CALIFORNIA COASTAL SURF AND TURF

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Comparison of allometrically estimated biomass of shellfish versus vertebrates exploited throughout the Holocene reveals that coastal Californians relied almost entirely on readily accessible invertebrate resources for dietary protein. During the earliest (i.e., the Paleocoastal) occupation of the coast, shellfish represented as much as 92 percent of consumed dietary flesh. Data show, however, that this profound dependence lessened over time, coinciding with an overall reduction in total quantity of consumed animal flesh.

RESEARCH QUESTION

Did early Californians rely primarily on hunted or fished vertebrates, or did they subsist on easily gathered, low-risk shellfish? For an answer I investigated the faunal collections from 18 coastal sites ranging from Sonoma County in the north to the Mexican border. These sites were selected because they had measured bone and shell *weights* along with dated sequences within the entire 10,000-year occupation of the coast. My research proceeded along several steps.

METHOD

First I normalized all bone and shell weights to the excavated volume at each site. This yielded a total sample of nearly 6.6 kg of vertebrate bone (mammal, bird, and fish) and more than 1,200 kg of shell normalized to m^3 of matrix (a uniform factor for analysis). Next, I calculated biomass of the normalized shell and bone weights using the non-linear regressional allometric method recommended by Reitz and Wing (2008).

The allometric method uses *archaeological specimen* bone or shell weight rather than comparative (i.e., modern) specimen weights or dimensions and is deemed to be the most accurate for reconstructing biomass (Reitz and Wing 2008:66-69, 236-239). It is based on the biological relationship of bone or shell weight to flesh, avoids comparison with presumably "typical" entire animals, and avoids reliance on problematic indices such as the Number of Identified Specimens or Minimum Number of Individuals. Only the biomass associated with the recovered bone or shell is calculated, not assumed entire animals. I then averaged the biomass data from the 18 sites into means for the Paleocoastal, Early, Middle, and Late Holocene periods of California prehistory.

Finally, since some of my data derived from large, extensively excavated sites and some data came from sites with only one or a few test units, I applied a technique described by Gravetter and Wallnau (2007:76-77) and others to weight the contribution of each site into the means. This mitigated sample-size bias and provided rational means for shellfish and vertebrate biomass within each geochronological portion of the Holocene.

RESULTS

Throughout prehistory there was an overwhelming reliance on shellfish biomass relative to biomass of all combined vertebrata (Figure 1). In the Paleocoastal period, shellfish made up 92 percent of the diet. This decreased to 89 percent in the Early Holocene, to 82 percent in the Middle Holocene, and to a low of 76 percent in the Late Holocene.

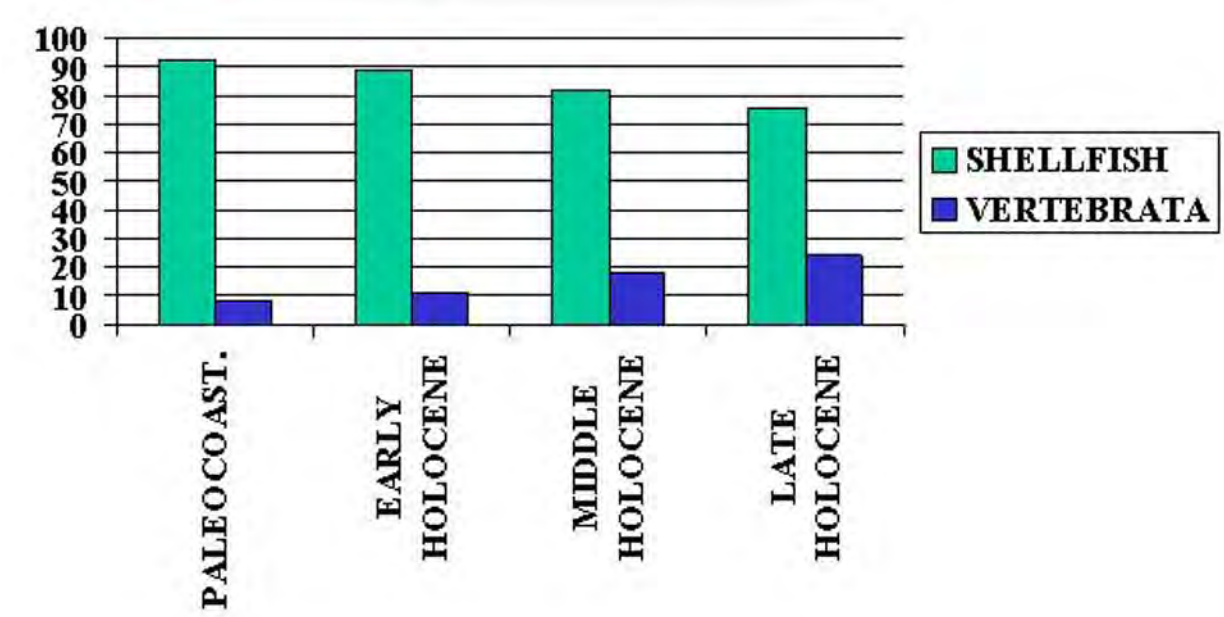

Figure 1. Percentage of shell versus vertebrate biomass.

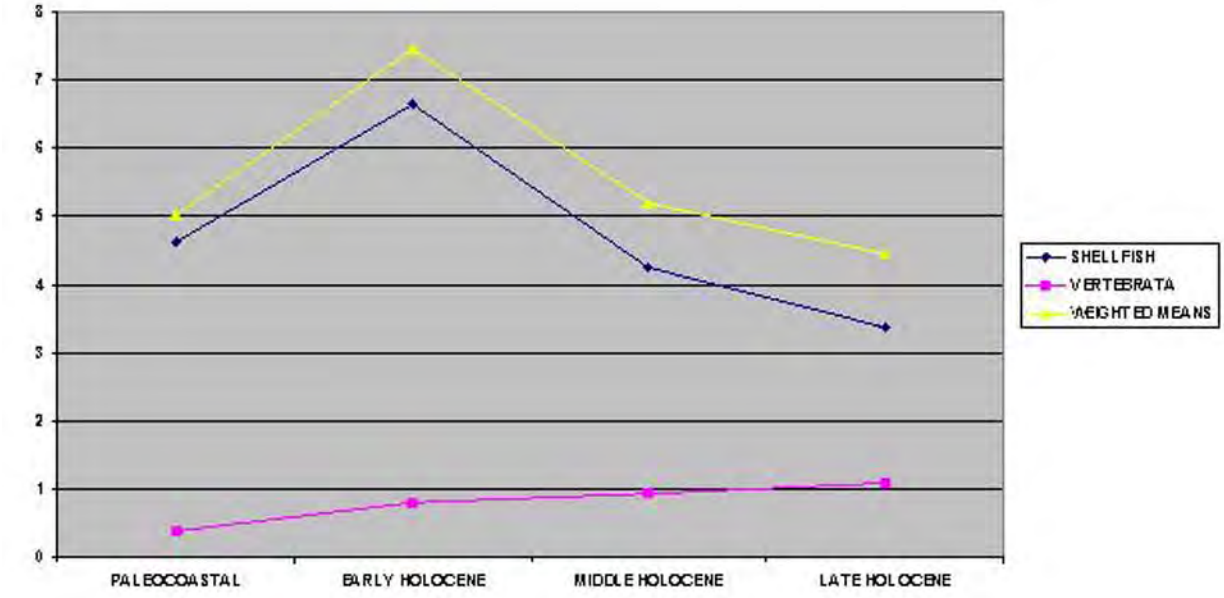

Figure 2. Biomass (kg of flesh per m^3 excavated).

More importantly, the total use of animal flesh decreased over time, even though human populations increased (Figure 2). In the Paleocoastal period, total animal biomass was about 5 kg of flesh per m^3 of excavated matrix. This increased to approximately 7.5 kg in the Early Holocene, but then declined through the Middle Holocene to about 4.5 kg in the Late Holocene.

CONCLUSION

Although early coastal Californians were primarily shellfish gatherers, the overall decrease in the use of animal flesh shown in this research is evidence of the significant dietary transition brought about

by the oft-described Millingstone lifeway (Jones 2008:137-153). This transition may have involved an adaptive increase in the use of high-energy plant carbohydrates accessible along the California coast, along with a corresponding decrease in the high-protein, flesh-based diet that echoed earlier traditions of Pacific Rim immigrants into North America. Such an adaptation might have been enhanced by beneficial genetic selection as described by Gibbons (2010).

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