University of Alberta

Zooarchaeological Analysis of Avian Skeletal Material in Neolithic and Early Bronze Age Mortuary Contexts, Cis-Baikal, Siberia

by

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For my father, Charles Fleming, who I suspect is delighted to finally have an archaeologist in the family, and for my spouse, Evan Cole, the most interesting person I've had the good fortune to meet.

Abstract

During the Neolithic and Early Bronze Age in Cis-Baikal, Siberia, human groups inhabiting the region interred their deceased with a variety of objects, including modified and unmodified avian skeletal elements. Archaeological excavation of graves in the Shamanka II, Lokomotiv, and Ust'-Ida cemeteries have yielded quantities of these materials. However, they have been addressed infrequently by previous research, and reasons for their inclusion in human mortuary contexts are unclear. This research focuses on contextual relationships between human interments and avian skeletal material, and examines the nature and patterning of bird inclusion in graves. My results indicate birds were procured especially for mortuary practices, and differential patterns of inclusion in graves suggest the gender and age of the deceased determined the avian materials placed in the grave. Further, these practices changed between the Neolithic and Early Bronze Age, providing additional evidence the region was inhabited by different human groups in these periods.

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My research and this thesis never would have been completed without the assistance of many individuals with whom I am deeply honoured to have been acquainted. First and foremost, I thank my supervisor, Dr. Robert Losey, for his patient and masterful guidance. I am extraordinarily lucky to have a supervisor whose nature is to inspire and uplift his students. I thank Dr. Andrzej Weber, director of the Baikal-Hokkaido Archaeology Project at the University of Alberta, who was always available to answer my questions, and whose helpful comments on a draft of this thesis were very much appreciated. I also thank additional members of my examining committee, Dr. Margriet Haagsma, Department of History and Classics at the University of Alberta, and Dr. Jack Ives, director of the Institute of Prairie Archaeology at the University of Alberta, who kindly gave me their time by reading a draft of this thesis and taking part in my defence.

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Chapter 1
Introduction

1.1 Introduction

Faunal materials recovered from mortuary contexts allow archaeologists to explore the numerous relationships between animals and humans, including those that extend beyond subsistence. Animal skeletal remains in particular present analytical and interpretive opportunities not available with other forms of archaeological materials (Gifford-Gonzalez 1991; Holt 1996; Marciniak 1999:299). So-termed traditional approaches tend to analyze and interpret the human-animal relationship in terms of subsistence (Argent 2010:157), particularly in contexts where disarticulated animal skeletal materials have been recovered. When subsistence has not been the focus of zooarchaeological inquiry, the interpretive treatment of faunal materials has been largely limited to exploration of the "functional and symbolic" (Argent 2010:163). These studies most often are concerned with complete, or mostly complete, animal skeletons (Morrow and Volkman 1975; Serjeantson 2010:175). More recently, researchers such as Jones and Richards (2003) and Mannermaa (2008) have examined modified and unmodified faunal skeletal elements in human mortuary contexts, arguing compellingly that the emergent patterns are not related solely to human consumption of animals. Jones (1998:309) has noted that the presence of faunal materials in human graves must necessarily lead archaeologists to question the intent and meaning of inclusion, as there is nothing inherent or obvious about interring dead animals (or their parts) with deceased humans.

Though many burials excavated at the Shamanka II, Lokomotiv, and Ust'-Ida cemeteries in Eastern Siberia, Russia yielded a variety of faunal remains, including specimens from mammals, birds, fish, and invertebrates, the avifaunal materials were

singled out for more careful examination in this thesis for several reasons. First, the avifaunal materials recovered from prehistoric cemeteries (or habitation sites) in this region previously had never been examined in detail, and had never been approached from an interpretive perspective. Second, owing to the thin cortex and pneumatisation of bird bones, they tend not to preserve as well as other types of animal skeletal material (Gál 2005:325). Preservation at these cemeteries is excellent on the whole, and this provides an opportunity to explore a class of animals whose bones do not always survive the taphonomic rigours of the archaeological record. Third, a cursory review of the bird materials from the study region revealed they were interred with humans as both modified and unmodified items. Gál (2005:325) notes that worked bird bone in particular is an exceptionally rare find at archaeological sites, owing to the aforementioned structural qualities that also make it more difficult to modify than other types of animal skeletal material. Lastly, the bird data from my study samples revealed a prevalence of wing elements, a pattern observed in many archaeological settings. Though their high survival rate often is attributed to their greater bone density compared to other skeletal elements, attempts to evaluate quantitatively such relationships have had mixed results (Serjeantson 2009; Bovy 2002).

1.2 Research questions

This research concerns disarticulated avian skeletal remains recovered from human graves from Shamanka II, Lokomotiv, and Ust'-Ida, three prehistoric cemeteries in Cis-Baikal, Siberia. My research goals are three-fold. First, I propose to examine the nature of avifaunal inclusion in these mortuary contexts, primarily addressing questions about the birds themselves. Second, I explore notions of Neolithic and Early Bronze Age Cis-Baikal identity, such as gender, life stages, and death, and how these conceptions may

have changed over time. Third, I propose to connect analysis and interpretation of the avifaunal specimens from Shamanka II, Lokomotiv, and Ust'-Ida to the larger body of archaeological research concerning forager cemeteries in Cis-Baikal.

Non-subsistence roles of birds. While disarticulation of animal skeletal remains in human cemeteries may suggest ceremonial feasting or food offerings to the deceased, such activities cannot be presumed in the absence of an evaluation of the data. Additionally, some avian materials from prehistoric Cis-Baikal graves have been modified significantly from their original form, indicating disarticulation was due specifically to the manufacture of certain objects.

Element selection and economic decisions. Preliminary examination of Neolithic and Early Bronze Age Cis-Baikal mortuary faunal assemblages revealed that particular avian skeletal elements of select taxa were chosen to make similar objects in many graves. For example, swan (*Cygnus* spp.) ulnae were commonly used at Shamanka II to make needle cases. The reasons for these decisions are not clear. Comparison of this mortuary avian data with that from nearby and contemporaneous habitation sites should prove informative, and together with ecological and behavioral information about the identified birds, can be used to address the following issues:

- *Availability.* Is the taxon local or non-local, and is it uncommon in sites despite its local availability?

- *Biological characteristics of species*. Some archaeologists have noted the possibility that specific animals were selected for use because of uncommon biological qualities, such as colorful markings (Kensinger 1991; Mannermaa 2008:208), or unusual or remarkable habits (Jones 1998:304). Investigation

of such qualities may suggest the uniqueness or specialness of certain avian taxa.

- *Procurement costs.* Based on known habits and characteristics of the taxon, is it easy or difficult to obtain? For example, some avian species prefer to live in inaccessible places. Some are extremely fast, high flying, or intelligent and may more easily elude capture. Qualities such as these may illuminate the value or special significance of a taxon (Reitz and Wing 2008:279; Jackson and Scott 1995).

- *Edibility.* Is it possible these avian skeletal materials were the by-products of subsistence activities? Do they come from meat-bearing portions of the body?

- *Element frequency.* Do certain elements from a particular taxon occur with more regularity than others in prehistoric Cis-Baikal mortuary contexts? Additionally, regarding paired elements, does the side from which the bone comes, or the fact that it is paired, have significance (after Mannermaa 2008:210)?

- *Element selection*. Were elements chosen because they, in their natural form, had qualities desired for an eventual item, or were the elements themselves imbued with a special meaning?

Gender-based patterns. Many human skeletons recovered from prehistoric Cis-Baikal cemeteries have been biologically sexed, either by assessment of cranial and pelvic features (Lieverse et al. 2008:21-216; Link 1996:187-189) or at the molecular level

(Mooder 2004:264). Such information, taken into consideration with incidence of avian skeletal material grave inclusions, may reveal patterns of bird species use and/or preference. Alternatively, they may manifest patterns not similar to western notions of gender and gender-appropriate activities (Geller 2008). The specific questions to be posed include the following:

- Are certain items or object types always, or nearly always, associated with males or females? Can a conception of gender be gleaned through such associations?

- Are certain avian taxa only associated with a particular biological sex, suggesting such items were used by an individual to signify identification with a particular gender?

- Are certain types of items only associated with a particular biological sex? Can we infer a division of labor and suggest a gendered basis for activities based on these associations?

Age-based patterns. People of all ages at death were interred with bird-derived materials in Neolithic and Early Bronze Age Cis-Baikal cemeteries, thus providing an opportunity to explore culturally meaningful conceptions of age among the prehistoric inhabitants of Cis-Baikal. Questions about age include:

- Are certain avian taxa, or certain objects made from their remains, associated with different life stages? Can the life stages themselves be identified through patterning of avian skeletal materials coupled with estimates of biological age at death?

- Are avian items interred with Neolithic and Early Bronze Age individuals consistent with the age of the deceased? Are modified skeletal elements too large, or would they require more dexterity than an individual likely possessed at a certain age?

Multiples of the same artifact type in a single burial. In several instances, the same type of artifact fashioned from bird skeletal remains occurs more than once in a single burial. Contextual information will be carefully reviewed to glean under what conditions or criteria such multiples occur.

Self-expression. Some avian bone artifact types, particularly needle cases fashioned from the long bones of large species, exhibit varying degrees of ornamentation. It is possible that the differences in object ornamentation are the result of personal preference, expression, and identity. It is equally plausible that such items represent different stages of completion. An examination of contextual information will be undertaken to determine if other criteria are concomitant with this phenomenon.

Larger body of Cis-Baikal archaeology research. Weber et al. (2002:291) note research questions such as those listed above may be greatly enriched by the wealth of empirical data generated by earlier Russian research and the joint Russian-Canadian Baikal Archaeology Project. These data include insights from Middle Holocene human osteological analyses (Lieverse 2005; Link 1996; Mooder 2004; Thomson 2007), investigations of diet and subsistence patterns through stable isotope analysis (Weber et al. 2011), mortuary patterning (Bazaliiskii 2010; McKenzie 2003; Shepard 2010), radiocarbon dates (Weber et al. 2006; Weber et al. 2010), paleoenvironmental modelling (White and Bush 2010), and zooarchaeological analyses (Losey et al. 2011;

Nomokonova 2007; Nomokonova et al. 2011; Ready 2008). Since 2008, Dr. Robert Losey has endeavoured to integrate these data into zooarchaeological analyses and interpretations (e.g., Losey et al. 2011) and the research detailed in this thesis draws heavily upon these various data sets generated by the Baikal Archaeology Project.

1.3 Organization of Thesis

Chapter 2 provides a geographic and culture history context for the items examined in this thesis. Additionally, I review the history of archaeological inquiry in Cis-Baikal, including the development and evolution of the region's culture history model and previous scholarship regarding each of the three cemeteries. In Chapter 3, I place my approach to the avifaunal materials of Shamanka II, Lokomotiv, and Ust'-Ida in a theoretical context that focuses primarily on the perception of relationships between humans, animals, and material culture. Chapter 4 briefly describes the data collection and analysis methods employed in this research. Chapter 5 presents the results of analysis, including a taxonomic summary for each cemetery, identification of patterning, and similarities and differences in avifaunal mortuary inclusions between Shamanka II, Lokomotiv, and Ust'-Ida. In Chapter 6, I examine questions about the avian taxa in detail, and I discuss patterns revealed during data analysis. I conclude the thesis with Chapter 7, which provides a summary of research.

1.4 Terminological Conventions

All radiocarbon dates discussed in this thesis were provided by Weber et al. 2006. These are presented here as calibrated ^{14}C dates, and all were on human skeletal collagen samples.

The terms *grave* and *burial* have specific meanings in Cis-Baikal mortuary research. Following conventions set forth by Weber et al. (2008:436), grave refers to the structure in which an individual, or individuals, was interred. Burial refers to an individual in a grave.

Lastly, due to the large number of avian specimens described in this research, I refer to the most specific taxonomic level to which a specimen, or group of specimens, was identified. Common English names and formal Latin names for taxa identified also are presented.

Chapter 2
The Cis-Baikal Region and Previous Archaeological Research

2.1 Physical Context

Located in the Russian Federation just north of the Mongolian border (Figure 2.1), the Cis-Baikal region is defined as the area immediately north and west of Lake Baikal. Following Michael's (1958:5) boundaries, the region includes the Angara River basin from its source at Lake Baikal to Ust'-Illimsk, the Upper Lena River and drainage to Kirensk, and the west coast of Lake Baikal, including Ol'khon Island (Figure 2.2). The northwest coast is bounded by the Primorskii and Baikalskii mountain ranges, and the southwest tip of the lake is characterised by the Tunka rift valley (Schnetnikov et al. 2012). The remainder of Cis-Baikal belongs to the Central Siberian Plateau, characterized by gentle hills dominated by taiga (Weber 2003:53-54), steppe, and forest-steppe environments (Nomokonova et al. 2010:157).

Lake Baikal itself is the focal point of the Cis-Baikal landscape. The lake, which formed within a rift valley, is the largest body of fresh water in the world by volume (Ovchinnikova 2005), and is believed to be the oldest (Sakai et al. 2000:35). Approximately four hundred rivers and streams flow into Lake Baikal, but it is drained only by the Angara River, which proceeds downstream to the northwest from its exit near the southwestern tip of the lake (MacKay et al. 2002:403).

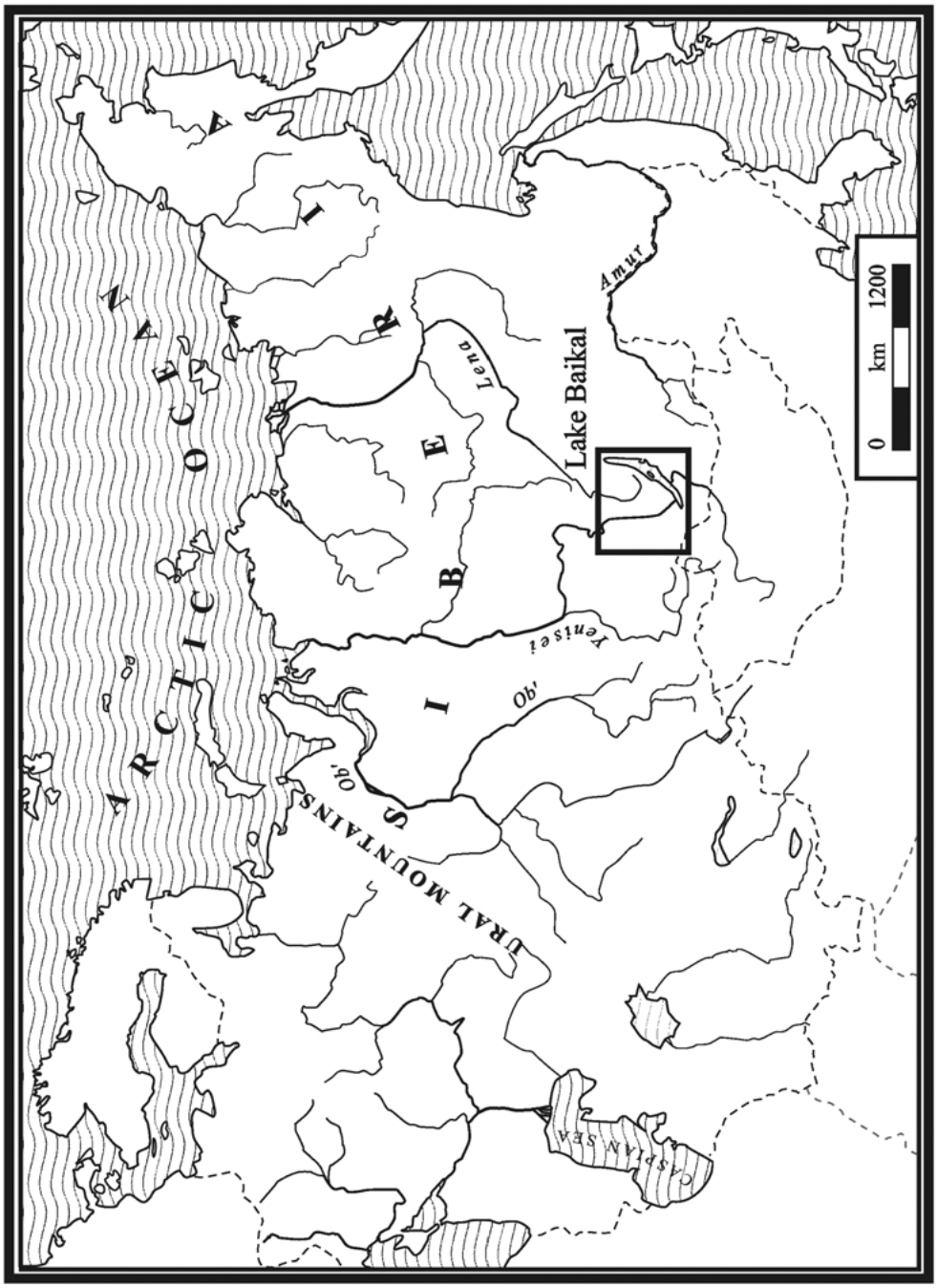

Figure 2.1 Location of Lake Baikal and the Cis-Baikal region.

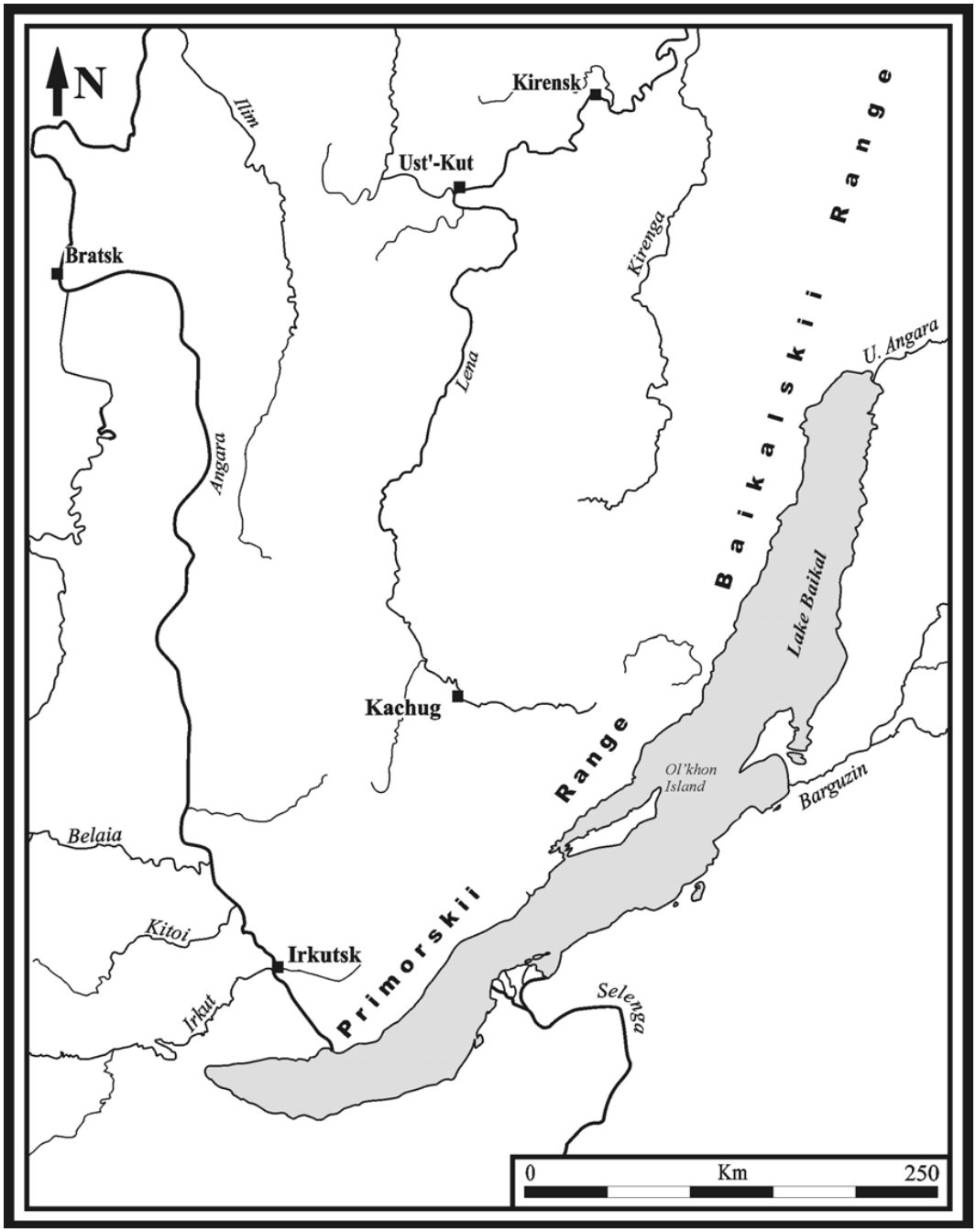

Figure 2.2 Map of the Cis-Baikal region showing major geographic features.

Today, the entire Cis-Baikal area generally experiences warm, short summers and cold winters during which the lake freezes over from January to March-April (Kozhova and Izmest'eva 1998:9). However, the varied topography of Cis-Baikal results in more locally specific weather patterns in each of its microregions (Weber 2003:54). The early and middle Holocene paleoclimate of Cis-Baikal, extensively examined under the auspices of the Baikal Archaeology Project, is believed to have been highly variable compared to the climate at the present time (White and Bush 2010:13). Through collection of paleoenvironmental proxy data in Cis-Baikal and numerical computer simulation modelling, it has been determined the Cis-Baikal region experienced a general warming and wetting trend throughout the Holocene (White and Bush 2010:14). Despite this trend, a transition to more arid conditions occurred between c. 7500 years ago to c. 6500 years ago, which may have differentially impacted the four microregions of the Cis-Baikal region (White and Bush 2010:13-14).

Today, both the lake and immediate area are home to numerous plant and animal species. Cis-Baikal lies at the junction of three biogeographically distinct regions, with considerable overlap of floral and faunal taxa (Kozhova and Izmest'eva 1998:13-14; MacKay et al. 2002:405; Weber 2003:55). Birds in particular are numerous in Cis-Baikal, with 326 avian species inhabiting the Baikalskii mountain regions (Kozhova and Izmest'eva 1998:14).

In most archaeological literature, Cis-Baikal is separated into four microregions (Figure 2.3). These subdivisions are based on weather patterns, local ecological characteristics, and landscape features, as well as variances in archaeologically visible prehistoric mortuary practices and materials found in each. The Angara River Valley

microregion includes the area around the outflow of the Angara River (near the western end of Lake Baikal) to its confluence with the Ilim River much further north (Weber 2003:62). South Baikal is defined as the area surrounding the southwest tip of Lake Baikal, marked by the aforementioned Tunka rift basin (Schnetnikov et al. 2012). Priol'khon'e, typically referred to in the project as the Little Sea, refers to the northwest coast of Lake Baikal, extending south from Elokhin Cape to the Bugul'deika River, and includes the entirety of Ol'khon Island (Goriunova 2003:15). The Lena River Valley includes the area along the Upper Lena River, from its source in the Primorskii Range to the city of Kirensk (Weber et al. 2002:233). My research focuses on the South Baikal and Angara River Valley microregions, as Shamanka II is located in South Baikal, and Lokomotiv and Ust'-Ida are situated in the Angara River Valley.

2.2 Development and Refinement of Cis-Baikal Culture History Models

The original culture history model for Cis-Baikal was developed by Russian archaeologist A. P. Okladnikov in the 1930s (Okladnikov 1959). Okladnikov was under pressure to conform his archaeological research to the human social evolutionary scheme detailed by Friedrich Engels, which was considered doctrinal in the political and social atmosphere of the Soviet Union (Dolitsky 1985:362; Link 1996:6; Weber 1994:7). He constructed a continuous framework for Cis-Baikal that corresponded to Engels' evolutionary scheme, which views the increasing division of labour as the primary cause of economic disparity (Engels 1954). Applying Engels' concept to the archaeological record, Okladnikov concluded that simple burials with few grave goods and little variation in mortuary treatment must be the oldest, and cemeteries where fewer individuals were subjected to more complex mortuary treatments were indicative of

later time periods (Okladnikov 1959:13, 14, 16). On this basis, he identified six formal stages for the Cis-Baikal culture history model: Khin', Isakovo, Serovo, Kitoi, Glazkovo, and Shivera (Bazaliiskii 2003:37; Okladnikov 1959:12-30). The Isakovo, Serovo, and Kitoi traditions were identified as mortuary traditions affiliated with the Cis-Baikal Neolithic, while the Glazkovo and Shivera, characterized by the presence of metal objects in graves, were believed to correspond to the Early and Middle Bronze Age respectively (Bazaliiskii 2003:37; Okladnikov 1959:22).

Okladnikov's Cis-Baikal culture history model has been critiqued for its reliance on typological similarities of artifacts and mortuary treatment among cemeteries in Cis-Baikal at the expense of other salient aspects of the archaeological record, such as stratigraphy and intersite comparison (Henry 1958:5-13; Link 1996:7-21; Weber et al. 2006). Other archaeologists have attempted to generate culture history models that incorporated both mortuary and habitation site materials, mainly on the basis of ceramic styles (Weber 1995:122-132).

An intensive radiocarbon dating campaign on human skeletal remains was initiated by Russian archaeologists and expanded by the Baikal Archaeology Project has conclusively resolved conflicts within Okladnikov's original culture history model for Cis-Baikal (Weber et al. 2010b:27-28). In Weber et al.'s (2010b) revised model (Table 2.1), the Kitoi mortuary tradition is said to be temporally equivalent to the Early Neolithic. This tradition is followed by a period in which humans were not interred in formal cemeteries, termed only as the Middle Neolithic. Formal interments then resumed with the Isakovo and Serovo mortuary traditions, and are associated with the Late Neolithic

culture history phase. Glazkovo graves are typically identified by the inclusion of worked metal objects and are associated with the Early Bronze Age.

PERIOD	MORTUARY TRADITION	ANGARA/SOUTH BAIKAL CAL BP	UPPER LENA CAL BP	LITTLE SEA CAL BP
Late Mesolithic	n/a	8800 to 8000	8800 to 8000	8800 to 8000
Early Neolithic	Kitoi	8000 to 7000/6800	8000 to 7200	8000 to 7200
Middle Neolithic	Hiatus	7000/6800 to 6000/5800	7200 to 6000/5800	7000/6800 to 6000/5800
Late Neolithic	Isakovo, Serovo	6000/5800 to 5200	6000/5800 to 5200/5000	6000/5800 to 5200/5000
Bronze Age	Glazkovo	5200/5000 to 4000	5200/5000 to 3400	5200/5000 to 4000

Table 2.1 Current culture history model for the Cis-Baikal region.

Despite current focus on Neolithic and Early Bronze Age mortuary contexts of Cis-Baikal, the archaeological record in the region extends as far back as the Paleolithic period (Aksenov 1969; Ineshin and Teten'kin 2010; Michael 1984; Okladnikov 1959:1-11). Based on excavations at the sites of Mal'ta and Buret', both located in the Angara River Valley, it has been determined the Paleolithic peoples of Cis-Baikal made utilitarian and ornamental bone and stone objects, created mobiliary depictions of humans and animals, and hunted a variety of terrestrial mammals (Abramova 1966:52-62; Michael 1984:34; Okladnikov 1959:3-6). Very few Paleolithic graves have been found in Cis-Baikal (Abramova 1967:58), and no mortuary tradition relating to the Paleolithic has been described.

The Mesolithic period also is visible in the archaeological record of Cis-Baikal, and is occasionally referred to as the Epi-Paleolithic in this area as it is viewed as a continuation of Paleolithic lifeways (Khlobystin and Clark 1969:89; Lieverse 2005:15). In the Angara River Valley, strata supposedly associated with the Mesolithic at the Ust'-

Belaia site yielded skeletal remains of fish taxa, roe deer (*Capreolus capreolus*), and dog (Medvedev 1969; Michael 1984:36). Knives, fish hooks, awls, and needles, among other utilitarian objects, were recovered from Ust'-Belaia (Michael 1984:37), further suggesting Mesolithic riverine and terrestrial subsistence strategies. The strata at this site, however, remain very poorly dated.

Though mortuary traditions believed to be associated with Mesolithic peoples of Cis-Baikal have been identified by several researchers (e.g., Okladnikov 1959:12; Bazaliiskii 2010:54-63), evidence for the dating of these graves remains tenuous at best. No radiocarbon dates have been obtained on alleged Mesolithic burials to substantiate their chronological positions, with the one possible exception being the wolf and human grave at Lokomotiv (Losey et al. 2011; Weber and Bettinger 2010:492). For these reasons, I have omitted possible Mesolithic mortuary traditions from discussion.

The Cis-Baikal Early Neolithic (c. 8000 to ~6800 BP) is characterised by the emergence of technological innovations, such as the bow and arrow, ceramics, and ground stone objects, and is further marked by the rise of formal cemeteries (Bazaliiskii 2010:63-64; Okladnikov 1959:12). Though the beginning of the Neolithic period is identified principally by the rise of agriculture in many parts of the world, in Cis-Baikal, it refers only to the emergence of ceramic technology (Weber et al. 2006:129). Based on radiocarbon dates (Weber et al. 2011), the Early Neolithic period begins approximately 8000 BP in Cis-Baikal. In the Angara River Valley and South Baikal microregions, it lasted until c. 6800/7000 BP. In the Priol'khon'e and Upper Lena River Valley microregions, it continued until c. 7200 BP.

As archaeological excavations in Cis-Baikal have been concerned in large part with its prehistoric cemeteries (Weber 1994:2), there is little information regarding Early Neolithic habitation sites. Additionally, the mixed nature of strata at prehistoric habitation sites across Cis-Baikal precludes clear identification of specific cultural levels (Weber 1995:115). However, drawing from the available evidence, Weber (2002:260) indicates Early Neolithic peoples likely would have experienced a low degree of residential mobility. A notable exception to poor habitation contexts is the well-stratified site of Gorelyi Les, located on the Angara River (Weber 2002:257). There, strata associated with the Early Neolithic revealed hearths, ceramics, fishing equipment, and a variety of lithic materials (Ready 2008:14-15). Additionally, quantities of faunal skeletal remains from terrestrial mammals, including *Bison* spp. (bison), *Alces alces* (moose), *Capreolus pygargus* (Siberian roe deer), *Cervus elaphus* (red deer), *Ursus arctos* (brown bear), and *Lepus* spp. (hare), and remains from a single fish taxon, *Esox lucius* (Northern pike), were recovered from the site (Ready 2008:20-23). Despite an apparent abundance of terrestrial mammals at Gorelyi Les, these data are seemingly at odds with results of stable carbon and nitrogen isotope signatures obtained from human skeletal remains associated with the Early Neolithic elsewhere in Cis-Baikal, which suggest protein diets rich in aquatic foods.

Differences in stable nitrogen and carbon isotope values are thought to reflect strongly both spatial and temporal variations in subsistence practices among the Neolithic peoples of Cis-Baikal (Weber et al. 2002:272). Recently published data further indicate Early Neolithic diets were heavily focused on locally available species (Weber et al. 2011:43). In the Angara River Valley, Early Neolithic peoples relied more heavily on riverine fish species than terrestrial mammals for the basis of their diet (Weber et al.

2011:538). In the South Baikal microregion, Early Neolithic peoples appear to have protein diets dominated by lacustrine fish species and the Baikal seal (*Phoca sibirica*), but of course also relied to some extent on terrestrial mammals (Weber et al. 2011:542).

The mortuary tradition present in Cis-Baikal during the Early Neolithic is known as Kitoi (c. 7000 to 6000 BP). Kitoi graves are distinguished on a material basis by the presence of composite fish hooks, bone or antler harpoons, bird bone needle cases, small ornaments such as pendants fashioned from a variety of materials, and occasionally pottery (Bazaliiskii 2010:69). These grave inclusions are believed to represent the importance of river- and lake-centred subsistence activities, which have been substantiated through the aforementioned stable isotope studies of prehistoric Cis-Baikal human remains (Weber et al. 2011). Interments of a single individual are most common, but graves with multiple individuals also are common (Bazaliiskii 2010:66-67). Kitoi burials often were placed in extended supine position (Bazaliiskii 2010:66), and many graves exhibit extensive use of ochre (Bazaliiskii 2010:67; Okladnikov 1959:13). Bazaliiskii (2003:38) notes the absence of human crania in interments as an additional hallmark of Kitoi mortuary treatment, but this phenomenon is not common in all cemeteries assigned to the Kitoi tradition, nor is it limited to this tradition. The placement of graves on the landscape varies among cemeteries, but cemeteries themselves are almost always situated near bodies of water.

Despite common use of the term Kitoi to describe the Early Neolithic mortuary tradition in the entire Cis-Baikal area, it perhaps is more correctly applied to graves in the Angara River Valley and South Baikal, as it appears to be a locally developed

tradition in those microregions (Bazaliiskii 2003:38). In the Lena River Valley and Priol'khon'e, composite fish hooks, pottery, and the use of ochre are documented rarely in Early Neolithic graves, and stone structures commonly were constructed as part of the grave (Bazaliiskii 2010:71-72), indicating microregional variations in mortuary practices during this period.

The Kitoi mortuary tradition is followed by a biocultural discontinuity. This seven hundred year-long (at minimum) interval corresponds to the Middle Neolithic period in Cis-Baikal. In the Angara River Valley, South Baikal, and Priol'khon'e microregions, the Middle Neolithic lasted from c. 7000/6800 to 6000/5800 BP. In the Upper Lena River Valley, the Middle Neolithic dates to c. 7200 to 6000/5800 BP. Very few graves or burials securely dated to this period have been discovered. Though the habitation record shows people continued to live in the area during the Middle Neolithic, it "involved a hiatus … in the development of archaeologically visible mortuary protocols" (Weber et al. 2010a:xvii). The hiatus appears to be concomitant with the previously mentioned shift to increased aridity in the region (White and Bush 2010), though has not been explained conclusively through environmental factors alone. Further, data from ancient DNA research indicates Late Neolithic peoples were genetically discontinuous from Early Neolithic groups, suggesting the area was inhabited by an entirely new human group (Mooder et al. 2010).

The Late Neolithic is said to correspond to the return of archaeologically visible human burial practices in Cis-Baikal. Once again, dates for the Late Neolithic vary by microregion. In the Angara River Valley and South Baikal, dates for the Late Neolithic

range from c. 6000/5800 to 5200 BP, and in the Upper Lena Valley and Priol'khon'e from c. 6000/5800 to 5200/5000 BP.

Stable carbon and nitrogen isotope data obtained from analyses of human skeletal remains associated with Late Neolithic contexts in the Angara River Valley reveal significantly different signatures from those noted in the Early Neolithic. Data suggest Laet Neolithic peoples consumed more terrestrial mammals than riverine fish species. As hunting and fishing technologies appear to be virtually unchanged from the Early to Late Neolithic, Weber et al. (2011:545) note these differences may be due to climate change, which would cause a shift in the isotopic values of the species Late Neolithic peoples consumed (but not necessarily indicative of a dramatic shift in subsistence strategy). As dietary stable isotope data for South Baikal is limited to a single cemetery, Shamanka II, with burials dating chiefly to the Early Neolithic, no temporal differences in this microregion may be examined at this time.

Isakovo and Serovo were originally identified by Okladnikov as distinct Early and Middle Neolithic mortuary traditions, respectively, though both were later demonstrated to belong to the Late Neolithic (Weber et al. 2010b). Human burials exhibiting Isakovo and Serovo characteristics have been radiocarbon dated to c. 6000/5800 BP to 5000 BP in each of the Cis-Baikal microregions. In the Angara River Valley and South Baikal, the tradition appears to have ended by c. 5200 BP. It endured for a slightly longer period of time in the Upper Lena River Valley and Priol'khon'e microregions, ending approximately 5000/5200 BP (Weber et al. 2010:32).

Isakovo and Serovo graves feature stone structural components, such as slab lined pits or 'paving' stones on pit surfaces (Bazaliiskii 2010:74, 77). There is a particular

absence of composite fish hooks in all but a few Isakovo and Serovo graves, though bone and antler harpoons occur with some regularity (Bazaliiskii 2010:75, 78). Insert tools fashioned from terrestrial mammal long bones are commonly recovered, and bird bone needle cases are increasingly encountered in graves. Generally speaking, Isakovo and Serovo grave inclusions are less diverse and less numerous than those of Kitoi (Bazaliiskii 2010:75). Nearly all Isakovo and Serovo cemeteries are located near rivers. The majority of Isakovo graves are oriented with the deceased's feet pointing downstream, while most Serovo graves are perpendicular to the river, with the feet oriented towards it (Bazaliiskii 2010:74, 77).

The Early Bronze Age in Cis-Baikal, which spans from c. 5200 to 3400 BP, is signalled by the appearance of metal objects in archaeological contexts. This period began in all subregions at c. 5200 BP, ending at c. 4000 BP in the Angara River Valley, South Baikal, and Priol'khon'e, while in the Upper Lena Valley, appears to have persisted far longer, ending c. 3400 BP(Weber et al. 2010:32).

Weber et al. (2002:259) comment that the dearth of Early Bronze Age habitation sites in Cis-Baikal is likely a manifestation of smaller group size and shorter-term campsite occupation across a wider geographic area (Weber et al. 2002:272, 281). Stable carbon and nitrogen isotope analysis of human remains associated with the Early Bronze Age in the Angara River Valley have revealed signatures consistent with the increased importance of terrestrial herbivores relative to earlier periods (Weber et al. 2011:539). In addition to isotopic data, the general absence of fishing-related gear in mortuary contexts also may point to a reliance on terrestrial mammals.

The appearance of the Glazkovo mortuary tradition is thought to coincide with the beginning of the Bronze Age in Cis-Baikal. It is believed by some to differ little from the earlier Isakovo and Serovo traditions, with the exception of differing burial positions and burial orientations (Weber et al. 2008:8) and the presence of grave goods made from new materials (Bazaliiskii 2010:85). Copper and bronze items were increasingly included in human burials, as were items made from white nephrite (Weber et al. 2008:8).

2.3 Description of the Shamanka II, Lokomotiv, and Ust'-Ida Cemeteries

The avifaunal assemblages selected for this project were recovered from three Cis-Baikal cemeteries. It is important to note that none of the three cemeteries has been fully described in the literature (they are presently unpublished), and as a result, the contextual information presented in the thesis was compiled from field excavation reports and the illustrations therein. The Shamanka II cemetery is located in the South Baikal microregion, and the Lokomotiv and Ust'-Ida cemeteries are in the Angara River Valley microregion. The majority of Shamanka II and Lokomotiv graves have been assigned to the Kitoi tradition, while Ust'-Ida graves are associated primarily with the Late Neolithic Isakovo and Early Bronze Age Glazkovo traditions.

Shamanka II. The Shamanka II cemetery is located at the extreme southwestern end of Lake Baikal and near the mouth of the Kultuchnaia River, on a small peninsula jutting into the lake (Weber et al. 2006:139) (Figure 2.4). The site is situated on the southwest slope of a hill called Shamanskii Mys. The site appears to have been accidentally disturbed during construction of the Krugomorskii Trail in 1867-1868, when workers uncovered human skeletal material and bronze objects in the immediate area (Kharinskii 1999:5). According to local inhabitants, the southern portion of the site was likely

further impacted by blasting activities during the construction of the Trans-Siberian Railway in the late 1800s (Bazaliiskii 2001:6).

The site was not officially documented until the early 1960s, when a teacher and student from the nearby Sliudianka School collected some materials at the site and followed up with several visits in subsequent years, when two burials were discovered (Bazaliiskii 2001:5). The archaeologist V. V. Svinin came to the site in 1966. He identified three clusters of archaeological deposits on two hills (the second of which is now known as Shamanka II) and one terrace (Bazaliiskii 2000:5). In 1988, Irkutsk State University and Sliudianka High School #2 conducted an archaeological survey of Shamanka Bay, with Sliudianka High School #2 undertaking further surveys in the years from 1995 to 1997 (Bazaliiskii 2001:5). In 1998, A. V. Kharinskii excavated a single eroding burial (Grave 1), and two trenches were placed across the Shamanka II cemetery to reveal four additional graves (Graves 2, 3, 4, and 6) (Kharinskii 1999:5). The cemetery was then excavated in stages in 1999 (Grave 7, by Turkin), 2000 (Graves 8 through 11, by Turkin), 2001 (Graves 12 through 19, by Bazaliiskii, who subsequently directed excavation on behalf of the Baikal Archaeology Project at the site through 2008), 2002 to 2004 (Graves 20 through 40), 2005 (Graves 41 through 49), 2006 (Graves 50 through 72), 2007 (Graves 73 through 102), and 2008 (Graves 103 through 112).

Individuals generally were placed in extended supine position with the head to the northeast. Single, double, and triple interments have been documented (Bazaliiskii 2003:43). In all, 112 graves containing a minimum of 178 individuals were excavated. The majority of graves, 99 in all, were attributed to the Kitoi mortuary tradition, while thirteen were identified as Glazkovo. On the whole, material inclusions and radiocarbon

dates from Shamanka II are consistent with a primarily Early Neolithic use of the site (Bazaliiskii 2003:43).

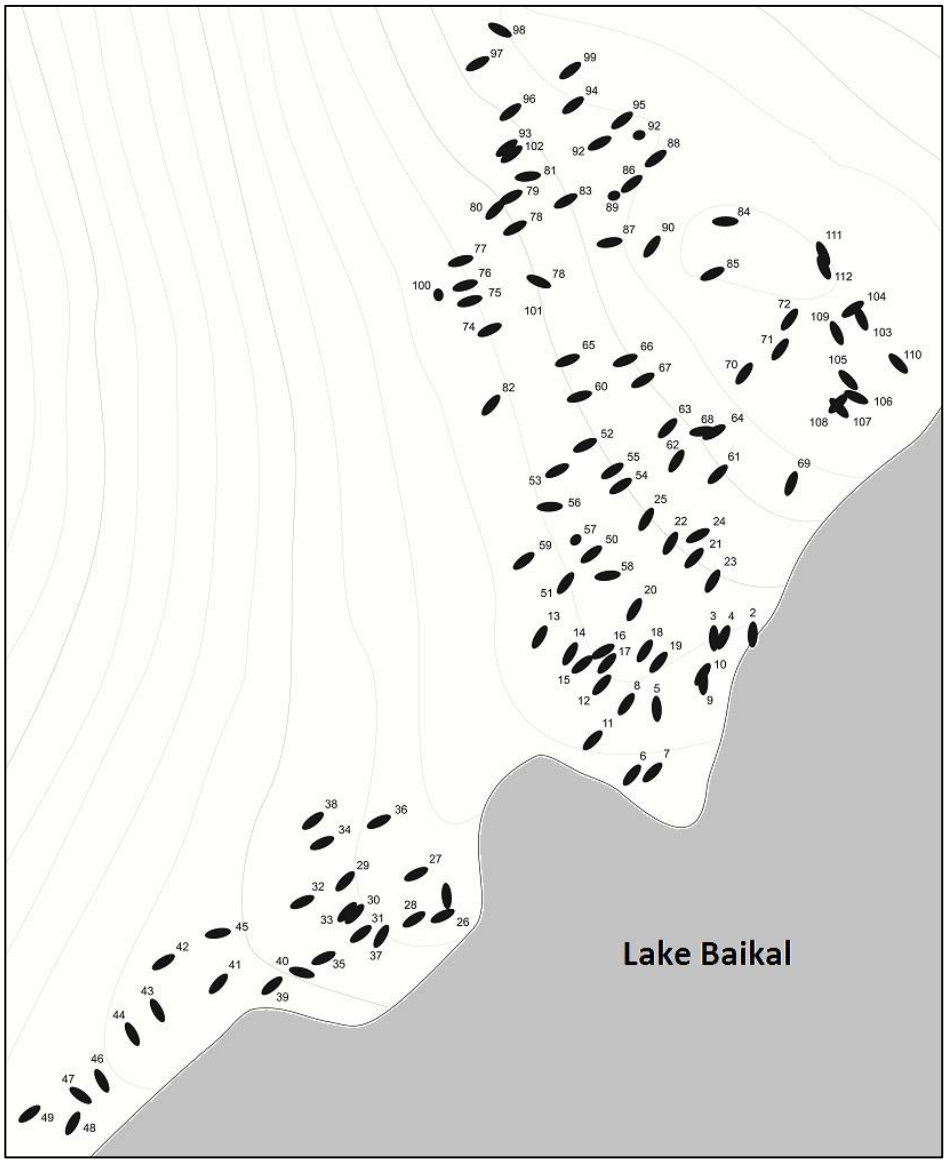

Figure 2.3 Map of the Shamanka II cemetery.

Since excavations at Shamanka II were completed in 2008, several graduate research projects involving the human skeletal materials have been completed. A. Lieverse (2005; 2010) examined the Shamanka II human osteological materials to assess age and sex of

each individual, and to document incidence of skeletal pathologies. T. Thomson (2007) carried out a partial examination of the Shamanka II mitochondrial DNA haplogroups using collagen obtained from human skeletal material. Their combined data appear in Appendix A. Additional human osteological research includes work carried out by Waters-Rist (2011), who examined morphological affinities, activity-induced alteration, stable carbon and nitrogen values, and dental enamel hypoplasia of teeth in the Shamanka II cemetery population, and Faccia (2011), who addressed age- and activity-related osteological changes through microCT analysis.

Modified and unmodified avifaunal remains were recovered from 47 Shamanka II graves. Shamanka II yielded the greatest variety of bird taxa among the three assemblages analyzed in this thesis, including members of order Anseriformes (four taxa), Pelecaniformes (two taxa), Gruiformes (two taxa), Gaviiformes (one taxon), Falconiformes (four taxa), and Passeriformes (one taxon). Undifferentiated large and small Aves skeletal materials also were identified.

Lokomotiv. The Lokomotiv cemetery (Figure 2.5) is located on the western bank of the Angara River near its confluence with the Irkut River, in the present-day city of Irkutsk. It is situated on a promontory overlooking the Angara. Initial discovery of the site occurred in 1897, when construction for the Trans-Siberian Railway disturbed several graves (Ovchinnikov 1904:67-71; in Bazaliiskii and Savel'ev 2003:20). Excavation of the site took place in stages at various points throughout the twentieth century. In 1927, Gerasimov discovered five graves, and 21 additional graves were excavated in the 1940s and 50s by Khoroshikh (Gerasimov 1955; Khoroshikh 1966; Okladnikov 1974; qtd. in Bazaliiskii and Savel'ev 2003:20). Larger projects were completed in the 1980s and 90s

by the archaeologists N. A. Savel'ev and V. I. Bazaliiskii (both of Irkutsk State University), who excavated an additional 59 graves.

Though some clustering of graves has been noted at Lokomotiv, there is no clear spatial organization, and there is no consistent orientation of graves (Weber et al. 2002:240). Though unpublished to date, reliable contextual data are available for 87 graves, which have yielded the skeletal remains of 124 individuals (Bazaliiskii and Savel'ev 2003:21). However, the site has been impacted by construction on many occasions, and the number of lost graves is not known (Bazaliiskii 2010:65; Bazaliiskii and Savel'ev 2003:21); some likely remain unexcavated.

Nearly all Lokomotiv graves were attributed to the Kitoi mortuary tradition on the basis of material grave inclusions and positioning. Radiocarbon dating has affirmed their assignment to the Early Neolithic period (Weber et al. 2006:131-138).

The Lokomotiv human skeletal remains have been the subject of doctoral dissertations by Link (1996), Mooder (2004), Lieverse (2005), and Faccia (2011). Link's research concerned the ageing and sexing of individuals on the basis of skeletal structures, as well as the documentation of dental and skeletal pathologies. Overall, the skeletal remains of the population represented at Lokomotiv showed little evidence for trauma and disease (Link 1996:57-61, 67-68). Mooder's research focused on the mitrochondrial DNA haplogroups of select Lokomotiv individuals, with determinations of sex on the molecular level (Mooder 2004:263). Lieverse re-examined the Lokomotiv human skeletal materials for age and sex determinations, and searched for evidence of dietary stressors and osteoarthritis (Lieverse 2005). Her age and sex data from the Lokomotiv individuals are cited more frequently than those of Link (1996). For this

reason, I have used Lieverse's sex identifications, except in cases where these data disagree with the molecular sex determinations of Mooder (2004). The combined data of these researchers appear in Appendix B. As with Shamanka II, Faccia (2011) examined age- and activity-related alteration to human osteological materials recovered from Lokomotiv.

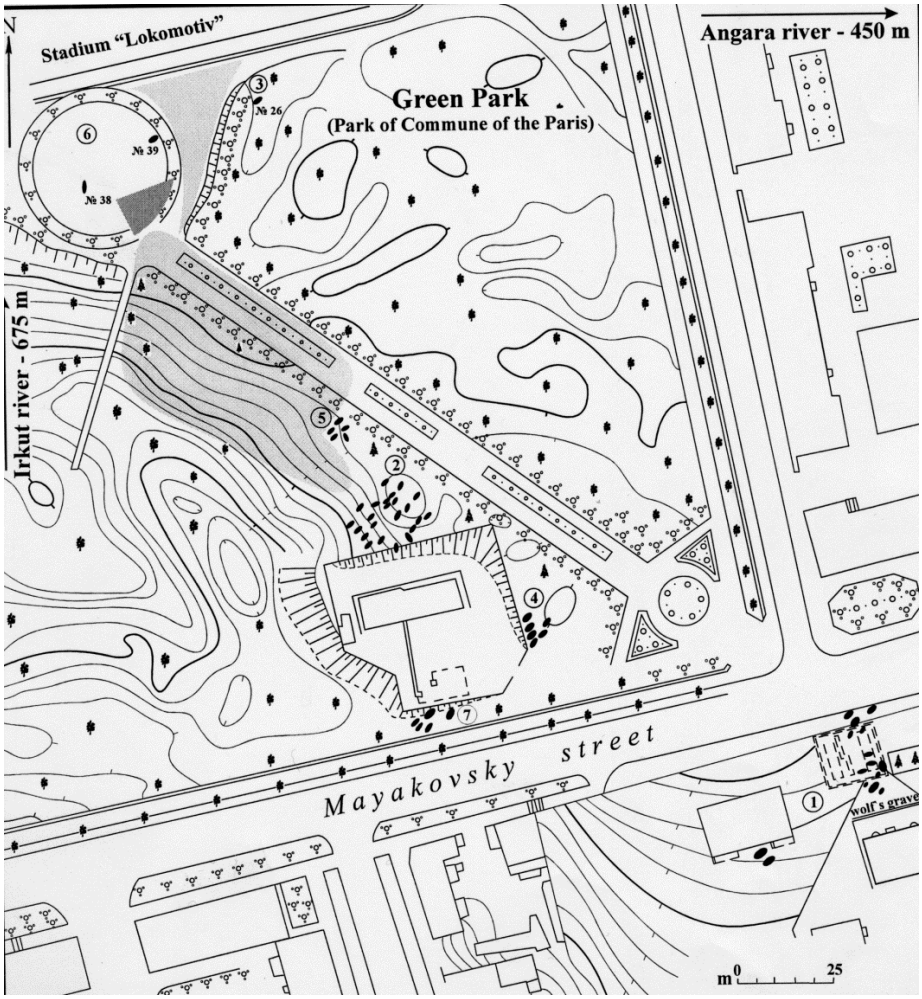

Figure 2.4 Map of the Lokomotiv cemetery.

Twenty-nine Lokomotiv graves contain avian skeletal materials, including modified and unmodified long bone portions, beaks, talons, and needle cases. Only four taxa,

Accipitridae, *Cygnus* sp., and undifferentiated large and small Aves, are represented by the Lokomotiv assemblage.

Ust'-Ida. The Ust'-Ida cemetery (Figure 2.6) is situated just north and east of the confluence of the Angara River with the smaller Ida River. The site was first discovered in 1957 after a damming project on the Angara caused flooding, exposing several burials near the shoreline (Link 1996:32). However, full-scale excavation of the cemetery did not begin until 1987, under the direction of V. I. Bazaliiskii; the project was completed in 1995 (Link 1996:32; Weber et al. 2006:143). Interestingly, the area adjacent to the prehistoric Ust'-Ida site is used as a cemetery in the present day (Link 1996:32).

Both Isakovo and Glazkovo graves at Ust'-Ida were oriented parallel to the Angara River (Weber et al. 2002:242), while rows themselves were perpendicular to the river (Weber et al. 2006:144). Additionally, Isakovo graves contained very few stone grave constructions, but Glazkovo graves featured limestone slab pavers above the interments (Weber et al. 2006:144).

A total of 56 graves containing the burials of 67 individuals were excavated at Ust'-Ida. Thirty-eight graves with 47 individual burials were attributed to the Isakovo mortuary tradition; the cultural assignment of 46 individuals to the Late Neolithic period was corroborated by radiocarbon dates (Weber et al. 2006:129-138). Seventeen graves with 18 individual burials were assigned to the Glazkovo mortuary tradition, with radiocarbon dates obtained from 15 individuals clearly attributing their interments to Early Bronze Age (Weber et al. 2006:143-149).

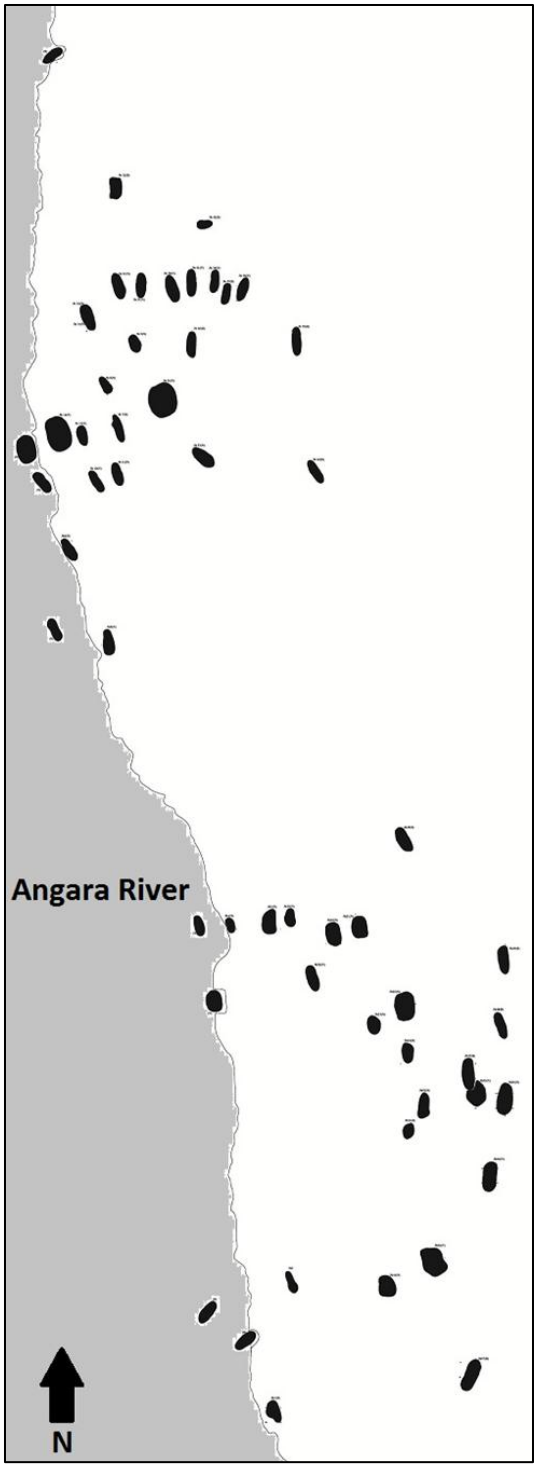

Figure 2.5 Map of the Ust'-Ida cemetery**.**

These dates revealed two main periods of cemetery use corresponding to the Late Neolithic, c. 5600 to 5400 BP (Weber et al. 2010b:46), and the Early Bronze Age, c. 4600 to 4200 BP (Weber et al. 2010b:46). A single grave, 43, showed characteristics consistent Kitoi mortuary treatment; the radiocarbon date for this individual confirms this observation (Weber et al. 2006:148).

Link (1996), Mooder (2004), and Lieverse (2005) studied the human skeletal remains recovered from Ust'-Ida. Among the three cemeteries, Ust'-Ida is perhaps most notable for yielding the greatest number of subadult individuals—indeed, more subadults were interred at Ust'-Ida than individuals securely identified as adults. Overall, skeletal evidence for trauma and disease were similarly uncommon among the Ust'-Ida population as they were in the Lokomotiv (Link 1996:57-61, 67-68; Lieverse 2005:84), though specific patterns of osteoarthritis on the basis of bodily location were noted. Lieverse (2005:84) comments this bias was due, in part, to the differential representation of certain human skeletal elements recovered from each cemetery. Mooder (2004) included some Ust'-Ida individuals in her study of mitochondrial DNA haplogroups. She also obtained some molecular sex determinations. Both data sets appear in Appendix C.

Avifaunal materials were recovered from 36 graves at Ust'-Ida. Identified taxonomic groups include *Cygnus* sp., Accipitridae, and large and small Aves. The assemblage includes both unmodified and modified objects, as well as a large number of bird bone needle cases.

Chapter 3
Theoretical Considerations

In this chapter, I explain my theoretical approach to the examination of avifaunal inclusions in the cemeteries of Shamanka II, Lokomotiv, and Ust'-Ida. I argue for the agency of humans, animals, and "inanimate" objects. I then explore how a relational approach to archaeological materials might shift interpretation from a focus on the human use of non-human animals and objects to how all entities are active in the construction of human identity.

3.1 Previous Interpretations of Faunal Materials in Human Mortuary Contexts

Material inclusions in human graves and other mortuary contexts have been used to serve a variety of archaeological interpretations, including inference of status and societal roles, kinship structures, gender and gendered activities. Increasingly, aspects of identity, such as gender, age group (Stoodley 1999), ethnicity, and specific occupation (Treherne 1995), also are addressed through the assessment of grave goods. While recognizable objects, or those with similarities to recognizable objects, are employed frequently in mortuary analyses and interpretations, faunal materials from human graves have been considered less often. Articulated animal burials in human mortuary contexts have been used to create or enhance interpretations of status (Judd 1959:336). The presence of partially articulated or disarticulated avifaunal skeletal remains have been invoked in similar interpretations (Hanson 1980), but have been suggested also as residues of feasting (Crabtree 1995), sacrifice (Creel and McKusick 1994), ritual paraphernalia (Hill 2000), or evidence of generalized ceremonial practices (Bar-Yosef and Bar-Yosef Mayer 2002).

Formerly, many theoretical approaches to faunal remains recovered from mortuary contexts were limited to rather clinical examinations of a group's social organization or "ceremonial" activities (Binford 1971; Saxe 1970), with an apparent resistance to examine the beliefs, emotions, or relationships of the deceased. Increasingly, faunal remains are used for the purposes of "interpretive zooarchaeology" (Marciniak 1999:284), including the inference of cosmological concepts and beliefs about post-mortem activities or needs of the deceased (Mannermaa 2008; Morrow and Volkman 1978), an examination of the roles and abilities of deceased humans and animals (Argent 2010; Grosman et al. 2008), and interpretations that highlight relationships between humans and animals that may have existed in the past (Jones 1998; Oma 2010; Losey et al. 2011).

Despite these developments, there exists no inclusive theoretical model to approach the analysis and interpretation of faunal materials recovered from human mortuary contexts.

3.2 Relationality and Agency

I rely on relationality as the primary structuring principle in my theoretical approach to the avifaunal materials of Shamanka II, Lokomotiv, and Ust'-Ida. This approach affirms humans, animals, and objects are social agents that work in concert to shape culture and identity (Birke et al. 2004; Brück 2004; Hodder 2012; Knappett and Malafouris 2005; Olsen 2010), as opposed to a perspective in which any non-human entity is a passive receptor of human thought and action. As a theoretical model applied to archaeological phenomena, relationality seeks to redress implications of human dominance over the non-human world, and to move interpretation away from a strictly functionalist understanding of the record that favours a static view of society (Barrett 1988:7).

I assert that a relational approach to humans, animals, and objects is explored most meaningfully through the notion of agency. Loosely defined, agency is the ability to act. However, what constitutes a specific demonstration of action, and what sorts of things are capable of performing it, has been a topic of considerable debate (Jones and Cloke 2008; Dobres and Robb 2000:8-9; Knappett and Malafouris 2008:x). Some scholars have argued that agency is squarely in the domain of humans, as in this view agency requires intent, which in turn necessitates the existence of an entity possessed of both body and mind. Others have remarked that agency is not hinged upon a dichotomy of culture (human) and nature (non-human), and everything is considered an actor (Callon 1999:181-182; Gell 1998:17-19; Olsen 2010:4). I prefer an explicitly anthropological definition, such as the one provided by Dobres and Robb (2000:8): "Agency is a socially significant quality of action rather than being synonymous with, or reducible to, action itself."

My application of relationality, and more specifically human and non-human agency, to archaeological interpretation is in part a response to the anthropocentric approaches that have prevailed in the social sciences (Hodder 2012:13; Knappett and Malafouris 2005:ix). I operate on the observation that explicitly anthropocentric theoretical approaches may be concomitantly ethnocentric, as Ahern (2001) has noted that a human's perception of what does and does not possess agency is fully determined by one's culture. Further, it has been suggested that the oppositional notion of culture versus nature is incompatible with a number of non-western ontological constructions that make different, some, or no distinctions between the two (Brück 2004:312; Ingold 2000:89-110; Mauss 1990:11-13). We will never be able to understand in detail how the prehistoric peoples of Cis-Baikal organized their world, nor how and where they placed

themselves in regard to non-human entities, nor whether those entities were perceived as actors. My acceptance of non-human agency is an attempt to escape the bias couched within a present-day, western understanding of the organization of the world. It is in my view necessary to approach archaeological materials in the most comprehensive means possible, which requires the acknowledgement of humans, animals, and objects to be social performers in potentially equal measure.

3.3 Engagement between Humans and Non-Humans

Ingold (2000:60) proposes that no actual distinction can be made between "nature" and "culture." He suggests anthropologists might focus instead on the engagement of humans with non-human entities that also inhabit the world. To this end, the ability of non-human agents to engage with other entities is usefully explored through Actor Network Theory (ANT). ANT understands the construction of the world as one in which humans and everything else are "defined … by their relations, collaborations, and coexistence" (Olsen 2010:138-139). In this model, there is no fundamental distinction between humans (culture) and non-humans (nature) in their ability to act and be acted upon, and all entities must be considered equal in their capacity to be actors (Latour 1993:94). In this view, the links and actions between people, animals, and things are highlighted, rather than relegated to the "backdrop" of human lives (Argent 2010:157-158; Knappett and Malafouris 2008:ix; Olsen 2010:8).

A discussion of humans' and non-humans' ability as actors would be remiss if it did not address the kinds of interaction they have. While taking the perspective that all things—thinking, living, or otherwise—are capable of performing action and being performed upon, I, as a human, cannot escape fully the human position (Benso 2000:44;

Hodder 2012:13). For this reason, I shall assume the human as the point of reference. In taking this view, non-humans need not be perceived as mere analogues or metaphors for specific kinds of human action—indeed, many kinds of human activity are partially or completely enabled by them, furthering the existence of a relationship between them (Gell 1998:20-22; Hodder 2012:29).

3.4 Human Identities

Dobres (1995:28) notes that human "identities, practices, and ideologies" enter the material world through the "knowledge, skill, production of, access to, and use of material culture." My interest in the avifaunal specimens recovered from prehistoric Cis-Baikal mortuary contexts lies in what these skeletal remains, and objects created from them, may reveal about the relationships they have with humans. I am interested in how these materials shaped and reinforced people's conceptions of identity. Specifically, I am concerned with the relationships between biological human bodies, social human bodies, and the avifaunal materials included in graves.

Even the human body cannot escape the "culture versus nature" debate. Archaeological approaches to human remains have interpreted the human body in two main ways (Sofaer 2006; Stutz 2008). On one hand, human remains may be conceptualized as subjects of hard sciences-based inquiry; on the other, human remains are the product of a social life lived, exhibiting evidence of their roles and relationships that were created in a particular social context. These views, though often seen as competing for primacy in the interpretation of archaeological human remains, are in fact compatible.

For the purposes of this thesis, I employ the definition of identity set forth by Díaz-Andreu and Lucy (2005:1) in which individuals self-identify with larger groups whose differences are recognized by the society as a whole. I have chosen to focus my consideration of prehistoric Cis-Baikal identities on two aspects of identity: gender and age. Additionally, I will discuss how each relates to my interpretation of the avifaunal mortuary inclusions in the graves of Shamanka II, Lokomotiv, and Ust'-Ida.

Gender. Anthropologists generally agree that anatomically modern humans participate in their societies in various ways with respect to their gender and age (Dobres 1995:28). Outlined by Binford (1965:205), differential participation asserts that individuals place themselves, or are organized by others, into groups on the basis of some similarity deemed socially significant, and that these groups take part in the broader society in different ways. Extending this argument to its material implications, it can be said that members of these groups routinely undertake activities that necessitate particular kinds of things, or adorn themselves with similar kinds of objects. It is further suggested that these group distinctions are manifest on a material level in archaeological contexts (Dobres 1995:27). Binford uses this model largely to explain that the degree of differential participation helps to reveal the overall complexity of a society (Binford 1965:205), but, following Dobres (1995), I believe his model may instead provide a useful springboard for the exploration of identity and the materials associated with it.

I have assessed other scholars' definitions in attempting to outline gender. However, in this endeavour, I discovered that many definitions fail to capture the full spectrum of its construction. Díaz-Andreu (2005:14) suggests gender "can be defined as an

individual's self-identification and the identification by others to a specific gender category on the grounds of their culturally perceived gender difference. The concept of gender is related to but not equivalent to that of sex." Despite its utility in explaining how archaeologists understand and use the concept of gender, I find it wanting for deeper exploration. In archaeological literature, Conkey and Spector's article *Archaeology and the Study of Gender* (1984) is commonly credited with bringing to the fore serious issues about the treatment of gender in archaeological interpretation. Taking their cue from earlier developments in feminist and sociocultural theory, Conkey and Spector castigated archaeology for its apparent acceptance of an understanding of gender based on the two biological sexes, remarking that western ethnocentrism was perpetuated in such an approach. In adhering to this uncritically applied biological determinism, the pair argued that archaeological interpretation suffered from a pervasive androcentrism that only served to limit western-constructed "men" and "women" to sex- and gender-appropriate roles, as well as to undervalue or ignore the societal participation and contributions of non-adult males in the past (Conkey and Spector 1984:28). This is not to imply that biological sex does not have bearing on the construction of gender, only to say that it is not the lone determinant.

As the concept of gender cannot be summarised by a single cross-cultural definition, , I have ascribed to Voss and Schmidt's (2000:5-6) "social constructionist approach," which underscores acknowledgment of how one's own biases and social constructions might affect or constrain interpretation, the discernment of sexual variability from available archaeological evidence, and an analysis of the context in which the evidence was produced, used, and disposed. In my view, this approach leaves room for Díaz-Andreu's (2005:14) observation that "the interrelationships of sex and gender identities

have the potential to create intricate social structures to an extent perhaps so far underestimated by social scientists."

In following chapters, I frequently use biological sex determinations to explain material patterning in graves and among burials. While I reject the basis of an individual's gender based *entirely* upon sex, patterns emerged while investigating sex as a variable. I assert these patterns are related to Neolithic and Early Bronze Age conceptions of gender, and that these categories provide useful way to explain patterning observed in the sample.

Age and Life Stages. Until recently, age was afforded very little consideration in archaeological literature. As with gender, age was rarely addressed explicitly as a socially constructed phenomenon. When age and gender were addressed, the most defining characteristic of other members of a society was that they somehow lacked the attributes assigned to the adult male, who represented optimal human fitness and ability (Chamberlain 1997:248), with biological determinism and ethnocentrism plaguing interpretation. Sofaer Derevenski's (1997:193) survey of more recent literature dealing with the subject of "finding" children and mature adults in the archaeological record provides an examination of their treatment in archaeological interpretation, with underrepresentation in mortuary contexts as the most oft-cited reason for their omission. Even more frequently, individuals of advanced age have been excluded from discussions of the past (Lucy 2005:43). It has been suggested the problem is not an actual absence of children or mature adults in the archaeological record, but rather a resistance to look for evidence of their activities, which undervalues their contributions

to a society (Baxter 2005:63-67; Chamberlain 1997: 249; Kamp 2002; Lucy 2005:47; Sofaer Derevenski 1997:193).

Like gender, the primary issue concerning age identity is how to define it. Sofaer (2006:120) notes age cannot be understood entirely as a human construct because the concept corresponds in many ways to the physical changes of the human body as it grows and ages. Some changes, such as tooth eruption, epiphyseal fusion, and sexual maturity, are osteologically apparent and take place within a fairly consistent chronological age range for all humans. Others, such as degenerative bone conditions, tooth wear, and dental attrition are generally taken as indicators of advanced age, but are perhaps more indicative of one's lifestyle and activities (Lillie 1997; Sofaer 2006:121) and may occur variously under differential environmental conditions (Lucy 2005:48-49; Sofaer 2006:121-123).

The archaeological investigation of the social dimension of the determination of age has been fraught with western, present-day projections onto the past. "Infant," "child," "teenager," "young adult," "adult," and "elderly" are age categories likely to be recognized by a Westerner in the present day, but each category carries with it socially and historically determined activities, rights, responsibilities, and roles (Hendrick 1997; Kamp 2001; Lucy 2005:53-58). If archaeologists are to take for granted these categories and place them onto humans of the past based on estimates of their biological age at death, our assumptions about the participation and contributions of these individuals have the potential to bias interpretation. In such an example, youths and the elderly of the past might be perceived as one dimensional, non-productive members of society, with their societal contributions overlooked (Kamp 2002:75; Lucy 2005:47).

In lieu of a specific definition that attempts to explain the construction and reckoning of age across space and time, I turn to a methodical approach. In his examination of age, Robb (2002:161) suggests to archaeologists that they might consider "growth, illness, ageing, and death as posing universally recognizable material which must have been incorporated into cultural interpretations without rigidly dictating the way in which they were understood." This approach is echoed in the work of Kamp (2001:4), who advocates for an investigation of age identity rather than a specific assumption of it.

Where possible in subsequent chapters of this thesis, I attempt to avoid language laden with specific social meanings. However, my discussion of social phenomena required the use of terms that could be used to easily differentiate between age groups. Halcrow and Tayles (2008) note the lack of agreement among pediatricians, bioarchaeologists, developmental osteologists, evolutionary anthropologists, and medical anthropologists of how best to characterise age groups on the basis of biological changes. In subsequent chapters, where such discussion is warranted, I use the juvenile age group designations given by Scheuer and Black (2000) and the adult categories employed by Faccia (2011). I use "subadult" and "adult" as broader descriptive categories, with pubescence as a general division between the two.

That societies often make gender- and age-based distinctions among their members is particularly beneficial to my research. Extensive analyses of the human skeletal material excavated from Shamanka II, Lokomotiv, and Ust'-Ida have yielded biological sex and age at death determinations for all but a few individuals interred in these cemeteries. These human skeletal analyses provide a unique opportunity to search for patterning in material grave inclusions. However, rather than approaching these

inclusions from the vantage that they were buried with inalienable "men or women," or "children or adults," I view sex and age at death as variables, with my point of inquiry beginning at the materials themselves (cf. Stoodley 1999:24).

Gender and age in previous Cis-Baikal archaeology have seen very little study. Previous assessments of prehistoric Cis-Baikal mortuary materials have tended to privilege the quantity and quality of grave inclusions. Generally, high numbers of grave inclusions, and particularly those fashioned from non-local materials, have been used as indicators of the deceased's status (Bazaliiskii 2010:68-71; McKenzie 2010:104; Shepard 2010:31-36). Additionally, these items have been interpreted as being generally correspondent to gendered activities, which in turn have been loosely yet uncritically suggested for the biological sexes (Bazaliiskii 2010:75). There has been scant consideration of the potential for the absence of gendered tasks, or significant differences in what activities members of a particular gender might have performed, or more culturally relevant reckonings of gender not based explicitly on biological sex. In a similar manner, the presence and artefactual richness exhibited by some subadult interments in prehistoric Cis-Baikal cemeteries have been used to make arguments for the increased significance of status, or the marking of it, in mortuary treatment (Shepard 2010:40). That their presence might be attributed to other social factors, in whole or part, has been given little consideration.

Chapter 4
Methods of Identification, Quantification, and Analysis

In this chapter, I describe the methods by which the avifaunal materials from Shamanka II, Lokomotiv, and Ust'-Ida were assessed, as well as the types of information obtained from the specimens. I include an explanation of the calculation of the minimum number of individual birds present in these cemeteries' assemblages, as well as the method by which I examined these data for patterns. I conclude the chapter with a brief overview of recovery biases.

4.1 Primary Data

The Shamanka II and Lokomotiv faunal materials were analyzed between 2007 and 2010 by Dr. Robert Losey, who granted access to these data. The Ust'-Ida materials were reanalyzed by me in August 2010. For all three cemeteries' assemblages, primary data, including taxon, element, side, modifications, and dimensions, were recorded when possible. Terminology used to describe bird elements follows the anatomical conventions found in *A Manual for the Identification of Bird Bones from Archaeological Sites* (Cohen and Serjeantson 1996). This information entered into computer spreadsheets during data collection for further analysis.

Efforts were made to identify each specimen to the most specific taxonomic level possible. Identifications were carried out in consultation with a faunal comparative collection housed in Irkutsk, as well as with published guides (e.g., Gilbert et al. 1985). Some specimens from the Shamanka II and Lokomotiv cemeteries were identified by Dr. Losey using comparative materials at the National Museum of Natural History at the Smithsonian Institution. In the case of Ust'-Ida, where the comparative collection did not contain a needed specimen, high-resolution photographs of skeletal elements (from

modern specimens curated at the Royal Alberta Museum in Edmonton, Alberta) were consulted. Photographs were taken of some specimens deemed identifiable to a more specific taxonomic level. The taking of consistent measurements (following von den Driesch 1976) typically was not possible, as many prehistoric Cis-Baikal faunal grave goods have been broken or heavily modified from their original form. In the case of modified objects, modifications, maximum length, width, and thickness were measured in millimeters with digital calipers. It was not expected that metrics would be necessary component of this analysis, but they have proven useful when distinguishing between morphologically similar artifacts of different sizes in the same grave.

4.2 Calculation of Number of Identifiable Specimens and Minimum Number of Individuals

The number of identifiable specimens (NISP) is simply a raw count of all avian skeletal material that was documented in the Shamanka II, Lokomotiv, and Ust'-Ida mortuary assemblages.

Minimum number of individuals (MNI) is a calculation frequently employed by zooarchaeologists to understand the minimum number of individual animals that are represented by a faunal assemblage. MNI cannot reflect the actual number of animals, but its calculation provides a baseline estimate of the minimum number of animals required to account for the faunal material present (Reitz and Wing 2008:206). The calculation is based on the notion that the appendicular portions of animals' skeletons occur in sided pairs, and even when disarticulated or fragmented, a single animal will not have more than the prescribed number of skeletal elements for either the left or right side of the body. Further, in cases where skeletal elements are fragmented, it is

understood that overlapping portions of bone from the same kind of element must necessarily come from separate animals.

To better understand a taxon's representation in each cemetery, MNI was determined for taxonomic levels more specific than Aves, and these were calculated at the grave level. This unit of analysis was selected as graves are discrete spatial and temporal units across the three cemeteries. Calculating MNI at the burial level had the potential to inflate the numbers for each taxon, particularly given the number of multiple burials in some graves. Further, the association between a specific burial in a grave of multiple individuals and a particular object was not always established in excavation notes or in grave plan views. In some instances, an avifaunal specimen potentially was associated with all individuals in a grave.

4.3 Examination of Patterning

Data generated by these analyses were entered into tables in a database program. Where available, biological sex, approximate age at death, mitochondrial DNA haplogroup determination, mortuary tradition, and radiocarbon dates for each (human) burial were grouped and entered into tables. Given the many different kinds of data, and the variables within each, I determined they would be examined best in a format that facilitated expediency. Additionally, it was expected that patterns not previously considered would emerge. Statistical methods were not employed due to the small size of the avifaunal data sets.

Separate tables were created to group like kinds of data. To correlate data from table to table, the grave and burial numbers assigned during excavation were used as the primary key in every table. This resulted in a unique designation for each individual. For

example, UI 25-3 refers to the third individual in grave 25 at Ust'-Ida. This tied all data to the appropriate individual across tables when queries were run. Queries themselves were designed to address the research questions, as well as to examine new questions that arose during the course of analysis.

To execute these queries, it was necessary to create partitions between different kinds of data. To this end, I identified four broad categories based on the degree of modification for each avifaunal specimen: unmodified, modified, fishhook barbs and shanks, and needle cases. Avifaunal remains were placed in the unmodified category when human alteration to the specimen was absent. The modified category encompasses all avifaunal materials that were obviously altered from their natural forms by humans, including items that were identifiably sawn, snapped, ground, smoothed, cut, and/or incised. A third category of identifiable modified objects, including fishhook barbs and shanks, also was identified, but was sufficiently small to evaluate without the aid of queries.

The fourth category is comprised of objects variously referred to as needle cases or needle boxes. Similar items rendered in bird bone have been recovered from several Neolithic sites across the circumpolar regions of Eurasia (Mannermaa 2003; Martynovich 2011). Fashioned from the long bone diaphyses of large birds, these hollow, cylindrical objects occasionally contain bone needles, and are sometimes ornamented with a variety of surface treatments (Figure 4.2). Often, they were shaped by removal of the epiphyses through the saw and snap technique, leaving a moderately straight shaft with clean edges. In other instances, both epiphyses appear to have been roughly broken off,

or sometimes one end was left intact (Figure 4.3). The interior cavities of the bones also were smoothed.

Though needle cases fall under the modified category in the strictest sense, they were separated for two particular reasons. First, they are the only modified bird materials to be altered into a fairly consistent and recognizable form. Second, I was able to recognize additional types or forms of cases within the needle case category. For example, it became apparent that it was worth considering such variables as the element used to make the needle case, or whether a case was decorated or contained needles. Separating them from the larger body of data made their variable nature easier to examine.

Because I approached biological sex as a variable, in instances where an individual was determined to be a probable male or female, they were assigned to that sex.

Figure 4.1 Example of needle case from Ust'-Ida 33-1 (Isakovo). Scale is in centimetres.

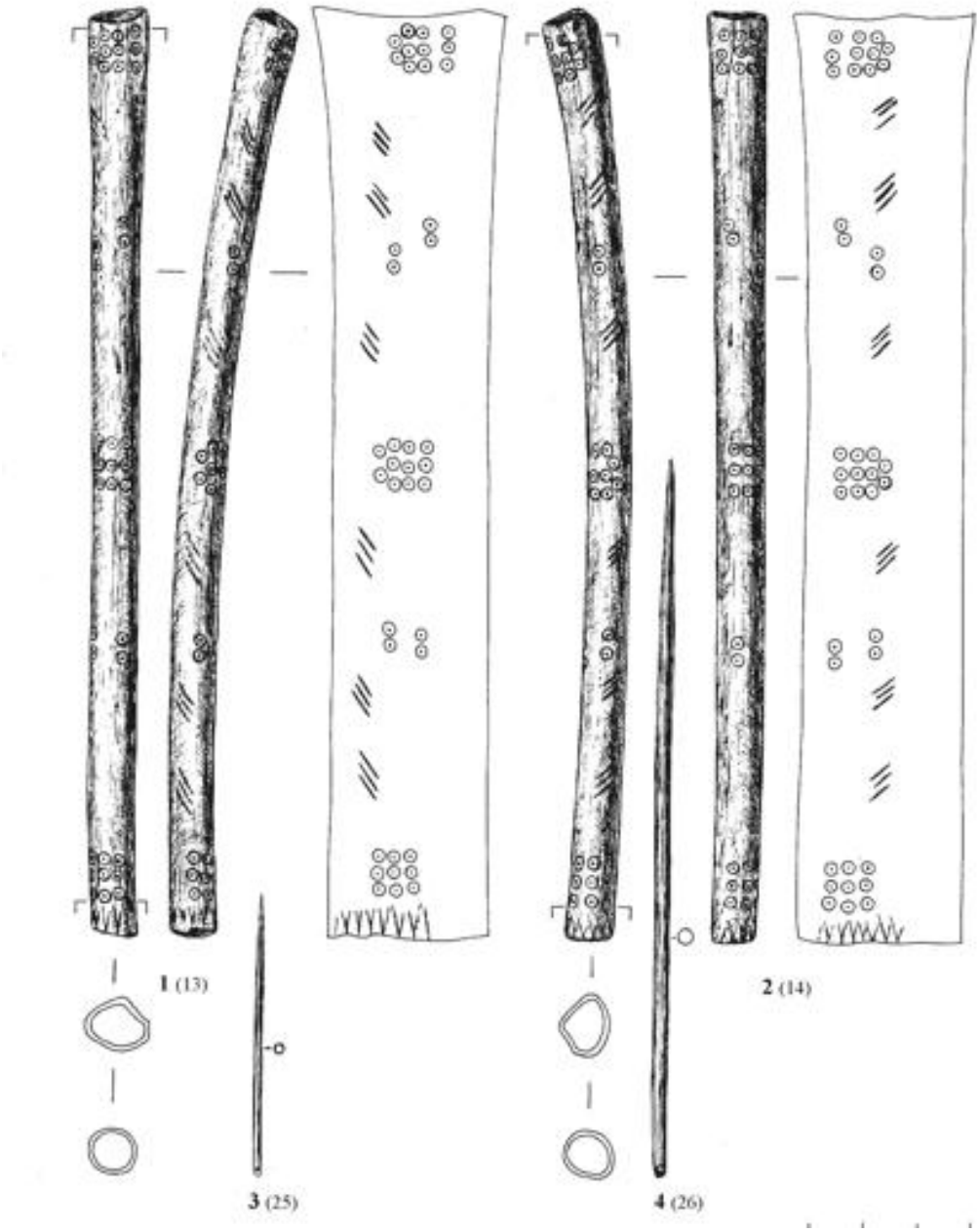

Figure 4.2 Example of decorated needle cases with mirrored treatment from the Shamanka II cemetery (25-1). Image courtesy of V. I. Bazaliiskii.

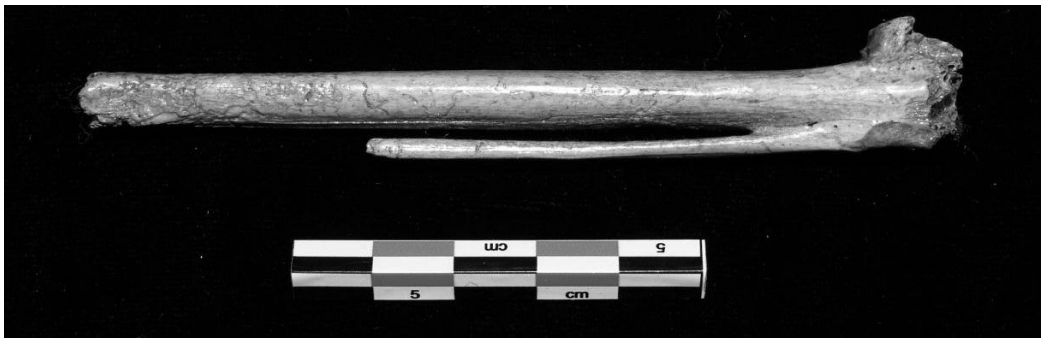

Figure 4.3 Example of needle case with one removed epiphysis and one partially intact epiphysis from Ust'-Ida 6-1 (Isakovo). Scale is in centimetres.

4.4 Recovery Biases

Sampling strategies and fieldwork procedures varied greatly from excavation to excavation. However, in no known case was burial matrix screened in the field or sampled for later flotation or sieving. Though careful excavation procedures were in place, collection of archaeological materials was limited to what excavators could easily see and collect by hand. Remains of smaller animal taxa are known to be lost even when screening protocols are used (James 1997; Steadman and Rolett 1996; Struever 1968), which could explain the high incidence of large avian taxa remains in these samples and the relative absence of smaller bird taxa. Specimens undoubtedly were missed during excavation or have been misplaced during curation. It is acknowledged that, in light of a more thorough faunal material recovery, analyses and subsequent interpretations of these data might be different.

Chapter 5
Results of Analysis and Examination of Patterning

In this chapter, I present the results of avifaunal analyses from Shamanka II, Lokomotiv, and Ust'-Ida, including taxonomic and element identifications of bird remains, and notes on modifications to these objects where applicable. This information is followed by an examination of patterning in these items in relation to the human individuals with whom they were interred. Appendices A and B list each grave with avifaunal remains, human osteobiographical information (age, sex, mtDNA haplogroup), the avifaunal materials associated with each burial and grave, and modifications to avian remains. The avian bone items associated with each burial and these items' location in the grave (where such information was available) are presented in Appendices A, B, and C.

5.1 Taxonomic Summary and Modifications to Shamanka II, Lokomotiv, and Ust'-Ida Avifaunal Specimens

Shamanka II. A total of 168 human burials in 108 graves were excavated. The majority of these graves were attributed to the Kitoi tradition, though nine graves exhibited characteristics of the later Glazkovo tradition. Of the 99 Kitoi graves, 48 (48.5%) yielded avifaunal remains, with a total of 455 specimens identified. No bird material was identified in the mortuary assemblages from the nine Glazkovo graves.

Shamanka II Taxonomic Summary

Class Aves

Undifferentiated aves

A total of 27 specimens were identified as undifferentiated Aves. Elements included premaxilla and dentary portions (n=5), long bone diaphyses and diaphyses fragments (n=20), an ulna (n=1), and a carpometacarpus (n=1).

Large aves

A total of 42 specimens were identified as large Aves. Elements included humeri (n=2), ulnae (n=11), radii (n=2), long bone diaphyses and diaphyses fragments (n=25), and phalanxes (n=2).

Medium to large aves

A total of 8 specimens were identified as medium to large Aves. Elements included a modified radius (n=1) and ulna (n=1), as well as 6 long bone diaphyses fragments.

Medium aves

A total of 3 specimens were identified as medium Aves. All were long bone diaphyses fragments.

Order Gaviiformes

Family Gaviidae

Gavia* sp. and cf. *Gavia (Loon)

A total of 3 specimens were identified as *Gavia* sp. or cf. *Gavia*, including premaxilla (n=1) and dentary fragments (n=2, refit). These unmodified specimens were recovered from the same grave (Sha 23) and likely came from a single bird. A dentary portion

identified as *G. stellata,* which bore cut marks, also was recovered from Sha 23. It may represent another bird, which would give an MNI of two.

Gavia stellata (Red-throated Loon)

A total of 11 specimens, all bone elements of the beak (the keratin sheath was not present), were identified as *Gavia stellata*. Specific elements included premaxillae, maxillae, and dentaries, which were recovered from four graves (Sha 8, Sha 11, Sha 18, and Sha 53). All but one, a dentary, exhibited cut marks, likely due to removal of the beak from the birds' heads. The total MNI for this taxon was calculated at four.

Order Pelecaniformes

Family Phalacrocoridae

***Phalacrocorax* sp.** (Cormorant)

A total of six specimens were identified as *Phalacrocorax* sp. All elements were parts of the beak, and were associated with a single burial (Burial 8-1). One portion, a premaxilla, exhibited cut marks. The remaining portions were unmodified. The data yielded an MNI of one.

Family Ardeidae

Botaurus stellaris (Eurasian Bittern)

A total of two specimens, the dentary (n=1) and premaxilla (n=1) portions from the same bird's beak, were identified as *B. stellaris*. Both portions exhibited cut marks. These materials were associated with one burial (Sha 23-1), and an MNI of one was calculated.

Order Anseriformes

Family Anatidae

A total of three specimens could be identified only to the level of Anatidae, including humeri (n=2) and a coracoid (n=1). None was modified. These materials were associated with 2 burials (12-1 and 16-1), and yielded an MNI of two. Other skeletal elements were attributable to five genera in the Anatidae family.

Cygnus* sp. and cf. *Cygnus (Swan)

A total of 47 specimens were identified as either *Cygnus* sp. or cf. *Cygnus*. Elements included humeri (n=2), ulnae (n=10), radii (n=2), a scapholunar (n=1), pollexes (n=2), carpometacarpi (n=11), first phalanxes of the major digit (n=6), second phalanxes of the major digit (n=3), first phalanxes of the second digit (n=2), second phalanx of the second digit (n=1), and distal phalanxes (n=2). Notably, these elements are associated solely with the wing of the bird. Assuming that elements from individual birds were not shared between graves, 23 individual birds belonging to cf. Cygnus or *Cygnus* sp. are represented at Shamanka II. Radiocarbon dates of graves notwithstanding, if elements were shared between graves, the MNI at the cemetery level would be calculated at 10.

Anser cygnoides (Swan Goose)

An entire beak, apparently carefully cut from the head of the bird, was identified as *A. cygnoides*. It was associated with one burial, Sha 26-1, giving an MNI of one.

***Melanitta* sp.** (Scoter)

A single humerus was identified to the genus *Melanitta*. The specimen was recovered from burial Sha 34-1, giving an MNI of one. Of note is that the specimen exhibited signs of carnivore gnawing.

Mergus* sp. and cf. *Mergus (Merganser)

A total of three specimens were identified as either *Mergus* sp. or cf. *Mergus*. Elements included carpometacarpi (n=2) and a premaxilla (n=1). All were unmodified. The carpometacarpi were recovered from burial Sha 21-1 and yielded an MNI of one. The premaxilla portion was in association with burial Sha 28-1. In total, a minimum of two individual birds is represented.

Mergus* cf. *serrator (Red-breasted Merganser)

A total of three specimens were identified as *M.* cf. *serrator* premaxilla and maxilla fragments. The fragments were recovered from burial Sha 26-1, and an MNI of one was determined.

Mergus merganser (Common Merganser)

A total of two specimens, both premaxilla fragments, were identified as *M. merganser*. The specimens were recovered from the same burial, Sha 62-1, and refit with each other, giving an MNI of one.

Order Falconiformes

Family Accipitridae

A total of 49 talons were identifiable only to the Accipitridae family level, along with several humeri (n=2), a first phalanx of the major digit (n=1), and first and second phalanges (n=101). Additional specimens were identified more specifically to eight genera.

cf. *Milvus migrans* (Black Kite)

Two tarsometatarsi, paired left and right elements, most closely resembled those of *M. migrans*. Both specimens were recovered from one grave (Sha 39). MNI was calculated at one.

Aquila/Haliaeetus* sp. and cf. *Aquila/Haliaeetus (Sea Eagle)

A number of skeletal elements were attributed to either *Aquila/Haliaeetus* sp. or more closely resembled *Aquila/Haliaeetus* than any other taxon. These elements include humeri (n=6), ulnae (n=4), a radius (n=1), femora (n=5), tibiotarsi (n=4), and talons (n=5). The MNI was calculated at 13.

***Accipiter* sp.** (Goshawk/Sparrowhawk)

A total of six tarsometatarsi were identified as belonging to the genus *Accipiter*. All were recovered from burial Sha 39-1 and represent a minimum of four individual birds.

Accipiter* cf. *gentilis (Northern Goshawk)

A total of five elements, all tarsometatarsi, were identified as most closely resembling *A. gentilis*. All tarsometatarsi were recovered from the same grave (Sha 39) and represent a minimum of 4 individual birds. Notably, these elements closely correspond in number to those identified as *Accipiter* sp., and may represent the paired elements of four birds.

Accipiter nisus (Eurasian Sparrowhawk)

A single *Accipiter nisus* tarsometatarsus was identified, yielding an MNI of one.

***Buteo* sp.** (Buzzard)

Four elements, all tarsometatarsi, were identified as belonging to the genus *Buteo*, and were recovered from a single grave (Sha 39). The tarsometatarsi account for a minimum of three individual birds.

Buteo lagopus (Rough-legged Buzzard)

A total of two elements, both tarsometatarsi, were identified as *B. lagopus*. They were recovered from the same grave (Sha 39) and likely represent paired left and right elements, giving an MNI of one.

Buteo hemilasius (Upland Buzzard)

Two tarsometatarsi were identified as *B. hemilasius*. As with the *B. lagopus* specimens, these *B. hemilasius* tarsometatarsi were recovered from the same grave (Sha 39) and likely came from a single bird.

Order Gruiformes

Family Gruidae

Anthropoides virgo (Demoiselle Crane)

A total of three specimens, all premaxilla fragments, were identified as *A. virgo*. All specimens were recovered from a single grave (Sha 23) and represent a minimum of one bird.

Grus* sp. and cf. *Grus (Crane)

A total of eight specimens were identified as either *Grus* sp. or cf. *Grus*. Elements included a dentary fragment (n=1), carpometacarpi (n=2), tarsometatarsi (n=4), and a tibiotarsus (n=1). MNI was calculated at four.

Grus grus* and *Grus* cf. *grus (Eurasian Crane)

A total of one specimen, a tarsometatarsus, was identified as *G. grus*. Another specimen from a separate grave, also a tarsometatarsus, was identified as most closely resembling that of *G.* cf. *grus*. MNI was calculated at two.

Order Passeriformes

Family Fringillidae

Coccothraustes coccothraustes (Hawfinch)

Fringillidae was represented by a single taxon, *C. coccothraustes*. Dentaries (n=2) were found in two separate graves, yielding an MNI of two.

Modifications to Bone

All modifications observed for Shamanka II bird remains are presented in Appendix A; a summary follows here (and see Figure 5.1). Though the majority of avifaunal specimens recovered from Shamanka II were unmodified (70.9%, n=323), the most common modification was the removal of epiphyses from long bones (14.3%, n=65). Other modifications included cut marks (3.3%, n=15), grinding/polishing (3.3%, n=15), sawn and snapped surfaces (1.5%, n=7), incised lines (1.5%, n=7), and drilled holes (0.2%, n=1) (Figure 5.1).

Seventeen specimens (4.4%) were identified as needle cases (with a variety of modifications), while two (0.4%) were determined to be fishhook barbs fashioned from the talons of raptorial taxa.

Several specimens from Shamanka II exhibited signs of non-human modification. Five specimens were notably weathered. Root etching was noted on another five specimens. A *Melanitta* sp. humerus showed signs of carnivore gnawing.

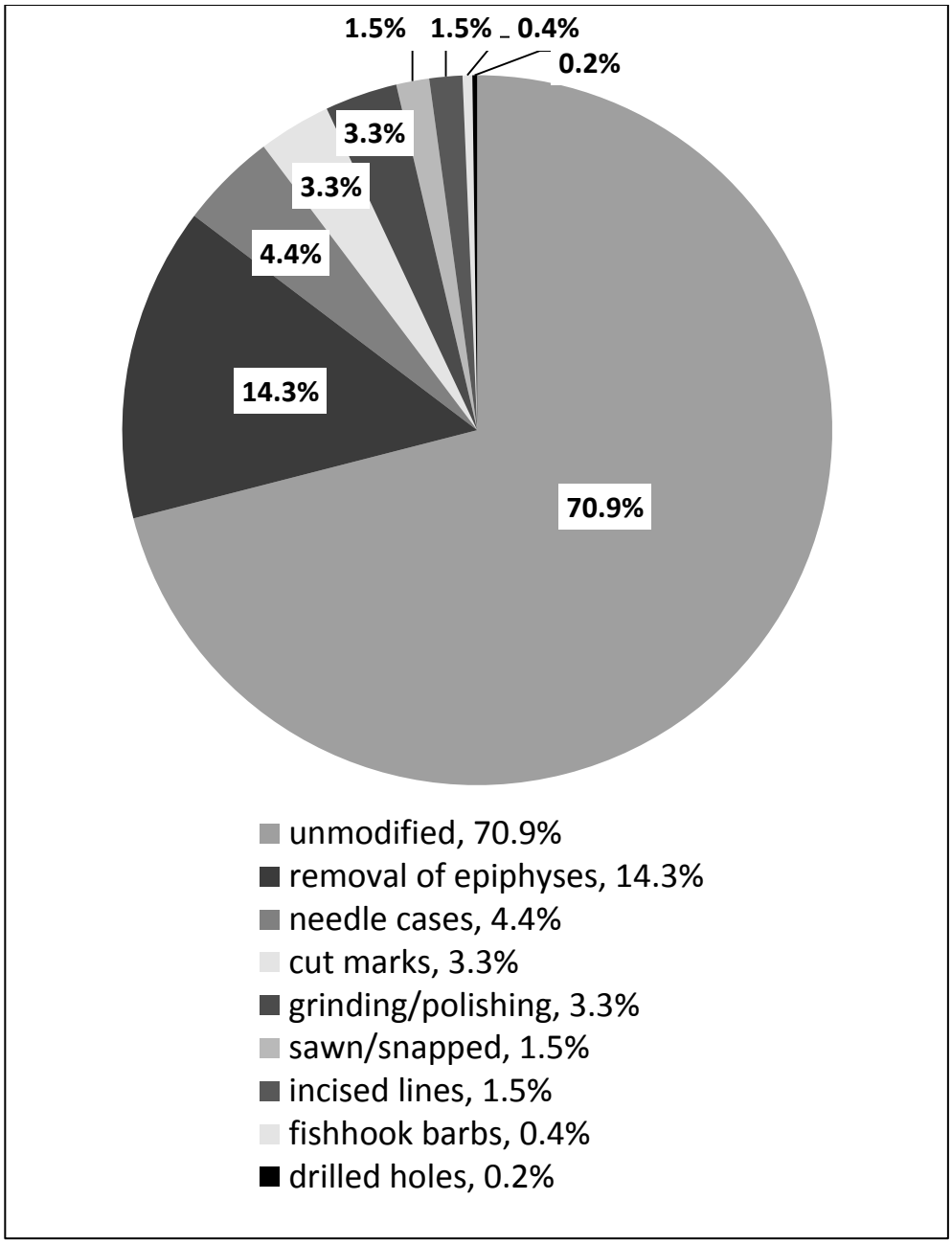

Figure 5.1 Modifications to avifaunal specimens recovered from the Shamanka II cemetery.

Lokomotiv. For this study, I was granted access to 59 graves containing 100 burials from the Lokomotiv cemetery. All Lokomotiv burials exhibited Kitoi mortuary treatment, the assignment of which was corroborated by numerous ^{14}C dates obtained from human skeletal material. Thirty burials (30%) were associated with avifaunal remains, with a total of 85 specimens identified as avian taxa.

Lokomotiv Taxonomic Summary

Class Aves

Undifferentiated aves

A total of 29 elements and fragments were identifiable only to the level of Aves. These elements included a phalanx (n=1), a tarsometatarsus (n=1), and long bone diaphyses and diaphyses fragments (n=27).

Large aves

A total of 13 elements were identified as large Aves, including a tibiotarsus (n=1), ulnae (n=2), and long bone diaphyses fragments (n=10).

Order Anseriformes

Family Anatidae

Cygnus* sp. and cf. *Cygnus

The Anseriformes were represented by a single genus, *Cygnus*. Recovered elements included humeri (n=2), an ulna (n=1), radii (n=3), carpometacarpi (n=7), and one first phalanx of the major digit (n=1). MNI was calculated at 12.

Order Gruiformes

Gruidae

***Grus* sp.**

A single ulna was identified as *Grus* sp.

Modifications to Bone

A full description of modifications to Lokomotiv avifaunal specimens appears in Appendix B. A summary follows here (and see Figure 5.2). Almost half (48.2%, n=44) of the Lokomotiv avifaunal specimens exhibited signs of modification by humans (Figure 5.2). The most frequently modification was the removal of long bone epiphyses, which was noted in 14.1% (n=12) of the specimens. Other human modifications included surface grinding/polishing (4.7%, n=4), cut marks (2.4%, n=2), sawn and snapped surfaces (4.7%, n=4), and incising (1.2%, n=1).

Needle cases (21.2%, n=18) and needle case fragments (5%, n=4; main fragment included with complete needle case figure) were documented among the Lokomotiv avifaunal materials. These cases were made from large Aves and *Cygnus* sp. ulnae and long bone diaphyses. Specimens identified as fishhook barbs made from raptorial talons (n=3) accounted for 3.5% of the assemblage.

No non-human modifications to bone were recorded for Lokomotiv avifauna specimens.

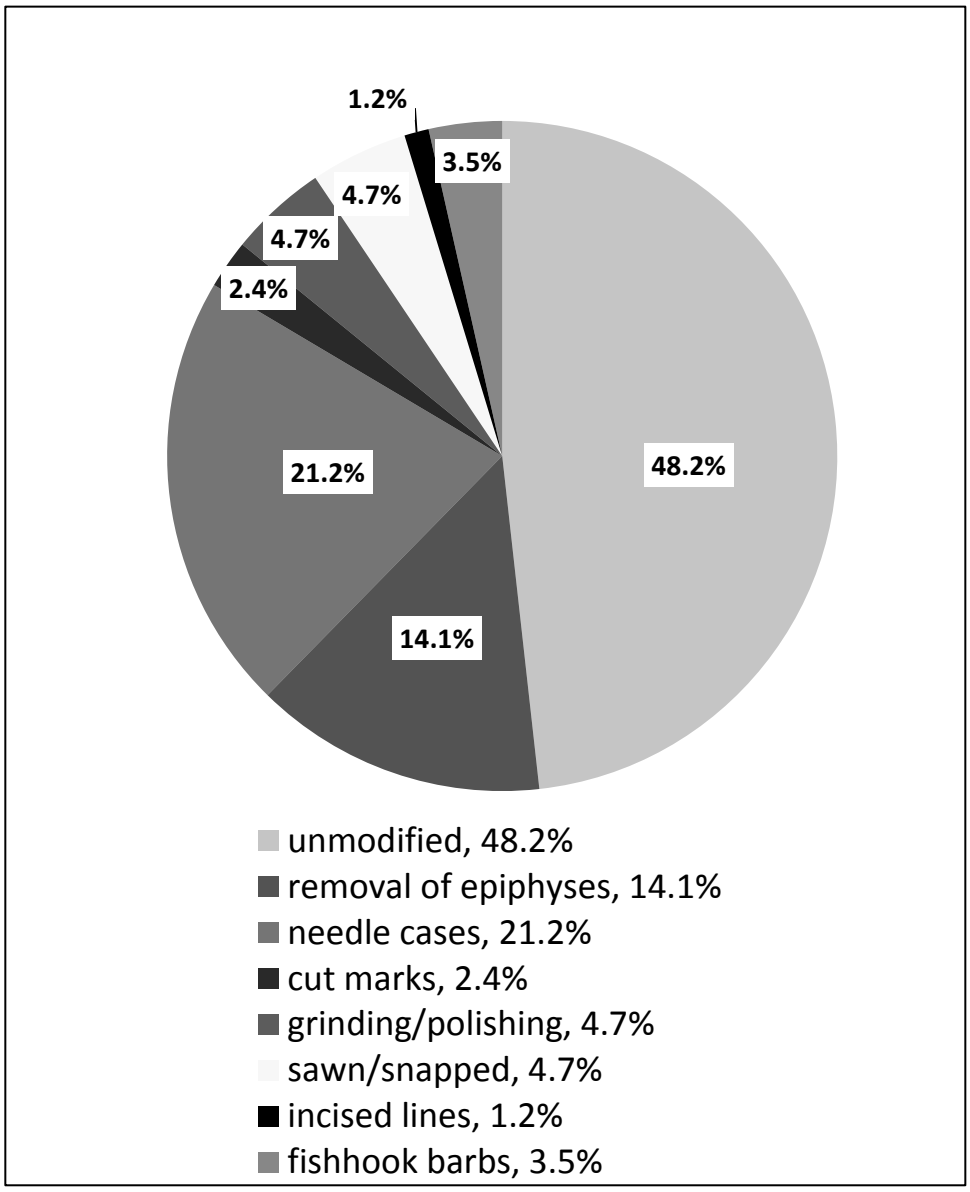

Figure 5.2 Modifications to avifaunal specimens recovered from the Lokomotiv cemetery.

Ust'-Ida. Ust'-Ida is the smallest cemetery examined in this study, with 67 human burials from 57 graves. Forty graves exhibited mortuary treatment and grave goods consistent with the Isakovo tradition, while the remaining 17 graves showed affinities to the Glazkovo mortuary tradition. Of the 49 individuals associated with the Isakovo mortuary tradition, 35 (71%) were interred with avifaunal materials. Of the 18 individuals attributed to the Glazkovo mortuary tradition, only two individuals (11%) from a single grave contained bird remains. In all, 37 individuals were associated with a total of 84 bird specimens.

Ust'-Ida Taxonomic Summary

Class Aves

Undifferentiated aves

A total of 10 specimens were identifiable only to the level of Aves, including upper beak fragments (n=4), mandible fragments (n=4), an ulna (n=1), and a long bone diaphysis (n=1).

Large aves

Thirty-one specimens were attributed to large avian taxa, but were not identifiable to a more specific taxonomic level. Items included cranium fragments (n=6), a humerus (n=1), ulnae (n=17), radii (n=3), carpometacarpi (n=3), and a tarsometatarsus (n=1).

Medium to large aves

A total of 10 specimens were identified as belonging to medium to large avian taxa, including ulnae (n=4), a carpometacarpus (n=1), and a long bone diaphysis (n=1).

Medium aves

Five ulnae were attributed to medium avian taxa.

Small to Medium aves

A single scapula was identified as belonging to a small- to medium-sized bird taxon.

Order Anseriformes

Family Anatidae

Cygnus sp. and cf. *Cygnus*

Specimens identifiable beyond the level of Aves all were attributed to the genus *Cygnus*. A total of 29 specimens were identified as *Cygnus* sp. or as most closely resembling *Cygnus* skeletal elements, including upper beak fragments (n=4), mandible fragments (n=9), a humerus (n=1), ulnae (n=6), carpometacarpi (n=6), a first phalanx of the major digit (n=1), a tibiotarsus (n=1), and a tarsometatarsus (n=1).

Modifications to Bone

A full description of modifications to Ust'-Ida avifaunal specimens appears in Appendix C; a summary of these data follows here. Over half (53.6%, n=45) of the Ust'-Ida avifaunal assemblage was modified, primarily in the form of incised, cut, and ground needle cases (45.2%, n=38). Other modifications to bird bone included cut marks (3.6%, n=3), grinding/polishing (2.4%, n=2), removal of the epiphyses of the long bones (1.2%, n=1), and sawn and snapped surfaces (1.2%, n=1).

No natural modifications to bone were documented for the Ust'-Ida avifauna specimens.

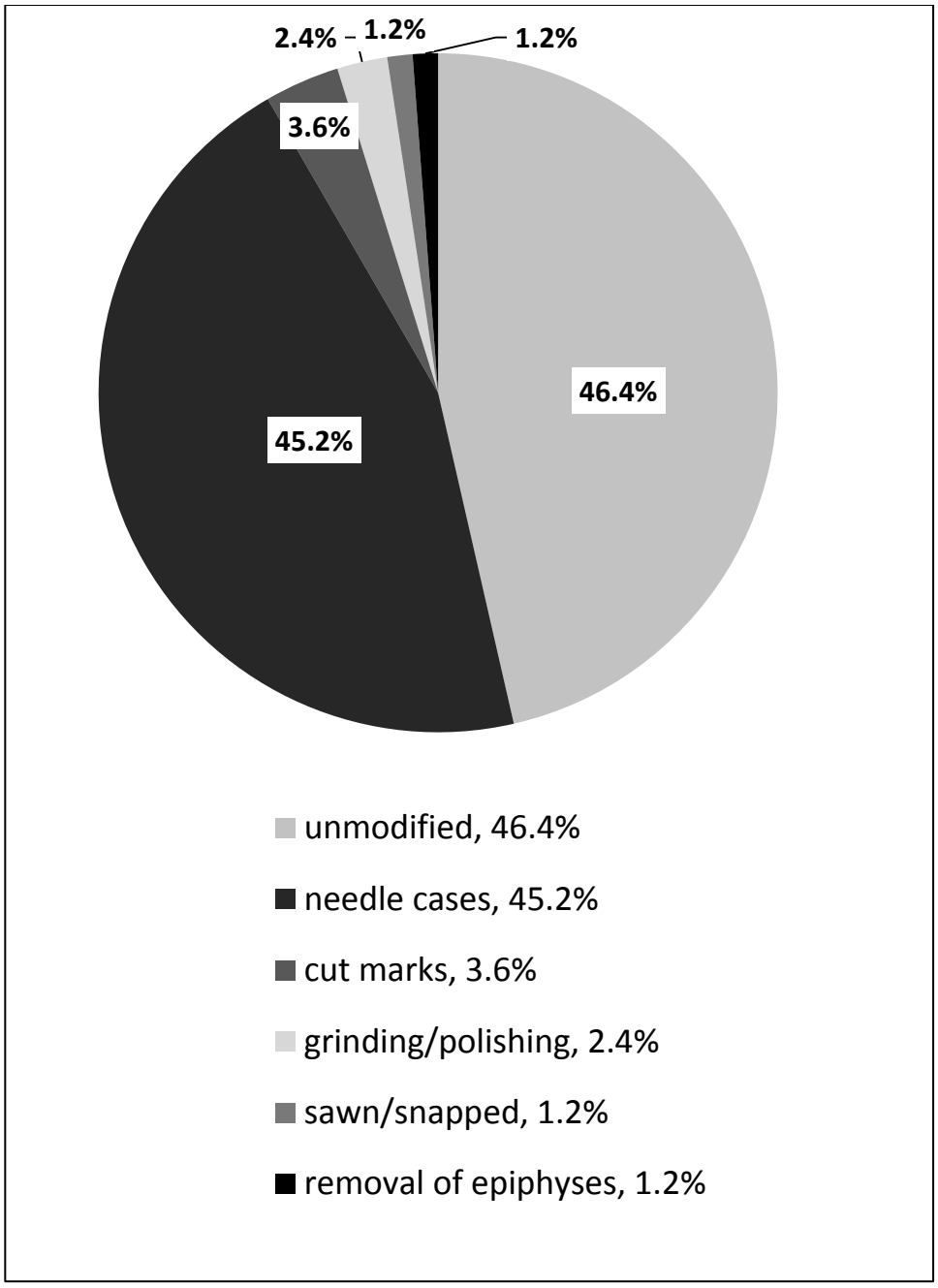

Figure 5.3 Modifications to avifaunal specimens recovered from the Ust'-Ida cemetery.

5.2 Comparison of Avifaunal Inclusion at Shamanka II, Lokomotiv, and Ust'-Ida

The overwhelming majority of avifaunal specimens identified in this study were recovered from the Shamanka II cemetery (Figure 5.4). As the largest cemetery in this study, perhaps this is expected. However, the data clearly show that individuals at Shamanka II were interred with greater quantities of bird remains, a greater variety of taxa, and a wider selection of skeletal elements than individuals at either Lokomotiv or Ust'-Ida. However, it should be noted that the greater number of taxa represented in the Shamanka II assemblage was facilitated by the identification of bird beaks to more specific taxonomic levels (i.e., genus and species); beak parts are rare in the other cemeteries.

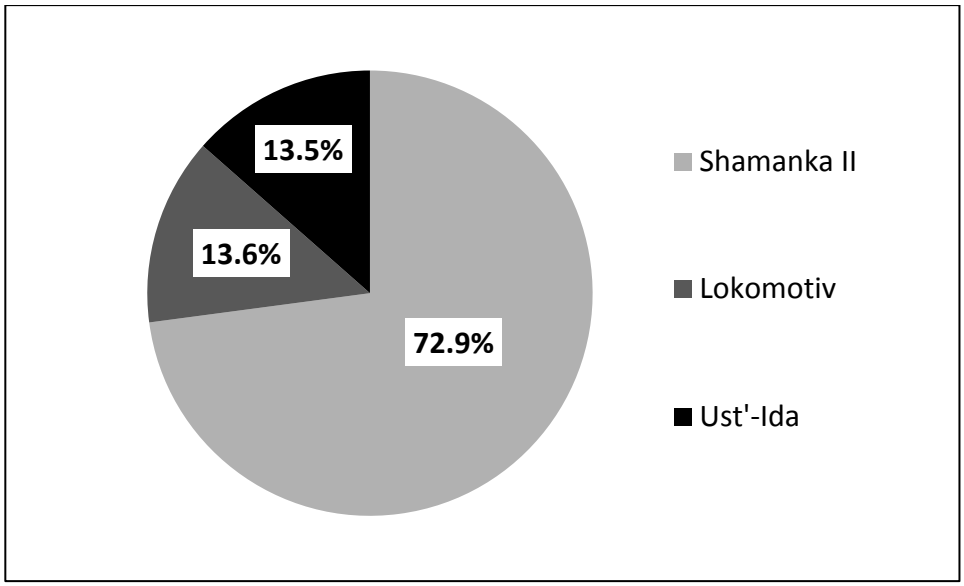

Figure 5.4 Comparison of Shamanka II, Lokomotiv, and Ust'-Ida faunal assemblage total Aves NISP of the study sample.

Lokomotiv and Ust'-Ida yielded almost equal amounts of avian skeletal material (Figure 5.4), and certainly fewer taxa and types of elements than Shamanka II. Further, the majority of these specimens could not be identified to a taxonomic level more specific than Aves.

Of the specimens identifiable to at least the family level, two general groups, water birds (including members of Gaviiformes, Pelecaniformes, Anseriformes, and Gruiformes) and raptorial birds (including members of Falconiformes), dominated the assemblages of Shamanka II and Lokomotiv (Figure 5.5). Notably, no raptorial bird specimen was identified among the Ust'-Ida avifaunal materials. Additionally, the Shamanka II assemblage included two beak specimens belonging to a passerine species (*Coccothraustes coccothraustes*, hawfinch).

Elements that comprise the appendicular bird skeleton dominate these assemblages (Figure 5.6), with a complete absence of elements from the postcranial axial skeleton. At Shamanka II, the preponderance of pedal elements is related to the high number of talons found in graves. These elements are followed in relative abundance by long bones, and wing and leg elements. The majority of Lokomotiv bird elements were long bones, but considerable amounts of pedal and wing elements also were present. The Ust'-Ida assemblage was dominated by wing elements, followed by beak portions.

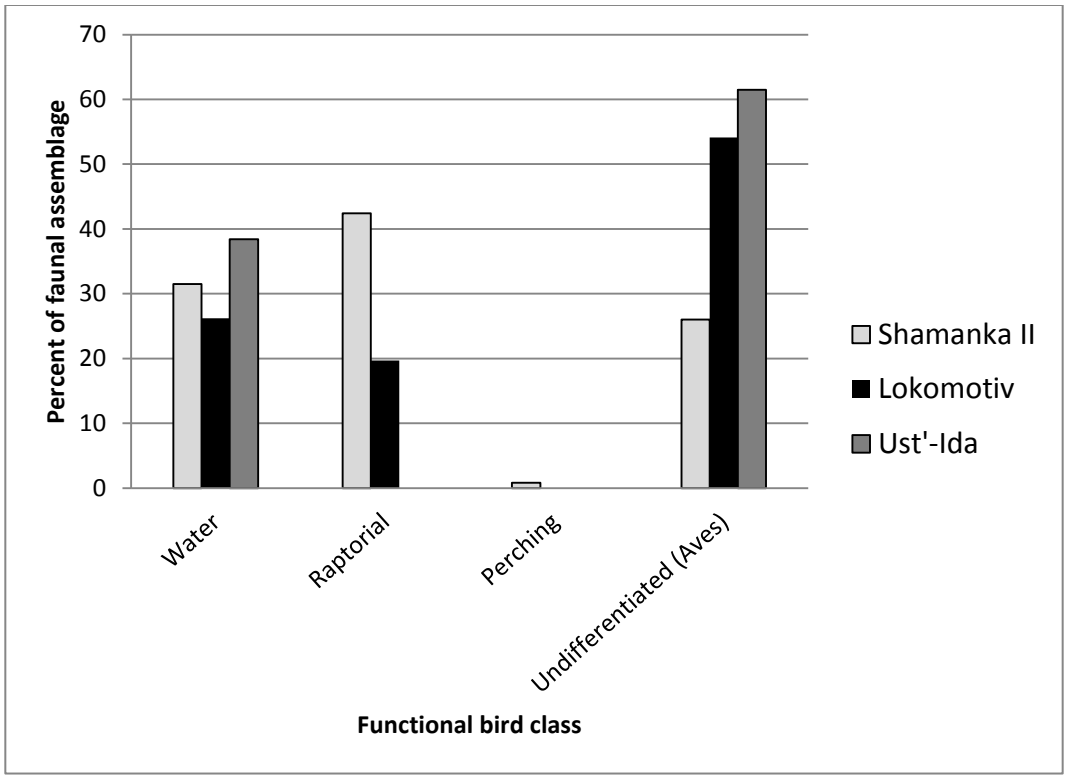

Figure 5.5 Distribution of bird groups in each assemblage.

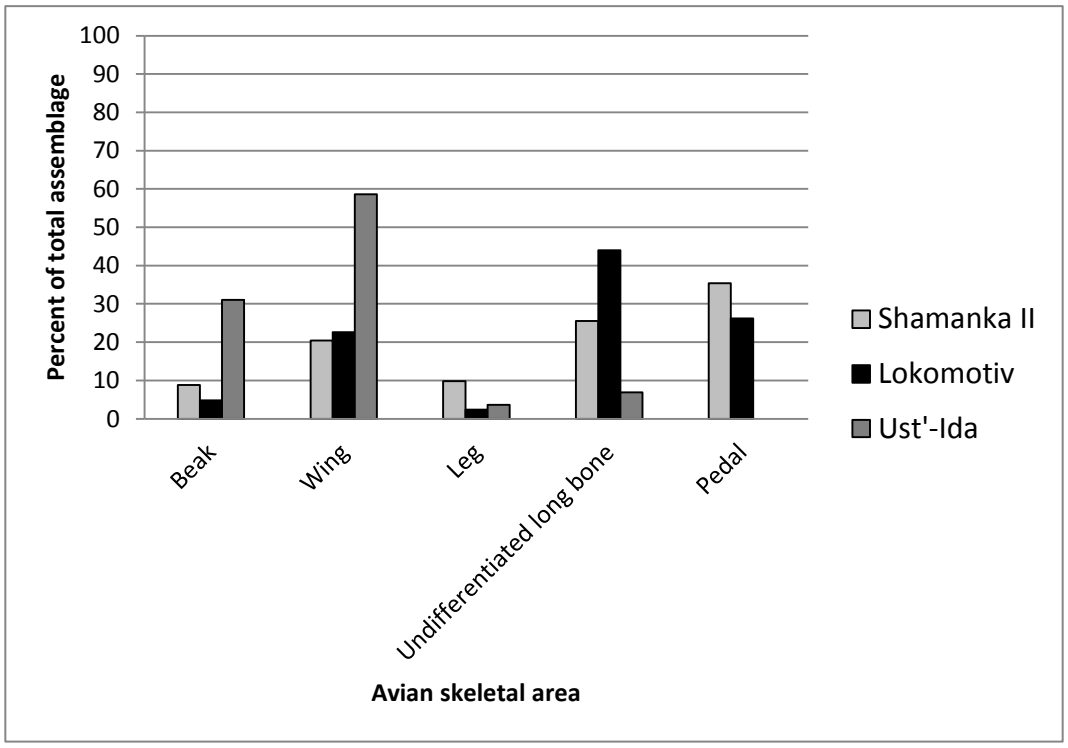

Figure 5.6 Distribution of avian skeletal elements for each assemblage.

The near-complete dearth of axial skeleton elements in the cemeteries of Shamanka II, Lokomotiv, and Ust'-Ida makes the few specimens that were encountered more notable. Cranium fragments and beak portions were encountered in a variety of locations within graves, but most often were found in close association with human skeletons. Further, these items were found typically near the cranium of individuals at Shamanka II and Lokomotiv, or at least where the cranium would be located if present, while at Ust'-Ida were encountered more often near the legs of the deceased (Figure 5.7). It should be noted that many Shamanka and Lokomotiv graves were disturbed, reused, or revisited in antiquity, and the location of avian skeletal remains documented during excavation may not accurately reflect their original placement in the grave. Very few graves at Ust'-Ida showed evidence for such prehistoric episodes of reopening.

Overall, avifaunal skeletal elements in Shamanka II, Lokomotiv, and Ust'-Ida graves generally were placed in artifact clusters on or near the human interment. No *in situ* articulation of bird elements was documented, and grave plans do not suggest articulation, with the exception of a cluster of avian pedal elements associated with grave 39 at Shamanka II. No complete birds or whole bird body portions such as wings were buried with humans at these sites. Additionally, postcranial axial skeletal elements were not originally included in the graves of these cemeteries. Aside from the absence of these materials in graves, the data indicate specific, disarticulated elements were preferred for mortuary purposes.

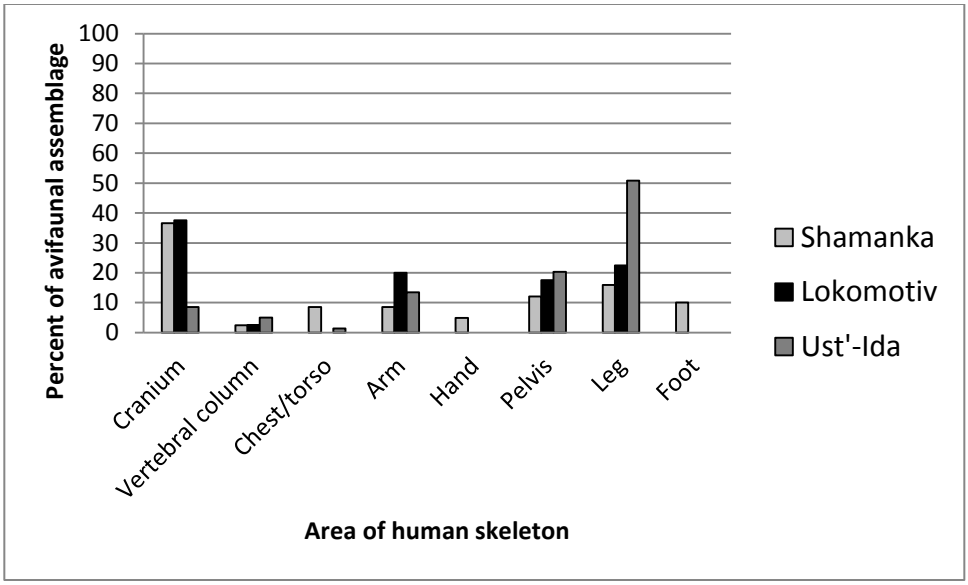

Figure 5.7 Distribution of avifaunal materials in association with areas of the human skleleton.

5.3 Patterning of Avifaunal Materials at Shamanka II, Lokomotiv, and Ust'-Ida

In this section, I examine patterns in the distribution of bird remains as they relate to human biological sex, biological age at death, and mitochondrial DNA haplogroups. Preliminary examination of the avifaunal assemblage data from each cemetery suggested the existence of some correlations between bird bones and items and biological sex and age at death at Shamanka II, Lokomotiv, and Ust'-Ida. I hoped to ascertain whether taxa, skeletal elements, or certain items were nearly always interred with the male or female sex.

In addition to sex and gender, I explored questions about the relationships between an individual's life stage and the inclusion of bird remains in graves. The presence or absence of avifaunal skeletal materials in burials might be used to identify chronological age groups with whom certain kinds of items were

interred, which would suggest variable mortuary protocols depending on an individual's life stage at death.

Previous studies indicate material inclusions in human mortuary contexts reflect culturally relevant constructions of gender (Schmidt 2000). Additionally, an individual's age at death or life stage may necessitate particular mortuary treatment and/or inclusion of certain types of items (Lucy 2005). For example, Stoodley (1999) examined patterning among Anglo-Saxon mortuary artifacts and biological data, which yielded convincing identification of the age- and gender-based bracketing of life stages constructed by Anglo-Saxon society.

I also examined such data for further evidence to link burial placement in the cemetery and mortuary treatment to familial relationships and ascribed status within family groups, rather than acquired status, as suggested by Mooder et al. (2005:631). Past research has yielded little evidence that individuals were grouped in cemeteries on the basis of matrilineal affinity, as examination of individuals' mitochondrial DNA haplogroup has not revealed significant spatial clustering at Lokomotiv (Mooder et al. 2005:632).

To ascertain if matrilineal relationships might have been manifest on a material basis, rather than spatial one, I searched for consistent relationships between individuals of a particular mitochondrial DNA haplogroup and inclusion of a particular type of bird item (e.g., taxon, needle cases) in burials.

Lastly, I evaluated the spatial dimension of these data at both the cemetery and grave levels. In his examination of Cis-Baikal Early Bronze Age cemeteries, McKenzie (2006) demonstrated graves were clustered spatially on the basis of several variables, including age at death, and presumed status and group affiliation. However, this coincidence has

not been examined in earlier Cis-Baikal cemeteries, and not evaluated for differential inclusion of faunal materials. While beyond the scope of this research to conduct a similar project for Shamanka II, Lokomotiv, and Ust'-Ida, I hoped to ascertain if group identities might manifest in patterning of the avifaunal materials, and to determine what, if any, implications this would have for the spatial arrangement of graves on the prehistoric Cis-Baikal landscape. Further, I evaluated the spatial organization of bird materials in each grave (where such information was accessible) to determine if avian materials were routinely placed in specific locations in and near human burials.

For each cemetery, I review the taxa, elements, and identifiable artifacts associated with biological females, males, and individuals whose sex was not morphologically distinct and/or for whom molecular sex determinations have not been made. These data, along with the estimated age and mitrochrondrial DNA haplogroup of the deceased, where available, appear in Appendices A, B, and C.

Shamanka II. At the Shamanka II cemetery, biological females were interred with both unmodified and modified avifaunal skeletal materials. Elements vary largely on the basis of taxon (Figure 5.8), and this is particularly true for premaxilla and dentary portions of the beak. Taxa represented only by osseous beak portions include *Gavia stellata*, *Anser cygnoides*, *Mergus* cf. *serrator*, and *Mergus merganser*. With the exception of a beak fragment from one grave (Sha 51) identifiable only to the level of Aves, the above taxa are not represented by other skeletal elements in burials of Shamanka II females. Wing elements (humeri, radii, ulnae, carpometacarpi, pollexes, and first and second phalanxes of the major digit) were most often identified as *Cygnus* sp., though humeri, ulnae, and talons identified as *Aquila/Haliaeetus* sp. also were associated with female burials. Diaphyses of the long bones also were present, but

identifiable only to the level of Aves. Only females were interred with *A. cygnoides*, *M*. cf. *serrator*, and *M. merganser*, all members of Anatidae. Notably, no female was interred with a tarsometatarsus at Shamanka II.

Biological males also were associated with unmodified and modified bird remains. Additionally, they were interred with a greater variety of taxa and types of elements (Figure 5.8). As with the females, several taxa were represented solely by complete beaks, premaxillae, and dentaries (*Gavia stellata*, *Botaurus stellaris*, *Phalacrocorax* sp., *Anthropoides virgo*, and *Coccothraustes coccothraustes*).

Other elements belonging to these taxa were not identified in any grave's assemblage. In a similar vein, some taxa were associated strictly with tarsometatarsi and were included only in the burials of males, including cf. *Milvus migrans*, *Accipite*r cf. *gentilis*, *Buteo hemilasius*, and *Grus grus*.

Other elements identified in male graves were humeri (cf./*Cygnus* sp., *Melanitta* sp., and *Aquila/Haliaeetus* sp.), radii (Aves, *Aquila/Haliaeetus* sp.), ulnae (Aves, cf./*Cygnus* sp., and *Aquila/Haliaeetus* sp.), a scapholunar (*Cygnus* sp.), carpometacarpi (cf./*Cygnus* sp., *Mergus* sp., *Accipiter nisus*, and *Grus* sp.), a pollex (cf. *Cygnus*), major digit phalanx 1 (cf./*Cygnus* sp., Accipitridae), major digit phalanx 2 (cf./*Cygnus* sp.), a minor digit phalanx 1 (Aves), femora (*Aquila/Haliaeetus* sp.), tibiotarsi (*Haliaeetus* sp., *Grus* sp., *Buteo* cf. *hemilasius*), additional tarsometatarsi (*Buteo* sp., *Buteo lagopus*, and *Grus* sp.), talons (Accipitridae, *Aquila/Haliaeetus* sp.), and diaphyses of the long bones (Aves). Only biological males were interred with specific elements from taxa, including radii (cf. *Aquila/Haliaeetus* sp.), humeri (cf. *Aquila/Haliaeetus* sp.), a scapholunar (*Cygnus* sp.), a carpometacarpus (*Grus* sp.), a digit III (*Cygnus* sp.), femora (cf. *Aquila/Haliaeetus* sp.), tibiotarsii (*Buteo* cf. *lagopus*, cf. *Aquila/Haliaeetus* sp., and *Grus* sp.).

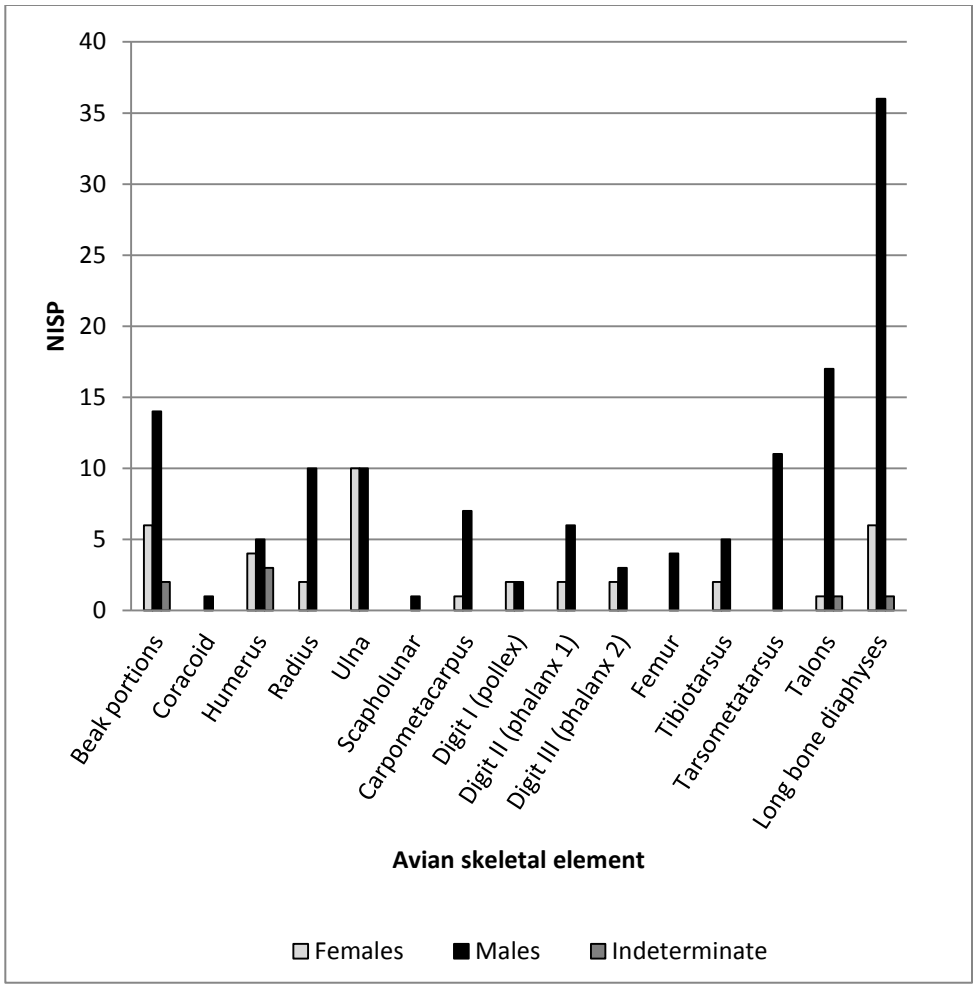

Figure 5.8 Distribution of modified and unmodified avian skeletal elements on the basis of biological sex at the Shamanka II cemetery.

Individuals of indeterminate sex had the smallest amounts and types of avian skeletal material included in their burials (Figure 5.8). The majority of these burials are subadults. Five individuals of indeterminate sex were interred with unmodified and modified bird bones, three of whom were adults. At Shamanka II, subadults of indeterminate sex (n=2) were buried with a *Mergus* cf. *mergus* beak, a *Gavia* sp. ulna, and Accipitridae talons. No individual between the ages of four and 15 at death was interred with any kind of avian skeletal material.

The remainder of adults and subadults of indeterminate sex interred with bird material were over the age of 20 at death (Figure 5.9). Materials consisted of both unmodified and modified elements, including a coracoid (*Cygnus* sp.), humeri (Aves, Anatidae, and *Cygnus* sp.), ulna (*Gavia* sp.), carpometacarpus (*Cygnus* sp.), talons (Accipitridae), and long bone diaphyses (Aves).

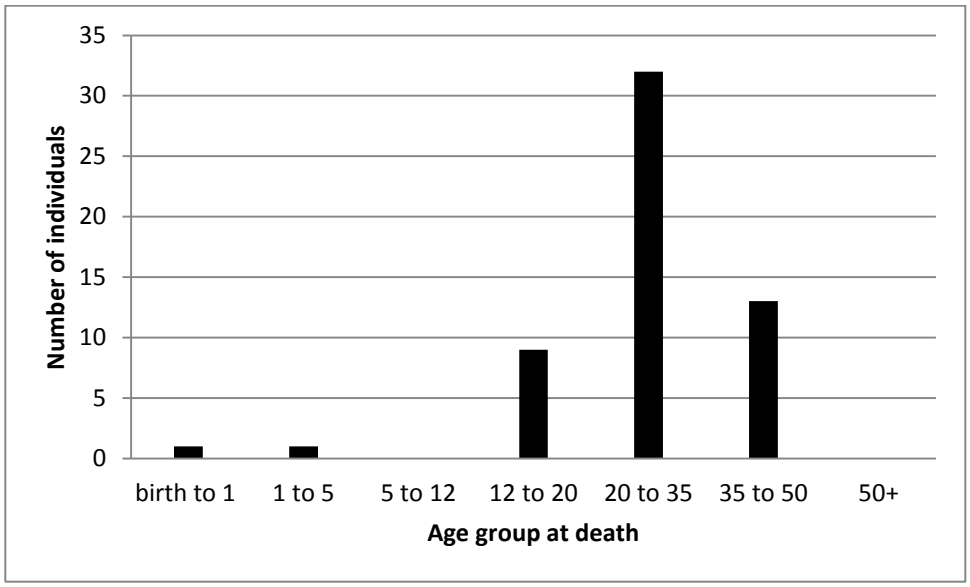

Figure 5.9 Number of Shamanka II individuals with avian skeletal materials by age at death.

Nine needle cases were found in association with five females at Shamanka II, while seven cases were discovered with four males. No inclusion of needle cases was documented for individuals of indeterminate sex, or with any individual under the age of 15 years at death. Though there is no apparent relationship between the inclusion of needle cases in burials and biological sex among Shamanka II adults, a possible sex-based pattern emerged when other variables were examined. Specifically, needle cases were associated exclusively with adolescent and adult females *under* the age of thirty and with males *over* the age of thirty (Figure 5.10).

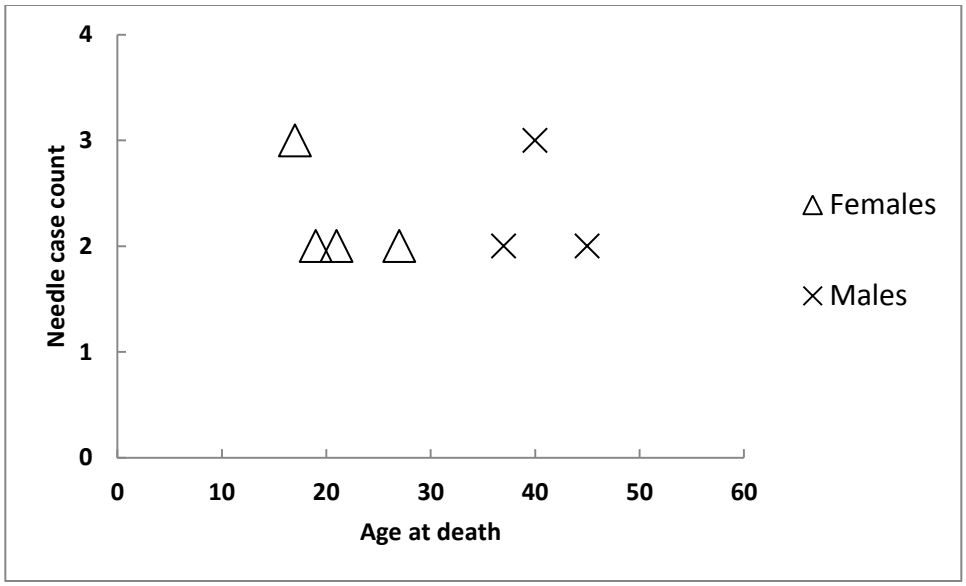

Figure 5.10 Association between needle cases and age at death in the Shamanka II cemetery.

There was little evidence to indicate needle case element selection varied on the basis of sex. Needle cases fashioned from the ulnae and long bone diaphyses of medium and large Aves taxa were interred with females. Males were interred with cases made from these elements, along with one made from a *Grus* sp. carpometacarpus.

The majority of needle cases from Shamanka II exhibited some form of ornamentation. Though included in the burials of some members of both sexes, over three-quarters (77.8%, n=7) of the cases interred with females were decorated. Nearly a third (28.6%, n=2) of cases interred with males were decorated. Additionally, three females were interred with cases made from paired (left and right elements) of the same bird with mirrored ornamentation (Figure 5.11). In some instances, however, both decorated and undecorated cases were recovered from a single grave or were associated with a particular individual. Biological sex showed no correlation with the presence of needles inside the needle case, with the coincidence of needle cases and

needles being roughly equal among burials of females (33.3%, n=3) and males (28.6%, n=2).

Two fishhook barbs, both fashioned from raptor talons, were recovered from one burial, and a single fishhook shank (made from a humerus identified as *Aquila/Haliaeetus* sp.) was found in another. These items were interred with adult males. The extremely small number of barbs and shanks precludes suggestion of any obvious sex- or gender-related basis for their inclusion.

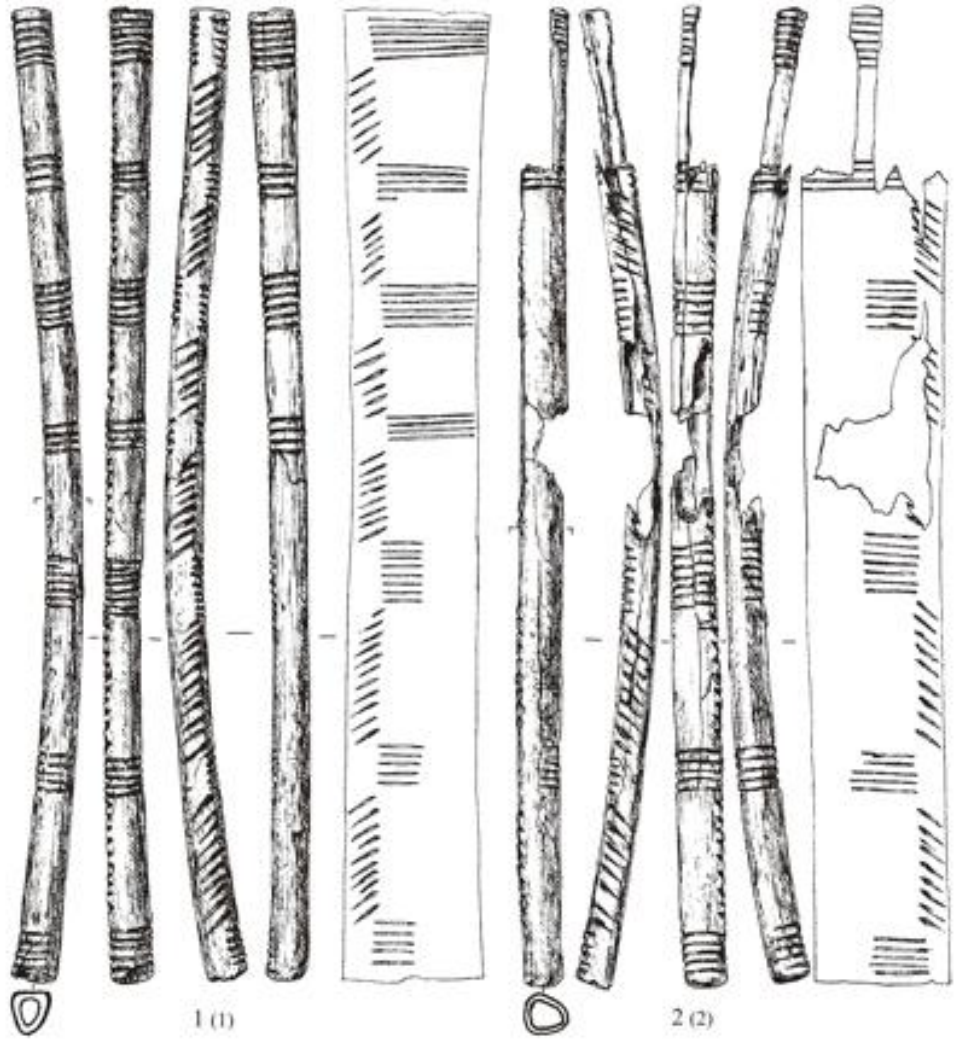

Figure 5.11 Example of needle cases with mirrored decoration from the same grave at the Shamanka II cemetery (57-1). Image courtesy of V.I. Bazaliiskii.

Mitochrondrial DNA haplogroups present in the Shamanka II population include A, C, D, F, G2a, and U5a, and individuals from all haplogroups were interred with bird materials. The small mitrochondrial DNA haplogroup dataset (n=20) for Shamanka II prevents identification of patterning of avian materials based on matrilineal relationships. Where these data were available, I was not able to document consistent relationships between a specific haplogroup and a particular type (i.e., taxon, element, or object) of bird-derived material.

Though graves containing avifaunal materials appear to occur in clusters at Shamanka II (Figure 5.12), I was unable to determine any clear spatial pattern for the inclusion of avifauna at the cemetery level, as these materials were recovered from graves across the site.

Within graves, bird skeletal material was recorded in a variety of locations throughout the pit: in the grave fill, at the burial level, and in immediate association with human skeletons. Specific locations on the human skeleton include the cranium, vertebral column, chest area, arms, hands, pelvis area, legs, and feet. At Shamanka II, bird materials were most often found in association with the cranium (Figure 5.13), located either near or on it.

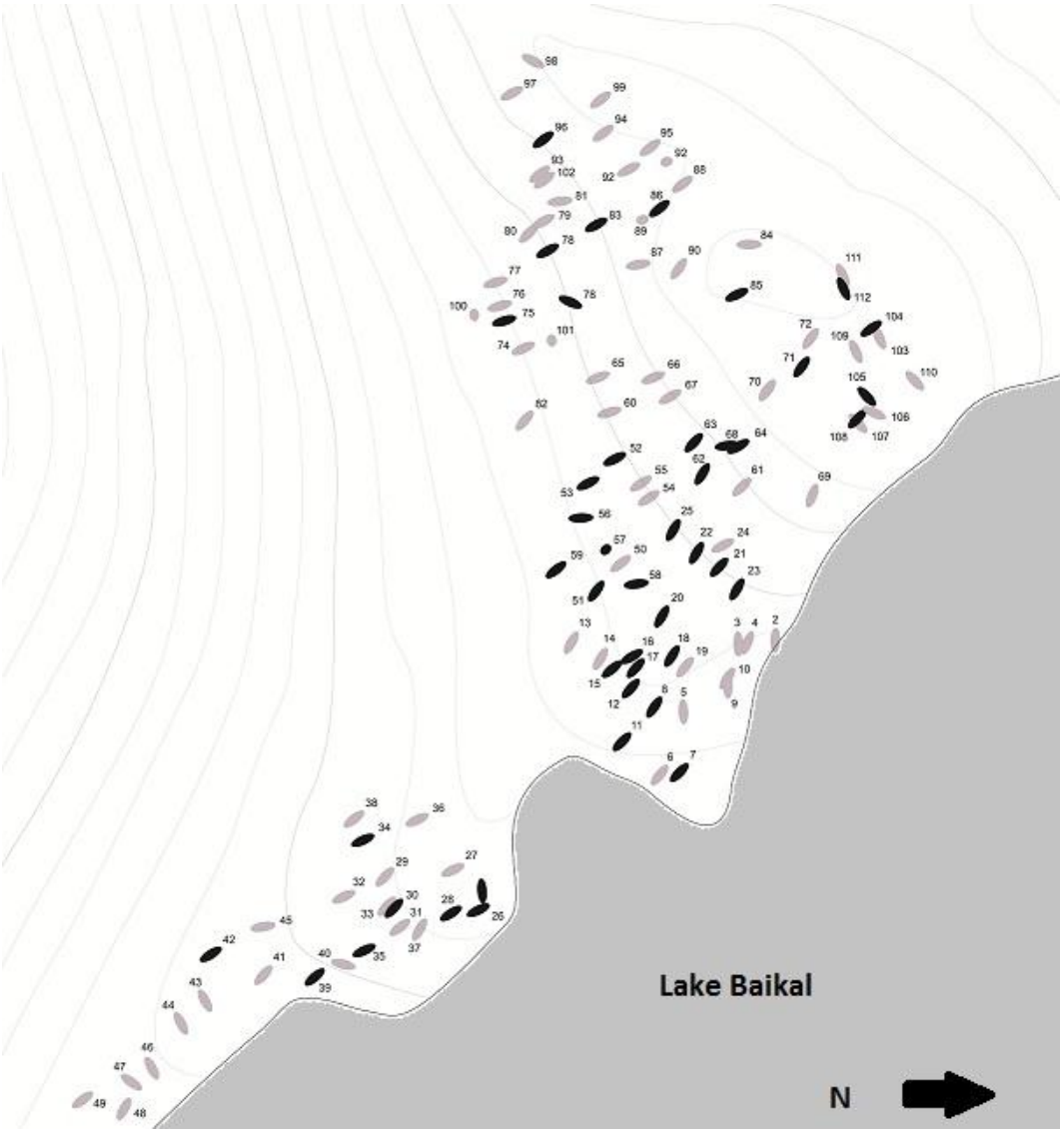

Figure 5.12 Map indicating location of graves with avifaunal material (in black) at the Shamanka II cemetery.

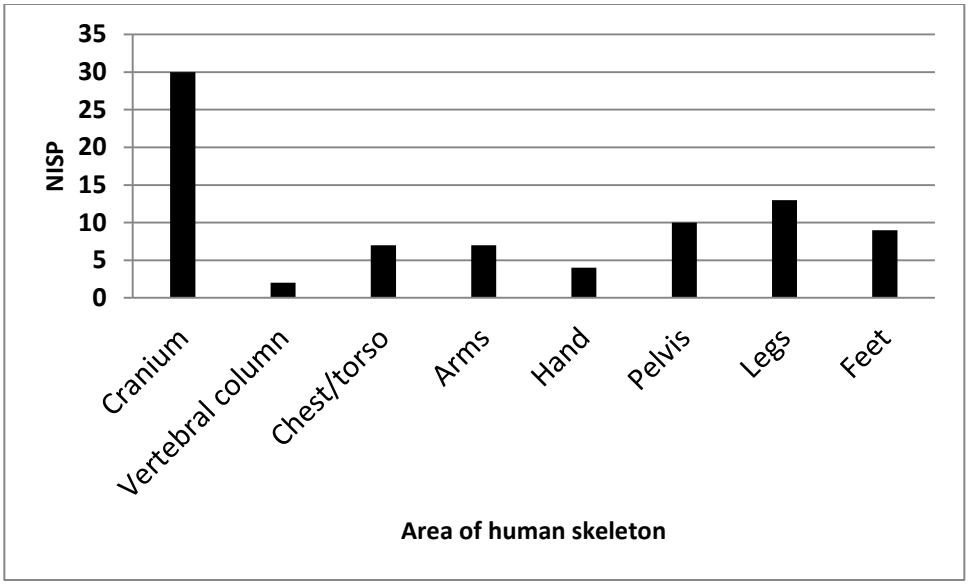

Figure 5.13 Placement of avian material relative to the human skeleton at the Shamanka II cemetery.

Lokomotiv. Overall, the quantity and variety of avian skeletal material recovered from the Lokomotiv cemetery is significantly less than that of Shamanka II. Unlike the trend seen at Shamanka II, the differences observed in avian skeletal materials recovered from female and male burials at Lokomotiv are much fewer and less frequent.

Lokomotiv individuals identified as female were interred with both unmodified and modified materials (Figure 5.14). Highly fragmented beak portions were identifiable only to the level of Aves. Some wing elements were present, including a humerus (cf./*Cygnus* sp.), ulna (*Grus* sp.), carpometacarpi (cf./*Cygnus* sp.), and a major digit phalanx 1 (cf. Cygnus/*Cygnus* sp.). A single tibiotarsus, in addition to several long bone diaphyses, were attributed to Aves.

Males also were buried with unmodified and modified bird bones (Figure 5.14). A beak fragment buried with one male (Lok 38-1) only could be identified to Aves. Elements of the wing interred with Lokomotiv males included a humerus (cf./*Cygnus* sp.), radii (cf./*Cygnus* sp.), carpometacarpi (cf./*Cygnus* sp.), a phalanx 2 of the major digit

(cf./*Cygnus* sp.), and an undifferentiated phalanx belonging to a juvenile bird (Aves). Identifiable leg elements were limited to a tarsometatarsus (undifferentiated Aves), but some long bone diaphyses (Aves) might have come from the lower bird appendages. Lastly, talons (Accipitridae) were identified in the mortuary assemblages associated with biological males.

At Lokomotiv, few individuals of indeterminate sex were buried with bird materials (Figure 5.14). Unmodified materials, consisting of a talon (Accipitridae) and a long bone diaphysis (Aves), were interred with two adult individuals. One grave containing the remains of two subadults, both under the age of four, yielded bird bone needle cases. With the exception of these burials, no individual between the ages of four and twenty were interred with avian skeletal material at Lokomotiv (Figure 5.15). This pattern is similar to that observed at Shamanka II.

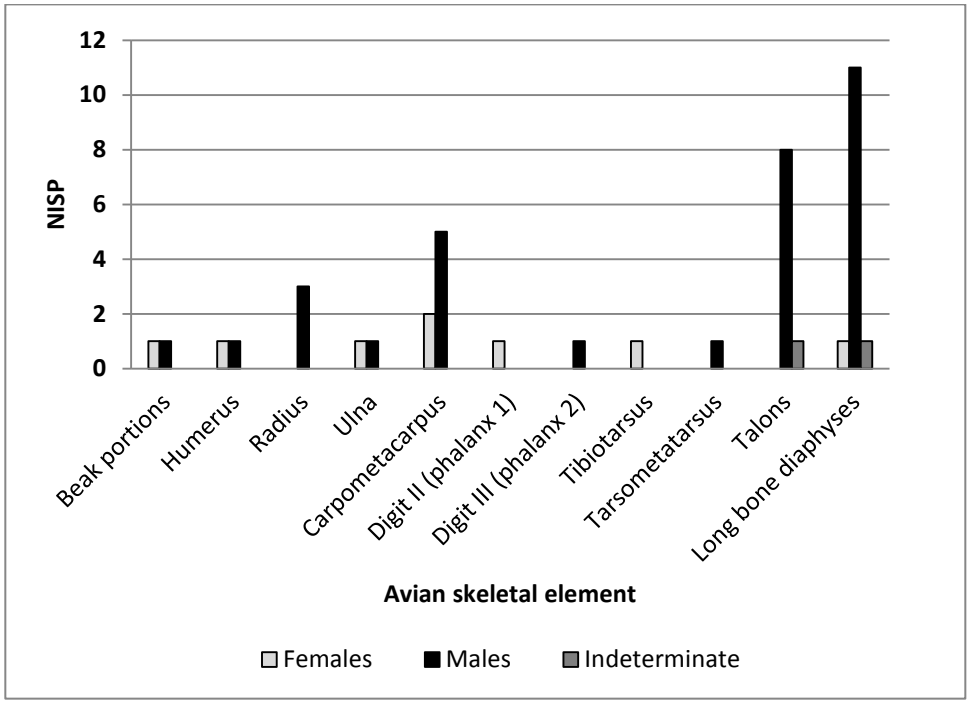

Figure 5.14 Distribution of modified and unmodified avian skeletal elements on the basis of biological sex at the Lokomotiv cemetery.

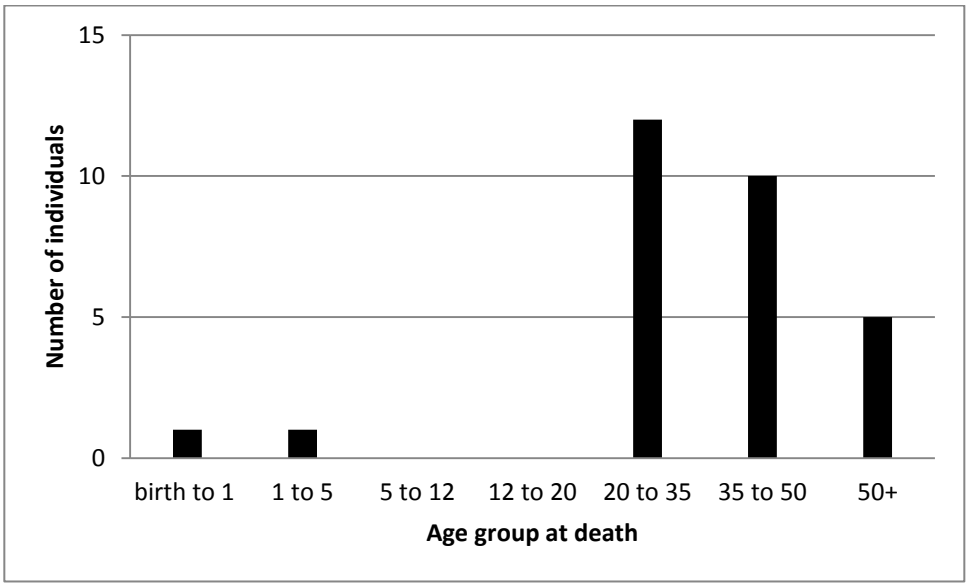

Figure 5.15 Number of Lokomotiv individuals with avian skeletal material and age group at death.

Eighteen needle cases were recovered from Lokomotiv. The majority of these cases were identified only to the level of large or undifferentiated Aves, though one was identified as *Cygnus* sp. Eleven of these cases were interred with eight females, while four were interred with four males. Two cases were associated with two subadult individuals of indeterminate sex who were buried in the same grave.

Though data are scant, age or biological sex do not appear to have been stringent determinants of needle case inclusion at Lokomotiv as at Shamanka II (Figure 5.16). Two subadults were interred with needle cases, with no discrete age boundaries between biological males and females. The needle cases recovered from Lokomotiv were fashioned from elements identified as either ulnae (cf./*Cygnus* sp.) or long bone diaphyses (Aves). Females, males, and individuals of indeterminate sex were interred with needle cases made from these elements, and there appears to have been no preference for taxon or element on the basis of biological sex.

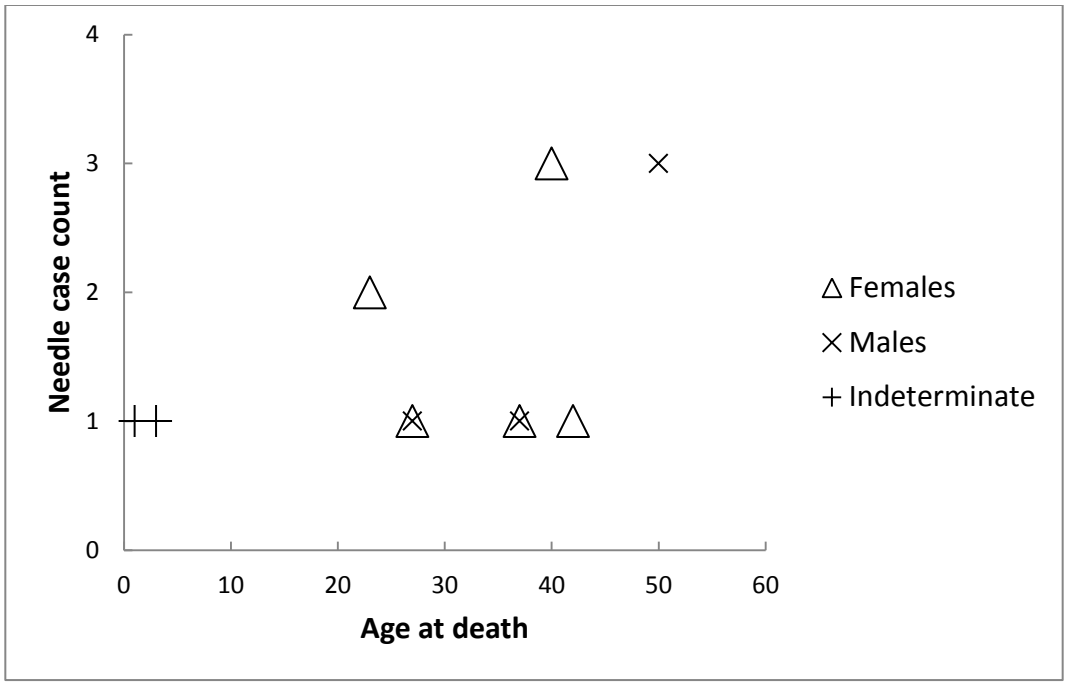

Figure 5.16 Association between needle cases and age at death in the Lokomotiv cemetery.

At Lokomotiv, equal numbers of needle cases were decorated (50%, n=9) and undecorated (50%, n=9). Almost three-quarters of needle cases interred with females (72.7%, n=8) were decorated, but only a quarter of such cases were buried with males (25%, n=1), a pattern similar to the one observed among the Shamanka II needle cases. No decoration was noted on the needle cases interred with subadults. Only two needle cases contained needles, one each with a female and a subadult individual of indeterminate sex. There was no apparent preference for the addition of needles to cases on the basis of biological sex at Lokomotiv.

Following the trend seen at Shamanka II, three fishhook barbs fashioned from Accipitridae talons were interred with two male individuals at Lokomotiv. No females, adult individuals of indeterminate sex, or subadults were buried with such barbs.

Avian skeletal materials were interred with individuals belonging to the A, D, F, and U5a mtDNA haplogroups. Of the mtDNA haplogroups identified at Lokomotiv (Mooder et al. 2005), only haplogroup C (represented by a single Lokomotiv individual) was not associated with bird bone. Due to very few mitochondrial DNA haplogroup determinations (n=28), I am unable to suggest specific patterns of avifaunal inclusion in the grave on such a basis.

A complete map of the Lokomotiv cemetery with graves labelled by number was not available for this study. For this reason, I was unable to determine any spatial aspect to the placement of graves containing avian skeletal material.

Bird remains were encountered during excavation of the grave fill and at the burial level. Where it was possible to determine specific locations of bird materials at the burial level, such items were found near the cranium, vertebral column, chest area, arms, hands, pelvic area, legs, and feet. At Lokomotiv, the cranium was the most common location for placement of bird materials (Figure 5.17); this pattern mirrors the one observed at Shamanka II.

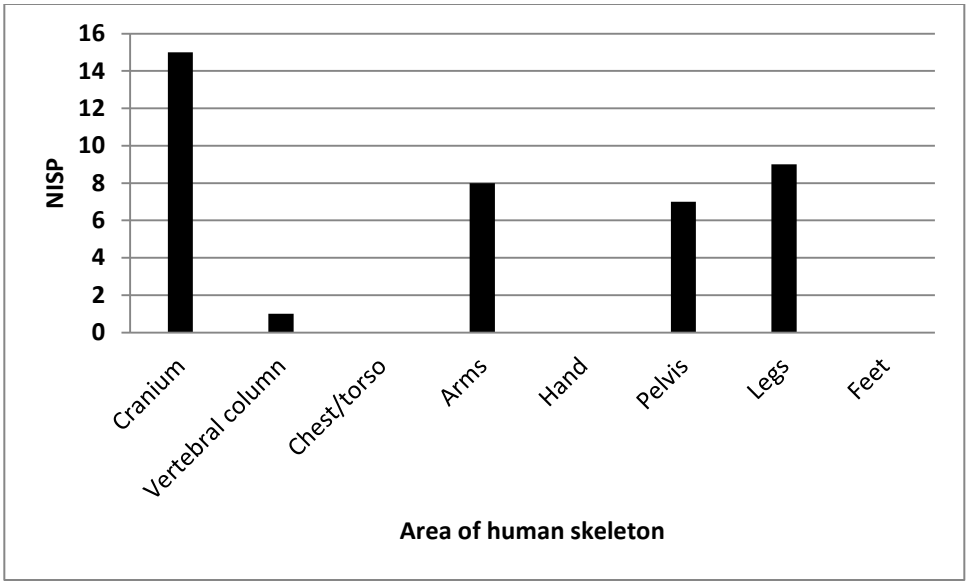

Figure 5.17 Placement of avian material relative to the human skeleton at the Lokomotiv cemetery.

Ust'-Ida. The Ust'-Ida cemetery yielded the smallest avifaunal assemblage of the three Cis-Baikal cemeteries under consideration, as well as the least variation in taxa and types of elements represented. Despite this, the site's avifaunal assemblage reveals very different patterns from those seen at Shamanka II and Lokomotiv, primarily in relation to age of the deceased. With the exception of three bird bone needle cases found in a single grave attributed to the Glazkovo mortuary tradition, all bird materials were recovered from Isakovo graves.

Females were interred with unmodified and modified beak portions (Aves, *Cygnus* sp.), humeri (Anatidae, *Cygnus* sp.), and an ulna (Aves) (Figure 5.18). There is no age gap for the inclusion of avifauna—females of all ages were interred with bird remains (Figure 5.19).

Males were buried with a greater variety of elements, including unmodified and modified cranium fragments (Aves), a humerus (Aves), ulnae (Aves, *Cygnus* sp.), a radius (Aves), carpometacarpi (Aves, *Cygnus* sp.), a tibiotarsus (*Cygnus* sp.), and a

tarsometatarsus (*Cygnus* sp.) (Figure 5.19). As with the females, males of all ages were buried with bird-derived items (Figure 5.19).

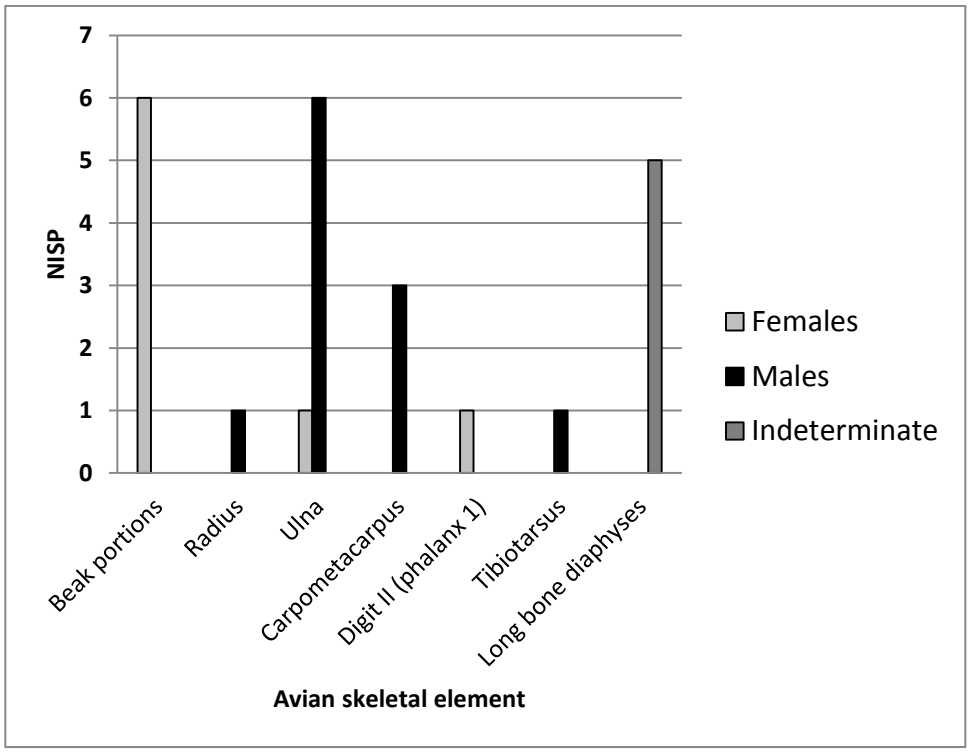

Figure 5.18 Distribution of modified and unmodified avian skeletal elements on the basis of biological sex at Ust'-Ida.

As previously mentioned, more subadults than adults were recovered from Ust'-Ida. Correspondingly, sex was undetermined for a large number of these individuals. Unmodified and modified avian skeletal elements associated with these individuals include ulnae (Aves, *Cygnus* sp.) and long bone diaphyses (Aves) (Figure 5.18).

The most notable pattern in the Ust'-Ida avifaunal data is the inclusion of bird materials in the graves of subadults (Figure 5.19). Unlike Shamanka II or Lokomotiv, where it appears the graves of subadults lacked such items, the graves of Ust'-Ida subadults often contain more avian skeletal material than do those of adults.

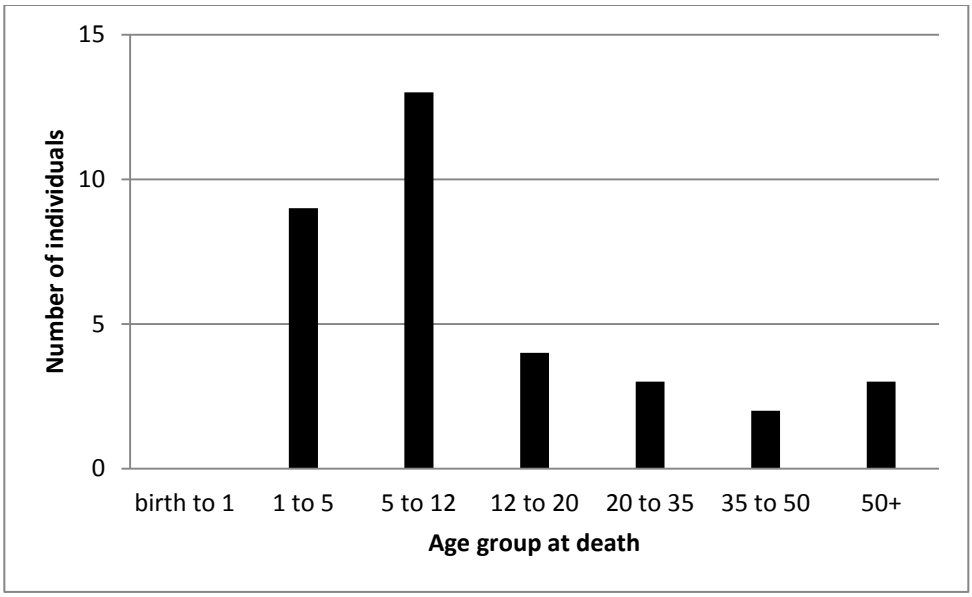

Figure 5.19 Number of Ust'-Ida individuals with avian skeletal material and age group at death.

As mentioned in the introductory chapter, the Late Neolithic peoples of Cis-Baikal were genetically distinct from the Early Neolithic inhabitants of the region (Mooder et al. 2006). Additionally, differences in mortuary protocols are clearly visible between these two periods (Bazaliiskii 2010:73). The significantly higher incidence of inclusion of bird material in the graves of subadults in the Late Neolithic is a previously unrecognized difference in the mortuary treatments of the two periods.

Though the smallest cemetery in this sample, Ust'-Ida yielded the greatest number of needle cases, 38 in all. Unlike the pattern established at Shamanka II and Lokomotiv, they were interred with individuals of all ages (Figure 5.20). Eleven cases (29%), fashioned from humeri (Anatidae and *Cygnus* sp.) and ulnae (Aves), were included in the burials of females. Thirteen cases (35.2%) were associated with males, and were made from a greater variety of elements, including a humerus (Aves), ulnae (Aves and *Cygnus* sp.), carpometacarpi (Aves and *Cygnus* sp.), and a tarsometatarsus (*Cygnus* sp.). Eleven

needle cases (29%) were recovered from the burials of individuals of indeterminate sex. Ulnae (Aves and *Cygnus* sp.) and long bone diaphyses (Aves) were used. As noted above, three cases were recovered from a Glazkovo grave containing two individuals. These cases were made from ulnae and a tarsometatarsus (Aves).

The majority of Ust'-Ida needle cases lacked ornamentation (34.2%, n=13). Slightly over a third (36%, n=4) of needle cases associated with females were decorated. Fifteen percent (n=2) of needle cases in male burials were similarly adorned. The majority (63.6%, n=7) of needle cases associated with individuals of indeterminate sex were decorated. In another departure from patterns seen at Shamanka II and Lokomotiv, all cases associated with the burials of males (100%; n=13) and the majority of cases associated with individuals of indeterminate sex (81.9%, n=9) contained needles than did those recovered from female burials (45.5%, n=5).

No patterns relating to age at death and the decoration of needle cases or the inclusion of needles emerged in my examination of the data.

Once again, too few determinations of mitochondrial DNA haplogroup for the individuals interred with bird materials have precluded any suggestion of patterning on the basis of familial relationships. Mitochondrial DNA haplogroups A, C, D, F, G2a, and U5a were represented by 27 individuals at Ust'-Ida, and at least one member of each was interred with avian skeletal material.

There appears to be no spatial pattern to the placement of graves with avian remains within the Ust'-Ida cemetery, despite some clustering of graves containing these materials (Figure 5.21). However, within the grave, it was clear bird materials most often were placed near the legs of individuals (Figure 5.20).

A final point of consideration for the Ust'-Ida avian skeletal materials concerns their near-absence in the later Glazkovo graves at the cemetery. These items are limited to only three needle cases, and the Glazkovo grave (UI-03) in which they occur contains two subadult individuals (UI-03-1 and UI-03-2), both between the ages of three and five at death. The ^{14}Cdates for Isakovo Ust'-Ida graves with needle cases do point to a decrease in the inclusion of bird bone items in graves during the Late Neolithic of use of this site. Unfortunately, radiocarbon dates were not obtained for this Glazkovo grave.

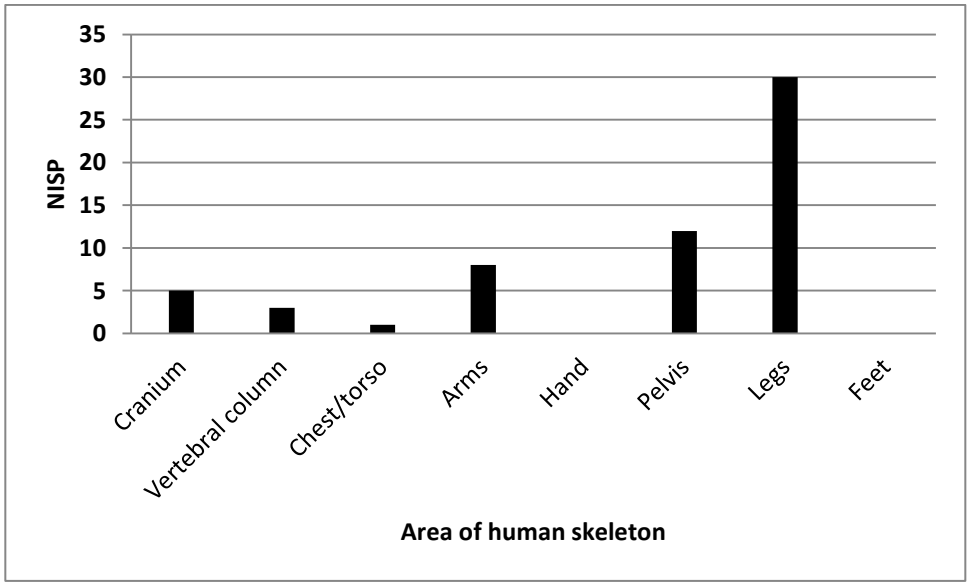

Figure 5.20 Placement of avian skeletal material relative to the human skeleton at the Ust'-Ida cemetery.

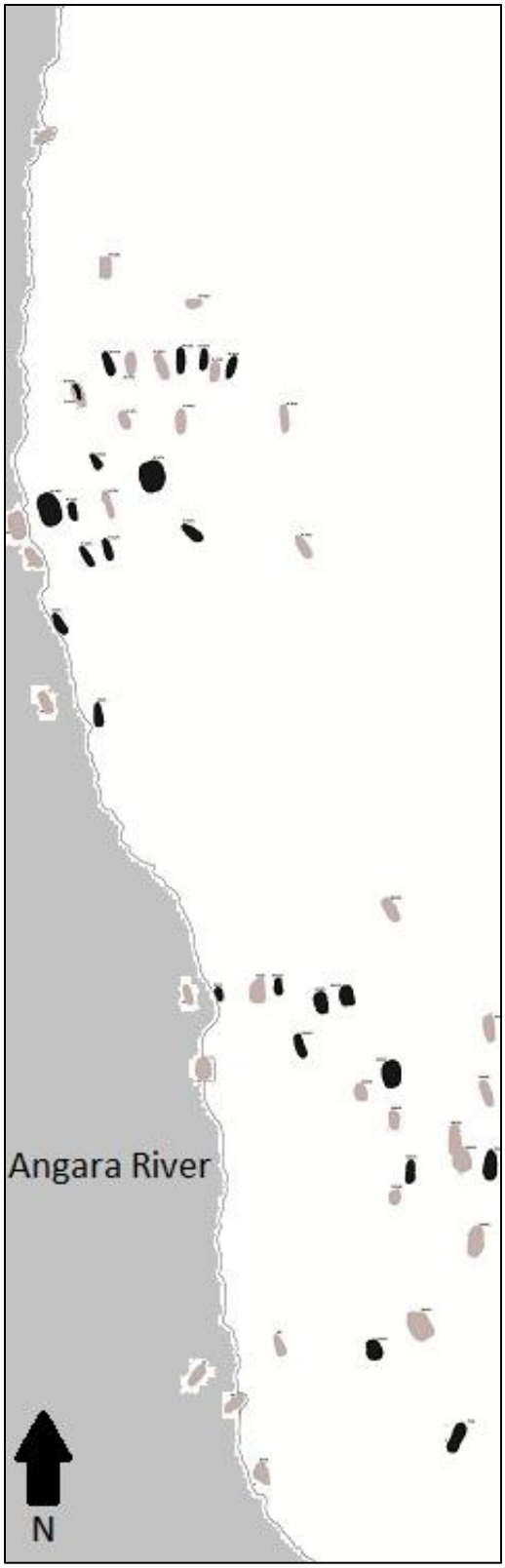

Figure 5.21 Map showing location of graves containing avian skeletal (in black) material at Ust'-Ida.

5.4 Summary of Avifaunal Inclusion at Shamanka II, Lokomotiv, and Ust'-Ida

Patterns on the basis of age at death and biological sex were present at each of the three cemeteries. However, the specific patterns that emerged at each cemetery revealed some inconsistency in the use of avian skeletal materials in these contexts.

At Shamanka II, the majority of avifaunal materials were interred with individuals over the age of 15. The graves of subadults generally lacked bird materials, with only two such graves yielding avian bone specimens (n=3). In no instance was an individual under the approximate age of 15 interred with a bone needle case. Notably, among adult individuals, needle cases were associated only with females under the age of 30, and with male individuals over 30.

Lokomotiv shared similarities with Shamanka II, with the majority of avifaunal inclusions noted in graves containing individuals over the age of twenty. However, the Lokomotiv bird materials were far less numerous than those at Shamanka II. Avifaunal specimens were identified in the graves of three subadults (n=3). The incidence of needle cases was not as defined on the basis of age and sex as at Shamanka II, though needle cases were more often interred with both males and females over the age of 30.

These patterns were not found at Ust'-Ida, where subadults were interred with a variety of bird materials, albeit in generally smaller quantities than those in adult interments. Graves from both the subadult and adult chronological age groups yielded needle cases, with an apparent preference for inclusion of cases in subadult graves.

Chapter 6
Discussion and Interpretation of Results

In this chapter, I discuss the results of my findings in light of previous archaeological research in Cis-Baikal, and I address research questions of a qualitative nature. I begin the chapter with a brief review of the biology and behavior of the birds and their representations in Cis-Baikal and Siberia. I then examine the differential nature of deposition of avian skeletal elements among the three cemeteries. I address the biological characteristics of avian taxa represented in the assemblages of Shamanka II, Lokomotiv, and Ust'-Ida, focusing on topics of seasonality, nesting behaviours, and appearance. Also, I give consideration to the manner in which birds might have been hunted or captured by the Middle Holocene inhabitants of the region. I explore the existence of spatial relationships between human bodies and bird elements. I address locational aspects of avifaunal materials in the Shamanka II, Lokomotiv, and Ust'-Ida cemeteries, and discuss some evidence for the expression of gender in prehistoric Cis-Baikal societies. I then examine why certain elements were selected for use, and give consideration to the use of avifaunal materials before deposition in graves. I conclude the chapter by connecting this research to the larger body of Cis-Baikal archaeological scholarship.

6.1 Manifestations of Birds in Prehistoric Cis-Baikal

Birds' ability to fly, walk on land, and swim has been suggested as an explanation for their representation and significance in the prehistoric archaeological record of other regions (Ingold 1986; Zvelebil and Jordan 1999). Specific demonstrations of the importance of birds to many indigenous Siberian societies come from ethnographic literature collected in the nineteenth and twentieth centuries, with birds' perceived

ability to fly between the worlds of spiritual beings, animate beings, and the dead highlighted as their most valued characteristic (Balzer 1996; Black 1973; Chernetsov 1963; Czaplicka 1914; Hill 2011:413; Prokofyeva 1963; Sirina 2009:17; 23-24). Often, they are described as being particularly important to shamans, who required bird skeletal materials and feathers to aid in shamanic flight (Balzer 1996; Chernetsov 1963; Prokofyeva 1963). It also has been suggested that migratory birds in particular might have represented rebirth (Hill 2011:413).

Representations of avifauna in human burials, typically in the form of figurines, have been described in some mortuary contexts in the Cis-Baikal region. At the Upper Paleolithic sites of Mal'ta and Buret', both located in the broader Angara River Valley, bird figurines fashioned from mammoth ivory have been recorded and examined. Typically, these sculptures seem to depict water birds in flight, taking off, and sitting or feeding (Martynov 1991:12; Medvedev 1998:133, 135, 244-45).

Rather than attributing the presence of animals in human graves as only feasting activities or ceremonial offerings, Jones (1998:309) suggests archaeologists approach faunal materials in prehistoric mortuary contexts with a "culturally specific logic of deposition." To this end, Jones highlights comparison of the items recovered from specific depositional contexts and an evaluation of the biological characteristics of the taxa identified, as this may permit deeper consideration of items included in human mortuary contexts.

Few avifaunal skeletal elements have been recovered from prehistoric non-mortuary sites in Cis-Baikal, making less clear which taxa might have been appropriate for a particular context or preferred for a specific use. This is partially related to the rarity of analyzed habitation site faunal assemblages in the region; perhaps sites used for

procuring and processing birds will be identified when larger numbers of assemblages are analyzed. Though the fragile nature of bird bones makes them more susceptible to destructive environmental agents than bones of larger mammals, the extremely small number of avian specimens recovered from Cis-Baikal habitation sites suggests birds were a not major component of local diets. For example, no bird remains were identified among the faunal remains recovered during test excavations at the Neolithic habitation site of Gorelyi Les in the Angara River Valley (Ready 2008). A single bird specimen was recovered from cultural levels associated with the Late Neolithic at the Ulan-Khada habitation site in Priol'khon'e (Nomokonova et al. 2011:32), and a single coracoid identified as Anatidae was recovered from the multicomponent Ityrkhei camp on the western shore of Lake Baikal (Nomokonova et al. 2009:55). The best current evidence for bird use in Middle Holocene Cis-Baikal are the remains found in the three cemeteries described here. Further, stable carbon and nitrogen isotope data do not indicate avian taxa were consumed in significant quantities by Early or Late Neolithic inhabitants of Cis-Baikal (Weber et al. 2011).

6.2 Seasonality of Cis-Baikal Avian Taxa

Cis-Baikal paleoclimate studies have suggested how the effects of climate could affect locally available fauna (White and Bush 2010:15-20), but have focused on terrestrial mammals and fish. It is not clear how or if climate change impacted avian species that inhabited Cis-Baikal during the Neolithic and Bronze Age. Consequently, I have assumed that because the taxa represented in the avifaunal assemblages of Shamanka II, Lokomotiv, and Ust'-Ida are still known to inhabit the Cis-Baikal region, their present-day habits are similar to those of their Middle Holocene counterparts.

Of the birds represented in Shamanka, Lokomotiv, and Ust'-Ida, most taxa identified to a more specific level than Aves currently do not inhabit Cis-Baikal on a year-round basis. However, it has been noted that when the outflow of the Angara River from Lake Baikal does not fully freeze, some *M. merganser* will overwinter in the area (Mlíkovský 2009:14). All other taxa migrate to Cis-Baikal in the spring to nest and brood and return to diverse locations around the eastern hemisphere in the fall (del Hoyo et al. 1992:162-172; 577-581; 622-626; Maleev and Popov 2010). A single taxon represented in the Shamanka II assemblage, *Anser cygnoides*, currently is not believed to breed at Lake Baikal (del Hoyo et al. 1992:581), though individuals of this species regularly have been observed in southern Baikal during the breeding season (Mlíkovský 2009:21).

The fall and winter ranges of all taxa are sufficiently distant to dispel suggestion that bird-derived materials were obtained at any other time of year, excepting the possibility of human scavenging activities. Considering their seasonal presence in Cis-Baikal, it also seems unlikely that long-distance trade played a prominent role in procurement of these bird remains.

Nesting habits and procurement of avian taxa in Cis-Baikal. A goal of this thesis was to investigate questions relating to the effort that may have been expended to hunt or capture the birds represented in the Shamanka II, Lokomotiv, and Ust'-Ida mortuary assemblages. The effort required to procure some of the bird species evidenced in these sites could indicate the motivations for pursuing them were not purely opportunistic. I explored the possibility that some Shamanka II, Lokomotiv, and Ust'-Ida avifauna were pursued *because* they were difficult to obtain, and that their interment with a specific individual may indicate certain beliefs about the deceased. Typically, these specimens are the bones of animals that likely were not efficiently obtained (more efficiently

obtained species were readily available), meaning the nutritional contribution or utility of an animal's raw material was mitigated or outstripped by the effort required to obtain it (Ervynck et al. 2003:430). Of importance to my research is the potential to identify bird taxa that were restricted to some members of a group, or as an animal taken primarily for purposes of prestige. Such an examination also may help indicate that certain animals were hunted and included in human mortuary contexts because of an ideological or ontological significance, and possibly related to the status of the deceased (after Jackson and Scott 1995:107).

Jones (1998) has suggested that animal remains were included in human graves to signify relationships between the landscape and its animal inhabitants. He describes mortuary animal bone inclusion as a "conceptual map of the resources located in any one part of the landscape" (Jones 1998:315). The Shamanka II avifaunal assemblage was represented by the greatest number of different avifaunal taxa, which primarily were identified to a genus or species on the basis of beaks or beak portions. It is possible the Lokomotiv and Ust'-Ida assemblages also included materials from similarly diverse taxa, but were not identified because diagnostic beak portions were not present. However, I believe this is due to the location of Shamanka II.

In addition to the representation of the greatest variety of taxa, Shamanka II yielded the largest avifaunal assemblage of the three cemeteries. I suggest these disparities are in part due to the location of Shamanka II, which is situated on the southern shore of Lake Baikal and provides habitats for a variety of birds. A greater variety of bird taxa, and an overall greater number of birds, might find more suitable nesting and foraging sites. Mlíkovský (2009:13-14) reports Lake Baikal provides a variety of habitats for nesting waterbirds, including rocky cliffs, grassy marshes, and reedbeds. Rock outcrops

and cliffs, as well as tall trees, are found on or near the lake, providing habitat for nesting raptorial birds. It should be noted that while many waterbird species are found in areas surrounding Lake Baikal, the mortuary assemblage of Shamanka II is particularly biased towards divers, dabblers, and waders. Other types of water birds that inhabit the Lake Baikal area but do not dive, swim, or wade, were not represented in the Shamanka II assemblage. The Tunka Valley, by contrast, is a relatively broad river valley with patches of marsh, steppe, and forest steppe. These patches potentially provided an even more diverse set of bird habitats within which local groups could have hunted.

Similarly, the abundance of preferred nesting sites for raptorial birds at Lake Baikal may explain why so few birds of prey specimens (n=11) were identified in the Lokomotiv avifaunal assemblage, and none was found in Ust'-Ida. It is possible the high number of taxa and specimens attributed to raptors in Shamanka II graves is related to the fact that these birds were most numerous on or near the shores of Lake Baikal.

Shamanka II			
Taxon	**Males NISP**	**Females NISP**	**Indeterminate NISP**
Undifferentiated aves	24	2	2
Large aves	25	10	4
Medium to large aves	6	1	
Medium aves		1	
cf./*Gavia* sp.		1	1
Gavia stellata	3	1	1
Phalacrocorax sp.	3		
Botarus stellaris			1
Anatidae			3
cf./*Cygnus* sp.	20	22	5
Anser cygnoides			1
Melanitta sp.	1		
cf./*Mergus* sp.	1		
Mergus cf. *serrator*			1
Mergus merganser			2
Mergus cf. *mergus*			1
Accipitridae	129	19	6

Taxon	Males NISP	Females NISP	Indeterminate NISP
cf. Milvus migrans	2		
cf./*Aquila/Haliaeetus* sp.	16	11	1
Accipiter sp.	5		
Accipiter cf. *gentilis*	5		
Accipiter nisus			1
Buteo sp.	4		
Buteo lagopus	3		
Buteo hemilasius	2		
Anthropoides virgo			2
cf./*Grus* sp.		3	2
cf. *Grus grus*	1	1	1
Coccothraustes coccothraustes	1		
Shamanka II totals	301	72	35

Lokomotiv			
Taxon	**Males NISP**	**Females NISP**	**Indeterminate NISP**
Undifferentiated aves	7	5	9
Large aves	1	9	1
cf./*Cygnus* sp.	3	3	5
Accipitridae	5		6
cf./*Grus* sp.		1	
Lokomotiv Totals	16	18	21

Ust'-Ida			
Taxon	**Males NISP**	**Females NISP**	**Indeterminate NISP**
Undifferentiated aves	1	9	1
Large aves	10	7	6
Medium to large aves	3	1	6
Medium aves	1	2	1
Small to medium aves			1
Anatidae		1	1
cf./*Cygnus* sp.	10	15	3
Ust'-Ida Totals	25	35	19

Table 6.1 NISP by taxon and association with human biological males, females, and indeterminate sex individuals at Shamanka II, Lokomotiv, and Ust'-Ida.

Broughton (2002:73) has demonstrated that the nesting localities of bird taxa impacted prehistoric peoples' decisions about which kinds of birds to take. Because these avian taxa inhabit Cis-Baikal during the spring and summer in part for the purposes of reproduction, the location of nests may be an especially important factor in understanding where and how birds were obtained by prehistoric humans. For specimens identified to at least the genus level, I examined ornithological literature concerning nesting behaviours. When possible, I obtained information specifically for bird populations in the Cis-Baikal region. This information appears in Table 6.2. Because many specimens were identified to the genus level, I include region-specific information for all species belonging to genera that were recovered from the three study cemeteries.

Taxon	**Common name**	**Nesting location**
Gavia stellata	Red-throated Loon	wetlands; on ground
Gavia arctica	Black-throated Loon	wetlands; on ground
Phalacrocorax carbo	Great Cormorant	cliffs and tall trees
Botaurus stellaris	Great Bittern	wetlands
Cygnus columbianus	Tundra Swan	wetlands
Cygnus cygnus	Whooper Swan	wetlands; on ground
Anser cygnoides	Swan Goose	wetlands; on ground
Melanitta fusca	White-winged Scoter	wetlands; on ground
Mergus serrator	Red-breasted Merganser	near water; on ground
Mergus merganser	Common Merganser	near water; in trees
Milvus migrans	Black Kite	cliffs and tall trees
Aquila chrysaetos	Golden Eagle	trees
Haliaeetus leucoryphus	Pallas' Fish Eagle	trees; occasionally on ground
Haliaeetus albicilla	White-tailed Sea Eagle	cliffs and tall trees
Accipiter gentilis	Northern Goshawk	trees
Accipiter nisus	Eurasian Sparrowhawk	trees
Buteo lagopus	Rough-legged Buzzard	rocky cliffs and outcrops
Buteo hemilasius	Upland Buzzard	rocky cliffs with overhang
Grus grus	Common Crane	wetlands; on ground
Anthropoides virgo (*Grus virgo*)	Demoiselle Crane	open patches of grass
Coccothraustes coccothraustes	Hawfinch	trees

Table 6.2 Nesting locations of avian species identified in the Shamanka II, Lokomotiv, and Ust'-Ida assemblages.

Diving (*Gavia* sp.), wading (*B. stellaris, Grus* sp.), and dabbling (*Cygnus* sp., *Melanitta* sp.) bird taxa whose skeletal elements were identified in all three assemblages generally locate their nests at ground level at or near the water's edge, with some vegetative cover for concealment (del Hoyo et al. 1992:162-172; 577-581; 622-626; Mlíkovský 2009). However, *P. carbo* nests high in cliffs or trees, and *M. merganser* prefers to nest in trees.

The nesting habits of the raptorial birds in the Shamanka II and Lokomotiv assemblages are markedly different from those of most water birds. These taxa (*M. migrans*, *Aquila/Haliaeetus* sp., *Accipiter* sp., *Buteo* sp.) build nests in locations less accessible to humans, such as cliffs, ledges, and tall trees (del Hoyo et al. 1992:118-162).

Methods for the capture and hunting of birds are largely dependent on the type of bird pursued, and it is not known how the Early Neolithic and Late Neolithic/Early Bronze Age peoples of Cis-Baikal obtained avian taxa. Ethnohistoric examples of Siberian bird procurement document a variety of techniques, including snaring, obtaining juvenile birds from nesting sites, and clubbing (Black 1973:25-28; 39). Though a probable juvenile *Cygnus* sp. wing bone was identified in the Shamanka II assemblage, and a juvenile Accipitridae phalanx in the Lokomotiv assemblage, it seems unlikely young birds were taken from the nest and raised by humans. Further, the absence of traumatic skeletal injury does not point to violent capture techniques such as clubbing, though skeletal portions most likely to exhibit signs of such practices, such as the sternum (Judd 1959:35; 127) were not recovered from the Shamanka II, Lokomotiv, and Ust'-Ida cemeteries.

In his volume on food-getting technologies, Oswalt (1976) makes a distinction between "weapons" and "facilities." He defines weapons as items used to kill animals,

whereas facilities are understood to control the movement of animals, even if the method of facility ultimately results in the death of an animal (Oswalt 1976:105). He further notes the use of facilities may make the capture of some animals easier by decreasing danger to humans and, in some instances, relieving humans of the need to lie in wait for prey (Oswalt 1976:105). Because most avian taxa are able to fly, generally they are regarded as difficult to hunt with weapons (Bochenski et al. 2009:2663; Russell and McGowan 2005:110). Further, the majority of Cis-Baikal raptorial species nest in hard-to-reach locations. If birds from these cemeteries were taken with the assistance of a facility, such as a fowling net or snare, their procurement might have been less difficult, dangerous, or time-consuming (though perhaps more 'expensive' in terms of material and labour costs involved in capture technologies).

Both fishing and fowling nets are examples of facilities. Most fowling nets are used by luring or chasing a bird to a specific location, where the net is dropped or drawn up over the animal. The use of fowling nets to subdue both water and raptorial bird prey has been documented historically in Siberia and elsewhere around the world (e.g., MacPherson 1897; Potapova and Panteleyev 1996:131; Reina and Pressman 1991:113; Wijngaarden-Bakker 2010). The use of nets in fishing activities among the prehistoric peoples of Cis-Baikal cannot be disputed, and it is possible this technology was applied to other purposes. Impressed ceramic vessels included in several Kitoi graves, and in 70% of Isakovo graves, indicate these groups possessed nets (Bazaliiskii 2010:70-71; 75). Further, Losey et al. (2008) have suggested the use of fishing nets based on the size of perch remains recovered from the Ityrkhei site on Lake Baikal. If fowling nets were in use by the Neolithic peoples of Cis-Baikal, the inclusion of avifauna in graves may not indicate conclusively that their capture necessitated an expenditure of greater-than-

usual labour, perhaps no more than that used to capture many local species of fish (remains of which are very rare in graves). However, nets do require an output of time for manufacture and repair. Snares, however, require comparatively little labour to produce and set up (Oswalt 1976:149)), and often do not require a human attendant. Though there is no known archaeological evidence for the use of either fowling nets or snares in prehistoric Cis-Baikal, their employment in the capture of birds should not be discounted.

6.3 Associations between Human Burials and Avian Skeletal Material

The regular inclusion of animal skeletal portions in human graves has led some archaeologists to conclude elements were selected because they represent most obviously specific animals, or kinds of animals (Jones 1998:315; Sutherland 2001). Feathers, wings, beaks, and talons are highly characteristic of birds as a whole, and in many instances, entirely unique to a species. Other parts of the bird skeleton, such as sternae, vertebrae, and synsacra, are less immediately recognizable as belonging to birds as skeletal homologues for these elements are found in many different types of animals.

The Shamanka II assemblage was dominated by talon and beak portions. Long bone diaphyses, followed by talons, were the most numerous identifiable elements in Lokomotiv graves. Over half of the Ust'-Ida avifaunal assemblage was represented by wing elements. Though wing portions constitute the majority of specimens in avifaunal assemblages recovered from prehistoric archaeological sites around the world (Bochenski et al. 2009; Bovy 2002:965; Gumiński 2005:120; Mannermaa 2008; Russell and McGowan 2005:107; Salmi et al. 2011), this pattern rarely has been addressed in dedicated research. Serjeantson (2009:158-162) has suggested the wing elements of

birds are more dense than others, ensuring greater survivorship in the archaeological record. However, Bovy (2002) has demonstrated that the density of skeletal elements across functional classes of birds (e.g., divers, dabblers) does not correlate with the numbers of specimens recovered from archaeological contexts.

Mannermaa (2008) has suggested that the abundance of wing elements from mortuary contexts illustrates the widespread practice of interring complete wings with deceased individuals, and in some instances, the placement of wing elements on or near human arm bones. Mannermaa (2008:216-217) posits the practice is linked to a belief that the deceased were in need of the ability to fly, perhaps to an afterlife. Historically in Siberia, bird wings were used as fans to keep away mosquitoes (Derugin 1898; qtd. in Potapova and Panteleyev 1996:133), and by shamans for a variety of ceremonial activities (Balzer 1996; Czaplicka 1914:217-219).

The historic use of colourful feathers in shamanistic activities has been noted among many indigenous groups in Siberia (Djakonova 1978:325; Siikala 1978). The significance of both bird wings and plumage is reflected further in descriptions of historic Siberian shamans' regalia. However, these descriptions generally remark that along with feathers, *depictions* of wings and feathers were rendered in materials such as fur and hide, with no apparent requirement for the use of materials obtained from actual birds (Gračeva 1978:317; Prokofyeva 1963; Siikala 1978:118; Žornickaja 1978:299). Further, present-day examples of the bird taxa identified in the Shamanka II, Lokomotiv, and Ust'-Ida assemblages yielded no compelling evidence that feathers associated with these wing skeletal elements were particularly bright, often occurring in shades of brown, black, grey, and white. Taxa with colourful plumage inhabit the Cis-Baikal region today, including a variety of waterbirds (Maleev and Popov 2010). While many

specimens were identified only to the taxonomic level of Aves, that these taxa were not identified specifically does not presume their absence in the sample. However, of the specimens identified to genus or species, it suggests colour was not an exclusive determinant for the selection of these birds.

Shamanka II, Lokomotiv, and Ust'-Ida graves contain no clear evidence for the practice of interment of entire bird wings. Where burial plans or descriptions of bird bone placement in the grave were available, I observed no avian skeletal element in obvious association with a corresponding location on the human skeleton. Additionally, no *in situ* articulation was noted for avian specimens in any grave.

However, contiguous elements of the bird skeleton from a single taxon were interred occasionally with humans. I determined this by examining the frequency of both unmodified and modified elements for the taxa recovered from each burial. If whole or nearly whole wings were present, it was expected that slightly modified (i.e., signs of disarticulation) or unmodified elements that articulate *with* each other, though not necessarily encountered during excavation as an articulated unit, would be recovered from graves. This possibility was borne out by the bird materials in 12 graves from Shamanka II, one grave from Lokomotiv, and two graves from Ust'-Ida. The phenomenon was observed most often among wing elements identified as *Cygnus* sp. However, in every incidence the number of contiguous elements present was not sufficient to suggest an *entire* wing or leg had been interred with a deceased human.

It appears the absence of the avian postcranial axial skeleton in prehistoric Cis-Baikal graves was an intentional act on the part of the individuals who buried the deceased. I interpret this phenomenon as being related, at least in part, to beliefs about qualities and abilities of birds that humans do not physically possess.

Inspired by Mannermaa's interpretation of bird wing elements in association with human arms, as well as by Viveiros de Castro's (1998:479-482) ethnographic discussion of humans employing specific parts of animal bodies in order to transform one's physical identity and abilities, I examined other human bodily locations where spatial relationships between corresponding parts of avian and human skeletons were recorded during excavation. This effort met with mixed results (Table 6.4), and does not suggest unmodified or partially modified bird bones were placed in targeted locations on the human body to aid the deceased human in some specific activity, or to impart a quality or ability not possessed by humans.

Shamanka II									
	Human skeleton location								
	Cranium	Shoulder	Arm	Hand	Torso	Vertebrae	Pelvis	Leg	Foot
Bird element									
Cranium/beak	2						1		1
Coracoid								1	
Humerus	2	1					2		2
Radius	4	1				1			
Ulna	7	3		1				1	3
Scapholunar								1	
Carpometacarpus	1	1		1	1		2	1	1
Pollex	1			1			1		
Major digit, phalanx I				2	2				1
Major digit, phalanx II					2			1	
Femur		4					2		
Tibiotarsus		3							1
Tarsometatarsus	4								21
Long bone diaphysis	5	13	1		3	2	3	6	1
Pedal elements								1	
Talons	10	4	1			1	2	3	1

Lokomotiv

	Human skeleton location								
	Cranium	Shoulder	Arm	Hand	Torso	Vertebrae	Pelvis	Leg	Foot
Bird element									
Cranium/beak	2								
Humerus	2								
Ulna					1			2	
Carpometacarpus	4								
Major digit, phalanx I				1					
Tarsometatarsus	1								
Long bone diaphysis	3		1				4	6	
Talons	1		1						

Ust'-Ida

	Human skeleton location								
	Cranium	Shoulder	Arm	Hand	Torso	Vertebrae	Pelvis	Leg	Foot
Bird element									
Cranium/beak	1							16	
Scapula							1		
Humerus								3	
Radius	1								
Ulna	2		4	1	2	1	7	9	
Carpometacarpus	2		5			1	2		
Tarsometatarsus	2						1		
Long bone diaphysis			1				1	1	

Table 6.3 Location of bird elements in relation to human skeletal areas at Shamanka II, Lokomotiv, and Ust'-Ida.

Bird beaks, while present in graves at each of the three cemeteries, were not consistently associated with specific locations of the human skeleton (Table 6.4), When found in association with a particular human burial, their proximity to other disarticulated faunal elements and non-faunal materials suggests they were included as items in bundles or tool pouches rather than sewn to clothing items as pendants (see Figure 6.1) (Bazaliiskii 2010), though the reason for their inclusion in human graves is

not clear. In ethnohistoric accounts, many of the species represented by these beaks were associated with death or the underworld (Dolgikh 1978:347; Gračeva 1978:316). They may have been included in grave fill or as part of a suite of burial materials to convey certain beliefs about the deceased. As previously noted, beaks often are highly representative of a species, and could be associated with particular habits or the unique sounds made by each. At least one species in this sample, *C. coccothraustes* (Hawfinch), has a beak known to change colour at various points throughout the year.

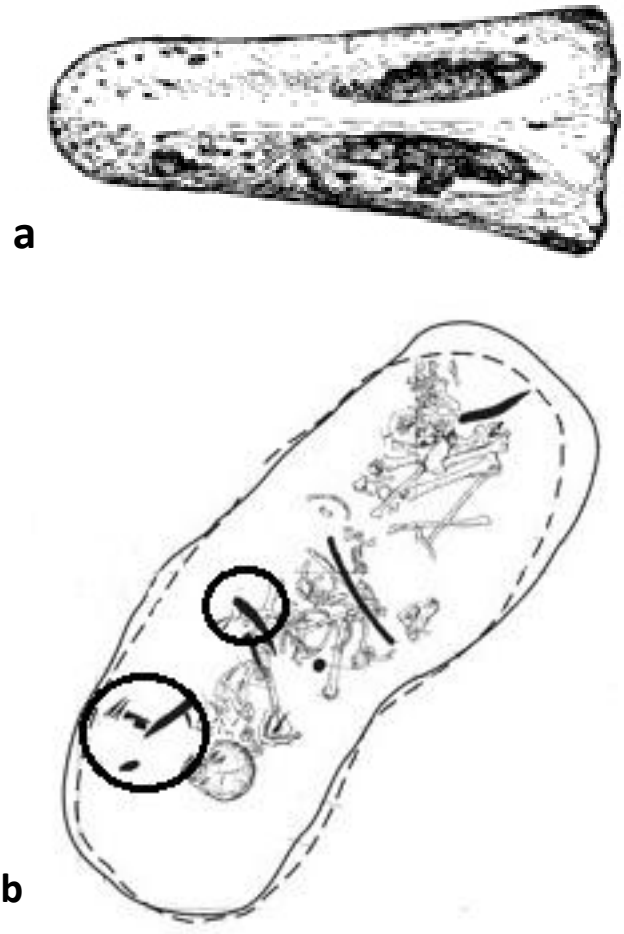

Figure 6.1 (a) *Mergus* cf. *serrator* beak recovered from Shamanka II (Sha 26); (b) plan view showing location of bird beaks in artefact clusters (Sha 23-1). Images courtesy of V. I. Bazaliiskii.

6.4 Needle Cases

As noted in Chapter 4, bird bone needle cases are occasionally found in prehistoric Siberian mortuary contexts and in other areas of the circumpolar north. Historically, Nenets women of northern Siberia carried on their person tubular cases filled with sewing equipment; Prokofyeva (1963:133) notes they were even "put into her grave," a practice which bears similarity to the cases recovered from Shamanka II, Lokomotiv, and Ust'-Ida.

Investigation of the location of manufactured needle cases in the grave yielded an interesting pattern. In each of the three cemeteries, in graves with adequate contextual descriptions, needle cases were recorded often as resting near the pelvis or legs of the deceased with whom they were interred (Figures 6.2, 6.3, 6.4), though in some instances, at the hand, arm, or in clusters beneath the cranium and feet (Figures 6.2, 6.3, 6.4). Needle cases associated with biological females were more often recorded along the leg, while those associated with males frequently were documented near the torso or pelvis. I interpret these locational differences in needle cases along lines of gender, and I suggest that an individual's expression of identity may have included the manner in which a needle case was worn on the person. The presence of needle cases near the upper legs indicates suspension of such items, possibly from the waist or clothing, while needle cases recovered from the torso or pelvis areas points to their attachment at the waist.

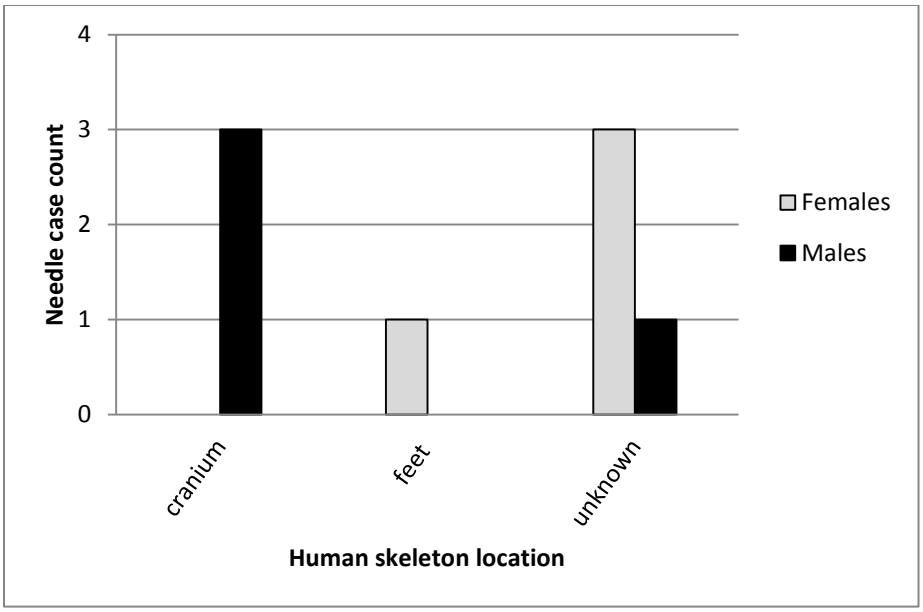

Figure 6.2 Location of needle cases in association with human interments by biological sex at the Shamanka II cemetery.

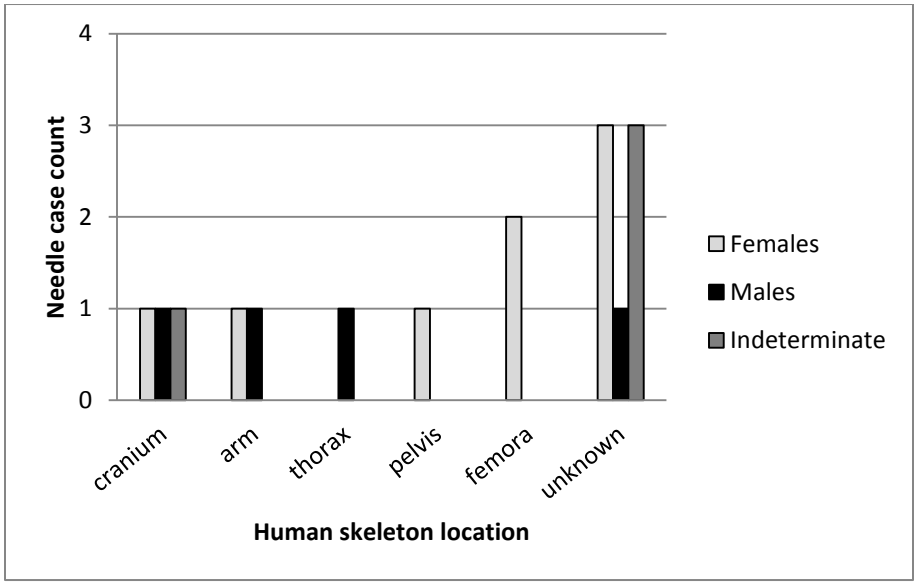

Figure 6.3 Location of needle cases in association with human interments by biological sex at the Lokomotiv cemetery.

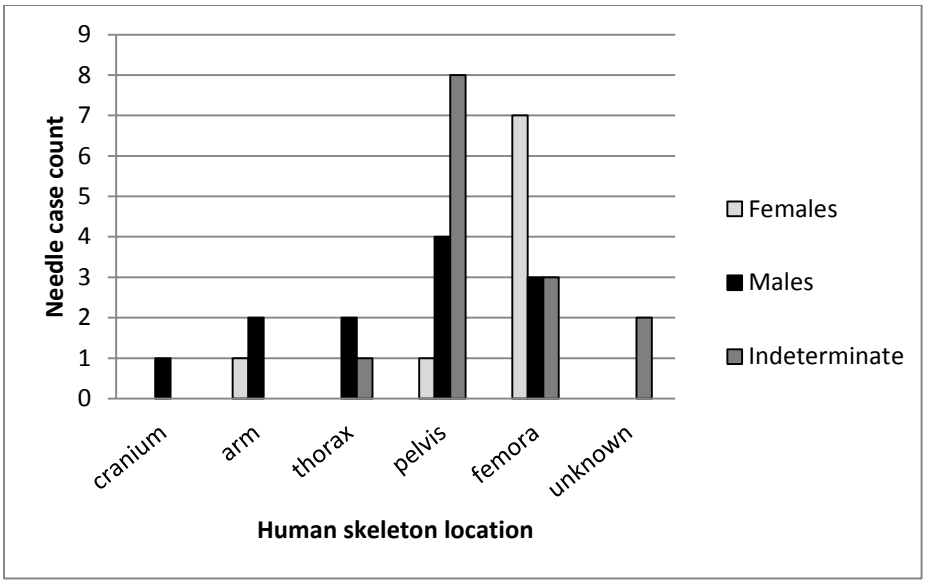

Figure 6.4 Location of needle cases in association with human interments by biological sex at the Ust'-Ida cemetery.

At both Shamanka II and Lokomotiv, approximately 75% of ornamented needle cases were interred with biological females (examples in preceding chapters). In all instances, the surface decorations of female-associated needle cases were more complex than those of ornamented cases associated with males. At Ust'-Ida, almost half of decorated needle cases were interred in the graves of individuals of indeterminate sex. Further, decorated cases were primarily buried with subadults (example in Figure 6.5).

Needle cases in the Shamanka II, Lokomotiv, and Ust'-Ida assemblages were identified primarily on the basis of their manufacture, as well as the presence of bone needles. Generally, they were fashioned from bird long bones by removal of the epiphyses through the sawing and snapping technique. Needle cases recovered from each of the three cemeteries were made exclusively from the long bones of larger avian taxa (Table 6.4).

Figure 6.5 Example of decorated needle case from Ust'-Ida 44-1 (Isakovo). Scale is in centimetres.

Ornamentation techniques, such as incising (see Figure 6.6a) and 'ridging' (see Figure 6.6b), were repeated on numerous cases, but all individuals were interred with uniquely decorated cases, suggesting these designs were the result of personal preferences and expression.

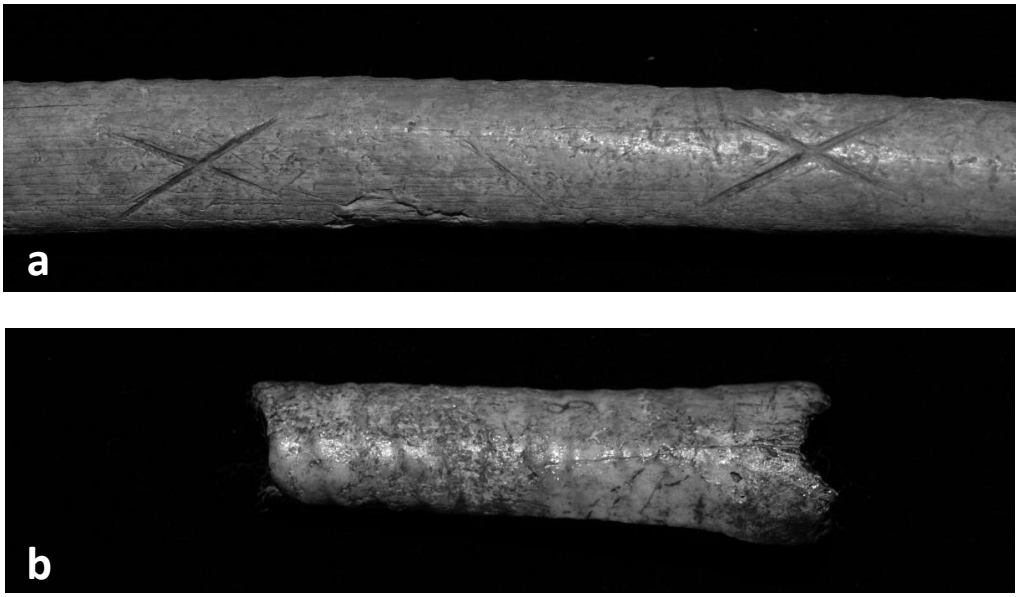

Figure 6.6 Example of needle case incising (a) and ridging (b) from Isakovo graves at Ust'-Ida.

Avian skeletal element	Shamanka II	Lokomotiv	Ust'-Ida
humerus			3
radius			1
ulna	6	3	26
carpometacarpus	2		6
tarsometatarsus	2		1
long bone diaphysis	9	9	1

Table 6.4 Needle case element selection in Shamanka II, Lokomotiv, and Ust'-Ida graves.

Though archaeologically invisible choices may have played a part in taxa and element selection for the eventual manufacture of needle cases, it is equally plausible bird long bones were chosen for practical reasons, such as their size and thin yet durable cortex (Choyke 1997). While bird long bones were used to create needle cases themselves, in all instances bone needles were not identifiable to a taxonomic level more specific than Vertebrata. Given the appearance, size, and textural qualities of the needles, however, it is likeliest they were manufactured from cortical bone of mammals.

In each of the three cemeteries, bird long bones with either the proximal or distal epiphyses removed were recovered. In form, they are similar to needle cases, with the interior cavity of the bone shaft exposed. Some long bones with one epiphysis removed were positively identified as needle cases because they contained needles; without them, their intended use may have been overlooked. For this reason, I examined the specific locations in which long bones with one intact epiphysis were located in the grave. This spatial relationship was less compelling than that of items readily recognized as needle cases, and suggests these roughly-hewn cases may only be identified by the presence of needles. Further, it is possible taphonomic factors are responsible for these missing long bone epiphyses, and that they may originally have been interred as whole elements.

It is not clear if the needle cases and needles recovered from Shamanka II, Lokomotiv, and Ust'-Ida graves were used in life, either by the deceased or another individual. Repeated use or handling of skeletal material is assumed to have particular, regular effects on bone, depending on the type of bone used for the object, how the object was used, and on what kind of material it was used. Stone (2011:39) notes there are few widely accepted standards for evaluating use-wear on animal bone. In her examination of bone use-wear patterns in fiber production and manufacture, she cites polished and/or pitted surfaces and rounded edges or bone features as the most readily observable features (Stone 2011:132).

Light grinding of cortical surfaces was noted for many Shamanka II, Lokomotiv, and Ust'-Ida needle cases, though identification of this technique was limited to specimens exhibiting a high polish, or where skeletal features (such as quill knobs on ulnae) had been observably diminished or entirely removed. Polish on bone needles also was documented.

That these items were subjected to modification is unquestionable. However, without closer evaluation of the appearance of the Shamanka II, Lokomotiv, and Ust'-Ida needle cases and needles, and a fuller consideration of which actions and materials were responsible for the resultant appearance, I am not able to conclude if these materials were used prior to deposition. However, their use among the living cannot be ruled out at this time.

6.4 Sex- and Age-Based Patterns

Neolithic and Early Bronze Age Cis-Baikal burial inclusions have sometimes been described on the basis of the biological sex of the human they are interred with. It has been said that certain types of bird bone artifacts (e.g., long bone needle cases and

talon fish hook barbs) correspond to activities that would be performed specifically by men and women in life, and likely the afterlife, and that a particular suite of items could mark members of a certain sex in mortuary contexts (Weber 1995:111). Further, associations between the gendered activities of daily life and the biological sexes as seen through mortuary materials have been quantitatively and qualitatively demonstrated in prehistory in other areas (e.g., Aranda et al. 2009; Stoodley 1999).

I have demonstrated that needle cases were interred with both males and females at Shamanka II, Lokomotiv, and Ust'-Ida, making their mere presence in prehistoric Cis-Baikal graves a poor marker of sex, nor do they provide evidence for a gendered division of labour. However, when variables among these objects, such as degree of ornamentation and position in the grave, were considered, potential sex-based distinctions emerged. By jointly examining the variables among slightly modified and unmodified avian skeletal materials and the biological sex and age of the humans with whom they were interred, it was believed clear associations would emerge.

Consideration of raw NISP for graves with avian materials yielded slightly different results at each cemetery. Graves containing males at Shamanka II were associated with greater amounts of bird material (Figure 6.7). At Shamanka II, males also were interred with a greater variety of taxa and skeletal elements than either females or individuals of indeterminate sex (Table 6.3). At Lokomotiv, individuals of indeterminate sex were buried with the greatest amounts of avifauna (Figure 6.8). However, it should be noted that it was not possible in every instance to ascertain if a bird specimen was in direct association with a specific individual in graves containing multiple individuals. In these instances, the sex association with the specimen was assigned as indeterminate, potentially skewing numbers in favour of these individuals at each of the three

cemeteries. At Ust'-Ida, the graves of individuals of indeterminate sex contained the greatest amount of avifaunal material (Figure 6.9).

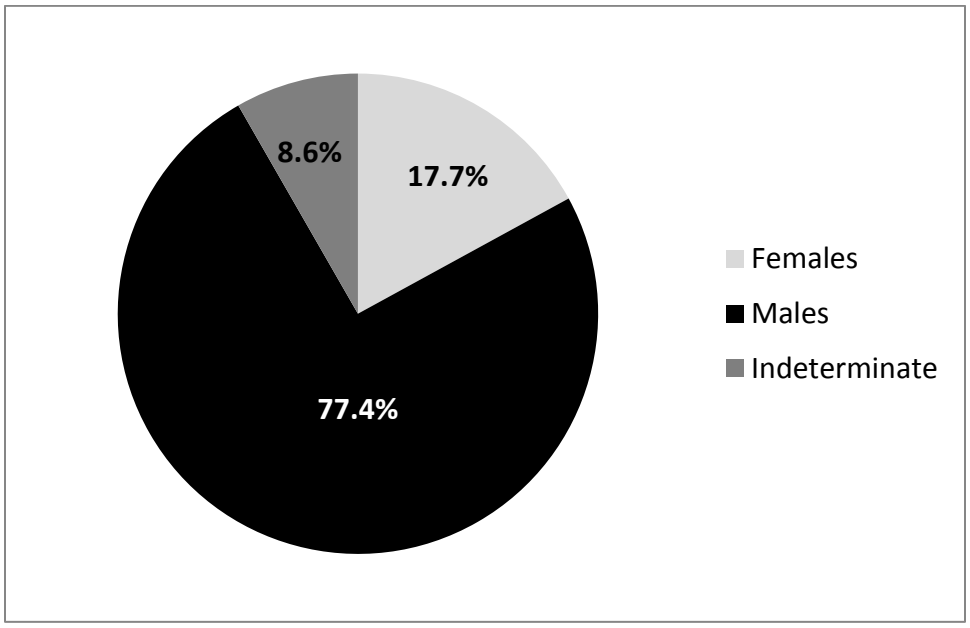

Figure 6.7 Shamanka II total avian specimen NISP associated with biological males, females, and indeterminate individuals.

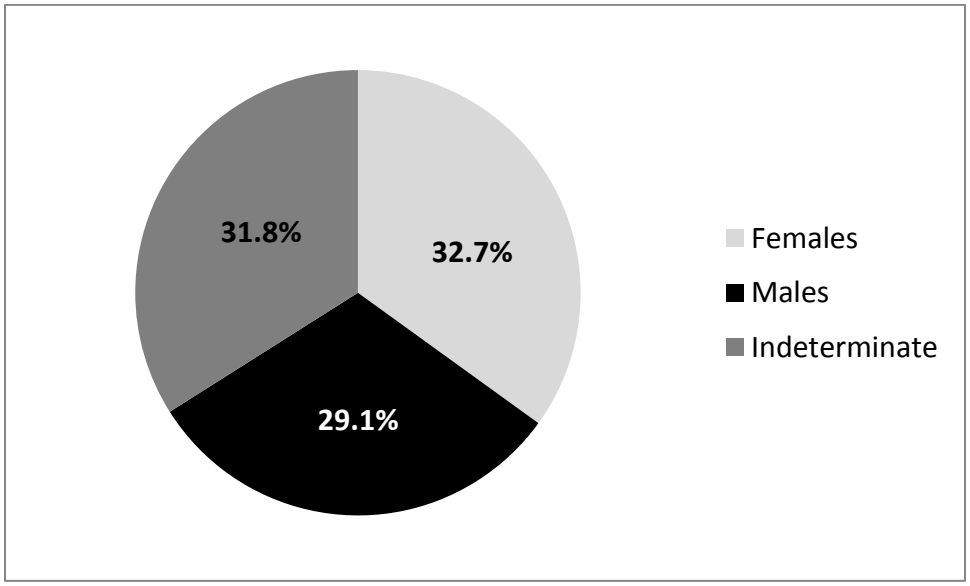

Figure 6.8 Lokomotiv total avian specimen NISP associated with biological males, females, and indeterminate individuals.

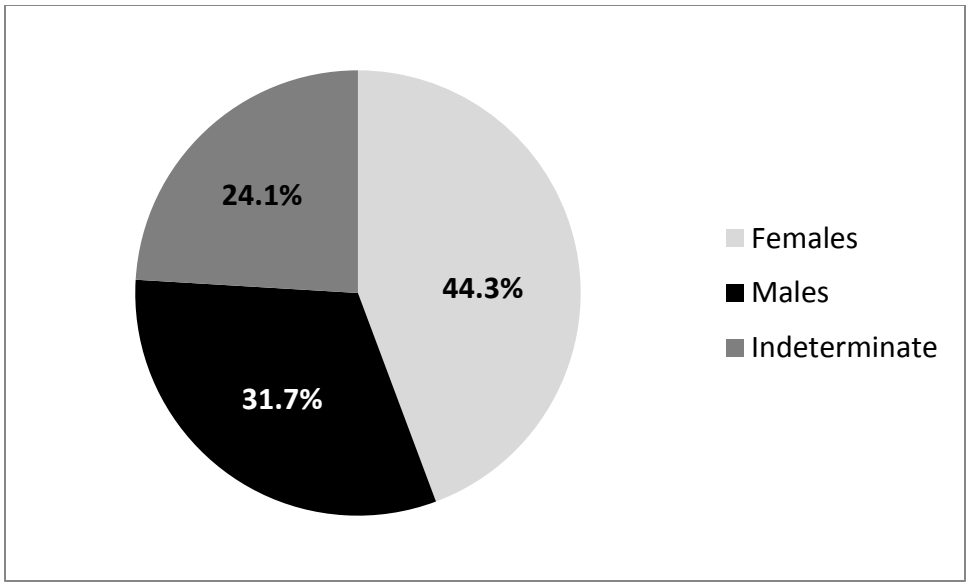

Figure 6.9 Ust'-Ida total avian specimen NISP associated with biological males, females, and indeterminate individuals.

There was an apparent association between the burials of males and the remains of raptorial birds at Shamanka II (Table 6.1), and the majority of these items were talons (Table 6.6). Indeed, for every bird skeleton portion, males were associated with the greatest amount of bird remains (Table 6.6). Females were interred with significantly less avian material on the whole, but it can be said they were associated more often with wing elements of waterbird taxa. As previously noted, individuals of indeterminate sex (Table 6.1, Table 6.6) primarily represent the interments of subadults, and members of this age group generally were not interred with bird skeletal materials.

A similar pattern emerged at Lokomotiv (Table 6.6). Talons and long bone diaphyses dominated the assemblage, and were recovered most often from the graves of males. Females again were associated most frequently with wing elements of waterbird taxa (Tables 6.1 and 6.6). Overall, the inclusion of bird remains in graves was more equitably distributed among the sexes at Lokomotiv. As with Shamanka II, the graves of subadults at Lokomotiv generally lacked bird materials.

At Ust'-Ida, Isakovo males and females were interred with somewhat equal amounts of avifaunal skeletal remains, with females' graves containing slightly greater numbers of these items than those of males (Figure 6.5). Waterbird wing elements were in most frequent association with males, while waterbird beaks were recovered solely from the graves of females (Tables 6.1 and 6.7). When needle cases are considered along with unmodified and slightly modified elements, female graves contain more bird bones than those of males. Further, whereas Shamanka II and Lokomotiv subadult graves appear to have a fairly consistent absence of avian skeletal material, the interments of their counterparts at Ust'-Ida routinely included bird materials.

Shamanka II **Avian skeletal element**	**Males NISP**	**Females NISP**	**Indeterminate NISP**
beak portions	12	2	13
coracoid			1
humerus	10	2	4
radius	4	2	
ulna	11	12	1
scapholunar			1
carpometacarpus	6	5	4
digit 1 phalanges 1 and 2	102	5	1
second digit phalanx 1	2	3	
second digit phalanx 2	2	1	
minor digit phalanx 3	2		1
talons	28	22	6
femur	5		
tibiotarsus	5	3	
tarsometatarsus	23	3	1
long bone diaphyses	42	12	2
pedal elements	24		
Shamanka II totals	**278**	**72**	**35**

Lokomotiv Avian skeletal element	Males NISP	Females NISP	Indeterminate NISP
beak portions	1	1	
humerus	1	1	
radius	3		
ulna	1	3	2
carpometacarpus	5	2	
second digit phalanx 1		1	
second digit phalanx 2	1		
phalanx (juvenile)	1		
talons	8		1
tibiotarsus		1	
tarsometatarsus	1		
long bone diaphyses	14	10	1
Lokomotiv totals	**36**	**19**	**4**

Ust'-Ida Avian skeletal element	Males NISP	Females NISP	Indeterminate NISP
cranium fragment	1		
beak portions		5	
humerus	1	2	
radius	1	1	
ulna	12	9	12
carpometacarpus	8		
second digit phalanx 1		1	
tibiotarsus	1		
tarsometatarsus	1		1
long bone diaphyses			6
Ust'-Ida totals	**25**	**18**	**19**

Table 6.5 Avian skeletal element NISP on the basis of biological sex at the Shamanka II, Lokomotiv, and Ust'-Ida cemeteries.

The differential patterns of avifaunal materials in human graves in the Kitoi, Isakovo, and Glazkovo mortuary traditions are not surprising when taken in consideration with insights gleaned from earlier Cis-Baikal mid-Holocene archaeological research. Radiocarbon dating of human skeletal material from a number of prehistoric mortuary contexts including the three cemeteries examined here has substantiated the absence of archaeologically visible mortuary practices during the Middle Neolithic, resulting in the ~700 to 1000 year gap between the Kitoi and Isakovo traditions (Weber et al. 2010).

Further, examination of Cis-Baikal dietary patterns based on stable carbon and nitrogen isotope data suggest markedly different modes of subsistence among Kitoi, Isakovo, and Glazkovo peoples, at least in cemeteries analyzed from South Baikal and on the Angara. As discussed in chapter 2, these data indicate Early Neolithic peoples buried at Shamanka II relied principally on fish and perhaps also Baikal seal (*Phoca sibirica*) for a significant portion of their protein diets, while those interred at Lokomotiv subsisted on riverine fish species. In the Late Neolithic and Early Bronze Age, terrestrial mammals made a far larger contribution to the diets of Isakovo and Glazkovo peoples buried at Ust'-Ida (Weber et al. 2011).

The biocultural discontinuity in this region has been linked to several processes. Environmental proxy data have led some Cis-Baikal researchers to suggest environmental change was responsible for collapsing subsistence-level fishing activities on the Angara River, causing human inhabitants to shift their dietary focus to terrestrial mammals as a more reliable source of food (White and Bush 2010:18). Increased aridity may have resulted in the creation of more forest-edge ecotones, in which many terrestrial mammals, ungulates in particular, prefer to browse for food. This change would simultaneously increase terrestrial mammal populations and cause them to move

into and concentrate in localities they had not inhabited previously (White and Bush 2010:19-20).

In a report of recent ethnographic fieldwork among the Orochen-Evenki reindeer herders of Zabaikal'e (East Baikal), Brandišaukas (2011:101) remarks that the unforgiving taiga environment necessitates knowledge of and skill in hide processing techniques, along with the ability to create garments and gear from them. Both men and women perform these activities today, and even children participate in the process, often to help soften hides (Brandisaukas 2011:103). Though no direct representations of prehistoric Cis-Baikal garments have been encountered in the archaeological record, it is reasonable to assume that humans would have used animal hides to fashion a variety of items for survival and comfort, many of which would have required sewing activities. With artiodactyls forming the foundation of Isakovo (and Glazkovo) diets in the Angara River Valley, it is expected that raw materials, such as bone, antler, and hide, were obtained from these animals in addition to their meat.

The increase in the number of bird bone needle cases and needles recovered from Isakovo graves compared to earlier periods might be interpreted as a reflection of the greater societal significance of hideworking and sewing. I further posit that the increase in the amount of available hides created a labour demand and necessitated the work of more humans, including subadult individuals (after Arnold 1999; Lackey 1982; London 1986). Consequently, these individuals may have been perceived as important social and economic agents, reflected by the mortuary treatment afforded to both adults and subadults at the Ust'-Ida cemetery (see Lillie 1997:223 for a similar argument). Waguespack (2005) notes that in societies where hide-bearing animals begin to take precedence over other kinds of hunted or gathered resources, there is a concomitant

shift in the quotidian activities of the non-hunter members of the group, who increasingly focus their labour on manufacture, with women, children, and the elderly particularly involved.

To examine this in greater detail, I assessed the number of non-avian faunal objects that may have been used for hide processing and sewing activities, such as bone piercing implements, bone needles not associated with needle cases, and bone scrapers (Figure 6.10). Unfortunately, I did not have access to full mortuary assemblage data for the three cemeteries, and other kinds of artifacts that might have been used to carry out hideworking and sewing activities could not be considered.

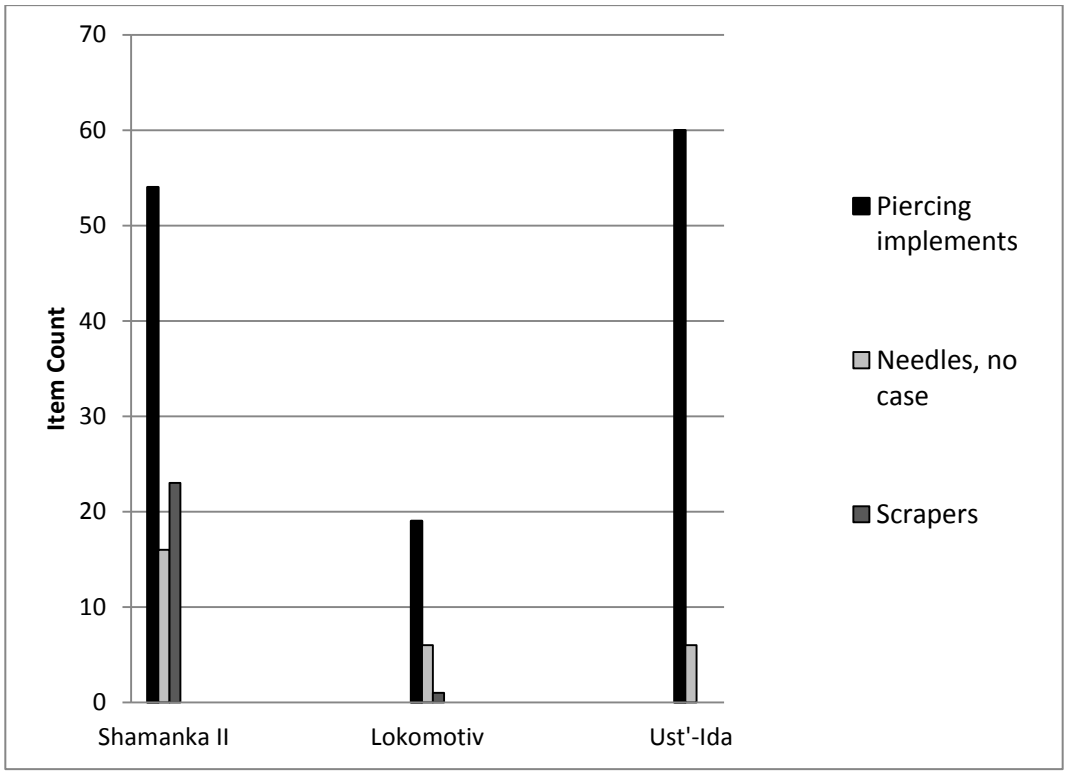

Figure 6.10 Non-avian bone, antler, and tooth hideworking and sewing implements in Shamanka II, Lokomotiv, and Ust'-Ida graves.

The data indicate a greater number of these types of materials among the Ust'-Ida Isakovo graves, with 42% of all graves containing faunally-derived processing and sewing implements. This is in stark contrast to percentages of similar objects in the graves of Shamanka II (14%) and Lokomotiv (14%). Additionally, at Shamanka II, subadults were not associated with needle cases or other sewing-related items. At Lokomotiv, only one subadult was interred with a needle case.

To further consider the potential of subadult labour contribution in prehistory, Fahlander and Oestigaard (2008:11) remark that the size of objects in the graves of subadults should be considered, as such items may not be appropriately scaled for their use, or a child may have not developed the dexterity required to manipulate certain kinds of items despite their presence in the grave. However, research in the field of developmental psychology has demonstrated that the acquisition and timing of certain motor skills is culturally determined (Werner 1972). Further, research suggests infants reared in non-Western, non-urbanized environments are more developmentally advanced, believed to be the result of increased exposure to and experience with a greater variety of objects, as well as significant cultural differences in parents' child-rearing practices (Vierhaus et al. 2011). With this in mind, it is impossible to presume the dexterity level of a subadult interred with utilitarian items despite an estimate of age at death, or to suggest the individual lacked or possessed the ability to manipulate such items.

Despite these concerns, Ust'-Ida provides an opportunity to examine materials interred with a group of subadults, presumed to have been raised within the same culture. To address whether age-related dexterity might be related to the inclusion of sewing and hideworking implements in Ust'-Ida subadult graves, I examined needle

length and age at death. Clear contextual association between complete, unbroken needles and a specific human interment was required for this assessment. Needles in 15 graves satisfied these criteria, thus only a few data points are available for discussion. These Ust'-Ida needles range in length from 44.9 mm to 87.4 mm, and both the smallest and the largest needles included in the sample were associated with individuals under the age of ten at death (Figure 6.11).

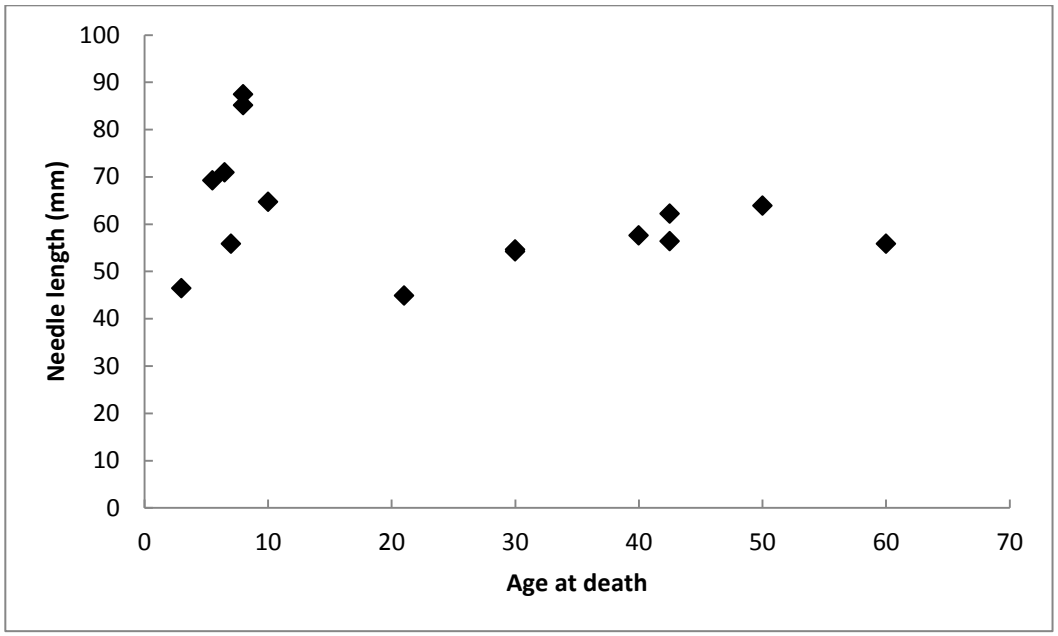

Figure 6.11 Association between needle length and biological at death among Isakovo burials (Ust'-Ida).

I acknowledge the likelihood that a range of needle sizes would be required to perform different tasks; however, the overall association of larger needles with subadults at Ust'-Ida and smaller needles with adults could suggest these individuals were interred with objects suitably sized for use by the deceased. In spite of this observation, the youngest individual in this sample was interred with the smallest needle, and the largest needle in the sample was interred with an older subadult.

6.5 Absence of Avian Skeletal Material in Glazkovo Mortuary Contexts

Both Shamanka II and Ust'-Ida cemeteries included Glazkovo graves, with 11 and 19 individuals, respectively. No avifaunal material was identified in Glazkovo graves at Shamanka II. One Glazkovo grave at Ust'-Ida, the double interment of two subadults, contained two bird bone needle cases.

An extremely small number of avifaunal remans from reported Glazkovo cemeteries generally conforms to the pattern seen in Glazkovo graves at Shamanka II and Ust'-Ida. In particular, bird bone needle cases are rare in Glazkovo graves. This pattern is surprising in light of the apparent continuity of avifaunal inclusion from the Kitoi to the Isakovo. Additionally, stable isotope data indicate a continuation of the terrestrial mammal subsistence focus from the Late Neolithic to the Early Bronze Age in Cis-Baikal, making less clear why needle cases are seldom encountered in Glazkovo contexts.

A small percentage of unmodified bird bones were reported in Glazkovo graves in Priol'khon'e cemeteries, including elements from some raptorial taxa (McKenzie 2010:98-99). Once again, the location of Priol'khon'e on the western shore of Lake Baikal situates these cemeteries in an environment that attracts a diverse number of avian taxa. Given the predominance of raptorial bird grave inclusions at Shamanka II during the Kitoi tradition, and their appearance, though diminished, in much later graves during the Glazkovo tradition in Priol'khon'e, it is suggested bird taxa retained their significance to prehistoric peoples inhabiting areas near Lake Baikal over hundreds of years. The low numbers of raptorial bird

specimens recovered from Kitoi graves at Lokomotiv, and the near-complete absence of bird specimens in Glazkovo graves at Ust'-Ida, may point to their lack of availabilty in the Angara River Valley in the Early Bronze Age in addition to the Neolithic.

Chapter 7
Conclusion

In this chapter, I highlight the main points of my research concerning the inclusion of avian skeletal material in human mortuary contexts in prehistoric Cis-Baikal. I then provide suggestions for future research.

7.1 Summary of Results

Examination of the avifaunal materials in the graves of Shamanka II, Lokomotiv, and Ust'-Ida suggested specific patterns of inclusion during the Kitoi, Isakovo, and Glazkovo mortuary traditions in the South Baikal and Angara River Valley microregions of Cis-Baikal. The greatest amount and variety of bird taxa were recovered from the graves of Shamanka II, likely due to its proximity to Lake Baikal, areas which in the present day are host to a large number of nesting bird species during the spring and summer. Smaller quantities of avian skeletal material and fewer avian taxa were identified in the assemblages of the Lokomotiv and Ust'-Ida. Both cemeteries are situated on the Angara River west of Lake Baikal in areas that provide less nesting habitat diversity.

The exact method of capture of birds in prehistoric Cis-Baikal is not known. The near-absence of juvenile specimens indicates young birds were not removed from their nests to be raised by humans. Further, a complete dearth of specimens representing the avian postcranial axial skeleton prevented any suggestion of capture methods that would maim, but not kill, a bird. However, it is known peoples inhabiting the region possessed fishing nets at least by the Neolithic period. It is possible this technology was applied to the procurement of a variety of birds, which would have permitted less skill and time to obtain, as well as presented less danger to humans. It is equally possible even simpler

methods of capture, such as snares, were employed. However, there exists no clear archaeological evidence for this practice.

The absence of butchery marks in the specimens recovered from these mortuary contexts, as well as scant data for bird consumption from habitation sites and stable isotope analyses, indicate avian taxa were not regularly taken as food by the prehistoric peoples of Cis-Baikal. However, the utility of the raw materials birds provide cannot be overlooked, and it appears likely they were captured for purposes not related directly to human consumption.

Avian skeletal material was variously included in the graves of Shamanka II, Lokomotiv, and Ust'-Ida. Among the Kitoi graves at Shamanka II and Lokomotiv, avian specimens were included more often in the graves of biological males, and were demonstrably absent from the graves of all but several subadults. The Isakovo graves at Ust'-Ida, however, present a different practice wherein these materials were placed most often with subadults. Subadult interments also were most numerous in the Ust'-Ida cemetery, which I posit is due in part to the increased significance of their labour in more intensive hide processing activities during the Late Neolithic.

It has been suggested that certain items, such as needle cases made from bird long bones, were included in graves for use in the next life, but it is not clear if the materials were used by the deceased prior to death. The question of use-wear was not addressed in explicit detail during analysis, but the data indicate their possible use before placement in the grave.

Examination of placement of avian skeletal material in the grave met with inconclusive results. The number of contiguous bird elements in some Shamanka II, Lokomotiv, and Ust'-Ida graves did not indicate individuals were interred with

articulated portions of the bird skeleton. Additionally, bird elements in direct association with burials did not correspond to homologous skeletal areas of humans. It appears disarticulated items were most often placed in bundles or caches with other faunal and non-faunal materials in various locations on or near the human skeleton.

The most compelling pattern relating to the location of bird materials in the grave concerns needle cases fashioned from bird long bones. At each of the three cemeteries, needle cases were encountered most often at the legs of biological females and most often in the waist area of biological males. I suggest the location of these needle cases points to a pattern of gender identification based on where and how such items were carried on the body. Further, decorated needle cases most frequently were found in association with biological females, suggesting another gendered practice, and possibly one of self-expression. Though the data set was extremely small, avian taxa-derived fishing equipment was associated exclusively with biological males.

7.2 Future Research

This study yielded intriguing evidence of a number of social phenomena revealed through examination of avian skeletal material included the graves of Shamanka II, Lokomotiv, and Ust'-Ida. The assessment of the entire suite of mortuary goods in these graves would be particularly illuminating, and could support the arguments presented in this thesis on a more specific level. Additionally, the examination of avian skeletal materials from a greater number of Early and Late Neolithic cemeteries would aid in identifying cultural practices in their use across Cis-Baikal.

While Kitoi, Isakovo, and Glazkovo individuals were interred with a suite of materials, it remains unclear if items included in these graves were used before deposition. A greater effort to link an individual with the items recovered from the grave is needed. In

Chapter 6, I suggest microwear studies of needles could be used to investigate the matter. Additionally, Lieverse (2005) addressed the presence of osteoarthritis in key skeletal locations for individuals from Shamanka II, Lokomotiv, and Ust'-Ida, including the shoulder, elbow, wrist, and hand. While beyond the scope of this thesis, comparison of these data with the incidence of specific types of objects included in these individuals' graves could contribute an additional line of evidence for their use by the person with whom they were interred.

Patterning on the basis of sex/gender and familial relationships in mortuary avian skeletal material inclusion would be well addressed through additional ancient DNA analyses. Though many individuals interred in the Shamanka II, Lokomotiv, and Ust'-Ida cemeteries have yielded biological sex and mitochondrial DNA haplogroup data, many more determinations remain. Further, investigation of Y-chromosome haplogroups among males could reveal the existence of familial organization and patterning where mitochondrial DNA did not.

Lastly, these interpretations could be improved vastly by the excavation of additional prehistoric Cis-Baikal habitation sites. Comparing greater amounts of data from these contexts to those obtained from cemeteries might reveal new insights into the nature of bird use during the Cis-Baikal Neolithic and Early Bronze Age.

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Appendix A: Shamanka II Human Osteological Data and Avifaunal Materials

Human Osteological Data

Grave	Tradition	Age	Sex	mtDNA
Sha 02-1	Glazkovo	18-20	M	
Sha 03-1	Glazkovo	25-35	M	
Sha 04-1	Kitoi	35-45	M	
Sha 05-1	Glazkovo	19-22	M	
Sha 06-1	Kitoi	16-18	PM	
Sha 07-1	Kitoi	20-25	PF	D
Sha 08-1	Kitoi	35-40	M	
Sha 08-2	Kitoi	20+	U	
Sha 09-1	Glazkovo	17-18	PM	
Sha 100-1	Kitoi	U	U	
Sha 10-1	Kitoi	25-30	M	
Sha 101-1	Kitoi	U	U	
Sha 103-1	Glazkovo	12-16	U	
Sha 103-2	Glazkovo	05-06	U	
Sha 104-1	Kitoi	30-39	F	
Sha 105-1	Glazkovo	infant	U	
Sha 106-1	Glazkovo	35-55	F	
Sha 107-1	Glazkovo	25-35	M	
Sha 108-1	Kitoi	35-45	M	
Sha 108-2	Kitoi	25-30	M	
Sha 109-1	Glazkovo	40-55	F	
Sha 1-1	Kitoi	U	U	
Sha 110-1	Glazkovo	U	U	
Sha 11-1	Kitoi	18-20	F	C
Sha 111-1	Glazkovo	18-20	M	
Sha 11-2	Kitoi	30-40	M	D
Sha 112-1	Kitoi	25-35	M	
Sha 12-1	Kitoi	20-35	U	U5a
Sha 13-1	Kitoi	25-35	PF	
Sha 13-2	Kitoi	35-50	M	
Sha 13-3	Kitoi	18-19	PF	D
Sha 14-1	Kitoi	25-30	M	D
Sha 14-2	Kitoi	20-25	F	F
Sha 15-1	Kitoi	25-35	M	A
Sha 16-1	Kitoi	20-25	U	U5a
Sha 17-1	Kitoi	30-40	M	
Sha 17-2	Kitoi	20-22	M	

Sha 18-1	Kitoi	20-25	M	C
Sha 19-1	Kitoi	25-30	M	D
Sha 20-1	Kitoi	30-60	M	
Sha 20-2	Kitoi	20-35	F	
Sha 20-3	Kitoi	20-35	PF	
Sha 20-4	Kitoi	20+	U	
Sha 20-5	Kitoi	20+	U	
Sha 21-1	Kitoi	25-30	M	G2a
Sha 21-2	Kitoi	25-30	M	F
Sha 21-3	Kitoi	16-18	U	F
Sha 22-1	Kitoi	19-22	M	F
Sha 23-1	Kitoi	35-45	PM	F
Sha 23-2	Kitoi	20+	PF	
Sha 23-3	Kitoi	20+	U	F
Sha 23-4	Kitoi	20+	U	U5a
Sha 23-5	Kitoi	20+	U	D
Sha 24-1	Kitoi	25-35	M	D
Sha 24-2	Kitoi	12-16	U	
Sha 25-1	Kitoi	20-22	F	
Sha 25-2	Kitoi	16-22	U	
Sha 25-3	Kitoi	20+	PF	
Sha 25-4	Kitoi	06-12	U	
Sha 25-5	Kitoi	20+	U	
Sha 26-1	Kitoi	20+	PF	
Sha 26-2	Kitoi	20+	PM	
Sha 26-3	Kitoi	06-08	U	
Sha 26-4	Kitoi	*C. familiaris*	U	
Sha 26-5	Kitoi	14-18	U	
Sha 26-6	Kitoi	07-09	U	
Sha 27-1	Kitoi	35-50	M	
Sha 27-2	Kitoi	25-30	M	
Sha 27-3	Kitoi	02-03	U	
Sha 27-4	Kitoi	2 weeks-1.0 mo	U	
Sha 28-1	Kitoi	02-04	U	
Sha 29-1	Kitoi	20-30	M	
Sha 29-2	Kitoi	02-04	U	
Sha 30-1	Kitoi	35-50	M	
Sha 31-1	Kitoi	04-06	U	
Sha 32-1	Kitoi	35-45	M	
Sha 33-1	Kitoi	35-45	M	
Sha 34-1	Kitoi	35-45	M	

Sha 35-1	Kitoi	25-35	M	
Sha 35-2	Kitoi	20+	U	
Sha 36-1	Kitoi	25-35	PM	
Sha 37-1	Kitoi	05-07	U	
Sha 38-1	Kitoi	02-04	U	
Sha 39-1	Kitoi	40-44	M	
Sha 40-1	Kitoi	.5-01.5	U	
Sha 41-1	Kitoi	30-39	M	
Sha 42-1	Kitoi	40-45	F	
Sha 42-2	Kitoi	50+	F	
Sha 43-1	Kitoi	35+	PF	
Sha 44-1	Kitoi	50+	PM	
Sha 44-2	Kitoi	20+	U	
Sha 45-1	Kitoi	30-39	M	
Sha 46-1	Kitoi	25-29	M	
Sha 47-1	Kitoi	20-25	F	
Sha 48-1	Kitoi	50+	M	
Sha 48-2	Kitoi	1.5-2.5	U	
Sha 48-3	Kitoi	05 +/- 16 mo	U	
Sha 48-4	Kitoi	20-35	U	
Sha 48-5	Kitoi	20+	U	
Sha 49-1	Kitoi	17-20	PM	
Sha 49-2	Kitoi	20+	U	
Sha 50-1	Kitoi	20-30	M	
Sha 50-2	Kitoi	25-29	M	
Sha 50-3	Kitoi	35-45	M	
Sha 51-1	Kitoi	20-25	M	
Sha 52-1	Kitoi	20-25	PM	
Sha 52-2	Kitoi	25-29	M	
Sha 53-1	Kitoi	20-25	M	
Sha 53-2	Kitoi	50+	M	
Sha 54-1	Kitoi	17-21	F	
Sha 55-1	Kitoi	35-39	M	
Sha 55-2	Kitoi	06.5 +/- 30 mo	U	
Sha 56-1	Kitoi	04 +/- 12 mo	U	
Sha 56-2	Kitoi	09.5 +/- 30 mo	U	
Sha 57-1	Kitoi	25-29	F	
Sha 57-2	Kitoi	50+	F	
Sha 58-1	Kitoi	35-45	M	
Sha 59-1	Kitoi	35-39	M	
Sha 59-2	Kitoi	15-18	PF	

Sha 60-1	Kitoi	50+	M	
Sha 60-2	Kitoi	40-45	F	
Sha 61-1	Kitoi	25-29	F	
Sha 61-2	Kitoi	35-45	M	
Sha 61-3	Kitoi	6 mo +/- 3 mo	U	
Sha 62-1	Kitoi	35-45	PF	
Sha 62-2	Kitoi	35-45	M	
Sha 62-3	Kitoi	20+	PF	
Sha 62-4	Kitoi	20+	PM	
Sha 62-5	Kitoi	45-60	M	
Sha 63-1	Kitoi	25-29	M	
Sha 63-2	Kitoi	25-35	M	
Sha 64-1	Kitoi	30-39	M	
Sha 64-2	Kitoi	09 +/- 24 mo	U	
Sha 65-1	Kitoi	50+	M	
Sha 66-1	Kitoi	30-35	F	
Sha 66-2	Kitoi	21 mo +/- 6 mo	U	
Sha 67-1	Kitoi	08 +/- 24 mo	U	
Sha 68-1	Kitoi	45-50	M	
Sha 69-1	Kitoi	25-30	F	
Sha 69-2	Kitoi	20-25	F	
Sha 69-3	Kitoi	16 mo +/- 6 mo	U	
Sha 70-1	Kitoi	35-45	M	
Sha 71-1	Kitoi	35-45	M	
Sha 72-1	Kitoi	3 +/- 12 mo	U	
Sha 73-1	Kitoi	16-18	F	
Sha 74-1	Kitoi	20-22	M	
Sha 75-1	Kitoi	25-29	M	
Sha 76-1	Kitoi	40-50	M	
Sha 77-1	Kitoi	30-39	F	
Sha 78-?	Kitoi	25-29	F	
Sha 78-?2	Kitoi	20-24	M	
Sha 78-1	Kitoi	16-18	F	
Sha 78-2	Kitoi	25-35	F	
Sha 78-3	Kitoi	20-25	M	
Sha 78-4	Kitoi	35-50	F	
Sha 79-1	Kitoi	20+	U	
Sha 80-1	Kitoi	16 mo +/- 6 mo	U	
Sha 81-1	Kitoi	6 mo +/- 3 mo	U	
Sha 82-1	Kitoi	22 mo +/- 6 mo	U	
Sha 83-1	Kitoi	20-24	M	

Sha 83-2	Kitoi	20-30	PF	
Sha 84-1	Glazkovo	other		
Sha 85-1	Kitoi	28-33	M	
Sha 86-1	Kitoi	adult	F	
Sha 86-2	Kitoi	adult	U	
Sha 86-3	Kitoi	adult	U	
Sha 87-1	Kitoi	infant	U	
Sha 88-1	Kitoi	05-10	U	
Sha 89-1	Kitoi	infant	U	
Sha 90-1	Kitoi	20-24	M	
Sha 91-1	Kitoi	05 or under	U	
Sha 92-1	Kitoi	14-17	U	
Sha 93-1	Kitoi	05-10	U	
Sha 93-2	Kitoi	35-40	F	
Sha 94-1	Kitoi	05-10	U	
Sha 95-1	Kitoi	under 5	U	
Sha 96-1	Kitoi	30-35	F	
Sha 97-1	Kitoi	U	U	
Sha 98-1	Kitoi	adult	U	
Sha 99-1	Kitoi	subadult	U	

Shamanka II Avifauna Data

Note: where association between a specific burial within a grave and avian materials were documented, the Grave No. appears as 00-0, the second digit referring to the burial number. Where no relationship between a human burial in a grave and avian materials was determined, only the grave number is listed.

Grave No.	Artefact No.	Taxon	Element	Count	Side	Portion	Modification
Sha 07-01	N14	Eagle	Talon	1		Whole	Unmodified
	26 (pencil)	Eagle or large hawk	Talon	1		Very tip broken off	Unmodified
	34 pencil	Eagle or large hawk	Talon	1		Whole	Unmodified
	N10	Eagle or large hawk	Talon	1		Whole	Unmodified
	none	Eagle or large hawk	Talon	1		Whole	Unmodified
	none	Eagle or large hawk	Talon	1		Very tip broken off	Unmodified
	2H? (pencil)	Eagle or large hawk	Talon	1		Very tip broken off	Unmodified
	31 (pencil)	Eagle or large hawk	Talon	1		Whole	Unmodified
	N8	Eagle or large hawk	Talon	1		Whole	Unmodified
	34 (pencil)	Raptor (hawk-sized)	Talon	1		Whole	Unmodified
	20 (pencil)	Raptor (hawk-sized)	Talon	1		Very tip broken off	Unmodified
	30 (pencil)	Raptor (hawk-sized)	Talon	1		Whole	Unmodified
	33 (pencil)	Raptor (hawk-sized)	Talon	1		Whole	Unmodified

	10	Raptor (hawk-sized)	Talon	1		Whole	Unmodified
	8	Raptor (hawk-sized)	Talon	1		Whole	Unmodified
	31 (pencil)	Raptor (hawk-sized)	Talon	1		Whole	Unmodified
	25 (pencil)	Raptor (hawk-sized)	Talon	1		Very tip broken off	Unmodified
	14	*Aquila/Haliaeetus* sp.	Talon	1		Whole	Unmodified
Sha 08-01	75, 76	Large aves	Long bone	1		Diaphysis, without epiphyses, lateral 1/2	Half tube, both edges were sawed and then lightly ground, epiphysis cut off but are ragged
	1	Large aves	Ulna	1	L?	Whole	Tube/case, all faces ground and polished, end cut off and ground polished
	47	*Gavia stellata*	angular portion of dentary	1	R	Posterior portion	Unmodified
	14	*Phalacrocorax* sp.	Premaxilla	1		Anterior portion	Unmodified
	12	*Phalacrocorax* sp.	Angular, dentary	4	L, R	Posterior 1/2 of lower beak	Unmodified, both in two pieces
	12	*Phalacrocorax* sp.	Premaxilla	1		Posterior portion	Appears to have been cut from cranium
	39	cf. *Cygnus* sp.	1st phalanx of digit 2	1	L	Whole	Unmodified
	44	cf. *Cygnus* sp.	2nd digit	1	L	Whole	Unmodified
	48	cf. *Cygnus* sp.	2nd phalanx of digit 2	1	L	Whole	Unmodified
	52	cf. *Aquila/Haliaeetus* sp.	Humerus	1	R	Diaphysis fragment	Diaphysis fragment with both ends coarsely broken off, part of diaphysis also missing; ochre stained
	5	cf. *Aquila/Haliaeetus* sp.	Ulna	1	L	Diaphysis	Diaphysis half-tube, both lateral margins carefully sawed and snapped, both ends irregular.
	32? Or 92?	*Coccothraustes coccothraustes*	Dentary	1	L,R	Whole	Unmodified
Sha	227,	*Gavia stellata*	Maxilla and	3	L, R	Whole	Whole beak of bird, cut from rest of cranium

11-1	228, 229		dentary				
	269	Large aves	Long bone	1		Diaphysis	Needle case, both ends sawed of and polished, entire body highly polished, interior near ends also polished, some linear striations on one face
	271	Large aves	Long bone	1		Diaphysis fragment	Fragment of long bone, exterior face is ground, possible needle case fragment
	284	Large aves	Ulna	1	L	Whole	Needle case, both ends sawed of and polished, entire body highly polished, interior near ends also polished
Sha 12-01	1	Large aves	Humerus diaphysis	1	L	Anterior half, with both epiphysis missing	Appears to have been cut open, but heavily weathered, ends definitely removed
	2	Large aves	Long bone diaphysis fragment	1		Partial diaphysis	One end possibly removed, surfaces ground but heavily root etched
	13	Anatidae (mallard-sized)	Humerus	1	L	Nearly whole	Only portion of distal end missing
Sha 15-01	103	Large aves	Long bone diaphysis fragment	1		Fragment	Exterior face ground and polished
	104	Large aves	Long bone diaphysis fragment	1		Fragment	Fragment with grinding on one face
	186	Large aves	Long bone diaphysis fragment	1		Fragment	Fragment of diaphysis, both ends coarsely broken; no obvious modifications
	200	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Exterior face ground and polished
	119	cf. *Cygnus* sp.	Ulna	1	R	Diaphysis	Diaphysis of ulna with both ends coarsely broken off
	30	*Cygnus* sp.	Humerus	1	L	Diaphysis	Diaphysis of humerus with both ends coarsely broken off
	197	Accipitridae (medium)	Talon	1		Whole	Articular face ground to make it less concave
	6	*Aquila/Haliaeetus* sp.	Humerus	1	L	Diaphysis	Diaphysis of humerus with both ends coarsely broken off
	176	*Aquila/Haliaeetus* sp.	Humerus	1	L	Diaphysis	Diaphysis of humerus with both ends coarsely broken off

	157	*Aquila/Haliaeetus* sp.	Humerus	1	R	Diaphysis	Diaphysis of humerus with both ends coarsely broken off
	34	cf. *Aquila/Haliaeetus* sp.	Femur	1	L	Diaphysis	Both ends coarsely broken off
	125	*Aquila/Haliaeetus* sp.	Tibiotarsus	1	R	Distal 2/3rds	Broken irregularly at midshaft; distal epiphysis has two possible coarse cutmarks at edges both lateral edges
Sha 16	61	Anatidae (teal-sized)	Coracoid	1	R	Small portion of proximal end broken off	Unmodified
	128	Anatidae (teal-sized)	Humerus	1	L	Proximal 2/3rds	Unmodified
Sha 17	29	Large aves (eagle- or swan-sized)	Radius	1	R	Diaphysis	Both ends coarsely broken off
Sha 17	32	Large aves	Long bone diaphysis fragment	1		Fragment	Unmodified
	18	cf. *Cygnus* sp.	Ulna	1	L?	Diaphysis fragment	Both ends coarsely broken off
	104	Accipitridae	Talon	1		Articular portion broken off	Unmodified
	15	Accipitridae (hawk-sized)	Talon	1		Very tip broken off	Unmodified
	119	Accipitridae (hawk-sized)	Talon	1		Very tip missing	Articular face ground flat
	129	Accipitridae (hawk-sized)	Talon	1		Whole	Articular face ground flat
	134	Accipitridae (hawk-sized)	Talon	1		Whole	Unmodified
	150	Accipitridae (hawk-sized)	Talon	1		Whole	Unmodified
Sha 18-01	56, 57	*Gavia stellata*	Dentary, premaxilla	2	L, R	Whole	Cut from rest of cranium at exactly the same length
	88	Large aves	Ulna	1		Diaphysis fragment	Both ends coarsely broken off
Sha	22	Large aves	Long bone	1		Fragment	Bird bone tube, one end appears to have cut off and ground, body probably ground

20-01			diaphysis fragment				
	56	Large aves	Long bone diaphysis fragment	1		Base and partial body fragment	One end squared off and ground, body ground and polished. One face has an incised X on it, one lateral edge has series of parallel incised lines and an incised X.
	57	Large aves	Long bone diaphysis fragment	1		Body fragment	Exterior face ground an polished, one section has series of parallel incised lines.
Sha 21-1	39	*Mergus* sp.	Carpometacarpus	1	L	Whole	Unmodified
Sha 21-2	40	cf. *Mergus* sp.	Carpometacarpus	1	R	Proximal end eroded	Unmodified
Sha 21-3	46	*Accipiter nisus*	Carpometacarpus	1	L	Whole	Unmodified
Sha 22-1	42	Accipitridae (small eagle- or large hawk-sized)	Talon	1		Small portion of tip missing	Unmodified
	43	Accipitridae (small eagle- or large hawk-sized)	Talon	1		Small portion of tip missing	Unmodified
Sha 23	59?	Large aves	Long bone diaphysis fragment	1		Fragment	Sawed and snapped along one lateral margin
	Layer II, tag says no number for artifacts	Undifferentiated aves	Mandibular body fragment	2		Fragment	Unmodified
Sha 23-1	52	Gavia sp.	Dentary	1	L, R	Midbody sections	Unmodified
	no number	cf. *Gavia* sp.	Premaxilla fragment	1		Fragment	Unmodified, probably part of other Gavia from this grave
	60, 61	*Gavia stellata*	Premaxilla, dentary	2		Beak of bird	Cut from the head of the bird
	62, 67	*Botarus stellaris*	Premaxilla, dentary	1		Beak of bird	Cut from the head of the bird
	19	*Cygnus* sp.	Carpometacarpus	1	R	Missing	Unmodified

						minor metacarpal portion	
	11	Accipitridae (small eagle- or large hawk-sized)	Talon	1		Very tip missing	Unmodified
	57	*Anthropoides virgo*	Premaxilla fragments	1		Fragments	Unmodified
	no number	*Anthropoides virgo*	Premaxilla fragment	1		Fragment	Unmodified, possibly part of #57
	no number	cf. *Grus grus*	Dentary	1	R	Body fragment	Unmodified
Sha 25	13	Large aves (swan-sized)	Ulna	1	L	Long bone diaphysis	Needle case, decorated. Both ends squared off and ground smooth, body ground very smooth. Five groups of dot and circle designs, one group at each end, one at center, the other two between center and end. One lateral edge marked by 6 sets of three short parallel lines. One end also has zigzag incised line. All decoration confined to one face of tube.
	14	Large aves (swan-sized)	Ulna	1	R	Long bone diaphysis	Needle case, decorated. Both ends squared off and ground smooth, body ground very smooth. Five groups of dot and circle designs, one group at each end, one at center, the other two between center and end. One lateral edge marked by 6 sets of three short parallel lines. One end also has zigzag incised line. All decoration confined to one face of tube.
Sha 26	48	*Mergus* cf. *serrator*	Premaxilla, maxilla fragments	3		Fragment	Appears to have been cut from rest of head of the bird
	52	Undifferentiated aves	Dentary	1		In two fragments	Possibly cut from rest of cranium
Sha 26-1	47	Large aves	Long bone diaphysis fragment	1		Fragment	Unmodified
Sha 26-2		Undifferentiated aves	Dentary	1			
Sha 26-3	70	*Anser cygnoides*	Maxilla, premaxilla, dentary (beak)	1		Beak of bird	Unmodified
Sha 28-1	5	*Mergus* cf. *mergus*	Premaxilla	1		Anterior portion	Unmodified
Sha 30-1	9	cf. *Grus* sp.	Tarsometatarsus	1	L	Nearly whole, in	Distal epiphysis cut and irregularly worn or ground away; anterior portion of proximal epiphysis broken away. Three holes drilled side by side down the face of the diaphysis

						two pieces	about 8.8 cm from proximal end. One lateral margin marked by a irregularly spaced incised lines along most of length, opposite lateral margin marked by only three such lines.
Sha 34-1	8	*Melanitta* sp.	Humerus	1	L	Whole	Both ends appear gnawed by small carnivore
Sha 35	293	Large Accipitridae (hawk- or eagle-sized)	Talon	1		Lacks very tip	Unmodified
Sha 39-1	no number	Accipitridae	1st and 2nd phalanges	101		Whole	
	no number	Accipitridae	Talons	54		Whole	Unmodified
	no number	Accipitridae	Unidentified pedal elements	24		Whole	Unmodified
	no number	cf. *Milvus migrans*	Tarsometatarsus	1	L	Whole	Unmodified
	no number	cf. *Milvus migrans*	Tarsometatarsus	1	R	Whole	Unmodified
	no number	*Accipiter* sp.	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Accipiter* sp.	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Accipiter* sp.	Tarsometatarsus	1	L	Proximal end eroded	Unmodified
	no number	*Accipiter* sp.	Tarsometatarsus	1	L	Proximal end eroded	Unmodified
	no number	*Accipiter* sp.	Tarsometatarsus	1	R	Proximal end eroded	Unmodified
	no number	*Accipiter* sp.	Tarsometatarsus	1	R	Whole	Unmodified
	no number	*Accipiter* cf. *gentilis*	Tarsometatarsus	1	R	Whole	Unmodified
	no number	*Accipiter* cf. *gentilis*	Tarsometatarsus	1	R	Whole	Unmodified
	no number	*Accipiter* cf. *gentilis*	Tarsometatarsus	1	R	Proximal end eroded	Unmodified
	no number	*Accipiter* cf. *gentilis*	Tarsometatarsus	1	R	Proximal end eroded	Unmodified
	no	*Accipiter* cf.	Tarsometatarsus	1	L	Proximal	Unmodified

	number	*gentilis*				end eroded	
	no number	*Buteo* sp.	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Buteo* sp.	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Buteo* sp.	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Buteo* sp.	Tarsometatarsus	1	R	Whole	Unmodified
	no number	*Buteo lagopus*	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Buteo* cf. *lagpopus*	Tibiotarsus	1	R	Distal end only	Unmodified
	no number	*Buteo lagopus*	Tarsometatarsus	1	R	Whole	Unmodified
	no number	*Buteo hemilasius*	Tarsometatarsus	1	L	Whole	Unmodified
	no number	*Buteo hemilasius*	Tarsometatarsus	1	R	Whole	Unmodified
Sha 42-1	22	cf. *Cygnus* sp.	Radius	1	L	Diaphysis	Both ends coarsely broken off
Sha 42-2	14	cf. *Cygnus* sp.	Ulna	1	L	Diaphysis	Both ends coarsely broken off
	15	cf. *Cygnus* sp.	Ulna	1	L	Diaphysis	Both ends coarsely broken off
	30	cf. *Cygnus* sp.	Ulna	1	R	Diaphysis	Both ends coarsely broken off
	24	cf. *Cygnus* sp.	Tibiotarsus	1	R	Diaphysis	Both ends coarsely broken off
Sha 46-1	19	Large aves	Long bone diaphysis fragment	1		Fragment	Unmodified
Sha 49-1	605	Large aves	Long bone diaphysis fragment	1		Base and partial body fragment	One end sawed and snapped, one lateral margin sawed and snapped, some wear on break faces near base.
Sha 49-2	374	Large aves	Long bone diaphysis fragment	1		Fragment	Unmodified

Sha 51-1	242	Large aves	Humerus?	1		Diaphysis fragment	Unmodified
	624	Undifferentiated aves	Premaxilla	1		Fragment	Unmodified
	242	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Unmodified
	242	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Unmodified
	242	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Unmodified
	310	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	One lateral edge sawed and snapped
	318	Undifferentiated aves	Long bone diaphysis fragment	1		Lacks tip	Probably piercing implement; 1/2 of body is ground to produce thin cross section, tapers toward tip; base unmodified
	338	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis	Unmodified
	341	Undifferentiated aves	Long bone diaphysis fragment	1		Body fragment	One lateral edge sawed and snapped
	350	Undifferentiated aves	Long bone diaphysis fragment	1		Base fragment	Base sawed and snapped, probably ground. One lateral edge sawed and ground.
	352	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Unmodified
	353	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Unmodified
	354	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Piercing implement. Irregular in outline, one end ground to a sharp point, base has incised lines, probably to produce the splinter.
	374	Undifferentiated aves	Long bone diaphysis	1		Body fragment	One lateral edge sawed and snapped

			fragment				
	849 (649?)	Undifferentiated aves	Long bone diaphysis fragment	1		Diaphysis fragment	Unmodified
	241	Large aves	Radius	1		Diaphysis	Bone end broken of more or less squarely, other end irregular jagged break
	no number	cf. *Cygnus* sp.	Carpometacarpus	1	L	Lacks minor metacarpal, most of proximal end	Unmodified, but has several odd erosional holes in it.
Sha 52-1	no number	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Unmodified
Sha 52-2	79	Accipitridae (hawk- or small eagle-sized)	Talon	1		Lacks tip	Unmodified
Sha 53-1	45	Undifferentiated aves	Ulna	1	L	Whole	Both ends coarsely broken off
Sha 53-2	51	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Unmodified
	75	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Unmodified
	224	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Unmodified
	107?	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Fragment, ground on one face, two parallel incised lines run lengthwise down fragment.
	48	Medium to large aves	Long bone diaphysis fragment	1		Diaphysis	Both ends coarsely broken off
	67	Medium to large aves	Long bone diaphysis fragment	1		Diaphysis	Both ends coarsely broken off
	201	Medium to large aves	Long bone diaphysis	1		Diaphysis	Both ends coarsely broken off

			fragment				
	31	Medium to large aves	Radius?	1		Diaphysis	Both ends coarsely broken off
	71	Medium to large aves	Ulna	1		Diaphysis	Both ends coarsely broken off
	8	Large aves	Long bone diaphysis fragment	1		Diaphysis	Both ends coarsely broken off
	66	Large aves	Long bone diaphysis fragment	1		Diaphysis fragment	Splinter of diaphysis, appears unmodified
	148	Large aves	Long bone diaphysis fragment	1		Diaphysis fragment	Splinter of diaphysis, appears unmodified
	162	Large aves	Long bone diaphysis fragment	1		Fragment	One lateral edge ground
	166	Large aves	Long bone diaphysis fragment	1		Diaphysis	Both ends coarsely broken off, heavily ochre stained
	10	*Gavia stellata*	Premaxilla	1		Nearly whole	cut from rest of cranium
	3	*Gavia* cf. *stellata*	Dentary	1	R	Body fragment	Appears to have been cut from rest of cranium
	2	cf. *Cygnus* sp.	Ulna	1	R	Diaphysis	Proximal end coarsely broken off, distal end cut and snapped off, ground.
	119, 47	cf. *Cygnus* sp.	Ulna	1	R	Diaphysis, in two fragments that refit	Both ends coarsely broken off, several spots of abrasions/grinding on one lateral edge.
	149, 163	cf. *Cygnus* sp.	Ulna	1	R	Diaphysis, in two fragments that refit	Both ends coarsely broken off, rectangular section about 7mm wide cut from entire length.
	72	Accipitridae (hawk- or small eagle-sized)	Talon	1		Whole	Unmodified
	108	Accipitridae (hawk- or small	Talon	1		Whole	Unmodified

		eagle-sized)					
	133	*Aquila/Haliaeetus* sp.	Humerus	1	L	Diaphysis	Both ends coarsely broken off
	135	*Aquila/Haliaeetus* sp.	Humerus	1	R	Diaphysis	Both ends coarsely broken off
	138	*Aquila/Haliaeetus* sp.	Femur	1	R	Diaphysis	Both ends coarsely broken off, stone fish hook shank stuck protruding out of one end.
	136	*Aquila/Haliaeetus* sp.	Tibiotarsus	1	L	Diaphysis	Proximal end coarsely broken off, distal end cut and snapped off.
	152	*Aquila/Haliaeetus* sp.	Tibiotarsus	1	R	Proximal end missing	Proximal end coarsely broken off, possible cutmarks on the anterior face of one of the condyles
	115, 202	cf. *Aquila/Haliaeetus* sp.	Radius	1	R	Diaphysis, in two fragments that refit	Both ends coarsely broken off, body ground, heavily ochre stained
	134	cf. *Aquila/Haliaeetus* sp.	Femur	1	R	Diaphysis	Both ends coarsely broken off.
	137	cf. *Aquila/Haliaeetus* sp.	Femur	1	R	Diaphysis, in two fragments that refit	Both ends coarsely broken off
Sha 57-1	1	Aves, large	Ulna?	1	L	Whole	Decorated bird bone case. Embellished with sets of parallel incised lines that vary by which side one is viewing.
	2	Aves, large	Ulna?	1	R	Nearly whole	Decorated bird bone case. Embellished with sets of parallel incised lines that vary by which side one is viewing.
Sha 58-1	12	Aves (Accipitridae?)	Talon	1		Whole	Fish hook barb. Proximal end ground off and completely flat.
	13	Aves (Accipitridae?)	Talon	1		Lacks base	Fish hook barb. Base missing and body partially eroded. May have been notched
Sha 59-1	57	Medium to large aves	Long bone diaphysis fragment	1		Diaphysis fragment	Sawed and snapped along both lateral margins
	80	*Cygnus* sp.	Carpometacarpus	1	R	Whole except for a small portion of proximal end.	May have been cut to remove part of proximal end.

	81	*Cygnus* sp.	Digit 1 of phalanx 1	1	R	Whole	Unmodified
	46	cf. *Aquila/Haliaeetus* sp.	Ulna	1	R	Diaphysis	One end coarsely broken off, the other cut and snapped off, ground.
	206	*Aquila/Haliaeetus* sp.	Ulna	1	L	Diaphysis	Both ends coarsely broken off, body ground, ochre stained
	63	*Aquila/Haliaeetus* sp.	Tibiotarsus	1	L	Distal 3/4ths	Proximal end coarsely broken off.
	45	*Grus* sp.	Carpometacarpus	1	L	Proximal end broken off	Proximal end coarsely broken off, body may be polished.
	75	*Grus* sp.	Tarsometatarsus	1	L	Distal end broken off	Body is lightly ground, Both lateral margins embellished by irregularly spaced incised lines running perpendicular to long axis. Proximal end partially fragmented away but posterior face was ground leaving a hole through the element. A hole drilled through diaphysis (anterior-posterior) about 9cm from proximal end.
	86, 79, 76	*Grus* sp.	Tarsometatarsus	1	R	Small portion of both ends broken off	Mirror image of #75 in this grave but made from a larger element. Body lightly ground, both lateral margins embellished with incised lines. Hole through the proximal end about 1 cm from end. Drilled hole through diaphysis about 10 cm from proximal end. To cutmarks on central trochlea at distal end. The intercondylar process at the proximal end is ground flat.
	27	*Grus grus*	Tarsometatarsus	1	L	Distal epiphysis only	Unmodified
Sha 59-2	67, 68	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Unmodified.
	207	Large aves	Long bone diaphysis fragment	1		Body fragment?	Both ends coarsely broken off.
	240, 241	Medium aves	Long bone diaphysis fragment	1		Whole	Needle case, embellished. Both ends squared off, ground. Body polished. One face has five sets of 4 or 5 parallel incised lines. Zigzag design on this same face at both ends. One lateral edge has parallel incised lines about 2 mm apart and angled between each of the five sets of adjacent parallel lines. Broken open near midshaft on the undecorated face. Mirror image of #242, 243
	242, 243	Medium aves	Long bone diaphysis fragment	1		Whole	Needle case, embellished. Both ends squared off, ground. Body polished. One face has five sets of 4 or 5 parallel incised lines. Zigzag design on this same face at both ends. One lateral edge has parallel incised lines about 2 mm apart and angled between each of the five sets of adjacent parallel lines. Broken open near midshaft on the undecorated face.

							Mirror image of #240, 241
	332, 325	Medium aves	Long bone diaphysis fragment	1		Nearly whole	Both ends were squared off, body ground. Body decorated with geometric designs. Two faces have sets of converging incised lines (triangles without bases) in pairs at both lateral margins.
Sha 62-1	30	*Mergus merganser*	Premaxilla	1		Anterior portion	Unmodified
	56	*Mergus merganser*	Premaxilla	1		Posertior portion	Unmodified, refits with #30 from this grave
Sha 63-1	10	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	11	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	12	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	13	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	14	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	15	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	16	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	17	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	18	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
	19	Small Accipitridae	Talon	1		Lacks very tip	Unmodified
Sha 64-1	17	*Cygnus* sp.	Distal phalanx	1	L?	Proximal 3/4	Unmodified
	65	*Cygnus* sp.	Phalanx 3	1	L?	Whole	Unmodified
	188	*Cygnus* sp.	Scapholunar	1	L?	Whole	Unmodified
	42	Accipitridae	Phalanx 1	1	?	Whole	Unmodified
	47	Accipitridae (hawk- or small eagle-sized)	Talon	1		Lacks tip	Unmodified

	157	Accipitridae (hawk- or small eagle-sized)	Talon	1		Whole	Unmodified
	184	Accipitridae (hawk- or small eagle-sized)	Talon	1		Whole	Unmodified
	163	*Aquila/Haliaeetus* sp.	Talon	1		Whole	Unmodified
	186	*Grus* sp.	Carpometacarpus	1	L	Whole	One cutmark at the tip of the extensor process
	53	*Grus* sp.	Tarsometatarsus	1	R	Distal 1/3rd	Sides of diaphysis embellished with parallel incised lines 5-6 mm apart.
Sha 68-1	8	*Cygnus* sp.	Phalanx 1	1	R	Whole	Unmodified
	5	*Grus* cf. *grus*	Tarsometatarsus	1	R	Proximal 1/3	Proximal end appears to have been cut off, ground, body polished, remnant of at least one hole drilled through element at the distal broken end
Sha 69-1	no number	cf. *Aquila/Haliaeetus* sp.	Humerus	1	R	Diaphysis	Both ends broken off, unclear if natural or cultural
Sha 69-2	78, 44	Large aves	Long bone diaphysis fragment	1		Fragment	Appears to have been polished, squared off at one end.
Sha 71-1	59	Undifferentiated aves	Maxillary	1		Fragment	May have been cut from the rest of cranium--proximal end is precisely squared off.
Sha 73-1	8	Large aves	Ulna	1		Diaphysis	Both ends coarsely broken off, lightly ground
	1	*Cygnus* sp.	Radius	1	R	Diaphysis	Both ends coarsely broken off
	2	*Cygnus* sp.	Tibiotarsus	1	R	Diaphysis	Both ends coarsely broken off.
	3	*Cygnus* sp.	Ulna	1	R	Diaphysis	Both ends coarsely broken off, body lightly ground
Sha 75-1	4	Accipitridae	Talon	1		Whole	Bulbous portion at proximal end is ground off.
	8	cf. Accipitridae	Talon	1		Whole	Tip of talon that is ground to a flat base
Sha 78-1	122	Large aves	Ulna?	1		Diaphysis	Both ends squared off and ground, body ground and highly polished.
	42	Medium to large aves	Long bone diaphysis fragment	1		Whole	Bone tube, both ends squared off, body ground.

	45	Accipitridae	Humerus	1	L	Diaphysis	Both ends coarsely broken off.
	80	*Aquila/Haliaeetus sp.*	Ulna	1	R	Diaphysis	Both ends coarsely broken off.
Sha 79-1	5	*Cygnus* sp.	Carpometacarpus	1	L	Whole?	Proximal end broken off, end ground, minor metacarpal broken off, body ground.
Sha 83-1	18	Large aves	Long bone diaphysis fragment	1		Fragment	Unmodified
	103	*Cygnus* sp.	Carpometacarpus	1	L	Whole?	Both ends broken off, ground, body extensively ground and polished.
	159	*Cygnus* sp.	Carpometacarpus	1	R	Whole	Unmodified
	135	*Cygnus* sp.	Phalanx 1 of major digit	1	R	Whole	Unmodified
	143?	*Cygnus* sp.	Phalanx 2 of major digit	1	R	Whole	Unmodified
	34	Large Accipitridae	Talon	1		Very tip missing	Bulbous portion at proximal end is ground off.
	32	*Aquila/Haliaeetus sp.*	Talon	1		Very tip missing	Bulbous portion at proximal end is ground off.
	33	*Aquila/Haliaeetus sp.*	Talon	1		Very tip missing	Bulbous portion at proximal end is ground off.
	35	*Aquila/Haliaeetus sp.*	Talon	1		Very tip missing	Bulbous portion at proximal end is ground off.
Sha 85-1	14	Large aves	3rd (not distal) phalange	1		Whole	Unmodified
	9	Large aves	Phalange fragment	1		Fragment	Unmodified
	98	*Coccothrastes coccothraustes*	Dentary	1		Whole	Unmodfied
Sha 86-1	30	Undifferentiated aves	Carpometacarpus	1			
	90	cf. *Cygnus* sp.	Humerus diaphysis	1	L	Fragment	Proximal end coarsely broken off, distal end broken at midshaft of element, possibly when bone was fresh.
Sha 96-1	116	Large aves	Long bone diaphysis fragment	1		Lacks tip	One end squared off, ground, body ground, ochre stained.
	123	Large aves	Ulna	1	L	Diaphysis	Both ends coarsely broken off, body possibly ground, ochre stained

	130	cf. *Cygnus* sp.	Pollex	1	R	Whole	Unmodified
	127	*Cygnus* sp.	Carpometacarpus	1	R	Whole?	Proximal end broken off, irregular. Multiple angled cutmarks on ventral face of extensor process from butchery.
	128	*Cygnus* sp.	1st phalanx of major digit	1	R	Whole	unmodified
	129	*Cygnus* sp.	Distal phalanx of major digit	1	R	Whole	Unmodified
Sha 104-1	81	*Cygnus* sp.	Carpometacarpus	1	R	Most of distal 3/4 with proximal end missing	Unmodified
	82	*Cygnus* sp.	Pollex	1	R	Small portion of proximal end broken off	Unmodified
	70	*Cygnus* sp.	1st phalanx of major digit	1	R	Proximal end eroded away	Unmodified
	48	*Cygnus* sp.	2nd phalanx of major digit	1	R	Whole	Unmodified
Sha 108-1	96	Undifferentiated aves	Fragment	1		Fragment	Unmodified
	24	cf. *Cygnus* sp.	Ulna	1	L	Diaphysis	Needle case. Both ends broken off somewhat irregularly, body very lightly ground.
	139	*Cygnus* sp.	Carpometacarpus	1	L	Only a small portion of proximal end coarsely broken off	A simple needle case formed by coarsely breaking off a portion of the proximal end to give access to interior cavity
	246	*Cygnus* sp.	Carpometacarpus	1	L	Only a small portion of proximal end coarsely	A simple needle case formed by coarsely breaking off a portion of the proximal end to give access to interior cavity

						broken off	
	92	*Cygnus* sp.	Carpometacarpus	1	L	Body fragment	Proximal end partially broken off, body ground in many places, distal end appears to have been broken off post-burial
	2	*Cygnus* sp.	Pollex	1	L	Whole	Unmodified
	240	*Cygnus* sp.	1st phalanx of major digit	1	L	Nearly whole but not well preserved	Unmodified
	1	*Cygnus* sp.	1st phalanx of major digit	1	L	Whole	Unmodified
	93	*Cygnus* sp.	2nd phalanx of major digit	1	L	Distal tip broken off post-burial	Unmodified
	30	*Grus* sp.	Tibiotarsus	1	L	Whole?	Proximal end cut off and partially broken off. Proximal 1/2 of the diaphysis has three holes drilled through it, two together, one close to the proximal end--anterior-posterior. The lowermost hole was drilled at least twice and is elongated. The medial face of diaphysis has sets of incised lines perpendicular to long axis. Distal epiphysis has been lightly ground around its margins. Entire object was warped post-burial.
Sha 109-1	114	*Aquila/Haliaeetus* sp.	Femur	1	L	Diaphysis	Both ends coarsely broken off, some breakage may be post-burial
Sha 112-1	114	*Aquila/Haliaeetus* sp.	Femur		L	Diaphysis	Both ends coarsely broken off, some breakage may be post-burial

Shamanka II Avian Skeletal Material Measurements

Grave #	Artefact	Length (mm)	Width (mm)	Thickness (mm)
7	N14	41.56	10.51	18.12
7	26 pencil	28.17	8.08	11.58
7	34 pencil	29.49	7.95	11.76
7	N10	26.53	6.2	9.49
7	none	25.1	5.98	9.52
7	none	23.04	5.42	9.57
7	2H? Pencil	25.78	6.31	9.43
7	31 pencil	23.7	5.47	9.21
7	N8	23.57	5.36	8.94
7	14	41.34	10.56	18.31
7	34 (in pencil)	29.49	7.94	11.82
7	20 (in pencil)	28.16	8.12	11.52
7	30 (in pencil)	25.1	5.98	9.45
7	33 (in pencil)	25.85	6.33	9.45
7	10	26.54	6.22	9.5
7	8	23.6	5.39	8.88
7	31 (in pencil)	23.64	5.46	9.21
7	25 (in pencil)	22.95	5.43	9.73
8	75, 76	199.14	13.45	5.51
8	1	172.72	13.26	9.68
8	52	120	17.08	13.16
8	39	56.8	13.45	12.46
8	44	26.23	4.82	4.02
8	48	43.83	9.23	6.61
8	5	196.52	12.49	8.22
8	32? Or 92?			
8	14			
8	47			
8	12			
8	98	35.77	7.56	2.87
8	101	26.26	4	2.25
8	50	31.74	3.86	2.44
8	49	39.81	2.51	2.33
10	4	48.27	5.92	4.2
10	7	74.53	7.94	3.67
11	227, 228, 229			
11	269	171.62	9.57	7.53
11	271	105.53	11.39	6.13

11	284	163.76	13.13	13
12	1	113.48	15.55	11.42
12	2	88.09	12.91	10.28
12	13	94.47	21.56	12.53
12	3	49	5.7	1.97
12	4	62.32	7.66	2.85
14	67	71.83	8.77	5.76
14	129	49.63	8.68	6.58
15	52	67.19	11.07	7.08
15	102	70.04	10.69	2.84
15	201	37.66	10.35	1.8
15	103	28.14	7.99	2.63
15	104	38.09	11.54	3.11
15	186	68.34	12.92	10.47
15	200	38.74	3.64	8
15	119	195.4	15.04	10.7
15	34	101.07	20.46	16.62
15	30	196.84	25.95	14.48
15	6	142.26	21.58	15.43
15	176	131.53	21.9	14.16
15	157	140.03	22.51	15.29
15	125	131.5	21.52	13.93
15	197	19.02	8.49	3.97
16	61	42.15	15.11	6.49
16	128	60.14	18.45	10.93
16	20	29.32	4.84	1.16
16	21	33.55	5.36	1.22
16	22	24.21	5.92	1.61
17	29	228.24	7.66	6.72
17	32	69.11	9.07	1.62
17	18	142.28	10.84	8.64
17	104	16.93	3.13	3.77
17	15	18.43	4.53	8.68
17	119	15.47	4.08	9.43
17	129	17.88	3.79	7.61
17	134	20.29	4.6	8.98
17	150	19.28	5.13	9.09
18	56, 57			
18	88	88.05	7.4	8.16
18	60	52.52	8.62	2.71
18	76	22.17	5.12	1.55

18	78	91.8	6.05	2.05
20	78	28.95	3.99	1.29
20	22	151.43	13.5	10.89
20	56	58.87	13.44	11.47
20	57	52.04	9.05	2.83
21	39	48.92	9.65	4.69
21	40	46	5.33	4.56
21	46	42.04	10.36	5.61
22	42	24.31	5.21	10.51
22	43	22.47	5.28	10.78
23	59?	69.68	15.14	4.93
23	52	73.16	9.68	5.32
23	Layer II, tag says no number for artifacts	33.35	3.26	4.82
23	62, 67	82.98	6.5	8.9
23	19	98.91	19.41	10.09
23	60, 61	72.95	14.17	5.07
23	11	22.54	6.04	9.66
23	57			
23	no number			
23	no number			
23	no number			
23	Tag in bag says no numbers	24	3.22	2.63
23	Tag in bag says no numbers	25.99	3.3	1.4
25	13	171.36	12.75	10.15
25	14	171.28	12.89	9.65
26	70	70.81	28.3	27.72
26	48			
26	47	61.57	9.12	2.94
26	52			
28	5			
28	NONE			
30	9	261.21	20.32	11.92
34	8			
35	293	31.65	15.4	8.87
39	35	83.06	14.33	8.74
39	35	71.95	11.49	6.65
39	35	69.67	10.67	6.04
39	35	71.74	11.59	6.95
39	35	65.04	11.01	6.67
39	35	63.18	10.77	6.61
39	35	64.42	10.74	6.00

39	35	83.14	14.37	8.66
39	35	71.15	11.56	7.07
39	35	72.29	11.06	6.75
39	35	71.25	10.81	6.49
39	35	69.3	10.86	6.80
39	35	69.26	10.79	6.69
39	35	62.85	11.17	6.85
39	35	67.69	14.88	9.98
39	35	70.55	13.9	8.19
39	35	71.06	13.12	7.59
39	35	67.64	15.08	9.81
39	35	71.58	13.15	7.59
39	35			
39	35			
39	35	55.84	13.13	6.70
39	35	55.62	13.6	6.63
39	35	15.26	13.13	9.21
39	35			
42	22	205.83	8.45	8.07
42	14	226.41	14.8	13.01
42	15	218.95	15.42	13.54
42	30	171.38	13.53	10.74
42	24	156.2	17.63	9.62
42	13	53.03	3.29	1.7
46	19	28.91	11.29	2.97
46	23	19.86	6.65	2.21
48	no number	18.96	11.78	2.94
49	605	47.29	10.4	4.5
49	374	58.01	10.39	3.81
50	8	18.86	4.5	1.79
51	92, 99, 100	38.3	9.08	2.18
51	242	95.82	15.72	12.98
51	241	169.4	8.11	7.46
51	242	70.62	7.02	3.72
51	242	37.88	9.33	2.57
51	242	47.82	5.46	2.53
51	310	44.3	5.54	2.36
51	318	77.44	5.59	1.67
51	338	48.76	5.81	1.62
51	341	76.81	10.5	4.8
51	350	26.96	10.46	3.55

51	352	24.88	9.54	2.08
51	353	27.71	14.07	2.52
51	354	50.97	5.75	2.56
51	374	54.43	12.73	4.11
51	849 (649?)	33.73	8.2	1.72
51	624	21.03	7.77	4.61
51	no number	106.94	15.81	11.08
52	no number	26.72	10.68	3.92
52	79	20.37	6.42	9.23
52	37	47.86	5.78	2.23
52	74	39.21	5.97	1.62
53	137	47.88	6.62	1.51
53	161	33.38	8.57	2.83
53	168	27.07	6.58	2.09
53	182	48.71	7	3.36
53	186	31.88	6.26	2.54
53	219	21.11	5.39	1.68
53	225	32.5	7.89	1.85
53	229	24.7	6.19	2.34
53	232	31.09	10.27	3.14
53	45	101.02	11.46	10.58
53	10			
53	3			
53	8	94.41	11.48	10.77
53	66	78.1	8.16	3.33
53	148	109.37	9.77	3.56
53	162	25.86	10.26	3.38
53	166	113.49	10.67	9.25
53	48	103.69	6.07	4.88
53	67	119.1	8.23	7.16
53	201	107.6	8.61	4.6
53	31	140.66	6.35	5.7
53	71	90.3	7.34	8.57
53	51	31.41	8.32	2.54
53	75	38.66	6.81	3.09
53	224	33.34	9.04	5.43
53	107?	22.07	6.69	3.46
53	2	160.35	15.89	12.38
53	119, 47	179.29	15.91	12.62
53	149, 163	199.63	15.05	8.82
53	134	86.05	16.16	14.03

53	137	69.1	12.48	13.4
53	115, 202	251.49	12.85	9.19
53	138	96.91	22.54	15.89
53	133	113.02	19.13	13.12
53	135	127.3	23.92	13.56
53	136	131.82	14	10.28
53	152	143.53	23.88	15.24
53	72	19.46	8.53	4.62
53	108	20.64	8.34	5.46
58	12	14.07	2.84	4.2
58	13	13.1	2.42	3.07
59	81			
59	207	82.62	14.5	11.93
59	240, 241	166.05	8.08	9.42
59	242, 243	165.98	8.68	8.65
59	332, 325	121.51	8.04	6.24
59	57	89.39	8.49	7.01
59	67, 68	127.32	8.17	4.09
59	46	138.94	15.77	10.67
59	80	145.21	30.52	13.83
59	45	123.73	23.2	12.26
59	75	243.52	18.33	10.18
59	86, 79, 76	292.1	25.81	10.41
59	63	145.82	22.5	15.15
59	206	214.97	20.31	11
59	27			
59	43	20	4.01	1.81
59	54	61.18	7.54	2.18
59	64	13.92	2.84	1.28
59	65	12.97	3.44	1.91
59	66	33.43	4.38	1.54
62	30			
62	56			
62	43	31.41	3.22	1.38
63	10	17.57	4.1	7.68
63	11	16.8	3.36	7.17
63	12	18.63	4.13	7.5
63	13	12.37	3.13	4.78
63	14	13.02	3.62	5.13
63	15	11.67	3.18	4.9
63	16	12.77	3.38	4.68

63	17	12.43	3.3	4.88
63	18	11.79	3.2	4.84
63	19	11.87	3.32	5.27
64	8	25.18	7.04	6.53
64	42			
64	17			
64	65			
64	188			
64	186	117.33	25.88	10.86
64	53	93.02	25.01	16.4
64	163	45.59	11.21	17.78
64	47	20.28	5.49	9.44
64	157	23.95	5.34	9.39
64	184	25.92	5.96	9.56
68	5			
68	8			
69	78, 44	87.68	12.16	11.83
69	no number	118.34	13.94	14.08
69	3, 6	108.02	9.14	6.43
70	2	28.77	6.31	3.91
70	3	19.9	4.6	2.55
71	59	43.28	11.79	3.17
73	1	240.52	13.52	7.58
73	2	143.01	12.97	7.81
73	3	238.15	17.63	15.3
73	8	137.73	12.41	10.03
75	4	19.18	3.19	4.2
75	8	9.53	2.21	3.33
78	45			
78	122	155.3	11.92	9.59
78	42	85.27	8.83	7.48
78	80	179.2	15.74	12.12
79	5	115.02	12.22	10.07
83	18	53.79	7.97	2.32
83	103	118.2	12.19	12.67
83	159	129.36	28.6	12.87
83	135	56.34	13.06	12.97
83	143?	39.97	7.19	9.19
83	32	33.47	8.76	10.67
83	33	40.09	10.35	12.34
83	35	26.07	8.22	9.03

83	34	25.28	6.21	8.15
85	14	23.1	5.63	5.76
85	9	18.56	4.91	6.77
85	98			
86	30			
86	90	119.63	26.73	25.9
86	40	55.81	6.18	5.52
96	239	95.81	12.39	5.35
96	116	121.94	9.54	10.8
96	123	245.42	9.89	11.49
96	130	27.66	4.83	5.84
96	128	62.04	13.13	14.2
96	127	140.15	27.07	14.17
96	129	41.89	7.44	8.76
104	70	49.72	6.11	13.39
104	48	43.62	9.54	6.48
104	81	104.29	14.27	10.53
104	82	25.29	3.43	5.09
108	96	42.23	15.04	18.98
108	24	164.39	13.04	10.35
108	240	54	12.56	9.77
108	1	58.79	11.99	12.78
108	93	27.06	7.43	7.78
108	139	134.28	26.62	14.41
108	246	131.53	24.92	12.53
108	92	95.24	23.16	9.03
108	2	24.52	6.39	4.6
108	30	276	14.82	18.32
112	114	95.66	21.77	12.77
112	100	172.06	16.07	6.34
112	180	47.32	7.08	4.22
112	167	52.81	5.42	1.22
112	166	52.34	5.5	1.58

Appendix B: Lokomotiv Human Osteological Data and Avifaunal Materials

Lokomotiv Human Osteological Data

Grave	Tradition	Age	Sex	mtDNA
Lok 01-1	Kitoi	35-50	M	
Lok 02-1	Kitoi	20-25	U	F
Lok 02-2	Kitoi	35-39	U	F
Lok 02-3	Kitoi	25-35	F	
Lok 02-4	Kitoi	25-35	U	
Lok 03-1	Kitoi	01-01.5	U	
Lok 04-1	Kitoi	35-50	F	D
Lok 05-1	Kitoi	09-11	U	
Lok 06-1	Kitoi	20+	M	F
Lok 07-1	Kitoi	40-45	F	
Lok 08-1	Kitoi	40-45	M	
Lok 09-1	Kitoi	20+	F	
Lok 10-1	Kitoi	20-25	M	
Lok 10-2	Kitoi	20-25	M	other
Lok 10-3	Kitoi	25-30	M	F
Lok 10-4	Kitoi	30-35	M	
Lok 11-1	Kitoi	50+	M	
Lok 11-2	Kitoi	8-9 miu	U	
Lok 12-1	Kitoi	18-22	M	A
Lok 13-1	Kitoi	25-30	M	D
Lok 14-1	Kitoi	25-30	F	
Lok 14-2	Kitoi	06-10	U	
Lok 14-3	Kitoi	10-11	M	U5a
Lok 14-4	Kitoi	04-07	U	F
Lok 15-1	Kitoi	20-35	M	D
Lok 16-1	Kitoi	45-55	M	D
Lok 17-1	Kitoi	45-55	F	
Lok 18-1	Kitoi	50+	F	
Lok 19-1	Kitoi	50+	M	
Lok 20-1	Kitoi	20-29	F	
Lok 20-2	Kitoi	35-50	M	
Lok 21-1	Kitoi	50+	F	
Lok 22-1	Kitoi	20+	PM	
Lok 22-2	Kitoi	20-35	M	
Lok 22-3	Kitoi	20-25	M	
Lok 22-4	Kitoi	01.5-02.5	U	

Lok 22-5	Kitoi	20+	U	
Lok 22-6	Kitoi	25-30	F	
Lok 22-7	Kitoi	20+	PF	
Lok 22-8	Kitoi	20+	PM	
Lok 23-1	Kitoi	20-25	M	
Lok 24-1	Kitoi	12-15	M	F
Lok 24-2	Kitoi	40-45	M	F
Lok 24-3	Kitoi	04-07	U	
Lok 24-4	Kitoi	08-10	U	
Lok 24-5	Kitoi	45-50	M	
Lok 24-6	Kitoi	25-35	F	
Lok 25-1	Kitoi	35-40	F	
Lok 25-2	Kitoi	20-22	F	
Lok 25-3	Kitoi	25-35	F	
Lok 25-4	Kitoi	35-45	F	
Lok 25-5	Kitoi	35-50	M	
Lok 26-1	Kitoi	20+	M	
Lok 27-1	Kitoi	15-18	M	D
Lok 28-1	Kitoi	35-40	F	U5a
Lok 29-1	Kitoi	30-40	M	F
Lok 30-1	Kitoi	35-40	M	F
Lok 30-2	Kitoi	35-40	M	
Lok 31-1	Kitoi	35-50	U	
Lok 31-2	Kitoi	25-30	M	A
Lok 33-1	Kitoi	35-45	M	
Lok 34-1	Kitoi	35-45	F	
Lok 35-1	Kitoi	20+	U	
Lok 36-1	Kitoi	20-25	F	F
Lok 37-1	Kitoi	25-29	F	F
Lok 38-1	Kitoi	50+	PF	F
Lok 38-2	Kitoi	35-45	F	A
Lok 39-1	Kitoi	20-25	F	D
Lok 40-1	Kitoi	20+	M	
Lok 41-1	Kitoi	15-20	F	D
Lok 41-2	Kitoi	05-07	U	
Lok 41-3	Kitoi	20+	U	
Lok 42-1	Kitoi	40-50	M	G2a
Lok 43-1	Kitoi	04-05	U	
Lok 43-2	Kitoi	20-29	F	
Lok 44-1	Kitoi	35-39	M	F
Lok 44-2	Kitoi	30-39	M	F

LokRa 01-1	Kitoi	30-34	M	
LokRa 02-1	Kitoi	35-50	M	
LokRa 03-1	Kitoi	30-45	M	
LokRa 03-2	Kitoi	02-04	U	
LokRa 05-1	Kitoi	6-9 miu	U	
LokRa 06-1	Kitoi	35-39	M	
LokRa 06-2	Kitoi	35-39	M	
LokRa 07-1	Kitoi	50+	M	
LokRa 07-2	Kitoi	15-20	F	
LokRa 07-3	Kitoi	02-03	U	
LokRa 08-1	Kitoi	20+	U	
LokRa 09-1	Kitoi	06-07	U	
LokRa 10-1	Kitoi	03-04	U	
LokRa 11-1	Kitoi	20-25	F	
LokRa 12-1	Kitoi	10-12	U	
LokRa 13-1	Kitoi	06-08	U	
LokRa13-2	Kitoi	8-12	U	

Lokomotiv Avifauna Data

Note: where association between a specific burial within a grave and avian materials were documented, the Grave No. appears as 00-0, the second digit referring to the burial number. Where no relationship between a human burial in a grave and avian materials was determined, only the grave number is listed.

Grave No.	Artefact	Taxon	Element	Count	Side	Portion	Modification
Lok 04-1	80-∏4-20	Undifferentiated aves	Long bone diaphysis fragment	1		Body fragments	Possible needle case fragments. One intact end appears to have been cut off, ground square. In three pieces that do not refit
Lok 06-1	80-∏6-68	cf. *Cygnus* sp.	Carpometacarpus	1	R	Whole	Both ends broken off, ground and squared off.
Lok 07	P-91-∏7-5	Large aves	Long bone diaphysis fragment	1		Body fragment	Sawed and snapped along one lateral margin.
Lok 07-1	P-91-∏7-7	Large aves	Long bone diaphysis fragment	1		Body fragment	Sawed and snapped along both lateral margins.
Lok 08-1	81-∏8-101	*Cygnus* sp.	Humerus diaphysis	1	R	Whole	Both ends coarsely broken off, otherwise unmodified
Lok 10-3	80-∏10-20	Undifferentiated aves	Phalanx (juvenile)	1		Whole	Unmodified
Lok 11-1	80-∏11-26	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Not obviously modified, heavily eroded
	80-∏11-39	Undifferentiated aves	Long bone diaphysis fragment	1		Body fragmetn	Needle case? Carefully decorated bone tube. One face has two sets of small triangular incised designs formed by very precise incised parallel lines. Opposite face may have had three incised lines but is partially broken away. Both ends not intact.
	80-∏11-39	Undifferentiated aves	Long bone diaphysis fragment	1		End fragment?	Fragment of the item above. Needle case? Carefully decorated bone tube. One face has two sets of small triangular incised designs formed by very precise incised parallel lines.
	80-∏11-61	Undifferentiated	Long bone	1		End	Likely a fragment of #39 from this grave. Needle case? Carefully decorated

		aves	diaphysis fragment			fragment?	bone tube. One face has two sets of small triangular incised designs formed by very precise incised parallel lines.
	80-∏11-69	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Likely a fragment of #39 from this grave. Needle case? Carefully decorated bone tube. One face has two sets of small triangular incised designs formed by very precise incised parallel lines.
	80-∏11-65	Undifferentiated aves	Long bone diaphysis fragment	1		Fragment	Likely a fragment of #39 from this grave. Needle case? Carefully decorated bone tube. One face has two sets of small triangular incised designs formed by very precise incised parallel lines.
	fragments of #26	Undifferentiated aves	Long bone diaphysis fragments	7		Fragments	Not obviously modified
	80-∏11-26	Undifferentiated aves	Long bone diaphysis fragment	2		Body fragments	May be ground, both ends not intact.
Lok 13-1	81-∏13-22	Undifferentiated aves	Long bone diaphysis fragment	1		Body fragment	May be ground
Lok 15-1	80-∏15-230, 132	Undifferentiated aves	Long bone diapysis fragment	3		Fragments	Unmodified
Lok 19-1	80-∏19-129	cf. *Cygnus* sp.	Ulna	1	L	Nearly whole, refitted, glued	Needle case. Both ends coarsely broken off, body possibly lighly ground.
Lok 22-1	80-∏22-100	cf. *Cygnus* sp.	2nd phalanx of major digit	1	R?	Proximal 3/4	Unmodified
Lok 23-1	81-∏23-27	Accipitridae	Talon	1		Whole	Fish hook barb, base of talon ground off to a flat surface, leaves portion of small bulb to act as line attachment.
	81-∏23-56	Accipitridae	Talon	1		Tip broken off	Fish hook barb, base of talon ground off to a flat surface, leaves poriton of small bulb to act as line attachment.
	L-81-P23-26	Accipitridae	Talon	1			Unmodified
	L-81-P23-25	Accipitridae	Talon	1			Unmodified
	L-81-P23-11?	Accipitridae	Talon	1			Unmodified
	L-81-P23-64	Accipitridae	Talon	1			Unmodified
	L-81-P23-47	Accipitridae	Talon	1			Unmodified
Lok 26-1	83-∏26-196, 174, 198, 210, 197, 189, four	Accipitridae	Talons	10		All whole or lacking only tips	Unmodified small talons

	unreadable						
Lok 28-1	84-∏28-6	cf. *Cygnus* sp.	Carpometacarpus	1	L	Body fragment	Poorly preserved, may have had both ends broken off.
Lok 30-1	85-∏30-148	Undifferentiated aves	Tarsometatarsus	1		Body fragment	Both ends coarsely broken off, otherwise unmodified
	85-∏30-155	*Cygnus* sp.	Carpometacarpus	1	L	Whole	Proximal end coarsely broken off
	85-∏30-36	*Cygnus* sp.	Carpometacarpus	1	L	Body fragment	Both ends broken off, but may be post-burial.
	123	Accipitridae	Talon	1		Lacks tip	Fish hook barb. Arches in outline. Base ground and proximal end of element completely gone. Base concave, small notch cut on outer curve less than 1 mm from base
Lok 31-1	85-∏31-4	*Cygnus* sp.	Carpometacarpus	1	R	Proximal end missing	Proximal end coarsely broken off, body lightly ground, minor element removed.
Lok 33-1	85-∏33-76	Accipitridae	Talon	1		Body fragment	Unmodified
Lok 34-1	85-∏34-13	Undifferentiated aves	Long bone diaphysis	1		Lacks tip	One end was cut off, ground. Probably needle case fragment.
	no number	Undifferentiated aves	Long bone diaphysis	1		Fragment	Ground fragment
Lok 35-1	85-∏35-8	Accipitridae	Talon	1		Body fragment	Not modified
Lok 36-1	86-∏36-4	*Cygnus* sp.	phalanx 1 of major digit	1	L	Whole	Unmodified
	86-∏36-3	*Cygnus* sp.	Carpometacarpus	1	R	Whole	Proximal end coarsely broken off to expose cavity.
	86-∏36-15	bird	Long bone diaphysis	1		Body fragments	Needle case, decorated. Ground long bone diaphysis shaft, carefully incised with a geometric design. One face has a zig-zag pattern form by lines made up of groups of small incised lines, opposite face has many small triangles side by side also formed by small parallel lines
Lok 37-1	87-∏37-12	Large aves	Ulna?	1		Whole	Needle case, decorated. Ground long bone diaphysis shaft. One face simply decorated with a series of unevenly spaced incised lines.
	87-∏37-13	Large aves	Ulna?	1		Whole	Needle case, decorated. Ground long bone diaphysis shaft. One face simply decorated with a series of unevenly spaced incised lines.
Lok 38-1	88-∏38-6	Undifferentiated aves	Upper beak	1		Partial upper beak	Appears to have been cut from rest of head
	88-∏38-28	Large aves	Long bone diaphysis	1		Base and partial	Needle case, decorated. Intact end cut off, ground. Body ground, one face near end has two sets of two parallel lines incised on it; same face has one

						body	other set of parallel lines about 6 cm from end.
Lok 38-2	88-∏38-21	Large aves	Long bone diaphysis	1		Base and partial body	Needle case, decorated. Intact end appears to have been cut off, ground. Body ground, two opposing faces decorated with groups of parallel incised lines running at sharp angles to the long axis.
	88-∏38-24	Large aves	Long bone diaphysis	1		Body fragment	Needle case, decorated. Body ground, two opposing faces decorated with groups of parallel incised lines running at sharp angles to the long axis.
	88-∏38-22	Large aves	Long bone diaphysis	1		Body fragment	Needle case, decorated. Near what may be a partially intact end, one face is decorated with a group of parallel incised line, running perpendicular to long axis. Both lateral margins have groups of parallel incised lines at sharp angles to the long axis.
	88-∏38-23	Large aves	Long bone diaphysis	1		Body fragment	Needle case, decorated. Near what may be a partially intact end, one face is decorated with a group of parallel incised line, running perpendicular to long axis. Both lateral margins have groups of parallel incised lines at sharp angles to the long axis.
	88-∏38-4	*Cygnus* sp.	Humerus	1	R	Whole	Unmodified whole humerus.
Lok 39-1	88-∏39-2	Undifferentiated aves	Long bone	1		Whole	Needle case, decorated. Both ends cut and snapped off, ground. Body ground on all faces. About 2 cm from one end on one face there are 5 incised parallel lines running in an angle across the face of the case.
	88-∏39-67	Large aves	Tibiotarsus	1	R	Body fragment	Appears unmodified but is highly fragmented
	88-∏39-99	*Grus* sp.	Ulna	1	L	Body fragment	Proximal end coarsely broken off
LokRa 01	P-80-P1-114	Accipitridae	Talon	1		Whole	Unmodified
LokRa 03-1	P-80-∏3-36	Undifferentiated aves	Long bone diaphysis fragment	1		Body fragment	Not obviously modified.
LokRa 03-2	P-80-∏3-37	Undifferentiated aves	Long bone diaphysis fragment	1		Body fragment	Not obviously modified.
	P-80-∏3-34	Large aves	Long bone, probably ulna	1		Small portion of one end missing	Needle case. Both ends were cut off, ground. Body was also lightly ground.
LokRa 06-2	P-91-∏6-51, 57	Undifferentiated aves	Upper and lower beak	1		Portion of upper beak broken off	Probably cut from rest of head, but otherwise unmodified

LokRa 07-1	P-91-∏7-7	Large aves	Long bone diaphysis fragment	1		Body fragment	Sawed and snapped along both lateral margins.
	P-91-∏7-5	Large aves	Long bone diaphysis fragment	1		Body fragment	Sawed and snappe along one lateral margin
LokRa 15-1 (no data?)	P-97-∏15-54	Undifferentiated aves	Long bone	1		Base and partial body	Needle case? One end cut off, possibly ground. Body ground. Opposite end was cut off and ground.
	P-97-∏15-45	*Cygnus* sp.	Radius	1	L	Whole	Both ends coarsely broken off
	P-97-∏15-24	*Cygnus* sp.	Radius	1	R	Whole	Both ends coarsely broken off
	P-97-∏15-31	*Cygnus* sp.	Radius	1	L	Whole	Both ends coarsely broken off. One face decorated with sets of fine parallel incised lines at sharp angles to the long axis.
	P-97-∏15-15	*Cygnus* sp.	Carpometacarpus	1	L	Whole	Portion of proximal end broken off to expose cavity.

Lokomotiv Avian Skeletal Material Measurements

Grave #	Artefact	Length (mm)	Width (mm)	Thickness (mm)
1 (Rasiovet)	P-80-P1-114	27.93	8.06	15.24
3	P-80-∏3-34	155.09	9.08	7.65
3	P-80-∏3-36	63.34	8.16	6.14
3	P-80-∏3-37	71.34	10.93	7.01
4	80-∏4-20	45.14	8.32	8.76
6	P-91-∏6-51, 57			
6	80-∏6-68	99.54	14.84	10.97
7	P-91-∏7-7	134.13	10.54	7.96
7	P-91-∏7-5	70.1	10.36	3.23
8	81-∏8-101	170.98	21.38	15.05
10	80-∏10-20	25.91	4.31	5.18
11	80-∏11-26	110.96	5.05	5.28
11	80-∏11-39	94.63	7.22	4.79
11	80-∏11-39	42.19	6.93	4.96
11	80-∏11-61	39.96	6.26	4.78
11	80-∏11-69	15.54	4.56	1.63
11	80-∏11-65	19.54	5.67	2.75
11	no numbers but bag says all are fragments of #26			
11	80-∏11-26	300	8.04	6.68
13	81-∏13-22	75.07	11.44	10.61
15	P-97-∏15-15	134.72	25.3	13.66
15	P-97-∏15-54	63.7	7.38	6.71
15	P-97-∏15-45	201.71	11.25	7.9
15	P-97-∏15-24	225	11.25	7.82
15	P-97-∏15-31	188.69	11.49	8.15
15	80-∏15-230, 132			
19	80-∏19-129	202	15.05	12.62
22	80-∏22-100	28.48	8.07	7.14
23	81-∏23-27	15.65	7.55	3.2
23	81-∏23-56	11.39	5.78	3.42
23	L-81-P23-26	22.19	9.61	5.36
23	L-81-P23-25	19.99	9.03	5.26
23	L-81-P23-11?	16.02	7.9	4.43
23	L-81-P23-64	31.9	15.57	10.63
23	L-81-P23-47	34.07	14.75	9.26
26	83-∏26-196, 174, 198, 210, 197, 189, four unreadable			
28	84-∏28-6	101.27	12.31	10.92
31	85-∏31-4	114.8	16.93	12.34
30	85-∏30-155	116.2	21.72	10.55
30	85-∏30-36	102.76	14.3	9.43
30	85-∏30-148	66.79	13.21	8.83
30	123	15.15	5.04	3.22
33	85-∏33-76	15.25	3.88	5.97
34	85-∏34-13	71.75	8.55	7.29
34	no number	39.3	8.28	5.77
35	85-∏35-8	21.33	6.24	3.98
36	86-∏36-4	60.37	12.41	10.61
36	86-∏36-3	134.71	20.06	12.82
36	86-∏36-15	at least 16 cm	8.33	7.12
37	87-∏37-12	193.99	12.94	13.14

37	87-∏37-13	194.65	14.44	13.1
38	88-∏38-4	271	44.03	22.35
38	88-∏38-6	37.51	11.74	5.15
38	88-∏38-28	99.77	12.9	10.84
38	88-∏38-21	94.81	13.15	11
38	88-∏38-24	95.41	13.35	11.91
38	88-∏38-22	81.44	11.9	10.2
38	88-∏38-23	87.81	13.37	10.64
39	88-∏39-67	117.57	14.81	10.03
39	88-∏39-99	182.88	15.71	11.56
39	88-∏39-2	150.91	8.14	6.96

Appendix C: Ust'-Ida Human Osteological Data and Avifaunal Materials

Human Osteological Data

Grave	Tradition	Age	Sex	mtDNA
UI 01-1	Glazkovo	20+	F	
UI 03-1	Glazkovo	04-05	U	
UI 03-2	Glazkovo	03-04	U	
UI 04-1	Isakovo-Serovo	02-03	U	
UI 05-1	Isakovo-Serovo	07-09	M	
UI 06-1	Isakovo-Serovo	35-50	M	
UI 07-1	Glazkovo	20+	M	
UI 08-1	Isakovo-Serovo	06-08	U	
UI 09-1	Isakovo-Serovo	06-07	M	
UI 10-1	Isakovo-Serovo	09-11	U	
UI 11-1	Isakovo-Serovo	35-50	F	G2a
UI 12-1	Glazkovo	35-50	M	D
UI 14-1	Isakovo-Serovo	18-20	M	F
UI 15-1	Isakovo-Serovo	05-06	U	
UI 16-1	Isakovo-Serovo	25-35	M	F
UI 16-2	Isakovo-Serovo	25-35	M	other
UI 17-1	Isakovo-Serovo	02-04	U	
UI 18-1	Isakovo-Serovo	11-13	F	U5a
UI 19-1	Glazkovo	30-35	M	C
UI 20-1	Isakovo-Serovo	18-24	M	
UI 20-2	Isakovo-Serovo	30-40	F	
UI 21-1	Isakovo-Serovo	03-04	U	
UI 21-2	Isakovo-Serovo	05-07	U	
UI 22-1	Isakovo-Serovo	15-20	F	other
UI 23-1	Isakovo-Serovo	03.5-05.5	U	
UI 24-1	Glazkovo	14-18	F	
UI 25-1	Isakovo-Serovo	03-04	U	
UI 25-2	Isakovo-Serovo	07-09	U	
UI 25-3	Isakovo-Serovo	09-11	U	
UI 26-1	Isakovo-Serovo	13-15	M	A
UI 26-2	Isakovo-Serovo	8-16 mo	U	
UI 26-3	Isakovo-Serovo	03-04	U	
UI 26-4	Isakovo-Serovo	10-12	M	A
UI 26-5	Isakovo-Serovo	05-07	F	F
UI 28-1	Glazkovo	20+	U	
UI 29-1	Glazkovo	50+	M	A
UI 30-1	Isakovo-Serovo	50+	M	A

UI 31-1	Isakovo-Serovo	10-12	M	other
UI 32-1	Isakovo-Serovo	08-10	U	
UI 33-1	Isakovo-Serovo	12-15	M	other
UI 33-2	Isakovo-Serovo	13-16	M	other
UI 36-1	Isakovo-Serovo	03-04	F	D
UI 36-2	Isakovo-Serovo	40-50	F	
UI 38-1	Isakovo-Serovo	35-45	M	C
UI 39-1	Glazkovo	25-35	F	
UI 40-1	Glazkovo	25-30	F	C
UI 40-2	Glazkovo	8-9 miu	U	
UI 41-1	Isakovo-Serovo	35-50	M	G2a
UI 42-1	Glazkovo	50+	F	
UI 43-1	Isakovo-Serovo	19-25	M	G2a
UI 44-1	Isakovo-Serovo	09-10	F	A
UI 44-2	Isakovo-Serovo	05-06	F	A
UI 44-3	Isakovo-Serovo	11-12	M	A
UI 45-1	Glazkovo	22-30	M	C
UI 46-1	Glazkovo	7-9 miu	U	
UI 47-1	Glazkovo	30-40	M	C
UI 48-1	Glazkovo	50+	M	C
UI 49-1	Glazkovo	20+	PF	
UI 51-1	Glazkovo	20+	M	C
UI 52-1	Isakovo-Serovo	60+	F	other
UI 53-1	Isakovo-Serovo	09.5-11.5	U	
UI 53-2	Isakovo-Serovo	04-06	M	A
UI 54-1	Isakovo-Serovo	50+	M	C
UI 55-1	Isakovo-Serovo	02-04	M	C
UI 55-2	Isakovo-Serovo	15-18	M	G2a
UI 56-1	Isakovo-Serovo	35-50	M	
UI 56-2	Isakovo-Serovo	09-11	U	

Ust'-Ida Avifauna Data

Note: where association between a specific burial within a grave and avian materials were documented, the Grave No. appears as 00-0, the second digit referring to t he burial number. Where no relationship between a human burial in a grave and avian materials was determined, only the grave number is listed.

Grave No.	Artefact	Taxon	Element	Count	Side	Portion	Modification
UI 03-1	38	Large aves	ulna, diaphysis	1	L	incomplete	needle case preform (?); bone not completely hollowed out; short, irregular horizontal ridges along ~ ½ lateral surface of shaft
UI 03-2	4	Large aves	tarsometatarsus	1		incomplete	needle case; original bone features ground down
UI 04-1	5	cf. *Cygnus* sp.	ulna, diaphysis	1	R	incomplete	needle case (no needles); end sawn and snapped; surface ground and highly polished; numerous horizontal ridges along shaft (like rhythm sticks)--these ridges are nearly equidistant from the neighboring ridge
UI 05-1	5	Large aves	ulna, diaphysis	2	R	incomplete	needle case; ends sawn/snapped and rounded; numerous horizontal ridges around entire length of shaft
UI 06-1	3	Large aves	carpometacarpus	1	R	incomplete	needle case (contained #3a needle); ends of shaft missing, and minor metacarpal broken
UI 08-1	4	Large aves	ulna, diaphysis	1		complete	needle case (contained #37 needle); ends sawn and snapped; quill knobs not present
UI 09-1	3	*Cygnus* sp.	carpometacarpus	1	L	complete	needle case (contained #unknown needle); missing epiphyses
UI 10-1	6	Large aves	ulna, diaphysis	1	L	complete	needle case (contained 2 unknown needles); ends sawn and snapped; surface lightly ground; quill knobs absent
UI 11-1	2	Large aves	ulna, diaphysis	1	L	incomplete	needle case (contained #2a needle); ends sawn and snapped; quill marks not present
	3	Medium to large aves	ulna, diaphysis	1	L	incomplete	needle case (contained no needles); ends sawn and snapped; quill knobs not present
UI 15-1	3	cf. *Cygnus*	ulna, diaphysis	1	L	complete	needle case (contains #4 needle); ends sawn/snapped and rounded; numerous horizontal ridges around entire length of shaft
UI 16-1	22	Large aves	ulna, diaphysis	1	R	incomplete	needle case (contained #22a needle); ends sawn and snapped; quill knobs present; fragment missing from proximal end of shaft

UI 16-2	55	cf. *Cygnus sp.*	carpometacarpus	1	R	complete	needle case (contained #55 needle); surface lightly ground; ends do NOT appear to have been sawn and snapped
UI 17-1	5	Medium aves	ulna, diaphysis	1	R	incomplete	needle case (contained unnumbered needle); proximal shaft sawn and snapped; distal shaft broken off
UI 18-1	6	Large aves	ulna, distal diaphysis	1		incomplete	needle case; ends sawn/snapped off; quill knobs not present; missing proximal diaphysis
UI 20-1	80	Large aves	humerus, diaphysis	1	R	incomplete	needle case (no needles); end sawn/snapped and rounded, other end missing; horizontal ridges run along entire shaft and around bone
	3	cf. *Cygnus* sp.	carpometacarpus	1	L	complete	needle case (contained #3a needle); ends sawn/snapped and rounded; epiphyses missing
UI 21-1	21	Medium to large aves	long bone, diaphysis	1		incomplete	
	14	Medium to large aves	long bone, diaphysis	1		incomplete	
UI 21-2	20	Aves, medium to large	long bone, diaphysis	1		incomplete	one end of shaft shows evidence of having been sawn and snapped
	16	Aves, medium to large	long bone, diaphysis	1		incomplete	
	15	Aves, medium to large	long bone, diaphysis	1		incomplete	
UI 25-3	20	*Cygnus* sp.	ulna, diaphysis	1	L	incomplete	needle case (contained no needles); ends sawn and snapped; quill knobs not present; decorated with horizontal ridges (like rhythm stick) along entire lateral surface; four x-shaped cut marks on medial surface
	21	Aves, large	ulna, diaphysis	1	L	incomplete	needle case; ends sawn/snapped; horizontal cut marks on both ends around entire circumference of shaft; no quill knobs present
UI 26-1	13	Large aves	ulna, diaphysis	1	R	incomplete	needle case (contained #14 and #15 needles); ends missing; quill knobs not present
UI 26-3	203	Medium aves	ulna, diaphysis	1		complete	needle case (contained #203a needle); ends sawn and snapped; groupings of short cut marks all over shaft; quill knobs not present
	41	Large aves	ulna, diaphysis	1	R	complete	needle case (contained #47a needle); thin and flat; ground to sharp tapering point; drilled eye
UI 26-4	145	Large aves	ulna, diaphysis	1	L	complete	needle case (contained #146 needle); ends sawn and snapped; quill knobs not present
UI 26-5	190	Medium to large	ulna, diaphysis	1	R	complete	needle case (contained #190a and #190b); ends sawn and snapped; quill knobs not present

		aves					
UI 30-1	1	cf. *Cygnus* sp.	ulna, diaphysis	1	R	complete	needle case (?); bone hollowed out and rounded; ends sawn and snapped; broken in center but glued together; contains three needles (#2, 24, 25)
UI 32-1	6	Medium to large aves	ulna, diaphysis	1		complete	needle case; ends sawn/snapped off and rounded; undecorated
UI 33-1	6	Large aves	ulna, diaphysis	2		incomplete	fragments with quill knobs present
	11	Medium to large aves	ulna, diaphysis	1	L	incomplete	needle case (contained no needles); ends sawn and snapped; 2 x-shaped cut marks on medial surface
UI 36-1	8	Large aves	ulna, diaphysis	1	R	incomplete	ground (?); quill knobs missing; missing epiphyses
UI 37-1	7	cf. *Cygnus* sp.	carpometacarpus	1	L	incomplete	missing proximal and distal epiphyses
	12	Small to medium aves	scapula	1		incomplete	
UI 38-1	7	cf. *Cygnus* sp.	tibiotarsus	1	R	incomplete	
	6	Large aves	radius	1		incomplete	missing proximal and distal epiphyses
	4	*Cygnus* sp.	ulna, diaphysis	1	L	incomplete	needle case "preform?"; epiphyses missing; quill knobs not present
	66	Medium to large aves	carpometacarpus	1		complete	needle case (contained #66a needle); ends sawn and snapped; minor metacarpal absent
UI 41-1	27	*Cygnus* sp.	carpometacarpus	1	R	incomplete	missing epiphyses
	36	*Cygnus* sp.	carpometacarpus	1	L	incomplete	needle case; ends sawn/snapped off and rounded; horizontal hatch marks along medial surface; missing epiphyses
	18	cf. *Cygnus* sp.	ulna	1	R	incomplete	missing epiphyses
	31	Large aves	ulna	1	R	incomplete	missing epiphyses
	30	Large aves	carpometacarpus	1		incomplete	missing epiphyses
UI 44-1	3	Anatidae, medium	humerus	1	L	unknown	needle case; hatch marks on anterior—longer lines in sets of three, shorter lines in pairs of two (lines do not extend to posterior); ends sawn/snapped; surface ground and polished

UI 44-2	8	Medium aves	ulna, diaphysis	1		incomplete	needle case (?); bone hollowed out; ends sawn/snapped; horizontal ridges along entire length of bone (like rhythm sticks), but do not extend all the way around bone
	9	Medium aves	ulna, diaphysis	1		incomplete	needle case (?); bone hollowed out; ends sawn/snapped; horizontal ridges along entire length of bone (like rhythm sticks), but do not extend all the way around bone
UI 52-1	11	*Cygnus* sp.	humerus, diaphysis	1	R	complete	needle case; ends sawn/snapped and rounded
	34	Large aves	ulna, diaphysis	1	L	complete	needle case (contained #32 needle); ends sawn/snapped and rounded; surface lightly ground; quill knobs not present
	15	*Cygnus* sp.	mandible	1	R	incomplete	beak portion
	13	*Cygnus* sp.	mandible	1	R	incomplete	beak portion
	23	*Cygnus* sp.	mandible	1	R	incomplete	cut marks that match up with cut marks on #52
	26	*Cygnus* sp.	mandible	1	R	incomplete	fragment
	52	*Cygnus* sp.	mandible	2	L	incomplete	cut marks that match up with cut marks on #52; look up words to describe
	27	*Cygnus* sp.	mandible	1	L	incomplete	fragment
	26	*Cygnus* sp.	mandible	1	L	incomplete	fragment
	19	*Cygnus* sp.	mandible	1	L	incomplete	fragment
	28	*Cygnus* sp.	beak, upper	1		incomplete	fragment
	unknown	*Cygnus* sp.	beak, upper	1		incomplete	fragment
	14	*Cygnus* sp.	beak, upper	1		incomplete	fragment
	16	*Cygnus* sp.	beak, upper	1		incomplete	fragment
	17	*Cygnus* sp.	1st phalanx	1	L	incomplete	
	30	Undifferentiated aves	beak	1		incomplete	beak fragment
	22	Undifferentiated	beak	1		incomplete	beak fragment

		aves					
	12	Undifferentiated aves	beak	1		incomplete	beak fragment
	21	Undifferentiated aves	beak	1		incomplete	beak fragment
	33	Undifferentiated aves	mandible	1		incomplete	mandible fragment
	20	Undifferentiated aves	mandible	1		incomplete	
	26	Undifferentiated aves	mandible	1		incomplete	
	32	Undifferentiated aves	mandible	1		incomplete	
	unknown	Large aves	radius	2		complete	needle case (no needles); ends sawn/snapped and rounded
UI 53-1	27	Undifferentiated aves	long bone, diaphysis	1		incomplete	needle case; ends sawn/snapped off; whole body ground with horizontal ridges on shaft; with needle (#47); ends broken off
UI 54-1	25	Aves	ulna, diaphysis	1	R	incomplete	missing epiphyses
UI 55-1	unknown	Large aves	carpometacarpus	1	L	incomplete	missing proximal epiphysis and distal diaphysis/epiphysis
	1	Large aves	cranium	1		incomplete	fragments
UI 55-2	13	cf. *Cygnus sp.*	tarsometatarsus	1	L	complete	needle case (contained #unknown needle); ends sawn and snapped; surface lightly ground and bone features smoothed
UI 57-1	2	Anatidae, large	ulna, diaphysis	1	L	incomplete	needle case; ends sawn/snapped off and rounded; surface ground; missing epiphyses

Ust'-Ida Avian Skeletal Measurements

Grave #	Artefact	Length (mm)	Width (mm)	Thickness (mm)
U-I-1-P-3	38	80.54	19.1	12.95
U-I-1-P-3	4	141.19	21.12	13.32
U-I-1-P-4	5	95.51	13.94	10.01
U-I-1-P-5	5	151	17.17	11.09
U-I-1-P-6	3	106.08	16.43	8.28
U-I-1-P-8	4	116.02	9.48	7.71
U-I-1-P-9	3	106.77	23.8	11.29
U-I-1-P-10	6	177	13.31	10.03
U-I-1-P-11	2	137.12	12.83	11.02
U-I-1-P-11	3	131.26	9.94	8.82
U-I-1-P-16	22	126.69	14.55	10.18
U-I-1-P-16	55	120.26	27.3	9.76
U-I-1-P-15	3	118	15.92	12.16
U-I-1-P-17	5	111.54	10.47	7.81
U-I-1-P-18	6	110.5	12.62	8.85
U-I-1-P-20	80	183.5	18.27	13.4
U-I-1-P-20	3	101.46	13.17	9.07
U-I-1-P-21	21	130.96	7.2	6.62
U-I-1-P-21	14	116.5	8.08	6.21
U-I-1-P-21	20	93.29	8.32	6.55
U-I-1-P-21	16	84.06	8.12	6.92
U-I-1-P-21	15	109.42	8.24	6.19
U-I-1-P-25	20	248	17.65	12.16
U-I-1-P-25	21	153	12.36	10.72
U-I-1-P-26	13	137	15.08	10.22
U-I-1-P-26	190	99.62	9.91	8.82
U-I-1-P-26	203	60.8	10.15	7.44
U-I-1-P-26	41	54.17	2.2	1.45
U-I-1-P-26	145	92.66	11.73	9.78
U-I-1-P-30	1	135	15.91	11.61
U-I-1-P-32	6	116.02	9.65	8.72
U-I-1-P-33	6	115.05	10.85	1.13
U-I-1-P-33	11	117.35	10.15	9.29
U-I-1-P-36	8	135.11	11.04	8.69
U-I-1-P-37	7	136.49	32.03	12.25
U-I-1-P-37	12	50.87	11.94	2.38
U-I-1-P-38	7	163	17.72	9.77
U-I-1-P-38	6	141	6.01	5.47

U-I-1-P-38	4	239	14.01	11.96
U-I-1-P-38	66	109.91	12.29	8.4
U-I-1-P-41	27	105.06	13.97	11.88
U-I-1-P-41	36	122.57	19.6	12.26
U-I-1-P-41	18	158	14.19	11.04
U-I-1-P-41	31	165	12.96	13.5
U-I-1-P-41	30	108.36	11.76	10.9
U-I-1-P-44	3	124.5	19.37	11.79
U-I-1-P-44	8	102.77	11.05	10.63
U-I-1-P-44	9	107.63	14.42	10.18
U-I-1-P-52	11	165	19.82	15.68
U-I-1-P-52	34	180.5	13.4	11.35
U-I-1-P-52	15	62.42	21.3	2.72
U-I-1-P-52	13	52.29	20.89	2.65
U-I-1-P-52	23	87.78	21.99	5.68
U-I-1-P-52	26	88.7	4.65	2.63
U-I-1-P-52	52	31.14	14.09	4.28
U-I-1-P-52	27	38.35	11.01	4
U-I-1-P-52	26	81.19	10.09	5.36
U-I-1-P-52	19	25.31	11.96	2.04
U-I-1-P-52	28	18.37	16.87	2.98
U-I-1-P-52	unknown	15.97	27.71	2.55
U-I-1-P-52	14	35.53	31.19	2.56
U-I-1-P-52	16	50.67	32.99	3.54
U-I-1-P-52	17	38.21	6.13	4.32
U-I-1-P-52	30	12.44	10.79	2.63
U-I-1-P-52	22	22.2	11.66	6.29
U-I-1-P-52	12	17.96	10.48	7.82
U-I-1-P-52	21	26.19	7.14	2.16
U-I-1-P-52	33	46.08	5.04	3.78
U-I-1-P-52	20	19.47	4.07	1.74
U-I-1-P-52	26	30.33	4.05	2.66
U-I-1-P-52	32	26.16	7.05	4.39
U-I-1-P-52	unknown	123.5	9.88	8.37
U-I-1-P-53	27	153.43	11.87	10.84
U-I-1-P-54	25	145	13.1	9.12
U-I-1-P-57	2	161	16.65	10.91
U-I-1-P-55	13	129.42	17.74	9.29
U-I-1-P-55	unknown	58.33	21.53	9.5
U-I-1-P-55	1			