

ALASKAN RESOURCES DEVELOPMENT: ISSUES FOR THE 1980s.

Edited by THOMAS A. MOREHOUSE. Boulder, CO: Westview Press, 1984. (5500 Central Avenue, Boulder, CO 80301, U.S.A.) xvii + 212 p. incl. index, maps, tables. Hardbound. US \$20.00.

The topic of Alaskan resources development is broad and complex, and includes social, economic, and environmental issues; however, it cannot be completely separated from value judgments. In general, where human observation and analysis enter the picture, different individuals can reach different conclusions using the same data. This book is a good example of a reasonably thorough analysis, but appears to support a particular policy outcome. Perhaps its major contribution is the discussion of a policy continuum.

The book is divided into six substantive chapters, each by a different author (including the book's editor), and an Introduction and Conclusion by the editor. The topics include land policy, petroleum-based economy, non-fuel minerals and coal, renewable resources, environmental issues, and management of Alaska's wealth.

From a general-interest standpoint, much of the book provides a good review and analysis of resource policy in Alaska. I was particularly impressed with Cooley's chapter on the evaluation of Alaska land policy and Weeden's chapter on environmental issues. Richard Cooley's presentation of the diminishing role of the U.S. Bureau of Land Management as the chief federal land manager and the increasing roles of the U.S. Fish and Wildlife Service and National Park Service was of particular interest. The shift can be seen as away from multiple use toward more restrictive protection of the natural environment. My impression of this chapter was modified somewhat in the last few pages: Cooley concludes by indicating that a pro-development stance on the part of Alaska's state government could be economically wasteful and cause damage to the environment. He develops this point with little supporting material, thus providing a conclusion before the analysis is complete. The chapter ends on the contentious theme that Alaskan resources are economically depleted.

Robert Weeden emphasizes four themes relative to environmental issues: trade-offs between development and conservation, colonialism, rural vs. urban Alaska, and anti-government reaction to environmental regulation. Weeden concludes by indicating that expansionist public policy will create environmental conflicts, and that an alternative approach emphasizing education, research, maintenance of infrastructure, and better stewardship of resources will not (this implies a high savings potential by the Alaska state government). A strong bias is apparent toward the latter approach.

Arlon Tussing discusses the petroleum-based economy, and unfortunately develops too broad an analysis. My preference would have been to develop the case for petroleum by examining past policies and then discussing resource decisions. Tussing attempts to do this while delving into topics such as economic-base analysis, crude-materials processing, and "the emergence of Alaska as a cultural entity". I would have appreciated more detail, and I believe the topics should have been developed in two chapters. Tussing also emphasizes the decline of world oil prices and the potential impact of oil revenues on the Alaska state government. It should be noted that Tussing is a leading spokesman for this minority view of world oil prices. There are other petroleum economists (particularly in the Alaska Department of Revenue) using similar data, who have a more positive view.

A key point in Tussing's chapter is the examination of Ugnu, a heavy-oil field on the North Slope near Prudhoe Bay. He indicates that if technology can be developed to tap this field by the time the main Prudhoe Bay oil field declines, "...it is likely to displace Prudhoe Bay as the largest oil field ever found in the United States or Canada." The possibility of such technology being developed does not appear all that remote, although, as Tussing notes, the higher cost of production in Alaska makes such an oil field marginal.

The non-fuel minerals chapter by Brad Tuck makes a strong case for the market-test argument. In essence, government subsidizing of mineral development is not economically efficient. Based on economic theory, Tuck has a point, except that he seems to indicate that distribution and equity questions are secondary to economic efficiency. In other words, it is more important to obtain maximum return on investment than to provide for more equitable distribution of resources in society (e.g., regional employment). Economic theory offers a neat framework for efficiency evaluation, but has a less satisfactory analytical structure for equity questions. Using economic-efficiency criteria as the policy benchmark assumes that present ownership of resources and wealth by permanent Alaska residents will continue as it is. Tuck's implicit value judgment follows the pattern that occurs throughout this book; i.e., the authors favor efficiency-based answers to policy questions.

Renewable resources are covered in one chapter by Matthew Berman. He begins by attempting to make a case for biological constraints on the development of renewable resources at high latitudes. I found his supporting material for this assertion to be meager. Biological constraints of various types exist in

every forest, agricultural, and fishing region in the world. Farming in Alaska, with its short (based on frost-free days) growing season, is probably no more difficult than in Australia's successful agricultural areas where moisture stress is often a major problem.

The highlight of Berman's chapter is an informative discussion of common property resources in Alaska. This is the problem associated with public ownership and management of renewable natural resources. Generally speaking, federal and state governments have not given ownership of publicly owned resources to harvesting interests; they have only given harvest rights, e.g., for timber or fish. As the state population has grown, non-commercial, non-consumptive, and other commercial user groups have become more vocal in proclaiming their rights to these resources. The outcome is a growing government "bureaucracy to referee user claims".

I was particularly unimpressed with Berman's discussion of agriculture. He seems to have read few, if any, of the myriad of studies on Alaskan agricultural development conducted in the past 10 years. Finally, he argues that growth in renewable resources depends on increasing "subsidization of submarginal activities". These are value-laden terms needing stronger support than is provided in this chapter.

Thomas Morehouse, in his chapter on Alaska wealth management, suggests a major relationship between economic growth and expenditures by the State of Alaska. He cites sources which indicate that 50% of current employment and business activity in Alaska is related to Prudhoe Bay. With the downturn in oil production that will likely occur some time in the next decade, coupled with low world oil prices, revenues to the state will be greatly reduced. These lost revenues cannot be replaced by other resource-development schemes in Alaska (an argument which recurs throughout the book), so a large economic contraction will occur.

This bleak scenario is based on conservative estimates of future events. It should be remembered that this is only one of several possibilities including development of the Ugnu field, a rise in oil prices, the discovery of another Prudhoe Bay-sized field onshore or offshore on state-owned submerged lands. Each of these scenarios has a probability greater than zero. But assuming the worst, or the Morehouse *et al.* outcome, what should the state government do with its royalties and taxes as long as Prudhoe Bay production lasts? The answer is based on value judgments and will be decided through public-policy decisions.

Morehouse provides a good analysis of the end points of a policy continuum. At one end is the economic-efficiency approach: the state should save and invest as much as possible in a portfolio which will maximize return for predetermined levels of risk. Resource development that does not meet the market test would not be subsidized. Such a strategy would tend to favor state and local-government employees, businesses dependent on government (state or local) business, and long-term residents. At the other end of the policy continuum is a pro-spending approach. State support for resource development, and high operating and capital budgets, would keep economic activity in Alaska at a high level for the next 5-20 years. This would directly benefit construction firms, resource-development interests, short-term residents (who stay in Alaska for the high salaries), and newcomers to the state.

The issue is that there are other groups, probably a large percentage of Alaska residents, who have sympathy with both extremes of the policy continuum. I expect that state government policy on this topic will be somewhere between the two end points, and will vary from year to year depending on new estimates of state revenues. Thus economic efficiency and distribution issues will both be considered in the policy process.

The book is nicely bound and has few typographical errors. One problem is the type size used: it is too small for easy reading. I understand that a soft-bound version has been printed with larger type size.

I found the book both interesting and somewhat provocative. It is valuable reading for those who wish to better understand Alaskan resource issues. It is essential to remember, however, that the interpretation of economic data relative to future events is, to a degree, in the eye of the beholder.

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PALEOECOLOGY OF BERINGIA. Edited by DAVID M. HOPKINS, JOHN V. MATHEWS, JR., CHARLES E. SCHWEGER, and STEVEN B. YOUNG. New York: Academic Press, 1982. ISBN 0-12-355860-3. 489 p. incl. 121 illus., 39 tables, indices, refs. No price indicated.

Paleoecology of Beringia, a collection of 24 edited papers, is the result of a symposium organized by its editors, held in June 1979 at Burg Wartenstein,

Austria, sponsored by the Wenner-Gren Foundation. The papers are organized into six sections, with a concluding summary and synthesis by the editors. Some were written after the conference. They range from very detailed, somewhat narrow contributions on the general theme of the symposium to major syntheses.

The volume will appeal to both specialists and other scientists interested in the nature of this unique Late Pleistocene environment. The symposium focuses on this environment's productivity — how the apparent abundance of vertebrate fauna can be reconciled with a probably sparse vegetation between 45 000 and 11 000 B.P.

Setting the stage for the volume is a new geological and paleoenvironmental synthesis by David Hopkins, the acknowledged dean of Beringian studies. In a paper entitled "Aspects of the Paleogeography of Beringia during the Late Pleistocene", he presents a regional Beringian paleoenvironmental chronology for the Late Pleistocene. Hopkins proposes four intervals, the Happy (©65 000 years), the Bouteller (65 000 - 30 000), Duvanney Yar (30 000 - 14 000) and the Birch Zone (14 000 - 8 000). The Bouteller, the most ecologically productive, was the time of maximum development of the unique Beringian ecosystem, and the Duvanney Yar the most intense cold dry interval. At 14 000 B.P. a major climatic and environmental change occurred marking the end of Beringia. Hopkins's new synthesis of the glacial, paleoecological, vertebrate, and other data is, like his earlier syntheses (Hopkins, 1967, 1972) the "state of the art" statement on the overall characteristics of Beringia. It represents a significant advance in our knowledge and conception of this lost environment which lacks modern analogues. S.V. Tomerdiro presents an accompanying paper to Hopkins's on the evolution of the North-eastern Asian landscapes.

Five papers deal with the fossil record of the Beringian vegetation, focusing on the steppe-versus-tundra and productivity debate. They range from extremely conservative views, presented by James C. Ritchie and Les C. Cwynar in a paper titled "The Late Quaternary Vegetation of the North Yukon" (they interpret the fossil record as representing an environment not particularly different from the more sparsely vegetated arctic regions today), to reconstructions of a more varied and prolific productive Beringian vegetation by most other authors. Palynology and macrofossils are discussed in a paper by R.E. Gitterman, A.V. Sher, and J.V. Mathews, Jr. entitled "The Comparison of the Development of the Steppe-Tundra Environments in West and East Beringia" and in Charles E. Schweger's paper "Late Pleistocene Vegetation of Eastern Beringia: Pollen Analysis of Dated Alluvium". These papers, and an important synthesis by J.V. Mathews, Jr., entitled "East Beringia During Late Wisconsin Time, a Review of the Biotic Evidence", which integrates the plant, mammal, and insect macrofossil remains with the pollen record, correctly emphasize the ecological significance of the large grazers in reconstruction of the Beringian vegetation. Ritchie and Cwynar largely ignore the faunal evidence, stating:

"We suggest that the arctic steppe biome never existed in the Northern Yukon (nor in Alaska) during the most recent stadial-interstadial cycle (25 000 to 0 B.P.). There is so far no evidence of large numbers of either species or individuals of herbivorous vertebrates" (p. 126).

However, the evidence that Mathews and others present indicates that the fauna, while less abundant than in the preceding Bouteller interval, is represented by numerous radiocarbon-dated specimens in the Duvanney Yar interval indicative of greater faunal diversity and numbers than are present in today's environment. The archaeological, faunal, and paleoenvironmental data from the Blue Fish Caves excavations, in the foothills of the Keel Range; reviewed in a symposium paper by J. Cinq-Mars and Richard Morlan, are pertinent to Ritchie and Cwynar's argument. The evidence at Blue Fish indicates that man and a diverse fauna were present around the northeast perimeter of Glacial Lake Old Crow during the Duvanney Yar, which would appear to contradict Ritchie and Cwynar's interpretation. To account for the diversity in the record, Mathews and others suggest that Beringia was a vegetational mosaic characterized by a variety of vegetation associations and zonations, reflecting as Schweger points out the geographical distribution of topography and surface water as well as elevation. The writers postulate a number of associations, including tundra, grasslands, mixed tundra, and steppe-tundra associations. Thomas A. Ager, in a paper on the vegetational history in Western Alaska, views the vegetation as primarily herb tundra on the southern border of Beringia, supporting Ritchie and Cwynar's scenario:

The steppe-tundra concept is further explored in three papers dealing with historical and modern vegetation aspects. The concept itself is reviewed in a short (3.5 pages) paper by Dennis Hibbert, a very brief review of its development among European, Soviet, and North American scientists. A more detailed analysis of the intellectual bases, biases, and theoretical orientation of the various schools would have been useful to the reader in better understanding the present debate. Very useful papers are included by Borris A. Yurtsev and Steven B. Young on modern vegetation. Yurtsev presents a review of the

nature and distribution of relic steppe-tundra communities in Northeastern Siberia, which are more numerous than most of us know. Yurtsev makes particular mention of the relic communities on Wrangel Island, the closest living analogues to Northern Beringian vegetation. Young presents a zonal regional vegetational reconstruction of the Land Bridge, emphasizing its mosaic nature, and discusses a number of important phytogeographic and synecological considerations, reminding us that these ecological principles must always be utilized in interpreting Beringian vegetation, a consideration occasionally forgotten by some palynologists writing in this volume. He notes: "the concept of two simple biomes, the tundra and taiga, in northeast America was largely developed by workers in glaciated areas of Canada and Scandinavia, where the floral communities are much less complex than Beringia today and certainly in the past" (p. 185). Young correctly recommends that we ignore these simple concepts and their associated climatic and other implications when interpreting the Beringian record.

Two papers are included on the Beringian paleoclimate. The first, by Roger Barry, deals with approaches to reconstructing the steppe-tundra climate, and the second, by Tzui-Gal Chan, with mathematical modelling. Both provide insights into the Beringian climatic system and some of its unique characteristics, much more of which remains to be understood.

A section entitled "Primary Production and the Pleistocene Ungulates - the Productivity Paradox" contains seven papers. They run the whole gamut of ungulate-related studies, from a paper entitled "Production and Diversity in Contemporary Grasslands" by R.E. Redman to "The Morphological Characteristics of the Mammoth: An Adaptation to the Arctic Steppe Environment" by Henry Kubiak.

Three papers, including Redman's, one by L.C. Bliss and James C. Richards entitled "Present-Day Arctic Vegetation and Ecosystems as a Predictive Tool for the Arctic-Steppe Mammoth Biome", and P.J. Martin's "Digestive and Grazing Strategies of Animals in the Arctic Steppe", deal with present-day ungulates, grassland, tundra, and ecosystems. Although providing some insights into the Beringian community they do not, except for that of Bliss and Richards, integrate well into the volume, principally because most of the models presented or discussed are not viewed by the authors within the Beringian perspective. Bliss and Richards, in contrast, propose a model for the Beringian ecosystem which includes not only vegetation and mammals but also man and his dogs. They estimate carrying capacities of 15-25 persons per 1000 km². While these estimates may be somewhat low, based on analogues from the Northwestern Plains grass - bison - man ecosystem, they provide a framework for examining the Beringian ecosystem from the human perspective. Bliss and Richards's paper is one of the few in the volume to consider man as an integral component in the Beringian ecosystem, and is a welcome addition.

A paper by N.K. Vereshchagin and G.F. Bortshnikov reviews various aspects of the paleoecology of the mammoth fauna in Eurasia, providing the reader with useful information on the age, morphology, ecology, and biotopes of mammoth, woolly rhino, steppe bison, yak, and other species which comprise the fauna. Major faunal extinctions in Siberia occurred between 45 000 and 30 000 years ago and 12 000-10 000 years ago. Henry Kubiak summarizes the adaptive morphological characteristics of the mammoth, and Robert C.D. Oliver examines the ecology and behaviour of living elephants, relating these to the Beringian mammoths and their environment. Oliver views their extinction as a result of environmental change combined with increased predation by man.

R. Dale Guthrie of the University of Alaska takes the steppe-tundra productivity argument a major step further, in a paper examining the ethology and ecology of the mammoth fauna. Guthrie correctly points out that the great diversity, dietary specializations, gigantism, and ornamentation of the constituent species indicates a highly productive environment. As in his earlier works (Guthrie, 1968), he has once more brought together many lines of evidence to provide us with an important new synthesis on the mammals and their environment which, in Guthrie's view, indicates that a more productive grassland system existed there then than in modern analogues today. Climate, not man, was the overriding cause of the demise of the mammoth steppe, in Guthrie's view, a case which he successfully argues.

Man in Beringia is dealt with in the five papers, ranging from a major review of Eastern Beringian data by Richard Morlan and Jacques Cinq-Mars to a paper by Stuart A. Marks entitled "Arguing from the Present to the Past: A Contemporary Case Study of Human Predation on African Buffalo". Marks's paper deals with a marginal Zambian agricultural group's hunting of wild water buffalo. It not only is irrelevant to the other papers in the volume but also displays a lack of knowledge and interest on the part of the author in either the ecosystems or the archaeology of Beringia. It should not have been included. There are much better studies of contemporary and prehistoric hunters in northern latitudes that are applicable to the Beringia model.

Hans Müller-Beck, in a paper mistitled "Late Pleistocene Man in Northern

Alaska and the Mammoth Steppe Biome" (as it deals with Eurasia) provides a wide-ranging and somewhat eclectic review of large mammoth/mammal hunting sites, and the archaeology and paleoecology of Western Europe and Asia including China. Müller-Beck concludes that man was well adapted by 40 000 years ago to the steppe-tundra and could have crossed the Land Bridge by that time.

Morlan and Cinq-Mars review the evidence for human occupation in the late Pleistocene of Alaska and the Yukon, including the controversial Old Crow bone technology, and the results of excavation at Blue Fish Caves and later terminal Pleistocene sites. They conclude that man was probably present more than 50 000 years ago. (Since then Morlan has revised his position at least twice.) Of particular importance are the Blue Fish Caves excavations, where both bone and stone artifacts occur in good stratigraphic context, which on the basis of Cinq-Mars's 1983 site studies date to ca. 25 000 years ago. Blue Fish promises to become one of the key sites in unravelling the argument about humans vs carnivores as agents of bone modification centering around the bones found at Old Crow by the Archaeological Survey of Canada and W.N. Irving's group from the University of Toronto. Whereas Morlan and Cinq-Mars devote considerable space to the work of Morlan *et al.* from the Archaeological Survey, they barely mention Irving *et al.*'s interpretations of the geology, archaeology, and chronology. Indeed, Irving's most recent studies, though referenced in the volume, are not cited or discussed in Morlan and Cinq-Mars's paper, a most unfortunate academic "oversight" which the editors should have corrected, as Irving's group has a reasonably good argument suggesting that occupation at Old Crow dates at least to Late Illinoian times, ca. 150 000 years ago.

While the archaeological evidence points to an Eastern Beringian human occupation by 30 000 years ago at the latest, papers by C. Vance Haynes and Paul S. Martin present the extreme conservative view of most American archaeologists, reaffirming their "gut" views of Pleistocene overkill and the first occupation of the Western Hemisphere (ca. 12 000 B.P.). In their view, man, entering the New World out of Asia around 14 000-12 000 years ago, was largely if not solely responsible for the extinction of the Pleistocene megafauna both in Beringia and in the continental interior to the south, as the "Ice-Free Corridor" opened up at the end of the last glaciation along the eastern slopes of the Rocky Mountains. This corridor, however, was most probably present throughout Late Wisconsinan or Duvanny Yar time. These authors dismiss with no argument, or don't mention, the Beringian archaeological evidence reviewed by Morlan and Cinq-Mars (e.g., Blue Fish Caves) and that from south of Beringia, which indicate a pre-17 000 B.P. entry for man. Haynes's and Martin's papers, particularly Martin's, represent a restatement of previous, somewhat dated, views which shed no new light, and simply sidestep the issues and evidence of the last 10 years on the age of Early Man in the Americas.

The concluding section, "The Paleoecology of Beringia", is a major synthesis by the editors. Highly readable and based on a most reasonable interpretation of the data, it is the paper one should read first or immediately after Hopkins's initial statement. Hopkins, Mathews, Schweger and Young have brought together the various lines of evidence to develop a Beringian scenario and man's place in it for the last 40 000 years. They present a perceptive view of the human and natural history of this unique Pleistocene ecosystem which will no doubt change in future years as research continues.

In sum, this volume will be the basis on which the explanatory theory and models develop over the next decade. It should be on every Quaternary scientist's shelf, not only as a basic reference but also as an example of the value of an interdisciplinary approach in increasing our knowledge and understanding of this unique ecosystem as well as other environments of the Quaternary period.

REFERENCES

- GUTHRIE, R.D. 1968. Paleoecology of the large mammal community in interior Alaska during the Late Pleistocene. *American Midland Naturalist* 79:346-373.
- HOPKINS, D.M. (ed.). 1967. *The Bering Land Bridge*. Stanford: Stanford University Press.
- _____. 1972. The paleogeography and climatic history of Beringia during late Cenozoic time. *Internord* 12:121-150.

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POZDNEPLEYSTOTSENOVYE I RANNEGOLOTSENOVYE KUL'TURNYE SVYAZI AZII I AMERIKI (LATE PLEISTOCENE AND EARLY HOLOCENE CULTURAL CONTACTS OF ASIA AND AMERICA). Edited by R.S. VASIL'YEVSKY. Novosibirsk: Izdatel'stvo "Nauka", 1983. 151 p. Price 2 rubles 30 kopecks (North American price unknown). In Russian.

The Pacific was one of the most significant areas on earth for the origin of Early Man and the development of humankind. Scholars from nearly 50 countries, in the 60 years since the foundation of the Pacific Science Association in the 1920s, often meet in congresses of Pacific studies for the exchange of scientific information.

The XIX Congress, entitled "Environment of the Pacific Ocean for the Development of Humankind", was held in 1979 in Khabarovsk, USSR. Eighteen papers, included in the monograph under review, were presented in one of the congress's symposia, "Late Pleistocene and Early Holocene Cultural Contacts of North Asia and America". The monograph is divided into two relevant sections: Ancient Cultural Contacts, and Chronology and Periodization. The papers, written by specialists from the Soviet Union, United States, Canada, and Japan, include: New Information on the Mongolian Paleolithic (A.P. Okladnikov); Cultural Contacts between Northeastern Asia and America on the Basis of the Late Pleistocene and Early Holocene Sites of the Kamchatka, Chukotka and the upper Kolyma River (N.N. Dikov); Levallois Traditions of North Asia and North America (R.S. Vasil'yevsky); Paleolithic Population of Southern Siberia and Ancient Cultures of North America (G.I. Medvedev); On the Peopling of Sakhalin Island (V.A. Golubev); Evaluation of the Late Pleistocene and Early Holocene Archaeology of Coastal Alaska, the Bering Sea and Asia (R.E. Ackerman); Late Pleistocene Traditions of Northeast Asia and Northwest America (A.L. Bryan); Early Cultures of Northern Northwest America (R.L. Carlson); Sinodontia and Sundadontia: Origin, Microevolution and Distribution of the Mongoloids in the Pacific, Siberia and America on the Basis of Odontological Data (C.G. Turner); Contacts of Northern Japan with American Preceramic Traditions During the Holocene (V. Herli, P. Blid, and M. Esidzaki); Cult of Birds in California (E.A. Okladnikova); Small Tools from the Lower Horizon of the Hosino Site in Japan (T. Seridzava); Early Sites of the Middle Coast of British Columbia (F.M. Hobler); The Placement of the Yubileyny Site in the Stone Age of Yakutia (V.A. Kashin); Final Paleolithic of Trans-Baykal (M.V. Konstantinov); The Neolithic Site of the Chertovy Vorota Cave (V.A. Tatarnikov); Archaeological Investigations in the Coast of the Western Tatar Peninsula (V.I. D'yakov and O.V. D'yakova); and Excavations of the Middle Age Mounds in the In River (V.E. Medvedev).

Although each of these articles is significant for the study of Early Man in the northern Pacific, I emphasize in this review those papers which deal directly with comparative studies of the two continents and some articles written by certain Soviet archaeologists which are not readily accessible to readers in the West.

In order to understand the problems of the peopling of North America it is necessary to familiarize oneself with the origins of Early Man in Siberia. Okladnikov's and Vasil'yevsky's articles address this topic in concise form. Russian and Soviet scholars have a long-established tradition of the study of Early Man. In an attempt to establish the ethnogenetic origins of past human cultures, the questions usually asked have been directed toward the investigation of the migration of Early Man from the Old to the New World, and toward a definition of the geographical dimensions of archaeological cultures. The settlement of Siberia by Early Man was a lengthy and complex process originating in various regions of Asia and Europe, where human cultures had already long existed. Unlike the studies concerning Soviet Central Asia, southeastern Asia, and eastern Europe, no indisputable evidence has as yet been found to confirm the habitation of Siberia by man of the Lower Paleolithic period. The earliest Upper Paleolithic settlements of Siberia (except Ulalinka in Altay and the Kumara sites in the middle Amur) belong to the Kargin Interstadial or Sartan Glacial period (Tseytlin, 1979).

The spread of Early Man into new areas with severe winter climates also required a significant period of time for adaptation to the new conditions. The settlement of the expanses of Siberia, rich in natural resources but with difficult climatic conditions, was directly linked to a host of ecological and demographic changes occurring in areas already inhabited by man, from which were established several routes for migration to Siberia.

The first route originated in Soviet Central Asia (Kazakhstan, Uzbekistan, Turkmenia). In the latest Paleolithic settlements of the Altay and the Yenisey River, one finds Levallois cores and long blades similar to those found on the Kara-Kum desert on the Syr-Dar'ya River, near the city of Leninabad, and in the Khadzhikeynsky Cave near the city of Tashkent (Anisutkin and Astakhov, 1970). The hypothesis first suggested by Mergart, Savitsky, and Sal'moni (Kholyushkin, 1981) was expanded later by Okladnikov. In a number of his publications, Okladnikov defines a "Siberian-Mongolian Upper Paleolithic