

## BVAR DATA COLLECTION AND CODING SYSTEM

From 2016-2019, the BVAR faunal collection was analyzed following the coding system developed at the Northern Arizona, Department of Anthropology, Faunal Analysis Laboratory (NAUDAFAL; Burke et al. 2020). The goal was to streamline data collection and standardize the dataset. Note that this system was not used by previous BVAR researchers (N. Stanchly, M. Welker; see associated publications). Generally, the provenience data collected follows the BVAR artifact cards.

**Quantity (QTY):** Label the frequency of each specimen. If there are five long bone fragments which refit, the quantity would be five. If there are six first phalanges from a white-tailed deer, however, three are completely carbonized and the other three are not then they would be split with quantities of three on different lines of the spreadsheet.

**Taxonomic Classifications Columns (Phylum, Class, Order, Family, Genus/Species):** Faunal remains are first identified to Phyla based on the identifiable diagnostic anatomical features of each specimen. Remains are then identified conservatively to Class, Order, Family, Genus/Species depending on identifiable diagnostic anatomical features of each specimen.

The code *cf.* is used to describe bones which closely follow a given taxonomic classification. For instance, a different species may have similar anatomical features making it difficult to distinguish elements between species, such as in larger brocket deer and smaller white-tailed deer.

The code *IDWCC*, identifiable with comparative collection, is used when a specimen has anatomical features which should enable it to be identified to a taxonomic level with a comparative collection not housed at the NAUDAFAL. With a more extensive comparative collection, certain species may be identified to a Class such as Mammalia or Aves. Finally, minor morphological differences between species or genus' may also be discernable with a comparative collection.

The code *INDT*, indeterminate, is used when a specimen cannot be identified to the category of that column because of lack of discernible features, poor preservation, and extreme fragmentation.

Taxonomic classifications are not italicized, except for those falling in the binomial nomenclature, genus, and species. In these instances, genus is always capitalized and italicized whenever it is identified. Species is always lower case and italicized. If *cf.* is associated with genus and species identification it is not italicized. If a genus is known but a species is unknown, the genus would

be capitalized, and followed by a lower case, not italicized code of sp., which designates species as unknown.

**NOTE:** Indeterminate samples should be grouped into small (SM), small-medium (SM-MED), medium (MED), medium-large (MED-LG), and large (LG) according to family. E.g., small mammals that can't be identified should be placed together in the small mammal bag and labeled SM. Separate bags should also be created for burned vs. unburned by size class and cutmarks vs. no cutmarks by size class. A tag with the following info should be placed in the bag:

Size class (e.g., SM) ID#s: XXX-XXX Count Burn or No Burn Cut or No Cut
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BODY PORTION	ELE	SD	POR	AGE	SEX
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**Body Portion:** Describes the portion of the body the individual skeletal element comes from anatomically. This includes cranial for all elements of the cranium, and mandible, including teeth, axial for all elements in the midline portion of the body including vertebrae and bones of the pelvic region and thoracic region, and appendicular including all limb elements, including the scapula.

**Element (ELE):** Identifies the specific bone on the animal, or portion of any exoskeleton. Examples would be femur, incisor, carapace for turtles, scute for armadillos, and exoskeleton for many shells and other invertebrates. Gastropods are identified to shell type in element based on marine shell, freshwater shell, and land snail.

**Side (SD):** Side of the body the specimen is from. Appendicular and cranial elements are typically sided, while vertebrae are not. Codes for sides include L for Left, R for Right, and N for specimens which are not sideable.

**Portion (POR):** Portion of the specific skeletal element present, including things like shaft, epiphysis, fragment, head, condyle, proximal, distal, and complete for complete skeletal elements.

**Age:** Age of the specimen, if features used for ageing are present. Fusion of the epiphyses and dental eruption are two of the primary features used to measure age. Age is divided into Juvenile, Subadult, and Adult. Juvenile individuals have unfused epiphyses, while subadults are fused with epiphyseal line present. Adults are completely fused without a line.

**Sex:** Identifies sex, when discernible, of the specimen. This is based on sexually dimorphic features including antlers, horns, canines, baculum, and drastic size differences within the species, if present. Sexual dimorphism based on size differences is often not addressed though, as it requires a significant sample from the same species to be measured and grouped based on measurements of length, features, etc.

SIZE CLASS	MODIFICATION	ARTIFACT TYPE	SPECIAL FIND	COMMENTS
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**Size Class:** Determinations of size class based on previously published literature (Emery and Brown 2012:101; Thomas 1969:393) and live animal weights (Animal Diversity Web: <https://animaldiversity.org/>).

*Mammals (North and Central America):* Different classification schemes have been used to categorize North and Central American mammals. Here we use a five class system following Emery and Brown (2012). Large mammals weigh >15 kg and include deer, peccary, and tapir. Medium-large mammals weigh between 7 and 15 kg and include monkey, dog, and ocelot. Medium mammals weigh between 2.1 and 6.9 kg and include paca, armadillo, coati, fox, and tamandua. Small-medium mammals weigh between 1 and 2 kg and include rabbit, opossum, and agouti. Small mammals weigh <1 kg and include bats, rats, and mice.

*Amphibians, Fishes, and Reptiles (North and Central America):* Five classes differentiate amphibians and reptiles in North and Central America. Class I includes organisms weighing less than 100 g and 700 g, such as blind snakes, tree frogs, and anoles. Class II includes those organisms' weight between 800 g and 5 kg, such as mud and musk turtles, and cane toads. Class III includes individuals weighing 5 kg and 25 kg, such as black and green iguanas. Class IV includes organisms weighing 26 kg between 50 kg, such as caimans and smaller sea turtles. Finally, Class V are individuals weighing more than 50 kg, such as loggerhead sea turtles, anaconda, and Morelet's crocodile.

*Aves (North and Central America):* Five classes differentiate bird sizes in North and Central America. Class I includes birds weighing less than 30 g, such as hummingbirds and blue-gray gnatcatchers. Class II includes birds weighing between 30 g and 120 g, such as the cactus wren, elf owl, and woodpecker. Class III includes birds between 120 g and 400 g, such as the burrowing owl, dove, quail, and roadrunners. Class IV consists of birds between 400 g and 3 kg, such as falcons, hawks, and macaws. Finally, Class V includes birds weighing more than 3 kg, such as eagles, condors, and turkeys.

*Shells:* Five classes of shell sizes in Central America have been established for the NAUDAFAL. These include both marine and freshwater shells. Large shells include conch, helmet, tulipa, and turbinella species. Medium to large shells are often younger conch size. Medium shells include Melongenidae and Spondylus species. Shells sized small to medium are from *Oliva* sp. and small shells are generally *Olivella* and *Prunum*.

**Modification:** Standardized methods for identifying natural and cultural modifications to the specimens through taphonomic processes. Taphonomy is the transition of animal remains from the biosphere to the lithosphere, essentially the events leading to decay and burial of organisms (Efremov 1940).

*Natural Modifications:* Refers to any taphonomic effect directly inflicted onto the element by non-human agents. This includes burning by natural fires, breakage, mold, etching caused by the acidity of roots, erosion, exfoliation of the outer bone layers often caused by sun exposure, bleaching caused by sun exposure, gnawing marks caused by rodents filing their teeth, carnivore gnawing, any marks or polishing caused by ungulates sucking on bone for nutrients, natural polishing of bone, abrasion, any staining because of soil, etc.

*Cultural Modifications:* Refers specifically to any taphonomic effect caused by human interactions with the animal and its skeleton at any time. This includes cultural burning, butchery marks such as cut marks, chop marks and scrape marks, any stage of altering an element to be a tool, adornment, musical instrument, or other artifact.

**Artifact Type:** Identifies what specific artifact the faunal or shell materials have been transformed into (if applicable)—this is an artifact designation including items such as needles, awls, ear flares, beads, etc. Artifacts are defined by regional convention and by individual archaeologists. Given this, some basic definitions are provided below.

*Tools:* Items modified from bone or shell to create items used as apparatuses to carry out necessary activities. These include needles, awls, and musical instruments.

*Personal Adornments:* Items modified from bone or shell to create items associated with individual adornment, such as beads, rings, pendants, hairpins, or clothing embellishments.

**Special Find:** Includes special find designations determined by projects in the overall spreadsheet and data analysis but also provides a simple means of pulling data about special finds to share with staff needing the information. For fauna, a special find is any complete faunal or shell artifacts, typically incomplete or fragmentary faunal and shell artifacts are not special finds.

**Notes/Docs in Box:** Records the information written by other researchers and left with the faunal remains. This can include provenience information, information on testing, or possible taxonomic delineations. Notes in excel sheets provided by other projects or entities such as the MNA may also be included in this column. (This is probably not applicable for BVAR materials in most cases).

**Comments:** This category is available for researchers to include any additional information, either from the cards or boxes the fauna/shell were recovered from, or any ideas/interpretations, issues associated with the analysis. Typically, *IDWCC* shows up in this column as a note to other researchers that it is possible to identify the material more with additional resources.

## **CODING SYSTEM**

The following are the codes and their descriptions as used by the NAUDAFAL / BVAR staff. These codes have been and can be adapted as more specific patterns need to be recorded. This coding system began as an adaptation to the system provided by Todd (1987) from the American Great Plains bison kill site, Horner. Including more species and element minutiae into the coding system has allowed for its applications to data collection globally.

Additional codes may be added as needed.

### **Generic Codes:**

INDT = Indeterminate  
NA = Not Applicable/Available  
IDWCC = Identifiable with Comparative Collection  
UN = Unknown

### **Body Portion - BP Codes:**

APP = Appendicular  
AXL = Axial  
CRN = Cranial  
INDT = Indeterminate  
EXO = Exoskeleton

### **Side - SD Codes:**

L = Left  
R = Right  
N = Not Sided \*

\* This code can refer to unsided elements because of breakage or elements not paired.

### **Age Codes:**

JUV = Juvenile (unfused epiphyses)  
SUB = Subadult (fused - line present at epiphyses)  
ADLT = Adult (fully fused - line absent at epiphyses)  
UN = Unknown (broken or lack epiphyses)

### **Sex Codes:**

M = Male  
F = Female  
UN = Unknown

## Element - ELE Codes:

### *ALL ANIMALS*

AC = Acetabulum	MO = Molar
ANT = Antler	MP = Metapodial
AR= Ascending Ramus	MT = Metatarsal
AS = Astragalus	MX = Maxilla
AT = Atlas	NC = Naviculo-cuboid
AV = Alveolar	NSL = Nasal
AX = Axis	OC = Occipital
BOC = Basioccipital	OCC = Occipital Condyles
BUL = Bulla	OF = Optic Foramen
CAL = Calcaneus	PA = Patella
CC = Costal Cartilage	PAL = Palatine
CD = Caudal	PAR = Parietal
CLAW = Decapod/Crayfish Claw	PB = Pubis
CLV = Clavicle	PEP = Petrous Portion
CN = Canine	PH = Phalanx
CP = Carpal	PHF = First Phalanx
CRN = Cranium	PHS = Second Phalanx
CV = Cervical	PHT = Third Phalanx
DC = Dermal Scute	PM = Premolar
DT = Dentary	PMX = Premaxilla
FB = Fibula	PP = Petrous Portion
FM = Femur	PV = Pelvis
FN = Frontal	PRA = Prearticular
HX = Hallux	RB = Rib
HC = Horn Core	RC = Radial Carpal
HM = Humerus	RD = Radius
HY = Hyoid	RDU = Radius/Ulna
IL = Ilium	SAC = Sacrum/Sacral
IM = Innominate	SC = Scapula
IN = Incisor	SCA = Scaphoid
INP = Interparietal	SDS = Second Dorsal Spine
INV = Incisive	SE = Unidentified Sesamoid
IS = Ischium	SED = Distal Sesamoid
IST = Ischiatic Tuber	SEP = Proximal Sesamoid
JG = Jugal	SN = Sternal Element
LAM = Lateral Malleolus	SOP = Supraorbital Process
LB = Long Bone	SUR = Surangle
LIN = Lower Incisor	SQ = Squamosal
LM = Lumbar	STN = Sternum
LU = Lunar	TB = Tibia
MA = Mandible	TE = Teeth
MC = Metacarpal	TEM= Temporal

TF = Tibia/Fibula

TH = Thoracic

TS = Tarsal

UIN = Upper Incisor

UL = Ulna

VT = Vertebrae

#### *FISH ONLY*

ART = Articular

BARB = Stingray Barb

BCR = Brachiostegeal Rays

BSN = Basal Spine

CE = Ceratohyal

CCD = Coracoid

CD = Caudal Vertebrae

CLT = Cleithrum

DSN = Dorsal Spine

ECPG = Ectopterygoid

ENPG = Entopterygoid

FFR = Fish Fin Fragment

HYM = Hyomandibular

IOP = Interopercular

LPB = Lower Pharyngeal Bone

MPG = Metapterygoid

NCRM = Neurocranium

OP = Operculum (Opercular)

OT = Otolith

PCD = Precaudal Vertebrae

PCTF = Pectoral Fin Spine

POP = Preoperculum (Preopercular)

PSD = Parasphenoid

PTM = Posttemporal

PG = Pectoral Girdle

QD = Quadrate

RAS = Radials

SCLT = Supracleithrum

SOC = Supraoccipital

SUB = Subopercular

SOS = Suborbital Series

UPB = Upper Pharyngeal Bone

VO= Vomer

WB= Weberian Apparatus

#### *AVES ONLY*

AFL = Articulated Forelimb

AHL = Articulated Hindlimb

CAM = Calamus

CCD = Coracoid

CMC = Carpometacarpus

CUN = Cuneiform

EO = Eye Orbit

FU = Furculum

HYA = Hyoid Apparatus

POX = Pollex

PTY = Pterygoid

PYG = Pygostyle

SCL = Scapholunate

SCR = Sclerotic Ring

SRB = Sternal Rib

SYN = Synsacrum

TM = Tarsometatarsus

TN = Talon

TT = Tibiotarsus

#### *TURTLE ONLY*

CRP = Carapace

CP=Carapace/Plastron

NCRP = Neural Carapace

PCRP = Peripheral Carapace

PLS = Plastron

PLC= Pleural Carapace

PCCD = Procoracoid

XPL = Xiphiplastron

#### *ANURA ONLY*

CAST = Astragalus/Calcaneus

UR = Urostyle

RU= Radioulna

TBF = Tibiofibula

#### *MOLLUSCA ONLY*

FS = Freshwater Shell

LS = Land Snail Shell

MS = Marine Shell

SHLL= Shell

VA= Valve

## Portion of Element Codes - POR:

### *ALL ANIMALS*

AC = Acetabulum	GL = Glenoid
AL = Alveolus	HE = Head
APT = Aperture	HR= Horizontal Ramus
APX = Apex	MF = Masseteric Fossa
ARC= Vertebral Arch	NK = Neck
BD = Body	PED = Pedicle
CDL = Condyle	PFR = Proximal fragment
CEP = Vertebrae Centrum Epiphysis	POR = Posterior Ridge
CN = Centrum	PR = Proximal
CO = Complete	PRE = Proximal Epiphysis
CRW= Crown	PRS = Proximal +< Half the Shaft
DB = Debitage (Fragment from Bone Working)	PSH = Proximal +> Half the Shaft
DF = Diaphysis	RT = Root
DFR = Distal fragment	SAP = Sacral Auricular Process
DS = Distal	SF = Spinous Fossa
DSE = Distal Epiphysis	SH = Shaft
DSH = Distal +> Half the Shaft	SLC = Sacral Lateral Crest
DSS = Distal +< Half the Shaft	SMC = Sacral Medial Crest
EP = Unidentified Epiphysis	SP = Spinous Process
FK = < Half the Circumference of the Shaft	TNE = Tine
FR = Fragment	TP = Transverse Process
	UN = Unknown

### *GASTROPOD ONLY*

APT = Aperture	LP = Lip
APX = Apex	HG= Hinge
BWL = Body Whorl	OP = Operculum
CLM = Columella	OTL = Outer Lip
CNL = Canal	SPR = Spire
INL = Inner Lip	

### *BIVALVE ONLY*

HG = Hinge
LT = Lateral Tooth
PS = Pseudocardinal Tooth
UM = Umbo

### *FISH ONLY*

CN = Centrum
HS = Haemal Spine
NS = Neural Spine

### *TURTLES ONLY*

BR= Bridge
SC = Scute

### *AVES ONLY*

BK = Beak
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## **Modification Codes - MOD:**

### *BREAKAGE TYPES*

D = Dry  
E = Excavator Damage  
G = Green  
H = Heavy Equipment  
I = Intermediate  
LO = Longitudinal  
M = Multiple  
S = Crushed  
SH = Spire Hole  
SL = Spire-lopped  
SP = Spiral  
TR = Transverse

### *MODIFICATION*

BR = Brownd Burning  
CL = Calcined Burning  
CR = Carbonized Burning

### *ANIMAL GNAWING*

CB = Chipping Back  
CG = Carnivore Gnawing  
FW = Furrowing  
IG = Ingested  
PC = Puncture  
PT = Pitting  
RG = Rodent Gnawing  
SC = Scoring

### *TAPHONOMY*

CM = Cut Marks  
COL = Discolored  
EX = Exfoliated  
ID = Insect Damage  
LEX = Limestone Exfoliation  
MLD = Mold  
PATH = Pathology  
RE = Root Etching  
RO = Red Ocher  
STN = Staining  
WEA = Weathering

### *WORKED FAUNA*

AB = Abrasion  
BCP = Biconically Perforated  
BW = Bone Working  
CRV = Carved  
CW = Cut-Worked  
CWH = Cut-Worked Hole  
DB = Debitage  
DH = Drilled Hole  
DRILL = Drilling  
ETCH = Etching  
PF = Perforated Fracture  
PO = Polishing  
PRE = Preform  
REWRK = Reworking  
RSHRP = Resharpener  
SDB = Shell Debitage  
SH = Worked Shell  
UDH = Unfinished Drilled Hole  
WBP = Worked Bone Preform  
WR = Worked  
WRD = Worked Rod

## Artifact Types

### *UNKNOWN ARTIFACTS*

IN = Instrument  
PA = Personal Adornment  
TL = Tool

### *ARTIFACT*

ASF = Awl Shaft Fragment  
BA = Bone Awl  
BB = Bone Bead  
BF = Bone Figure  
BP/BNP = Bone Pendant  
BT = Bone Tube  
BTAL = Blunt Tipped  
CHP = Corn Husking Pin  
DHP = Dagger Hair Pin  
DM = Drum  
EF = Ear Flare  
FLAKER = Pressure Flaker  
FTAL = Fine Tipped Awl  
GP = Game Piece  
HP = Hair Pin  
LBT = Labret  
NED = Bone Needle  
RSP = Rasp  
SA = Shell Awl  
SB = Shell Bead  
SCRP = Scraper  
SDS = Shell Disc  
SG = Shell Gorget  
SPAT = Spatula  
SPE = Shell Pendant  
SR = Shell Ring  
TB = Drilled Tooth Bead  
TK = Tinkler  
UBA = Unfinished Bone Awl  
UNAL = Ulna Awl  
USB = Unfinished Shell Bead  
USD = Unfinished Shell Disc  
UT = Utensil  
WD = Wand  
WHS = Whistle

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