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Copper on the Northwest Coast, A Biographical Approach

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Abstract

This paper explores Indigenous use of copper metal to create objects of cultural importance on the Northwest Coast of North America, and the impacts of colonial contact on established cultural practices. Prior to contact (late 17th to early 19th century), native copper and occasional shipwreck drift copper was collected, traded, and used by Indigenous communities to fabricate meaningful objects such as Coppers. Following the introduction of foreign trade materials, copper continued to be used to create culturally significant artefacts but existing frameworks of interaction with the metal shifted to accommodate the new materials and social relations introduced by contact.

This investigation highlights the utility of a biographical approach to gain an understanding of Indigenous artefacts and the relationships they engender. Specifically, a close material investigation of a Kwakwaka'wakw Copper fabricated from multiple pieces of metal is conducted. This copper alloy artefact results from a series of material choices, fabrication traditions, and usage that, when considered alongside archaeological and ethnographic data allow us insight in to social, economic, and political changes during the contact period.

Key words: artefact biography, copper, Northwest coast, material culture studies

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1 Introduction

This paper highlights the utility of considering object biographies (Kopytoff 1986) to gain a particular understanding of artefacts outside of a rigid classification system. Instead, biographies consider artefacts based on their interactions and how these change over time, revealing the subtle differences in each object's discreet history of social, economic, and political interactions (Appadurai *et al.* 1986; Gosden & Marshall 1999; Knappett 2005). Here the shifting relationship between copper and Indigenous communities on the Northwest Coast during the colonial period (late 17th to early 19th century) is addressed through the biographical study of a Dzawada'enuxw Kwakwaka'wakw Copper. It remains unclear to what extent the perceived value and prestige of copper material and artefacts changed, or was altered due to colonial contact; however, it is presumed that alongside new diseases, peoples, and colonial restrictions on trade, travel, and tradition (Boyd 1999; Suttles 1990; Acheson &Delgado 2004), the introduction of foreign materials affected the communities of the Pacific Northwest.

1.1 Copper on the Northwest Coast

The Northwest Coast of North America, stretching from Tlingit traditional territory in Alaska to the Coast Salish residing in what is now Washington State, is characterised by a broadly similar environmental biome. Residing across this region are multiple First Nations communities who share, to varying extents, cultural practices and ontological views. These shared elements of culture are also intercut with regional diversity, particularly in relation to elements of language, architecture, and cultural practices such as marriage partner residence and kinship organisation (Figure 1; Acheson 2003; Ames 1994; Donald 1997; Drucker 1951; Jorgensen 1980; Matson & Coupland 1995; McClellan 1975; Suttles 1990; Jordan and O'Neil 2010). Copper, as material and artefact, played a part in this distinction and seems to have a long-established significance that was retained throughout colonial contact (Jopling 1989). For example, discreet pre-contact sites across the Pacific Northwest that contain small amounts of copper artefacts support an argument for a long-established pre-contact metallurgical tradition (Cooper 2012; Hunt 2015). Furthermore, reference to copper metal and artefacts in oral histories, alongside archaeological, anthropological, and colonial records, demonstrates that copper was thought of as a powerful and active material for many of the region's First Nations communities (Acheson 2003; Acheson & Delgado 2004; Couture 1975; de Laguna 1972; de Laguna *et al.* 1964; Hunt 2015, 57; Drucker 1951; Pratt 1998, 82). This shared interest in copper was also intercut with diversity in material use, and individual communities chose to employ copper in distinct and enduring ways. The Tlingit, Haida, Nisga'a, Tsimshian, Nuxalk, Haisla, Heiltsuk, Wuikinuxv, and Kwakwaka'wakw created shield-shaped ‘Coppers’, while the Nuu-chah-nulth, Coast Salish, Makah, and Quileut focused more on other objects such as personal adornments (Ames 1994; de Laguna 1972; de Laguna *et al.* 1964; Donald 1997; Matson & Coupland 1995, 259; Harkin 2000, 21; Garfield 1966).

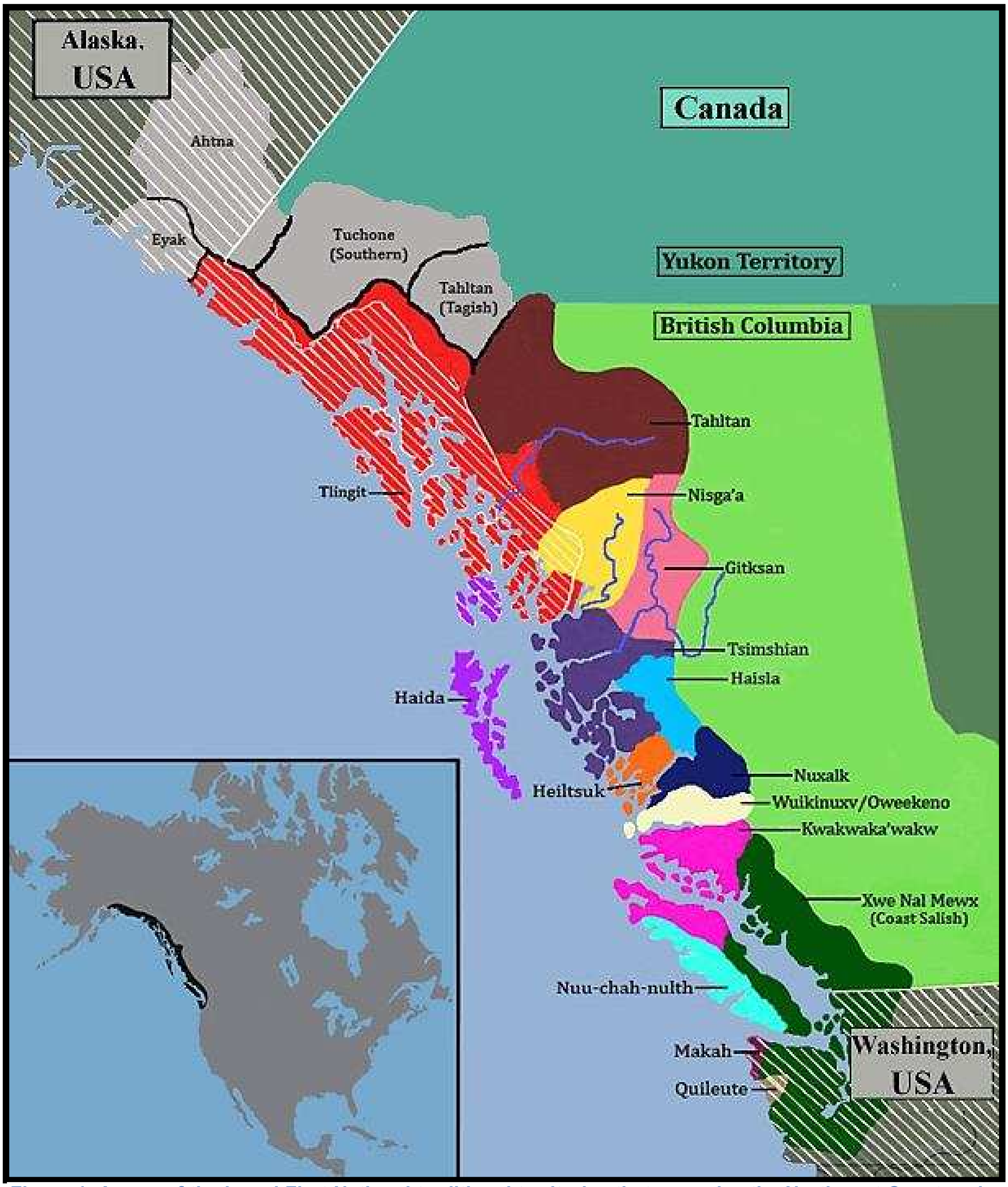

Figure 1. A map of the broad First Nations’ traditional territories that comprise the Northwest Coast region, which stretches from the Tlingit of Yakutat Bay in Alaska, to the Xwe Nal Mewx (Coast Salish) residing North of the Columbia River on the border of Washington and Oregon state. Some northern culture groups, shown in grey, traded copper with Indigenous communities in the Northwest Coast study area and are included for context.

Native copper is abundant in the Northwest Coast region, with the majority coming from the terrestrial river drainages of the Wrangell St. Elias mountain range in Alaska (Acheson 2003, 215; Blake 2004, 110-111; Cooper 2012; Dawson 1879, 116B; Large 1958, 59; Leposky *et al.* 2000; MacFie 1865, 152-3; Swan *n.d.*). The metal can be collected from streambed gravels as placer nuggets, dense blocks, or dendritic spongy masses, and is often identified by its characteristic green corrosion products or abraded metallic lustre (Lethcoe 1990). Native metal was traded by the Ahtna, Southern Tutchone, and Tanana to the Tlingit at meeting places such as Dry Bay, Lynn Canal, and Lake Atlin in Alaska and British Columbia, who in turn traded copper to their southern neighbours (Birket-Smith 1953; Brooks 1900; Dawson 1879; Grinev 1993; Kari & Fall 2003; Niblack 1890; Osgood 1937; Pratt 1998). This trend in trade and movement continued and expanded following the introduction of colonial materials, which appear to have been swiftly incorporated into the assemblage of Indigenous trade goods (Figure 1; Figure 2; Acheson 2003, 215; Acheson & Delgado 2004; de Laguna 1972; de Laguna *et al.* 1964, 9; Emmons 1991, 176-77; McClellan 1975; Swanton 1909).

Figure 2. A native copper slab recovered from the White River drainage of the Wrangell St. Elias Mountain Range, displayed by the MacBride Museum, Whitehorse, Yukon Territory. The 1175kg mass was discovered in 1905 by prospectors (Pictures by author).

1.2 Copper Use on The Northwest Coast

Copper was regarded as a powerful and animate material that was part of both the natural and supernatural worlds, requiring prescribed protocols when handled (Blackman 1990; Cooper 2011; de Laguna 1972; Jopling 1989; Keithahan 1964). Its potency is apparent in its entanglement with supernatural beings, origin stories, and ideas of protection, commination, health, wealth, and prestige (Cooper 2011; McIlwraith 1948, 688-90; Niblack 1890). For example, Swanton's recorded Haida stories highlight the foundational qualities embodied in copper, where Haida Gwaii has been described as resting upon a supernatural being that lies upon a copper box which provides protection to the island (Blackman 1990, 248; Macdonald 1989, 16; Swanton 1905). Additionally, copper was described by the Kwakwakw'wakw as instrumental in bringing light into the world (King 1999, 160) or as the blood of the earth (Damon 2017, 3). Communities throughout the entire region have been recorded as adorning adults and children of both sexes with various copper pieces for purposes of supernatural protection, as well as conspicuous displays of wealth and power (Colnett 1786-88, 136; de Laguna 1972; de Laguna *et al.* 1964; Grinev 1993; Jopling 1989; Kari 1986; Legros 1985; McClellan 1975; McIlwraith 1948; Pratt 1998). This empowerment of copper translated into limited rights of access to procurement areas, metallurgical knowledge, and the use and display of artefacts (Cooper 2011, 2006; Hayden 1998; Lattanzi 2007; Leader 1988; Lisiansky 1814; Pleger 2000).

The earliest indications of copper use in the region are relatively rare (Hunt 2015, 61; Copper & Waber 2010). Excavations at the Haida village site *Lc!uuga*, at Louscoone Point, Moresby Island, recovered copper wire affixed to a shell fragment from contexts dating to AD 1150-1400 (Acheson 2003, 223-4; Acheson 1998). Hunt identified 31 pre-contact sites along the Northwest Coast and Fraser River watershed that produced copper artefacts, but again with only small numbers of objects attributed to any single site (Hunt 2015, 56-61). Late prehistoric or proto-historic house floors and middens at Tlákw.aan (Old Town) in Yakutat Bay were more productive, with a significant concentration of 48 copper artefacts/fragments (de Laguna *et al*. 1964; Cooper 2006, 149-151).

The use of copper in funerary practice continued throughout the colonial period, with several burial sites from both pre-, during-, and post-contact contexts found to contain copper and copper alloy pendants, bracelets, rings, and beads (Blake 2004, 111; Hill-Tout 1930; Smith 1899, 151; 1900, 425; Smith & Fowke 1901, 65; Stryd 1978; Stryd & Baker 1968; Burley & Knüsel 1989). For example, four native copper pendants and one ring were found associated with a male burial dated to ca. 1400 B.P., within a large mound excavated at Stó:lō Nation site *Sq'éwlets* (Lepofsky *et al.* 2000, 406). Additionally, copper beads, fragments, wrapped dowels, and bracelets have been recovered from burial contexts dated earlier than 1100BC up to the colonial era at archaeological site GbTo-31 located in Prince Rupert Harbour (Ames 2005, 208-234). This is not to suggest that these were solely funerary goods as they may have had previous and extensive use in life (Acheson 2003, 227; Ames & Maschner 1999, 171; Blake 2004, 110; Carlson 1994; Drucker 1951, 54; Matson & Coupland 1995, 203; McClellan 1975; Richards & Rousseau 1987; Schulting 1995).

1.2.1 Indigenous Metallurgy and Metallurgists

Indigenous metallurgists produced a wide range of artefacts, relying on a repertoire of techniques that included hammering, annealing, folding, riveting, and engraving while making use of an open fire, and a range of tools (Acheson 2003; Cooper 2012, 2007; Emmons 1991; Franklin *et al.* 1981; Wayman 1993). Hammer and anvil stones, chisels, inscribers, fuel to sustain the fire, and carved forms for shaping artefacts would have to be procured from varied geological, floral, and faunal resources, testifying to the specialised environmental knowledge of metalworkers (Cushing 1894; McClellan & Denniston 1981; Leader 1988; Richard 1939). This, coupled with specialist skills required to create significant objects, meant that working copper afforded metallurgists a specific identity. For example, among the Tlingit, metallurgists were sometimes identified by particular attire, i.e. woven cedar head, neck, and waist bands adorned with copper ornaments, and referred to by special names that have been translated as 'Copper Breaker', 'One Who Hammers', or 'They Pound It' (de Laguna & McClellan 1981, 662; Kari 1990; Kari & Fall 2003; Swanton 1905). In some instances, the identity of copper workers was not simply confirmed by their skill with or access to the metal, but also by the spaces they inhabited. Skilled copper workers among the Ahtna reportedly lived outside of their villages to avoid being captured or killed in an attack (de Laguna & McClellan 1981, 645; Kari & Fall 2003, 111; McClellan 1975). While such segregation was likely enforced for protection, it would also have reinforced the special status of both metallurgist and metal. These segregated areas were most likely the location of copper working, suggesting that copper artefacts themselves would have emerged from marginal locations that serve to simultaneously define and obfuscate their origins (Jopling 1989, Day & Doonan 2007).

1.2.2 Coppers

Coppers are flat sheet artefacts with a distinct raised 'T' ridge, that range from ~10->100cm in length. They can be constructed from a single sheet, or multiple pieces that are variously riveted, folded, soldered, and/or glued together. Often invoked in important social acts such as conspicuous consumption, rites of passage, commemoration, and embodied oral history (Jopling 1989; Boas & Hunt 1921), they are among some of the most significant cultural objects to the communities who make and use them (Ames 1994; Suttles 1990). Examples of composite Coppers show complex fabrication and breakage sequences sometimes incorporating pieces of previously 'broken' fragments. Surface decoration may be present and include combinations of painting, carving, engraving, and scratching (Jopling 1989, 7-8). Terms used to refer to parts of the Copper suggest they are anthropomorphised by some. For example, the Tlingit sometimes refer to the vertical portion of the T-ridge as the 'backbone', the horizontal ridge as the 'shoulders', horizontal painted lines on the bottom portion of the artefact as 'ribs', and pieces cut from the Copper as the 'bones of the dead Chief' (Ames & Maschner 1999; Kan 2016, 239; de Widerspach-Thor 1981, 169; Drucker 1951, 237; Jopling 1989; Olson 1933-54).

Rather than having a single intrinsic value, Coppers accumulated value and worth through their participation in social transactions (Ames & Maschner 1999; Boas 1887, Jopling 1989; King 1999; McIlwraith 1948). Coppers were involved in a wide range of activities and could, for example, be given as part of a wedding dowry, inherited or passed down, affixed to Memorial poles, offered as tokens of peace and good will, used in acts of supplication to the spirit world, and were even used in public challenges through their entire or partial destruction (Boas 1975 (1909), 1930; Carlson 1990, 1983; Carlson and Hobler 1993; Curtis 1916; de Laguna & McClellan 1981; de Widerspach-Thor 1981, 169; Drucker 1951, 237; Pratt 1998; Simeone 1995; Tybjerg 1977). Interactions could take place across clan and moiety lines and accumulated value would in turn be incorporated in oral history (Boas 1897; Emmons 1991; Kan 2016, 238-9; Lisiansky 1814, 150; Niblack 1890, 336; Suttles 1990; Swanton 1909, 63).

It is not known to what extent Coppers were present in the region prior to colonial contact (Jopling 1989; de Laguna 1972). Ahtna and Tlingit oral histories describe a '*tinaá*', a copper shield or plate worth 10 slaves, used to purchase land in Yakutat Bay around 1400AD (de Laguna 1972, 231-247; Swanton 1909, 347-368). However, it is not entirely clear whether this '*tinaá*' should be understood as a conventional Copper. During the early contact period two accounts, one written by Colnett in 1787 among the Southern Haida and the other by Lisiansky in 1814 among the Tlingit, both include descriptions and illustrations of artefacts that bear a marked resemblance to large Coppers (Colnett 1786-88, 136; Lisiansky 1814, 146). Evidence for pre-contact antecedents to Coppers is sparse, and studies to date have found a predominance of non-native copper used for fabrication (Wayman, King, & Craddock 1992; Wayman 1993, Jopling 1989). de Laguna documents three artefacts that may be copper antecedents, one small slate amulet collected by Libby at Yakutat in 1886, and two small whale bone amulets collected by Emmons before 1888 from a Shaman's grave house at Drybay (de Laguna 1972, 1053,1096). Unfortunately, the date of production for these objects is unknown and collection occurred well after initial contact, though the inclusion of Coppers in oral history and early ethnographic accounts support an argument for a pre-contact tradition (Boas 1887, Jopling 1989, 50; de Laguna 1972; Hunt 1906; Colnett 1786-88; Lisiansky 1814, 146).

1.2.2.1 Coppers in an Era of Contact

Coppers were often employed in their various roles while on public display during festivals such as the Potlatches of the Northwest Coast, allowing their rich histories to grow (Cole & Darling 1990). Prior to contact such gatherings are recorded as relatively small and reserved affairs (Cole & Darling 1990, 129; Grumet 1975, 301; Codere 1961, 445; Codere 1950, 95). However, population decline due to conflict, disease, and the subsequent upset in community structure caused by loss of high-status members and cultural knowledge, meant that fragmented groups often consolidated and the sizes of their festivals grew. Uncertainty, tension, and competition concerning social status became a notable feature in these new communities (Cole & Darling 1990, 129; Boyd 1999, 21-60; Codere 1950). When situated near colonial outposts and with access to trade goods, new materials were available to those Indigenous people with the means and will to engage with foreign interests. As such, individuals who previously had not been able to access the Potlatch system were now able to participate and effectively compete, upsetting protocols and hereditary rights. During this time Potlatch ceremonies also expanded geographically while increasing in size, frequency, and seeming importance during the colonial period until the Potlatch ban in 1885, resulting in an increased number of Coppers in circulation (Codere 1990, 369; Schreiber & Newell 2006, 226; Loo 1992, 143; Wolf 1999; Dickason 1992, 237; Plewes 1997, 60-61; Jonaitis 1991).

2 Artefact Biographies on the Northwest Coast

Archaeologists have tended to partition the study of artefacts into the conditions of their production and the circumstances of consumption. This partitioning has enabled discrete technology and/or exchange studies and, while it might suit certain classes of material, it can be considered limited for artefacts such as the Coppers' of the Northwest Coast (Gosden and Marshall 1999, Kopytoff 1986) For Coppers, and especially composite ones (see above), their making, exchange, breaking, and remaking means there is no neat division between production and consumption, it is instead a continuing cycle (Gosden and Marshall 1999, Jopling 1989). This ongoing sequence lends itself to an alternative scheme of study that is best understood as an artefact biography; the study of how persons and things change as they gather time and are caught up in life (Gosden and Marshall 1999, Kopytoff 1986; Barad 2007). Biographical approaches do not seek to classify individual artefacts in to group categories or trace exchange networks based on intrinsic properties. Rather, the individual nuanced lives of individual artefacts are sought, with an emphasis on how they and persons are drawn together in social interactions; what Igor Kopytoff refers to as its social life (Kopytoff 1986). While biographies accept that artefact meanings can change without any material alteration, methodologically, artefact biographies are rooted in the close examination of material to reveal use-wear and production history, but with an eye to explaining these through their social conditions and relations (Appadurai *et al.* 1986; Knappett 2005). Biographies then offer a relational perspective by connecting the material with the social, and shifting the archaeological focus towards detailed documentation of fabrication syntax, and the subsequent practices that are indicative of use, or as Ingold might say “how things get caught up in life” (2010). In exposing the conditions within which things are made and accumulate their own inextricable social and material histories, biographical studies lend themselves to comparative analysis to show the varied and shared practices that might attend to individual artefact classes (Gosden & Marshall 1999, 169-170; Hoskins 1998).

Maintaining a commitment to the biographical approach may appear intransient, especially in light of developments in post-humanism and its reconsideration of agency in the non-human (Latour 2005, Witmore 2014; Ferrando 2013). There now exists a selection of approaches that assert the agency and/or the vitality of things (Bennett 2010; Olsen *et al.* 2012) and in doing so offer anthropologists a way of thinking with an apparent closeness to the shared Indigenous material ontologies of the Northwest Coast (Damon 2017). The closeness of what is seen as animism (Descola 2013) with “new materialism” may be attractive to anthropologists, but as anthropology asserts its interest over Indigenous material it executes “epistemic violence…in creating and sustaining boundaries around what is considered real” (Hunt 2014 cited in Damon 2017). This is as true for “new materialism” as it is for any other western anthropological approach, and in some ways magnified for “new materialism” if employed under the misguided assumption that it somehow approximates Indigenous ontologies. Similar points have been raised by Todd (2016) who, in pointing out the superficial similarities between Indigenous ontologies and post-humanist approaches, notes the failure of western academia to recognise the contribution of Indigenous thought. This failure sets the attempt to decolonise anthropology as a renewed effort of colonisation (Todd 2016) and undermines any attempt to place post-humanist approaches as an ethical alternative. The study of Indigenous communities and their belongings (Damon 2017) carries with it inescapable issues that cannot simply be solved by importing new approaches and methods. The commitment to biographies employed here is equally open to critique. Yet from one aspect its use is fitting in that, quite unlike any other approach, it promotes a sense of temporal depth in analysis and this is certainly one aspect of Northwest Coast copper that is central to its broad appreciation.

3 A Biography of a Copper: A Case Study

Working with artefacts from museum collections is challenging as they often curate artefacts from early explorers and travellers who recorded little about acquisition or social context. In the absence of explicit archaeological or social detail the investigator needs to adopt a predominately materials based approach. As such, the examination of the artefact involves close inspection, making note of material type, physical form, patina, and marks indicative of fabrication, use, destruction, discard, recycling, repair, and repurposing that accumulate during the artefact's life (Gosden and Marshall 1999; Joy 2009, 545-548; Tilley 1999). Akin to the definition of stratigraphy on an archaeological site, here too it is possible to delineate the sequence of events associated with the fabrication, use, and repair of artefacts. Where present, ethnographic accounts and archaeological records provide further context, through revealing glimpses of how fabrication was organised or how artefacts were used and meanings transformed.

3.1 Dzawada'enuxw, Kwakwaka'wakw Copper

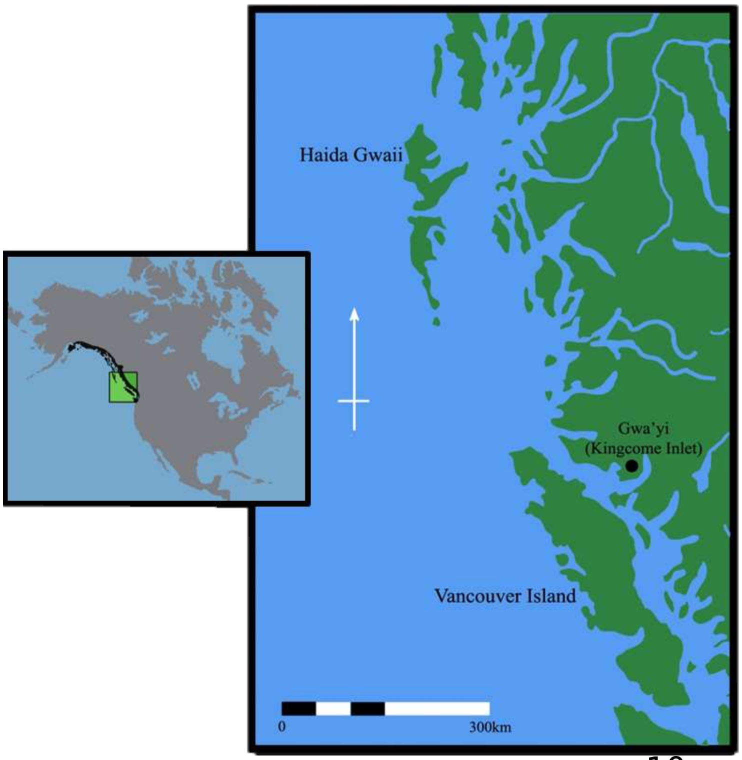

Figure 3. The Copper examined in this case study was created in Gwa'yi (Kingcome Inlet), British Columbia, Canada.

This case study focuses on a Dzawada'enuxw Kwakwaka'wakw Copper, identification no. A6834, housed at the Museum of Anthropology (MOA), Vancouver, British Columbia, Canada. Museum records show that the Copper was made in Gwa'yi, or Kingcome Inlet, British Columbia (Figure 3). The Copper came to the MOA through a sale in 1958, with the museum using funds from the Leon & Thea Koerner Foundation for the purchase. The previous owner of the Copper, Mrs Emily Watson of the

Dzawada'enuxw community was born in Kingcome village in 1899 as Emma Sunday. Emma was married to her first husband Hector Webb, son of Charles Seaweed, in 1923. Following his death in 1953 she remarried to a Robert Watson and changed her name (Province of B.C. Vital Statistics 1953, 1963). In 1957 Emily wrote to MOA curator Audrey Hawthorn to inquire whether the museum would like to purchase this Copper along with other items such as masks. In her letter she described the Copper as a 'very old treasure' that had belonged to her great grandfather. Though it is unclear whether she was referring to her own, or Hector Webb's, great grandfather the attribution suggests the copper was extant around the early part of the 19th century. This type of transaction occurred quite often at the MOA in the 1950's and 60's, and is potentially linked to the changing perception and use of some Indigenous objects in the 20th century following the end of the Potlatch ban, a need for cash within the westernised economy, and the understanding that museums were willing to pay for these artefacts (MOA Collections Manager personal communication).

3.1.1 Physical Analysis

Copper A6834 is a large copper measuring 76.3cm x 45.5cm on its major axes. While of typical sheet metal construction, it is immediately apparent that it is a composite artefact fabricated from seven individual pieces of copper sheet held together with an assemblage of varied rivets. The variety of rivets, punched holes, percussion tool marks, and design features visible across the body of the Copper show that it has been made, broken, and remade many times.

The upper portion of the Copper shows construction is arranged around a centre-line giving the impression of two halves. Viewed from the front, the right half is composed of three pieces of sheet, while the left half is formed from a single sheet. The manner of sheets overlaying one another, *the stratigraphy*, shows that the three sheets that form the right panel have been fixed together prior to attachment to the left panel. Where the left and right panels are brought together the metal has been heavily worked, leaving an approximately 1-2 cm wide vertical strip of prominent impact marks. The hammering tool used to better marry the two halves together has left slightly concave uniformly circular or crescent shaped markings similar to those of a hammer with a regularly shaped cylindrical head.

The bottom section of the Copper features the raised 'T' ridge that is a typical attribute of Coppers. This section is fashioned from three pieces of sheet metal as one major and two minor sections. The two minor sheet fragments indicate a repair following a breaking, and their stratigraphy suggests that they were fixed together prior to application to the major bottom panel. Regular round and crescent shaped tool marks comparable to those found along the central seam of the top panel are visible across this join.

Metal burrs, created when the artefact was cut to shape, overhang the outside edges of the Copper. These burrs are noticeably distorted and folded inward where the central ‘T’ ridge is located, suggesting the artefact was cut to shape prior to creation of the ridge. The horizontal ridge of the ‘T’ is rounded and irregular rather than angular and defined, and has few witness marks to indicate it was hammered into shape. In contrast to the horizontal section, the vertical line of the ‘T’ ridge is angular and roughly defined with multiple amorphous impact marks along either side of the ridge.

Once the Copper had been completely assembled in its current form, but prior to surface decoration, a convex bulge has been worked into the top portion of the artefact. The order of construction is determined by the incorporation of the bottom panel into the convex embellishment. A flattened lip approximately 3 cm wide is left around the periphery of this domed area. The precise fabrication history is difficult discern but it seems most likely that the lower section bearing the ‘T’ ridge was taken from an existing Copper (either a section discarded or retained) and then reworked in to a complete Copper with the addition of the upper section, which may itself have been part of a discarded or retained Copper.

A striking and coherent design is affected across the body of the artefact, created using a combination of black and grey pigment. The colour of the metal itself is also incorporated into the design, revealed by etching and scratching through the paint. The consistency of these designs, which run continuously over metal fragment edges and rivet heads, shows that the Copper was completely assembled in its current form prior to decoration. The notable absence of material from the lower left corner of the artefact, potentially due to a ‘breaking’, is emphasised by the disruption that removal of this portion has caused to the design. Score marks, visible parallel to the edges of the removed section, suggest that the area identified for removal was first outlined on the surface of the artefact. The horizontal cut appears neat; however, the vertical edge is ragged and bent upward, suggesting the piece was initially cut horizontally and then repeatedly bent along the vertical axis to ultimately tear the section from the Copper and leaving the score marks behind. The ‘broken’ piece of metal could have met any number of fates, including discard, trade, gifting, and repurposing.

3.1.2 Material Characterisation

Chemical characterisation was carried out using a Niton XL3t handheld XRF Analyzer (Appendix: HHpXRF Performance). This method of analysis was chosen due to its portability for use within museums, the ability to analyse non-destructively, and the ability to take multiple measurements rapidly. This last consideration was essential for composite artefacts. Coupled with contextual and material observation such as surface textures and colours, it is possible to use compositional data to identify some alloy types such as brasses and bronzes, and highlight samples that are consistent with what might be considered native copper.

The naturally occurring copper available on the Northwest Coast is characteristically low in trace elements, predominantly represented by minor levels of iron, silver, and vanadium (Jopling 1986; Craddock 1995; Hancock *et al.* 1991; Pernicka 1999; Rapp *et al.* 1984; Wayman 1989; Wayman *et al.* 1985). Conversely, colonial trade materials that arrived on the coast could vary widely in elemental composition, including alloys containing appreciable levels of zinc, tin, arsenic, and lead (Bingeman *et al.* 2000; Hancock *et al.* 1991, 1993, 1994; Harris 1966; Knight 1973; McCarthy 2005, 105, 115, 122; Wayman 1989, Wayman *et al.* 1985, 375). As Indigenous metallurgical practices are thought not to involve smelting or melting activities, material composition would remain consistent through multiple rounds of making and remaking (Hancock *et al.* 1991; Maddin *et al.* 1980; Acheson 2003; Cooper 2012, 2007; Emmons 1991). It is important to note that XRF is a surface analysis method and results will be influenced by corrosion and other elements that may accumulate on the object. This can complicate data analysis and any ambitions of attributing particular analyses to specific groups (Dussubieux & Walder 2015). However, in general for well-preserved untreated surfaces, it is possible to use the results of XRF to group artefacts in to specific metal types that can be further assessed through a detailed material study of each object.

Two HHpXRF readings were taken from each of the seven copper sheets, on portions of metal free from corrosion and thick layers of paint. At first inspection the characterisation data shows little variation among the copper panels, with the presence of arsenic, lead, and zinc indicating manufactured as opposed native copper. The levels of As, Pb, and Zn are low and would have a negligible effect in terms of modifying the physical properties of the metal. The material should therefore be thought of as copper rather than a deliberate alloy such as Muntz Metal or Admiralty Brass. The variation between samples is slight, and examined singularly it is difficult to see any distinct patterning in the dataset. However, when the syntax of fabrication is considered: (((Purple + Pink)+Red) + Yellow) + ((Orange + Green) + Blue), and the analyses is associated with fabrication elements, it is apparent that distinct compositonal groups can be seen (Table 1; Figure 4; Figure 5; Figure 6).

The close study of fabrication outlined above supports the groupings of material that are apparent in the compositional data. The bottom panel was assembled from compositionally similar metal, characterised by an absence of zinc and around 0.7% As. The coherence of the upper panel fabrication is supported by the compositional analysis that shows that these panels all contain some zinc, but the major panels (red and yellow) contain no detectable As. The small pieces of metal added to the top right of the artefact, indicated by Pink and Purple, also seem to represent a discrete material group, with the detected presence of both arsenic and zinc. Taken together, compositional analysis further supports the hypothesis that a large part of the top panel represented by Red and Yellow was made of metal different to those used to construct the bottom half of the object. The implications of this analysis are significant, as the variability identified alongside the fabrication sequence points to the fabrication of a composite artefact that has been made and remade episodically, drawing on materials that were procured from different sources, at different locations, and/or different times. It remains possible that some or all of these pieces are different portions of separate Coppers that have been brought together to (re)make what is now known to us as Copper A6834. Taken singularly the analytical data was of limited utility but when understood from the perspective of the fabrication history and the close physical study of the artefact, the compositional analysis takes on an added significance that supports the wider study.

Table 1. Niton XL3t handheld XRF Analyzer trace element data (wt%) from the seven copper sheets comprising the Dwawada'enuxw Kwakwaka'wakw Copper, identification no. A6834. Each copper piece has been colour coded to coincide with the physical description of the artefact and trace element analysis presented in Figure 4 and Figure 5. Note that two readings were taken from each of the 7 copper sheets for a total of 14 samples across the entire object. Samples from the same sheet are averaged to provide a single analysis; 'nd' = 'not detected'.

Individual Metal Pieces Colour Code	%As	%Pb	%Zn	%Cu	%Fe
Yellow	nd	0.074	0.094	99.275	0.109
Red	nd	0.119	0.112	98.830	0.381
Pink	0.841	0.128	0.088	98.166	0.260
Purple	0.824	0.070	0.117	98.379	0.206
Blue	0.777	0.065	nd	98.681	0.080
Green	0.779	0.100	nd	98.542	0.311
Orange	0.764	0.129	nd	98.590	0.147

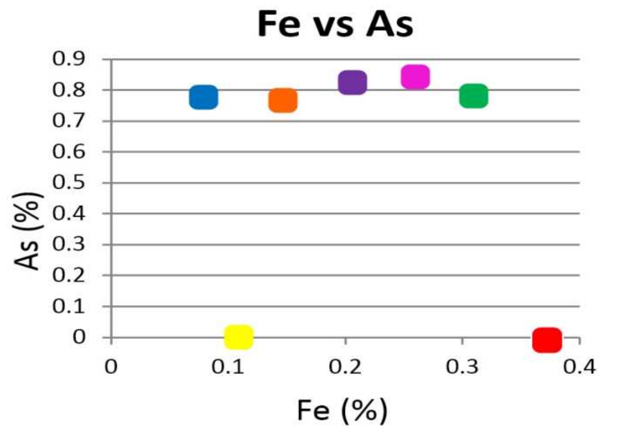

Figure 4. Trace Element Analysis of the seven pieces of metal that comprise Dwawada'enuxw Kwakwaka'wakw Copper, identification no. A6834. Iron vs Arsenic wt.% concentrations determined by HHpXRF analysis and presented in a bivariate plot.

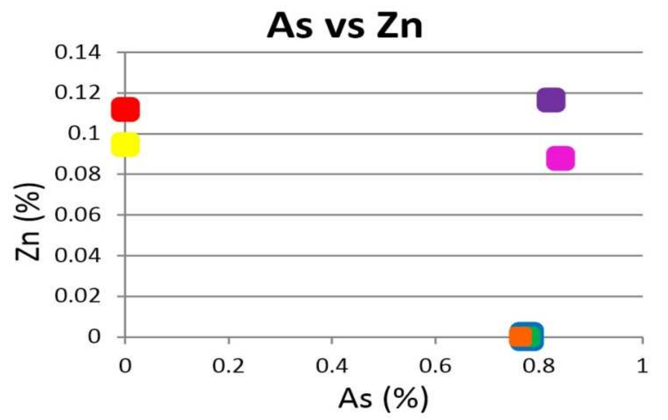

Figure 5. Trace Element Analysis of the seven pieces of metal that comprise Dwawada'enuxw Kwakwaka'wakw Copper, identification no. A6834. Arsenic vs Zinc, wt.% concentrations determined by HHpXRF analysis and presented in a bivariate plot.

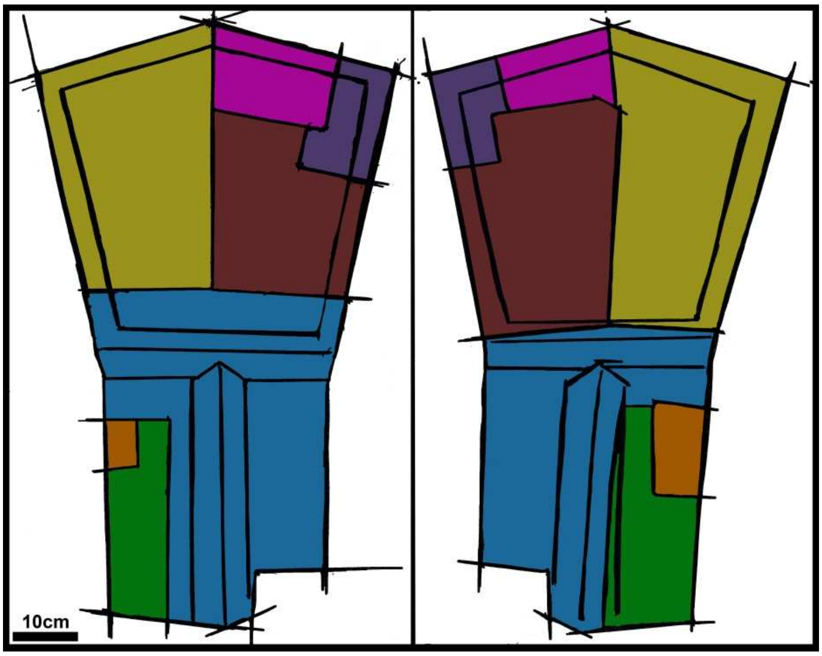

Figure 6. A stylised drawing based on Dzawada'enuxw Kwakwaka'wakw Copper, identification no. A6834, housed at the Museum of Anthropology, Vancouver, British Columbia. Left: View of front; Right: View of back. This Copper is constructed from seven separate pieces of copper metal that have been variously coloured in this drawing to highlight aspects of the composite object. The colours coincide with HHpXRF samples presented in Table 1, Figure 4 and Figure 5. (© Museum of Anthropology).

4 An Artefact Biography Assembled

The Dzawada'enuxw Kwakwaka'wakw Copper discussed here is suited for biographical study as it is observably always in a state of becoming through its accumulated history of use. As this Copper has been made and broken and made again, the biography of the artefact and its composite parts detail the dynamic trajectories and relationships that developed through the artefact's life. The seven pieces of sheet metal that make up this Copper appear to broadly conform to patterns of contact era trade metal, and all seem to have been completely incorporated into Indigenous material repertoires. The inclusion of trade metal in the construction of significant artefacts was a process that seems to have occurred throughout the Pacific Northwest, and this Copper is one of multiple examples (Jopling 1989; Wayman 1993; Wayman King & Craddock 1992). Although the duration of time that the Copper or any of its constituent parts were in circulation among Indigenous communities is unknown, the evidence of past use on each of the metal sheets suggests that this artefact was created and used during a time of tension and changing social and political landscapes. The presence of the iconic central 'T' ridge as a fragment, with material removed from and added to this piece, is significant. This carries implications that the 'T' ridge was involved in multiple cycles of use as a Copper, prior to its current form and composition. Furthermore, the continuous design painted and inscribed on the Copper, overlaying and transecting cut edges and rivet heads across the body of the artefact, was applied following complete assembly of this object in its current form. As such, the central 'T' ridge may have undergone a complete decorative redesign at least once during its life as a Copper. The subsequent 'breaking' of a portion of metal from the artefact's bottom left corner further attests to its extended participation in Northwest Coast First Nations activities, and suggests that it capably fulfilled its role as a Copper.

The apparent increasing frequency of copper objects on the Northwest Coast, and the use of both the metal and the associated artefacts in a wider range of applications, points to fundamental political, social, and economic transformations that disrupted the way that the material was valued. Overall, trends seem to suggest that the system of commodification in the region was subjected to stress and change, resulting in the integration of new materials into established value systems. However, this is not to say that First Nations communities without an abundance of copper always welcomed foreign materials with open arms. Perhaps a stronger focus was placed on chances to increase resources in light of growing segmentation and disruption in other aspects of life.

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5 Appendix: HHpXRF Performance

The performance of the HHpXRF was established in terms of accuracy and precision. Instrument bias was monitored daily and the FP calibration attenuated according to the incorporated system check routine. Precision was monitored using an in house sample (see below) while accuracy was determined across a range of compositions using for MBH certified reference materials (C50X20, C71X06, C11X01, 31XB27).

Accuracy expressed as %error was dependent on element concentration. The main elements useful for categorising alloys were Cu, Zn, Sn and Pb. Arsenic was determined through an uncertified in-house prepared material at 7% As (all replicates within 10%). For the certified reference materials, achieved accuracy as %error is shown in Table A.1. Error associated with tin (Sn) determinations ranged from 25% when present as a trace (>0.2wt%) to -2.6%error as a major element (8.8wt%). Error associated with zinc (Zn) ranged from (-9.7%)(>1wt%) to -2.7% as a major element (30.3%). Accuracy for lead ranged from 40% at trace level to 1.1% at major levels (10.9%). Copper was present as the major element in all certified standards and was determined at better than 1% error.

Accuracy=%error=$\%E = \left\{\frac{M - A}{A}\right\} x\ 100$

Table A.1. The certified reference materials showing the measured results.

		Sn	**Zn**	**Pb**	**Cu**	**Ni**	**Fe**
C50X20	*Certified*	8.80	0.41	10.90	79.01	0.51	0.10
	Measured	8.57	0.37	11.02	79.48	0.37	0.07
	Accuracy (%E)	-2.61	-9.76	1.10	0.59	-27.45	-30.00
C71X06	*Certified*	3.90	3.70	6.10	84.26	2.10	0.04
	Measured	3.84	3.81	5.94	83.92	2.41	0.05
	Accuracy (%E)	-1.54	2.97	-2.62	-0.40	14.76	30.00
C11X01	*Certified*	0.16	30.30	0.05	69.50	0.13	0.04
	Measured	0.12	29.47	0.07	69.81	0.08	0.04
	Accuracy (%E)	-25.00	-2.74	40.00	0.45	-38.46	18.92
31X B27	*Certified*	0.99	17.65	0.49	80.65	0.03	0.11
	Measured	1.12	17.96	0.35	80.29	0.02	0.13
	Accuracy (%E)	13.71	1.76	-29.88	-0.45	-20.00	17.12

Precision was determined in two ways. Firstly, expressed as co-efficient of variation (%CV) over a number of replicates (10) undertaken as a single event. Secondly, as a long term %CV on an in-house sample measured periodically between 11 June 2015 to 27 July 2015. As can be seen the precision for Cu is comparable over the longer term with that for a single analytical event. Sn shows more variability over the long term but remains respectable at ~2%. Variability for Pb is respectable at 1.9% for an analytical event but increases to ~16% over the long term. This significant increase is explained by two factors. Firstly, the heterogeneity of Pb in copper alloys means precision will always be quite high when the HHpXRF is relocated on a sample, such as that encountered in a long-term precision determination, as Pb is not evenly distributed in the material; local variability is therefore significant in determining this figure. For this reason, the majority of objects were always analysed at several points wherever possible. Secondly, the sample used for long-term precision was not high in Pb (~0.5%) and therefore higher variability is to be expected.

Table A.2. Table showing %CV for batch and event determinations.

		Sn	**Pb**	**Cu**
Inter batch precision	%CV	2.05	16.91	0.21
Event precision	%CV	0.66	1.9	0.22

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