ARCHAIC HUNTER-GATHERER DIET BREADTH AND PREY CHOICE ON THE SNAKE RIVER PLAIN

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ABSTRACT

This article summarizes the zooarchaeological record of Archaic period occupations of Idaho’s Snake River Plain. The record suggests an early and continuing use of deer, elk, and bison with an increasing use of rabbits and small mammals during the Middle Archaic (5000–2000 BP). Archaic period prey choice reflects considerable evenness over time and across the Plain. The Late Archaic period (2000–150 BP) is, however, characterized by an increase in the ubiquity of fish and artiodactyl associated with the emergence of modern conditions reflecting greater aridity. Though diet breadth appears to have narrowed and broadened by local potentialities, there is generally little evidence of resource intensification or depression.

Introduction

During the past twenty years the systematic reporting of faunal remains from southern Idaho archaeological sites has become considerably more common (Rudolph 1995). Though faunal analyses provide the primary means by which changes in prey choice may be assessed (Butler and Campbell 2004), archaeologists working on the Snake River Plain have continued to rely heavily upon historic and ethnographic depictions of resource use thought to reflect the range of species being taken by indigenous groups. In some instances, as with presumptions regarding salmon usage, the failure to examine the zooarchaeological record has resulted in the continuing perpetuation of undocumented conclusions regarding resource availability and use. In addition, the long-standing, almost obligatory enumerations of distributions of modern fauna to create “environmental settings” as backdrop to periods sharing no common environmental histories have tended to eclipse the evaluation of the actual distribution of archaeofaunas. For example, though archaeologists have discussed and debated the prehistoric importance of bison on the Plain for more than forty years (Butler 1971), only recently has the geographic and temporal range been documented. In this instance, a number of conclusions based upon the zooarchaeological record depart from traditional assumptions (Plew and Sundell 2000).

The purpose of this paper is to document the range of Archaic period (8000–250 BP) archaeofaunas recovered from archaeological sites on the Plain (Fig. 1). Similar analyses have provided an important means by which archaeologists have utilized foraging theory to assess the ways specific animal-based subsistence shifts have occurred over time (e.g. Bayham 1979; Yesner 1981; Hildebrandt and Jones 1992; Lupo and Schmitt 1997; Broughton 1997, 1999; Janetski 1997; Grayson and Cannon 1999; Cannon 2000; Lubinski 2000; Byers and Broughton 2004). These and other studies examine changing diet breadths with respect to resource intensification (Broughton
and Grayson 1993; Broughton 1994, 1999; Butler and Campbell 2004) or resource depression (Broughton 1997; Janetski 1997; Butler 2000; Cannon 2000; James 2004) and the environmental events influencing increases in target prey (Butler 1978; Byers, Smith and Broughton 2005). This paper evaluates the frequency of occurrence and abundance (frequency of high ranked taxa within assemblages) of archaeofaunas with respect to whether these reflect changing environmental conditions during the Holocene or are associated with changing human demographics. This paper assumes that prey choice will focus upon the most highly ranked prey when encountered and only shift to exploitation of more lowly ranked species when high-ranked prey decrease in availability. Specifically, it seeks to evaluate the relationship of large to small-bodied species (Ugan 2005), assess whether artiodactyl (antelope, deer, bison, sheep, and elk) hunting increases over time and under any specific circumstances, and whether the use of salmon or fish in general is increasingly important in the diet over time (Gould and Plew 1996).

Fig. 1. Map showing the general location of the Snake River Plain.
Methods

Data were compiled from 50 prehistoric sites distributed across the Snake River Plain and described in the published literature. An initial evaluation of the comparability of data served to determine the study parameters. With respect to issues of comparability, a number of authors have discussed the ways in which zooarchaeological analyses are hampered by techniques of recovery, recording, and reporting (Grayson 1984; Driver 1991; Cannon 1999, 2001; Lyman 2003). In addition, issues relating to abundance and diversity indices as well as measures of evenness have been addressed (Cruz-Uribe 1988; Ugan and Bright 2001; Jones 2004). Most reports provide the Number of Identified Specimens (NISP). Though useful for assessing intra-site preservation and abundance, NISP tend to over represent the actual number of animals present. Only a few reports provide estimates of Minimum Numbers of Individuals (MNI). In all instances where MNI have been calculated (Hetrick, Three Island Crossing, 10-CN-1, Wahnuza, Crutchfield, Bison, and Veratic, among a few others), few individuals are represented. Acknowledging the limitations, NISP are at present the least problematic means by which to begin to assess faunal distributions on the Plain and provide a reasonable estimate of faunal abundance. Many site reports note only the presence of specific species. In many instances it is not clear how the assemblages were recovered or analyzed. The use of 3⁄4 inch hardware mesh in dry screening and flotation was first used in the late 1970s (Plew 1981; Green 1982) and then sparingly for the next decade. Hence, the absence of fish bones and other small mammal and avian remains collected prior to the late 1970s most probably reflects data recovery methods of the period.

At times writers have noted the presence of particular animals but not provided analyses of assemblage diversity or ranking. In only a few instances do authors clearly distinguish between identifiable and unidentifiable remains in listings of NISP (Fortsch 1981; Huelsbeck 1981; Walker 2002). In this regard, bison as with many other species have been commonly mentioned as part of the assemblage at a number of sites (Challis Bison Jump, Quill Cave; Butler 1971) but without formal analysis (these assemblages now being analyzed). In other instances collections of large artiodactyl remains have been assigned to family only as is the case with Henrikson’s (1996, 2003) analysis of Bobcat Cave and Scaredy Cat Cave. Not included in this study are reports of isolated finds such as Kenneth Cannon’s (1997) descriptive analysis of a Late Holocene bison skull from the Fawn Creek site.

Though cervids (deer and elk) and bovids (sheep, goat, and bison) are well represented in Archaic assemblages, small to medium-sized mammals and rodents are not well documented at the species level across most sites in this study. For this reason, small mammals have been grouped into the families of Leporidae (rabbits) and Sciuridae (all small rodents). The rabbits include cottontail (Sylvilagus nuttallii) and jackrabbit (Lepus californicus). The majority of rodents identified to species are the Townsends ground squirrel (Spermophilus townsendii), and the marmot (Marmota flaviventris). Owing to their commonness, canids (coyotes, wolves, foxes, and domestic dogs) are included even though their presence in most contexts probably reflects natural mortality independent of human activity. Some species are so rarely represented that they are noted in period discussions but have not been tabulated even though some are known to be economically important (porcupine, beaver). These include members of the Mustelidae family (badger, marten, weasel, skunk), beaver, porcupine, raccoon, bear (n = 4), bobcat, and lynx (n = 4). Members of the Muridae family (mice, voles, and woodrats), which are often naturally occurring in deposits, were excluded from consideration. Birds are relatively well represented in Archaic sites and are included in tabulations. Common non-salmonid fishes largely include catostomids and cyprinids and occasional sturgeon (Acipenser) remains. These species are
generally rare in archaeological sites of the Plain. For example, only three sturgeon scutes have been reported in the literature and are not considered to be highly ranked prey (Plew 1997). Based on the difficulty of osteological identification of salmonids (salmon versus trout) and the relative absence of other fishes in archaeological assemblages, fish are separated into salmonid (salmon, trout, whitefish) and non-salmonid fishes.

Temporally the sites are listed according to the chronologic period that includes Early Archaic (8000—5000 BP), Middle Archaic (5000—2000 BP), and Late Archaic (2000—250 BP) (Plew 2000:24). Components at Bliss, Challis Bison Jump, and Wahnuma, having possible protohistoric components, have been included in the Late Archaic inventory. Some reports are unclear in temporal assignments of fauna. In some instances, faunal analysis is feature-specific, yet the radiometrically-dated strata in which features are located are not correlated. In some instances, as with Bison and Veratic Rockshelters (Swanson 1972), cultural and natural phases are correlated but without clear radiometric assignment of fauna to specific contexts. Where the assignment is uncertain, reference has been excluded in the data tabulations. These tabulations detail the distribution of animals to species where possible by site, age of occupation, and environmental setting that includes upland, riverine and lacustrine contexts.

Here the Plain refers largely to the Snake River watershed but includes “upland” sites in various locations of southern Idaho south of the central mountains. Sites included in the upland category are geographically distant from the Snake River and at higher elevations than the Plain proper. Sites on the periphery in the Challis and Salmon areas, for example, are excluded from the analysis. Riverine sites are located directly adjacent (within 200 meters) to river courses. The study sample consists of 62 components from 50 sites and includes nine Early Archaic age components, 10 Middle Archaic components, and 45 Late Archaic components. The ages of the majority of site assemblages in this study are typologically derived. Uncalibrated radiocarbon dates BP have been included in tabulations where possible. Multiple radiocarbon dates have been included as ranges. In constructing appropriate abundance indices (AIs), the analysis followed the example of Butler and Campbell (2004) in summarizing the data at the family level and using ubiquity (frequency of occurrence in assemblages) and abundance (frequency of assemblages in which taxon is ranked first) as primary measures of assemblage diversity. Ubiquity represents the number of times a species is found within a specified number of components or site assemblages. Abundance refers to the number of times a particular species or class is ranked first within a group of components or site assemblages. This measure is similar to “rank-ubiquity” as used by Lubinski (2000).

The Paleoenvironmental Context

Butler (1978:43–46) describes nine “climatic-ecologic” periods based upon paleo-climatic data from Wilson Butte Cave, Wasden (Owl Cave) site, and Swan Lake (Bright 1966). During the period 11,400–8400 BP continuing warm conditions brought about a retreat of coniferous stands in eastern Idaho and a continuing expansion of the sagebrush-grass biome. This warming trend appears to have reached an optimum at approximately 7200 BP and is thought to be associated with an abrupt shift in the number of dry-adapted animals. With a minor cooling event between 3800 and 2800 years ago, increasing temperatures and dryness approximate modern conditions (see also Gehr 1982). Chatters’ (1982) work in the Pahsimaroi Valley of eastern Idaho suggests increased aridity after 2500 BP. Butler’s (1978) reconstruction is challenged to some extent by Henry’s (1984) investigations of Murphey’s Rockshelter along the Snake River in
southwestern Idaho. Henry’s analysis provides for the development of a five-period paleo-climatic model. Following cool-moist conditions of the early Holocene, climate reached a maximum warmth between 8000 and 7500 BP. With a minor cooling episode at 6200 years ago, warmer conditions are prevalent by 6000 BP. These conditions are followed by a cooling trend extending until 3500 BP. Between 3500 and 2500 BP, much cooler and moister conditions prevailed after which conditions warmed. Henry’s (1984) model, in contrast to Butler’s (1978), suggests a less dramatic shift to warmer and dryer conditions at ca. 7000 BP. Henry (1984:108) notes that only one of the three mammalian species used by Butler (1978) to indicate cooler-moister conditions suggests a “wide ecological tolerance.” In contrast, Henry (1984) notes no correspondence in the frequency of Thomomys talpoides (pocket gopher) at Murphey’s Rockshelter and the Wasden site at 7000 years ago, a point central to Butler’s (1978) arguments regarding the emergence of the modern sagebrush-grass biome.

One of the issues raised by the differences in the Henry and Butler constructions is the probability of local or sub-regional climatic variability. Pearson’s (1978) dendrochronological data from four areas in the south-central mountains suggest a degree of variation while documenting common signature years. Similarly, Davis’ (1982) work indicates greater Holocene variation within vegetational mosaics of the Plain. The existing body of paleo-ecological data for the Plain is insufficient to determine the extent to which these broadly changing patterns would have influenced markedly the habitats of specific localities. For example, no data exist that can be used to assess the impact upon stream flows, springs, ephemeral lakes, and wetlands, all of which would have significantly affected the availability of resources and configured considerable variation in settlement regimes. If Henry’s model is accurate then conditions may have changed more gradually and on a local basis and is reflected in Bentley’s (1983) argument that modern conditions along the Snake River in southern Idaho occurred relatively late between 2000 and 3000 years ago. This challenges the view that changes in the technological organization of assemblages necessarily reflect rapid adaptive responses to environmental change (Swanson 1972; Butler 1978).

Trend Expectations

In general, resource intensification is not expected to occur throughout the Archaic, but rather a pattern of the presence and absence of taxa reflecting changing resource opportunities associated with environmental fluctuations instead of adaptive responses to resource stress related to human foraging pressure. Trend expectations are that artiodactyls should be common in Early Holocene (Early Archaic) contexts and gradually increase in prey encounters through the Late Holocene (Late Archaic). This is based in part upon data suggesting a correlation between the stability of artiodactyl populations and cooler-moister conditions influencing forage and availability of water (Murphy 1970; Van Vuren and Bray 1985; Fairbanks 1993; Peek, Dennis, and Hershey 2002). One general expectation, then, is of increasing encounter rates for artiodactyl populations. With warmer-drier conditions of the Late Holocene, the Late Archaic period should reflect a broader or more diverse diet breadth common to the modern sagebrush-grass biome, but one reflecting local potentialities. One expectation relative to increasing aridity is that artiodactyls may appear more abundant as they aggregate near water.

If resource intensification or increased resource productivity does occur, then by expectations of the optimal foraging model, high-ranked large animals should become relatively less common, though some recent studies from the Southwest and Great Basin suggest that they
may increase (Szuter and Bayham 1988; Hildebrandt and McGuire 2002; Byers and Broughton 2004; Byers, Smith and Broughton 2005). These inconsistencies reflect the great difficulty of separating climatic influences upon prey choice from human induced changes in animal populations as well as variance reflecting environmental heterogeneity (Lyman 2003).

A final expectation is that fish should become more common in the record as modern conditions emerge allowing for the development of conditions favorable to the establishment of fisheries. Though post-Pleistocene downcutting is complete by the beginning of the Archaic period, Bentley (1983) and Swanson and Muto (1975) have argued that conditions within the canyon remain dynamic for an extended period. This may be associated with the development of terraces that provide stable habitats supporting a range of resources that draw humans to riverine environments and allow for constancy in aquatic conditions. The highly dynamic conditions described by Bentley (1983) would have impacted developing salmon fisheries with respect to water temperatures, run-off, silting, and food levels. Further, paleo-environmental models indicating increased aridity during the Late Holocene (Late Archaic) suggest decreasing water and forage. If true, we would expect to see an increased aggregation of artiodactyls near water and perhaps a means by which diet breadth was expanded to include aquatic resources.

The Early Archaic on the Snake River Plain (8000–5000 BP)

The Early Archaic faunal assemblages are from nine sites, the majority of which are on the central and eastern Snake River Plain. Included here is the Hetrick site located along the Weiser River in western Idaho (Fig. 2). Conventional radiocarbon ages on bone collagen establish horizons between 9730 and 9850 BP from strata IIIc–IIIId. As with early dates for the Midden site (Willig 1989), the actual dates of occupation are somewhat more recent. In the case of Bison and Veratic Rockshelters, cultural phases and radiocarbon ages overlap with respect to faunal distributions. In general, the deposits contain evidence of Early and Late Archaic occupations. For that reason, the later Early Archaic materials are included as Early Archaic and not Middle Archaic. Diversity in these assemblages suggests an increasing diet breadth during Early Holocene in western Idaho. All are multi-component sites. The total NISP (n = 3021) for the assemblage include 2219 mammal bones, 306 bird bones, and 496 fish remains (Table 1). Mammal bones are clearly the best represented in the assemblage and are more commonly found in upland settings (n = 6).

Cervids (n = 7, 77%) rank highest in ubiquity among represented taxa but rank first in abundance only once. Bovids rank second in rank ubiquity (n = 6, 66%) and have the highest relative abundance (n = 5, 55%, Table 2, Fig. 3). Rabbits occur with frequency (n = 6, 66%) but are not ranked first in any assemblages. Notably, however, rabbits are quite common at Wasden (Guilday 1967), Hetrick, and Veratic Rockshelter demonstrating their common presence in both upland and riverine settings. The ubiquity of bird remains is equal to that of bovids though such are most common at Wasden (Guilday 1967). The three sites where bird bones are most common are Veratic Rockshelter, Wasden, and Hetrick. Canids are also common in Early Archaic sites (n = 6, 66%). Of note is the presence of sage grouse at both Wilson Butte Cave and at Bison and Veratic Rockshelters. The distribution of sage grouse with sagebrush (Artemisia tridentata) suggests the establishment of a sagebrush biome somewhat earlier than suggested by Butler (1978). Fish are found only at 10-CL-3 and the Hetrick site (Rudolph 1995) in western Idaho. Non-salmonid fishes are in greatest relative abundance at the Hetrick site only. Hetrick documents the earliest archaeological evidence of the occurrence of salmonids on the Snake River
Plain. It is unclear whether non-salmonid remains reflect consistent/periodic taking of these smaller fishes or reflect an isolated mass capture. Though riverine settings are not well represented in the Early Archaic, fish are probably not important in the diet breadth. With the exception of the Hetrick site, where deer, elk, bison and sheep are present, deer are found in both upland settings. In contrast, bison are found also exclusively in upland settings.

Fig. 2. Locations of Early Archaic sites within Snake River Plain, southern Idaho.
TABLE 1. NUMBER OF INDIVIDUAL SPECIMENS FOR EARLY ARCHAIC SITES (8000—5000 BP) ON THE SNAKE RIVER PLAIN

| Site          | Age/BP | Deer | Ant* | Elk | Bison Sheep | Canids | Rabbits | Rodents | Birds | Salmon | Nsal* | Setting | Author                  |
|---------------|--------|------|------|-----|-------------|--------|---------|---------|-------|--------|-------|---------|------------|-------------------------|
| 1-Hetrick     | 9730   | 25   | 41   | 1   | 131         | 16     | 43      | 27      | 469   |         |       | riverine | Olsen in Rudolph et al. 1995 |
| 2-Bachman     | Early Arch | 1    | 18   | 42  | 1           | 3      | 4       |         |       |        |       | riverine | Plew et al., 1998 |
| 3-Crutchfield | 7350-7100 | 17   |      |     |             | 3      |         |         |       |        |       | riverine | Murphey 1985 |
| 4-Wilson Butte Cave | Early Arch |  |      |     | 75         |         |         |         |       |        |       | upland   | Gruhn 1961 |
| 5-Rock Creek  | Early Arch | 1    |      |     |             |         |         |         |       |        |       | upland   | Green 1972 |
| 6-Weston Canyon | 7099   | 8    | 16   | 9   | 300         | 3      | 17      | 42      | 7     |        |       | upland   | Miller 1972, 1999 |
| 7-Wasden      | Early Arch | 1    | 150  |     | 130         | 212    |         |         |       |        |       | upland   | Guilday 1967 |
| 8-Veatic RS   | 6925-3995 | 20   | 36   | 1   | 457         | 246    | 20      | 33      | 5     | 1      |       | upland   | Swanson 1972 |
| 9-Bison RS    | Early Arch | 28   | 4    | 234 | 44          | 1      | 2       |         | 75    |        |       | upland   | Swanson 1972 |
| Totals        |        | 98   | 40   | 60  | 851         | 739    | 157     | 226     | 48    | 306    | 28    | 469     |            |

*Ant=Antelope, Nsal=Non-salmonid

TABLE 2. UBIQUITY AND RELATIVE ABUNDANCE OF VERTEBRATE TAXA FOR THE EARLY ARCHAIC

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Ubiquity (frequency of occurrence in assemblages)</th>
<th>Abundance (frequency of assemblages in which taxon is ranked first)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervidae</td>
<td>7 (77%)</td>
<td>1</td>
</tr>
<tr>
<td>Bovidae</td>
<td>6 (66%)</td>
<td>5 (55%)</td>
</tr>
<tr>
<td>Antilocapridae</td>
<td>2 (22%)</td>
<td>0</td>
</tr>
<tr>
<td>Leporidae</td>
<td>6 (66%)</td>
<td>0</td>
</tr>
<tr>
<td>Sciuridae</td>
<td>2 (22%)</td>
<td>0</td>
</tr>
<tr>
<td>Canidae</td>
<td>6 (66%)</td>
<td>0</td>
</tr>
<tr>
<td>Salmonidae</td>
<td>1 (1%)</td>
<td>0</td>
</tr>
<tr>
<td>Non-salmonid</td>
<td>1 (1%)</td>
<td>1</td>
</tr>
<tr>
<td>Aves</td>
<td>6 (66%)</td>
<td>1</td>
</tr>
</tbody>
</table>

The Middle Archaic on the Snake River Plain (5000—2000 BP)

Faunal assemblages are from eight Middle Archaic sites (Fig. 4). Four of the sites are single component sites. The total NISP (n = 517) for the sites include 370 mammal bones, 36 rodent remains, 138 birds, and one fish bone (Table 3). Mammal remains again dominate the assemblages, which are largely from central and eastern Idaho localities with the exceptions of Lydle Gulch near Boise and 10-GM-61 near Montour in western Idaho. Seven of the sites are located in upland settings, while site 10-GG-191 at Hagerman is located along the Snake River, Lydle Gulch is located on the Boise River, and 10-GM-61 is near the Payette River.
Fig. 3. Relationship between ubiquity and abundance of species in Early Archaic assemblages.

### TABLE 3. NUMBER OF INDIVIDUAL SPECIMENS FOR MIDDLE ARCHAIC SITES (5000—2000 BP) ON THE SNAKE RIVER PLAIN

<table>
<thead>
<tr>
<th>Site</th>
<th>Age/BP</th>
<th>Deer</th>
<th>Ant*</th>
<th>Elk</th>
<th>Bison</th>
<th>Sheep</th>
<th>Canids</th>
<th>Rabbits</th>
<th>Rodents</th>
<th>Birds</th>
<th>Sal</th>
<th>Nsal*</th>
<th>Setting</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Dry Creek</td>
<td>3530</td>
<td>40</td>
<td>2</td>
<td></td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>upland</td>
<td>Webster 1978</td>
</tr>
<tr>
<td>2-10GM61</td>
<td>3118</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>riverine</td>
<td>Arzt 1983</td>
</tr>
<tr>
<td>3-Lytle Gulch</td>
<td>4500</td>
<td>30</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>riverine</td>
<td>Brown 1981</td>
</tr>
<tr>
<td>4-Crutchfield</td>
<td>3560</td>
<td>13</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>31</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>riverine</td>
<td>Murphey and Crutchfield 1985</td>
</tr>
<tr>
<td>5-Wilson Butte Cave</td>
<td>13</td>
<td>66</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upland</td>
<td>Gruhn 1961</td>
</tr>
<tr>
<td>6-Rock Ck</td>
<td>Mid Arch</td>
<td>1</td>
<td>66</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upland</td>
<td>Green 1972</td>
</tr>
<tr>
<td>7-Bobcat</td>
<td>4300</td>
<td>3</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upland</td>
<td>Henrikson 1996</td>
</tr>
<tr>
<td>8-Wasden</td>
<td>Mid Arch</td>
<td>70</td>
<td>135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upland</td>
<td>Guilday 1967</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>91</td>
<td>8</td>
<td>18</td>
<td>14</td>
<td>68</td>
<td>133</td>
<td>36</td>
<td>138</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Ant=Antelope, Nsal=Non-salmonid

The most commonly occurring species in Middle Archaic sites are leporids (87%). The increased ubiquity of rabbits is of interest as it may reflect the warming trends of the Middle Archaic (Table 4). However, rabbits occur as the highest ranked species only once in ten site assemblages. Deer and elk are present in 50% of the assemblages and rank highest in 40% of the sites. In contrast, Early Archaic cervids were more ubiquitous but rank first only once in occurrence. Bovids are the most commonly occurring species in the Middle Archaic (75%), a percentage of occurrences significantly greater than the Early Archaic (55%). Bovids, however,
are not highest ranked in any assemblage. Antelope that are not well represented in the Early Archaic period (22%) are slightly more common (37%) in the Middle Archaic. This is equally true for canids (n = 4), which are well represented but only once appear as the most abundant species. One notable contrast with the Early Archaic is the apparent emphasis upon single species. All eight Middle Archaic sites are dominated by the remains of a single species, most commonly deer (n = 4, 50%). Though three sites are near major rivers none contain the remains of salmonids. Only a single non-salmonid fish is noted at Dry Creek, an upland site in the foothills above Boise. The ubiquity of birds is equal to that of small rodents, rabbits, and canids. Birds occurred in both upland and riverine settings and are best represented at Wasden. Birds include upland species (Table 4, Fig. 5).

The Late Archaic on the Snake River Plain (2000–250 BP)

Faunal assemblages are from 45 Late Archaic sites, which are for the most part single component sites (Fig. 6). Unlike Early and Middle Archaic assemblages, the majority of sites in the Late Archaic are within riverine settings (n = 29). There are 12 sites located in upland settings and a single lacustrine site at Bear Lake in southeastern Idaho. The total NISP (n = 52,471) for the Late Archaic include 7594 mammals, 100 birds, and 22,740 fish remains (Table 5). A small number of sites have produced very large assemblages of rodent and fish remains. Notably, over 2000 rodent bones were identified at Rocks Springs in southeastern Idaho.

At Three Island Crossing, near Glenns Ferry, Gould and Plew (2001) report 19,000 fish bones while Ames (1983) reports the recovery of 1516 fish remains at Swan Falls Dam. At the Hemmert site at Bear Lake, 1100 fish remains were recovered (Plew 1997). MNI calculations for the highly fragmented assemblage from Three Island Crossing appear to represent fewer than 400 fish associated with three radiocarbon-dated horizons (Gould and Plew 1996, 2001). The remains from the Hemmert site are of the endemic species Bonneville cisco (Prosopium gemmiferum), a small-bodied fish that spawns in January and February on the north side of the lake. The remains suggest the possibility of mass capture or possibly mass death during the winter period.

The ubiquity of cervids (n = 25, 55% of assemblages) as well as their relative abundance is notable (Table 6). Cervids rank first in frequency in 15 assemblages as compared to bovids (n = 6) and salmonids (n = 8). The only taxon with a greater ubiquity are rabbits (n = 27), which are ranked first among species in only three assemblages. This reflects the pattern previously described by Gould and Plew (1996) for seven Late Archaic sites along the Snake River. Variance in the abundance of rabbits as reflected by the assemblage at Kanaka (see Butler and Murphy 1983) may reflect periodic prey targeting. Cervids, particularly deer, are best represented in riverine settings (n = 18, 61%), followed by bison (n = 9, 31%), antelope (n = 7, 24%) and elk (n = 5, 17%). In upland settings, bison (n = 9, 69%) are dominate with deer (n = 6, 46%), antelope (n = 4, 31%), and elk (n = 2, 15%) appearing less commonly (Table 6). Over all assemblages, bovids are common (n = 19, 42%) but appear as a first-ranked resource only six times. The majority of these remains are bison and is best represented at Quill Cave (Butler 1971), Veratic Rockshelter (Swanson 1972), Baker Cave III (Plew, Pavesic, and Davis 1987), and at Rocks Springs (Arkush 2002). The fact that bison are present in 42% of the sites is noteworthy. In conjunction with the limited abundance ranking, the pattern appears to reflect the arguments of Butler (1971) and Plew and Sundell (2000) regarding the Late Archaic use of bison as a secondary resource (Lupo and Schmitt 1997). Antelope continue to be relatively common, occurring in 26% of the sites but never ranking first in abundance. Birds occur in 40% of the sites with ducks and riverine species
TABLE 4. UBIQUITY AND RELATIVE ABUNDANCE OF VERTEBRATE TAXA FOR THE MIDDLE ARCHAIC

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Ubiquity (frequency of occurrence in assemblages)</th>
<th>Abundance (frequency of assemblages in which taxon is ranked first)</th>
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</thead>
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<td>4 (50%)</td>
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<td>Aves</td>
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Fig. 4. Locations of Middle Archaic sites.
Fig. 5. Relationship between ubiquity and abundance in species in Middle Archaic assemblages.

commonly found in the assemblages. Canids are found in 44% of the sites while rodents occur in 51% of the sites. Canids, which include primarily coyotes and wolves, have a low relative abundance while rodents rank first among taxa in four assemblages. Though possibly representing sampling bias, there is a distinctly greater presence of artiodactyls in riverine than upland sites. Finally, the Late Archaic is characterized by an increase in the ubiquity and relative abundance of fish (Table 6, Fig. 7). Of the Late Archaic sites, 31% contain salmonid (ubiquity = 13) and non-salmonid (ubiquity = 14) remains. Most interesting is that salmonids rank second only to cervids (n = 25) in relative abundance (n = 8).

Discussion

The faunal samples examined in this study are admittedly small and biased in various ways. The inconsistency in data recovery methods, osteological identifications, and unevenness in data reporting most probably affect the ubiquity of some species. In addition, other factors potentially influence the reliability of the data. Though the effect of butchering patterns upon specimen counts per taxon are well documented (White 1953; Perkins and Daley 1968; Binford 1978; Grayson 1984), consideration of the effects of mass captures (Madsen and Schmitt 1998; Grayson and Cannon 1999; Jones 2004; Ugan 2005) and the ways in which variability in target prey may create spatially distinct but contemporaneous faunal assemblages (Lupo and Schmitt 2005) have only recently been taken into account. Regardless, general trends emerge from the data presented.

Based on the assumption that an increase in the ubiquity of species adapted to the modern sagebrush-grass biome should increase as conditions warm at the beginning of the Middle Holocene (Middle Archaic), it is expected that smaller "ecologically tolerant" species would increase during the past 8000 years (Butler 1978), particularly if resource intensification were to
Fig. 6. Locations of Late Archaic sites.
<table>
<thead>
<tr>
<th>Site</th>
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<th>Deer</th>
<th>Ant*</th>
<th>Elk</th>
<th>Bison</th>
<th>Sheep</th>
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*Ant=Antelope, Nsal=Non-salmonid

TABLE 6. UBIQUITY AND RELATIVE ABUNDANCE OF VERTEBRATE TAXA FOR THE LATE ARCHAIC

<table>
<thead>
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<th>Taxon</th>
<th>Ubiquity (frequency of occurrence in assemblages)</th>
<th>Abundance (frequency of assemblages in which taxon is ranked first)</th>
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<td>Cervidae</td>
<td>25 (55%)</td>
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<td>19 (42%)</td>
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<td>Antilocapridae</td>
<td>12 (27%)</td>
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<td>Leporidae</td>
<td>27 (60%)</td>
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<td>Sciuridae</td>
<td>23 (51%)</td>
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<td>0</td>
</tr>
<tr>
<td>Salmonidae</td>
<td>13 (29%)</td>
<td>8 (17%)</td>
</tr>
<tr>
<td>Non-salmonid</td>
<td>13 (29%)</td>
<td>2</td>
</tr>
<tr>
<td>Aves</td>
<td>18 (40%)</td>
<td>0</td>
</tr>
</tbody>
</table>

increase. Because this presumes that exploitation was random in proportion to abundance of prey, it is unclear that this occurred. Examination of the data for the Middle Archaic period demonstrates that the ubiquity of leporids (87%) increases significantly. Bovids (75%) increase notably though not highest ranked in any assemblage. Cervids (50%), and antelope (37%) remain common as do canids (decreasing slightly 66% to 50%). Notably, leporids increase by 17% from Early to Middle Archaic times. The increase in leporids appears to support Butler’s (1978) proposal that small-bodied animals should increase with warming conditions of the Middle Holocene. Small mammals remain common into the Late Archaic though rabbits decrease 6%, to 60%. This finding mirrors Gould and Plew’s (1996) earlier examination of the faunal distributions of seven Late Archaic sites between Hagerman and Glenns Ferry (sites included here) which concluded that rabbits were second in ubiquity only to deer, whereas in this study the pattern is reversed. Though sample size variations affect the presence and absence of leporid and small mammal bones in these assemblages, it is noteworthy that as small-bodied animals increase
over the Holocene, the presence of large game remains relatively constant over time. In general, Archaic assemblages exhibit a continuing use of taxa occurring in the Early and Middle Archaic, suggesting that resource intensification did not occur in the Late Archaic as some have suggested (Pavesic and Mettke 1980).

This study documents the importance of artiodactyls to the diet breadth of prehistoric peoples on the Snake River Plain. As expected, artiodactyls are common throughout the Early and Middle Archaic periods and across varied environmental contexts though decreasing slightly during the Middle Archaic. While this may reflect sampling, few Middle Archaic sites have been documented on the Plain. The cooler-moister conditions of these periods, the Early Archaic in particular, would have fostered stability in forage and thereby the reproductive success of the artiodactyl populations (Byers and Broughton 2004). Notably, and as expected, encounter rates for artiodactyls appear to increase during the Late Archaic, bison (42%) and deer (55%) occurring most frequently. This mirrors an emerging regional pattern in which artiodactyl encounter rates increase significantly in the Later Holocene (Lubinski 1997; Byers, Smith and Broughton 2005; Figures 8 and 9). Commensurately, the record suggests that as in the Wyoming Basin (Byers, Smith and Broughton 2005) forager diet breadths narrowed and broadened in response to local environmental circumstances. Voids issues of sampling, it is noteworthy that the majority (64%) of all Late Archaic sites are situated within riverine settings. Increasing encounter rates for artiodactyls in the Late Archaic may reflect habitat shifts associated with increasing aridity as suggested by a number of models (Butler 1978; Chatters 1982; Davis 1982; Henry 1984, Fig. 9). Yet at the same time, there is no evidence of intensification in pronghorn exploitation as in the Wyoming Basin (Lubinski 1997), except as reported in the Pahsimerai Valley (Chatters 1982), the latter seemingly reflective of local circumstances. This may reflect the fact that while artiodactyls are expected to reflect the trends noted, they vary in ecologic requirements, range, and seasonal
Archaic Frequency of Artiodactyl Remains

Fig. 8. Archaic frequency of artiodactyl remains.

availability. The increases in artiodactyl encounters may co-occur with environmental stabilization within the Snake River Canyon between 2000–3000 years ago (Bentley 1983), a period of time during which human occupations increase significantly as modern habitats were established.

Throughout the Archaic, cervids and bovids are ubiquitous taxa with cervids ranking first in relative abundance much more commonly than any other taxon and are common in upland and riverine settings, the latter reflecting a greater uniformity of the environment of the Plain. This is particularly noteworthy since an increase in small-bodied mammal remains is not accompanied by a concurrent decrease in the presence of large game as is expected by the optimal foraging model. This suggests that intensification did not occur or that the presence of highly-ranked large game reflects long-distance hunting forays (Hildebrandt and McGuire 2002). (See also Cannon 2003 for discussion of how centralization of foraging results in overrepresentation of high-utility parts associated with transport costs or encounter rates associated with expanding ungulate populations (Byers and Broughton 2004). Additionally, artiodactyls may appear more common in riverine settings as populations aggregated nearer water sources during a period of increased aridity, possibly reflecting the type of central place foraging discussed by Cannon (2003) in the Southwest.

Bovids, which are particularly common in the Early Archaic (66%), decline in the Middle Archaic (37%) and increase slightly in the Late Archaic period (42%). They rank first in six assemblages. The majority of bovid remains from the Late Archaic are bison, which are present in 42% of the sites. Noteworthy is the fact that bison occur across the Plain in diverse settings and are actually more common in their occurrence on the Western Snake River Plain (Plew and Sundell 2000). Their analysis and the present study challenge Butler’s (1978) argument that bison populations declined during the last 3000 years. In fact, as Grayson (2006) has recently demonstrated, bison were common across the Great Basin, particularly after 1600 BP. The ubiquity index and abundance ranking of Snake River Plain bison appear to reflect the arguments of Butler (1971) and Plew and Sundell (2000) regarding the Late Archaic use of bison as a secondary resource. The latter suggest that bison occurred in small herds across rather diverse environmental settings and while taken with regularity did not constitute, in contrast to arguments
by Henriksen (2004), the most optimal prey species. This is reflected in the abundance ranking of bison. Of note is Stutte’s (2004) report of Late Holocene (ca. 500 BP) bison in eastern Oregon, an area environmentally similar to the western Snake River Plain. Grayson (2006) observes that the appearance of bison in eastern Oregon after 500 BP may reflect increased winter moisture and cooler temperatures associated with the so-called “Little Ice Age” (Wigand and Rhode 2002), these conditions resulting in increased grasslands and expansion of bison habitat. Yet, with the exception of the possible proto-historic component at Bliss, the nine radiometrically-dated Late Holocene sites on the Snake River Plain date no later than 630 BP, the majority dating between 1900 and 700 years BP.

One of the significant findings of this study is an increase in the ubiquity and relative abundances of fishes in the Late Archaic. While a total of three individual fish are documented for Early and Middle Archaic periods, 31% of Late Archaic sites contain salmonid (ubiquity = 13) and/or non-salmonid (ubiquity = 14) remains. Notably, the ubiquity of non-salmonids is greater than salmonids. Most interesting is that salmonids rank second only to cervids in relative abundance. Previous studies have noted the relative absence of salmonids from earlier periods (Gould and Plew 1996; Plew and Plager 1999; Plew 2000) and their remarkably greater presence in the Late Archaic. Though sampling, differential preservation, and discovery of taxa may partially account for this, it appears that the use of fish becomes increasingly common into the Late Archaic period.

This may reflect a greater use of the riverine setting (29 of 42 sites are along major rivers including the Snake River), a sampling bias, or relative to trend expectations the emergence of modern (improved) environmental conditions along the Snake and its tributaries. As noted, Bentley (1983) has argued that modern environmental conditions occurred within the Snake River corridor only during the past 2000—3000 years, essentially the Late Archaic. Recently, Willson and Plew (2007) have reviewed data for sites between Hagerman and Marsing, Idaho, a distance

![Late Archaic Upland-Riverine Frequency of Artiodactyls](image)

Fig. 9. Late Archaic upland-riverine frequency of artiodactyls.
of more than 100 miles. They note that terraces are of Late Holocene age. The emergence of these conditions may well be the primary reason for increased use of riverine contexts. The presence of invertebrate remains becomes common only in the Late Archaic and may again reflect the increasing use of the riverine setting or a general broadening of the diet breadth. The general absence of Early and Middle Archaic sites from these areas is also potentially explained by the absence of stable habitats along the riverine corridor and by less arid conditions in the uplands. Based upon trend expectations, the greater use of aquatic resources might also be taken to reflect an indigenous focus on artiodactyl populations aggregating near water. This would follow prey choice model expectations but create circumstances under which there would be a broadening of the diet breadth to include aquatic species. Though some writers, including Pavesic and Meatte (1980), have argued that resource intensification involving salmon exploitation became the “the basis for population shifts and determining village size...the most important protein source available” the relative optimality of resources discussed in this study and elsewhere suggests otherwise (Broughton 1994; Gould and Plew 1996; Yu 2006). The prey choice data presented here demonstrate a continuing common use of large and small-bodied animals. Though small-bodied animals become more common, cervids are the most highly ranked species and the second most common in rank ubiquity. Salmon are the second highest ranked resource, though this reflects their period and short-term availability. Regardless, fish do become more common during the Late Archaic. The issue is whether this reflects resource intensification. The addition of aquatic resources to the diet most probably reflects an exploration and expansion of the dietary breadth within a rich and relatively stable habitat (Johnson 1997; Binford 2001; Yu 2006).

Conclusions

This evaluation of the zooarchaeological record for the Archaic period on the Snake River Plain suggests an early reliance upon deer, elk, and bison with increasing use of rabbits and other small mammals beginning in the Middle Archaic. The increasing numbers of small mammals may reflect the warming trends of the Middle Holocene (Butler 1978). The use of artiodactyls appears somewhat less important during the Middle Archaic, a period during which site assemblages reflect the taking of specific species. Notably, bison are very common in the Middle Archaic (75%) but not highly ranked. In general, Early and Middle Archaic assemblages suggest that between 8000 and 2000 years ago and across the plain there is little change in the range of species utilized by aboriginal populations. Notably, however, Middle Archaic sites appear less diverse. In contrast, Late Archaic site assemblages exhibit a broad range of species and an increase in the presence of artiodactyls, particularly in riverine environments. The period is also associated with a marked shift in the ubiquity of fish, particularly salmon. This may reflect greater use of the riverine setting associated with increased aridity and the aggregation of artiodactyls populations near the Snake River. Notably, diet appears to have narrowed and broadened by local potentialities. Overall, there is little evidence of resource intensification.
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