.488	790.488	T		T									T			4	3	0	14.910	31.579	CWH vh 2
GbTo-059	10.817	2001.000	1255.762	1714.987	794.158	794.158	T						T			T	T	T			8	4	30	9.431	2.418	CWH vh 2
GbTo-055	17.038	2001.000	1132.441	1151.277	806.740	806.740	T		T												9	4	5	12.526	16.415	CWH vh 2
GdTo-007	3.371	2001.000	2001.000	1220.922	814.234	814.234	T		T									T			8	3	70	14.967	14.120	CWH vh 2
GcTo-048	6.366	2001.000	2001.000	1273.361	815.017	815.017	T											T			5	3	20	18.019	8.081	CWH vh 2
GaTp-007	5.862	2001.000	1209.627	825.085	834.251	825.085	T											T			0	0	0	10.350	7.400	CWH vh 2
GbTo-015	14.000	2001.000	825.890	1436.365	1085.825	825.890	T		T									T			9	4	20	9.184	7.524	CWH vh 2
FlTo-015	9.368	2001.000	1257.221	829.235	1247.777	829.235	T												T		9	3	75	6.812	8.241	CWH vh 2
GcTo-035	1.676	2001.000	1083.142	1688.253	844.745	844.745	T											T			6	3	0	11.067	12.638	CWH vh 2
FeTc-007	30.802	2001.000	2001.000	2001.000	846.783	846.783															0	0	0			CWH vh 2
GcTm-004	6.506	2001.000	2001.000	865.301	1007.067	865.301	T		T									T			8	4	20	10.557	10.443	CWH vh 2
GdTo-003	11.370	2001.000	1288.077	867.929	1346.812	867.929	T											T			8	3	80	15.207	41.964	CWH vh 2
GbTn-013	14.263	2001.000	1321.759	1330.250	871.778	871.778	T						T					T			9	3	90	10.933	11.187	CWH vh 2
FlTl-004	109.566	2001.000	1314.301	1162.103	879.939	879.939							T								9	3	70	41.739	20.602	CWH vh 2
GbTo-032	12.064	2001.000	885.612	1499.469	1339.364	885.612	T					T				T	T	T			7	3	64	9.204	17.721	CWH vh 2
GbTo-033	17.893	2001.000	1670.522	2001.000	886.243	886.243	T					T						T			0	0	0	9.153	10.350	CWH vh 2
GaTo-001	18.473	2001.000	1349.513	889.519	1108.625	889.519	T											T			9	3	80	7.106	9.560	CWH vh 2
FkTo-015	17.770	2001.000	1832.206	1297.297	899.457	899.457	T											T			9	4	35	15.982	19.450	CWH vh 2
GdTo-001	5.381	2001.000	2001.000	2001.000	901.908	901.908		T													0	0	0	11.475	1.964	CWH vh 2
GbTo-046	16.405	2001.000	1200.766	2001.000	934.422	934.422							T								9	2	60	3.926	12.001	CWH vh 2
GbTo-030	17.447	2001.000	1174.053	936.453	1381.974	936.453	T									T		T			4	3	0	10.633	26.919	CWH vh 2
GbTo-014	16.513	2001.000	1110.558	936.465	990.555	936.465	T											T			8	3	60	11.707	8.157	CWH vh 2
FlTo-005	21.703	2001.000	1889.272	943.057	1329.576	943.057	T											T			8	4	70	16.704	10.724	CWH vh 2
GcTo-004	37.529	2001.000	1266.382	1276.329	944.001	944.001	T											T			7	4	0	13.872	4.749	CWH vh 2
GbTo-011	23.500	2001.000	1165.648	1170.149	946.555	946.555	T						T					T			9	4	70	1.819	6.683	CWH vh 2
GcTo-005	34.915	2001.000	1448.406	1455.335	953.244	953.244	T								T			T			7	4	0	9.247	2.049	CWH vh 2
GbTo-072	2.793	2001.000	2001.000	1990.985	959.548	959.548	T									T	T	T			8	2	40	13.656	6.754	CWH vh 2
GcTo-047	3.000	2001.000	2001.000	1423.833	960.438	960.438	T											T			5	3	20	11.775	4.802	CWH vh 2
FkTo-026	8.193	2001.000	1081.989	960.555	1904.072	960.555	T											T			9	3	90	7.175	0.396	CWH vh 2
GbTo-057	1.542	2001.000	1005.472	1794.548	962.181	962.181	T									T	T	T			8	2	80	10.775	10.756	CWH vh 2
GbTo-036	198.372	2001.000	1929.101	2001.000	966.191	966.191	T					T						T			0	0	0	10.810	6.755	CWH vh 2
GcTo-011	1.506	2001.000	1238.133	1250.440	974.148	974.148	T								T						7	4	0	13.924	5.730	CWH vh 2
GbTo-003	16.844	2001.000	984.135	2001.000	1331.901	984.135	T					T				T	T	T	T		0	0	0	10.961	7.946	CWH vh 2
GcTo-010	8.025	2001.000	1422.400	1432.909	985.678	985.678	T								T						7	4	0	9.325	2.511	CWH vh 2
GbTo-039	13.673	2001.000	1212.093	1703.423	1002.063	1002.063	T								T						0	0	0	10.950	7.749	CWH vh 2
FkTo-019	7.228	2001.000	1630.007	1702.417	1007.088	1007.088	T						T			T	T	T			8	3	65	5.294	5.304	CWH vh 2
GbTo-083	10.570	2001.000	1018.088	1230.920	1198.111	1018.088	T											T			9	4	50	7.709	2.361	CWH vh 2
FkTo-016	20.785	2001.000	1951.450	1425.494	1032.569	1032.569	T											T			9	4	35	18.278	21.064	CWH vh 2
GbTo-024	18.428	2001.000	1075.919	1933.105	1051.174	1051.174							T								9	2	30	7.516	22.594	CWH vh 2
GcTo-002	17.384	2001.000	1948.463	1121.700	1051.264	1051.264	T								T			T			0	0	0	19.257	12.170	CWH vh 2
GbTo-062	8.602	2001.000	2001.000	1843.452	1068.416	1068.416		T													0	0	0	12.272	2.117	CWH vh 2
GcTo-011	8.074	2001.000	1131.091	1313.511	1075.134	1075.134	T											T			9	4	70	9.839	23.805	CWH vh 2
GcTo-022	4.044	2001.000	1990.264	1554.663	1078.131	1078.131	T									T		T			8	4	20	11.371	2.472	CWH vh 2
GcTo-008	17.427	2001.000	1938.449	1081.324	1085.638	1081.324	T								T						0	0	0	19.570	9.936	CWH vh 2
GbTo-046	36.478	2001.000	1101.529	1117.000	1566.504	1101.529	T						T			T	T	T			9	3	55	11.636	5.705	CWH vh 2
GbTo-004	1.923	2001.000	1200.589	1737.849	1122.451	1122.451	T		T						T	T	T	T	T		0	0	0	11.861	5.816	CWH vh 2
FjTo-004	42.036	2001.000	2001.000	2001.000	1136.613	1136.613		T					T								9	3	50	21.405	19.447	CWH vm 1
FkTo-020	8.899	2001.000	2001.000	2001.000	1141.107	1141.107	T											T			8	3	20	3.929	2.059	CWH vh 2
FlTq-004	8.519	2001.000	1217.436	1141.833	1922.022	1141.833	T											T			9	3	40	4.966	19.507	CWH vh 2
FkTo-004	12.350	2001.000	2001.000	1540.868	1143.755	1143.755	T											T			9	4	35	7.401	15.770	CWH vh 2
FlTq-005	10.563	2001.000	1213.976	1155.509	1647.037	1155.509	T											T			9	4	70	8.255	6.829	CWH vh 2
FeTd-006	758.024	2001.000	1690.398	1710.826	1156.499	1156.499															0	0	0	-16.522	1.034	CWH vh 2
GcTo-027	4.780	2001.000	2001.000	1535.878	1157.103	1157.103	T									T	T	T			9	4	15	8.540	7.695	CWH vh 2
GaTp-006	17.216	2001.000	1194.830	1157.966	1491.541	1157.966	T											T			9	3	70	19.749	13.528	CWH vh 2
GbTo-023	4.439	2001.000	1180.397	2001.000	1621.363	1180.397	T		T									T	T		0	0	0	11.473	1.132	CWH vh 2
GcTo-028	6.759	2001.000	2001.000	1389.907	1216.503	1216.503	T									T	T	T			9	4	15	6.450	6.988	CWH vh 2
FkTo-005	2.086	2001.000	2001.000	1790.358	1238.027	1238.027	T		T				T					T			8	3	70	12.311	6.810	CWH vh 2
FkTo-011	3.441	2001.000	1655.193	1244.608	1766.148	1244.608	T						T			T	T	T			9	4	50	13.588	9.553	CWH vh 2
GdTo-047	3.747	2001.000	1389.560	1692.905	1271.548	1271.548	T											T			8	4	0	6.869	0.827	CWH vh 2
GbTo-058	0.221	2001.000	1758.965	2001.000	1316.916	1316.916	T						T					T			8	4	50	11.765	4.354	CWH vh 2
GcTo-017	1.381	2001.000	2001.000	1502.321	1323.459	1323.459	T											T			8	4	10	13.888	5.042	CWH vh 2
FhTh-003	8.874	2001.000	1705.797	1657.189	1325.093	1325.093	T											T			9	4	50	11.253	14.822	CWH vh 2
FlTq-001	11.000	2001.000	1361.367	1333.848	1840.956	1333.848	T									T	T	T			9	3	40	7.059	8.442	CWH vh 2
FlTp-019	7.281	2001.000	1396.433	1418.758	1335.908	1335.908	T											T			9	4	80	11.115	10.847	CWH vh 2
FhTi-002	25.065	2001.000	2001.000	2001.000	1351.913	1351.913	T											T			0	0	0	17.271	4.660	CWH vh 2
GdTo-002	2.607	2001.000	2001.000	2001.000	1352.444	1352.444	T									T		T			9	4	0	4.298	13.756	CWH vh 2
GdTo-045	4.984	2001.000	1474.748	1760.152	1358.689	1358.689	T											T			8	4	0	5.985	1.004	CWH vh 2
FlTp-020	3.230	2001.000	1523.800	1369.981	2001.000	1369.981	T											T			9	3	65	10.766	1.065	CWH vh 2
FkTo-012	32.535	2001.000	1810.307	1388.399	1912.548	1388.399	T											T			9	4	50	15.395	21.653	CWH vh 2
FlTq-002	2.474	2001.000	1416.591	1932.798	2001.000	1416.591	T		T							T	T				9	3	60	9.614	1.362	CWH vh 2
FkTo-009	15.143	2001.000	1668.473	1614.659	1417.948	1417.948	T						T					T			9	3	40	15.704	20.508	CWH vh 2
GdTo-044	0.733	2001.000	1629.941	1772.240	1422.691	1422.691	T											T			0	0	0	9.723	4.234	CWH vh 2
GcTo-016	0.471	2001.000	2001.000	1425.946	1602.953	1425.946	T									T	T	T			8	5	20	11.086	4.012	CWH vh 2
GcTo-012	6.239	2001.000	2001.000	1449.995	1716.635	1449.995	T									T	T	T			8	5	20	6.381	6.614	CWH vh 2
FkTo-018	12.326	2001.000	2001.000	2001.000	1462.875	1462.875	T											T			9	3	70	13.361	6.426	CWH vh 2

APPENDIX 2: SITE ATTRIBUTES

ZBN	DIST_CST	DIST_DBLRV	DIST_LAKE	DST_DEFRV	DIST_INTRV	DIST_FRESH	PRECONTAC	HISTORIC	CANOE_RUN	FISH_TRAP	FISH_WEIR	BURIAL	CMT	PICTOGRAP	PETROGLYF	HABITATION	DEPRESSIO	SHELL_MIDD	LITHIC	TRAIL	AGE_CL	HT_CL_IN	CEDARPCT	ELEVATION	SLOPE	BIOGEO
GdTc-042	5.240	2001.000	1580.801	1847.932	1464.560	1464.560	T											T			8	4	0	8.958	2.158	CWH vh 2
FkTc-003	54.772	2001.000	2001.000	1752.319	1466.354	1466.354	T						T					T	T		8	3	50	15.886	26.104	CWH vh 2
FkTc-017	9.086	2001.000	2001.000	2001.000	1473.177	1473.177	T											T			9	3	70	10.192	9.535	CWH vh 2
FdTd-001	1310.152	2001.000	2001.000	2001.000	1500.832	1500.832															0	0	0			CWH vh 2
GdTc-043	7.813	2001.000	1677.389	1865.387	1509.097	1509.097	T											T			8	4	0	7.911	3.238	CWH vh 2
FkTc-010	19.937	2001.000	1930.710	1716.192	1541.156	1541.156	T						T					T			0	0	0	7.700	4.592	CWH vh 2
FiTp-018	14.164	2001.000	1587.172	1541.934	1861.614	1541.934															9	3	70	7.211	7.633	CWH vh 2
GbTc-025	8.089	2001.000	2001.000	2001.000	1609.967	1609.967	T									T	T	T			8	3	60	7.071	16.337	CWH vh 2
GcTc-018	7.364	2001.000	2001.000	2001.000	1610.921	1610.921	T									T		T			8	4	0	7.948	1.665	CWH vh 2
GbTc-090	9.326	2001.000	2001.000	2001.000	1628.911	1628.911	T											T			0	0	0	7.015	0.563	CWH vh 2
GbTc-001	5.515	2001.000	2001.000	2001.000	1721.772	1721.772	T		T				T					T			8	2	40	13.422	13.761	CWH vh 2
GbTc-088	2.579	2001.000	1944.249	2001.000	1932.105	1932.105	T											T			8	3	90	13.428	2.412	CWH vh 2
GbTc-063	11.013	2001.000	2001.000	2001.000	1964.024	1964.024	T											T			6	4	50	4.105	6.892	CWH vh 2
FkTc-013	1.973	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			0	0	0	7.926	5.675	CWH vh 2
GbTp-001	3.561	2001.000	2001.000	2001.000	2001.000	2001.000	T					T						T			0	0	0	5.930	5.157	CWH vh 2
GbTc-050	4.739	2001.000	2001.000	2001.000	2001.000	2001.000							T								5	4	10	11.115	9.719	CWH vh 2
GcTc-054	5.404	2001.000	2001.000	2001.000	2001.000	2001.000							T								5	4	10	19.295	23.352	CWH vh 2
GdTc-003	6.064	2001.000	2001.000	2001.000	2001.000	2001.000	T					T									9	3	20	12.337	13.068	CWH vh 2
FlTp-006	6.810	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			9	4	45	6.278	12.658	CWH vh 2
GbTc-024	7.892	2001.000	2001.000	2001.000	2001.000	2001.000	T					T				T	T	T			5	4	10	3.241	5.998	CWH vh 2
GdTc-048	8.485	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			8	4	0	4.667	7.617	CWH vh 2
FkTc-014	11.913	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			8	3	40	9.231	13.014	CWH vh 2
GbTc-067	12.465	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			6	4	50	5.853	6.971	CWH vh 2
FlTl-001	18.446	2001.000	2001.000	2001.000	2001.000	2001.000	T					T									0	0	0	12.888	1.143	CWH vh 2
GcTp-002	18.820	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			9	4	40	20.749	26.078	CWH vh 2
GbTp-002	20.097	2001.000	2001.000	2001.000	2001.000	2001.000	T											T			5	4	10	6.212	3.694	CWH vh 2
FiTl-002	21.285	2001.000	2001.000	2001.000	2001.000	2001.000	T					T									9	3	90	16.828	0.483	CWH vh 2
GbTq-001	23.666	2001.000	2001.000	2001.000	2001.000	2001.000	T						T					T			9	3	30	19.780	12.554	CWH vh 2
FkTc-001	31.476	2001.000	2001.000	2001.000	2001.000	2001.000		T													0	0	0	4.137	1.187	CWH vh 2
GeTp-001	38.125	2001.000	2001.000	2001.000	2001.000	2001.000							T								9	4	40	20.377	47.646	CWH vh 2