DOLORES ARCHAEOLOGICAL PROGRAM TECHNICAL REPORTS

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Activities of the Faunal Consultant

by

Steven D. Emslie

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Under the supervision of
David A. Breternitz, Senior Principal Investigator

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ABSTRACT

The Dolores Archaeological Program faunal analysis program was initiated in 1978 under the direction of S. Emslie. Immediate priorities were the direction and supervision of field operations with regard to the recovery of faunal remains, development of articulation points between the projected analysis and the project Research Design, and the operationalization of a preliminary analysis to be undertaken in 1978-1979. The preliminary analysis is currently underway and is expected to be completed by May 1979. Faunal analysis is viewed as having the potential to contribute significant information to the corpus of data needed to answer questions posed in the project's Research Design. Specifically, faunal studies are seen as having direct bearing on all five major problem domains.

INTRODUCTION

Due to other commitments, the Dolores Archaeological Program (D.A.P.) faunal consultant spent only limited time on the project during the first field season. He visited the site excavations regularly during this period to advise field personnel on techniques to be employed in recovering faunal remains and to estimate the amounts and types of remains being collected. In addition, he drafted an animal burial form and an interim form to be used for preliminary analysis until implementation of the data-management system being designed by Woodward-Clyde consultants.

After the field season, the faunal consultant directed his project activities toward progress in four areas: collaborating with Woodward-Clyde personnel on development of the data-management package for faunal remains; designing faunal research based on the problem domains outlined in the project Research Design; formulating a methodology for preliminary analysis; and beginning preliminary analysis.

The current status of these task areas is as follows:

1. The first stage of the development of the data-management package for the faunal analysis program is nearly complete; the forms needed have been finalized (Appendix A) and must be filled out before entry into the project's data-processing system.
2. An interim version of the research design for faunal studies has been completed and is included as the main portion of this chapter.
3. Work continues on the preliminary analysis; to date, the remains from two sites (Site 5MT2191 and Site 5MT4475) have been completely analyzed for species identification.

PRELIMINARY ANALYSIS

A two-stage procedure has been adopted in the implementation of the faunal analysis program: first a preliminary analysis or rough sort and later a more detailed analysis. The preliminary analysis is designed to provide D.A.P. archaeologists with basic data to include in their fieldwork reports and consists of four tasks: identification by species of all individual items in the faunal collections; tabulation of species identified at the excavated sites, by provenience; identification of worked or culturally modified bone; and calculation of minimum-number-of-individual (MNI) statistics for each site.

To record the results of preliminary analysis, a preliminary sort form is now being designed; a draft version is included in this report as Figure 5.1. For each field provenience (F.S.) number assigned by the excavation staff, a column set is provided on the form. Within the set individual columns are provided for numbers of bones of easily identified taxonomic groups of animals and for the numbers of bones and MNIs for bones which can be easily classified by species. If the technician identifies worked bone in any of these groups, the number in the column is starred and the total number of worked bones for the field-specimen number is recorded at the bottom of the column set. Total numbers of animal bones and MNIs for the field-provenience units can be calculated by adding all numbers in the column except the entry for worked bones.

In order to increase efficiency, in many cases only the generic name of a species is provided on the form (e.g., Cynomys for Cynomys gunnisoni or Gunnison's prairie dog and Lepus for Lepus californicus or black-tailed jackrabbit). The preliminary sort form provides usable information to

Figure 5.1 Form, Preliminary Sort of Nonhuman Bone (NHB), Unworked.

SITE 5MT

IDENTIFICATION	FS No. Bones	MNI	FS No. Bones	MNI	FS No. Bones	MNI	FS No. Bones	MNI
Not Identifiable								
Not Identified								
Mammalia								
Lagomorpha								
Sylvilagus								
Lepus								
Rodentia								
Cynomys								
Spermophilus								
Marmota								
Thomomys								
Peromyscus								
Microtus								
Neotoma								
Erethizon								
Castor								
Sciuridae								
Cricetidae								
Carnivora								
Canidae								
Cania								
Fox, spp.								
Mustelidae								
Felidae								
Lynx rufus								
Artiodactyla								
Odocoileus								
Ovis								
Antilocapra								
Cervus								
Aves								
Falconiformes								
Galliformes								
Meleagris								
Grouse, spp.								
Passeriformes								
Amphibia								
Fish								
Worked Bone								

Figure 5.1 Form, Preliminary Sort of Nonhuman Bone (NHB), unworked.

site archaeologists and can be quickly completed for each field-provenience unit.

THE RESEARCH DESIGN FOR FAUNAL STUDIES

Basic models for faunal collection and analysis have been formulated which are compatible with the general research design of the D.A.P. These models are explained below in terms of the five problem domains specified in the design.

Domain I: Cultural Adaptations

Faunal studies can provide information in this domain in two main areas--paleoenvironment and animal domestication. Several questions are basic to these studies:

1. What faunal resources were available to the Anasazi prehistorically, and what animals are found in the area today?
2. How were these resources used by the Anasazi, and how are they used by contemporary groups?
3. When did animal domestication become important, and how did it reflect cultural adaptations?

Availability of Faunal Resources

Determining the faunal resources that were available to the Anasazi requires paleoenvironmental studies in the project area. This primarily involves field collection of animal remains which can be positively assigned to particular cultural time periods. Most of the paleoenvironmental information will come from ecologically sensitive animals which reflect specific environments. These sensitive animals are most typically small rodents, and careful collection procedures are necessary to recover their remains. The usual quarter-inch screening of soil in archaeological sites is not adequate to catch these small bones and teeth.

In addition, there are only a few methods for distinguishing culturally altered bone: recognizing cut marks, breakage patterns, and burns on the bone caused by man and knowing the stratigraphic location of the bone within a site. Since cut marks, breaks, and burns rarely occur on small animal bones, we need to rely on stratigraphic location to determine whether or not the bone is cultural. The following methods will help insure accurate results.

Soil samples will be collected from undisturbed proveniences which reflect a certain time period. The environmental studies team is formulating a systematic procedure for collecting the samples to insure accurate data recovery. No samples will be collected from areas disturbed by rodents. Bone from undisturbed areas should reflect the species present in the area prehistorically. Other procedures being formulated will help determine what parts of a site provide the richest source of information regarding faunal remains and how much bone is preserved in archaeological deposits under natural conditions.

Animal Skeleton Forms (Figure 5.2) will be used in the field. These forms will require the excavator to record certain data when as much as or more than one-half of a complete animal skeleton is encountered. These data will be helpful for models in several domains. In this domain they will provide necessary information for interpreting rodent skeletons (e.g., whether the skeleton is associated with a recent burrow or disturbance in the stratigraphy or is located in undisturbed stratigraphy related to the paleoenvironment).

Related to this problem is the question of what species of rodent are likely to burrow in the soil of a site. This will be tested with an onsite/offsite trapping system to determine what species might occur in

Figure 5.2 The D.A.P. Animal Skeleton Form (draft).

FIGURE 5.2 D.A.P. ANIMAL SKELETON FORM (Draft)

SITE NO._____ SITE SUBAREA_____ FEATURE NO._____

BURIAL NO._____ DATE RECORDED_____ RECORDER_____

I. LOCATION (INCLUDE DETAILS IN PLAN AND SECTION SKETCHES)

A. GRID_____ SOUTH, _____ EAST

B. VERTICAL_____M. TO_____ FROM_____

C. HORIZONTAL_____M. TO_____ FROM_____

_____M. TO_____ FROM_____

II. STRATIGRAPHIC DATA (INCLUDE DETAILS IN SECTION SKETCH)

A. NATURE OF GRAVE, IF ANY (e.g., PIT OR CIST, OTHER VISIBLE DETAILS)

B. MATRIX (e.g., COLOR AND TEXTURE OF SOIL, ROCK, TRASH, ORGANIC CONTENT, ETC.)

C. RELATIONSHIP OF GRAVE TO STRATA

D. DISTURBANCE

E. ASSOCIATED FEATURES (INCLUDE DISTANCES AND DIRECTIONS)

III. DESCRIPTION

A. POSITION AND ORIENTATION OF ANIMAL (IS ANIMAL JUMBLED OR ARTICULATED)

EXTENDED_____ SEMI-FLEXED_____ FLEXED_____ OTHER_____

COMPASS ORIENTATION ALONG LONG AXIS_____

ABNORMALITIES NOTED:

B. DIMENSIONS

MAX LENGTH_____M _____DIRECTION

MAX WIDTH _____M _____DIRECTION

MAX DEPTH _____M _____DIRECTION

C. IS SKELETON INTENTIONAL BURIAL OR INTRUSIVE?

D. ASSOCIATED OBJECTS OR OTHER SKELETONS

E. SPECIES IDENTIFICATION

F. DATA CONTROL

F.S. NOS._____ SAMPLE NOS._____

PHOTOS NOS._____

DESCRIPTION OF SOIL SAMPLES TAKEN:

G. CONDITION OF SKELETON (DESCRIBE)

H. OTHER NOTES AND COMMENTS

I. STICK FIGURE (SKETCH)

archaeological deposits; site-specific vegetation types and disturbed soils are thought to influence the distribution of local rodent popluations. An idea of the amount of impact these rodents have had on a site may then be estimated during excavation by recording all disturbances.

Trapping of modern mammals and avifauna will also be initiated in the summer of 1979. The technique of systematic collection by ecological zones will be similar to that discussed by O'Farrell et al. [1]. A 12 by 12 grid will be used with 144 live traps spaced at intervals of 15 m. The traps will be baited in the evening and checked during the late evening and early morning. Captured specimens will be killed using ether, immediately weighed in grams, and assigned temporary catalogue numbers. Then the specimens will be positively identified, specific measurements taken, hair samples collected, and the bodies cleaned for masceration. Stomach contents and crop contents of birds will be placed in glass vials with preservative for future analysis. These data will provide information on species restricted to certain environmental zones and on their impacts on those zones. In addition, they may also provide information on how some species adapt to changes in their environment, specifically man-caused changes.

Along with the systematic trapping, an experimental corn field, which will be grown by the Environmental Studies personnel, will be trapped throughout the summer during all stages of its growth. Animals trapped here may indicate species that will abandon their natural range for the more favorable cornfield habitats. If these animals were hunted by the Anasazi for crop protection, as well as food, they may also appear in the prehistoric faunal record. Bones which can be analyzed to determine

season of death will become important in these interpretations. It is probable that many species occurring in archaeological sites were killed primarily for crop protection and secondarily for food (Emslie [2]).

Finally, live and snap traps will be placed in specific locations in the D.A.P. study area near woodrat nests, etc., to insure that these animals are included in the sample. All trapping and snaring techniques will be tested in the spring and refined before systematic trapping begins in the summer.

Data from other sources of paleoenvironmental information, such as palynology, dendrochronology, and seed analysis, will be coordinated with these data to support, or challenge, any results.

Determination of species in the area today and those present during the prehistoric period is also of importance to research involving cultural adaptations. For example, the prairie dog increased in numbers through time in archaeological sites in Mancos Canyon (Emslie [2]); these prairie dog remains were recovered in undisturbed prehistoric strata. However, this species was not recorded in Montezuma County by the first Euro-American settlers, although it has since been steadily reinvading the area (Anderson [3]). It may be inferred that this species, which thrives in agricultural areas, increased in numbers prehistorically due to the increasing use of agricultural methods by the Anasazi. When the Anasazi abandoned the region the prairie dog also disappeared, until the historic period when agricultural practices in the area were renewed.

Since an historical study of animal species in the D.A.P. area is important as a method to gain knowledge concerning the prehistoric assemblage, a literature search has been initiated. This study includes communication with Colorado Wildlife Commission personnel and use of their

records on local fauna. To date, a large amount of literature has been gathered, but the most important and extensive studies are not published and are available only in the libraries at the University of Colorado and Colorado State University. Until these sources can be tapped and local Wildlife Commission personnel contacted, this portion of the study will remain incomplete. More research on this particular aspect of the problem will be done in the summer.

Human Use of Faunal Resources

A second major concern in Domain I (Cultural Adaptations) is how faunal resources were used by the Anasazi and how this compares with ethnographic records on the use of these animals by contemporary groups. Addressing these questions requires data on how animals were processed; evidence from the archaeological bone collections, such as cut marks, burn and boiling marks, and breakage patterns, can be used to infer prehistoric processing practices. A detailed analysis card has been devised to record all applicable kinds of information from each bone, group of bones, or animal skeleton (Figure 5.3).

Information to be recorded on this card includes identification of species, if possible; skeletal element and side of element (right or left), if known; initials of analyst; date of analysis; site; basic provenience information and number; time period with which the bone is associated; description of any modifications; description of any breakage, whether snap, spiral or, if caused during excavation, fresh; measurements of complete elements and skulls, mandibles, etc.; and additional comments if the bone is burned, pathological, or if notes on its identification are necessary.

Figure 5.3 Card used to record cultural modification of bone (draft).

DOLORES PROJECT ANIMAL BONE

Species:
Element(s):
Identified by: Date:
Site:
Provenience: F.S.

Period:
Worked:

Cut marks and breakage:

Measurements:
Additional Comments:

Figure 5.3 Card used to record cultural modification of bone (draft).

The above information can then be applied to several models of study. Butchering processes can be inferred from locations of cut marks and breakage patterns as well as from what elements are present and absent. Butchering activity areas or loci may be identified from the basic provenience information. If only the foot bones of certain species occur in a site, it can be inferred that individual animals represented were processed for skins and hides and were perhaps killed at long distances from the site, with only the skins and intact extremities being carried back.

Information from ethnographic sources can also be used to infer prehistoric practices. For example, the Hopi are known to place certain animal waste materials in shrines away from their habitations and specifically away from their dogs (Beaglehole [4]). This practice obviously biases the faunal record, and the possibility that the Anasazi used similar practices needs to be considered when making archaeological interpretations. A similar bias in the faunal record may exist with rodent remains. The Zuni are known to grind entire rodents into a meal before consumption (Cushing [5]) leaving no discarded parts. Other studies which may be helpful in this area include Henderson and Harrington [6], Lange [7], Mason [8], Ortiz [9], and Tyler [10]; but a complete bibliography still needs to be assembled.

Animal Domestication

Another important aspect of cultural adaptations is the role of domestic animals, in this case the turkey and dog. Exactly when these domestic resources appeared and how they were used needs to be established. The dog has a long history of use in North America and in the Southwest, with some of the earliest remains, such as those from

Ventana Cave, dating to at least 2500 B.C. (Haury [11]). Dogs have also been recorded in Basketmaker sites in northeastern Arizona (Guernsey and Kidder [12]) and southwestern Colorado (Carlson [13]) and were probably present with the earliest Anasazi populations in the D.A.P. area. The economic role of the dog in local Anasazi communities is a potential area for future investigations. Studies of data recovered from Anasazi sites in Mancos Canyon, Colorado (Emslie [14]), indicate that the dog was used as a food source as well as for ritual practices associated with site abandonment. These studies also reveal the presence of numerous bone pathologies, perhaps reflecting the state of health of the local prehistoric canine population. Specialized excavation and recording techniques in the field and analytical methods in the laboratory will be implemented to further elucidate the role of the domestic dog in prehistoric D.A.P. societies.

Pathologies on animal bone, rarely noted in the available literature (see Parmalee [15], Parmalee and Bogan [16]), are viewed as potentially valuable data in studying the dog and turkey. Several of the Mancos Canyon dog skeletons display vertebral anomalies, perhaps because of their use as pack animals. Dogs in many hunting and gathering cultures were used for this purpose, but this practice decreases with the adoption of agriculture as a primary subsistence mode (Allen [17], Haag [18]). A suspected decrease in dog remains from sites in the Mesa Verde Region (Emslie [14]) is thought to be related to economic practices of the Anasazi. This model can be further investigated by studying the D.A.P. data.

The turkey was also an important domestic animal in Anasazi culture, but evidence indicating domestication does not definitely occur in

Colorado and southern Utah until the Pueblo II period, A.D. 900-1100 (Emslie [2], Emslie and Hargrave [19]). The few turkey bones which occur in earlier sites are probably the result of trade from the south before this species was established in the area. Beginning in the Pueblo II period, turkey skeletons and bones of immature individuals representing all phases of development begin to appear, indicating that turkeys were being raised at the site. Turkey skeletons, as well as dog remains, associated with kivas may be of some ceremonial importance, and information recorded in the field regarding these burials will aid in their interpretation.

Recent research with turkey-bone measurements indicates that two different sizes of turkeys are present in the southwestern archaeological record (C. McKusick, personal communication to L. Hargrave); this may indicate that two turkey breeds were present in the area during prehistoric times. Similar measurement studies conducted by D.A.P. faunal-program personnel may help determine which breed of domestic turkey was introduced into Colorado. Bone pathologies, such as broken wings, may add information on how turkeys were handled by their owners. Some turkey-bone pathologies can also be related to poor nutrition (Schorger [20]).

Domain II: Paleodemography

Faunal analysis is important in this domain with respect to questions concerning amounts of animal-food nutrition available to the Anasazi and how this affected their state of health. Studies in this area can begin once it has been determined what animal resources were available to the local Anasazi population. Generally, studies of this nature in the past have been based on meat-weight percentages for each animal species

identified at a site. These percentages are determined using standard meat-weight figures for a species multiplied by the MNI of that species calculated for the site (White [21]). Use of standard figures, however, can often lead to inaccurate and biased results, since a species' weight will vary by season and by region, and since young and adult individuals are often lumped together.

To avoid these problems, it is proposed to provide more accurate meat-weight figures for the D.A.P. faunal-analysis program; data from live trapping will be useful. Weights of young and adult individuals of certain species of rodents and rabbits will be recorded and used to establish the new meat-weight figures. These figures can then be applied to MNIs of young and adult specimens represented in the faunal record. Data on the meat-weights of large game cannot be collected in the summer of 1979 but may be available from local Wildlife Commission records. When these new figures are established, more accurate estimates of meat nutrition available to the Anasazi can be made.

The D.A.P. faunal-analysis program will also include studies to determine the total nutritional value of whole specimens of rodents which might have been ground and eaten in their entirety. In addition, seasonal trapping should be implemented to determine what animals provide the greatest nutritional potential at certain times of the year. Important in this regard is determining at what season animals were collected by the Anasazi. A number of papers dealing with establishing the age of animal remains specific to year and season of death have been published (Buckley and Libby [22], Carson [23], Gilbert [24], Hale [25], Kay [26], Knight [27], Mosby [28], Olsen [29], Petrides [30], Reilly and Curren [31], Sather [32], Tiemeier and Plenert [33], Van Nostrand and Stephenson [34]),

but these treatments deal mainly with elements of immature specimens or are restricted to particular elements. Use of these techniques, while helpful, can bias interpretation since all skeletal elements cannot be included. Alternate means for identifying season of death need to be developed. Pollen data from the same stratigraphic levels as the bone remains may be of some use; more background work must be done in this area.

Nutritional aspects of domestic animals are important in studies of paleodemography. The temporal placement of domesticates in the archaeological record and their utilization as food resources can be determined from data collected regarding Anasazi adaptations. A pertinent problem is determining the nutritional value of these animals. Meat-weight figures for turkeys can be obtained from specimens in the wild, but wild turkeys probably differ significantly from domestic turkeys in terms of nutritional value. This is true for the dog as well, and gross nutritional figures on these species will have to be developed.

Domain III: Community Organization and Settlement Patterns

Two aspects of faunal analysis have important implications for studies of community organization: ceremonial use of animals and activities associated with animal procurement. Possible clues to the use of animal products as ceremonial objects include bones associated with ceremonial activity areas such as kivas and animal skeletons associated with ceremonial activity areas and human burials.

Certain species are identified regularly from bone tools or are present only as bone tools in the faunal record. Swannack [35] and Rohn [36] found evidence of bighorn sheep at Big Juniper House and Mug House

only in the worked-bone assemblages and postulated that this species was procured primarily as a raw-bone source for the manufacture of tools. They ignore other possible explanations such as the ethnographic practice of placing bighorn sheep remains at a shrine away from the site (Beaglehole [4]). This practice would result in only worked bones of this species being present at the site, while the primary procurement strategy for this species might have been for food or other reasons. Factors such as species and element identification, provenience in the site, and ethnographic analogies need to be considered in the analysis of worked bone.

Archaeological proveniences of worked and unworked bone may also aid in identifying ceremonial animals. In Anasazi sites excavated in Mancos Canyon, Colorado, several bighorn sheep skulls and horns were found associated with kiva floors and fill (Emslie [2]). These objects may be associated with costumes or other religious paraphernalia; ethnographic studies again become important in interpreting this phenomenon. Tyler [10] discusses the presence of a Mountain Sheep Clan, now extinct, among the Hopi. This clan used sheep horns in various ceremonies and dances. Determining aspects of animal ceremonialism depends primarily on bone provenience in the site and on skeletal elements present.

A final clue to determining animal ceremonialism is the placement of animal burials with kivas or with human burials. The greatest problem here is ascertaining if an animal burial is intentional for ceremonial purposes, intentional for other purposes, or accidental or intrusive. It is believed that correct application of the D.A.P. Animal Skeleton Form and timely photographs of the remains in situ will rectify this problem. The recording of the location of animal burials in the site, their

orientation, position, etc., is essential in these interpretations. A large number of dog and turkey burials were associated with kivas from several sites in Mancos Canyon and were probably intentionally placed in these features either during or after their abandonment (Emslie [2], Gillespie [37]). It is also possible that an abandoned and collapsed kiva acts as a natural pitfall, trapping many animals (W. Gillespie, personal communication). Finally, unidentified snake skeletons at Sites 5MTUMR2785 and 5MTUMR2559 in Mancos Canyon have possible associations with human burials (Emslie [2]), and possible similar occurrences at D.A.P. sites need to be recorded in more detail.

A model for the study of community organization of animal procurement activites needs further development. Possible evidence for community rabbit drives by prehistoric groups was found at Mancos Canyon where the meat-weight percentages of cottontails and jackrabbits never differed by more than 0.5 percent at any time period. A rabbit drive would capture all rabbits in a certain area; the area is assumed to contain stable ratios of these two species. Cottontails are usually more numerous in the area and their greater numbers make up the difference in individual meat-weights compared to jackrabbits. Hence, the similar meat-weight percentages calculated for rabbit remains collected from the Mancos Canyon sites may be the result of organized rabbit drives. In such drives, neither species would have a collection preference, and equal meat-weight percentages would be expected. This example assumes, however, that rabbits were procured primarily by this technique, and that individual kills have minimal effect on the ratio. Rabbit drives are important to the Hopi, particularly in the spring for crop protection (Beaglehole [4]). Tyler [10:133] states that: "For an agricultural people some

rabbit hunting is imperative as they are a pest in fields of young corn and other crops, unless their numbers are kept in check by community drives."

Other means of studying community organization of animal procurement depend on analysis of artifacts associated with procurement, such as nets, snares, and throwing sticks. Finally, the association of bones of certain species with certain household units may also be of importance.

Faunal analysis can aid in settlement-pattern studies by making it easier to recognize site function and activity loci within a site. The detailed analysis of bone necessary for investigations of cultural adaptations will provide this information. Changes in animal subsistence practices through time may also be important, and these will be the subject for detailed studies in regard to culture change (Domain V).

Domain IV: Extraregional Relationships

The role of faunal analysis in studying extraregional relationships is the identification of exotic animals, such as the parrot and macaw. These species are usually considered to have been trade items from Mexico (Hargrave [38]). Unfortunately, such exotic species may be impossible to distinguish from animals representing a new range extension. For example, passenger pigeon remains from some pueblos in New Mexico probably represent a species range extension due to brief climatic fluctuations (Hargrave and Emslie [39]). A solution to this problem may be provided by data from paleoenvironmental studies and from studies in palynology and dendrochronology. If an environment suitable for the exotic species existed in the study area during the time period of its occurrence, then it may be assumed the species represents a range extension. Otherwise

the species may be considered a probable trade item. The introduction and original source of domestic animals is also an area which must be researched to gain information on extraregional relationships.

When a trade item is recognized, it may be possible to identify its source. However, the source may only be identifiable in broad terms, such as Mexico as the source for macaws. Recognizing an exact group of people from which the trade items were obtained will probably depend on other artifactual remains such as obsidian, shell, etc.

Another area of study in this domain which needs further development is the possible practice of inter- and intrasite trade of food items. Evidence for this could include the recognition of food-processing areas within a site and the presence of elements from only one side of an animal in a domicile. This information will be recorded as part of the detailed analysis described for Domain I: Cultural Adaptations.

Domain V: Culture Process

The final domain of study in the general research design is culture change and why it occurs. Faunal studies are pertinent here with recognition of shifts in animal exploitation due to paleoenvironmental changes, to man-caused ecological changes, or to overexploitation of certain species. This domain combines results of faunal research in all other domains, as well as other contributory studies. Some of these other studies include the role of domesticates, shifts in trade systems, effects of subsistence systems on human nutrition, and changes in architecture and artifact assemblages. Models of study in this domain actually involve all models discussed so far.

CONCLUSION

Faunal analysis is a vital area of study in researching the basic questions outlined in the D.A.P. Research Design. The most obvious application of faunal studies is in reconstructing Anasazi cultural adaptations; the exploitation of faunal resources and the specific use of these resources in Anasazi communities are areas that must concern us. In addition, the role of domestic animals in the Anasazi economic system is another important aspect of the problem.

Research applications of faunal analysis are not limited to the domain of prehistoric adaptations. Such analyses also have a bearing on paleodemography, in studies of animal foods and nutrition; on social organization, in studies of ceremonial usages of animals and social activities associated with animal procurement; and on extraregional relationships, in studies of exotic animal remains and the introduction of domesticates into the study area. Aspects of cultural change and evolutionary processes can be examined by identifying shifts in patterns of animal exploitation and the pressures causing such changes. Studies of cutural processes involve the consideration of data from all other problem domains and from other analytical programs as well.

The D.A.P. faunal analysis program has been initiated to process animal remain collections from excavated sites and to assemble data that are pertinent to the problem domains of the general research design.

APPENDIX A

FAUNAL ANALYSIS DATING CODING FORM AND CODING FORMAT

FAUNAL ANALYSIS: DATA CODING FORM

General Inventory Considerations

Field Specimen Number	6 digits, assigned in field
Material I.D.	2 digits, always 02
Catalog Item Number	3 digits, assigned by faunal analyst
Special Specimen Type	2 letters, per standard list (e.g., BS)
Special Specimen Number	4 digits, assigned in field
Point Location	3 digits, assigned in field

Modification: General classification of bone

0: Unworked bone
1: Worked bone

Bone Identification

Class

0: Unidentifiable
1: Uncertain
2: Mammalia
3: Mammalia, large
4: Mammalia, small
5: Mammalia or Aves
6: Aves
7: Reptilia
8: Amphibia
9: Osteichthyes

Order, Family, Species

See attached sheets.

Element Type

Side

0: Indeterminate
1: Right
2: Left
3: Not applicable

Type

See attached sheets.

Number of Items

Used only for fragments of bones, which are not tools or tool fragments, and which have no cut marks. The implication of this is that all whole elements, all tools and tool fragments, and all bones with cut marks will be entered as separate line entries.
Two digits, indicating the number of bone fragments of the same class, order, family, species and element category. For preliminary analysis, can be used to show number of bones by class, order and element type group.

Cut Marks

Location

0: Not Present
1: Proximal
2: Distal
3: Medial
4: Indeterminate

Kind

0: Not present
1: Oblique
2: Perpendicular to long axis
3: Parallel to long axis
4. Indeterminate

Number of cuts

2 digits for approximate or exact number

Breakage

0: Not present
1: Long bone shaft fragment
2: Indeterminate element fragment
3: Fresh break - caused during excavation or other, proximal end only
4: Fresh break, distal end only
5: Fresh break, both ends of element
6: Spiral fracture, proximal end
7: Spiral fracture, distal end
8: Spiral fracture, both ends
9: Snap fracture, proximal end
10: Snap fracture, distal end
11: Snap fracture, both ends
12: Snap fracture proximal, spiral fracture distal
13: Snap fracture distal, spiral fracture proximal
14: Snap fracture proximal, fresh break distal
15: Snap fracture distal, fresh break proximal
16: Spiral fracture proximal, fresh break distal
17: Spiral fracture distal, fresh break proximal
18: Breakage indeterminate

Whole Element Measurement

Three digits, includes length in millimeters of whole elements and of complete worked tools. For additional skull measurements, when taken, see comments.

Comments

00: Preliminary analysis only
01: Element(s) partially burned
02: Element(s) completely burned
03: Identification not positive, needs further confirmation
04: Pathological element, pathology indeterminate
05: Pathological element, healed break
06: Pathological element, lesion
07: Pathological element, arthritic growth
08: Pathological element, assymetrical growth (warping)
09: Pathological element
10: Pathological element
11: Immature element(s), indeterminate age
12: Immature element(s), less than 3 weeks old
13: Immature element(s), 3-6 weeks old
14: Immature element(s), 2-3 months old
15: Immature element(s), 3-6 months old
16: Immature element(s), less than 1 year old
17: Immature element(s)
18: Immature element(s)
19: Immature element(s)
20: Immature element(s)
21: Epiphyses not fused
22: Epiphyses fused with line present
23: Not used
24: Not used
25: Season of death, early summer (June - mid-July)
26: Season of death, late summer (mid-July - August)
27: Season of death, early fall (Sept. - mid-Oct.)
28: Season of death, late fall (mid-Oct. - Nov.)
29: Season of death, early winter (Dec. - mid-Jan.)
30: Season of death, late winter (mid-Jan. - Feb.)
31: Season of death, early spring (March - mid-Apr.)
32: Season of death, late spring (mid-Apr. - May)
33: Season of death, summer
34: Season of death, spring
35: Season of death, fall
36: Season of death, winter
37: Season of death
38: Season of death
39: Season of death
40: Minimum Number of Individuals (MNI) = 1
41: MNI = 2
42: MNI = 3
43: MNI = 4
44: MNI = 5
45: MNI = 6
46: MNI = 7
47: MNI = 8
48: MNI = 9
49: MNI = 10

50: Not used
51: Additional skull and/or long bone measurements recorded - see site file.
60: Upper tooth
61: Lower tooth
65: Additional comments on data card and in site file.
66: Cut marks on shaft
67: Cut marks on condyle
68: Cut marks on end
69: Cut marks anterior
70: Cut marks posterior
71: Cut marks lateral
72-99: Not used

Element Type

000: Mammal skull, indeterminate
001: Mammal skull, basisphenoid
002: Mammal skull, presphenoid
003: Mammal skull, alisphenoid
004: Mammal skull, vomer
005: Mammal skull, temporal
006: Mammal skull, premaxilla
007: Mammal skull, palatine
008: Mammal skull, nasal
009: Mammal skull, parietal
010: Mammal skull, occipital
011: Mammal skull, maxilla
012: Mammal skull, malar
013: Mammal skull, lacrimal
014: Mammal skull, interparietal
015: Mammal skull, frontal
016: Mammal skull, jugal
017: Mammal skull, auditory bulla
018: Mammal skull, squamosal
019: Mammal skull, hyoid
020: Mammal skull, Incisor 1
021: Mammal skull, Incisor 2
022: Mammal skull, Incisor 3
023: Mammal skull, Incisor 4
024: Mammal skull, Canine 1
025: Mammal skull, Premolar 1
026: Mammal skull, Premolar 2
027: Mammal skull, Premolar 3
028: Mammal skull, Premolar 4
029: Mammal skull, Molar 1
030: Mammal skull, Molar 2
031: Mammal skull, Molar 3
032: Mammal skull, Molar 4
033: Mammal skull, Mandible

Element Type, (Cont.)

040: Aves skull, indeterminate
041: Aves skull, pterygoid
042: Aves skull, quadrate
043: Aves skull, postfrontal process
044: Aves skull, supraoccipital
045: Aves skull, quadratojugal
046: Aves skull, ethmoid
047: Aves skull, squamosal process
048: Aves skull, occipital condyle
049: Aves skull, basioccipital
050: Aves skull, exoccipital
051: Aves skull, basitemporal plate

055: Reptilia skull, indeterminate
056: Reptilia skull, prootic
057: Reptilia skull, prefontal
058: Reptilia skull, transversum
059: Reptilia skull, ectopterygoid
060: Not used

065: Amphibia skull, indeterminate
066: Amphibia skull, parasphenoid
067: Amphibia skull, fronto-parietal
068: Amphibia skull, columella
069: Not used

070: Osteichthyes skull, indeterminate
071: Osteichthyes skull, hyomandibular
072: Osteichthyes skull, preoperculum
073: Osteichthyes skull, interoperculum
074: Osteichthyes skull, operculum
075: Osteichthyes skull, suboperculum
076: Osteichthyes skull, cleithrum
077: Osteichthyes skull, ceratohyal
078: Osteichthyes skull, branchiostegal
079: Osteichthyes skull, circumorbital
080: Osteichthyes skull, gular plate
081: Osteichthyes skull, metapterygoid
082: Osteichthyes skull, dermethmoid

Element Type (Cont.)

083: Osteichthyes skull, post temporal
084: Osteichthyes skull, articular
085: Osteichthyes skull, otolith
086: Osteichthyes skull, sphenotic
087: Osteichthyes skull, epiotic
088: Osteichthyes skull, pterotic
089: Osteichthyes skull, opisthotic

099: Skull, indeterminate
100: Vertebra, indeterminate fragment
101: Vertebra, atlas
102: Vertebra, axis
103: Vertebra, cervical
104: Vertebra, thoracic
105: Vertebra, lumbar
106: Vertebra, sacral
107: Vertebra, sacrum
108: Vertebra, caudal
109: Vertebra, centrum
110: Vertebra, transverse process
111: Vertebra, spinous process
112: Vertebra, synsacrum
113: Vertebra, coccygeal
114: Vertebra, pygostyle
115: Vertebra, ultimate

120: Rib, indeterminate fragment
121: Rib, clavicle
122: Rib, sternal
123: Rib, vertebral
124: Rib, pleural
125: Rib

Element Type, (Cont.)

130: Sternum, indeterminate fragment
131: Sternum, carinal margin
132: Sternum, costal margin
133: Sternum, manubrium
134: Sternum, lateral caudal process
135: Sternum, xiphisternum
136: Sternum

140: Scapula, indeterminate fragment
141: Scapula, glenoid
142: Scapula, acromion process
143: Scapula, caudal border
144: Scapula, cranial border
145: Scapula

150: Innominate
151: Innominate, indeterminate
152: Innominate, ilium
153: Innominate, ischium
154: Innominate, pubis
155: Innominate, acetabulum

160: Coracoid
161: Humerus
162: Radius
163: Ulna
164: Carpal, indeterminate
165: Carpal, scapholunar
166: Carpal, pisiform
167: Carpal, cuneiform
168: Carpal, unciform
169: Carpal, scaphoid
170: Carpal, lunar
171: Carpal, trapezoid-magnum

Element Type, (Cont.)

180: Metacarpal, indeterminate
181: Metacarpal, 1
182: Metacarpal, 2
183: Metacarpal, 3
184: Metacarpal, 4
185: Metacarpal, 5

190: Phalange, indeterminate
191: Phalange, 1
192: Phalange, 2
193: Phalange, 3
194: Phalange, 4
195: Phalange, ungual
196: Phalange, pollex
197: Phalange, hallux

210: Femur
211: Tibia
212: Tibio-fibula
213: Tibiotarsus
214: Fibula
215: Patella

Element Type, (Cont.)

216: Tarsal, indeterminate
217: Tarsal, calcaneum
218: Tarsal, astragalus
219: Tarsal, cuneiform
220: Tarsal, navicular
221: Tarsal, navicular-cuboid
222: Tarsal, cuboid

230: Metatarsal, indeterminate
231: Metatarsal, 1
232: Metatarsal, 2
233: Metatarsal, 3
234: Metatarsal, 4
235: Metatarsal, 5

240: Metapodia
241: Carpometacarpus
242: Tarsometatarsus
243: Urostyle
244: Radio-ulna
245: Carapace
246: Plastron
247: Supraclavicle
248: Pterygiophores
249: Scale
250: Eggshell
251: Feather, indeterminate
252: Feather, primary
253: Feather, secondary
254: Feather, breast
255: Feather, rectrice (tail)
256: Feather, head
257: Feather, covert

300: Long bone fragment
301: Unidentifiable fragment

ORDER	FAMILY	SPECIES
01 Not determined		
02 Unidentifiable		
MAMMALS		
03 Insectivora	01 Unidentifiable	
	02 Talpidae	01 Scalopus aquaticus
	03 Soricidae	01 Unidentifiable
		02 Notiosorex crawfordi
		03 Cryptotis parva
		04 Blarina brevicauda
		05 Microsorex hoyi
		06 Sorex spp.
		07 Sorex palustris
		08 Sorex nanus
		09 Sorex vagrans
		10 Sorex merriami
		11 Sorex cinereus
04 Chiroptera	01 Unidentifiable	
	02 Vespertilionidae	01 Unidentifiable
		02 Plecotus townsendii
		03 Antrozous pallidus
		04 Euderma maculatum
		05 Lasiurus spp.
		06 Lasiurus cinereus
		07 Lasionycteris noctivagans
		08 Lasiurus borealis
		09 Eptesicus fuscus
		10 Pipistrellus hesperus
		11 Myotis spp.
		12 Myotis volans
		13 Myotis californicus
		14 Myotis subulatus
		15 Myotis thysanodes
		16 Myotis evotis
		17 Myotis lucifugus
		18 Myotis yumanensis
		19 Myotis leibii
	03 Molossidae	01 Unidentifiable
		02 Tadarida spp.
		03 Tadarida brasilensis
		04 Tadarida macrotis

ORDER	FAMILY	SPECIES
05 Lagomorpha	01 Unidentifiable	
	02 Ochotonidae	01 Ochotona princeps
	03 Leporidae	01 Unidentifiable
		02 Lepus spp.
		03 Lepus americanus
		04 Lepus townsendii
		05 Lepus californicus
		06 Sulvilagus spp.
		07 Sylvilagus audubonii
		08 Sylvilagus nuttallii
		09 Sylvilagus floridanus
06 Rodentia	01 Unidentifiable	
	02 Sciuridae	01 Unidentifiable
		02 Marmota flaviventris
		03 Cynomys spp.
		04 Cynomys ludovicianus
		05 Cynomys leucurus
		06 Cynomys gunnisoni
		07 Spermophilus spp.
		08 Spermophilus richardsonii
		09 Spermophilus tridecemlineatus
		10 Spermophilus spilosoma
		11 Spermophilus variegatus
		12 Spermophilus lateralis
		13 Ammospermophilus leucurus
		14 Eutamias spp.
		15 Eutamias minimus
		16 Eutamias quadrivattatus
		17 Eutamias umbrinus
		18 Eutamias dorsalis
		19 Tamiasciurus hudsonicus
		20 Sciurus spp.
		21 Sciurus aberti
		22 Sciurus niger
	03 Geomyidae	01 Unidentifiable
		02 Thomomys talpoides
		03 Thomomys talpoides
		04 Thomomys bottae
		05 Geomys bursarius
		06 Pappogeomys castanops
	04 Heteromyidae	01 Unidentifiable
		02 Dipodomys ordii
		03 Perognathus spp.
		04 Perognathus hispidus
		05 Perognathus parvus

ORDER	FAMILY	SPECIES
	(Heteromyidae)	06 Perognathus flavescens
		07 Perognathus falvus
		09 Perognathus fasciatus
	05 Castoridae	01 Castor canadensis
	06 Cricetidae	01 Unidentifiable
		02 Reithrodontomys spp.
		03 Reithrodontomys montanus
		04 Reithrodontomys megalotis
		05 Peromyscus spp.
		06 Peromyscus crinitus
		07 Peromyscus maniculatus
		08 Peromyscus leucopus
		09 Peromyscus boylii
		10 Peromyscus difficilis
		11 Peromyscus truei
		12 Onychomys leucogaster
		13 Sigmodon hispidus
		14 Neotoma spp.
		15 Neotoma cinerea
		16 Neotoma mexicana
		17 Neotoma albigula
		18 Neotoma micropus
		19 Neotoma floridana
		20 Neotoma lepida
		21 Clethrionomys gapperi
		22 Phenacomys intermedius
		23 Microtus spp.
		24 Microtus pennsylvanicus
		25 Microtus montanus
		26 Microtus longicaudus
		27 Microtus mexicanus
		28 Microtus ochrogaster
		29 Lagurus curtatus
		30 Ondatra zibethicus
	08 Zapodidae	01 Zapus spp.
		02 Zapus hudsonius
		03 Zapus princeps
	09 Erethizontidae	01 Erethizon dorsatum

ORDER	FAMILY	SPECIES
07 Carnivora	01 Unidentifiable	
	02 Canidae	01 Unidentifiable
		02 Canis spp.
		03 Canis latrans
		04 Canis lupus
		05 Canis familiaris
		06 Vulpes spp.
		07 Vulpes vulpes
		08 Vulpes velox
		09 Urocyon cinereoargenteus
		10 Vulpes or Urocyon
	03 Ursidae	01 Ursus spp.
		02 Ursus americanus
		03 Usrsus arctos
	04 Procyonidae	01 Unidentifiable
		02 Bassariscus astutus
		03 Procyon lotor
	05 Mustelidae	01 Unidentifiable
		02 Martes americana
		03 Mustela spp.
		04 Mustela erminea
		05 Mustela frenata
		06 Mustela nigripes
		07 Mustela vison
		08 Gulo gulo
		09 Taxidea taxus
		10 Spilogale putorius
		11 Mephitis mephitis
		12 Conepatus mesoleucus
		13 Lutra canadensis
	06 Felidae	01 Unidentifiable
		02 Felis concolor
		03 Lynx spp.
		04 Lynx canadensis
		05 Lynx rufus
08 Artiodactyla	01 Unidentifiable	
	02 Cervidae	01 Unidentifiable
		02 Cervus canadensis
		03 Odocoileus spp.
		04 Odocoileus hemionus
		05 Odocoileus virginianus
		06 Alces alces

ORDER	FAMILY	SPECIES
	03 Antilocapridae	01 Antilocapra americana
	04 Bovidae	01 Unidentifiable
		02 Bison bison
		03 Oreamnos americanus
		04 Ovis canadensis
BIRDS		
09 Gaviiformes	01 Gaviidae	01 Gavia spp.
		02 Gavia immer
		03 Gavia adamsii
		04 Gavia arctica
		05 Gavia stellata
10 Podicipediformes	01 Podicipedidae	01 Unidentifiable
		02 Podiceps spp.
		03 Podiceps grisegena
		04 Podiceps auritus
		05 Podiceps nigricollis
		06 Aechmophorus occidentalis
		07 Podilymbus podiceps
11 Pelecaniformes	01 Unidentifiable	
	02 Pelecanidae	01 Pelecanus spp.
		02 Pelecanus erythrorhynchos
		03 Pelecanus occidentalis
	03 Phalacrocoracidae	01 Phalacrocorax spp.
		02 Phalacrocorax auritus
		03 Phalacrocorax olivaceus
	04 Anhingidae	01 Anhinga anhinga
12 Ciconiiformes	01 Unidentifiable	
	02 Ardeidae	01 Unidentifiable
		02 Ardea herodias
		03 Butorides virescens
		04 Florida caerulea
		05 Bubulcus ibis
		06 Dichromanassa rufescens
		07 Casmerodius albus
		08 Egretta thula
		09 Hydranassa tricolor
		10 Nycticorax nycticorax
		11 Nyctanassa violacea
		12 Ixobrychus exilis
		13 Botaurus lentiginosus

ORDER	FAMILY	SPECIES
	03 Ciconiidae	01 Mycteria americana
	04 Threskiornithidae	01 Udentifiable
		02 Plegadis spp.
		03 Plegadis chihi
		04 Plegadis falcinellus
		05 Eudocimus albus
		06 Ajaia ajaja
13 Anseriformes	01 Anatidae	01 Unidentifiable
		02 Olor spp.
		03 Olor columbianus
		04 Olor buccinator
		05 Cygnus olor
		06 Branta spp.
		07 Branta canadensis
		08 Branta bernicla
		09 Branta nigricans
		10 Anser albifrons
		11 Chen spp.
		12 Chen caerulescens
		13 Chen rossii
		14 Anas spp.
		15 Anas olatyrhynchos
		16 Anas rubripes
		17 Anas fulvigula
		18 Anas strepera
		19 Anas acuta
		20 Anas crecca
		21 Anas discors
		22 Anas cyanoptera
		23 Anas americana
		24 Anas penelope
		25 Anas clypeata
		26 Aix sponsa
		27 Aythya spp.
		28 Aythya americana
		29 Aythya collaris
		30 Aythya valisineria
		31 Aythya marila
		32 Aythya affinis
		33 Bucephala spp.
		34 Bucephala clangula
		35 Bucephala islandica
		36 Bucephala albeola
		37 Clangula hyemalis
		38 Histrionicus histrionicus
		39 Somateria mollissima

ORDER	FAMILY	SPECIES
		40 Melanitta spp.
		41 Melanitta deglandi
		42 Melanitta perspicillata
		43 Melanitta nigra
		44 Oxyura jamaicensis
		45 Lophodytes cucullatus
		46 Mergus spp.
		47 Mergus merganser
		48 Mergus serrator
14 Falconiformes	01 Unidentifiable	
	02 Cathartidae	01 Unidentifiable
		02 Cathartes aura
		03 Coragyps atratus
	03 Accipitridae	01 Unidentifiable
		02 Elanoides forficatus
		03 Ictinia missippiensis
		04 Accipiter spp.
		05 Accipiter gentilis
		06 Accipiter striatus
		07 Accipiter cooperii
		08 Buteo spp.
		09 Buteo jamaicensis
		10 Buteo lineatus
		11 Buteo platypterus
		12 Buteo swainsoni
		13 Buteo lagopus
		14 Buteo regalis
		15 Parabuteo unicinctus
		16 Aquila chrysaetos
		17 Haliaeetus leucocephalus
		18 Circus cyaneus
	04 Pandionidae	01 Pandion haliaetus
	05 Falconidae	01 Unidentifiable
		02 Caracara cheriway
		03 Falco spp.
		04 Falco rusticolus
		05 Falco mexicanus
		06 Falco peregrinus
		07 Falco columbarius
		08 Falco sparverius
15 Galliformes	01 Unidentifiable	
	02 Tetraonidae	01 Unidentifiable
		02 Dendragapus obscurus
		03 Canachites canadensis
		04 Lagopus leucurus

ORDER	FAMILY	SPECIES
		05 Bonasa umbellus
		06 Tympanuchus spp.
		07 Tympanuchus cupido
		08 Pedioecetes phasianellus
		09 Centrocercus urophasianus
	03 Phasianidae	01 Unidentifiable
		02 Colinus virginianus
		03 Callipepla squamata
		04 Lophortyx gambelii
		05 Phasianus colchicus
		06 Alectoris spp.
		07 Alectoris chukar
		08 Alectoris rufa
		09 Perdix perdix
		10 Gallus gallus
	05 Meleagrididae	01 Meleagris gallopavo
16 Gruiformes	01 Unidentifiable	
	02 Gruidae	01 Grus spp.
		02 Grus americana
		03 Grus canadensis
		04 Grus c. canadensis
		05 Grus c. tabida
	03 Rallidae	01 Unidentifiable
		02 Rallus limicola
		03 Porzana carolina
		04 Coturnicops noveboracensis
		05 Laterallus jamaicensis
		06 Porphyrula martinica
		07 Gallinula chloropus
		08 Fulica americana
17 Charadriiformes	01 Unidentifiable	
	02 Charadriidae	01 Charadrius spp.
		02 Charadrius semipalmatus
		03 Charadrius melodus
		04 Charadrius alexandrinus
		05 Charadrius vociferus
		06 Charadrius montana
		07 Pluvialis spp.
		08 Pluvialis dominica
		09 Pluvialis squatarola
		10 Arenaria interpres

ORDER	FAMILY	SPECIES
	03 Scolopacidae	01 Unidentifiable
		02 Philohela minor
		03 Capella gallinago
		04 Numenius spp.
		05 Numenius americanus
		06 Numenius phaeopus
		07 Numenius borealis
		08 Bartramia longicauda
		09 Actitis macularia
		10 Tringa spp.
		11 Tringa solitaria
		12 Tringa melanoleucus
		13 Tringa flavipes
		14 Catoptrophorus semipalmatus
		15 Calidris spp.
		16 Calidris canutus
		17 Calidris melanotos
		18 Caladris fuscicollis
		19 Caladris bairdii
		20 Caladris minutilla
		21 Calidris alpina
		22 Calidris alba
		23 Caladris pusillus
		24 Caladris mauri
		25 Limnodromus spp.
		26 Limnodromus scolopaceus
		27 Limnodromus griseus
		28 Micropalama himantopus
		29 Tryngites subruficollis
		30 Limosa spp
		31 Limosa fedoa
		32 Limosa haemastica
	04 Recurvirostridae	01 Unidentifiable
		02 Recurvirostra americana
		03 Himantopus mexicanus
	05 Phalaropodidae	01 Unidentifiable
		02 Phalaropus fulicarius
		03 Steganopus tricolor
		04 Lobipes lobatus
	06 Stercorariidae	01 Stercorarius spp.
		02 Stercorarius pomarinus
		03 Stercorarius parasiticus
		04 Stercorarius longicaudus

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ORDER	FAMILY	SPECIES
	07 Laridae	01 Unidentifiable
		02 Larus spp.
		03 Larus thayeri
		04 Larus hyperboreus
		05 Larus glaucoides
		06 Larus occidentalis
		07 Larus argentatus
		08 Larus californicus
		09 Larus delawarensis
		10 Larus atricilla
		11 Larus pipixcan
		12 Larus philadelphia
		13 Pagophila eburnea
		14 Rissa tridactyla tridactyla
		15 Xema sabini sabini
		16 Sterna spp.
		17 Sterna forsteri
		18 Sterna hirundo
		19 Sterna paradisaea
		20 Sterna albifrons
		21 Chlidonias niger
	08 Alcidae	01 Synthliboramphus antiquum
18 Columbiformes	01 Columbidae	01 Unidentifiable
		02 Columba spp.
		03 Columba fasciata
		04 Columba livia
		05 Zenaida spp.
		06 Zenaida asiatica
		07 Zenaida macroura
		08 Columbina passerina
		09 Scardafella inca
		10 Ectopistes migratorius
19 Psittaciformes	01 Psittacidae	01 Unidentifiable
		02 Ara spp.
		03 Ara macao
		04 Ara militaris
		05 Rhynchopsitta pachyrhyncha
20 Cuculiformes	01 Cuculidae	01 Unidentifiable
		02 Coccyzus spp.
		03 Coccyzus americanus
		04 Coccyzus erythropthalmus
		05 Geococcyx californianus

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