Review of: Monteleone, K. R. B. (2019). Uncovering submerged landscapes: Towards a GIS method for locating submerged archaeology in southeast Alaska (British Archaeological Reports Int. Series, 2917). Oxford: BAR. Paperback, 132 p., 49 figures (27 in colour), 11 tables. ISBN 978-1-4073-1656-7.

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"*Uncovering Submerged Landscapes*" presents innovative research conducted as part of the Gateway to the Americas project, specifically focused on Shankan Bay on the southeast coast of Alaska. The primary focus of this research was the development and testing of a predictive model to identify submerged areas of high archaeological potential on the Northwest continental shelf of America. This follows several projects that have demonstrated a continuous occupation of this region on raised marine terraces dating to between 13,300 and 10,000 cal BP (Carlson & Baichtal, 2015; Baichtal & Carlson, 2010), at a time of significantly lowered sea level. Shankan Bay was identified as a study area of the wider Gateways project based on its palaeogeography during the period from 12,000-13,000 cal BP: an intertidal estuary with inter-connecting lakes, sheltered from the full fetch of the Pacific by Baranof Island to the west. Elevation changes in the Bay would have allowed for hills, valleys and depressions to form through all periods of reduced sea levels, and the depth of Sumner Strait, to the west, would have provided a nearby source of diverse marine resources: a highly productive environment.

The research presented is grounded in the theory that the pacific coast would have provided the earliest feasible route into the Americas after the Last Glacial Maximum. The inland, ice-free corridor between the North American Cordilleran and Laurentide ice sheets, often cited as the most likely option for this initial migration, was not viable for human occupation until 13,000 cal BP (Mandryk et al., 2001). With sites as far south as Monte Verde, Chile, at 13,900-14,200 cal BP (Dillehay et al., 2008), however, there are clear problems with this hypothesis. For decades, proponents of a pacific coastal route have cited ecological benefits of resource-rich coastlines as both a draw for populations and a resulting impetus for further migration, with the use of watercraft for movement (e.g. Dixon, 1999; Fladmark, 1975; 1979; Erlandson et al., 2015). The recent publication of the Cooper's Ferry site at 16,560-15,280 cal BP, along the Columbia river basin, lends further support to this, being the first major river system that populations moving south could have viably migrated along (Davis et al., 2019). But where is the evidence for this Pacific coastal occupation? Monteleone's work postulates that much of it has been lost to the rise in sea levels that was locally up to 165 m (Fedje et al., 2018), submerging vast tracts of once-inhabitable land. Although far from the first people to make such a claim, this work pushes the research forwards by taking a practical, evidence-based approach to finding these sites.

Embedded in a theoretical framework that combines high-level land/seascape theory, middle range theory and GIS-based low-level theory, Kelly Rose Bale Monteleone integrates a range of datasets from the archaeological and ethnographic record to the palaeogeography of the region. Ethnographies discuss seasonal land-use patterns and oral histories of traditional groups, such as the Tlingit, Haida and Tsimshain. The archaeological element looks at site locations, material cultures and isotopic studies, which address questions of whether the initial peopling of the region was already maritime adapted, a theory that has been gaining support in recent years (e.g. Dixon, 1999; Lindo et al., 2017). These data are used to create varied resolution predictive GIS-based models for the offshore region. An interesting aspect of the research is the use of both quantitative archaeological and qualitative ethnographic data to derive variables from land-use patterns, and the use of summary statistics to provide weight to aspects of each variable. With palaeoenvironmental reconstruction creating time-slices of 500 years (11,000-16,000 cal BP), the variables range from coastal sinuosity to distance from palaeolakes, coastlines and known archaeological sites.

Further statistical testing of the resulting model against archaeological sites within the study region indicates that it has useful predictive potential, as the model flags-up each location as of archaeological importance. Crucially, the sites used for this test were discovered since the creation of the model and were not used to define the input variables and their weights.

Despite this potential, the resulting two field seasons discussed in this book were not successful in identifying submerged archaeological sites: "*Technically, one site was located […] a ship that sank in 1910*" (Monteleone, 2019, 98). These words will resonate with many people involved with research into submerged landscapes; they are extremely challenging. As Monteleone points out, however, during this project only 40 m^3 of subsurface were tested for a study area of > 45,000

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km², so the chances of locating an archaeological site underwater were incredibly slim. Far from being a negative, this simply highlights the reality of this burgeoning area of research, with studies such as these building the framework for future, more focused investigations. It also raises several pertinent issues. The first is a question of scale and of reconciling what are usually ephemeral traces of archaeology with the data we collect and model. In this case, Monteleone is clear that their geophysical data collection experienced issues and, as such, they were working with an imperfect resolution of 1.5 m. At those scales, she rightly states that identification of anthropogenic traces will be problematic, particularly given the timescales involved and the resulting erosion and burial of deposits. With archaeologists often working with data collected for other purposes, with no control over line spacing and resolution, this is a common problem and generally one of funding. Mapping large areas of seabed is out of the reach of many archaeological budgets, yet a crucial part of moving submerged landscape research forwards. This is where this kind of research has the potential to be so useful: with the ability to predict refined areas of high potential using pre-existing data, study areas can be narrowed-down before even setting foot on an expensive survey vessel.

The second issue relates to how we engage with the record. The predictive model presented here provides refined search areas, and higher resolution geophysical data would allow these to be refined further still, but questions remain over how we deal with anthropogenic expressions once we have found them. This research used Van Veen grab samplers but was unable to penetrate beyond the modern mobile seabed. What is promising to see here is that future work includes the use of auger testing of high potential deposits, using divers in accessible depths out to the 12,000 cal BP shoreline (< 30 m water depth). If successful, this approach could then be used further offshore, moving from the known to the unknown, presumably replacing divers with ship-based vibrocores.

Finally, there are issues of expectation: *"What did we think we could find?"* (Monteleone, 2019, 98). It is not feasible to imagine the setting up of this project, several iterations of the model and only a few days spent in the study area to result in the discovery of archaeological material. These are huge areas to cover and refining these models will be a process of trial and error. Add to that the scarcity of prehistoric sites in general, their small size and ephemeral archaeological expression, and the chances of immediately locating archaeological sites is slim-to-none. These issues are well set-up by Monteleone at the start of this publication and rightly so; it is important to keep re-stating that whilst these projects are costly and challenging, their eventual outputs have the potential to open up this under-explored archaeological sub-discipline.

The progression of the model presented, and its efficacy in locating known onshore sites, indicates that future iterations with higher resolution geophysical mapping have great potential for the discovery of submerged archaeology. Ultimately, therefore, this work presents a thorough and critical analysis of a predictive model that has the potential to provide a cost-effective means to locate and investigate submerged landscapes on the northwest continental shelf of America. Should these sites begin to be located, their investigation has the potential to provide answers to some of the most pertinent questions about the timing and nature of migrations into this continent. This book is well worth a read from both a methodological standpoint as well as providing an interesting ethnographic and archaeological overview. It is well presented, with high quality figures throughout. Finally, it is a timely contribution to research addressing questions of early migrations to the Americas, with great potential for future work to add a tangible submerged component to the record.

References

Baichtal, J. F. & Carlson, R. J. (2010). Development of a model to predict the location of early Holocene habitation sites along the western coast of Prince of Wales Island and the outer islands, Southeast Alaska. *Current Research in the Pleistocene, 27*, 64-67.

Carlson, R. J. & Baichtal, J. F. (2015). A predictive model for locating Early Holocene archaeological sites based on raised shell-bearing strata in Southeast Alaska, USA. *Geoarchaeology, 30(2)*, 120-138. https://doi.org/10.1002/gea.21501

Davis, L. G., Madsen, D. B., Becerra-Valdivia, L., Higham, T., Sisson, D. A., Skinner, S. M., ... & Cheyney, M. (2019). Late Upper Paleolithic occupation at Cooper's Ferry, Idaho, USA, ~16,000 years ago. *Science, 365(6456)*, 891-897. https://doi.org/10.1126/science. aax9830

Dillehay, T. D., Ramírez, C., Pino, M., Collins, M. B., Rossen, J., & Pino-Navarro, J. D. (2008). Monte Verde: seaweed, food, medicine, and the peopling of South *America. Science, 320(5877)*, 784-786. https://doi.org/10.1126/science.115653

Dixon, E. J. & Dixon, F. J. (1999). *Bones, boats & bison: archeology and the first colonization of western North America.* Albuquerque: Univ. of New Mexico Press.

Erlandson, J. M., Braje, T. J., Gill, K. M. & Graham, M. H. (2015). Ecology of the kelp highway: Did marine resources facilitate human dispersal from Northeast Asia to the Americas? *The Journal of Island and Coastal Archaeology, 10(3)*, 392-411. https://doi.org/10.1080/15564894.2014.1001923

Fedje, D., McLaren, D., James, T. S., Mackie, Q., Smith, N. F., Southon, J. R. & Mackie, A. P. (2018). A revised sea level history for the northern Strait of Georgia, British Columbia, Canada. Quaternary *Science Reviews, 192*, 300-316. https://doi.org/10.1016/j.quascirev.2018.05.018

Fladmark, K. R. (1975). *A Palaeoecological Model for Northwest Coast Prehistory.* (National Museum of Man Mercury Series, Archaeological Survey of Canada Paper 43). Ottawa: National Museums of Canada.

Fladmark, K. R. (1979). Routes: Alternate migration corridors for early man in North America. *American Antiquity, 44(1)*, 55-69. https://doi.org/10.2307/279189

Lindo, J., Achilli, A., Perego, U. A., Archer, D., Valdiosera, C., Petzelt, B., ... & Rasmussen, M. (2017). Ancient individuals from the North American Northwest Coast reveal 10,000 years of regional genetic continuity. *Proceedings of the National Academy of Sciences, 114(16)*, 4093-4098. https://doi.org/10.1073/pnas.1620410114

Mandryk, C. A., Josenhans, H., Fedje, D. W. & Mathewes, R. W. (2001). Late Quaternary paleoenvironments of Northwestern North America: implications for inland versus coastal migration routes. *Quaternary Science Reviews, 20(1-3)*, 301-314. https://doi.org/10.1016/S0277-3791(00)00115-3

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