

Milling Stone Cultures in Northern California: Berryessa I

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IN a recently published California volume of the *Handbook of North American Indians* (Heizer 1978), William J. Wallace had the responsibility for summarizing the archaeology of California from 9000 B.C. to 2000 B.C. He proposed three periods within this time range: Period I, Hunting (9000-6000 B.C.); Period II, Food Collecting (6000-3000 B.C.); and Period III, Diversified Subsistence (after 3000 B.C.). We present some evidence here that appears to be relevant to Wallace's Period II. The portrayal of this period or horizon is basically an expansion of Wallace's earlier (1954) paper on this subject. It is thought that subsistence during this period was based on "harvesting of wild seeds and other edible plant parts." The artifact inventories of the period are given as follows (Wallace 1978:28): "a lack of variety characterized the artifact assemblages. Heavy deep-basined mills predominate. The rare projectile points are typically heavy, indicating continuing employment of darts and throwing sticks. Crude service tools fashioned from cores or thick flakes commonly occur. Bone and shell items are scarce."

The above discussion is based upon and refers to Southern California. Wallace says (1978:28) "Outside Southern California seed collecting is less well documented." He then refers to evidence of this period in Northern California at Sacramento and Oroville. In the

North Coast Range, manifestations of the sort Wallace discussed have been noted by both Fredrickson (1974) and Meighan (1955).

In point of fact, the amount of material from Northern California attributed to Wallace's Milling Stone Horizon is miniscule as compared with Southern California. The question arises from this as to whether the people of the Milling Stone Horizon were present in Northern California only in very small numbers, if at all, or, on the other hand, whether they were present but that their remains are less known for one reason or another.

Our data favor the hypothesis that they were present but are less known. The reason for our lack of knowledge is two-fold. First is that their remains have been overlooked. Northern California archaeology from its beginnings in the 1930's has concentrated on the later and more spectacular cultures; very little attention has been paid to simpler and peripheral remains. Thus, in a 133-page monograph on the archaeology of the Napa region (Heizer 1953), a three-page appendix is devoted to the material of the Milling Stone Horizon. This very monograph suggests the second reason why these remains are less known—they are much more difficult to find. One of the sites reported in that monograph is Nap-131. This is a site which is quite unde-

tectable from the surface. It was discovered only because a road cut through it, and R. F. Heizer (personal communication) happened to see a handstone (mano) embedded in that cut while driving by. It is our view that much Milling Stone Horizon material in Northern California is similarly difficult to find but a great deal of it exists.

The recent two-year drought (1975-77) provided an opportunity to find out just how such material might be brought to light. During the drought, Lake Berryessa on Putah Creek lowered its level about 40 feet leaving surfaces exposed that were considerably altered from their pre-1956 (year of inundation) condition. How we happened on to the situation is outlined below. This is the first in a series of papers in which we hope to report in detail on the extent, condition, and nature of such material in one small part of the North Coast Range of California.

During the winter of 1975-76, an archaeological survey was made over a small parcel of land near Lake Berryessa, Napa County, California, as part of a proposed campground and

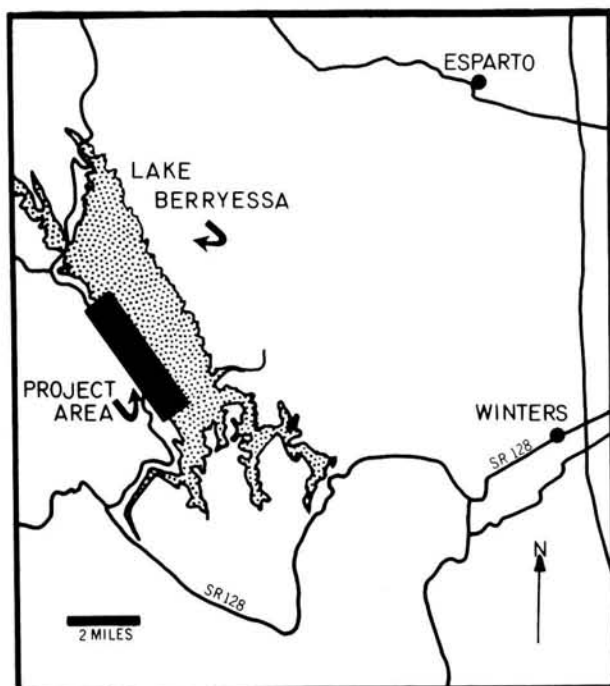


Fig. 1. Location map showing project area.

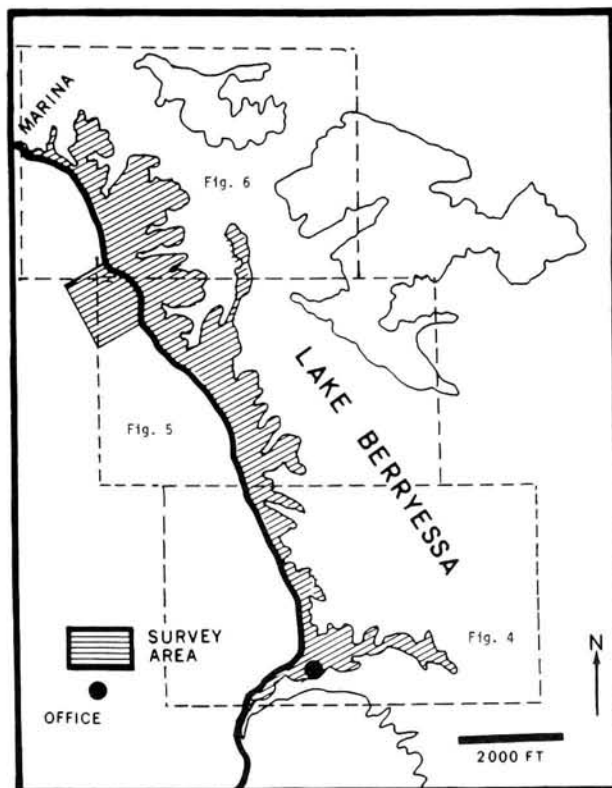


Fig. 2. Location map showing Oakshores survey area.

recreational improvement project identified as Oakshores Park. Figure 1 shows the general location. Figure 2 indicates the survey area.

Although the study area (Oakshores Park) is contiguous to Lake Berryessa and appears (at the present time) to be a favorable place for human occupation, prior to the construction of Monticello Dam it was a considerable distance from the principal stream draining the area (Putah Creek), and would not usually be considered a very likely place to search for or find substantial evidence of prehistoric occupation. Thus, when the Bureau of Reclamation requested the Oakshores survey, it appeared that it would be yet another public archaeology project in which the primary value would be the exercise gained by the surveyors.

After some reflection, however, the Oakshores survey project appeared to be an excellent opportunity to examine a parcel of marginal land under near ideal and controlled circumstances. A road extends the full length

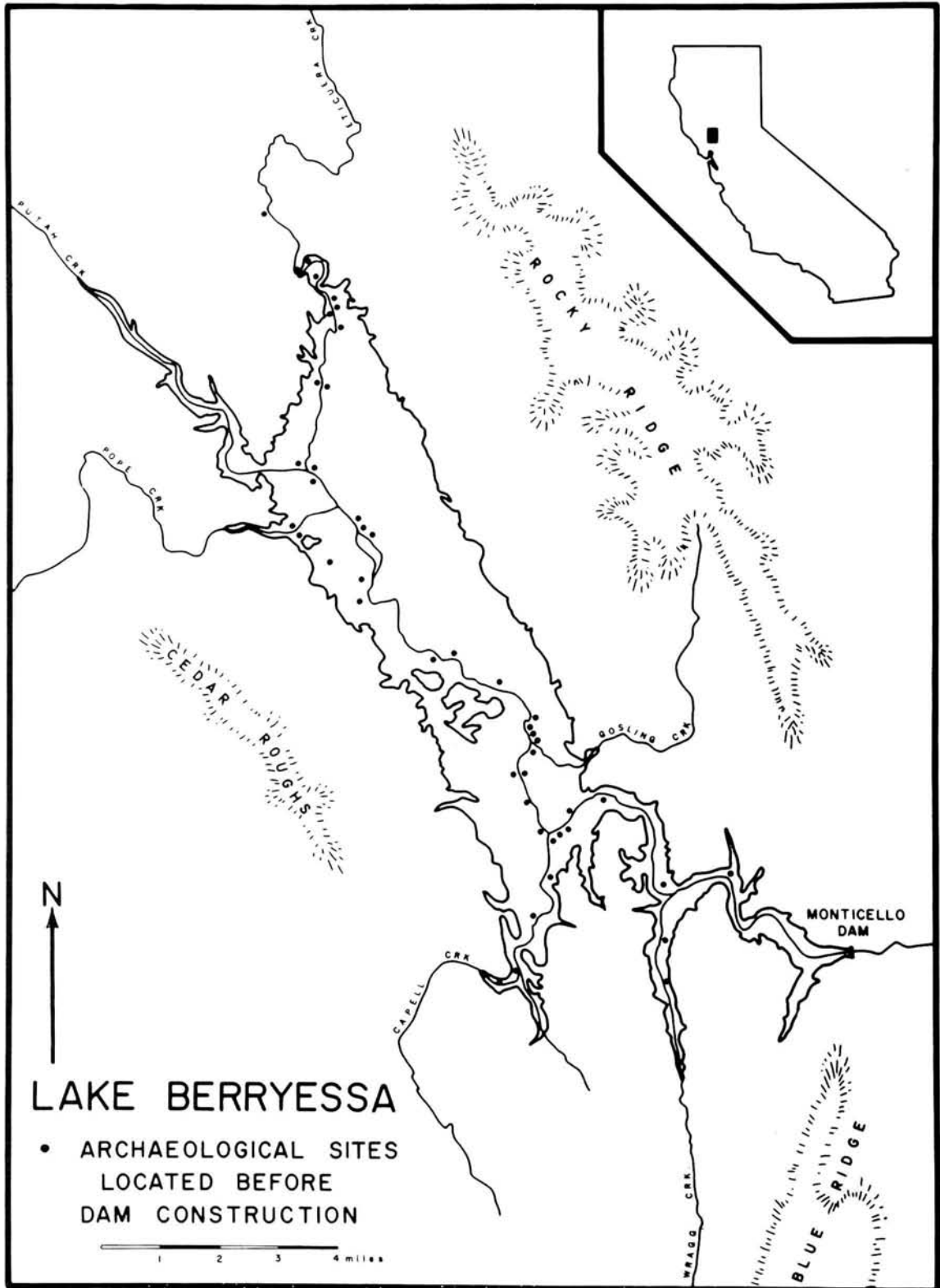


Fig. 3. Map showing archaeological sites located as a result of previous surveys.

of the parcel so that no part of the survey area was more than one-half mile from a vehicle. The winter had been exceedingly dry and grass cover was greatly reduced, thereby increasing the likelihood of locating artifacts and features. As an additional plus, the survey area was adjacent to an area covered by earlier archaeological surveys made prior to the construction of Monticello Dam and the subsequent filling of the lake. As part of these earlier investigations, a number of sites were located along the margins of the principal streams in the area (Putah, Capell, Eticuera, and Pope creeks). Some of the sites located at that time were partially excavated or tested. Figure 3 locates the sites recorded as part of the earlier surveys. Although it is not entirely clear from the available reports, it is assumed that some survey effort during the early investigations was extended to at least part of the hillside areas adjacent to the valley sites.

Given these circumstances, the planned Oakshores survey would complement the previous investigations and with some luck provide additional settlement and subsistence information over a wider range of terrain and geographic settings.

THE SURVEYS

Although not made explicit in the proposal submitted to the Bureau of Reclamation, it was hypothesized that sites would be present in the survey area, and that they would be small subsistence-oriented locations which in some way or another could be related to the larger villages and camps located along the valley streams. It was assumed that bedrock mortars would surely be part of this pattern.

To implement the project, all of the land included in the Oakshores development area (Fig. 2) was examined by archaeologists walking over the terrain in such a manner that all exposed soil surfaces were examined, and in those few places where the grass cover was still intact it was removed at regular intervals

with a shovel so that the underlying soil could be examined. In short, the survey was intensive, and it was focused on the recovery of archaeological remains that might well have been overlooked under other circumstances.

In spite of this rather intensive effort, not a single site was located within the survey area. Even after checking some areas more than once not a single flake, bedrock feature, or other bit of evidence of prehistoric occupancy was noted. Given the terrain and general environmental considerations and the fact that several sites of consequence were situated in the valley a relatively short distance away, this complete lack of cultural remains was an enigma.

A consideration of the circumstances that might account for such a dearth of archaeological remains suggested at least four viable possibilities: (1) there was no significant utilization of this kind of terrain by the prehistoric occupants of the North Coast Range province in general; (2) terrain such as this was normally or usually exploited or utilized, but for some special reason the Oakshores area was not; (3) the area had actually been utilized but under circumstances where no tangible remains were left behind; or (4) the survey area had been utilized and artifacts or other evidence of this utilization were simply not apparent.

Given the information available relative to resource exploitation for Northern California from ethnographic sources, along with some understanding of prehistoric subsistence patterns in general, it seemed likely that at least some portions of the larger survey area would have been utilized, and there is no reason to believe that the Oakshores area would have been avoided for any reason (given the presence of the major sites nearby). Therefore, it seemed that of the four hypothetical possibilities, only the latter two were reasonable.

It is of course quite possible to make use of an area and its produce without leaving recog-

nizable evidence of such use. Food resources could easily have been collected and transported to the nearby streamside camps for processing without leaving imperishable tools behind. The collection of acorns without the associated processing (implying use of mortars and pestles) leaves very little evidence. The same applies to small game hunting which is often done with wooden-tipped arrows, snares, traps, etc., none of which would normally survive to be recovered by archaeologists. This is of course a major difficulty in any attempt to deal archaeologically with catchment areas and such related concepts.

Although it seemed unlikely given the nature of the surveys, the last possibility, that artifacts were present but simply not being discovered, had to be considered.

In sum, although the situation was difficult to accept in view of our general notions about resource exploitation and prehistoric space utilization, we had to face the fact that a careful survey over a substantial territory had produced no tangible evidence of occupancy or utilization. It was agreed at that point that a short report was in order pointing out that the survey had been accomplished and that the planned campground development would not impact any known cultural resources.

However, in the interim between the first examination of the area and the last trip up for one more effort, the lake level had dropped even further as a result of the drought conditions and a substantial strip of beach was newly exposed. Although the contract called for a survey extending only to the high water mark (maximum pool level), it was decided to make one more examination of part of the survey area including, this time, some of the newly exposed beach surface.

The first few hundred feet of survey along the beach below the normal high water line (440 feet elevation) resulted in the recovery of a single obsidian flake. A careful examination of the location both below and above the high

water mark produced no additional artifacts. The flake (Fig. 7C), which was clearly of cultural origin, was recorded as an isolated piece with no special significance. Several hundred feet further along the same beachline, however, a nearly complete obsidian projectile point (Fig. 7A) was recovered, and again the surrounding area was combed with great care. No other artifacts were noted. Along an adjacent spit of land (which in pre-lake days had been a long narrow ridge) two heavy chert "cores" were noted but not considered seriously because of the strong possibility that they were the result of natural fracturing. These were seen as *possible* tools, but because of the context and the lack of clear-cut cultural modification, they were set aside. A short distance down the same beach, however, another heavy core was noted, and this time there was no question as to its origins. The flaking pattern was clearly cultural (Fig. 8E). Not far down the same beach a pitted mano was recovered (Fig. 9A). Again the survey was extended to the land surface above the beach, expecting to find evidence of a camp, but without success. The survey was then continued along several spits or points of land extending into the lake. Consistent with the pattern established to that point, isolated artifacts were recovered at various locations along the beachline, but none was found anywhere above the high water mark. Because of the rather consistent occurrence of artifacts on nearly every point of land examined so far, it was decided to extend the beachline survey to include the entire 11 mile shoreline of the Oakshores project area. As a result of the extended survey, a number of additional artifacts were recovered. Figures 4, 5, and 6 show the locations of the sites. A brief description of the artifacts recovered as a result of the expanded survey is presented below.

A total of 244 artifacts were recovered as a result of the Oakshores survey project. Two hundred seven of these have been sorted into

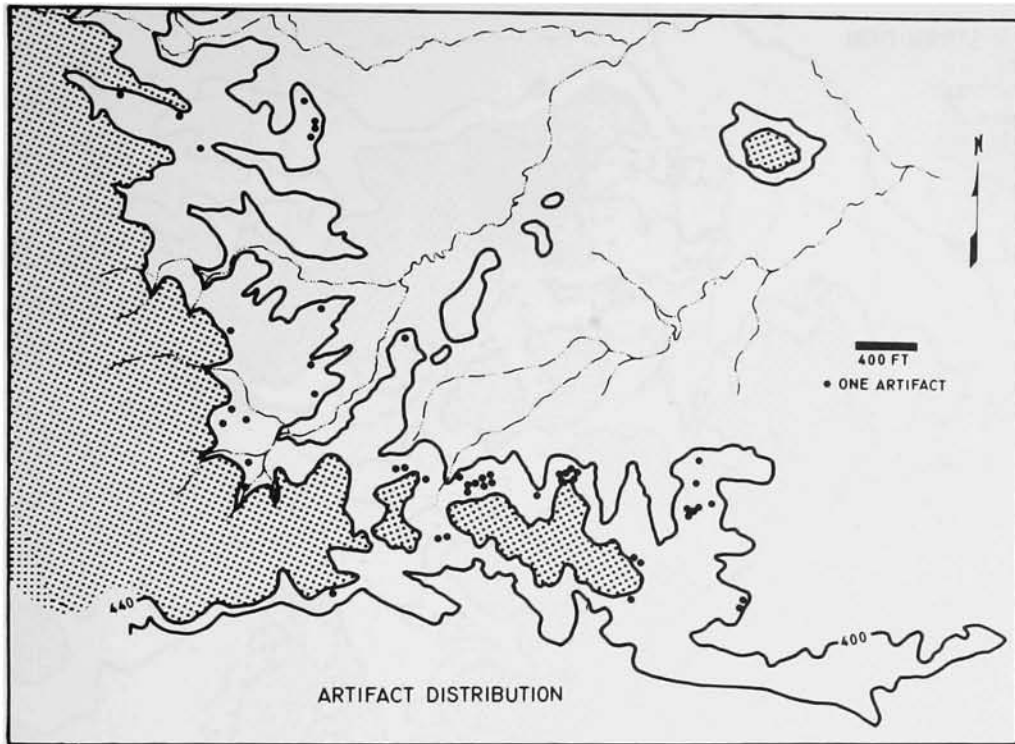


Fig. 4. Distribution of individual artifacts within Oakshores survey area, southern sector.

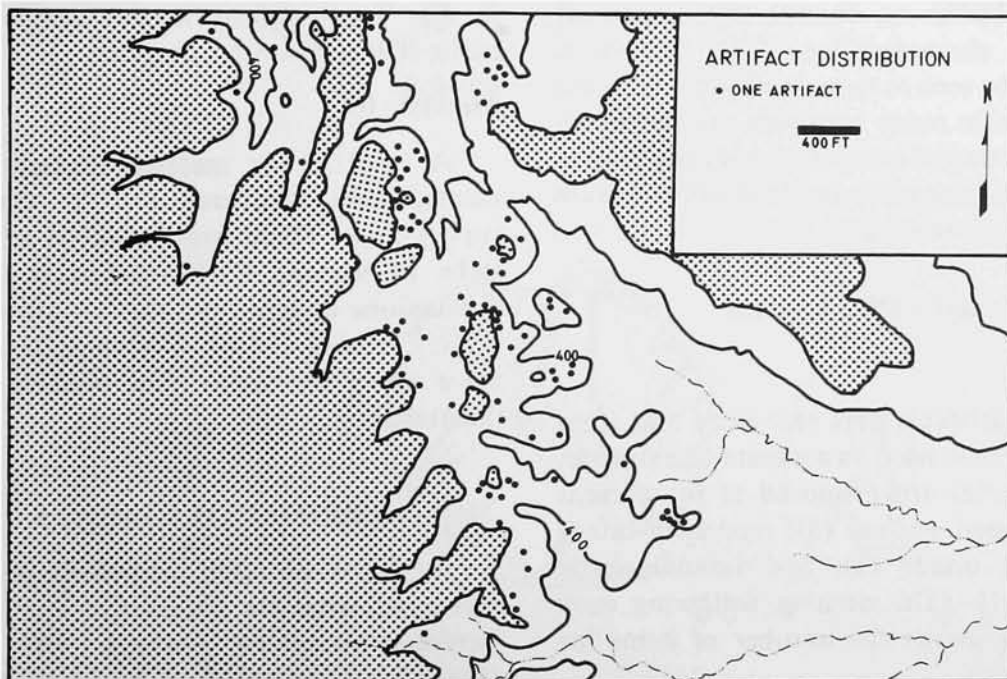


Fig. 5. Distribution of individual artifacts within Oakshores survey area, central sector.

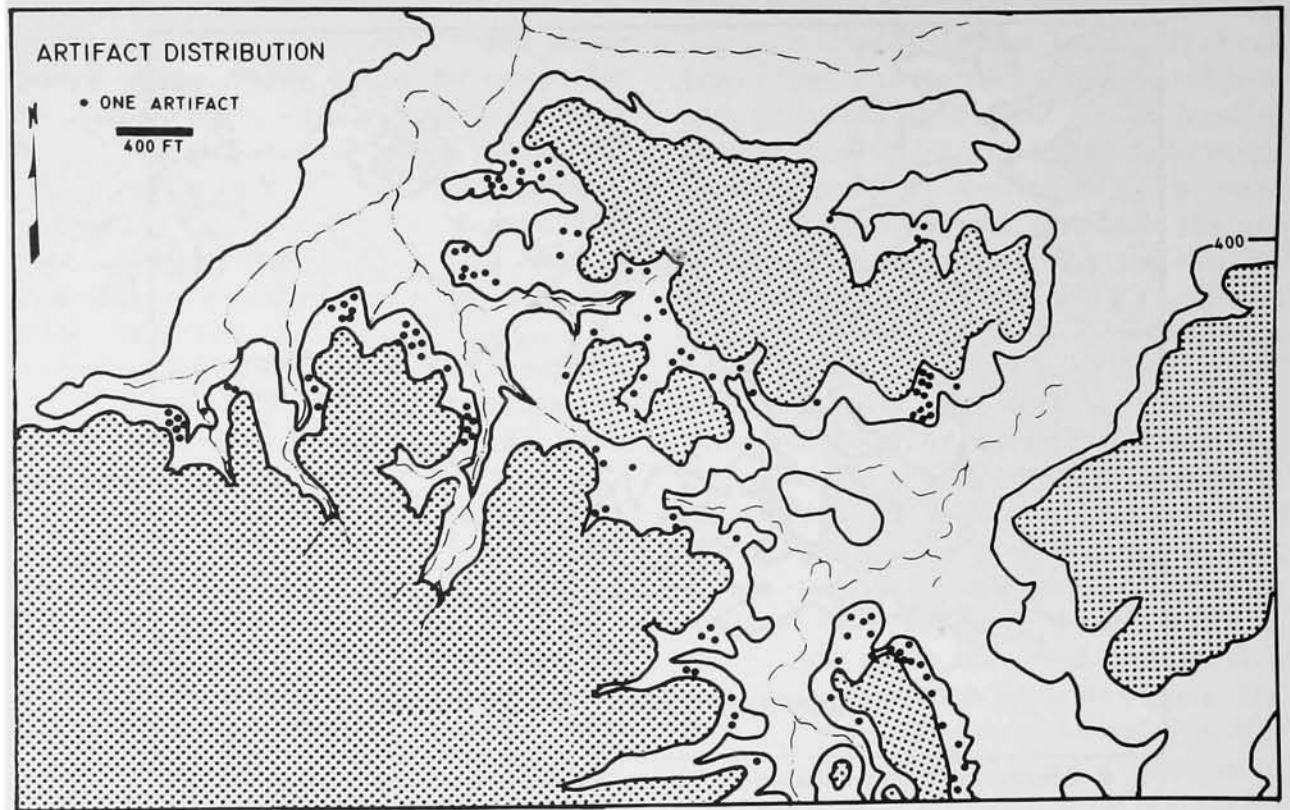


Fig. 6. Distribution of individual artifacts within Oakshores survey area, northern sector.

categories based on formal and presumed functional characteristics. The categories should not be seen as types, and the functional designations in many instances are simply an economical way of categorizing several classes of tools that otherwise would require elaborate descriptive statements.

MILLING TOOLS

Manos (9)

Several artifacts were recovered that seem to be handstones used on a metate-like surface. Four categories are proposed at the present time: unshaped uniface (5), unshaped biface (1), shaped biface (2), and nondiagnostic fragments (1). (The number following each category represents the number of items for that category.)

Three of the manos had small depressions pecked into one or more surfaces (Fig. 9A,

B, D). Two artifacts in this category have pestle-like surfaces on one end.

Metates (6)

A total of six metates (including fragments) were recovered for the Oakshores survey area. These are unshaped sandstone slabs of varying sizes marked by shallow depressions or wear surfaces on one or more sides. Three of the six specimens were left in place along the beach. The metates are not illustrated.

PROJECTILE POINTS

A single obsidian projectile point was recovered from the Oakshores sector of the Berryessa beachline surveys. This artifact (Fig. 7A) is identified as an Excelsior point based on its size and configuration (Fredrickson 1973:199-200).

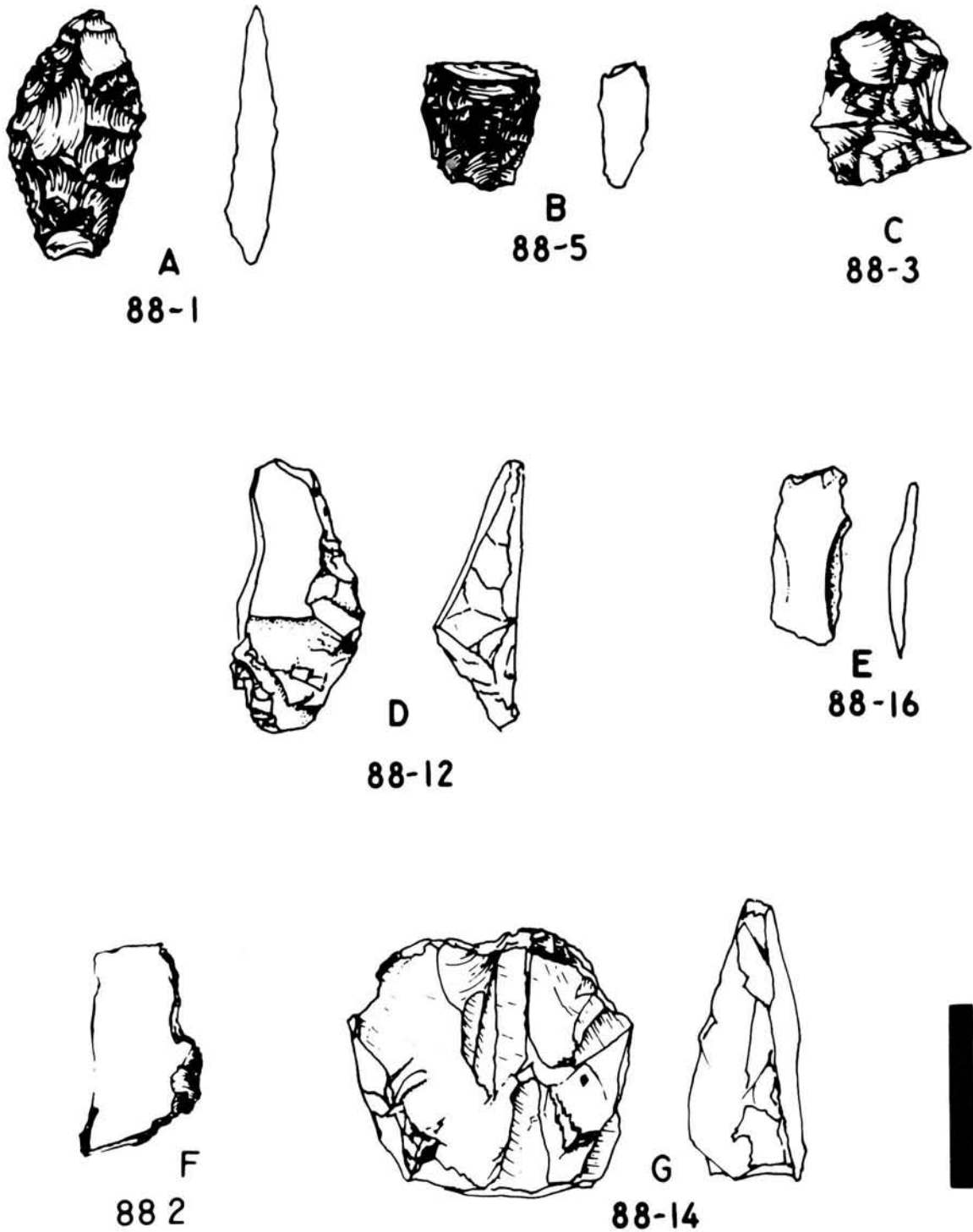


Fig. 7. Artifacts recovered from Oakshores survey. Excelsior projectile point (A); worked flakes (B, C); heavy flake scraper (D, G); retouched flakes (E, F). Scale 3 cm.

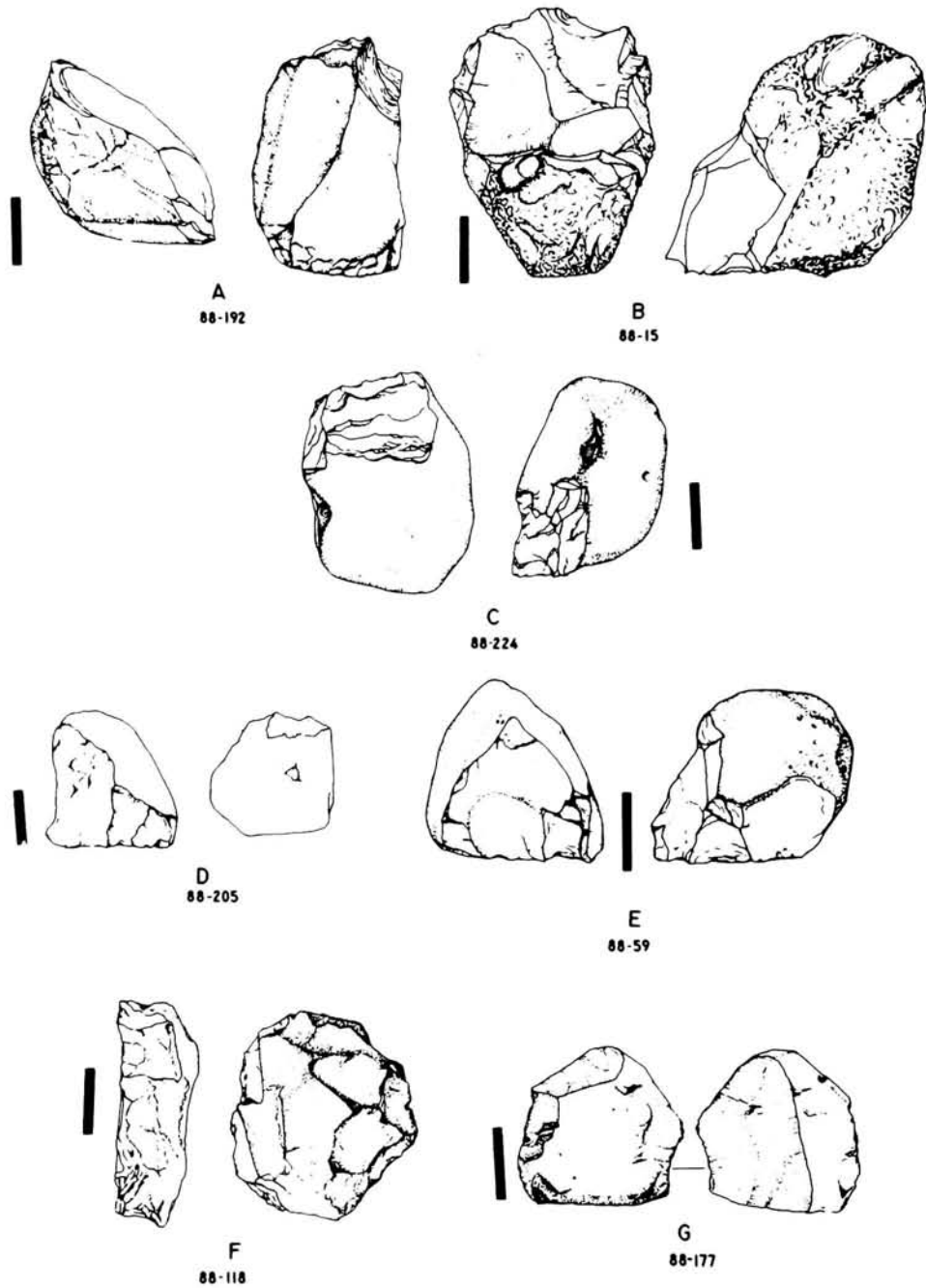


Fig. 8. Artifacts recovered from Oakshores survey. Irregular cobble scrapers: beveled horse hoof (A-C), horse hoof (D); core (E); domed scraper: unifacial, cortex based (F); split pebble/cobble casual knife (G). All scales are 3 cm.

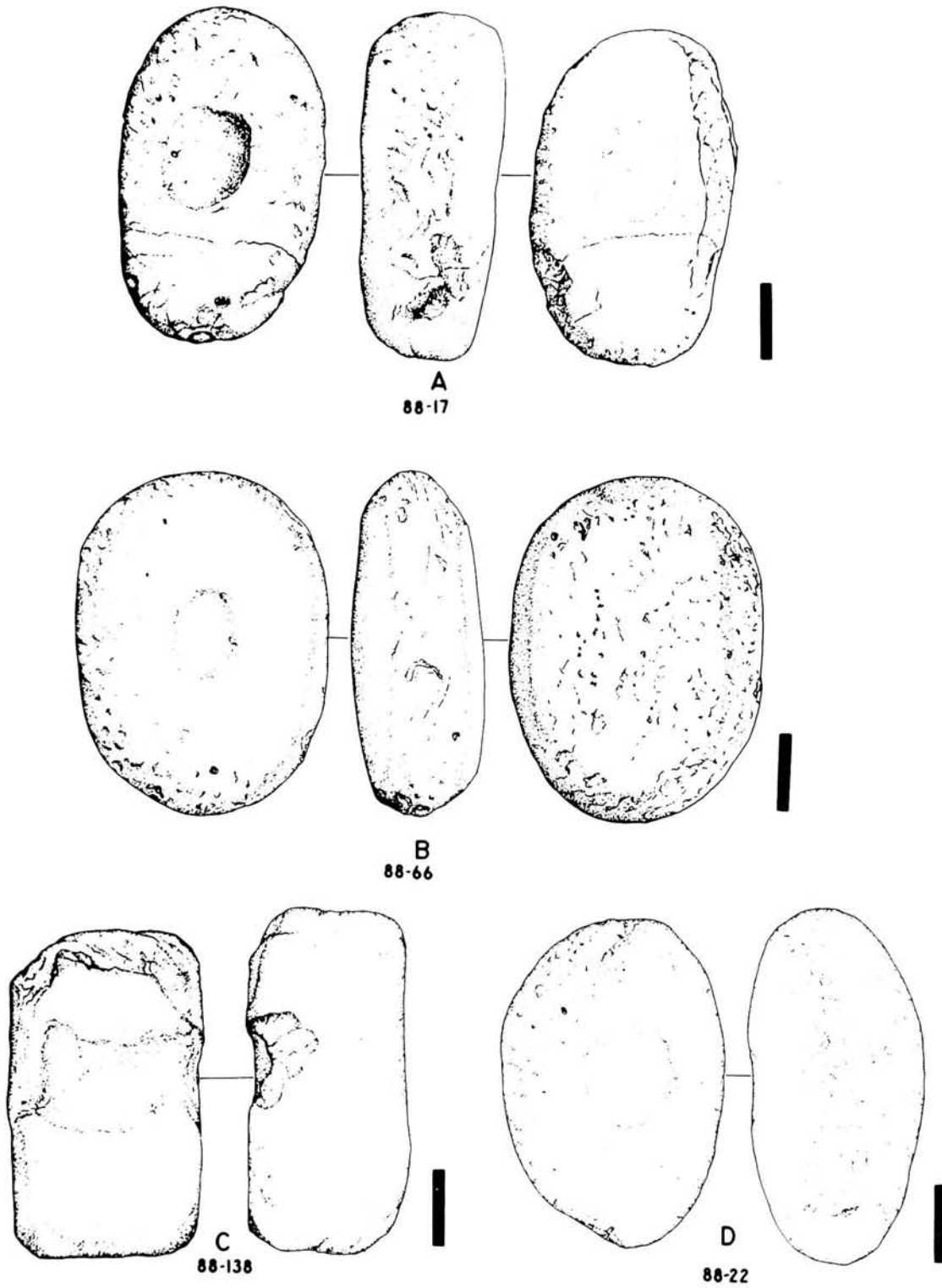


Fig. 9. Artifacts recovered from Oakshores survey. Pitted manos (A, B); pitted rock (C). Scales 3 cm.

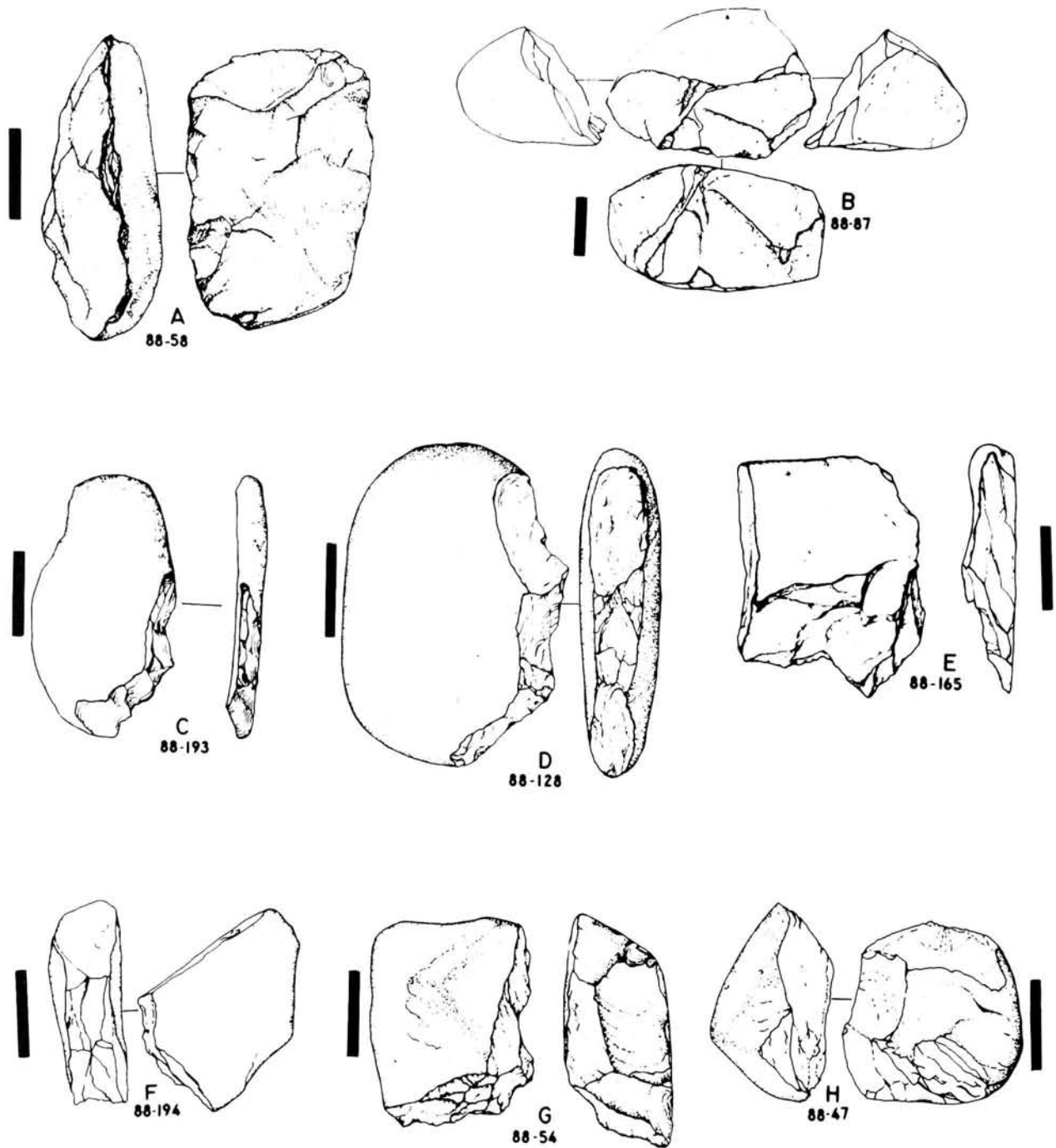


Fig. 10. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular unifacial, cortex based: elongate, side flaking, angular (A, B); tabular (C-F); side and end flaking (G, H). Scales 3 cm.

SCRAPING TOOLS

The largest category of artifacts recovered from Oakshores consists of objects tentatively described as scrapers. The function, of course, is not based entirely on empirical evidence, and some of the artifacts included below may well have served some other purpose. Multipurpose functions are assumed in many instances. A total of 166 artifacts are placed into this general grouping which is subdivided as follows:

Cobble Scrapers (158)

Irregular unifacial, cortex based (137)

1. Tabular (13) (Fig. 10C)
2. Small tabular (3) (Fig. 10D, F)
3. Elongate, end flaking (26) (Fig. 11A-E)
4. Heavy elongate, end flaking (15) (Fig. 12A-E)
5. Elongate keeled, end flaking (2) (Fig. 13D)
6. Horse hoof (4) (Fig. 8D)
7. Beveled horse hoof (9) (Fig. 8A-C)
8. Elongate, side flaking (24) (Fig. 14A-F)
9. Elongate, side flaking, angular (8) (Fig. 10A, B)
10. Side and end flaking (8) (Fig. 10G, H)
11. Multiple surfaces (11) (Fig. 15D)
12. Heavy plane (6) (Fig. 13A-C)
13. Broken cobble (6) (Figs. 13F, 15A)
14. Broken cobble, keeled planar (2) (Fig. 16E, F)

Irregular unifacial, flake scar based (12)

1. Broken cobble (5) (Fig. 16D)
2. Heavy broken cobble (1) (Fig. 13E)
3. Cortex backed (4) (Fig. 16A-C)
4. Heavy core, multiple (2) (Fig. 15B, C)

Irregular bifacial (9)

1. Elongate, end flaking (5) (Fig. 17D, E)
2. Elongate, side flaking (1) (Fig. 17F)
3. Elongate, end and side flaking (1) (Fig. 17C)
4. Heavy cobble, beaked (2) (Fig. 17A, B)

Domed Scraper (1)

Unifacial, cortex based (1) (Fig. 8F)

Core Scraper (1)

Multiple surfaces (1) (not illustrated)

Flake Scrapers (6)

Heavy flake scraper (3) (Fig. 7D, G)

Retouched flakes (3) (Fig. 7E, F)

KNIVES OR CUTTING TOOLS

Artifacts with relatively sharp edges suitable for cutting seem to be uncommon in the Oakshores inventory and conventionalized knife forms are conspicuous by their absence. Twenty-one knife-like artifacts were recorded although it is recognized that many implements categorized here as scrapers may well have served as cutting tools under some circumstances. Cutting tools here include five large basalt flakes that could have been casually used as knives and three small obsidian flakes that *might* have been used for cutting, although there is no actual evidence to support this possibility. Based primarily on edge angles, two other categories of artifacts are identified as possible cutting tools:

Split pebble knife/scraper (3) (Fig. 15F, G)

Split pebble/cobble casual knife (10) (Figs. 8G, 15E)

These two categories are simply thin cobbles or pebbles from which flakes have been removed forming a reasonably sharp edge along one or more sides.

OTHER ARTIFACTS

In addition to the artifacts described or listed above, several other items were collected. These include the following:

Smoothing Stone (1) (not illustrated)

One artifact was found that appeared to be a small mano. Because of its size it is considered to be some kind of smoothing stone.

Anvil Stone

This is a worked stone with a pecked and battered surface suggesting use as an anvil (not illustrated).

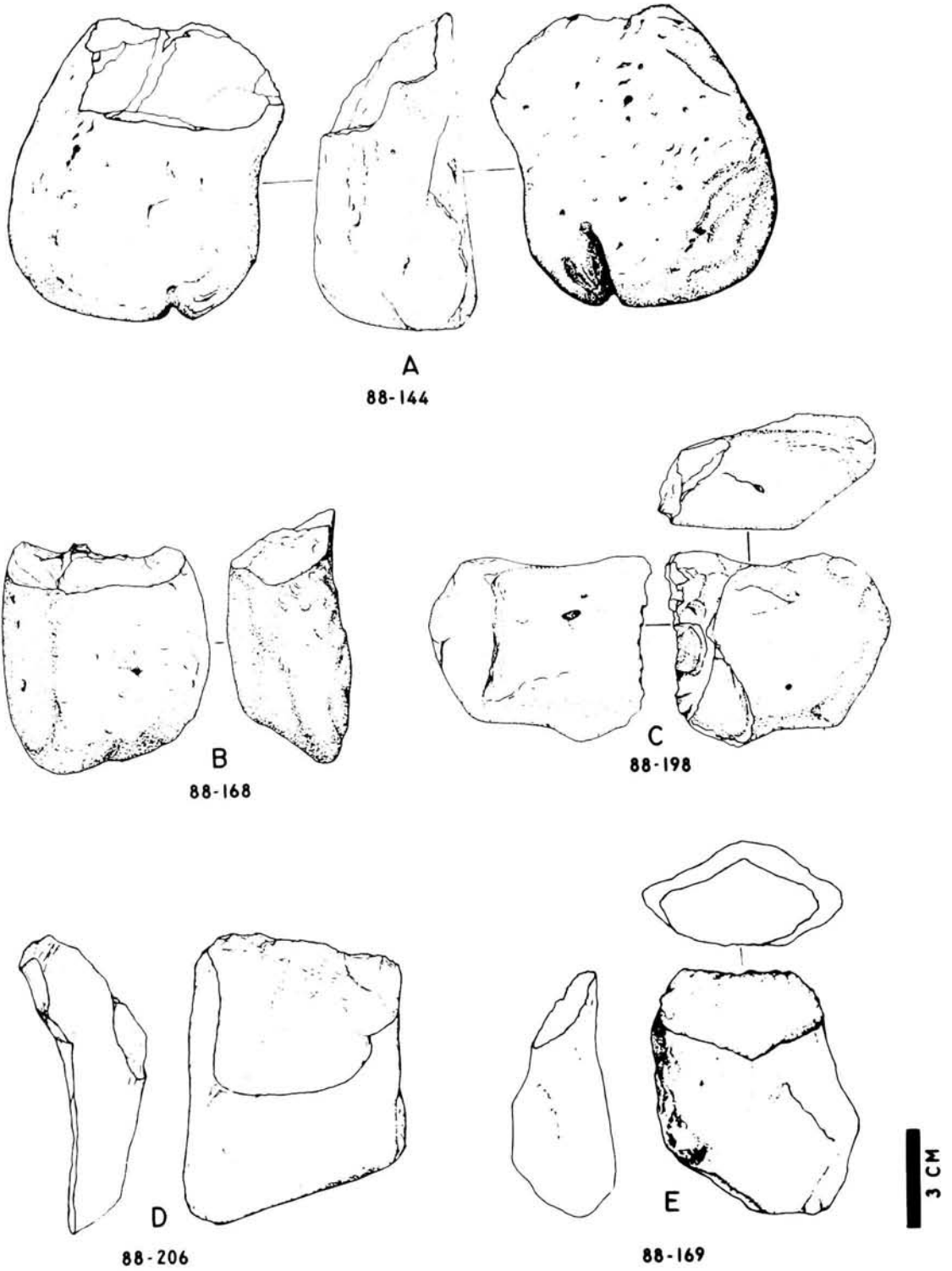


Fig. 11. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular, unifacial, cortex based: elongate, end flaking (A-E). Scales 3 cm.

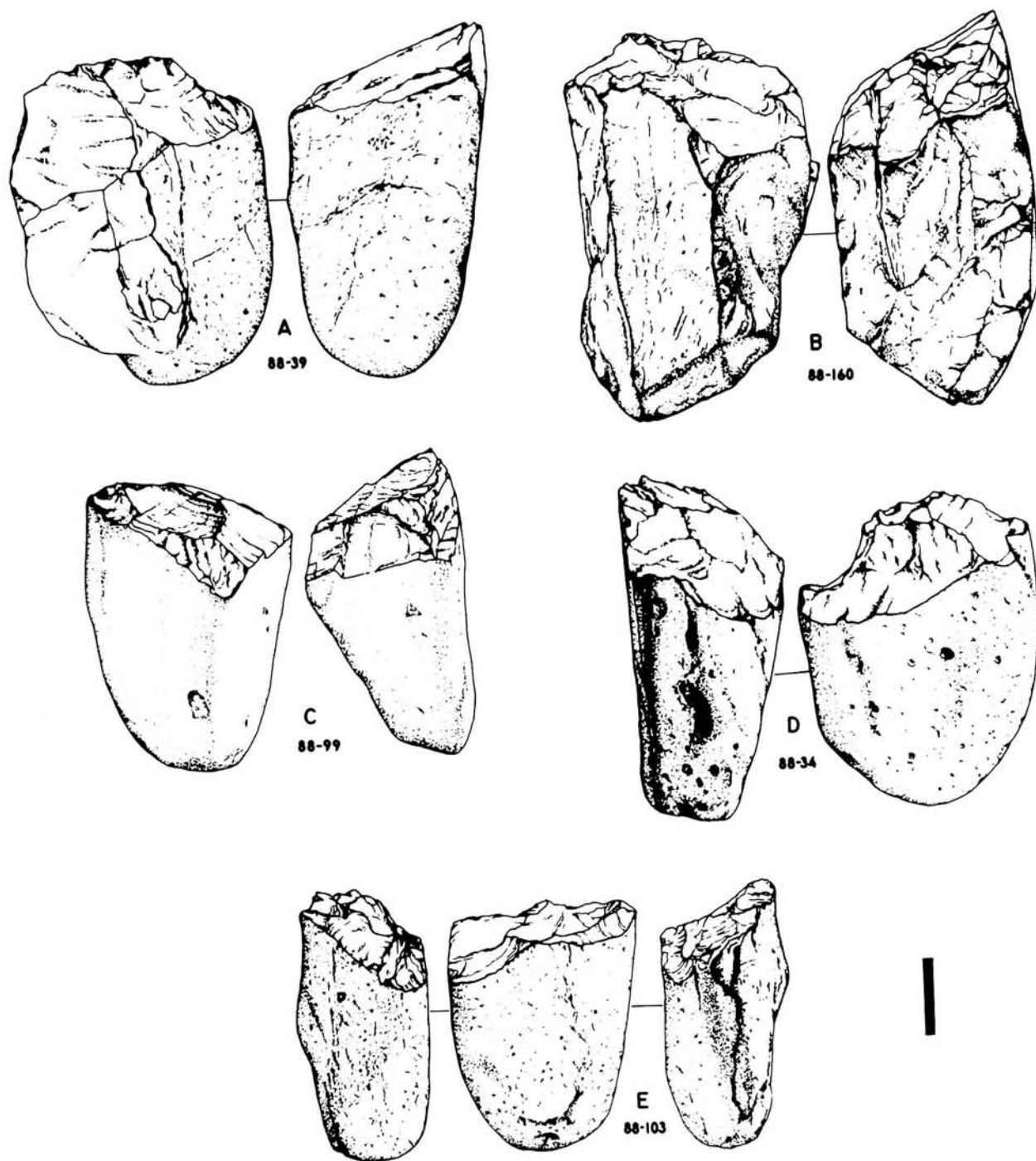


Fig. 12. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular, unifacial, cortex based: heavy elongate, end flaking (A-E). Scales 3 cm.

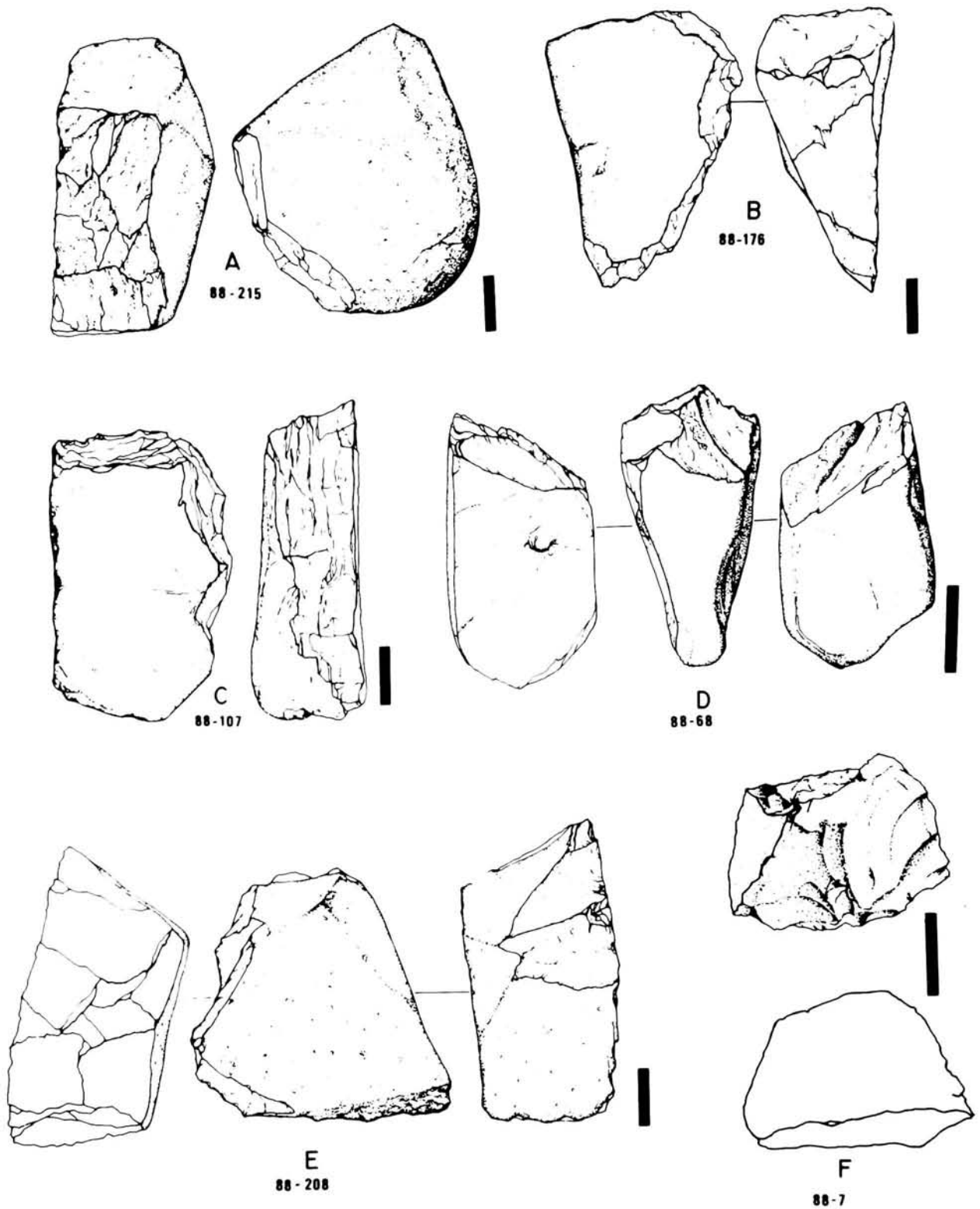


Fig. 13. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular, uniface, cortex based: heavy plane (A-C); elongate keeled (D); broken cobble (E, F). Scales 3 cm.

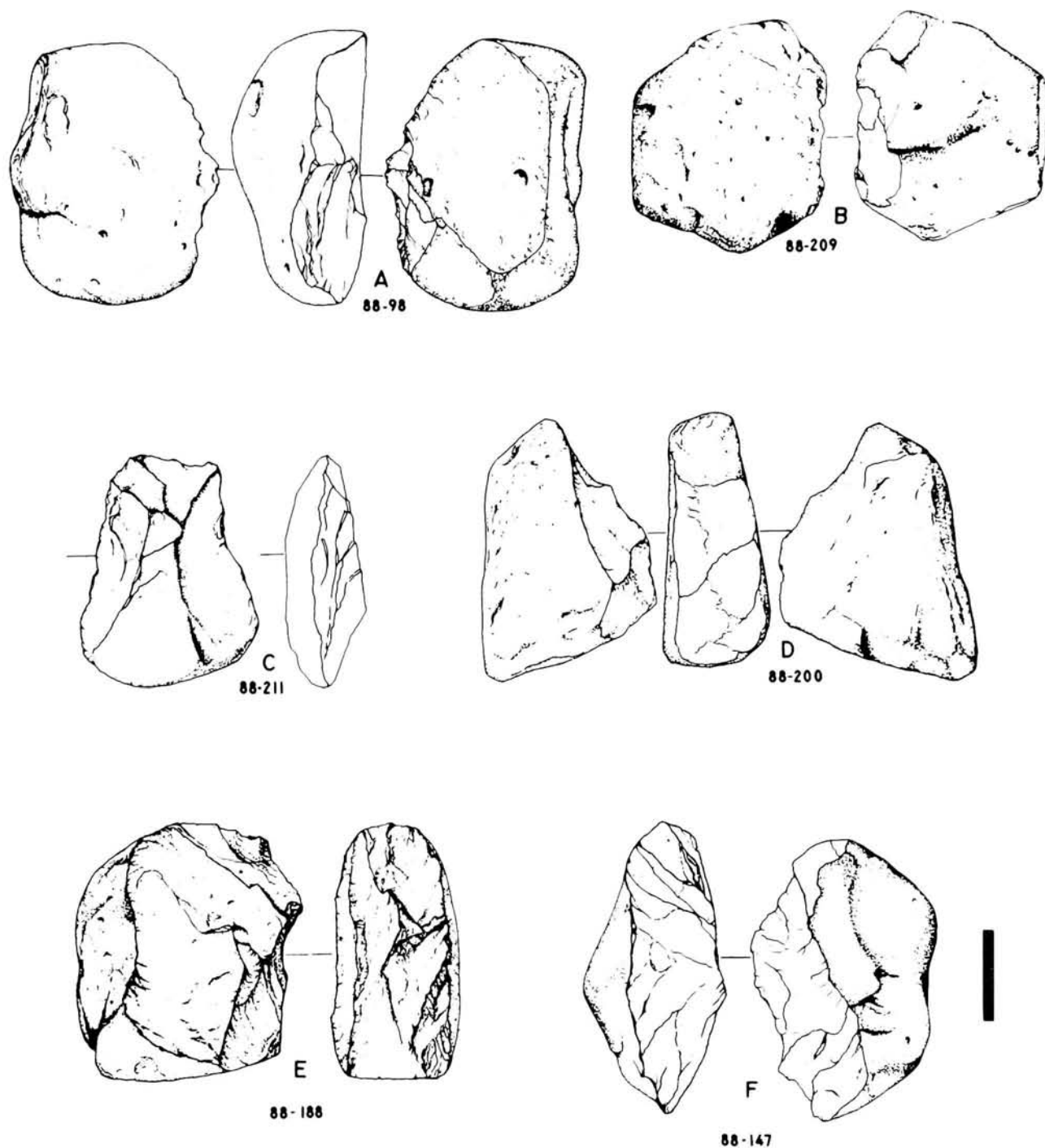


Fig. 14. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular, unifacial, cortex based; elongate, side flaking (A-F). Scale 3 cm.

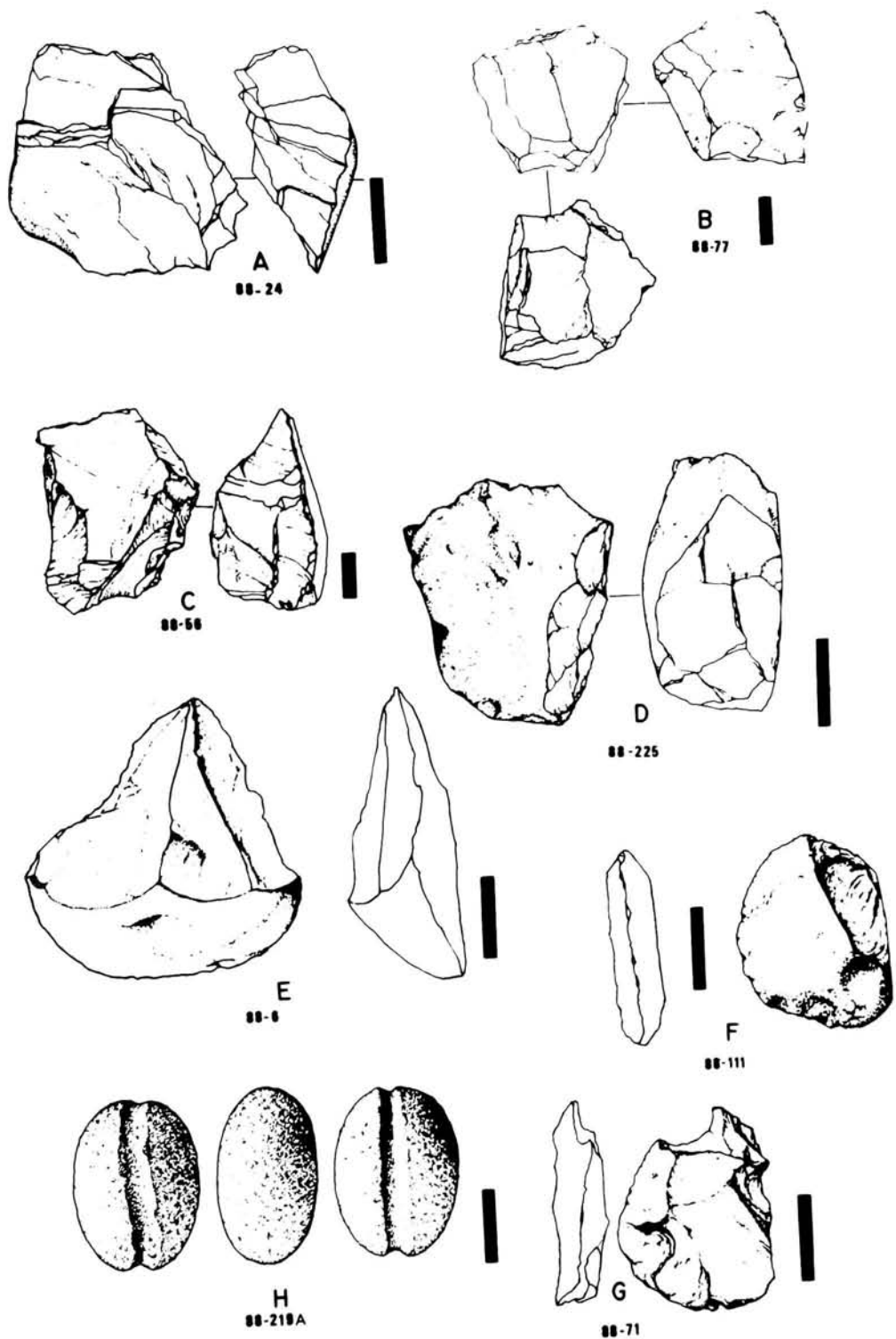


Fig. 15. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular, unifacial, cortex based: multiple surfaces (D); broken cobble (A). Irregular, unifacial, flake scar based: heavy core, multiple (B, C). Split pebble knife/scrapper (F, G). Split pebble/cobble casual knife (E). Grooved stone (H). Scales 3 cm.

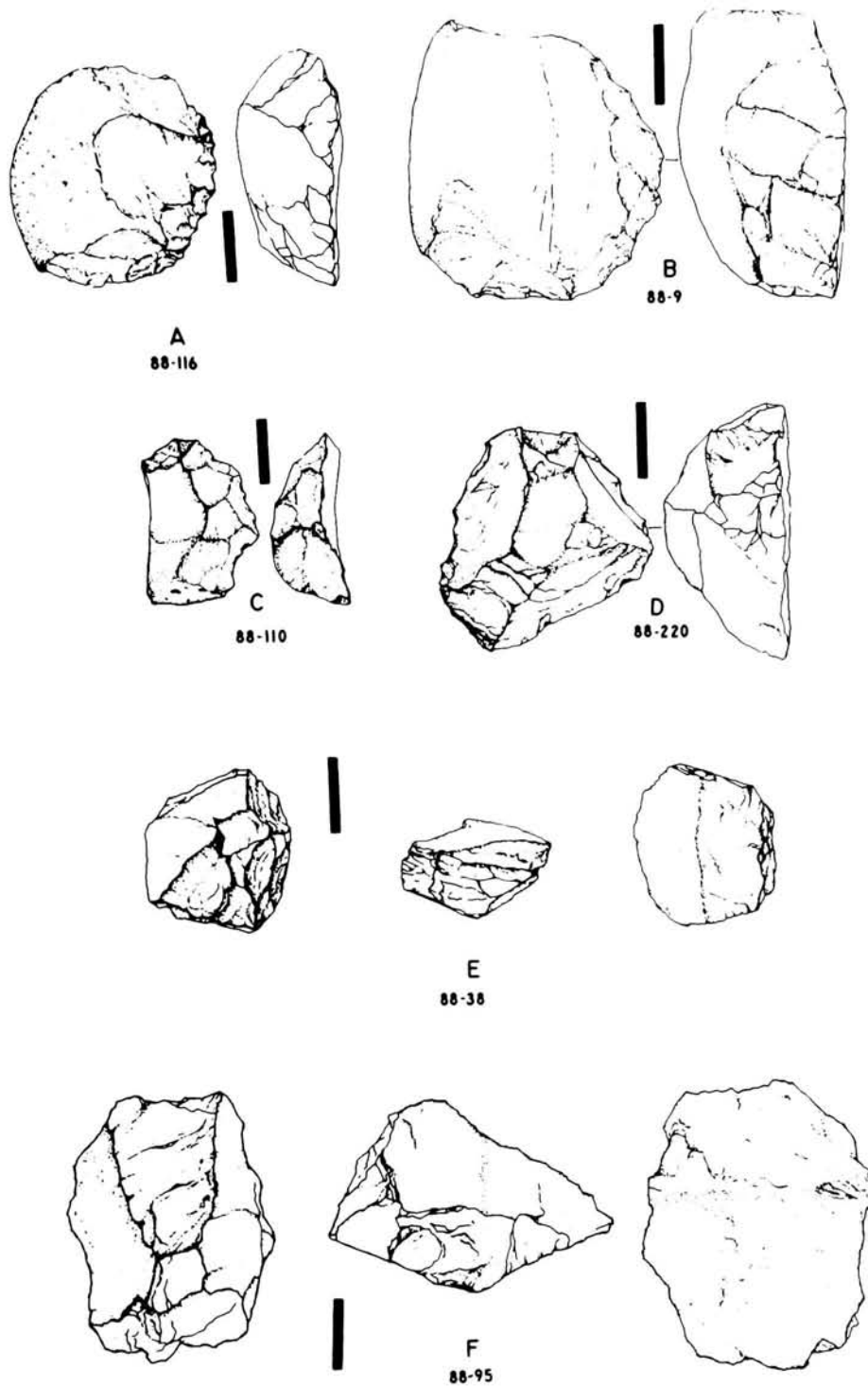


Fig. 16. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular unifacial, flake scar based: cortex backed (A-C); broken cobble (D). Irregular, unifacial, cortex based: broken cobble, keeled planar (E, F). Scales 3 cm.

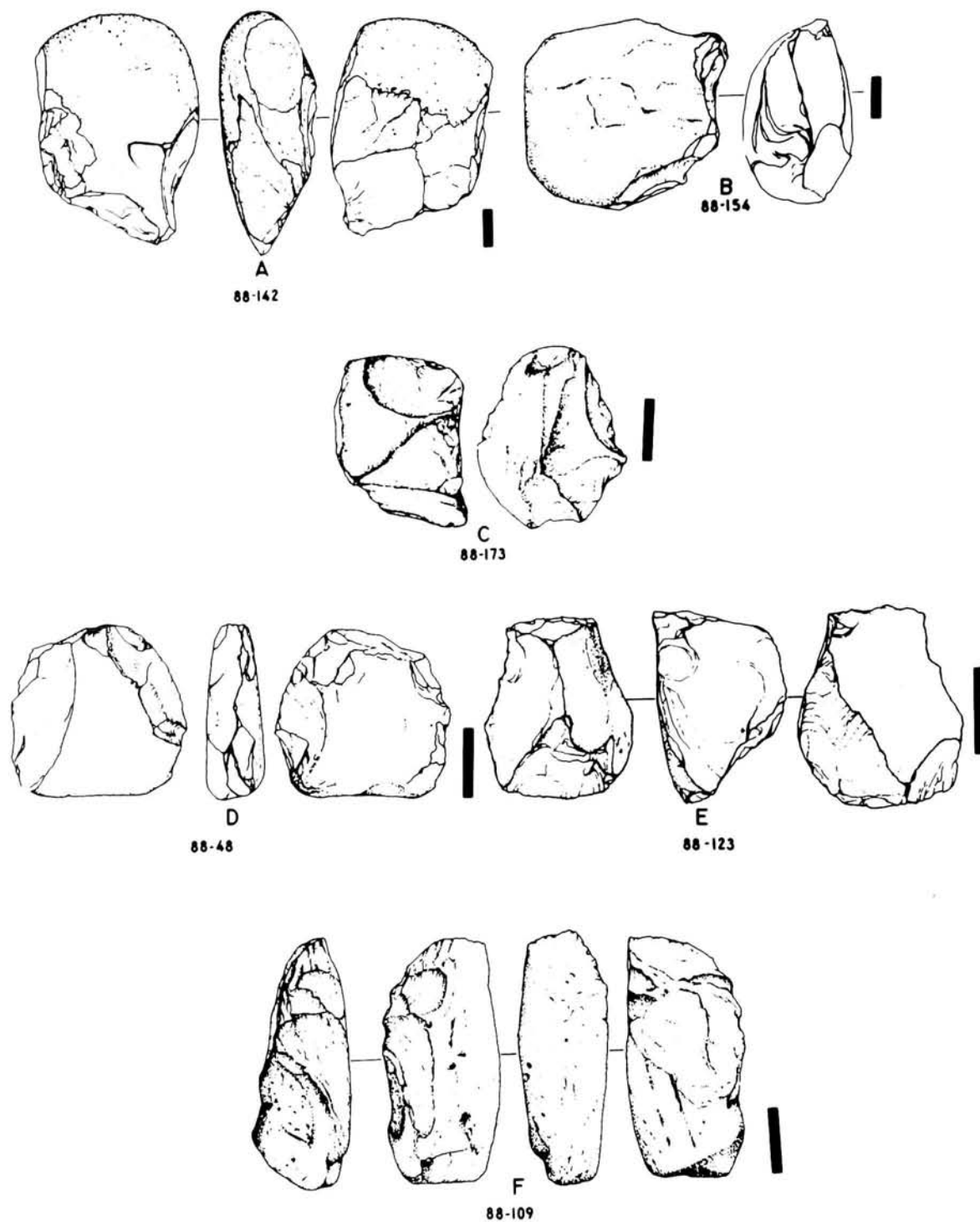


Fig. 17. Artifacts recovered from Oakshores survey. Cobble scrapers—irregular, bifacial: heavy cobble, beaked (A, B); elongate, end and side flaking (C); elongate, end flaking (D, E); elongate, side flaking (F). Scales 3 cm.

Pitted Rock

This is a tabular sandstone fragment with a pit pecked into one surface. The pit is similar (identical?) to those noted on several mano forms. In this case, however, the base rock has not been shaped or used (Fig. 9C).

Grooved Stone (1)

This is a relatively rare artifact here, although others have been recovered from other Berryessa survey sectors. The artifact here is a small oval-shaped stone with a groove incised around the long circumference (Fig. 15H).

Worked Flakes

Probable fragments of completed artifacts or unfinished tools (points or knives?) (Fig. 7B, C).

In addition to the artifacts described or listed above a total of 21 broken cobbles and 16 pieces of broken field stone were collected which are believed to have been culturally modified. These are probably artifacts and very likely served some kind of scraping or chopping function.

Table 1**ARTIFACT PERCENTAGES FOR OAKSHORES COLLECTION**

Overall Categories	Artifacts	Percentage Total	Percentage of Diagnostic
Milling	15	6.14%	7.24%
Projectiles	1	.40%	.48%
Scraping	166	68.03%	80.19%
Cutting	21	8.60%	10.14%
Other	4	1.63%	1.93%
Miscellaneous fragments	37	15.16%	—
	<hr/> 244	<hr/> 99.96%	<hr/> 99.98%
Scraper percentages			
Cobble scrapers	158	95.18%	
Domed scrapers	1	.60%	
Core scrapers	1	.60%	
Flake scrapers	6	3.61%	
	<hr/> 166	<hr/> 99.99%	
Cobble scraper percentages			
Unifacial	149	94.30%	
Bifacial	9	5.69%	
	<hr/> 158	<hr/> 99.99%	
Unifacial cortex based	137	91.94%	
Unifacial flake scar based	12	8.05%	
	<hr/> 149	<hr/> 99.99%	
Unifacial, cortex based			
Percentage of total cobble scrapers		86.70%	
Percentage of all scrapers		82.53%	
Percentage of all diagnostic artifacts		66.18%	
Percentage of all artifacts collected		56.14%	

Table 2
DIMENSIONAL INFORMATION FOR ILLUSTRATED ARTIFACTS
(FIGS. 7 to 17)

	Length (mm.)	Width (mm.)	Thickness (mm.)	Weight (g.)	Edge Angle (degrees)
Figure 9					
88-17	127	77	53	535	—
88-66	134	100	51	874	—
88-138	123	75	59	948	—
88-22	126	86	63	777	—
Figure 7					
88-1	43	23	8	7	—
88-5	21*	20	9	—	—
88-3	28	25	4	—	—
88-12	47	24	15	15	—
88-16	31	13	2	—	—
88-2	37	20	4	—	—
88-14	49	45	18	51	—
Figure 10					
88-58	52	98	48	235	55
88-87	79	109	65	584	69
88-193	100	53	13	104	55
88-128	105	74	25	299	63
88-165	91	71	20	190	53
88-194	75	50	27	142	78
88-54	76	62	36	221	76
88-47	40	60	49	152	70
Figure 11					
88-144	94	78	42	376	56
88-168	76	67	35	229	80
88-198	65	60	28	147	81
88-206	94	75	41	240	83
88-169	80	60	35	173	52
Figure 12					
88-39	150	87	75	1394	78
88-160	117	87	60	651	74
88-99	132	100	56	963	79
88-34	107	76	48	541	78
88-103					
Figure 13					
88-215	124	146	68	1760	88
88-176	169	115	65	1423	82
88-107	156	94	58	1435	85
88-68	92	48	48	250	75
88-208	123	143	68	1842	84
88-7	55	78	53	288	82
Figure 8					
88-192	83	63	81	501	87
88-15	125	81	91	769	59
88-224	80	73	85	555	79;
88-205	74	80	73	425	88
88-59	78	85	69	480	79
88-118	98	91	36	425	84
88-177	69	67	16	93	53

Table 2 (cont'd.)

	Length (mm.)	Width (mm.)	Thickness (mm.)	Weight (g.)	Edge Angle (degrees)
Figure 14					
88-98	70	89	45	316	70
88-209	62	76	23	147	55
88-211	87	71	34	172	60
88-200	70	73	33	175	57
88-188	78	80	38	296	68
88-147	60	95	48	250	78
Figure 16					
88-116	91	101	48	495	70
88-9	110	100	56	820	84
88-110	58*	83	35	162*	64
88-220	97	90	50	528	80
88-38	55	71	44	223	94
88-95	114	90	72	752	79
Figure 17					
88-142	181	127	73	2313	75
88-154	168	131	83	466	84
88-173	72	88	61	313	83
88-48	77	74	24	174	57
88-123	66	55	43	154	86
88-109	58	115	38	338	81
Figure 15					
88-24	96	74	35	318	78
88-77	106	98	83	920	92
88-56	96	80	58	459	82
88-225	74	80	45	290	77
88-6	101	99	35	243	50
88-111	78	60	18	99	53
88-219A	70	40	52	197	—
88-71	70	55*	15	62	32

*Broken

Table 3

ARTIFACT DIMENSIONS BY CATEGORY

Cortex based, irregular cobble scraper**Irregular cobble scraper, tabular** (Fig. 10C, D, E, F)

Specimens — 16

Length	Range 67-144 mm., average 93.4 mm.
Width	Range 50-107 mm., average 70.8 mm.
Thickness	Range 13-38 mm., average 27.4 mm.
Weight	Range 104-638 g., average 300 g.
Edge angle	Range 53-78°, average 67.7°

Irregular cobble scraper, broken (Figs. 13F, 12A)

Specimens — 6

Length	Range 55-96 mm., average 73 mm.
Width	Range 48-88 mm., average 73.8 mm.
Thickness	Range 35-53 mm., average 45.3 mm.
Weight	Range 168-444 g., average 277 g.
Edge angle	Range 67-91°, average 78°

Irregular cobble scraper, end flaked (Fig. 11A, B, C, D, E)

Specimens — 26

Length	Range 65-110 mm., average 85.4 mm.
Width	Range 48-99 mm., average 66.1 mm.
Thickness	Range 22-58 mm., average 39.6 mm.
Weight	Range 122-804 g., average 359.5 g.
Edge angle	Range 52-95°, average 63.3°

Irregular cobble scraper, broken (keeled) (Fig. 16E, F)

Specimens — 2

Length	Range 55-114 mm., average 84.5 mm.
Width	Range 71-90 mm., average 80.5 mm.
Thickness	Range 44-72 mm., average 58 mm.
Weight	Range 223-752 g., average 487 g.
Edge angle	Range 79-94°, average 86.5°

Table 3 (cont'd.)

Irregular cobble scraper, heavy end flaked (Fig. 12A, B, C, D, E)		Irregular cobble scraper, unifacial, flake scar based	
Specimens — 15		Irregular cobble scraper, broken cobble (Fig. 16D)	
Length	Range 87-150 mm., average 116.5 mm.	Specimens — 5	
Width	Range 75-106 mm., average 86.2 mm.	Length	Range 80-110 mm., average 93.4 mm.
Thickness	Range 41-84 mm., average 60.4 mm.	Width	Range 71-105 mm., average 87.6 mm.
Weight	Range 356-1394 g., average 802 g.	Thickness	Range 36-60 mm., average 47.8 mm.
Edge angle	Range 57-88°, average 74.4°	Weight	Range 371-691 g., average 536.8 g.
		Edge angle	Range 75-88°, average 79.8°
Irregular cobble scraper, elongate keeled, end flaking (Fig. 13D)		Irregular cobble scrapers, broken cobble, heavy (Fig. 13E)	
Specimens — 2		Specimens — 1	
Length	Range 92-139 mm., average 115.5 mm.	Length	123 mm.
Width	Range 48-58 mm., average 53 mm.	Width	143 mm.
Thickness	Range 48-72 mm., average 60 mm.	Thickness	68 mm.
Weight	Range 250-672 g., average 461 g.	Weight	1842 g.
Edge angle	Range 70-75°, average 72.5°	Edge angle	84°
Irregular cobble scraper, horse hoof (Fig. 8D, E)		Irregular cobble scraper, cortex backed (Fig. 16A, B, C)	
Specimens — 4		Specimens — 4	
Length	Range 74-88 mm., average 81.7 mm.	Length	Range 91-123 mm., average 108 mm.
Width	Range 60-85 mm., average 75 mm.	Width	Range 83-110 mm., average 98.5 mm.
Thickness	Range 58-73 mm., average 66.7 mm.	Thickness	Range 35-56 mm., average 47.2 mm.
Weight	Range 393-510 g., average 452 g.	Weight	Range 495-790 g., average 701.6 g.
Edge angle	Range 71-88°, average 79.5°	Edge angle	Range 64-84°, average 70.7°
Irregular cobble scraper, elongate, side flaked (Fig. 14A, B, C, D, E, F)		Irregular cobble scraper, heavy core multiple (Fig. 15B, C)	
Specimens — 24		Specimens — 2	
Length	Range 45-103 mm., average 73.6 mm.	Length	Range 96-106 mm., average 101 mm.
Width	Range 68-115 mm., average 88.3 mm.	Width	Range 80-98 mm., average 89 mm.
Thickness	Range 23-72 mm., average 44.12 mm.	Thickness	Range 58-83 mm., average 70.5 mm.
Weight	Range 106-686 g., average 344 g.	Weight	Range 459-920 g., average 689.5 g.
Edge angle	Range 52-96°, average 69.7°	Edge angle	Range 82-92°, average 87°
Irregular cobble scraper, elongate, angular side flaking (Fig. 10A, B)		Irregular cobble scraper bifacially flaked	
Specimens — 8		Irregular cobble scraper biface, end flaking (Fig. 17D, E)	
Length	Range 50-79 mm., average 60.3 mm.	Specimens — 5	
Width	Range 76-110 mm., average 94.8 mm.	Length	Range 66-98 mm., average 82.8 mm.
Thickness	Range 31-65 mm., average 47.1 mm.	Width	Range 55-90 mm., average 60 mm.
Weight	Range 120-584 g., average 273.1 g.	Thickness	Range 24-47 mm., average 38.6 mm.
Edge angle	Range 49-69°, average 59.6°	Weight	Range 154-502 g., average 285 g.
		Edge angle	Range 57-86°, average 68.6°
Irregular cobble scraper, side and end flaking (Fig. 10G, H)		Irregular cobble scraper, biface, side flaking (Fig. 17F)	
Specimens — 8		Specimens — 1	
Length	Range 40-128 mm., average 80.8 mm.	Length	58 mm.
Width	Range 50-104 mm., average 74.1 mm.	Width	115 mm.
Thickness	Range 28-60 mm., average 49.3 mm.	Thickness	38 mm.
Weight	Range 85-930 mm., average 414.2 g.	Weight	338 g.
Edge angle	Range 68-87°, average 73.5°	Edge angle	81°
Irregular cobble scraper, multiple surface (Fig. 15D)		Irregular cobble scraper, biface, end and side flaking (Fig. 17C)	
Specimens — 11		Specimens — 1	
Length	Range 74-137 mm., average 102.9 mm.	Length	72 mm.
Width	Range 81-127 mm., average 106 mm.	Width	88 mm.
Thickness	Range 49-88 mm., average 62.3	Thickness	71 mm.
Weight	Range 290-1665 g., average 845.9 g.	Weight	313 g.
Edge angle	Range 65-100°, average 76°	Edge angle	83°

Table 3 (cont'd.)

Irregular cobble scraper, heavy plane (Fig. 13A, B, C)	
Specimens — 6	
Length	Range 124-169 mm., average 146.5 mm.
Width	Range 94-146 mm., average 112.6 mm.
Thickness	Range 58-77 mm., average 68.3 mm.
Weight	Range 1233-1760 g., average 1513.6 g.
Edge angle	Range 82-92°, average 86.1°

Irregular cobble scraper, heavy, biface beaked (Fig. 17A, B)	
Specimens — 2	
Length	Range 168-181 mm., average 174.5 mm.
Width	Range 127-131 mm., average 129 mm.
Thickness	Range 73-83 mm., average 78 mm.
Weight	Range 466-2313 g., average 1389.5 g.
Edge angle	Range 75-84°, average 79.5°

Domed Scrapers**Unifacial cortex based** (Fig. 8F)

Specimens — 1	
Length	98 mm.
Width	91 mm.
Thickness	36 mm.
Weight	425 g.
Edge angle	84°

DISCUSSION OF THE BERRYESSA ARTIFACTS

Although limitations of space preclude a detailed discussion of the artifacts here, several points seem worth noting. These include the following:

1. *The overwhelming preponderance of cobble tools relative to other chipped stone forms, with an emphasis on tools with probable scraping functions.*

The categorization of most of the cobble tools as scrapers rather than as chopping or cutting implements is based primarily on edge and flaking angles as well as on evidence from other locales where similar forms have well-defined wear facets on the planar and other surfaces.

It is proposed that these were casual tools made and discarded on the spot as part of some subsistence-related activity, and that they were multipurpose implements used on occasion for cutting and chopping as well as scraping. Reuse and subsequent reworking (sharpening) of some implements through time would account for the different levels of modification noted in any form category.

The several variant form categories proposed here are probably unrelated to specific

function, and it is not likely that a variety of specialized functions are represented by the various subdivisions proposed here. There is, for example, unlikely to be any meaningful functional or cultural difference in this assemblage between a cobble tool with a flake scar base and one with a cortex base.

Likewise, it is considered unlikely that end flaking versus side flaking versus side and end flaking represents meaningful cultural or functional differences in the present assemblage. Similarly, scrapers made on tabular pebbles or small cobbles are probably not functionally different from those made on more rounded forms.

Size, on the other hand, may be meaningful and heavy planes were no doubt used differently than the smaller cobble tools. It is proposed that scraping functions here included both planing (push plane movements) and reversed direction scraping with drawknife-like movements toward the operator. These are probably evident both in artifact sizes and edge angle differences.

The question of probable function as indicated by edge angles and other physical criteria will be considered in somewhat greater detail in another context when the Oakshores artifacts are examined in conjunction with a larger

artifact series recovered from another sector of the Berryessa shoreline.

2. *The presence of milling implements (manos and metates) and the apparent absence of mortars and pestles.*

3. *The scarcity of projectile points, chipping waste, and other small chipped stone implements (in spite of the fact that such artifacts are present in substantial numbers on other sites in the general area).*

4. *The seemingly significant differences between the Oakshores inventory and that reported for the nearby streamside sites excavated or investigated by Arnold and Reeves in 1959.*

A more detailed comparison of the artifacts recorded by Arnold and Reeves (1959) for several of the streamside sites and those found at Oakshores emphasizes the differences between the two assemblages. Very few items are shared.

Projectile points similar to the single Excelsior point recovered from Oakshores are reported from two of the excavated streamside sites (Nap-89 and Nap-98). These are shown in Plates 15a and 16b of Arnold and Reeves (1959). It is not a common form here, however, and makes up a relatively small percentage of the total projectile point inventory.

Obsidian flakes were present in substantial numbers on all of the excavated streamside sites. Only a tiny handful was recovered from the entire Oakshores area.

Arnold and Reeves report 48 mortars (including fragments) and some 100 pestles from the streamside site locations (Nap-89, 98, 60, and 94). In contrast, no mortars or pestles at all were recovered as a result of the Oakshores survey.

Arnold and Reeves do report pitted pebbles and possible handstones that appear to be similar to those found at Oakshores. If pitted stones and manos are included in the same category (following Arnold and Reeves),

18 specimens were recovered from the four excavated sites. These are illustrated in their Fig. 1C, category g. The majority are from Nap-98, and nine of these are surface finds from the general area near the site. According to Arnold and Reeves (page 30), these probably *do not* belong with the Nap-98 assemblage.

No metates were reported by Arnold. In contrast, six metates were recorded at Oakshores.

Other artifacts from the streamside sites excavated by Arnold and Reeves include several additional projectile point forms, knives, many worked flakes, abraded stones, ocher-stained rock, sandstone tablets, hammerstones, and a variety of ornaments including shell beads. Several kinds of worked bone are described, including awls and antler tools. Other than one projectile point form and several casual knives, none of these artifacts were found at Oakshores and, in contrast, the heavy cobble tools so common at Oakshores are rare or absent from all of the reported streamside sites.

A cursory examination of the literature available for North Coast Range locales east of the general Napa Valley region reveals a dichotomy not unlike that suggested for the Berryessa streamside sites and the artifact assemblages found on the Oakshores beachline. Several sites and aggregates of sites are essentially similar to those described by Arnold and Reeves (cf. Johnson 1967). Others are somewhat different than the Berryessa streamside locations, but are obviously late in time and generally do not include elements similar to those found at Oakshores. On the other hand, a few locations are now known that duplicate most of the elements found at Oakshores and appear not to have artifacts and features similar to those at the Berryessa streamside sites.

The Capay Valley region, which lies just east of the Berryessa Valley and is environmentally similar, has been subjected to surveys

and investigations over several years, and a number of sites have been recorded for the area. None of the Capay Valley data have been published, but some site data are available in summary form (Johnson 1967). The Capay sites, as presently known, appear to be essentially the same as those described by Arnold and Reeves for the Berryessa streamside locations. Of the seven sites described by Johnson in 1967, for example, six have mortars and pestles (the seventh site apparently had only two artifacts present and is not meaningful in this context).

Two Capay sites (Yolo-D4 and Yolo-28) had *possible* manos, but no metates were reported. Pitted cobbles were recorded for two sites. These artifacts are described by Johnson as "bead vices" although the basis for this designation is unclear. Shell beads were noted in substantial numbers on four of the seven sites, with the presence or absence of beads seemingly being related to the presence or absence of burials in the excavated deposits. Projectile points were recovered from most of the sites and usually were of forms considered to be late in time. Johnson made some tentative comparisons between the Capay and Berryessa sites excavated by Arnold and Reeves and proposed that the occupancies in both regions were late in time.

Surveys in the Paskenta-Newville reservoir area in Glenn and Tehama counties by Chartkoff and Childress (1966) resulted in the location of 67 prehistoric and historic sites generally in environmental contexts not unlike the Berryessa Valley. Most of the prehistoric sites there are situated along the margins of Thomes Creek, and a substantial percentage of them appear to be recent camps or villages with obvious midden deposits and house pits. Artifacts were rare, however, and only 130 were recorded for the entire survey area. No metates or manos were reported, and cobble tools, if present, were not described. A category designated "chopper" may refer to tools similar to those found at Oakshores,

although only one artifact of this type was recorded, at site Tehama-S-282.

Surveys made along the route of the Tehama-Colusa Canal by Treganza, Edwards, and King (1965) resulted in the location of 19 sites, most of which are situated along the easternmost margins of the North Coast Range. As in the case with the Paskenta-Newville surveys, surface artifacts were scarce, and only five were reported for the entire survey. These included a single mano and an anvil stone from site Gle-1 (San Francisco State University number). Bedrock mortars were also present at this site along with some evidence for fire-cracked rock.

In addition to the surface collections for the Tehama-Colusa Canal project, four sites were partially excavated but with minimal results insofar as artifact recovery is concerned. Except for two manos at Tehama-23 and three basalt cores from Tehama-233, none of the excavated sample bears any resemblance to the Oakshores assemblage.

As part of the same general project, five reservoir sites were surveyed by Chartkoff from 1967 through 1969 (Chartkoff 1969). These reservoir locations are scattered along the eastern margins of the North Coast Range and are part of the West Sacramento Canal unit of the Central Valley Project. A total of 21 prehistoric sites were recorded for the five reservoir locations, and artifact descriptions provided by Chartkoff suggest that two sites out of the 21 (Funks Reservoir area) had artifacts similar to those found at Oakshores. These include cobble tools and manos. It was noted at the time that the two sites were atypical (on the basis of the manos) and might well represent an older occupation (Chartkoff 1969:14).

A change in routing led to a resurvey of part of the Tehama-Colusa Canal unit with the subsequent discovery of several additional prehistoric sites along the north bank of Thomes Creek. Test excavations were made at three of these locations (Tehama-256, 261,

262) by Rob Edwards in 1969. The results of these excavations are reported in an M.A. thesis (Edwards 1969).

In contrast to most of the sites so far described in this brief summary (excluding the two Funks Creek sites), the Thomes Creek sites investigated by Edwards were characterized by a surface scatter of heavy core and cobble tools, basalt chipping waste, manos, and metates. Mortars and pestles were present, but rare. It was agreed at the time of their discovery that these were in fact clearly Milling Stone oriented assemblages. Space limitations preclude a more detailed discussion of these artifacts here, but it is obvious that they are similar to the artifacts recovered as a result of the Oakshores surveys at Berryessa.

A later reexamination of the Funks Creek reservoir area led to the discovery of two additional sites and resulted in a greatly expanded inventory for the originally recorded sites (Colusa-28, 37) (West, Levulett, and True 1975). The Funks Creek artifacts are essentially the same as those found at Oakshores.

Surveys conducted prior to the construction of the Indian Valley reservoir, which is situated 25 miles north of the Berryessa Valley, resulted in the location of 74 prehistoric sites (Orlins 1971). An examination of the site sheets included with the Indian Valley report suggests that *most* sites there do not fit the Oakshores pattern, although several Indian Valley sites did include occasional artifacts similar to those found at Oakshores, and it appears likely that there is a milling stone-cobble tool based component present in the Indian Valley area.

Finally, a recent reexamination of the Oat Reservoir location (originally surveyed in 1969 by Chartkoff) resulted in the location of several heretofore unreported prehistoric sites scattered along the margins of Oat Creek (West and True 1977). All of the Oat Creek sites fit the developing milling stone-cobble tool pattern suggested by the artifacts reported

from Thomes Creek, Funks Creek, and Oakshores at Lake Berryessa.

In sum, artifacts similar to those found along the Oakshores beachline are known from several eastern North Coast Range contexts, and although the total number of such locations and artifacts (outside of the Oakshores locale) is not large, it seems clear that this aggregation of milling stone-cobble tool based artifacts is an important element in North Coast Range prehistory.

DISCUSSION AND CONCLUSIONS

The Oakshores assemblage, although relatively small and localized in its own right, is, when considered in conjunction with sites with similar artifacts at Thomes Creek, Funks Creek, and Oat Creek, believed to be a significant addition to our knowledge of North Coast Range prehistory. This significance can probably be counted in several ways.

Overall, it is probably a local manifestation of a larger widespread milling stone based pattern represented in other North Coast Range contexts by material categorized by Fredrickson and others as Borax Lake (Fredrickson 1974; Meighan 1955). In this sense, it is significant because it establishes the presence of this pattern in an area where it had been previously unreported.

The Oakshores material has further implications, however, both in terms of the actual makeup of its inventory and the circumstances of the actual artifact distributions. Cobble tools or other heavy core tools (choppers) are mentioned as elements in Borax Lake pattern inventories, but they appear to be either relatively rare, or have been generally ignored in the earlier descriptions. At Oakshores they represent the predominant element in the assemblage.

The nature of these tools and their distribution on the Oakshores beachlines provides some interesting insights into the subsistence related activities of their makers and raises

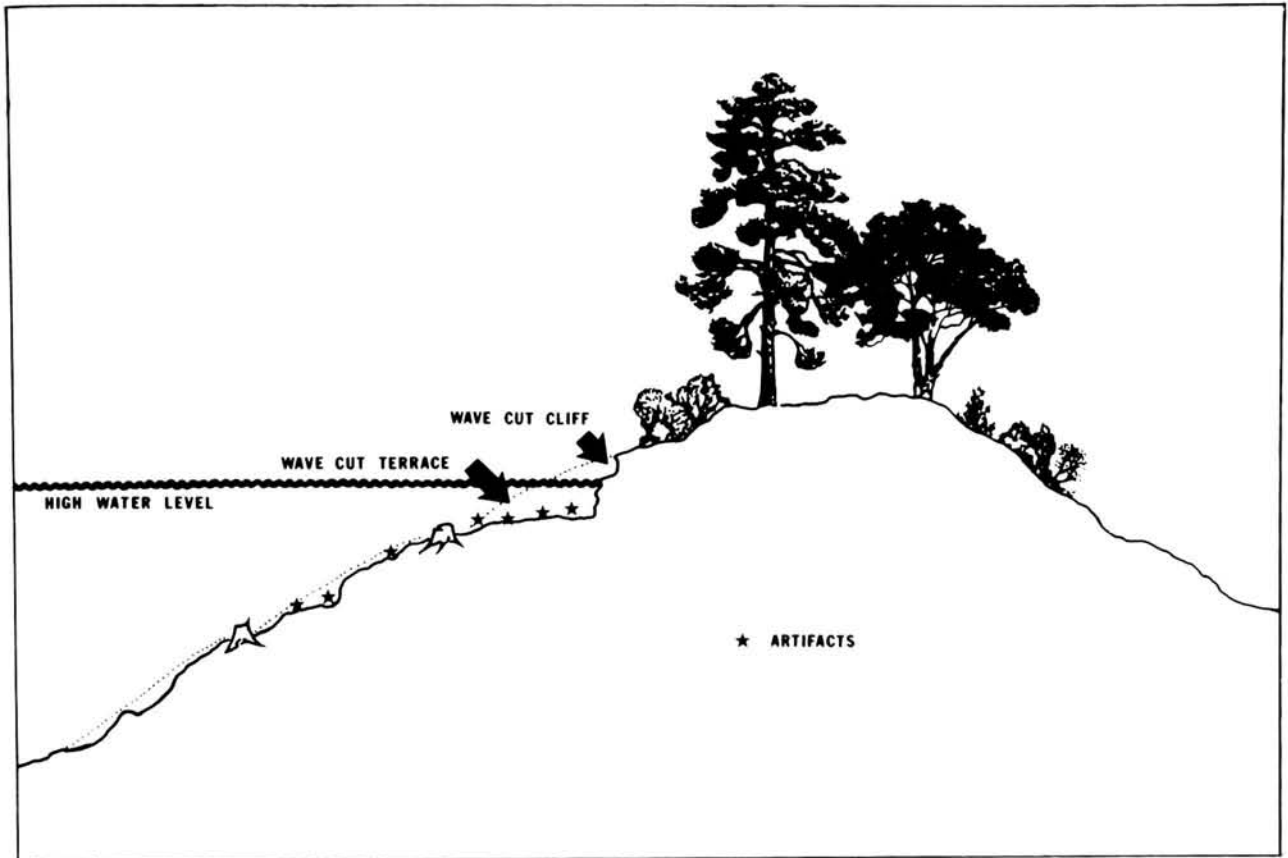


Fig. 18. Schematic diagram showing relationship of recovered artifacts to lake surface, beaches, and undisturbed terrain. Not to scale.

several provocative questions relative to the overall archaeology of the area at large.

The Oakshores artifacts are seen at the present time as isolated individual items rather than as elements making up a site in the traditional sense. They are found on eroded beachlines and clearly support the idea that cultural material is present in the area in spite of the fact that repeated efforts to locate similar artifacts above the beachline were unsuccessful. Based on their locations, it is clear that the artifacts were exposed or deposited on the beach surface as a by-product of erosion which removed varying amounts of soil or other cover from the original surface. It is proposed that the artifacts were not deeply buried (in most cases) but were covered by just enough soil and organic material so that they would not be visible to an archaeologist under

normal survey conditions. Figure 18 is a schematic showing the disposition of typical artifacts on an eroded beach where surviving stumps provide excellent indicators of the amount of erosion that has taken place. Based on the contextual circumstances as we interpret them, it appears that the individual artifacts so far recovered have not been moved very far. That is to say they were dropped on the developing surface as the soil matrix was eroded. Although they may have moved downslope slightly, they are probably within a few feet of their prelake location. Most artifacts recovered to date appear to be concentrated along ridges, on the upper slopes of small hills or knolls, and on saddles between small knolls.

Based on the indicated distributions and the casual nature of the artifacts, we propose

that these implements are the by-product of as yet undefined subsistence activities, that they represent tools fabricated more or less on the spot and that they were probably discarded after brief use. On occasion, the same tool would be reused more or less fortuitously at another time by the same or some other person, so that in time a range of utilization or edge modification would result.

We present this possibility as an idea to be tested with further investigations. The implications of these data are probably of some significance both in terms of North Coast settlement and subsistence patterns, and in terms of archaeological data recovery techniques in general.

Limitations of space preclude a detailed discussion of the subsistence and settlement implications in the present paper. These will be considered in greater detail in future publications. However, some comments on the archaeological implications are in order and these are presented briefly below:

If the situation outlined above for Oakshores is as we perceive it, significant numbers of artifacts exist that are being overlooked both in isolated contexts and probably as sites, and are therefore not presently being considered in the interpretation of the North Coast Range prehistory.

In the Oakshores situation, at least, many of these artifacts are different from those found in the traditional site contexts, suggesting either some time differential or some specialization relative to task specific activities. We are quite convinced that the Oakshores artifact distribution is not unique and wish to propose that significant amounts of data *are* being overlooked (missed) with meaningful implications for both the processual and chronological aspects of California prehistory. Additional support for this thesis is suggested both by recent work in the Sierra foothills and in earlier work in Southern California.

Archaeological surveys made in the Sugar-pine Reservoir basin (Placer County) over the past two years resulted in the discovery of two categories of sites. One category included small bedrock mortar sites believed to be part of a lifeway that included larger camps or villages in other locations. The second consisted of scatters of artifacts seemingly unrelated to the bedrock mortar sites. In this latter case, there was no obvious indication of soil alteration or midden, and the sites were seldom marked by more than one-half dozen artifacts. Most important in the context of the present discussion, *all* of the sites in this second category *were located in disturbed areas* (locations bulldozed as a result of logging activities, on logging roads, and [in one instance] on an exposed eroded slope). Not one site in this category (which included manos and cobble tools as diagnostic artifacts) was found in an area in which the surface had not been disturbed. It was our contention in this instance that many more similar sites are present in adjacent areas and that they were not being recovered simply because they are not visible to survey crews under normal circumstances (Hellen and True 1976).

Surveys in other parts of the Auburn Reservoir project *suggest* similar situations. In one locale, for example (an area of easy access), surveys during 1966-67 located two sites (both with bedrock mortars). Reexamination of the locale in 1976, after portions of the area had been bulldozed, resulted in the discovery of another site and artifacts (manos and chipping waste) not previously noted.

Likewise, several years ago a number of surveys over portions of upland San Diego County in typical chaparral situations failed to locate any sites. Subsequent reexamination after clearing and bulldozing resulted in the discovery of several artifacts not previously noted. As a result of this observation, the locations of a number of previously recorded sites were reexamined, and it was noted at the

time (*ca.* 1958) that *in almost every case* Milling Stone and probable San Dieguito sites in northern San Diego and western Riverside counties were located in situations in which the previous surface had been disturbed either by farming and land clearing operations or by significant erosion. In short, for that period of time in that part of the state, locations that have been disturbed have sites on them; those in which the surface is intact seemingly do not. This relationship has held remarkably consistent over the past twenty years in Southern California and there is little reason to suggest that it does not hold equally well for Northern California.

Recent surveys over the now exposed Folsom Lake bottom resulted in the discovery of several sites not located during the original surveys prior to the filling of the reservoir, and there is reason to believe that the situation there is not unlike that at Berryessa (John Foster, personal communication 1977). Likewise, a number of sites have been reported along the shoreline of Shasta Reservoir as a result of dropping water levels, and although we do not yet have any specific information as to the artifacts or kinds of sites observed there, we believe that the situation again is probably similar to that noted at Berryessa (F. A. Riddell, personal communication 1977).

The presence of artifacts and sites in contexts not normally observed using standard archaeological survey techniques under circumstances where there has been no significant erosion or ground surface disturbance is of course important in any interpretational scheme. Failure to consider such resources would considerably distort the results of such interpretation. Our concern here is not simply that we are not getting all of the resources, since archaeologists have always known that their data base was incomplete and that they were missing sites here and there along the way. What is alarming is the suggestion of the scale and nature of these missing pieces. If

the evidence at Berryessa (and Folsom and Shasta as well) is in any way a measure of the gaps in the record in general, it would appear that we are, or have been, missing more than just an occasional piece of the puzzle and that significant gaps or distortions are probably present in all of the interpretative efforts so far proposed for California.

The foregoing discussion makes two principle points, one methodological and one culture-historical. The first concerns the means we must use to recover certain remains that are now covered by soils and thus normally undetectable. The existence of artificial lakes provides a tool in the discovery of these remains. The annual drawdown in the reservoirs makes it possible even in normal years to observe a certain amount of land under optimal conditions. Prolonged droughts, of course, improve these conditions for discovery considerably.

The existence of the material described above as well as other material we shall report on in later papers indicates that the Milling Stone Horizon was widely present in northern California rather than merely sporadically as previous evidences suggested. Of course, the question of whether it was as abundantly represented in the north as in the south cannot be settled here. Our feeling is that it will ultimately be found in most parts of the north about as much as the south. In fact, we believe the Milling Stone Horizon represents a single group of people with substantially similar culture who essentially filled up (in some sense) the area now covered by the State of California in the period from 6000 to 3000 B.C.

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