Native copper has been associated with the expression of social inequality in numerous North American prehistoric contexts (e.g., Lattanzi 2007; Pleger 2000; see overview in Ehrhardt 2009). In his influential article “Archaeology as Anthropology,” Binford (1962) inferred changes in Old Copper Culture social relations based on changes in how native copper was used over time. Copper has also been noted as a source of wealth and a measure of prestige and rank (i.e., social complexity or “permanent social inequality” [Ames 2007:487]) among northern Athabascans, especially the Ahtna (Cooper 2006; Grinev 1993; Kari 1985; Pratt 1998; Shinkwin 1979). Native copper is naturally occurring pure (often greater than 99.9 percent Cu) copper. Because copper melts at 1084° C, high temperatures are necessary to extract it from ores (smelt), requiring furnace technology. Native copper is malleable, meaning it deforms plastically under percussion rather than fracturing, and can be worked and beaten to shape (forged) with a lithic hammer and anvil without melting or smelting. Hammering native copper flattens the grain structure and will eventually lead to stress fracture. Heating worked copper (annealing) recrystallizes the metal grains restoring malleability and can be achieved with temperatures as low as 200°C (LaRonge 2001; Wayman 1989).

Numerous sources of native copper are known for Alaska and Yukon (AK-YK) with most concentrated in the Wrangell and St. Elias Mountain...
Indigenous people began using it during the First Millenium A.D. (Dixon et al. 2007; Dixon et al. 2005; Workman 1976, 1978), and it was used by many groups in the Late Prehistoric-Early Historic periods including: Chugach, Koniag, Thule, Inupiat (Eskimoan speakers), Ahtna, Dena’ina, Tutcheone, Tanana, Gwich-in (Athabascan/Na-Dene), and two additional Na-Dene speaking groups, the Eyak and Tlingit (Figure 1) (Cooper 2007). It continued to be used long after the initial introduction of industrial smelted copper and other metals in the mid-eighteenth century (Glave 1892; Legros 1984, 2007; Mendenhall and Schrader 1903; Moffet and Maddren 1909; Powell 1997 [1909]; Schwatka 1996 [1892]). Using a Behavioral Archaeology framework (Skibo and Schiffer 2008) this paper combines ethnographic, ethno-historic, geological, and archaeological data to examine the relationship between native copper innovation and social complexity.

Behavioral Archaeology and Design Theory

Design is “a means of creating or adapting forms of physical objects to meet functional needs within the context of known materials, technology, and social and economic conditions” (Horsfall 1987:333). Implicit in this definition is the concept of innovation, which includes invention and adoption (Torrence and van der Leeuw 1989:3). Adoption refers to individual decision-making in the continued use of an innovation. Diffusion is the process by which an innovation spreads within or between social systems (Rogers 1962). Similar to optimal foraging theory (e.g., Kelly 2007 [1995]), design theory assumes optimization as an important factor in technological behavior.

Design theory consists of four parts: (1) life history/behavioral chain, (2) activities and interactions, (3) technical choices, and (4) performance characteristics and compromises (Skibo and Schiffer 2008:9). An artifact’s life history includes the procurement of raw materials, manufacture, use, reuse, recycle, discard, and deposition. A behavioral chain is a “fine-grained” life history, a detailed account of the interactions and activities in the course of an object’s life (Schiffer 2004; Skibo and Schiffer 2008; Walker and Schiffer 2006:71). Behavioral chain and life history are each more inclusive than chaîne opératoire, which is focused on the act of manufacturing (Cresswell 1976:6; Leroi-Gourhan 1964).

Each link in an artifact’s behavioral chain (material procurement, manufacture, use, etc.) is an activity or interaction where people, artifacts, and

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**Figure 1. Ethno-linguistic groups in south-central Alaska and southwestern Yukon.**
externs (relevant environmental factors) interact. Technical choices result in performance characteristics, i.e., those formal properties that contribute to an artifact’s ability to perform tasks within a specific context task. Comparing the technical activities and choices and the performance characteristics of alternative technologies provides insight into compromises made during the course of past technological decision-making. Understanding these compromises is important for formulating both explanations for technological (and social and behavioral) change, and hypotheses for additional investigation (LaMotta and Schiffer 2001; Schiffer 2004; Skibo and Schiffer 2008).

Technological differentiation and transfer is the process of the appearance, adoption, and diversification of a new technology (Skibo and Schiffer 2008). Differentiation refers to “large-scale behavioral change” (Schiffer 1992:107), such as the replacement of the atlatl with the bow and arrow, and is the result of the transfer of technology within and between communities. Skibo and Schiffer (2008) use community as a flexible analytic unit that refers to a group whose members share in the use of a certain technology, and can be defined archaeologically at various spatial scales, e.g., features (activity areas), sites, or regions. The process of differentiation and transfer consists of six phases: (1) information transfer, (2) experimentation, (3) redesign, (4) replication, (5) acquisition, and (6) use—new technology is incorporated into recurring pattern of daily activities (Skibo and Schiffer 2008:129–133; see also Rogers’s 1962:81–86 “Stages in the Adoption Process”). Diversity within a community provides an opportunity to examine differential access to technology and the materialization of social power (Skibo and Schiffer 2008), which is relevant to the study of the evolution of prestige technologies (Hayden 1998).

Prestige Technology

Hayden’s (1998:5, Fig. 1) explanation of the evolution of prestige technology relied on the use of design theory to identify six types of constraint that impact an individual’s technological choices: task, locational, material, technological, socioeconomic, and ideological. Individuals must deal with these constraints (make choices) when using technology to achieve goals, whether practical, such as securing food and shelter, or prestige, i.e., communicating “wealth, success, and power” (Hayden 1998:11). Hayden (1998) acknowledged the potential for a technology to satisfy both goals simultaneously, but offered this idealized technological dichotomy as a way of examining the relationship between technological and social change similar to Binford’s (1962) functional classification of material culture as technomic, socio-technic, or ideo-technic.

Prestige technological behavior is intended to attract the positive attention of potential followers, mates, or allies, within a community context. As a result, visually striking (refractive, luminous) materials such as metals, shell, minerals, and some stones have been valued in a number of cultural contexts for their sensory performance characteristics as well as their rarity, durability, and association with the supernatural (Hayden 1998; Renfrew 1986; Saunders 2002; Skibo and Schiffer 2008). These prestige goods are used by archaeologists to identify socioeconomic inequality, i.e., social complexity (e.g., Brumfiel and Earle 1987).

Crucial to understanding the innovation of prestige technology is the assumed role of an aggrandizer, one who uses prestige goods not merely as a sign of wealth but to create situations of indebtedness and obligation that can be converted into economic and political inequality (i.e., power) (Clark and Blake 1994; Hayden 1995, 1998, 2001). The speed at which an individual adopts an innovation depends on their cosmopolitaness, “the degree to which an individual’s orientation is external to a particular social system” (Rogers 1962:17). Like aggrandizers, cosmopolite innovators are willing to take risks and operate outside of their communities’ norms and values. Though not generally characterized as acting aggressively in pursuit of their own self-interest like aggrandizers, the actions of both individuals are implicated in facilitating technological and social change.

At the time of Russian contact in the mid to late eighteenth century, the use of copper as a prestige good was associated with ranked societies in AK-YK. For example, the Ahtna (de Laguna and McClellan 1981; Reckord 1983), Den’ina (Fall 1987), Tutchone (Legros 1985, 2007;
McClellan 1975) Eyak (de Laguna 1990a), Tlingit (de Laguna 1990b) and Chugach were all ranked societies with nobles, slaves, and commoners (Townsend 1980). While the evolution of social complexity has been one of the most important themes in hunter-gatherer studies, evidence of rank among these societies is ambiguous (Ames 2007). Thus, copper, a durable material with high archaeological visibility, has the potential to inform on not only the process of technological innovation but also the development of social inequality among hunter-gatherers in northwest North America. Was its innovation and transfer across time and space a result of its use as prestige, or practical technology? What role did it play in the expression or development of ranking and how would such a relationship manifest itself materially? Because the bulk of evidence related to the use of native copper in AK-YK relates to northern Athabascans, the following section presents a brief overview of northern Athabascan culture and technology.

**Northern Athabascan Culture and Technology**

Often characterized as egalitarian and possessing minimal material culture, northern Athabascan societies showed considerable socioeconomic variation (Ives 1990; VanStone 1974). The two most important species for subsistence were salmon and caribou but freshwater fish, waterfowl, moose, mountain sheep, and smaller mammals were also important. Settlements were generally not occupied year-round due to high seasonal mobility, but good fishing locations became centers of trade and were revisited annually (de Laguna and McClellan 1981; McClellan and Denniston 1981; VanStone 1974). These societies self-identified as local bands associated with distinct territories. Marriage exchanges created kin ties in neighboring groups, allowing for easy movement between bands (Townsend 1980; VanStone 1974).

Leadership among northern Athabascans depended on a variety of factors such as sib affiliation and other kin ties, organizational abilities, and skills in speaking, trading, hunting, and dealing with the supernatural (Fall 1987; McKennan 1959; Reckord 1983; VanStone 1974). Though sharing was a cultural imperative (e.g., Lane 1981; McKennan 1959; McClellan 1975; Reckord 1983; Savishinsky and Har 1981), acquiring wealth was an important factor in becoming a chief (Fall 1987; Legros 1985; Townsend 1980). According to Simeone (1995:xviii), “in Athapaskan culture, competition and cooperation exist in a dialectical relationship. People compete for power and prestige in the face of a cultural ideal that stresses cooperation and solidarity.” This contradiction is captured with the term “transegalitarian.” Transegalitarian societies exhibit considerable private (individual or corporate) property, an institutionalized wealth-based hierarchy, and minimal sharing, though kinship still largely determines one’s position in the community hierarchy (Hayden 2001).

Northern Athabascan technology is known for its flexibility and lack of materiality (e.g., Dumond 1980; McClellan and Denniston 1981; Nelson 1983a; Riddington 1982; VanStone 1974). Complicated hunting implements included snares and traps (Oswalt 1976), but successful adaptation depended on “a complex and sophisticated form of *artifice* and understanding,” not an investment in specialized tools (Riddington 1988:107). The more important raw materials were plant (bark and wood) and animal (skin, sinew, bone, and antler) tissue, copper and lithics were relatively less important (McClellan and Denniston 1981). With its reliance on raw materials available across much of the landscape the Athabascan tool-kit was well-suited for mobility. The successful application of these material aspects of technology required detailed knowledge of animal behavior and the landscape (McClellan and Denniston 1981; Nelson 1983b; Riddington 1988; VanStone 1974). The complexity of northern Athabascan technology and society lies in its web of multidimensional relationships between people, places, and things.

Northern Athabascans exercised considerable individual autonomy in many aspects of life including subsistence activities (Honigmann 1981; Riddington 1988; Rushforth 1986). Learning was accomplished through observation rather than instruction (e.g., Gaulet 1998). This autonomy and technological flexibility expressed at the band level might account for the presence of Athabaskan speakers in nearly all western North American Culture Areas subsisting variously on caribou,
salmon, whales, buffalo, and agriculture at the time of contact with Euro-North Americans (Ives 1990, 2003).

Native Copper in Alaska and Yukon

Activities and Interactions

Procurement. Native copper has been reported for 54 distinct locales in Alaska and Yukon (Table 1, Figures 2 and 3), but most sources are concentrated in the Wrangell and Saint Elias Mountain ranges (Cooper et al. 2008) of south-central Alaska and southwestern Yukon where it occurs as primary deposits in basaltic lavas and interbedded sedimentary rocks (Cornwall 1956; MacKevett et al. 1997). Many sources are at high elevations with steep topography. Although weathering, erosion, and glacial activity have displaced it into streams where it continues to be transported down slope, deep snows and frozen sediments would have made obtaining native copper during the winter difficult, even at lower elevations. Native copper sources and place names containing indigenous terms for copper are found in the traditional territories of the Ahtna, Tutchone, Dena’ina, Upper Tanana, and Chugach (Cooper 2006, 2011).

Placer nuggets of native copper were collected from streambeds (Wayman 1989), sometimes with aid of caribou or moose antler used to rake gravels (Brooks 1900; Schwatka 1892). Ahtna from the lower Copper River collected native copper from the upper Chitina and Nizina Rivers during spring sheep hunting trips. This copper was later worked at communities near the confluence of the Chitina and Copper Rivers (Reckord 1983). Collection of native copper nuggets from stream gravels would leave no archaeological trace but evidence from Dahak De’nin’s Village (VAL-065) and the Gulkana site (also Ringling, GUL-077) record the transport of native copper to more permanent habitation sites. Geological samples from Kletsan, Chitim, and Dan Creeks (Figure 2:§s 1, 29, and 30 respectively) and artifacts from the Gulkana site were analyzed for trace elements using both instrumental neutron activation analysis and inductively coupled plasma-mass spectrometry. The artifacts matched both Dan and Chitim Creeks, effectively ruling out Kletsan Creek, but the large number of unsampled sources prohibits definitive attribution of provenance (Cooper et al. 2008).

Manufacture. Native copper was cold-worked with lithic hammerstones and annealed (Dena’ina—Kari and Fall 2003; Osgood 1937; Tutchone—McClellan 1975, 1987; Upper Tanana—McKennon 1959; Rainey 1939a; Tlingit—Emmons 1991). Heating copper in fish oil was mentioned among the Ahtna (Shinkwin 1979) and Tlingit (Withoft and Emmons 1969), possibly to make them more resistant to corrosion. Tlingit (Emmons 1991) and Ahtna (Powell 1997 [1909]) individuals mentioned the use of urine to temper copper. Tempering in metallurgy refers to a specific process whereby steel is heated to reduce brittleness (Scott 1991). Native copper can be made harder or softer by cold-hammering and annealing, respectively, but this is not the same as tempering, and urine would not have affected the physical properties of copper though it was routinely used to wash the body and as an all-purpose cleaner (e.g., McClellan 1975).

The most common copper artifacts are small amorphous pieces, often thin sheet fragments, not resembling any specific tool. These artifacts are generally referred to as scrap or debris. Two sites, Gulkana and Dahak De’nin’s Village, which have 71 and 106 pieces of scrap, respectively, also have the largest inventories of native copper in AK-YK (Shinkwin 1979; Workman 1976). Workman (1976) provided a description of the manufacture (chaîne opératoire) of tools at Gulkana based on macroscopic examination. Nuggets were first hammered into thin sheets, which were then folded and consolidated by repeated hammering. Grinding was used to sharpen points and thin edges. An ethnographic account of copper working ca. 1860s or 1870s describes hammering a nugget on a stone anvil using a stone pick until it was thin enough to break with one’s fingers. It was then sharpened and smoothed on a whetstone (Rainey 1939a). The association of scrap and unfinished tools with hearth ash was considered to be additional evidence for annealing at the Gulkana site (Workman 1976); this was later verified by metallographic analysis of copper artifacts from the site (Cooper 2007; Franklin et al. 1981).
### Table 1. Native Copper Sources.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Location</th>
<th>Reference</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<td>AK-YK</td>
<td>Hayes 1892; Brooks 1900; Moffit and Knopf 1910</td>
</tr>
<tr>
<td>2</td>
<td>Genec River</td>
<td>YK</td>
<td>Cairnes 1915</td>
</tr>
<tr>
<td>3</td>
<td>Beloud Creek</td>
<td>YK</td>
<td>Kindle 1953</td>
</tr>
<tr>
<td>4</td>
<td>Mush Lake</td>
<td>YK</td>
<td>Kindle 1953</td>
</tr>
<tr>
<td>5</td>
<td>Grafter Mine</td>
<td>YK</td>
<td>Kindle 1964</td>
</tr>
<tr>
<td>6</td>
<td>Burwash Creek</td>
<td>YK</td>
<td>McConnell 1905</td>
</tr>
<tr>
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<td>Bullion Creek</td>
<td>YK</td>
<td>McConnell 1905</td>
</tr>
<tr>
<td>8</td>
<td>Sheep Creek</td>
<td>YK</td>
<td>McConnell 1905</td>
</tr>
<tr>
<td>9</td>
<td>Fourth of July Creek</td>
<td>YK</td>
<td>William LeBarge, personal communication</td>
</tr>
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<td>YK</td>
<td>McConnell 1905</td>
</tr>
<tr>
<td>11</td>
<td>Windy Arm</td>
<td>YK</td>
<td>McConnell 1906</td>
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<tr>
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<td>Nisling River</td>
<td>YK</td>
<td>Dawson 1899</td>
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<td>Tetamagouche</td>
<td>YK</td>
<td>Muller 1954</td>
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<td>AK</td>
<td>Brooks 1911; Moffit and Knopf 1910</td>
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<td>Nutzotin Mountains</td>
<td>AK</td>
<td>Moffit and Wayland 1943</td>
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<td>Moffit 1954</td>
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<td>Slana River</td>
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<td>18</td>
<td>Nabesna River</td>
<td>AK</td>
<td>Rohn 1900</td>
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<td>19</td>
<td>Sheep Creek</td>
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<td>Capps 1916</td>
</tr>
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<td>AK</td>
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<td>AK</td>
<td>Kari 2005</td>
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<td>Nugget Creek</td>
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<td>Abercrombie 1900</td>
</tr>
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<td>near Cordova</td>
<td>AK</td>
<td>Grant and Higgins 1910; de Laguna 1956</td>
</tr>
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<td>AK</td>
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<td>de Laguna 1956</td>
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<td>Capps and Johnson 1915; Grant and Higgins 1910</td>
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<td>Carpenter Creek</td>
<td>AK</td>
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<td>AK</td>
<td>Mertie 1934</td>
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Figure 2. Archaeological and geological occurrence of native copper in Alaska, Yukon, and northwestern British Columbia.

Figure 3. Archaeological and geological occurrence of native copper in northern Alaska and Yukon.
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<td>1: awl</td>
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<td>Athabascan/Tutchone</td>
<td>Greer 1983:7</td>
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<td>Gotthardt and Hare 1995</td>
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<td>isolated surface find</td>
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<td>Workman 1978:344-350</td>
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<tr>
<td>JjVs-7</td>
<td>15: 1 bipoint, 12 fragments (8 sheet, 2 implements)</td>
<td>post-dates WRA-Late Prehistoric; campsite</td>
<td>Athabascan/Tutchone</td>
<td>Workman 1978:344-350</td>
</tr>
<tr>
<td>KtTx-20</td>
<td>1</td>
<td>Late Prehistoric; surface scatter; campsite</td>
<td>Athabascan/Tutchone</td>
<td>Clark 1997</td>
</tr>
<tr>
<td>KdVa-8</td>
<td>5: 1 projectile point, 1 sheet fragment, 3 blanks</td>
<td>post-dates WRA-Late Prehistoric; campsite</td>
<td>Athabascan/Tutchone</td>
<td>Thomas 2003:43</td>
</tr>
<tr>
<td>KdVo-3</td>
<td>2: fragments</td>
<td>Late Prehistoric; in level dated to cal A.D. 1147–1280; campsite</td>
<td>Athabascan/Tutchone</td>
<td>Walde 1994:112</td>
</tr>
<tr>
<td>KeVe-2</td>
<td>7: 2 projectile points, 5 sheet fragments</td>
<td>Late Prehistoric/Protohistoric/Historic; 4 sheet fragments from level dated to cal A.D. 1513–1600; campsite; projectile points and 1 sheet fragment historic</td>
<td>Athabascan/Tutchone</td>
<td>Gotthardt and Easton 1989:36; Castillo 2006</td>
</tr>
<tr>
<td>Code</td>
<td>Quantity</td>
<td>Description</td>
<td>Context</td>
<td>Reference</td>
</tr>
<tr>
<td>-------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>IkVI-1</td>
<td>1</td>
<td>Spiral bead Late Prehistoric-Historic; cal A.D. 1670–1850; isolated human remains</td>
<td>Tlingit</td>
<td>Richards et al. 2007</td>
</tr>
<tr>
<td>XMC-098</td>
<td>1</td>
<td>Bar Prehistoric; surface find at lookout; campsite</td>
<td>Athabascan/Ahtna</td>
<td>Elder and Worthington 1988</td>
</tr>
<tr>
<td>XMC-398</td>
<td>1</td>
<td>Projectile point Prehistoric; surface find atolithic scatter near obsidian source</td>
<td>Athabascan/Ahtna</td>
<td>Patterson 1998.15</td>
</tr>
<tr>
<td>XMC-442</td>
<td>1</td>
<td>Projectile point Prehistoric/Late Prehistoric; point found near barbed antler point. Copper point articulates with the barbed antler point which has green staining and dates to cal A.D. 1267</td>
<td>Athabascan/Ahtna</td>
<td>Dixon et al. 2005:137, Dixon et al. 2007:27</td>
</tr>
<tr>
<td>VAL-065</td>
<td>138:106</td>
<td>Fragments, 7 blanks (unfinished tools), 6 projectile points, 6 awls, 5 knives, 5 needles, 2 beads</td>
<td>Late Prehistoric-Protohistoric; based on dendrochronology house 2 (114 copper artifacts) dates to A.D. 1816–1822 and contained iron and glass beads, house 1 (24 copper artifacts) contained no European/American trade goods; village</td>
<td>Athabascan/Ahtna Shinkwin 1979:51–59, 75–76</td>
</tr>
<tr>
<td>XMH-242</td>
<td>1</td>
<td>Bracelet Lithic scatter; campsite</td>
<td>Athabascan/Ahtna</td>
<td>McKay 1981:206</td>
</tr>
<tr>
<td>HEA-189</td>
<td>2</td>
<td>Cone and unidentified Late Prehistoric-Protohistoric; A.D. 1710–1830</td>
<td>Athabascan/Ahtna</td>
<td>Betts 1987</td>
</tr>
<tr>
<td>GUL-038</td>
<td>1</td>
<td>Nugget Late Prehistoric; surface scatter of lithics; lookout</td>
<td>Athabascan/Ahtna</td>
<td>Irving 1957:44–45</td>
</tr>
<tr>
<td>GUL-076</td>
<td>1</td>
<td>Awl Late Prehistoric; from hearth; habitation site</td>
<td>Athabascan/Ahtna</td>
<td>G. Clark 1974:47</td>
</tr>
<tr>
<td>GUL-077</td>
<td>170:71</td>
<td>Fragments, 36 awls (including “bipoints”), 8 projectile points, 13 knives, 14 cones, 25 unfinished/ unidentified tools, 3 decorative</td>
<td>Late Prehistoric; habitation site</td>
<td>Athabascan/Ahtna Hanson 2008; Holmes and McMahan 1986; Workman *1976</td>
</tr>
<tr>
<td>GUL-352</td>
<td>1</td>
<td>Sheet fragment Late Prehistoric; two hearths at site dated to 685-920 BP; campsite</td>
<td>Athabascan/Ahtna</td>
<td>Jangala et al. 2010</td>
</tr>
<tr>
<td>TLM-222</td>
<td>1</td>
<td>Flattened fragment Protohistoric; surface collected from habitation site</td>
<td>Athabascan/Ahtna</td>
<td>Dixon et al. 1985: D-1475</td>
</tr>
<tr>
<td>MMK-004</td>
<td>2</td>
<td>Bar and flattened sheet Late Prehistoric-Protohistoric; habitation</td>
<td>Athabascan/Ahtna</td>
<td>Holmes 1986:108</td>
</tr>
<tr>
<td>TNX-004</td>
<td>62:28</td>
<td>Fragments, 13 awls, 8 projectile points, 4 jewelry/ decorative, 3 unidentified tools, 2 fishhooks, 2 knives, 1 scraper, 1 adze</td>
<td>Late Prehistoric; majority of copper from midden with two dates – cal A.D. 1225-1275 and cal A.D. 1443-1521, but also found with iron and glass beads; village with 9 housepits; village</td>
<td>Athabascan/Upper Lawn 1974:227; Rainey 1939:366; Shinkwin 1979:100–110</td>
</tr>
<tr>
<td>XMH-205</td>
<td>2</td>
<td>Knife, 1 awl Late Prehistoric; campsite</td>
<td>Athabascan/Tanana</td>
<td>Cook 1975:126</td>
</tr>
<tr>
<td>HEA-062</td>
<td>1</td>
<td>Fragment Late Prehistoric; from hearth dated to cal A.D. 1393-1523; campsite</td>
<td>Athabascan/Tanana</td>
<td>Plaskett 1977:105, 90</td>
</tr>
<tr>
<td>Site ID</td>
<td>#/Artifacts</td>
<td>Date/Period/Context</td>
<td>Ethnic Affiliation</td>
<td>Reference</td>
</tr>
<tr>
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<td>-----------</td>
</tr>
<tr>
<td>MLZ-050</td>
<td>1:awl</td>
<td>Late Prehistoric; near obsidian source; campsite</td>
<td>Athabascan/Koyukon</td>
<td>Clark and Clark 1993:148–149</td>
</tr>
<tr>
<td>NUL-10</td>
<td>3-4:1 worked nugget and 2 flattened curved pieces</td>
<td>Late Prehistoric-Protohistoric; habitation site</td>
<td>Athabascan/Koyukon</td>
<td>Ream 1986:524</td>
</tr>
<tr>
<td>SEW-214</td>
<td>4: &quot;spatulate implement&quot; (flesher?), 3 fragments</td>
<td>Late Prehistoric; from upper level of hearth dated to cal A.D. 1310-1420; habitation site</td>
<td>Athabascan/Dena'ina</td>
<td>Holmes 1985:201-203, 248; 1988:363-36</td>
</tr>
<tr>
<td>ANC-036</td>
<td>1:fragment</td>
<td>Late Prehistoric-Protohistoric; habitation site</td>
<td>Athabascan/Dena'ina</td>
<td>DuMond and Mace 1968:7, 11</td>
</tr>
<tr>
<td>ANC-037</td>
<td>2:awls</td>
<td>Late Prehistoric-Protohistoric; habitation site</td>
<td>Athabascan/Dena'ina</td>
<td>DuMond and Mace 1968:7, 11</td>
</tr>
<tr>
<td>ANC-268</td>
<td>1:projectile point</td>
<td>isolated surface find</td>
<td>Athabascan/Dena'ina</td>
<td>AHRS 2005</td>
</tr>
<tr>
<td>KEN-066</td>
<td>3:projectile point, bipoint, blade</td>
<td>Late Prehistoric; from upper level of site, dated to as early as cal A.D. 1117-1213; habitation site</td>
<td>Athabascan/Dena'ina</td>
<td>Reger 1998:167; Reger and Boraas 1996:159</td>
</tr>
<tr>
<td>KEN-094</td>
<td>2:awl, sheet</td>
<td>Late Prehistoric-Protohistoric; from housepit dated to A.D. 1750-1800; habitation site</td>
<td>Athabascan/Dena'ina</td>
<td>Holmes 1985:130-133; 1988:362-363</td>
</tr>
<tr>
<td>TYO-122</td>
<td>2:fragments</td>
<td>Late Prehistoric-Historic; 1 fragment from midden 1 from midden dated to cal A.D. 1649-1667, 1783-1796; habitation site</td>
<td>Athabascan/Den'ina</td>
<td>Stephen R. Braund &amp; Associates 2009</td>
</tr>
<tr>
<td>YAK-007</td>
<td>48:9 pins, 7 rings, 6 bracelets, 5 projectile points, 5 knives, 5 fragments, 3 tube beads, 2 coiled beads, 2 wire hooks, 3 composites</td>
<td>Late Prehistoric-Protohistoric; cal A.D. 1832-1886 and 1485-1642; habitation site.</td>
<td>Tlingit/Yakutat</td>
<td>de Laguna et al. 1964</td>
</tr>
<tr>
<td>YAK-009</td>
<td>1:knife</td>
<td>Prehistoric; from outside cobblestone wall at fortification; fort</td>
<td>Tlingit/Yakutat</td>
<td>de Laguna et al. 1964</td>
</tr>
<tr>
<td>SIT-135</td>
<td>1:copper band on wood</td>
<td>Late Prehistoric; site dated to cal A.D. 1270-1328, relationship of dated material to copper unknown; fort</td>
<td>Tlingit'胡斯胡沃</td>
<td>de Laguna 1960; Moss et al. 1989:537</td>
</tr>
<tr>
<td>SIT-244</td>
<td>1:bead (cone)</td>
<td>Late Prehistoric; site dated to cal A.D. 1487-1604, 1397-1491, 962-1284 but relationship of dated material to copper unknown; fort</td>
<td>Tlingit'胡斯胡沃</td>
<td>de Laguna 1960; Moss et al. 1989:537</td>
</tr>
<tr>
<td>COR-001</td>
<td>5: knife, pin, ring, barbed harpoon, projectile point</td>
<td>Late Prehistoric; from uppermost level later dated to cal A.D. 1429-1485 and 1438-1521; habitation site</td>
<td>Eskimo/Chugach</td>
<td>de Laguna 1956; Yarborough 2000</td>
</tr>
<tr>
<td>SBW-056</td>
<td>1:pin</td>
<td>Late Prehistoric; found on wooden floor dated to cal A.D. 1473-</td>
<td>Eskimo/Chugach</td>
<td>Yarborough and Yarborough</td>
</tr>
</tbody>
</table>
**SEW-056** 1: pin  
Late Prehistoric; found on wooden floor dated to cal A.D. 1473-1665; habitation site

**SEW-081** 1: projectile point  
Late Prehistoric; beach midden

**SEW-488** 2: knives  
Late Prehistoric; 1 knife found below charcoal dated to cal A.D. 1435-1660, 1 knife bracketed by dates of cal A.D. 1315-1345/1390-1455 and cal A.D. 1290-1455; habitation site

**ANC-054** 1: fragment  
Late Prehistoric; from component with two hearths dated to cal A.D. 1150-1298 and 1345-1393; campsite

**SEL-001** 5: 2 cones, bracelet, blade, fragment  
Late Prehistoric; Layer 10 of Yukon Island IV, above level dated to Cal A.D. 576-772; habitation site

**SEL-041** 2: bracelet and fragment  
Late Prehistoric; from level with dates cal A.D. 773-1019, 547-902, 769-1053; habitation site

**SEL-079** 1: needle  
Late Prehistoric; from level between material dated to cal A.D. 852-1189 and cal A.D. 1434-1518 and 1272-1314; habitation site

**XMK-016** 3: 2 fragments, 1 “rod-shaped”  
Late Prehistoric; Brooks River Bluffs Phase (A.D. 1450-1800); habitation site

**XMK-034** 3: 2 knives, fragment  
Late Prehistoric; Brooks River Bluffs Phase (A.D. 1450-1800); habitation site

**NAK-015** 3: fragments  
Late Prehistoric; Brooks River Bluffs Phase (A.D. 1450-1800); from floor of house with hearth dated to cal A.D. 1732-1808 and 1493-1602, date on floor cal A.D. 1539-1634; habitation site

**KAR-121** 1: rectangular bar  
Prehistoric; from slope below habitation site

**KOD-026** 1: knife  
Late Prehistoric; from midden above house floor dated to cal A.D. 1447-1522; habitation site

**KOD-101** 1: knife  
Prehistoric; habitation site

**AFG-005** 2: awl, ring  
Prehistoric; from ca. 3,000 year old context; habitation site

**SEW-078** 1: projectile point  
Prehistoric; surface find

**SEW-077** 1: projectile point  
Prehistoric; surface find

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**Eskimo/Chugach**  
Yarborough and Yarborough 1996:157, 29

de Laguna 1956:177

Yarborough 1997:97-98


de Laguna 1934;
Reger and Boraas 1996:

Workman and Lobdell 1979:5;
Workman et al. 1980:390

Workman and Workman 1988:348

Harritt 1988:192

Harrill 1988:192

O'Leary 1999

Mobley et al. 1990:274

Donta 1994:2

D. Clark 1974:99, 164-165

Knecht and Davis 2003:40

de Laguna 1956:31
Table 3. Northern Alaska and Yukon Sites.

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Artifact # &amp; Description</th>
<th>Date/Period/Context</th>
<th>Cultural Affiliation</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>MhVf-1</td>
<td>1</td>
<td>Late Prehistoric; campsite</td>
<td>Athabascan/Gwich’in</td>
<td>Harington 1968</td>
</tr>
<tr>
<td>MjVk-7</td>
<td>1</td>
<td>Late Prehistoric; campsite</td>
<td>Athabascan/Gwich’in</td>
<td>Franklin et al. 1981:9</td>
</tr>
<tr>
<td>MjVl-1</td>
<td>3:1 fishhook, 2 fragments</td>
<td>Late Prehistoric; Post A.D. 1000-1500; campsite</td>
<td>Athabascan/Gwich’in</td>
<td>Morlan 1973:369-370, 402-403</td>
</tr>
<tr>
<td>MjVl-6</td>
<td>?</td>
<td>Prehistoric; lithic and bone scatter; campsite</td>
<td>Athabascan/Gwich’in</td>
<td>Morlan 1970</td>
</tr>
<tr>
<td>MjVg-1</td>
<td>14:2 projectile points, 2 awls, crescentic knife, 7 pieces of sheet, and 2 worked pieces</td>
<td>Late Prehistoric; 12 from level 5 - cal A.D. 620-1795, 1 from level 6a – cal 175 B.C.- A.D. 635, 1 from river bank below site; campsite</td>
<td>Athabascan/Gwich’in</td>
<td>Le Blanc 1984:35-36, 388-389</td>
</tr>
<tr>
<td>PSM-074</td>
<td>1:awl</td>
<td>Late Prehistoric; from cultural level below cal A.D. 1500-1780 date; campsite</td>
<td>Athabascan/Gwich’in</td>
<td>Wilson 1978:158, 167-168</td>
</tr>
<tr>
<td>XHP-308</td>
<td>7:3 flat circular pieces, 2 bracelets, 1 U-shape, 1 scrap</td>
<td>Late Prehistoric-Protohistoric; campsite</td>
<td>Eskimo/Inupiat</td>
<td>Irving 1964:286-287; Kunz et al. 2005</td>
</tr>
<tr>
<td>WAI-96</td>
<td>1: fishing lure with copper eyes</td>
<td>Late Prehistoric; village</td>
<td>Eskimo/Thule-Inupiat</td>
<td>Gregory A. Reinhardt, personal communication 2005</td>
</tr>
<tr>
<td>HAR-1</td>
<td>1 fishing lure with copper eyes</td>
<td>Late Prehistoric; village</td>
<td>Eskimo/Inupiat</td>
<td>Irving 1953:22</td>
</tr>
<tr>
<td>XBM-9</td>
<td>2: fishing lure with copper eyes, and fishhook barbs?</td>
<td>Late Prehistoric; village</td>
<td>Eskimo/Inupiat</td>
<td>Giddings 1952:38</td>
</tr>
</tbody>
</table>
Use. Seventy-seven archaeological sites with a combined total of approximately 569 native copper artifacts were recorded (Tables 2 and 3 and Figures 2 and 3). These sites represent varying levels of investigation ranging from pedestrian survey to subsurface testing and partial excavation of a site. It is possible that some sites or copper contexts are protohistoric or later (A.D. 1770–1850, see Workman 1977:24–25 for regional definitions of protohistoric and historic). Some additional reports of native copper artifacts have not been included in the present study due to a lack of documentation. Forty-three sites have only a single native copper artifact, 26 sites have 2 to 8 artifacts, and for two sites the exact number is not known but is likely few. The remaining six sites had 14 (Rat Indian Creek, MjVg-1—Gwich’in), 15 (Chimi, JVi-7—Tutchone) 48 (Old Town, YAK-007—Tlingit), 62 (Dixthada, TNX-004—Upper Tanana), 138 (Dakah De’nin’s Village—Ahtna), and 170 (Gulkana—Ahtna) copper artifacts. All of the sites with more than eight artifacts are Athabascan, except for the Old Town Site in Yakutat Bay. Though known as a Tlingit community, it was composed of individuals of Eyak and Ahtna heritage (de Laguna 1972).

The most common copper tools found in archaeological sites are awls (and awl-like objects probably used as drills and punches), projectile points, and knives. Drills and awls of native copper were used by the Upper Tanana (McKennan 1959) and Ahtna (de Laguna and McClellan 1981; Kari 1990), and copper needles were used by the Chugach (de Laguna 1956). The Ahtna had three tools (awl, needle, drill) specifically associated with the manufacture of snowshoes (Kari 1990). For the Upper Tanana awls were part of every man and woman’s tool kit (“workbag”) used for sewing, making snowshoe frames, and piercing the nose and ear for ornaments (McKennan 1959:68). The Ahtna (de Laguna and McClellan 1981; Kari 1990), Upper Tanana (McKennan 1959; Oswalt 1973), Southern Tutchone (Legros 2007; McClellan 1975), and Eyak (de Laguna 1990a) used native copper for knives and spear and arrow points. It was the preferred material for knives among the Upper Tanana who described two different types. One consisted of a blade about 6 inches long with a single edge set into a horn or wood handle (McKennan 1959). This roughly semi-circular form is known by the Eskimo term ulu, or “woman’s knife,” because of its association with processing fish, traditionally a female activity in both Athabascan and Eskimo culture. Ulus were part of Athabascan, Tlingit, Eyak, and Chugach material culture in south-central Alaska (de Laguna 1938, 1972, 1990a; McKennan 1959). The other knife mentioned by the Upper Tanana was a fluted doubled-edged blade with a leather-wrapped handle ending in “flaring, voluted antennae” (McKennan 1959:58) resembling ethnographic examples made of trade metal (Rogers 1965). The Southern Tutchone used long copper knives attached to shafts to kill people and bears (McClellan 1975). Copper spear points were used by the Upper Tanana to kill bears (Oswalt 1973) and by the Ahtna as weapons against both bears (Shinkwin 1979) and humans (Kari 1990). Adzes of native copper were mentioned by both the Denaina (Osgood 1937) and Upper Tanana (McKennan 1959). Workman (1976:83) considered the absence of cryptocrystalline projectile points and bifacially retouched knives at Gulkana to be “conspicuous” and suggested that such items may have been replaced by native copper and also bone and antler. Dakah De’nin’s Village is completely lacking in flaked stone tools (Shinkwin 1979).

Ethnographic accounts also describe the use of native copper for personal adornment. The Ahtna (de Laguna and McClellan 1981; Kari 1990) and Upper Tanana (McKennan 1959) used copper for ear and nose ornaments. Southern Tutchone, Inland Tlingit, and Tagish wore copper bracelets considered to be of great value and the Southern Tutchone and Inland Tlingit also reported the use of copper neck bands like those found among Tlingit on the coast (McClellan 1975). The Denaina had necklaces made of copper (Osgood 1937). Yakutat Tlingit used native copper for personal adornment but it was “worn only by the rich and noble” (de Laguna et al. 1964:87). The Eyak used copper for finger rings, hair rings, bracelets, and ear and nose ornaments (Birket-Smith and de Laguna 1938; de Laguna 1990a). Copper was also worn by the Tutchone to ensure health. During a young girl’s puberty confinement she might keep copper pieces in her mouth to ensure strong teeth in old age (McClellan 1975:256).

Trade and Exchange. The Ahtna held a near monopoly on the regional native copper trade (de
Laguna and McClellan 1981; Grinev 1993; Reckord 1983). Because sources are not evenly distributed throughout traditional Ahtna territory, access was largely controlled by the Lower Ahtna, those living nearer the coast and referred to as Mednovsty (“coppers”) by the Russians (Grinev 1993). Not only were there numerous sources of native copper in their territory, they also had direct access to coastal trading partners. In the nineteenth century the Lower Ahtna chief Nicolai controlled this trade (de Laguna and McClellan 1981; Pratt 1998).

Though native copper is present within the traditional territories of the Dena’ina (Kari and Fall 2003) and Chugach (de Laguna 1956; Lethco 1990), both also obtained it from the Ahtna via trade (Osgood 1937; Sauer 1892, in Birket-Smith 1953). At least two of the sources in Prince William Sound were used by the Chugach (Birket-Smith 1953; de Laguna 1956). The Chugach also acquired copper during raids into Ahtna territory and by trading with the Eyak (de Laguna and McClellan 1981; McClellan 1971; Reckord 1983). Among the Tutchone there was a man known as the Copper Chief who lived along the White River and made knives and spearheads out of native copper. Kletsan Creek, derived from Kletsan-dek (copper creek), a tributary of the White River, was the main source of native copper for the Tutchone (Brooks 1900; Hayes 1892; Moffit and Knopf 1910). The Upper Tanana collected nuggets from the upper portions of the Nabesna and Chisana Rivers and Kletsan Creek and traded it to other interior Athabascans (McKennan 1959). In the nineteenth century Tutchone, Ahtna, Han, and Upper Tanana leaders competed for control of the White River sources (McClellan 1981).

Ahtna immigrants from the confluence of the Chitina and Copper Rivers, who later became the Kwackwan sib, first brought copper to the Tlingit in Yakutat Bay. People in Yakutat traded food items such as seal oil, dried seaweed, and berries to the Ahtna for small bars of copper that were then beaten into shape (de Laguna 1972; de Laguna et al. 1964). According to Emmons (1991) the Chilkat Tlingit at the head of Lynn Canal began the trade in copper with Tutchone who obtained copper from Kletsan Creek. Both the Ahtna and Tutchone traded copper to the northern Tlingit (Yakutat, Chilkoot, Chilkat) (de Laguna 1972; de Laguna et al. 1964; Emmons 1991; Legros 1984; McClellan 1975) who, in turn, controlled its movement south exchanging it for prestige goods such as slaves and Haida-made red-cedar canoes (de Laguna 1972; Emmons 1991). Emmons (1991) described four routes by which native copper traveled from the interior to the coast and noted it was rare on the Northwest Coast, its value increasing as it moved south. It is reported to have reached the Haida of Queen Charlotte Islands (Acheson 2003; Brooks 1900) and the Nootka of Vancouver Island (Rickard 1939). During the fur trade (mid to late eighteenth century), native copper, tanned caribou and moose skins, tailored skin clothing, and furs were traded by Athabascans to the Tlingit in exchange for dentalium, Chilkat dance blankets, medicinal roots, and fish oil as well as goods of foreign manufacture such as pipes, beads, knives, mirrors, copper kettles, and leaf tobacco and tea (Legros 1984; McClellan 1964, 1975).

Technical Choices and Performance Characteristics

There has been disagreement regarding the relative efficiency of metal vs. lithic tools (Binford 1962; Halsey 1996; Renfrew 1978), but Leader’s (1988) experimental work with native copper demonstrated an important factor. Annealed projectile points could potentially be re-used more often than stone or work-hardened native copper projectiles because annealed native copper points are less likely to break upon impact. Extended use-life may have been one of the major benefits of using annealed native copper because the ability to reuse a tool translates into a reduction in the time and energy necessary for material acquisition and manufacture. In another experiment, Frink et al. (2003) found that processing fish with iron knives was two to three times faster than when using slate knives. Despite the greater attention given to more symbolic uses of native copper in eastern North America, awls are the most common copper artifact found at Old Copper Culture (Vernon 1990) and other sites in North America (Miles 1951). Native copper’s combination of malleability, flexibility, strength, and hardness would have made it a desirable alternative to stone, bone, antler, for a number of tools such as a punch or awl (Franklin et al. 1981). These qual-
Native copper is visually striking when polished, and is heavier than stone in relation to size. Unlike reductive lithic technology, it is transformative (Franklin et al. 1981). Its ability to change form, like shamans, or animals and humans in Distant Time (Nelson 1983b), might have been an additional attribute appreciated by northern Athabascans. According to Gell (1988:8–9), technological innovation is motivated by a desire to perform magic, which he defines as “an ‘ideal’ technology which orients practical technology and codifies technical procedures at the cognitive-symbolic level.” Similarly, the ritualization of technical procedures in a nonliterate society was proposed by Budd and Taylor (1995) as leading to the mingling of the roles of metal-worker with that of magician (shaman) or chief.

**Discussion**

*Experimentation and Information Transfer*

Franklin (1982; Franklin et al. 1981) and Clark (1991) emphasized the role of diffusion, either internally or externally, respectively, to explain the widespread occurrence of native copper technology across the Arctic and Subarctic. Social interaction and learning accounts for the spread of innovation more often than independent learning (Henrich 2001), and diffusion certainly played a role in the spread of native copper technology across the Arctic and Subarctic. However, the hammering and annealing of native copper, what Franklin et al. (1981:35) referred to as the “primary” means of working native copper, was the basic technique not just in the Arctic and Subarctic, but also throughout North America (Leader 1988; Martin 1999; Schroeder and Ruhl 1968; Trevelyan 2004; Vernon 1990), and the Old World (e.g., Smith 1968; Stech 1999; Tylecote 1992). The technique of annealing might be discovered multiple times, and could have spread rapidly, though perhaps unevenly due to a number of factors including individual preference and differential access to sources.

South-central Alaska and southwestern Yukon is currently the most extensively glaciated region in North America (Molina and Post 2010). People have hunted caribou at mountain ice patches (1800–2000 m above sea level) in the region for at least eight thousand years (Dixon et al. 2005; Farnell et al. 2004; Hare et al. 2004), but there is little to no occupation of lowland areas of the Copper River Basin before about 1,500 years ago (Harritt 1998; Potter 1997; Workman 1977). Persistent glaciation may have delayed human inhabitation of the region and exploration of steep-sided valleys where much native copper is found until the Late Prehistoric Period (Brooks 1900). The bright green and blue corrosion products (carbonates and oxides) covering native copper would have drawn attention once people began traveling along streams with nuggets. But because many sources are remote to habitation sites and at high elevation in difficult terrain, access could have been controlled by restricting the sharing of source location information.

Ethnohistoric sources state native copper knowledge and products originated among Athabascans and were then passed onto the Tlingit (de Laguna 1972; de Laguna et al. 1964; Emmons 1991; McClellan 1975; Swanton 1909). The Ahtna were called ?iqka or ?iqkaha (copper diggers) by northern Tlingit (de Laguna and McClellan 1981:662). Sources of native copper are found in central and southern British Columbia (Cooper et al. 2008; Rapp et al. 1990) where its use pre-dates that in AK-YK by 1,000 years or more (Ames 2005; Cooper 2006; de Laguna et al. 1964). There are also numerous native copper sources in the central Canadian Arctic and Subarctic concentrated around the lower Coppermine River and southern Victoria Island (Franklin et al. 1981; Rapp et al. 1990). Most of the archaeological evidence for native copper use is associated with Late Dorset (e.g., Lemoine et al. 2003; McGhee 1996), Thule-Inuit (e.g., McCartney 1988, 1991; Morrison 1987), or Athabascan culture (e.g., Gordon 1996; Moodie et al. 1992). However, a small number are believed to be evidence of earlier Arctic Small Tool tradition use (e.g., Clark 1975; McGhee 1972; Noble 1981). The relationship between native copper technology in these three regions is unknown.

*Acquisition*

Personal preference for tool raw material may have slowed the adoption of native copper even
among those who had access to it. The regional pattern of native copper use among northern Athabascans fits with ideas about northern Athabascan autonomy. Copper was integrated into the existing material technology repertoire of bone, antler, and stone, but only those with regular direct access, such as the inhabitants of Gulkana and Dakah De’nin’s Village, became heavily invested in this technology. Awls were used by men and women but ulus are associated specifically with the activities of women. As a result, women may have played a significant role in evaluating the benefit of native copper tools during the adoption process.

Replication and Use

The radiocarbon dates presented in Tables 2 and 3 are associated with copper contexts and provide either or terminus post quem, terminus ante quem, or approximate time of use. All radiocarbon dates have been calibrated using CALIB 5.0 (Stuiver and Reimer 1993) to the nearest 1 sigma. In southwestern Yukon White River Ash (WRA) deposits, dated to cal A.D. 803 (Clague et al. 1995), provide a terminus post quem for copper found at: JaUk-23, JaUn-4, JbUn-1, JeUj-12, JeVb-15, JfUv-7, JgVv-4, JhVf-4, JjVj-7, JiVv-1, and KdVa-8. The majority of archaeological evidence for its use in south-central Alaska and Yukon dates to A.D. 1000–1700. This makes it a Late Prehistoric horizon technology in AK-YK, occurring alongside lithic (flaking and ground stone), bone, and antler technologies rather than replacing them (Workman 1978). However, archaeological evidence at two sites, Gulkana and Dakah De’nin’s Village, shows that some Ahtna communities became heavily invested in this technology. Other technological changes that characterize Late Prehistoric Athabascan technology and distinguish it from the Northern Archaic tradition (6,000–1,000 B.P.) are, in addition to the use of native copper: increased use of organic materials such as bone and antler, less use of flaked stone and a reduction in biface size, absence of microblades, and the introduction of the bow and arrow (Clark 1981; Dixon 1985; Hare et al. 2004; Potter 2008).

Early First Millennium evidence for its use has been found at two sites. At Rat Indian Creek (MJVg-1) in the northern Yukon a piece of native copper sheet debris came from a level associated with radiocarbon dates of cal 130 B.C.–A.D. 10 and A.D. 360–520 (Le Blanc 1984). Bonanza Patch (XMC-442), an ice patch site consisting of surface finds melting out of shrinking ice at high elevation produced a single native copper point but also two unilaterally barbed antler points both with green staining where an endblade would have been inserted. One was found near the copper point with which it articulates. This nearby antler point was dated to cal A.D. 1267 and the other to cal A.D. 534. If the green staining on this latter point is from copper, it represents the earliest date for native copper use in the region (Dixon et al. 2007; Dixon et al. 2005). These early dates still place native copper technology within the Athabascan tradition (1500–100 B.P.) (Dixon 1985).

The number of native copper artifacts drops off quickly away from the Wrangell and St. Elias mountain ranges, which largely coincides with the traditional territories of the Ahtna and Tutchone. This distribution corresponds to a model of direct procurement and supply zone behavior where users obtain raw material either by traveling to its source, or acquire it via trade from someone who visited the source (Renfrew 1977). Reciprocal exchange with kin, the dominant form of trading activity among small-scale societies (Sahlins 1972), could account for most of the distribution of native copper found archaeologically as northern Athabascans and other Na-Dene speakers were the major users of native copper in AK-YK but artifacts have been recovered from several Late Prehistoric (post-ca. A.D. 1000) coastal contexts in Alaska associated with Chugach, Koniag, Thule, and Inuit Eskimo groups (Figures 2 and 3, Tables 2 and 3). Whether the copper from the northern sites (Figure 3) is from the south or sources to the east in the central Canadian Arctic is unclear. The Chugach, whose territory contained native copper, made the greatest use of it among these groups with most evidence dating to the fourteenth and fifteenth centuries A.D. (Cooper 2007). Two additional Late Prehistoric (ca. A.D. 1,000) copper finds from southwestern Alaska outside of the map coverage shown here and not included in the tables are two beads and one fragment from a Koniag (Late Prehistoric Eskimo) context at SUT-27 in Aniakchak Bay on the Alaskan Peninsula (per-
sonal communication, Hoffman 2009), and a single copper blade 7 cm long from UNL-55 (Unangan culture) (Knecht and Davis 2003). These sites are approximately 186 km and 830 km southwest of the Kodiak Island, respectively. Two copper artifacts from AFG-5 on Afognak Island at the northern end of the Kodiak Archipelago were reportedly associated with a 3,000-year-old context (Knecht and Davis 2003) but little is known about this find at present.

Native Copper and Social Complexity

Control over the regional copper trade contributed to the establishment of high social rank among the Ahtna (de Laguna and McClellan 1981; Grinev 1993; Kari 1985; Pratt 1998; Shinkwin 1979). Ahtna chiefs claimed ownership of sources and were ranked relative to other chiefs based on their possession of copper and control of its trade. An Ahtna man stated that all men could collect copper, “but it all belonged to the chief” (Shinkwin 1979:27). Though copper was associated with the prestige of individual chiefs, it also provided group prestige. Several native copper sources in Ahtna territory are located in the Nizina area (see Figure 2 source #s 26, 27, 29–31), which corresponds to the concentration of Ahtna copper place names (Cooper 2011). This area was claimed by the Udzisyu (McClellan 1975), the matrilineage of Chief Nicolai, who controlled the native copper trade in the latter part of the nineteenth century (Shinkwin 1979). Stories concerning the discovery of copper among the Dena’ina (Kari and Fall 2003; Osgood 1937), Sitka Tlingit (Swanton 1909), Ahtna, and Yakutat Tlingit (de Laguna 1972) give accounts of poor men who, after finding copper, marry the daughter of a chief. The Yakutat story tells of an Ahtna boy of low status, his mother a slave, to whom the spirit of copper appears, leading him to the source. After taking copper back to the community that had ostracized them, the boy and his mother were recognized by the chief (de Laguna 1972).

Native copper was associated with luck, wealth, and prestige among the Tutchone (Legros 1985, 2007), Dena’ina (Osgood 1937), and Ahtna Athabascans (Grinev 1993; Kari 1985; Pratt 1998) and Yakutat Tlingit (de Laguna 1972; de Laguna et al. 1964). Wealth and luck are closely intertwined in the worldview of northern Athabascans and Tlingit. Luck, an important factor in hunting success, is dependent upon proper interaction with the spirits. Luck connects humans to spirits and one keeps or acquires luck through proper behavior toward and interaction with spirits (Nelson 1983b). Among the Ahtna copper “demanded religious precautions to secure the nuggets, and specialized knowledge to shape it into knives, daggers, spear heads, and harpoon heads” (de Laguna and McClellan 1981:645). The association of native copper with animals, especially those with dangerous and powerful spirits such as the wolverine (McKennan 1959), and its use for killing bears (de Laguna and McClellan 1981) and humans (McClellan 1975), emphasize native copper as a spiritually powerful weapon. A copper projectile point that had killed a person had “special power” once hammered back into shape (Kari 1985:101). Another example of a native copper tool taking on spiritual or prestige associations is the Ahtna copper knife used to cut salmon in a First Salmon ceremony (Moffit and Maddren 1909). That copper required special spiritual attention suggests that, like animals, plants, and features of the landscape (de Laguna 1969), native copper was perceived as a living conscious entity that had to be treated with respect (Cooper 2011).

Even in societies with a strong egalitarian ethic some individuals will be shown greater respect due to a variety of factors including knowledge or age (Ames 2007, Fried 1967). Native copper sources are widespread but distributed unevenly across the landscape. Several sources could have been accessed regularly, though not easily due to the terrain. Differential access to copper was a result of this uneven distribution of sources remote from habitation sites. Matrilineal groups and their leaders could control access to sources in their territory by exerting exclusive property rights and keeping the location of sources secret. Those without direct access to sources would have been dependent on trade relationships with real or fictive kin to acquire copper. The aggressive control of coast-interior trade relationships by high-ranking individuals among the Ahtna (de Laguna and McClellan 1981), Tutchone (Legros 2007), and Tlingit (Legros 1984) was one method by which they attempted to acquire power (Hayden 1995). These relationships can easily account for the
transfer of native copper technology between communities evidenced in its archaeological distribution. The idea that native copper could be collected and used by anyone but was owned by chiefs blurs the distinction made by Torrence (1986:84) regarding access to lithic raw material whereby unrestricted access coincides with the acquisition of material and manufacture of products by the same person, and restricted access is associated with market exchange and greater specialization. The use of native copper for tools is not a good long-term option for practical technology unless sources can be accessed directly, or it can be obtained regularly via trade at a reasonable cost. The high cost of procurement associated with long-distance exchange reinforces the goal of prestige technology, which is to impress others with one’s knowledge and external contacts (Cooper 2006; Hayden 1998).

Archaeological and ethnohistoric data both support native copper’s use as prestige technology by high-ranking individuals in Yakutat Bay. This site produced 48 native copper artifacts, 16 of which are bracelets, beads, or rings (de Laguna et al. 1964; de Laguna 1972). Similarly, Leader (1988) found that though native copper in the Great Lakes region was treated as any other desirable lithic material during the Archaic, it was more likely to be used in a prestige context with increasing distance from sources. There is very little archaeological evidence for the use of native copper in any ritual or prestige context by Athabascans. The foodstuffs received from the coast in exchange for native copper were likely considered prestigious and consumed at community feasts, reinforcing the wealth and power of the chief who controlled the movement of copper (Hayden 1995, 2001), but they have left no archaeological trace. The overt use of native copper as prestige technology, e.g., personal adornment, was hindered by an Athabascan worldview that valued sharing and harmony (Simeone 1995).

Summary
Native copper may have traveled great distances via down-the-line trade but artifacts are concentrated in the supply zone. The widespread availability of native copper, existence of the basic technological repertoire necessary for working it, and indigenous oral history all support a model of in-situ native copper innovation in AK-YK. This paper does not claim that native copper caused social complexity among the Ahtna or any other group. To do so would ignore the more obvious and interrelated causes of increasing social complexity such as sedentism, food storage, and scalar stress (see Ames 2007:493–494). However, I argue here that diffusion of copper artifacts and knowledge was facilitated by cosmopolite innovator-aggrandizers working within a transegalitarian social environment who sought to control copper sources and trade relationships.

The form and context of native copper artifacts in this region overwhelmingly supports their use as a practical technology but regional ethnohistory emphasizes a connection with prestige. This discrepancy is probably a result of three factors. First, rather than impressing others, the personal display of wealth in a transegalitarian society might have an opposite negative effect. Avoiding overt strife would be especially important for aggrandizers attempting to move toward less egalitarian relations, but who have not yet accrued social power. Second, the relationship between native copper and social complexity among Athabascans, especially the Ahtna, was a result of its value as a trade item. The control and exchange of native copper provided wealth and prestige, not its use for display. Third, this innovation occurred relatively late in AK-YK, meaning its movement into the realm of prestige technology may have occurred recently. The adoption of copper technology during the Late Prehistoric period leaves little opportunity for its use to be recorded in archaeological contexts prior to the severe social and technological change that followed quickly after the beginning of the fur trade.

Future Directions
Skibo and Schiffer’s (2008) design theory principles provide a methodological framework for investigating innovation, particularly, why a given technology is chosen over available alternatives. This approach avoids technological determinism and recognizes that technological differentiation represents something more complex than trade and exchange. Future analyses of the use of native
copper focused on activities and interactions at the site or feature level will allow for a more detailed discussion of the integration of native copper into northern Athabaskan technology.

Replication studies of the Late Prehistoric Athabaskan toolkit will provide information on the relative reliability and ease of maintenance of different materials that will facilitate the comparison of the technical activities and choices and performance characteristics, and will additionally provide quantitative and qualitative data on the acquisition of native copper working skill. Ongoing research into the prehistoric use of native copper on the Northwest Coast and adjacent Plateau and in the central Canadian Arctic and Subarctic will clarify the extent to which this technology was shared between these regions and add to the discussion of the relationship between the innovation and transfer of technology and its relationship to social complexity among hunter-gatherers.

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