Lithic Resource Abundance and Expedient Technology on Agattu Island

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Abstract: In 1989 a BIA ANCSA crew surveyed ten 14(h)(1) sites and documented 23 others on the island of Agattu near the western end of the Aleutian chain. Most of these sites had substantial exposures of artifacts and midden debris. Stone artifacts from these exposures and from small test excavations suggest prehistoric inhabitants employed a very expedient lithic technology greatly influenced by the nature of the island's considerable lithic resources.

Keywords: Aleutian Islands, Stone Tools, Inter-Island Contact

INTRODUCTION

In late May of 1989, a crew of four archeologists from the Bureau of Indian Affairs (BIA), ANCSA Office, traveled to Agattu Island in the western Aleutians to investigate 10 archeological sites selected by the Aleut Corporation under section 14(h)(1) of the Alaska Native Claims Settlement Act (ANCSA).[1] Logistical support and transportation to the island were arranged through a cooperative agreement with the U.S. Fish and Wildlife Service, which maintained crews in the western Aleutians in connection with its Aleutian Canada Goose reintroduction program. Their agency's research vessel, Tiglax, transported both the BIA and the Fish and Wildlife crews from Adak to Agattu with one stop on Buldir to set up a Fish and Wildlife camp there (Figure 1). During this stop, the BIA crew completed a survey of the single known site on that island (KIS-008). Upon reaching Agattu, the crew established a base camp on the island's north shore, then used inflatable boats for transportation to survey areas. Over the next five weeks the BIA archaeologists completed investigations of the ten 14(h)(1) sites (U.S. Bureau of Indian Affairs 1996), and 23 additional sites, including 21 Aleut village sites and two isolated rock cairns.

Most sites had substantial occupation mounds characterized by lush disturbance vegetation, numerous large cultural depressions, and exposures of artifacts and midden debris. The exposures often included very high densities of flaking debris and stone tools, which were produced from readily available lithic raw materials. These scattered artifacts yielded important clues about the characteristic chipped stone tool industry of the prehistoric inhabitants of Agattu. This initial inquiry suggests Agattu's lithic technology conforms to models of expedient technology developing in the face of raw material abundance (e.g., Andrefsky 1994; Bamforth 1986; Parry and Kelly 1987), and it offers insight into broader questions of prehistoric lithic reduction strategies, especially in terms of curated versus expedient technologies. Although there have been few studies of lithic technology in the Aleutians, the Agattu stone tool industry appears to be an example of divergent technological development influenced chiefly by the island's lithology.

ENVIRONMENT

From the Alaska mainland, Agattu is the next-to-last island in the Aleutian chain and the southernmost in a cluster of five islands known as the Near Islands. Agattu is roughly triangular in shape and about 30 kilometers in maximum dimension. The interior is treeless with mountainous to rolling terrain and many small lakes. The coastline is characterized by steep slopes and precipitous cliffs interrupted at regular intervals by rocky points and small, kelp-congested bays. The cliffs are often nesting grounds for large colonies of birds of many species. In past years, sea lions congregated on many of the island's short, rocky beaches – especially on the southern shores. Seals and sea otters can be seen along most of Agattu's shoreline. Intertidal reefs associated with the bays provide habitat for several species of invertebrates. Prehistorically these invertebrates were an important food resource for inhabitants of the villages commonly located

[1]See Pratt 1992 for information on the ANCSA 14(h)(1) program.

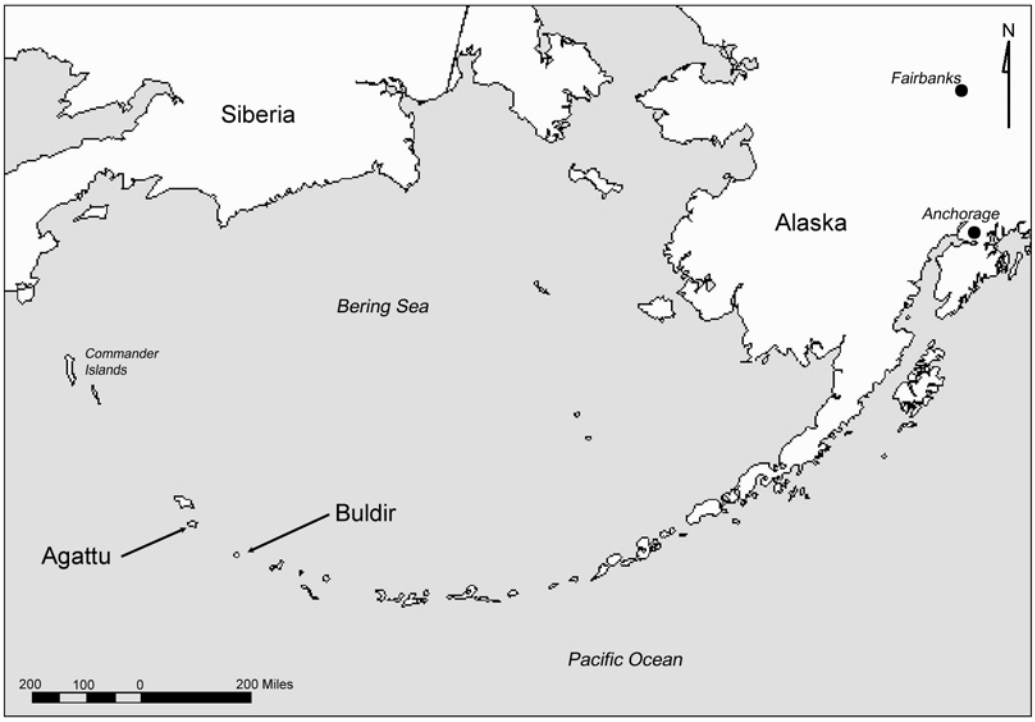

Figure 1. Bering Sea region, with Aleutian Islands to the south.

along the bays. Weather on Agattu is dismal by most standards. Though extreme temperatures are rare, high winds, fog, and drizzle are virtually everyday occurrences.

In general, the weather, terrain, vegetation, and wildlife of Agattu are typically Aleutian. Geologically, however, Agattu and the other Near Islands differ from the rest of the Aleutians in their lack of volcanic activity. They are composed of volcanic, sedimentary, and minor amounts of intrusive rocks, but there are no active volcanoes in the Near Islands. They have been shaped largely by preglacial marine and subaerial erosion. Basement rocks consist of basalts, waterlaid breccias and tuffs, sandstone, siltstone, mudstone, argillite, and chert (Gates et al. 1971: 709, 758). Especially important for Agattu's human history is the abundance of siliceous, relatively fine-grained, sedimentary rocks which are suitable materials for making chipped stone tools (Spaulding 1962).

PREVIOUS RESEARCH

Prior to 1989, archaeological investigations on Agattu had been limited to two short field seasons at two different locations. In 1937, Ales Hrdlicka (1945) excavated for three weeks on the island's eastern shore at Aga Cove (which he mistakenly called McDonald Cove; sites ATU-030 and 038), and Albert Spaulding (1962) excavated for five weeks in 1949 at Krugloi Point at Agattu's northeast tip (ATU-001 and 002 [Figure 2]). While Hrdlicka's primary objective at Aga Cove was to collect human skeletal material, he also collected artifacts, including "many hundreds of chipped points," a few of which are illustrated in his report on the Aleutian and Commander Islands (Hrdlicka 1945:442-449). Hrdlicka noted that bone tools were rare, and the chipped stone artifacts were of many varieties and often very coarsely flaked. Most stone tools were made of locally available bluish or brownish argillite. A less common "black basalt or andesite" was said to have been brought from elsewhere on the island to be used only for projectile points and hafted knives. He called the stone industry "clearly unique" (1945:296), and suggested that artifact forms were greatly influenced by the raw material source. Hrdlicka concluded that this unique stone tool industry continued throughout the occupation of the site even though people of a new physical type occupied the site in its later years (1945:310).

Spaulding's excavations at Krugloi Point documented occupation of Agattu as early as 2500 years ago. In four excavation units, he recovered 819 artifacts, 384 of which were chipped stone. He noted similarities between some of his artifacts and those illustrated by Hrdlicka, but described many additional varieties of tools. His tools included various scrapers, gravers, flake knives, drills, a chopper, a planing adze, various bifacial knives and fragments, and lance and projectile points. Noticeably absent from his inventory were cores, which he hypothesized did not occur because flat plates of stone rather than nodules were used. Typologies were hard to establish because of small numbers of some classes of tools and marked variation within others. Spaulding also failed to established any definite patterns of distribution for the various classes of chipped stone tools through time. The material used most often at Krugloi Point was said to have been greenstone, with tan and gray cherts having secondary importance. As at Aga Cove, these were readily available materials. Spaulding echoed Hrdlicka's conclusion that the tools conformed, to a very notable degree, with original raw material form. Another similarity with Aga Cove was the scarcity of bone artifacts, which Spaulding was at a loss to explain.

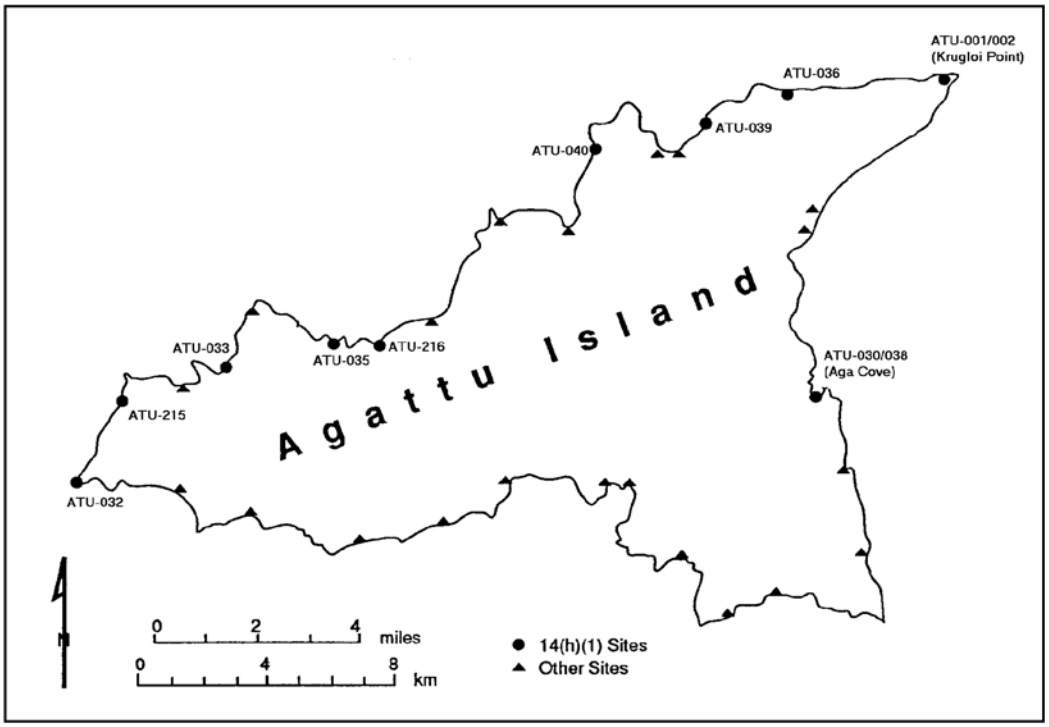

Figure 2. Aleut Village Sites on Agattu.

In 1996 Agattu was visited by a team of archaeologists from the Smithsonian Institution led by Stephen Loring. The Smithsonian team excavated at Karab Cove on the island's south shore. Like other researchers on Agattu, Loring (1998) was struck by the abundance of flaking debris at the habitation sites and noted the abundance of lithic raw material along the coast. The full report on the 1996 excavations is not yet complete.

RESULTS OF INVESTIGATION

The BIA surveys involved site mapping, quantification and description of surface features, and description of exposed artifacts and midden debris. Agattu's cultural features (primarily house depressions) are discussed in more detail elsewhere (Hoffman 1990; US BIA ANCSA 1996). The exposures, which are the main concern here, were seen at nearly all sites on the island. Exposures were most commonly noted in and around cultural depressions underneath the low canopy of the disturbance vegetation. Artifacts were also present in the small streams that were found at most sites. Occasionally material was seen eroding from stream cuts or waterfront terraces, but sites were generally very stable. Exposed material included bone, shell, human skeletal remains, bone and ivory tools and ornaments, chipped stone artifacts, ground stone tools, large cobble tools, and miscellaneous historic debris.

While all tools encountered in exposures on the 14(h)(1) sites were briefly described in the field, none were collected. For most chipped stone tools, the outline was traced, cross-section, thickness, or edge angle was sketched, flake patterns along any working edges were described or sketched, and material type was recorded if possible. Material type was sometimes difficult to determine because of heavy patination or staining. Photographs were taken of all stylized artifacts, as well as a sample of informal tools and cores.

The BIA crew did subsurface testing at two sites. A 50 X 50 centimeter (cm) unit was dug into a large depression at ATU-035, and a 1 X 1 meter unit was dug into a large depression at ATU-216. The units were dug in 10 cm arbitrary levels, and all material was screened through ¼-inch mesh. Charcoal samples were collected for radiometric dating (Table 1). In both tests, excavation was halted at the 40 to 50 cm level when human skeletal remains were encountered. Both tests revealed jumbled deposits – probably the result of reoccupation of old house depressions. Two charcoal samples from the test at ATU-216 yielded dates of AD 1456 – 1650 and 1474 – 1676. At ATU-035, charcoal from a concentration in the upper part of the unit produced a date of AD 1156 – 1328, and scattered charcoal from the same level was dated to AD 1441 – 1644. A sample from the 40-50 cm level yielded a date of AD 404 – 639.

All artifacts from the test units were collected. Analysis of the stone tools recovered in excavations was consistent with the descriptions of tools done in the field. A total of 303 stone tools and cores were examined from excavations and surface exposures on 14(h)(1) sites (Table 2). Stone artifacts were found on every 14(h)(1) site and almost all of the non-14(h)(1) sites. Functional categories included stemmed projectile points or knives, flake tools, large crude unifacial and bifacial tools of many varieties, cores, wedges, and an adze.

Table 1. Radiocarbon dates from ATU-035 and ATU-216 house interiors.

Site No.	Feature	Unit	Datum Depth	Conventional Age RCYBP	Calibrated Age (2 sigma)	Lab No
ATU-035	18	1	9-16 cm	360±60	AD 1441-1644	Beta-33320
ATU-035	18	1	9-16 cm	760±70	AD 1156-1328	Beta-33321
ATU-035	18	1	40-50 cm	1550±60	AD 404-639	Beta-127625
ATU-216	49	1	40-43 cm	330±50	AD 1456-1650	Beta-33322
ATU-216	49	1	45 cm	280±50	AD 1474-1676	Beta-33323

Calibration datasets from Struiver and Braziunas 1993; Struiver et al. 1998; Struiver, Reimer, and Braziunas 1998.

Table 2. Stone artifacts from Agattu 14(h)(1) sites (excluding flakes).

Artifact Type	ATU-001/002	ATU-030/038	ATU-032	ATU-033	ATU-035 Exp.	ATU-035 Test	ATU-036	ATU-039	ATU-040	ATU-215	ATU-216 Exp.	ATU-216 Test	Totals
Projectile Points/Knives		3		6		1	4				1		**15**
Unfinished Bifaces	2	3	1	4			6	1	1	2	4	2	**26**
Adze		1											**1**
Chipped Stone Wedges					1							1	**2**
Bifacially Retouched Plates/Fragments	1	9		4	1	1	3	1		1	4	5	**30**
Unifacially Retouched Plates/Fragments		8		9	1	1	2			4	1	3	**29**
Bi and Unifacially Retouched Plates/Fragments										3			**3**
Bifacially Retouched Flakes		1		1							13		**15**
Unifacially Retouched Flakes		4		2	2	4	3		3	3	2	2	**25**
Bi and Unifacially Retouched Flakes		1		1			1						**3**
Edge Damaged Flakes	2		1				2				3	8	**16**
Freehand Cores	27	7				1	15	10	12	3	4	4	**83**
Tested Raw Material		2										3	**5**
Ground and Flaked Stone				4			1			1			**6**
Ground Stone				1			3						**4**
Cobble Choppers						2		1					**3**
Saws/Groovers of Coarse Stone						4						2	**6**
Hammerstones							2		4			1	**7**
Anvil Stones	1	1		1					1	2			**6**
Grooved Cobble Sinkers	2						1				1		**4**
End Grooved Cobble Sinkers	1			1			5	1	3	1	2		**14**
Totals	**36**	**40**	**2**	**34**	**5**	**14**	**48**	**14**	**24**	**20**	**35**	**31**	**303**

Only fourteen tools could be classified as formal or patterned tools. Patterned tools are defined here as tools with an overall form dictated by intent on the part of the craftsman, as opposed to unpatterned tools in which form varies little from the form of the raw material blank. The patterned tools were the adze and 15 projectile point or knife fragments. Of these fragments, eight were proximal, three were medial, and four were distal. Nine of the 15 are clearly stemmed. Only one basal fragment is unstemmed, and it is possibly a fragment of an unfinished tool. The stemmed points are generally similar, having broad blades and shoulders, and thin, lenticular cross-sections. Some stems contract slightly, and shoulders range from slight to barbed (Figures 3 and 4). Eight are of a gray/black laminated chert. The rest are made of argillite. Because of breakage, original length measurements were not possible on any of the points. Widths ranged from 2.2 to 3.9 cm with one exception – a 1.3 cm wide,

finely flaked point from ATU-216 (Figure 5). This point and one from ATU-033 both have single small notches on opposite blade edges. This notching was also seen on a small, stemmed point of gray/black chert from the island of Buldir (KIS-008). Spaulding (1962:27) reported similar notching on bifaces from Krugloi point and suggested it was an ownership mark. This interpretation is questionable, however, given the lack of variety and wide distribution of this trait. It might signify a group affiliation, or it could be purely functional.

Figure 3. Stemmed biface with slight shoulders, site ATU-030/038.

Figure 4. Stemmed biface with barbed shoulders, site ATU-036.

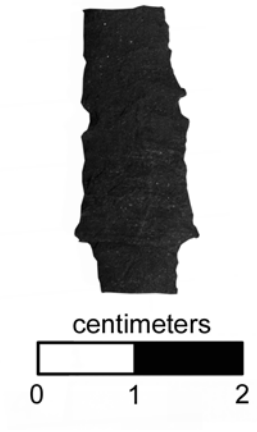

Figure 5. Narrow point with small notches on blade; site ATU-216.

Twenty-six bifaces appeared to be unfinished. These were thick bifaces with roughly oval outlines and irregular edges. Most had breaks consistent with production failure. These were found at all but one of the 14(h)(1) sites. Fifteen were made of argillite, three of gray/black laminated chert, six of indeterminate or unrecorded material type, and one of a gray/brown, exotic chert.

The most common chipped stone tools were large, crude, unpatterned tools made by unifacial or bifacial edging of cobbles or tabular fragments of stone. Sixty-two of these were recorded on eight of the ten sites. They were equally divided between unifacial and bifacial with some tools showing both kinds of flaking. These tools were made by relatively few flake removals, and flaking was concentrated on the edge only, so overall form varied considerably. They ranged in size from roughly 3 X 5 cm to 10 X 20 cm and from 1 to 3 cm thick. Forty-three of the 62 were made of argillite. This argillite was available in enormous quantities in the form of beach cobbles at every site surveyed. Three of these tools were of gray/black laminated chert, seven were of miscellaneous coarse metasediments, and nine were of indeterminate or unrecorded material type.

Flake tools were recorded almost as frequently as the large unpatterned tools. They may actually be more common, but because of their small size and less obvious modification they were more likely to be overlooked in surface exposures, which often included large numbers of waste flakes. Flake tools include flakes with marginal unifacial and/or bifacial retouch, usually by pressure flaking. They also include flakes showing damage from use, but we were very conservative in accepting this type of flake tool in the field because of the difficulty of distinguishing use damage from other types of damage.

Of the 57 flake tools recorded, 36 were of argillite, seven were of gray/black laminated chert, and 14 were of indeterminate or unrecorded material type.

Table 3. Flaking debris comparisons.

	Gray/Black Laminated Chert	Other Materials
Total Flakes	81	1860
% Lipped	46%	20%
% Cortical	12%	16%

Table 4. Core/tool comparisons.

	Gray/Black Laminated Chert	Other Materials
Total Cores	0	88
Total Tools	25	140
% Patterned	32%	6%
% Unpatterned	68%	94%

Another indication that flake tools might be more common than suggested by the flake tool counts is the fact that 88 cores were recorded. These cores produced flakes that were too small to be fashioned into any of the other types of tools identified. The cores were almost exclusively free-hand, hard-hammer percussion cores. Most had few flake removals. Five were recorded as "tested raw material." Only three were recorded as exhausted cores. The source for raw material, again, was beach cobbles. Of the 60 cores for which material type was recorded, all were argillite.

Flaking debris was the most common form of artifact found in surface exposures. It was noted in 111 of the 358 cultural depressions recorded on 14(h)(1) sites, and the flake scatter was so dense at one non-14(h)(1) site that a Fish and Wildlife Service employee hypothesized that the house depressions had been chiseled into stone. While not all sites had such dense scatters, many were comparable, especially where vegetation allowed ground visibility.

Flaking debris was not recorded in detail in the field. Generally its presence was noted, as well as the material type(s) represented. As might be expected, most flakes were of argillite. Gray/black chert was present on most sites in small amounts. Flakes of possibly exotic material were present in five instances on four sites. The materials were red chert, maroon chert, gray/white banded chert, and translucent brown chalcedony.

Flaking debris recovered from the two test excavations on the north shore totaled 1941 pieces (Table 3). In the lab these flakes were sorted by material type, platform characteristics, and cortex. Seventy-seven percent were made of blue/green argillite. This was the same argillite used to make most of the artifacts already discussed and the same argillite so common in flake scatters elsewhere on the island. It is apparently the same material as Spaulding's "greenstone" which was so common at Krugloi Point. In addition to the blue/green argillite flakes, flakes of miscellaneous argillites made up 12 percent of the flaking debris. This category is less precise and might include other silicified sediments which resemble argillite. Four percent of the flaking debris was a distinctive gray/black laminated chert, two percent were miscellaneous fine sediments, and five percent were miscellaneous coarse materials.

The gray/black laminated chert is finer grained and has better flaking properties than the argillites. It is apparently the same material identified by Hrdlicka at Aga Cove as "black basalt or andesite." He reported that this material was used for projectile points and hafted knives. Gray/black chert was observed in many instances during the BIA survey at Aga Cove. It was present in small but noticeable quantities on sites all around the island, though it was observed to occur naturally only on the eastern and southern shores.

In comparing flaking debris of this material with other flakes, the chert appears to have been used for more finely flaked tools. A much greater proportion of the chert flakes have lipped platforms, indicating they are the result of biface thinning, and a smaller proportion have cortex, which could indicate they are from a more advanced stage of reduction. This idea is supported by the high proportion of patterned tools made of this material (Tables 3 and 4).

DISCUSSION

Lithic raw material is abundant on Agattu. Argillite can be found on cobble beaches around the entire coast.

Gray/black chert also occurs naturally on the island, but in lesser quantities and more limited distribution. The chert is relatively fine-grained and seems to have been a preferred material for curated tools. Argillites and coarser sediments, on the other hand, seem to have been used mostly for expedient tools. The finer grades of argillite are comparable in quality to the chert, and some argillite was finely flaked, but generally it was used for simple flake tools or crudely flaked knives, scrapers, or choppers. Its abundance essentially made it disposable. There was no need for material to be used efficiently, and there was no need for most tools to be curated. Because the material came in large plates and cobbles, which could be firmly held in the hand, hafting was seldom necessary for domestic tools. Tools were probably quickly discarded and often reused, as is evidenced by different types of retouch on the same piece and by fresh flake scars on weathered flaked surfaces (Figure 6). The fact that lithic resources were uniform around the whole island reinforced this throw-away technology.

Figure 6. Argillite tool with differential weathering on flake scars, ATU-030/038.

Comparisons between the bone and stone industries on Agattu are misleading. Hrdlicka and Spaulding both commented on the scarcity of bone tools, and Spaulding was admittedly confused by it (Hrdlicka 1945:288; Spaulding 1962:43). In the 1989 surveys, bone tools were once again found to be relatively rare. Despite excellent conditions for bone preservation in the Agattu middens, bone tools made up less than 10 percent of the total tool inventory. By comparison, bone tools accounted for 46% of the tool inventory at six sites excavated on Amchitka Island in the western Aleutians (Desautels et al. 1970:75). In the central Aleutians, Denniston (1966:84) reported that 30% of the tools from the 1962 Trench A at Chaluka were of bone. The difference in the frequency of bone and stone tools on Agattu is, at least in part, a function of the expendable nature of the stone. Bone may have been no less important on Agattu than elsewhere in the Aleutians, but its importance is overshadowed by the sheer number of stone artifacts.

Relatively little is known about the stone industries elsewhere in the Near Islands, but Agattu might have been a source of lithic material for inhabitants of other islands. Jochelson recovered artifacts on Attu made of "green hornstone-schist" which he believed had been traded from Agattu (Jochelson 1925:57). He also reported stone implements made of andesite which, according to Native informants, came from Agattu (1925:114). A small collection made by another BIA crew on Nizki in 1989 included both green argillite and gray/black chert, and a private collection from Shemya confiscated by the U.S. Fish and Wildlife Service included many artifacts of finer green siliceous stone. It is not known if this material occurs naturally on these islands, but it very closely resembles the material from Agattu. A 1990 study on Shemya identified propyllitized andesite or "greenstone" as the most common lithic material (Corbett et al. 1997a:475; 1997b:108). The stemmed point mentioned earlier from the island of Buldir was certainly not of a local material. Most chipped stone tools at the Buldir site were made of a locally available phyllite of extremely poor quality, but one point recorded during the 1989 BIA survey was made from a "gray/black banded chert." This material was obviously exotic and quite possibly from Agattu. This is interesting because Buldir is believed to have been a stepping stone in the earliest migrations of people to Agattu, and this artifact may represent a small "backwash" from west to east.

SUMMARY

The lithic industry on Agattu is intimately adapted to an unusual, island-specific resource. The inhabitants of the island relied on vast quantities of readily available, flakable stone to make large numbers of simple flake tools and large crude unifacial and bifacial tools which were essentially disposable (see Figure 7). This expedient technology was in use at least as early as 2500 years ago and probably continued up until Russian contact. Finer

Figure 7. Crudely flaked argillite tool, site ATU-035.

tools were made, but in relatively small numbers and often using a specific type of higher quality chert. There is evidence that materials from Agattu were used elsewhere in the Near Islands and as far east as Buldir. Perhaps they were trade items, or at the very least, evidence of contact. The nature of this contact is the subject of ongoing research (Corbett et al. 1997a, 1997b).

Agattu chipped stone artifacts illustrate the potential for island-specific stone tool technologies and possible misconceptions in comparing stone artifact assemblages from different islands or island groups. Ironically, this underscores the importance of bone tools, as Workman (1966) and McCartney (1974) have suggested, as temporal and ethnic markers because they are influenced much less by raw material variability than stone, which can vary significantly between the isolated islands of the Aleutian chain.

ACKNOWLEDGEMENTS:

Special thanks to Matt O'Leary for sifting out the relevant fraction from the 13-year-old Agattu field notes and photographs, and for making this information available in Kentucky. Thanks also to Ken Pratt for support and leadership during the Agattu field season and many since, and to the remainder of the Agattu crew, Brian Hoffman and Robert Drozda. Dale Slaughter, Grant Day, and Andrew Martin provided critical, and greatly appreciated, assistance with graphics. Tom Corbett generously identified raw materials for collected stone artifacts and material samples, and Andrew Bradbury shared his library and his expertise in lithic technology. Finally, I would like to thank the Aleut Corporation for support of this project.

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