Chapter 1.
Background, Methods, and Questions Posed

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Environmental Context

This book focuses on the Lake Baikal area of Eastern Siberia in the Russian Federation (Figure 1.1). More specifically, all of the sites analyzed in the following chapters are from Cis-Baikal, defined here as the western portion of the Lake Baikal region encompassing the Angara River basin down to Ust'-Ilimsk, the drainage of the upper Lena down to Kirensk, and the islands and entire western shoreline of the lake. This definition differs slightly from that used in other BAP publications in that we specifically include the lake's northwest shoreline. Within Cis-Baikal, our zooarchaeological research has focused on three micro-regions.

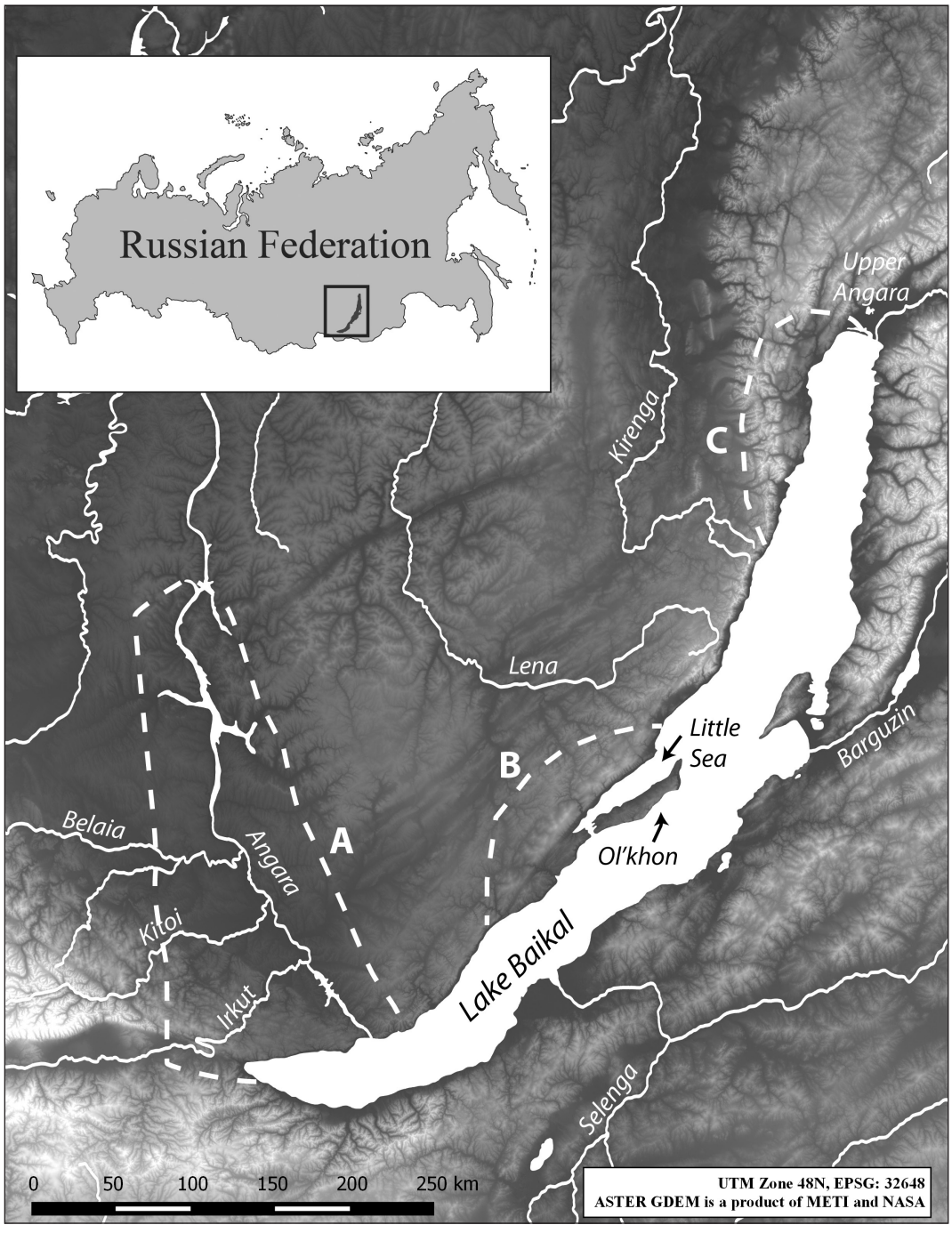

Figure 1.1. Map of the Lake Baikal region of Eastern Siberia, Russian Federation. Study micro-regions shown with dotted lines. A is Angara-Southwest Baikal; B is Priol'khon'e; C is Northwest Baikal.

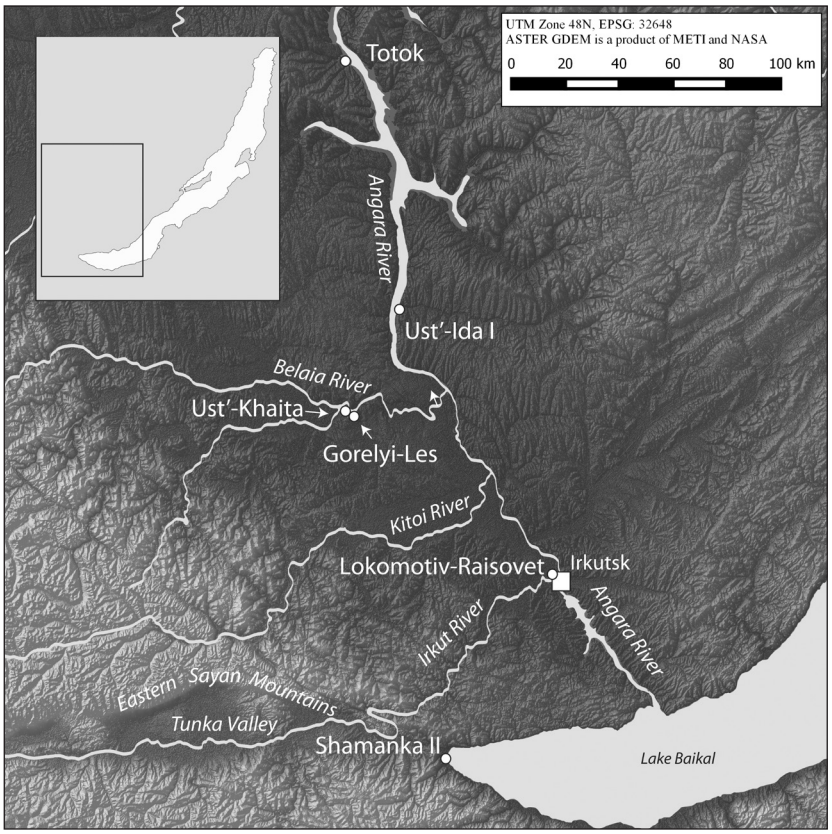

Figure 1.2. Map of the Angara-Southwest Baikal micro-region. Faunal remains from the habitation sites and cemeteries indicated on the map are discussed in Chapter 3.

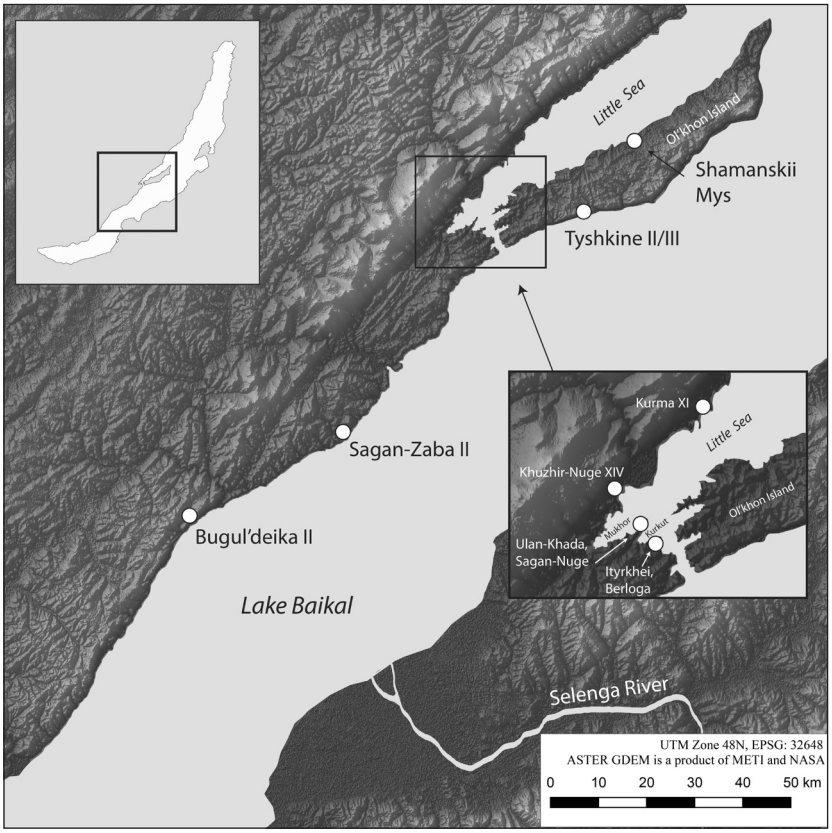

Figure 1.3. Map of the Priol'khon'e micro-region. Faunal remains from Sagan-Zaba II are discussed in Chapter 4, Bugul'deika II in Chapter 5, and all of the sites in the southern Little Sea (Kurma XI, Khuzhir-Nuge XIV, Ulan-Khada, Sagan-Nuge, Ityrkhei, and Berloga) and on Ol'khon Island (Tyshkine II and III, Shamanskii Mys) in Chapter 6.

The first is the Angara River basin and the south shore of the lake, referred to as Angara-Southwest Baikal (Figure 1.2). The second is Priol'khon'e, which roughly encompasses the west shore of Lake Baikal from the Bol'shaia Bugul'deika River in the south, to Cape Elokhin (on Ol'khon Island) in the north, and includes the lake's largest island, Ol'khon, as well as the section of the lake between this island and the western lake shore, known as the Little Sea (Goriunova and Svinin 1995; Figure 1.3). The third area is Northwest Baikal, the region stretching north from the Elokhin Penninsula to the delta of the Upper Angara River and extending inland from the shore of Baikal to the crest of the Baikal'skii Mountain Range (Figure 1.4). The Upper Lena basin constitutes a fourth study area for the BAP but is little discussed in this volume, as we have no faunal samples from this region.

Lake Baikal was created millions of years ago by tectonic forces (Horiuchi et al. 2003) and is massive, measuring 636 km by 79 km in maximum length and width. Its greatest depth is 1741 m, and Baikal's total surface area is 31,500 km^2 (Lut 1978). This lake is located in the center of a mountainous region known as the Baikal Rift Zone that is marked by a series of ranges that flank the lake on all sides. These include the Barguzinskii, Ulan-Burgazy, and Khamar-Daban ranges along the eastern and southern shores, and the Eastern Sayan range west of the southern tip of Lake Baikal. The Baikal'skii range descends directly into the lake on the northwest shore, while the Primorskii range stretches along its southwest portion. 'Coastal plains' are narrow (no more than a few km) or entirely absent along the entire western shoreline due to the position of the ranges close to the lake (Galazii and Molozhanikov 1982; Lut 1978).

Lake Baikal is turbulent, as winds create powerful horizontal currents and vertical water circulation, especially during the autumn when stormy days outnumber calm days. Strong winds often blow from the land out across Baikal making boat travel hazardous. Waves in the lake can be as high as six meters in early winter before ice coverage, but usually do not exceed 2–3 m in summer and 4–5 m in fall (Kozhova and Izmest'eva 1998).

The lake contains 30 islands, but most of these are too small to have been inhabited for any substantial length of time. As mentioned, the

lake's largest island is Ol'khon, which is ~72 km long. The lake also holds three large 'gulfs' or 'seas', with the Barguzinskii and Chivyrkuiskii being on the east shore (in Trans-Baikal, the region just east of the lake), and the Little Sea located between Ol'khon Island and the lake's western shore. The Little Sea in Priol'khon'e is ~78 km long and has a maximum width of 18 km, with a total surface area of ~800 km^2. The depth of the southern Little Sea generally does not exceed 5 m, whereas its northern end reaches ~200–300 m.

While several hundred streams and rivers flow into Lake Baikal, the Angara River is its only outlet, which prior to the construction of the dam in Irkutsk was a rapidly flowing braided river. The Irkut, Kitoi, and Belaia rivers are large tributaries of the Angara, all draining the Easter Sayan Mountains west of the south end of the lake. The largest rivers entering the lake, the Selenga, Upper Angara, Kichera, Barguzin, and Turka, all drain areas outside of our study area in Trans-Baikal. The rivers and streams draining into the lake within Cis-Baikal are small by comparison—essentially none are navigable and all can easily be waded across.

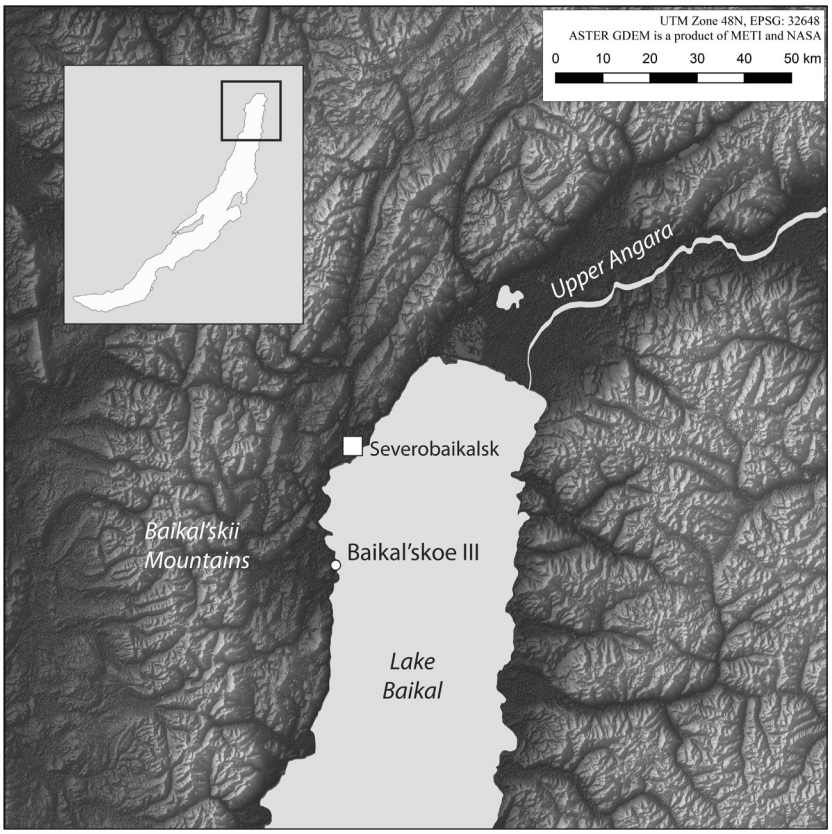

Figure 1.4. Map of the Northwest Baikal micro-region. Faunal remains from Baikal'skoe III are discussed in Chapter 7.

The climate in the Lake Baikal region is continental but varies in relation to a number of different factors including geographical location, specific atmospheric circulation, topography, and the influence of the lake. Winters are cold and last approximately five months, while summers, approximately two months in length, are warm. July and August witness about half of the yearly precipitation in the form of rain. Temperatures during summer may reach 33–35° C, but in winter sometimes drops as low as –40° C. In general, the climate is drier and more variable on the western shore, and wetter and cooler on the east (Galazii and Molozhnikov 1982). The eastern shore is generally downwind of the lake and it is most subject to lake-effect precipitation and the cooling effects of winds that have passed over Baikal. Overall, the Baikal region experiences little precipitation, averaging ~300 mm per year.

Priol'khon'e has a unique microclimate due to its proximity to the Primorskii mountains to the west and the open waters of the lake to the east. Baikal has a warming effect on Priol'khon'e in autumn and winter and cooling effect in spring and summer. In addition, the Primorskii range produces a rain-shadow on this micro-region, resulting in less frequent cloud cover and less precipitation than in surrounding areas. As such, Ol'khon Island is somewhat arid, receiving on average only 169 mm of precipitation annually (Berg 1950; Galaziy 1993).

The average water temperature of Lake Baikal is 4° C, but substantial variation occurs depending on location, season, and depth. For example, while the thermal regime of the northern portion of the Little Sea is similar to that of the open water in the center of Lake Baikal, the shallow areas in the south, such as Kurkut and Mukhor bays, are much warmer. In stark comparison to the cold waters of the open lake, these portions of the Little Sea can reach a high as 20° C in summer (Sorokin and Sorokina 1998). In winter the lake gradually freezes, beginning in the shallow bays at the end of October and encompassing the entire lake during the first few months of winter. The Little Sea is usually completely ice covered by the third or fourth week of December. The melting process on average begins around the third week of May (Kozhova and Izmest'eva 1998).

The Lake Baikal region is also characterized by a high degree of differentiation in vegetation,

especially between the lower elevation areas and the mountains (Galazii and Molozhnikov 1982). Vegetation complexes include steppe, forest-steppe, taiga and alpine-tundra environments (Berg 1950). Common steppe and forest-steppe zone vegetation includes fescue, koeleria, feather grass, and steppe sedge. In some locales, such as southeast part of Ol'khon Island, portions of the Kuda Valley, and stretches along the Upper Lena and Angara, the landscape is steppe, with little tree cover present, except for the occasional larch (*Larix sibirica* and *L. dahurica*) (Kas'ianova 1993).

The taiga vegetation complex is the most widespread in the region, and includes mainly larch, Scots pine (*Pinus sylvestris*), Siberian pine (*Pinus sibirica*), spruce (*Picea obovata*), and fir (*Abies sibirica*), along with some poplar (*Populus suaveolens*) and aspen (*Populus tremula*). Alpine areas are characterized by a diversity of mosses, lichens, grasses, and willows, with meadows being common (Bezrukova 1999; Kozhova and Izmest'eva 1998). Wild food plants commonly used in this region today include Siberian pine (pine nuts), raspberry (*Rubus idaeus*), strawberry (*Fragaria* spp.), blueberry (*Vaccinium uliginosum*), red huckleberry (*Vaccinium vitis-idaea*), bird cherry (*Prunus padus*), wild garlic and onion (*Allium sp.*), burnet (*Sanguisorba alpina*), and canker-rose (*Rosa* sp.).

The mammals of the Lake Baikal region include 67 indigenous species (Liamkin 2002). Terrestrial fauna that were likely important as major sources of food, clothing, and other raw materials include various groups of ungulates and fur-bearing animals. The majority of the ungulates are Cervidae, including red deer (*Cervus elaphus*), roe deer (*Capreolus pygargus*), Eurasian elk (*Alces alces*), and reindeer (*Rangifer tarandus*; Lavov 1974). Musk deer (*Moschus moschiferus*), Siberian snow sheep (*Ovis nivicola*) and wild boar (*Sus scrofa*) are also present in smaller numbers. Common fur-bearing mammals include hare (*Lepus timidus*), Eurasian red squirrel (*Sciurus vulgaris*), Eurasian ground squirrel (*Urocitellus undulatus*), marmots (*Marmota* spp.), and various carnivores. This latter group includes gray wolf (*Canis lupus*), red fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), lynx (*Felis lynx*), sable (*Martes zibellina*), wolverine (*Gulo gulo*), ermine (*Mustela erminea*), several weasels (*Mustela* spp.), steppe polecat (*Mustela eversmanni*), and Eurasian badger (*Meles meles*). Domesticated mammals are now common in the region, including cattle, sheep, goats, pigs, and dogs, and domesticated reindeer are kept in some mountainous regions, including portions of the Easter Sayan range. Historically, camels were also present in small numbers (Zhambalova 2004).

Aquatic mammals in this region consist only of the Baikal seal (*Phoca sibirica*) and the otter (*Lutra lutra*). The latter mainly inhabits rivers (Stroganov 1962) but occasionally can be seen in the lake. Beaver (*Castor fiber*) previously were present in his region, but were extirpated more than 100 years ago (Nekipelov et al. 1965). Baikal seals, locally known as nerpa, are endemic to Lake Baikal, and their preferred habitats are the deep, open sections of the lake. They are an ice-adapted seal, most closely related to the arctic ringed seal (*Pusa hispida*) (Amano et al. 2000; Pastukhov 1993).

Well over 400 species of birds have been documented in the Baikal region (Dorzhiev and Elaev 1999; Fefelov 2001). Lake Baikal and its tributaries are inhabited by a variety of waterfowl, including an array of ducks (e.g., *Anas* spp., *Bucephala clagula*, *Aythya* spp., *Mergus* spp.), common cormorant (*Phalacrocorax carbo*), geese (*Anser* spp.), swans (*Cygnus* spp.), gulls (*Larus* spp.) and terns (*Sterna* spp.). Eurasian bittern (*Botarus stellaris*) and demoiselle cranes (*Anthropoides virgo*) are also occasionally seen along the lake shore. One of the important habitats for waterfowl migrating south in autumn is the 15–20 km stretch of the Angara River immediately downstream from the lake, which often remains largely free of ice in winter (Kozhova and Izmest'eva 1998). The mountain taiga is home to birds such as woodpeckers (*Picidae*), wood-grouse (*Tetrao* spp.) and partridge (*Lagopus* spp.), while the forest zones harbor heath-cock (*Tetraster bonasia*), wood-grouse, tomtit (Paridae species) and woodpecker. The steppe patches are home to partridge, wheatear (*Oenanthe* spp.) and lark (Alaudidae)(Dorzhiev and Elaev 1999; Galazii and Molozhannikov 1982).

While 55 native fish species are present in Lake Baikal, only fourteen are historically documented as important food resources (Kozhov and Misharin 1958). One of the most prominent of these is the sturgeon (*Acipenser baeri baicalensis*), an inhabitant of the region's rivers and some areas of the lake itself. Most

of the other fish species, such as perch (*Perca fluviatilis*), pike (*Esox lucius*), dace (*Leuciscus leuciscus baicalensis*), ide (*Leuciscus idus*), and roach (*Rutilis rutilis lacustris*), spend a significant part of their lifecycle in the littoral or open shallow habitats of the lake (Sideleva 2003). They are also common in the warmer sections of the region's rivers.

The historically documented food fish of the open water environment of Lake Baikal include a number of cold water species such as whitefish (*Coregonus lavaretus baicalensis*), two forms of grayling (black and white grayling; *Thymallus arcticus baicalensis*), lenok (*Brachymystax lenok*) and taimen (*Hucho taimen*). The latter two species are widely distributed in the lake only in summer, but are found in rivers and river mouths during the remainder of the year. Whitefish and burbot (*Lota lota*) move into the rivers only during the spawning season (Kozhov 1972), while some subspecies of whitefish spawn in the shallow waters of the lake itself. White grayling live mainly along the lake's eastern shores and spawn primarily in larger rivers such as the Selenga. Black grayling are widely distributed in the lake and spawn in early spring in smaller rivers along the lake's western shore. These fish also used the Angara between Irkutsk and the lake for spawning prior to dam construction (Kozhova and Izmest'eva 1998).

The omul´ (*Coregonus migratorius*) is the most commercially important fish in the Lake Baikal area today. Omul' is the only species known to inhabit almost all habitats of Lake Baikal, including open coast littoral, pelagic, and deep waters (Bronte et al. 1999). Because of its feeding behaviors, omul' tend to be found closer to shore in the southern parts of the Little Sea (but at depths of 30–50 m) in spring and summer. Around the middle of June adults concentrate in large shoals and move to river mouths for spawning. The omul' spawning period occurs from the end of August until the beginning of October. In October-November, omul' migrate to the deep regions of the lake for wintering (Kozhova and Izmest'eva 1998).

Archaeological Context

The Holocene culture history of Cis-Baikal varies geographically and temporally, with some micro-regions and periods being far better documented than others. The most refined chronologies presently exist for the Middle Holocene (Holocene subdivisions are described below) burials in Angara-Southwest Baikal and Priol'khon'e, and to some extent for those of the Upper Lena; burials of this age are largely undocumented in Northwest Baikal. Habitation sites in all regions generally have poorly established chronologies, with the few exceptions described in this volume. Typically, most such sites have only a few radiocarbon dates, and these tend to be on bulk sediment carbonates or unidentified bones, and have large margins of error. Such sample types have been clearly demonstrated to be poor choices for establishing precise and reliable archaeological chronologies, both in this region and elsewhere (see Nomokonova et al. 2013a and references therein). Further, in the habitation sites that have been extensively radiocarbon dated (multiple dates from each strata), such as Sagan-Zaba II, Bugul'deika II, and Ust'-Khaita (see Chapters 3, 4, and 5), some mixing of materials between strata is almost always indicated. As such, there is good reason to expect that re-dating the region's habitation sites would result in significant revisions in their occupation histories, and in turn would (or should) lead to the redefinition of the culture history units themselves. In other words, there are few temporally 'pure' habitation site layers, although this is commonly assumed to be the case. Further, radiocarbon dates on both human and faunal remains from the region are potentially affected by a significant freshwater reservoir effect caused by the consumption of region's aquatic fauna. This effect was recently discovered while analyzing the Sagan-Zaba II site, described in Chapter 4 (see also Nomokonova et al. 2013a). Methods for correcting for this old carbon effect have now been published (Bronk Ramsey et al. 2014; Schulting et al. 2014, 2015) and have been used to revise the region's Middle Holocene mortuary site chronologies (Weber et al. 2015).

The traditional hallmarks of Siberia's culture history periods are the presence of certain technologies (pottery, bronze ornaments, iron tools; Weber 1995). However, radiocarbon dates on human remains are the data used to establish the chronologies for nearly all of Cis-Baikal's major culture history periods. In other words, mortuary traditions, not technologies, define these periods. The only exceptions are portions of the Late Holocene, when historical records provide some means of independently assessing period timelines. Given the chal-