

# ETHNOZOOARCHAEOLOGY

## The Present and Past of Human–Animal Relationships



edited by

Umberto Albarella and Angela Trentacoste

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THE PRESENT AND PAST OF HUMAN—ANIMAL RELATIONSHIPS

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## 7. Pacific Ocean fishing traditions: Subsistence, beliefs, ecology, and households

*Jean L. Hudson*

*Two case studies, one in Polynesia and the other in coastal Peru, are used to examine some of the methodological strengths of ethnozoarchaeological approaches to human ecology in the past. Linguistic evidence in Polynesia suggests some dietary taboos may be linked to family health. Participant-observation with reed boat fishers in Peru documents ecological and social details of family-level subsistence fishing and the potential for surplus. Family-based decisions and associated household-oriented archaeology are argued to provide a useful focus for ethnozoarchaeological research, with analytic value for researchers of diverse theoretical frameworks.*

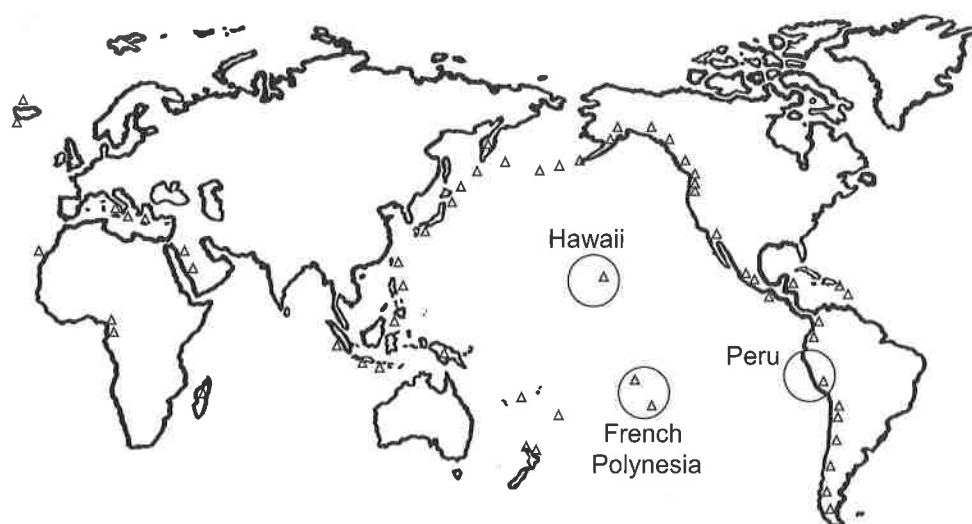
Keywords: fishing, ethnoarchaeology, zooarchaeology, family, household, Polynesia, Peru

### **Introduction**

The fishing traditions of the Pacific Ocean are diverse, as are its peoples. The goal here is not to attempt a comprehensive review of fishing practices along the coastlines of the Pacific Ocean, but rather to select a few examples that illustrate some of the ways that an ethnozoarchaeological approach to fishing can yield useful insights. The focus is on the intersection between fishing practices, subsistence goals, beliefs about fishing, and human ecology. In the process, I will argue for the merits of an analytic focus

on the household, rather than the individual, whether theoretically framed as 'genetically selfish' or 'agency-driven.' A second goal is to illustrate the value of a range of ethnozoarchaeological field methods, some more qualitative, others more quantitative.

To do this I will focus on two rather different case studies, one in Polynesia and the other in Peru (Fig. 7.1). In both cases the beliefs and practices of modern fishing people are examined for insights of potential relevance for our understanding of the past.



*Fig. 7.1 Location of study sites and coastal Holocene volcanism. Triangles approximate locations of volcanoes; source data from the Smithsonian Institution Global Volcanism Program.*

### ***Analytic Merits of Focusing on the Household***

Before detailing the two cases, I will outline the potential analytic merits, and some of the attendant theoretical issues, in focusing on the household rather than the individual or the society as a whole. I will then look briefly at how archaeologists in the two study areas, Polynesia and Peru, have integrated social and archaeological concepts of household in those regions.

In the North American zooarchaeological literature, there is a strong representation of theoretical approaches that are grounded in evolutionary theory (*e.g.* Broughton 1997; Butler 2000). Many researchers use the quantitative data from their zooarchaeological assemblages to test for evidence of evolutionarily-driven human decisions, with energy optimization as the most common proxy (*e.g.* Byers and Broughton 2004), although alternative currencies, such as prestige, have been suggested (McGuire and Hildebrandt 2005). In evolutionary models, inclusive fitness or relative reproductive success is the ultimate goal, regardless of currency (Smith 2004; see Bird and O'Connell [2006] for a recent review of archaeological applications). The individual becomes the analytic focus, at least at the theoretical level. Typically the focus is on males and their natural-selection-enhancing decisions and behaviors, since variance in reproductive success has the potential to be far more extreme for males than females. Recent exceptions include Bliege Bird's (2007) work on gender and age variations in foraging strategies among the Meriam of the Torres Strait Islands, Australia. Methodologically, however, the zooarchaeological assemblages are often analyzed as a whole. Since these typically represent the accumulated decisions of many individuals, there is some discord between theory and method in the practice of this approach.

At the other end of the theoretical spectrum are models of human behavior that place greater emphasis on conscious social agency, often in the form of post-modern attention to unique and constantly negotiated individual identities and agendas, sometimes with the assumption that concepts of oppression and resistance can be usefully applied to all societies (*e.g.* Brumfiel 1992; Hendon 1996). Here, too, the desired unit of analysis is the individual decision-maker, but the decisions are assumed to be driven by factors other than reproductive success. Individual attributes of social identity, such as gender, class, or membership in a wide variety of other social groupings, are seen as the most significant motivators of human decisions. In practice, at the interpretive stage, individuals are often grouped according to some aspect of their social identity. Then the archaeological residues of opposing memberships, such as male and female, or elite and commoner, are assigned and interpreted.

Both these theoretical frameworks share the same methodological handicap: it is rarely possible to associate an assemblage of zooarchaeological remains with a particular individual and their decisions during life. Consequently, both frameworks might find an analytic focus on the household more methodologically feasible, while still allowing the researcher to integrate data from

other social scales, such as individual burials or intra- and inter-site variations, when those data are available. Households do, in some archaeological contexts, leave behind tangible architectural remains or patterns of spatial clustering of artifacts, features, and debris that can be used to delimit likely household groups and their zooarchaeological remains.

### ***Household Archaeology: Theoretical and Methodological Issues***

An analytic focus on the house and/or household has a long history in archaeology, one which I will not attempt to review comprehensively here. Notable early works that made productive use of the house to represent a basic social unit within the larger community or settlement include those by Chang (1958) and Flannery (1976). Household archaeology was explicitly advocated, applied and critiqued in the 1980s (*e.g.* Bawden 1982; Kent 1987; Stanish 1989; Wilk and Rathje 1982). More recent comparative works and reviews include Blanton's (1994) cross-cultural comparisons, Hendon's (1996) critique, Allison's (1999) attention to activities within households, and Beck's (2007) applications of the Lévi-Strauss 'house society' concept.

Household archaeology is not without its problems. There is the fundamental issue of how closely our interpretations rest on an exact match between the physical dwellings and the social groupings we assume they represent. We should expect an imperfect match, given all the ways in which residents of one dwelling area can interact with individuals located elsewhere in the community and larger region, but we might reasonably hope that the match will be sufficient for tackling questions about often-repeated behaviors that leave archaeologically robust material patterns. We should expect variability; there is no need to assume or decry a normative approach. We should expect that most archaeological accumulations will represent a mix of decisions and decision-makers. Comparisons among households within communities and across regions will be needed to discern both commonalities and variations. We should be attentive to the match between the time span of archaeological accumulation – a season, a few years, several generations – and the particular questions we seek to answer about the past.

There are also practical issues. Preservational filters may allow or blur the definition of separate dwellings, complexes or compounds and their associated middens. People with durable dwellings will be easier to study than those with ephemeral ones; a household approach will not be equally feasible for all times and places. Excavation and analysis costs may limit the number of contemporaneous dwellings available for study and require special budgeting at the proposal stage of research.

It is, however, possible to design and conduct meaningful research, given these issues of thoughtfully matching methods and questions. Household-oriented archaeology has been productively pursued in both the study areas of concern here, Polynesia and Peru.

### Household Studies in Polynesia and Peru

In their recent review of Polynesian archaeology, Kirch and Kahn (2007) note the application by themselves and others working in Oceania of the Lévi-Strauss concept of house societies. This concept focuses attention on the social and ideological role of house and household in creating identity and economic relationships, especially in societies where blood lineages are less important (see Beck [2007] and Gillespie [2007] for thoughtful discussion of the original “*sociétés à maisons*” concept and its archaeological applications). Kahn (2007) applies a household approach to her examination of status distinctions between different dwelling areas within a larger residential and ceremonial complex on the island of Moorea. O’Day (2004) and Kirch and O’Day (2003) explore the integration of ethnography and archaeology and some of the zooarchaeological evidence for status differences and female roles in Polynesian fishing societies.

Archaeologists working in Peru and other parts of Andean South America have also made productive use of household archaeology, using a diverse array of framing theories. Among the many valuable contributions that could be cited are Aldenderfer’s (1988) work at the Archaic site of Asana and his (1993) edited volume on domestic architecture and ethnicity, Bawden’s (1982) residential comparisons at Galindo, Chapdelaine’s (2002) detailing of Moche urban life, Isbell’s (1996) discussion of Andean social concepts as they relate to archaeological remains of households, Janusek’s (2004) work at Tiwanaku, Stanish’s (1989) discussion of household archaeology as an analytic method for approaching ethnicity, and Vaughn’s (2005) analysis of Nasca domestic architecture. Specific attention to zooarchaeological data at the household level is not yet common, but published examples, such as the work by Roselló, Vásquez, Morales and Rosales (2001) in an urban Moche sector, hint at the potential.

It thus seems worth taking a closer look at how a household level analysis of zooarchaeological and ethnozoarchaeological data might help us bridge a common gap between theory and method, the gap between our theoretical models of individual decision makers (however they might be motivated) and our recovery of socially and temporally aggregated archaeological remains. The two case studies that follow illustrate some of the ways that diverse ethnozoarchaeological methods might add to our insights about human–animal relationships in the past, and how a household scale approach to our faunal data might be relevant and useful.

### A Polynesian Case Study

The Polynesian case study comes from an interdisciplinary project begun in 2005 in French Polynesia (Fig. 7.2), specifically on the islands of Tahiti, Moorea, and Tikehau, a project whose premise is outlined in the journal *Clinical Toxicology* (Dellinger *et al.* 2005). The project grew out of a conversation between a Polynesian translator, Hinano Murphy, who is also president of a Tahitian heritage group,

*Te pū átitiá*, and a toxicologist, John Dellinger, from the University of Wisconsin, Milwaukee. Hinano was explaining a Tahitian dietary taboo that specifies that when you are pregnant or nursing, you cannot eat “outside” or *e-i’a-tua* fish. Outside fish refer to those found outside the lagoon, such as pelagic tuna. These outside fish include piscivorous species and older individuals. Ecologically, it is these outside fish that concentrate toxic levels of mercury, or more precisely, methylmercury. From the perspective of human consumers of such fish, the family members most vulnerable to mercury poisoning are developing infants and children (Myers and Davidson 1998). This dietary taboo thus does a good job of protecting the health of women and children.

I was invited to join the project to add an anthropological and archaeological perspective. I found good linguistic evidence that a very similar taboo was part of traditional Hawaiian beliefs. Titcomb (1972, 17–18), citing Cobb (1900/1901), Pogue (1858), and Malo (1903), notes that on the Hawaiian islands certain fish were taboo for pregnant women, specifically *aku* (ocean bonito or skipjack tuna, *Katsuwonus pelamis*) and ‘*opelu* (mackerel scad, *Decapterus* sp.). These are both predatory fish of the open ocean, ecologically positioned to accumulate toxic levels of methylmercury. Hawaiians and Tahitians share Polynesian heritage (Kirch 2000), but they are separated by enough water and linguistic variation for the similarity



Fig. 7.2 Polynesian case study. As part of the 2005 fieldwork in French Polynesia, locally caught fish, such as this Tatihi (*Naso brevirostris*), were sampled for their mercury content.

of their dietary taboos to suggest significant antiquity and cultural importance.

This is where the research of a fourth member of the team, David Krabbenhoft, a geologist, made a significant addition. Volcanoes are natural sources of atmospheric mercury. Krabbenhoft and Schuster (2002) used ice core data to track historical patterns of atmospheric mercury. Their work demonstrates that while our modern industrial practices are responsible for the steady level of methylmercury accumulation in fish that we worry about today, some of the largest historic volcanic eruptions, such as that of Krakatoa in 1883, created brief atmospheric mercury spikes even higher than those we produce industrially. The Pacific Ocean is of course geographically surrounded by active volcanic systems, and some of the Polynesian islands are themselves volcanic (Fig. 7.1).

This means that it is quite conceivable that ancient Polynesians experienced short bursts of mercury toxicity in the fish they relied upon for so much of their subsistence. The impacts of mercury on developing infants is dramatic and visible, resulting in a variety of birth defects including microcephaly, cerebral palsy, seizures, and mental retardation (Myers and Davidson 1998). The stage was thus set for Pacific Ocean people to observe correlations between the diets of men and women, and among various pregnant women, and discern the negative impacts when pregnant women ate outside fish.

Dietary taboos represent another popular anthropological topic of study to which I cannot hope to do justice in a paper of this scale. I am defining taboos as conscious, verbally articulated social rules about appropriate behaviour, in this case rules about what you should or should not eat. Archaeologically, we have little access to what was verbally articulated in the past. Thus to frame possible explanations of taboos anthropologists rely heavily on ethnographic and linguistic observations. Once hypotheses are framed, archaeological data can contribute to tests of their relevance based on the presence or absence of expected material results, such as differences in diet. Ethnozoarchaeology is uniquely suited to tackling such issues, as it explicitly engages both ethnographic and archaeological types of data.

Perhaps of most immediate relevance to the themes discussed here are discussions of food-related taboos within Oceania and circum-Pacific regions. Some have focused more on inter-household differences in status (Kahn 2007; Kirch and O'Day 2003); dietary restrictions that differentiate men and women are mentioned, but chiefly vs. commoner differences are the primary focus. Others have highlighted links between beliefs and ecological sustainability (Swezey and Heizer 1977; Watanabe 1973) or among beliefs, nutrition and health, seasonal use of specific fish habitats, and sustainability (Rouja, 1998; Rouja *et al.* 2003). Another significant body of literature on fishing peoples of Oceania focuses on gender differences in food acquisition rather than food consumption, some theoretically framed by symbolism (Brightman 1996), others by evolutionary ecology (*e.g.* Bliege Bird *et al.* 2001;

Sosis 2000). The evolutionary models for prey choice, costly signalling, and symbolic capital provide interesting hypotheses for how and why particular foods are obtained, and for division of labor and patterns of food sharing, but do not focus directly on individual or gender differences in foods consumed and their impacts on health.

The correlation of dietary taboos based on gender and the resulting health of children is a working hypothesis to explain this Polynesian dietary taboo. What makes it especially relevant to the issues raised earlier in the discussion of theoretical frameworks is that what might otherwise have been judged a self-serving monopoly by men on the biggest and the best of the fish becomes open to a very different interpretation. Adult men can eat mercury-rich tuna with far less risk to their health. This division of diet by sex and age thus serves the best interests of many members of the family. It provides an interesting alternative to male-oriented or individual-oriented explanations, shifting the focus to shared interests at the family or household level. At the same time, it allows a theoretical fit with both evolutionary models and agency models, since family health can be conceived of as a goal of both inclusive fitness and socially motivated agendas.

Two other aspects of this case study are of interest as well. First, it is potentially testable through several lines of evidence. Such evidence includes: dated archaeological contexts corresponding to major volcanic events visible stratigraphically; changing patterns in zooarchaeological fish remains; mercury levels in associated human remains; and a more thorough examination of relevant linguistics. Secondly, the pairing of volcanic activity and dietary reliance on fish is not unique to Polynesia. Productive coastal fisheries and Holocene volcanism co-occur in many parts of the world (Fig. 7.1), including the Caribbean, the Mediterranean, and much of the Pacific coast of Asia and the Americas, many of which have archaeological records of human reliance on fishing. Future research could explore the relevance of gender-related family dietary patterns and fish toxicity in such contexts, and test the wider relevance of health-seeking goals in general and family health-related decisions in particular as important aspects of past human relationships within the ecology of fishing.

### *A Peruvian Case Study*

The second case study takes us to a different part of the Pacific Ocean, the west coast of Peru. Since 2001 I have been conducting ethnographic work with modern fishing families in a Peruvian coastal community. I chose this particular community because of their reliance on reed boats as watercraft when fishing the ocean. So many modern fishing communities throughout the world have adopted motorized craft that this seemed a rare and valuable opportunity to collect information about non-motorized styles of fishing, styles that might compare in a meaningful way with those of the archaeological past.

Ethnographic analogy must be done thoughtfully, as no modern case will be identical in all parameters to any

archaeological case. Ideally one recognizes points of divergence as well as similarity, seeks meaningful parallels in ecology, economy, and social and political life, and considers carefully how long the studied modern population has been in its current ecological setting and what particular historic trajectories of change have been at work. One also seeks to disentangle underlying relationships of cause and effect, and assess their relevance to the particular archaeological case of interest. For example, if modern Peruvian reed boat fishing usually involves division of labor within an extended family, what needs are met by this particular social approach and what alternatives might also serve those needs? How relevant are those needs for fishing communities of the past? In this particular case, the benefits of certain patterns of division of labor can be linked to parameters with long-term relevance, such as the ecological behaviours of different fish species, the physical demands of paddling through rough surf, and the efficiency and security of pooling labor or resources.

In this part of Peru we also have the benefit of a thread of continuity stretching from the present back through recent historic records (Edwards 1965), colonial period ethnohistoric accounts (e.g. Garcilaso de la Vega [1609] as translated by Livermore [1966]; Rostworowski de Diez Canseco 1981), and into the more distant archaeological past. Reed boats are illustrated in Moche and Chimú art from the first millennium AD (Benson 1972; Donnan 1978; McClelland 1990). Archaeological remains of bundled fishing nets with their stone weights and gourd floats still attached have been recovered from strata radiocarbon dated to roughly 4000 years ago; the site of these finds, Huaca Prieta, is located less than 100km to the north of the modern fishing community discussed here (Bird and Hyslop 1985; Hudson 2004). In this case, then, we may argue that many parameters of the ethnographic analogy are well matched. Care is taken in the discussion that follows to consider aspects of human behavior and decision-making that are likely to have deep temporal relevance, and to use ethnography as a source of insight, rather than to paste the historically impacted particulars of a modern case onto the past.

I began the Peruvian study with ecological questions. Which species of fish were being caught from reed boats and which from shore? How productive was the fishing? How many hours did they spend at it? How many kilograms did they catch? How did particular fishing techniques affect the amount and kind of fish caught? Was fishing with nets rather than hooks significantly different in terms of either absolute productivity or relative gain for labor invested? These questions are relevant ones for those of us who try to interpret zooarchaeological assemblages of fish remains. In Andean archaeology, the ability of coastal fisheries to provide a large enough surplus to set in motion the emergence of political complexity has been long discussed, as has the significance of the use of both nets and watercraft in accumulating such a surplus (e.g. Moseley 1975; 1992; Haas and Creamer 2006).

Results of the ethnographic work thus far have been

useful. Based on data collected during three different field seasons (2001, 2003 and 2004), and including both seasonal and annual variations, I have some quantitative answers to those questions (Table 7.1). The catch per fishing event can vary between 5kg and 60kg (N=65 fishing events). Fishing events can be as brief as half an hour or as long as eight hours. Several events can occur in a single day, and the accumulation of surplus beyond subsistence needs is a common occurrence. In other words, the combined daily catch of the household often exceeds what is needed for all its members' meals by a significant margin. For example, an extended family with 10 members could accrue 100kg of seafood in a day; if each member consumed a kilogram, they would still be left with a 90kg surplus.

Median catch size for hook and line versus nets (both as practiced from reed boats) is actually very similar, 13 to 16kg, respectively. However, the largest catches, when they do occur, tend to be netted from boats. Also interesting is that the taxonomic families of fish caught by each technique show considerable overlap; for example, fish taxa caught with nets from watercraft may also be caught with nets from shore, and fish taxa caught with hooks may also be caught with nets. Furthermore, the reality of daily fishing within any particular household mixes techniques, and household middens accumulated over any period of time would also reflect a mixture.

### *Methods and Insights*

This style of ethnozoarchaeology – quantitative time studies and enumeration of catches per fishing event, based on participant-observation – can be very productive. As a zooarchaeologist I learned that even in modern times, when the Peruvian fisheries have been greatly reduced by international commerce, a reed boat fisher could gather quite a bit of daily surplus. This suggests that ecologically the Maritime Foundations hypothesis (*sensu* Moseley 1975; 1992) for the rise of complex regional polities along the North Coast of Peru is on firm footing. This hypothesis argues that highly productive fisheries can, like agriculture, create food surpluses, support large sedentary communities, foster specialization, and underwrite new social experiments, including large-scale cooperative activities, such as monument building or competitive social hierarchies. Prehistorically, Peruvian fishing communities could certainly have caught much more than they needed for family level subsistence. The impacts of historic changes work against surplus accumulation by modern reed boat fishers. These historic impacts include decimation of the fisheries themselves by industrialized fishing, fewer family members devoting their working time to fishing activities while still consuming the catch, and decreased use of shellfish and marine plants. Yet families continue to accumulate enough fishing surplus to make a viable livelihood.

I also learned that in a single day the catch could come from multiple habitats: surf zone, beyond the surf zone, sandy bottom, rocky bottom, and at various depths in



	Fishing from Shore	Fishing from Watercraft	
	With Nets	With Nets	With Hooks
Number of fishers needed	1 to 3 people	1 to 2 people	1 person
Hours per fishing event	0.5 to 1.5 hours	0.75 to 8 hours	1 to 6 hours
Kilograms per fishing event 1) median 2) range 3) N (events observed)	under 5kg 1 to 10kg N=16	16kg 5 to 60kg N=19	13kg 5 to 35kg N=30
Fish families represented:			
Ariidae	yes	yes	
Atherinopsidae		yes	
Blennidae			yes
Carangidae	yes	yes	
Cheilodactylidae			yes
Clupeidae		yes	
Engraulidae		yes	
Haemulidae	yes	yes	yes
Labrisomidae			yes
Merluccidae		yes	
Mugilidae	yes	yes	
Myliobatidae	yes		yes
Paralichthyidae	yes		yes
Rhinobatidae	yes		yes
Sciaenidae	yes	yes	yes
Scombridae		yes	
Squatinae	yes		yes
Triakidae	yes	yes	yes

Table 7.1 Quantitative results from ethnozooarchaeological research in Peru.

the water column. This provided a gentle reminder that archaeologists should avoid overly simplistic assumptions that match a particular archaeological assemblage of fish remains with a single type of prehistoric fishing in terms of ecological niche exploited or technologies utilized.

However, after spending weeks helping to pull in nets at dawn, watching and recording the coming and going of reed boaters, and counting the numbers and types of fish caught in a given fishing event, I also became aware of other vitally important aspects of fishing. These were social aspects and they were complex in their patterns of interdependence. I came to realize that the social group that mattered most in this fishing community was the extended family. I am using the term extended family here to contrast with that of nuclear family. If a nuclear family represents one married couple and their dependent children, then an extended family incorporates more than one such set, typically related by some form of kinship. Some Andeanists prefer the term multi-nuclear family for this social arrangement (Isbell 1996).

How might such important social aspects of fishing be studied archaeologically? When possible, analysis of household-level assemblages can provide meaningful subsets of the larger site assemblage. The degree to which those sub-assemblages vary can provide insights into the social composition of the community and open relevant

analytic doors to researchers of differing theoretical orientations, regardless of their position within the evolutionary-agency spectrum. For example, prehistoric styles of political integration, be they egalitarian balancing of near-equals, pyramids of ranked differences, communities of specialists provisioning urban centers elsewhere, or some other form, can be meaningfully pursued with household data. Changes over time in household subsistence, division of labor, pooling of resources, and integration within the larger community and region can be studied, as can degrees of variation among households. This is a common approach with other forms of archaeological data, but somewhat neglected in zooarchaeology.

The following narrative is a composite of typical daily activities, some of which are illustrated in Figure 7.3. It demonstrates the possible roles of various family members and indicates why the household would be a productive focus of analysis for both zooarchaeological research and for research into human ecology in general.

The day starts before dawn. An older man – the grandfather in the family – hikes down the coast to the sandy stretch of beach where he keeps his net tied off. The net is anchored on land and floats in the surf zone, catching fish while the family sleeps. He starts the job of pulling the net in to shore. This requires considerable muscle and he is soon joined by his son-in-law and a teen-aged grandson.



Fig 7.3 Peruvian case study. Division of labor within the extended family. Women and children meet incoming reed boat fishermen on the beach to process and market the catch.

They haul in the net and strip it of fish, then let the net back out into the sea. It has been a fair morning and they are bringing a dozen fish home, a total catch of over 5kg, some of which will be had for breakfast, and some of which will be taken by his daughter to market to sell or exchange for other needed items. While the shore fishers are walking home, two adult sons have launched their reed boats to check gill nets set with floats and weights in deeper near-shore waters beyond the surf zone, paddling out and back in an hour and bringing home another 20kg of fish. As the morning wears on, the grandfather walks down to the shore to mend nets while the sons and grandson head out in their reed boats to hook and line a school of fish passing through the bay. The fish are biting and each of the three men brings in another 10 to 15kg. The adult daughter meanwhile is trading some of the surplus fish for crab bait, knowing the grandson will go out crabbing in the afternoon. The midday heat brings everyone in for a meal and a rest. In the afternoon the two sons paddle out to check their gill nets again, the grandfather builds a new reed boat for his grandson – a job of two hours – and then heads down the beach with the son-in-law to do a late afternoon check of his beach net. The three pre-teen children in the family may join their mother at the beach to meet the reed-boaters and help sort the fish. The combined afternoon fishing adds another 25kg to the family catch. The grandson, back from crabbing, contributes part of his 30kg to dinner and converts some of the remainder into a late night of *chicha* (maize beer) with his friends. His grandfather gives him grief the next morning when he shows up late and a bit hung-over for the early beach net pull. But the family – a grandfather, two adult sons, a son-in-law, an adult daughter, three small children, and a teen-aged grandson – has brought in over 100kg of seafood in a single day – a surplus well beyond the needs of family subsistence.

This rich narrative approach is another style of ethnozoarchaeology, different from and complementary to the quantitative style described previously. One of its benefits is the reminder it provides of the elaborate detail

of human social lives, a level of detail we cannot see archaeologically, but whose summed results we do recover. It reminds us to consider the family, and its archaeological manifestation, the house and its midden, as a meaningful unit of zooarchaeological analysis. In this case an extended family of three generations split fishing tasks and associated marketing of surplus and maintenance of fishing gear, and shared the results. The young adult men did more of the physically demanding labor, the older man did more of the work requiring slow-paced discipline and technical expertise, and the woman managed the resulting catch, including the marketing of surplus and handling of family subsistence. In a single day this extended family mixed nets and hooks, shore and boats, subsistence and surplus.

As with the Polynesian case, the door is open to put these ethnozoarchaeological insights to archaeological use. Household-oriented zooarchaeology might shed light on the intersection of social and economic aspects of fishing along the Peruvian coast in the past. Hypotheses about fishing as a household or community specialization within the context of emerging regional political complexity could be tested, as could the chronological depth of household level autonomy and extended family division of labor.

### Conclusions

How do these two case studies, one in Polynesia and the other in Peru, contribute to the original goals of this paper? How do they illustrate both ethnozoarchaeological methods and some of the specific ways that fishing practices, subsistence goals, and human social values and beliefs intersect as part of human ecology?

One goal of this paper was to illustrate the value of a range of ethnozoarchaeological field methods, some more qualitative, others more quantitative. In the Polynesian case linguistic data was key in forming a new and archaeologically testable hypothesis about fishing, diet, and family health. In the Peruvian case quantitative time and capture studies were combined with the kind of detailed narrative that participant observation allows. In both cases the ethnographic or linguistic data were used primarily to provide insights relevant for building testable hypotheses about the past, thereby contributing to zooarchaeological research design for future projects.

Both case studies viewed human ecology at the level of the family or household, recognizing that both those concepts, family and household, contain a great deal of cultural variability. Ethnoarchaeological research allows one to see a social group, such as a family, in action, and be persuaded of its relevance to understanding life in the past as well as the present. It also makes real the complexities of family life, including the variations within and between communities in what constitutes a family and the inevitably dynamic internal quality of a family as different members are born, grow, marry, age, and die. Yet for all its variance, it remains an important emic reality, combining special qualities of shared economy and social identity.

Equally important to an archaeologist, household-

oriented research is methodologically feasible in ways that individual-oriented research often is not. The record we recover typically represents an accumulation of materials over many days, or seasons, or years, as well as the blending of the results of decisions of many individuals, including males and females of various ages. A household-oriented approach to zooarchaeological analyses could improve our ability to see variance within and between larger social groupings, as well as track changes over time at a scale of decision-making that is both socially meaningful and archaeologically visible.

A second goal of this paper was to illustrate how ethnozoarchaeology, as an integration of ethnography and zooarchaeology, can yield useful insights and alternative models for past human behaviours. Two case studies, one in Polynesia and one in coastal Peru, looked at examples of how fishing practices can combine family-based goals for nutrition, health, and surplus, and can link values and beliefs with subsistence and ecology at the household level. In the Polynesian case a testable model was outlined to explain dietary taboos that protect pregnant women and developing children from eating potentially toxic fish. This provides an alternative to currently popular models focused on male prestige and chiefly prerogatives. In the Peruvian case, the division of labor within families was described and quantitative data on fishing productivity and surplus was presented. The implications of these data for understanding the ecology, economy, and emerging political complexity within prehistoric Peruvian fishing communities were highlighted. In the process, the methodological merits of a theoretical and analytic focus on the household, rather than the 'genetically selfish' or 'agency-driven' individual, were argued.

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