ETHNOBIOLOGY LETTERS

Reviews

Rivers, Fish, and the People: Tradition, Science, and Historical Ecology of Fisheries in the American West. Edited by Pei-Lin Yu. 2015. The University of Utah Press, Salt Lake City. 160 pp.

Jonathan Dombrosky[1*]

[1]Department of Anthropology, University of New Mexico, USA.
*jdombrosky@unm.edu

Received March 1, 2016
Accepted March 22, 2016

OPEN ACCESS
DOI 10.14237/ebl.7.1.2016.641

The seven chapters in *Rivers, Fish, and the People* represent some of the most recent work in historical ecology on rivers associated with salmon populations in western North America, a resource of increasing conservation concern. One of the aims of historical ecology is to help solve current environmental and/or social problems by using a deep temporal perspective to understand human-environment interactions at different scales (Armstrong and Veteto 2015; Balée 2006; Szabó 2014). The archaeological record has much to offer historical ecology (Hayashida 2005), shown by Pei-Lin Yu and the contributors to this volume, in which they demonstrate how archaeological data can be used to better think about, interact with, and manage fisheries in the North American West.

For example, Mark G. Plew and Stacey Guinn argue that the timing of different hunter-gatherer settlement patterns related to natural environmental perturbations that affected the productivity of the salmon fishery along the Snake River in southwestern Idaho. In short, they contend that a logistical foraging pattern coupled with intensive salmon fishing is best documented in the area during the late Holocene (2000–150 BP) because this period is characterized by less environmental disturbance. Conversely, pre- ca. 2000 BP was characterized by seismic activity, fire-induced erosion, floods, and landslides that would have been pivotal in shaping the Snake River channel, but that would have led to poor habitat conditions for salmon. Thus, they posit, hunter-gatherers relied on more residential foraging during this period. This argument has important implications for understanding the prehistory of the eastern Columbia Plateau, and is a revealing example of how past peoples may have used animal resources amidst environmental change. Mobility was an important option in mitigating environmental risk in the past, which is sobering given that current trends in population abundance and density may render this strategy useless in certain geographic areas.

In the chapter by Pei-Lin Yu and Jackie M. Cook, the authors develop techniques to infer the intensity of fish processing from lithic assemblages at sites where faunal remains might be absent or poorly preserved. By analyzing tabular fish-butchering tools from the Kettle Falls collection of northeastern Washington State, they show that high numbers of low-cost raw materials with relatively little retouch are characteristic of intensive salmon processing sites. They conclude that "[t]hese expedient but high-performing tools may have been a collective form of 'site furniture' left by women intending to recover them season after season" (p. 89). Yu and Cook's research is important for documenting variability in the intensity of fish processing in different cultural contexts, and could have implications for documenting areas where salmon populations thrived in the past. Using lithic studies in this way may be of great interest to conservation biologists and wildlife managers.

Kevin J. Lyons explains how to pick up the signature of past fisheries using ethnographic data and information about the life-histories of certain fish species in the Pend Orielle Basin. In this chapter, Lyons provides an excellent road map for determining

the presence of a fishery. He details different Kalispel fishing tools and methods, contemplates the preservation of such tools in the archaeological record, and discusses issues related to tool typology (i.e., set weight anchors vs. mauls). Further, Lyons shows that salmon were not the only preferred fish species consumed by the Kalispel. He demonstrates that the life-histories of bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Oncorhynchus clarkii*), and mountain whitefish (*Prosopium williamsoni*) could have allowed these species to be intensively harvested. This chapter provides a model for recognizing past fisheries in the archaeological record, but it also forces researchers to think about what exactly a fishery is and how to detect one in the archaeological record in other regions.

Jason M. Jones focuses on the exploitation of a freshwater mussel (family Unionidae) species in the lower Spokane River. He documents how the western pearlshell (*Margaritifera falcata*) was procured and cooked at four different sites in the region. Like Lyons, Jones highlights an often-overlooked food item. Freshwater mussels represent an important component of riverine subsistence strategies and variations in their procurement could have implications for the study of past hunter-gatherer groups. In addition, unionids are one of the most threatened groups of animals worldwide (Lydeard et al. 2004). Studies such as the one carried out by Jones in this volume have the potential to elucidate pre-impoundment distributions of this imperiled fauna.

Several current themes in ethnobiology are touched on by Michelle L. Stevens and Emilie M. Zelazo, such as traditional ecological knowledge, traditional resource management, and fire ecology. They propose that fire management, by the Plains Miwok in the floodplains of the Cosumnes River in central California, helped maintain the vegetation needed for making cultural materials such as baskets and fishing-related tools. Further, fire management would have rejuvenated soils while also keeping the floodplain clear of overgrowth that could block habitat connectivity for juvenile fishes. By analyzing the ichthyofaunal record at four archaeological sites, the authors argue that juvenile taxa and taxa that prefer slow water settings dominate the assemblages. Thus, intentional and somewhat large-scale habitat modification by prehistoric groups seems to be directly related to the over 1000 years of sustainable use of the Cosumnes River fishery.

Although the contributions to this volume are great examples of the historical ecological approach, it was disappointing that none of the authors engaged with the growing literature concerning applied zooarchaeology (see Lyman and Cannon 2004; Wolverton and Lyman 2012). This is surprising in that some of the best examples of what archaeological data can provide conservation science, in the larger geographic region this book focuses on, have been intertwined with (Butler and Delacorte 2004), or explicitly contextualized in (McKechnie et al. 2014), an applied zooarchaeological framework. Engaging more with the applied zooarchaeological literature might have also helped clarify a recurrent and confounding point in the book concerning the use of "frames of reference" to establish ecosystem reference conditions.

Binford's (2001) "frames of reference" are invoked as the prime archaeological way to establish ecosystem reference conditions (*sensu* Callicott 2002). Yu laments that, "In order to describe system states at a given point in time, researchers try to unpeel intervening layers of historic impacts… But historical sciences are largely inductive, so that the inconsistent validity of empirical data reduces confidence in extrapolations" (p. 4). Yu goes on to say that "Scientific approaches can alleviate this problem by identifying historic variability and trends in healthy river ecosystems, using frames of reference to characterize a system's dynamic properties (e.g., stabilizing mechanisms and thresholds), and proposing causal relationships. Hypotheses can be tested and revised through field experiments, model simulations, and controlled observations of naturally occurring phenomena…" It is clear that Yu, and other contributors to the volume, view "frames of reference" as the main archaeological device that helps solve issues with fragmentary, historically contingent datasets.

I found the use of "frames of reference" puzzling for two reasons. First, Binford's conception of establishing frames of reference is explicitly linked to organizing a large body of both ethnographic and environmental data to interpret the archaeological past (Binford 2001:3–4). Thus, what Binford was talking about was importing data from other areas of research to help support the explanatory prowess of archaeological interpretation. He was not concerned with going a step further and launching archaeological interpretations, gleaned from these frames of reference, into a future marred by habitat degradation,

species loss, and global climate change. In other words, the "frames of reference" concept was not created with contemporary management and policy implications in mind. Second, "frames of reference" is not the only way, as the volume would lead one to believe, that archaeological data can be useful in establishing ecosystem reference conditions. Another approach is to use the presence, absence, or abundance of the remains of a species, that is of current conservation concern, at an archaeological site to establish reference conditions. Such species-specific reference conditions, along with other forms of paleoenvironmental information, can then be enclosed in an ecosystem-level reference envelope (*sensu* Nabhan et al. 2014). These kinds of interpretations, common in the applied zooarchaeological literature, are a valid use of the inherently historic, time-averaged, and sometimes poorly preserved data that archaeologists have. Indeed, using archaeological data in these sorts of ways has proved quite fruitful (see discussions in Grayson 1981; Lyman 1998; McKechnie et al. 2014; Newsome et al. 2007; Peacock et al. 2005; Popejoy et al. 2016; Randklev et al. 2010; Rick and Lockwood 2013). Thus, it was somewhat shocking to read that "… the great variability, geographic scope, and time span of Native life and river environments cannot provide fine-grained data points for current conditions, for example, the population of species that should be present for a given locality" (Yu, p. 4) and "… faunal remains will always lack the probative weight to compel the restoration of endangered species' habitats on their singular merits" (Lyons, p. 122).

These criticisms aside, as Anna Marie Prentiss (p. 203) wraps up the book, she hits the nail on the head when she says, "… the chapters in this volume point us in new directions. They aptly illustrate the potential complexity of the archaeological record that accumulates at the intersection of local and regional ecology and historical tradition." It is precisely the presentation of this sort of complexity, in the context of habitat degradation that characterizes rivers in the modern North American West, that makes this work a great contribution to the historical ecology literature. Yu's volume demands from its readers that they contemplate how the dynamic uses of past river ecosystems by first peoples can be applied to rapidly changing contemporary environments.

References Cited

Armstrong, C. G. and J. R. Veteto. 2015. Historical Ecology and Ethnobiology: Applied Research for Environmental Conservation and Social Justice. *Ethnobiology Letters* 6:5–7. DOI:10.14237/ebl.6.1.2015.313.

Balée, W. 2006. The Research Program of Historical Ecology. *Annual Review of Anthropology* 35:75–98. DOI:10.1146/annurev.anthro.35.081705.123231.

Binford, L. R. 2001. *Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building Using Hunter-Gatherer and Environmental Data Sets*. University of California Press, Berkeley, CA.

Butler, V. L. and M. G. Delacorte. 2004. Doing Zooarchaeology as If It Mattered: Use of Faunal Data to Address Current Issues in Fish Conservation Biology in Owens Valley, California. In *Zooarchaeology and Conservation Biology*, edited by R. L. Lyman and K. P. Cannon, pp. 25–44. The University of Utah Press, Salt Lake City, UT.

Callicott, J. B. 2002. Choosing Appropriate Temporal and Spatial Scales for Ecological Restoration. *Journal of Biosciences* 27:409–420. DOI:10.1007/BF02704969.

Grayson, D. K. 1981. A Critical View of the Use of Archaeological Vertebrates in Paleoenvironmental Reconstruction. *Journal of Ethnobiology* 1:28–38.

Hayashida, F. M. 2005. Archaeology, Ecological History, and Conservation. *Annual Review of Anthropology* 34:43–65. DOI:10.1146/annurev.anthro.34.081804.120515.

Lydeard, C., R. H. Cowie, W. F. Ponder, A. E. Bogan, P. Bouchet, S. A. Clark, K. S. Cummings, T. J. Frest, O. Gargominy, D. G. Herbert, R. Hershler, K. E. Perez, B. Roth, M. Seddon, E. E. Strong, and F. G. Thompson. 2004. The Global Decline of Nonmarine Mollusks. *BioScience* 54:321–330. DOI:10.1641/0006-3568(2004)054[0321:tgdonm]2.0.co;2.

Lyman, R. L. 1998. *White Goats, White Lies: The Misuse of Science in Olympic National Park*. University of Utah Press, Salt Lake City, UT.

Lyman, R. L. and K. P. Cannon, eds. 2004. *Zooarchaeology and Conservation Biology*. University of Utah Press, Salt Lake City, UT.

McKechnie, I., D. Lepofsky, M. L. Moss, V. L. Butler, T. J. Orchard, G. Coupland, F. Foster, M. Caldwell, and K. Lertzman. 2014. Archaeological Data Provide Alternative Hypotheses on Pacific Herring (*Clupea pallasii*) Distribution, Abundance, and Variability. *Proceedings of the National Academy of Sciences* 111:E807–E816. DOI:10.1073/pnas.1316072111.

Nabhan, G. P., M. Coder, and S. J. Smith. 2004. *Woodlands in Crisis: A Legacy of Lost Biodiversity on the Colorado Plateau.* Bilby Research Center Occasional Papers No. 2. Ralph M. Bilby Research Center, Northern Arizona University, Flagstaff, AZ.

Newsome, S. D., M. A. Etnier, D. Gifford-Gonzalez, D. L. Phillips, M. van Tuinen, E. A. Hadly, D. P. Costa, D. J. Kennett, T. P. Guilderson, and P. L. Koch. 2007. The Shifting Baseline of Northern Fur Seal Ecology in the Northeast Pacific Ocean. *Proceedings of the National Academy of Sciences* 104:9709–9714. DOI:10.1073/pnas.0610986104.

Peacock, E., W. R. Haag, and M. L. Warren. 2005. Prehistoric Decline in Freshwater Mussels Coincident with the Advent of Maize Agriculture. *Conservation Biology* 19:547–551. DOI:10.1111/j.1523-1739.2005.00036.x.

Popejoy, T., S. Wolverton, L. Nagaoka, and C. R. Randklev. An Interpretive Framework for Assessing Freshwater Mussel Taxonomic Abundances in Zooarchaeological Faunas. *Quaternary International.* DOI:http://dx.doi.org/10.1016/j.quaint.2015.09.101.

Randklev, C. R., S. Wolverton, B. Lundeen, and J. H. Kennedy. 2010. A Paleozoological Perspective on Unionid (Mollusca: Unionidae) Zoogeography in the Upper Trinity River Basin, Texas. *Ecological Applications* 20:2359–2368. DOI:10.1890/09-1425.1.

Rick, T. C. and R. Lockwood. 2013. Integrating Paleobiology, Archeology, and History to Inform Biological Conservation. *Conservation Biology* 27:45–54. DOI:10.1111/j.1523-1739.2012.01920.x.

Szabó, P. 2015. Historical Ecology: Past, Present and Future. *Biological Reviews* 90:997–1014. DOI:10.1111/brv.12141.

Wolverton, S. and R. L. Lyman, eds. 2012. *Conservation Biology and Applied Zooarchaeology*. University of Arizona Press, Tucson, AZ.