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Arch Notes

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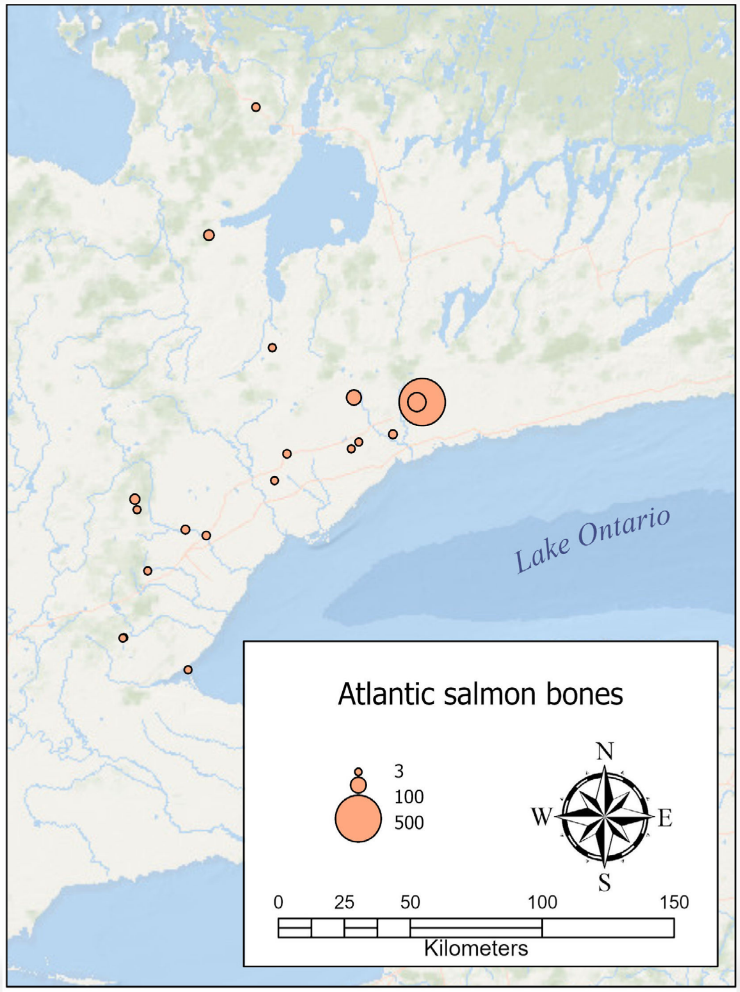

Read about passenger pigeons, salmon, and more on page 5

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President's Message

Hi everyone! I hope that you are staying safe and doing well. These are interesting times for all of us concerned with the preservation of Ontario's heritage, whether you are a descendant or stakeholder, an archaeological consultant in cultural resource management, an academic, working in a museum, a student, working for the government, or an avocational archaeologist. Archaeologists and our colleagues in provincial heritage organizations (PHOs) have been left reeling from the dramatic changes, including amendments to the *Ontario Heritage Act* imposed by the Government of Ontario since last autumn. Given the current political quagmire around Bill 23 *More Homes Built "more" Faster 2022* (bringing about many sleepless nights for me anyway!), it is not clear what it will really mean for all of us and the future of Ontario heritage. What we can do is all work together (and with other PHOs) to express our concerns and help each other navigate these challenging times.

While all of those concerns are ongoing, I wanted to share some positive news and updates about the OAS Board of Directors, appointed volunteers, and our members. Last year, our part-time Executive Director (ED), Chiara Williamson, took a full-time position with a consulting company; thus, we needed to find her replacement. Thanks to Chiara for all of her work for the OAS from 2020 until mid 2022. After an intensive search, the OAS Human Resources committee interviewed four impressive candidates. As a result, we are happy to welcome Kaitlyn Malleau, who joined us as the new Executive Director on February 1st (see her biography in this issue). Kaitlyn had previously volunteered on the OAS Board of Directors, so she understands how the Society works. The OAS has always depended a great deal on our volunteers, and we appreciate them so very much. But for the first time, we have hired a full time ED, with the idea of helping us keep up with ever growing demands on the OAS volunteer Board of Directors. Kaitlyn will also be helping to advance the "Best Practices" guides that we have been slowly working on over the last few years, amongst other initiatives. She has already had the opportunity to mentor Matthew Alabaszowski (see article in this issue), a high school co-op student. Welcome aboard Kaitlyn!

Congratulations to Craig Ramsoomair, who is our dedicated Director of Public Outreach. He was recently recognized for his efforts, winning the Canadian Archaeological Association Public Communications/Social Media award this May! Craig works tirelessly on promoting the OAS and all of our events. As part of his endeavours, Craig and members of the Public Outreach committee also set up the Archaeological Mentorship program last year just prior to the annual symposium. Mentoring the next generation of Ontario archaeologists is all important, so contact Craig if you would like to help with this initiative.

OAS Director of Education Jake Cousineau, with the help of other members, has been organizing another set of Indigenous Archaeological Monitor training sessions for members of many different Sudbury and Southern Ontario area First Nations in March and July. Working together with the Canadian Archaeological Association, co-hosts Sarah Hazell and former OAS President Alicia Hawkins have also been instrumental in offering these sessions. Together they have helped to train more Indigenous people in archaeology, giving them more power for heritage advocacy and protection in their traditional territories, while also providing more employment opportunities. Thank you to all of the participants and volunteer speakers who help to make this program so successful.

Here in Northwestern Ontario, there are few Indigenous Archaeological Monitors/Technicians and relatively few archaeological consulting companies. However, developments such as housing, mining, forestry, roads, and hydro-electric initiatives are increasing at an unrelenting pace. So, after receiving several requests from Indigenous communities (including Fort William First Nation) and individuals for similar training programs here in Northwestern Ontario, I have brought together a group of like-minded individuals to develop a series of initiatives. One result was a grant just obtained by the OAS Board of Directors called "Developing Ontario Archaeological Society NW ON Indigenous Archaeology Monitor Training". It is funded by the Government of Canada under the Community Services Recovery Fund (est financé par le gouvernement du Canada sous le Fonds de relance des services communautaires). This federal program awarded $66,246.00 to the OAS through United Way of Thunder Bay. We have already held a four-day training event offered in May by Dave Norris and Arlene Lahti of Woodland Heritage Northwest, the OAS and the Department of Anthropology at Lakehead University, mainly funded by the Waasigan Transmission Line Project. It was held in conjunction with the archaeological field school, which Clarence Surette and I were teaching for the department. Many people from 10 different communities participated. We would also like to acknowledge Lisa Sonnenberg of Parks Canada, National Marine Conservation Area (Nipigon), who assisted with the field school.

In another student related initiative, I am also happy to report that we have received funding once again from the Ministry of Tourism, Culture, and Sport of $11,436 to hire three Summer Experience Program students. They will work with Kaitlyn, other board members and myself this summer. Students Landunika Tennakoon was hired in the GTA, Conor Egan was hired in London, and Lauryn Eady-Sitar is working for the OAS again in Thunder Bay. We are very pleased that Kaitlyn, and Heather Hatch and Rhonda Bathurst at the Museum of Ontario Archaeology, will also be working with Conor.

In addition to being our talented Web Master, Josh Dent is the OAS Director of Member Services, and looks after the annual awards and membership queries. He brought together a committee of professional archaeologists to award the annual Valerie Sonstenes Student Research Fund, which was then ratified by the OAS Board of Directors. This year, the award went to Katherine Davidson ($1000) of Carleton University and Dylan Morningstar ($420) of Trent University. Katherine's project is titled "Long, Long Time Ago": Explorations of Identity and Memory with First Nations and Métis in Ontario Through Object Elicitation. Dylan's study is titled Macrobotanical Analyses on the Trent-Severn (MATS): Human Behavioural Ecology and Comparative Paleoethnobotany within the Great Lakes, Ontario. Congratulations to both students and we look forward hearing more about those great projects that the OAS is helping to support!

We are looking forward to celebrating an impressive **50th anniversary of the 2023 OAS Symposium** with the theme Maawnjidwin: 50 Years of Gathering, Where Yesterday Meets Tomorrow! It will be held in Southampton in the treaty territory of Saugeen Ojibway Nation (Chippewas of Saugeen First Nation and Chippewas of Nawash Unceded First Nation) and near the home of the Historic Saugeen Métis. The Board of Directors, along with volunteers from local Indigenous communities and Timmins Martelle Heritage Consultants, are busy organizing the in-person symposium to be held from Nov. 3-5, 2023. The main locations will be the Bruce County Museum and Cultural Centre and Southampton Town Hall. Thanks to Susan Dermarkar, OAS Director of Chapter Services, and Jeff Seibert (Director of Heritage Advocacy) for taking on much of that work as Chairs. Our awesome Treasurer, Nancy Kallina, has also taken on much of the financial work involved. Hope you can attend!

Thanks to editors Suzanne Needs-Howarth, Bonnie Glencross and Director of Publications Greg Braun for their continuing efforts with *Ontario Archaeology*. We just released Vol. 101! With this addition of *Arch Notes*, we welcome Tiziana Gallo, who will be working with Sarah Timmins on the OAS newsletter. Thanks to Katie Mather, who has worked on *Arch Notes* for the last two years. To learn more about the current OAS Board of Directors, click here. Please send us your articles or announcements!

Miigwetch,

Jill

Considering Extinct, Extirpated, and Endangered Species in the Zooarchaeological Record of Southern Ontario

By Trevor J. Orchard[1], Alicia Hawkins[1], Suzanne Needs-Howarth[2,3], Louis Lesage[4], Eric Guiry[5,6], and Thomas C.A. Royle[7]
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Introduction

More than a century of archaeological work in Ontario and surrounding areas has resulted in a massive quantity of archaeological data and collections, much of which has been subject to relatively limited analyses. For the past several years, our research team has been working on (re-)analyzing legacy faunal collections[1] to understand past subsistence and economic activities, technologies, environments, and social relations at individual sites, while also contributing data and insights to larger, multi-site research projects that also use non-legacy data generated by ourselves and others.

Drawing on this growing database of new and legacy zooarchaeological data, we have started to conduct large-scale meta-analyses to explore broad trends across various aspects of the archaeology and historical ecology of the Lower Great Lakes region through roughly the past 1000 years. A theme that runs through all of this research is our desire to gain a better understanding of species that are now extinct, extirpated, or endangered. Through a combination of zooarchaeological meta-analysis and the use of modern analytical tools and techniques—including geographic information systems (GIS), stable isotope analysis, and ancient DNA (aDNA) analysis—our research is providing fascinating insights into past human interactions with, and the historical ecology of, such animals as the now-extinct passenger pigeon and the now-extirpated (locally extinct) Atlantic salmon. In this paper, as part of our commitment to sharing the results of our research with a wider audience, we provide a brief overview of some of our completed and ongoing research projects and publications that show how we use legacy faunal collections and legacy faunal data as a basis to explore various aspects of past human–animal relationships and the ecological history of these iconic species—and other species as well—in southern Ontario and the broader Great Lakes region.

Legacy Faunal Collections and Legacy Faunal Data

During the long history of archaeological research in Ontario, spanning well over a century (e.g., Hawkins and

[1] Following Orchard and colleagues (2021: 59-60), we use the term legacy collections to refer to all collections that are "now removed from the initial context in which they were excavated or collected."

Lesage 2018), the nature of archaeology has shifted from primarily avocational collecting to primarily academic research to primarily development-driven commercial archaeology. The rise of cultural resource management (CRM) archaeology over the past several decades (Williamson 2010) has significantly changed the discipline, with CRM archaeology now accounting for as much as 99% of the archaeology carried out in the province (Warrick et al. 2021). Both the long history of archaeology in Ontario and the scale at which CRM archaeology is now undertaken have contributed to the generation of large numbers of archaeological collections and vast quantities of data derived from the analysis of those collections. Although the scale at which these collections have been generated is certainly not unproblematic (Karrow 2017; Mann 2022), they nevertheless hold considerable potential to contribute, through minimally invasive approaches (Warrick et al. 2021), to diverse research that can elucidate many aspects of the archaeological history of the province (Orchard et al. 2021).

From a research perspective, the analysis of legacy collections has the potential to contribute high-quality archaeological data to a wide range of research questions. Importantly, analysis of such existing collections avoids excavation, which is destructive, does not necessarily accord with the wishes of descendants, and creates additional collections that must be curated into the indefinite future. As we increasingly prioritize both non-destructive and community-led approaches to learning about the past, analysis of legacy collections has the potential to be a starting point for dialogues including archaeologists and descendants. Finally, analysis of these legacy collections, in combination with broader syntheses of legacy faunal data, provides an excellent basis for broad, regional projects, as exemplified by several of our recent research projects.

Our Research Team

The authors of this paper form the core of the team, and we sometimes collaborate with additional researchers, depending on the topic. Alicia Hawkins, Suzanne Needs-Howarth, and Trevor Orchard are all specialists in, among other things, the zooarchaeology of Ontario. Hawkins also uses GIS to visualize and interpret zooarchaeological data. Louis Lesage is a biologist and a member of the Huron-Wendat Nation, whose ancestors occupied many of the sites that provide the data on which our work is based. Louis is also a hunter and a member of the National Aboriginal Council on Species at Risk, and thus brings diverse perspectives to our collaborative work. Eric Guiry is a specialist in isotopic analysis of archaeological and contemporary fauna, while Thomas Royle is a specialist in the analysis of ancient DNA from archaeological faunal remains.

Aspects of many of the projects outlined in this paper have been published in other contexts, and we encourage the reader to seek out the original sources for more detail (some are available through our ResearchGate [https://www.researchgate.net] profiles). Here we provide a general summary of how many of these projects touch on our understanding of animal species that are now extinct, extirpated, or endangered.

Extinct Species: The Passenger Pigeon

Although the passenger pigeon (*Ectopistes migratorius*) has been extinct for only a century, it is difficult in the contemporary world to fathom the vast populations of these birds that once flocked to the forests of the eastern woodlands of North America. Nineteenth-century observers describe flocks that numbered in the billions of birds, and the total passenger pigeon population may have exceeded that of every other bird species on the planet (e.g., Schorger 1955). American naturalist John James Audubon, in 1813, for example, remarks on his inability to count the number of birds in the flocks that were passing overhead in Louisville, Kentucky, as they were too numerous for this to be practicable:

> The air was literally filled with Pigeons; the light of noon-day was obscured as by an eclipse; the dung fell in spots, not unlike melting flakes of snow; and the continued buzz of wings had a tendency to lull my senses to repose.… Before sunset… the Pigeons were still passing in undiminished numbers, and continued to do so for three days in succession.… The people were all in arms. The banks of the Ohio were

> crowded with men and boys, incessantly shooting at the [pigeons]; which there flew lower as they passed the river. Multitudes were thus destroyed. For a week or more, the population fed on no other flesh than that of Pigeons, and talked of nothing but Pigeons (Audubon 1832:321).

Unfortunately, the species declined rapidly through the late nineteenth century, and it became extinct in 1914, when the last individual, a female named Martha, died in the Cincinnati Zoo (Shufeldt 1915).

Figure 1 – Passenger pigeons – "Billing pair" by John James Audubon, from The Birds of America, 1827–1838; Public Domain - https://en.wikipedia.org/wiki/Passenger_pigeon#/media/File:Mershon's_The_Passenger_Pigeon_(Audubon_plate,_crop).jpg

We were, in part, inspired to start collaborating on passenger pigeons by a 2014 book by avocational ornithologist Joel Greenberg, who captures the sheer awfulness of the passenger pigeon's extinction. We wanted to see whether our research methods could contribute to an understandingof some of the unresolved questions in the published literature on exactly which factors contributed to the extinction of the passenger pigeon and whether our methods could make sense of the widely varying numbers of pre-colonial passenger pigeon reported in published surveys of zooarchaeological data in eastern North America. Given that we knew, from personal experience, that passenger pigeon bones are ubiquitous and often common in zooarchaeological assemblages from southern Ontario, these seemed like reasonable topics to explore through a (re-)examination of legacy faunal collections as well as legacy and more recent faunal data sets from the region.

Our first foray into passenger pigeon research aimed to examine passenger pigeon historical ecology (Guiry, Orchard, et al. 2020). Surprisingly, despite a considerable amount of research attention having been given to passenger pigeons in the past, key questions remain about aspects of passenger pigeon ecology and life history. We therefore aimed, through targeted carbon and nitrogen stable isotopic analysis, to directly explore aspects of passenger pigeon diet to help address questions about whether it was direct exploitation or habitat destruction that was the primary factor in their extinction. We sampled passenger pigeon bones from legacy collections and compiled previous isotopic data totalling 94 bone collagen samples from 22 sites. As passenger pigeons are now extinct, we were conscious of the fact that, despite their high relative abundance in many sites, their remains are a finite resource. We therefore selected broken and incomplete specimens whenever possible, and we photographed all specimens and subjected them to standard measurements before conducting the destructive sampling. In addition, for isotopic and aDNA sampling, we removed as small a portion as feasible.

This analysis of carbon and nitrogen isotopes in passenger pigeon bone produced a clear, tight clustering for the majority of samples (Guiry, Orchard, et al. 2020), consistent with most passenger pigeons consuming a diet comprised of tree mast, such as beech nuts, acorns, and chestnuts. This fits well with the historically described tendency for passenger pigeons to be specialist mast consumers, a foraging behavior that focuses on isotopically distinctive C3 plant foods. Of particular interest, however, is a separate cluster of six individuals that were clearly consuming significant quantities of C4 plants, which could not have been tree nuts. Given that these isotopic values reflect lifetime average dietary trends they indicate that some individuals were clearly specializing in foods other than tree mast. This implies that, as a species, passenger pigeons were capable of shifting their diet to foods other than tree mast, and it suggests that habitat destruction alone may not have been sufficient to cause their extinction.

Stable Isotope Analyses of Ontario Faunal Remains
Eric J. Guiry

Stable isotope analyses of Ontario's zooarchaeological remains provide a powerful tool for reaching back into the past to understand how animals that died centuries or millennia ago lived their lives. Based on the premise that "you are what you eat," and that different foods can have distinctive isotopic compositions, archaeologists can measure chemical signatures (isotopic compositions) preserved in faunal remains to reconstruct the kinds of foods they ate and the environments in which they lived. Because isotopic compositions are passed along a food web, from soil to plants, from plants to herbivores, and then on to carnivores, we can use them to trace food and mobility relationships across ecosystems. This technique works by extracting and analysing a small quantity of collagen, the main protein in bone, which allows researchers to determine an archaeological animal's stable carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and sulfur ($\delta^{34}S$) isotope compositions, among other possible isotopes. Due to the way that these elements cycle through physical environments and terrestrial and aquatic food webs, each can give direct insight into specific aspects of past animals' lives. Carbon isotopes differ based on the way plants convert carbon dioxide from the atmosphere into sugars and, in the context of Ontario, this relationship makes maize a highly distinctive foodstuff (Katzenberg 1989). Carbon isotopes also differ between animals feeding in denser forests and those in more open grass and woodlands (Bonafini et al. 2013). Another distinction, related to how plants move nutrients and build tissues, makes animals whose diet is rich in tree nuts distinctive from those focused on foliage (Cernusak et al. 2009). Carbon isotopes also change between different kinds of aquatic habitats, meaning that fish that live in different parts of lakes, rivers, and oceans can have distinctive signatures (Guiry 2019). Nitrogen isotope compositions, in contrast, change between "trophic levels," such that plant eaters have a higher $\delta^{15}N$ than plants, and meat eaters have a higher $\delta^{15}N$ than plant eaters (DeNiro and Epstein 1981). Because $\delta^{15}N$ of the nutrients that are used by plants at the bottom of food webs are sensitive to human activities that cause environmental change, such as deforestation and agriculture, $\delta^{15}N$ can also provide an indicator for animal behaviours, husbandry, and other human impacts (Guiry, Buckley, et al. 2020; Szpak 2014). Last, sulfur isotope compositions, which are linked to local bedrock and water sources, can help to reconstruct whether an animal lived or was raised locally or, rather, if it migrated or was traded in from another region (Nehlich 2015). At the same time, new research is demonstrating that $\delta^{34}S$ can also provide an indicator for the extent to which an animal used food webs associated with wetlands (Guiry et al. 2022). Together, these three isotopic compositions make up the bulk of Ontario's published faunal isotope data and offer a window into the past allowing researchers to explore diverse questions about the ways in which humans and animals influenced, and co-existed with, one another through time (Glencross et al. 2022; Guiry and Buckley 2018; Guiry et al. 2016, 2017, 2021; Guiry, Orchard, et al. 2020; Morris et al. 2016). Although such compositions are not a focus of the research highlighted here, it is worth pointing out that other isotopic compositions, including those of oxygen and strontium, which can offer insights on mobility, have featured in studies of Ontario's archaeological faunal remains and represent additional approaches in the archaeologist's tool kit.

Given that we were seeing some unexpected patterns in the passenger pigeon isotope data, and given that the original analyst's taxonomic identification was confirmed (by TJO) by analogy to other pigeons (because, like most comparative collections, the one at University of Toronto

Mississauga lacks passenger pigeon reference material), we decided to conduct aDNA analysis to confirm taxonomic identity on a small sub-sample (*n*=9) of the passenger pigeon specimens sampled for isotopic analysis (Guiry, Orchard, et al. 2020). To our great relief, all specimens selected for aDNA analysis were confirmed as passenger pigeon. Although the majority of the pigeon DNA samples fell within two previously identified haplogroups (lineages), one specimen revealed a unique, intermediate haplogroup not previously observed. We speculate that this may reflect greater genetic diversity prior to European settlement, although further research is needed to clarify these patterns. Our data also show that the consumption of C4 plants occurred among pigeons belonging to different haplogroups.

More recently, we have begun to explore passenger pigeon abundance more broadly across southern Ontario, using a meta-analysis of archaeological faunal data from pre-colonial contexts (Orchard et al. 2022). For this project, we compiled data from our own analyses and from various other published and unpublished sources that we deemed to be reliable, including data from student and consultant reports compiled by pioneering Ontario zooarchaeologist and teacher Howard Savage and ornithologist Douglas Sadler. Our initial meta-analysis covered 157 Late Woodland sites in southern Ontario, which span the tenth to the mid-seventeenth centuries CE.

The key result from this preliminary meta-analysis (Orchard et al. 2022) is that passenger pigeons were undoubtedly present and relatively abundant in southern Ontario in the Late Woodland period. Of the 157 sites in our analysis, only 27 lacked identified passenger pigeon bones,

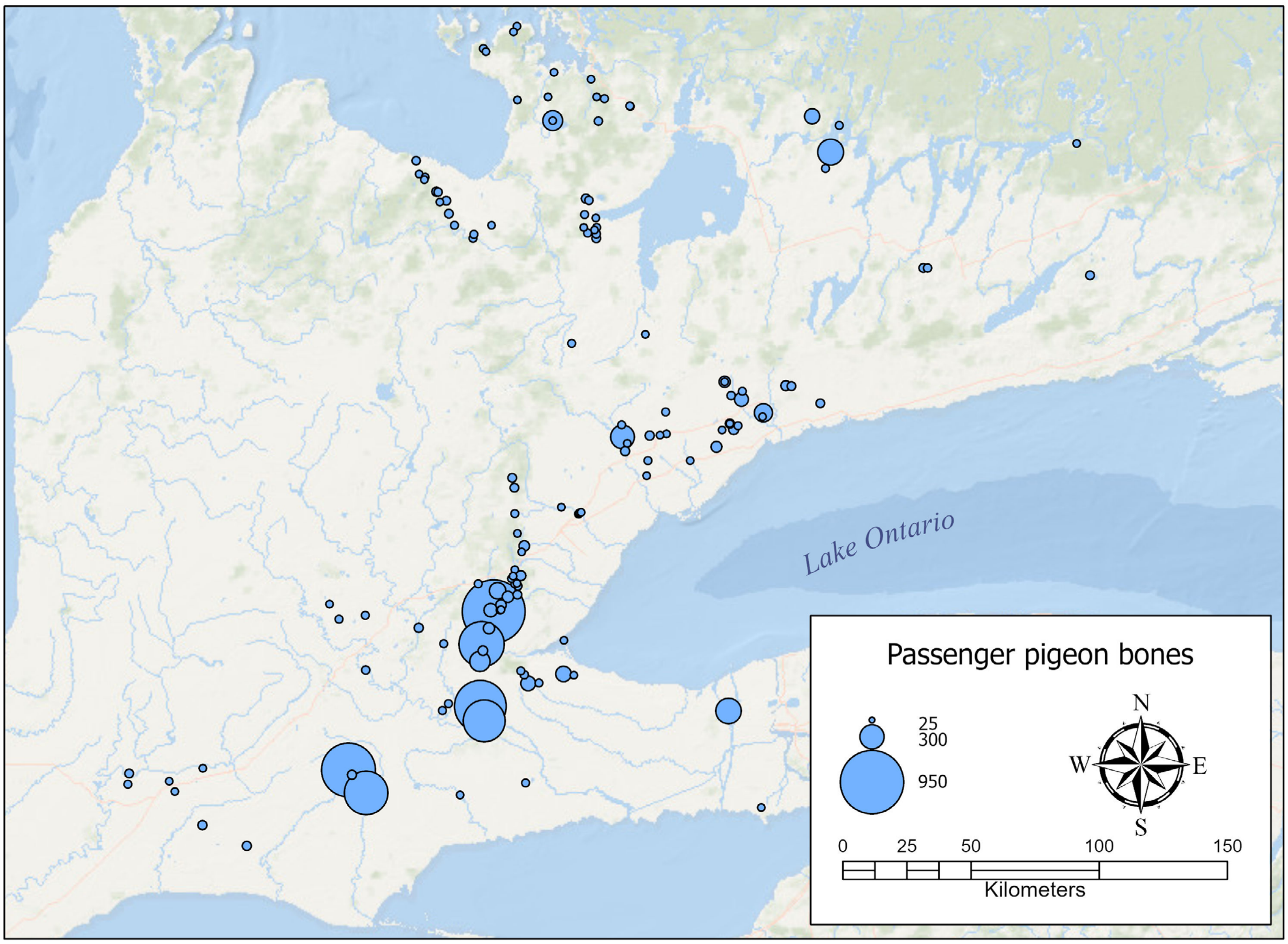

Figure 2 – Map of sites with passenger pigeon remains in southern Ontario. Map produced by AH from data in Orchard et al. 2022

and 58% of the almost 14,000 bird specimens identified below the taxonomic level of class in these sites collectively are passenger pigeon bones. Although passenger pigeons are regionally both ubiquitous and abundant, they are highly variable in abundance on the level of individual sites, likely reflecting annual variability in the locations to which passenger pigeons flocked as they followed the cyclical availability of tree mast. Although pigeons may not have been predictable on an annual seasonal basis in any one location, people almost certainly would have focused hunting effort on them whenever this hyper-abundant resource became available, much as we see in the nineteenth-century observation from Audubon quoted previously.

We may be able to further explore such short-term but intensive hunting effort by examining passenger pigeon hunting camps, and this is something that we hope to do in future research. In a preliminary consideration of sites in our meta-analysis sample that were identified by the excavators as non-village sites, we noted that the two non-village sites with the largest samples of identified bird remains are both heavily dominated by passenger pigeon (Orchard et al. 2022). We hope to track down the locations of some of these prominent passenger pigeon site collections so that we may examine them in more detail and further explore the possibilities of specialized passenger pigeon hunting camps and the targeting of squabs (i.e., juveniles that have not yet left the nest), among other questions.

Our passenger pigeon meta-analysis also allowed us to consider trends in relative pigeon abundance over time (Orchard et al. 2022). To accomplish this, we grouped the 157 sites by century based on the site dates available from the initial excavators or the accepted local chronologies or village occupation sequences (which are largely based on ceramic seriation, radiocarbon dating, or both). This gave us large samples of sites, and of bird abundance data, for the fourteenth through seventeenth centuries, as well as an amalgamated pre-fourteenth-century sample that combined our smaller sample of sites from the tenth through thirteenth centuries. Passenger pigeons remained the most abundant bird species throughout this time period, but we noted a clear decline in passenger pigeon abundance in the fifteenth century. We cannot yet explain this temporal pattern with any confidence, but we speculate that it may reflect a combination of human demographic factors and climatic variability (Orchard et al. 2022). We plan to explore this temporal patterning in more detail in the future.

Although our research has greatly furthered our understanding of both the relative abundance and the historical ecology of passenger pigeons in the Late Woodland period of southern Ontario, we feel that we have just scratched the surface of the potential for research on passenger pigeons based on legacy faunal collections and legacy and more recent faunal data sets. Our initial work has clearly highlighted the potential for zooarchaeological

Figure 3 – Carolina parakeet, illustration by John James Audubon; Public Domain - https://en.m.wikipedia.org/wiki/File:AudubonCarolinaParakeet2.jpg

collections and data from Ontario to facilitate research into now-extinct species, such as the passenger pigeon. We note that passenger pigeon is not the only extinct bird species to have been identified from archaeological contexts in the province. Rosemary Prevec (1985) identified bones of the Carolina parakeet (*Conuropsis carolinensis*) from the Calvert site (AfHg-1). This species was far less abundant than passenger pigeon in eastern North America in the past, and it is known from only this one site in Ontario. Although the Calvert site parakeet remains may have arrived in Ontario via trade (Prevec 1985), they nevertheless serve not only as a reminder that we must be open to the presence of rare and unexpected species within zooarchaeological assemblages from the province, but also as a call to pursue further research into the possible presence of extinct species in the archaeological record of the region. This also highlights the need for analysts to be familiar enough with the more common species to be able to recognize the presence of unusual species.

Extirpated Species: Atlantic Salmon

Extirpated species (those that are locally extinct from a particular region) are equally fascinating. Atlantic salmon (*Salmo salar*), for example, were once very abundant in the Lake Ontario watershed. Early nineteenth-century historic accounts note that spawning Atlantic salmon were so abundant in rivers flowing into Lake Ontario that settlers could catch them without fishing gear. For example, John McCuaig, the Superintendent of Fisheries for Upper Canada, stated in a report written in 1859, "I have seen them from 1812 to 1815, swarming the rivers so thickly, that they were thrown out with a shovel, and even with the hand" (King 1866:248). Overfishing, combined with other impacts resulting from increasing settler populations surrounding the lake (including damming for watermills), ultimately led to the extirpation of salmon from Lake Ontario by 1900 (as summarized in Guiry et al. 2016).

Members of our research group have been exploring the historical ecology and subsistence importance of Atlantic salmon through various research projects over the past seven years. Despite the historic abundance of this species, some basic aspects of Atlantic salmon ecology remained unclear, a situation that mimics that of the passenger pigeon. It had been assumed by fisheries researchers that, unlike Atlantic salmon in other waters, which migrate to the Atlantic Ocean as part of their life cycle (known as anadromy), those in Lake Ontario did not migrate to the ocean and, instead, stayed within the lake system all their lives (known as freshwater residency, or potamodromy). We realized that we could confirm this through stable isotope analysis. Our research group has examined historic and pre-colonial Atlantic salmon behaviour through broad, regional isotopic sampling of salmon bones from archaeological contexts and from historical specimens held by the Royal Ontario Museum (Guiry et al. 2016; Guiry, Royle, et al. 2020). The results of this research, in particular patterns in stable isotopes of both carbon and sulfur, which clearly differentiate sea-run salmon from lake-resident salmon, demonstrate that all of the archaeological specimens analyzed to date from sites in both Ontario and New York state represent salmon that were resident in the freshwater system of the Lake Ontario drainage throughout their life cycle. This has implications both for our understanding the historical ecology of Atlantic salmon in Lake Ontario and for the ongoing, modern attempts to re-introduce Atlantic salmon to the lake (e.g., Haddrath et al. 2008; Oosthoek 2007; Siekierska 2016).

Figure 4 – Atlantic salmon; public domain https://commons.wikimedia.org/wiki/File:Atlantic_salmon_Atlantic_fish.jpg

Another aspect of our research on Atlantic salmon involved the application of ancient DNA analysis to determine the sex of archaeological salmonid remains and confirm their taxonomic identity. We wanted to test the hypothesis that the Late Woodland occupants of southern Ontario conserved salmonid stocks through sex-selective fishing. Because you need far fewer males than females for successful reproduction at the population level, preferentially harvesting male salmon can help preserve the health of fish populations in the region. Such sex-selective salmon-fishing practices, facilitated by the differences in morphology of male and female salmon during spawning, have been identified at ancestral Coast Salish archaeological sites on the West Coast of North America (Morin et al. 2021).

Ancient DNA Analysis of Zooarchaeological Remains in Ontario
Thomas C. A. Royle

Ancient DNA, or aDNA, collectively refers to any DNA from long-deceased organisms preserved in ancient and historic materials. Ancient DNA has been recovered from a variety of materials, including bones, shells, soft animal tissues, botanical remains, sediments, ice cores, ceramics, and lithics (Green and Speller 2017). Relative to other provinces and regions, the number of aDNA studies that have been conducted on archaeological material from Ontario is small (Speller 2018). Nonetheless, the handful of studies that have been conducted on animal remains from the province have provided numerous insights into human–environment interactions and the historical biology of non-human animals (Bathurst and Barta 2004; Guiry, Orchard, et al. 2020; Royle et al. 2020; Rutledge et al. 2010).

In Ontario, the most common application of aDNA analysis within zooarchaeology has been for species identification (e.g., Guiry, Orchard, et al. 2020; Royle et al. 2020; Rutledge et al. 2010). By comparing DNA sequences obtained from archaeological animal remains with reference sequences whose species is known, it is possible to assign animal remains to a species. Because genetic differences between species exists regardless of bone morphology, aDNA analysis is particularly useful for identifying the remains of closely related species whose bones are morphologically similar (e.g., Guiry et al. 2020; Royle et al. 2020; Rutledge et al. 2010), as well as fragmented and worked bone (e.g., McGrath et al. 2019). For example, the combined application of morphometric and aDNA analyses to canid remains (*Canis* sp.)—which can be difficult to identify morphologically to the species level—indicated that both domestic dog (*Canis familiaris*) and eastern wolf (*Canis lycaon*) were present at the sixteenth-century Lawson site (AgHh-1) (Rutledge et al. 2010). These data also suggest that eastern wolf, not gray wolf (*Canis lupus*), was the wolf species that historically inhabited southwestern Ontario (Rutledge et al. 2010). While it has only been used in Ontario to sex archaeological salmonid remains (Royle et al. 2020), aDNA analysis can also be used to sex the remains of other species with genetic sex-determination systems (i.e., amphibians, birds, mammals, and some fish and reptiles). Since management strategies often involve sex-selective strategies, such genetic sex identification can provide information about the sustainability of past harvest practices (see main text for more detailed discussion) (Morin et al. 2021; Royle et al. 2020). The application of aDNA analysis to faunal remains has also provided clues about the health of past animals. For example, at the sixteenth-century Cleveland site (AhHb-7), Bathurst and Barta (2004) detected *Mycobacterium tuberculosis* DNA in a dog with hypertrophic osteopathy, suggesting that these lesions may have been caused by tuberculosis. Ancient DNA analysis can provide information about the health of not only individual animals but also populations as a whole. Because genetic diversity (the number of genetic variants, or haplotypes, within a population) tends to increase with population size, documenting a species' genetic diversity over time can shed light on whether its abundance has changed in response to environmental change (e.g., Prost et al. 2010) or human activities (e.g., Johnson et al. 2018). By determining the geographic region that specimens' haplotypes are associated with, aDNA analysis also has the potential to shed light on the exchange and movement of animals by past peoples within and between regions (Barrett et al. 2022; Star et al. 2017).

Ancient DNA analysis is undoubtedly a powerful tool for studying the complex relationships among humans, animals, and the environment, but it is not without its problems. First and foremost, aDNA analysis requires damaging or destroying archaeological materials. Care must therefore be taken to ensure that materials subjected to aDNA analysis are likely to contain preserved DNA. While methodological advances have increased the probability of recovering DNA from archaeological materials, the preservation of DNA in animal remains is not guaranteed. Whether or not DNA is preserved in archaeological remains tends to be a function of environmental conditions rather than age, with temperature being the primary factor influencing DNA preservation (Allentoft et al. 2012; Burger et al. 1999; Smith et al. 2003). Exposure to high temperatures tends to be associated with poor DNA preservation because such exposure increases the rate of the chemical reaction (depurination) that is primarily responsible for DNA fragmentation (Allentoft et al. 2012; Burger et al. 1999; Lindahl and Nyberg 1972; Smith et al. 2003). Fortunately, temperate conditions, such as are present in Ontario, are favourable to long-term DNA preservation (Speller 2018). Acidic conditions also increase the rate of DNA degradation, leading to poor DNA preservation in faunal remains from sites with acidic soils, such as those typical of the Boreal Forest (Allentoft et al. 2012; Burger et al. 1999; Lindahl and Nyberg 1972). As a result of DNA degradation, archaeological faunal remains are susceptible to contamination with modern DNA (Cooper and Poinar 2000; Yang and Watt 2005). Consequently, special precautions needed to be taken when conducting aDNA analysis. These include extracting DNA in a genetic laboratory dedicated to analysing ancient materials, the use of protective clothing by lab workers, sample decontamination, the inclusion of controls to detect contamination, and the replication of results (Cooper and Poinar 2000; Yang and Watt 2005).

This project built on a methodology that Royle and others had previously developed to determine the sex of Pacific salmon remains from archaeological contexts in the Pacific Northwest (Royle et al. 2018). Like humans, salmonids have an XY chromosome sex-determination system, where males have both an X and a Y chromosome and females have two X chromosomes. Our methodology capitalizes on these genetic differences between males and females to determine the sex of individual salmon. In our method, we use two polymerase chain reaction (PCR) tests that screen for the presence of short fragments of a gene located on the Y chromosome (*sexually dimorphic on the Y-chromosome gene* [*sdY*]) and a proxy for the X chromosome. If both PCR tests detect the presence of the *sdY* gene, an individual is identified as a male, while if only the X chromosome proxy is found to be present, an individual is identified as female. Our project aimed to test whether that methodology could be used to determine the sex of Atlantic salmon and lake trout (*Salvelinus namaycush*) from archaeological contexts in southern Ontario (Royle et al. 2020). Although this was largely a methodologically driven project, it also aimed to use a case study that would allow us to test whether these species were subject to sex-selective fishing practices in a Late Woodland context in southern Ontario.

We selected salmonid samples from the legacy faunal collections from the Antrex site (AjGv-38). This site, located in Mississauga, Ontario, is a Late Woodland village, dating to the late thirteenth century. Our initial sample, of 17 Atlantic salmon specimens and 11 lake trout specimens, was selected from remaining portions of previously collected samples that had been used in part for our parallel isotopic sampling project. To clarify the initial patterns, and to expand the sample size to satisfy peer reviewer concerns, we sampled an additional 18 Atlantic salmon and 15 lake trout vertebrae from the site assemblage. We sampled single vertebrae from contexts in which multiple, morphologically identifiable salmon and/or lake trout vertebrae were present, with the aim of minimizing destruction of specimens in contexts where such vertebrae were less abundant. Again, much to our relief, for all 60 of the samples that had preserved DNA (DNA was not preserved in one sample), the ancient DNA analysis confirmed the initial taxonomic identifications based on skeletal morphology. Although confirming taxonomic identity was not a primary goal of this project, the results validate that the key morphological features that we use to separate these salmonid species based on their skeletal remains actually do stand up under more rigorous biomolecular testing.

Ultimately, we were successfully able to determine sex for 29 of 35 Atlantic salmon and for 22 of 26 lake trout (Royle et al. 2020). The sex ratios revealed that female salmon were more abundant than male salmon (20 females:9 males), while male and female lake trout were relatively equally abundant (10 females:12 males). These patterns, however, are not statistically significant, and we therefore cannot reject the hypothesis that there is no bias in sex representation in either of these species. However, we hypothesized that the preponderance of female salmon at Antrex may reflect the site's inhabitants fishing during the early part of the salmon runs, when females are more abundant than males. This project successfully tested the methodology of sexing salmonid remains from archaeological sites in Ontario. This is a powerful methodology, and it will be interesting to see what a larger, multi-site, regional sample shows in terms of sex bias in salmonid fisheries.

Atlantic salmon are also a major focus of our ongoing, large-scale meta-analysis work examining fish and fisheries in the Lower Great Lakes region. A preliminary perspective (Hawkins et al. 2019) tested whether it is feasible and useful to take a big-data, regional approach to compiling and analyzing existing zooarchaeological data sets in this region. To do that, we compiled existing data from analyses by experienced analysts who attempted identification of cranial, vertebral, and appendicular parts of the fish skeleton. We were thus able to include not only our own data, but also those from other available sources on overall fish abundance and on the relative abundances of some key, high-trophic level fishes. This included salmonids (i.e., Atlantic salmon, lake trout, and whitefish [*Coregonus* spp.]), as well as *Sander* (i.e., walleye, also known as pickerel [*Sander vitreus*] and sauger [*Sander canadensis*]). This specific choice was made to test hypotheses raised by Susan Pfeiffer and colleagues (2016) on the consumption of such fish in the region. Ultimately, we compiled useful legacy and recent data from 106 sites, with occupations spanning from prior to the fourteenth through seventeenth centuries and regionally covering roughly the same area as our passenger pigeon research (Hawkins et al. 2019).

This preliminary meta-analysis on salmonids and *Sander* revealed a variety of spatial and temporal trends in the Late Woodland period use of these fishes. The data we compiled, for example, suggest that salmonids are more abundant in assemblages from the western end of Lake Ontario and around Lake Huron and Georgian Bay, while *Sander* are often more abundant on the north shore of Lake Erie (Hawkins et al. 2019). Among the salmonids, whitefish are more abundant in sites on the north shore of Lake Erie and in some sites near Lake Simcoe, while Atlantic salmon and/or lake trout are more abundant in sites near Lake Ontario or Georgian Bay. Broadly, this patterning may reflect natural abundances, as these patterns somewhat mirror historic catch statistics from these bodies of water (Baldwin et al. 2009). Looking more closely at Atlantic salmon, we realized that they are really just found in sites near Lake Ontario and that they are often the most abundant salmonid in these sites. This mirrors the known limits of Atlantic salmon spawning territory, as they moved no farther up the Great Lakes system than Niagara Falls.

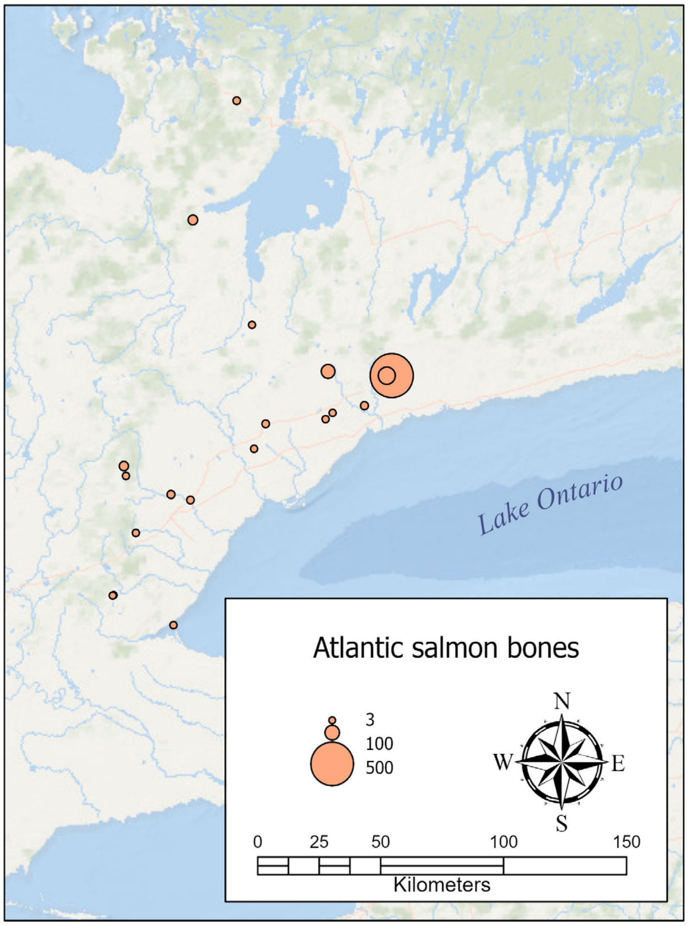

Figure 5 – Map of sites with Atlantic salmon remains in southern Ontario. Map produced by AH from data in Hawkins et al. 2019.

Indigenous Management of Endangered Species
Louis Lesage

From an aboriginal point of view, exploring archaeological data and collections can reveal unexpected information on hunting practices, subsistence, and food selection of ancestors. For example, a contemporary Huron-Wendat person could not imagine that passenger pigeon, when available, could have represented such an important portion of the diet of our ancestors. Unfortunately, the only clue related to the passenger pigeon that has survived the centuries is the Huron-Wendat name for passenger pigeon, *orite* (a non-reconstructed and non-standardized word), a word that was noted as identifying pigeon in dictionaries compiled by Jesuits centuries ago. In the Iroquoian cultural heritage, an old dance named the "pigeon dance" and its related song "Oriteneha" refer to this original relation between the animal and the ancestors. Re-analyzing legacy faunal remains to understand past subsistence and economic activities, technologies, environments, and social and cultural relations at archaeological sites brings new perspectives and values to such data relating to the time of our ancestors.

Thus, for contemporary descendants, learning that our ancestors were hunting, for their subsistence, a now-extinct species raises many questions, such as: Which techniques were they using to hunt? How were they processing the food? What was its relative importance in the annual diet? And, maybe: Did they even contribute to the extinction of the species? With respect to this last question, our results showed four centuries of hunting and consuming passenger pigeons, suggesting that the harvest never exceeded the growing capacity of this population. This example reminds us that humans can utilise animal species at equilibrium but can also invent hunting and harvest capacities that can rapidly change this fragile equilibrium. Still today, the aboriginal perspective on the territory and the living animals that are present comes with a sense of stewardship and responsibilities. All living plants and animals are connected and are in relation to one another. Knowing that our ancestors were commonly consuming now-extinct species, such as the passenger pigeon and locally extinct Atlantic salmon, increases our own responsibilities for the stewardship of our present environment and thus increases the efforts that we have to deploy in relation to contemporary endangered species.

It is with this sense of responsibilities that the Huron-Wendat Nation deployed, a decade ago, a vast project to reinstate connectivity to reproductive areas that were blocked by dams for the American eel in many rivers on the Nionwentsïo (the traditional territory of the Huron-Wendat). The last recollection of eel being harvested as a subsistence species comes from an elderly woman living in the community of Wendake in the early 1950s, who recalled using nets to capture American eels at the bottom of the Kabir Kouba falls, on the Akiawenrahk River. From that faint memory, the Nionwentsïo Office increased its interest and, in the early 2010s, conducted historical research on eel and other endangered species, such as woodland caribou, in their traditional territory (Bureau du Nionwentsïo 2016). Interestingly, historical and archaeological research reveal deep and important relations with now-extinct, -extirpated, and -endangered species. The objectives of these studies were, first, to increase governance and stewardship and, second, to increase resource capacities on surveys, monitoring, management and participation in their recovery. These prehistoric relations with endangered species also increased the desire of living descendants to develop stewardship actions to help in these species' recovery, a vivid example of reconnection to the past and moving into the future. Rapidly, American eel became the flagship of the Huron-Wendat Nation for endangered species recovery work, with the result that an outstanding and undeniable expertise has been developed by the Nionwentsïo Office in eastern Canada that is now in demand when local groups want to see connectivity re-established to spawning grounds over dams and other obstacles in their own areas (D'Astous et al. 2023).

Finally, another relevant aspect of exploring legacy zooarchaeological data with aboriginal descendants is building relationships with academics and other researchers who hold specific and complementary knowledge. This engagement between traditional and scientific knowledge holders brings science, hypotheses, and interpretations to new and complementary levels. Exploring extinct, extirpated, and endangered species in the zooarchaeological record through this "two-lens seeing" brings new perspectives and natural engagements with aboriginal people to better understand their ecology and relations in the past, as well as significant actions to better protect them today.

The final point that we would highlight from this particular project is more methodological. We explicitly examined the relative abundance of both vertebrae and non-vertebral elements of these high-trophic-level fish species in the faunal data sets we compiled for this meta-analysis (Hawkins et al. 2019). Our research clearly confirmed an earlier finding (Hawkins and Needs-Howarth 2016) that often the vast majority of the elements for salmonid species preserved in Ontario archaeological sites are vertebrae. We highlight this point to emphasize how important complete identification of all elements can be to fully understanding faunal diversity. Historically, there has been an unfortunate tendency by some people working in Ontario zooarchaeology to not attempt to identify fish vertebrae. And student analysts were and still are often explicitly instructed to not identify them. As our research highlights, ignoring fish vertebrae would potentially mean that some very abundant and important species may be entirely overlooked.

Future Research: Endangered Species?

Our research projects on both passenger pigeons and Atlantic salmon, as well as the larger projects into which those species are embedded, are still ongoing. So, where do we go from here in terms of our research into extinct, extirpated, and endangered species in the Ontario zooarchaeological record? Although we have made some interesting finds and have published our early results, we continue to explore new avenues of research on these species and to expand and refine our meta-analyses.

We also have research in earlier stages of development that is examining American eels (*Anguilla rostrata*) and lake sturgeon (*Acipenser fulvescens*) (e.g., Guiry et al. 2022), both of which are currently listed as endangered in Ontario (Ontario Ministry of the Environment, Conservation and Parks 2022) and are the subject of research and conservation projects by descendant First Nations (Fisheries and Oceans Canada 2018; General and Warrick 2012; Quebec AM 2022; see text box by Lesage). More broadly, we aim to expand our meta-analysis research to include more faunal data (i.e., more species and more data sets); to include other archaeological data classes; and to include a broader range of sites, both geographically and temporally. Perhaps most importantly, we want to include more diverse perspectives on these species, particularly more Indigenous voices. Many recent studies have shown the importance of Indigenous knowledge in understanding other species and how people in the past interacted with them (e.g., Henri et al. 2021; Kimmerer 2013; Popp et al. 2019). We anticipate that, because of this knowledge and the principle of obtaining free, prior, and informed consent before undertaking research on sites and belongings created by Indigenous peoples, any future projects will include Indigenous knowledge keepers.

In conclusion, we hope that a few key things are clear from what we have outlined in this summary of some of our recent research. First, we can learn things about extinct, extirpated, and endangered species from the zooarchaeological record that we cannot learn in any other way. Second, there is huge potential for a multi-scalar, multi-disciplinary, collaborative approach to zooarchaeology to contribute to our understanding of both the archaeological history of the Lower Great Lakes region and historical ecology—in this case of passenger pigeons, Atlantic salmon, and the numerous related species with which we have been comparing them. Third, the historical-ecological information that we can gather from such archaeological records provides a deep-time perspective that is often lacking in contemporary resource management and that thus can contribute to contemporary issues surrounding ecological management and to attempts at reintroducing or protecting species, such as Atlantic salmon (e.g., Siekierska 2016). And, finally, research based on minimally invasive studies of legacy collections and on the synthesis of legacy data holds considerable potential to form the basis for collaborations and to contribute in significant ways to our understanding of the historical ecology and archaeology of Ontario.

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The Valerie Sonstenes Student Research Fund is intended to support student research that relates to and advances knowledge of Ontario's archaeological record. This fund provides students with grants to assist them in undertaking new research for Honour's, Master's, PhD or postdoctoral projects. Following their research, the recipients share their use of the funds and outcomes in *Arch Notes*. In this issue, *Arch Notes* presents the work of Philip Woodley, PhD candidate at Western University and recipient of the 2021 Valerie Sonstenes Student Research Fund.

Valerie Sonstenes Student Research Fund (2021): Radiocarbon Dating the Middle Woodland/Princess Point Occupations of the Christie Site (AhHa-61)

By Philip Woodley

Introduction

As the recipient of the 2021 Valerie Sonstenes Student Research Fund, I used the funds to obtain radiocarbon dates on paleobotanical samples recovered from features at the Middle Woodland/Princess Point occupations of the Christie site (AhHa-61), located near Ancaster, Ontario. Four samples were submitted to Beta Analytic Ltd. for AMS dates from two features, with one possible maize cupule and one nut fragment submitted for dating from each feature. Although the results are not what was expected, these dates will assist with my interpretation of the southern Ontario Middle Woodland/Princess Point era occupations at the Christie site.

Background

The Christie site was an unploughed, multi-component site located in a small valley beside a bog on what is now Highway 403 in Ancaster, Ontario (Figure 1). Christie was excavated by Ontario Ministry of Transportation archaeologists from 1991 to 1994 with over 1100 one metre hand-excavated topsoil squares, with 51 subsoil features excavated at the site (Figure 2). Diagnostic artifacts recovered from the excavation indicate occupations from Paleo (Ellis and Deller 1990), Archaic (Ellis et al. 1990), and the Early Woodland eras (Spence and Fox 1986), with the main occupation during the Middle Woodland (ca 400 BC to 700 AC) (Spence et al. 1990; Spence and Pihl 1984), and Princess Point eras (ca 700 to 900 AC) (Crawford and Smith 1996; Fox 1990; Smith and Crawford 1997; Stothers 1977). My research focuses on the Middle Woodland/Princess Point era occupations at the Christie site.

Features

The topsoil layer at Christie ranged from 5 to 10 cm deep. All 51 features were located directly below the shallow topsoil layer and most features tended to be very shallow, indicating that they would have been destroyed if the site had been ploughed. Most of these features are hearths, primarily identified by fire-reddened subsoil visible against the tan-coloured sandy subsoil. Soil samples were taken from all features for floatation to recover paleobotanical material to identify foodways, wood species, and to select items for radiocarbon dating. The intent was

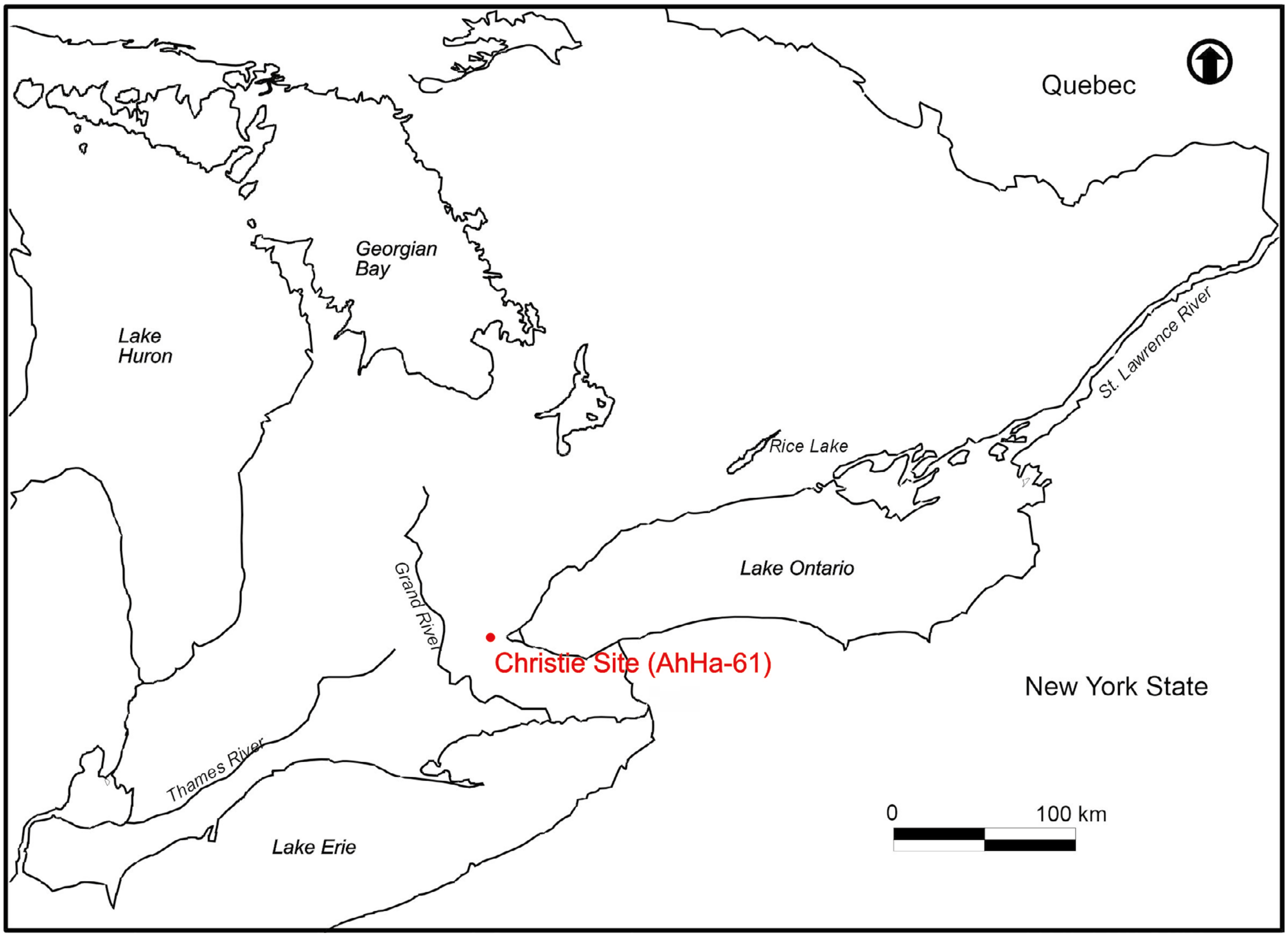

Figure 1: Location of the Christie Site (AhHa-61)

to use the radiocarbon dates obtained from the feature samples to help understand the occupation of the Christie site. Unfortunately, very few paleobotanical remains were recovered from the soil samples, thereby restricting the amount of information available to help understand past lifeways and providing few carbonized samples large enough for radiocarbon dating.

Feature 44 (Figure 3) contained a nearly complete Middle Woodland era vessel (Figures 4 and 5), as well as possible (cf.) maize cupules and a nutshell fragment recovered from the floatation sample. Feature 46 (Figure 6) contained a Princess Point era rim sherd (Figures 7 and 8), plus cf. maize cupules and nutshell fragments from the floatation sample. Maize has previously been found on Princess Point era sites (Crawford et al. 1997, 2006), but to date they have not been found associated with Middle Woodland era sites in southern Ontario. Given this, finding possible maize cupules associated with Middle Woodland ceramics was an important discovery.

Samples for Radiocarbon Dating

Four samples were submitted to Beta Analytic Ltd. for radiocarbon dating, including one cf. maize cupule and one nut fragment from Feature 44 and one cf. maize cupule and one nut fragment from Feature 46 (Table 1). These samples were visually identified by Breanne Reibl, Archaeobotanist, TMHC, using reference samples, and confirmed by Rudy Fecteau, Archaeobotanist, R.D. Fecteau and Associates. Unfortunately, the upper levels of each of these features contained topsoil mixed with subsoil (Figures 3 and 6) thereby questioning the context from which the soil samples were recovered. Even so, I decided that dating the possible maize cupules was necessary to confirm or negate their association with the ceramic vessels. The goal of dating

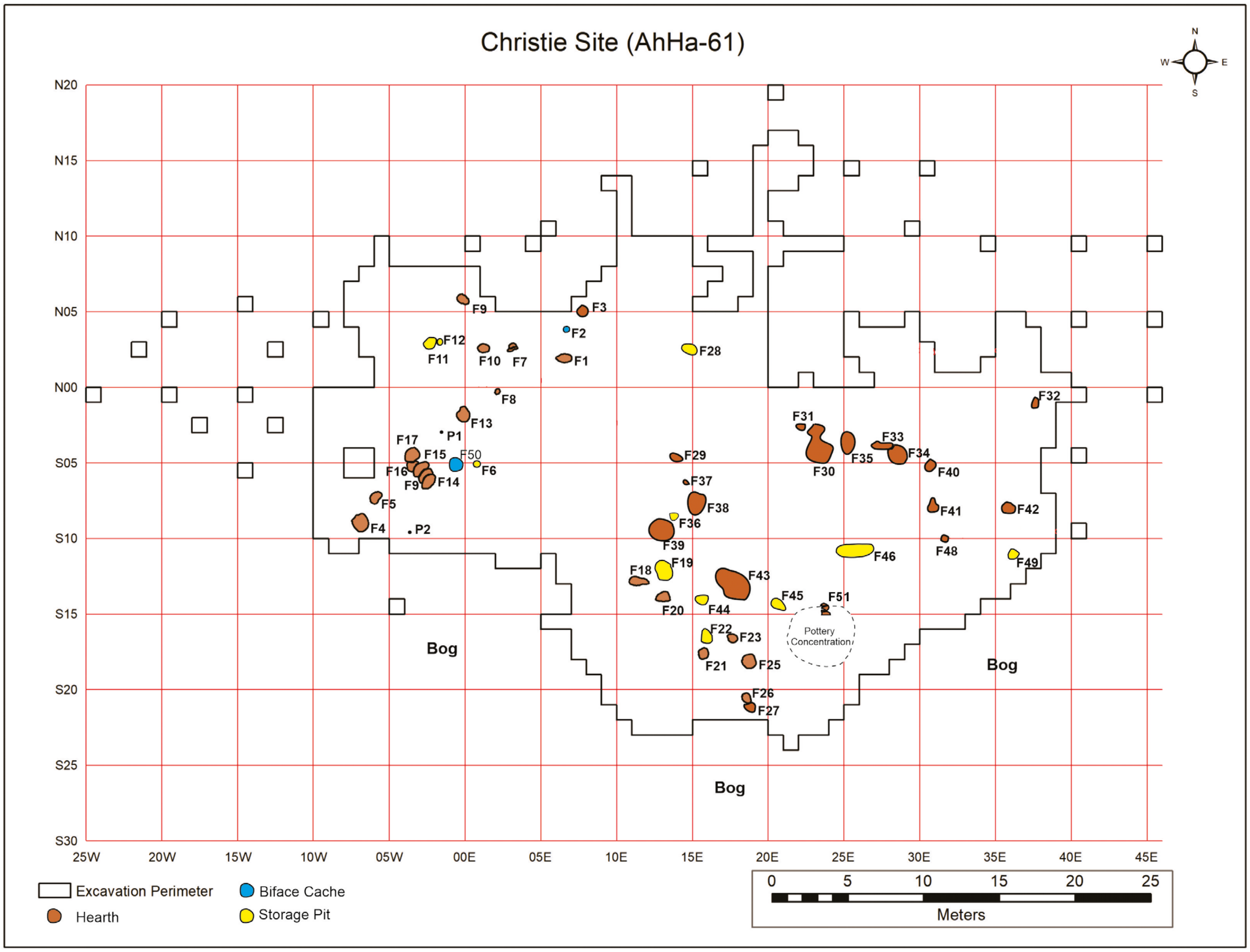

Figure 2: Christie Site Plan Showing the Location of Subsoil Features

two samples from each feature was so that the dates would hopefully support one another.

Results

The results of the AMS dating are provided in Table 1. The possible maize cupules date to 390±30 BP and 360±30 BP, one nut fragment is in the 360±30 BP range, and the second is in the 900±30 BP range. None of these dates fall within the expected range of 400 BC to 900 AD for the Middle Woodland/Princess Point occupation (Spence, Pihl, and Murphy 1990; Fox 1990). When I questioned the results, Ron Hatfield, President of Beta Analytic, noted that these dates are accurate for the material submitted and, although two samples were identified as maize and two were identified as nutshell, all four returned $\delta^{13}C$ ratios that are generally associated with nutshell rather than maize. Maize is usually between -9 to -14 o/oo and nutshells between -22 to -30 o/oo depending on the species of nutshell (Ron Hatfield, personal communication, 2023), suggesting that all of the submitted samples were nutshell.

Discussion

None of the dates from the four Christie samples fit within the expected time range for the Middle Woodland/ Princess Point occupation of southern Ontario. The two dates from Feature 44 and the later date from Feature 46 are comparable (ca. 1450 to 1600 AD) and therefore indicate what was presumably a single intrusion into the

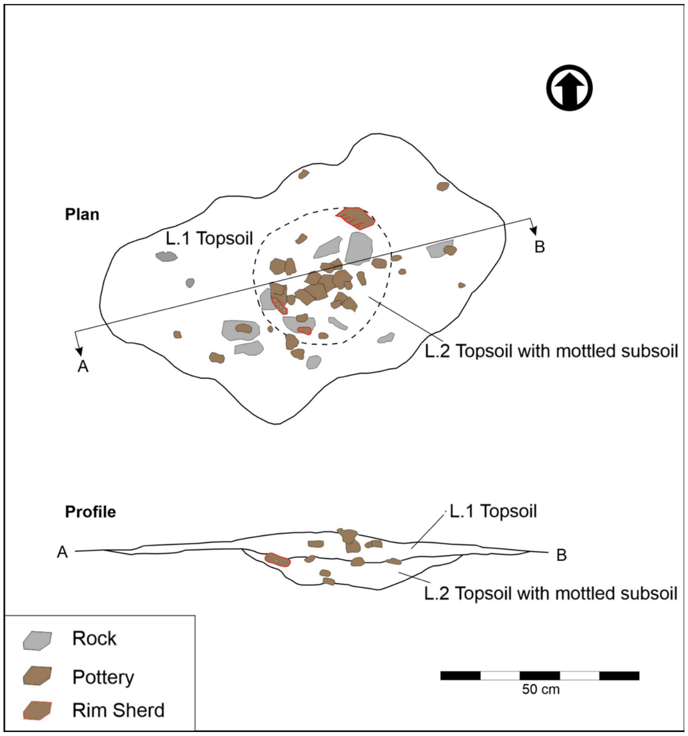

Figure 3: Feature 44 Plan and Profile

Figure 4: Middle Woodland Era Ceramics from Feature 44, Exterior

Figure 5: Middle Woodland Era Ceramics from Feature 44, Interior

Christie site. The earlier date from Feature 46 (1116 to 1219 AD) seems late to be associated with a Princess Point era vessel. There are no diagnostic artifacts at the Christie site from the 1116 to 1219 AD range or the 1450 to 1600 AD age range, so the question remains how did similarly dated botanical samples end up in features located about 10 m apart (Figure 2) containing temporally distinct artifacts.

When in use, each feature would originally have been a hole dug through the topsoil and into the subsoil. When the people who called the area now known as the Christie site home moved on, the hole would presumably have been left open and the material inside left to decompose leaving a depression. The depression would subsequently fill with forest debris, which would also eventually decompose. This repeated long-term process would gradually fill the hole with debris that would eventually become topsoil. It should be noted that a topsoil depression was noted above Feature 46 but Feature 44 was beneath a tree so no depression was identified.

Further to this, during the excavation of the Christie site, paleopollen core samples were taken from the adjacent bog by a team from Brock University (Parkins and McCarthy 1994). No maize pollen was found in the core samples, but the results of the coring indicated that the bog was a fast-flowing creek until about 2900 BP, when it became a swamp presumably because a landslide downstream from the site blocked the flow of the creek. The paleopollen analysis also indicated that this valley had multiple forest fires through time, and that "(t)he presence of charcoal at several intervals in the core suggests that fires occasionally swept through the area over the last 2900 years, but fires appear to have been commonplace only between 1400 and 180 yBP (sic)" (Parkins and McCarthy 1994:5). Given this, it seems possible that a forest fire about 360 – 400 years BP burned the debris on the forest floor that had slumped into the feature depressions. A forest fire at about 900 years BP would also explain the earlier date from Feature 46.

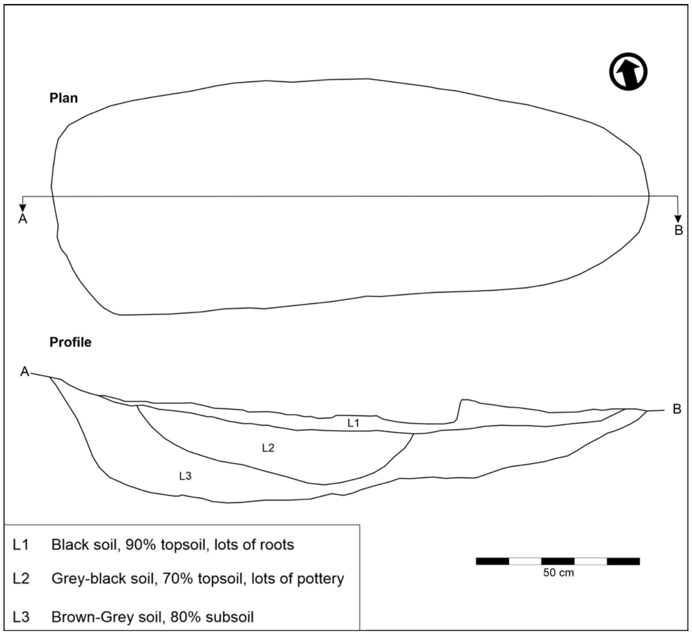

Figure 6: Feature 46 Plan and Profile

ID	Submitter ID	Material	14C yr BP	Cal AD
Beta - 643354	Sample 1: Christie Site Feature 44 L2	Charcoal – cf. Maize cupule	390±30	(66.9%) 1442-1524 (28.5%) 1571-1630
Beta - 643355	Sample 2: Christie Site Feature 44 L2	Charcoal – cf. juglans	360±30	(49.9%) 1540-1634 (45.5%) 1456-1529
Beta - 643356	Sample 3: Christie Site F46 L3	Charcoal – dicot/cf. acorn	900±30	(60.5%) 1116-1219 (34.9%) 1042-1108
Beta - 643357	Sample 4: Christie Site F46 L3	Charcoal – cf. maize cupule	360±30	(49.9%) 1540-1634 (45.5%) 1456-1529

Table 1: Radiocarbon dates from The Christie Site.

Unfortunately, these charred paleobotanical samples were selected and submitted for radiocarbon dating.

If the Christie site had been in a farm field, this slump of forest debris within the upper layers of the feature would have been churned up and obliterated by mechanical ploughing, leaving only the lower levels as features. Given this, samples recovered from the ploughzone site features are potentially less likely to be contaminated by burnt forest debris.

Figure 7: Princess Point Era Rim Sherd from Feature 46, Exterior

Figure 8: Princess Point Era Rim Sherd from Feature 46, Interior

One final note on the radiocarbon dating from the Christie site; in hindsight it would have been better to date the possible maize cupules first and, if the results were in line with my expectations, then submit the nut fragments for radiocarbon dating. Unfortunately, this did not occur to me until after the dates were returned.

Conclusions

Given the above, the following has been learned from the radiocarbon dates from the Christie site.

The palaeobotanical samples from Christie returned radiocarbon dates that are more recent than I expected. These dates are possibly the combined result of the slump of forest debris into the holes/features, decomposition of this debris, and forest fires. Even so, the dates from the cf. maize cupules at Christie are still an important research contribution. Even though these samples were associated with Middle Woodland/Princess Point era vessels, the cf. maize samples do not date to the corresponding periods. If the cf. maize cupules had not been dated, I would have interpreted their presence as indicating that the people who lived at Christie were growing or at least using maize as part of their lifeway. Given the dates returned, there is currently no known evidence that maize was part of the Middle Woodland era diet at the Christie site. Finally, two of the samples selected for dating were identified as possible maize cupules, however the signature returned from the radiocarbon analysis suggests that they are nut fragments. Although I am unsure how to use this bit of information, I wanted to make sure it is available for others doing paleobotanical research.

In part, this is a cautionary tale on things to consider when sampling subsoil features on unploughed sites for radiocarbon dating. The slump of forest debris and subsequent forest fires possibly had an impact on material recovered from the subsoil features at Christie. It will be best to also take this into consideration when interpreting the lifeway and diet of the people who lived at Christie, but any further samples for radiocarbon dating must come from the lowest feature levels.

Hopefully, I will be submitting more samples for radiocarbon dating and the results will assist my understanding of the Christie site and how it fits within the Middle Woodland/Princess Point era occupation of the Ancaster area, and more broadly across southern Ontario. One thing is certain, I will be more selective in the samples that I choose to submit for dating.

Acknowledgements

Funding for the radiocarbon dates discussed in this report was provided by the Valerie Sonstenes Student Research Fund through the Ontario Archaeological Society, by the Christine Nelson Graduate Award for Research in Archaeology and Bioarchaeology from the Anthropology Department, Western University, and through the Graduate Research Awards Fund from Western University. My research has been supported by an Ontario Graduate Scholarship and a SSHRC Doctoral Fellowship. I would like to thank Breanne Riebl and Rudy Fecteau for identifying the paleobotanical samples that were submitted, Lara Wood for reviewing an earlier version of this manuscript, Jeff Seibert and Denise McGuire, Regional Archaeologists, MTO, for their assistance, and the Ontario Ministry of Transportation for allowing access to the Christie site for my research.

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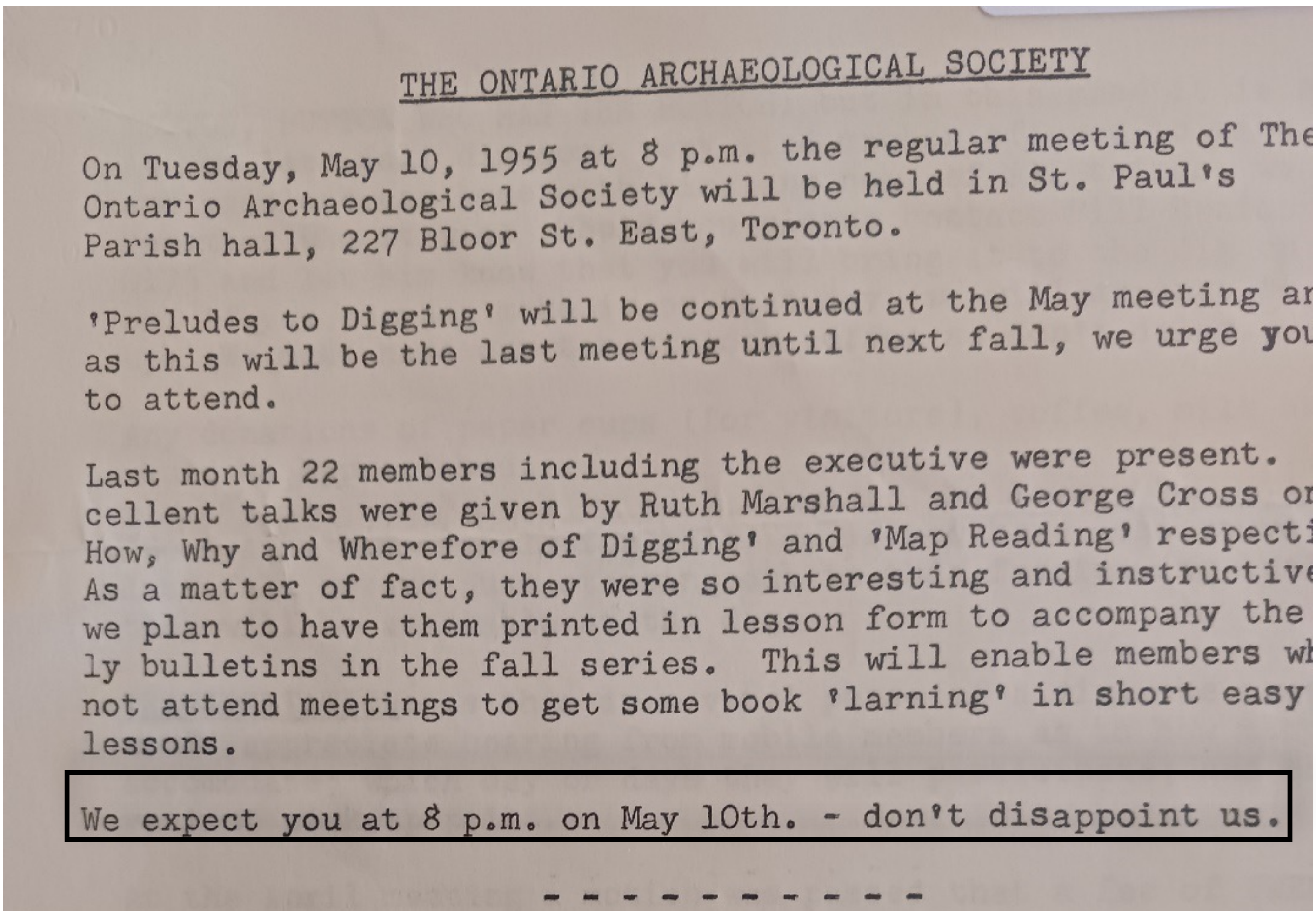
From the OAS Office: High school co-op student helps with office clean-up

By Kaitlyn Malleau

As we leave the pandemic further and further behind, I am happy to report that the OAS office, nestled within the Ashbridge Estate heritage building in Toronto, continues to look a little more cheerful every passing day. After working my way through a few strata of old OAS records, I finally seem to be hitting the floor—an exciting achievement in this context! And though the office clean-up is still not quite finished, we are well on our way to being able to transfer a good majority of our paper files to the Archives of Ontario by the end of the year, ensuring the preservation of our Society's history.

I could not have done it alone, however. This past winter semester, the OAS office had the opportunity to take on a co-op student from a nearby high school: Matthew Alabaszowski from Monarch Park Collegiate Institute. As part of his co-op, Matthew worked at the OAS office for 2.5 hours every afternoon from March to the end of the school year in June. While we were occasionally able to rustle up some more interesting tasks for him to work on—for example, he gained artifact handling experience in helping to inventory the OAS Teaching Collections and field experience when the Ontario Heritage Trust arrived one day to test pit the



THE ONTARIO ARCHAEOLOGICAL SOCIETY

On Tuesday, May 10, 1955 at 8 p.m. the regular meeting of The
Ontario Archaeological Society will be held in St. Paul's
Parish hall, 227 Bloor St. East, Toronto.

'Preludes to Digging' will be continued at the May meeting ar
as this will be the last meeting until next fall, we urge you
to attend.

Last month 22 members including the executive were present.
cellent talks were given by Ruth Marshall and George Cross or
How, Why and Wherefore of Digging' and 'Map Reading' respecti
As a matter of fact, they were so interesting and instructive
we plan to have them printed in lesson form to accompany the
ly bulletins in the fall series. This will enable members wh
not attend meetings to get some book 'larning' in short easy
lessons.

We expect you at 8 p.m. on May 10th. - don't disappoint us.

\- - - - - - - - - - -

A stern reminder to show up to the May 10th OAS meeting! (From a 1955 issue of *Arch Notes*.)

MEMORANDUM TO MEMBERS

On May 22nd, 23rd and 24th will be held the "Spring Dig" of the O.A.S. We regret the fact that the location of the site has not as yet been definitely established.

Will all who are planning to attend kindly (a) contact Bill Renison, HU.1-0175; Helen Devereux, BA.1-2227; John Fuller, HU.9-2728 (available also during the day); or the Secretary; OR (b) return this notice with written detail - i.e. (1) days on site; (2) if driving own car - how much space available for passengers (3) if transportation is required.

Don't forget your Lunches, rubber boots, mosquito lotion, and Tools!

Fee: 75¢ per person for the "dig" - to defray costs of coffee, milk, sugar, etc..

Further information will be available by Monday, May 17th.

Coffee is always a priority on an archaeological excavation! (From a 1954 issue of *Arch Notes*.)

Ontario Archaeological Society

Toronto, Ontario

On Tuesday, January 17th, 1956 at 8 P.M., the regular meeting of The Ontario Archaeological Society will be held in St. Paul's Parish Hall, 227 Bloor St. E., Toronto.

PLEASE NOTE THE DATE - the seventeenth. Due to circumstances beyond our control, we are forced to postpone the January meeting for one week.

Last month's meeting was, to say the least, a floperoo! as far as a business meeting is concerned. TWELVE people attended the meeting - of the twelve, two were new members (a fine example was set for them) and one, a friend of a member. The remainder, outside of the executive, were the usual staunch, loyal, active members who attend 95% of all meetings and take part in the activities of the O.A.S.

The all-important question of Incorporation was to have been put to a vote, but much to our regret and disappointment this could not be done. If you will read over your copy of the Constitution regarding a Quorum, it reads "Quorum shall comprise twenty members of the Society for general transaction of business". Now, you can readily understand that with only eleven members present, plus one vote by mail, no definite 'pro' or 'con' could be ascertained. However, the ELEVEN unanimously agreed on Incorporation, but we must have your support on January 17th. or the O.A.S. will be stopped in its tracks.

From a 1956 *Arch Notes* issue—turns out it's always been difficult to attract members to our ABM!

property's fence line—the majority of his co-op hours were spent sorting the massive collection of *Arch Notes* prints that we had accumulated over the years. Not only did Matthew put together a complete reference collection for the OAS office, but he was able to scan the issues that were missing on our website! (Coming soon to a webpage near you: https://ontarioarchaeology.org/resources/publications-2/arch-notes/)

There were times when looking through old *Arch Notes* issues were amusing (the OAS Executive have tried various strategies to get members out to meetings it seems…) and times when they were interesting (chipping in $0.75 for coffee would get you onto an OAS dig in 1954!). But I know that many days, sorting and scanning *Arch Notes* was not the most glamourous work! It is a credit to Matthew's diligence that he was able to finish this momentous task.

During his last week working in the OAS office, Matthew and I pulled out some of the 1993 OAS EduKits from the basement. I then asked him to propose an educational program geared towards his fellow high school students using some of the materials the OAS already had on hand. Matthew was excited to bring several fresh ideas to the table—and the Director of Education, Jake Cousineau, and the Director of Outreach, Craig Ramsoomair, are anxious to discuss his proposal further!

One thing that surprised Matthew about working in the OAS office was how much paperwork is involved, "I knew things like [artifact provenience] and keeping records on digs [were] incredibly important, but I never realised just how much time and effort it takes to manage all the documentation around archaeology." Matthew's major takeaway from his co-op program was "[t]hat archaeology is an interesting, expansive field that involves so much more than just excavations." Matthew believes that archaeology will make up at least a part of his future, "I learned so much from my time at the OAS, I've learned how fun and rewarding archaeology can be… My plan right now is to pursue a degree in history or [anthropology] in order to be an educator, while continuing to involve myself with the Ontario Archaeology scene by working at digs over the summer."

To thank him for all his hard work, we gifted Matthew a small field kit (including a hand tape, a plumb bob, root clippers, and of course a Marshalltown trowel), which we hope will serve him well this summer on the Boyd Archaeological Field School!

Thanks again for all your work, Matthew! Here's hoping you stay cool and have fun at your field school this summer!

Matthew brandishes his new Marshalltown as he stands beside a leaning tower of boxed *Arch Notes*.

Introducing the new Executive Director of the OAS and the new *Arch Notes* co-editor

Kaitlyn Malleau, Executive Director of the Ontario Archaeological Society

Always fascinated by human stories in all their forms, archaeology has always been a natural fit for Kaitlyn (she/her). An Ontario-focused archaeologist, Kaitlyn has accumulated 10 years of experience working in the field of Ontario archaeology in various roles including researcher, lab and field technician, and field director. She received her training at Laurentian University (B.Sc.) where she assisted in research relating to Wendat subsistence practices, as well as Western University (M.A.) where she learned lithic analysis pursuing research relating to Genesee point-making practice communities. After completing her M.A., she joined the ranks of CRM archaeologists where she enjoyed the challenge of completing a quality Stage 2 survey. Before becoming the Executive Director, Kaitlyn had a long history of volunteering for the OAS, and she is very excited to serve the organization in this new capacity! Outside of archaeology, Kaitlyn likes to express her creativity through screenwriting and experimenting in the kitchen with plant-based cooking.

Tiziana Gallo, *Arch Notes* Co-editor

In 2010, after working for twelve years as a chef, Tiziana Gallo began studying archaeology and working in CRM in Saguenay, Quebec. Her first field school experience was on a Maritime Archaic site with a rich groundstone assemblage, which motivated her to pursue an MSc at Université de Montréal to better understand this understudied artifact category. In 2016, she moved to Toronto to study groundstone celts from ancestral and historic Wendat sites, and obtained her PhD from UofT in 2022. Now a Rebanks Postdoctoral Fellow at the Royal Ontario Museum, her work focuses on objects in the museum's antiquarian collections and helps retrace their different shaping techniques, uses, and relations: to each other, people, materials, and places. When she is not looking through a microscope, writing, or experimenting with stone tools, she can be found knitting, upcycling vintage clothes, or playing the guitar. Tiziana is exicted to join Sarah Timmins as new co-editor of *Arch Notes*!

Regional Chapters

Grand River

President: Chris Dalton
Vice President: Chris Watts
Treasurer: Bonnie Glencross
Secretary: TBA
Website: https://sites.google.com/site/grandriveroas
Facebook: https://www.facebook.com/OAS-Grand-River-Chapter-1530572620573825
Meetings: 2nd Tuesday of each month, Sept.-April Psychology, Anthropology, Sociology building (PAS) 1241 (First Floor), University of Waterloo (South Campus)
Membership: Individual $20, Student $15

Hamilton

President: Emily Anson
Vice President: Jacqueline Fisher
Treasurer/Membership: Ruth Macdougall
Events Co-ordinator: Martha Tildesley
E-mail: oashamiltonOAS@gmail.com
Website: http://hamilton.ontarioarchaeology.org
Facebook: https://www.facebook.com/groups/1453543678209795
Phone: (647) 449-0668
Meetings: 7:30 pm on the 3rd Thursday of the month, Sept. to May, Fieldcote Museum, 64 Sulphur Springs Road, Ancaster
Membership: Individual $11, Family $18

Huronia

President: Victoria Brooks-Elder
Vice President: Dayle Elder
Treasurer: Jamie Hunter
Past-President: John Raynor
Email: huronia.oas@gmail.com
Website: http://huronia.ontarioarchaeology.on.ca
Facebook: https://www.facebook.com/Huronia-ChapterOfTheOntarioArchaeologySociety
Meetings: 7:00pm on the 2nd Wednesday of the month, Year Round at the Midland North Sports and Recreation Centre
Membership: Individual $15, Family $18 Student $10

London

President: Chris Ellis
Vice President: Lafe Meicenheimer
Treasurer: Jim Keron
Secretary: Nicole Aszalos
Directors: Rebecca Parry, Larry Nielsen
KEWA Editors: Christine Dodd, Chris Ellis & Chris Watts
Website: http://oaslondonchapter.ca/
Facebook: https://www.facebook.com/londonoas
Email: oaslondonchapter@gmail.com
Mail: Museum of Ontario Archaeology, 1600 Attawandaron Rd., London, ON N6G 3M6
Phone: (519) 473-1360
Fax (519) 473-1363
Meetings: 7:30 pm on 2nd Thursday of the month except May–August; at MOA
Membership: Individual/Family $18, Student, $15, Institutional $21

Ottawa

President: André Miller
Vice President: Stacey Girling-Christie
Secretary: Carol Pritchard
Treasurer: Bill MacLennan
Directors at large: Glenna Roberts, Ben Mortimer, Elizabeth (Libby) Imrie, Stephanie Carles, Philippe Trottier & Chris Kerns
Ottawa Archaeologist Editor: Chris Kerns
Web master: Yvon Riendeau
Peggi Armstrong Public Archaeology Award: Lois King
Website: www.ottawaoas.ca
Facebook: https://www.facebook.com/Ottawa-Chapter-of-the-Ontario-Archaeological-Society-582145708470231
Email: ottawaoas@gmail.com
Mail: PO Box 4939, Station E, Ottawa ON K1S 5J1
Meetings: Every 3rd Thursday of the month from Sept. to May; usually at Routhier Community Centre, 172 Guigues Street, Ottawa (in the Byward Market)
Membership: Individual $20, Family $25, Student $12

Peterborough

President: Tom Mohr
Vice-President: Bill Fox
Treasurer: Deb Mohr
Secretary: Dirk Verhulst
Past President: Sheryl Smith
Director of Indigenous Liaison: Julie Kapyrka
Directors at Large: Robert Pearce and Morgan Tamplin
Strata Editor: Dirk Verhulst
Website: peterborough.ontarioarchaeology.org
Facebook: https://www.facebook.com/groups/1519076065078299
Meetings: 7:00 pm on the fourth Tuesday of each month,
Membership: Individual $12, Family $15, Student $8

Thunder Bay

President: Clarence Surette
Vice-President: Dave Norris
Secretary/Treasurer: Laura Gosse
Director: Bill Ross
Wanikan Editor: Clarence Surette, Jill Taylor-Hollings, and Laura Gosse
Web Design/Photography: Chris McEvoy
E-mail: clarence.surette@lakeheadu.ca
Website: https://www.lakeheadu.ca/programs/departments/anthropology/the-ontario-archaeological-society
Meetings: 7 pm on the last Friday of the month except May-August in Room BB0017, Braun Building, Lakehead University
Membership: $10 (as of Jan. 1, 2021)

Toronto

President: Carole Stimmell
Past President: Mima Kapches
Vice President: Carla Parslow
Treasurer: Sam MacLoed
Secretary: Neil Gray Website
Profile Editor: Carole Stimmell
Website Editor: Janice Teichroeb
Website: http:/toronto.ontarioarchaeology.org
Email: TorontoArchaeology@gmail.com
Meetings: 7:30 pm on the 3rd Wednesday of the month, except June–August in U of T Anthropology Building, Room 246, 19 Russell St.
Membership: Individual $12, Family $14

Windsor

President: Amanda Black
Vice President: Rosemarie Denunzio
Secretary/Website: Barbara Johnson
Treasurer: Michael McMaster
Newsletter Editor: Zach Hamm
Media Outreach: Haylee Meloche
Website: http://sites.google.com/site/windsoroas
Email: oaswindsor@gmail.com
Facebook:
https://www.facebook.com/WindsorOAS/
Meetings: 7:00 pm on the second Wednesday of February, April, and October and the first Wednesday of December. at the Duff-Baby Interpretation Centre in Old Sandwich Town
Membership: Individual $15, Family $20, Students $5

MEMBERSHIP

	Without OA	With OA
Individual	45 (65)*	57 (77)*
Family	52 (72)	64 (84)
Student	25 (45)	34 (54)
Institutional	75 (includes OA)	
Life	800 (includes OA)	

*Effective 2017, the print version of Arch Notes will cost $20 per year to mail. Those receiving the email version of Arch Notes pay the lower fee.