Native fishing in the Great Lakes
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CHAPTER 1: CONTEXT

“It is probably true that the imaginative efforts of most ... fishermen who spent time thinking about options, such as how, when, and where they should employ their efforts to gain food, far surpassed those of modern archaeologists, who view this process as a static exercise in energetics, or who are constrained by the formal properties of idealized models.”

(Cleland 1982:777)

Introduction

Fishing was an important component of the precontact economy in much of the Great Lakes area. In the lower Great Lakes this has become especially evident recently, with improved archaeological recovery of fish remains (e.g., Cooper 1996; Junker-Andersen 1988; Lennox et al. 1986; Needs-Howarth 1997b; Needs-Howarth and Thomas 1998; Stewart 1991b; Thomas 1996a; Thomas 1996b; Thomas 1996d). There is need to develop analytical methods specific to these fish remains, in order to understand when, where, and how the fish originated: the time, location and method of catch.

This thesis presents several lines of investigation, which, in combination, offer a way to understand in detail fish subsistence strategies in the Great Lakes area. These involve using palaeoenvironmental data to understand the ancient landscape, using biogeographical data to understand local fish distribution and habitat, and using fisheries science data to understand seasonal variation in fish behaviour. They also include examining the ethnohistoric literature for descriptions of the techniques and social customs surrounding fishing in the early contact period. Moreover, they involve re-thinking the zooarchaeological data themselves – getting more information from relatively small collections of fish bones by looking at species distribution, co-occurrence, element size and state of maturity within features as well as at the site level. The approach adopted here combines information on location, season and method of resource procurement, allowing us to understand how precontact native people scheduled their time, energy, material and labour resources.

Parts of this approach have been employed by researchers working in other contexts. The multidisciplinary, comparative approach advocated here offers some additional and different ways to understand fish subsistence strategies. While it is tempting to think that it is easier to understand fish procurement because it is often more restricted in habitat and season than that of some mammals and birds, the situation is probably more complex. Key questions remain about when and where fish were caught: during the spawning-run, at a predictable location, or during other times of the year, perhaps more opportunistically or incidentally? The fisheries science literature and the zooarchaeological assemblages themselves indicate that some fish were usually caught during the spawning-run, and others usually not. In other words, procurement of many fish species was not necessarily as seasonally restricted as has sometimes been assumed, both in the published literature and in the numerous student reports that, until about ten years ago, were the main source of local zooarchaeological data and interpretation.

The approach described above is employed to investigate within-site and between-site differences in the temporal and spatial use of the local environment by the inhabitants of three precontact longhouse villages located near Lake Simcoe, Ontario. These sites range in date from the end of the thirteenth century to the turn of the sixteenth century A. D. (Table 1, 2). The inhabitants, who are broadly known as Ontario Iroquoian, based their subsistence on slash-and-burn maize horticulture, gathering, hunting and fishing (Dodd et al. 1990).

A prerequisite to zooarchaeological interpretation is the ability to differentiate between taphonomic effects (i.e. the processes operating on an animal from its death, through butchering, deposition, burial, recovery, sampling and interpretation of its bones) and real differences in time and space. Prior to interpreting fishing strategies, therefore, this thesis presents a comparative analysis of site-specific taphonomic issues, with an emphasis on fragment weights, element sizes, fish vertebrae and fish scales. The methodological potential and limitations of the fish component of the collections are discussed in detail because some of these issues have not been explored previously in an Ontario context.

The application focuses mainly on the fish remains; other aspects of the zooarchaeological assemblage are discussed primarily as a way of understanding fish bone taphonomy and fishing strategies. In order to get a broader picture of fishing strategies in the area, data from other sites in southern Ontario are also discussed. Particular attention is paid to the origins of a specialized fishery for autumn-spawning lake trout (Salvelinus namaycush), lake herring (Coregonus artedi) and lake whitefish (Coregonus clupeaformis), documented for the cultural descendants of these people, the Huron of the early contact period.

As is often the case, this research raises as many questions as it answers. It is not easy to quantify the factors that cause faunal assemblage variability, especially taphonomy and human choice. However, detailed inter- and intra-site comparisons can extend our knowledge of Iroquoian subsistence and at the same time further our understanding of the possibilities and limitations of our methods.
Research context and objectives

Despite over 50 years of intensive research on precontact sites in the area, there are still comparatively few animal bone collections from Iroquoian sites in the Lake Simcoe area that have been excavated using dry screening and/or flotation and that have been analysed by experienced zooarchaeologists. Studies of fish bones in Ontario have been characterized by a general lack of methodological and theoretical considerations. Interpretations of subsistence are mostly limited to a discussion of faunal abundance based on number of identified specimens (hereafter NISP), minimum number of individuals (hereafter MNI) or, rarely, bone weight (hereafter BW). There have been no in-depth investigations of the taphonomic factors that influence interpretation. Intra-site comparisons are often limited to broad contextual units, such as houses and middens. There have been few inter-site comparisons, apart from two theses (Hamalainen 1981; Stewart 1997), and one very general article (Prevec and Noble 1983); these focus more on mammals and birds than on fish. No comprehensive comparative studies are available for the Lake Simcoe area.

Recent work on material from the Wiacek (Lennox et al. 1986; Thomas 1993), Barrie (Needs-Howarth 1995a; Needs-Howarth and Sutton 1993; Needs-Howarth and Thomas 1998), Hubbert (Thomas 1996b), Dunsmore (Needs-Howarth 1994; Needs-Howarth and Thomas 1994a; Needs-Howarth and Thomas 1998; Thomas 1996d), Carson (Needs-Howarth 1997b) and Molson sites (Cooper 1996) indicates that precontact animal food subsistence in the Lake Simcoe area differed substantially from the generalized descriptions in recent syntheses (Dodd et al. 1990; Ramsden 1990). Subsistence strategies appear more varied in time and space, and more concentrated on fish. This calls for a refocusing of zooarchaeological research aims and methods to include ways of dealing with fish remains in detail, using additional and different approaches to those used on other classes, such as birds and mammals.

Fish bones have only been systematically recovered since the implementation of sieving procedures in the 1970s. Excavators on both academic and commercial projects usually aim for complete recovery through coarse mesh dry sieving. The government-mandated mesh size is 6.4 mm (Task Force on Self Regulation 1992); only a few archaeologists use 3.2 mm. The intensity of wet sieving and flotation sampling is uneven and neither are mandatory. Less than optimal recovery is probably a contributing factor to relatively small zooarchaeological sample sizes. Another limitation to sample size is the salvage context of most excavations; only those portions of the site to be impacted by development are excavated.

Analysis of the recovered zooarchaeological remains is uneven in scope, although draft guidelines concerning mitigative excavation (Task Force on Self Regulation 1992) do recommend that some analysis be carried out for each project. Until recently the bulk of analysis was carried out as undergraduate student projects with imposed limits on sample size. While some consultants are voluntarily complying with more specific guidelines for zooarchaeological analysis put forth recently (Cooper et al. 1995), including the requirement that “analyses must be conducted and/or closely supervised by an experienced zooarchaeologist”, these guidelines have not yet been included in any government regulations.

Collections in the study area have anywhere from 42 (Hamalainen 1974) to 1526 (Christine Dodd, personal communication, based on Lennox et al. 1986) fish bones identified below the taxonomic level of class, excluding vertebrae and scales. These fish bones are usually divided among many different deposits, with different taphonomic histories. Because there may be up to 25 different fish taxa at each site, it is rare to have a statistically valid sample per context per species – even less so per element.

There are six major causes of observed variability between the zooarchaeological samples: availability of resources; human subsistence choices; butchering and processing; preservation; recovery and analytical methods. Any of these factors alone, or in combination, can result in significantly different datasets, and it is difficult to control for this variation.

Discussions of precontact human settlement location, duration and population movement have focussed on population dynamics (Warrick 1988), conditions for maize cultivation (Campbell and Campbell 1992), secondary growth habitats (Monckton 1994), or wood for heating and house construction (Fecteau et al. 1991). The availability of animal resources traditionally has not been considered as a motivating or limiting factor in settlement and subsistence choices. There are, however, clear differences in faunal profiles, both within and between sites in the area. These differences probably result at least in part from people making choices regarding their resources, even going to some lengths to procure preferred species. It is, therefore, important to understand fishing as part of the overall subsistence strategy by determining when, where and how the occupants of these sites fished, and the relationship of fishing to other food-getting activities. Only then will it be possible to understand to what extent resources such as fish played a role in Iroquoian settlement and subsistence choices.

The samples used in this application derive from three sites, the Barrie (BeGw-18), Dunsmore (BeGw-10) and Carson (BeGw-9) sites, which differ in their temporal and spatial distribution. While these differences offer the opportunity to track changes in time and space, they also pose certain problems in interpretation. Small sample sizes and great diversity of species pose problems for statistical manipulation. Small numbers of finds in individual features are a problem, particularly at Carson, the latest site. Barrie, the earliest site, is located on a creek, immediately south of an upland area, with easy access to a large bay. The two later sites are located immediately north of the same upland area.
close to a small lake and creek, and were probably occupied within the same 100 year period. Slight environmental differences may complicate the differentiation between resource availability and human choice at the Barrie site on the one hand, and the Dunsmore and Carson sites ones on the other hand.

The sample sizes are similar, thus minimizing differential sample size as a cause of variation. Taphonomic variation also has to be taken into consideration. While it is very difficult to control for differential preservation, it appears possible to understand some of the effects of differential recovery. The latest assemblage, from the Carson site, was recovered with a smaller dry screen mesh size, and intensity of flotation also varies. It was obvious from the start that sorting out recovery differences from real differences in resource exploitation was essential. As is the case with so much zooarchaeological research, taphonomy is a recurring theme throughout this work.

Environmental context
The archaeological sites discussed in this thesis are situated between Lake Simcoe and Georgian Bay of Lake Huron, in and around the contemporary city of Barrie, Ontario (Figure 1, 2). The area that would have been exploited on a regular basis by the site inhabitants roughly coincides with the contemporary boundaries of Simcoe County. This area is bounded to the north by the Severn River, the Severn Sound (part of Georgian Bay) and the southern extremity of the Canadian Shield; to the east by Lake Simcoe and connecting Lake Couchiching; to the south by the Holland Marsh and connecting Holland River and the Oak Ridges Moraine (left by receding glaciers in the last glaciation); and to the west by Nottawasaga Bay (part of Georgian Bay) and the Niagara Escarpment (a geological formation originating over 400 million years ago). In the following discussion, Nottawasaga Bay refers specifically to the area of Georgian Bay closest to the sites.

The sites lie in the maple-hemlock section of the Great Lakes/St. Lawrence Forest Region, in a transitional area between the deciduous and the coniferous/deciduous Canadian Biotic Zone. According to early Euro-Canadian surveyor records, vegetation was dominated by maple (Acer sp.), beech (Fagus grandifolia) and basswood (Tilia sp.), with eastern hemlock (Tsuga canadensis), white pine (Pinus strobus) and oak (Quercus sp.) as secondary dominants (Heidenreich 1971:63).

The major physiographic regions in the immediate vicinity of the sites are the “Simcoe Uplands” and the “Simcoe Lowlands.” The uplands consist of a series of broad rolling till plains about 85 metres above the adjacent lowlands (Wilson and Ryan 1988:209). The sandy soils of these uplands are well drained, with low to moderate natural fertility. The main sources of water are the numerous streams that feed the permanent lowland streams. The Simcoe Uplands are separated by a series of steep-sided, flat-floored valleys and basins known as the Simcoe Lowlands. These consist largely of poorly drained silts and clays with eastern hemlock, maple and basswood swamps. The section of the Simcoe Lowlands located in the basin of the Nottawasaga River, however, contains sandy and loamy soils of low natural fertility, with cedar (Thuja sp.) swamps (Heidenreich 1971:70), including the extensive Minising Swamp.

The largest river in the area is the Nottawasaga River, which flows northward into Nottawasaga Bay. The numerous creeks and rivers in the area all drain into either Nottawasaga Bay, Severn Sound or Lake Simcoe and adjacent Lake Couchiching, which in turn drain into the Severn River into the Severn sound. The area around the three sites is drained by creeks flowing into Kempenfelt Bay of Lake Simcoe, and Willow Creek, which drains into the Nottawasaga River. The area south-west of the sites is drained by the Boyne, Pine and Mad rivers, which flow eastward into the Nottawasaga River. The uplands to the north of the sites are drained by the Wye, Sturgeon, Coldwater and North rivers, which flow northward directly into Severn Sound.

Cultural context
Southern Ontario has been occupied by humans since the early Holocene (Table 1). While there are few zooarchaeological finds from earlier periods, data from the last millennium are much more abundant. At this time the area between Lake Simcoe and Nottawasaga Bay was densely occupied by (semi-)sedentary communities. Settlement in the historic period consisted of villages, satellite villages, hamlets and special purpose camps for activities such as corn horticulture and fishing. It is likely that at least parts of this pattern go back to the precontact period.

Over the last 15 years many previously known and newly discovered village sites have been excavated in the context of developer-funded mitigative excavation projects. This study focuses on faunal assemblages from three recently excavated late precontact Iroquoian horticultural villages near Kempenfelt Bay of Lake Simcoe and Little Lake, excavated in a salvage context: the Barrie, Dunsmore and Carson sites. These sites range in date from the end of the thirteenth to the beginning of the sixteenth century A. D. The site occupants are the cultural antecedents of the Huron, who were living in the area at the time of European contact, until they were dispersed by Iroquois groups from New York State starting in 1649 (Table 1).

The period from A. D. 500 to A. D. 1300 saw great cultural and economic change in Southern Ontario and New York State. The timing and correlation of maize horticulture, semi-permanent settlement and matrilocality is still being debated (e.g., Chapdelaine 1993; Crawford and Smith 1996; Snow 1994; Snow 1995; Snow 1996). Recent data from transitional/early Late Woodland Princess Point complex sites in south-western Ontario (Crawford and Smith 1996; Crawford et al. 1997) indicate that maize horticulture was being practised there by A. D. 540.
Unlike in other areas of southern Ontario and New York State, there appears to have been no in situ development of Iroquoian villages in the area between Lake Simcoe and Nottawasaga Bay in the first millennium A.D. (Table 2). There were Middle Woodland temporary spring fishing camps (Sutton 1996a:46) and there were some Early Iroquoian warm season fishing camps, but no villages. Archaeological surveys and excavations have been very intensive. Having ruled out all other explanations, Sutton (1996a) argues that the most likely reason for the lack of Early Iroquoian villages in this area is that a new population migrated into the area during the Uren substage of the Middle Iroquoian period.

The Uren substage of the Middle Iroquoian period (Table 1) saw the initial establishment of semi-permanent villages in the Lake Simcoe area. The Barrie site represents a pioneering community that originated south of Oak Ridges Moraine and migrated to the area between Lake Simcoe and Nottawasaga Bay at the end of the thirteenth century or the start of the fourteenth century, after a local gap in permanent occupation of some 500 years (Sutton 1996). The migration followed a leap-frog pattern, bypassing the area between the Oak Ridges Moraine and the southern end of Lake Simcoe. Most Middle Iroquoian sites in the area are, in fact, located within a 10 km radius of the head of Kempenfelt Bay. The Barrie site is located at the end of the most direct canoe route from the north shore of Lake Ontario, via the Humber River, the bush trail across the Oak Ridges Moraine, the Holland River and Cooks Bay. It is suggested (Sutton 1996a) that the improved climate of A.D. 1000 to 1200 (Baerreis et al. 1976) was one of the inducements for some Middle Iroquoian groups to move north into the area between Lake Simcoe and Nottawasaga Bay. The only other site that may date to the Uren sub-stage of the Middle Iroquoian period is the recently excavated Holly site (BeGw-58), located a few kilometres south of the Barrie site (Ron Williamson, personal communication 1999).

The Middle Iroquoian period was a time of rapid changes in population size, the emerging of new settlement-subsistence systems, an increasing formalisation of socio-political organization, and an increasing homogenization of certain aspects of material culture throughout southern Ontario (Dodd et al. 1990). The Dunsmore site, dating from the mid-to late fifteenth century or very early sixteenth century, and the Carson site, dating somewhat later, from the late fifteenth century to the early sixteenth century, were part of a proliferation of permanent villages in the area. This increase in village sites is attributed to a population explosion in the fourteenth century (Wright 1966), hypothesized to result from the decreased infant and juvenile mortality and increased fertility that accompanied a markedly increased reliance on corn horticulture (Noble 1975:37; Trigger 1985:99; Warrick 1988:343-346).

Middle and Late Iroquoian sites located close to the Barrie, Dunsmore and Carson sites include the previously mentioned late thirteenth-early fourteenth century Holly site, two early-mid fourteenth century sites, and one mid-late fourteenth century. There is also a cluster of sites slightly further south, along the tributaries of Lover's Creek, and there are two early-mid fourteenth century sites on the north side of Little Lake. Many of these sites are known only through surface survey or small-scale test excavations (Robertson and Ramsden 1996a).

In general, Iroquoian settlements consisted of large, permanently occupied villages with many multi-family longhouses and large external refuse deposits. The three sites that are the focus of this work were probably each occupied for at least 20-30 years, after which time the communities moved to a new location (Warrick 1988). In the contact period, it is thought that villages were relocated for a combination of reasons related to slash-and-burn horticulture, including soil exhaustion, construction and firewood depletion, refuse accumulation, insect infestation and disease. The close spacing of some protohistoric and contact period village clusters suggests that the new settlement catchment may have purposefully included the anthropogenic community of berry plants from the previous village (Monckton 1994). Smaller special purpose sites were located away from the villages in corn fields, or close to seasonally available resources such as fish and whitetailed deer (Odocoileus virginianus) (Ramsden 1990). Because all the excavated sites from the period A.D. 1300-1500 are villages, it is not clear yet to what extent the Huron settlement typology can be extrapolated back in time.

Subsistence in both the contact and precontact periods was based on slash-and-burn horticulture involving non-local domesticates: maize (Zea mays), and to a lesser extent beans (Phaseolus vulgaris), squash (Cucurbita pepo) and sunflower (Helianthus annuus). Tobacco (Nicotiana rustica) was used for medicinal and ritual purposes, although most tobacco may have originated via trading with other Iroquoian groups outside the area (Heidenreich 1972:69). While the area between Lake Simcoe and Nottawasaga Bay lies close to the northern limit for corn horticulture, the mean annual frost free period and mean annual temperature are, in fact, sufficient for the Eastern Complex maize variety to mature (Monckton 1992).

Based on ethnohistorical records, Heidenreich (1972:58) estimates that corn represented about 65 percent of the Huron diet, beans and squash 15 percent, gathered plant foods five percent, meat five percent and fish 10 to 15 percent. Palaeobotanical data from five Huron villages (Monckton 1992), however, indicate that up to 25 percent of dietary calories may have come from non-cultivated plant foods, especially dried fruit. Indeed, deposition of the seeds of wild berries such as bramble (Rubus spp.) and strawberry (Fragaria sp.) in refuse and human faeces around the village may have fostered anthropogenic plant communities (Monckton 1994). Ratios of $^{13}$C in human bone indicate that by A.D. 1400 maize may have contributed 50 percent of the carbon in the diet. Some of the $^{13}$C enrichment may
have resulted from human consumption of the meat of dogs (Canis familiaris), which may have been fed maize, and deer, which may have browsed on stands of corn. The $^{15}$N content in human bones indicates that beans were not a major food source. It appears, therefore, that fish and meat remained the main sources of protein in the human diet even after the adoption of horticulture (Schwarz et al. 1985). The only domesticated animal resource was the dog. In the contact period this animal was eaten by the Huron, apparently mostly in the context of religious ceremonies (Sagard 1939:220, 226). Ongoing isotopic analyses are aimed at further elucidating the dietary role of maize in southern Ontario (Ron Williamson, personal communication 1999).

It has been suggested (Chapdelaine 1993:178) that Iroquoian men were very mobile between April and November, while women seldom left the village for a lengthy period. Based on ethnographic sources it is likely that women and children focussed on local gathered resources, while men were more involved with hunting and fishing. Both men and women may have been involved in the trapping of fish and smaller mammals, such as squirrels and muskrat. The contact period Huron engaged in mass deer hunting drives in areas further south, towards Lake Ontario (Heidenreich 1971:207). There is no evidence from precontact sites in the area for such intensive deer exploitation (Robertson et al. 1995). Heidenreich (1972:71) suggests that in general hunting by the contact period Huron brought small returns. In contrast, he argues that fish were a plentiful resource that reproduces rapidly. Fish were in many ways more predictable and reliable in terms of location and seasonal habits, they were easy to catch, and could be dried and stored for long periods of time. According to Heidenreich it is not surprising that for the Huron fishing was more important than hunting (Heidenreich 1971:212).

Some of the numerous trails used by the Huron (Hunter 1906) may have been in use in earlier times, thus allowing for easy movement between different locations in the area between Lake Simcoe and Nottawasaga Bay. It is likely that the communities in the area between Lake Simcoe and Nottawasaga Bay were in contact with other Iroquoian communities south of the Oak Ridges Moraine. Ethnohistoric accounts indicate that the contact period Huron traded ceramic pots, chert, maize, fishnets and tobacco to the hunter-gatherer Algonkian-speaking people on the Canadian Shield to the north, in exchange for native copper, dried berries, dried fish, furs, reed mats and meat (Heidenreich 1971). The Algonkian-speaking Odawa, located on the Bruce Peninsula, appear to have played a pivotal role as middlemen in the trade between the Iroquoian groups and Algonkian groups in the French period (Smith 1996). The precontact origins of regional trade contacts are reflected in finds at the Barrie site of a native copper needle, small amounts of Hudson Bay Lowland and Detour chert that must have come from northern Ontario, probably via the Odawa (Sutton 1996a:128), as well as Onondaga chert from the Iroquoian-speaking people in south-western Ontario.