

Re-evaluating “Conservation Implications of Native American Impacts”

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Commentary On:

Oswald, W. W., Foster, D. R., Shuman, B. N., Chilton, E. S., Doucette, D. L., Duranleau, D. L. Conservation implications of limited Native American impacts in pre-contact New England. *Nature Sustainability* <https://doi.org/10.1038/s41893-019-0466-0>

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In a recent contribution to *Nature Sustainability*, Oswald and colleagues challenge what they call the “cultural management paradigm”, in which conservation initiatives and resource management strategies are based on how past human activities influenced modern ecosystems. The authors present a multidisciplinary study aimed at investigating the signatures of anthropogenic and climate-mediated fire over 10,000+ years in New England. They conclude that human-associated fires in the past had limited impact on forest ecosystems in “regions like New England” and that climate was the primary driver of wildland fire. They base these inferences on (1) the asynchronies between population spikes among Indigenous inhabitants and the presence of open canopy forests (as inferred from the pollen record in 21 lake cores and the abundance of charcoal from the same cores); and (2) the temporal correlation between the vegetation and charcoal records and that of regional climate. The authors conclude human activities were insignificant drivers of ecosystem conditions and argue that Indigenous (Native American) management is therefore overemphasized in contemporary conservation and management practices.

We appreciate the authors’ call for multi-disciplinary investigation into past human-landscape interactions and their recognition of the potential for paleo-records to inform current management practices. As archaeologists, ethnoecologists, and ecologists who have devoted much of our careers to these very issues, we are pleased to see such debates endure. We recognize how difficult it can be to detect and document the ecological impacts of human land-use in the historical-ecological, paleoecological, and archaeological records (Lepofsky and Armstrong 2018) and we have no qualms with the authors’ analyses of the archaeological and paleoecological records that they examined. We differ, however, in our interpretations of these paleorecords for conservation and management and for their implications of how past peoples engaged with the ecosystems in which they lived. Specifically, we challenge the authors’ conclusions concerning (1)

the role Indigenous peoples had in shaping past ecosystems in the Northeast and elsewhere, (2) the legacy of those actions on contemporary ecosystem functions and processes, and (3) their implications for sound and socially informed contemporary ecological management.

There is an extensive global literature indicating that the land use and management practices of past Indigenous peoples have had significant impacts on forested ecosystems. Historic and ethnographic data indicate that these practices encompassed a broad range of activities, including coppicing, pruning, selective harvesting, terracing, tilling, fertilizing, gardening, transplanting, and burning (Anderson 2005; Butz 2009; Delcourt et al. 2004). The impacts of these practices range from unintentional (Bird et al. 2016) to intentional and from ephemeral to ecologically profound (Anderson 2013; Lepofsky et al. 2003; Hoffman et al. 2017). Oswald et al.'s broad conclusion that "anthropogenic impacts on the landscape before European contact were limited" is surprising given the extensive evidence to the contrary. Oswald et al. seem to interpret the evidence that open canopy forests were historically rare to mean that Indigenous activities in general (e.g., including horticulture, agriculture, transplanting, habitation, etc.) had little impact on vegetation composition and structure. Unfortunately, it is bold, inadequately supported statements like this that are reported on by popular media (e.g., "[Native Americans did not make large-scale changes to environment prior to European contact](#)").

Indigenous peoples in New England set fires for a range of purposes resulting in diverse local ecological impacts. Abundant ethnohistoric and ethnographic evidence indicates that people used fire to facilitate travel, improve hunting, and clear land for planting (Russell 1983; Tooker 1991). While some accounts refer to parkland-like open canopy ecosystems or extensive grasslands that were likely fire-maintained (e.g., Wroth 1970) many others focus on more localized burning, such as clearing understory brush to facilitate travel, hunting, and horticulture (Day 1953). In such cases, the goal of Indigenous management would not have been regional-scale landscape change. Localized burning associated with settlements or high-use areas (e.g., Russell 1983) that might not appear in the paleorecord may still have influenced forest understory species composition and tree species composition in closed canopy forests and other ecosystems. The widespread occurrence of fire on the landscape before the arrival of European settlers is supported by the numerous fire-adapted species in the flora of New England; surveys beginning in the late 1600s indicate that pyrophilic trees were widespread in Oswald et al.'s study area (Thomas-Van Gundy et al. 2015). These lines of evidence are consistent with the interpretation that anthropogenic fire was a driver of historical vegetation structure and composition throughout eastern North America prior to European settlement (Clark and Royall 1995; Stambaugh et al. 2015; Abrams and Nowciki 2019).

Instead of concluding definitively that human-set fires played an insignificant ecological role in "regions like New England", one might ask more nuanced questions about the relationship between human-set fires and ecological processes. For instance, what are the ecological or cultural factors that might determine the detectability of Indigenous-set fires in paleorecords? Under what circumstances would we expect Indigenous management to have a footprint in the paleorecords of different types? Does

our ability to detect prescribed burning in paleoecological records differ in distinct bioregions or forest types (e.g., Hoffman et al. 2017)?

Additionally, we challenge Oswald and colleagues' broad conclusion that past Indigenous management practices are overemphasized in contemporary conservation policy and management. Although some western scientists have, in recent years, sought to incorporate Indigenous knowledge and practices into management, this has rarely translated into practice (e.g., Butz 2009; Welch and Coimbra 2019). Fire ecologists are only beginning to work with Indigenous peoples to integrate traditional management practices, including burning, into forest management, and while there has been some success, these efforts have so far been limited in number and scope (Armstrong et al. 2017). More commonly, Indigenous management practices are ignored in conservation initiatives and policy; we believe that these practices and this social context need more, rather than less attention in the development of conservation policy and management.

Dichotomizing the importance of cultural or biophysical processes oversimplifies a complex problem, since neither human nor nature is universally the protagonist of ecosystem formation and maintenance (Armstrong et al. 2017). Climate is undeniably a major driver of fire regimes in both past and modern ecosystems, but humans have long shaped ecosystems as well (Stephens et al. 2019) and interacted with climate to produce complex dynamics. This is just as important in the context of modern fire management, where prescribed fire remains a critical management tool, even in the presence of strong climate drivers (e.g. Schoennagle et al. 2016). Nonetheless, from the title onwards, Oswald and colleagues infer that the lack of fire in their record indicates minimal pre-colonial human land-use impacts of any kind, not only in New England, but also — by implication — more generally. A robust model of historical/pre-colonial Indigenous management outcomes should be consistent with all sources of evidence on the subject, in this case both the ethnographic records and the paleoecological records. Otherwise, such interpretations are not only scientifically unsound, but also devolve into less inclusive (i.e., Eurocentric) science, leading to less informed conservation policy and management.

Competing Interests

The authors declare no competing interests.

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