Appendix A:
The Stone Tool Typology

February 9,2010

This appendix provides the description of the 42 classes used to classify the Cedar Mesa chipped and ground stone artifacts which were used in almost all further analyses. Section IA provides a description of the chipped stone artifacts and includes the four ground stone categories used in the 43 classes which were actually reduced to 42 in practice. This 42 (or 43) class taxonomy includes six debitge classes. Section II is a more detailed description of the ground stone which are expanded into a total of 21 types and includes a tabulation of these 21 classes found during the Cedar Mesa Quadrat Survey, Drainage Canyon Survey, Tree-Ring and Architectural Survey, and the Testing subprojects.

Section I, the Chipped Stone, also includes the tabulation of the Gizzard stones among the 42 classes, and includes a "post-classification" analysis of the common projectile points. The Ground Stone description (Appendix AII) was completed in essentially the same form given here in 1976. The Chipped stone section was first developed and presented by Matson in 1972, but was greatly improved by Paul Sneed (1973) who produced a six-page, single-spaced document, that introduced the lithic debris classes and which was used as the basis for all subsequent classification. This document was the basis for the description provided here. Sneed's description, though, lacked the photographs (although it did have drawings) now included in the current version, and the measurement tabulations which were done later. Most of the projectile point analyses (Section Ib) was produced in the early 80's but not fully written up. So the current Section Ia and Ib , although based on a number of earlier works, were not in anything close to the current form until 2008.

I: Chipped Stone
A) Description of Chipped Stone Classes

A relatively simple classification scheme for chipped stone was developed in 1972. Since most of the sites collected in 1972 had modest-sized chipped stone tool collections, we developed a classification with that in mind, putting all chipped stone tools into 33 classes, with one of those being "miscellaneous artifacts," those relatively rare objects that could not be squeezed into any of the other 32 classes. Matson developed the first version in 1972, which was refined in 1973 by Paul Sneed, who also added a simple debitage classification scheme. All together, including the four ground stone categories (See Appendix A:II) these make up the 43 classes of which 42 lithic categories were used in the data tables. These 42 were reduced via combining closely related classes identified by R-mode analyses for the separate BM II, BM III and P II/III occupations as described in Chapters V, VI, and VII.

The most abundant chipped stone artifacts were unifacial tools. We divided this group into 10 categories. The most abundant were unifacially retouched and utilized flakes which were divided into four classes. In situations where more than one type of use was noted on a single flake, either the maximum modification was noted (i.e., retouch instead of utilization) or the maximum edge area of use, if the quality of modification was the same. Thus each object was placed into a single class.

Unifacial Tools

1) Unifacial Flake - Steep Angle (Unif FlScp - code used on lithic tabulation sheets)
This was defined as a flake with steep (greater than 45 degrees) regular retouching. The distinction between "Utilized" and "Retouched" is made on the basis of the regularity of the retouching. Since many of these tools were made on high quality cherts, quite small retouching flake scars could be discerned under magnifying lamp or low power binocular microscope (@ 10-40X magnification), the two standard procedures used in classifying flakes. It is quite possible that many of these "Retouched Flakes" were actually utilized flakes but were used in such a fashion to produce the "regular" microflaking.

This category is illustrated in Figure AI: 1, top three rows. Note that BM II, BM III and P II/III tools are separately illustrated. Measurements of samples from BM II and P II/III occupations were also made to see if there were significant differences in size (Table AI: 1), as there are significant differences in the material used (Keller 1982). The Basketmaker II ones do appear to be made on thinner flakes, but then with the abundance of large, thin, bifacial reduction flakes (class [5], below) found on these sites and a favorite kind of flake to retouch, this is not unexpected.

Table AI: 1
Measurements of 1) Unifacial Flake, Steep Angle

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
P II/III	Range	14-55	8-41	3-16	0.4 - 36.5
n=55	1/4-3/4	25-38	18-28	6-12	3.4–14.1
	Median	33	23	9	6.1
	Mean	33.1	23.7	9.5	9.4
BM II	Range	19-77	13-36	1.5-19	0.1-22.1
n=12	1/4-3/4	21-44	15-33	5-11	1.5-15.0
	Median	31	21	6	3.0
	Mean	34.75	23.67	7.42	7.7

2) Unifacial Flake, Narrow Angle. (Unif NAng)
This was defined as a flake with narrow angle (less than 45 degrees) regular retouching. The comments made above about the possibility of this regular retouching being possibly the result of utilization made about also apply here.

This class is illustrated in Figure AI: 1 (bottom two rows), keeping the BM II, and P II/III occupations separate. The measurements of this type in P II/III and BM II occupations are shown in Table AI:2.

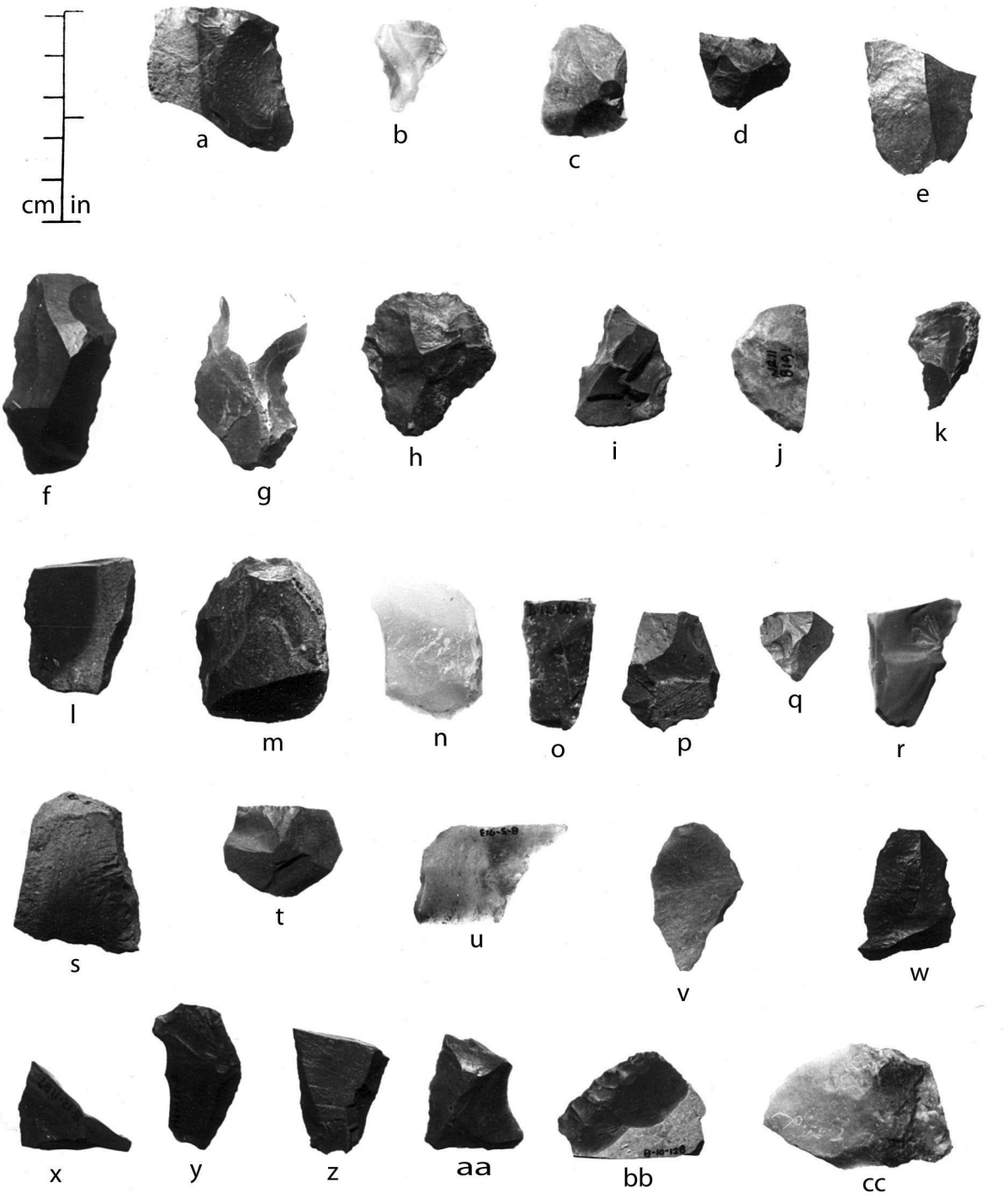


Figure AI: 1. 1) Unifacial Flake, Steep Angle, a-r, and 2) Unifacial Flake, Narrow Angle, s-cc. a-e, Basketmaker II, f-k, Basketmaker III, l-r, P II/III, Unifacial Flake, Steep Angle. s-w, Basketmaker II, x-cc, P II/III, Unifacial Flake Narrow Angle. a, B5-343; b, B5-797; c,B5-751; d, B5-809; e, B5-644; f, NR11-3350; g, NR11-4872; h, NR11-7451; i, NR11-9129; j NR11-8191; k, NR11-4006; l, B10-970; m, B10-175; n, B12-1208; o, B12-606; p, B!2-2750 ;q, B10-107; r, B10-378; s, B5-788; t, B5-704; u, B5-906; v, B5-360; w, B5-768; x, B12-1167; y, B12-3361; z, B12-2469; aa, B10-460; bb, B10-128; cc, B12-1103.

Table AI:2
Measurements of 2) Unifacial Flake, Narrow Angle

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
P II/III	Range	15-53	11-48	2-21	0.5 - 30.0
n= 63	1/4-3/4	25 - 41	19 - 29	5.5 - 9	1.7 - 6.5
	Median	31	23	6.5	4.7
	Mean	32.6	23.3	7.5	5.9
BM II	(1)	17	13	3	?

3) Utilized Flake, Steep Angle. (Util StAng)
This type is a flake which shows a number of small flake scars on a steep edge (greater than 45 degrees) but the distribution of these is irregular, or the sizes of the scars varies greatly. Mild abrasion of the edge or edge rounding is present on some flakes..

Steep Angle Utilized Flakes, separated by occupations, are illustrated in Figure AI: 2, top two rows, again separating BM II and P II/III artifacts. The size measurements, also separated by BM II and PII/III occupations are shown in Table AI:3. Even with a very small BM II sample, it appears that the BM II examples are made on thinner flakes, repeating the observations made previously, and the intuitive judgement about the Pueblo occupation using inferior lithic material, resulting in thicker, blockier lithics.

Table AI:3
Measurements of 3) Utilized Flake, Steep Angle

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
BM II	Range	26-44	15-26	5 - 5	2.1 - 11.9
n=3	1/4 - 3/4	----	-----	-----	----------
	Median	35	18	5	2.4
	Mean	35	19.7	5	5.5
P II/ III	Range	15-63	14 - 51	3 - 21	0.8 - 52.1
n= 24	1/4 - 3/4	29 - 47	18 - 33	6 - 11	2.1 - 13.2
	Median	36	24	9	7.5
	Mean	36.5	25.6	9.2	10.9

4) Utilized Flake, Narrow Angle. (Util NAngl)
This is a flake with shows a number of small, uneven, flake scars on a narrow angle edge (less than 45 degrees). Thinner examples often have pieces snapped off (i.e., bending fractures) their peripheries. This class is the one most likely to include examples resulting from trampling and/or "bag wear." It also has an uncertain relationship with 8) Snapped Denticulates, which may be utilized flakes which have had sections of their utilized edges "snapped" during use.

Utilized Flakes, Narrow Angle, are illustrated in Figure AI:2 (bottom three rows) with the three occupations, BM II, BM III, P II/III, kept separate, as before. The measurements of a sample of Pueblo II/III artifacts, are seen in Table AI:4.

Table AI:4
Measurements of 4) Utilized Flake, Narrow Angle

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
P II/III	Range	14 - 43	9 - 33	2 - 12	0.2 - 14.5
n=36	1/4 - 3/4	22 - 34	15 - 24	3.5 - 6.5	1.2 - 3.1
	Median	27	20	5	1.8
	Mean	28.9	20.5	5.2	3.0

5) Resharpening or Bifacially thinning Flakes. (Debris Res Flk)
In the original classification scheme resharpening flakes were placed here, in Unifacial Tools . In the tabulations and in further analysis they were moved to "Debitage" where they fit better. So this category is described again, there. These are recognized by their striking platforms with multiple flake scars, expanding margins, and the typical biface multiple flake scars on their dorsal surfaces. These flakes, particularly those produced in thinning large bifaces, were very often re-used as Utilized Flakes, 3) & 4), particularly for BM II assemblages. Metric measurements of Pueblo II and III objects are in Table AI:5.

Table AI:5
Measurements of 5) Resharpening or Bifacial Thinning Flakes.

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
P II/ III	Range	12 - 33	8 - 27	1.5 - 4	0.1 - 2.6
n-11	1/4 - 3/4	15 - 28	12 - 21	2 - 3.5	0.5 - 1.7
	Median	20	18	3	1.1
	Mean	21.3	16.5	2.7	1.25

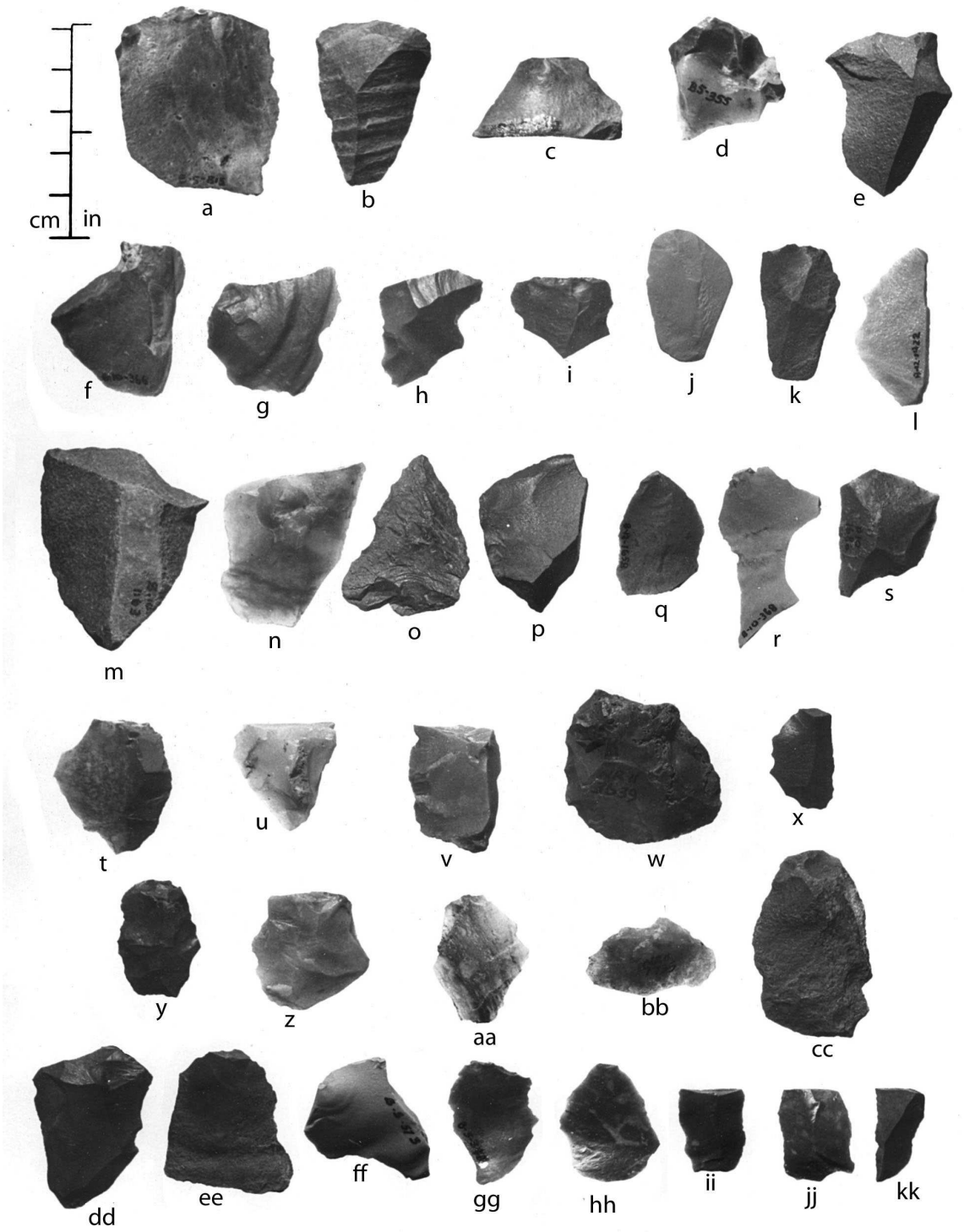


Figure AI: 2. Utilized Flakes. 3) Steep Angle Utilized Flakes, a-s; 4) Narrow Angle Utilized Flakes, t-kk. a-e; BM II; f-l, P II/III, m-s, x, BM II, t-w,y-cc BM III, dd-kk, P II/III.a, B5-815; b, B5-586; c, B5-540; d, B5-355; e, B5-863; f, B10-366; g, B10-1257; h, B12-2422; i, B12-152; j, B12-2359; k, B12-2284; l, B12-1422; m, B10-1163; n, B12-2475; o, B10-775; p, B10-381; q, B12-1658; r, B10-368; s, B10-1686; t, NR11-6061; u, NR11-5224; v, NR11-2705; w, NR11-3639; x, B12-410; y, NR11-5503; z, NR11-8968; aa, NR11-5485; bb, NR11-7735; cc, NR11-8752; dd, B5-435; ee, B5-359; ff, B5-573; gg, B5-342; hh, B5-385; ii, B5-367; jj, B5-740; kk, B5-846.

6) Bifacially Retouched or Cutting Flakes. (BifCt Flks)
This is a unifacial tool in that both the ventral and dorsal surfaces are unmodified surfaces are almost entirely unmodified surfaces of the original flake. The actual use edge, though, is modified by regular, bifacial retouching. This edge is almost always narrow, less than 45 degrees.

These are relatively unusual items, far less common than the 2) Unifacial Flakes, Narrow Angle equivalents. A sample of metric measurements is given in Table AI:6.

Table AI:6
Measurements of 6) Bifacially Retouched or Cutting Flakes

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
BM II, n=1		34	33	6	6.8
P II/ III, n=3	Range	26-46	25 - 34	4.5 - 14	4.4 - 18.1
	Median	34	25	9	6.4
	Mean	35	28	9.2	9.6

7) Gravers. (Gravr)
These are usually flakes which have been retouched to make one or more steep-sided projections which shows wear from use for engraving soft material. The common case is a single short point or projection. Some objects in this class are not obviously retouched but have projections that show definite wear, usually rounding visible under the microscope. A selection of these objects are illustrated in Figure AI: 4 and Table AI:7 gives metric measurements of a small sample from BM II and P II/III contexts.

Table AI:7
Measurements of 7) Gravers

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
BM II, n=3	Range	25 - 36	16 - 30	2 - 9	1.2 - 8.0
	Median	35	26	5	4.1
	Mean	32	24	5.33	4.43
P II/III, n=2					
Range		18 - 19	16 -17	3 - 5	0.6 - 1.3

8) Snapped Denticulates (Don's Saws). (Dons Saws)
These are fairly thin flakes which have a series of prominences separated by 'snapped out' pieces. The "teeth" are often worn. These were first recognized by Donald Keller, hence their secondary name. They turn out to be most common Cedar Mesa Basketmaker II assemblages, and Matson (1991:108-109) reports identifying these in Black Mesa Lolomai BM II assemblages.

It is unclear whether these are purposely made objects or the end result of Narrow-Angle Utilized flakes used for a particular function. Certainly, some of them do appear to be a special sort of utilized flakes with areas adjacent to the "snaps" heavily worn. On the other hand, they may have commonly resulted from being type 4 Utilized flakes that were broken by trampling.

Measurements of this type of flake tool found in both Pueblo II/ III and Basketmaker II sites are found in Table AI-8. It appears from this sample that the BM II tools are made on slightly smaller, but much thinner flakes. This is likely because of the presence of the relatively thin bifacial thinning flakes present in this occupation because of the large atlatl point production at that time.

A total of 12 snapped denticulates in the Pueblo sample in Table AI:8 had outlines definite enough that one could count the notches . These ranged from 2 to 7, with a median of 4 and an interquartile range of 4 to 5 and a mean of 4.25. It is notable how this class is lighter and thinner than the 9) Retouched Denticulates, as seen in Table AI:9.

Table AI:8
Measurements of 8) Snapped Denticulates

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
BM II	Range	12 - 38	11 - 21	1.5 - 11	0.1 - 5.7
n= 13	1/4 - 3/4	19 - 27	13 - 19	2 - 5	0.3 - 1.7
	Median	22	16	3	1.1
	Mean	22.8	16.7	3.9	1.34
P II/III	Range	17 - 36	11 - 22	3 - 9	0.3 - 6.7
n-18	1/4 - 3/4	20 -29	14 - 17	3.5 - 5	0.4 - 2.9
	Median	23	15	4	1.0
	Mean	24.3	15.9	4.5	1.67

9) Retouched Denticulates. (Notch Tools)
Flakes which have a number of notches clearly produced by purposeful retouching are called Retouched Denticulates. These tools are much rarer than the Snapped Denticulates and do

not seem to be more abundant in any particular occupation.

As seen in Table AI:9, the number of notches usually ranges from 2 to 4. Table AI:9 also gives the metric measurements of 4 Pueblo II/III Retouched Denticulates. It is clear that these are made are larger and much thicker flakes than the Snapped Denticulates.

Table AI:9
Measurements of 9) Retouched Denticulates

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)	Notches
	Range	24 - 29	16 - 25	4 - 8.5	2.2 - 8.1	2 - 4
P II/III						
	Median	28	20	6.5	4.0	3
n=4						
	Mean	30.3	20.3	6.4	4.58	3

10) Core Scrapers. (Lrge CoScp)
A relatively modest number of objects are classified as Core Scrapers. These appear to be cores which have steep retouching and are used as scrapers. A few appear to be very thick retouched flakes and not objects which were originally cores. Some show marked edge abrasion.

It is difficult in examples without edge abrasion to distinguish between a core modified for the purpose of scraping and a core that is expended and shows the results of failed attempts of retouching for rejuvenation.

The measurements of three Core Scrapers from NR C9-5 are shown in Table AI:10.

Table AI:10
Measurements of 10) Core Scrapers

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
BM II					
	Range	55 - 59	34 - 38	13 - 24	20.3 - 50.5
n=3					
	Median	56	35	22	38.2

Bifacial Tools

11) Biface Fragments. (Bifac Frags)
These are fragments of bifaces that have too few characteristics to place into any more specific biface category which follows. These are typically midsections, but may also include tips which are not clearly either projectile points or knives. Both dorsal and ventral surfaces show large, invasive flake scars.

12) Large Point Fragments. (Lg Pt Frags)
Projectile fragments from atlatl points, i.e., points that if complete would be larger than 35 mm or wider than 20 mm. The distinction between this class and 23) Large Knives and Fragments, and 24, Small Knives and fragments was usually made on the basis of finish and may be suspect. In some cases part of the notching is present, so the distinction is clear as "knives" in this classification are un-notched.

The common atlatl points on Cedar Mesa are BM II points which can be 50 or 60 mm long, so these fragments are often substantial in size.

13) Small Point Fragments. (Sm Pt Frags)
These are fragments from points less than 35 mm long, usually lacking basal features so they can not be classified further. These are usually arrow points and are most often associated with BM III or P II/III occupations. Some point fragments from Basketmaker II sites also fit this class; whether these are small atlatl points or early arrow points is not clear. These are larger, though, than the clear arrow points present in the Pueblo occupations. The two complete small points from NR C9-5, our largest Basketmaker II collection are 32 and 33 mm long and weigh 2.6 and 3.3 g.

14) Jumbo Side and Corner-Notched Points. (Sd CN Jumbo)
When classifying relatively complete bifaces, it was noted that a few were really too large to be used as atlatl points. We presume that these were either hafted as spears or knifes (Figure AI:6n). All bifaces with haft elements that were larger than 60 mm in length (or would be if they were complete) or more than 30 mm in width were placed in this class.

This is a rare and heterogenous class, with only four noted on BM II quadrat sites.

15) Large Corner-Notched -Straight Base Points. (Lg Cn St Bs)
These are large atlatl points which have relatively broad corner notches. Although originally we thought that the distinction between this class, and the next one 16) Large Corner-notched, Round Base, was important, analysis (see Projectile Point Analysis, later in this appendix) afterwards did not confirm any significant differences.

These points, along with categories 16) and 17) are typical BM II points, are illustrated in in Figure AI:5 and 6 and seen in Matson (1991:80). Measurements of the combined 15 and 16 types are in Table AI:16.

16) Large Corner-Notched-Round Base Points. (Lg Cn Rd Bs)
These are large atlatl points which have corner- notches and rounded bases. As discussed in the previous category, these can not be really be considered to members of a separate class. Like 15) these are common on Basketmaker II sites, and described more fully in the section on projectile points later in this appendix.

These points are illustrated in Figure AI:5 and 6, and in Matson (1991:80). Measurements of the combined 15) and 16) classes are in Table AI:16.

17) Large Side-Notched Points. (LG Sn Point)
These are large side-notched atlatl points which Kidder and Guernsey (1921) found distinctive of the Basketmaker II. Cedar Mesa examples vary from ones with relatively narrow notches,

such as illustrated in Figure AI:7 l, similar to the ones illustrated by Kidder and Guernsey (1919:183) to the more broad notches (Figure AI:7) and Matson 1991:80) more like those common on the Black Mesa Lalomai BM II phase (Parry and Christenson, 1987).

Although these points are seen as the classic BM II point form, the corner-notched atlatl points are actually more abundant on Cedar Mesa. These side-notched points are usually more than 35 mm long. Further details and measurements are found in Section Ib on Projectile Points later in this appendix (Figure AI:7 and Table AI:17).

18) Small Corner-Notched Barbed Points. (Sm Cn Barbd)
These are probably arrow points, usually less than 35 mm long and 20 mm wide. They have deep corner notches which produce long barbs and a long stem. The base can be a straight parallel sided stem, or one that widens to an excurvate base. This style is to be distinguished from the succeeding one, 19) small Corner-Notched, broad base, which tend to look more like small versions of 16) and 17).

This class appears to be concentrated on BM III Mossback sites but is also found on BM II and P II/III sites. Illustrations of the BM II points are found in Figure AI:10 and their metrics in Table AI:19. The BM III examples are found in Figure AI:13 and Table AI:22 and the P II/III points are in Figure AI:14 and Table AI:24.

19) Small Corner-Notched, Broad Base Points. Sm Cn Bd Bs)
These are relatively small points, many of which are probably arrow points. As suggested above, the outline is similar to the atlatl forms of 16) and 17) without the narrow necks and deep corner notches resulting in barbs as seen in the other small corner-notched class. These are most abundant on BM II (Figure AI:10 and Table AI:19) and BM III sites (Figure AI:13 and Table AI:22). For further discussion, see the section on projectile points.

20) Small Triangular Points. (Sm Tri Point)
These are arrow points, usually less than 35 mm long and 20 mm wide. They are triangular in outline, with no notches, and either a straight or incurvate base (Bull Creek points). As a class these are not preforms for 21) small side-notched points, as many are well-finished and the incurvate base is not present on 21) small side-notched points, nor are the serrations, occasionally present in this class. Like the similar Cottonwood Triangular points found in the Great Basin, though, some may be preforms for 21) small side-notched points.

These points appear to be absent on BM II sites, but are found on BM III (a questionable association) and Pueblo II/III sites. For further discussion see the projectile point section, Figures AI: 13, 14 and 15, Tables AI:23 and 25.

21) Small Side-Notched Points. (DS SN Point)
These are small triangular side-notched arrow points, associated with P II/III occupations. The notches are typically high on the point and relatively narrow. Unlike the otherwise similar Desert Side-Notched point, the base is not notched and is usually straight. 20) small triangular points, may, in some case, be un-notched preforms of this type.

These points are illustrated in Figure AI:14 and measurements of a sample given in in Table AI:25. It is to be noted how much lighter these points are than 19) small corner-notched broad base points.

22) Small Shallow Side-Notched or Stemmed Points. (Sm Sn Stmpt)
These are medium sized bifaces, larger than arrow points and smaller than most Basketmaker II atlatl points. They typically have broad shallow side notches that vary towards a stemmed appearance, with an expanding stem. The base is usually straight. In some cases (Figure AI:3a, e, f) there are 'ears' at the junction of the blade and base and very little in the way of a side-notch.

They have a noticeably more lenticular cross-section than Types 15 and 16. Type 22 has a median thickness of 4.7 mm compared to 5.0 mm of Types 15 and 16, but a blade width of 14.0 compared to 23.2 of the atlatl points.

What they were used for is unclear, but many are battered on the lateral edges indicating a very strenuous use. As noted by Matson (1991:79) they are not only found on Cedar Mesa Grand Gulch BM II components, but are also found in Durango BM II sites.

A few points in this class (if they are projectile points) are also found in non-BM II contexts. Whether these non-BM II points are really the same type or are heirlooms is unclear.

Type 22) points are illustrated in Figure AI:3 and measurements are given in Table AI:15.

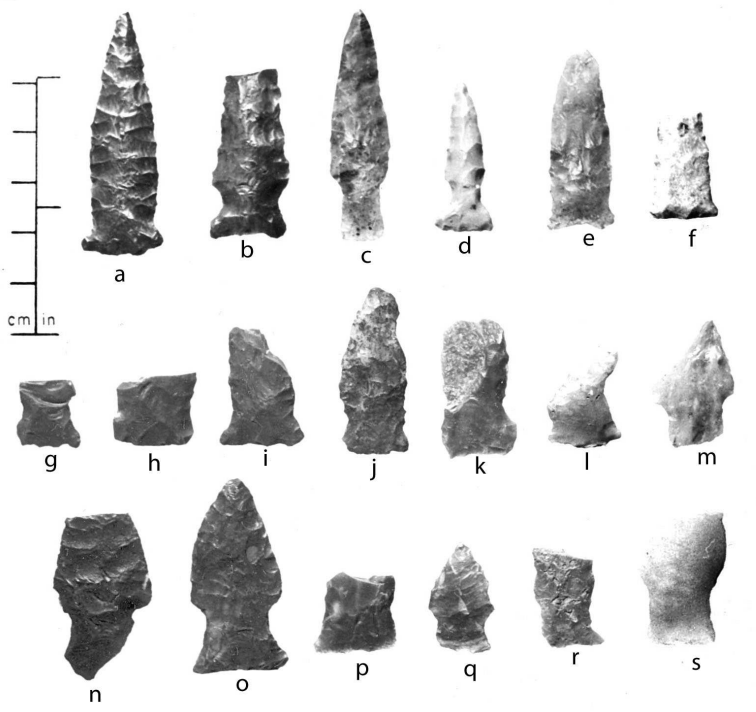


Figure AI: 3. Small Shallow Side-notched Points. a, WJ 17-101; b,HS 5-357; c, UGG C 15-4-451; d, B 14-331; e, UGG 7-706; f, NR 4-162; g, NR C9-5-6457; h, NR C9-5-8370; i, NR C9-5-6457; j, WJ 19-655; k, UGG 7-412; l, UGG 7-518; m, HS 11-2070; n, B 10-2508; o, NR C9-5-3135; p, NR 6-605; q, NR 6-786; r, WJ 9-877; s, NR C9-5-7790.
All points illustrated are from sites with BM II components.

23) Large Knives and Fragments. (Lge Knive)
These are large, un-notched bifaces that were either used as knives or un-notched atlatl preforms. Many of these appear to have been broken in manufacture. Well finished examples

usually have straight bases. These objects are particularly common in BM II contexts (a total of 113 on BM II quadrat sites), where they are almost certainly projectile point preforms.

A "hunting kit" including a number (6) of hafted atlatl points and a larger number (18) of this "large knife" class was found at Sand Dune Cave (Lindsay, Ambler, Stein, and Hobler 1968:47). This discovery supports the idea that the atlatl points were only notched when the Basketmaker II were at the point of replacing another point in a haft (Guernsey and Kidder 1921:87).

Almost all objects in this class are incomplete. W22:97 is a relatively complete one with a length of more than 45 mm, width of 34 mm, a thickness of 7 mm and a weight of 11.5 g in its incomplete state.

24) Small Knives and Fragments. (Small Knive)
Like 23) these are un-notched bifaces, many of which are probably projectile point preforms (and thus typically less well finished) and others are probably knives. Unlike "Large Knives," these are not concentrated on BM II sites, although they are also found there.

The size distinction between 23) and 24) is based on whether they could be a finished preform for the usual Basketmaker II atlatl point. Of 64 BM II atlatl points, only 9 had blade widths less than 20 mm, thus we use that a criteria for well-finished problem objects, when they were complete enough to allow us to do so.

25) T or Flanged Drills. (T Drill)
These well-made bifacial objects are found throughout the sequence on Cedar Mesa but are concentrated in BM II. Three are illustrated in Figure AI: 4. Not all the objects have the classic 'T' shape, but are quite different from the following 26) Other Drills.

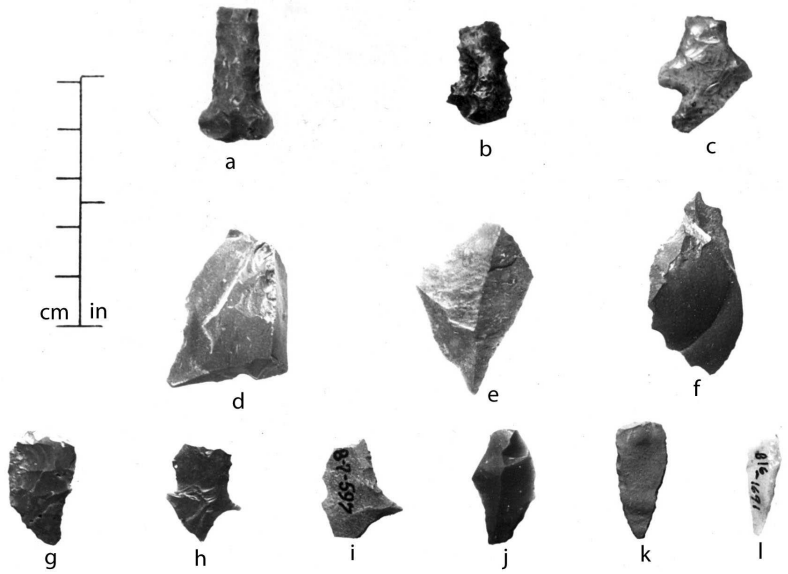


Figure AI: 4. Drills and Gravers.
a, b, c, 25) T or flanged Drills. a, NR4-1335, b, B16-1602; c, NR9-43.
d, e, g, j, k, l, 26) Other Drills. d, WJ12-1347; e, WJ12 1429, f, WJ12-1574; g, UGG2-702; j, WJ12-1554; k, B16-1546; l, B16-1691.
f, h, i, 8) Gravers. f, WJ12-1574; h, NR11-9608; i, B7-597.

The shafts (as the following measurements indicate) have a thick, lenticular cross-section, and, at least close to the tip, evidence of rotary wear. Measurements of four incomplete examples (NR4-1335, NRC9-5.651, NRC9-5.5344, and NRC9-5.844) are: length 27.2+, 23.4+, 12.7+, 28.0+; 'T' width 15.7, 15.5+, 17.4, 20.4; shaft width 9.6, 8.2, 9.2, 7.8; shaft thickness 5.6, 3.6, 3.9, 4.5, and weight 2.2+, 1.4+, 1.1+, 2.7+.

26) Other Drills. (Other Drill)
In contrast with the previous category, this class includes 'Plain Shaft' drills which are a parallel-sided biface without a flange, as well as retouched flakes that have a projection which which was used as a drill. This projection is often tapering one. While the plain shaft drills appear to have been hafted, it is unclear how these other objects were used. Some objects classified in other biface classes were also used as drills with Figure AI:3c being a case in point.

A selection of Other Drills are illustrated in Figure AI: 4.

27) Drill Fragments. (Drill Frags)
In many cases one finds a fragment of a biface that is clearly from a drill, but it is unclear whether it is from a T-Drill or not. These objects are usually midsections, but tips are also included in this class.

Large Percussion and Ground Stone Artifacts.

28) Irregular Hammerstones. (Irreg Hammr)
These are nodules of chert or utilized cores showing evidence of extensive battering. They tend to spherical in shape with some being quite round, and others not. The more angular ones may have been used to peck metates so they would hold the grain for better grinding.

Dimensions of a number of Irregular Hammerstones are shown in Table AI: 11.

29) Pebble Hammerstones. (Pebbl Hammr)
Unlike the Irregular Hammerstones, which are produced from Cedar Mesa chert sources, Pebble Hammerstones are made on exotic pebbles such as found on San Juan River gravels. The material is usually igneous and much of the surface is that of a water-worn pebble or cobble.

These distinctive hammerstones are often flattened and sometimes long rather than spherical like the 28) Irregular Hammerstones. They typically show battering at the ends or sides. This hammerstone class is less common than 28) and examples tend to be larger.

Measurements of this class of hammerstones are seen in Table AI:12. Note, that in all but thickness, this sample approximates twice the dimensions and is three or four times the weight of Irregular Hammerstones.

30) Hammerstone Fragments. (Hammr Frags)
These are large flakes which have become detached from hammerstones and are identified as such by showing evidence of extensive battering. Generally, if a water-worn surface is present and the material was igneous, instead of being placed in this category, it would be placed in 29) Pebble Hammerstone. Thus, this category consists largely of 28) Irregular Hammerstone fragments, with a few, small likely Pebble Hammerstone fragments present (those igneous

objects not showing a water-worn surface).

Table AI:11
Measurements of 28) Irregular Hammerstone
n=9, all from P II/III sites.

	Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
Range	51 - 76	41 - 67	27 - 58	84.4 - 410
1/4-3/4	52 - 73	44 - 58	38 - 55	102.6 - 304.3
Median	64	54	41	187.4
Mean	63.8	55.7	43.4	213.0

Table AI:12
Measurements of 29) Pebble Hammerstones.
n=4, all from P II/III sites.

	Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
Range	129 - 183	51 - 142	19 - 65	221.3 - 1216
Median	135	112	30	786
Mean	145.5	104.3	36	752.4

31) Choppers. (Chopp)
These are large heavy tools usually made on cobbles, but also occasionally made on very large flakes or cores. Choppers made on large, flat cobbles are distinctive of Basketmaker II and, as reported in Chapter V, distinctive to Basketmaker II habitations sites.

Choppers made on large flakes and cores tend to be found on Pueblo II/III sites. Measurements of two Pueblo choppers, not made on cobbles, are, B1-7:1453, 152 x 142 x 49 and 764 g and WJ 2-8:2572, 78 x 59 x 21 and 135.4 g.

32) Cores. (Cores)
Cedar Mesa cores tend to be irregular pieces of locally available cherts (Keller 1982). Most are not very regular and show more than a single striking platform. In some cases they are made from materials exotic to Cedar Mesa, including a few made on river gravels.

Measurements of a selection of different Pueblo II/III cores are found in Table XI:13, as well as three BM II cores. Two of the latter are single platform, one has two platforms. In the Pueblo cores, two are single platform, one is discoidal, one has opposed platforms, and the final is very irregular with multiple platforms.

Table AI:13
Measurements of 32) Cores

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
P II/III	Range	32 - 119	18.5 - 79	10 - 50	9.5 - 777
	1/4 - 3/4	32 - 69	26 - 34	16 - 24	18.1 - 72.7
n=5	Median	38	28	20	21.7
	Mean	58	37.1	24	179.8
BM II	Range	44 - 158	30 - 68	19 - 54	24.1 - 748
	Median	47	41	22	48.4
n=3	Mean	83	46.3	31.7	273.5

33) Two Hand Manos. (Manos)
These ground stone tools are more fully described in Appendix AII. For illustrations and measurements see that Appendix. All two hand manos described and tabulated there are placed into category 33). Two Hand Manos are combined with 34) One Hand Manos in the lithic summary tabulations (Data Tables). Appendix AII also includes the distribution of the various kinds of Two Hand Manos on Cedar Mesa sites.

34) One Hand Manos. (Manos)
Like two hand manos, these objects are more fully described in Appendix AII. All varieties described there are placed in this 33-34) category where all mano types were combined for the lithic summary tabulations. Appendix AII also includes the distributions of the different varieties of manos in this class on Cedar Mesa sites.

35) Metate or Millingstones. (Millg Stone)
Nether stones are also more fully described in Appendix AII. Since the various types of metates described there are actually usually rare individual occurrences they have been grouped into a single category for the purposes of the lithic tabulation summaries.

See Appendix AII for a full description of the various metate types and their distribution on Cedar Mesa sites.

36) Ground Stone Fragments. (Misc GrdSt)
This class includes fragments that could not be placed into any of the three previous lithic classes (33-35). In some case the artifacts in this class appear to be fragments of grinding stone too thin and too lightly used to be considered metates . See Appendix AII for further information about "tabular" grinding stones.

Miscellaneous Artifacts.

37) Gizzard Stones. (Gizz Stone)
These are usually small rounded and polished chert flakes. As shown in Table AI:14 these are almost always less than 1.5 cm in length and are apparently turkey gizzard stones.

We assume that in the absence of other suitable material for gizzard stones on Cedar Mesa, turkeys picked up small lithic flakes for this purpose. It may be that all these turkeys were domesticated, making the focus on flakes easier to understand. In any event, these objects are easy to recognize and are found in Basketmaker II, III, and Pueblo II/III sites. Turkey coprolites were found along with human coprolites in the Basketmaker II deposits in the Turkey Pen site (Aasen 1984) showing that some turkeys were domesticated in Basketmaker II times.

Measurements of gizzard stones are given in Table AI:14. Because Gizzard Stones are not 'tools' their numbers are not included in the percentages calculated in the Lithic Tabulation Summaries where their counts are located after the tools but before the debitage categories.

Table AI:14
Measurements of 37) Gizzard Stone.

		Length(mm)	Width(mm)	Thickness(mm)	Weight(gms)
	Range	6.2 - 14.4	3.7 - 11.0	1.3 - 6.0	0.08 - 0.60
BM II	1/4 - 3/4	7.5 - 10.5	5.6 - 7.7	1.8 - 2.9	0.11 - 0.28
(NRc9-5)	Median	8.55	6.65	2.3	0.17
n=24	Mean	9.05	6.85	2.46	0.21
B3-1	(1651)	12	6	4	1.3
	(1669)	7	6	2	0.5
	(889)	11	10	3	1.0
P II/III	Range	7 - 12	6 - 10	2 - 4	0.5 - 1.3
	Median	11	6	3	1.0
	Mean	10	7.3	3	0.93

38) Other Miscellaneous Artifacts. (Misc Arts)
Artifacts which did not fit into any of the above 37 categories and which were not common in the first year of Cedar Mesa Project fieldwork (1972) were placed into this class. These included such items as different as pendants and axes. What these objects are is not apparent on the digital Lithic Tabulation Summaries, only the number present as the last column of tools counts. On the original paper records, though, they are individually described.

As examples of large, unusal objects, two axes or mauls were found on a Pueblo II/III site, WJ 2-8. One (WJ2-2498) measured 130 x 65 x 26 and weighed 372 g. The other (WJ2-2490) was originally longer than 140 mm, 89 mm wide, and 34 mm thick, while it weighed in its fragmentary state, 687 g. Both of these had pecked notches.

Debitage.

As indicated in the introduction to this Appendix, the original lithic scheme by Matson did not include a classification of the debitage. The following debitage classification was introduced by Paul Sneed in 1973 in his development of Matson's scheme. Although the following classification appears dated today, or even by the 1980s (Pokotylo 1978, 1981b: Magne 1985; Magne and Pokotylo 1981) for its time (1973), it was a large step forward. Furthermore, as discussed in the chapters of the main text, the interpretations based on it appear to correspond well with these later developments (Matson 1981). The following debitage classification was applied to all Cedar Mesa assemblages and the counts (and percentage of the debitage) for the following categories are found in the Lithic Tabulation Summary tables.

Identifiable Debitage

A) Primary Flakes (39). (Debris A)
Primary flakes are the first flakes struck off of the raw material to prepare a core nucleus. These flakes are sometimes termed decortication flakes and two kinds of such flakes can be distinguished:
1) Primary decortication flakes have cortex material covering the entire outer (dorsal) surface of the flake.
2). Secondary decortication flakes have an outer or dorsal face covered only partially with cortex.

Both subclasses are probably usually produced by percussion flaking. In Cedar Mesa raw material the cortex is often not easy to identify making this sometimes difficult to determine. In any event, flakes with their dorsal surface completely covered with cortex are very rare in these assemblages, so that we did not distinguish between the two kinds of primary flakes.

B) Secondary Flakes(40). (Debris B)
These are usually large (greater than 1.0 cm wide and 1.5 cm long when complete) flakes which were removed from cores by percussion. These could be expanding, contracting, or blade-like flakes. This type of flakes are often called blank flakes because they were often used as or modified into tools. The rejects which we are classifying here were apparently not suitable for tools use, or were broken, or the supply of flake blanks exceeded demand.

Although broken flakes were placed into this category, they had to have the striking platform present and fit the size criteria for them to be so classified.

C) Tertiary Flakes(41). (Debris C)
These are small (generally less than 1.0 cm wide and 1.5 cm long) produced in the production of tools. These could be expanding, contracting, or blade-like flakes which were probably often produced by pressure flaking or soft-hammer percussion from large flakes or bifaces. Typically these small flakes had several flake scars on their dorsal surface. If the flake had all the attributes of a bifacial retouching flake, they were placed into that category; small flakes produced when finishing a biface, however, often do not, and so would be classified here. These tertiary flakes generally have diminutive platforms and bulbs of applied force. Tertiary

flakes were seldom used or modified into tools.

In many cases, the platforms were crushed, but if the other criteria were present, the flake was placed into this category.

5) Resharpening or Bifacially thinning Flakes. (Debris Res Flk)
In the original classification scheme resharpening flakes were placed with "Unifacial Tools". In the tabulations and in further analysis they were moved to "Debitage" where they fit better. So this category is described twice, with the unifacial tools and here. These are recognized by their striking platforms with multiple flake scars, expanding margins, and the typical biface multiple flake scars on their dorsal surfaces. The striking plaforms are often recognizable sections of a biface edge and the bulb of percussion is usually absent.

These flakes, particularly those produced in thinning large bifaces, were very often re-used as Utilized Flakes, 3) & 4). This is particularly true for BM II assemblages. Metric measurements of Pueblo II and III bifacially thinning flakes are in Table AI:5.

In the Lithic Tabulation forms, these are tabulated with the other debitage categories and found in the last column.

<u>Unidentifiable Debitage.</u>

D) Lithic Debris (42). (Debris D)
These objects are fragments of lithic debitage which exhibit not identifiable critical technological attributes and not indication of use or modification as tools. They are core fragments, flake fragments or block shatter. In many classifications this material is called "Shatter". In most cases in these collections these are relatively small flake fragments.

E) Unmodified Raw Material (43). (Debris E)
These are nodules or cobbles or chunks of lithic raw material which have not be modified by lithic stoneworking techniques. While these often show a few flake scars, indicating that they have been "tested" they do not show the number and sizes that would indicate that they have actually been used as cores.

B) Projectile Point Analysis

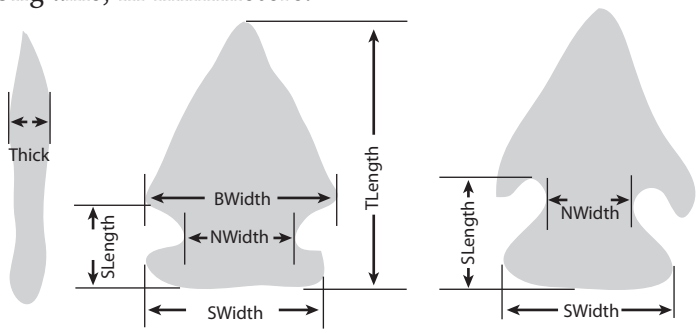
After the previously described classification was developed and used for most of the Cedar Mesa collections, a closer examination in the 1980s was made of the projectile points. This was focussed on Basketmaker II points, which resulted in the conclusion that types 16 and 17), Corner-notched, Straight Base and Corner-notched Round Base, could not be distinguished. As part of this project all relatively complete BM II points from Quadrat sites were measured, and then all the points from good Basketmaker III contexts were also evaluated and then a large sample of the forms found in Pueblo II and III contexts.

A total of six measurements were taken for each projectile point, as illustrated below.

TLength; Total length of projectile point on the long axis, in millimeters.
SLength; Stem length, greatest dimension.

BWidth; Blade width, greatest dimension.
SWidth; Stem width, greatest dimension.
NWidth; Notch width, minimum dimension.

Thick; Greatest thickness.



Weight; in grams.
The symbol of + was used for measurements when the artifact was incomplete (i.e., broken) for that measurement.

Type 22, Small Shallow Side-Notched or Stemmed Points.
As described earlier these points (Figure AI:3) are almost always in Basketmaker II contexts, and vary from ones with clear side-notches to ones without clear side-notches but have "ears", such as seen in Figure AI:3, a, d, f and i. Others, appear to be more "Stemmed" as in Figure AI:3c, q and s. As stated earlier, many of these are very heavily battered along their margins suggesting they were used for some purpose that was unusual for bifaces, and that may well not have been as projectile points.

Table AI:15 gives the five dimensions and weights for the more complete examples of this class that were found on Basketmaker II sites. Note that the table includes both the artifacts which appear to be good members of this class in the retrospective analysis and those that are placed in this class, although there are questions about their affiliation ("Doubtful members of Class 22"). The 'Comment' column gives alternative interpretations for the reason why the object is a questionable as well as noting those with "ears". The summary statistics use only the complete measurements of the good members. In some cases these measures may be misleading, as in the weight column, where the incomplete NRC9.5.7790 is heavier (4.8 gms) than any complete point (4.2 gms).

The example illustrated in Figure AI:3c (UGG C9.2.18), as mentioned under "Other Drills" was used as a drill, with heavy abrasion and striations indicating a rotary motion, so that appropriately placed in this class by form, it displays a function not evident on other examples in this class. Although much narrower than the atlatl corner-notched points 15 and 16, type 22 are as thick as the latter, again suggesting that these had another function. The neck width as listed in Table AI:15 appears to be the same as the atlatl corner-notched points, suggesting that they may have been hafted in the same foreshafts as the latter.

Although not recognized as a separate type, it appears that several items that fits this class were found in the Black Mesa Lolomai culture, i.e., Plate 5y, Plate 7k, and Plate 13k in Parry and Christenson 1987. None of these, though, are the form with "ears".

Table AI:15
Small Shallow Side-notched or Stemmed Point measurements
(Type 22)

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
NR4.162	21.1+	~2.7	11.5	13.8	-	4.4	1.5+	"Ears"
WJ17-101	47.3	~5.2	14.3	16.7	-	4.2	2.9	"Ears"
UGG7-706	34.9	~4.4	13.9	13.5	-	4.6	2.5	"Ears"
WJ9-1745	26.5+	10.1	15.8	17.4	12.5	4.5	2.2+	Base indented 2.0, serrated
WJ19-655	33.4	10.9	14.0	13.6	11.2	5.1	3.0	
NRC9.5.7790	39.0+	15.8	18.6	13.8	11.9	6.9	4.8+	
NRC9.5.7135	38.3	15.3	18.7	19.4	12.8	4.6	4.2	Thick base, poor CN?
HS5-357	33.5+	10.8	15.8	15.4	11.4	6.1	3.6+	
NRC9.5.183	13.8+	10.7	11.1+	13.0	9.4	3.6	0.7+	
NR6-605	17.4+	15.0 (+?)	13.8+	16.6	13.3	5.9	1.9+	
WJ9.877	20.3+	~9.4	12.8	12.6+	10.3	4.7	1.3+	
UGG7-412	27.8+	~16.8	13.9	15.4+	11.0	4.7+	2.2+	
HS11.2070	24.3+	8.9	16.9	11.4	11.2	3.8	1.7+	A stemmed point
NRC9.5.6457	23.9+	~8.8	13.0	17.4	12.6	6.1	2.5+	
NR5-786	22.7	9.9	13.8	10.9	9.8	5.5	1.7	A poor small CN point?
UGG7-518	22.2+	16.3	16.4+	14.7	11.9	4.8+	1.3+	Possibly a poor CN.
NRC9.5.8370	14.5+	~13.3	16.6+	16.2	14.6	5.8	1.6+	
		Doubtful	members	of Class	22			
NR5-824	30.9	13.9	19.8	13.0+	11.1	6.9	3.7(+?)	A poor CN point?
B10-2508	32.8+	14.1	19.4	14.8	12.2	5.3	3.3+	Curved stem.
WJ13-2217	38.9	10.9	21.2	19.2	14.5	6.9	4.6	A CN pt w resharpen. blde?
B14-3331	30.1	9.9	8.4	11.9	6.0	4.8	1.2	A small SN point?
UGGC9.2.18	45.9	12.9	11.9	8.9	7.8	6.9	3.8	A SN point used as a drill?
n	5	16	13	15	14	15	5	
Range	22.7-47.3	2.7-16.8	11.5-18.7	10.9-19.4	9.4-14.6	3.6-6.9	1.7-4.2	
1/4 - 3/4	-	8.8-15.3	13.0-16.9	13.5-17.4	11.0-12.6	4.4-5.9	-	
Median	34.9	10.4	14.0	14.7	11.65	4.7	2.9	
Mean	35.3	10.6	14.8	14.9	11.7	5.05	2.9	

Corner-Notched Atlatl Points (Types 15 and 16).

As discussed earlier, although we classified Corner-notched atlatl points into types 15 (Straight base) and 16 (Round base) on the basis of their bases, and the data tables show this classification, when we looked at the entire set together, we could not find any significant difference between the two, beyond the shape of the base, and found that there were many which were not clearly one or the other.

In numbers, a total of 30 with straight bases and 18 with round bases were tabulated from the BM II quadrat sites. In the three drainages with substantial numbers of these objects (Hardscrabble, West Johns, and Bullet) the same ratio of almost twice as many straight based points as round base points are recorded. These points are illustrated in Figures AI:5 and AI:6.

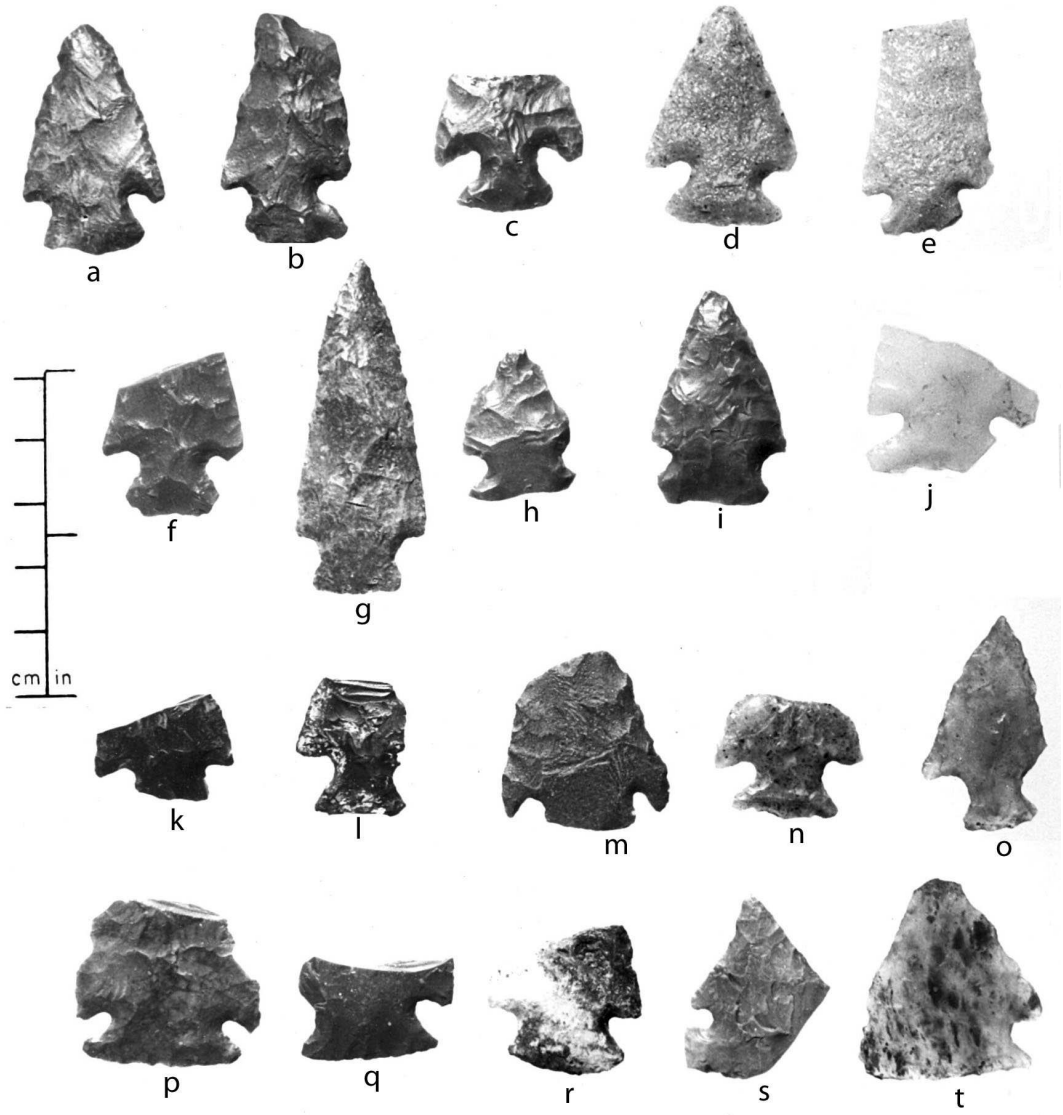


Figure AI:5. BM II Corner-notched Atlatl point (Types 15 &16):a, B10-1730; b,WJ9-911; c, HS2-214; d, NR10-2209; e, B18-806; f, WJ9-1855; g, WJC42.1-678; h, WJ10-1030; i, HS11-1940; j, HS4-238; k, WJ2-101; l, HS11-1899; m, BC24.1-43; n, HS11-51; o, WJ8-12; p, WJ13-1004; q, UGGC15.4-12; r, WJ20-17; s, NR2-193; t, HS11-427.

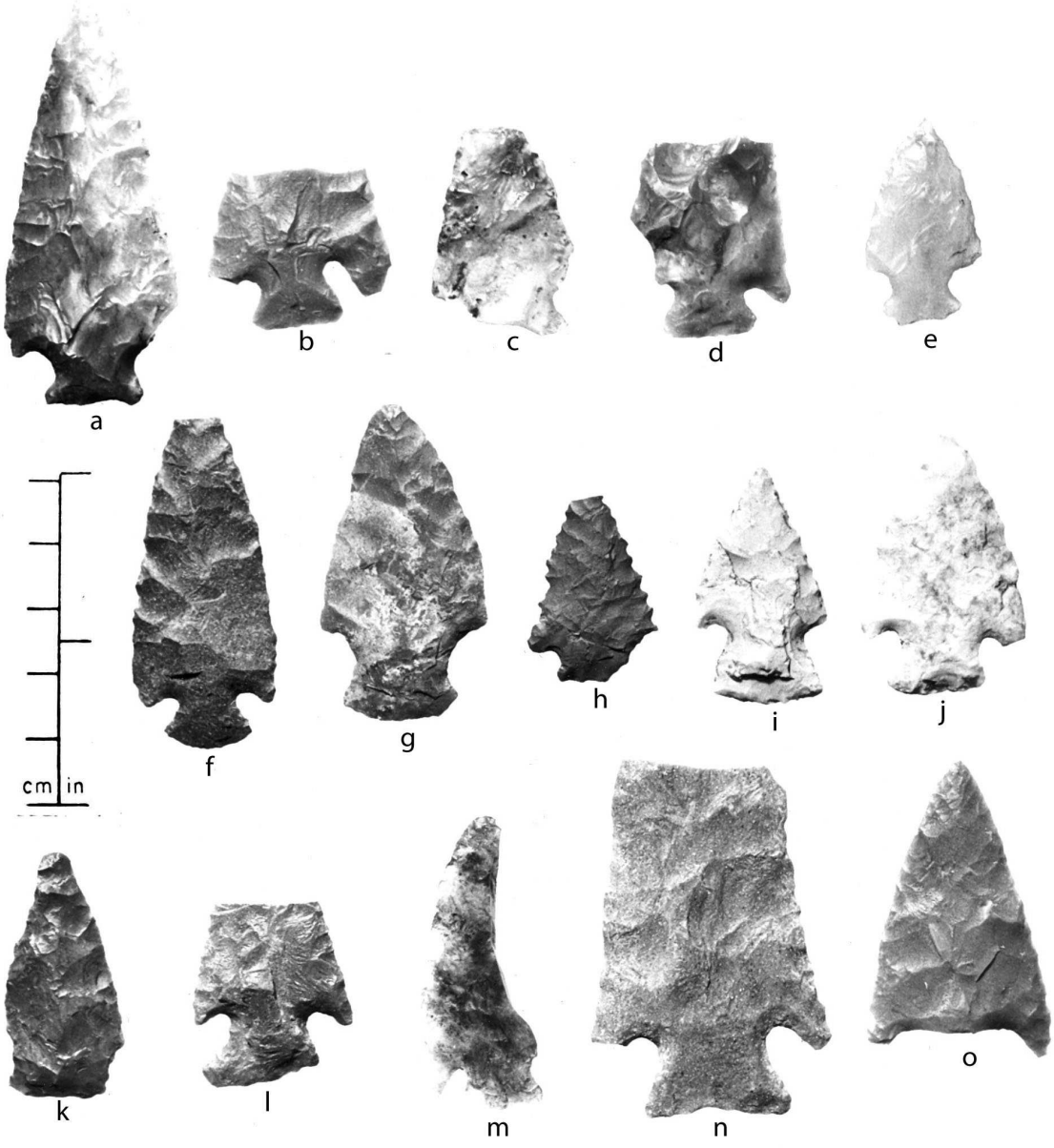


Figure AI:6. BM II Corner-notched Atlatl points (Types 15 &16), plus "Jumbo (Type 14) "n": a, NR10-1179; b, WJ19-750; c, B10-2382; d, B21-471; e, WJ9-366; f, B9-169; g, B16-771; h, B11-261; i, HS2-182; j, UGGC9.2.24-44; k, WJC42.1-129; l, B18-356; m, HS11-2113; n, B9-166; o, B11-150.

The metric measurements of the corner-notched atlatl points are seen in Table AI:16. Note that the first point, B9-166, "n" in Figure AI:6, is a type 14, Jumbo Corner-notched or stemmed point. Although some artifacts illustrated in Figure AI:6 have clearly "straight" bases (such as B9-166) and others have very "round' bases, such as B9-169 ("f" in Figure AI:6) others (see also Figure AI:5) are difficult to place securely into a single class.

Table AI:16
Measurements of Corner-Notched Atlatl points (Types 15 &16)

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
B9-166	55.7+	13.4	37.0	22.7	16.9	6.7	12.4+	
UGGC15.4.12	16.7++	7.9	24.8	21.8	15.9	4.2	1.9+	
B10-1730	36.8	9.6	22.4	15.0	12.7	4.2	3.5	
HS2-182	36.9	12.8	20.9	17.2	11.9	5.3	3.5	
UGGC9.24.44	40.7	9.4	25.3	15.3	11.9	5.9	5.0	
WJ19-750	24.6+	10.6	28.5	14.3	10.2	4.3	3.0+	
HS11-2113	45.7	8.3	19.7+	12.4	10.1	3.9	3.1+	
BC24-1-43	28.4?	6.4	26.6	14.4	14.4	4.8	3.5	Tip, reworked, blunt
B11-150	44.8+	- -	28.5	- -	- -	5.5	5.8+	Broken at notch
B21-471	30.3+	7.1	23.4±	14.6	10.8	5.0	3.9+	
B9-169	51.2+	8.8	22.3	13.6	8.9	4.9	5.6	~3 mm missing from tip
WJC42-1-18	18.0+	9.0	20.5	12.4	12.1	6.0	2.3+	May not be finished
WJ9.661	12.4+	6.7	18.6	12.4	9.9	5.5	1.2+	
WJ8.12	34.4	11.1	19.6+	11.8	8.3	5.0	2.6	
WJ13-1004	26.7+	8.3	28.5	24.9	17.4	5.4	4.7+	Tip broken
B10-2382	32.2+	10.9±	22.8	14.0+	12.8	4.5+	2.9+	
NR2-193	18.6+	5.9	29.2	- -	- -	4.9	2.6+	Base with single notch
WJ9-911	36.9+	10.4	20.7	16.3	10.6	5.4	4.0+	Reused as a scraper?
NR10-2209	34.6	10.4	23.8	18.5	11.3	4.9	3.8	
B18-356	28.5+	11.4	24.6	17.9	11.9	6.5	3.9+	
HS11-51	19.1++	9.8	23.2	16.8	10.6	3.9	1.8+	Reused as a scraper.
HS2-214	21.8+	10.2	23.1	15.2	9.4	4.4	2.1+	
HS11-1075	29.4	10.7	23.3	12.6+	8.1	5.3	3.1+	Used as a scraper.
HS11-1899	21.8+	9.4	17.4	14.4	9.8	4.4	1.7+	
WJ9-1855	26.1+	10.6	22.2	14.9	10.6	4.1	2.5+	
HS4-238	22.9++	9.8	26.0	20.5+	13.5	5.7	3.1+	
HS11-1940	33.9	9.3	21.2	17.8	14.5	4.9	3.5	
B18-806	33.8+	7.4	20.9	12.9	10.6	5.3	3.8+	
WJ20-17	24.9+	10.0	24.4	18.5	14.8	6.2	3.3+	

Table AI:16, Continued
Measurements of Corner-Notched Atlatl points (Types 15 &16)

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
HS11-427	31.7	9.1	27.3	25.9	22.4	4.4	3.7	Only 1 notch.
WJ9-355	31.7	9.7	17.9	12.5	8.8	4.8	2.6	
B11-261	28.9+	6.8	20.0	12.4+	11.1	4.7	2.3+	Tip and stem corner missing
NRC19-1-24	14.3++	6.2++	26.5	10.8+	10.6	3.9	1.1++	Only a section present.
WJ2-1001	16.6++	6.1	21.9	11.8	11.2	5.5	1.8+	
NR10-1779	63.6	9.8	26.9	15.4	12.4	5.6	8.8+	Only 1 tang tip missing.
WJC42-1-678	52.6	9.7	20.7	14.3	11.9	7.4	6.7	
HS2-25	25.4	6.9	16.9	12.3	11.6	5.6	2.1	Preform?
WJ10-1030	23.4	8.4	17.6	17.3	12.2	4.2	1.8	
B16-771	49.2	15.6	26.3	18.0	14.6	5.5	6.5	Very broad notches
n	15	36	36	32	37	38	14	
Range	23.4 - 63.6	5.9 - 15.6	16.9- 37.0	11.8- 25.9	8.1 - 22.4	3.9 - 7.4	1.8 - 6.7	
1/4 - 3/4	31.7 - 45.7	7.9 - 10.4	20.7- 26.5	12.9 -17.9	10.6 -12.8	4.4 - 5.5	2.6 - 5.0	
Median	34.6	9.5	23.15	15.1	11.6	5.0	3.5	
Mean	38.0	9.36	23.6	16.0	12.1	5.1	3.9	

Type 17, Large Side-Notched Atlatl Points.

This is the type associated by Guernsey and Kidder (1921:87) with the Basketmaker II and also the style that dominates the Black Mesa Lolomai Basketmaker II. On Cedar Mesa, though, it is clearly a minority form compared with the Corner-notched style (Types 15 and 16). Although one might argue that a number illustrated in Figures AI:5 and 6 should be considered "side-notched", the illustration of most of the intact Basketmaker II side-notched points in Figure AI:7 definitely have a different form than those illustrated earlier. They are also quite different from the earlier described type 22, small shallow side-notched or stemmed point (Figure AI:3). The metric measurements of thirteen relatively complete points are tabulated in Table AI:17.

This point style is also the dominant shape in the Lolomai Basketmaker II culture, although corner-notched points are also frequent (Parry and Christenson 1987:171-172). This is a reverse of the situation with the Grand Gulch phase on Cedar Mesa. It does appear true that the Lolomai culture is slightly earlier than the Grand Gulch, so this difference may be the result of a temporal trend. Very similar measurements were taken of Lolomai points as we have given, but are only given for the projectile points of a period, not for each style found. If we assume the measurements given are dominated by the abundant side-notched points in Lolomai we can compare these with the parameters given in Table AI:17. Figure 5-4 in Parry and Christenson (1987) shows a mean neck width of about 9.6 mm , quite a bit less than the median/mean of 12.0 listed in Table AI:17, and a median of 27.7 mm of "blade-edge length" which would be similar to our

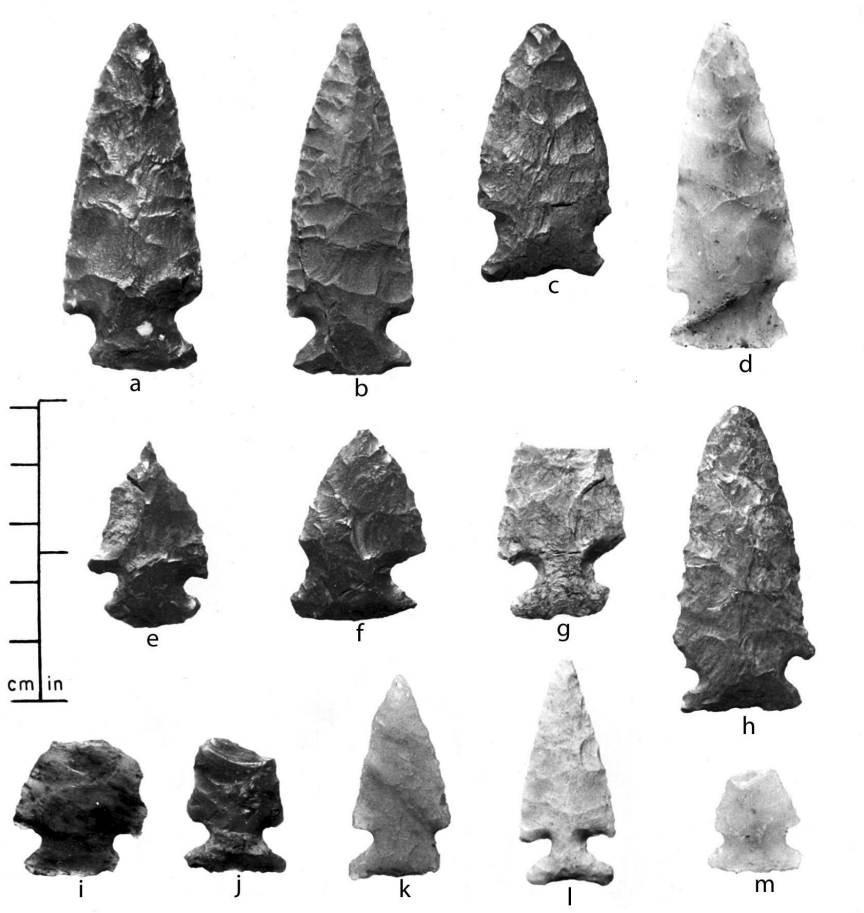


Figure AI:7. Large Side-Notched Atlatl points (Type 18). a, NR10-70; b, B9-165; c, B16-960; d, HS14-926; e, WJ2-950; f, WJ22-44; g, B1-1097; h, B10-1935; i, HS11-1231; j, B10-1797; k, B9-163; l, NR6-199; m, NR4-211.

"Total Length" minus "Stem Length" which if we subtract the SLength mean from TLength is 35.2 mm, nearly 10 mm more. "Stem Length" has an average of 8.8 mm with Lolomai points compared with 10.4 mm in Table AI:17, a figure that appears to not be very different. The average weight for Lolomai points is given as 2.7 gms in Figure 5-3 (Parry and Christenson 1987) as compared to a mean weight in Table AI:7 of 5.0, a very large difference. Some of this difference may be the result of many points on Black Mesa being made on "baked siltstone" a local substance that is light, but only 18 of 98 Basketmaker II points (Table 5-8, Parry and Christenson 1987) are made of it. In summary, the Lolomai points are much lighter, and have smaller neck widths, and shorter blades than the Grand Gulch points, although the stem lengths are similar.

Another comparison with Type 18 of interest is with Type 22, Small Shallow Side-notched or Stemmed Points. Using the medians as a point of comparison, TLength of Type 22 is 34.9 compared with 43.9, SLength 10.4 compared to 9.8, BWidth 14.0 to 22.1, SWidth, 14.7 to 18.6, NWidth 11.65 to 12.0, Thick 4.7 to 4.9 and Weight of 2.9 gms to 5.0. So the Type 22 points are shorter, but with the same stem length, with narrower blades, stems, but similar neck widths and thicknesses, resulting in a much lighter weight.

A final comparison is with the Type 15 & 16 Corner-Notched points, as tabulated in Table A1:16. Corner-Notched points had TLength medians of 34.6, Type 18 of 43.9, SLength of 9.5, Type 18, 9.8, BWidth of 23.2, Type 18, 22.1, SWidth 15.1, Type 18, 18.6, NWidth 11.6, Type 18, 12.0, Thick 5.0, Type 18, 4.9, and Weight, 3.5 gms, Type 18, 5.2 gms. Type 18 appear to be longer, heavier than the Corner-Notched points,

Table AI:17
Measurements of Type 18, Large Side-Notched Points.

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
HS11-1231	23.8+	8.6	22.2	15.9	12.0	4.4	2.5+	
WJ2-950	31.7	9.8	20.7	16.5	11.3	5.1	2.7	Drill on tip.
B9-165	34.3	9.2	16.9	15.9+	10.7	4.4	2.4	
B1-1097	29.7+	10.6	22.4	17.6	10.0	6.1	3.8+	
B10-1797	22.8+	8.7	16.7	18.4	9.0	4.3	1.6+	
NR4-211	17.8+	8.9	14.7	16.4	10.6	4.4	1.3+	
WJ22-441	33.7	13.3	22.2	21.7	14.6	4.9	3.8	
B16-960	43.9	12.3	22.8	21.2	16.4	4.5	5.2	Wide notches, 9.2mm
HS14-926	55.8	11.9	22.1	19.9	14.4	5.4	7.3	
NR10-70	59.3	14.1	24.1	18.8	13.8	5.1	7.4	
B10-1935	52.6	9.9	24.3	20.9	14.9	5.3	6.8	Worn and dull tip.
B9-164	60.0	9.6	21.9	20.4	12.2	5.5	7.0	
NR6-199	39.2	8.2	16.7	15.0	6.2	4.3	2.3	0.9mm indented base.
n	9	13	13	12	13	13	9	
Range	31.7- 60.0	8.2-14.1	14.7-24.3	15.0-21.7	6.2-16.4	4.3 - 6.1	2.3 - 7.4	
1/4–3/4	33.7- 59.3	8.7- 12.3	16.7-22.8	16.4-20.9	10.0-14.4	4.4 - 5.4	2.7 - 7.3	
Median	43.9	9.8	22.1	18.6	12.0	4.4	5.2	
Mean	45.6	10.4	20.6	18.6	12.0	4.9	5.0	

but blades widths, neck widths, and thicknesses are about the same, while the slightly greater stem-width of Type 18 is logically the result of side-notches rather than corner-notching. It is hard to know how to interpret the greater length and heavier weight of the Type 18. Inspecting Figure AI:7 shows that some are relatively complete, large points, while some are incomplete, small, side-notched points. Table AI:17 is the identical set of points, so if it was the small points that were complete and the large ones incomplete, those two measurements would be much smaller. Although this would explain the difference in those figures for the Cedar Mesa Side-Notched and Corner-Notched points, it does not explain the suite of differences between Black Mesa and Cedar Mesa measurements.

Corner-Notched to Stemmed Points (Types 15 and 16).
If one looks at Figures A1:5(e.g., g,k) and 6(g, k), one can see items that appear to be as much "stemmed" as "Corner-Notched". One can pull out those points that appear to be intermediate in nature and see if these appear to be a separate variety. Figure A1:8 and Table AI:18 illustrates and gives the measurements of those items. My conclusion is that if there is such a variety, it is relatively rare in Basketmaker collections from

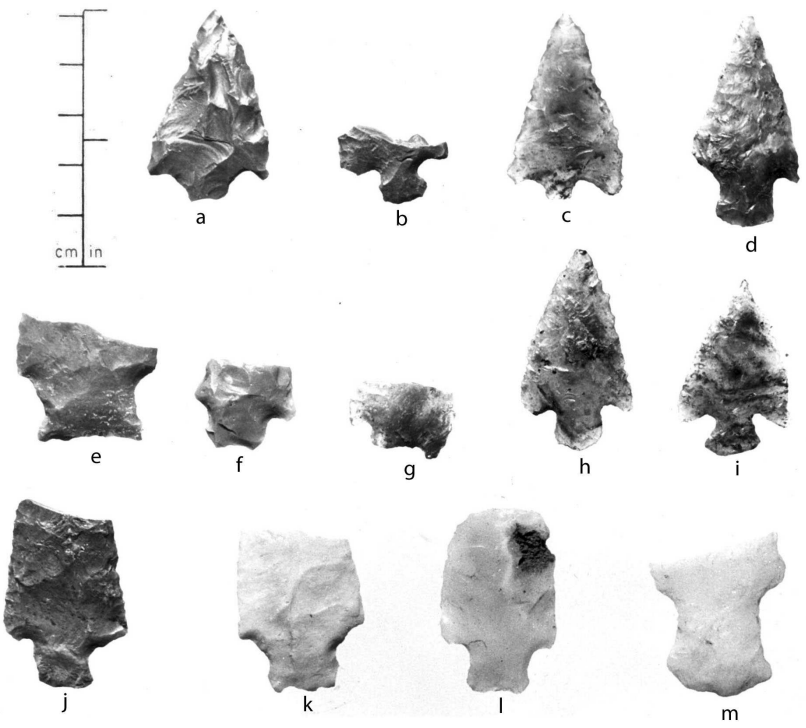


Figure AI:8 Corner-Notched to Stemmed Points (Types 15 and 16). a, WJC42.1-790; b, WJ2-1004; c HS11-2080; d, WJ19-828; e, B16-592; f, WJC42.1-10; g, NR2-162; h, B20-245; i, B9-162; j, HSC7- ; k, WJ13-4171; l, WJ20-137; m, WJ13-4172.

Cedar Mesa. Of the 13 points illustrated or 12 tabulated, a number are clearly really corner-notched, such as 'b', 'g', and 'i' in Figure AI:8. Item 'i' is a good corner-notched point with slightly narrower base than usual, 'b', 'f', & 'g' are corner-notched points with the tangs and lateral portions of the base broken off. Item 'j' looks like a tang is broken and the left part of the base is broken off. Other points look like they are the results of poorly executed notching. This leads to the question whether any of these objects were actually planned as "stemmed" points, or whether they are failed executions of corner-notched points, or changed from corner-notched to stemmed in order to save what was otherwise a good blade. If any of these were planned as stemmed points, their total must be less than half of those placed into this class. One (Figure AI:8m) looks more like a very large Type 22, than anything else.

The Basketmaker II projectile points from Black Mesa also show a few points that vary towards "stemmed", some clearly broken, but others not (Plates 5-8, Parry and Christenson 1987). This reinforces the idea that, although stemmed points do occur in Basketmaker II assemblages, they do so in low numbers and many, if not most, should be thought of a poorly executed or broken corner-notched points.

Inspecting the size (Table AI:18) of these objects does not indicate that these differ significantly from types 15, 16, and 17, those points classified as either corner-notched or large side-notched points. In terms of total length (TLength), these appear to be the same as corner-notched, but less than the side-notched points. The stem length (SLength), a measurement one might expect to be different if a point is "stemmed" rather than corner-notched, is the same as seen in the side-notched points and very similar to the corner-notched points. Blade width (BWidth) appears to be essentially the same among all three (median 22-23 mm), but that might be expected if all were atlatl points. Stem width (SWidth) is one that one might expect to be different, either way, as the width would be greatest as the base in side-notched or corner-notched point if

Table AI:18
Measurements of Corner-Notched to Stemmed Points (Types 15 & 16).

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
HS.C7	38.8+	9.9	24.9	11.8+	11.5	4.6	5.4+	Pos. CN with stem end miss.
WJ13-4171	32.4+	12.4	24.9	14.5+	13.3	5.3	5.3+	
B16-592	25.2+	14.9	28.3	21.4	18.6	6.5	5.3+	Very broad shallow notches
WJ13-4172	33.2+	22.6	26.9	20.6	16.5	6.9	6.2+	Very broad shallow notches
WJ20-137	36.7+	9.8	23.4	12.6	12.1	5.9	5.8+	
WJ19-828	42.2	10.7	21.7	11.9	10.8	5.9	4.4	Only 1 tang missing
B9-162	35.4	8.8	22.9	11.2	7.6	3.7	2.4	Stem may be broken
B20-245	40.4	9.5	22.6	9.8	9.1	4.6	3.4	
WJ2-1004	16.7+	7.0	22.0	10.1	8.8	4.7	1.2+	
HS 11-2080	27.2	4.5	23.2	6.5	6.5	5.8	3.9	SWidth,NWidth arbitrary
WJ.C.42.1.790	38.3	6.4	24.5	9.7	9.7	4.3	3.7	SWidth, NWidth arbitrary
NR2.162	14.6+	3.8	21.5	6.5	6.5	4.8	1.8+	SWidth, NWidth arbitrary
n	5	12	12	7	9	12	5	
Range	27.2-42.2	3.8-22.6	21.5-28.3	9.8-21.4	7.6-18.6	3.7-6.9	2.4-4.4	
1/4–3/4	–	6.4-10.7	22.0-24.9	10.1-20.6	8.8-16.5	4.6-5.8	–	
Median	38.3	9.65	23.2	11.9	11.5	5.05	3.7	
Mean	36.7	10.0	23.9	13.9	12.0	5.25	3.6	

the base was broken off, or if not part of the design, and it is greater in the notched points. Neck width (NWidth) is one that might be the same or different depending on whether stemmed points were a different design, or if these are reworked notched points. And the neck widths are similar (medians 11.5, 12.0 and 11.6). The thicknesses and weight are also similar, but this might well be so if the stemmed points were a valid type.

In sum, in all aspects these points have similar values to the notched points which supports the idea that these are broken and re-worked notched points. However, this is not a conclusive test, as one might easily produce, or expect, the same dimensions if one was producing a point for the same atlatl and foreshafts.

Miscellaneous "Points."

In addition to the above classes, there were also a number of generally "atlatl" sized bifaces, most broken, that were difficult to convincingly place into any previous Basketmaker II point category. These are illustrated in Figure AI:9. The first two ("a" & "b") show evidence of very heavy wear. Item "b" may be a hafted drill. Several others (e.g. "j" & "l") look like they are items that were the result of failed notching,

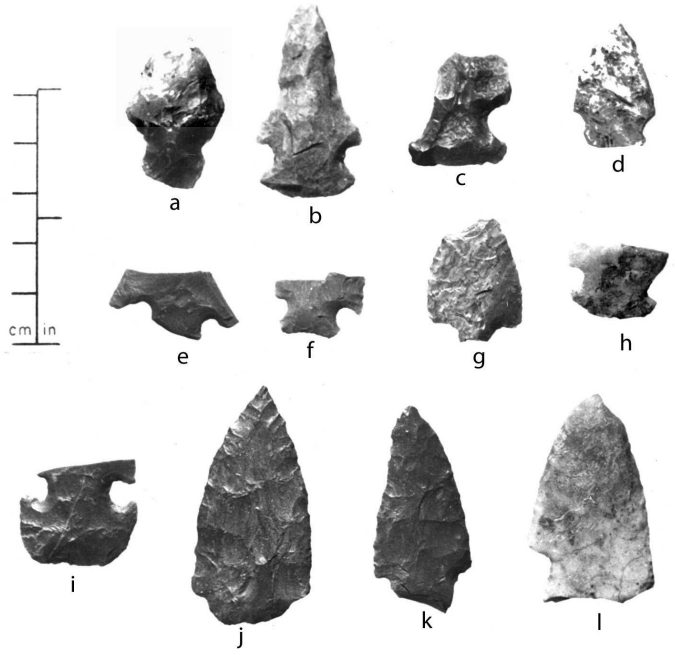


Figure AI:9, Miscellaneous Basketmaker II "points". a, NR5-824; b, WJ13-2217; c, NR10-57; d, HS2-25; e, NRC19.1-24; f, WJ9-561; g, WJC14.1-79; h, NR2-93; i, B20-63; j, WJ19-380; k, NR10-129; l, UGGC9.2-37.65

and then possible used (and hafted ?) as knives. Item "j" (B20-63) might be a broken "Sudden Side-Notched" point, but the notches are not similar to anything illustrated in the site report (Jennings et al. 1980:68). Item "k" (NR10-129) may look like a Gypsum point with a broken stem in Figure AI:9 but inspection shows that it is a corner or side notched point probably broken during notching.

Small Basketmaker II Points

In addition to the large atlatl points some smaller projectile points were also present on some Basketmaker II sites. These were usually Type 19, Small Corner-notched, broad based points, of which 7 are tabulated in Chapter V in Table V-7 as the total for Basketmaker II quadrat sites. Seven Basketmaker II artifacts from this class are illustrated in Figure AI:10 and six have their dimensions given in Table AI:20.

In addition to this style, a very few slender triangular bifaces were also found on Basketmaker II sites (Figure AI:10a,c and Table AI:20). What these objects are is not clear. B16-1331 (Figure AI:10b) may look like a barbed point, but inspection shows that it is broken at the neck (as is UGGc.15.4-451) and since no certainly barbed Basketmaker II points are present, it is more likely a Type 19 with notches that were especially "corner". So these smaller points appear to be of the same general form as the common larger Types 15 and 16, but much smaller with the neck widths about half that of the larger points (Table AI:6).

Although none of the points are complete, we can estimate the total length is usually between 30 and 35 mm and the weight between 1 and 2.5 gms. The question of the function raises the issue of the possible presence of bow and arrow. Geib(1996:64-66) discusses the evidence for the bow and arrow being present at this time in the Glen Canyon and surrounding areas. The length and weights suggested above for these Cedar Mesa Basketmaker II points is quite a bit larger than the Basketmaker III points discussed later, which are assumed to be arrow points, but the neck widths are similar, and many think that the neck width is the most discriminating dimension. Clearly the dominant BM II projectile points are atlatls points but that does not preclude smaller points resulting from the occasional use of the bow and arrow.

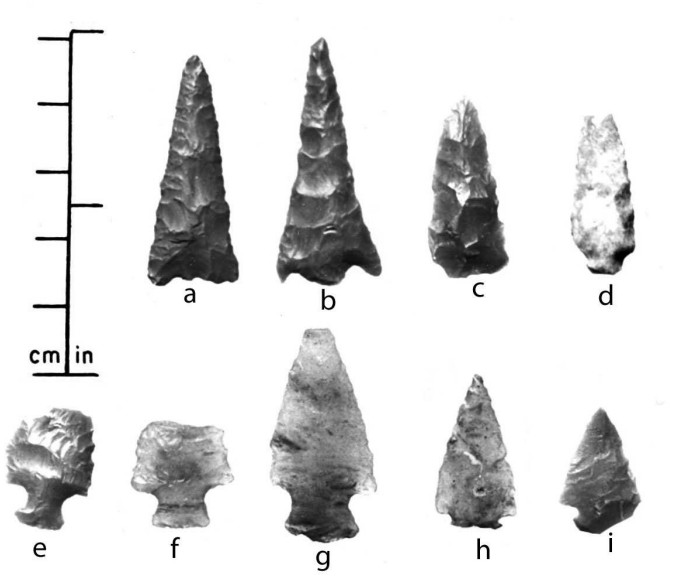


Figure AI:10, Small Basketmaker II points. a, WJ9-1469; b, B16-1331; c, UGGc11.6.117; d, UGGc15.4.451; e, B7-858; f, UGGc15.4.411; g, HS13-108; h, WJ9-107; i, Cat # unknown.

Table AI:19
Small Basketmaker II Points, Triangular and Type 19

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
WJ9-1469	34.5	–	13.6	–	–	3.6	1.37	Triangular
UGGc11.6.117	27.6	–	11.9	–	–	4.7	1.26	Triangular
B16-1331	36.8+	3.0+	15.7	–	4.2	4.3	1.71+	Broken at Neck
UGGc.15.4.451	24.0+	4.3+	9.3	–	4.5	4.1	1.09+	Broken at Neck
B7-858	18.4+	5.8	13.6	7.5	5.0	3.7	0.85+	Tip broken
UGGc.15.4.411	16.8+	7.1	15.2	8.7	6.5	3.4	0.92+	Tip broken
HS13-108	31.8+	9.2	15.9	11.0	8.0	4.9	2.48+	Only the very tip missing
WJ9-107	22.7+	3.0+	11.9	–	6.8	3.4	0.76+	Broken at Neck
n		3	6	3	6	3		
Range		5.8 - 9.2	9.3 - 15.9	7.5 - 11.0	4.2 - 8.0	3.4 - 4.9		
1/4 - 3/4			11.9 -15.7		4.5 - 6.8			
Median		7.1	14.4	8.7	5.65	3.9		
Mean		7.4	13.6	9.1	5.9	4.0		

Scrapers and Unique Bifaces.

A total of four notched bifaces appear to have been used as hafted scrapers. This are illustrated in Figure AI:11, a-d, and their dimensions in Table AI:20. All of these items show extensive wear on the

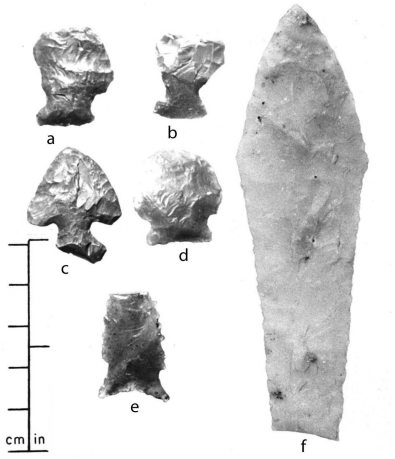


Figure AI:11, Scrapers (a-d) and unique bifaces. a, BC24.1-28; b, WJ4-1989; c, HS11-1075; d, B16-653; e, WJ9-1745; f, HS5-54.

"proximal" end although 'b' is less convincing than the others. The wear is not clearly one directional and appears to be heavier than I would expect from a hide scraper. The scraper dimensions are presented in Table AI:20.

Also illustrated in Figure AI:11 are two unique bifaces (e and f). Item "f" has been identified as some as a Jay point, but I have not found any Jay points that looked similar, the stem is not ground and I believe it is a hafted knife. Biface "e" may be an "Armijo Point" (Hovezak et al. 2003:7-15,6). Bifaces 'e' and 'f' dimensions are given in Table AI:21.

Table AI:20
Dimensions of hafted Scrapers

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
HS11-1075	29.4	10.7	23.3	12.6+	8.1	5.3	3.1	Wear on tip?
WJ4-1989	21.2	9.4?	17.9	13.7	7.5	4.8	1.7(+)	Barbs broken off?
BC24.1-28	24.5	9.5	21.5	14.9	11.2	5.4	3.2	
B16-653	24.3	8.7	22.2	15.0	13.9	5.5	3.7	

"Archaic Points"

Also present on a few Basketmaker II sites are a few clearly "archaic" points as shown in Figure AI:12 and in Table AI:21. Four points (Figure AI:12a,b,c,d) are either "Pinto" or "San Jose" points. Item 'c' is serrated and probably relatively complete. Items 'a' and 'd' are resharpened. Except for 'c' these points fit well with those Pinto points illustrated from Sudden Shelter (Jennings et al. 1980:69). Pinto points are probably 7000-8000 RCYBP (Matson 1991:130). If 'c' is a San Jose, it is probably between 4000 and 6000 RCYBP (Matson 1991:160). The presence of most of these old Archaic points being found on much later Basketmaker II sites is likely the result of Basketmaker II people picking them up, as suggested by Parry and Christensen (1987:171).

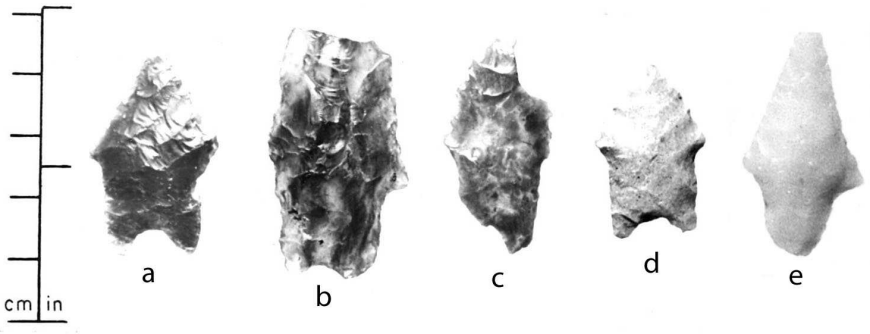


Figure AI:12, "Archaic Points, a-d, Pinto-San Jose, e, Gypsum. a, NR5-53; b, B14-3361; c, NR5-49; d, NR-810, e, HSC12.4-204.

In addition to the quite old Pinto-San Jose points, a single Gypsum point, 'e', was found in Hardscrabble canyon 12-4, a Basketmaker II site. This also appears to be very similar to Gypsum points illustrated from Sudden Shelter (Jennings et al. 1980:69). This type is usually dated from about 4500 RCYBP to about 3000 RCYBP (Jennings et al. 1980:83; Matson 1991:168). In addition to these five, definitely not Basketmaker II points, two others, discussed in the previous section (Figure AI:11e,f) may also be archaic points and are also found in Table AI:21.

Table AI:21
Measurements of Archaic points.

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
NR5-53	28.0	15.0	18.2	14.4	–	5.6	2.6	2.3 mm basal notch
NR6-810	35.2	15.2	22.6	16.5	–	5.8	3.8	3.8 mm basal notch
NR5-49	40.0+	15.5	23.4	16.9	–	6.5	6.6+	1.5 mm basal notch
B14-3362	36.7+	16.3	17.8	14.3?	–	6.5	3.3+	4.7 mm basal notch
HSC12.4-204	36.6	13.9	19.8	12.4	10.0	6.7	3.56	Gypsum style
WJ9-1745	26.5+	10.1	15.8	17.4	12.5	4.5	2.2+	2.0 mm basal notch, serrat.
HS 5-54	106.2	68.1	32.4	29.6	16.4	7.0	20.7	Stem broken? Jay pt.?

Examining the first four items in Table AI:21, one sees that they are thicker and have wider necks/stems than the Basketmaker II points. This suggests that when complete, they would be heavier, and that they would be hafted in foreshafts of larger diameter and likely longer and larger diameter atlatl shafts. The general flaking does not show the broad, thin flakes typical of Basketmaker II, suggesting that the indirect percussion hypothesized for the Basketmaker II by Phil Geib (2002) is correct. The Gypsum Cave point also shows some of the same kind of differences with Basketmaker II points.

Basketmaker III Points

In contrast with the Basketmaker II case, where one had relatively numerous projectile points, existing ideas about the style of points present, and single component sites, the Basketmaker III situation was much more confused. As reported in Chapter VI, most Basketmaker III sites are multicomponent and although we expected small barbed or corner-notched points (Types 18 and 19) these did not occur in large numbers, and in fact, we found only two reasonably complete Type 18 points in the first year of survey on sites where the Basketmaker III component was dominant. In view of this situation, I tried to collect all the reasonably complete points from the 31 Basketmaker components that were from either single component quadrat sites or sites where the Basketmaker component was the largest one present. The 21 points are illustrated in Figure AI:13 and 20 are listed in Table AI:22 and AI:23.

Beginning with the top two items in Table AI:22 (B7-507 & UGG5-880; a &b in Figure A:13) these appear to be indistinguishable from atlatl points. Whether these are actually Basketmaker III objects (perhaps hafted as knives or spears) or Basketmaker II points that were picked up is unclear. Neither site has a recorded Basketmaker II component present, although that possibility is difficult to totally eliminate.

Table AI:22

Basketmaker III points, large points and Type 18 and 19

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
B7-507	40.8	14.4	23.2	15.1+	12.4	4.8	4.83+	15 Resh. tip, broken "ear"
UGG5-880	36.4+	11.7+	19.5	14.5+	14.5	5.5	3.22+	19 Broken stem
			Types	18&19				
NR4-1227	41.6	8.0	22.7	9.3	6.8	3.7	2.24	15 6mm Barb
UGG5-540	32.8	7.1	19.6	8.8	6.8	4.3	2.14	18
HS4-194	15.7+	6.9	15.1	10.9	7.1	3.5	1.01+	19 Tip Broken
B7-460	21.5+	7.8	20.7	12.1+	8.3	4.2	7.7+	16 Tip and Base Broken
NR4-1698	22.8	6.5	15.3	10.0	11.4	3.4	0.82	19
NR11-8257	25.0	6.0	13.4	8.2	4.6	4.3	0.73	18
NR11-5458	21.7+	2.4++	17.5	6.2++	6.1	3.1	1.12+	18
UGG2-204	14.5	3.9	12.8	5.2	4.5	2.2	0.30	18 Complete, minature
NR11-5172	20.7	5.1	16.2	10.1	9.4	2.8	0.72	19 Possible broken base
NR11-1608	24.9	4.3	17.8	11.7	(4.9)?	3.3	1.15	19 Incomplete, only 1 notch.
n	7	9	10	8	9	10	7	
Range	14.5 - 41.6	3.9 - 8.0	12.8 -22.7	5.2 - 11.7	4.5 - 11.4	2.2 - 4.3	0.30-2.24	
1/4 - 3/4	20.7 - 32.8	4.3 - 7.8	15.1- 19.6	8.8 - 10.1	4.6 - 9.4	3.1 - 4.2	0.72- 2.14	
Median	24.9	6.5	16.85	9.65	6.8	3.45	0.82	
Mean	26.0	6.2	17.1	9.3	7.2	3.48	1.16	

B7-507 appears to have been resharpened.

The rest of Table AI:22 shows the 10 points recorded as either Types 18 or 19 from these 31 components. Although Type 18 and 19 are conceptually distinct, there are items (both broken and complete, Figure AI:13 m, n, v, s) that are difficult to place into one of those two categories, although clearly belonging to one or the other. Thus the summary parameters at the bottom is that of items classified into both categories, with the original classification listed in the comments column in Tables AI:22 and 23. These figures show that these are much smaller than Basketmaker II points, particularly in neck width, stem width. and thickness with almost no overlap between Table AI:22 and Table AI:16 (Types 15 and 16).

Type 18 (Small Corner-notched Barbed) as seen Figure AI:13 l and o, can have a very different shape than Type 19, which are basically smaller examples of Types 15 and 16 (Figure AI:13 s & u). Although these are clearly different points, others, such as Figure AI:12, are difficult to classify into one or the other, hence our summarizing them together. Both types are of the size, including the small neck width's which should be correlated with a smaller diameter hafting element, that one would associated with the bow and arrow rather than atlatl.

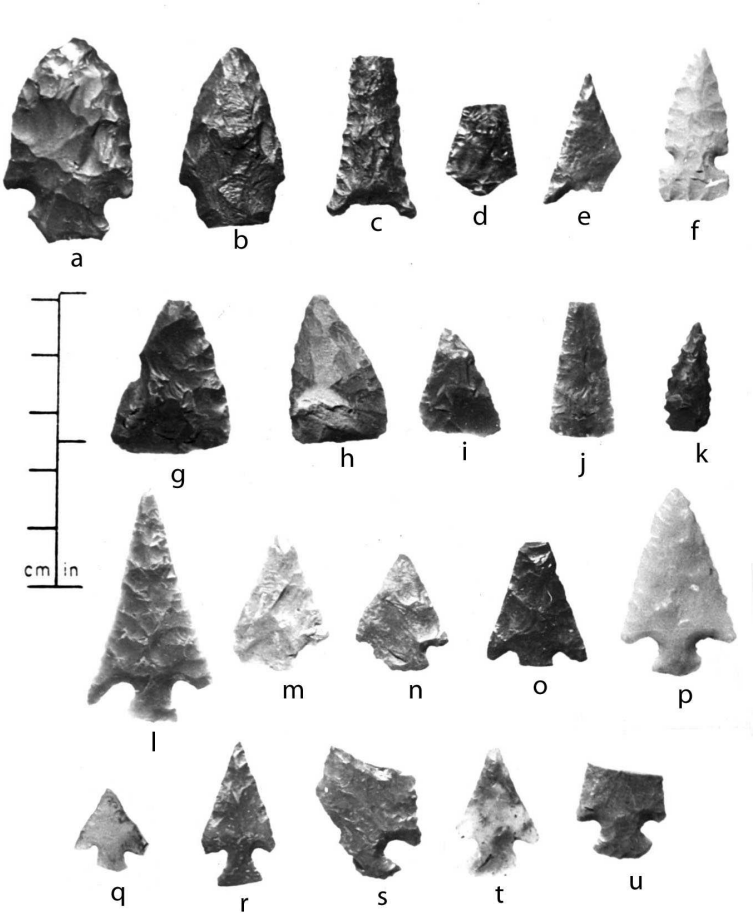


Figure AI:13. Basketmaker III sites. a -e unique points, a, B7-507; b, Ugg5-880; c, NR10-676; d, B6-1967; e, B6-1965; f, NR11-3616. g-k, Type 20 points, g, NR11-2650; h, NR11-2430; i, NR11-3361; j, HS4-92; k, NR11-4094. l-u, Types 18 and 19, l, NR4-1227; m, NR11-1608; n, NR11-5172; o, NR11-5458; p, UGG5-540; q, UGG2-204; r, NR11-8257; s, B7-460; t, NR4-1698; u, HS4-191.

In part, our expectations that small corner-notched points (whether barbed or not) would be the main Basketmaker III point type is confirmed. That points are not as important in the Basketmaker III culture as in the Basketmaker II is supported by the relatively modest numbers present. As reported in Chapters X and XI, the population estimates indicated a larger population for Basketmaker III than Basketmaker II, but a shorter occupation span. If the span was approximately 1/3 of the Basketmaker III, but the population circa 30% higher, one might expect about half as many points rather than the approximately 1/4 tabulated here.

What was not expected, though, was the presence of Triangular points (Type 20), as tabulated in AI:23 and shown in Figure AI:13 g-k. Although some of these may be preforms for Types 18 and 19, as a class they are too small and too narrow (Blade Width) for this to be true for all. Items NR 11-2650 and NR11-2430 (Figure AI:13 g & h) are the two that could well be preforms. An additional proviso must be made in that four of the five are from North Road 11-4, the largest, and perhaps the latest of the quadrat Basketmaker III sites. These four points include the serrated point (NR11-4094, Figure AI:12k), and

Table AI:23

Basketmaker III Points, Type 20 and unique.

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
NR11-3361	19.4	-	14.9	-	-	4.0	0.83	
NR11-2650	26.9	-	21.6	-	-	5.3	2.38	
NR11-2430	26.3	-	17.2	-	-	6.5	2.48	
HS4-92	23.7+	-	10.7	-	-	2.7	0.71+	Tip missing, but finished
NR11-4094	19.5	-	8.2	-	-	2.6	0.37	Serrated; stem broken?
n	4		5			5	4	
Range	19.4 -26.9		8.2-21.6			2.6- 6.5	0.37-2.48	
Median	22.3		14.9			4.0	1.6	
Mean	23.0		14.5			4.2	1.52	
NR11-3616	26.2	8.5	11.3	12.4	7.2	3.3	1.01	21, typical Pueblo point
NR10-676	28.0+	3.3	13.5	15.7	-	3.2	1.21+	15, tip brokn; conc. base 2.5
B6-1965	23.4	3.1	14.2+	14.2	-	2.2	0.51+	18, brokn barb, conc. ba.2.8

The number in the comment column is the type originally assigned; last two rows also have depth of basal concavity.

serrations are very unusual among Cedar Mesa points. NR11-4 is a site which also has a Pueblo component. In short, while apparently another Basketmaker III type, it may be present on Cedar Mesa only well after AD 700 and after most Basketmaker III sites were no longer occupied, or, less likely, actually a Pueblo form.

Table AI:23 also lists three other points. One, (NR11-3616, Figure AI:13f) is a side-notched form which

appears to be identical to other Type 21 points found on Pueblo sites. Rather than a Basketmaker III point it is far more likely a Pueblo point, as this site also has a Pueblo component. The other two points (NR10-676 and B6-1965, Figure AI:12 c and e) are unique. NR10-676 is the only one of this shape from a Cedar Mesa site with a Basketmaker III component. It appears to be a Bull Creek type (Jennings and Sammons-Lohse 1981:66), a type more usually associated with the Fremont, dated to AD 1000-1300, and known to occur in Southeastern Utah (Holmer and Weder 1980:61-2). Site NR10-5, where this point was found, has only Basketmaker III ceramics, making its presence there a mystery. Artifact B6-1965 (Figure AI:13 e) also has a concave base and was originally classified as a type 18, where it may well belong, but is the only example with this feature and in a number of its measurements is an outlier compared with the 10 type 18 and 19 points in Table AI:22, so it is likely also a "Bull Creek" point, but of the short form (Holmer and Weder 1980:69).

In summary, the points from the 31 Cedar Mesa quadrat sites that were dominated by Basketmaker III components show a lot of diversity. The most common forms were small corner-notched points of both the barbed and unbarbed forms, but arrow-sized. In addition, small triangular points are also found. These last points may occur only at the very end of the Basketmaker III occupations, or even be "drift" from a Pueblo component present on site North Road 11-4.

Pueblo II-III Projectile Points

In the previous projectile point descriptions, those of the Archaic, Basketmaker II, and III occupations, efforts were made to assemble all the relatively complete projectile points for each period. This was best performed for the Quadrat sites, as not all Drainage Canyon sites, Tree-Ring and Architectural survey or Tested sites had had their lithic material classified at the time. And this effort was not perfect; some points were not located, questions about the correct catalogue numbers made others unusable. Although there were these lapses, the tables and figures do show the vast majority of the "typable" points from those occupations. As we did not begin with the questions about the Pueblo II/III projectile points that we had with the earlier occupations, this effort to locate all the typable points was not spent. Instead a selection of the variety found in the relatively complete Pueblo points was located as illustrated in Figures AI:14 and 15 and in Tables AI:24 and 25. It turned out that this selection process included about two-thirds of the Pueblo points.

We found four kinds of points present on Pueblo sites, the Type 18, small barbed points (Figure AI:13c,d), the indented base, Bull Creek triangular points (Figure AI:14a,b and Figure AI:15 f-k), small triangular "Cottonwood" points (Figure AI:15 a-e) and the small side-notched points (Figure AI:14 e-l). On the Quadrat sites, 7 Type 18, 12 triangular (Type 20), and 13 side-notched points (Type 21) for a total of 32 were recovered from Pueblo II/III sites according to Chapter VII, compared to the 23, in total, that are tabled here.

Table AI:24 begins with two barbed points (WJ12-861 and UGG6-1417: Figure AI:14 c,d) which we called Type 18. This small sample is too small to be certain that the Pueblo Type 18 are the same as the Basketmaker III Type 18, but that appears to be the case. Barbed points of this approximate size and shape were the two most common forms for the late Pueblo II on Black Mesa (Parry and Christenson 1987: 180). Parry and Christenson (1987:180) point out that this point style is very widespread in the Southwest at this time. It forms only a quarter of the typable points recovered from Pueblo II/III quadrats on Cedar Mesa.

The most common point associated with the Cedar Mesa Pueblo II/III is the small triangular side-notched point (Type 21), although only a total of 13 were recorded on the Pueblo II/III quadrat sites of which eight are tabulated and illustrated (Table AI:24; Figure AI:14 e-l). Like the small barbed points, these are widely distributed in Pueblo II/III on the Colorado Plateau, with a number illustrated in Parry and

Table AI:24
Pueblo II/III Points
Type 18 (Small Corner-notched) and Type 21 (Small Triangular Side-notched) Points

Cat. #	TLength	SLength	BWidth	SWidth	NWidth	Thick	Weight	Comments
WJ12-861	20.3	5.9	13.4	7.3	5.1	3.1	0.65	18, Complete
UGG6-1417	24.2+	5.2+	21.0+	5.7+	5.3	4.0	1.71+	18, tip,base of stem, broken
UGG7-1028	23.2	5.5	10.4	10.8	6.3	2.3	0.52	Complete
B19-1087?	22.5+	8.5	11.7	14.6	5.9	3.9	1.10+	Only tip missing
B19-322	14.3+	5.3	8.7	9.1	4.4	3.0	0.37+	Tip, part of base, missing
B19-502	7.1+	7.1+	–	12.0	4.3	2.5	0.27+	Broken at neck
NR9-222	22.6	6.2	8.6	9.6	7.4	3.7	0.65	Barely notched
NR11-3616	26.5	8.5	11.3	12.4	6.6	3.3	1.01	Also in Table AI:23
UGG4-8805	13.9	3.5	6.2	5.0	3.9	0.9	0.11	Minature point
WJ12-823	29.8+	4.5	10.8	8.7	5.5	2.5	0.77+	Only tip missing
n	4	7	7	8	8	8	4	Type 21
Range	13.9 - 26.5	3.5 - 8.5	6.2 - 11.7	5.0 - 14.6	3.9 - 7.4	0.9 - 3.9	0.11-1.01	
1/4 - 3/4		4.5 - 8.5	8.6 - 10.8	8.7 - 12.4	4.3 - 6.6	2.3 - 3.7		
Median	22.9	5.5	10.4	10.2	5.65	2.75	0.59	
Mean	21.6	6.0	9.7	10.3	5.5	2.76.	0.57	

Christenson (1987) for Black Mesa. These are also present on the Hopi mesas (Woodbury 1954). Two of these on Cedar Mesa are unusual. NR 9-22 has very shallow side-notches and UGG 4-9905 is very small (Table AI:24 and Figure AI:14, i and k).

WJ12-823 (Figure AI:14 l) is an especially long and slender side-notched point. Similar forms north of the Colorado river have been termed Nawthis Side-notched (Holmer and Weder 1980:61) or Square Base Side-notched (Jennings and Sammons-Lohse 1980:67). These are also thought to have a post A.D. 1000 distribution.

In the original classification, Type 20, small Triangular Points, included both straight-based "Cottonwood" points, and the indented base, "Bull Creek" points, which were defined in 1980, sometime after we completed our original analyses. A total of 12 Type 20 are listed in Table VII-19 but we were able to locate 13, (Table AI:25) likely because of varying ways of classifying the Bull Creek variety. Turning to the Cottonwood form (Table AI:25, Figure A1:15 a-e) first, it is unclear whether these are "preforms" or complete points. Although only five are illustrated here, it should be remembered that another five are listed for the Basketmaker III, but four are from NR 11-4, a very larger Basketmaker III site which also has a Pueblo component. Thus these four may be really Pueblo II/III points.

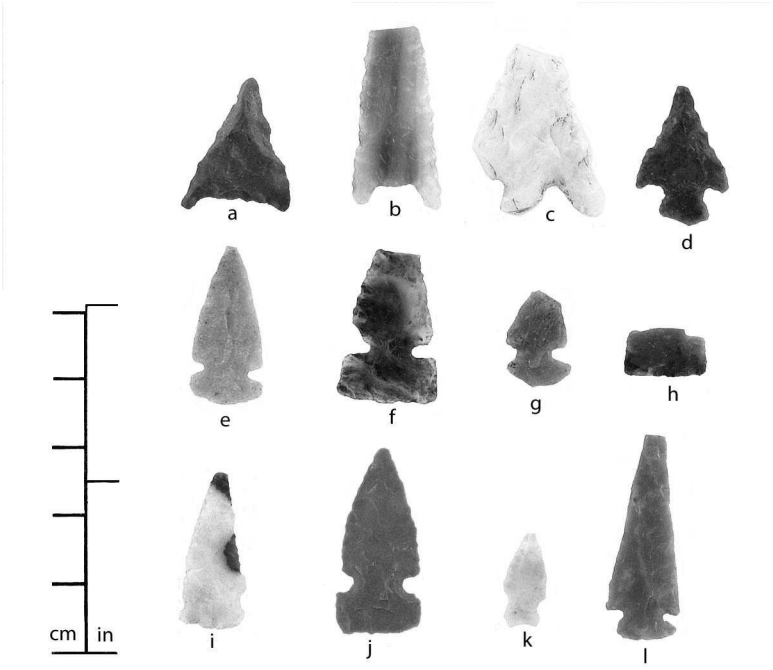


Figure AI:14. Pueblo II/III Notched Points. a,b, Bull Creek (Type 20); c,d, small barbed points (Type 19), e-j, small triangular side-notched points (Type 20). a, WJ7-479; b, UGG4-612A; c, WJ6-1417; d, WJ12-861; e, UGG7-1028; f, B19-1087; g, B19-322; h, B19-502; i, NR9-222; j, NR11-3616; k, UGG4-8805; l, WJ12-823.

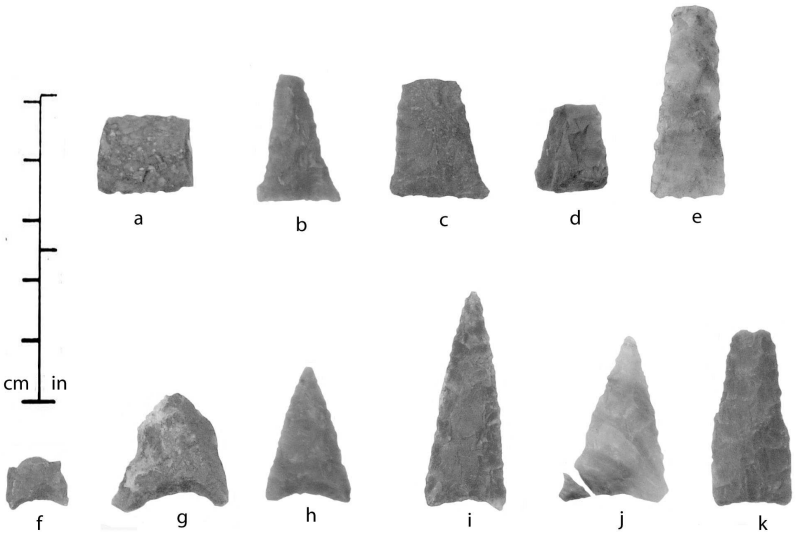


Figure AI:15. Pueblo II/III Type 20, Triangular Points.
a-e, Cottonwood Points, f-k Bull Creek Points. a, B1-1371; b, B1-1416; c, B6-1058; d, B12-250; e, B22-305; f, B3-7248; g, B3-5512; h, W4-978; i, B15-441; j, B22-2097; k, B22-538.

Table AI:25
Pueblo II/III Type 20 (Cottonwood and Bull Creek) Points.

Cat. #	TLength	SLength	BWidth	BConc	NWidth	Thick	Weight	Comments
B1-1371	17.3+		14.5	–		4.0	1.1+	
B1-1416	23.9+		14.3	–		3.8	1.0+	Almost complete
B6-1058	22.4+		17.5	–		3.9	1.4+	
B12-250	14.8+		13.1	–		3.3	0.7+	
B22-305	31.8+		12.2	–		4.3	1.8+	
n			5			5		Cottonwood Pts
Range	(14.8+-31.8+)		12.2-17.5			3.3 - 4.3	(0.7+-1.8+)	
Median			14.3			3.9		
Mean			14.3			3.9		
WJ7-479	19.3		14.8	1.8		4.3	0.93	
UGG4-6712a	26.6+		11.9	3.2		3.7	1.2+	
B3-5512	20.2+		20.4	2.5		6.7	2.4+	
B3-7248	9.5+		10.9	1.3		3.6+	0.4+	
B15--441	36.1		13.6	1.4		3.8	1.6	
B22-538	28.8		12.9	0.5		4.1	1.6	Very shallow indented base
B22-2097	26.8		15.9	0.9		4.2	1.4	Corner of base broken
WJ4-978	23.7		14.1	1.3		3.2	0.8	
n	5		8	8		7	5	Bull Ck. Points
Range	19.3 - 36.1		10.9- 20.4	0.5 - 3.2		3.2 - 6.7	0.8- 2.4	
1/4 - 3/4	–		11.9- 15.9	0.9 - 2.5		3.7 - 4.3	-	
Median	26.8		13.9	1.4		4.1	1.4	
Mean	26.9		14.3	1.6		4.3	1.3	

Table AI:25 has the column for "SWidth" substituted with "BConc" standing for Basal Concavity, which is only present in the Bull Creek form. Both the short and long forms of these points are present, as seen in Figure AI:15. Figure AI:15 g (B3-5512), though a short form, is clearly resharpened. Item k on Figure AI:15 (B22-538), on the other hand although also appearing to be resharpened, has such a shallow basal concavity that its assignment to the Bull Creek type could be questioned.

Similarly to the Cottonwood form, two Bull Creek forms are described among the Basketmaker III points (Table AI:23, Figure AI:13 c, e) but may actually be Pueblo II/III. If this is the case, there are 10 Bull Creek Pueblo points, making these almost as common as the side-notch triangular points during the Pueblo II/III period. As indicated during the Basketmaker III point description, Bull Creek points are thought to date between AD 1000 and 1300 or even AD1050-1250 (Holmer and Weder 1980:61). If the beginning date is correct, the Cedar Mesa Basketmaker III examples should be re-assigned to the Pueblo II/III, but I am unclear that the beginning date is as firm as the ending date.

Bull Creek points appear to be present but very rare in the Black Mesa late Pueblo II. Parry and Christenson (1987:307) illustrate only a single example and they have tried to illustrate all complete points. Thus northern Black Mesa may be the southeast distribution limit of Bull Creek points. Helmer and Weder (1980) show their eastern limit being near Cedar Mesa, but is less clear about their southern limit.

Another similarity between Black Mesa and Cedar Mesa is the presence of large "Atlatl" points in the late Pueblo II on Black Mesa (Parry and Chistenson 1987:180). This was not recognized on Cedar Mesa until a comparison was made, but 11 Type 15 and 16 Corner -Notched "Atlatl" points are recorded from Cedar Mesa Pueblo II/III quadrat sites in Table VII-19. This is as high a frequency as any of the Pueblo II/III arrow point types, although the larger points are probably more likely not to be missed in the surface collections. Are these hafted as knives? Or used as spears? Further research is needed on this point.

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Appendix A: II
Ground Stone

February 11, 2010

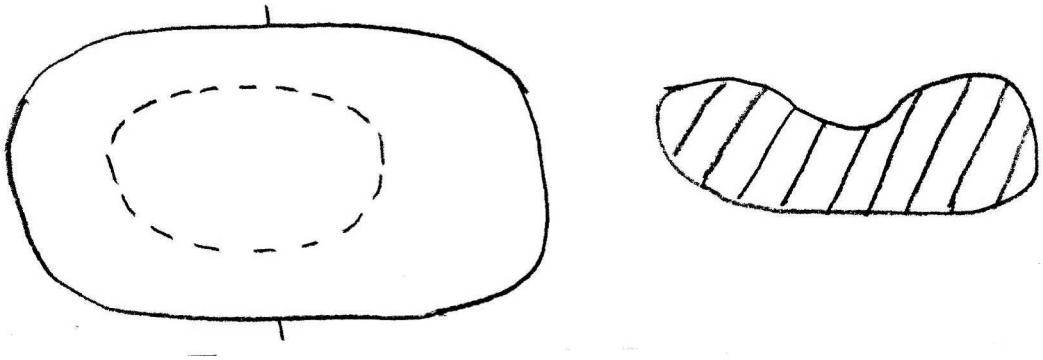
(Scanned and OCR'ed, Dec., 2007)
(Corrections to Title, Footer, Woodbury Ref. added, Feb. 11, 2010)

While ground stone did not occur in sufficient frequency to warrant a detailed classification for intra-site analysis, the sum total of ground stone collected is substantial, and the classification used for intra-site comparison obscures some important variation. What follows is a summary of the more detailed ground stone analysis that was carried out, pointing out some of the major aspects of variation and some inferences drawn from these. These are presented as 21 different classes and are tablulated (as G1-G21) for all sites, although these classes were not used in the inter and intra site analyses described in the main text.

The main categories used are those of metates and manos, with the addition of mortars and the single doughnut stone. In both the metates and manos Woodbury (1954) is used as a guide.

Type I Metates (G10)

These slabs have an oval grinding surface which with use develops into an oval deep basin. The grinding motion is primarily rotary with some pounding, the cross section is a roundish one without vertical sides.



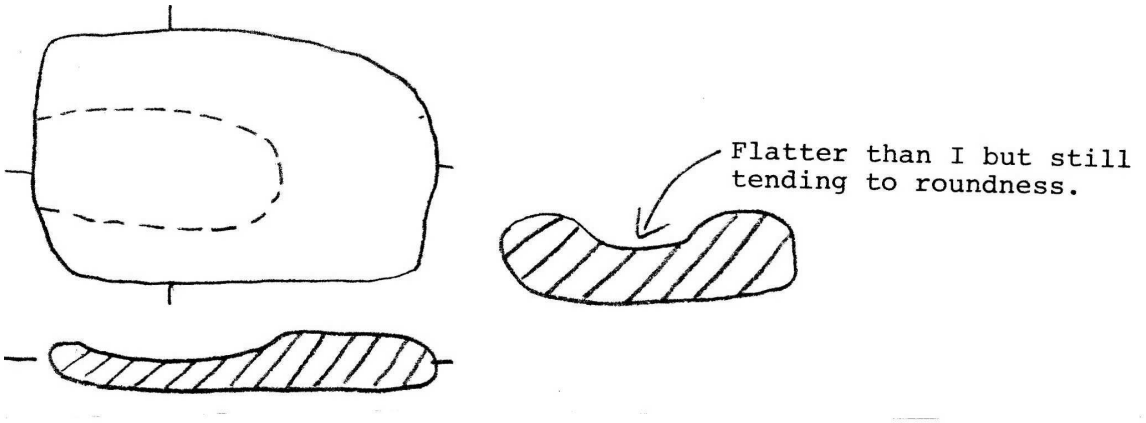
See Woodbury(1954) grinding slabs for comparative examples.

Type II Utah-Semi Trough (G12)

This class clines into the previous but shows evidence of a more back and forth grinding motion, with a more trough like grinding surface localized at one end of the grinding slab. These tend to be made on relatively rectuangular usually relatively thin slabs.

They differ from true troughs:

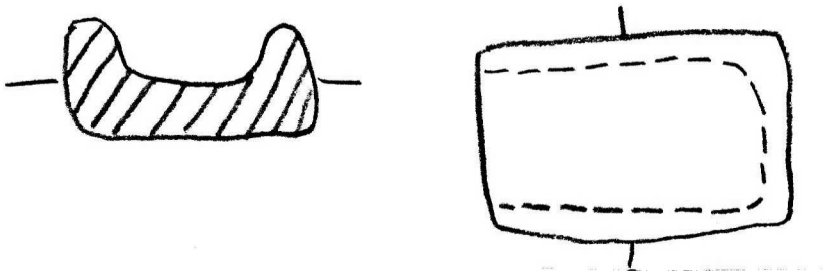
1. Lack of rectangular cross section
2. Always a shelf at one end.
3. Wide areas on both sides of the trough.



Ref. May fit Woodbury's Utah but does not fit his trough. Brew may illustrate some, Fig. 174, a,b,c.

Type III Trough Metates (G14)

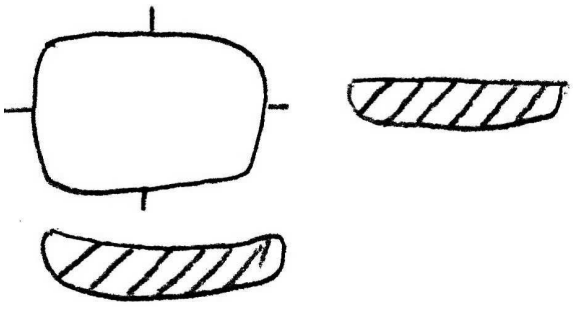
These grinding slabs show evidence of only back and forth grinding motions. The edges of the troughs are thin and the "shelf" is usually absent. The cross section is usually quite rectangular and the overall shape is usually very rectangular and well finished. This class does cline into "Utah Semi-Troughts" and some have "rims" so thin that they may have been placed in bins and thus are functionally "Flat" metates.



Ref. Woodbury 1954:52 "Troughed Metates Open at One End", 1954:53: "Troughed Metates Open at Both Ends". [1954:51: "Troughed Metates With shelf at Closed End" ?]

Type IV Flat Metates (G16)

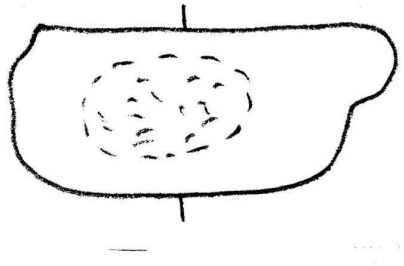
These grinding slabs are flat with the entire surface being used for grinding with a slight bend in the middle. Following Woodbury 1954:59-65, these were probably placed in bins in a permanent fashion.

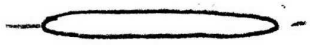


Ref. Woodbury 1954:54
"Flat Metates"

Type V Tabular Grinding Stones (G18)

These objects are thin pieces of sandstone showing pecking or grinding. These differ from Type IV in that the entire surface is not used and from Type I in that the pieces are too thin for a deep basin to ever develop. These typically show little wear.





Ref. Woodbury's "Tabular Flat Abraders" (1954:98)?. Also possibly Woodbury's "Grinding Slabs" (1954: 113, 114).

Type "Unidentified" (G21)

If a fragment was too small to be placed into any category and group of categories but still was apparently a nether grinding surface it was designated "Unidentified/Unclassified".

Type I/II Deep Basin–Utah Semi-Troughs

A few complete metates seemed to fall in between these two categories and were designated as both by I/II. It was not uncommon for fragments to be indeterminate and these were also designated as I/II. Probably the fragments came from either I's or II's and not I/II's. Thus using the fragments as a guide, the number of complete metates in this class would be overestimated.

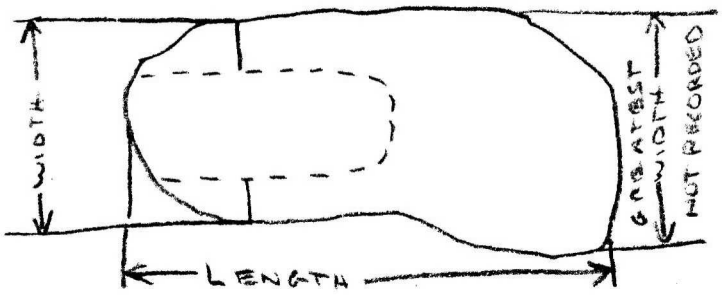
Type II/III/IV/V (G20)

A few fragments were clearly not deep basin metates, but could have been anything else. These were not as common as I/II's and are not represented in the following tables. In the site tabulations they are placed in the "Miscellaneous Nether" class.

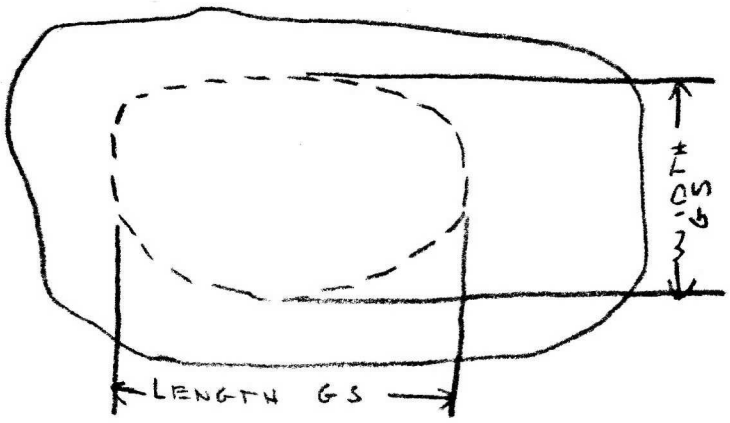
METRIC MEASUREMENT SUMMARIES

Because of different measurements resulting from complete metates and from what appear to be "complete" measurements from incomplete metates, they are given separately below. First the measurements for "pure" type, then the "mixed" types and finally a discussion is given.

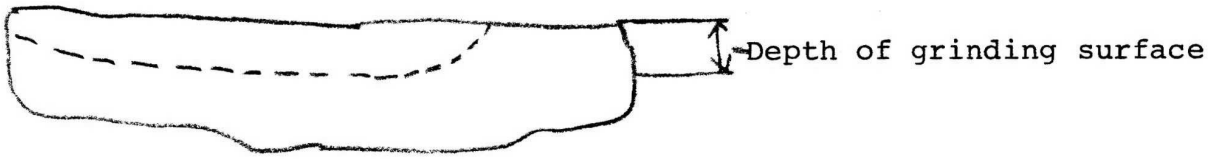
Overall width measurement is not greatest width, but instead the width measured midway up the grinding suface.



Thickness greatest thickness 90° to length width.
Length of grinding surface = greatest length of grinding surface.
Width of grinding surface = greatest width of grinding surface.



Grinding surface depth = greatest depth from unground surface



GS = Grinding surface
OA = Overall

Type I Deep Basin Complete (G10)

Measurement	N	Mean	Median	Low	High	Interquartile
Length GS	28	34.23	35.5	9	57.6	8, 41.2
Width GS	26	22.83	23	8	37	19.4, 27.5
Depth GS	28	2.32	0.9	0.3	10	0.3, 4.2
Length OA	26	44.20	46.5	19.1	64.6	36.2, 52
Width OA	27	33.05	34.4	18.2	47.4	26, 40.6
Thickness OA	29	10.29	10.1	3.4	27	7.6, 11.5

Type I Deep Basin Incomplete (G11)

Measurement	N	Mean	Median	Low	High	Interquartile
Length GS	3	31.3	29.5	29	35.4	
Width GS	9	18.63	18	13.5	26.1	15, 19.9
Depth GS	12	2.36	1.6	0.5	5.6	0.5, 4.6
Length OA	2	42	42	37	47	
Width OA	5	27.60	25.6	24	34.4	25, 29
Thickness OA	19	7.61	7.6	3.5	12.9	6.4, 8.9

Type II Semi-Utah Trough Complete (G12)

Measurement	N	Mean	Median	Low	High	Interquartile
Length GS	19	36.79	38.6	26.5	42	33.7, 40.5
Width GS	19	21. 79	22	15.8	27.8	19, 23.7
Depth GS	19	3.3	2.5	0.5	11	2, 4.7
Length OA	16	55.23	55.3	47	65.6	49.6, 59
Width OA	16	38.83	38.15	25.8	49.2	36, 41.6
Thickness OA	16	8.26	8.45	2.9	18	5.6, 10

Type II Semi -Utah Trough Incomplete (G13)

Length GS	2	36	36	32	40	
Width GS	6	18.3	17.8	14.6	23	15.6, 21
Depth GS	8	4.15	4.35	2.1	6.2	2.2, 6
Length OA	2	50.5	50.5	42	59	
Width OA	2	29	29	28	30	
Thickness OA	17	7.95	7.7	2.9	16	5, 9.8

Type III True Trough Complete (G14)

Length GS	2	34.2	34.2	31	37.4
Width GS	2	22.35	22.35	21	23.7
Depth GS	2	1.55	1.55	1.1	2
Length OA	2	35.2	35.2	33	37.4
Width OA	2	25.35	25.35	23.7	27
Thickness OA	2	9.15	9.15	7.9	10.4

Type III Metates Incomplete (G15)

Length GS	2	36.5	36.5	33	40	
Width GS	4	21.30	21.70	19	22.8	
Depth GS	11	2.76	3	1	4.3	1.5 , 3.6
Length OA	3	36.33	36	33	40	
Width OA	3	27.47	27	26.4	29	
Thickness OA	9	7.42	7.6	2.2	14	4.8 , 8

Type IV Metates Complete (G16)

Length GS	3	39.77	40.6	36	42.7
Width GS	3	26	25.6	24	28.4
Depth GS	3	0.5	0.5	0.5	0.5
Length OA	3	39.77	40.6	36	42.7
Width OA	3	26	25.6	24	28.4
Thickness OA	3	5.73	6	3.6	7.6

Type IV Metates Incomplete (G17)

Measurement	N	Mean	Median	Low	High	Interquartile
Length GS	1	19.8	19.8			
Width GS	3	22.23	21.5	17.2	28	
Depth GS	3	0.2	0.1	0	0.5	
Length OA	0					
Width OA	3	22.57	21.7	18	28	
Thickness OA	3	7.33	7.6	6	8.4	

Type V Metates Complete (G18)

Length GS	2	24.4	24.4	18	30.8	
Width GS	2	15.9	15.9	14	17.8	
Depth GS	2	0.25	0.25	0	0.5	
Length OA	2	26.4	26.4	22	30.8	
Width OA	2	18.4	18.4	17.8	19	
Thickness OA	2	4	4	2	6	

Type V Metates Incomplete (G19)

Length GS	0					
Width GS	2	17.5	17.5	15.5	19.5	
Depth GS	3	0.17	0	0	0.5	
Length OA	0					
Width OA	2	17.5	17.5	15.5	19.5	
Thickness OA	7	2.8	1.8	1.3	5.1	1.6 , 4.7

INDETERMINATE "TYPES"

Type I/II Complete

Measurement	N	Mean	Median	Low	High	Interquartile
Length GS	2	39.55	39.55	37.9	41.2	
Width GS	2	25.55	25.55	24	27.1	
Depth GS	2	6.9	6.9	6.6	7.2	
Length OA	2	53.45	53.45	53	53.9	
Width OA	2	39	39	38.4	39.6	
Thickness OA	2	7.6	7.6	6.6	8.6	

Type I/II Incomplete

Length GS	0					
Width GS	3	13.2	14.2	11.1	14.3	
Depth GS	1	2.30	2.30			
Length OA	0					
Width OA	1	39.9	39.9			
Thickness OA	5	9	7.9	6.4	14.3	

Type II/III Metates

No complete metate, only four measurements from incomplete ones.

Measurement	N	Mean	Median	Low	High
Depth GS	2	2.7	2.7	1.7	3.7
Thickness OA	2	4.7	4.7	3.3	6.1

No valid measurements for Type III/IV complete or incompletes, or for Type IV/V's (although two very fragmentary specimens of the latter do exist).

Metate Measurement Summary

One of the striking points in the metric measurements is the general lesser size of the measurements of the "incomplete" metates. This is in spite of the fact that only such measurements that seemed to be complete were used in the summaries. With the exception of depth of grinding surfaces this is true for mean and medians for every other measurement in Type I and Type II metates. And even in Types III, IV and V where the numbers are very small this same trend continues, where eight of the 12 possible comparisons are larger for the complete metates.

While some of these differences do not appear significant, others are. For instance comparing width of grinding surface of the deep basin of Type I metates, we find the difference significant at .01 by the Wilcoxen test (0.01 Σ d 98 this Σ d 95). And the consistency of the difference clearly shows a systematic bias. This difference is in accord with smaller and lighter metates having less of a chance of surviving "complete" in the archaeological record compared to large and heavier metates. This systematic difference then is one that should appear in most metate studies wherever.

When this difference was first noted and the reason for it suggested, M. Powers asked whether all such metric measurements should show this and on examining the different measurement classes are in accord with this general wear model including that the incomplete metates would have a greater depth of grinding surfaces. That is, metates with their bottoms nearly worn through are more likely to break than those with thick bottoms. And this latter turns out to be so for metates Type I, II, and III. For Type IV, flat metates, besides an insufficient sample size, the measurement is merely a measurement of flatness. For Type V grinding slabs, a similar situation occurs.

The fact that the measurements for depth of ground surface are larger for incomplete metates also indicates that the other measurements for incomplete metates are not small due to mistaken identification of "incomplete" measurements as valid "complete" ones. If this was the situation one would expect the depth of ground surface measurement also to be low. Thus in all, the data are in agreement with the "wear" model.

The question of whether "depth" differences are significant can be approached in several different ways. If we assume as the null hypothesis that there is no differences in populations and the differences found due to sampling error, the chance for any given comparison to be higher or lower would be 50 percent, as in flipping a coin. Since we are dealing with three "independent" sets of measurements (three types of metates) the product model is appropriate. Thus the chances of obtaining three heads in a row (1/2 x 1/2 x 1/2 = 1/8) is also the probability of the observed situation occurring by chance. Thus it appears that it unlikely (one chance in eight) that all three measurements would be higher in incomplete

metates.

Actually the probabilities are not 1/2 for each case as the differences between incomplete complete in Type II metates seems to be relatively great. If we compare the Type II measurements we find they are significant at between .10 and .05 according to the Wilcoxen test (Σd for .10 = 87, .05 = 80, this Σd = 84). By interpolation this gives a probability of about .08. Substituting this figure for one of the .50's in the above paragraphs gives an overall probability of .02, clearly demonstrating the significance of this relationship.

It should be borne in mind that these systematic differences suggest that analyses dealing with only whole metates or only broken ones may well lead to different results.

COMPARISON WITH OTHER REPORTS

Our Type I, deep basin grinding slabs, appear to be the same as Woodbury's "grinding slabs" (1954:113-114). The only figures he gives are for length and these seem to indicate a smaller size. His median length is between 20 and 30 centimeters, while his lower quartile is between ten and 20 centimeters and his upper quartile is less than 30 centimeters as compared to our of 46.5, 36.2 and 52. However, his show an abundance from Pueblo V contexts far later than any known from Cedar Mesa.

Our type II, semi-Utah troughs, apparently overlaps with Woodbury's "troughed metates with shelf at closed end" (1954:51:52). His means for length, width and thickness (overall) are 45 centimeters, 36 centimeters, 13.3 centimeters compared to our complete metate measurements of 55.23, 38.83, 8.26, showing fair agreement considering the sample sizes (3 and 16).

Woodbury has only one "troughed metate open at both ends" (1954:53) that is complete and two more incomplete but partially measurable. This category overlaps with our Type III troughed metates, likewise a small class. Woodbury's complete one is 47 x 33 x 8 centimeters, the two incomplete are 22 and 26 centimeters wide and 5 and 11 centimeters thick (1954:53). This suggests this class may be larger than ours with means of (34.2 complete, 36.35 incomplete) by (25.3, 27.47) by (9.15, 7.6) but of the same general size.

Woodbury's "troughed metates open at one end" also overlaps with our Type III (1954:52) and he gives means apparently based on ten complete specimens of 48 x 31 x 9 centimeters again seemingly larger than those found at Cedar Mesa.

One of Woodbury's largest classes is that of "flat metates" which is the same as our "flat metates" (1954:54-58). He gives means of 39.5 by 27.2 and 8.8 for overall measurements. These are in close agreement with our small samples of 39.77 for length, 26 for width and 5.73 for thickness (7.33 from incomplete metates). Even though the great bulk of Woodbury's are from late Pueblo IV and Pueblo V times, the uniformity of measurement suggests the size was standardized far before.

MANOS

While a wide variety of attributes were measured on manos, the only ones determined of significance are those listed in the following tables, length, width, thickness, completeness, whether one hand, or two hand, and whether made on cobbles or not. The last attribute refers to the material type, that is if it was not sandstone of some sort. These non-sandstone tools were assumed to have been made from river cobbles transported to Cedar Mesa from some location such as the San Juan River. While many manos were clearly made from such

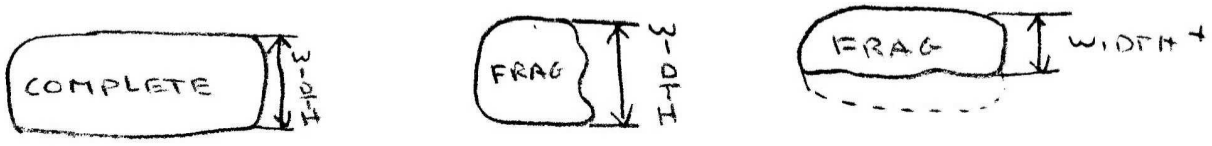
cobbles, others were modified sufficiently so that the original shape was impossible to determine. It was assumed that one handed cobble manos would be associated with Basketmaker II sites.

The following tables illustrate the distribution of the above attributes.

Measurements are:

Length = longest measurement of complete mano. Presumably perpendicular to line of movement. For fragments, the mano was orientated in that fashion and the length existant was measured and given a plus (+) above and to the right of the measurement.

Width = longest measurement 90° from length for complete manos, fragments measured after orientation.



Thickness = longest measurement 90° from width for complete manos, fragments as before. Note that a mano can be thicker than it is wide.

Mano Metric Measurements

1 Hand Manos (Cobble) Complete (G1)

Measurement	N	Mean	Median	Low	High	Interquartile
Length	41	11.83	12.3	7.9	14.8	10.4, 13.2
Width	40	9.16	9.2	7.4	12	7.9, 10.1
Thickness	40	5.05	4.7	3.2	13.6	4.3, 5.6

1 Hand Manos (Cobble) Incomplete (G2)

Length	2	11	11	9	13.8	
Width	14	8.35	8.35	6.3	10	7.4, 10
Thickness	19	3.74	3.8	2.3	5	3, 4.50

1 Hand Manos (Not Cobbles) Complete (G3)

Length	56	11.8	11.5	5.9	17.1	10.5,	13.2
Width	59	8.78	8.7	5.1	11.6	8,	9.4
Thickness	58	4.06	3.8	2.3	8	3.2,	4.3

Measurement	N	Mean	Median	Low	High	Interquartile
1 Hand Manos (Not Cobbles) Incomplete (G4)						
Length	1	12	12			
Width	21	9.19	9	7.2	12.1	8.3, 9.8
Thickness	30	2.96	2.8	1.4	5	2.4, 3.5
2 Hand Manos (Not Cobbles) Complete (G5)						
Length	74	21.46	20.95	15	32	19.2, 24
Width	71	11.32	11.5	7.5	17.7	10.2, 12.1
Thickness	72	4.08	3.7	1.5	10	3.1, 4.9
2 Hand Manos (Not Cobbles) Incomplete (G6)						
Length	4	23.28	23.25	17.6	29	
Width	83	11.9	11.19	8.3	15	10.1, 12.2
Thickness	87	3.48	3.2	1	13	2.4, 23.9
2 Hand Manos (Cobble) Incomplete (G7)						
Length	23	17.69	17.2	13.6	24	15.9, 20.2
Width	23	10.33	10.4	7.4	12.4	9.9, 12.4
Thickness	22	5.29	5.05	2	8.8	4.1, 6.3
2 Hand Manos (Cobble) Complete (G8)						
Length	1	17.2	17.2			
Width	6	10.92	10.75	9.6	12.6	10.4, 11.9
Thickness	6	4.73	4.85	3.4	5.7	4.0, 5.6
Unclassified Non-Cobble Mano Fragments (G9)						
Length	0					
Width	99	9.89	9.8	6.7	18	8.7, 10.6
Thickness	99	3.31	3.2	0.8	5.5	2.5, 3.8

Manos Discussion

The handstones associated with the nether grinding stones come in a wide variety of sizes and shapes, but much of this variety is due to amount of wear rather than deliberate shaping. The basic division that we, along with other workers, perceived was short or one handed manos and long or two handed manos. The one handed manos as well as being smaller (three fourths being less than 13.2 centimeters long) were rounder in outline and generally had a longitudinal cross-section in which both grinding surfaces were not exactly flat but were slightly lens shaped. One hand manos presumably were used with a slight rotary motion and thus used with deep basin or semi-troughed metates.

Two handed manos on the other hand have a rectangular longitudinal cross section and were presumably used on flat surfaces in a back and forth motion. Two handed manos also tended to have grips, triangular or wedge crossssections. About three-fourths of complete two handed manos had lengths greater than 18 centimeters. While the lengths of two handed

manos would seem to be in accord with the width of grinding surfaces of the semi-trough class of metates, in fact because of the curvature of these grinding surfaces, few would actually fit. Thus, only the relatively rare types III, IV and V metates are compatible with these manos in spite of the fact we have about as many two handed manos as one handed (Types I and II outnumber Types III, IV and V about four to one). A similar situation is noted by Woodbury (1954:80) for Basketmaker III and Pueblo I times.

Within each of these two broad classes a subdivision was made on the basis of whether the mano was made on a pebble or cobble of exotic origin. It was thought that such manos tended to be less modified and in the one hand with more convex longtitudinal cross-sections and being typical of Basketmaker II. These can be seen to be somewhat wider and thicker than one handed manos not made on pebbles. In the two handed case pebbles were much less common and differed from the non-pebble case in being shorter, narrower and much thicker. These measurements may be somewhat biased in that a well worn cobble is difficult to identify, but the general trends are probably valid.

The length of both one hand mano types agree very closely with that reported by Woodbury who lists a mean length of 11.7 centimeters (1954:79). The mean width (8.6) and thickness (4.0) are also close considering that both these measurements fall close to the non-pebble manos which apparently was the only type found by Woodbury.

The length of all two handed manos found by Woodbury is significantly greater than that found on Cedar Mesa. Only 14 of the 74 complete non-pebble two handed manos were 25 or more centimeters long which was the mean of all two handed classes reported by Woodbury (1954:68-78). The widths on the other hand of manos with a single grinding surface (which most of our two handed manos fit) are very close with a mean of 11.2 centimeters compared to our 11.32 centimeters (1954:69). Manos with more than one grinding surface become progressively smaller in width and thickness. The thickness of Cedar Mesa two handed manos is less than that reported by Woodbury (4.08 to 4.6 centimeters) for manos with a single grinding surface, and even for two opposite grinding surfaces (4.4 centimeters) but more than for manos with three or four grinding surfaces (3.1 and 3.5 centimeters).

The biggest difference is thus the 3.5 centimeters or so in length. Woodbury has a mano category we did not recognize called “Convex Surface Manos” which has a mean length of 18 centimeters) intermediate between one and two handed manos (1954:67,68). The question arises if our two handed mano category includes this class and if that accounts for the difference observed. The answer appears to be no. We did not recognize many convex surface manos except in the two handed cobble class, and only 14 of the 74 complete two handed manos were less than 18 centimenters long. Furthermore Woodbury reports this form as being most abundant during Basketmaker III and Pueblo I periods to which few Cedar Mesa manos could be assigned. It appears then that at Cedar Mesa the two handed manos were shorter thant hose from primarily later contexts at Antelope Mesa.

On checking our assumption that one hand cobble manos were distinctive of Basketmaker II, we find it apparently not so. Inspecting complete one hand manos found during the quadrat survey we find that about as many were made on cobbles as not, but that this was also true of one hand manos found in other contexts.

Complete One Hand Manos (Quadrats)

	Basketmaker II	Basketmaker III Pueblo II/III	Total
Cobble	13	12	25
Non-Cobble	12	17	29

The frequency of one hand manos made on cobbles does not seem to vary between Basketmaker II and later times. the same manos were checked to see how many came from sites in which a Basketmaker III component were found.

Complete One Hand Manos (Quadrats)

	Basketmaker II/III	Pueblo II/II	Total
Cobble	19	6	25
Non-Cobble	22	7	29

What the tables do show is that most cobble one hand manos are found on either Basketmaker II or Basketmaker III sites. This fact plus the absence of two handed non-cobble manos on Basketmaker II sites gave us the impression that one handed manos made on cobbles were distinctive of Basket maker II. It now appears that the dominance of one handed manos on Basketmaker II sites is what is distinctive, not the presence of one handed manos made on cobbles.

One problem with mano fragments not made on cobbles was they often could not be assigned to the one handed or the two handed class upon inspection. Our impression was, however, that most unclassified fragments were in fact pieces of two handed manos. It was hoped that a plot of complete one handed and two handed manos by width and thickness might help to clarify this matter (Figure C-1). Upon inspection it can be seen that thickness does not distinguish these two classes, but that width does. A line drawn at 9.6 centimeters "misclassifies" 17 manos out of 113 for a rate of 15 percent (assuming the original classification was "correct"). If we plot the unclassified fragments that were given length and width we find the concentration is in the area of overlap (Figure C-2).

If we use the 9.6 centimeter width as a dividing line for unclassified fragmentary manos we find that 63 out of 99 are one the "two handed" side, about two out of three. If we remember that most of our measurements for incomplete ground stone are less than for complete ground stone, for the reasons above, this estimate is thus a conservative one. In summary, most of the unclassified fragments are from two handed manos, however, the distinctions between the two classes are not good enough to classify members of this group as individuals with any certainty.

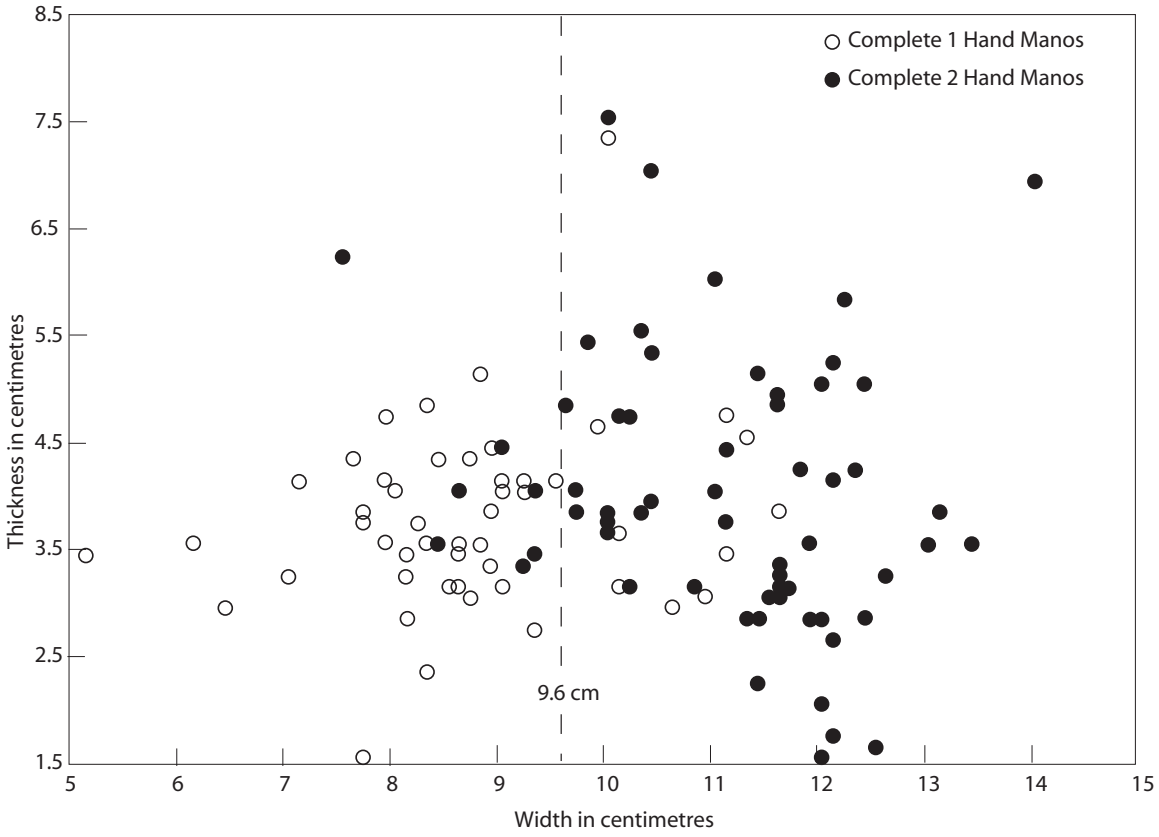


Figure C-1. Complete Manos Length and Width

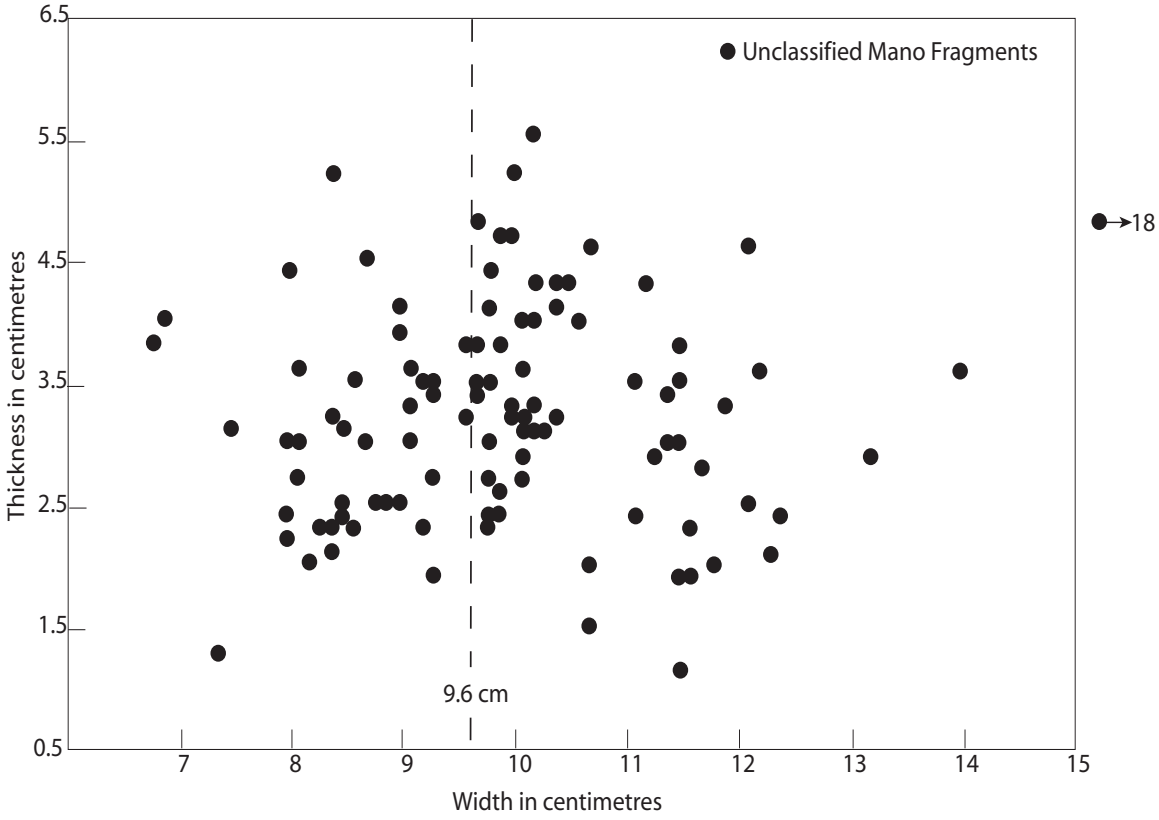
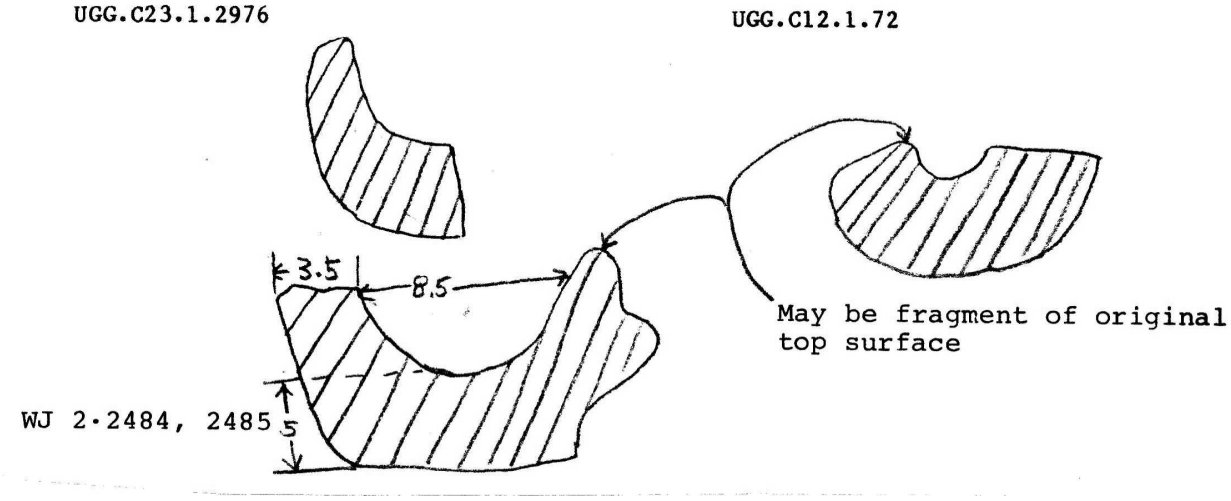


Figure C-2. Mano Fragments, Width and Thickness

MORTARS

These appear to be cobble mortars made out of either sandstone or quartzite. Woodbury's roughly shaped mortars and bowl-shaped mortars appear to correspond to these objects (1954:115-117).

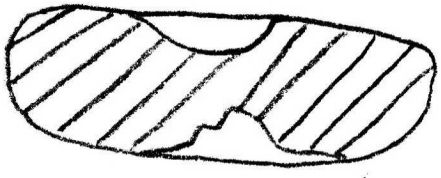
Artifact	Material	Overall Length	Width	Height	Length	Width	Height
UGG C23.1:2976	Medium Sandstone	12+	16+	13	6+	9+	9
	Bowl	10x19x9cm, Overall circa 18x18x13cm					
UGG C12.2:72	Coarse Quartzite	19	16	9+	5+	6+	4+
	Bowl may be only 6x6x5cm						
WJ 2.2484+ WJ 2.2485	Fine Sandstone	18.5	17	9.5+	8.5	8.3	4.5
	Bowl probably 8.5x8.3x6, overall 18.5x17x10cm.						



The sizes of the three mortars are more in accord with Woodbury's bowl shaped mortars, although the fisnish and shaping is in more accord with his roughly shaped mortars.

Doughnut Stone

This piece of eroded sandstone may be a concretion. Nothing similar was noted by Woodbury.



UGG 9:884. 10.5x 11.5 x 4cm

Depression #1, 4 x 3.5 x1

Depression #2 , 5 x 3 x 1.5

Reference

Woodbury, Richard
1954 Prehistoric Stone Implements of Northern Arizona. *Papers of the Peabody Museum*, Vol. 34, Harvard Univesity, Cambridge.

Cedar Mesa Project **Ground Stone Inventory** Quadrats, Mar. 11, 2007

	Manos									Metates											
	One Hand Manos				Two Hand Manos																
	Cobble		Non-Cob		Cobble		Non Cobb		Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
B1-1	1								3												
B1-2			1			1			1												
B1-4									1												
B1-5							1														1
B3-1			1				3	3	7		1		1	2	1				2		6
B3-7		1							1											I/II 1	
B3-10A		1						2	1				1								
B4-2									1												
B4-4							1		1										1	I/II 2	1
B5-1	1								1		1										1
B5-2								1												II/III 1	
B5-7																					1

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
B5-8			1																		
B6-3									1												1
B6-4									1												
B6-6									1												
B7-1									2												
B7-2	1						1		3												
B7-5																				II/III 1	2
B8-3				1																	
B8-4			1																		
B8-5			1																		
B9-3																				I/II 1	
B9-5	1																				

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
B9-6		1																			
B10-1					1																
B10-3																			1		
B10-5									1	1											
B10-7	1			1				5	6		5		1		1					I/II 1* II/II 1	10
B10-9							1	1	1												
B10-10	1	1																			
B11-5									1												
B11-8				1					1												
B12-1				2			1	2	13			1	2							I/II 1 II/III1	
B12-2								1	5												1
B12-5									3				1								

* Plus 1 I/IV

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates												
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb															
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
B12-8																					1
B13-3							1		1												
B13-4	1																				
B14-1													1								1
B14-2			2	1				1													
B15-1				1					3												
B15-7	1				1				1		1										
B15-9	2				1						2										
B15-10																				II/III 1	
B16-1			1				2		1	1											
B16-2	1		1				1		2	1											
B16-4	1																				

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
B17-1			1						2			1									
B18-1											1										1
B18-2			1		1						1										
B18-3				1					3		1							1		I/II 1	3
B19-1	1			1			1	1	2											II/III 1	
B20-1					1																
B20-3A	1				1																
B21-2									1												
B21-10							1		4												1
B21-11							1														
B22-2																					3
B22-3									1												

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
B 3 Offsite																					1
B 8 Offsite	3																				
B15 Offsite	1		1						3											I/II 1	
B16 Offsite							2														
B 18 Offsite											1										
B 19 Offsite	1																				
UGG 1-1																1					
UGG 2-2			1	1			1		1				1								
UGG 2-4	1																				
UGG 2-6							1														
UGG 4-3	1		3				5	7	25			1			2				3	I/V 1	8
UGG 4-3A	1																				

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
UGG 4-4							1		1						2						
UGG 4-6							1														
UGG 5-2			1																		
UGG 6-1			1	1			1	6	4										2		6
UGG 6-3								3	11						1					IV/V 1	1
UGG 7-1								1													
UGG 7-2									1									1			
UGG 7-5	1																				
UGG 7-7							1														
UGG 7-9			1				3	4	10						2						1
UGG 7-10									1												
UGG 9-1																				I/II 1	

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
UGG 9-2									1												
UGG 9-3									1												
UGG 9-5			1						1		2										
UGG 9-6			1				1														
UGG 9-7												1									
UGG2 Offsite			1																		
UGG5 Offsite									1												
HS 2 -1			1																		
HS 2 -2													1								
HS 3 -1								1	1												
HS 4 -1							1		1	1											
HS 4 -2																					1

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
HS 7 -1			1																		
HS 8 -1			1							1											
HS 8 -3								1													
HS11 -2									1				1								
HS14 -1			1																		
HS14 -2							1	1	1		1										1
HS 2 Offsite			2																		
HS 4 Offsite			1																		
NR 1 -2											1									I/II 1	
NR 2 -1								1													
NR 3 -1										1											
NR 4 -1								1	1	1											

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
NR 4 -2				2				1	5	1											1
NR 4 -3	1								1												
NR 4 -5								1	1						1					I/II 1	2
NR 4 -6		1					4		4		1										
NR 5 -1	1								1												
NR 5 -4									1												
NR 5 -5										1											
NR 5 -8	1	1	1						1												
NR 6 -1				1		1			3	1	1										
NR 6 -2A									1												
NR 6 -4	1																				
NR 6 -5	2		1		2		1		3	4									1	II/III 1	1

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
NR 8 -1									2												
NR 8 -3									1												
NR 8 -4							1														
NR 9 -1																				I/II 1	4
NR 9 -3										1											
NR10 -1			1						1	1											
NR10 -2									1												
NR10 -2A							1		2												
NR10 -3	1						1														
NR11 -1									1												
NR11 -2																		1			
NR11 -3		1				1			2						1						

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
NR11 -4			1						2												3
NR11 -10			1				1														
NR 11 -12								2													
NR 1 Offsite							1														
NR 4 Offsite	3																				
NR11 Offsite								1													
WJ 2 -1								1	1												
WJ 2 -3					1																
WJ 2 -4					1							1							1		
WJ 2 -6				1					2										3	I/II 1	
WJ 2 -7A							1														
WJ 2 -8			1		1		2		2	1							1				

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
WJ 4-6										1											
WJ 4-7										1										I/II 1	
WJ 7-4													1								
WJ 8-1								1	1											I/II 1	
WJ 9-2					1				2			1									
WJ 9-2A									1												
WJ 9-4		2			1		1		1				1								
WJ 9-5						1															
WJ10-1			1			1															
WJ11-2																					1
WJ11-3									5				1								1
WJ11-3A									4				2							I/II 1	2

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
WJ12 -1													1								
WJ12 -4								1													1
WJ12 -6											1										
WJ12 -8									1												
WJ13 -1	1						2	1	4	3	2									I/II 1	4
WJ16 -3									1												1
WJ16 -6									1												
WJ17 -4A							1														
WJ19 -1	1								1												
WJ19 -2											1										
WJ19 -3									2											IV/V 1	3
WJ19 -5/6									1												

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
WJ20 -1			1																		
WJ22 -1						1			1	3											
WJ 9 Offsite	2																				
WJ10 Offsite																					1
WJ12 Offsite			1																		
WJ16 Offsite							2	1													
WJ22 Offsite	1																				

Cedar Mesa Project **Ground Stone Inventory** Drainage Canyon Collections
March 11, 2007 1/4

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
BC3-2			1														1				
BC6-1		1		1					9		1					1	1				4
BC16-2								1	1												1
BC16-4									2												
BC18-4			1	1																	
BC22-6*	3	1	1		2				2				1								
BC24-1					1					1**											
BC28-1	1						1		1												
BC30-2		1	1				2	1	1												1
BC32-2				1					1												
BC34-2			1		1																
BC35-1							1					1									

* Includes 2 Manos from “B20-3A”, an early collection
** Basin Metate not collected.

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
BC35-2								1													
BC37-2	1					1															
UC3-1																				II/III 1	2
UC5-1				1																	
UC9-2													2								
UC10-1							1														
UC10/11-4									6						1						
UC11-1									3				1								1
UC11-6	1			1																	
UC12-2								2												Mortar 1	
UC13-1				1																	
UC14-1		1																			

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
UC15 -1	1		1																		
UC15 -4																					1
UC18 -1												1									
UC20 -1				2																	
UC23 -1			1	3				5	7	1										II/III 1	
NC2 -1														1							
NC7 -3			1																		
NC8 -2							1														
NC9 -5			1																		
NC17 -2							1	1													
NC23 -2									1												
NC27 -1				1									1				1	1			1

Note, a one handed complete non-cobble Mano is also recorded from “NR C14-3” but no Ceramics or Lithics from that site are recorded.

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
NC27-2								2													
NC27-5		2							3												
HC4-1								1			1										
HC7-1				1																	
HC15-1			1																		
HC15-2				1																	
WC9-4									1												
WC14-1		1										1									
WC27-2			2																		
WC31-3									1												
WC33-2							1														
WC42-1	2	1	1		4																

Cedar Mesa Project **Ground Stone Inventory** "Tested" Sites June 5, 2007

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
UGG 4x-3	1		2	2					5				2				1				
Bu 3x-7				1				3	4												2
Bu3x -10a				1			1														
Bu10 x-7																					
WJ 2x-3									1												3
WJ12 x-6	2	1					1		1								2				1
NR 4x-5									3												
NR11 x-4									1												2

Cedar Mesa Project — Ground Stone Inventory

August 16, 2007

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
GG C4-1								1	1												
GG C4-2									1												
GG C6-3		1*			1**										1						
GG C6-4			1																		
GG C6-6									1												
GG C6-8							1														
GGC 7-1							1														
GG C8-3							1		1												
GG C9-1		1		1				6	5								1				
GGC 10-1		1***						5	4												1
GGC 12-1			1				3	1	1												
GGC 13-1			1																		

* #40 classified as 1 hand Mano: ** #46 classified as 2 hand Mano; both on lithic analysis, neither are on Mano Analysis forms

*** #932 recorded as 1 hand Mano during lithic analysis, not on Mano Analysis forms.

Cedar Mesa Project **Ground Stone Inventory**

	Manos									Metates											
	One Hand Manos				Two Hand Manos				Unclass Mano Frags	Basin I		Utah II		True Trough III		Flat IV		Tabular Type V		Misc. Nether Frags	Unclas Nether Frag
	Cobble		Non-Cob		Cobble		Non Cobb														
	Com	Inc	Com	Inc	Com	Inc	Com	Inc		Com	Inc	Com	Inc	Com	Inc	Com	Inc	Com	Inc		
Site	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21
TC1 -1							1														
TC1 -2			1				1	4													1
TC1 -3		3							2												
M-1		1							2												
M-2																					
M-3									1												
M-9																					