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South Bend and Ridge Pine 2: Fraternal Twins

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Abstract

The Ridge Pine 2 and South Bend sites lie within four kilometres of each other, both date to the late Middle Archaic period (ca. 5500-4500 radiocarbon years before present), and both contain significant amounts of nonlocal chert. This exploitation of nonlocal chert occurred despite the close proximity of the Kettle Point chert outcrop to both sites. Notwithstanding their similarities, the two sites differ dramatically. From the raw material breakdown to projectile point types the two assemblages are quite different. These differences raise questions surrounding the chert procurement strategy employed by the groups at Ridge Pine 2 and South Bend. In order to distinguish between strategies a detailed analysis of the projectile points, formal tools, bifaces, and chipping detritus was undertaken. The results indicate that the occupants of Ridge Pine 2 probably acquired nonlocal Onondaga chert through direct procurement, while the South Bend group used more locally available Kettle Point chert and likely acquired nonlocal chert through exchange.

Keywords

Middle Archaic, Lithics, Resource Procurement, Lake Huron, Onondaga chert, Kettle Point chert, Haldimand chert, Lithic Raw Material

Lay Summary

The Ridge Pine 2 and South Bend sites are archaeology sites that lie along the shore of Lake Huron in Grand Bend and date to the Middle Archaic (ca. 5500-4500 before present). The purpose of this study was to assess the artifacts found at these two sites were the product of trade with groups that lived along the shore of Lake Erie. This study was done through the thorough examination of the stone tools found on site in order to isolate particular characteristics that may indicate whether trade took place.

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Chapter 1: Introduction

Humans throughout history have often shaped their organization around the pursuit of resources. For mobile-hunter gatherers this is especially true, as they typically are traveling across land in order to procure resources. While Southern Ontario is a resource rich region, it is also an expansive territory and as a result these resources are often widely distributed. For mobile-hunter gatherers in Southern Ontario, one of the most important resources was chert as it was the primary material from which they made their stone tools. Stone tools were integral to subsistence based activities and therefore played a primary role. The procurement of chert, as a result, was extremely important.

The majority of archaeologists in Ontario work in the private cultural resource management industry (CRM). This means that sites are often discovered and excavated in advance of development, but the reports become grey literature and are not easily accessible to the public, while their archaeological collections receive minimal analysis. There has been a recent concerted effort to combat this issue by archaeologists. This thesis is based on two CRM sites which provide information about chert procurement in Ontario.

The Ridge Pine 2 (AhHk-136) and South Bend (AhHk-97) sites lie near the shoreline of Lake Huron near the community of Grand Bend. The area is of note due to its proximity to the Kettle Point chert outcrop, which lies only 30 kilometres to the south. They are both multi-component sites and contain significant late Middle Archaic (5500-4500 B.P.) lithic assemblages. They also contain significant amounts of Onondaga, Haldimand, and Selkirk chert whose bedrock sources are found near the eastern half of

Lake Erie, nearly 200 kilometres to the southeast. This phenomenon raises multiple questions surrounding resource procurement.

Why would these groups be exploiting cherts from the east end of Lake Erie when they were in such close proximity to the Kettle Point chert outcrop? Furthermore, how did those nonlocal cherts get to site? Were they traded? Did task groups go out and procure them directly? Or were they simply procured because these mobile groups happened upon the resource during the procurement of other resources? These questions may be answered through the application of hunter gatherer settlement and procurement models (Bradbury 2017, 27).

These two models are inter-related because the manner through which resources are procured depends in part, on group organization. The following is a simple explanation of what archaeologists are studying when they discuss settlement models. Hunter gatherer groups settle on the land differently due to the abundance or lack of resources. This varying level of resource abundance impacts how groups organized themselves in order to procure resources. While the late Middle Archaic is an under researched time period, enough data exists in order to determine how the people during that period settled the land.

Procurement models involve the description of how a distinct manner of procuring resources will manifest itself in the archaeological assemblage. The application of procurement models necessitates a thorough investigation of the lithic assemblages at Ridge Pine 2 and South Bend. Many archaeologists have used lithics to study procurement strategies and most of their studies point to the same thing, which is the following; In order to discern if nonlocal chert is arriving on site in a reduced form you need to study the curated tools, the bifaces, and the chipping detritus (Cook & Lovis 2014, 55). A detailed lithic analysis of specific artifacts should reveal what kind of procurement was occurring at Ridge Pine 2 and South Bend by aligning with specific characteristics that can be attributed to Embedded Procurement, Direct Procurement and Indirect Procurement.

In general terms, Ridge Pine 2 and South Bend are quite similar, as they are from the same area, contain assemblages that date to the late Middle Archaic, and contain nonlocal chert. However, upon examining both of their lithic assemblages in accordance with procurement models, they are quite different. South Bend contains much more Kettle Point chert and rather unique projectile points. Ridge Pine 2 on the other hand is absolutely dominated by Onondaga chert and contains typical Brewerton corner notched projectile points. It remains to be seen what these differences mean, however some possibilities will be discussed in this thesis.

In order to apply procurement and settlement models to South Bend and Ridge Pine 2 one needs a robust understanding of the time period and the environmental settings of the sites. South Bend is notable due to its stratigraphic context and its location. It is a multi-component site, and the artifact collection containing early Middle and Late Archaic materials was recovered from a sealed paleosol. To an archaeologist, a sealed paleosol is exciting as it can provide an opportunity to study a single deposition from a single occupation untouched by later activity. This would allow an archaeologist to study an assemblage as a whole without focusing too much on diagnostic artifacts. With a sealed deposit an archaeologist would be assured that each artifact comes from the exact same time period and could therefore draw wider conclusions about the tool kit beyond diagnostics. However, as is the case at Ridge Pine 2, South Bend is a multi-component site. It is also located on a resource rich baymouth bar created by the Thedford Embayment, a large lagoon-like body of water extending inland from the Grand Bend area. This environmental phenomenon was created by the high water levels in Lake Huron during the Nipissing Transgression (ca. 5500-4500 B.P.), a period of great environmental change. Ridge Pine 2 was also located in close proximity to the Nipissing beach, however it is far more difficult to reconstruct the environment surrounding the site. These changes impacted settlement and resource procurement during the late Middle Archaic.

Hunter-gatherer settlement models which highlight the differences between foragers versus collectors will be used to assess how people during the late Middle Archaic organized themselves (Bradbury 2017, 24; Binford 1980). Foragers, as described by Binford are peoples who typically provide themselves with resources on a day to day basis traveling out through the land in a daisy pattern. Collectors on the other hand are people who logistically procure resources; this typically involves storage, and therefore a more pronounced visibility in the archaeological record (Binford 1980, 7). In keeping with the research of other archaeologists who have studied the Middle Archaic I will evaluate the lithic assemblages against 3 major procurement models. The first is Embedded Procurement which involves individuals procuring resources incidentally during the completion of other subsistence based activities in the same area (Morrow& Jefferies 1989, 27). The other two models, which are closely related, are Indirect and Direct Procurement. Indirect procurement involves procuring resources through interaction with other communities, a process which is typically referred to as exchange (Meltzer 1989, 11). The final possibility, Direct procurement, involves groups traveling directly to the source of a resource in order to procure it themselves (Seeman 1994, 283).

In order to assess which of these means of lithic procurement was employed an in-depth study of the curated tools, bifaces, and chipping detritus was undertaken. The curated tools were comprised of the projectile points, drills, scrapers, perforators, spokeshaves and drills. All were analyzed by chert type and measured. Projectile points were classified using existing typologies. The remaining bifaces were classified by stage of reduction in accordance with Andrefsky (2005).

A 25% percent sample of the chipping detritus from each collection was analyzed. The sample was selected systematically in order to make it representative of units across each site. An in-depth classification of chipping detritus was done, using reduction stages in order to assess whether the nonlocal chert was arriving on site in a reduced form. The chipping detritus was also analyzed by material type.

This in-depth analysis clearly illustrated the differences between South Bend and Ridge Pine 2, which ranged from subtle to quite blatant. For example, the use of raw materials varies significantly between sites with the ultimate conclusions remaining rather similar. The nonlocal chert was arriving on both sites in a reduced form; however, this pattern took different forms in each lithic assemblage. The projectile points at South Bend and Ridge Pine 2 are blatantly different from material used, to size, to style. The differences between these two assemblages create many questions. Did the people who lived at these two sites use different procurement strategies? Or could it be that these sites are from different time periods during the late Middle Archaic? Do the assemblages contain evidence for occupation in different time periods, and if so, how might that affect interpretations of procurement patterns? The following chapters will explore the fascinating lithic assemblages from Ridge Pine 2 and South Bend in order to answer these questions.

Chapter 2: Background

For the purposes of this study, the Archaic period (ca. 10000-2800 RCYBP) will be defined as an archaeological construct that exists as a bridge between the preceding Paleo-Indian period and the proceeding Woodland period. The Archaic is typically conceived of as an intermediary period between the more intensively researched eras that came before and after it. The Archaic is a poorly understood time period due in part to varying post-glacial Great Lakes lake levels (Lovis 2009, 669). In the Huron basin, after high water levels associated with glacial Lake Algonquin, retreat of ice from the North Bay outlet permitted a rapid lowering of lake levels, between ca. 11,000 and 10,000 RCYBP (Lewis 1969, Karrow & Warner 1990). From the low water Lake Stanley/ Hough stage, ca. 10,000 RCYBP, water levels gradually increased over the next ca. 5000 years culminating in the Nipissing high water stage, ca. 5500-5000 RCYBP (Lewis 1969: 25, Ellis et al 1990: 789, Karrow & Warner 1990s, 21). Consequently, a large mass of land, that was undoubtably occupied by Archaic period people, dating to between 10,000 and 5000 RCYBP had been inundated. After 4500 RCYBP, water levels gradually lowered eventually reaching modern levels (Ellis et al 2009, 789. Thus the Archaic period was a time of great change in Ontario: it was dominated by environmental and technological changes that lead to the emergence of slightly more sedentary/ less mobile societies. The people of the Archaic are described as supporting themselves through hunting, fishing, gathering, and collecting (Emerson & McElrath 2009, 25).

There were also considerable changes to the lithic tool kit during the Middle Archaic. The lithic technology of the Archaic is sometimes described as a deterioration from the Paleo-Indian period. The stone tool technology of the Archaic is plainly distinct from the preceding Paleo-Indian period (Emerson & McElrath 2009, 26). There was a marked decrease in the care and skill involved in the production of chipped stone tools, and an increased use of more local stone sources, which included secondary deposits found in glacial till and river beds (Ellis et al. 1990, 65-66). There was also a diminished use of exotic lithic materials derived from distant sources (Ellis et al. 1990, 65). A distinctive shift took place in subsistence practices as groups shifted from Paleo-Indian big-game hunters to Archaic foragers (Emerson & McElrath 2009, 26).

During the Archaic some tools were manufactured by grinding and polishing, which contrasts with the almost exclusive use of flaking to manufacture stone tools in Paleo-Indian times (Ellis et al. 1990, 65). The manufacture of bone tools became more prevalent and included a wider range and number of bone tools (Ellis et al. 1990, 66). The Archaic also saw the increase of large tools that were far less portable than those used during the Paleo-Indian era. These tools were typically ground stone tools that were used in woodworking, processing of plant foods, and other activities (Ellis et al. 2009, 20). This less portable tool kit is evidence of a change from highly mobile groups to groups that set up longer occupations based on seasonal resource changes (Ellis et al. 1990, 67).

This change to a more sedentary lifestyle resulted in groups beginning to settle in and become more familiar with local resources. In doing so they broadened their resource base, began to exploit a range of foods previously ignored, and increased their efficiency in resource procurement. This economic transition is evidenced by the appearance of specialized resource procurement and processing tools absent in earlier contexts (Ellis et al. 1990, 66). Sedentism is often mischaracterized as a threshold, thereby making it impossible for people to be semisedentary (Emerson & McElrath 2009, 30). But sedentism is also used in a relative sense, for example, in describing the people of the Archaic as more sedentary in comparison to the highly mobile people of the Paleo-Indian period. Sedentism should therefore be viewed as a continuum. In this sense, it is understood that groups in the Archaic were not fully sedentary peoples, but rather archaeological trends demonstrate that they began to settle into their resource areas and seasonally occupy sites for longer periods of time (Emerson & McElrath 2009, 30).

The Archaic peoples, as they settled into their environments, adapted to the local fauna and flora and developed subsistence practices based on collecting (Emerson & McElrath 2009, 25). Collecting, in this instance refers to logistically procuring resources, including seasonal storage. The more intensive and extensive exploitation of local resources combined with a focus on less mobile resources was concomitant with a population increase, as seen in the larger number and size of sites. This population increase was also paired with a decrease in the size of territories exploited by individual groups (Ellis et al. 1990, 67). By ca. 4400-4000 RCYBP (5000-4400 cal BP) true cemetery burials begin to emerge, which may indicate fewer residential moves as a result of longer occupations and an increase in populations (Conolly et al. 2014 ,127).

The Archaic is subdivided into Early, Middle and Late subperiods. The Middle Archaic is generally dated in Ontario from 8000 to 4500 RCYBP (Ellis et al. 2009, 803), and the sites from which this study derives both date to the latter part of the period, ca. 5500 to 4500 RCYBP The Middle Archaic involves some major formal shifts in items such as projectile points and a significant geological event, which had a direct impact on the development of the South Bend site. This event was the Nipissing high water phase (Karrow and Warner 1990, 20), also known as the Nipissing Transgression.

Fifteen thousand years ago the ice sheets that had covered much of Canada began to recede and shaped much of the landscape of southern Ontario (Stewart 2013, 25). The recession of the ice sheets left mineral sediments, creating hills, plains, valleys and sand plains in southwestern Ontario (Karrow and Warner 1990, 14). Due to the retreat of the ice sheets meltwater lakes began to emerge. None of these lakes were stable for long as isotactic rebound caused them to change continuously over the next several thousand years (Stewart 2013, 25).

Table 1 List of Dates for the Nipissing Transgression

Lab No.	Date (RCYBP)	Date (Calibrated BP)*	Material	Reference	Comment
WAT-297	5840±100	6653±120	Wood	Karrow 1980	Pre-dates beginning or water level rises to Nipissing level
GSC-2190	5770±100	6585±143	Cedar	Karrow 1980	deposit of Nipissing lacustrine sand
RSG869	5530 ± 130	4375 ± 137	Wood	Lewis 1969	In situ tree stump, predates Nipissing high level; below the Nipissing shoreline.
WAT-301	5440±100 5160±100	6202±123 5928±145	Wood	Karrow 1980	Sample run twice; Pre-dates beginning or water level rises to Nipissing level
I-4038	5420±110	6181±127	Peat & Wood	Karrow 1980	Pre-dates beginning or water level rises to Nipissing level

WAT-392	5410+100	6171±118	Mixed Organics	Morgan et al. 2000	Pre-dates beginning or water level rises to Nipissing level
WAT-567	5270±70	6067 ± 97	Wood	Karrow 1980	Pre-dates beginning or water level rises to Nipissing level
GSC-1115	5250±140	6028±162	Peat	Karrow 1980; Lewis 1969	Peat accumulated in water levels rising to Nipissing maximum
GSC-1118	5120+130 5070+140	5889±158 5830±150	Shell	Karrow 1980; Lewis 1969	Different fractions of the same shell sample, considered a Nipissing deposit.
WAT-245	5080+250	5851±276	Twig	Morgan et al. 2000	Peat Layer Contemporary with Nipissing
BGS-341	4700±100	5438±113	Shell	Karrow 1980	Contemporary with Nipissing
GSC-2186 & S24	4660±60 4600±210	5410±74 5256±269	Wood	Karrow 1980; Dreimanis 1958	Sample dated by two different labs; just pre-dates beginning of Nipissing
S-25	4650±200	5307±255	Wood	Karrow 1980; Dreimanis 1958	Just pre-dates beginning of Nipissing
I-9355	4570±95	5246±169	Hemlock Log	Morgan et al. 2000	Peat Layer Contemporary with Nipissing
GSC-1122	4310±130	4919±222	Wood	Karrow 1980; Lewis 1969	From erosion surface correlated with the Nipissing shoreline
GSC-1133	4240±140	4798±205	Wood	Karrow 1980; Lewis 1969	Red oak lying on erosion surface, considered and Nipissing deposit
WAT-554	3840±60	2316 ± 99	Shell	Karrow 1980	Rejected as too recent

*calibrated using Calpal online. Table compiled by Chris Ellis and Peter Timmins.

During the Nipissing Transgression water levels in Lake Huron rose to a height of around 184m above sea level (asl) which is approximately nine metres above modern Lake Huron levels (Stewart 2013, 29; Thompson et al. 2011, 568). The Nipissing Transgression has been dated by a series of radiocarbon dates on materials associated with geoglacial deposits, Table 1; summarizes several of the dates. Several of the dates in Table 1 appear to pre-date the Nipissing high water stage, however a group of these dates (GSC-1118, WAT-245, BGS-341, 1-9 355, GSC-1122, GSC 1133) are categorized as contemporary with the Nipissing high water stage. Collectively these dates range from 4240 ± 140 to 5120 ± 130 RCYBP, or 4798 ± 205 to 5889 ± 158 cal BP. Taken at face value, these dates suggest that the high water stage lasted ca. 1100 years from 4800-5900 cal BP.

Once the high water stage receded, the shore along Lake Huron was full of emerging wetlands, which changed constantly in response to lake levels adjusting to climate change (Stewart 2013, 29). The slightly elevated dunes that can be found along the shoreline of former lakes created an environment that was welcoming for year-round settlement (Stewart 2015, 29). The wetlands provided rich resources such as shellfish, shallow water species of fish, amphibians, reptiles, migratory waterfowl, and fur bearing mammals. The lowlands supported sycamore, walnut, chestnut and basswood trees. These rich environments likely provided reliable access to resources to support local populations (Stewart 2013, 30).

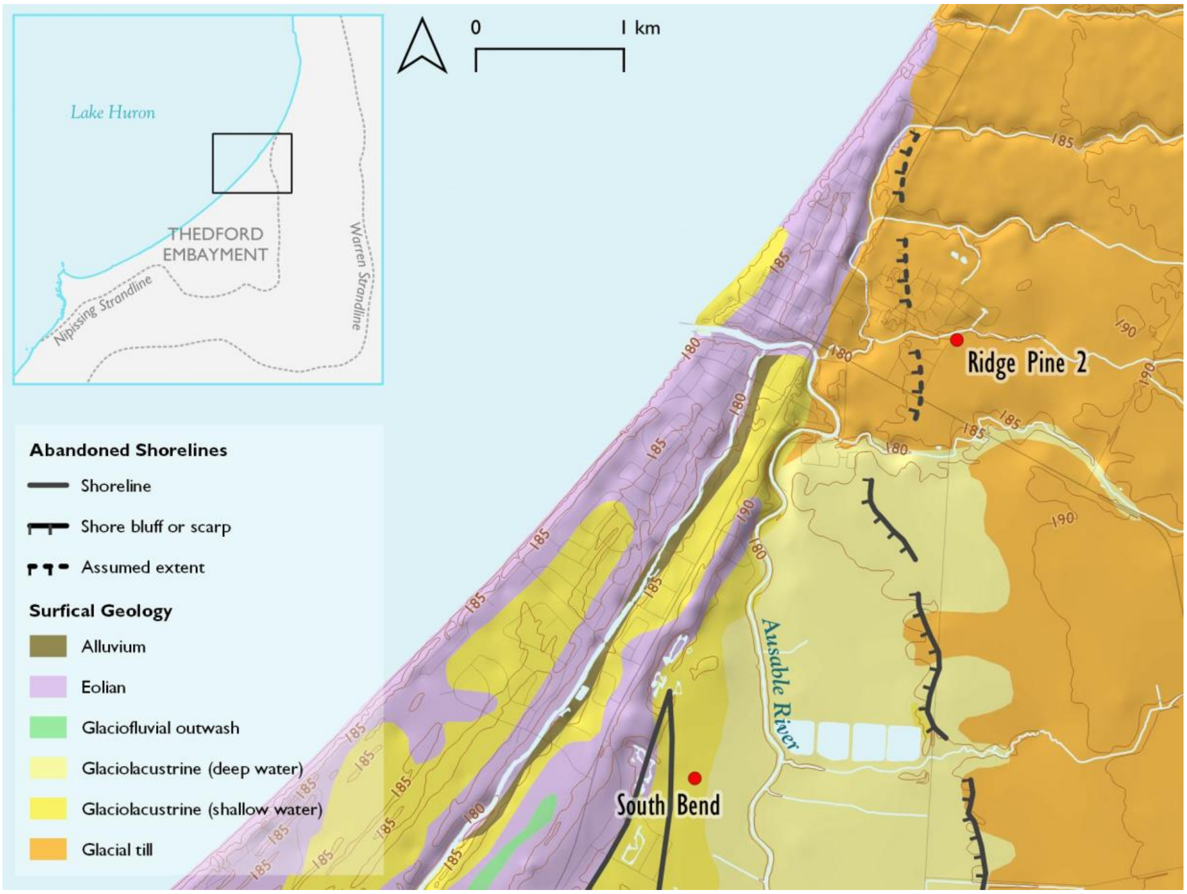

Figure 1: Map Depicting the Location of Ridge Pine 2 and South Bend in relation to the Nipissing Beach (Map courtesy of TMHC)

One of these wetlands, formed in the Grand Bend area, was the Thedford Embayment (Figure 1).. The former shorelines of proglacial lake Algonquin and post-glacial lake Nipissing form the rim of the Thedford Embayment. The shoreline runs almost due south of Grand Bend for 13 kilometres to Parkhill Creek at which point I turns west, and eventually runs southwest towards Kettle Point reservation (Cooper 1979, 32). A baymouth bar was formed across the mouth of the embayment during the Nipissing high water stage (Cooper 1979, 32-33). Isotactic rebound and the high water levels of the Nipissing stage largely destroyed any previous shorelines associated with the earlier glacial Lake Algonquin in the southeastern Lake Huron basin (Karrow 1980, 1273).

Mollusks present in the lacustrine deposits from these shifts in lake levels allowed geologists to date the embayment (Karrow and Eschman 1985, 91). The formation and eventual draining of the embayment are events that would have affected the end of the Middle Archaic due to their influence on resource availability, settlement and subsistence at the time

The existence of areas like the Thedford Embayment, which facilitated a more stable occupation, was part of a trend that began around the time of the Nipissing Transgression. At this time there were indications of increasing populations, decreasing size of territories exploited during annual rounds, reduced residential mobility with longer occupations at seasonal campsites, and continuous use of certain locations on a seasonal basis (Ellis et al 1990, 93). The increase in population is believed by some to have been a result of the stabilizing environment during the Middle Archaic. The rising water levels would have inevitably funneled people into smaller areas thus opening up more opportunities for mate exchange, which may have also contributed to a population increase (Ellis et al. 1990, 93; Ellis et al. 2009, 811).

This increase in population would have led to restrictions on the movements of local groups and would favour smaller territories. As a result, groups would be more likely to occupy resource rich locales for prolonged periods of time. Smaller territories could have favored more intensive use of available resources and the appearance of specialized procurement and processing tools designed to increase the yield of available resources. Restricting territory size would have limited access to certain geographically localized and valued resources, and people may have developed long distance exchange networks to overcome these issues (Ellis et al. 1990, 93).

There are multiple reasons for exchange networks to develop within mobile-hunter gatherer societies. Groups during the late Middle Archaic began to settle for longer periods of time, however, they continued to be hunter-gatherer bands whose social and economic organization was characterized by openness and flexibility (Ellis et al. 1990, 123). These flexible groups would have needed to create contacts with other bands for the development of social relations in order to obtain aid in times of resource stress, provide means for exchange of information, and assist in providing mates (Pearce 2008, 25). There was, therefore, a strong basis for the necessity of exchange networks during the late Middle Archaic.

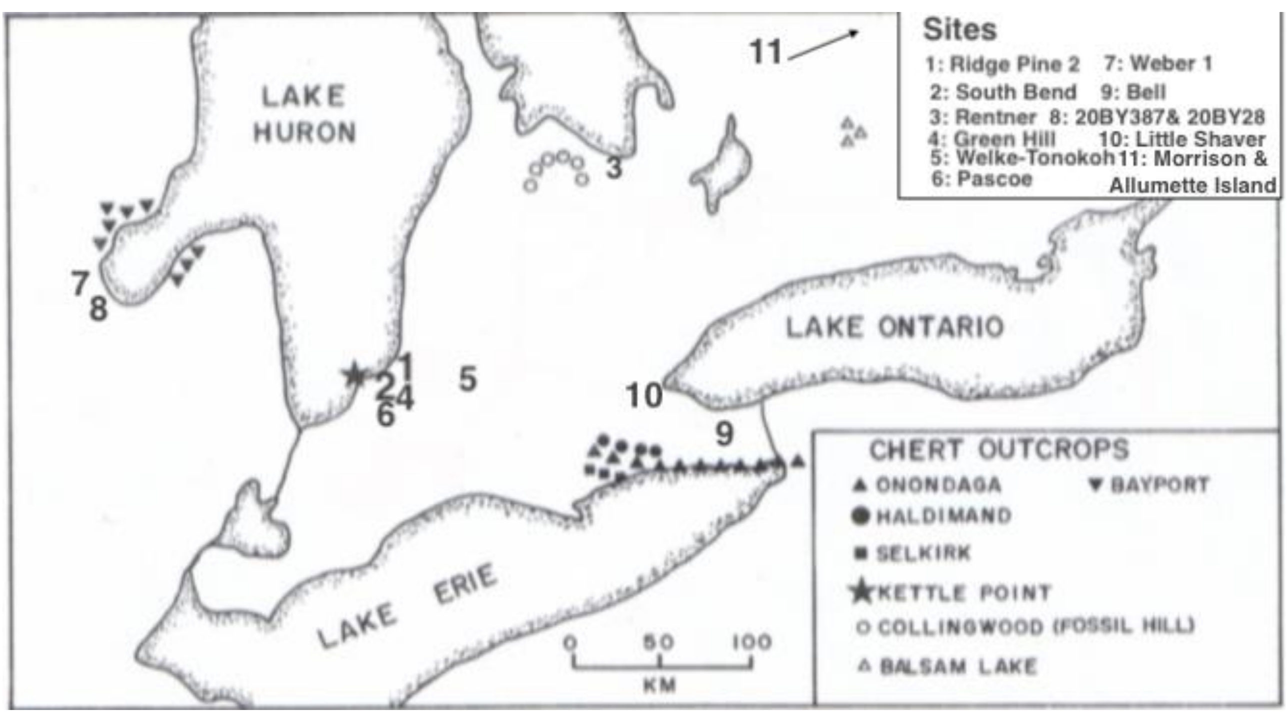

Figure 2: Map of Archaeology sites and Chert Sources mentioned in the text. (Adapted from Maika 2010).

As previously stated, the two sites that are the focus of this study are Ridge Pine 2 and South Bend which are both found in the Grand Bend area, in close proximity to Lake

Huron (Figure 1). They are near the Kettle Point chert outcrop and a considerable distance from the Onondaga chert outcrop (Figure 2). Despite their distance from the Onondaga chert outcrop, the lithic assemblages of both sites contain a considerable amount of Onondaga chert. In order to demonstrate that the presence of Onondaga is likely a result of exchange, it will be necessary to review multiple sites from the same time period with similar phenomena that may set precedents for the patterns observed at Ridge Pine 2 and South Bend.

There are multiple small sites along the Lake Huron shoreline or nearby that contain Onondaga chert in their lithic assemblages. Among these sites are the Rentner site, the Green Hill site, the Pascoe site, and the Welke-Tonokoh site. The Rentner site, located in the Georgian Bay area, not only had Onondaga chert but also exotic materials like Michigan cherts. The site lies along a bluff overlooking the abandoned lakebed of the Nipissing Phase and was probably contemporary with its high water level due to the presence of Brewerton projectile points (Lennox 2000, 16).

In total, 22 points were recovered at Rentner; of them, 11 were Brewerton phase projectile points – similar to the projectile points found at Ridge Pine 2 and South Bend. Traces of later occupations are suggested by two points and a small concentration of ceramics. A large majority of the Rentner projectile points were made of Onondaga and the chert also is common in the flaking debris, as well as among biface preforms (Ellis et al. 2009, 806). The Onondaga chert was likely obtained from the source due to the size of the tools made of Onondaga. The bedrock source is located at least 200 km away, which suggests relatively high distance mobility for the site inhabitants. Other exotic materials, such as Michigan cherts, occur as well. Ellis et al. (2009:806) have argued that the cherts found at Rentner represents "the first good evidence for long-distance interaction since the earliest Archaic" (Ellis et al. 2009, 806). A total of 50 bifaces were recovered, 38 of which were made of chert. Very few are early stage bifaces, in fact the majority appear to be finished tools, or refined and utilized tools that display secondary retouch and worn edges (Lennox 2000, 26).

The weathering on the chipping detritus from Rentner indicates the use of secondary chert from till or beach deposit. In total there were 1933 pieces of chipping detritus found and most of the assemblage is composed of late stage reduction flakes. The nature of the chipping detritus combined with the large number of late stage bifaces indicates a lack of early-stage production of bifaces from cores at the site and is further reinforced by the scarcity of large random chert cores (Lennox 2000, 32). The difficult access to tool stone at the Rentner site has probably resulted in greater curation of its assemblage, which is evidenced by the projectile points which have been extensively resharpened and exhausted (Lennox, 2000, 40).

Feature 2 at Rentner contained a slate point and over 3000 faunal bones which returned an AMS date of 5,900 B.P. ± 90 RCYBP (6910-6490 cal B.P.). which is rather early for a Brewerton occupation (Ellis et al. 2009, 21). The site was likely occupied while the waters of the Nipissing phase rose as it is located on the Nipissing beach. The forest surrounding the site was inundated by the high water phase and this is likely what led to an earlier date due to the presence of old wood (Lennox 2000, 38). The amount of cultural material recovered suggests infrequent or brief occupations by mobile people exploiting resources in the area.

The Green Hill site, located in Thedford Ontario, was occupied from the Late Archaic to the Early Woodland period (Pearce & Ellis 2008, 5). The site itself located in a woodlot on a bluff overlooking the Ausable river valley. It appears the main activity on site was roughing out preforms and bifaces (Pearce & Ellis 2008, 10). Due to the nature of the tools recovered from the site it is most likely that the people of Green Hill were hunting and hide processing; this would designate the site as being occupied during the summer or fall period. However, this conclusion is difficult to draw due to a lack of floral and faunal remains (Pearce & Ellis 2008, 16).

The lithic assemblage is largely comprised of flakes, however only two of those flakes were made of Onondaga chert (0.7%), which leaves 91.2% of the flake assemblage to have been made of Kettle Point chert. This dominance of Kettle Point is also present in the core assemblage as they are all made of the aforementioned chert (Pearce & Ellis 2008, 6). Six Small-Point archaic corner and side notched points were recovered at Greenhill, stylistically they appear to be most similar to the Crawford Knoll type (Pearce & Ellis 2008, 11).

The Welke-Tonokoh site is located in Mt. Brydges Ontario on a semi-circular raised area which perhaps could be a pro-glacial lake strandline (Ellis 1999, 3). At the time of occupation this site was in the Carolinian biotic zone which is typified by deciduous forests that contain nut-producing trees (Muller 1989, 3). The high number of projectile points and scraping tools in the lithic assemblage indicates that hunting and hide scraping may have been significant site activities. Furthermore, due to its interior location it is likely that the site represents a fall or winter camp (Muller 1989, 20).

There are six types of raw material present in the lithic assemblage: Onondaga chert, Kettle Point chert, Selkirk chert, Haldimand chert, unidentifiable chert, and metasediments. The flaking debris is fairly equally split between Kettle Point (46%) and Onondaga (38.26%) with Selkirk, Haldimand representing less than 5% respectively. There were no Small-Point Archaic diagnostics made on Selkirk and Haldimand chert which could lead one to conclude that they were not the cherts being exploited by the people of the Small-Point Archaic at Welke-Tonokoh. In fact, all of the Small-Point Archaic points are made of Onondaga chert (Muller 1989, 7). There are five expanding flakes that are fan shaped end scrapers, all but one were made on Kettle Point chert. There was one circular scraper that differed from the triangular scraper and it was made of Kettle Point chert (Muller 1989, 12). An eyeless, bar-type birdstone on finely banded slate was recovered from the surface. This type of birdstone is diagnostic of the Glacial Kame burials associated with the Small-Point Archaic (Muller 1989, 15).

The Pascoe site, located on the Nipissing beach approximately 10 – 14 km south of the South Bend and Ridge Pine 2 sites, is another location of interest. It is a multi-component site that has yielded several surface-collected water worn artifacts, suggesting that it was occupied when the Nipissing Beach was active (Ellis and Deller 1986). Of the 41 artifacts analyzed, 16 are projectile points. The points were grouped in two classes, I and II, which both contain Brewerton-like points (Ellis and Deller 1986, 48). All of the Class I points are made of Onondaga and all of the Class II points were made of Kettle Point (Ellis and Deller 1986, 49). A large number of the points exhibited evidence of reworking. The remaining 25 artifacts reported on included six bifaces and 19 unifaces (Ellis and Deller 1986, 52). The majority of the bifaces were likely point preforms (Ellis and Deller 1986, 52). The close proximity of Pascoe to Ridge Pine 2 and South Bend indicates that the use of Onondaga chert was common along the southeastern Lake Huron shoreline during the late Middle Archaic.

The Weber I site (20SA582), located in Saginaw County, Michigan, does not contain Onondaga chert but it is an important site in relation to South Bend. The site is located on the Shiawassee Embayment, and the stratum, Occupation Zone II, predates the Nipissing high water stage as it is found under Nipissing deposits(Lovis 1983, 8). This basal stratum dates to between 6200 and 4500 B.P. (Lovis 1983, 18). The site contains both Late and Middle Archaic components and a very diverse assemblage with multiple projectile point types.

There are two other Archaic sites (20BY387 & 20BY28) in the Saginaw Valley in Michigan that contain Middle Archaic artifacts and appear to be contemporaneous with the later end of the Nipissing high water stage (Cook and Lovis 2014, 57). Most of the raw materials in the lithic assemblages were locally derived Bayport chert and Charity Island chert (Cook and Lovis 2014, 58). However, there were several raw material types that were not locally derived, and among these foreign cherts were Onondaga and Kettle Point (Cook and Lovis 2014, 59).

Site 20BY28 was also a multi-component site that involved Woodland and Archaic occupation. While the Late Archaic component dominated, there were also two Middle Archaic Brewerton projectile points found on site as well (Cook and Lovis 2014, 63). The lithic assemblage was comprised of 245 tools and 32,685 pieces of debris. Preforms were typically made of both Bayport and Onondaga cherts (Cook and Lovis

2014, 62). Formal tools were most commonly made with Onondaga, while tools like wedges and retouched flakes were made of Bayport (Cook and Lovis 2014, 63).

Lovis believes that the Nipissing high water stage had submerged the Bayport chert outcrop, which could explain the use of Onondaga for tools requiring high quality chert (Cook and Lovis 2014, 69). This belief is also held about the Kettle Point chert outcrop in the southeastern Lake Huron basin during the Nipissing phase (TMHC 2005, 38) and may be why people who lived along the southeastern Lake Huron shoreline sought Onondaga chert during the late Middle Archaic.

At site 20BY28 there is also a lower incidence of cortex on Onondaga cores, which indicates that cores were arriving in more advanced stages of reduction. The use of a variety of projectile point types, in tandem with Onondaga chert arriving in a reduced form, suggests increased interaction and broader exchange relations (Cook and Lovis 2014, 68). The conclusion that the people living at 20BY28 were involved in the exchange of lithic raw materials suggests that, although exchange may have dropped off during the Early Archaic, it appears to have picked up again by the end of the late Middle Archaic.

There are also several Middle Archaic sites in southern Ontario that lie in closer proximity to the Onondaga chert source. For example, the Bell site, located in the interior of the Niagara peninsula near the headwaters of a small creek in the town of Fonthill, is only 20-25 km from the Onondaga chert outcrops along the eastern shoreline of Lake Erie (Williamson et al 1994; Ellis et al, 2009, 809). The soils surrounding the site are sandy loams which are rare throughout the region and would have made the site especially attractive to animals such as deer and turkey (Williamson et al. 1994, 64). The recovery of butternut shell suggests a fall occupation (Ellis et al. 2009, 809).

All of the projectile points from the Bell site are the side-notched to eared forms of Brewerton projectile points (Ellis et al. 2009, 809). The dominance of this point type indicates heavy reworking of hafted bifaces, since the Brewerton Eared type is commonly thought to be a product of resharpening side notched and corner notched forms. Over 5000 stone artifacts were found, with the majority comprising lithics. There were 73 bifaces in total and all but one were made of Onondaga chert. There were a number of thermally altered artifacts; in fact, 40% of the chipping detritus was burnt (Williamson et al. 1994, 67). The most common formal tools were scrapers, 18 of which were end scrapers, 15 were amorphous flake scrapers, eight were scraper/gravers, seven were side scrapers, and six were crescent scrapers (Williamson et al., 70). There were only a small number of primary reduction flakes and only ten cores were found, all of which were made of Onondaga (Williamson et al. 1994, 75).

A subsoil level cluster of artifacts included lithic and faunal debris which suggested the presence of an activity area, however none of them could be associated with the presence of house structures (Williamson et al. 1994, 75). The overall size and nature of the site suggests that it functioned as a hunting and processing center for a small group. It was neither a base settlement for a larger macroband population nor a settlement situated to exploit rich riverine resources. Due to its interior location, it appears to represent the cold season component of a settlement-subsistence system involving interior fall and winter microband camps, and larger spring and summer macroband settlements located near river mouths (Williamson et al. 1994, 83-84).

Another Middle Archaic site is the Little Shaver site, which was a small site located near Ancaster, Ontario, in relatively close proximity (50-60 km) to Onondaga chert sources. It was located in a mature woodlot that had never been ploughed, situated near the bottom of a small valley, 55 m north of a seasonal creek (Timmins 1996, 48). The site occupies an interior location in relation to Lakes Ontario and Erie and the Grand River. The valley where the site is located would have presented one of the few openings for animals to pass through the escarpment (Timmins 1996, 48).

While Little Shaver is multi-component, it yielded a small collection of four Brewerton-like projectile points, three which were made of Onondaga chert and one was made of Ancaster chert (Timmins 1996, 54). There were no radiocarbon dates generated for the site. It was dated as Middle Archaic due to the presence of Brewerton projectile points. The Brewerton points are spatially isolated away from a small number of Early Woodland Meadowood points, which represent the second component on the site (Timmins 1996). The other tool forms attributed to the Middle Archaic component include a semi-lunar biface, a wedge, two retouched flakes, one denticulate, and 19 utilized flakes. (Ellis et al. 2009, 809). There is a lack of formal scrapers but the high frequency of utilized flakes which indicates that expedient tools were being used for scraping and cutting activities (Ellis et al. 2009, 809). Onondaga chert represents 85% of the chipping debitage assemblage, with Ancaster chert representing the second most common material (Timmins 1996, 59). The faunal assemblage is unfortunately quite small and is almost entirely calcined and highly fragmented (Timmins 1996, 59). The site itself was interpreted as a logistical hunting and retooling camp, probably occupied by a small task group during the fall or winter as the tool assemblage points to a restricted range of retooling, biface manufacture, and processing activities associated with a special purpose hunting camp (Timmins 1996, 76).

The Allumette and Morrison Island sites, located on the Ottawa River near Pembroke, Ontario, contained a myriad of exotic materials including copper and Onondaga chert. These sites are well researched and provide solid evidence for exchange networks during the Middle Archaic (Clermont and Chapdelaine 1993, 1998).

Both sites are part of a distinct archaeological manifestation called the Laurentian Archaic. The distribution of the Laurentian Archaic is generally understood to include most of New York State, the region around Lake Ontario and the Niagara Peninsula, the St. Lawrence River valley extending into southern Quebec, the Ottawa River valley, Vermont, northern Pennsylvania and Connecticut (Funk 1988, 7). However, rigid boundaries cannot be drawn for archaeological cultures or complexes, rather they are regional clusters of distinct elements, typically seen as adaptive responses of human populations to regional environments (Funk 1988, 34). Morrison and Allumette Island may have Brewerton projectile points, but their lithic assemblages assign them as Laurentian Archaic sites due to some key differences. Allumette island is a far larger site than Morrison island. They are also dated to different time periods during the Middle Archaic due to different point types and different radiocarbon dates.

Distributional studies have indicated that slate artifact types are more common in eastern Ontario where they are often part of Laurentian Archaic assemblages. Ground stone tool forms such as points, bayonets, gouges, plummets, and ulus are also more common in the Laurentian heartland (Ritchie 1980, 80). Diagnostic elements of the

Laurentian tradition are distributed well outside the heartland; however, the frequency of sites drops off dramatically with increasing distance (Funk 1988, 28). Some archaeologists see Laurentian as evidence of a distinct linguistic and cultural group (Ellis et al. 2009, 806). Others see the high frequency of ground stone tool forms as a response to a lower density of good quality flakable cryptocrystalline sources (Ellis et al. 2009, 806). However, it is most likely that these distinctive characteristics are a reflection of an adaptation to differing environments (Ellis et al. 2009, 806). The Laurentian Archaic is generally restricted to the Canadian biotic forest and contain sites that are far larger and more complex than those found in Southwestern Ontario. Sites like Morrison and Allumette Island contain burials and very large assemblages, for example, Morrison Island has 282 projectile points.

The Laurentian tradition was divided into three phases by Ritchie. The first and earliest, is called the Vosburg phase, followed by the Vergennes phase and finally the Brewerton phase. The Vosburg phase is similar to the Vergennes and Brewerton phases but differs due to a lack of native copper and other key artifacts in Vosburg assemblages (Ritchie 1980, 83). There is limited evidence of Vosburg sites and Ritchie considered it a tentative construct (Ritchie 1980, 84). Ritchie considered the Normanskill projectile point to be morphologically transitional between the Lamoka side-notched and the Brewerton side-notched forms, and he associated them with the Vosburg phase, although Vosburg points are the most diagnostic artifact for this phase (Ritchie 1971, 37). However, Conolly has recently argued that the Vosburg point is really just a variation of the Brewerton Corner-Notched type which calls into question the validity of the Vosburg phase (Conolly 2018, 72).More recently, Ontario archaeologists have considered

Normanskill and Lamoka points as diagnostics of the Late Archaic Narrow Point complex (ca. 4500-4000 B.P.), postdating the Middle Archaic (Ellis et al. 1990, 94-99). This distinction is important due to the presence of a single Normanskill projectile point at the Ridge Pine 2 site.

Morrison Island is a typical Laurentian Archaic site, as indicated by the use of multiple lithic raw materials, such as quartz, quartzite, siltstone, rhyolite, chert, igneous rocks, greywacke, shale, slate, and chalcedony. The radiocarbon dates for Morrison Island indicate it was occupied between 5700-5350 cal B.P., which aligns with the Laurentian Archaic (Ellis et al. 2009, 803; Clermont & Chapdelaine 1998; Kennedy 1966). In total the site had 15343 quartz flakes and only a few chert flakes. Quartz flakes comprised 95.2% of the debitage, 3.5% of the sample was siltstone, 1.1% chert, 0.07% quartzite, and 0.03% rhyolite (Clermont and Chapdelaine 1998, 57). There was also a large amount of native copper on site, which would have originated near the west end of by Lake Superior. Of the chert flakes, 97 were grey chert of unknown source and 53 were Onondaga (Clermont and Chapdelaine 1998, 58). It is worth noting that the Onondaga present was of a high quality, which indicates that it was likely obtained from a primary source.

The Morrison Island lithic assemblage consisted of 282 projectile points, scrapers, perforators, knives, utilized flakes, bannerstones, pear shaped rocks, slate bayonettes, ground stone tools, cup stones, and net sinkers (Clermont and Chapdelaine 1998, 57). Despite the rarity of some artifacts, the assemblage at Morrison Island was rather elaborate. Of the 282 projectile points, 249 were made of chert (Clermont and Chapdelaine 1998, 67). The points have been typed as Brewerton projectile points with

60% being made of Onondaga chert (Clermont and Chapdelaine 1998, 69). Classifying the site as part of the Brewerton phase appears to be accurate based both on the points and the radiocarbon dating . Half of the bifaces were projectile point preforms and don't appear to have been made on site (Clermont and Chapdelaine 1998, 82). The site itself appears to be have had specialized quartz tool production areas (Clermont and Chapdelaine 1998, 95).

The Allumette Island site is in close proximity to the Morrison Island site, but it is slightly different. The projectile points at Allumette Island are Otter Creek points which classifies the site as a Vergennes phase site (Clermont & Chapdelaine 1993, 357). The radiocarbon dates confirm that the site slightly predates Morrison Island as it returned a series of dates between 6340-5370 cal B.P. (5440-4680 RCYBP) (Ellis et al. 2009, 803) (Clermont & Chapdelaine 1998) (Wright 1970a). The site contained an assemblage that consisted of 128 projectile points, 58 bifaces that may have been preforms, and 163 tips of bifacial tools that might have also been distal ends of projectile points or bifaces. Sixty of the 96 full points were made of Onondaga (Clermont and Chapdelaine 1993, 356). Most of the bifaces present in the assemblage appear to have arrived on site in a finished form (Clermont and Chapdelaine 1993, 204). Clermont and Chapdelaine concluded that bifaces were made elsewhere due to the fact that Onondaga debitage on site was so rare. The debitage that was recovered was quite small and clearly from end stage reduction. There were many pieces of good chert, which indicates that access to the source was satisfactory (Clermont and Chapdelaine 1993, 357). The large majority of flakes were made of local chert while the formal tools were typically made of Onondaga. There were also 1000 copper items found at Allumette Island (Ellis et al. 1990, 90).

The presence of Onondaga chert and copper indicates that the people of the Morrison and Allumette Island sites engaged in a widespread trade network that involved an area larger than the size of France (Clermont and Chapdelaine 1998, 154). Both sites show evidence of Onondaga chert arriving in finished form and being reduced further into projectile points. A majority of the points were made of Onondaga chert on both sites. The attributes of their lithic assemblages are also quite similar to those of South Bend and Ridge Pine 2. Although Morrison and Allumette Island are much farther away from the Onondaga outcrop than the area of Grand Bend, the fact that they are widely accepted as proof that a large trade network existed during the late Middle Archaic sets a precedent for other groups during the time period who are known to have participated in widespread trade.

The Paleo-Indian era is commonly understood as a period of high mobility and very large interaction networks. These networks may have broken down during the early part of the Archaic period, but towards the end of the Middle Archaic evidence for increasing exchange appears (Ellis et al. 1990, 93). The late Middle Archaic was a period in which there was economic and social interaction during an era of environmental change. It was also a period of reduced residential mobility due to this change, which is likely what led to a population increase. This population increase may be what led to the need for more interaction due to the shrinkage of territory size. There are multiple sites that are local to the Grand Bend area and as far away as the Ottawa Valley and the Saginaw Valley that provide strong evidence for a far-reaching network that exchanged Onondaga chert. Whether Ridge Pine 2 and South Bend are sites that fit within that tradition of exchange will be assessed by lithic analysis informed by procurement and settlement models.

Chapter 3: Theory and Methods

3.1 Theory

This study has been shaped by two interrelated groups of models: procurement models and hunter-gatherer settlement models. One particular hunter-gatherer settlement model posits that hunter-gathers range from being foragers to collectors, and their settlement patterns are shaped primarily by how they procure resources (Binford 1980, 6). Understanding which kind of settlement pattern corresponds with the people of the Middle Archaic in the lower Great Lakes is important because in order to properly evaluate relationships between groups we must have some idea as to how the groups were organized (Spence 1986, 84). How groups settle on the land and organize themselves is related to what kind of procurement practices they will partake in.

Binford defines foragers as hunter-gatherer bands who move their residences in accordance with the seasons among a series of resource patches. A distinctive characteristic of forager groups is that they typically do not store foods, but gather food daily (Binford 1980, 6). He explains that the typical forager pattern of land use looks like a daisy, with the center as a residential base. Foraging parties then travel out from the residential base in search loops that resemble the petals of a daisy (Binford 1980, 7). Foragers create two basic types of archaeological sites when they discard remains: the first is the residential base, and the other is the location. Locations are sites where extractive tasks are performed (Binford 1980, 9).

Collectors are defined in marked contrast to the foragers and their strategies of procurement. Collectors organize themselves logistically in order to supply themselves with specific resources through the employment of specially organized task groups (Binford 1980, 10). In this context organizing groups logistically refers to the careful organization of a complicated task. Logistical strategies were created by collectors in response to a land that contained incongruent resource distributions (Binford 1980,10). These task groups were smaller in nature and were typically made up of knowledgeable individuals who were procuring specific resources in specific contexts (Binford 1980, 10). The food collected by these logistically organized task groups from many distant sources is stored at residential bases for at least part of the year. In contrast to foragers, collectors are seeking resources for far larger groups. This results in high-bulk procurement and processing events (Bradbury 2017, 26). This strategy can have direct site implications and is rather visible in the archaeological record. If such procurement activities are successful, the obtained resource may be field processed to facilitate transport. The collector’s relationship with procurement is less flexible than foragers due to a more predictable relationship between population and a resource (Bettinger, Garvey and Tushingham 2015, 75).

The types of sites generated by collectors differs slightly from foragers, as explained by Binford:

> Collectors generate three types of sites in addition to the residential base: the field camp, the station, and the cache. A field camp is a temporary operational center for a task group. Stations are sites where special-purpose task groups are localized when engaged in information gathering, for instance, when groups are observing game movement or the observation of other humans. Caches are

> common components of a logistical strategy in the successful procurement of resources (Binford 1980, 12).

Andrew Bradbury (2017) applied the foragers versus collector model to Middle Archaic settlement systems in west-central Illinois. Bradbury asserts that there was a mixed settlement system during the late Middle Archaic. During the summer months the settlement patterns reflect a logistical strategy of resource procurement with groups splitting into smaller groups during the fall and winter. He argues that groups with larger residential bases that were targeting specific resources were logistically organized, thus they are collectors in the summer months (Bradbury 2017, 57). Lovis et al. (2005) agreed that the people of the Middle Archaic were collectors, at least for a large section of the year. They argue that this is likely due to important food sources being located long distances from one another thus necessitating a logistical strategy (Lovis et al. 2005, 672). Bradbury inferred low and high bulk processing of resources with the resources transported back to base camp locations (Bradbury 2017, 27). He also points out that numerous tool classes should be present at a long-term occupation, as many subsistence and day-to-day activities would likely have taken place. The longer a site is occupied, the greater the likelihood that tools are worn out through use and then discarded on site (Bradbury 2017, 29).

The classification of the people of the Middle Archaic in Southwestern Ontario as collectors supports the idea that procurement was likely done by task groups who left the residential base to specifically procure chert. It follows that direct or indirect procurement were likely the strategies employed by task groups. Direct procurement is defined as involving task groups traveling directly to the source of a resource in order to procure it

(Hirth 2008, 440). This model is borne from the idea that the procurement of chert was incredibly important for hunter-gatherer societies in Southwestern Ontario and was worth the cost of task groups procuring it *en masse*. Indirect procurement is the idea that a specific resource was exchanged between two groups (Hirth 2008, 440). The indirect procurement model relies heavily on an understanding of the societal make-up of the group being studied.

The direction of this study was heavily influenced by a recent study on lake levels, mobility and lithic raw material selection and reduction strategies in the Great Lakes (Cook & Lovis 2014). The authors suggest the use of highly mobile task groups after the end of the Nipissing phase could have resulted in the incorporation of more distant and higher quality raw materials, either through exchange or direct procurement (Cook and Lovis 2014, 55). While Cook and Lovis' study focuses on sites that date to the latter end of the Late Archaic the authors lay out the specific parameters needed in order to infer that chert was arriving on site in a reduced form as the result of either direct procurement or exchange.

The current understanding of the late Middle Archaic in the lower Great Lakes is that it was a time of increased sedentism and reduced territory size (Ellis et al. 2009, 92). The Archaic as a whole is viewed as a time period in which groups were less mobile than their highly mobile Paleo-Indian predecessors. However, it is also understood that the lowering of lake levels shifted mobility patterns, as stated by Cook and Lovis (2014). While shifting lake levels may have allowed the people of the late Middle Archaic to settle into their residential bases for longer periods of time, they were still employing highly mobile task groups.

In discussing interaction parameters during the Paleo-Indian period, Brian Hayden (1982), asserts that increased interaction among groups occurred when there was an increasing degree of sedentism or extreme scarcity of essential and portable resources (Hayden 1982). Therefore, it appears that interaction typically increases when a society has begun to settle in to residential locations for longer periods of time yet are still quite mobile through the use of task groups.

It is important to note that exchange occurred for many reasons. Exchange of toolstone could have been conducted as a means of creating alliances that could be called upon in times of resource shortfalls. Exchange could have also taken place for social purposes, such as mate exchange, in addition to being conducted for utilitarian purposes (Pearce 2008, 36). Interaction is viewed as a choice that is made in a context created by a set of specific cultural conditions. The important variables include the size of communities, the size of territories, means of transportation, the variability and availability of resources, the biological demographic needs of a community and degrees of nomadism (Hayden 1982, 110).

In a study of band structure and interaction in early southern Ontario, Michael Spence points out that in order to maintain a demographically viable population, small bands that are widely spaced require a broad area and a high degree of exogamy (Spence 1986). Archaeological and osteological evidence suggests that bands were made up of around twenty-five to fifty people. This information was gleaned through the study of the Middle Archaic burials at the Morrison and Allumette Island sites (Spence 1986, 92). This research suggests that the social structure of the Middle Archaic involved small bands that were widely spaced. It is therefore likely that exchange was partially carried out in order to strengthen bonds for demographic reasons (Clark 2003, 31); for example, a group may want to diversify their gene pool by importing marital partners. Furthermore, archaeologists have associated the emergence of cemeteries with societies in which claims to critical resources may have been restricted or subject to competition from outside groups (Spence 1986, 92; Conolly et al. 2014).

Chert is well suited to trade in order to maintain effective relationships between groups. Due to breakage and use-exhaustion new pieces of chert would have had to be acquired (Hayden 1982,118). This need to replenish stone supplies would require reliable contact among groups, creating a network of interactions (Meltzer 1989, 15).

Cook and Lovis (2014) describe specific characteristics of their lithic assemblages that point to Direct procurement or exchange being the strategy through which Onondaga chert was procured (Cook and Lovis 2014, 59). They indicate that primary reduction did not take place with Onondaga chert on site 20BY387 but rather at the bedrock source (Cook and Lovis 2014, 62). Primary reduction is indicated by higher frequencies of cores and core fragments, decortication flakes, blocky flakes, and shatter. Instead, it appears that the Onondaga debitage were as a result of maintenance, which is evidenced by a high percentage of flat thinning flakes (Cook and Lovis 2014, 59). This data supports the conclusion that items at these sites studied by Cook and Lovis were arriving in reduced forms. Transporting material in the middle of biface reduction meant easier transport and less damage to the bifaces (Ellis and Spence 1997, 122).

At site 20BY28 in the Cook and Lovis study, Onondaga is the most common raw material used in the manufacture of formal tools (Cook and Lovis 2014, 67). This is due to the fact that formal tools are difficult to make on lower quality randomly produced flakes because they require larger pieces of material. In order to create a stone tool, knappers must extensively work the material in order to successfully shape it and require material that is relatively free of flaws, i.e. a large flake made of high quality chert (Ellis and Spence 1997, 121). The Onondaga chert used was also of a high quality and was likely not derived from secondary sources (Cook and Lovis 2014, 68). This however does not conclusively prove that exchange took place and other factors are necessary in order to point to exchange.

During the late Middle Archaic multiple sites from the Ottawa Valley to the shores of Lake Huron produced projectile points made of Onondaga chert. This suggests that Onondaga chert may have been exploited by local groups and traded out at a regional scale to be used as formal tools. Furthermore, non-local chert would have played a more specialized role in the technological system as evidenced by differential use. Due to the highly curated nature of formal tools made of non-local chert it is most likely that they would have been discarded largely as exhausted and/or broken tools (Morrow and Jeffries 1989, 30). However, archaeologists do point out that these attributes also point to Direct procurement, which raises the issue of equifinality (Meltzer 1989, 25-26).

There have been slight deviations between lithic assemblages produced by Indirect and Direct procurement that have been noted. These differences fall into three general categories; stylistic uniformity versus diversity, degree of curation of nonlocal, and material uniformity versus diversity.

Lithic assemblages that reflect exchange will typically contain a number of different chert types that originate from multiple locations. This is directly related to how far the site is from the source of the chert that was used in down the line exchange. Assemblages that contain chert from a bedrock source located a great distance from a site will likely have other cherts represented in the deposit. This phenomenon occurs where the outcrops of two or more different cherts are located in close juxtaposition, such that both would be common in local secondary deposits. This is evident on the north shore of Lake Erie, west of the Grand River, which is the source area of Onondaga and other cherts like Haldimand and Selkirk (Ellis and Spence 1997, 120). While these bedrock outcrops are located in close juxtaposition, it is not known whether the Haldimand and Onondaga at South Bend, for example, was procured from the exact same location. Ellis and Spence do appear to argue that lithic assemblages that reflect down the line exchange will contain diluted amounts of chert in direct relation to the distance the site is located from the bedrock source (Ellis and Spence 1997, 120).

It is important to note that distance decay models heavily influence the conclusion that procurement choices can be evidenced by debitage. "Distance-decay models outline that the further a stone tool gets from its source the higher degree of processing it should exhibit (Beck 2008, 760). The distance from the bedrock source to the site will directly correlate with a drop off in the density of nonlocal chert, diluting its representation in the assemblage (Ellis and Spence 1997, 120). Assemblages that reflect exchange will therefore contain smaller amounts of chert the further you get from the source (Ellis 1989, 142).

The most recently visited source will be better represented in debitage, unfinished tools and expedient tools which reflect that the source was likely less laborious to visit. Heavily curated tools like projectile points require specialized blanks that are going to be lavished with more care if they are made of a distantly located chert and will be more heavily represented in the assemblage (Pearce 2008, 33). Sources that were used for exchange will not have been the most recently visited source and will therefore be heavily represented by highly curated tools.

As noted, a key indicator of exchange would be a diverse non-local lithic assemblage that contains chert originating from numerous places (Elaschuk 2015, 185). If it is found that certain lithic materials appear only made into points at a regional scale, this may indicate that the source was exploited by local groups primarily to produce objects for exchange (Pearce 2008, 6). The specialized role of a preferentially selected chert should be reflected in differential use of the material when compared to more readily available chert (Morrow & Jefferies 1989, 30). Differential use will likely take the form of nonlocal chert being used primarily for highly curated tools.

Direct procurement refers to craftsmen directly visiting source areas and obtaining raw material (Hirth 2008, 440). When represented in the lithic assemblage, Direct procurement may be indicated by projectile points, late stage debitage, and other formal tools manufactured of non-local chert, while unifaces, expedient tools, and the majority of early reduction stage debitage will be manufactured of local chert (Pearce 2008, 35). If local tills were used, then one should expect a high percentage of unidentifiable till cherts in the assemblage (Pearce 2008, 74).

Another key deviation from down the line exchange is the presence of uniform stylistic attributes or reduction strategies, which may reflect manufacture by the same group who acquired the stone at the source (Meltzer 1989, 30). Another characteristic suggestive of Direct procurement is the varying in intensity of use which is typically directly related to the distance from the bedrock source to site (Meltzer 1989, 34). This is generally reflected by, for example, expedient tools being made of local chert while tools that require a high degree of fine tuning made of nonlocal chert. Due to the effort expended to travel directly to the source of this nonlocal chert, it is typically used to create more highly curated tool forms.

Finally, if all artifact classes are manufactured of nonlocal stone, then they most likely came from stone that was directly acquired from the source (Meltzer 1989, 25). If the lithic assemblage is almost entirely manufactured of non-local chert, the likelihood for Direct procurement increases (Tankersley 1991, 294). Assemblages dominated by exotic chert but still containing some residual local chert likely indicate direct cyclical acquisition (Meltzer 1989, 33). Sites that reflect Direct procurement may contain large amounts of nonlocal chert on the other end of their territory hundreds of miles away from the source due to a group's affinity for the chosen chert (Ellis 1989, 147).

Embedded procurement is defined as groups procuring lithic resources incidentally while completing other subsistence based activities in the same area (Binford 1979, 259). This model was developed by Binford through participant observation with the Nunamiut (Binford 1979, 255). Binford argues that the Nunamiut are an extreme example of a group who bulk store their resources throughout the year (Binford 1979, 255). For the Nunamiut, lithics were not the primary resource that they used to hunt and process food and toolstone was therefore more of a third or fourth priority (Binford 1979, 261; Bamforth 2006, 521). Groups during the Middle Archaic in the lower Great Lakes used chert as their first choice and therefore may not be comparable to Binford's informants.

Embedded procurement also manifests itself in the lithic assemblage through specific characteristics. If the non-local chert was procured through embedded procurement, there would be no extra costs. In other words, if something is procured incidentally rather than being procured via targeted excursions it would not have entailed extra effort on top of that which was expended during the completion of supposedly more important tasks like food gathering. If no extra effort was expended, one would expect no differences in the way non-local and local cherts were manufactured and discarded (Morrow & Jeffries 1989, 30). The percentage of unfinished tools made of non-local chert would be roughly the same as the percentage of non-local chert in the entire assemblage (Morrow & Jeffries 1989, 31).

While it is possible that groups during the Middle Archaic procured chert as part of their seasonal rounds, chert was incredibly important and may have been worth the effort it would have cost for groups to procure the chert directly (Pearce 2008, 5).

3.2 Methods

The methods used to analyze the lithic assemblages of Ridge Pine 2 and South Bend were directly influenced by procurement models. As discussed, there are distinct characteristics of a lithic assemblage that can indicate whether direct procurement or exchange was the strategy employed to procure non-local chert. In past studies of procurement strategies archaeologists have consistently pointed to the importance of raw material differences between formal tools and debitage. Therefore, special attention was paid to formal tools and debitage in relation to material used.

The analysis of formal tools involved multiple resources. The projectile points were measured and typed in accordance with Noel D. Justice's approach (1987). Justice outlines the specific measurements and the unique characteristics of each projectile point type. The analysis involved recording the unique characteristics of the blade such as the shape of the blade and lateral edges (whether they are incurvate, excurvate, concave, or straight), the base, whether the base is ground and whether the point was notched or stemmed. Relevant attributes of the points were measured and recorded in accordance with Justice's method.

The projectile points were also examined in accordance with characteristics described by Ritchie (1971) in *A Typology and Nomenclature for New York Projectile Points*. Furthermore, the material of each point was noted based on macroscopic examination of distinctive characteristics (Eley and von Bitter 1989). A small reference collection of the most commonly occurring cherts (Onondaga, Kettle Point, Haldimand) was also employed.

Bifaces were assigned to stages of reduction in accordance with Andrefsky (2005). Andrefsky describes in detail the stages of reduction of bifaces undertaken in order to manufacture them into projectile points and unhafted bifaces (Andrefsky 2005, 188-190). Each biface was assigned a stage in accordance to measurements and observed degree of reduction.

Andrefsky describes five stages of biface production from either a cortical cobble or a flake blank. Stage one is a blank slab of chert. Stage two is an edged biface where small chips have been removed from around the edges with few flake scars across its face. Stage three is a thinned biface with flakes removed to the center of the biface and most cortex removed. Stage four is defined as a preform and has large flat flake scars and a flat cross section. Stage five is a finished biface/point. Finally, there is sixth stage that involves reworked broken points (Andrefsky 2005, 188). This analysis allowed me to state how many bifaces were in fact projectile point preforms that may have arrived on site in an advanced state of reduction. The material and its quality were recorded in order to ascertain whether it was non-local chert that was arriving in a reduced form.

The formal tools from each site were analyzed, typed, and sorted based on material used. The formal tools observed were scrapers, drills, wedges, and one perforator. Scrapers were further analyzed in order to deduce whether they were exhausted projectile points that had been resharpened into scrapers. A lithic training manual created by Timmins Martelle Heritage Consultants informed the specific characteristics recorded. This analysis was done to ascertain whether formal tools were mainly created with non-local chert and if artifacts made of non-local chert exhibit intense curating.

Chert debitage was analyzed following a technological typology developed by Pearce during her study of lithic procurement during the Small Point Archaic (2008). Pearce divides debitage into two groups corresponding to earlier and later stages of reduction. Primary decortication flakes, secondary decortication flakes, tertiary decortication flakes, bipolar reduction flakes, and shatter represent the earlier stages of reduction. Late stage reduction debris is represented by normal biface thinning flakes, bifacial retouch flakes, biface reduction flake errors, and unifacial retouch flakes. There are two extra categories, which are fragmentary flakes and potlids. A detailed breakdown of the characteristics of each flake type can be found in appendix A.

Due to the large number of flakes it was not possible to analyze each flake. I consulted the Ontario *Standards and Guidelines for Consulting Archaeologists (2011)* in order to provide a basis for a good sampling strategy. The standards describe a proper sampling of units as representative of each aspect of the site and approximately 20% of the overall assemblage (MTCS 2011, 75). The Ontario standards and guidelines were chosen due to the fact that South Bend and Ridge Pine 2 are cultural resource management sites that were excavated in accordance with said regulations. In order to sample the chipping detritus assemblage at 20%, flakes were selected from every fourth excavation unit at each site. Figures 3 and 4 below illustrate the sampling strategy with the black boxes indicating which units were sampled.

Finally, although archaeologists often rely on typology to assign sites to a time period this approach is complicated by the fluid nature of lithic tool use. Tools can often be resharpened into different tools or can be found by later groups and reused, sometimes making it problematic to assign a date based on typology alone. It is, therefore, preferable to radiocarbon date sites where possible in order to be more confident in the dating of the site. At Ridge Pine 2 there was one feature that contained charcoal that could be used for radiocarbon analysis. At South Bend there was an extensive faunal assemblage in the buried paleosol, which presented a multitude of possible samples for radiocarbon dating.

Accordingly, one sample from each site was submitted to the Lalonde AMS Laboratory for AMS radiocarbon dating.

This chapter has described the theoretical ideas used to inform the archaeological analysis and the methods used to analyze the assemblages. In the following two chapters the environmental settings and artifact assemblages of the Ridge Pine 2 and South Bend sites are described in detail.

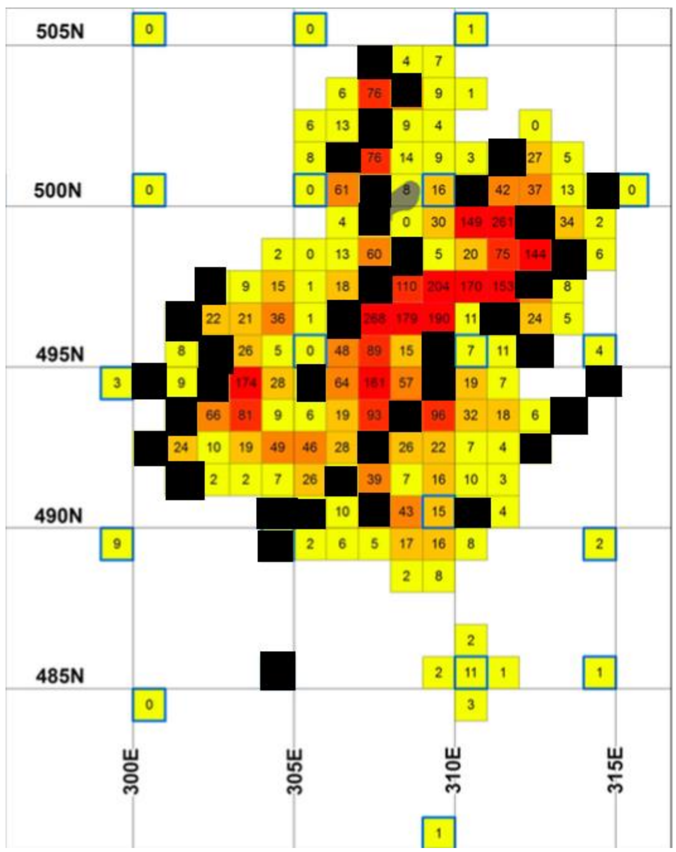

Figure 3 Unit map of Ridge Pine 2 showing units selected for debitage analysis in black (adapted from TMHC 2012, 19)

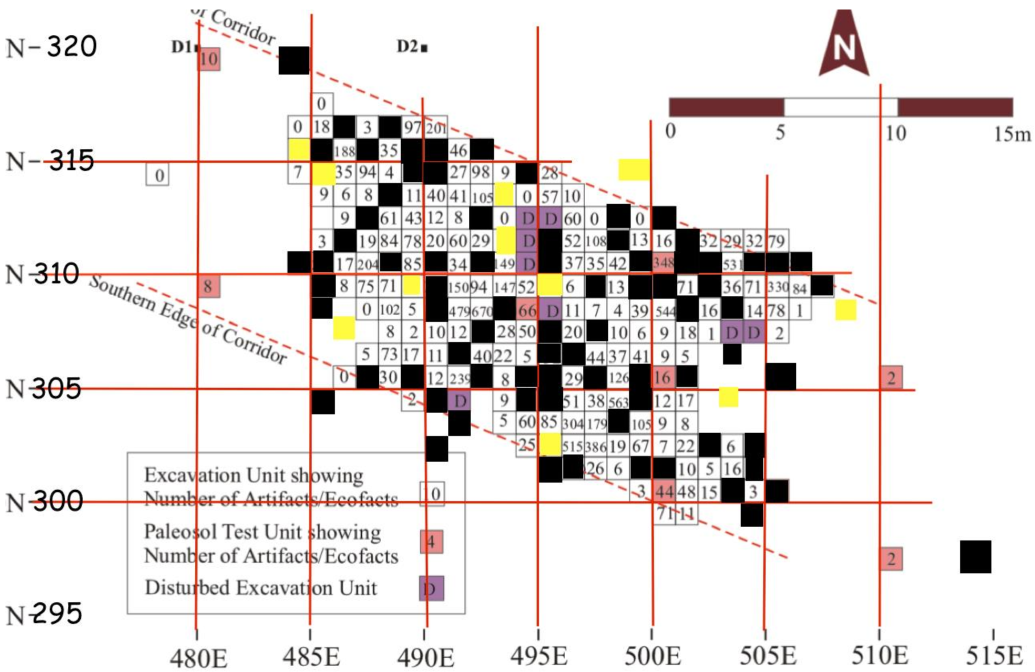

Figure 4: Unit map of South Bend showing units selected for debitage analysis in black (adapted from TMHC 2005, 9)

Chapter 4: Ridge Pine 2

The Ridge Pine 2 site (AhHk-136) is located in Grand Bend, Ontario approximately two kilometres from the shore of Lake Huron (TMHC 2012, 2). The site was discovered by Timmins Martelle Heritage Consultants during an archaeological assessment pre-development. Ridge Pine 2 yielded a substantial collection of pre-contact artifacts, numbering 5255, including 26 found during the Stage 2 survey (TMHC 2009a), 79 found during the Stage 3 site testing (TMHC 2010), and 5150 recovered during the Stage 4 mitigative excavations (TMHC 2012). The bulk of the artifact assemblage dates to the late Middle Archaic, ca. 5000-4500 years ago (TMHC 2012, 63).

4.1 Ecosystem/Setting

Ridge Pine 2 appears to have had multiple occupations as indicated by the presence of one Late Archaic Genesee projectile point found during Stage 2 test excavations, and several late Middle Archaic artifacts found during Stage 4 mitigative excavations. In total, 172 one-metre square units were hand excavated within the five-metre grid system (TMHC 2012, 18-19). Each unit was screened by passing dirt through 6 mm mesh. The area appeared to have been previously plough disturbed but is currently overtaken by a secondary growth forest (TMHC 2012, 5).

The lack of substantial flora and faunal remains has complicated the possibility of drawing definitive conclusions regarding environmental reconstruction, or the season of occupation (TMHC 2012, 62), however, there was one feature that yielded wood charcoal, identified as chestnut, which was used to carbon date the site. The presence of chestnut wood suggests that the environment that surrounded Ridge Pine 2 during occupation was likely a deciduous forest (Keever 1973, 303).

The radiocarbon date from the chestnut wood is 4522-4421 cal B.P. (4003 ± 24 RCYBP) (Keiser 2019). This places the site at the very tail end of the Middle Archaic and the Nipissing high water stage. The site appears to be located north of the Thedford Embayment and approximately 250-300 metres east of the lake, based on the assumed extent of the Nipissing beach (Figure 1). It lies on a slight rise at an elevation of 186-187 m asl, and is located only 15-20 metres south of the Simmons/Pergel Drain, a small creek that flows westerly, draining in to the Ausable River. Soils on the site are sandy loam and are generally better drained than the surrounding area (TMHC 2009:13). It should also be noted that there are several sites with Middle Archaic components in the immediate area surrounding Ridge Pine 2. They were all discovered during recent archaeological assessments and include sites AhHk-124, 125, 126, 135, 136, 155, 157, and 158 (TMHC 2004, 2009b, 2016).

The Stage 4 excavations at Ridge Pine 2 yielded 5150 artifacts, with a number of them made from Onondaga chert (TMHC 2012, 22). In order to test the hypothesis that Onondaga arrived on site due to direct procurement or exchange, this study focused on projectile points, formal tools, bifaces, and chipping detritus (Table 1). However, due to the fact that there were approximately 4858 pieces of chipping detritus a representative sample of 1207 flakes (25%) was analyzed. This sample was deemed sufficient based on the guidelines for sampling strategies in the *Ontario Standards and Guidelines* (MTCS 2011, 100). From this initial analysis it was found that the main occupation at Ridge Pine 2 occurred during to the late Middle Archaic era according to the majority of the diagnostic projectile points. As seen in Figure 15 the large majority of the projectile points are in the southern half of the site. The cores also appear to congregate to the southern half as well. The drills on the other hand tend to congregate in the northern area of the site, with scrapers and bifaces evenly spread throughout the site. The single feature is located in the northern half of the site and contains a large number of the ground stone tools.

Table 2: Ridge Pine 2 Artifacts

Artifact	Number	%
bullet	1	0.02
coin	1	0.02
ground stone fragment	1	0.02
gun shell casing	1	0.02
netsinker	1	0.02
retouched flake	1	0.02
wedge	1	0.02
perforator	2	0.04
rough stone cobbles	3	0.06
spokeshave	4	0.08
hammerstone	4	0.08
drill	6	0.11
scraper	7	0.13

core	8	0.15
projectile point	14	0.27
fire cracked rock	26	0.50
biface	27	0.52
non chert detritus	56	1.09
utilized flake	108	2.10
chipping detritus	4878	94.73
Total	**5150**	

4.2 Projectile Points

Of the 18 projectile points recovered from the site, 16 have been classified as Brewerton projectile points (ca. 5000-4000 RCYBP or 5852-4430 cal B.P.) (Justice 1987,115; Calpal 2019). One is classified as a Normanskill and one as a Genesee point. The Genesee point dates to the Late Archaic (4500-3500 RCYBP or 5262-3717 cal BP) (Ellis, Kenyon and Spence 1990, 99; Calpal 2019) and is made of Onondaga chert. The Normanskill point dates to the Late Archaic (ca. 4500- 4000 RCYBP or 5262-4430 cal B.P.; Calpal 2019) and is made of Kettle Point. The remaining 16 Brewerton projectile points are all made of Onondaga chert (TMHC 2012, 20). Superficially, upon visual inspection, these points appear nearly identical to the Brewerton points found at Morrison Island (Figure 13), which were also dated to the Middle Archaic (Clermont & Chapdelaine 1998, 69). Noel Justice provides outline drawings of Brewerton points in his book and the projectile points found at Ridge Pine 2 again appear to be almost identical (Figure 5) (Justice 1987, 117).

Justice (1987) provides the exact parameters of the Brewerton Corner Notched and Side Notched projectile point types. He describes Brewerton points as broad bladed and relatively thick forms. The blade is trianguloid in outline and biconvex in cross section. The definitive characteristic of this type projectile point is the very wide shoulders that extend beyond the basal ears. The blade edges are usually excurvate and less often straight. The basal edges on these points are typically straight and basal grinding is common. The points are usually corner notched; however, a side notched type exists (Justice 1987, 115). The points range from 23.88 to 79.45 mm in length with the majority of them falling between 31.75 to 57.15 mm in length. They are typically 31.75 to 38.1 mm in width and range from 4.76 to 9.53 mm thick with the majority of points 7.94 mm thick (Justice 1987, 247). In his article "Revisiting the Laurentian Concept" Conolly compiled measurements for 131 Brewerton Corner-Notched and 215 Brewerton Side-Notched projectile points. While Conolly provided a large number of different metric variables I will only summarize general length and width measurements. For the Corner-Notched type the mean blade length is 32.9 mm, the mean haft length is 9.7mm, the mean base width is 19mm, and the blade width is 26.1mm. For the Side-Notched type the mean blade length 27mm, the mean haft length is 10.7mm, the mean base width is 20mm, and the blade width is 21.4mm (Conolly 2018, 77). Conolly's measurements fall within the range provided by Justice but appear to be smaller, however it is important to point out that Conolly measured his points through the use of images so it is possible that that fact can account for the variance (Conolly 2018, 76).

Table 3: Ridge Pine 2 Projectile Points (all measured in mm)

Points	Blade Edges	Base	Measurements	Notches	Material Type
Point 68	Straight	Straight, curved edges	L: 23.04 W: 16.05 T: 6.83	N/A	Onondaga
Point 29	N/A	N/A	L: 103.5 W: 46 T: 8	N/A	Onondaga
Point 240	N/A	N/A	L: 21.63 W: 16.81 T: 4.13	N/A	Onondaga
Point 58	N/A	N/A	L: 41.16 W: 34.39 T: 7.09	N/A	Burnt Onondaga
Point 361	N/A	N/A	L: 17.40 W: 11.98 T: 6.91	N/A	Onondaga
Point 74	Straight	Straight, rectanguloid edges	L: 58.74 W: 23.53 T: 8.44	Side	Kettle Point
Point 60	N/A	N/A	L: 11.66 T: 5.86	N/A	Onondaga
Point 365	N/A	N/A	L: 11.97 W: 21.13 T: 5.02	N/A	Onondaga
Point 73	Straight	Convex, pointed basal edges	L: 40.47 W: 27.71 T: 6.94	Corner	Sec Source Onondaga
Point 59	Straight	Convex, straight edges	L: 65.54 W: 38.99 T: 7.86	Corner	Onondaga
Point 61	Excurvate	Straight, curved edges	L: 43.81 W: 29.56 T: 7.64	Corner	Onondaga
Point 63	Straight	Straight, straight edges	L: 43.58 W: 39.15 T: 7.36	Corner	Onondaga

Point 70	Excurvate	Straight, straight edges	L: 40.97 W: 28.49 T: 6.34	Side	Onondaga
Point 67	Excurvate	Straight	L: 35.65 W: 28.41 T: 7.85	N/A	Onondaga
Point 52	Excurvate	Straight, rounded edges	L: 50.64 W: 30.87 T: 9.66	Corner	Onondaga
Point 49	Straight	Straight, rounded edges	L: 49.85 W: 30.30 T: 7.55	Corner	Onondaga
Point 46	Excurvate	Straight, straight edges	L: 10.46 W: 8.95 T: 7.67	Corner	Onondaga
Point 51	Excurvate	Convex, straight edges	L: 46.90 W: 34.15 T: 7.56	Corner	Burnt Onondaga

Key: L: length, W: width, T: thickness.

There are 16 Brewerton projectile points that have been measured and will be referred to by their catalogue number. A summarized description of each point is located in Table 2, with a more detailed description of each point in Appendix B. Images of the points are presented in Figure 5. Twelve projectile points were made of primary source Onondaga chert. Two projectile points were made of burnt Onondaga chert, and one projectile point was made of lower quality secondary source Onondaga chert. One point consists of a portion of the base and mends with another point fragment (Cat. Nos. 46 & 68).

Of the 16 Brewerton projectile points, seven were complete. The average length of those seven points was 49.68 mm. The average width of the complete points was 31.54 mm, and the average thickness was 7 mm. These measurements fall within the average length, width, and thickness ranges of Brewerton projectile points as described by Justice and are much larger than the Terminal Archaic corner-notched forms with which they can be confused. All of the Brewerton projectile points were biconvex in cross section and had triangular blades. Six projectile points had excurvate lateral edges on their blades and another six projectile points had straight edges (Table 2). Seven projectile points have straight basal edges. The remaining points have either rounded or pointed basal edges. All of the projectile points, with the exception of the four incomplete points, are basally ground. The majority of these characteristics align with those described by Justice, with the exception of the basal edges, which are not as wide as the points described by Justice. However, this variance can be attributed to wear, or to the fact that the majority of the points were broken. Therefore, these sixteen points can be confidently classified as Brewerton projectile points.

The outliers are the two points classified as Normanskill and Genesee projectile points. The Genesee point was found during the course of the Stage 3 excavations in a unit that is just southwest of the edge of the Stage 4 excavations (Figure 16). The Normanskill point was found in the southwest corner of the block excavations (Figure 16).

Normanskill projectile points are typically slender, thick points of medium size, with prominent side notches (Ritchie 1971, 37). They are usually two to three times as long as they are wide. Blades are narrow, and triangular in outline, markedly biconvex in cross section with straight edges. The stem is boldly side notched and slightly thinned by coarse flaking from the base. Bases are straight or very slightly concave (Ritchie 1971, 37). Normanskill projectile points range from 36.51 to 69.85 mm in length, with the majority falling between 41.27 to 50.8 mm in length (Ritchie 1971, 37). They are typically 4.76 to 9.52 mm thick with the majority approximately 6.35 mm thick (Ritchie 1971, 37).

The Normanskill projectile point (Figure 5) in the Ridge Pine 2 collection is the only projectile point made of Kettle Point chert and the material appears to be from a primary source. The point is biconvex in cross section, slender in shape, and thick. The blade edges are straight and are almost rectanguloid towards the middle, finishing as a trianguloid point at the tip. The base is straight, and the side notches are quite large and prominent measuring 11.50 mm in height. The point is 58.74 mm in length, 23.53 mm wide, and 8.44 mm thick. These measurements and attributes confirm that the projectile point fits the Normanskill description.

According to Ritchie (1971, 37), Normanskill projectile points are part of the Middle Archaic Vosburg phase, which he places earlier than the Brewerton phase (Ritchie 1980, 84), however Justice (1987, 130) regards Normanskill points as a morphological correlate of the Lamoka cluster. In Ontario, Normanskill and Lamoka points are attributed to the Late Archaic Narrow Point complex, ca. 4500-4000 B.P. (Ellis, Kenyon and Spence 1990, 97), which immediately post-dates Brewerton. Thus, the Normanskill point at Ridge Pine 2 is clearly an outlier and may be from a later occupation when the lake waters had lowered, and the Kettle Point outcrop was exposed.

The Genesee projectile point was found during the Stage 3 excavations. The point is 103.5 mm long, 46 mm wide at the shoulder, 19 mm wide at the stem base, and 8 mm thick (TMHC 2012, 7). Genesee points date to the Late Archaic as they belong to the Broadpoint tradition and date to between 4500 and 3500 years ago (Ellis et al. 1990, 99). The Genesee point can therefore also be categorized as an outlier and as evidence of another brief Late Archaic occupation of the site.

Figure 5: Ridge Pine 2 Projectile Points. All but one are Brewerton type projectile points. Second from the right and second to the top is the sole Normanskill projectile point(TMHC 2012, 24)

4.3 Other Formal Tools

The formal tools at Ridge Pine 2 are almost exclusively made of Onondaga chert (Figure 6). Six of the formal tools at Ridge Pine 2 are drills. A detailed breakdown of the characteristics of each drill can be found in Table 3. All of the six drills are made of Onondaga. Catalogue numbers 39, 41, and 48 can be mended together to create a full T shaped drill. The remaining drills, catalogue numbers: 40, 34, and 33 are plain type drills, which are simple cylindrical forms.

Table 4: Ridge Pine 2 Drills (Figure 6)

Artifact	Measurements in mm	Characteristics	Material Type
39	L: 34.37 W:8.46 T: 4.21	Plain, lenticular, complete	Onondaga
41	L: 23.76 W: 34.66 T: 5.87	T shaped, lenticular, base	Onondaga
40	L: 30.18 W: 9.49 T: 6.77	Plain, lenticular, mid-section	Onondaga
48	L: 22.25 W: 9.56 T: 4.17	Plain, lenticular, mid-section	Onondaga
34	L: 28 W: 24.50 T: 5.64	Expanding base drill, lenticular, base	Onondaga
33	L: 38.97 W: 8.11 T: 4.41	Plain, lenticular, tip	Onondaga

Key: L: length, W: width, T: thickness.

The scrapers at Ridge Pine are varied (Figure 6). Seven scrapers are end scrapers, which is typical of the Middle Archaic tool kit. The remaining scraper (Cat. 110) is a side scraper. Three scrapers (Cat. Nos. 117, 516, and 110) are made on fragmentary Kettle Point flakes while the remaining five scrapers are made of good quality Onondaga. Three scrapers (Cat. Nos. 41, 180, and 398) were made on normal biface thinning flakes (BFTs). The remaining scrapers (Cat. Nos. 36 and 53) appear to be Brewerton points that have been reworked into end scrapers. This classification was made based on the appearance of the remaining point base. These artifacts are often referred to as "bunts" and are typical of Brewerton assemblages (Ellis et al. 1990, 88).The material breakdown of the formal tools at Ridge Pine appears to confirm that the Onondaga chert was used in a highly curated way in order to maximize the use of the high-quality chert. Table 4 below contains measurements for the scraper as a whole and measurements for length, angle and height of the bit modification. Refer to Appendix A for a detailed breakdown of flake types. As previously stated the scrapers themselves appear to be equally distributed throughout the site (Figure 16).

Table 5: Ridge Pine 2 Scrapers (Figure 6)

Artifact	**Measurements**	**Characteristics**	**Material Type**
110	L: 20.01 W:16.15 T:5.72	Side scraper on SHAT	Kettle Point
Bit Modification	L: 15.77 H: 3.51 A: 50 degrees	Dorsal, lateral, straight	
516	L: 30.92 W:17.76 T: 5.92	End scraper on PRIM	Kettle Point
Modification	L: 9.78 H. 4.02 A: 40 degrees	Dorsal, distal, straight	
398	L: 24.89 W: 15.10 T: 3.39	Side/end scraper on BFT	Onondaga
Modification	L: 20.86 H: 1.63 A: 80 degrees	Dorsal, lateral, straight	
180	L: 13.76 W: 16.09 T: 3.40	End scraper on BFT	Onondaga
Modification	L: 14.66 H: 3.08 A: 70 degrees	Dorsal, distal, convex	
117	L: 20.10 W: 17.97 T: 4.55	End scraper on FRAG	Kettle Point
Modification	L: 19.98 H: 4.53 A: 50 degrees	Dorsal, distal, convex	
36	L: 26.41 W: 34.49 T: 7.75	End scraper on corner	Onondaga

		notched PPO	
Modification	L: 33.02 H: 4.25 A: 40 degrees	Distal, convex	
53	L: 23.02 W: 36.27 T: 7.93	End scraper on corner notched PPO	Onondaga
Modification	L: 14.17 H: 5.04 A: 50 degrees	Distal, convex	
41	L: 34.14 W: 38.21 T: 4.51	End scraper on BFT	Onondaga
Modification	L: 23.51 H: 5.05 A: 50 degrees	Dorsal, distal, convex	

Key: L: length, W: width, T: thickness, SHAT: shatter, PRIM: primary flake, BFT: normal biface thinning flake, FRAG: fragmentary flake, PPO: projectile point, A: edge angle.

There are four wedges in the lithic assemblage at Ridge Pine 2 (Table 5). Two are made of Kettle Point and two are made of burnt Onondaga. Three of the wedges are rectangular, two have step fractures on all four sides, and one is crushed on two sides. There is one perforator made of an Onondaga BFT flake.

Table 6: Miscellaneous Ridge Pine 2 Formal Tools (Figure 6)

Artifact	**Measurements**	**Characteristics**	**Material Type**
Perforator: 182	L: 31.66 W: 33.93 T: 4.54	BFT, P: 70	Onondaga
Modification	L: 6.27 W: 5.34	Dorsal, lateral, plano-convex	
Wedge: 75	L: 20.41 W: 17.16 T: 7.84	Rectangular, 4 edges of step fractures	Kettle Point
Wedge: 79	L: 19.38 W: 14.25 T: 5.17	Rectanguloid	Kettle Point
Wedge: 495	L: 14.40 W: 12.75 T: 4.14	Rectangular, 4 edges of step fractures	Burnt Onondaga

Wedge: 116	L: 17.40 W: 11.54 T: 5.22	Incomplete, crushed on two sides	Burnt Onondaga

Key: L: length, W: width, T: thickness, BFT: normal biface thinning flake.

Figure 6 : Ridge Pine 2 Formal Tools (TMHC 2012, 27-28)

4.4 Bifaces

Like the other curated tools, the bifaces at Ridge Pine 2 were predominantly made of Onondaga chert (Figure 7). The bifaces were sorted according to their stages of reduction as described in Chapter 3. Of the 22 bifaces, 16 were made of Onondaga, five were made of Kettle Point and one was made of Haldimand chert. Six of the bifaces were abandoned during the second stage of reduction, eleven were abandoned during the third stage of reduction, and five were abandoned during the fourth stage of reduction. It is worthwhile to note that largest numbers of bifaces, 10 to be specific, are stage three Onondaga bifaces that are thinned with flakes removed to the center of the biface. Furthermore, four of the five Kettle Point bifaces were classified as stage two bifaces which are primarily flaked along the edges. A detailed breakdown of each biface's characteristics can be found in Table 6.

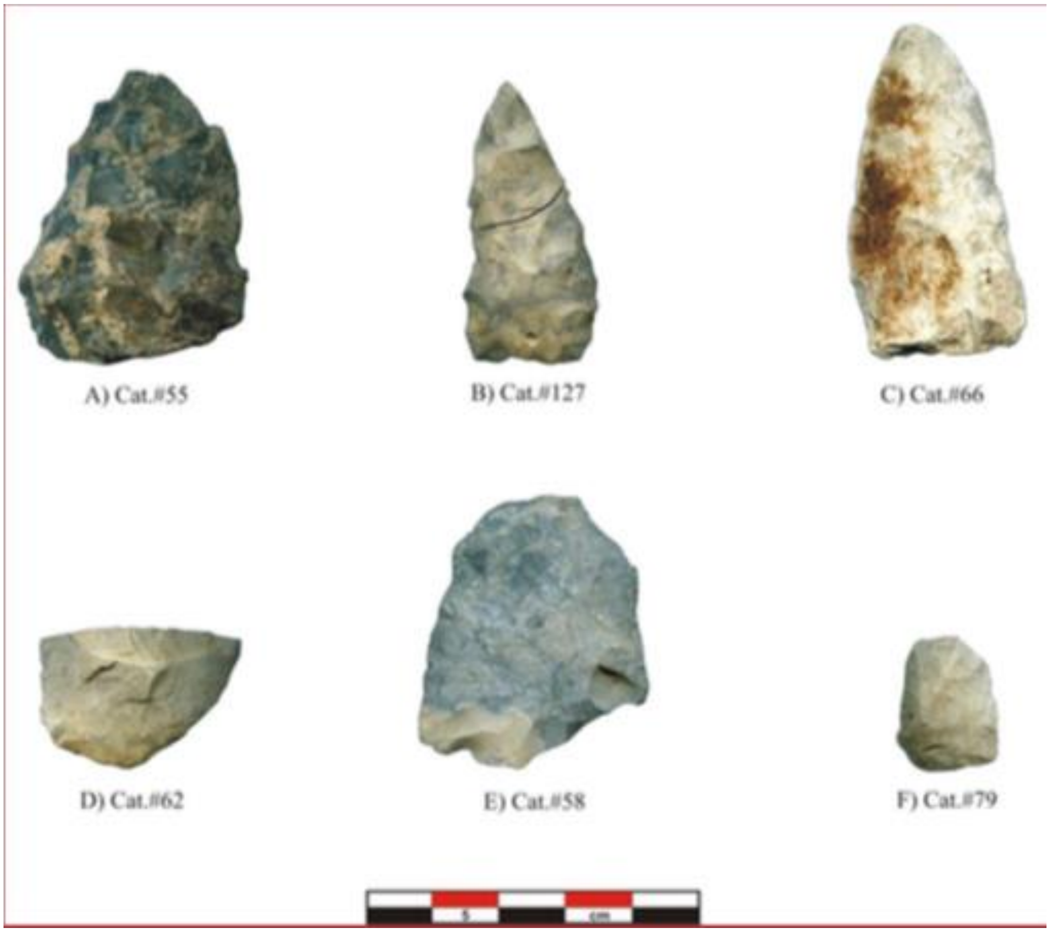

Figure 7 : Ridge Pine 2 Bifaces. Cat.# 55 and Cat.# 79 are made of Kettle Point, Cat.# 62 is made of Bayport, Cat.# 58 and 127 are made of Onondaga, and Cat.# 66 is made of an unknown material(TMHC 2012, 26)

Table 7: Ridge Pine 2 Bifaces (Figure 7)

Biface	St	Shape	Cross-section	Chert	Measurements	Section
230	2	Ovate	Plano-convex	Onondaga	L: 25.87 W: 37.95 T: 11.24	Complete
35	4	Ovate	Lenticular	Onondaga	L: 19.40 W: 37.28 T: 6.22	End frag

37	4	Lanceolate	Plano-convex	Onondaga	L: 31.86 W: 30.20 T: 6.28	Base
55	2	Ovate	Lenticular	Kettle Point	L: 44.12 W: 34.85 T: 15.33	Complete
127	3	Triangular	Lenticular	Onondaga	L: 41 W: 19.85 T: 7.45	Complete
378	3	Triangular	Lenticular	Burnt Onondaga	L: 22.55 W: 32.86 T: 6.52	Tip
410	3	Irregular	Lenticular	Onondaga	L: 41.20 W: 26.30 T: 8.08	Midsection
184	2	Ovate	Lenticular	Onondaga	L: 24.71 W: 43.08 T: 12.07	Base frag
72	3	Ovate	Lenticular	Onondaga	L: 21.29 W: 53.07 T: 9.44	Edge frag
490	2	Ovate	Rhomboid	Kettle Point secondary source	L: 29.45 W: 24.22 T: 13.67	Complete
44	3	Triangular	Lenticular	Onondaga	L: 34.11 W: 25.50 T: 6.02	Tip frag
43	3	Incomplete	Lenticular	Onondaga	L: 31.94 W: 12.84 T: 7.20	Edge frag
496	2	Incomplete	Median Ridged	Kettle Point	L: 21.63 W: 9.72 T: 4.04	Edge frag
62	3	Ovate	Lenticular	Kettle Point	L: 21.01 W: 29.06 T: 8.33	Base frag
66	4	Triangular	Lenticular	Haldimand	L: 49.56 W: 24.49 T: 6.44	Complete
65	4	Ovate	Plano-convex	Onondaga	L: 27.86 W: 38.58 T: 7	Base
286	3	Triangular	Lenticular	Onondaga	L: 29.35 W:	Tip

					35.98 T: 9.15	
233	3	Incomplete	Rhomboid	Onondaga	L: 38.57 W: 15.50 T: 5.85	Edge frag
450	3	Incomplete	Lenticular	Burnt Onondaga	L: 27.62 W: 17.11 T: 7.38	Edge frag
64	4	Ovate	Lenticular	Onondaga	L: 40.86 W: 41.67 T: 9.27	Tip
277	3	Ovate	Lenticular	Onondaga	L: 25.70 W: 46.55 T: 10.14	Base frag
79	2	Rectangular	Plano-convex	Kettle Point	L: 19.83 W: 14.25 T: 5.17	Complete

Key: L: length, W: width, T: thickness,

4.5 Chipping Detritus

Finally, a 25% sample of the chipping detritus found at Ridge Pine 2 was analyzed by flake type in order to assess the nature of the reduction strategies employed, and whether the majority of Onondaga flakes were made during late stage lithic reduction (Table 7). Flakes of Onondaga chert represent 86% of the chipping detritus found at Ridge Pine 2. Twenty-five percent of Onondaga flakes were normal biface thinning flakes, 10% were bifacial retouch flakes, 1% were biface reduction flake errors, and 1% were unifacial retouch flakes. Collectively these late stage flake types represent 37% of Onondaga flakes found at Ridge Pine 2.

There were no primary flakes of Onondaga found at Ridge Pine 2. 1% of Onondaga flakes were secondary flakes, 1% were tertiary flakes and 3% of Onondaga flakes were shatter. Collectively these early stage flakes represent 4% of total Onondaga flakes. Lastly, 58% of Onondaga flakes were fragmentary pieces that were generally small enough to possibly be broken late stage flakes, but it is not possible to state unequivocally that this is the case. However, it is clear that the majority of diagnostic flakes were created during late stage reduction of bifaces, supporting the idea that Onondaga bifaces were arriving on site in reduced forms and were further reduced into tools.

Haldimand and Selkirk, two cherts that are found in close proximity to the Onondaga source, are also present in the chipping detritus assemblage of Ridge Pine 2, although they only represent 1%, and 0.08% respectively. The Haldimand flakes are similarly distributed over early and late stage reduction. However, none of the tools at Ridge Pine 2 were made of Haldimand or Selkirk, so the tools or cores from which they were derived were either curated and carried from the site or simply not recovered.

Kettle Point chert represents a total of 12% of the flakes found at Ridge Pine 2. Eighteen of the Kettle Point flakes are normal biface thinning flakes, 5 are bifacial retouch flakes, and 7 are unifacial retouch flakes, all of which represent late stage reduction flakes and comprise 25% of the total assemblage. Fifteen are tertiary flakes, 8 are secondary flakes, 7 are primary flakes, and 22 are shatter which represent early stage reduction and comprise 26% of the total assemblage. There were 70 fragmentary flakes made of Kettle Point which represents 48% of the total flake assemblage. This indicates that there was no differential use of Kettle Point and all stages of reduction took place with the Kettle Point chert at Ridge Pine 2. This is to be expected due to the proximity of the Kettle Point source to the site and the presence of waterways, which provide access to both the primary source (the outcrops at Kettle Point) and secondary sources (cobble beaches along Lake Huron, the Ausable River, and local gravel deposits). The Kettle

Point source was also underwater during the late Middle Archaic, meaning this material either comes from secondary sources or relates to later (i.e. Late Archaic) occupations of the site, during which the Kettle Point source was likely exposed. Table 7 below provides a summary of the chipping detritus assemblage from Ridge Pine 2.

Table 8: Ridge Pine 2 Flake Summary

Flake Type	BFT	BRT	BRE	TERT	SEC	PRIM	FRAG	SHAT	URT	Total
Onondaga	259	101	8	11	9		608	35	7	1038
Kettle Point	18	5	N/A	15	8	7	70	22	N/A	145
Haldimand	2	N/A	N/A	2	2	2	5	2	N/A	15
Selkirk	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	8
Unknown	N/A	N/A	N/A	N/A	N/A	1	3	4	N/A	1
Total	279	106	8	28	19	10	687	63	7	1207

Key: BFT: normal biface thinning flake, BRT: Bifacial retouch flake, BRE: biface reduction error flake, TERT: tertiary flake, SEC: secondary flake, PRIM: primary flake, FRAG: fragmentary flake, SHAT: shatter, URT: unifacial retouch flake.

4.7 Cores

There were eight cores and core fragments found at Ridge Pine 2. All but one of the cores are cobbles of Kettle Point chert with the remaining core made of unidentified material (TMHC 2012, 34). This confirms that the nonlocal chert was reduced from cores elsewhere, likely at the source, and probably brought to site in the form of bifaces. It also confirms that there was access to Kettle Point chert during the occupation of Ridge Pine 2. As noted above, the Kettle Point material may have been acquired during the apparently brief Late Archaic occupation of the site, or it may have been acquired from secondary sources. Cores were analyzed according to the number and direction of flake removals. Unidirectional cores have flakes removed from one side only, random cores have flakes removed from multiple sides in multiple directions, and bipolar cores have flakes removed from two opposing ends by striking them while they are held on an anvil. A detailed breakdown of the cores can be found in Table 8.

Table 9: Ridge Pine 2 Cores

Artifact	Characteristics	Material Type
42	Fragment, random	Kettle Point
111	Complete, random	Kettle Point
197	Fragment, bipolar	Kettle Point
362	Complete, bipolar	Kettle Point
406	Complete, unidirectional	Kettle Point
412	Fragment, unidirectional	Unknown
428	Fragment, indeterminate	Kettle Point
511	Fragment, indeterminate	Kettle Point, burnt

4.6 Conclusion

Upon completion of a detailed analysis of the lithic assemblage of Ridge Pine 2 it is clear that the majority of the formal tools are made of nonlocal Onondaga chert (n=47), which was arriving at the site in reduced form as bifaces and manufactured into tools from there. It appears that the people of Ridge Pine 2 either had reliable access to the Onondaga bedrock outcrop or the deposit was the result of a large procurement event. This conclusion can be drawn due to the sheer volume of Onondaga chert present in the assemblage. Further discussion of the possible procurement patterns for Onondaga chert is presented in Chapter 6. A small number of formal tools are made of Kettle Point chert (n=11), indicating that the site occupants had access to the Kettle Point chert, either from secondary sources or from the bedrock outcrops which were inundated during the Nipissing high water stage. Some or all of the Kettle Point chert may have been acquired during brief Late Archaic occupations when the bedrock source would have been exposed during times of lower water levels.

Turning to the function of the Ridge Pine 2 site, due to the paucity of subsurface features and faunal remains, the site does not appear to be a residential base. However, there is a large number of tools that were abandoned before they were exhausted, including several large projectile points (Figure 5). This pattern raises questions surrounding the site's use and the manner in which these tools were deposited. Possible explanations for this and other patterns in the lithic data are also explored in Chapter 6.

Chapter 5: South Bend

The South Bend site is arguably more complex than Ridge Pine 2, and there has been far more attention paid to it. The South Bend site is located just south of Grand Bend, 1.2 kilometres from the shore of Lake Huron and 450 metres west of the Ausable River. The site was initially discovered during a Stage 2 survey of a watermain corridor in May of 2003 by Timmins Martelle Heritage Consultants (TMHC 2003; Timmins 2006,1). This chapter discusses the ecosystem of the South Bend site and the artifacts found in the sealed paleosol assemblage. The projectile points will be discussed first as they have implications for the time period of the site. In order to assess procurement strategy, I will then discuss curated tools, bifaces and chipping detritus.

The site is multi-component, with an Early Woodland component in the ploughzone and a buried component that contains intact Middle Archaic and Terminal Archaic deposits (TMHC 2005, v). The buried deposit was discovered incidentally during the hand excavation of the Early Woodland features (Timmins 2006, 3). The buried paleosol was discovered beneath a layer of sterile sand. There were 241 one-metre units excavated in the paleosol and 6 features were documented and excavated (TMHC 2005, 34). All soils were screened through 6 mm mesh. The stratigraphy of the site consisted of a sandy loam ploughzone layer which was 16 to 42 cm thick; it was underlain by the sterile sand layer which was 10 to 30 cm thick. The black sandy loam paleosol underlies the sterile sand layer and was 10 to 30 cm thick. The subsoil was a sterile yellow sand. Once the ploughzone was excavated the sterile sand above the paleosol was removed by mechanical excavator. Due to the fact that the site was found on a proposed water main corridor, mitigative excavations were limited to a 12-metre-wide corridor (TMHC 2005, 6; Timmins 2006, 3). The site itself extends over 320 metres, north-south, and 50-70 metres, east-west, (Timmins 2006, 1), thus the excavations conducted in the water main corridor covered only a small portion of the site (TMHC 2005, 6).

5.1 Ecosystem/Setting

The geographic location of South Bend is of great interest. The site lies at an elevation of 182m a.s.l. and, according to Cooper's map of the quaternary geology of the Grand Bend area (Cooper 1979), it is clear that the site is located on the inland, east side of a sand ridge that formed a baymouth bar during the high water level of the Lake Nipissing phase (Timmins 2006, 2) (Figure 1). The sand ridge formed a long north-south peninsula extending across the mouth of the Thedford embayment (Cooper 1979, 32-33). The area around it would have been inundated, creating a lagoon-like environment, which would have been a resource rich area that could have supported a long-term settlement of a considerable size (Timmins 2006, 3).

As noted above, this lagoon-type environment would have been a magnet for occupation. However, the rising lake levels associated with the Nipissing Transgression may have inundated and buried a number of other Early and Middle Archaic sites in the area (Robertson 1983, 8), including South Bend. The presence of water-rolled and heavily patinated artifacts may easily distinguish once inundated sites (Ellis and Deller 1986, 44). South Bend's inundation by the Nipissing high water stage is supported by the presence of a patinated projectile point, a patinated scraper, three bifaces and nine patinated pieces of chipping detritus. The patination of these artifacts may indicate their deposition in a wet shoreline environment (Ellis et al. 2009, 24). Despite the inundation of the site, it is likely that the thin layer of sediment between the Woodland and the Archaic component at South Bend was deposited by aeolian forces, and accumulated after the retreat of the Nipissing waters. The Lake Huron shoreline is a major area of dune building as the edge of the lake is exposed to strong winds. Furthermore, there are many forested dunes immediately to the west of the site which confirms that dune building took place in the immediate area of the site.

Two radio carbon dates have been obtained from the extensive faunal assemblage of the buried paleosol confirm that the overlying sand layer postdates the Nipissing stage. In 2006, a sample of deer bone from multiple paleosol units was submitted to Brock University for conventional radiocarbon dating. The lab noted that the sample yielded only 1/3rd of the optimal amount of collagen for their conventional dating process. The resulting date of 2740 +/- 110 RCYBP or 2850-2630 cal B.P. falls in the Terminal Archaic/Early Woodland transition and cannot apply to the Middle Archaic occupation. During the current study another attempt was made to obtain a radio carbon date for the paleosol. In order to mitigate the previous issue of sample size a large deer bone (48.8g) was submitted to the Lalonde AMS Lab at the University of Ottawa. Unfortunately, the issue of a lack of collagen continued to provide some problems for full analysis. The bone was soft and produced brown, crunchy collagen that provided less than 200µg of carbon, which was below the optimal running conditions on the accelerator and lowered the precision (Kieser 2019). This less than ideal sample provided a date of 2688 ± 144 RCYBP or 3079-2457 cal B.P. Like the previous radiocarbon date, this one dates the faunal material in the paleosol to the Terminal Archaic/Early Woodland transition, but with an even larger error range. However, the identification of a small number of Hind projectile points, which date to the Terminal Archaic, suggests that both of the radiocarbon dates relate to a Terminal Archaic occupations of the paleosol. This conclusion would mean the paleosol was a stable soil surface for approximately 2000 years before being overlain with windblown sand. Interestingly, the bone sample that yielded the radiocarbon date was recovered in the same general area as the Hind Points (Figure 8).

Figure 8 illustrates the location of tools at South Bend (Figure 8). The projectile points appear to cluster together, particularly the three Hind points as there is one in the 305N 485E block and two in the 310N 485E block. The rest of the tools appear to be distributed rather equally throughout the excavation area. There is only one point that appears to be outside of the cluster of other projectile points.

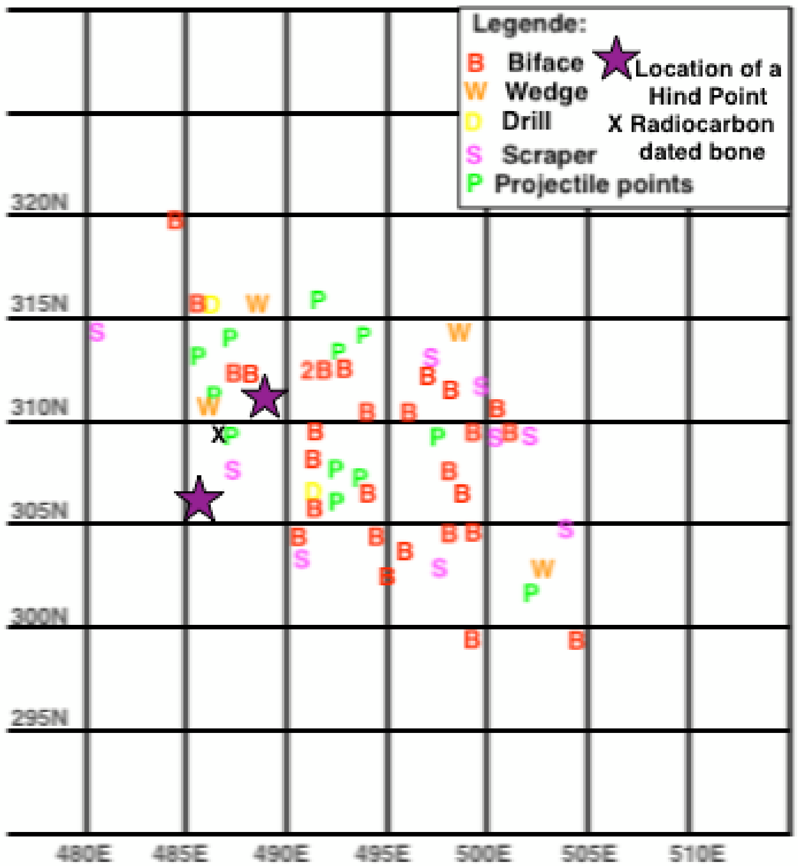

Figure 8: Map depicting tool distribution at South Bend

More than 11,200 faunal specimens were recovered from the buried paleosol at South Bend. The majority of these remains are likely attributable to the Terminal Archaic occupation, as they would have been deposited just prior to the sealing of the paleosol, leading to their preservation, whereas faunal material deposited during the earlier Middle Archaic occupation (ca. 5000 B.P.) would have been exposed to the elements for about 2000 years before the deposit was sealed. Thus, the faunal data likely provides information about the seasonality and diet of the people who lived at South Bend during the Terminal Archaic period.

Only a preliminary analysis of the faunal collection has been completed (Table 10). Deer is well represented in the faunal assemblage, making up 50% of the sample (Timmins 2006, 11). Despite the presence of a large number of mammal remains, 40% of the collection is made up of reptile remains. The reptilian sample is almost exclusively comprised of turtles, primarily carapace and plastron fragments, many of which are burnt (Timmins 2006, 8). This is important because it confirms the presence of a lagoon-like or wetland environment that is believed to have surrounded South Bend. Even after the decline in water levels from the Nipissing level, the area of the Thedford embayment would have remained a wetland for hundreds of years and parts of it were still occupied by shallow lakes in the historic period. In any case, the reptile remains in the paleosol suggest that at least the Terminal Archaic occupation at South Bend was likely a warm season camp, as turtles are not available in the cold season. The two netsinkers found on site (Table 10) also indicate that the people of South Bend were fishing using nets which would have been difficult during the winter due to the fact that the lake would likely have been frozen. In fact, given the inhospitable environment of the Lake Huron shoreline during the cold season, it is likely that all occupations of the site occurred sometime between spring and fall, during the warm season. Unfortunately, there are few floral remains to confirm seasonality.

Table 10: South Bend Faunal Remains (Timmins 2006, 9)

Class	Frequency	%

Bird	62	.70
Fish	525	5.94
Reptile (mostly turtle)	3415	38.70
Mammal (mostly deer)	4830	54.70
Total	8832	100.04

There are some significant differences between the lithic assemblages at Ridge Pine 2 and the South Bend paleosol, specifically when it comes to the projectile points. This may indicate that these two sites were occupied during different periods of the Middle Archaic. It is worthwhile to mention that the Middle Archaic lasted for several thousand years, and changes in material culture within the overall period have been well documented.

The artifact assemblage is, as a whole, dominated by faunal materials (61.8%) while chipping detritus makes up 32.9% of the collection (Table 11). There were a number of fire cracked rocks recovered from the paleosol and a few ground stone artifacts. There are four ground stone fragments, one miscellaneous chipped stone, and one miscellaneous ground stone artifact. There are two ground stone tools that have been classified as netsinkers. The analysis will focus on the chipped stone tool assemblage primarily.

Table 11: Artifact List -- South Bend Paleosol (TMHC 2005, 24)

Artifact Type	F	%
bifaces	35	0.180
chipping detritus	6391	32.784

cores	28	0.144
drill	2	0.010
faunal	12056	61.842
fire cracked rock	942	4.832
ground stone fragment	4	0.021
miscellaneous chipped stone	1	0.005
miscellaneous ground stone	1	0.005
modified bone fragment	1	0.005
netsinker	2	0.010
projectile points	12	0.062
retouched flakes	1	0.005
scrapers	10	0.051
utilized flakes	5	0.026
wedge	3	0.015
Total	**19494**	**100.000**

5.2 Projectile Points

Projectile points are referred to by their catalogue number. A summary of important characteristics can be found in Table 11, with a more in depth description of each point in Appendix C.

Table 12: South Bend Paleosol Projectile Points

Points	Blade Edges	Base	Measurements (mm, incomplete measurements in brackets)	Notches	Material Type	Type	Figure#
1117	Straight	Straight, straight edges	L: 27.94 W: 16.41 T: 5.93	Corner	Unidentified	Hind	
1139	Excurvate	Straight, straight edges	L: 19.08 W: 18.47 T: 5.08	Corner modified to Side	Onondaga	Hind	8
1170	Straight	Straight	L: 35.90 W: 21.91 T: 4.13	Side	Onondaga	Matanzas	8
1049	Excurvate	Straight, straight edges	L: 35.65 W: 23.88 T: 6.40	Side	Haldimand	Matanzas	8
471	Excurvate	N/A	L: (33.18) W: 22.43 T: 5.36	Corner	Kettle Point	N/A	
1262	Straight	Straight, straight edges	L: 73.76 W: 28.06 T: 6.94	Side	Onondaga	Hind	8
875	N/A (tip frag)	N/A (tip frag)	L: (14.78) W: (16.09) T: (4.92)	N/A	Kettle Point	N/A	
1397	N/A (base frag)	Convex	L: (11.20) W: (15.81) T: (3.89)	N/A	Onondaga	N/A	
1192	Straight	Concave, straight edges	L: 35 W: 19.31 T: 7.59	Corner	Haldimand	Brewerton Eared	9
1130	Excurvat	Concave,	L: 33.52 W:	Corner	Kettle Point	Bre	9

	e	straight edges	21.83 T: 4			wert on Eare d	
1200	N/A	Concave	L: 53.9 W: 28.1 T: 6.9	Corner	Haldimand	Bre wert on Eare d	9
974	N/A	Concave	L: (8.18) W: 18.20 T: 5.06	N/A	Unknown	Bre wert on Eare d	
1000	N/A	Concave	L: (9.82) W: 18.91 T: 6.10	N/A	Unidentifie d	Bre wert on Eare d	
970	Excurvat e	Concave, straight edges	L: 33.26 W: 22.57 T: 6.01	Corner	Kettle Point	Bre wert on Eare d	9

Key: L: length, W: width, T: thickness.

The projectile points can be divided into fairly two distinct groups: one with concave bases and one with straight bases. Six projectile points make up the concave base group (Catalogue numbers 970, 1000, 1192, 1200, 1130 & 970, Figure 8). They are not uniformly made of the same material. Two are made of unidentifiable material (Cat. Nos. 974 & 1000), two were made of Haldimand chert (Cat. Nos. 1192 & 1200) one (Cat. No. 1130) was made of high quality Kettle Point chert, and one (Cat. No. 970) appears to be secondary source Kettle Point chert.

Three of the points show signs of patination and possibly water rolling(Cat. Nos. 1130, 1000 & 970). This patination is similar to some of the class II eared projectile points from the Pascoe site, which were water-rolled and patinated. The Pascoe site is about 10 km southeast of South Bend and was located on the Nipissing beach ridge (Ellis and Deller 1986, 50). Ellis and Deller believe that these projectile points were water rolled and patinated because they are contemporaneous with the Nipissing high water stage (Ellis and Deller 1986, 56).

The complete concave based points range from 33.26 to 53.9 mm in length, 18.91 to 22.57 in width, and 4 to 7.59 mm thick. The concave based points are all biconvex in cross section. All of the complete points have triangular blades with either excurvate or straight edges. All but one (Cat. No. 974) of the concave based projectile points are basally ground. Projectile points 970, 1192 and 1000 all have pronounced basal ears that extend past the blades' edges. These projectile points align with the characteristics of Brewerton Eared Notched projectile points as described by Justice (1987, 122-123) and Ritchie (1971, 17). It is important to note that the validity of the Brewerton Eared type has been called into question as it is widely believed to be simply a reworked version of the traditional corner and side-notched Brewerton types (Connolly 2018, 72; Justice 1987).

Projectile points 1117, 1139, 1170, 1049 and 1262 make up the straight-based group (Figure 8). Projectile point 1139, 1170 and 1262 are made of Onondaga chert. One (1049) is made of Haldimand and one (1117) is made of an unidentified chert type. These points range from 73.76 to 19.08 mm in length, 28.06 to 16.41 mm in width, and 6.94 to 4.10 mm in thickness. All of the points are biconvex in cross section with straight basal edges and are basally ground. The blade edges range from straight to excurvate. Projectile point 1049 has prominent side notches, while point 1170 is also weakly side-notched with a heavily ground base. The characteristics of points 1170 and 1049 generally align with those of Matanzas Side Notched projectile points as described by Justice (1987, 119-121), although they could also be resharpened Brewerton Side-Notched points, or even resharpened Hind points. The difficulty in classifying these artifacts reveals the inherent ambiguity in our existing point typologies.

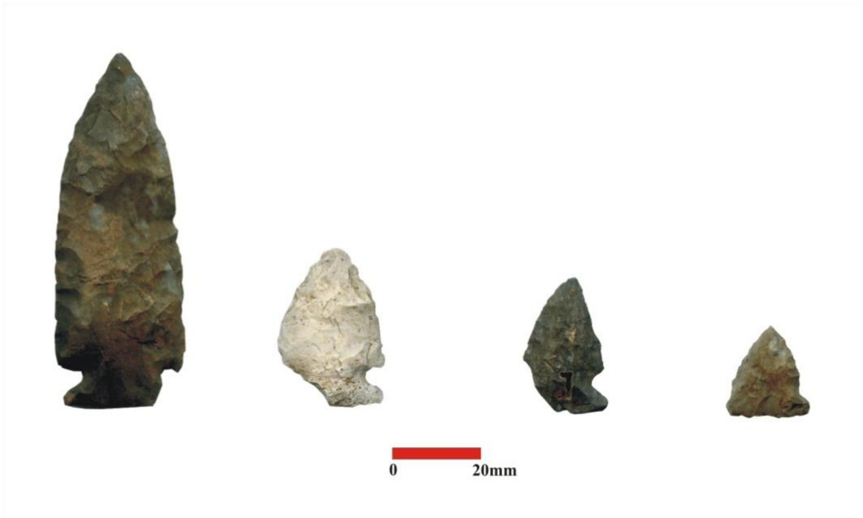

Figure 9 : Straight Based Projectile Points from South Bend (From left to right: Cat. 1262, 1049, 1117 & 1139). Points 1262 and 1139 are Hind points, while 1049 are Mantanzas points. Point 1117 can be called both Mantanzas and Hind. (Images from TMHC 2005, 26)

Figure 10 : Concave Based Projectile Points from South Bend (From left to right: Cat. 1200, 970, 1192, & 1130). Points 970 and 1130 are patinated (Images from TMHC 2005, 26)

Projectile point 1262 looks superficially like a Meadowood point, but it is clearly corner-notched, rather than side-notched, which makes it more similar to the Terminal Archaic Hind point type. Hind points are generally between 63-65 mm in length (Kenyon 1989, 17). Their mean measurements are as follows: shoulder width: 29.2, stem width: 13, base width: 23.40, and shoulder height: 8.8 mm (Kenyon 1989, 13). They are typically corner notched, straight based with excurvate blade edges, and the blade is triangular. The points are typically medium to large in size, but smaller varieties exist (Kenyon 1989, 17). The Hind cemetery site where the points were first discovered was dated to between 3,100-2,800 B.P. which aligns with the Terminal Archaic. While projectile point 1262 is larger than most Hind points, it is very similar to the type with respect to overall morphology. Two other straight based points in the South Bend paleosol, points 1117 and 1139, are much smaller than Hind points, but they have been heavily resharpened so they may well have started out big enough to be classified as Hind points. These points have a basal configuration similar to Hind points, although the extensive resharpening has altered their appearance, removing the upper part of the notch to make them appear side notched rather than corner notched. If these straight based points are in fact Hind points, they support the provide evidence of a Terminal Archaic occupation within the South bend paleosol. Such an occupation would also align, generally, with both of the radiocarbon dates obtained on faunal material from the paleosol.

Projectile points 471, 875, and 1397 are too fragmentary to be typed. 471 and 875 are made of Kettle Point and secondary source Kettle Point respectively with 1397 made of burnt Onondaga.

The projectile points at South Bend look quite different from those found at Ridge Pine 2, largely because they are not uniform in their morphology. The concave based projectile points are a variant of the Brewerton projectile point type. These variants are called the Brewerton Eared Notched and Brewerton Eared Triangle forms. Justice provides dates of 4980-3723 RCYBP for the Brewerton phase (1987, 123), but these dates would be significantly earlier if calibrated (OxCal 2019). For example, Brewerton Eared points are dated to 4535 +/- 70 RCYBP at the Miller A site in Indiana, which calibrates to 5382-5011 cal B.P. (OxCal 2019). The eared form results from flintknappers resharpening Brewerton Side/Corner Notched projectile points in order to reuse them and maximize the use of their resources. Brewerton Eared projectile points are thick, weakly side notched points with concave bases, and ears that project beyond the blade edges. The blade shape is trianguloid with straightened or slightly excurvate edges. A cross section of the blade is biconvex. The ears and base are finely retouched with unground or slightly ground edges The Brewerton Eared Triangle is a variant with a thinner blade and grinding on the ears (Justice 1987, 117). The heavily resharpened point 1139 from South Bend could, in fact, be classified as a Brewerton Eared Triangle type, although it has a straight, rather than a convex base.

Brewerton Eared Notched points are on average 19.05 to 63.5 mm in length, with the majority falling within 25.4 to 38.1 mm in length. They are typically 4.76 to 7.94 thick with an average thickness of 6.35 mm (Justice 1987, 248). This is slightly thinner than the Brewerton Side and Corner Notched forms. The complete concave based points from South Bend (970, 1192, 1200, 1130) all fall within these metric parameters. Furthermore, 970 and 1130 are patinated, suggesting that they were inundated by Nipissing phase waters between ca. 5900 and 4800 cal B.P. (see Table 1).

At Allumette Island the Laurentian Archaic projectile points were Otter Creek points (Clermont & Chapdelaine 1993). The points at Allumette island were radiocarbon dated to between 4680 and 5440 RCYBP or 5370 to 6340 cal B.P. According to Ritchie, Otter Creek points are related to Brewerton Side Notched points (Ritchie 1971, 41). More specifically they are from the Vergennes phase which precedes the Brewerton phase within the Laurentian Archaic. The Brewerton projectile points at Morrison Island are dated to between 4620 and 4860 RCYBP or 5350-5540 cal B.P. (Ellis et al. 2009, 802). Therefore, if there are both Otter Creek points and Brewerton Eared projectile points at South Bend, they would indicate two distinct phases represented within the assemblage, the earlier Otter Creek phase and the slightly later Brewerton phase.

Otter Creek points are typically large, thick, narrow or medium wide, side notched points, with square tangs (Ritchie 1971, 40). Their blades are ovoid or lanceolate and rarely trianguloid, while being biconvex in cross section. The blade typically has excurvate edges but can also be straight, however that is rare. The points are typically side notched, with the notching appearing to be the final step in creating the points, which likely resulted in square tangs. The base is concave, or less frequently straight with ground edges. Otter Creek points are typically 57.15 to 114.3 mm in length, with the majority falling between 69.85 to 88.9 mm. The points are between 9.93 to 12.7 mm thick, with the majority falling between 9.93 to 11.11 mm thick (Ritchie 1971, 40). Otter Creek points are difficult to define as they are often found in expended forms (Hranicky 2011, 383). None of the concave based points in the South Bend paleosol are large enough to be Otter Creek points, unless they have been heavily resharpened. While acknowledging that possibility, I believe that they are better classified as Brewerton Eared type points due to their morphology better aligning with the type.

As noted, some of the straight based points from South Bend are similar to the Matanzas side notched type (5700-5000 RCYBP), which is part of the same cluster as the Brewerton Eared points (Justice 1987, 119-121). Matanzas projectile points typically have small and shallow side notches. They have straight bases, although concave and convex bases occur. The blades of these points are highly symmetrical and biconvex in cross section, although they tend towards a diamond shape when reworked (Justice 1987, 119). Matanzas projectile points are usually basally ground and are typically 36 to 53 mm in length, 16 to 22 mm in width, 5 to 10 mm in thickness, with stems that can range between 7 to 10 mm in length, and 10 to 19 mm in width at notches (Justice 1987, 248). These points are found primarily in the American Midwest and their distribution does not border southwestern Ontario (Justice 1987, 120). Two of the straight based points from

South Bend (1049 and 1170) have been tentatively classified as Matanzas points, even though they are slightly shorter than the type specifications.

It should also be noted that is common for Middle Archaic sites to contain multiple types of projectile points, thus the paleosol assemblage at South Bend containing two different Middle Archaic point types is typical of the period.

5.3 Formal Tools

The formal tools found at South Bend are similar to the projectile points in terms of materials, as they are made of Haldimand, Onondaga, and Kettle Point cherts, with the latter nearly dominating.

There are 11 scrapers from the paleosol at South Bend (Table 12, Figure 9). Of the 11 scrapers, eight are made of Kettle Point and two were made of Onondaga. One of the Kettle Point scrapers (# 690) is made from a cobble as indicated by the presence of cobble cortex on the artifact. All of the scrapers are end scrapers with the exception of one bit fragment that is too small to ascertain the tool form. Only six of the scrapers are complete. All of the scrapers narrow at the base which could indicate hafting. Simple ovate end scrapers made from thick flakes with steep scraping edges are typical of the tool kit during the Middle Archaic can be found in other time periods (Ritchie 1980, 99).

Table 13: South Bend Paleosol Scrapers

Artifact	Measurements (mm, incomplete measurements in brackets)	Characteristics	Material Type
989	L: 28.94 W: 24.62 T: 7.25	End scraper on TERT	Kettle Point

Bit Modification	L: 25.86 H: 5.10 A: 80 degrees	Dorsal, distal, convex	
1043	L: 39.85 W: 18.87 T: 5.39	End scraper on BFT	Onondaga
Bit Modification	L: 15.61 H: 3.59 A: 80 degrees	Dorsal, distal, convex	
690	L: (28.72) W: 26.71 T: 7.39	End scraper on PRIM, cobble cortex	Kettle Point
Modification	L: 26.89 H: 5.67 A: 80 degrees	Dorsal, distal, convex	
886	L: (23.87) W: 28.41 T: 7.64	End scraper on FRAG	Kettle Point
Bit Modification	L: 24.39 H: 3.37 A: 90 degrees	Dorsal, distal, convex	
674	L: (11.92) W: 25.99 T: (8.43)	Bit end of end scraper on SHAT	Kettle Point
Bit Modification	L: 23.97 H: 5.16 A: 85 degrees	Dorsal, concave	
885	L: (18.40) W: 23.84 T: 7.14	End scraper on TERT,	Kettle Point
Bit Modification	L: 15.79 H: 6.70 A: 80 degrees	Dorsal, distal, convex	
627	L: 35.71 W: 30.39 T: 8.62	End scraper on SEC	Till Chert
Bit Modification	L: 26.06 H: 6.04 A: 85degrees	Dorsal, distal, convex	
1038	L: 32.77 W: 28.41 T: 5.36	End scraper on BFT	Kettle Point
Bit Modification	L: 26.83 H: 4.47 A: 70 degrees	Dorsal, distal, convex	

685	L: 31.45 W: 23.97 T: 8.68	End scraper on TERT patinated and water-rolled	Onondaga
Bit Modification	L: 28.71 H: 4.71 A: 70 degrees	Dorsal, distal, concave	
1398	L: (21.25) W: (12.09) T: (3.19	Bit fragment on FRAG	Kettle Point
Bit Modification	L: 6.59 W: 14.06 A: 40 degrees	Dorsal, distal, convex	
567	L: 39.7 W: 28 T: 8.6	End scraper	Kettle Point

Key: SHAT: shatter, PRIM: primary flake, BFT: normal biface thinning flake, FRAG: fragmentary flake, TERT: tertiary flake, SEC: secondary flake.

Figure 11 : South Bend Scrapers. From the left catalogue numbers are as follows: 567, 989, 685, 1038, 1043, and 627 (Images from TMHC 2005, 29)

There is one rod-like drill made of Haldimand chert that appears to be complete. The other drill is made of Onondaga chert and is triangular with a straight, ground base and a rod-like bit (TMHC 2005, 30). Thus, both of the drills are made of nonlocal chert. Measurements are provided in Table 13 and images in Figure 11.

There are five wedges with all but one made of Kettle Point chert (Table 14, Figure 11). The other wedge is made of Onondaga till chert. Three of the wedges of Kettle Point chert have cobble cortex present on the surface indicating that the chert likely came from a secondary deposit. Four of the wedges have step fractures on two edges, three of the wedges are rectanguloid and one of the wedges appears to have been battered on both edges but there are no step fractures. One of the wedges appears to have a heat fracture. The wedge made of Onondaga till (Cat. No. 1134) is a core reduced into a wedge. One wedge has step fractures on all four edges. Relatively large wedges like the wedges at South Bend are common on Brewerton Middle Archaic sites (Ellis personal communication 2019).

Table 14: South Bend Paleosol Drills and Wedges

Artifact	Measurements (mm)	Characteristics	Material Type
Drill: 1071	L: 33.97 W: 8.47 T: 4.30	Rod-like, complete	Haldimand
Drill: 1021	L: 31.4 W: 17.5 T: 5.9	Rod-like, complete	Onondaga
Wedge: 664	L: 36.43 W: 31.38 T: 14.82	Rectangular, step fractures on four edges	Kettle Point, cobble cortex
Wedge: 545	L: 23.29 W: 22.98 T: 7.68	Two edges have step fractures	Kettle Point till, cobble cortex
Wedge: 1134	L: 17.05 W: 24.94 T: 8.45	Step fractures on three edges	Onondaga till
Wedge: 327	L: 22.79 W: 23.18 T: 8.26	Rectangular, battered on two edges	Kettle Point
Wedge: 1143	L: 29.76 W: 24.43 T: 12.23	Rectangular, two edges have step fractures	Kettle Point, cobble cortex

Key: L: length, W: width, T: thickness, While there are artifacts made of Onondaga and Haldimand cherts, 12 out of the 16 (75%) of the formal tools are made of Kettle Point chert. This indicates that the people of South Bend had access to Kettle Point chert sources and would not have had to heavily rely on the nonlocal chert. However, there is still a significant amount of nonlocal chert used to create the formal tools. The projectile points indicate that people recycled what chert they had in order to maximize their supply, thus chert was a highly expensive resource to procure and was quite valuable. This conclusion may be drawn due to the high resharpened nature of the projectile points. Furthermore, it has been argued that the Brewerton Eared projectile points are just a reworked form of the classic Brewerton Corner/Side notched type (Conolly 2018, 72). Thus the Brewerton Eared points represent projectile points quite late in their use lives that have been recycled.

Figure 12 : South Bend Paleosol Drills (top, 1021 on the left and 1071 on the right) and Wedges (bottom, left to right: 1134 ,545, and 664) (Images from TMHC 2005, 29)

5.4 Bifaces

A large number of bifaces were found in the paleosol at South Bend (Table 14, Figure 11). Of the 36 bifaces, 24 are made of Kettle Point, six are made of Onondaga, two are made of Haldimand, one is made of local till chert, and three are made of an unidentified material. The Kettle Point bifaces exhibit all stages of biface reduction. Four of the bifaces are stage one, ten are stage two, seven are stage three, and three are stage four. This range in stages is to be expected due to the proximity of the site to the Kettle Point outcrop. The majority of the late stage Kettle Point bifaces were likely discarded due the fact that they broke during manufacture, however there are a number of complete stage four bifaces made of Kettle Point.

The Onondaga bifaces are all classified as late stage bifaces with two being stage three bifaces, and four being stage four bifaces. The Haldimand bifaces are equally divided between stages three and four (one of each). This pattern suggests that the nonlocal Onondaga and Haldimand chert was arriving on site in a reduced form. The bifaces of unidentified material are all early stage bifaces, with one being a stage one and two being stage two.

There are 13 complete bifaces, seven base fragments, seven tips, three base/mid-section fragments, one mid-section and five small fragments. The shape of the bifaces ranges from ovate to triangular (TMHC 2005, 27).

Table 15: South Bend Paleosol Bifaces (Figure 12)

Cat. No.	Stage	Shape	Cross-section	Chert	**Measurements** (mm, incomplete measurements in brackets)	Section

673	2	Ovate	Lenticular	Kettle Point	L: (13.72) W: 31.22 T: 8.52	Base frag
977	1	Rectanguloid	Lenticular	Kettle Point	L: (22.04) W: 53.03 T: 10.42	Mid
566	4	Lanceolate	Lenticular	Onondaga	L: 35.87 W: 21.73 T: 5.60	Complete
1001	4	Triangular	Plano-convex	Kettle Point	L: 46.41 W: 19.35 T: 6.20	Complete
1180	1	Ovate	Plano-convex	Kettle Point	L: 49.81 W: 33.80 T: 12.23	Complete
935	4	Lanceolate	Plano-convex	Kettle Point	L: 45.29 W: 30.65 T: 7.21	Complete
994	3	Ovate	Lenticular	Kettle point	L: 44.34 W: 34.61 T: 7.57	Complete
1097	2	Ovate	Lenticular	Secondary Kettle Point	L: (33.93) W: 32.22 T: 8.98	Tip
1223	4	Lanceolate	Lenticular	Onondaga	L: 39.60 W: 31.90 T: 6.64	Base/Mid Cache blade
1004	2	Triangular	Plano-convex	Patinated Kettle Point	L: (38.04) W: 44.22 T: 9.84	Tip
1196	2	Ovate	Lenticular	Unknown	L: (22.90) W: (34.04) T: 8.74	Edge and base
698	4	Incomplete	Lenticular	Kettle Point	L: (27.99) W: (8.30) T: 5.68	Edge frag
1008	2	Ovate	Plano-convex	Unknown	L: (15.96) W: (33.49_ T: 5.40	Edge frag
603	3	Ovate	Lenticular	Kettle Point	L: (27.42) W: 24.22 T: 6.66	Base frag

1070	2	Ovate	Plano-convex	Kettle Point	L: (30.42) W: 32.18 T: 8.24	Tip frag
987	3	Lanceolate	Lenticular	Kettle Point	L: 54.69 W: 33 T: 10.79	Complete
946	3	Ovate	Lenticular	Patinated Kettle Point	L: (33.19) W: 32.74 T: 7.77	Base frag
481	3	Incomplete	Rhomboid	Burnt Onondaga	L: (18.20) W: (19.27) T: 7.64	Edge frag
1118	2	Triangular	Plano-convex	Unknown	L: (31.31) W: (39.55) T: 9.63	Tip
1119	2	Incomplete	Lenticular	Secondary Kettle Point	L: (27.22) W: (25.32) T: 9.29	Base frag
1069	2	Ovate	Lenticular	Secondary Onondaga	L: 41.59 W: 33.09 T: 11.01	Complete
1090	1	Unknown	Rhomboid	Local till	L: (16.25) W: (29.55) T: 8.81	Edge frag
694	2	Incomplete	Rhomboid	Kettle Point	L: (24.01) W: 32.33 T: 11.58	Mid
910	3	Ovate	Lenticular	Kettle Point	L: (23.76) W: (29.61) W: 9.65	Tip
943	3	Incomplete	Lenticular	Kettle Point	L: 12.88 W: 17.20 T: 5.58	Tip
667	4	Ovate	Lenticular	Kettle Point	L: (28.96) W: 20.67 T: 4.28	Base
651	2	Ovate	Plano-convex	Kettle Point	L: 36.22 W: 41.70 T: 13.39	Complete
1120	2	Leaf	Lenticular	Secondary Kettle Point	L: 50.17 W: 27.65 T: 12.24	Complete

482	1	Leaf	Plano-convex	Secondary Onondaga	L: 40.50 W: 29.30 T: 13.22	Complete
1135	3	Incomplete	Lenticular	Haldimand	L: (9.61) W: 26.79 T: 10.40	Mid frag
531	2	Ovate	Lenticular	Kettle Point	L: 36.58 W: 28.90 T: 16.87	Complete
66	4	Triangular	Lenticular	Haldimand	L: 49.15 W: 24.37 T: 7.52	Complete
1181	3	Ovate	Lenticular	Kettle Point	L: 39.67 W: 32.63 T: 12.93	Complete
566	4	Lanceolate	Lenticular	Onondaga	L:32.87 W:21.73 T: 5.78	Complete
400	1	Ovate	Plano-convex	Patinated Kettle Point	L: 61.73 W: 32.29 T: 18.51	Complete
382	2	Ovate	Rhomboid	Kettle Point	L: 51.39 W: 26.37 T: 12.25	Incomplete

Key: L: length, W: width, T: thickness,

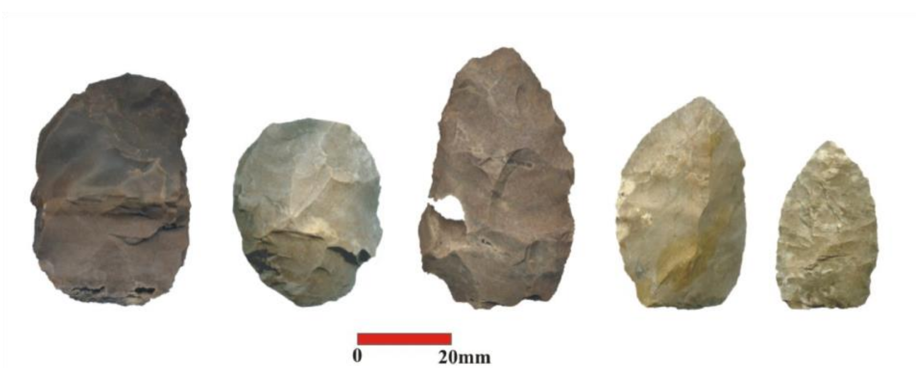

Figure 13 : South Bend Paleosol Bifaces (From the left: 987, 1180, 651,1143, and 1069 (Images from TMHC 2005, 26)

5.5 Flakes

As nearly 7000 individual pieces of chipping detritus were recovered from the paleosol, a 25% sample (1600 flakes) was selected for analysis. Kettle Point chert represents 82% of the flakes sampled (1319 flakes). Unsurprisingly, early stage and late stage reduction is present in the Kettle Point flake assemblage as its bedrock source is located quite close to the site. Normal biface thinning flakes (BFT) make up 10% of total Kettle Point flakes, bifacial retouch flakes (BRT) make up 6%, biface reduction error flakes (BRE) make up 0.8%, tertiary flakes (TERT) make up 8% and unifacial retouch flakes (URT) make up 0.5%. In total, late stage reduction makes up 25% of the Kettle Point flakes.

Shatter (SHAT) makes up 7% of total number of Kettle Point flakes, secondary decortication flakes (SEC) make up 9%, and primary decortication flakes (PRI) make up 6%. In total these early stage flakes make up 23% of the Kettle Point flakes. Fragmentary flakes make up 67% the Kettle Point sample. Based on these numbers, it appears that early and late stage reduction is almost equally represented in the Kettle Point flake assemblage. This again is indicative of the close proximity of Kettle Point chert sources.

Onondaga flakes make up 17% of the sampled flake assemblage (266 flakes). BFT flakes make up 17% of the Onondaga assemblage, BRT flakes make up 11%, BRE flakes make up 0.7%, TERT flakes make up 2%, and URT flakes make up 0.4%. In total these late stage reduction flakes make up 31% of this assemblage.

SHAT flakes make up 6% of the Onondaga assemblage, secondary flakes make up 4%, and primary flakes make up 3%. These early stage reduction flakes make up only

13% of the assemblage. Fragmentary flakes make up 56% of the total Onondaga assemblage. The higher frequency of late stage reduction flakes, 31% vs. 13%, supports the idea that the nonlocal chert was arriving in reduced form.

There are also four Haldimand flakes, which represent merely 0.2% of the total assemblage. One of the Haldimand flakes is a biface thinning flake, one is a secondary flake, and two are too fragmentary to type. There are not enough Haldimand flakes to confidently discuss the reduction patterns of Haldimand chert; however, the presence of multiple Haldimand formal tools indicates that the chert was used in a curated manner. There are also four flakes made of unknown material and eight non-chert flakes of coarse-grained stone.

5.6 Cores

There were forty-three cores from the paleosol at South Bend. Of these, 37 were made of Kettle Point chert which represents 86% of the core assemblage at site. Five were made of unidentified material and only one was made of Onondaga chert. The majority of the cores are block cores (74%) while the rest were bipolar cores (11.25%) (TMHC 2005, 32). The very small number of cores made of nonlocal chert aligns with the idea that the nonlocal chert arrived in a reduced form. A detailed breakdown of the cores can be found in Table 15.

Table 16: South Bend Cores

Artifact	Measurements (mm, incomplete measurements omitted)	Type	Material Type
932	W: 25.5 T: 17.8	Block, unidirectional	Kettle Point

626	L: 33 W: 28.2 T: 14.2	Block, random	Kettle Point
859	W: 51.4 T: 12.3	Block, unidirectional	Kettle Point
501	L: 44 W: 33.4 T: 17	Block, unidirectional	Kettle Point
498	L: 28.8 W: 51.6 T: 18.5	Block, unidirectional	Kettle Point
497	L: 37.4 W: 49.1 T: 12.5	Block, bidirectional	Kettle Point
658	L: 44 W: 20.8 T: 22	Bipolar, area/point	Unknown
940	L: 38.3 W: 35.5 T: 16.2	Bipolar, ridge/ridge	Kettle Point
893	L: 32.7 W: 24.5 T: 21.6	Block, random	Unknown
721	L: 46 W: 39.9 T: 17.3	Block, random	Kettle Point
1035	L: 46.9 W: 30.4 T: 17.2	Bipolar, area/point	Unknown
691	L: 40.9 W: 34.4 T: 12.3	Block, random	Onondaga
553	W: 32.4 T: 13.8	Bipolar, block	Kettle Point
878	L: 36.6 W: 33 T: 15.5	Block, random	Kettle Point
499	L: 40.5 W: 32.6 T: 15.3	Block, unidirectional	Kettle Point
858	L: 47 W: 30.6 T: 11	Block, random	Kettle Point
1127	L: 39.2 W: 43.7 T: 12.5	Block, unidirectional	Kettle Point
978	W: 37 T: 15	Block, random	Kettle Point
1131	L: 38.5 W: 25.7 T: 15.6	Bipolar, area/ridge	Kettle Point
917	L: 47 W: 37.2 T: 21.8	Block, random	Kettle Point
1142	L: 63.4 W: 46.6 T: 33.4	Block, random	Kettle Point
914	L: 40.6 W: 27 T: 14.3	Block, unidirectional	Kettle Point
533	L: 46.9 W: 31.3 T: 17.4	Block, random	Kettle Point
1094	L: 33.9 W: 29.9 T: 14.3	Bipolar, block	Kettle Point

1107	W: 34.4 T: 12.9	Block, unidirectional	Kettle Point
583	L: 31 W: 27 T: 24.1	Bipolar, ridge/area	Kettle Point
544	L: 28 W: 14.6 T:8.9	Bipolar, ridge/point	Kettle Point
927	L: 38.8 W: 34 T: 11.6	Block, random	Kettle Point
1020	L: 56.6 W: 39.5 T: 24.6	Block, random	Kettle Point
926	L: 21.9 W: 28.4 T: 10	Bipolar, area/point	Kettle Point
988	L: 57.7 W: 42.6 T: 29.6	Block, random	Kettle Point
862	L: 56 W: 27.3 T: 14.7	Block, unidirectional	Kettle Point
965	L: 56.6 W: 26.3 T: 15	Block, unidirectional	Kettle Point
1182	L: 42.2 W: 26.3 T: 15	Block, random	Unknown
1078	L: 63.5 W: 23.2 T: 22	Bipolar, area/area	Kettle Point
695	L: 36 W: 32 T: 19.2	Block, random	Kettle Point
502	L: 37.5 W: 27.6 T: 10.9	Bipolar, area/area	Kettle Point
879	L: 35.6 W: 17 T: 15.6	Block, unidirectional	Kettle Point
532	L: 36.5 W: 27.5 T: 12.3	Bipolar, area/ridge	Kettle Point
1034	L: 40.9 W: 36 T: 16	Block, random	Kettle Point
1089	L: 57 W: 29.7 T: 22.6	Block, random	Unknown
981	L: 40.9 W: 40 T: 21.3	Bipolar, area/ridge	Kettle Point
670	L: 39.5 W: 27.6 T: 10.6	Block, unidirectional	Kettle Point

Key: L: length, W: width, T: thickness.

5.7 Conclusion

In summary, there is evidence for at least two occupations in the South Bend paleosol. The initial occupation was by a group that used the Brewerton Eared projectile points and possibly the Matanzas Side Notched points as well. The temporal ranges of these point types are similar (ca. 5000 – 4000 RCYBP or 5852-4430 cal B.P.) and Justice places both types within a “Matanzas cluster” (Justice 1987, 119-123). These dates align well with the calibrated radiocarbon dates for the Nipissing phase of 5900 to 4800 (chapter 2). The second occupation occurred during the Late Archaic (ca. 3000-2800 RCYBP or 3266-2850 cal B.P.) and is represented by a small group of Hind-like points. The recognition of a Terminal Archaic occupation at the site helps to explain the two radiocarbon dates (2850-2630 cal B.P and 3079-2457 cal B.P.) obtained on faunal material from the paleosol, and further suggests that the extensive faunal sample recovered pertains to the more recent occupation.

Unlike Ridge Pine 2, the lithic assemblage at South Bend is not dominated by Onondaga chert. During the late Middle Archaic, the primary Kettle Point chert source was underwater due to the Nipissing high water stage (Cooper 1989, 5). However, there is evidence to suggest that the people of South Bend were exploiting secondary sources for their Kettle Point chert during the Middle Archaic. It is not known whether there are bedrock sources of Kettle Point chert in the area, other than those known at Kettle Point. Scarlett Janusas in her 1984 thesis titled “A Petrological Analysis of Kettle Point Chert”, posits that there may be another bedrock source in Thedford Ontario, however that has been debated. Her study does conclude that there are reports of secondary deposits of Kettle Point chert in the Ausable basin (Janusas 1984, 3). It is also possible that the nodular form of Kettle Point which occurs in limestone could have eroded from the main bedrock source and washed up on the shore of Lake Huron elsewhere (Janusas 1984, 4).

A large portion of the Kettle Point chert chipping detritus appears to be nodular low-quality chert. There is ample evidence for both patinated flakes and flakes with large quantities of limestone cortex. When a Kettle Point cobble is weathered the chert appears to be a yellowish-brown, which is evidence by points 1130 and 970. However, when a fresh surface is broken and exposed to weathering the chert appears to be a mauve colour, described as a pinkish gray by Janusas (Janusas 1984, 26). The large amount of mauve coloured flakes in the flake assemblage suggests that the artifacts were at some point exposed to weathering or perhaps in a water logged environment. There are 46 flakes that clearly show evidence of being made from cobble cores, based on the presence of cobble cortex. One wedge, two scrapers, and four bifaces were made from cobbles. Furthermore, the small size of the projectile points may indicate that they were only able to exploit small pieces of chert that would be found in cobbles. One projectile point in particular is clearly made from local till. However, there are also larger pieces of high-quality Kettle Point chert and it is possible that the high quality material was acquired from the known bedrock source when it was exposed during the Terminal Archaic occupation. The implications of the lithic data from the South Bend paleosol are further explored in Chapter 6.

Chapter 6: Discussion

This chapter will compare and contrast the archaeological assemblages from Ridge Pine 2 and South Bend. When compared, these two sites are quite distinct. When procurement models are applied to these two sites, further differences emerge.

6.1 A Comparison of South Bend and Ridge Pine 2

The differences between the Middle Archaic components at Ridge Pine 2 and South Bend are indicative of the fact that the Middle Archaic spanned several thousands of years and therefore the sites may be widely separated in time. This is evidenced by the drastically different projectile points that appear to indicate that South Bend was occupied at an earlier date than Ridge Pine 2, with the latter site dating to the very end of the late Middle Archaic and the Nipissing high water stage. The time differences in dates between these two sites may have shaped their procurement practices and therefore the make-up of their lithic assemblages.

While both sites are within two kilometres of the modern shore of Lake Huron, they occupied different ecological niches during the late Middle Archaic. Ridge Pine 2 is currently within a woodlot comprised of young trees. A channelized stream flows to the west of the site, near its western border. The site itself is located on an undulating ridge-like landform at an elevation of 186-187 m asl, overlooking a more level, slightly lower area to the south that is now agricultural fields. The site is plough disturbed and the land was probably levelled to some degree in order to make it more conducive for cultivation. If the Nipissing beach followed the 184 m asl contour in this area, as it does elsewhere, the Ridge Pine 2 site would have been 200-300 metres inland from the lake shore at the time it was occupied (Figure 1).

South Bend, on the other hand, is visibly associated with a baymouth bar that existed during the Nipissing phase, although at an elevation of 182m a.s.l. it is below the Nipissing beach which runs through a wooded area 300 metres west of the site. The terrain drops from 182 to 181m a.s.l. just east of the site. The baymouth bar associated with the site was created by the Thedford Embayment. The high frequency of turtle remains in the faunal assemblage further suggests that South Bend was situated near a resource rich lagoon or wetland environment. However, the Terminal Archaic date was provided by a large deer bone that was radio carbon dated. Therefore the turtle remains could date to the Terminal Archaic component and thus alone cannot prove the existence of a Middle Archaic component. This environment was clearly attractive over a very long period, as indicated by the size of the site in the ploughzone layer, and the ideal environment could also explain the evidence for repeated occupations within the sealed deposit.

Due to the location of the site adjacent to the embayment/wetland and close to the Lake Huron shoreline, it is likely that all of the occupations of the site were during warm weather (TMHC 2005, 37). The general understanding of seasonality during the late Middle Archaic is that groups settled around large bodies of water during the warm season and split up into smaller bands during the winter and headed inland (Williamson 1994, 84). Southern Ontario Middle Archaic sites such as Bell (Williamson et al. 1994) and Little Shaver (Timmins 1996), discussed in Chapter 2, demonstrate that groups were settling in interior locations away from large lakeshores, probably during the cold season.

This further supports the idea that South Bend was a warm season occupation. Many prominent forested dunes exist today on the former baymouth bar, and it is likely that those dunes were built during the Nipissing phase. The presence of these dunes between the site and the open water of the Lake Huron could have provided enough protection for a multi-season occupation. However, the large number of turtle remains attributed to the Terminal Archaic occupation indicate that the site was likely a warm weather occupation and that the Thedford Embayment had become wetland by that time.

The ecosystem of Ridge Pine 2 is harder to discern than that of South Bend. The single feature yielded a small sample of charcoal that was identified as chestnut, suggesting that the site may have been located within a deciduous hardwood forest. However, given the high water levels of the Nipissing phase inundated streams carrying materials from distance sources, it is possible that the chestnut wood originated elsewhere but was collected locally along a shoreline.

The differences between Ridge Pine 2 and South Bend are most evident in their lithic assemblages. Comparisons between the two assemblages are complicated by the fact that there is evidence for at least two occupations in the South Bend paleosol (Middle Archaic and Terminal Archaic), while Ridge Pine 2 has a dominant Middle Archaic occupation with limited evidence for short term Late Archaic occupations. In such mixed assemblages, it is not possible to assign non-diagnostic artifacts to a specific occupation.

Table 16 compares the lithic tool forms found at both sites. While the tool classes and frequencies are generally similar between the two sites, the projectile points at Ridge Pine 2 and South Bend are remarkably different. The Ridge Pine 2 points are quite uniform. With the exception of the single Normanskill and Genesee points, all other projectiles are made of Onondaga chert and are classic Brewerton Corner Notched projectile points. As shown in Figures 13 and 14, they are visibly quite similar to the Brewerton Corner Notched projectile points found at Morrison Island in the Ottawa Valley, a well-known site where exchange for Onondaga chert, among other resources, was undertaken by the sites inhabitants (Ellis et al. 2009, 808). The points also dominate the collection, perhaps suggesting a hunting function for Ridge Pine.

Figure 14 : Morrison Island projectile points (Image from Chapdelaine 2006)

Figure 15 : Ridge Pine 2 projectile points (Image from TMHC 2012)

South Bend, in contrast, contains a more varied projectile point assemblage. The presence of two different styles of projectile points is a marked difference from the uniformity seen at Ridge Pine 2. Due to the fact that the paleosol was a sealed deposit, one might assume that it would contain a single occupation that would be quite uniform. However, South Bend appears to have been inhabited at least twice, as suggested by the presence of two distinct groups of projectile points that may date to the late Middle and Terminal Archaic respectively.

Table 17: Artifact Summary Comparison

Artifacts	Ridge Pine 2	Percentage	South Bend	Percentage
Bifaces	27	15.6%	35	50%
Projectile Points	14	8%	12	17%
Scrapers	7	4%	10	14%
Drills	6	3.4%	2	2.8%
Perforator	2	1.15%	0	0%
Wedges	4	2.3%	5	7.14%
Retouched Flakes	1	0.5%	1	1.4%
Spokeshave	4	2.3%	0	0%
Utilized Flakes	108	62.4%	5	7.14%

The straight-based points can be grouped into two types. There are two potential Matanzas Side Notched projectile points which date to around the same time as the Brewerton Eared projectile points, as they are typically thought of as belonging to the same point cluster (Justice 1987). There are also two and a possible third straight-based Hind points that date to the Terminal Archaic, which aligns with the radiocarbon dates that have been generated from the faunal remains at South Bend. The concave based points, which have been typed as Brewerton Eared points make up the second group, and together with the Matanzas projectile points account for the late Middle Archaic component at South Bend. Three of these Middle Archaic projectile points are made of Haldimand Chert, one is made of Kettle Point chert and one is made of unknown material.

In large part due to the intense reworking that was done on the projectiles, the South Bend points are not uniform within their groupings. The Middle Archaic points are quite small in size, and show clear signs of resharpening, a process that is undertaken in order to maximize the use of the chert and is characteristic of Brewerton Eared points in particular. This intense curation could be due to the fact that during the Nipissing high water stage, the Kettle Point chert outcrop was mostly under water.

The Hind points also range significantly in size, and two of them exhibit extensive resharpening as well, despite the fact that during the Terminal Archaic the Kettle Point chert outcrop would no longer be inundated. However, the most extensively resharpened Hind-like point is made of nonlocal Onondaga chert (Figure 8, Cat. 1139), and the other heavily resharpened Hind point is made of an unidentified material (Figure 9, Cat. 1117). Thus, the resharpening of these points can also be attributed to tool curation.

The analysis of the Kettle Point tools and debitage when compared to the Kettle Point chert artifacts from other sites in the area surrounding South Bend suggests that much of the chert used at South Bend was likely derived from secondary source cobbles. The groups inhabiting South Bend during the late Middle Archaic occupation did not have direct access to the bedrock source of Kettle Point and this could be the reason they were forced to use secondary source Kettle Point and seek Onondaga and Haldimand cherts through exchange. However, it is also possible that the high number of patinated artifacts could be the result of the site predating the highest levels of the Nipissing transgression and were therefore underwater for a period of time, thus creating the patination. It is also possible the mauve colour is the result of simple weathering, however if it is the result of inundation, this would mean that the Middle Archaic component at South Bend predates the peak of the Nipissing transgression.

While the exact motivation for seeking other cherts to use cannot be determined with certainty, the lack of a steady supply of chert at South Bend likely would have led to intense resharpening and reuse of projectile points. This phenomenon is further confirmed by the presence of a significant number of flakes and tools made from Kettle Point chert from cobbles, suggesting that secondary sources of Kettle Point chert were being utilized. While it is possible that the secondary source material could relate to the Terminal Archaic occupation, it seems more likely that secondary source material would have been collected during the late Middle Archaic occupation when higher quality bedrock sources were not available.

There are a large number of cobble beaches in the Grand Bend area along the shore of Lake Huron. It is very possible that during the occupation of South Bend there were Kettle Point cobbles on or around the baymouth bar and along the Nipissing beach itself, extending south to the Kettle Point area. Waves may well have been washing against the submerged Kettle Point bedrock outcrop and breaking off chunks/nodules that were then water rolled and smoothed, and later washed up on the beach.

Ridge Pine 2 appears to have had more predictable access to Onondaga chert, based on the large size of projectile points at their time of discard. Furthermore, all of the points are made using high quality Onondaga chert, that undoubtably originated in bedrock sources near the east to central area of the north Lake Erie shoreline. South Bend on the other hand has projectile points made of both Onondaga and Haldimand chert. Haldimand chert sources are found in the same area as the Onondaga outcrops, near the eastern end of Lake Erie. In fact, Onondaga chert overlies Haldimand chert in the area just west of the Grand River and the stratigraphic relationship of both chert sources can be seen in modern quarries (Eley and von Bitter 1989, Parker 1986). At South Bend, two of the five concave based Brewerton Eared points were made of Haldimand chert and one of the straight based Matanzas Side Notched points is made of Haldimand.

The formal tools at Ridge Pine 2 are similar to the projectile points in that the majority of them are made from high quality Onondaga chert. However, the eight scrapers collected from Ridge Pine 2 differ from the projectile points, as they are not uniform. Seven are end scrapers with the one outlier being a side scraper. Three are made of Kettle Point, and five are made of Onondaga. At South Bend on the other hand, the scrapers are almost all quintessential end scrapers made on expanding flakes with unmodified haft areas that typify the Middle Archaic tool kit (Ellis et al. 2009, 810; Ritchie 1980, 99). Seven of the South Bend scrapers were made of Kettle Point chert, two were made of Onondaga chert, and one was made of Till chert. It was quite common during the Middle Archaic for broken projectile points to be reworked into scrapers, thus the two bunts at Ridge Pine 2 are characteristic of the Middle Archaic. Furthermore, a large number of Ridge Pine 2 scrapers are end scrapers some of which appear to have been hafted, however they do not contain pronounced ridges and haft areas like the South Bend scrapers.

Both sites contain drills made of nonlocal chert. The two drills at South Bend are made of Haldimand and Onondaga respectively, and all six drills from Ridge Pine 2 are made of Onondaga. Drill type is not uniform, as both t-shaped and rod-like drills are present at Ridge Pine 2. However, at South Bend both appear to be rod-like. Wedges, on the other hand, appear to be equally made out of Kettle Point and Onondaga at both sites, however this is likely due to the less curated nature of wedges.

The biface assemblages at Ridge Pine 2 and South Bend are mirror opposites. At South Bend, Kettle Point chert dominates and at Ridge Pine 2 Onondaga dominates. However, the majority of Onondaga bifaces are late stage bifaces at both sites. This indicates that, at both sites, the Onondaga was likely arriving in a reduced bifacial form to be made into projectile points at site. This conclusion is also supported by the results of the chipping detritus analysis.

At South Bend 31% of the Onondaga flakes were created during late stage reduction, i.e. during the process of reducing a biface preform into a projectile point. Meanwhile, only 13% of the Onondaga flakes were created during early stage reduction with the majority of those being blocky shatter. Fifty-six percent of flakes were too fragmentary to be classified; however, fragmentary flakes were typically small and broken and were likely created during late stage reduction.

The situation is similar at Ridge Pine 2 where 37% of Onondaga flakes were created during late stage reduction, 58% were fragmentary, and only 4% of Onondaga flakes were created during early stage reduction. This confirms that the Onondaga chert on site was being reduced from bifaces into projectile points and not from large cores or blanks into projectile points. Both sites were, therefore, either using Direct procurement or exchange to obtain the nonlocal chert.

A key difference between the two sites is the evidence for differential use of Onondaga and Haldimand at South Bend. In contrast, the assemblage at Ridge Pine 2 does not exhibit differential use of chert. The differential use of chert at South Bend is evident by the fact that Kettle Point dominates among the scrapers and bifaces, while Haldimand and Onondaga dominate the projectile point assemblage. However, there are utilitarian tools of Onondaga chert present in the assemblage, as shown by the presence of utilized flakes and one core.

Although it is a minority chert type, Haldimand is far more prevalent in the South Bend assemblage in general than at Ridge Pine 2. 0.20% of the flakes at South Bend are made of Haldimand, while only 0.01% of the flakes at Ridge Pine 2 are made of Haldimand. There is only one biface made of Haldimand at Ridge Pine 2 while there are 6 tools made of Haldimand at South Bend. This important divergence between the two sites is likely due to the fact that the groups who inhabited the sites used different procurement strategies to obtain the nonlocal chert.

6.2 Procurement Models Applied to South Bend and Ridge Pine 2

As previously stated, Direct procurement or exchange are the likely strategies used at South Bend and Ridge Pine 2 to acquire the nonlocal chert. Direct procurement involves task groups traveling directly to a source in order to procure a resource. Exchange involves groups exchanging resources. In both cases, nonlocal chert would have arrived on site in a reduced form in order to be easily transported. This is evidenced in assemblages by the presence of late stage bifaces, late stage reduction flakes, a lack of cores made of nonlocal chert, and a lack of early stage reduction flakes. The nonlocal chert is usually used to create heavily curated tools and is not usually used to make expedient tools.

There is an issue of equifinality when it comes to distinguishing between Direct procurement and exchange of non-local chert. However, there may be differences in archaeological assemblages that allow one to distinguish between these two strategies. Uniform stylistic attributes or reduction could be the result of manufacture by the same group that procured the chert at the source (Meltzer 1989, 33). Assemblages dominated by nonlocal chert with some residual local chert may reflect direct cyclical acquisition (Meltzer 1989, 30). Furthermore, if all artifact classes are manufactured of nonlocal stone, then they most likely were constructed of stone that was directly acquired (Meltzer 1989, 25). At Ridge Pine 2 the projectile points are quite uniform, as they all look nearly identical. All artifact classes are dominated by Onondaga chert, including projectile points, formal tools, and bifaces. The flakes are also dominated by Onondaga chert, as are the utilized flakes, perforators, and spokeshaves. The only exceptions are cores and early stage reduction flakes, which are dominated by Kettle Point chert. Despite the presence of a small amount of Kettle Point chert, it can still be argued that the nonlocal chert dominates the assemblage, while the small amount of Kettle Point chert could be attributed to brief Late Archaic occupations or expedient use of local secondary sources.

Due to the stylistic uniformity, uniform material usage, as well as the dominance of the nonlocal chert in almost every artifact class, Direct procurement was likely the procurement strategy chosen by the inhabitants of Ridge Pine 2. As argued in Chapter 3, the people of the late Middle Archaic were likely collectors, who partook in high intensity procurement and processing events (Bradbury 2017, 26) and such events may have included the procurement of chert.

The Ridge Pine 2 data raises many questions. If the people of Ridge Pine 2 were in fact practicing Direct-Embedded procurement, this would mean that they had a territory size between 150 to 200 kilometres in extent. The general understanding of settlement patterns during the Middle Archaic is that territory sizes were shrinking, perhaps making such a large territory size unlikely.

However, Ellis (1989) argues that archaeologists have no way of knowing if a given site and the lithic materials present in its assemblage represent end points in annual rounds (Ellis 1989, 147). He also suggests, albeit in the context of explaining PaleoIndian chert procurement, that it is entirely possible for a site to contain a large percentage of a nonlocal chert even if it is hundreds of kilometres away from the source, simply because that is the preferred material of the group who inhabited the site, perhaps for social or symbolic reasons (Ellis 1989, 156-157). Therefore, it is possible for the Ridge Pine 2 assemblage to be an example of Direct procurement despite its lengthy distance from the Onondaga outcrop. In fact, if Ridge Pine 2 had been the result of down the line exchange, the amount of Onondaga chert would have been much more diluted (Ellis 1989, 142, 145).

The function of Ridge Pine 2 is rather inconclusive. There is only one feature, and no faunal remains, which does not indicate that it was an intensely occupied residential base. The site has also been disturbed by ploughing, which may have contributed to the lack of faunal remains. If the people of Ridge Pine 2 were in fact collectors who employed task groups, the residential base could have been located elsewhere, closer to the Onondaga source. This would mean Ridge Pine 2 was a site created by a task group that was procuring another resource in the area. It is possible the site included a cache, due to the number of large functional projectile points that were abandoned there. Unlike at South Bend, the projectile points at Ridge Pine 2 were not heavily reworked and were seemingly abandoned after little use. It is possible that the plough disturbed a cache and spread the projectile points. A large number of them appear to be clustered in the south area of the site and a smaller number appear to be clustered in the north area. Figure 15 below illustrates the distribution of the projectile points and other tools at Ridge Pine 2.

It is important to consider that hunter-gatherer groups traveled long distances regularly for reasons other than resource procurement. Furthermore, it may be inaccurate to assume that the Ridge Pine 2 people traveled great distances to procure Onondaga chert due to its higher quality, as material is not necessarily critical for the construction of a high quality projectile point (Speth 2018). As discussed above, there may be a social, symbolic, or ritual reasons for the unique characteristics of the Ridge Pine 2 lithic assemblage (Speth 2018, 200). For example, it is possible that the tools were used for a kill and, out of respect for the animal and what it would provide the hunters, were then buried (Speth 2018, 175). While explanations involving symbolism are almost always speculative, there is widespread evidence of symbolic use of lithic materials across various similar groups of hunter-gatherers (Speth et al. 2010, 6). For example, Ellis believes that the miniature projectile points at the Parkhill site played a symbolic role for occupants, and while Parkhill is a Paleo-Indian site, it is located in close proximity to South Bend and Ridge Pine 2 (Speth et al. 2010, 6). It is well established that chert was important enough to influence settlement patterns, so it is not unfathomable to argue that tools made of chert held symbolic importance (Speth et al. 2010, 21). Furthermore, hunter-gatherer movement in service of needs beyond subsistence often emphasized long distance trips for the purpose of information gathering as well as maintaining important social networks (Speth et al. 2010, 20). Thus, it is possible that the large abandoned tools at Ridge Pine 2 were symbolic in nature and were abandoned purposefully. Whether they were buried out of respect for an animal they had been used to kill or as part of a social/ritual activity is unclear, but this may explain why a task group would travel so far to directly procure the Onondaga chert.

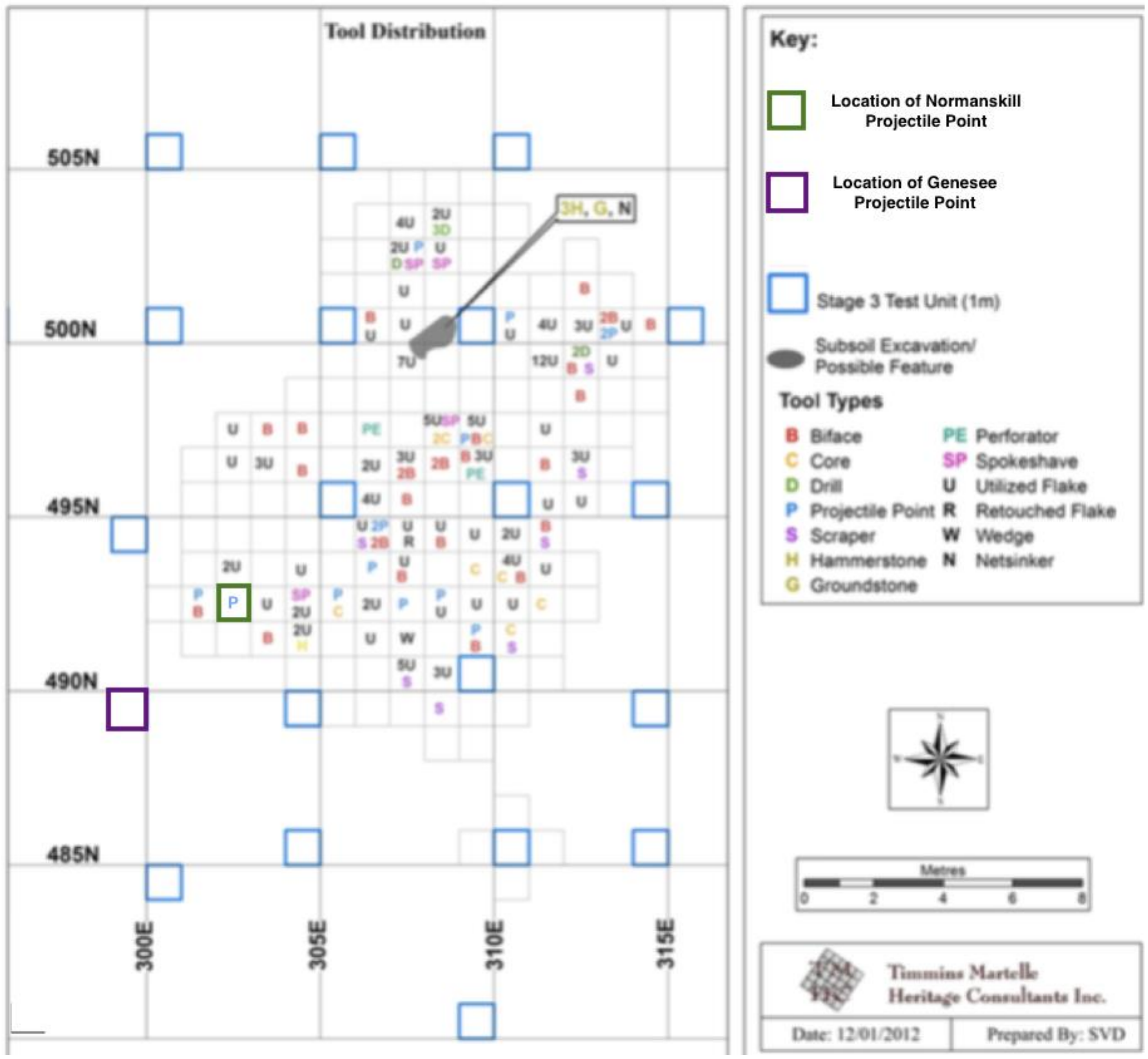

Figure 16 : Map of Artifact Distribution at Ridge Pine 2 (TMHC 2012, 19).

In sum, there are multiple possible explanations for Ridge Pine 2, and though the exact nature of the site is unclear, the Rentner, Bell, and Little Shaver sites, which are also late Middle Archaic sites in southwestern Ontario, confirm that groups during that time period were employing task groups to procure resources.

The lithic assemblage at South Bend is in such marked contrast to the assemblage at Ridge Pine 2 that it is possible that a different procurement strategy was employed.

The South Bend formal tool assemblage is quite diverse, with large numbers of tools made from Onondaga, Haldimand and Kettle Point. It has been argued that a diverse lithic assemblage that originates from numerous places is indicative of exchange (Elaschuk 2015, 185). While the bedrock outcrops for Onondaga and Haldimand chert occupy essentially the same area, one should not assume that the Onondaga and Haldimand chert was procured from the exact same location as the outcrops extend along the Lake Erie shoreline for a large portion of the Niagara Peninsula.

It is clear that the non-local chert at South Bend played a specialized role due to the degree of curation the points exhibit. The bifaces and scrapers are dominated by Kettle Point with some Onondaga use. However, for both the Middle Archaic and Terminal Archaic occupations the points are dominated by nonlocal chert (Haldimand and Onondaga) which further indicates how important these sources of chert were to the people of South Bend. In addition, the patterns in the chipping detritus and biface collections indicate that the nonlocal chert was arriving on site in a reduced form, which may be indicative of exchange.

The lithics at South Bend contain none of the indicators of Direct procurement found at Ridge Pine 2. The projectile points are far from uniform, in fact there are two different groups of diverse points and three projectile point types. The assemblage is not dominated by the nonlocal chert, but rather is dominated by local Kettle Point chert. This is most clear in the chipping detritus assemblage, which is dominated by cortex covered mauve Kettle Point flakes. This indicates that even much of the local Kettle Point chert at South Bend was likely from secondary sources, such as river cobbles.

Despite the fact that the Brewerton projectile points at Ridge Pine 2 are very visually similar to those from Morrison Island, it is South Bend that more closely resembles the lithic assemblage found at that site. Morrison Island contains a lithic assemblage that is dominated by local material, with only a residual amount of nonlocal material. There are 15,343 quartz flakes (95.2%) with only tens of flakes made of chert (1.1%). In fact, there are only 53 flakes made of Onondaga chert. Like the Kettle Point chert at South Bend, the local quartz is mostly found in the form of flakes. The assemblage at Morrison Island is diverse, being made up of multiple materials such as quartz, quartzite, siltstone, rhyolite, various chert types, various igneous rocks, greywacke, shale, slate, and chalcedony (Clermont and Chapdelaine 1998, 57).

The similarity between South Bend and Morrison Island is also reflected in the projectile point assemblage: 88.3% of the projectile points at Morrison Island are made of chert, with 60% made of Onondaga. This means that 11.7% of projectile points are made of local material at Morrison Island (Clermont and Chapdelaine 1998, 69). At South Bend 21% of the projectile points were made of local material. Of the 40 bifaces only 18 are made of chert (45%), the nonlocal material (Clermont and Chapdelaine 1998, 81). This pattern again mimics the South Bend assemblage where the local material, Kettle Point, effectively dominates the biface assemblage as it represents 78% of the assemblage with nonlocal chert only representing 22%. Morrison Island is accepted as a good example of exchange during the Middle Archaic. The assemblage similarities between Morrison Island and South Bend further supports the conclusion that the nonlocal chert at South Bend was acquired through exchange. The following graphs illustrate the similarities between the Morrison Island and South Bend assemblages (Figure 17).

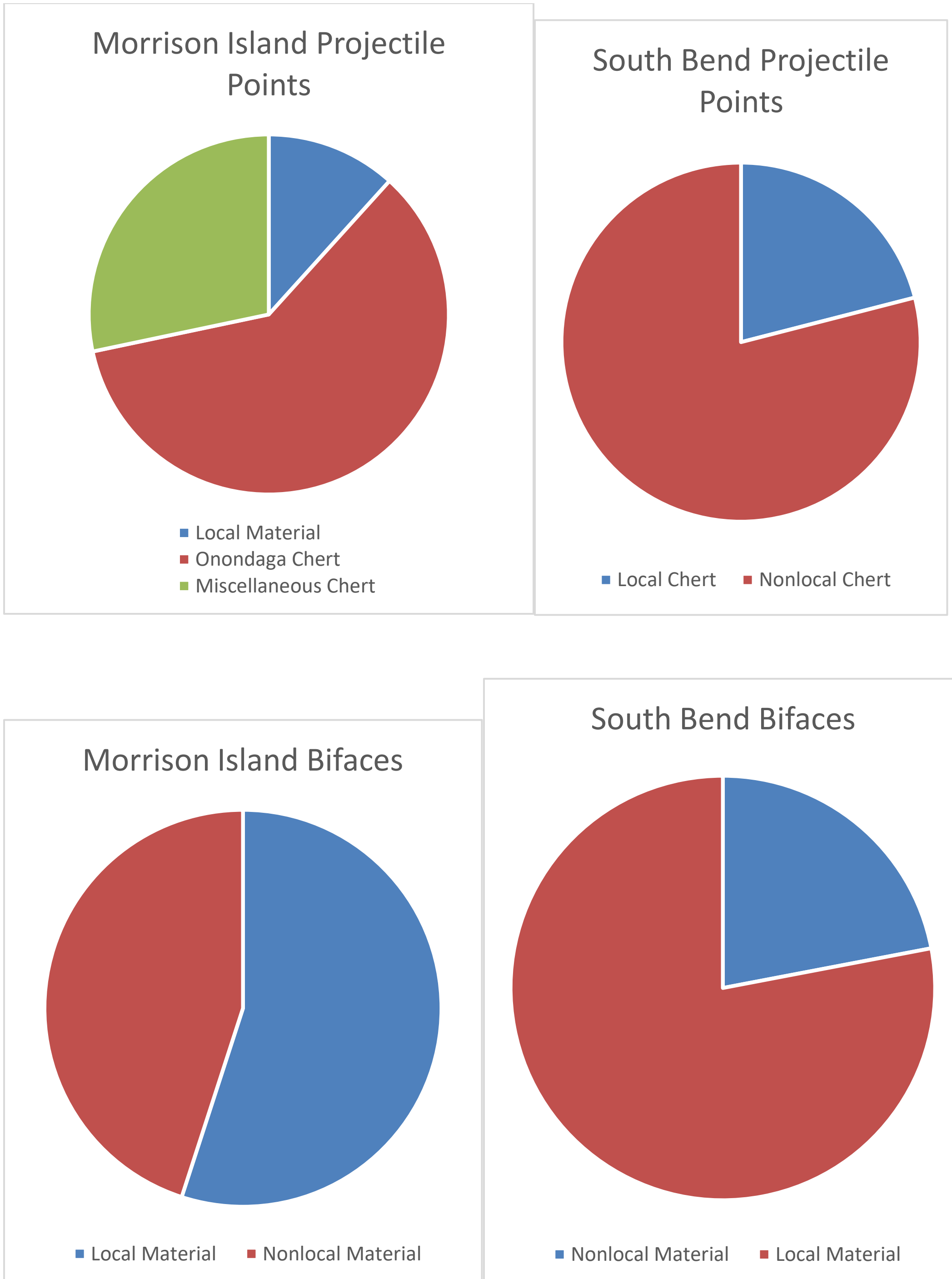

Figure 17: Local vs. Non-local Material comparison between Morrison Island and South Bend

The fact that Ridge Pine 2 and South Bend appear to have had different chert procurement strategies may relate to the possibility of a large temporal gap between the two Middle Archaic occupations. The South Bend site is located along the eastern edge of the baymouth bar, and during the high water stage, the area would have been inundated within the lagoon. The patinated artifacts suggest that the Middle Archaic occupation at South Bend occurred before the Nipissing high water stage, and indicate that the Middle Archaic deposit at South Bend is likely older than Ridge Pine 2. If the radiocarbon dating of the Nipissing stage to between 5900 and 4800 cal B.P is correct (see Chapter 2), Ridge Pine 2 may slightly post-date the high water stage based on its radiocarbon date of 4522-4421 cal B.P. The presence of the patinated artifacts at South Bend suggests that the site was likely occupied before Ridge Pine 2, and before water levels were at or near their highest level and partially inundated or saturated the South Bend site.

Thus, while Ridge Pine 2 and South Bend lie in close proximity to each other, their periods of occupation may have been quite different. This time difference contributed to the creation of two sites that, although similar in some ways are, as noted above, different in more respects. These differences in turn resulted in differing settlement and procurement strategies.

Chapter 7: Conclusion

Ridge Pine 2 and South Bend are examples of the importance of understanding the paleoenvironment to accurately reconstruct human behaviour. South Bend and Ridge Pine 2 exemplify the diversity of sites that date to the Middle Archaic, in part due to the length of the time period. The Middle Archaic is a time period that spans thousands of years and is comprised of multiple archaeological complexes. These sites differ greatly, partly because they date to different periods near the end of the Middle Archaic, but also because they practiced different resource procurement strategies. South Bend is clearly from a time period when the bedrock quarry for Kettle Point chert was either completely or partially underwater. This is confirmed by the patinated artifacts indicating a wet environment and the large number of artifacts and chipping detritus created from cobbles of secondary source Kettle Point chert. While the radiocarbon dates from South Bend relate to a Terminal Archaic occupation, other archaeological characteristics of the site indicate that it was first occupied during the late Middle Archaic, concurrent with the Nipissing high water stage. Ridge Pine 2 on the other hand is entirely dominated by Onondaga chert and dated through radiocarbon dating to the very end of the late Middle Archaic and the Nipissing high water stage. While Ridge Pine 2 was not situated in as resource rich an area as South Bend, it was in close proximity to the Nipissing beach, likely in a forested area, based on the presence of chestnut charcoal from the lone feature on the site.

These sites further differentiate themselves from each other by their evidence for distinct procurement strategies. At Ridge Pine 2 the high concentration of Onondaga chert which dominated every tool category and arrived in a reduced form, is interpreted as being the result of Direct procurement. South Bend, on the other hand, had a diverse assemblage in which Kettle Point, Onondaga, and Haldimand cherts are roughly equally represented in the projectile points and other formal tools. The nonlocal cherts at South Bend are interpreted as being procured through Indirect procurement/exchange.

There is often an issue of equifinality between Direct procurement and Indirect procurement because both strategies appear generally the same in the assemblage. However, the Ridge Pine 2 and South Bend lithic assemblages exhibit distinct characteristics that indicate clear differences in the procurement strategies that led to their formation. These differences were illustrated through a thorough investigation of the chipping detritus, bifaces, and formal tools from each site.

The assemblage at Ridge Pine 2 is comprised of nine complete Brewerton projectile points made of Onondaga chert. There was only one projectile point of Kettle Point chert found on site, a Normanskill point that it is likely from the Late Archaic and not part of the Brewerton deposit. The curated tools are similarly dominated by Onondaga chert; for example, all of the drills are made of the nonlocal chert, and 91% of the Stage three bifaces, and 80% of the Stage four bifaces were made of Onondaga, indicating that the nonlocal chert likely arrived in a reduced form. This is confirmed by the fact that 37% of the Onondaga flakes are classified as late stage reduction flakes, in contrast with only 4% of the chipping detritus classified as early stage reduction debris. Onondaga represents 86% of the entire chipping detritus assemblage. Thus, the Ridge Pine 2 lithic assemblage is dominated in almost all artifact classes by Onondaga chert, is stylistically uniform, and is largely the result of nonlocal chert arriving in a reduced form.

The South Bend paleosol, on the other hand, is a site whose story is complicated by the fact that it lies in a unique environment and has evidence of multiple occupations. While a small amount of wood charcoal returned an AMS date of 4522-4421 cal B.P. for Ridge Pine 2, two attempts at dating the Middle Archaic component at South Bend have yielded dates that fall in the Terminal Archaic to Early Woodland transition. These include an AMS date of 3079-2457 cal B.P. and a conventional date of 2850-2630 cal B.P. A Terminal Archaic occupation at the site has been identified based on the presence of three Hind-like projectile points. It is also important to note that the paleosol lies beneath a rich Meadowood component, with the two strata separated by a layer of fine, probably wind-blown sand. Hind points are considered precursors to Meadowood points (Spence et al. 1990, 129), thus the presence of both Terminal Archaic and Early Woodland Meadowood components suggests continuity in occupation. Given that the site is located adjacent to a dune field (to the west), the intervening sand layer may have accumulated over a very short period and does not necessarily indicate a significant discontinuity in occupation.

The South Bend lithic assemblage is stylistically diverse, with three projectile point types, as discussed in Chapter five. Onondaga chert does not dominate the assemblage but rather shares equal representation in the formal tools with Haldimand and Kettle Point chert. Nonlocal chert was likely arriving in a reduced form as late stage bifaces, acquired through exchange; however, at South Bend, the chipping detritus is 80% Kettle Point chert, which is the inverse compared to Ridge Pine 2.

The analysis of South Bend and Ridge Pine 2 was heavily influenced by procurement models; however, hunter-gatherer settlement models were also useful in drawing conclusions about these two sites. The size of a group's territory is related to their seasonal rounds and can impact which resources they were able to directly procure. For example, while South Bend and Ridge Pine 2 employed different procurement strategies (indirect and direct procurement respectively), they likely still relied on task groups that specifically set out to procure chert, although in the case of South Bend, the focus was on procurement of local Kettle Point, while the Ridge Pine 2 task group exploited the more distant Onondaga bedrock sources. These patterns are typical of collectors, who practice high-bulk procurement and processing events. The large amount of Onondaga at Ridge Pine 2 is a great example of a high-bulk procurement event. The nonlocal chert at South Bend and Ridge Pine 2 is also clearly the result of field processing, as the chert was not arriving on site in its raw form. The Ridge Pine 2 task group probably reduced Onondaga chert to easily transport bifaces at or near the quarry site, but the nonlocal chert found at South Bend was likely reduced to bifacial forms by others in preparation for exchange. It follows that the people of South Bend likely had a smaller territory size than the people of Ridge Pine 2. They certainly lived in a very resource rich area and may have exploited local sources more thoroughly than the people of Ridge Pine 2, although we have little concrete evidence of local resource exploitation from Ridge Pine 2. The people of Ridge Pine 2 are thought to have had a larger territory size which would have allowed them to directly exploit Onondaga chert.

The Ridge Pine 2 and South Bend sites are examples of the importance of understanding the environment to accurately reconstruct human behaviour These two sites illustrate how the late Middle Archaic was a time of great environmental change and variable settlement strategies, and it remains under researched and poorly understood.

This thesis attempts to fill in some knowledge gaps concerning the nature of late Middle Archaic occupations in the Grand Bend area on the southeasterly shore of Lake Huron, but it is clear that there is still a lack of information about the Middle Archaic in the lower Great Lakes region in general.

Recommendations for Future Research

The conclusions drawn in this thesis rely substantially on the precedents set by previous archaeological studies. However, there are few robust studies about the procurement of chert during the Middle Archaic in the lower Great Lakes region.

Much work needs to be done to understand the relationship between the dynamic environment of the time and subsistence strategies resource choices made by the people of the late Middle Archaic. The Nipissing high water stage must have had a great impact on how people settled the land and procured resources. Future studies should focus on the environmental changes of this period and the concurrent changes in human adaptation. This is especially true for studies in the Grand Bend area due to the presence of the Thedford Embayment. We need to better understand how that particular environmental phenomenon impacted settlement and subsistence choices made by local groups in the late Middle Archaic.

Unfortunately, it is very difficult to be definitive regarding the procurement choices at Ridge Pine 2 and South Bend. It would be very beneficial if a regional study was done on chert procurement in the Grand Bend area. Such a study would allow archaeologists to determine trends in chert procurement and use over time. The Grand Bend area would lend itself well to such a regional study.

This call for further research may seem optimistic given the lack of academic archaeologists dedicating their research to the Middle Archaic in southwestern Ontario. However, it is well known that there are numerous complex and interesting collections from cultural resource management archaeological excavations that are ripe for further investigation. One of the largest issues in the cultural resource management industry is the existence of grey literature, which are typically reports that lay inaccessible in government databases. It would be beneficial for more graduate students to conduct their research on cultural resource management sites in order to publish the information that remains inaccessible to the public. It is very likely that there are other important Middle Archaic sites that have been discovered and investigated but remain buried in the cultural resource management grey literature.

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Appendices

Appendix A: Flake Types

This table is taken directly from pages 157 to 161 of Sherri Pearce's 2008 thesis, "Small Point Archaic Lithic Procurement and Use.". This approach to analyzing lithic debitage was chosen due to the fact that Pearce trained me in lithic analysis during my practicum.

Flake Type	**Description**
Primary (PRIM)	Cortex covers the entire outer dorsal surface of the flake.
Secondary (SEC)	Cortex covers only part of the dorsal surface of the flake
Tertiary (TERT)	• Generated from core trimming activities • No cortex on surface other than the striking platform • Striking platform has few facets and is approximately right angles. • Dorsal surface has low number of scars
Shatter (SHAT)	• No clear ventral or dorsal surface • No visible negative bulb of percussion • No systematic alignment of cleavage scars • No orientation – distal or proximal, dorsally or ventrally • Blocky fragments
Biface Thinning (BFT)	• Large in relation to most other flakes, except for flakes used as tool blanks. • Striking platform are ground, faceted and acute-angled, usually exhibiting a lip. • Lateral edges are consistently expanding • Curvature is usually symmetrical or distal and ranges from slight to pronounced • Smooth ventral surface • Dorsal surface exhibits bidirectional flake scars.
Biface Retouch (BRT)	• Thing and flat transverse cross section lacking pronounced dorsal ridges. • Thin longitudinal cross section • Frequently curved so the flake is concave on the ventral surface. • Feathered edges both laterally and distally.

	• High number of dorsal scars which are bidirectional and multi-directional/centripetal. • Striking platform faceted, thin, lipped and often ground. • Little or no cortex on dorsal surface • Expanding lateral edges from platform is dominant. • Small or subdued bulb of force. • Acute platform to dorsal angle.
Biface Reduction Error (BRE)	• Overall size is small, especially in length, but exhibit very large platforms with pronounced lips. • Platforms are always ground, faceted and acute angled. • At least one, but usually both lateral edges are contracting from the platform.
Uniface Retouch (URT)	• Almost always a complete flake. • Platform approximates the ventral surface of a unifaces and is right angled. • Small circular to irregular in outline and can have pronounced bulb of force. • Parallel scars on dorsal surface (old working edge) • Pronounced curvature. • Usually feathered termination (may also be hinged or stepped). • Lateral edges are often expanding from platform. • On the surface adjacent to the platform, a series of small, overlapping, hinged or stepped-out flake scars are present, perhaps representing previous use of the tool edge.
Fragmentary (FRAG)	• Lacking striking platform but are thin in cross-section • Distal portion of a broken flake. • No striking platform • Clear-dorsal and ventral surfaces. • Break termination proximally.

Appendix B: Projectile Point Data Tables

D=depth, H=height, L= length, W=width, T= thickness, SW: shoulder width, IW: Inter-notch width

<u>South Bend</u>

Point: 1117	*Measurements*	*Characteristics*	*Type*
Full point	L: 27.94 W: 16.41 T: 5.93	Biconvex cross section	Unidentified chert. Group 2
Base	L: 8.30	Straight	Basally ground
Blade	L: 21.11	Trianguloid, narrower, straight edges	
Notch	H: 3.48 D: 2.74	Side notched, straight ears that extend past blade edges	

Point: 1139	*Measurements*	*Characteristics*	*Type*
Full point	L: 19.08 W: 18.47 T: 5.08	Biconvex	Onondaga, group 2
Base	L: 8.43 W: 18.57 SW: 15.11	Straight, straight ears	Heavily reworked and ground
Blade	L: 12.85	Trianguloid, convex edges	
Notch	H: 7.45 D: 6.06 IW: 14.34	weak	

Point: 1170	*Measurements*	*Characteristics*	*Type*
Full point	L: 35.90 W: 21.91 T: 4.13	Biconvex is cross section	Onondaga, group 2
Base	L: 7.08 W: 16.52	Straight	Basally ground
Blade	L: 30.56 SW: 31.87	Trianguloid, straight	

		edges, thin	
Notch	H: 8.84 D: 3.97 IW: 18.57	Broken, side	

Point: 1049	*Measurements*	*Characteristics*	*Type*
Full point	L: 35.65 W: 23.88 T: 6.40	Biconvex	Haldimand, group 2
Base	L: 8.29 W: 12.41 SW: 22.25	Straight, basal edges are straight	Reworked from wider point, basally ground
Blade	L: 26.60	Broad, Trianguloid, excurvate edges	
Notch	H: 7.70 D: 6.27	Side notched	

Point: 471	*Measurements*	*Characteristics*	*Type*
Full point	L: 33.18 W: 22.43 T: 5.36	Spade shape, biconvex	Kettle Point, Unidentified
Base	W: 14.53 SW: 21.24	Base broken	
Blade	L: 31.22	Broad, Trianguloid, convex edges	
Notch	H: 4.67 D: 4.69 IW: 14.48	Corner	

Point: 1262	*Measurements*	*Characteristics*	*Type*
Full point	L:73.76 W: 28.06 T: 6.94	Biconvex cross section	Onondaga, Meadowood
Base	L: 8.09 SW: 27.73 W: 22.13	Straight base, straight basal edges	
Blade	L:67.59	Very long, straight edges, pentagonal in shape,	

Notch	H: 7.50 D: 6.71 IW: 17.33	Side notched, very low notches, shallow, ground	

Point: 875	*Measurements*	*Characteristics*	*Type*
Full Point	L: 14.78 W: 16.09 T: 4.92	Point tip, biconvex	Secondary source Kettle Point, unidentified

Point: 1397	*Measurements*	*Characteristics*	*Type*
Base	L: 11.20 W: 15.81 T: 3.89	Point base fragment, biconvex	Burnt Onondaga, basally ground, unidentified

Point: 1192	*Measurements*	*Characteristics*	*Type*
Full point	L: 35 W: 19.31 T: 7.59	Biconvex cross section	Haldimand, Brewerton eared
Base	L: 8.97 W: 11.42 SW: 18.22	Basal edges are straight, concave but broken	Basally ground
Blade	L: 31.63	Narrower, thick, Trianguloid, straight edges	
Notch	H: 8.59 D: 5.39 IW: 16.35		

Point: 1130	*Measurements*	*Characteristics*	*Type*
Full point	L: 33.52 W: 21.83 T: 4	biconvex	Kettle Point, Eared Brewerton
Base	L: 7.88 W: 14.28 SW: 22.65	Slightly concave, straight basal edges,	Basally ground

Blade	L: 27.75	Excurvate edges, broad, trianguloid	One edge broken off
Notch	H: 6.10 D: 3.81 IW: 13.36	Corner notched	

Point: 1200	*Characteristics*	*Measurements*	*Type*
Full point	Corner notched concave base, triangular blade,	L: 53.9 W: 28.1 T: 6.9	Haldimand, Brewerton eared

Point: 974	*Measurements*	*Characteristics*	*Type*
Base	W: 18.20 T: 5.06 L: 8.18	Notched, concave base	Unknown chert and point type

Point: 1000	*Measurements*	*Characteristics*	*Type*
Base	L: 9.82 W: 18.91 T: 6.10	Solely a base, concave, biconvex in cross section	Unidentified, water rolled, patinated, ground
Notch	H: 9.61 D: 5.58 IW: 14.47		

Point: 970	*Measurements*	*Characteristics*	*Type*
Full point	L: 33.26 W: 22.57 T: 6.01	Biconvex cross section	Kettle Point, inclusion hole, reworked, till, Brewerton Eared
Base	L: 9.72 SW: 23.92 W: 23.14	Basal edges straight, ears extend past blade edges, concave	Basally ground
Blade	L: 30.66	Broad, Trianguloid,	

		excurvate edges	
Notch	H: 9.54 D: 6.86 IW: 16.25	Heavily ground,	Eared

<u>Ridge Pine 2:</u>

Point: 51	*Measurements*	*Characteristics*	*Type*
Full point	L: 46.90 W: 34.15 T: 7.56	Biconvex cross section	Burnt Onondaga, Brewerton
Base	W: 10.38 SW: 34.30	Convex, ears do not extend past the blade edges, dull basal ears, straight	Basally ground
Blade	L: 36.55	Broad, convex blade edges, Trianguloid	
Notch	H: 8.91 D: 5.03 IW: 18.74	High, corner notches	

Points: 46	*Measurements*	*Characteristics*	*Type*
Full point		Matches with 68	Brewerton corner notched, Onondaga
Base	L: 10.46 T: 7.67 SW: 8.95	Straight basal edges, not basally ground	Basally ground
Blade		Broad, excurvate edges, blade extends past ears	
Notch	H: 7.69 W: 4.14	Low angled corner notches	

Points: 49	*Measurements*	*Characteristics*	*Type*
Full point	L: 49.82 W: 30.30 T: 7.55	Biconvex cross	Brewerton corner

		section	notched, Onondaga
Base	L: 11.72 W: 23.96 SW: 29.75	Straight, slightly rounded basal edges,	Basally ground
Blade	L: 40.51	Narrower, Trianguloid, straight edges, blade extends past the ears	
Notch	H: 12.60 D: 6.21 IW: 19.22	Corner notched	

Points: 67	*Measurements*	*Characteristics*	*Type*
Full point	L: 35.65 W: 28.41 T: 7.85	Biconvex cross-section	Onondaga
Base	L: 10.07 W: 18.24 SW: 28.75	Straight, broken	Basally ground
Blade	L: 28.24	Broad, Trianguloid, excurvate edges	Appears to be reworked
Notch	H: 8.70 D: 3.52 IW: 20.59		

Point: 52	*Measurements*	*Characteristics*	*Type*
Full point	L: 50.64 W: 30.87 T: 9.66		Onondaga corner notched Brewerton
Base	L: 12.80 W: 22.45 SW: 31.56	Straight, rounded basal edges	
Blade	L: 41.09	Broad, Trianguloid, excurvate edges	
Notch	H: 9.04 D: 6.92 IW: 18.72		

Point: 70	*Measurements*	*Characteristics*	*Type*

Full point	L: 40.97 W: 28.49 T: 6.34	Broken tip	Onondaga Brewerton
Base	L: 10.65 W: 23.45 SW: 28.01	Straight base, straight basal edges	Basally ground
Blade	L: 31.80	Broad, Trianguloid, excurvate edges, extends wider than base	
Notch	H: 9.65 D: 4.03 IW: 18.34	Side notched	Appears to be reworked from corner notched into side notched

Point: 63	*Measurements*	*Characteristics*	*Type*
Full Point	L: 43.58 W: 39.15 T: 7.36		Onondaga Brewerton point
Base	L: 11.95 W: 25.88 SW: 37.62	Straight base, straight basal edges	Basally ground
Blade	L: 36.77	Broad, trianguloid, straight edges, blade extends wider than base	
Notch	H: 11.16 D: 4.34 IW: 20.97		

Point: 61	*Measurements*	*Characteristics*	*Type*
Full point	L: 43.81 W: 29.56 T: 7.64		Onondaga Brewerton corner notched point
Base	L: 11.41 W: 24.73 SW: 30.28	Straight, rounded basal edges	Basally ground
Blade	L: 33.97	Broad, Trianguloid, excurvate edges	

Notch	D: 5.36 H: 10.25 IW: 18.32

Point: 59	*Measurements*	*Characteristics*	*Type*
Full point	L: 65.54 W: 38.99 T: 7.86		Onondaga, Brewerton corner notched
Blade	L: 55.71	Broad, Trianguloid, straight edges, blade extends wider than base	Basally ground
Base	L: 9.95 W: 26.45 SW: 39.36	Convex, pointed basal edges	
Notch	H: 10.87 D: 7.35 IW: 19.06		

Point: 73	*Measurements*	*Characteristics*	*Type*
Full point	L: 40.47 W: 27.71 T: 6.94		Secondary source Onondaga, Brewerton
Blade	L: 30.93	Broad, Trianguloid, straight edges	Tip broken
Base	L: 11.09 W: 19.45 SW: 27.75	Convex base, pointed basal edges, blade extends wider than base	Basally ground
Notch	D: 4.67 H: 8.88 IW: 16.02	Corner notched	

Point: 365	*Measurements*	*Characteristics*	*Type*
Base	L: 11.97 W: 21.13 T: 5.02	incomplete	Onondaga, basally ground

Point: 60	*Measurements*	*Characteristics*	*Type*
Base	L: 11.66 T: 5.86	Small not typeable	Onondaga, ground, incomplete

Point: 74	*Measurements*	*Characteristics*	*Type*
Full point	L:58.74 W: 23.53 T: 8.44	bi-convex cross section, thick	Kettle point, Normanskill
Blade	L: 45.05	Straight rectanguloid edges that become Trianguloid at the tip	
Base	L: 13.57 W: 21.20 SW: 22.62	Straight base,	
Notch	D: 9.19 H: 11.50 IW: 12.67	side notched, large	

Point: 361	*Measurements*	*Characteristics*	*Type*
Base	L:17.40 W:11.98 T: 6.91	biconvex cross-section	Onondaga, incomplete

Point: 58	*Measurements*	*Characteristics*	*Type*
Base	L: 41.16 W: 34.39 T: 7.09	Reworked, biconvex, lanceolate	Burnt Onondaga, incomplete

Point: 68	*Measurements*	*Characteristics*	*Type*
Full	L: 23.04 W: 16.05 T: 6.83		
Base	L: 12. 64 T: 6.65	Rounded basal edges, straight base.	Onondaga, basally ground

Notch	H: 7.05 D: 4.71	Corner notched	

Point: 46 and 68	*Measurements*	*Characteristics*	*Type*
Full	L: 26.32 W: 34.44 T: 7.82	Straight edges, broad, triangular	Onondaga
Base	L: 10.27 W: 25.93 T: 5.94	Straight base, curved basal edges	Corner notched, ground

Point: 240	*Measurement*	*Characteristics*	*Type*
Tip	L: 21.63 W: 16.81 T: 4.13	biconvex	Onondaga

Appendix C: Flake Tables

South Bend

636 305N 495E: 19	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP	1				1		1	
B								
U								

300N 500E: 14	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						2	2	
B								
U								

615 300N 500E: 10	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1						1	
B								
U								

679 300N 500E: 6	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	2			1		9		
B								
U								

633 300N 500E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1			3		4		
B								
U								

593 310N 500E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O				1				
H								
KP								
B								
U								

624 310N 495E: 10	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP							1	
B								
U								

619 305N 495E: 15	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP				1		2	1	
B								
U								

683 310N 495E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						2		
H								
KP	1			1		2		
B								
U								

668 305N 495E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						2		1
B								
U								

649 305N 490E: 2	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP								
BO						4		
U								

681 310N 505E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O				1		5		
H								
KP					2	6		
B								
U					1	2		
cs						1		

688 305N 500E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1	2		1		15	1	
B								
U								

515 315N 480E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1			1		4		
B								
U								

536 305N 490E: 20	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						2		
B								
U								

652 300N 500E: 11	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						2	1	
B								
U								

599	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

305N 495E: 10								
O								
H								
KP		1						
B								
U								

527 295N 510E: 11	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						1		
B								
U								

605 300N 500E: 4	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						2		
H								
KP						1		
B								
U								

591 310N 500E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP				1		1		
B								
U								

513	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

300N 505E: 1								
O						3		
H								
KP								
B								
U								

521 310N 490E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					2		
H	1							
KP	1					2		
BKP						1		
U								

631 300N 495E: 10	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						2		
B								
U								

616 305N 495E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H							1	
KP								
B								
U								

507	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

310N 485E: 21								
O								
H								
KP						1	2	
B						1		
U								

534 3100N 490E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP						1		
B								
U								

505 310N 505E: 2	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP		3				1	2	
B								
U								

657 305N 500E: 7	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H						1		
KP						3		
B								
U								

538	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

310N 495: 5								
O								
H								
KP	2			2		4		
BKP						2		
U								

609 305N 495E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	3	1		4		22	9	
B								
U								

602 310N 505E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1					2		
BO					1	8		
BKP						3		
U								

469 Feature 16	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O	2	4				18			
H									
KP	3				1	12	1		
B									
U									

675 310N	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

495E: 17								
O	2	3				3		
H								
KP	3			1	1	4	1	1
BO	1							
U								1

529 Feature 44	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	2	2				11	11	
B								
U								

517 300N 490E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	4			3	1	16		
B								
U								

493 310N 500E:5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1	3				9		7
H								
KP	1	4				2	7	3
BKP						8		
U								

671 305N 500E:25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1							
H								

KP	12	5		1		36	6	1
B								
U								

495 310N 485E:1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	9	5	1		7	26		
H								
KP	2	1	2	43		27	31	21
B								
U								

1105 310N 485E: 4	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	11	3	1	3	3	12	10	
H								
KP	4	5		14	8	64	7	3
C								7
U								

1164 315N 485E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1				1	2	1	
H								
KP								
B								
U								

1108 315N 485E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP		1			1	1		
B								
U								

1023	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

315N 485E: 7								
O								
H								
KP	1							
B								
U								

1030 315N 485E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O		1						
H								
KP	1			1			1	
B								
U								

1056 315N 490E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O	2	4				1			
H									
KP	2			1		2			1
B									
U									

1128 315N 490E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP		3						
B								
U								

1061 310N 480E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP			1				1	1
B								
U								

1047 310N 485E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O									
H									
KP	3	9		9	1	45		6	3
B									
U									

1095 310N 485E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP	3		2		2	9		
B								
U								

1112 310N 485E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP							2	
B								
U								

848 310N 485E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						2		
H								
KP					1	1		
B								
U								

852 310N 490E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						2		
H								
KP	1			7		5	1	5
B								

U								

846 310N 490E: 7	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						1		
B								
U								

1051 310N 490E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1			2	2	3		
B								
U								

1115 310N 490E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	8					13		
H								
KP	26	14	1	30	21	170	16	7
B								
U								

1166 310N 490E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	2	2						
B								
U								

1211 310N 495E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						2		2

B								
U								

1187 310N 500E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1	2		2	3	6	5	2
B								
U								

911 310N 500E: 15	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1							
B								
U								

1172 305N 485E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1			1		1		1
B								
U								

719 305N 485E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1					1		1
B								
U								

1156 305N 485E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								

KP					1			
B								
U								

898 305N 485E: 20	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP				1			1	
B								
U								

843 305N 485E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
BKP							2	1
B								
U								

647 305N 490E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	2					3		
B								
U								

1018 305N 490E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP							2	
B								
U								

922 305N 490E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								

H						1		
KP	1					1		
B								
U								

1013 305N 490E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP		1				3		
B								
U								

936 305N 490E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP		2			1	7	1	
BO	2	4				4		
U								

558 305N 495E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1							
H								
BKP						1		
B								
U								

727 305N 495E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1				1	5	2	
B								
U								

1193 305N 495E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

O						1		
H								
KP		1			3	1		1
BO						1		
U								

523 305N 500E: 2	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP					1	1		
B								
U								

1205 305N 500E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O		1							
H									
KP					2	5		1	1
BKP	2					3			
U									

904 305N 500E: 19	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP		2			1	5		
B								
U								

488 305N 505E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP								
B								
U								

892 305N 505E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1					3		
B								
U								

1064 300N 485E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						1		
B								
U								

963 300N 490E: 15	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1			1		2		
B								
U								

902 300N 490E: 19	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1	1	
H								
KP						1	1	
B								
U								

565 300N 490E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						2		
H								
KP						1		
B								
U								

882 300N 495E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	2					3		
B								
U								1

906 300N 495E: 6	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1	1				4		
H								
KP	2	4	1	8	2	37	2	2
B								
U								

938 300N 495E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O	1				3	9			1
H									
KP	8	5	1		4	12		1	
B									
U									

975 300N 495E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O									
H									
KP	12	2		5	7	66		1	1
BKP						3			
U									

725 300N 495E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP	1				1	3		

B								
U								

1080 305N 485E: 19	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP				1		3		
B								
U								

1157 305N 505E: Baulk	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						1		
B								
U								

554 300N 495E: 15	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP		1		1		5		
B								
U								

562 300N 500E: 22	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP				2	1			
B								
U								

715 305N 495E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								

H								
KP	1				1	4		
B								
U								

663 310N 495E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP	2					5		
B								
U								

1121 315N 480E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						1		
B								
U								

1178 295N 500E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					5		
H								
KP	3	7	1	4	3	20		
BKP						4		
U								

<u>Ridge Pine 2</u>

466 500N 305E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	6	3			1	8		1
H						1		
KP								
BO	1					2		
U								

135, 136 500N 305E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

O	3		2			4		
H								
KP								
BO		1			1	3		
U								

92,93,94 500N 305E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	7	4		2		14		
H				1			1	2
KP								
BO	1					7		
U					1			

95 500N 305E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						4		
H								
KP								
BO	1					2		
U								

96 500N 305E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP								
BO						1		
U								

119 500N 305E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O					1			
H								
KP								
BO						1		
U								

120	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

500N 305E: 17								
O						1		
H								
KP								
B								
U								

416 500N 305E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O		1				2		
H								
KP						1		
B								
U								

192, 193 500N 310E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	2					6		
H								
KP								
B								
U								

278 500N 310E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					2		
H								
KP								
BO					1			
U								

279 500N 310E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O						2			1
H									
KP									
B									
U									

461, 462 500N 310E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM

O	1					2		
H								
KP						2		
B								
U								

334, 335 495N 300E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	5					5		
H								
KP								
B								
U								

306 495N 300E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O						1			2
H									
KP						1			
BKP						1			
U									

281, 282 495N 300E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	3	3				8		
H								
KP								
BO	2				2			
U								

302 495N 300E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					3		
H								
KP						1	1	
B								
U								

303 495N 300E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1	1				5		
H								
KP				1		1		
B								
U								

402, 403 495N 305E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	4			1		4		
H								
KP						2		
BO	2			1		1		
BKP						1		
U								

447 495N 305E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	39	8				51		
H								
KP	3					2		2
BKP	1					1		
BO	12	2				31		
U								

448 495N 305E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	7	5				10		
H								
KP								
BO		1						
U								

449 495N 305E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP								
BO						1		
U								

260, 261 495N 305E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	17		1	1		17		
BH				1		1		
KP						1		
BO						1		
BKP						1		
U								

113, 114 495N 305E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1	2			1	6		
H						1		
KP				1				
BO					1			
U								

404 495N 305E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	3	2				8		
H								
KP								
BO						1		
U								

246 495N 310E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					2		
H								
KP								
B								
U								

223 495N 310E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O		1				1		
H								
KP					1	1		
B								

U								

129, 131 495N 310E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	11	1		1	1	17		
BH						1		
KP						1		
BO	1					3		
BKP	1				1			
U								

343 495N 310E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	13	3	4			19		
H								
KP					1	1		
BKP					1			
BO		1			1	15		
U					1			

344, 345 495N 310E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	5	2				6		
H								
KP								
B0						2		
U								

397 495N 310E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O	12	11				24	4		4
H									
KP	4			2	3	2	3		
BO						2			
BKP						5			
U									

401 495N 310E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	2	4				7		
H								

KP						3		
BO						1		
U								

319 490N 300E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O		1				4		
H								
KP								
B								
U								

126 490N 300E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
BKP						1		
B								
U								

425 490N 300E:15	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	15	1		1		24		
H								
KP								
BO						3		
U								

351 490N 300E: 19	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	16	10				32		
H								
KP								
BO	2	4				11		
U								

352 490N 300E: 19	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	2			1				
H								
KP								
BO						1		

U								

226,226 490N 300E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	9					7		
H								
KP		1			2	2		
BO		1			1	3		
U					1			

467 490N 300E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	5	6				5		
H								
KP								
BO		4		1		7		
U								

298 490N 305E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	4	1				4		
H								
KP		1				4		
B								
U								

202, 203, 204 490N 305E: 3	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					3		
H								
KP	4	1		3		10		2
BKP						1		
BO	1	2			7	8		
U								

328 490N 305E: 9	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	2					2		
H								

KP	1			1		1		
B								
U								

384, 385 490N 305E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	2	2					3	
H								
KP		1			2	3		
BKP	1							
BO					3	25		
U								

142, 143 490N 305E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	6				1	3		
H								
KP	1				1	2		
BO						3		
U								
S						1		

254, 253, 252 490N 205E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O	35	8		1	4	75	2		1
H									
KP				1		5			
BO	4				2	11			
BKP									
U									

250, 249 490N 305E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	11	2	1			35		
H								
KP					3		1	

BO						3		
U								

251 490N 305E: 25	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O					1			
H								
KP	1			3	1	1		
BO					2	3		
BKP					1	2		
U						1		

442 490N 310E: 1	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O				1	1	2		
H								
KP				1		1		
BO						1		
U					1			

369 490N 310E: 7	B F T	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM	URT
O	2								
H									
KP									
BO						1			
U									

443 490N 310E: 13	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP							1	
BKP						1		
U								

285, 284, 283 490N 310E: 17	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1					1		
H								
KP	1	1		1	3	4		1
BO						3		
BKP								
U								1

295, 294 490N 310E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	3					7		
H	1			1	2	1	1	
KP								
BO						1		
U								

315 485N 305E: 5	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H	1							
KP								
B								
U								

128 485N 305E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP							1	
BKP						1		
U								

137 485N 305E: 23	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	2				1			
H								
KP				1				
BO						1		
BKP								

U								

299 485N 310E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O	1	2						
H								
KP						2	1	
B0		1				1		
BKP								
U								

373 480N 310E: 21	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O						1		
H								
KP								
B								
U						2		

317 485N 310E: 6	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O								
H								
KP						1		1
B								
U								

312 485N 310E: 2	BFT	BRT	BRE	TERT	SHAT	FRAG	SEC	PRIM
O					1			
H								
KP								
B								
U								

GABRYELL KURTZROCK BELYEA

Education

Bachelor of Arts | 2016

Honours in Classical and Near Eastern Archaeology from Wilfrid Laurier University

Experience

Past Recovery Archaeological Services Incorporated

Staff Archaeologist / 2019-present

Responsible for supervising fieldwork and writing reports

Timmins Martelle Heritage Consultants

Senior Field Technician / 2016-2018

Responsible for performing fieldwork

AECOM

Field Technician / 2015

Responsible for performing fieldwork

City of Gatineau/National Capital Commission

Archaeological Assistant / 2015

Responsible for overseeing fieldwork

Parks Canada

Archaeological Assistant / 2014

Responsible for performing fieldwork, creating a database for the Kejimkujik petroglyphs, and staffing community outreach events

Wilfrid Laurier University Field School: Gournia

Student Archaeologist / 2013

Responsible for performing field work and processing artifacts

Earthworks Field School: Arbeia

Student Archaeologist / 2011

Responsible for performing field work and processing artifacts