Journal of Archaeological Science: Reports xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Journal of Archaeological Science: Reports

journal homepage: www.elsevier.com/locate/jasrep

Maize provisioning of Ontario Late Woodland turkeys: Isotopic evidence of seasonal, cultural, spatial and temporal variation

Zoe Morris [a,*], Christine White [a], Lisa Hodgetts [a], Fred Longstaffe [b]

[a] Department of Anthropology, University of Western Ontario, Canada
[b] Department of Earth Sciences, University of Western Ontario, Canada

ARTICLE INFO

Article history:
Received 1 August 2015
Received in revised form 7 June 2016
Accepted 9 June 2016
Available online xxxx

Keywords:
Wild turkeys
Late Woodland
Carbon and nitrogen isotopes

ABSTRACT

The isotopic composition ($\delta^{13}C$, $\delta^{15}N$) of bone collagen from Ontario Late Woodland archaeological turkeys was compared with that of modern Ontario wild turkeys, and archaeological turkeys from American Southwestern, Mexican and other Woodland sites to determine whether Late Woodland Ontario peoples managed wild turkeys by provisioning them with maize, the only isotopically distinct horticultural plant at that time. Despite the fact that humans from Late Woodland Western Basin and Iroquoian traditions consumed equal amounts of maize, wild turkeys utilized by the two groups exhibit different diets. Western Basin turkeys reflect a C_3-only diet, whereas Iroquoian turkeys were consuming significant quantities of maize (a C_4 plant). Both groups of archaeological turkey consumed less maize than modern wild turkeys with access to waste left in fields by mechanized agriculture, but because ancient crop yields were much lower, we suggest that Iroquoian turkeys must have been provisioned, probably to create a reliable and nearby hunting niche (Linares, 1976). Archaeological and isotopic evidence supports ethnohistoric accounts that turkeys were hunted after the fall harvest. Iroquoian archaeological turkey diets, in general, reflect the seasonal consumption of maize that would have been created by cold weather maize provisioning, with the major exception of one turkey from an Attawandaron (Neutral) site that appears to have been fed maize year round. Motivations for provisioning by Middle Ontario Iroquoian people likely included climate change and ritual/ceremonial activity as well as a reliable food supply. Because Iroquoian women controlled the harvest, it is likely that they were instrumental in altering this human/animal interaction, creating a position on the wild/domesticated continuum that is unique in the North American archaeological literature.

1. Introduction

Isotopic studies of archaeological fauna in southwestern Ontario, Canada, (Fig. 2), were originally conducted primarily to reconstruct food webs for use in interpretation human isotopic data (Katzenberg, 1989, 2006; Pfeiffer et al., 2014; van der Merwe et al., 2003). Here we use isotopic zooarchaeology; (1) to enable an understanding of human/animal interactions, especially those related to the wild *versus* domesticated animal continuum, (2) to infer landscape use/change related to those interactions, and (3) to reconstruct ancient subsistence and hunting strategies and their relationship to cultural ideologies. A widely accepted definition of domestication is the selection of genetic/morphological modifications for human benefit (Bökönyi, 1969; Branford Oltenacu, 2004; Clutton–Brock, 1994; Harris, 1996; Ingold, 1994). Although this definition enables easier morphological separation of wild and domestic species and examination of how selected changes benefit humans, it leaves little room for understanding other human-animal interactions. For example, management of "wild" populations would not be recognized as domestication, but may still have altered natural distributions and behaviours of a species. Although the dominant definition of domestication is rooted primarily in biology, the range and nature of interactions between humans and animals is of considerable anthropological interest, and may also be part of the domestication process. For example, with or without intent to domesticate, different human behaviours associated with taming, protective herding and free-range management may initiate the process of modification, and change animal behaviours, including adaptation to evolving human landscapes and consumption of waste products discarded by humans (Harris, 1996; Ingold, 1994; Russell, 2012). The limiting dichotomy of wild *versus* domestic, therefore, has justifiably been challenged by many researchers who advocate a more fluid conceptualization or a continuum of this human-animal relationship (Harris, 1996; Ingold, 1994; Russell, 2012; Zeuner, 1963). We provide evidence here for the usefulness of the continuum approach.

The eastern wild turkey (*Meleagris gallopavo silvestris*, or *M.g. silvestris*) is native to the eastern United States and southeastern Canada (Fig. 1) (Eaton, 1992; Godfrey, 1966; Schorger, 1966) but was extirpated from Ontario in the 1800s and only re-introduced to the region in the

* Corresponding author at: University of Western Ontario, Department of Anthropology, Social Science Centre Rm. 3326, London, ON N6A3K7, Canada.
E-mail address: zhmorris13@gmail.com (Z. Morris).

http://dx.doi.org/10.1016/j.jasrep.2016.06.017
2352-409X/

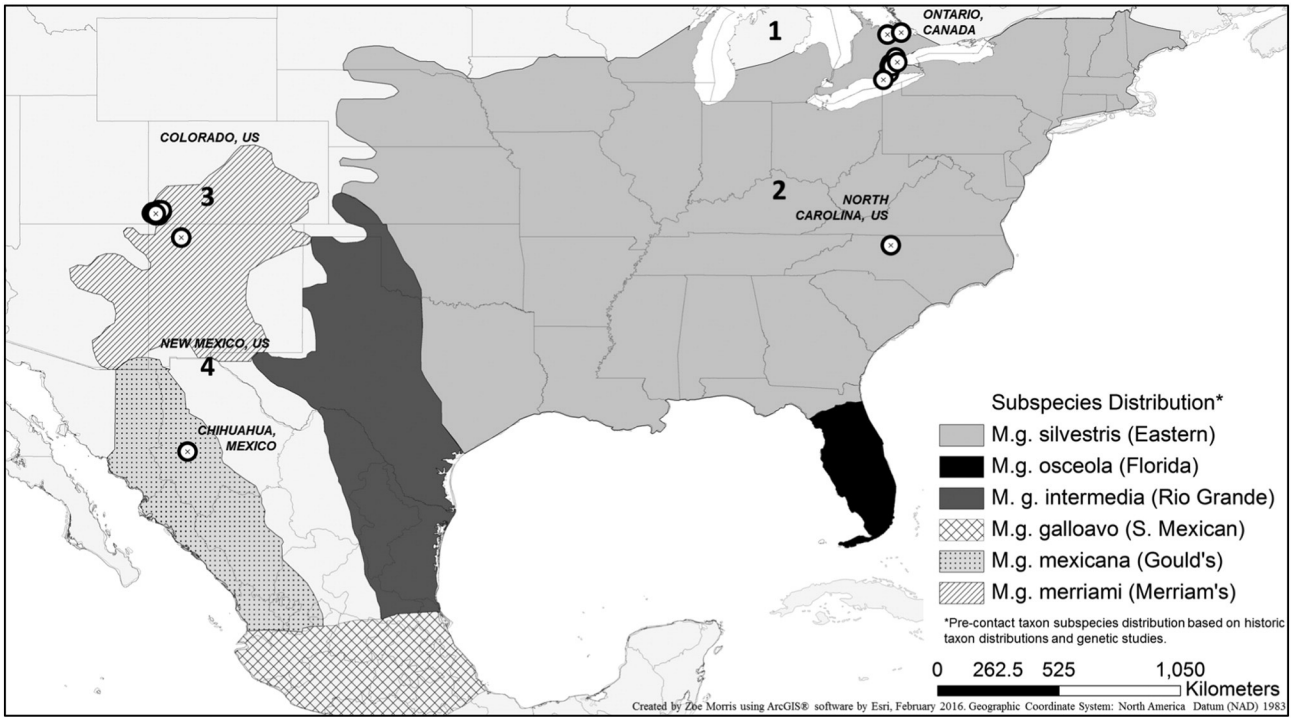

Fig. 1. Distribution of wild turkey prior to European contact and site locations discussed in text. Adapted from Speller et al. (2010: Fig. 4) (United States and Central America), Eaton (1992) (Ontario) and Schorger (1966: 43, 49) (United States and Canada). Sites with published isotope results discussed in text are marked by circles: (1) Southwestern Ontario (Katzenberg, 1989, 2006; Morris, 2015), (2) Southeastern United States (Price, 2009; Price et al., 2010), (3) Southwestern United States (McCaffery et al., 2014; Rawlings and Driver, 2010), and (4) north-central Mexico (Webster and Katzenberg, 2008).

1980s (Heckleau et al., 1982; McIlwraith, 1886; Weaver, 1989). It is highly adaptable to diverse and unstable environments (Weaver, 1989), with an equally variable diet that is dominated by hard and soft mast (Eaton, 1992; Schorger, 1966; Weaver, 1989). Maize fields are abundant in southwestern Ontario and preferred locations for wintering (Ellis and Lewis, 1967; Leopold, 1944; Weaver, 1989).

Although wild turkeys have been called crop-pests, they rarely cause crop damage. They are only capable of consuming kernels from cobs already on the ground. Cobs on standing stalks are too high for turkeys to reach in both modern and archaeological varieties of maize from this region (Kuhnlein and Turner, 1991; Waugh, 1916). Turkeys will scratch at cobs on stalks that have been knocked down by wind, water or other animals, or left in the fields after harvest (Greene et al., 2010; Groepper et al., 2013; Ontario Ministry of Natural Resources, 2007; Tefft et al., 2005; Wright et al., 1989). Their presence in fields may actually benefit farmers because insects that damage crops are an important summer food for turkeys, particularly young poults (Groepper et al., 2013; MacGowan et al., 2006, 2008; Wright et al., 1989).

Wild turkeys exhibit behavioural patterns critical for domestication, including their social nature (flocking behaviour), promiscuous mating system, strong parent-young bonding, high fertility, non-migratory behaviour, low reactivity to humans and environmental change, omnivorous diet and innate adaptability (Breitburg, 1993: 163, after Hale, 1969). The turkey was the only animal domesticated (in the strict sense) in North America prior to European contact (Beachum and Durand, 2007; Davis, 2001; Dickson, 1992; McKusick, 1986; Rawlings and Driver, 2010). There is evidence of independent turkey domestication events in the American southwest and Mexico (Mock et al., 2002; Speller, 2009; Speller et al., 2010; Thornton et al., 2012). The reason for turkey domestication is unclear. Ethnohistoric accounts suggest turkeys were domesticated for food (meat, eggs) and feathers (used in ritual) (Breitburg, 1993, McKusick, 1986; Speller, 2009; Thornton et al., 2012). Feasting involving the ritual and practical use of animals has also been suggested as a major motivation for animal domestication (Hayden, 2009). The separation of ritual and food uses of turkey may, therefore, be artificial (*e.g.*, Zimmermann–Holt, 1996) when trying to understand their domestication.

In this paper, we compare the isotopic compositions of turkeys from a subset of Ontario Late Woodland faunal assemblages with those from modern Ontario wild turkeys and archaeological turkeys from American Southwestern, Mexican and other Woodland sites. This comparison is used to aid interpretation of the faunal record and to determine whether Ontario Late Woodland peoples managed wild turkeys by provisioning them with maize. Because wild turkeys are non-migratory, terrestrial birds that opportunistically forage on available resources (Eaton, 1992; Lippold, 1974; Schorger, 1966), and maize was the only isotopically distinct horticultural plant in Woodland southwestern Ontario, they are an ideal candidate for testing this hypothesis and for use a proxy when reconstructing human subsistence behaviour and landscape change. Although there is no evidence of turkey domestication, they might have been managed and/or loosely protected by food baiting, *i.e.*, leaving maize in fields after harvest, a practice used today by hunters/farmers and conservation organizations to aid their survival or re-introduction survival (see for example the New Hampshire Fish and Games and Department of Environmental Conservation, 2014, advisory for feeding wild turkey).

Wild turkeys were ubiquitous in Late Woodland faunal assemblages, though their importance in the Western Basin Tradition and (ancestral) Attawandaron (Neutral) sites varies by site and time (Foreman, 2011; Prevec and Noble, 1983; Sadler and Savage, 2003; Stewart, 2000). It is speculated that long-term settlement use and increasing maize dependency over the Late Woodland period (900 CE to 1650) diverted labour previously used for hunting cold weather species (white-tailed deer and wild turkey) resulting in less specialized, more informal faunal procurement (Foreman, 2011; Prowse, 2008). Although maize became a dietary staple around 1000 CE for two neighbouring Great Lakes Woodland groups (Ontario Iroquoian and Western Basin) (Harrison and Katzenberg, 2003; Katzenberg et al., 1995; Pfeiffer et al., 2014; Schwarcz et al., 1985; Stothers and Bechtel, 1987; van der Merwe et al., 2003; Watts et al., 2011), these groups maintained different

Please cite this article as: Morris, Z., et al., Maize provisioning of Ontario Late Woodland turkeys: Isotopic evidence of seasonal, cultural, spatial and temporal variation, Journal of Archaeological Science: Reports (2016), http://dx.doi.org/10.1016/j.jasrep.2016.06.017