ALASKA ATHABASCAN STELLAR ASTRONOMY

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Abstract

Stellar astronomy is a fundamental component of Alaska Athabascan cultures that facilitates time-reckoning, navigation, weather forecasting, and cosmology. Evidence from the linguistic record suggests that a group of stars corresponding to the Big Dipper is the only widely attested constellation across the Northern Athabascan languages. However, instruction from expert Athabascan consultants shows that the correlation of these names with the Big Dipper is only partial. In Alaska Gwich'in, Ahtna, and Upper Tanana languages the Big Dipper is identified as one part of a much larger circumpolar humanoid constellation that spans more than 133 degrees across the sky. The Big Dipper is identified as a tail, while the other remaining asterisms within the humanoid constellation are named using other body part terms.

The concept of a whole-sky humanoid constellation provides a single unifying system for mapping the night sky, and the reliance on body-part metaphors renders the system highly mnemonic. By recognizing one part of the constellation the stargazer is immediately able to identify the remaining parts based on an existing mental map of the human body. The circumpolar position of a whole-sky constellation yields a highly functional system that facilitates both navigation and time-reckoning in the subarctic.

Northern Athabascan astronomy is not only much richer than previously described; it also provides evidence for a completely novel and previously undocumented way of conceptualizing the sky—one that is unique to the subarctic and uniquely adapted to northern cultures. The concept of a large humanoid constellation may be widespread across the entire subarctic and have great antiquity. In addition, the use of cognate body part terms describing asterisms within humanoid constellations is similarly found in Navajo, suggesting a common ancestor from which Northern and Southern Athabascan stellar naming strategies derived.

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Chapter 1: Introductory Materials

1.1 Introduction

Cultural astronomy is defined in this thesis as an indigenous culture's way of understanding, perceiving, and integrating the sky and its contents into its systems of knowledge and worldview. Cultural astronomy research is interdisciplinary in nature, drawing from the field techniques and methodologies of its parent disciplines: anthropology, archaeology, linguistics, history, and scientific astronomy. Cultural astronomy also encompasses the two subfields; archaeoastronomy and ethnoastronomy (Lopez 2011, 1). The division, archaeoastronomy, is primarily concerned with the study of a culture's past knowledge of the sky through historical and archeological investigation (Fabian 2001, 4; Kelley and Milone 2011, 2; Holbrook 2012, 246), while ethnoastronomy pertains to the holistic study of a living culture's understanding and relationship with the sky (Fabian 2001, 3). For the purpose of this thesis the terms ethnoastronomy and cultural astronomy both adequately describe this research.

The sky is a universal feature of the human experience, and Aveni (2001, 1) unequivocally states: "All developing civilizations exhibit reverence for the sky and its contents." Other scholars qualify, as Holbrook explains, that while it has been "definitively stated again and again that all human cultures have sky knowledge and a relationship to the sky . . . as of this millennium, information has not been collected from all human cultures in order to prove or disprove this point" (Holbrook 2012, 367). Whether all indigenous peoples utilize knowledge of the sky is somewhat circumstantial to the point that of the nearly 7,000 world languages (Holman et al. 2011, 843), few systematic ethnoastronomy studies have been conducted. In addition, most of the research within the field of cultural astronomy has focused primarily on physical artifacts devoted to astronomical observation and calculations (Kelley and

Milone 2011), and relatively less attention has been invested in describing and documenting the astronomy knowledge of living indigenous cultures. While peoples of high latitude regions, such as the Eastern Canadian Inuit have been shown to have rich systems of astronomy knowledge (MacDonald 1998; Bradley 2002), no systematic attempt has been made to describe the astronomy knowledge of any Northern Athabascan (Dene) culture.[1]

Indigenous knowledge of the sky is a fundamental component of Alaska Athabascan cultures that facilitates time-reckoning, navigation, weather forecasting, and cosmology. However, indigenous astronomy knowledge systems are today even more endangered than Alaskan languages themselves. Modern technology has replaced every major use of astronomy, leading to the disuse and loss of traditional astronomy knowledge. While no systematic effort has been made to document Northern Athabascan concepts of the sky, what little work has been done suggests a rich domain of linguistic and cultural knowledge.

This thesis describes and documents salient aspects of Alaska Athabascan stellar astronomy and shows that these stellar knowledge systems are much more detailed than previously believed. In addition to identifying stars and their varied uses in Alaska Athabascan culture, this research explores errors in the existing documentation, and builds a case for a uniquely adapted Northern Athabascan system of mapping the sky. Further, I discuss commonalities between Northern and Southern or Apachean stellar naming strategies and explain how such similarities may have antiquity within the larger Athabascan family.

Indigenous knowledge systems such as astronomy represent alternative possibilities of understanding and conceptualizing the world. Unlike the terrestrial environment, the celestial vault represents an accessible and essentially unalterable resource (Ruggles and Saunders 1993,

[1] While the terms Athabascan and Dene refer to the same language family, I have chosen to use the term Athabascan as preferred by the Tanana Chiefs Conference. Other alternative spellings of the term Athabascan include Athabaskan, Athapascan, and Athapaskan.

9) presumably observed by most, if not all world cultures (Steele 2008, 14). Cross-cultural comparisons of indigenous astronomies have received little attention in anthropological research and are particularly valuable "at the level of seeing how the same celestial resource is perceived [and] integrated into different systems of classification and belief, and manipulated to different or similar ideological ends" (Ruggles and Saunders 1993, 10). No doubt much indigenous astronomical knowledge has been lost in the recent past, rendering the documentation task more difficult. It is nonetheless still possible to reconstruct indigenous knowledge of the subarctic sky by combining archival research, ethnographic interviews, and an understanding of scientific astronomy.

1.2 Literature Review

The scope of this literature review is focused on Athabascan astronomy, though several relevant sources on ethnoastronomy research methodologies are described. Fabian's (2001) *Patterns in the Sky* is an introductory handbook to ethnoastronomy research and fieldwork. Likewise, Holbrook's (2012) book chapter *Cultural Astronomy for Linguists* also provides an excellent overview of field techniques for documenting indigenous astronomy knowledge and terminology. In addition, *Handbook of Archaeoastronomy and Ethnoastronomy* edited by Ruggles (2014) is a comprehensive three volume work that supersedes previous references in nearly all areas related to conducting cultural astronomy research.

1.2.1 Southern Athabascan Sources

Few systematic ethnoastronomy studies have been conducted in North America north of the Rio Grande (Kelley and Milone 2011, 411) let alone within the Athabascan family. Navajo, a Southern Athabascan or Apachean culture is the only ethnolinguistic group within the Athabascan family with well-documented knowledge of the sky.

Haile's (1947) classic work *Starlore among the Navaho* identifies 37 constellations comprised of numerous smaller groups of stars or asterisms. Navajo constellations are generally known as "star people" and the asterisms that comprise them are primarily named using body part terminology (Haile 1947, 5, 7-11). Haile supplements his identification of the Navajo constellations with a hand drawn star chart and explains that Navajo stellar astronomy primarily facilitates healing ceremonies and divination. Narratives on the creation and arrangement of the Navajo constellations are found in Haile (1947, 1-4) and O'Bryan (1956, 16-21). Together with Griffin-Pierce's (1992) book *Earth is My Mother, Sky is My Father* these works are the most scholarly sources on Navajo astronomy.

Griffin-Pierce (1992, 142-173) corroborates that Navajo stellar astronomy primarily serves a religious function intimately connected with sandpaintings and healing ceremonies. While the most comprehensive list of Navajo star and constellation names is found in Haile (1947), Griffin-Pierce provides contextualization and detailed analysis of Navajo astronomy not found in any other source. Griffin-Pierce (1992, 167-168) also stresses that while many aspects of Navajo culture are borrowed from the adjacent Pueblo tribes, the strategy of naming stars after human forms and body parts is not prevalent in neighboring cultures. Griffin-Pierce states:

> Navajos stress greater anatomical accuracy (as demonstrated by linguistic elaboration) than do Pueblo groups such as the Hopi, whose preoccupation and focus of culture is fertility. The same difference in cultural foci is illustrated by the fact that no Hopi constellations are named after an individual human figure, while only one of the fourteen Zuni constellations represents a human figure, while five of the eight major Navajo constellations depict single human figures, with the component stars representing body parts (Griffin-Pierce 1992, 168).

In addition to the sources just described, Maryboy and Begay (2010) provide a very general introduction to Navajo astronomy in their book *Sharing the Skies*. While Maryboy and Begay include a stylized Navajo star chart they do not mention the Navajo body part asterisms, which are important for comparing Athabascan systems of mapping the sky and understanding Athabascan astronomy more broadly. However, the authors satisfy their goal to create an introductory resource on Navajo astronomy.

While Apache knowledge of the sky has received less attention from scholars than Navajo astronomy, Farrer (1991) conducted an in depth study on the use of astronomy in Apache ceremonials, published as *Living Life's Circle: Mescalero Apache Cosmovision*. While Farrer's research is quite detailed, surprisingly few Apache constellations are identified. Farrer's papers *Mescalero Apache Terminology for Venus* (1986), and *Star Clocks: Mescalero Apache Ceremonial Timing* (1987) investigate the different names for Venus in relation to different contexts and describe the use of stellar time-reckoning in Apache ceremonies, respectively.

1.2.2 Alaska Athabascan Sources

While several detailed studies have focused on Apachean astronomy, there has so far been no systematic effort to describe and document Northern Athabascan knowledge of the sky. Granted, a thorough understanding of naked-eye astronomy requires a specialized background uncommon to the average student of anthropology, published discourse on Northern Athabascan stellar concepts are scarce and fragmentary. Only several classic ethnographic reports show attempts to elicit Alaska Athabascan stellar knowledge as a unique topic of inquiry. These reports are Osgood's *Tanaina Culture* (1933), *Contributions to the Ethnography of the Kutchin* (1936), *Ingalik Mental Culture* (1959), *The Ethnography of the Tanaina* (1976), and McKennan's *The Upper Tanana Indians* (1959) and *The Chandelar Kutchin* (1965).

While sources published by Osgood and McKennan are extremely important for their generally rich ethnographic documentation, they provide little insight into Athabascan stellar knowledge. Each of these sources elicits no more than two or three star or constellation names and generally lack descriptions of their utility or significance in a cultural context. What little mythological information is documented also lacks the context required to more fully understand the role of stars in Northern Athabascan cosmology or religion. In his monograph, *The Upper Tanana Indians*, McKennan (1959, 110) identifies that Ursa Major is the best known constellation and explains that it is used in time-reckoning. McKennan (1959, 110) also states: "The astronomy knowledge of the Upper Tanana is extremely slight. Star lore plays no part in their mythology, and only a few constellations are named." However, McKennan (1959, 110) also acknowledges that he conducted his research during the late spring when no stars were visible, suggesting that Upper Tanana astronomy may be more detailed than he describes.

Osgood provides fairly thorough descriptions of certain aspects of the Northern Athabascan sky, though his descriptions of stellar knowledge are scarce and generally lacks analysis. The most salient aspect of Osgood's documentation is a detailed description of a Dena'ina stellar figure that resides in the North Star and who the people appealed to as a powerful and beneficent figure much like the Christian God (Osgood 1976, 174). A certain Dena'ina clan or moiety also claims ancestry from the North Star (Osgood 1976, 130). Osgood (1959, 53, 110) also describes a belief in "star spirits" or "star people" among Deg Hitan Athabascans and explains that stars are regarded as holes in the celestial vault. Osgood (1959, 53, 181) provides Deg Hit'an names and personified descriptions of the Morning and Evening Stars but does not precisely locate or identify them in the sky. McKennan (McKennan 1959, 110, 113) and Osgood (1936, 54-55; Osgood 1959) identify that the Gwich'in, Deg Hit'an and Upper

Tanana Athabascans use stars for time-reckoning. While McKennan and Osgood add only very little to our understanding of Alaska Athabascan stellar knowledge, their contributions are above average and serve as valuable records of early attempts to elicit these concepts.

Data on Alaska Athabascan stellar astronomy is also found in several more contemporary sources. In their book *Tatl'ahwt'aenn Nenn': The Headwaters People's Country* John and Kari (1986, 27-28) include an Ahtna narrative regarding beliefs about a morning star. John and Kari (1986, 29) also mention that the term used to identify the Christian God *nek'eltaenn* is also the name of an indigenous Ahtna constellation that looks like a man.

In Nelson's ethnographies on Gwich'in (1973) and Koyukon (1983) traditional environmental knowledge several paragraphs are devoted to stellar concepts. On Gwich'in stellar astronomy Nelson (1973, 185) concludes that the Gwich'in "have very little knowledge of astronomical phenomena, with names for only a few stars and constellations." However, in his book *Make Prayers to the Raven* Nelson (1983, 39) discusses several Koyukon constellations gleaned from Jetté's (1909) unpublished manuscript *On the Time-Reckoning of the Ten'a*, but adds that none of his Koyukon instructors learned about the stars.

Few other published sources describe or document Alaska Athabascan stellar knowledge. Rooth (1971) documented several short Athabascan stellar narratives during her fieldwork in Alaska to fill in the record on North American creation legends. These stories were published in *The Alaska Expedition, 1966*, a compilation of relatively unedited field transcripts. Crucially, Rooth (1971, 265) states that the Han regard the Big Dipper as the tail and body of an unidentified stellar figure. The Han also utilize an unidentified mornings star as a clock associated with dawn hunting activities (Rooth 1971, 284).

Only several Northern Athabascan narratives describe the origin of specific groups of stars. Vaudrin (1969, 60), Norman (1990, 73), and Ellanna and Balluta (1992, 99) published Dena'ina narratives related to the origin of the Milky Way. On Upper Kuskokwim astronomy Pulu and Pope (1979, 34) describe a star near the moon utilized for making prognostications about the future abundance of food, though they do not precisely identify the star or elicit its Native name. In the late 1800's Nelson (1880, 80-85) documented an early Koyukon narrative from Nulato that explains the origin of Ursa Major and the morning star. Nelson's collective notes from the Yukon and Innoko Rivers are important for their antiquity and were first published in 1978 by Vanstone (Nelson and Vanstone 1978).

Dorcas Miller's (Miller 1997) book *Stars of the First People* surveys Native American constellations, but includes scant information on Northern Athabascan astronomy. Miller's only reference to Alaska Athabascan astronomy is a short summary of a few Koyukon constellations discussed in Nelson (1983, 39). While Kelly and Milone (2011, 411) cite Miller's research as an important work, her discourse is primarily suited for a general audience and skips lightly over much of the published record. However, Miller organizes her book by geographic regions and her research may serve as a starting point for making cross-cultural comparisons of different Native American constellations.

1.2.3 Canadian Athabascan Sources

Several historic sources include data on Canadian Athabascan astronomy. Simpson (1843, 187) states that his Gwich'in guides referred to Ursa Major is *eutyae* (i.e. *yudii*) and Kenicott (1869, 165) and Le Goff (1916, IX) mention that the Slavey and the Chipewyan, respectively, utilized stars as navigational aids. In addition, Birket-Smith (1930, 78) states that the Chipewyan refer to Ursa Major as *jɛ·da* and call the Pleaides *jɛ̃i^{i}ndela·zɛ*, but he qualifies "it

is only very little that I have been able to glean as to the astronomical knowledge of the tribe, which on the whole, however, seems to be only very small."

Morice (1894, 80) states that the Carrier refer to Ursa Major as *yihta*, and identify it as a man that "nightly carries his house about in the course of his travelling's." Morice (1894, 207) also provides an image of a Carrier pictograph identified by some of his Native consultants as *yihta* (Ursa Major). Another narrative regarding the Carrier constellation *yaxte* (i.e. *yihta*) is found in Jenness (1934, 248-249), which corroborates the identity of Ursa Major as a man.

In a more recent source, McClellan (1975, 78) states that the Southern Tutchone refers to the Milky Way as the "flight of the loon" and the Big Dipper is an old man known as *yI'da*. McClellan (1975, 78) also mentions that the Tagish use the term *yax't'e* to identify the Big Dipper and believe that when it stops turning around in the sky "the last day has come." However, like other ethnologists of Northern Athabascan cultures McClellan (1975, 78) concludes that stars "seem to be of relatively little importance to the southern Yukon Indians." While a few star terms are found in other sources, the published record provides few additional data on Canadian Athabascan stellar astronomy.

1.2.4 Alaska Athabascan Dictionaries

The largest collections of Alaska Athabascan star and constellations terms are found in dictionaries of Alaska Athabascan languages. In particular, the *Koyukon Athabaskan Dictionary* (Jetté and Jones 2000), the *Dena'ina Topical Dictionary* (Kari 2007), and the *Ahtna Athabaskan Dictionary* (Kari 1990a) are especially important sources for Alaska Athabascan sky-related terminology. The *Koyukon Athabaskan Dictionary* includes more than 8,000 lexical entries and draws from the ethnographic and linguistic manuscripts of the Jesuit Priest and linguist Jules Jetté. Likewise, the *Ahtna Athabaskan Dictionary* and *Dena'ina Topical Dictionary* also cover a

wide range of subject matter related to all aspects of traditional life and culture. Kari's other smaller dictionaries of Alaska Athabascan languages such as the *Deg Xinag Ingalik Noun Dictionary* (Kari 1978b), *Holikachuk Noun Dictionary* (Kari, Alexander, and Deacon 1978) and the *Lower Tanana Athabaskan Dictionary* (Kari 1994) also provide a few important star and constellation terms.

Other Alaska Athabascan dictionaries that contain stellar terminology are *Dinjii Zhuh Ginjik Nagwan Tr'iłtsąįį: Gwich'in Junior Dictionary* (Peter 1979), *Dinak'i: Upper Kuskokwim Athabaskan Junior Dictionary* (Collins and Petruska 1979), *Tanacross Learners' Dictionary* (Arnold, Thoman, and Holton 2009), and *Benhti Kokht'ana Kenaga': Minto Lower Tanana Athabascan Pocket Dictionary* (Tuttle 2009). In addition, Petitot's (1876) multilingual dictionary, *Dictionnaire de la langue dènè-dindjiè* includes a few star and constellation terms from Canadian Gwich'in dialects. However, Petitot was not consistent with his orthography which complicates transcribing his lexicon into a modern writing system. Likewise, John and Tlen's (1997) glossary of the Canadian Scottie Creek dialect of the Upper Tanana language also provides important sky-related terminology.

1.2.5 Unpublished Materials

Some of the earliest and most ethnographically detailed sources on Alaska Athabascan stellar astronomy are found in unpublished materials held at the Alaska Native Language Archive (ANLA) in Fairbanks, Alaska. Jules Jetté's manuscripts on the Koyukon language and culture are perhaps the most important documents on Koyukon ethnology. While some of Jetté's manuscripts were published, others were not. His unpublished manuscript *On the Time-Reckoning of the Ten'a* (Jetté 1909) is easily the single most detailed manuscript on an Alaska Athabascan culture's knowledge of the sky. While only two of the 26 pages in his short

manuscript are devoted to stars and their function is time-reckoning, Jetté's descriptions and identification of stars is quite detailed. However, most, but not all of the star terms collected by Jetté (1909) are transcribed into a modern writing system and published in the *Koyukon Athabaskan Dictionary* (Jetté and Jones 2000) previously mentioned.

Jetté also collected an important Koyukon narrative *na-raletale*, which explains the origin of Ursa Major (Jetté 1898). While this story is similar to a rendition obtained by Nelson (1880), Jetté documented the narrative in both the Koyukon and English languages. The Koyukon elder, Charlie Brush (1985) also recorded a variant of the same story using his Native language. Koyukon star names are also found in Jetté's *Koyukon Athabaskan Dictionary* (1900), *Semantic Category Noun Dictionaries* (1905a) and *On the Superstitions of the Ten'a Indians* (1911). Jetté's scholarship is not only important for its antiquity, but also for its immense breadth and careful attention to lexicographic and cultural details. While Jetté's original manuscripts are held at the Jesuit Oregon Province Archives (JOPA), the ANLA also has copies of his documents.

Frederica de Laguna and Catherine McClellan's (1960) unpublished Ahtna fieldnotes collected in the late 1950's and early 1960's also includes some star-related knowledge and terminology. Most importantly, they describe a circumpolar constellation identified as a fox, which is further subdivided into 11 smaller groups of stars named using body-part terminology. Unfortunately, de Laguna and McClellan do not precisely identify any of the stars in the constellation and only vaguely mention that it was used as a clock. However, they do provide a small rudimentary sketch of the constellation.

Other relevant archival sources are Kari's numerous field notebooks on Alaska Athabascan languages, such as his *Tanaina fieldnotes: notebook 14* (Kari 1976c); *Holikachuk and Ingalik field notebook 4* (Kari 1977b); and his *Upper Tanana, notebook 2* (Kari 1989b).

While much of the terminology in Kari's field notebooks also appears in published form, additional stellar terminology and context is occasionally gleaned by referenceing his origional notebooks. Kari also made a couple important audio recordings related to Athabascan stellar knowledge. Kari's interview with Dena'ina elders in Tynok (Pete et al. 1981) is an especially important audio recording as it contains a round table discussion of stars with some of Kari's most expert Dena'ina consultants. Kari also recorded a *Tsa' Ushąą* (smart beaver) narrative told by Mary Tyone (1994), which describes the origin of the Upper Tanana constellation *yihdaa.* Kari's recording of Tyone is the only audio file on Upper Tanana star lore.

Another important audio recording is Mishler's interview with the late Gwich'in elder Frank Ginnis (Mishler and Ginnis 1986). Ginnis describes that the Gwich'in constellation *yahdii* covers the entire sky and is comprised of stars named using body part terminology. Another important recording related to Gwich'in stellar astronomy is David Salmon's (1992) informative discussion on the utility of the Big Dipper and three morning stars in traditional time-reckoning.

The Koyukon elders Charlie Brush (1985) and Johnson Moses (1989) also discuss some additional knowledge related to the stars. In addition, a tape narrated by the late Upper Kuskokwim elder Miska Deaphon (1977) includes a story about the Pleiades and a description of the utility of the Big Dipper in weather forecasting. An interview with the Upper Kuskokwim elder Bobby Esai (Esai and Kibrik 2001) corroborates stellar knowledge described by Deaphon (1977).

While the published literature and archival sources only provide a glimpse into Northern Athabascan stellar astronomy, they suggest a rich domain of linguistic and traditional cultural knowledge.

1.3 Methodology

The methodology employed in this research utilized a combination of data collection tools and techniques, such as conversational interviews, participant-observation, fieldnotes, and archival/library research. In addition, this study drew from discourse on indigenous research methodologies by Wilson (2008), Archibald (2008), and Smith (2012) to develop a fieldwork agenda. Objectives for data collection and analysis largely focused on minimizing cultural biases in the field as well as contextualizing the presentation of data in terms of emic or cultural categories. Research tools and techniques were also deliberately flexible to accommodate for the different styles, teaching techniques, and preferences of individual Alaska Athabascan consultants.

Archival/library research for this study began in September 2009 in an effort to compile all relevant material on Alaska Athabascan astronomy, especially star names and their associated utilities in Northern Athabascan culture. While I identified relatively little data in the published literature, the collection held at the Alaska Native Language Archive (ANLA) at the University of Alaska Fairbanks (UAF) provided an invaluable source of baseline data. The ANLA collection includes materials pertaining to each of Alaska's 20 recognized Native languages and other related languages. However, identifying relevant data in ANLA sources was not transparent, as star and constellation terms are embedded within audio recordings and other linguistic documents such as lexicons, grammars, written narratives, noun dictionaries, and field notes. Locating these data required combing through individual documents, language by language. After more than two years of scouring archival sources, I had filtered through most of the Athabascan collection held at the ANLC, comprised of well over 5,500 items on Alaska

Athabascan languages alone.[2] While no item or manuscript provided an abundant source of data on its own, the cumulative data taken together generated a rich list of indigenous astronomy terminology. The cumulative list of Alaska Athabascan stellar terminology especially facilitated the identification of the most widely attested star and constellation names in Alaska Athabascan languages and helped identify discrepancies and holes in the existing documentation. This baseline archival research led to interviews with Alaska Athabascan consultants with the goal of clarifying and expanding the existing data.

I conducted conversational interviews with Alaska Athabascan first language speakers in Fort Yukon, Arctic Village, Northway, Tetlin, Tazlina, Gulkana, Nikolai, Tok, and Fairbanks. Interviews took place between November 2011 and October 2014 and served as informal guided conversations used to obtain qualitative data about indigenous Athabascan knowledge of the sky. The relatively informal and unstructured nature of conversational interviews was particularly well suited for this research, because it enabled Athabascan consultants to broadly discuss their knowledge and perspective of the sky. Field sessions were often conducted in collaboration with UAF-affiliated linguists having special expertise in documenting Athabascan languages. In particular, Dr. Gary Holton, Dr. James Kari, and Dr. Olga Lovick greatly assisted the documentation of Alaska Athabascan astronomy knowledge and terminology and served as facilitators for a variety of interviews conducted for this research. In addition, local residents in Nikolai, Arctic Village, Fort Yukon, and Tok also facilitated the documentation of indigenous astronomy knowledge by introducing me to elder Athabascan first language speakers and participating in the interview/documentation process.

[2] ANLA archivists and staff greatly facilitated this research process and quest for archival sources related to Alaska Athabascan astronomy. A research assistantship held at the ANLA during the spring semester, 2013 also provided me with increased exposure to the collection.

Interview sessions typically took place in a consultant's own private residence. Upon receiving informed consent all conversational interviews were recorded in WAV audio format on a Marantz PMD661 digital audio recorder. Recorded interviews offered a particular advantage in that they could be reviewed and preserved for other listeners after the fieldwork was conducted. All consultants and community facilitators were compensated a minimum of $25 per hour or $120 per day.

At least half of my interviews were conducted during the spring or summer season when no stars were visible. During these interview sessions I utilized night sky software (Stellarium 0.11.4) capable of simulating the night sky anywhere in the world. This software was loaded on a laptop computer and was especially useful for eliciting information and terminology related to diurnal and seasonal stellar movement, as well as for locating Athabascan stars and constellations.

On other occasions I made direct observations of the stars under the night sky and combined interviews with participant observation field techniques. Participant observation greatly augmented the collection of data by allowing me to join the activity and visually observe subtleties not conveyed in interviews alone. The accuracy of outdoor observations was enhanced by the use of a green astronomy grade (532nm, 50mw) laser pointer, capable of pin pointing each of the stars identified by consultants. Participant observation was especially useful for identifying indigenous constellations, as well as documenting complex concepts such as stellar orientation and time-reckoning. On a couple occasions I traveled out on the land (about 30 miles from Fort Yukon) in winter with an expert Gwich'in consultant to better understand and document indigenous stellar orientation and time-reckoning concepts. A major limitation of participant observation is that it can be difficult to participate in the activity or observation while

simultaneously documenting the consultant's knowledge. Extreme temperatures as low as -35°F froze the batteries in audio recorders, laser pointers, and headlamps, greatly inhibiting the ability to record data obtained during outdoor field sessions. When batteries functioned properly the headlamp used for taking field notes prevented us from seeing the stars. We remedied a few of these impediments by insulating equipment in heavy foam wrapping and by fitting the headlamp with a red bulb. Whenever conditions permitted, I employed multiple tools and techniques to triangulate data collection methods. I made fieldnotes and field summaries for each session (Cannon 2013a; 2013b; 2014), and occasionally took photos and recorded video on a Canon5DMarkII DSLR camera to supplement the data.

All data collected for this research is digitally stored at the Alaska Native Language Archive and is in the author's personal possession. No sensitive or classified information is contained in these files. Research and researchers involved with this study are compliant with standards set for by the UAF Institutional Review Board (IRB) for conducting research on human subjects (Appendix B). This research is cognizant of only disseminating those research data that may benefit the greater Alaska Athabascan community and cause no foreseeable harm. Material presented in this thesis is based upon work supported by the National Science Foundation under Grant No. OPP-1317245. Additional support provided by the Arctic Institute of North America; the University of Alaska Fairbanks Northern Studies Program; and the Alaska Native Language Center.

1.4 The Athabascan Language Family

The Athabascan language family consists of 40 or so distinct languages (Krauss and Golla 1981, 67) that comprise the most extensive indigenous language family in North America (Kari and Potter 2010, 3). The Athabascan languages are distributed across three discrete regions

of the United States and Canada. These regions are 1) Northern Athabascan of interior Alaska and Canada, 2) Southern Athabascan or Apachean, primarily located in the American Southwest, and 3) Pacific Coast Athabascan situated in small groups along the Northwest Coast of the United States.

The Northern Athabascan group encompass the largest region of the Athabascan territory, comprised of approximately 25 languages with near contiguous distribution from interior Alaska eastward across the subarctic and plains of Canada to Hudson Bay. The greatest linguistic diversity within Athabascan occurs in interior Alaska, the Yukon, and regions of British Columbia (Krauss and Golla 1981, 68). These regions most likely represent the Proto-Athabascan territory (Krauss and Golla 1981, 68), which began splintering into various other Athabascan languages just over 2,000 years ago (Krauss 1980, 11; Holman et al. 2011, 11). Subsequent Athabascan expansion proceeded east as far as Hudson Bay and south as far as northern Mexico and western Texas.

The eleven Northern Athabascan languages recognized within Alaska are Ahtna, Dena'ina, Deg Xinag, Holikachuk, Koyukon, Upper Kuskokwim, Tanana, Tanacross, Upper Tanana, Han, and Gwich'in (Krauss 1980, 36-41). The stellar astronomies of these eleven Alaska Athabascan ethno-linguistic groups are the subject of this thesis. Of the 30 or so Northern Athabascan languages only Dena'ina has portions of its territory situated on the coast (Figure 1.1).

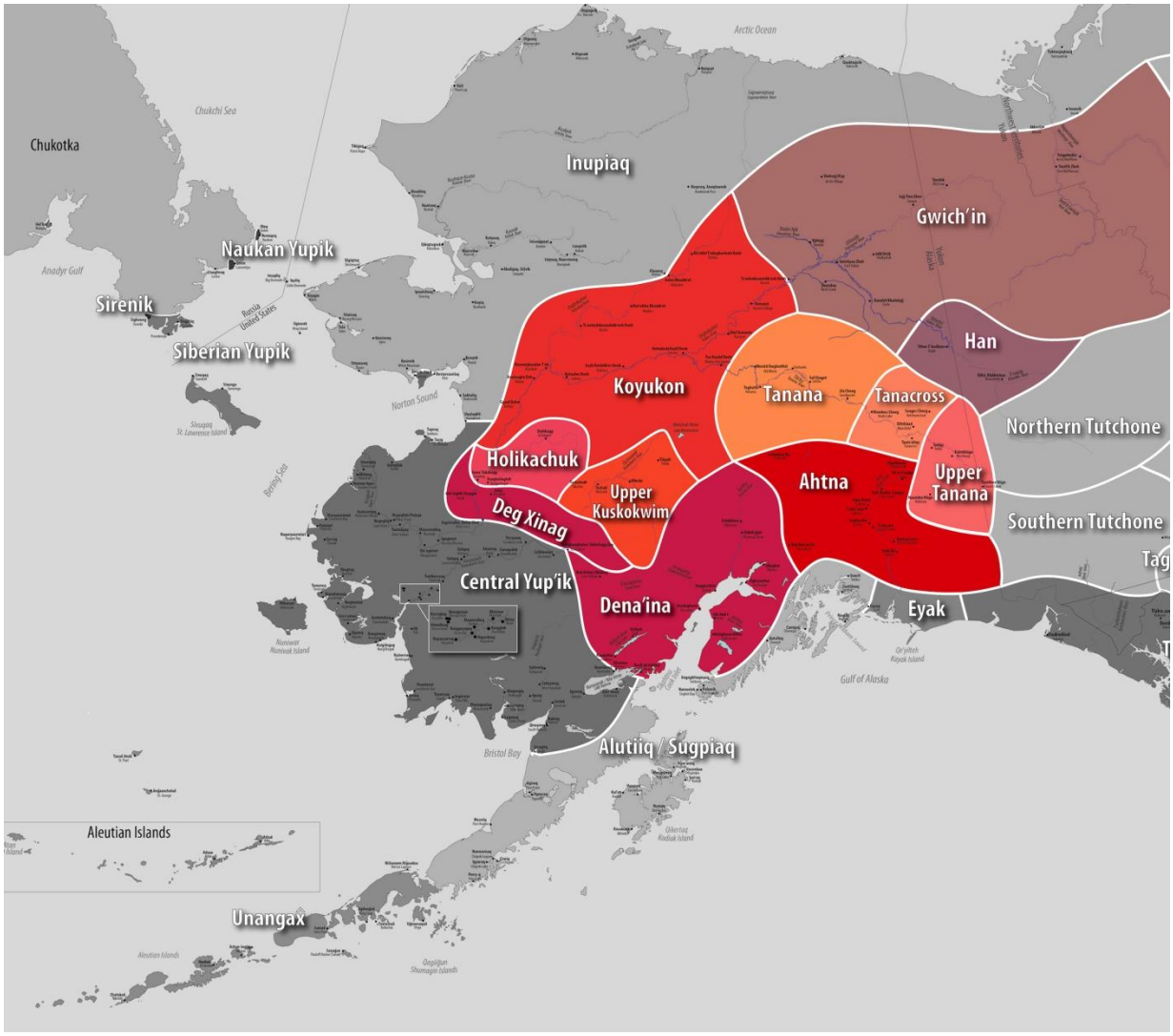

Figure 1.1. Map of "Indigenous Peoples and Languages of Alaska." Adapted from Krauss (2011). The eleven recognized Alaska Athabascan languages and study area is shown in color.

The second Athabascan region is comprised of seven Apachean languages found in the American Southwest, parts of Oklahoma and Texas, and northern Mexico (Krauss and Golla 1981, 67). These languages include Navajo, plus six other Apache languages (Young 1981:393).[3] The Apachean peoples reputedly migrated south from the Mackenzie Basin of Canada (Sapir 1936, 235) approximately 600-950 years ago (Krauss 1980, 12; Opler 1983, 381). The Apachean languages have the greatest linguistic similarity with Sarcee, a Northern Athabascan language

[3] The six recognized Apache languages are Western Apache, Chiricahua, Mescalero, Jicarilla, Lipan, and Kiowa-Apache (Young 1983, 393).

located in Alberta, which suggests a southward migration from Canada (Opler 1983, 381). Linguistic evidence suggests that Apachean was still a single homogeneous language until just over 700 years ago (A.D. 1300), after which time linguistic and cultural differentiations likely began (Opler 1983, 381). While the current Apachean territory is relatively small compared to the Northern Athabascan region, the Apachean population far exceeds the Northern group; the former was comprised of approximately 188,000 members in 1981 (Young 1983, 399), by far the most populous of the three major Athabascan regions. In comparison, a 1980 population estimate identified only about 30,000 Northern Athabascans dispersed across the 25 or so northern language groups (Krauss 1980, 1). The population of Pacific Coast Athabascan is significantly smaller (Shipley 1978, 87-88).

Pacific Coast Athabascan represents the third and final group comprised of approximately eight moribund or extinct languages distributed in small coastal groups between Oregon and Northern California (Krauss and Golla 1981, 67). Pacific Coast Athabascans may have migrated from the Babine/Witsuwit'en ethnolinguistic region in central-western British Columbia, arriving at their present locations at least 1,000 years ago (Krauss 1980, 12). Of the eight or so Pacific Coast Athabascan languages, four are located in Northern California: Hupa, Mattole, Sinkyone-Wailaki, and Cahto (Krauss and Golla 1981, 67) . The other four Pacific Coast Athabascan languages located in Southwestern Oregon are Upper Umpqua, Tututni-Chasta Costa, Galice-Applegate, and Chetco Tolowa (Krauss and Golla 1981, 67).

The collective Athabascan family is also more broadly related to the Na-Dene linguistic group, which also includes the Eyak and Tlingit languages (Kari and Potter 2010, 3).[4] Recent linguistic evidence suggests that Na-Dene was a homogeneous language some 8,500 years ago

[4] Na-Dene is otherwise known as Athabascan-Eyak-Tlingit. The last speaker of Eyak passed away in 2008 (Kari and Potter 2010, 3).

around the time when Tlingit bifurcated off the Na-Dene family tree (Holman et al. 2011, 859). However, Proto-Athabascan-Eyak was probably a cohesive language until about 4,200 years ago when Eyak branched off as a second clad of the Na-Dene evolutionary tree (Holman et al. 2011, 859). Krauss (1980, 11) speculates that Proto-Athabascan was a unified language some 2,000-2,500 years ago. Krauss's conclusion is corroborated by Holman et al. (2011, 859) who give Proto-Athabascan a time depth of just over 2,000 years, after which time numerous other Athabascan languages evolved, of which 45 or so surviving languages are recognized today (Figure 1.2).

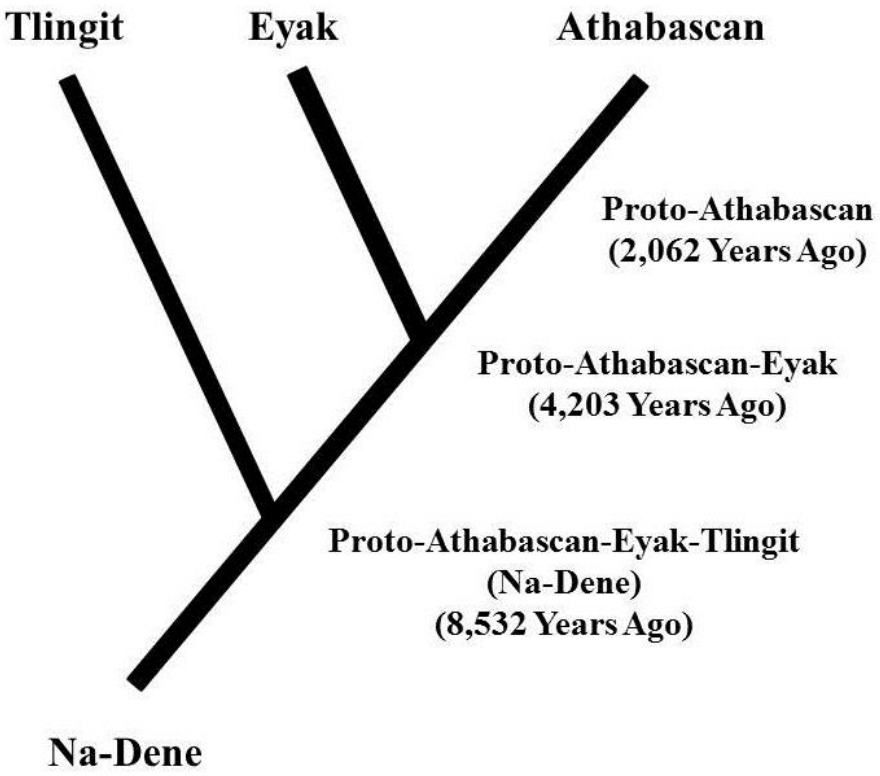

Figure 1.2. Na-Dene evolutionary tree. Dates are based on Holman, et al. (2011, 859).

While Eyak is more closely related to Athabascan than Tlingit, evidence suggests that Eyak was a deeply isolated language that is "linguistically no closer to its modern Ahtna neighbor than it is to Navajo" in the American Southwest (Krauss 1980, 12).

Linguists posit an additional genetic connection between Na-Dene and the Yeniseian language family located in Central Siberia. While the debate over the Dene-Yeniseian connection is ongoing, Kari and Potter (2010, 1) state: "If fully accepted by the broader academic community, Dene-Yeniseian would be the first substantiation of a language stock between Asia and North America. From its western Asian limits to its spread deep into North America, Dene-Yeniseian, would represent the farthest geographic distance for a pedestrian hunter-gatherer language stock." While the Siberian language, Ket remains viable, all other Yeniseian languages were extinct before the twentieth century, reducing their utility in substantiating the Dene-Yeniseian connection (Kari and Potter 2010, 4).

Chapter 2: The Athabascan Starscape – Whole-Sky Constellations

The paucity of documented indigenous stellar knowledge is particularly striking among the Northern Athabascan languages, where only a single constellation equated with the Big Dipper is robustly attested. This chapter provides evidence from Alaska Gwich'in, Upper Tanana, Ahtna, Dena'ina, Koyukon and other languages to show that the equation of these constellations with the Big Dipper is only partial. Evidence suggests that Alaska Athabascan terms formerly glossed as the Big Dipper are actually much larger constellations. In at least several languages these terms correspond to whole-sky constellations that map nearly the entire sky. The Big Dipper is just one of many body part asterisms (generally a tail) that comprise a man-animal or humanoid stellar figure. The remaining stars in the constellation are identified by other body part terms, forming a unified conceptualization of the sky. Evidence suggests that a large humanoid constellation is a defining linguistic and cultural feature of Northern Athabascan languages. This is not to deny the existence of additional Athabascan constellations beyond the whole-sky constellation. However, such smaller constellations exhibit much more variation across the language family and may represent recent innovations or borrowings over the top of a large or whole-sky constellation system.

The term *constellation* herein denotes a cultural construct grouping together certain stars. This contrasts with modern astronomical usage which divides the celestial sphere exhaustively into 88 named regions. The term *asterism* is used herein to denote smaller recognized patterns of stars within a larger constellation (e.g. in Western astronomy the Big Dipper is an asterism of the larger constellation Ursa Major).

This chapter will describe the Alaska Athabascan starscape as it pertains to large or whole-sky humanoid constellations and will provide evidence that terms for these humanoid

constellations have been consistently misidentified as the Big Dipper. Athabascan astronomy is much richer than has been previously claimed and provides the first well-documented examples of whole-sky constellations in cultural astronomies worldwide.

2.1 Gwich'in *Yahdii*

Although the classical constellations of the zodiac spread widely across both the Old and New worlds over a period of some five millennia (Baity 1973), these constructs are largely absent from the Northern Athabascan languages. In Gwich'in, the constellation *yahdii* is the only widely attested group of stars, and appears in the very earliest literature. On August 26, 1837, Hudson Bay Company officer, Thomas Simpson (1843, 187) ascended the Mackenzie River *en route* to Fort Good Hope and observed: "On the evening of the 26th there was a brilliant display of aurora, which our Loucheux [Gwich'in] companions called *saung*. Ursa Major they denominated *eutyae*."[5] More than 175 years after Simpson's expedition, few other Gwich'in constellations appear in the literature, and the association of *yahdii* with Ursa Major/Big Dipper is widely accepted (Table 2.1).

Table 2.1 Gwich'in constellation terms glossed as the Big Dipper or Ursa Major.

Name	**Stars**	**Source**
eutyae	Ursa Major	(Simpson 1843, 187)
yutié	Big Dipper/Ursa Major	(Petitot 1876, 80)
yah-tē	Big Dipper	(Wickersham 1903, 17)
yǿhdi	Big Dipper	(Benveniste 1953, 17)
yahdii	Big Dipper	(Mueller 1964, 12)
yati	Big Dipper	(McKennan 1965, 73)
yahdii	Big Dipper	(Peter 1979, 19)

Early encounters between Westerners and Gwich'in occurred at a time when Athabascan star knowledge would have been relatively vibrant, yet few constellations other than *yahdii* are documented in these sources. Nelson (1973, 184-185) posited that the apparent dearth of

[5] The common Gwich'in term for the aurora borealis is *yakąįh*, or *zheekąįh*. The term *eutyae* is from a Canadian Gwich'in dialect, spelled *yuhdii* or *yuhdyee* in the contemporary orthography.

Gwich'in astronomical knowledge is rooted in a navigation system based on reckoning by geography rather than by "navigational abstractions." While stars were useful for telling time, Nelson (1983, 39) maintained that Athabascans had little other functional reason to observe them. Others attributed this assumed paucity of stellar knowledge to geographic factors, such as prolonged periods of summer daylight common to high latitude regions (McKennan 1959, 110), or implausibly asserted a lack of indigenous interest in the sky (Gibbon 1964, 244; Birket Smith 1930, 78). In his classic ethnography of Gwich'in, McKennan (1965, 73) reported "my informants said their people have never been much interested in the heavenly bodies, and this is borne out by the paucity of star lore among the Chandalar Kutchin." In the subarctic winter sky the Big Dipper is located far overhead surrounded by stars leading off toward the horizon in every direction. That these would be unnamed is at least remarkable, if not improbable.[6]

The mystery of the missing constellations is solved by recognizing that the equation of *yahdii* with Big Dipper or Ursa Major is only partial. The archival record provides some evidence that Athabascan terms associated with Ursa Major actually reference a much larger group of stars. This is stated obliquely in nineteenth and twentieth century ethnographic reports. Jetté (1900) refers to "legs . . . formed by the minor stars in front of the pointers" of Koyukon *naagheltaale* 'Big Dipper'. And a more recent recording of Gwich'in speaker Frank Ginnis clearly stated that "*yahdii* covers all the skies" and includes distinct asterisms named using body part terms (Mishler and Ginnis 1986). Additional evidence for the broader denotational value of *yahdii* can be found in the use of body part terminology to refer to individual stars or star groups (asterisms) within constellations. In Alaska Athabascan languages for which such body part asterisms have been documented, the Big Dipper is generally denoted by the body part term for

[6] Indeed, other constellations have been documented in Gwich'in, though some, such as *yahdii tsal* (literally, 'little *yahdii*') are clearly neologisms calqued from English names. However, the Big Dipper is the only constellation term widely-attested across the Northern Dene languages.

'tail', suggesting that the Big Dipper itself may represent only one part of a larger constellation which includes other stars and star groups identified by other body part terms.

In order to investigate and better document the asterisms in the constellation *yahdii,* I consulted Gwich'in first language speakers in the primary Alaska Gwich'in settlement of Fort Yukon (latitude 66.3345 N). Over the course of several nights, two consultants identified each of the asterisms in *yahdii* by direct observation.[7] In some instances specific stars were identified and named, such as *tł'ǫhts'ąįį vidzee* 'its left ear', comprised of Castor and Pollux in constellation Gemini. In other cases only general areas of the sky were identified as belonging to a body part, such as its left and right legs and body. Consultants identified fifteen individual asterisms within *yahdii*, each named using a Gwich'in body part term, although, in six cases I have not yet precisely identified each individual star within these asterisms. A sixteenth asterism is identified as 'yahdii's knife', and the Milky Way is referred to as 'yahdii's trail' (Table 2.2).

[7] The accuracy of my documentation was enhanced by the use of a green laser pointer (532nm, 50mW) capable of pin pointing each of the stars identified by consultants. Further, I recorded field notes and made digital audio recordings (Marantz PMD661) of interviews with each consultant. Field notes and audio recordings were compared in the field against computer generated star charts (Stellarium 0.11.4) specific to Fort Yukon.

Table 2.2. Asterisms in the Gwich'in constellation y*ahdii*. Stars identified by Bayer designation abbreviation, followed by common name in parentheses. Uppercase letters in brackets following star names refer to locations in Figure 2.1 (Cannon 2013a; 2014).

Asterism	**Translation**	**Stars**
vitsi'	its tail	Big Dipper (of Ursa Major) [A]
tł'ǫhts'ąįį vanli'	its left hand	ο Leo (Subra), α Leo (Regulus) [B]
shreets'ąįį vanli'	its right hand	γ And (Almaak), β Tri [C]
tł'ǫhts'ąįį vatth'an'	its left leg	specific stars only approximately located [D]
shreets'ąįį vatth'an'	its right leg	specific stars only approximately located [E]
tł'ǫhts'ąįį vidzee	its left ear	α Gem (Castor), β Gem (Pollux) [F]
shreets'ąįį vidzee	its right ear	α Aur (Capella), β Aur (Menkalinan) [G]
vanhtral	its snout	Messier object 45 (Pleiades) [H]
vindee	its eyes	specific stars only approximately located [I]
viki'	its head	all stars in the ears, eyes, and snout
vatthąį	its body	specific stars only approximately located [J]
tł'ǫhts'ąįį vakwai'	its left foot	α Boo (Arcturus), η Boo (Muphrid)[K]
shreets'ąįį vakwai'	its right foot	α Cyg (Deneb), γ Cyg (Sadr) [L]
tł'ǫhts'ąįį vigin	its left arm	specific stars only approximately located [M]
shreets'ąįį vigin	its right arm	specific stars only approximately located [N]
(vigwiitsii)[8]	crooked knife	γ Leo (Algieba), ε Leo (Algenubi), ζ Leo (Adhafera), η Leo (Al Jabhah), μ Leo (Rasalas) [O]
vatąįį	its trail	Milky Way

As in other Athabascan languages, Gwich'in body part terms are obligatorily possessed and hence must occur with a pronominal prefix indexing the possessor. In the case of the body part terms associated with *yahdii,* this prefix is the third person singular *vi-/va-*. In all cases I independently confirmed the names and locations of asterisms with several Gwich'in speakers.

The constellation *yahdii* consists of stars that span more than 133 degrees across the sky, all of which are circumpolar or nearly so at the latitude of Gwich'in country.[9] In the Gwich'in

[8] The Gwich'in term for 'crooked knife' is *vigwiitsii*; however I was not able to verify that this term is also used to denote the asterisms which is referred to in English as 'yahdii's knife'.

knowledge system *yahdii* is envisioned as a tailed man crouching face-down above the earth with his head turned toward his right and holding a crooked knife in his left hand. Stargazers therefore observe the ventral side of *yahdii*. The two feet and two hands appear as low altitude asterisms, each located in separate quadrants of the sky, while the tail and body are located directly overhead in Ursa Major. Left and right hands, feet, ears, legs, and arms are distinguished using Gwich'in terms *tł'ǫhts'ąįį* 'left' and *shreets'ąįį* 'right', applied from the point of view of *yahdii*. In addition, the asterisms that delineate the hands, feet and ears are each easily recognized as bright pairs of stars. To an observer in Gwich'in country *yahdii* appears to rotate sunwise or from east to west, with his head facing his direction of travel. In the Gwich'in language this is described as *yahdii ahaa*, literally, 'yahdii is walking' (Figure 2.1).

[9] Compare to the largest classical constellation, Hydra, which spans about 100°.

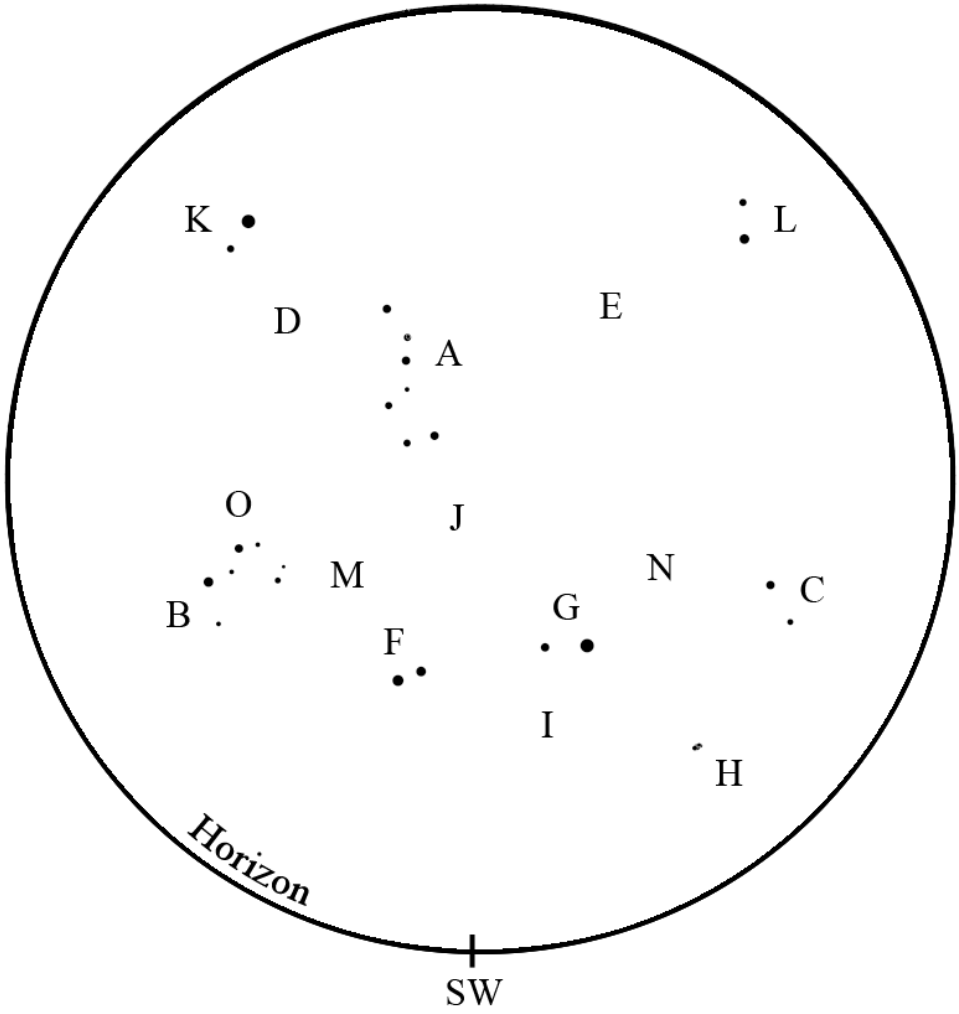

Figure 2.1. Whole-sky view of the Gwich'in constellation *yahdii*. Stars as seen from Fort Yukon, Alaska on March 26, 2013 at 22:45 local time. Zenith lies in the center of the circle. Letters correspond to asterisms listed in Table 2.2 (Cannon 2013a; 2014).

The lowest altitude asterism within *yahdii* is the left hand, comprised of the stars Subra and Regulus in the classical constellation Leo. These stars have declinations of 9.8317 and 11.9025 degrees respectively and thus are not quite circumpolar at the latitude of Fort Yukon.[10] Hence, the left hand does not rise above the horizon until late September; it remains visible until early May, after which time there is too much light to see stars at this latitude. However, the

[10] A circumpolar star is one that does not rise or set. At the latitude of Fort Yukon (66.3345 N), stars must have declinations greater than 23.4325 N to be circumpolar. Stars are circumpolar if: θ (latitude) + δ (declination) ≥ 90°.

configuration of *yahdii* and the body part metaphor allow the location of the left hand to be inferred even before its heliacal rising in autumn. The second lowest altitude asterism within *yahdii* is his left foot, comprised of the stars Arcturus and Muphrid, with altitudes of 19.1822 and 18.3977 degrees, respectively. These stars are nearly circumpolar at Fort Yukon, dipping below the horizon during part of the night in early winter, but remaining visible for at least a portion of the night. Again, the position of the asterism can also be inferred from the location of other body parts within *yahdii*. The remaining asterisms within *yahdii* are circumpolar, remaining visible throughout the year and throughout the night so long as it is dark enough for stars to be visible. The constellation *yahdii* is thus an enduring feature of the night sky in Gwich'in country.

Yahdii provides a single unifying system for mapping the night sky, and reliance on body-part metaphors renders the system highly mnemonic. No external knowledge of mythological relationships between constellations is necessary in order to relate the various asterisms within *yahdii* to one another. Once the viewer knows the stars corresponding to the individual body parts, their locations can be readily identified as *yahdii* rotates through the night sky. By recognizing one part of the constellation an observer can immediately identify the remaining parts based on an existing mental map of the human body. The circumpolar position of *yahdii* yields a highly functional system that facilitates both navigation and time-reckoning in the subarctic.[11] While cultural astronomies are influenced by latitude (Fabian 2001, vii), latitude alone cannot account for the existence of whole-sky constellations, as the Inuit languages spoken immediately to the north of Gwich'in contain at least seventeen distinct constellations rather than a single whole-sky constellation (MacDonald 1998). However, evidence suggests that a large humanoid constellation comprised of body part asterisms is a defining linguistic and cultural feature not only in Gwich'in but in Northern Athabascan languages more broadly. This evidence

[11] The functional aspects of Athabascan stars are discussed in chapter 4.0.

is corroborated by additional descriptions of Alaska Athabascan humanoid constellations, some of which also nearly span the entire sky.

2.2 Upper Tanana *Yihdaa* & *Neek'e'eltiin*

In Upper Tanana Athabascan, the constellation term *yihdaa* is associated with the Big Dipper and is cognate to the Gwich'in constellation term *yahdii*.[12] Few other Upper Tanana constellation terms appear in the literature and archival record. To this point, McKennan wrote:

> The astronomical knowledge of the Upper Tanana is extremely slight. Star lore plays no part in their mythology, and only a few stars and constellations are identified by name. Of these the Big Dipper (Ursa Major) is best known. It is called et-da [*yihdaa*], and because of its movements it is believed to be alive . . . Small as the astronomical knowledge of the Upper Tanana is, it apparently is no smaller than that of other Northern Athapaskan groups (McKennan 1959, 110).

McKenna's conclusions regarding Upper Tanana stellar knowledge likely drew from his own assumptions, as he subsequently stated "my information was obtained during the late spring when no stars are visible" (McKennan 1959, 110).

In order to investigate the possibility of a more detailed Upper Tanana astronomy than has been previously reported, I conducted interviews with Native consultants in the Alaska communities of Tetlin and Northway. A consultant in Northway independently verified the existence of a whole-sky constellation, imparting knowledge of asterism terms remarkably similar to those found in Gwich'in. Specifically, he described the Northway version of the whole-sky constellation as a tailed man comprised of body part asterisms. These asterisms span nearly the entire sky and are for the most part lexically and conceptually cognate to those documented in Gwich'in. A significant difference is, however, found in the term used to describe

[12] These terms follow the regular vowel correspondence (i.e. Gwi a = UT i).

the constellation itself. Rather than identifying a constellation term cognate to Gwich'in *yahdii*, a Northway consultant described the tailed-man as *neek'e'eltiin*, literally, 'that which moves following us', a constellation term cognate to *nek'eltaeni* of the adjacent Ahtna language.[13]

Another point of interesting distinction is the precise identification of each star that comprises *neek'e'eltiin's* ears. The stars in each ear are designated with the Upper Tanana terms for left *tł'ahts'ąy*, and right *hǫǫsǫǫ, ts'ąy'* as well as by distinguishing between the inner ear/hearing *ts'ąy udziit* and the outer ear *udziit.* Thus, the four stars that comprise the ears are identified with four separate spatially descriptive terms. A consultant identified the asterisms that comprise *neek'e'eltiin* on an interactive digital star map (Stellarium 0.11.4) specific to Northway. We applied this alternative approach to observing stars by direct observation due to the prolonged daylight hours that obscured the stellar bodies during my spring and summer fieldwork in Northway. Asterisms documented in Northway are listed in Table 2.3.

Table 2.3. Asterisms in the Upper Tanana (Northway) constellation *neek'e'eltiin*. Stars identified by Bayer designation abbreviation, followed by common name in parentheses. Uppercase letters in brackets following star names refer to locations in Figure 2.2. The Milky Way term is from a Tetlin consultant (Cannon 2013b).

Asterism	**Translation**	**Stars**
uche'	its tail	Big Dipper (with Ursa Major) [A]
tł'ahts'ąy ułа'	its left hand	o Leo (Subra), α Leo (Regulus) [B]
hǫǫsǫǫ ts'ąy ułа'	its right hand	specific stars not identified [C]
tł'ahts'ąy udziit	its left hearing/inner ear	α Gem (Castor) [D]
tł'ahts'ąy udzagn'	its left ear	β Gem (Pollux) [E]
hǫǫsǫǫ ts'ąy udziit	its right hearing/inner ear	β Aur (Menkalinan) [F]
hǫǫsǫǫ ts'ąy udzaagn'	its right ear	α Aur (Capella) [G]
mįįtsįį	its nose	Messier object 45 (Pleiades) [H]
unaagn'	its eyes	specific stars not identified [I]
tł'ahts'ąy uke'	its left foot	α Boo (Arcturus), η Boo (Muphrid) [J]
hǫǫsǫǫ ts'ąy uke'	its right foot	specific stars not identified [K]
*san' tąy'	star trail	Milky Way galaxy

[13] This consultant recognized the term *yihdaa* as a synonym for the humanoid constellation used by Upper Tanana speakers in other communities.

While my primary Northway consultant clarified that there are more parts to *neek'e'eltiin* than he could remember, he specifically located eight asterisms within the constellation and approximately located three others. This consultant conveyed a clear desire to only identify the asterisms that he remembered with certainty. It is also apparent from Northway consultants that *neek'e'eltiin* was more elaborately depicted in former times. For instance, one consultant stated that *neek'e'eltiin* grasps an implement in one of his hands, but he could not remember the type of implement or its location in the stars.[14]

In comparison to Gwich'in *yahdii*, the head of the Upper Tanana stellar figure is also turned toward his right, facing his direction of travel from east to west. As *neek'e'eltiin* progresses across the night sky, this stellar motion is described with the phrase *yaa nałts'aa aahaał* 'it is walking around the sky'. Compare to Gwich'in, *yahdii ahaa* 'yahdii is walking'. While Gwich'in *yahdii* and Upper Tanana *neek'e'eltiin* are clearly not cognate terms, they are both whole-sky circumpolar constellations comprised of body part asterisms that approximately correspond to the same groups of stars (Figure 2.2).

[14] An Upper Tanana consultant from Tetlin mentioned that the tailed-man might grasp a sharpened steel rod in one of his hands, but he was uncertain about this detail.

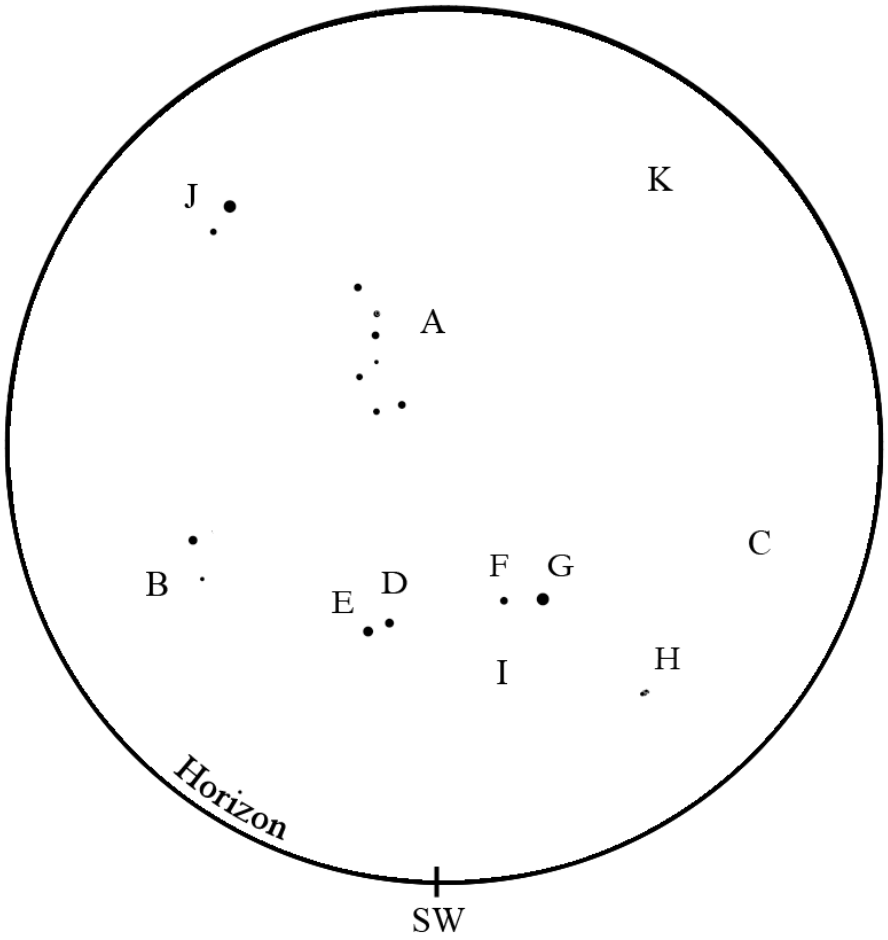

Figure 2.2. Whole-sky view of the Upper Tanana (Northway) constellation *neek'e'eltiin*. Stars as seen from Northway, Alaska on March 26, 2013 at 22:45 local time. Zenith lies in the center of the circle. Letters correspond to asterisms listed in Table 2.3 (Cannon 2013b).

A consultant in Tetlin further corroborated the existence of an Upper Tanana whole-sky constellation, adding that the stellar figure, *yihdaa* has a tail like a fox.[15] The term, *dineh san'* 'star man', was also used as a general convention to describe the whole-sky constellation with the caveat that the tailed-man is above the stars and not amongst them (i.e. he imitates the stars, but is not in fact composed of them).

The Tetlin depiction of the tailed man represents a significant variant relative to the forms documented in Fort Yukon and Northway. Stars (Castor & Pollux) previously described as 'its

[15] The Tetlin term, *yihdaa* is cognate to Gwich'in *yahdii,* but clearly not cognate to the Northway term, *neek'e'eiin.*

left ear', are designated in Tetlin as *diła' įį'ah* 'it raises its hand', and stars (Pleiades) formerly described as 'its nose' or 'its snout' are known in Tetlin as *utl'ahbat* 'its cheek'. A consultant also described a novel Tetlin innovation of body part asterisms that features the three stars, Kocab (β Umi), Polaris (α Umi), and Caph (β Cas). These stars lie approximately perpendicular to *yihdaa's* tail (Big Dipper) and were bashfully described as *san' di'ehtsąą'* 'it is defecating stars'. While chapter four describes the function of Athabascan stars, it suffices to say here that *san' di'ehtsąą'* is important in Upper Tanana stellar navigation, and is visually perceived as three pieces of feces shooting out from beneath *yihdaa's* tail. The same consultant also offered the term *ha'aldag san'* 'stars shoot out', as an alternative phrase to describe the same triplet of stars.

A significant and final Tetlin variant described here is the association of the sun and moon with *yihdaa's* eyes. To paraphrase: "*yihdaa* is always watching; his eyes are the sun and moon. He sees clear at night with wolf-like vision and has the same sharp eyesight during the day" (Cannon 2013a). This consultant could not locate *yihdaa's* nose, but clarified that it lies somewhere between the setting sun and rising moon at twilight; in other words, right between *yihdaa's* eyes.[16] Table 2.4, Figure 2.3, lists asterisms documented in Tetlin.

[16] This description is quite metaphorical, as the nose could be found anywhere along the ecliptic.

Table 2.4. Asterisms in the Upper Tanana (Tetlin) constellation *yihdaa*. Stars identified by Bayer designation abbreviation, followed by common name in parentheses. Uppercase letters in brackets following star names refer to locations in Figure 2.3 (Cannon 2013a).

Asterism	Translation	Stars
san' uche'	star tail	Big Dipper (with Ursa Major) [A]
san' di'ehtsanh	its shitting out stars	β UMi (Kocab), α UMi (Polaris), β Cas (Caph) [B]
ha'aldag san'	stars shoot out	β UMi (Kocab), α UMi (Polaris), β Cas (Caph) [B]
diła' jį'ah	it raises its hand	α Gem (Castor), β Gem (Pollux) [C]
utl'ahbat	its cheek	Messier object 45 (Pleiades) [D]
mįįtsįį	its nose	specific stars not identified
uthaat	its mouth	specific stars not identified
unaagn	its eyes	Sun & Moon
san' tąy	star trail	Milky Way galaxy

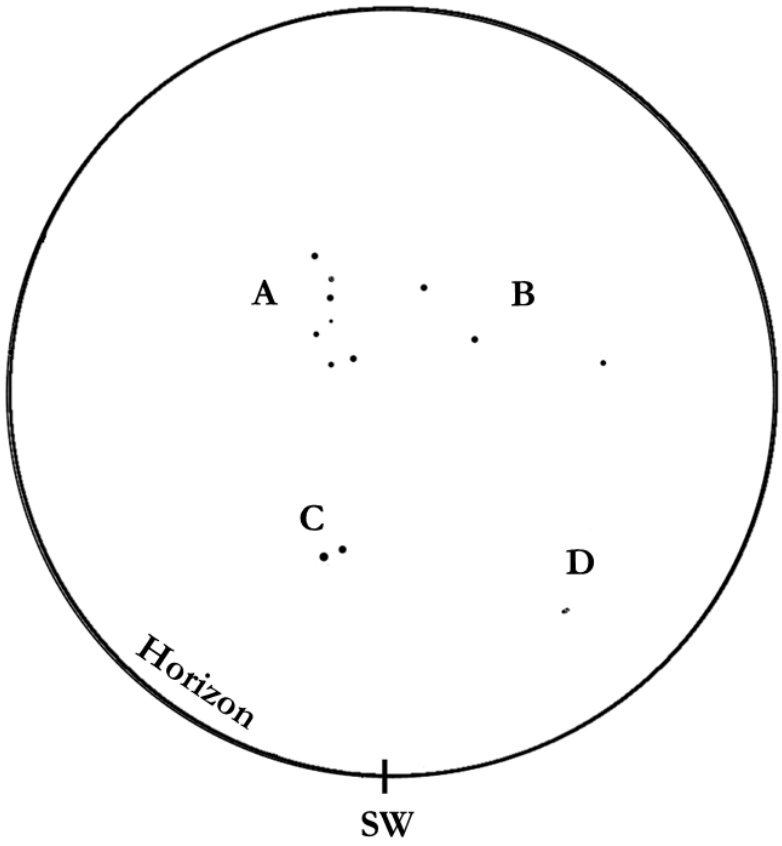

Figure 2.3. Whole-sky view of the Upper Tanana (Tetlin) constellation *yihdaa.* Stars as seen from Tetlin, Alaska on March 26, 2013 at 22:45 local time. Zenith lies in the center of the circle. Letters correspond to asterisms listed in Table 2.4 (Cannon 2013a).

Kari's unpublished field notes (1989b, 1) on the Scottie Creek dialect in Yukon, Canada provide evidence for a third and final variant of the Upper Tanana whole-sky constellation. Kari worked with the late Upper Tanana elder, Mary Tyone and elicited five asterisms within the constellation *yihdaa*, glossed as Big Dipper (Table 2.5).

Table 2.5. Asterisms in the Upper Tanana (Scottie Creek) constellation *yihdaa*. Asterism terms elicited from speakers of the Scottie Creek dialect of the Upper Tanana language in Yukon, Canada (Kari 1989b, 1).

Asterism	**Translation**	**Stars**
umbaagh iitįį	sun comes up at daylight	?
xałuudenaaxaał	darkness disappears	?
chech'ilts'ik	curls tail	?
łeekąy delyaa	pelvis	?
nił na 'ełnes	put hands one on top of the other	?

In comparison to other Alaska Athabascan languages, the first three phrases on Kari's list are more fitting as indigenous time terms based on the position of the Big Dipper. Compare the Upper Tanana phrase, *chech'ilts'ik* 'curls tail' (Table 2.5) to the Ahtna time term *yikaa ts'e' cila' ilts'iitl'* 'the fish tail has gotten curved towards dawn'. The Ahtna term delineates a temporal period based on the observation that, like a fish tail, the Big Dipper has rotated or curved to a position indicating dawn. In addition, each of the Scottie Creek phrases lacks the third person singular possessive prefix typically attached to Athabascan body part asterism terms. However, the Scottie Creek phrase *łeekąy delyaa* 'pelvis' may correspond to a group of stars, as de Laguna and McClellan (1960) also identified the term *uk'aye* 'its pelvis' as an Ahtna asterism. The final phrase *nił na 'ełnes* 'put hands one on another' may also correspond to an asterism, though cognate star terms have not been identified in other Athabascan languages, and the phrase more likely describes a temporal period based on a specific position of *yihdaa's* hands.

In addition to the five Scottie Creek asterisms/time terms, Kari recorded a rendition of a *tsa ushaa* 'smart beaver' story which accounts for the origin of *yihdaa*; envisioned as the ghost

of the *che't'iin* (tailed man) who was killed by *tsa ushaa* and repurposed as a celestial clock (Tyone 1994).[17] While this narrative is a valuable description of *yihdaa's* origin and illustrates that the Upper Tanana do in fact have a star lore, it does little to help further delineate the outline of stars comprising *yihdaa*. Without precise stellar identification, the Scottie Creek asterisms cannot be further assessed as they relate to a large or whole-sky constellation.

The Upper Tanana have at least three variations of the humanoid constellation, found in three separate communities; Northway, Tetlin, and Scottie Creek. This evidence strongly suggests that large or whole-sky constellations comprised of body part asterisms are governing tenets of Upper Tanana stellar ideology. That each tailed man constellation within the same language exhibits so much variation relative to one another suggests that this stellar knowledge is old and was widely known and regionally adapted. In addition, Upper Tanana stellar astronomy supplies corroborative evidence for a generic system guiding Northern Athabascan stellar nomenclature. In Gwich'in and Upper Tanana, consultants described whole-sky constellations as humanoids (named for their action - a verb) comprised of body part asterisms designated with a third person singular possessive prefix. When constellations are named, they are generally named for their perceived action; and those that are further divided into smaller asterisms are almost always named after body parts or material objects that have a possessive morpheme.[18] This naming strategy is also corroborated by Ahtna stellar nomenclature.

2.3 Ahtna *Nek'e Neghaltaexi* and *Nek'eltaeni*

Ahtna Athabascan constellation terms are sparsely documented. The few star names that are described are either associated with Ursa Major or are not otherwise precisely correlated with specific stars. The earliest record of an Ahtna constellation term is *nakxlx tēnē* [*nek'eltaeni*]

[17] Tetlin and Northway consultants loosely related the tailed man to a figure in the *stsǫǫ kelahdzeey* 'my grandmother spider' story. See (Tyone and Kari 1996, 23-34; David and Lovick 2011, 118-133).
[18] Athabascan body parts are obligatorily possessed and therefore must have a possessive prefix.

glossed as Ursa Major (Radloff and Schiefner 1874, 6). While the constellation *nek'eltaeni* 'that which moves following us' also appears in contemporary sources it is only approximately identified as "a constellation around the Big Dipper" (Kari and Buck 1975, 88) or as "a certain constellation of stars that looks like a man" (John and Kari 1986, 29).[19] However, the linguistic record reveals some evidence for Ahtna body part asterisms. Radloff and Schiefner (1874, 6) glossed the term *excịē* (presumably 'its tail') as an alternative name for Ursa Major. Likewise, the term *c'ece'* 'something's tail', is similarly glossed as the Big Dipper (Kari 1990a, 112). However, these linguistic sources do not associate the stars comprising 'its/something's tail' with the constellation *nek'eltaeni.*

Evidence for a large humanoid constellation comprised of body part asterisms similar to those identified in Gwich'in and Upper Tanana is, however, found in de Laguna and McClellan's (1960) unpublished Ahtna fieldnotes. During their work in the late 1950s-1960s de Laguna and McClellan (1960) identified the term *nekena c'uyaaxi* 'he walks/goes around' as a circumpolar constellation comprised of eleven asterisms named using body part terminology. However, none of these asterisms were precisely located in the stars. In their field summaries, de Laguna and McClellan (1954, 77) simply stated: "The constellations (including the Big Dipper) that circle the North Star are called the 'Fox', whose tail is used like the hour hand of a clock to tell the time."

Despite the constellation's description as a fox, other Alaska Athabascan consultants cogently described similar stellar figures as composite man-animals. Different body parts from different animals often factor into these descriptions. For example, a consultant in Tetlin described the humanoid constellation as a man with a fox tail. Personal interpretation likely

[19] The constellation term *nek'e nekeghaltaexi* 'that which moves in a circle following us' is used interchangeably with the term *nek'eltaeni* (Kari 1990a, 330; Kari and Buck 1975, 88).

accounts for various animal features incorporated into different descriptions of Alaska Athabascan humanoid constellations. This personal interpretation is found within and across different Alaska Athabascan ethnolinguistic groups. Some speakers explicitly state that the stellar figure is manlike, while others do not or cannot describe precisely what or whom the stellar figure resembles, which greatly adds to the mysticism of these constellations.

To better understand Ahtna stellar astronomy I conducted fieldwork with Ahtna speakers in the Copper River basin in 2013. During fieldwork near Tazlina village an Ahtna consultant identified eleven body part asterisms within the humanoid constellation, *nek'eltaeni,* also referred to as *nek'e nekeghaltaexi* 'that which moves in a circle following us'. Four asterisms were precisely identified, while the other seven were only approximately located (Figure 2.4).

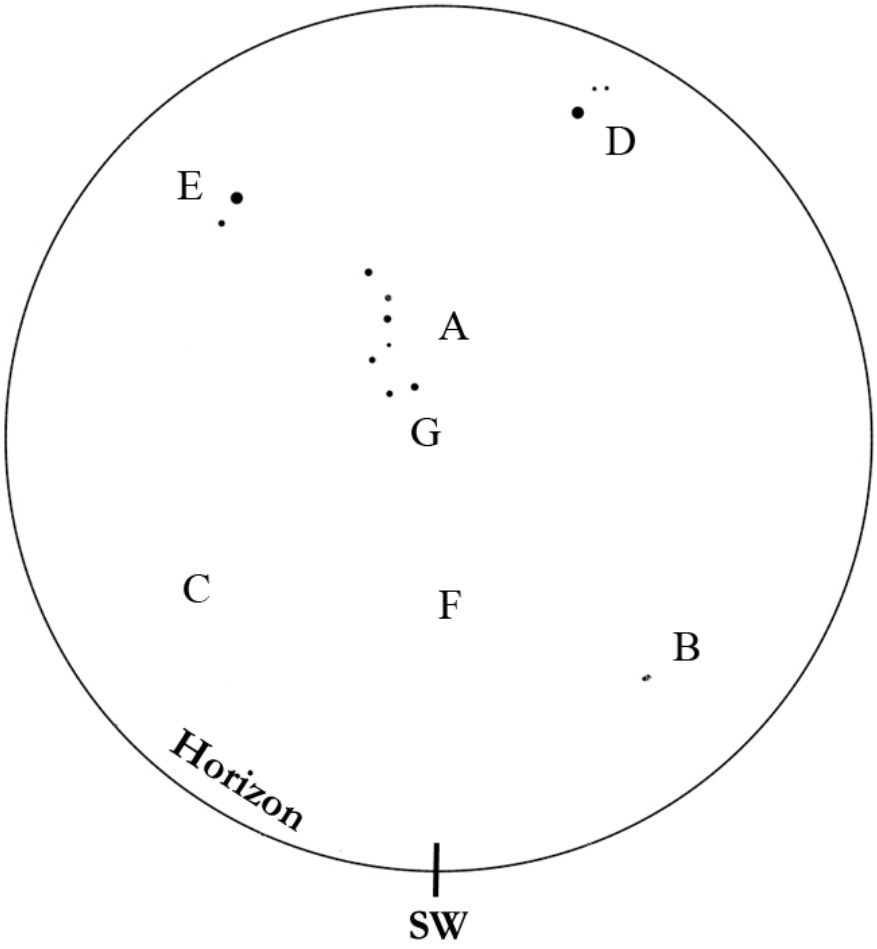

Figure 2.4. Whole-sky view of the Ahtna constellation *nek'eltaeni*/*nek'e nekeghaltaexi*. Stars as viewed from Tazlina, Alaska on March 26, 2013 at 22:45 local time. Zenith lies in the center of the circle. Letters correspond to asterisms listed in Table 2.6 (Cannon 2013b).

An additional Ahtna consultant in Gulkana independently verified, but did not precisely locate the body part asterisms elicited in Tazlina. Left and right hands, feet, and ears are distinguished using the Ahtna terms *tl'asts'en* 'left' and *kuzuun ts'ene* 'right', applied from the perspective of *nek'eltaeni*. The Ahtna terms consultants provided closely correspond to those de Laguna and McClellan (1960) documented, though I was unable to re-elicit the asterism terms 'its pelvis', 'femur', 'heart', 'palm', and 'head' (Table 2.6).[20]

[20] See appendix for a list of body part asterisms documented by de Laguna and McClellan (1960).

Table 2.6. Asterisms in the Ahtna constellation *nek'eltaeni*/*nek'e nekeghaltaexi*. Asterism terms Elicited from consultants in Tazlina and Gulkana in May 2013. Stars identified by Bayer designation abbreviation, followed by common name in parentheses. Uppercase letters in brackets following star names refer to locations in Figure 2.4 (Cannon 2013b).

Asterism (2013)	**Translation**	**Stars**
uce'	its tail	Big Dipper (with Ursa Major) [A]
kuzuun ts'ene ula'	its right hand	Messier object 45 (Pleiades) [B]
tl'asts'en ula'	its left hand	stars not specifically identified [C]
kuzuun ts'ene uke'	its right foot	α Lyr (Vega), β Lyr (Sheliak), γ Lyr (Sulafat) [D]
tl'asts'en uke'	its left foot	α Boo (Arcturus), η Boo (Muphrid) [E]
bentsiis	its nose	3 none specified stars (Orion's Belt?)
kuzuun ts'ene udzaghe'	its right ear	specific stars not identified
tl'asts'en udzaghe'	its left ear	specific stars not identified
unaegge'	its eyes	specific stars not identified [F]
udzedze'	its kidney	unspecified star near the Big Dipper's cup [G]

The consultant in Gulkana also provided an Ahtna phrase for the Milky Way, *ciił hwyaa yates ghilyaa* 'where smart boy stepped over the sky', but as opposed to the Gwich'in and Upper Tanana terms this phrase was not described as the trail of the humanoid stellar figure.[21]

While Ahtna consultants precisely located only four body part asterisms, it is noteworthy that the angular distance between the two furthest identified stars (its left foot & its nose/snout) is the same in Ahtna, Gwich'in and Upper Tanana (Northway). Given that stars become less circumpolar from latitudes north to south, a reduction in the size of the stellar figure might be expected between Fort Yukon and Tazlina. However, the humanoid constellation exhibits no reduction in size between 66.3345 N and 62.257N latitude, based on maximum angular distance criteria between the two furthest recognized asterisms. In Ahtna, Gwich'in, and Upper Tanana (Northway) languages, the tailed man spans more than 133° across the sky. Moreover, nearly all of the Ahtna asterism terms are cognate to those used to delineate stars within Gwich'in and Upper Tanana whole-sky humanoid constellations.

[21] *Ciił hwyaa* 'smart boy' is identified as a foxlike creator figure (not *nek'eltaeni).*

In addition to verifying body part asterisms, a consultant in Gulkana also described the Ahtna conceptualization of the humanoid stellar figure. According to this consultant *nek'eltaeni* (the constellation) is envisioned as a lynx or a wolverine-like man who was a highly revered and beneficent figure prior to Ahtna Christianization:[22]

> That's what they call *nekeghaltaexi.* Don't know why they call it a man, you know. . . I guess Lord, must have been . . . They don't know there was a Lord though [i.e. aboriginally]. They believe in wolverine. He's a man you know. You see sometime. Got eye and nose and mouth you know . . . star is made by that guy there . . . Everything just fit there. Must have been Lord, you know. But we don't know from beginning, you know. Only taught animal, we believe in animal [as God]. *Nek'eltaeni,* everything made by *nek'eltaeni*. We say other animals made it; no, not other animals. You know, that's the way they describe. They don't know Lord you know. *Nałtsiis* [wolverine] they say, you know. Wolverine's the only one that make it you know. *Saghani ggaay* [Raven] and *nałtsiis* (Cannon 2013b).

Evidence for an additional variant of the Ahtna humanoid stellar figure may also be recognized by compiling the few constellation terms found in the *Ahtna Athabaskan Dictionary* (Kari 1990a). While Kari does not present these terms collectively as a single unified constellation, they follow the predicted body part and material object pattern for naming humanoid asterisms and may represent components of a larger cohesive stellar group. In addition, the constellation/asterism terms are united in that they were elicited from speakers of the Mentasta-Batzulnetas dialect. Interesting differences include the use of the indefinite prefix, *c'e-*, as opposed to the more common third person singular possessive prefix attached to other

[22] The association of Alaska Athabascan humanoid constellations with the Christian concept of God is described in Chapter 4.

body part asterism terms previously described. This variation also provides an additional example of a material object depicted in the stars (presumably grasped by the stellar figure), which in this case is a cup or some type of container (Table 2.7).

Table 2.7. Constellation terms from the Mentasta-Batzulnetas dialect of Ahtna. Stars identified by Bayer designation abbreviation, followed by common name in parentheses.

Asterism	Translation	Stars	Source
c'ece'	something's tail	Big Dipper	(Kari and Buck 1975, 88)
c'entl'aa dezdlaay	that which is places on something's rear?	two unidentified stars	(Kari and Buck 1975, 88)
c'elak'aedi	something palm cavity	α UMi (Polaris)	(Kari 1990a, 254)
c'etutiil'	something's cup	four unidentified stars	(Kari and Buck 1975, 88)

As found in Upper Tanana, different Ahtna dialects also exhibit variation of a general humanoid stellar theme. Perhaps the most salient innovation or difference in the Ahtna whole-sky constellation is the presence of asterisms named for internal body organs and bones, a characteristic also found in Dena'ina (Kari 2007, 148) and Navajo (Haile 1947, 7-10) stellar nomenclature.[23]

2.4 Dena'ina *Naq'eltani* & *Yuq'eltaeni*

The linguistic record identifies at least five independent Dena'ina terms, excluding dialect variants, as names for the constellation Ursa Major/Big Dipper (Kari 2007, 148; Radloff and Schiefner 1874, VI, 11; Kari 1976c).[24] The Dena'ina term *naq'eltani*, glossed as both Ursa Major (Radloff and Schiefner 1874, 11) and Ursa Minor/Polaris (Osgood 1976, 174) is depicted as a Native deity that travels around the sky. Osgood reported:

> In Sheldon's brief account of the Tanaina [Dena'ina], he says that they believed in a supreme deity called *nachritahny*. This (*nákdeldáni*) is the common word in use for the Christian God introduced by the Russians. It seems also, however, to be an

[23] A primary Gwich'in consultant balked at the idea of asterisms named after internal body organs.
[24] A comprehensive list of Alaska Athabascan star and constellation names encountered in this research is listed in the appendix.

> abbreviated form of the earlier *náq'óčkdélldáni*, a native deity . . . At Kenai *náq'óčkdélldáni* is said to live in the North Star and to travel around the sky all the time. He is never visible in the daytime and only a few old people ever saw him at all. He is said to be responsible for the weather . . . At Tyonek, *náq'óčkdélldáni* is said to embody the whole constellation of the Little Bear [Ursa Minor]. When people lie down and think of *náq'óčkdélldáni* what they dream they think is real. Men appeal to him by holding up a hand and saying *kóx̣t'ana yéyóni* (you who made the people), and then they ask for what they wish (Osgood 1976, 174).

Given that the Ahtna term *nek'eltaeni* 'that which moves following us' describes a whole-sky humanoid constellation, the Dena'ina cognate, *naq'eltani* may also reference a constellation of similar value.[25] Radloff and Schiefner (1874, VI, 11) explicitly stated that the constellation *nakltanē* [*naq'eltaeni*] has been used synonymously with the Christian concept of God since contact with the Russians. They also mentioned that the Pleiades is called *čitalčini* "tail of the Great Bear" (Radloff and Schiefner 1874, III).[26] While *čitalčini* is not a body part term, it seems as though it was conceptualized as the tail of Ursa Major (*naq'eltani)*.[27] However, there is little other available information that advances the hypothesis of *naq'eltani* as a large humanoid constellation comprised of body part asterisms. Instead, the best candidate for a Dena'ina humanoid constellation is recognized by reconstructing evidence from the Upper Cook Inlet dialect. During language work with the late Dena'ina elder, Shem Pete, Kari (2007, 148; 1976c, 25) elicited the term *yuq'eltani,* 'the one over the sky' as a constellation comprised of Ursa Major and Polaris. In addition, Kari elicited four other Upper Cook Inlet body part terms,

[25] The Dena'ina term *naq'eltani* is also known by the variant term *naq'deltani* (Kari 2007, 312).
[26] Radloff and Schiefner cite Doroschin (c.a. 1848); however I was not able to locate this source. The exact quotation from Radloff and Sheifner (1874, III) follows: "Ausser den im Wörterbuche vorkommenden Namen für das Sternbild des grossen Bäran (S. 11 unter dem Worte Gott) und für die Plejaden, hat P.v. Doroschin noch *čitalčini* Schweif des grossen Bäaren, und *kutlilxhxhal kukan* als Gürtel des Orion.
[27] While no translation is provided, the term *čitalčini* may translate as 'stars stretched'.

glossed as individual constellations, none of which are precisely located in the sky. I posit that each of these body part terms (Table 2.8) is an asterism, located within a large unified Upper Cook Inlet constellation *yuq'eltani*.

Table 2.8. Unidentified Dena'ina star names from the Upper Cook Inlet dialect. These star terms may correspond to asterisms within a larger unified Upper Cook Inlet constellation *yuq'eltani*.

Asterism	**Translation**	**Stars**	**Source**
bejech'a	its kidney	?	(Kari 2007, 148)
kala q'edi	the one on the tail	?	(Kari 2007, 148)
belaq'a'edi	the one on its palm	?	(Kari 2007, 148)
k'tsikiq'edi	the one on top of the head	?	(Kari 2007, 148)

While each of the terms in Table 2.8 adheres to the Athabascan body part theme, only two terms have the expected third person singular possessive prefix, *be-*. In addition, *bejach'a* 'its kidney' is the only term cognate to another Alaska Athabascan asterism, Ahtna *udzedze'*. On the other hand, Shem Pete (1981) identified *yuq'eltani as* "a big bodied animal", which exhibits striking similarities to other humanoid constellations previously described. Because the Dena'ina asterisms/constellations are not precisely located, *yuq'eltani* should not be tacitly assumed to occupy the same celestial space as other Athabascan whole-sky constellations, though it is certainly a viable possibility.

Despite a relatively diverse array of Dena'ina terms associated with Ursa Major, little additional evidence substantiates a clear relationship between body part star names and a large humanoid constellation.[28] While the current viability of Dena'ina astronomy knowledge is questionable, additional documentation of the Dena'ina starscape would be especially valuable toward better understanding the relationship of stellar astronomies across Northern Athabascan languages.

[28] Refer to appendix for Dena'ina star and constellation terms.

2.5 Koyukon *Naagheltaale*

The Koyukon constellation, *naagheltaaele*, literally 'that (animate) which is revolving' is perceived as a man associated with the Big Dipper. During the late nineteenth and early twentieth centuries, Jesuit priest Jules Jetté documented all aspects of traditional Koyukon life and language, including descriptions of Koyukon constellations (Jetté 1909). While Jetté's scholarship provides invaluable insight into Koyukon stellar astronomy, he did not compile a comprehensive list of indigenous body part asterisms. However, Koyukon names for body part asterisms materialize by compiling terms from Jetté's various unpublished manuscripts. This reconstructive evidence shows that *naagheltaale* is comprised of asterisms cognate to those in other Alaska Athabascan languages and corresponds to a larger group of stars than delimited by the Big Dipper alone. Jetté wrote:

> To the Ten'a the *naagheltaale* is a man, from whom the legendary Raven recovered by stealth the sun and the moon. As Raven was taking his flight with these the injured possessor stabbed him, and though able to reach his home, he died immediately after. He then returned to the *naagheltaale* and killed him, whereupon they made friends and journeyed together to the *naaghedeneeł ne te* (among the dead). There they parted; the one to become the measurer of time, the other to be a Raven again. As the *naagheltaale* was ascending to his position in the sky, Raven speared him between the shoulders, where his back is now humped. The star η is the head of *naagheltaale*, and ζ is the place where he was hit by the Raven's spear; α and β are the buttocks; the legs are formed by the minor stars in front of the Pointers. But scanty attention is given to these by the

majority of the Ten'a, who practically know only the seven bright stars of the Dipper (Jetté 1900).

Body part asterisms documented by Jetté are listed in Table 2.9.

Table 2.9. Asterisms in the Koyukon constellation *naagheltaale* or *sekgheltaale*. Koyukon star terms from Jetté (1898, 508; 1900; 1905a; 1909). The term for 'its legs' (*metl'ene'*) is derived based on the descriptions from Jetté's (1900) manuscript. Stars identified by Bayer designation abbreviation, followed by common name in parentheses. Uppercase letters in brackets following star names refer to locations in Figure 2.5.

Asterism	**Translation**	**Stars**
metlee'	its head	η Uma (Alkaid) [A]
metl'o'	its buttocks	α Uma (Dubhe) and β Uma (Merak) [B]
naagheltaale melo'	naagheltaale's hand	α UMi (Polaris) [C]
meggontekk'et	space between its shoulders	ζ Uma (Mizar) [D]
*metl'ene'	its legs	faint stars in front of the pointers [E]

Each of the Koyukon body part asterisms listed in Table 2.9 includes the expected third person singular possessive prefix, *me-*. However, *metl'ene* 'its legs' is a derived term, as Jetté only provides the English equivalent. In addition, the possessive prefix *me-* suggests that Jetté elicited the body part asterism terms from the Lower Koyukon dialect, as the Central and Upper dialects use the equivalent prefix *be-*.

While at least six different sketches of *naagheltale* (Big Dipper) appear in Jetté's manuscripts, none collectively diagram each of the body part asterisms that he elicited. Moreover, Jetté (1900) articulates that the lesser known stars in front of the Dipper (its legs) are relatively unimportant because few people knew of them. On the contrary, the legs provide evidence for a larger denotational value of *naagheltaale*. The omission of the legs and general reduction of stars comprising *naagheltale* suggests that Koyukon stellar knowledge attrition was largely underway by the late nineteenth century. As found across contemporary Alaska Athabascan cultures, the dominant large or whole-sky constellation has been greatly reduced from its traditional form, apparently to fit the Western paradigm, Big Dipper. Today, just a

handful of traditional Alaska Athabascan people retain knowledge of the indigenous form of the humanoid constellation.

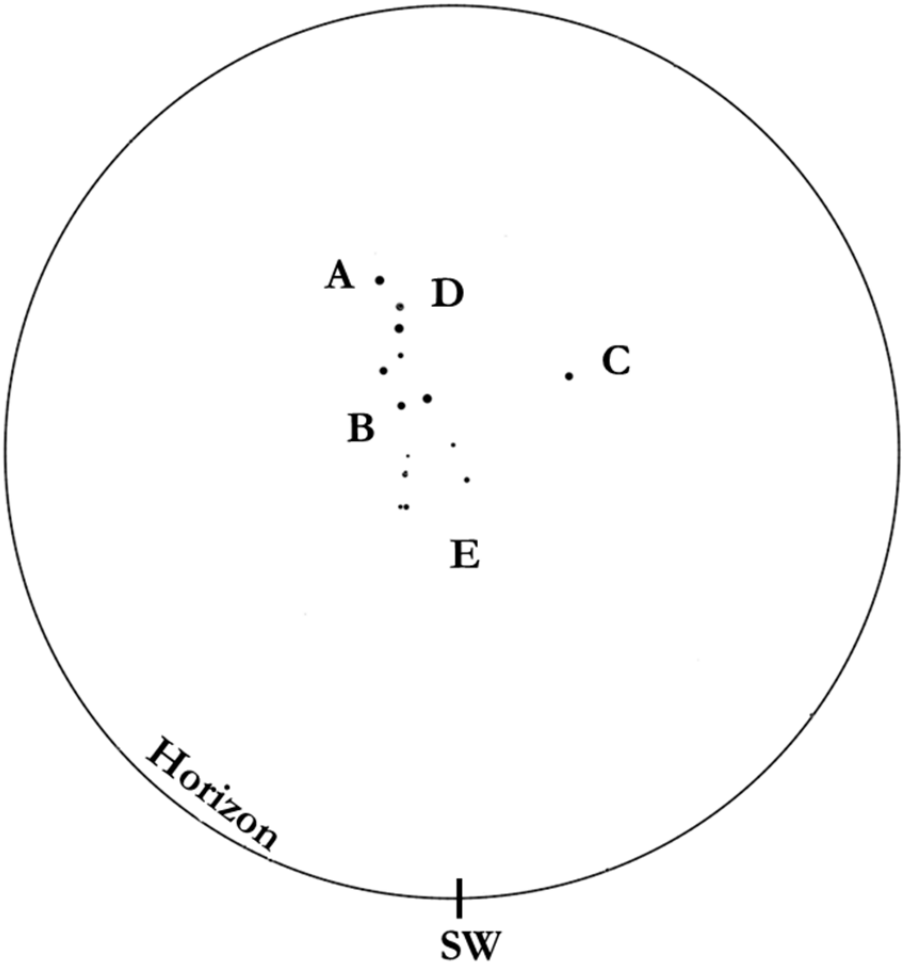

Figure 2.5. Whole-sky view of the Koyukon constellation *naagheltaale*. Stars as seen from Nulato, Alaska on March 26, 2013 at 22:45 local time. Letters correspond to asterisms listed in Table 2.0. Asterisms are based on descriptions from Jetté (1898, 508; 1900; 1905a; 1909). Note that the legs are only approximately located as "the faint stars in front of the pointers".

Naagheltaale exhibits a significant difference from other Alaska Athabascan constellations in that the stellar figure does not possess a tail. Moreover, *naagheltaale's* orientation is reversed; what is described in other Athabascan cultures as the tip of the tail is the

location of *naagheltaale's* head.[29] Interestingly, Jetté glossed *naagheltaale melo'* ('naagheltaale's hand') as the North Star (Polaris), but neglected to include it (or the legs) in any of his diagrams; instead he sketched only the seven stars of the Big Dipper. The North Star is, however, a very good candidate for *naagheltaale's* outstretched hand, as corroborated by Nelson (1880) in the story *Tale of Two Shamans*:

> He had gone but a little way from the ground when Raven raised his bear spear and cast it at him with so true an aim that it pierced the shaman in the small of the back where it stuck fast. When the spear struck him, the Ermine shaman cried out in pain, bent his body forward, and threw back both hands, and in this position he floated up and became the constellation of the Great Bear. And ever since he has turned around and around in the sky with the spear fast in his back, as anyone can see (Nelson 1880, 84; Nelson and Vanstone 1978, 58).

As depicted in Figure 2.5 the North Star provides a very nice image of an outstretched hand (or a spear), as Nelson described. In addition, the Ahtna asterism *c'elak'aedi* 'something's hand' is also idetified as Polaris (Kari 1990a, 254).

Body part asterisms unique to Koyukon are *metl'o',* 'its buttocks' represented by the pointer stars in the cup of the Dipper and *meggontekk'et* 'space between its shoulder blades', delimited by the second star in the handle of the Big Dipper, which identifies the location where *naagheltaale* was hit by a spear. While *naagheltaale* is likely comprised of additional body part asterisms, the influence of Western concepts, combined with traditional stellar astronomy knowledge attrition, contributes to the difficulty of eliciting additional Koyukon star terms today.

[29] *Naagheltaale's* head is described as the first star (Alkaid) in the handle of the Big Dipper.

2.6 Tanacross *Neek'e'elteen*

A very elderly Tanacross speaker from Mansfield identified the term *neek'e'elteen* 'that which moves following us' as a humanoid constellation. While this consultant was unable to locate any of the stars within *neek'e'elteen*, she described it as a "long man" indigenously percieved a beneficient deity now synonymous with the Christian God *wut'axdi̱ht'eey*. The Tanacross term *neek'e'elteen* is cognate to the humnoid constellations *neek'e'eltiin* and *nek'eltaen* in Upper Tanana and Ahtna, respectively and is likely comprised of similar body part asterisms.[30] This consultant also stated: "Not only Tanacross [people], the other people, they use their own language and they call different, that *nek'e'elteen*", which suggests that such a stellar figure was formerly widespread throughout the Alaska/Yukon border region.

2.7 Fragmentary Evidence from the Other Alaska Athabascan Languages

Descriptions from Gwich'in, Upper Tanana, Ahtna, Dena'ina, Koyukon, and Tanacross provide the most salient examples of Alaska Athabascan large or whole-sky humanoid constellations. Given that evidence for large humanoid constellations occurs in languages discontinously distributed across the entire Alaska Athabascan territory, it is likely that other Athabascan cultures between these groups share similar strategies for mapping the sky or at least did so in former times. However, there is little opportunity to elicit additional star names from some of the smaller Athabascan languages, given their extreme moribound status (Table 2.10).

[30] A Tanacross term for the Big Dipper is reported as *k'eltah* (Arnold, Thoman, and Holton 2009).

Table 2.10. Population and speaker statstics of Alaska Athabascan languages. Adapted from Krauss (2007, 408).

Language Name	Population	Speakers
Ahtna	650	25
Dena'ina	1,000	50
Deg Hit'an	250	14
Holikachuk	180	5
Koyukon	2,300	150
Upper Kuskokwim	100	25
(Lower) Tanana	400	25
Tanacross	200	50
Upper Tanana	300	55
Han	60	12
Han (Canadian)	250	7
Gwich'in	1,000	150
Gwich'in (Canadian)	1,900	400

However, a comparison of star terms from some of the smaller Alaska Athabascan languages that lack documented body part asterisms suggests that they may also depict a humanoid constellation.[31] In Tanana Athabascan, the term for Big Dipper is *nogheyoli* 'the one that walks around' (Kari 1994, 369), which implies that whatever is walking has legs and other body parts depicted amongst the stars. The term *nogheyoli* is also analogous to phrases describing stellar motion in Gwich'in (*yahdii ahaa* 'yahdii is walking') and Upper Tanana (*yaa nałts'aa aahaal* 'it's walking around the sky'). Similarly, *noghiltale* 'that animate which moves back and forth', is the term used to designate the Big Dipper in Upper Kuskokwim Athabascan (Collins and Petruska 1979, 98). While I found no Upper Kuskokwim body part asterisms in the literature or archival record, at least one elder from Nikolai assocaites *noghiltale* with an ape-man figure known as *nwho'an,* but added that there are no living elders who can confirm this association.

Han Athabascans also vizualize the Big Dipper as some type of animal or humanoid. In Eagle, Alaska, the three stars in the handle of the Big Dipper are described as a tail, and the four

[31] Linguistic analysis of Athabascan star terms is described in Chapter 3.

stars in the Dipper's cup represent a body (Rooth 1971, 264-265), which suggests that other undocumented body parts may also be depicted amongst the stars. In addition, the Han term for the Big Dipper, *yihjah* (Ritter and Paul 1980, 74) is cognate to the whole-sky constellation terms in Gwich'in (*yahdii*) to the north, and Upper Tanana (*yihdaa*) to the south.

The languages Deg Hit'an and Holikachuck provide little evidence in support of a large humanoid or whole-sky constellation. The primary Deg Hit'an term for Big Dipper is *vighun' xidiłt'ay* (Chapman 1911; Kari 1977b, 81) which loosely translates as 'according to it' or perhaps 'the governor', presumably a metaphor for time-reckoning or perhaps a reference to a celestial deity. *Yuxgitsiy* 'raven' or 'grandfather' (Zagoskin and Michael 1967, 309), appears as an alternative Deg Hit'an term for the Big Dipper, which may reference a man-like constellation. The term, *cheyyakda* 'our grandfather' similarly corresponds to Ursa Major in Dena'ina where it has religious significance similar to the concept of the Christian God (Radloff and Schiefner 1874, vi). The only known Holikachuk term for Big Dipper is *magha t'inixin'ney*, which is of unknown etymology (Kari, Alexander, and Deacon 1978, 25).

2.8 Chapter Two Conclusion

A single dominant circumpolar constellation that includes the Big Dipper is a defining feature of the Alaska Athabascan starscape. Newly documented examples from Alaska Gwich'in, Upper Tanana, and Ahtna show that these principal whole-sky constellations are depicted as humanoid figures that span more than 133 degrees across the sky. Yet, an Athabascan constellation larger than Ursa Major has not been previously described in the literature.

While evidence suggests that a single whole-sky constellation was formerly a dominant feature of the starscape in at least several Alaska Athabascan languages, the contemporary

ethnologist is hard pressed to find experts with this knowledge. The current status is that whole-sky constellations apparently underwent a reduction from their traditional forms to the point that most Athabascan consultants today associate only the Big Dipper with terms formerly depicted as large or whole-sky stellar figures. To this point a Gwich'in consultant commented: "*yahdii*, long time ago no white man, but he [Gwich'in people] know that star. He watch that star all the time. What time, all that. So, even some old people know that yet, but not many people." This apparent reduction of larger traditional humanoid constellations is likely a result of outside influence to fit the Western paradigm of the Big Dipper, which has no doubt complicated and perhaps overshadowed the documentation of indigenous humanoid constellations in the subarctic.

Alaska Athabascan whole-sky constellations provide a single unifying system for mapping the night sky, and the reliance on body-part metaphors renders the system highly mnemonic. By recognizing one part of the constellation an observer can immediately identify the remaining parts based on an existing mental map of the human body. The circumpolar position of these constellations greatly facilitates navigation and time-reckoning in the subarctic. The whole-sky constellation concept does not negate or deny the existence of additional Athabascan constellations beyond a large humanoid constellation. However, such smaller constellations exhibit much more variation across the language family and are therefore more likely to represent recent innovations or borrowings. In contrast, the concept, if not the term, of a large prominent humanoid constellation may extend across the entire span of Northern Athabascan languages and have great antiquity. Further, a common stellar naming strategy based on dividing

humanoid constellations into smaller body part asterisms is shared more broadly across the Northern and Southern Athabascan groups.[32]

Surprisingly, only a few other apparent examples of whole-sky constellations have been noted previously, and none of these are as robustly documented as those recently described in Alaska Gwich'in, Upper Tanana, and Ahtna. The ancient Egyptian goddess *Nut* is usually depicted as a whole-sky celestial figure, but the evidence for its representation is sparse (Kelley and Milone 2011, 265-267). Perhaps the most detailed example of a non-Athabascan whole-sky stellar figure is the Zuni (Pueblo) constellation *téhłiyakkh^{y}acíwanih*, literally 'chief of the night' (Young and Williams 1981, 187). Harrington describes this constellation as a "gigantic human figure, even bigger than the whole visible sky" (Young and Williams 1981, 187). However, only a few of the component asterisms within this constellation have been identified with known stars, and while some of these asterisms are envisioned as body parts, their names do not employ body part terminology. Similarly, the Skidi Pawnee (Caddoan) associate all the visible stars with the spots of a bobcat or deer fawn, suggesting that the entire sky represents a unified but rather abstract constellation (Chamberlain 1982, 130-131). In any case, none of these putative whole-sky constellations is circumpolar, and in contrast to the Athabascan examples, such as Gwich'in *yahdii*, only a portion of the constellation is visible at any given time. Thus, the whole-sky constellations recently documented in Gwich'in, Upper Tanana, and Ahtna are the first robust examples of whole-sky constellations in world astronomies. Northern Athabascan astronomy is not only much more detailed than previously believed; it also provides evidence for a completely novel and previously undocumented way of conceptualizing the sky—one that is unique to the subarctic and uniquely adapted to northern cultures.

[32]Linguistic evidence for a pan-Athabascan system of mapping the sky is discussed in Chapter 3.

Chapter 3: Linguistic Evidence for a Pan-Athabascan Strategy for Mapping the Sky

The concept of a large humanoid constellation divided into named body part asterisms may extend beyond Alaska across the entire span of Northern Athabascan languages. The use of body-part terminology to delineate asterisms within a larger constellation may also have antiquity within the broader Athabascan family. Navajo, a Southern Athabascan or Apachean culture, divides most constellations into asterisms named after body parts (Griffin-Pierce 1992, 168; Haile 1947, 7-14). While Navajo does not delineate a single whole-sky constellation, at least five of the eight primary Navajo constellations depict human forms comprised of body part asterisms (Griffin-Pierce 1992, 168). At least eleven of the body part terms used to denote asterisms within Navajo constellations are the same as those found in Northern Athabascan, suggesting a common ancestor from which Northern and Southern Athabascan stellar naming strategies derived.

The goals of this chapter are 1) to make linguistic comparisons of the most widely attested Northern Athabascan constellation terms to demonstrate that humanoid constellations comprised of body part asterisms are not limited to Alaska, but may be widespread across the Northern Athabascan languages and 2) to show that Northern and Southern Athabascans share a common stellar naming strategy.[33]

3.1 Two Widely Attested Athabascan Forms for the Big Dipper

Terms associated with the constellation Ursa Major (Big Dipper) are identified in at least 34 of the approximately 40 or so Athabascan languages. While terms for Ursa Major/Big Dipper may exhibit variation within a single language, such as Dena'ina (Kari 2007, 148) only two predominant forms are widely attested across the Northern and Southern Athabascan languages.

[33] Insufficient data prohibits an informed discussion of Pacific Coast Athabascan stellar nomenclature. Though, at first glance Pacific Coast Athabascan languages do not appear to follow other Athabascan stellar naming strategies.

For the purpose of this thesis, I have classified these constellation terms are category A or B terms. Category A consists of terms cognate to Gwich'in *yahdii.* These terms are attested in at least 17 Northern Athabascan languages within a contiguous area stretching from the Alaska-Yukon border region east across the subarctic and plains of Canada to Hudson Bay. Category B terms are all derived from verb stems which describe motion of the constellation. Terms in this category are not necessarily linguistic cognates, though they do rely on a common set of motion verb stems, including stems deriving from Proto-Athabascan *te· 'singular animate object'; *ya· 'singular go, walk'; and *kats' 'object moves independently'. Category B terms are found in at least 11 Alaska Athabascan and Apachean languages without any known occurrences in Canadian or Pacific Coast Athabascan. Both categories (A and B) have terms that refer to humanoid constellations that are further subdivided into named body part asterisms. While humanoid constellations comprised of body part asterisms are only confirmed in Alaska and the American Southwest, linguistic evidence suggests that similar constellations may exist in other Northern Athabascan languages.

At least six additional languages distributed throughout the Athabascan territory (Alaska, Canada, the Pacific Coast, and the American Southwest) utilize terms for the Big Dipper that do not meet category A or B criteria. These "other" terms are not linguistically united to each other in any particular way and comprise a final collection of Big Dipper terms identified in this thesis as category C. While a variety of Athabascan languages also utilize alternative names for the Big Dipper, category C contains only terms from languages that do not also utilize a category A or B Big Dipper term. In addition, stars named using body part terminology are not found in any of the languages that exclusively employ a category C term. Figure 3.1 illustrates the distribution of Ursa Major/Big Dipper terminology across the Athabascan languages.

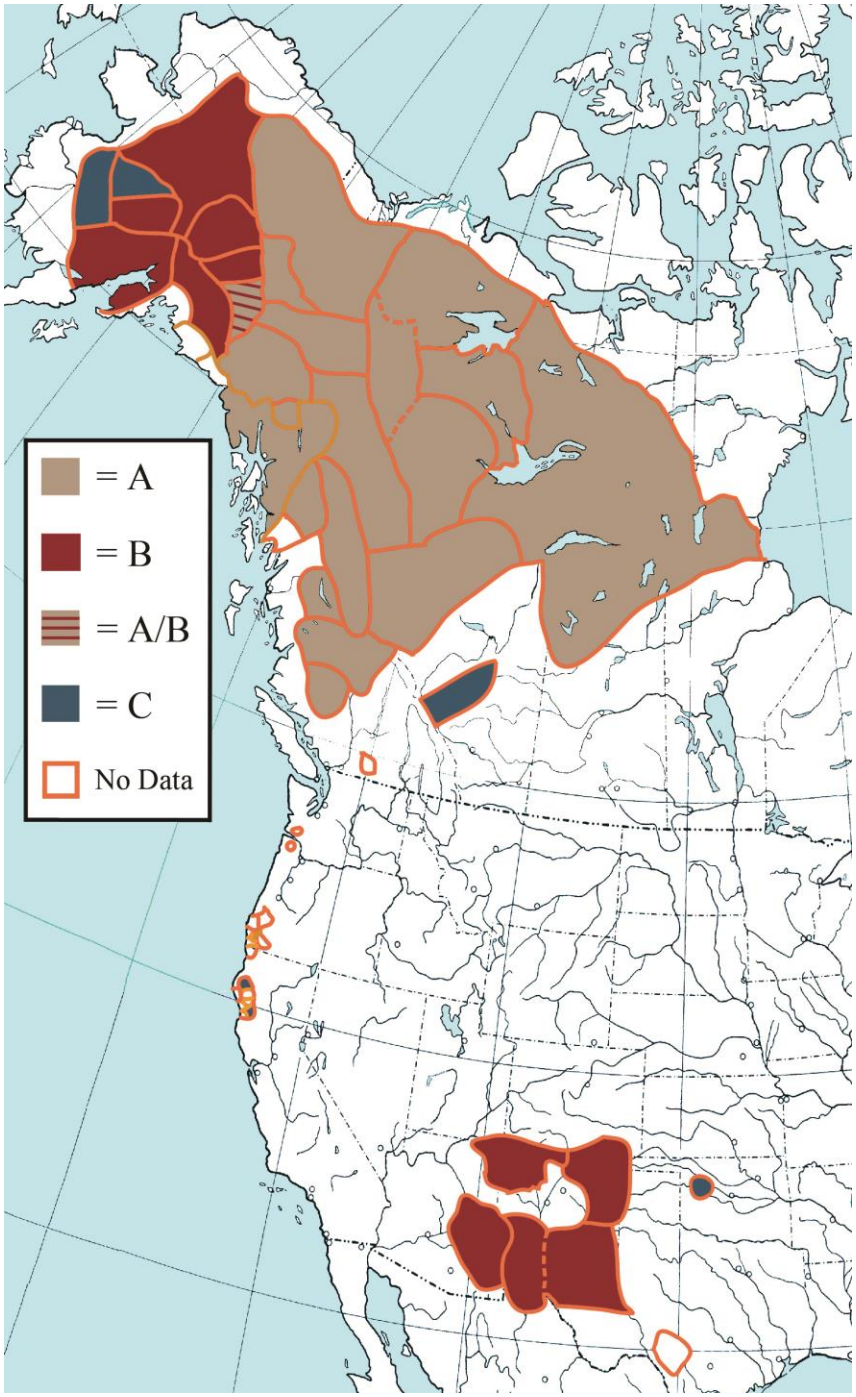

Figure 3.1. Distribution of Athabascan Ursa Major/Big Dipper terminology. Category A includes languages that have terms cognate to Gwich'in *yahdii*. Category B includes languages that have terms that share a common set of verb stems that describe the motion of the constellation. Category A/B is delimited by the Upper Tanana language, which employs both a Category A and B terms. Category C includes languages that exclusively utilize a Big Dipper term that does not meet category A or B criteria. The regions shaded white with an orange border depict Athabascan languages where a term for the Big Dipper or Ursa Major has not been identified (i.e. regions with no data).

3.1.1 Category A: *Yahdii* and Cognates Thereof

Terms cognate to Gwich'in *yahdii* and identified as referring to Ursa Major (Big Dipper) are found in at least 17 Athabascan languages occupying a contiguous area stretching from the Alaska-Yukon border region east to Hudson Bay (Figure 3.1). Within Alaska, cognates of *yahdii* are found only in the Alaska-Yukon border languages of Gwich'in, Han, and Upper Tanana. The term has also been borrowed into Tlingit, a language more distantly related to the Athabascan language family (Krauss & Golla 1981:67). However, no term for the Big Dipper has been documented in the now-extinct Eyak language, so it is not possible to ascertain whether a cognate term may have extended beyond Athabascan to the Eyak-Athabascan family. In addition, languages that have a category A term have few if any alternative names for Ursa Major or the Big Dipper (Table 3.1).

Table 3.1. Northern Athabascan languages with a constellation term cognate to y*ahdii*. Constellation terms cognate to Gwich'in *yahdii* are identified in this thesis as category A terms. The Tlingit term is not cognate but borrowed from neighboring Athabascan languages. Forms are cited in practical orthography. ISO 639-3 language codes provided for clarification in cases where language names may vary in the literature and in modern usage.

Name	Language (ISO 639-3)	Source
yahdii	Gwich'in (gwi)	(Peter 1979, 41)
yihjah	Han (gaa)	(Ritter and Paul 1980, 74)
yihdaa	Upper Tanana (tau)	(Kari 1989b, 1)
yíhda	North Slave (scs)	(Rice 1978)
yìhda	Sekani (sek)	(Hargus 2000, 135)
yìhda	Dogrib (dgr)	(Saxon and Siemons 1996, 133)
yïhda	Wiitsuwit'en (bcr)	(Hargus 1999, 11)
yihta	Carrier (crx)	(Morice 1932, 37, 95)
yéhtai	Chilcotin (clc)	(Morice 1890, 133)
yìhdā	Kaska (kkz)	(Kaska Tibal Council 1997, 382)
yehda'	Tahltan (tht)	(Palgrave ca. 1902, 148)
yehda	Chipewyan (chp)	(Le Goff 1916, 750)
yèshta	Beaver (bea)	(Petitot 1876, 261)
yèda	Southern Tutchone (tce)	(Tlen 1993, 57)
zhída	South Slave (xsl)	(South Slave Divisional Education Council 2009, 159)
zhéhde	Northern Tutchone (ttm)	(Ritter ca. 1977, 44)
yax't'e	Tagish (tgx)	(McClellan 1975, 78)
(yaxhté)	Tlingit (tli)	(Edwards 2009, 319)

The etymology of the Gwich'in term *yahdii* and cognates thereof is not transparent. The term *yahdii* is archaic and preserves the rare Proto-Athabascan gerundive form *həsda 'sitting' evidence for the antiquity of the term (Leer 2000, 117).[34] The prefix *hə- is a peg that facilitates pronunciation but has no literal meaning. The modern form *yahdii* derives from combining the Proto-Athabascan term *yə χ d 'house' with the gerundive *həsda 'sitting'. When these terms are combined the peg is dropped resulting in the term *yə χ da. The combination of consonants -χsd- is resolved in various ways, generally reducing to -s- (though now borrowed into Tlingit as -χ-). This is reflected in Gwich'in as -h-. The modern Gwich'in term *yahdii* is thus archaic in two

[34] The term gerundive is applied here to refer to a derived form which is a noun denoting an event/state.

ways 1) it preserves the swha in 'house' (written 'a' in modern orthography), and 2) it preserves a reflex -h- of the once productive gerundive -s- (Leer, pers. comm., April 26, 2013). It is likely that not only the form, but also the concept of *yahdii* as a large or whole-sky constellation can be reconstructed at the level of Proto-Athabascan.

While Gwich'in, Ahtna, and Upper Tanana consultants describe the whole-sky constellation as a tailed man crouched face down across the sky, the Proto-Athabascan reference to 'sitting' is somewhat mysterious. Sitting or staying may relate to the observational fact that *yahdii* is circumpolar and stays in a crouched position overhead without rising or setting. One Gwich'in Athabascan consultant stated:

> You see, the world turns like this, right. And he's [*yahdii*] sitting here. So when you're turning like this, the whole universe seems like it's turning this way. OK, so you're here, he's [*yahdii*] here, and we're turning at that angle. But he's always in the same spot. It's just us that are moving [i.e. earth is rotating].[35]

Reference to a celestial house is perhaps even more mysterious as terminology for a stellar abode is not identified in any Northern Athabascan language. However, the Proto-Athabascan reference to *yahdii* and cognates thereof as 'sitting inside the house' is supported by at least one Carrier Athabascan narrative collected by Morice (1894), which describes the Carrier constellation, *yihta* as a man that carries his house around in the sky as if pulling it on a sled.

> Groping his way thither, he soon perceived sparks flying out of two columns of smoke, and cautiously approaching he came upon a large lodge covered with branches of conifers. He peeped through a chink and saw nobody but an old man

[35] The concept of a rotating earth and a stationary sky was emphasized by other consultants in Ahtna and Upper Tanana communities.

> sitting by one of two large fires burning in the lodge. Immediately the old man cried out: 'Come in, my son-in-law!' The young man was much astonished, inasmuch as he could see nobody outside but himself. 'Come in, my son-in-law; what are you doing out in the cold?' came again from the lodge. Whereupon the gambler ascertained that it was himself who was thus addressed. Therefore he timidly entered, and, following his host's suggestion, he set to warm himself by one of the fires.
>
> The old man was called *nə-yəR-hwolluz* because, being no other than *Yihta* (Ursa Major), he nightly carries his house about in the course of his travellings (Morice 1894, 79-80).[36]

Terms cognate to *yahdii* have not been identified in three Canadian Athabascan languages; Tsetsaut, Nicola, and Sarcee.[37] Tsetsaut and Nicola are extinct and poorly documented languages within British Columbia (Krauss and Golla 1981, 77) and have no documented terms for Ursa Major or the Big Dipper. Conversely, Sarcee Athabascan is located in Alberta south of the contiguous region of other Northern Athabascan languages and is more culturally associated with the plains tribes, especially the Blackfoot (Krauss and Golla 1981, 84). This relative linguistic and cultural isolation from their Athabascan relatives may explain their use of a markedly different term for the Big Dipper, *suchisch'idi* (Starlight and Donovan 1996, 58), which may translate as 'seven stars'.

[36] Morice (1894, 80) provides the footnote: "lit. 'he carries (as with a sleigh) a house.' The final *hwolluz* is proper to the dialect of the Lower Carriers, though the tale is narrated by an Upper Carrier, which circumstance would seem to indicate that the legend is not, as so many others, borrowed from a Tsimpshian tribe."
[37] Sarcee is also known as Tsuut'ina.

3.1.2 Category B: Big Dipper Terms that Share Common Verb Stems and Prefix Morphemes

Category B terms associated with Ursa Major (Big Dipper) are not exclusive cognates. Instead, they share a small mix and match set of verb stems and prefix morphemes that describe the constellation as an animate, moving, or walking object. Category B consists of at least 20 terms from seven Alaska Athabascan languages and four Apachean languages (Table 3.2).

Table 3.2. Athabascan terms for Ursa Major which describe the constellation's motion. Alaska Athabascan and Southern Athabascan terms for Ursa Major/Big Dipper are united by a small set of common verb stems and prefix morphemes that describe the motion of the constellation. These terms comprise category B. Apachean terms are shown in shaded cells, while terms from Alaska Athabascan languages are shown in unshaded cells. Note that Chiricahua is a dialect of Mescalero Apache.

Name	Language	Translation	Source
nekena c'uyaaxi	Ahtna	it revolves around	(Kari 1990a, 471)
nek'e nekeghaltaexi	Ahtna	that which moves in a circle following us	(Kari 1990a, 330)
nek'eltaen	Ahtna	that which moves following us	(Kari and Buck 1975, 88)
nek'eltaeni	Ahtna	that which moves following us	(Kari 1990a, 330)
neek'e'eltiin	Upper Tanana	that which moves following us	(Cannon 2013b, 24-26)
neeke'e'lteen	Tanacross	that which moves following us	(Cannon 2014, 58-60)
naagheltaale	Koyukon	that which is revolving	(Jetté and Jones 2000, 500)
nosekgheltaale	Koyukon	that which is revolving its body	(Jetté and Jones 2000, 733)
sekgheltaale	Koyukon	that which is revolving its body	(Jetté and Jones 2000, 733)
noghiltale	Upper Kuskokwim	that which moves back and forth	(Collins and Petruska 1979, 78)
nogheyoli	Lower Tanana	that which is walking	(Kari 1994, 369)
naq'eltani	Dena'ina	that which repeatedly moves following after	(Kari n.d.)
yuq'eltani	Dena'ina	the one over the sky	(Kari 2007, 148)
naq'ech' niqahdghuqesi	Dena'ina	that which repeatedly moves over following us	(Kari 2007, 148)
naqaghuqesi	Dena'ina	that which repeatedly moves/falls	(Kari 2007, 148)
náhookǫs	Navajo	that which repeatedly moves/falls	(Young and Morgan 1980, 542)
náhokosé	Western Apache	that which repeatedly moves/falls	(Bray 1998, 297)
naahakosee	Jicarilla Apache	that which repeatedly moves/falls	(Phone, Olson, and Martinez 2007, 341)
náhaakusí	Mescalero Apache	that which repeatedly moves/falls	(Breuninger et al. 1982, 60)
*náhokosé	Chiricahua Apache	that which repeatedly moves/falls	(de Reuse 1998, 65)

While several smaller groups of terms within Table 3.2 are cognate to one another, it is the small mix and match set of prefixes and verb stems that unite all of the terms as a cohesive category. These similarities are more easily recognized by identifying the two primary verb stems and prefix morphemes in the list. The first set of terms discussed consist of the classificatory verb stem *qes* or *kǫ́ǫ́z* 'enclosed compact object moves/falls' (Young, Morgan, and Midgette 1992, 323). Terms comprised of this verb stem are found in four Apachean languages plus Dena'ina in Alaska (Table 3.3).

Table 3.3. Southern Athabascan and Dena'ina Big Dipper terms cognate to *náhookǫs*. Terms are based on the classificatory verb stem *qes* or *kǫ́ǫ́z* 'enclosed compact object moves/falls'.

Name	Language	Translation	Source
náhookǫs	Navajo	that which repeatedly moves/falls	(Young and Morgan 1980, 542)
náhokosé	Western Apache	that which repeatedly moves/falls	(Bray 1998, 297)
naahakosee	Jicarilla Apache	that which repeatedly moves/falls	(Phone, Olson, and Martinez 2007, 341)
náhaakusí	Mescalero Apache	that which repeatedly moves/falls	(Breuninger et al. 1982, 60)
náhokosé	*Chiricahua Apache	that which repeatedly moves/falls	(de Reuse 1998, 65)
naqaghuqesi	Dena'ina	that which repeatedly moves/falls	(Kari 2007, 148)

While each of the terms in Table 3.3 shares the same verb stem, each of the other morphemes is also cognate. In addition, all of the terms contain the iterative prefix *na-*, which designates that the constellation 'returns' or that the action (enclosed compact object moves/falls) is repeated 'again and again'. Significantly the cognate terms in Table 3.3 are found in the American Southwest and Alaska without any known occurrence in Canada. Considering this evidence the terms may have been independently innovated in both geographic regions, or perhaps other northern cognates were replaced by later waves of borrowing. While certain aspects of Apachean culture have been heavily influenced by the neighboring Pueblo groups

(Opler 1983, 380-381), star and constellations were apparently not borrowed (Griffin-Pierce 1992, 168) and appear to be uniquely Athabascan constructs.

In addition, the Dena'ina variant *naq'ech' niqahdghuqesi* (Kari 2007, 148) is clearly not cognate to the other forms in Table 3.3, but it is comprised of the same stem *–qes* and iterative prefix *–na*. The full phrase *naq'ech' niqahdghuqesi* loosely translates as 'that (enclosed compact object) which repeatedly moves/falls, following us'. The sharing of similar verb stems and prefix morphemes is further enumerated in other Alaska Athabascan examples.

A second predominant verb stem that occurs in category B terms is the classificatory stem for 'animate object' (*tae, taa, tan, tįį*) found in 12 terms from six Alaska Athabascan languages (Table 3.4).

Table 3.4. Alaska Athabascan constellation terms comprised of the stem 'animate object'.

Name	Language	Translation	Source
nekena c'uyaaxi	Ahtna	it revolves around	(Kari 1990a, 471)
nek'e nekeghaltaexi	Ahtna	that which moves in a circle following us	(Kari 1990a, 330)
nek'eltaen	Ahtna	that which moves following us	(Kari and Buck 1975, 88)
nek'eltaeni	Ahtna	that which moves following us	(Kari 1990a, 330)
neek'e'eltiin	Upper Tanana	that which moves following us	(Cannon 2013b, 24-26)
neek'e'elteen	Tanacross	that which moves following us	(Cannon 2014, 58-60)
naq'eltani	Dena'ina	that which repeatedly moves following after	(Kari n.d.)
naagheltaale	Koyukon	that which is revolving	(Jetté and Jones 2000, 500)
naraletale	Koyukon	That which is carried around	(Jetté 1905a)
nosekgheltaale	Koyukon	that which is revolving its body	(Jetté and Jones 2000, 733)
sekgheltaale	Koyukon	that which is revolving its body	(Jetté and Jones 2000, 733)
noghiltale	Upper Kuskokwim	that which moves back and forth	(Collins and Petruska 1979, 78)

While each of the terms in Table 3.4 describes a similar rotating motion, the terms *nek'eltaen* (Ahtna), *neek'e'eltiin* (Upper Tanana), and *neek'el'elteen* (Tanacross) represent the only true cognates that utilize the 'animate object' stem. However, five terms share the iterative prefix *na /no-*, while four others employ the prefix combination *ne-,* 'first plural object', plus *k'e-*, 'following after'.[38]

It should also be mentioned that another term comprised of an independent stem is grouped in category B.[39] The Tanana term *nogheyoli* consists of the stem *yol*, 'singular walks'. In addition, the Koyukon term, *sekgheltaale* contains the stem for 'animate object', but also consists of the incorporated stem *sek* 'body'. While one or two terms in Table 3.3 utilize independent or unique verb stems among category B terms, they approximately describe the same relative motion as the other terms in the category.

To summarize, only two verb stems are predominantly utilized in category B terms for the Big Dipper. Terms that incorporate the stem 'enclosed compact object moves/falls' are most prevalent among the Southern Athabascan languages, whereas Alaska Athabascan terms in category B predominantly utilize the verb stem 'animate object'. At subarctic latitudes the Big Dipper rotates endlessly about the North Star without rising or setting. This circumpolar motion may influence the Alaska Athabascan preference for an 'animate object' verb stem combined with prefix morphemes that describe a rotating or following motion. While prefixes are less useful in making lexical comparisons it is worth mentioning that the iterative prefix *–na/-no* is equally prevalent in the north and south, occurring in 13 terms from eight separate Athabascan languages (Table 3.5).

[38] This prefix combination, *nek'e-,* should not to be confused with the reflexive prefix *neke-* found in the Ahtna variant *nekena c'uyaaxi.*
[39] The term independent is used here to indicate that only one category B term utilizes this verb stem.

Table 3.5. Athabascan constellation terms that incorporate the iterative prefix *na-/no-*. While each of the terms share the same prefix, they are contrasted by the use of three different verb stems, *kǫs/qes* 'enclosed compact object moves/falls', *tae/tįį/tan/taɬ* 'animate object', and *yoɬ* 'singular walks'. Apachean terms are shown in shaded cells, while terms from Alaska Athabascan languages are have unshaded cells.

Name	Language	Translation	Source
nogheyoli	Lower Tanana	that which is walking	(Kari 1994, 369)
noghiltale	Upper Kuskokwim	that which moves back and forth	(Collins and Petruska 1979, 78)
naagheltaale	Koyukon	that which is revolving	(Jetté and Jones 2000, 500)
nosekgheltaale	Koyukon	that which is revolving its body	(Jetté and Jones 2000, 733)
naq'eltani	Dena'ina	that which repeatedly moves following after	(Kari n.d.)
naq'ech' niqahdghuqesi	Dena'ina	that which repeatedly moves over following us	(Kari 2007, 148)
naqaghuqesi	Dena'ina	that which repeatedly moves/falls	(Kari 2007, 148)
náhookǫs	Navajo	that which repeatedly moves/falls	(Young and Morgan 1980, 542)
náhokosé	Western Apache	that which repeatedly moves/falls	(Bray 1998:297)
naahakosee	Jicarilla Apache	that which repeatedly moves/falls	(Phone, Olson, and Martinez 2007, 341)
náhaakusí	Mescalero Apache	that which repeatedly moves/falls	(Breuninger et al. 1982, 60)
náhokosé	*Chiricahua Apache	that which repeatedly moves/falls	(de Reuse 1998, 65)

The collective group of category B terms illustrates that while these terms are not all exclusive cognates, they share a small mix and match set of prefix morphemes and verb stems that unite the terms conceptually. Each term similarly describes a constellation that rotates, follows, or falls. Moreover, multiple variations occur within a single language. For example, one Ahtna Athabascan consultant in Gulkana used each of the terms, *nek'e nekeghaltaexi*, *nekeghaltaexi*, *nek'eltaeni*, and *nek'eltaen* to refer to the same group of stars all within the same conversation. This elasticity apparently accommodates speaker preference and suggests that

providing a description of the constellation's apparent motion is more important than strictly adhering to a single well corroborated term, such as *yahdii* and cognates thereof.

Languages that utilize a constellation A term have few if any alternative names for Ursa Major, yet star terms cognate to *yahdii* have not travelled well to the Southern Athabascan languages. However, category B terms are only found in Apachean and Alaska Athabascan languages and exhibit much more variation within and across languages than category A terms. Taken together, is difficult to assess whether terms in category A or B represent the group of deeper antiquity. Moreover, the linguistic record has yet to provide evidence that suggests any of the terms in category A or B were borrowed from neighboring indigenous groups, such as the Inuit/Eskimo, Cree, or Pueblo peoples. Terms from both categories refer to constellations conceptualized as humanoids comprised of asterisms named using body part terminology.

3.1.3 Category C: Other Big Dipper Terms

Category C consists of Big Dipper terms from Athabascan languages that do not also have a category A or B constellation term. Category C terms are not linguistically related to each other in any particular way and represent a collection of remaining terms that are poorly attested across the Athabascan family. In addition, body part asterisms are not identified in any of the languages that exclusively employ a category C Big Dipper term. Six languages (Table 3.6) across each of the three major Athabascan regions (Northern, Southern, and Pacific Coast Athabascan) contain Category C terms.

Table 3.6. Athabascan languages that exclusively utilize an alternative Big Dipper term.

Name	Language	Translation	Source
vighun' xidiłt'ay	Deg Hit'an	according to it	(Kari 1978b, 45)
magha t'inixin'ney	Holikachuk	?	(Kari, Alexander, and Deacon 1978, 25)
suchisch'idi	Sarcee	seven stars?	(Starlight and Donovan 1996, 58)
sǫ̀tìì·šč̀ù	Plains Apache	?	(Bittle 1951)
xosta·n λiltik	Hupa	six altogether	(Woodward and Jarnaghan 1953)
kŭs-ná sĕn-kyo	Walaki	seven stars	(Curtis and Hodge 1970, 205)

While a few of the terms in Table 3.6 are based on a numerical theme, there is insufficient data to classify these terms as an additional unified category of terms.[40] It should also be noted that several category C terms are found in languages that are relatively isolated from larger contiguous groups of Athabascan languages. This cultural/linguistic seclusion combined with influences from other non-Athabascan neighbors has no doubt given rise to a few of these alternative Big Dipper terms. However, it is also possible that these languages contain other undocumented terms for Ursa Major/Big Dipper that may or may not correspond to other terms found in categories A or B.

3.3 Body Part Asterisms

While Athabascan terms for the Big Dipper appear in two predominant forms (categories A and B) linguistic evidence suggests that the equation of these terms with the Big Dipper is only partial. As previously described, Alaska Gwich'in, Upper Tanana, and Ahtna, refer to the Big Dipper as a tail, which is just one of many other body part asterisms that comprise a unified whole-sky constellation envisioned as a tailed humanoid. While the documentation of Northern Athabascan star names is sparse, constellation terms associated with a tail are found in a variety of other Athabascan languages widely distributed across Alaska, Canada, and the American

[40] Data from Pacific Coast Athabascan is particularly lacking.

Southwest. In addition, most of the stars identified as a tail are associated with the Big Dipper (Table 3.7).

Table 3.7. Athabascan star names based on the term for 'tail'. Note that terms are widely distributed across Alaska and Canada. While the Navajo do not associate the Big Dipper with a tail, the asterism, 'its' tail' is found in Navajo stellar nomenclature along with many other body part asterisms.

Name	Language	Translation	Stars	Source
vitsi'	Gwich'in	its tail	Big Dipper	(Cannon 2013a, 114-115)
uche'	Upper Tanana	its tail	Big Dipper	(Cannon 2013b, 24-25)
uce'	Ahtna	its tail	Big Dipper	(Cannon 2013b, 30-33)
bice'	Navajo	its tail	varies (not Big Dipper)	(Haile 1947, 7-10)
zhihdatche	Slavey	zhihda's tail	Big Dipper	(Monus and Isaiah 1977, 78)
yehdatche	Chipewyan	yehda's tail	Big Dipper	(Le Goff 1916, 750)
yétaa-tché	Chipewyan	yétaa's tail	Orion's Belt	(Petitot 1876, 260)
yihda hı̨néw'éne'	North Slave	yihda's tailbone?	Handle of Big Dipper	(Rice 1978)
déninttchié	North Slave	(old) man's tail	Orion's Belt	(Petitot 1876, 260)
(English equivalent only)	Han	its tail	Handle of Big Dipper	(Rooth 1971, 264-265)

Evidence from Table 3.7 suggests that other Athabascan languages aside from those in Alaska may also have additional body part asterisms that comprise a humanoid stellar figure. This is especially likely given that both categories of Big Dipper terms (A and B) are widely attested across the Athabascan language family. In addition, both categories have terms that refer to whole-sky humanoid constellations that are further divided into body part asterisms. Figure 3.2 shows the distribution of languages that have one or more body part constellations/asterisms.

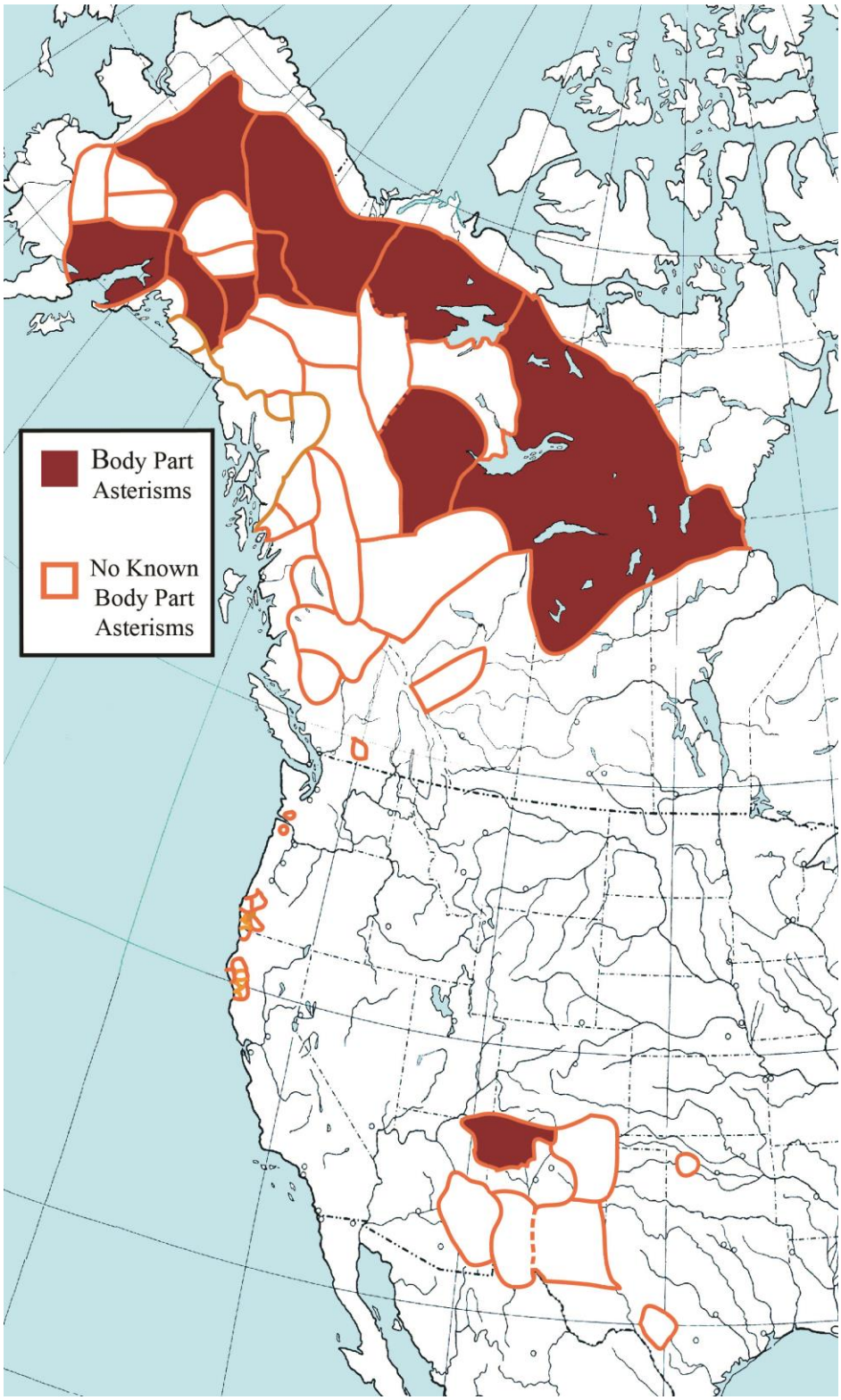

Figure 3.2. Distribution of Athabascan body part asterisms/constellations. Languages with known body part asterism are shaded red, while languages without known body part asterisms are unshaded in an orange border.

While the Navajo do not associate the Big Dipper with a large or whole-sky constellation they do envision it as a human form comprised of at least eight body part asterisms in addition to several other asterisms depicted as material objects; a feather, igniter, and a pedestal (Haile 1947, 10). According to Haile (1947, 7-10), the Navajo distinguish at least 31 separate constellations, 10 of which are depicted as human forms, seven as animals, and 11 as single star constellations. The three remaining Navajo constellations include the Milky Way, the Pleiades, and a constellation comprised of just two stars. Other scholars emphasis that the Navajo have only eight primary constellations, of which five are depicted as human forms comprised of body part asterisms (Griffin-Pierce 1992, 168). However, essentially every Navajo constellation (human form or animal) comprised of more than one star is further divided into named body part asterisms (Haile 1947, 7-10). Table 3.8 provides a comparison of terms for Navajo and Alaska Athabascan body part asterisms.

Table 3.8. Terms for Alaska Athabascan and Navajo body part asterisms. Alaska Athabascan asterism names are based on the author's own fieldwork and the following sources, (Kari 1990a; Kari 2007, 148; de Laguna and McClellan 1960; Jetté 1898; Jetté 1900; Jetté 1905a). The Navajo asterisms are based on Haile (1947, 7-10).

	Language					
Body Part Asterism	**Gwich'in**	**Upper Tanana**	**Ahtna**	**Dena'ina**	**Koyukon**	**Navajo**
its tail	vitsi'	uche'	uce'			bice·'
its left hand	tł'ǫhts'ąįį vanli'	tl'ahts'ąy uła'	tl'astsen ula'			
its right hand	shreets'ąįį vanli'	hǫǫsǫǫ ts'ąy uła'	kuzuun ts'ene ula'			
its left leg	tł'ǫhts'ąįį vath'an					
its right leg	shreets'ąįį vath'an					
its left ear	tł'ǫhts'ąįį vidzee	tl'ahts'ąy udzagn'	tl'astsen udzaghe'			
its right ear	shreets'ąįį vidzee	hǫǫsǫǫ ts'ąy udzagn'	kuzuun ts'ene udzaghe'			
its snout	vanhtral					
its nose	vantsįh	mįįtsįį	bentsiis			
its eyes	vindee	unaagn'	unaegge'			biná·'
its head	viki'				metlee'	bici·'
its body	vathąįį					bizi'
its left foot	tł'ǫhts'ąįį vakwai'	tl'ahts'ąy uke'	tl'astsen uke'			
its right foot	shreets'ąįį vakwai'	hǫǫsǫǫ ts'ąy uke'	kuzuun ts'ene uke'			
its left arm	tł'ǫhts'ąįį vigin					
its right arm	shreets'ąįį vigin					
its left inner ear		tl'ahts'ąy udziit				
its right inner ear		hǫǫsǫǫ ts'ąy udziit				
its cheek		utl'ahbat				
it's defecating stars		san' di'ehtsąą'				
its mouth		uthaat				bizé·'
its kidney(s)			udzedze'	bejech'a		bičáškaži
the one on the				kala q'edi		

tail						
the tip of the tail						bice·’ bílát^{l}a·í
its palm			ula’k’aedi			
the one on the palm				belaq’a q’edi		
the one on top of the head				k’tsikiq’edi		
its hand					melo’	bila’
its buttocks					metl’o’	biλ’a·’
its legs					metl’ene	bižá·d
its pelvis		łeekąy delyaa	uk’aye’			b^{a}kai’
its femur head joint			uk’aye’ c’elodae			
its heart			udzedze’			bižái
space between its shoulders					meggontekk’et	
its liver						bizid
its arms						b^{a}ga·n
its feet						bike·’
its knees						b^{a}god
its bladder						biliž
its intestines						bicána·zlái
its wings						bita’
its fibula						biλ’agai
its neck						bak̓os
its hair/head						bici·’
its horns						bide·’
its tongue						bico·’
its bill						bida’
its claws						bíla’
its elbow						b^{a}gą·žlá·’

Athabascan body part asterisms are obligatorily possessed and thus must occur with a possessive prefix, generally the third person singular (his/hers/its), though the indefinite (something’s) is occasionally used. Northern and Southern Athabascan asterisms describe at least 45 different human or animal body parts (Table 3.8). The Navajo alone distinguish at least 27

body parts, while approximately 30 have been documented in Alaska Athabascan languages so far. Navajo and Alaska Athabascans share at least 11 body part asterism terms.

In addition to body part asterisms, Navajo constellations also commonly include one or more material objects possessed by the Navajo stellar figure. According to Haile (1947, 4) each Navajo constellation has a *b^{a}kǫ'* 'igniter' which provides the constellation with its light. Other material objects delineated as separate asterisms include head feathers and a cane (Haile 1947, 7-14). Similarly, at least one Ahtna (Alaska) narrative describes *nek'eltaenn* as wielding a cane (John and Kari 1986, 29-30). While *nek'eltaenn* is described as an indigenous whole-sky constellation the same term is now applied to designate the Christian God and it is unclear from the narrative (John and Kari 1986, 29-30) whether the described cane is an asterism. However, an unidentified Kaska constellation is also referred to as *ketá' sę́lé'* 'God's hook' (Kaska Tibal Council 1997, 385). Perhaps the Ahtna and Kaska star group is the same hooked asterism (i.e. the head of Leo) identified in Alaska Gwich'in as *yahdii's* "crooked knife."

One clear difference between Northern and Southern Athabascan body part asterisms is the use of the terms for 'left' and 'right'. While these spatially descriptive terms are frequently employed in the naming of Alaska Athabascan asterisms, they are apparently never utilized in Navajo stellar nomenclature. This likely owes to the relatively large size of single unified Alaska Athabascan whole-sky constellations, versus a multitude of smaller Navajo constellations also divided into body part asterisms. In Alaska Athabascan many dozens of stars may comprise 'its left leg' and 'its right leg', whereas in Navajo only several stars are identified collectively as 'its legs'. While the Apachean and subarctic celestial spheres are visually quite different, both groups employ nearly identical stellar naming strategies, and they share nearly a dozen cognate body part asterism terms.

3.4 Chapter Three Conclusion

Terms associated with the stars in Ursa Major/Big Dipper are documented in most Athabascan languages. While a diversity of names correspond to Ursa Major only two forms are widely attested across the entire Athabascan language family. These terms can be divided into two categories (A and B), based on their etymology and other linguistic similarities. In addition, at least a few terms from each category reference a whole-sky stellar figure in which the Big Dipper is only one of many other body part asterisms. While whole-sky constellations are only confirmed in a few Alaska Athabascan languages, linguistic evidence suggests that a large humanoid constellation is a defining feature of Northern Athabascan stellar astronomy more broadly. In addition, the practice of naming stars using body part terminology is widely dispersed across the Northern and Southern Athabascan languages, suggesting the presence of a common Pan-Athabascan stellar naming strategy of great antiquity.

While the indigenous astronomies of most Northern Athabascan ethnolinguistic groups are poorly documented, a clear Athabascan stellar naming strategy is recognized.[41] This pattern emerges through focusing on the most widely attested star names across the Athabascan family as opposed to dwelling on relatively unique examples within individual ethnolinguistic groups. While there are certainly exceptions to this system or naming strategy, two fundamental principles generally guide Northern Athabascan stellar nomenclature: 1) Athabascan constellations are envisioned as living or animate beings named with verbs that describes their observed or metaphorical action or motion; 2) when constellations are further divided into smaller asterisms these asterisms are almost exclusively described as body parts or material objects (nouns) comprised of a possessive prefix, generally the third person singular.

[41] Aside from the recently documented star names in Gwich'in, Ahtna, and Upper Tanana, Northern Athabascan stellar astronomy is poorly documented, especially among Canadian Athabascan ethnolinguistic groups.

With the exception that Apachean constellations are not always named with verb terminology, an identical stellar naming strategy extends Navajo. These congruencies not only show that Northern Athabascan astronomy is much more detailed than previously described, but also demonstrate for the first time a connection between Northern and Southern Athabascan strategies of mapping the sky, which likely has antiquity within the Athabascan family. Similar naming systems or strategies are found in other areas of traditional Athabascan knowledge, such as in ethnogeography (Kari 1989a).

Chapter 4: The Function and Utility of Alaska Athabascan Stellar Astronomy

Alaska Athabascan stellar astronomy serves four main purposes; time-reckoning, navigation, weather forecasting, and cosmology. This chapter draws heavily from the author's own fieldwork to articulate the functional role of a whole-sky constellation as a system of knowledge. In addition, this chapter introduces and explains the utility of other less widely attested, but highly functional Alaska Athabascan constellations and shows that while Alaska Athabascan stellar astronomy exhibits many congruencies, adaptation and innovation of stellar concepts also occur within individual Athabascan ethnolinguistic groups. The primary objective of this chapter is to show that stellar astronomy is a fundamental component of Alaska Athabascan cultures that greatly facilitates life in the subarctic.

4.1 Stellar Time-Reckoning

At the most basic level the purpose of time-reckoning is to make sense and order of the world (Aveni 2002, 290), and like other indigenous peoples Alaska Athabascans looked to the periodicities found in the natural environment for the development of their time-reckoning system. While a time-reckoning system can be built around any observable phenomena that repeat in a consistent and reliable manner, those phenomena must also occur in periods appropriate to the social, economic, and political activities of the culture. For Northern Athabascans and many other peoples the world over, the celestial bodies have provided the most reliable and observable itineraries from which to reckon time. As Aveni (2002, 5) has noted, "some say that countless generations of watching the heavens turn led our ancestors to make temporal models that oscillate. After all, celestial rhythms are basically periodic."

Alaska Athabascans primarily have used stars to reckon time on a diurnal scale, though the helical appearance of a specific constellation may also delimit the beginning of a new annual

cycle in certain Athabascan cultures.[42] The circumpolar course of high latitude stars renders them an ideal clock, and such a stellar clock is a principal feature of all Alaska Athabascan time-reckoning systems.

Alaska Athabascan stellar time-reckoning relies on two general principles 1) observing the location of the stars in relation to the terrain, and 2) memorizing the different diurnal and seasonal positions of the stars so that their locations have temporal meaning. The use of stars as diurnal time-referents is analogous to observing the hour hand on the face of a clock. However, stars only move across the sky at approximately 15 degrees per hour, while the hour hand on a clock moves at twice that rate, or 30 degrees per hour. In addition to their motion across the sky, stars rise approximately four minutes earlier each day. This additional movement is analogous to the numbers on the face of a clock progressing one degree further clockwise each day until after one year the numbers return to their original stations. For example, a star located in the east (90°) at 10:00 PM will be located in the west (270°) at 10:00 PM 182.5 days later. After one year, the star will recur in the same position in the eastern sky. Stars therefore have different temporal meaning at different times of the year and these positions must be committed to memory in order to accurately reckon diurnal periods of time.

In addition, because no star is visible during all times of the day and throughout all seasons, more than one celestial time-referent must be observed in order to reckon time throughout the year. In Alaska Gwich'in and Ahtna a sequence of three celestial entities comprises the diurnal time-reckoning system.

[42] Longer periods of time such as seasonal and annual cycles are based upon observations of other natural phenomena such as plants, animals, the moon, sun, and stars.

4.1.1 A Tripartite Stellar Time-Reckoning System

Alaska Gwich'in and Ahtna Athabascans observe three primary celestial entities to reckon diurnal divisions of time; the Big Dipper and/or a large humanoid constellation, the crepuscular appearance of the morning star(s), and the sun. Each of these three primary stellar entities is visible in the Athabascan region of Alaska from about mid-December to late April and is observed in sequential order to reckon diurnal periods of time.[43] In Alaska Gwich'in different temporal periods of the night are based upon the attitude or different positions of the whole-sky constellation *yahdii*. The tailed man y*ahdii* is almost completely circumpolar (i.e. does not rise or set) and is said to walk (*yahdii ahaa*) until he sees a constellation of three morning stars. As *yahdii* rotates to a position facing dawn, he begins to fade in the morning crepuscular light and is temporarily succeeded by the three morning stars as the primary diurnal time-referent. Daylight follows soon after the appearance of the third and final morning star, after which time the sun takes over as the primary time-referent. Observers rely on the sun's position throughout the day until *yahdii* regains his prominence in the evening sky.

However, during the summer from late April to sometime around late-August when there is too much daylight to observe stars, the sun is employed as the exclusive stellar time-referent. Likewise, from early September to mid-December when the morning star(s) do not appear in the dawn sky, the combination of the sun and the Big Dipper (and/or whole-sky constellation) are independently observed as the two primary diurnal time-referents. This elegant cyclical replacement of one time-referent after another therefore repeats on both diurnal and seasonal scales.

While the Gwich'in and Ahtna temporal periods are relative according to the positions of the stars and sun, their time-reckoning systems also completely self-adjust. For example, the

[43] The identification of the morning stars is discussed later in this chapter.

Gwich'in traditionally observe the morning stars as a cue to wake up in the morning and it does not matter that the morning stars rise at 4 AM in March or 6 AM in January as long as individuals are awake at the appearance of the first morning star and are prepared for the day's activities prior to sunrise. Such a relative system contrasts with the absolute system found in contemporary Western culture, which is precisely based on the atomic second (Aveni 2002, 87-88).[44]

While a tripartite stellar time-reckoning system is only confirmed in Alaska Gwich'in and Ahtna, corroborating evidence suggests that similar systems may extend more broadly across the Alaska Athabascan languages where the morning star(s), Big Dipper, and sun are frequently and similarly described as time-referents.[45] Drawing heavily from Alaska Gwich'in, detailed descriptions of each of the three primary celestial entities utilized in Alaska Athabascan stellar time-reckoning follows.

4.1.2 The Big Dipper and Whole-Sky Constellations in Time-Reckoning

While a variety of stars and constellations are employed as time-referents, the Big Dipper undoubtedly represents the most important Alaska Athabascan star clock utilized in reckoning nocturnal periods of time. As previously mentioned, the circumpolar motion of the Big Dipper compares to the movement of an arm on the face of a clock and various positions of the Dipper's handle/humanoid constellation delineate different temporal periods of the night. Again, these positions are not consistent throughout the year, as stars move through the sky at approximately 15 degrees per hour and rise approximately four minutes earlier each day. The use of the Big Dipper as a stellar clock is documented in nearly every Alaska Athabascan ethnolinguistic

[44] The Alaska Athabascan time-reckoning system is relative because the temporal periods change according to the positions of the stars relative to the terrain, which varies throughout the diurnal and annual cycles. An atomic second is the interval of time for the cesium frequency to oscillate 9,192,631,770 times, which has been "the official world time standard since 1967" (Aveni 2002, 87).

[45] My fieldwork suggests that the Ahtna identify only one morning star (presumably Altair), whereas the Gwich'in observe a sequence of three morning stars corresponding to Tarazed, Altair, and Alshain.

group: Ahtna (de Laguna and McClellan 1954), Dena'ina (Kari 2007, 148), Koyukon (Jetté 1909), Upper Kuskokwim (Esai and Kibrik 2001), Lower Tanana (Tuttle 2009, 22), Tanacross (Arnold, Thoman, and Holton 2009, 58), Upper Tanana (McKennan 1959, 110), Han (Rooth 1971, 265), Gwich'in (Osgood 1936, 91). The Mescalero Apache, a Southern Athabascan culture, use the Big Dipper similarly (Farrer 1987, 227-230; Farrer 1991, 48-59). Likewise, the Big Dipper is a primary component of the neighboring Inuit/Eskimo time-reckoning system (MacDonald 1998, 199-200; Bradley 2002, 258; Silook ca. 1932, 70).

As astute observers of the night sky, the Alaska Gwich'in delineate different periods of night according to the position of *vitsi,*' 'its tail' (Big Dipper), as well as the positions of other body parts within the whole-sky constellation *yahdii*. Observers note the direction the figure is facing or the positions of his hands, tail, or other body parts. A few of these positions are named as indigenous divisions of time. For example, the phrase *yahdii it'ee neezhii łii* 'now it seems *yahdii* went', designates late evening based on the fact that *yahdii* has rotated or walked to a given position in the sky (Mishler and Ginnis 1986). The late Gwich'in elder Frank Ginnis stated "I could see any part of it, any part of *yahdii* and know exactly what time it is" (Mishler and Ginnis 1986), suggesting that any body part asterism is useful in time-reckoning. In the early morning period from about mid-December through April *yahdii* is envisioned as walking (*yahdii ahaa*) until he sees the morning stars, which indicate that daylight is approaching. During this morning period *yahdii's* head (*viki'*) is located in the northern sky turned toward the dawn light in the east. An analogous description from the Koyukon is corroborated by Jetté and Jones.

> In January and February, the 'head' of the *naagheltaale* points to the east, sometime before sunrise, hence to say 'it is morning', 'it is time to rise', the Ten'a will say *naagheltaale yekkoyh aatleeneetleyh*, 'the *naagheltaale* turned its head to

> the light', has ['touched the light with its head',] or merely: *yekkoyh aatleek'eneetleyh* 'it has turned its head to the light ['it has touched light with its head'] (Jetté and Jones 2000, 500).

Ahtna Athabascans also attentively observe the position of *uce'* 'its tail' (Big Dipper) as it bends or rotates toward the direction of the first dawn light, which indicates the beginning of the morning crepuscular around October.[46] In Ahtna, the phrase *yikkaas ts'e' cila' ilts'iitl*, literally 'the fish tail has gotten curved towards dawn' delineates this temporal period. This is not to say that *uce'* is envisioned as a fish tail; rather it bends or curves towards dawn light in a manner that emulates the motion of a fish tail. A consultant from Gulkana explained:

> *Ucila'*, like a salmon tail you know. Just like a salmon it turns its tail over toward daylight. *Cila' ilts'iitl'* like a fish tail, that's what they read off you know. *Cila' ilts'iitle* . . . it turn to daylight. You say *cila' iltst'iitl'* you know; *yikaas ts'e' cila' ilts'iitl'*. *Yikaas*, it's early in the morning. Go to daylight you know. That the Indian [time] . . . That's the night watch and then day sun (Cannon 2013b).

[46] Crepuscular is defined herein as the period around twilight.

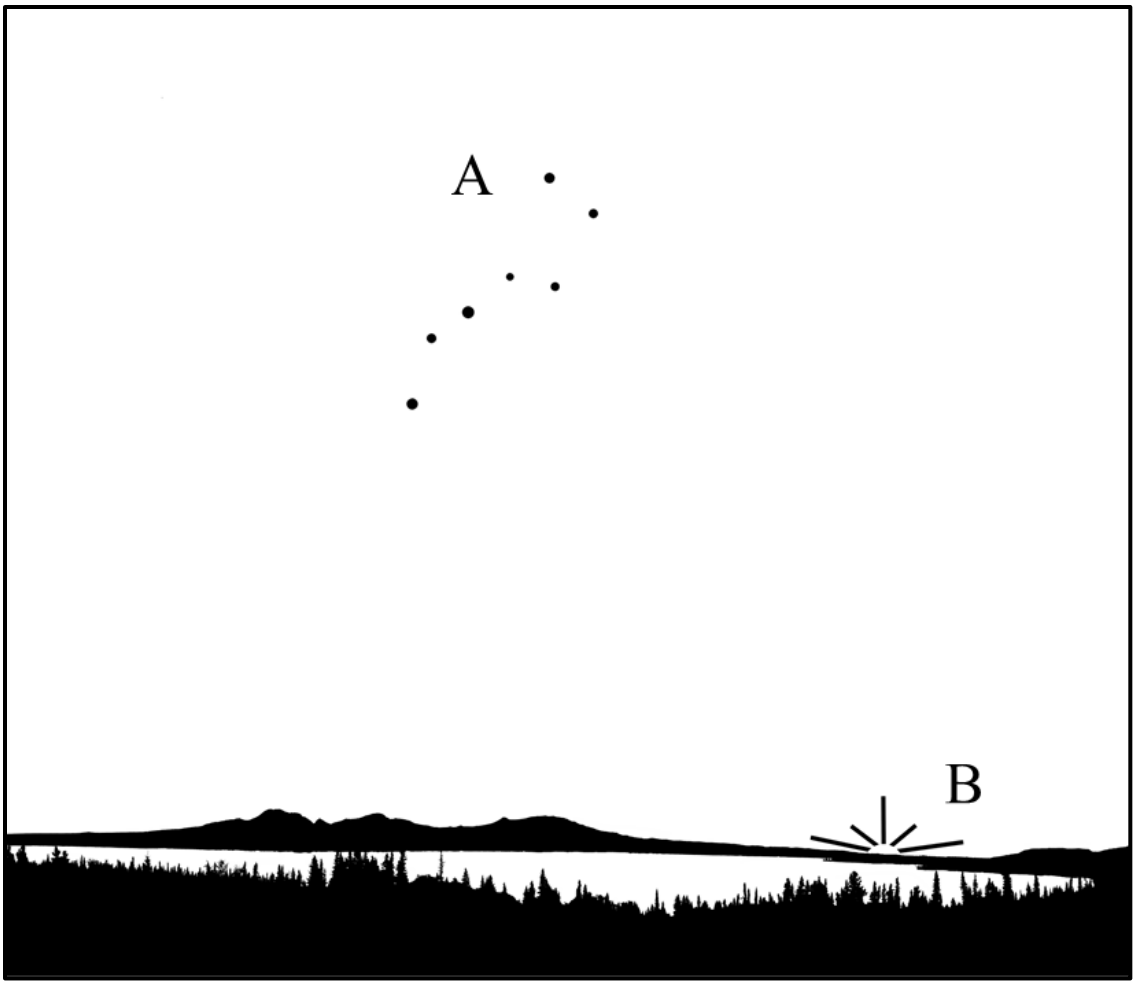

Figure 4.1. The Ahtna temporal period *yikaas ts'e' cila' ilts'iitl'*. The temporal period *yikaas ts'e' cila' ilts'iitl'* 'the fish tail has gotten curved towards dawn' is delineated by the attitude of *uce'* 'its tail' (Big Dipper) in relation to the first light of dawn. This temporal period designates early morning just prior to the emergence of the first morning light. Letter A represents the Big Dipper and letter B represents the location of the first light of dawn in the east at 6:45 a.m. in mid-October in the Copper River Valley, Alaska (Cannon 2013b).

A host of temporal phrases based on the position of the Big Dipper are documented in Alaska and Canadian dialects of Upper Tanana. While phrases recorded by Kari (1989b, 1) are glossed as unidentified asterisms within the constellation *yihdaa*, a few of these terms more likely reflect indigenous time phrases based on the positions of body part asterisms within *yihdaa*. Among these the phrase *chech'ilts'ik*, literally 'curls tail' is relatively similar to the Ahtna phrase; *yikkaas ts'e' cila' ilts'iitl,* literally 'the fish tail has gotten curved towards dawn'.

Table 4.1 below lists a comparison of Northern Athabascan phrases that designate different temporal periods based on the position of the Big Dipper and/or humanoid constellation.

Table 4.1. Temporal periods delineated by the Big Dipper/humanoid constellation.

Name	Language	Translation	Temporal Period	Source
yahdii it'ee neezhii łii	Gwich'in	now it seems *yahdii* went	late evening around 10:00 p.m.	(Mishler and Ginnis 1986)
naagheltaale yekkoyh aatleeneetleyh	Koyukon	*naagheltaale* touched the light with its head	morning	(Jetté and Jones 2000, 500)
yikkaas ts'e' cila' ilts'iitl	Ahtna	the fish tail has gotten curved towards dawn	morning crepuscular	(Cannon 2013b, 48-52)
chech'ilts'ik	Upper Tanana	curls tail	?	(Kari 1989b, 1)
umbaagh iitįį	Upper Tanana	sun comes up at daylight	?	(Kari 1989b, 1)
xał uudenaaxaał	Upper Tanana	darkness disappears	?	(Kari 1989b, 1)
yihdâa chè' daanèet'są' niniitâą	Upper Tanana	*yihdâa's* tail is pointing upstream	?	(John and Tlen 1997, 63)
yikaay tthą' dich'iltįį	Upper Tanana	dawn . . . ?	morning crepuscular (almost daylight)	(Lovick et al. 2007)
tädn tth'itohnia	Upper Tanana	middle of the night	midnight	(Lovick et al. 2007)

Anecdotes from Upper Tanana, Han, and Gwich'in Athabascans specifically describe the Big Dipper's use in delineating the middle of the night as well as the period around the commencement of dawn. An Upper Tanana elder from Northway explained:

> That seven star up there, that's the time. The star, that's old people, old timer. They know that star which way it go. It go toward the daylight, they know. Midnight they know. *Tädn tth'itohnia* they call midnight . . . *Tädn tth'itohnia* midnight. And when that seven star go this way *yikaay tthą' dich'iltįį*. That's really going to be a little daylight, they move (Lovick et al. 2007).

Among the Han Athabascans, Rooth stated:

> She [Bella Biederman] also said that the Dipper was used as a kind of clock by the Indians. The four stars of the Dipper are the body and the three stars are the tail and in the winter they can tell from the tail which time of night it is. In the winter the tail 'goes that way', clockwise, around as in a circle, and when it starts it is beginning to be night, when it is up it is midnight, and when it is turning right over, it is going to be morning. So when it is clear they can see if it is midnight or if it is near the morning (Rooth 1971, 265).

Likewise, the late Gwich'in elder, Kathrine Peter wrote:

> *Tł'eevihti' drin gwanlįį dąį' shree shree kaahchy'aa a'įį.Tǫǫ gwanlįį dąį' chan yahdii nijin nigwindhat yaa gwaandak. Yahdii shree gihee'aa dai' yaa gwaandak yahdii. Tohtł'an nigwiindhat dąį' chan yik'iighai gaandaii*:
>
> [He] uses the sun by day to tell time. When it's dark he tells time by the Dipper. The Dipper also tells him when the sun will rise. When it's midnight, he knows because the Dipper tells him (Peter 1976).

The Upper Kuskokwim similarly utilized the Big Dipper as a dawn time-referent. Bobby Esai, an elder from Nikolai explained: "There was no clock long time ago like this one here. When it became dark up there, then you can see that *noghiltale*; and it moves towards morning" (Esai and Kibrik 2001). Among the Dena'ina, Osgood (1976, 115) wrote: "three stars turning around in the sky like a watch tell the hunters when to get up in the morning."[47] However, during late winter and early spring the Gwich'in and Ahtna observe the position of the Big Dipper and/or whole-sky constellation as it relates to the appearance of the morning star(s). After the

[47] Presumably the handle of the Big Dipper.

winter solstice when the morning stars are visible on the dawn horizon they provide the Gwich'in and Ahtna with detailed temporal information regarding the morning twilight period.[48]

The association of the Big Dipper with time-reckoning is also recognized by alternative names for the Big Dipper that reference its function as a clock. In Koyukon, the conventional term for clock or watch is s*assee*, adopted from the Russian (*chasý*) and utilized as an additional name for the Big Dipper (Jetté and Jones 2000, 725). Other phrases for the Big Dipper, include *tl'eeyeggee hʉt'aane k'esaasee'* 'the clock of the aborigines' and *dzanh kk'ʉghe leneyee* 'the day tester/day-measurer' which also references the asterism's indigenous use as a time-referent. Jetté and Jones stated:

> The native term [for Big Dipper] was *dzanh kk'ʉghe leneyee*, 'the day-tester, the day-measurer', but [that] is altogether forsaken. *Tl'eegee hʉt'aane k'esaasee'*, the natives' clock, a term sometimes used to designate Ursa Major [the Big Dipper] as it is used to know the time during the long nights in winter, and this by observing its motion around the pole, analogous to the motion of clock hands around their pivot (Jetté and Jones 2000, 725-726).

A similar association may exist in Upper Tanana where the generic term for clock is *łaa'aahal*, which alludes to a rotating club-like object, a likely references to the Big Dipper. This association is particularly plausible given that the phrase *neek'it ts'inaahaal* 'it (animate) is walking around us' was elicited as an alternative name for the Big Dipper from speakers of the Scottie Creek dialect (Kari 1992).[49]

In the context of a whole-sky constellation the Upper Tanana also employ other body part asterisms in time-reckoning beyond those delineated by the Big Dipper. A consultant from Tetlin

[48] A discussion of the morning star(s) is provided in the following section.
[49] Athabascan terms for clock also reference the sun. See under the section "sun in time-reckoning."

explained that while *uche'* 'its tail' (Big Dipper) is often utilized by the Upper Tanana to determine the time, the asterism *utl'ahbat* 'his cheek' (Pleiades) is the primary group of stars employed in time-reckoning. The Dena'ina are also reputed to utilize the Pleiades (*nyila'i* 'objects extend') as a time-referent, though this star group is not correlated with a larger unified constellation (Radloff and Schiefner 1874, III, 20; Kari 2007, 148).[50] Similarly, the Koyukon observe the constellations *ghededzuyhdle* 'those multiple objects which are moving along' (Pleiades), and *k'enodele* 'the ones that are following something' (Orion's Belt) as time-referents in situations when *naagheltaale* (Big Dipper/Ursa Major) is not conveniently situated in the sky. Jetté explained:

> As they move [Pleiades and Orion's Belt] in the southern portion of the sky, it often happens that one is sleeping outside, by the camp-fire, lies in such a position that he can see them without moving, whilst he would have to turn to see the Great Dipper. In such cases, then the Ten'a take notice of the positions of these constellations, before going to sleep, and when they wake, easily find, with sufficient accuracy, the time of night (Jetté 1909).

Likewise, if clouds obscure *naagheltaale*, the Koyukon may employ another star clock that corresponds to Cassiopeia called *detsey kk'aatl'o neenaa'edoye* 'the one that comes back in his grandfather's place' (Jetté 1909; Jetté and Jones 2000, 637). The Koyukon also observe an additional stellar clock comprised of the Big Dipper and Cassiopeia together, wherein Cassiopeia is envisioned as *naagheltaale's* grandchild. This constellation is named *te tsi yar ka-rodełnihe'* 'who bothers his grandfather and sends him out of his place', which according to Jetté (1905a) "alludes to the fact that they [Big Dipper and Cassiopeia] are opposite each other and one takes the other's place as the heavens move in diurnal motion."

[50] Kari (2007, 148) glossed the same constellation as Little Dipper.

The principle of a stellar clock based on the positions of circumpolar stars is the same whether the observed target is a single star or a whole-sky constellation. Because stars rise approximately four minutes earlier each day, the positions of the target stars in relation to the geography are not fixed throughout the year. Different star positions must be memorized in order to properly exploit such a stellar clock. Practiced observers who have committed to memory the various positions of the stars throughout the night, as well as throughout the seasons (when stars are visible) benefit from knowledge that orients them in both time and space. What is for the Gwich'in a stellar time-reckoning system is also a system that facilitates navigation and orientation in the subarctic.[51] In regard to learning the utility of stars, a Gwich'in consultant in Fort Yukon who began observing the stars during his adolescence stated "my great grandmother used to take me out every night to talk about the stars, every clear night . . . every day you got to do it you know, live it."

4.1.3 The Morning Stars in Time-Reckoning

The second component of an Alaska Athabascan tripartite stellar time-reckoning system includes the use of the morning star(s) to delineate time around morning twilight. Names for constellations identified as 'morning stars' are documented in all but three Alaska Athabascan languages. While terms for the 'morning star(s)' are not cognate across these languages, all but one term is grammatically structured around a verb theme and nearly all reference dawn light, brightness, or the perceived action of lifting or leading the dawn light into day (Table 4.2).

[51] Stellar orientation is further explained in a subsequent section.

Table 4.2. Alaska Athabascan terms for ‘morning star(s)’.

Name	Language	Translation	Stars	Source
son’ kadghiłdza	Ahtna	star shows brightly?	α Aql (Altair)	(Cannon 2013b, 49-55)
son’ yikaas k’eghiłdzaxi:	Ahtna	?		(Kari 1990a, 169)
yikaas k’eghiłdzaxi:	Ahtna	?		(Kari and Buck 1975, 88)
yikaas k’eghaltaen	Ahtna	?		(Kari 1990a, 230, 330)
veq’enuyełquyi	Dena’ina	daylight is upon it		(Kari 2007, 150)
veq’enyełqu’i	Dena’ina	daylight is upon it		(Kari 2007, 150)
q’it’unteh hu’uhi	Dena’ina	one coming up in morning		(Kari 2007, 150)
diq viyoqoyh iłney	Deg, Hit’an	lifting up pf the daylight		(Osgood 1959, 183; Kari 1976a, 17)
yokkolaaye	Koyukon	it leads light into day	γ Aql (Tarazed) and α Aql (Altair)	(Jetté and Jones 2000, 696)
yo yekkoyh gho dełt’oye	Koyukon	that which customarily shines along the northern lights		(Jetté and Jones 2000, 550)
mihoyołkole	Upper Kuskokwim	?		(Collins and Petruska 1979, 98)
bek’eghw yiłkoyi	Lower Tanana	?		(Kari 1994, 155)
tsagheeł k’adełt’e’e	Lower Tanana	one that keeps it dark		(Tuttle 1991, 25)
ikaay k’adeht’ąą’a	Upper Tanana	it’s dark before the first dawn light	α Aql (Altair)	(Lovick et al. 2007; Cannon 2014, 74)
yihkah sòn’	Upper Tanana	dawn star		(John and Tlen 1997, 67)
san’ dog eedlah ha’eldayh hu	Upper Tanana	stars are above, they’re shooting out	α Aql (Altair)	(Cannon 2013a, 156-157)
ch’iiłäl	Upper Tanana	?		(Kari 1989b, 43)
yeendak gahaajil	Gwich’in	they went up	γ Aql (Tarazed), α Aql (Altair),	(Cannon 2013a, 93-94)

			and β Aql (Alshain)	
vats'a' gach'agahaajil	Gwich'in	they went toward it		(Salmon 1992)
vanh oozhrii	Gwich'in	morning shines	γ Aql (Tarazed), α Aql (Altair), and β Aql (Alshain)	(Cannon 2013a, 46-50)

The use of the English gloss 'morning star' in the extant documentation is not sufficiently identifying. In English the terms 'morning star' and 'evening star' usually denote the planet Venus in its morning and evening appearances, respectively (Schneider and Arny 2009, 113). The precise identification or definition of Athabascan terms glossed as 'morning star' is, however, seldom articulated in the extant documentation. At least several Alaska Athabascan languages instead associate the English term 'morning star' with one or more stars located in the classical constellation Aquila, as shown in Table 4.1 above.

Fleshing out the identities of terms glossed as 'morning star' can be achieved by focusing on their utility in Alaska Athabascan time-reckoning. In Koyukon, the morning stars are explicitly described as corresponding to the stars Tarazed and Altair in the constellation Aquila (Jetté 1905). This pair of morning stars called *yokkolaaye* 'it leads light into day', first appears on the dawn horizon after the winter solstice and was observed to determine the period around the commencement of dawn (Jetté and Jones 2000, 696; Jetté 1909; Jetté 1905a). Jetté stated:

> Another constellation which the Ten'a observe as being a fore-runner of the day, is Aquila, or rather the bright star Altair and the one of second magnitude which lies near to it [i.e. Tarazed]. These two stars are called by them *yokolaiha* [*yokkolaaye*], and their appearance above the eastern horizon denotes the approach of day, from the beginning of January to about the third week in February. When they come near to the meridian, or 'mid-sky,' as the natives say,

> the day is about to begin. The Ten'a are often heard to say: *yokolaiha yo nidzu ru nidatł,* the *yokolaiha* have come near to mid-sky, to imitate that it is time to get up, or to go (Jetté 1909).

Jetté and Jones (2000, 550) also provided the phrase *yo yekkoyh gho dełt'oye* 'that which customarily shines along the northern lights' as an additional name for the 'morning star'. While this constellation may also refer to the stars Altair and Tarazed, the authors do not explicitly equate this constellation with stars in Western astronomy.

The Alaskan Gwich'in similarly observe a unified constellation of three morning stars identified as Tarazed, Altair, and Alshain, which corresponds to the Koyukon pair of stars in *yokkolaaye* (Tarazed and Altair). The Gwich'in constellation is known by several names including *yeendak gahaajil* 'they went up', *vats'a' gach'agahaajil* 'they went toward it' (Salmon 1992), and *vanh oozhrii* 'morning shines'.[52] The three Gwich'in morning stars rise vertically from the dawn horizon in sequential order, each designating a different temporal period or activity associated with morning. As seen from Fort Yukon, one consultant explained that the three morning stars rise in the southeast over the Yukon River. The late Gwich'in elder David Salmon also discussed the three morning stars and noted their widespread use as a time-referent among the *Gwichyaa Gwich'in* or Yukon Flats people:

> Dipper is the Indian time. And the three stars come up early in the morning, that's the Indian time. That's the real Indian time that they teach children over there. And the big star over there, right over here toward the northeast, you know, little over just like this. Like this, and that's where it is pointed. These three star is pointed to that star [Vega?], you know. Everybody knows it in Yukon Flat. They use that time . . . So they know that, when the daylight comes. By that time the

[52] The constellation *yeendak gahaajil* was described as meaning "it goes up" like a spirit rising skyward.

> first star come up you know, like this. And then the next star come up in the east like this; follow the first star. And the last star come up in the daylight. So when my father had no time [i.e. no pocket watch], he look at the star, they call them *vats'a' gach'agahaajil* (Salmon 1992).

David Salmon (1992) also recalled traveling with his father during his childhood and waiting for the appearance of the third morning, which they observed to determine the appropriate time to break camp and continue on their overland journey. For the Alaska Gwich'in, the appearance of each of the three morning stars conveys specific temporal information in regard to morning activities, especially hunting. An expert Gwich'in consultant from Fort Yukon explained how his great grandmother taught him how to use the morning stars as a time-referent.

> A lot of people go by morning star [*vanh oozhrii*]. So when you're hunting that's how people a long time ago, all they did was hunt, eh; go hunting for food. I mean long, long time ago. They have to go hunting to survive. OK, so they go by the stars for the direction, for their time. So early in the morning when you get up and you go outdoors, you go outside and you look. You see the stars just peeking over the horizon, you know it's four o'clock [by the appearance of the first morning star]. So then by the second one [star] you've already drank something, you've ate and you're going, you're on your way cause you got ready. Like if we're going to go tomorrow we're ready to go tonight; OK, we got everything ready. All you've got to do is jump into your warm clothes and you're going, you're gone; by the second star. And by the third star, you're one hour out that way [on the trail hunting] . . . OK, the light start peaking over the horizon and you know daylight is happening. Then you can see enough to hunt (Cannon 2013a).

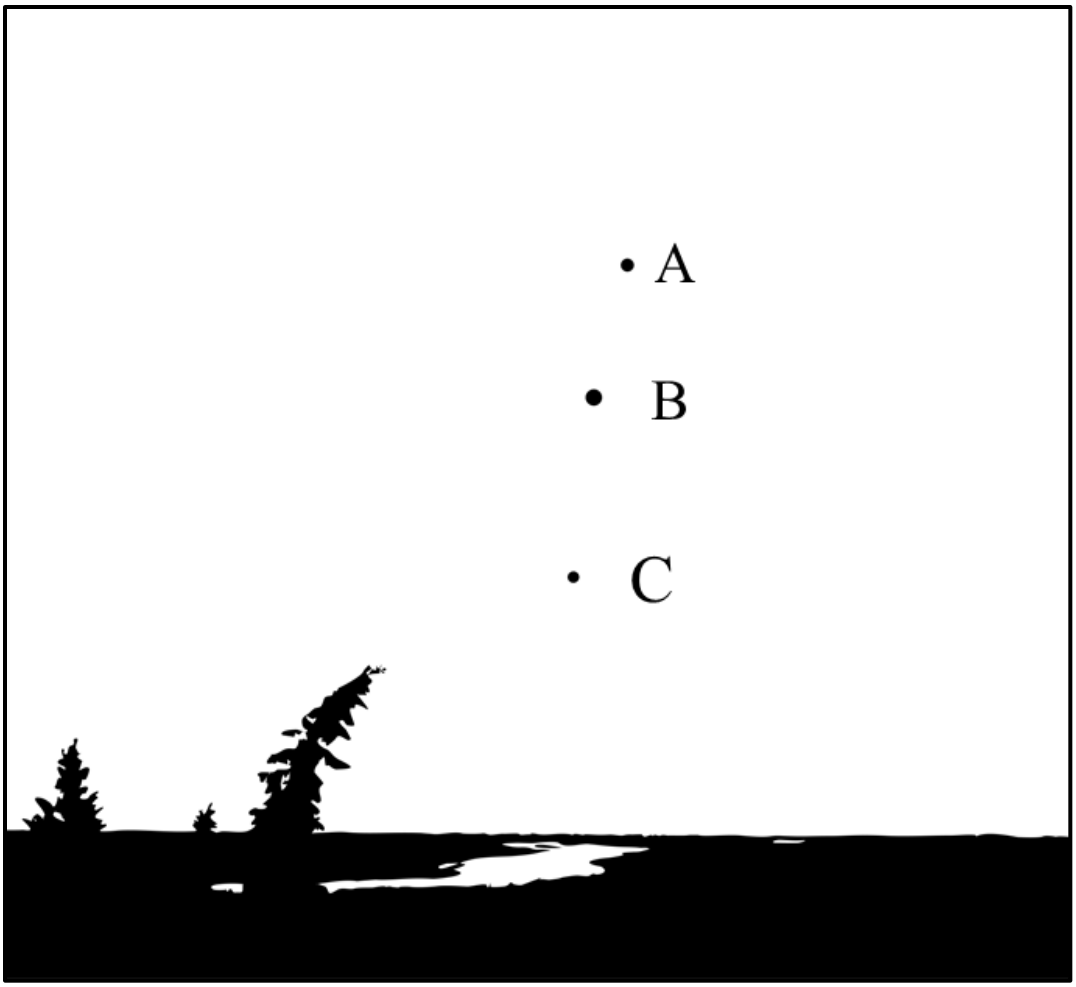

Figure 4.2. The Gwich'in constellation of three morning stars. The Gwich'in constellation of three morning stars is known as, *yeendak gahaaji.*(they went up), *vats'a' gach'agahaajil* (they went toward it), or *vanh oozhrii* (morning shines) comprised of the stars Tarazed (A), Altair (B), and Alshain (C) as seen rising above the dawn horizon in early spring in interior Alaska. The appearance of the first morning star, Tarazed (A) indicates that it is time to be awake and begin the morning routine. The appearance of the second morning star, Altair (B) indicates the period when breakfast and other morning preparations must be completed and the time when individuals must depart for morning hunting activities. The appearance of the third and final morning star, Alshain (C) informs hunters that there is enough light to hunt/shoot game (Cannon 2013a).

The Han (Rooth 1971, 284) and the Upper Tanana (Lovick et al. 2007) also employed the morning stars as a time-referent for dawn hunting activities. In particular, the appearance of the morning star(s) informed hunters that there was adequate light to dispatch an animal. An Upper Tanana consultant from Tetlin explained:

> You see star, big one. It come up here, but about a couple hour you see little star from there, it's beginning to daylight . . . You see now it's getting brighter, getting brighter, getting brighter, pretty soon that's when we're ready to hunt. We could see gun sight (Cannon 2013a).

Likewise, an Upper Tanana elder from Northway explained:

> *Ikaay k'adeht'ąą'a* they say. You know star coming out. It mean daylight come. Daylight come, you see star come up first. *Ikaay k'adeht'ąą'a* they call that star. By that one, they know daylight come. Go hunt right now. The people they know that one, daylight comes over there. They know, they got no watch, but they know what time from that star up there. Before daylight comes, star coming out, they know daylight comes behind it (Lovick et al. 2007).

Knowing when to wake up and begin preparing for the day's activities was an important aspect of Northern Athabascan subsistence life that was facilitated by observing the appearance of a certain star(s) at dawn. Among the Dena'ina, Osgood (1976:25) stated "early rising is held up to children as the means through which all desirable things are attainable . . . no matter what crime a native commits, to give him the full measure of disapprobation is to add that he did not get up in the morning. It would seem almost as though there were some potent charm in dawn itself." The late Ahtna elder Huston Sanford described his experience from childhood learning about the morning star from his parents, the luck it could bring, and how he was taught to look for it at dawn:

> When we were just waking up (they would tell us), 'you hurry outside just as the morning light begins. At the doorway look up for it (the star-clock [morning star]). You should look for it three times, and then you will be fortunate. If you

delay, you will forget about it. After several days when you remember it again, you can run out for it. Look up for it. Then it will take care of you. You will still remember it after three days pass. From then on your life will improve. Riches will come to us. We will be in wealth. We will be successful from it (the star).' That is what our mother and father used to tell us (John and Kari 1986:27-28).

In addition to its use as a diurnal time-referent from mid-December through April, the morning star(s) may have formerly served as an annual marker. While evidence for Altair's use in determining the advent of a New Year is limited, one consultant from Tetlin explained that the New Year traditionally began around the winter solstice, *dziin uniik'ul* 'shortest day', which was determined by the appearance of a star. While the consultant did not identify the solstice-marking star, the star Altair is a perfect candidate, as it makes its first annual appearance on the dawn horizon in interior Alaska within a few days of the winter solstice. In addition, Altair is also identified as the morning star in the Upper Tanana language.

The late elder Frank Ginnis also noted that the three Gwich'in morning stars are first visible on the dawn horizon during the week of the shortest day of the year, but he did not explicitly state that they marked the advent of a New Year (Mishler and Ginnis 1986). Much of Gwich'in country is situated above the Arctic Circle where the sun does not appear above the horizon on the winter solstice. Yet, the stars Tarazed, Altair, and Alshain make their first dawn appearance around this time and would be an excellent seasonal marker during the sun's absence. However, while the Koyukon also observed the stars Tarazed and Altair (*yokkolaaye*), they instead determined the advent of the New Year by the position of the sun relative to local landmarks (Jetté and Jones 2000, 57; Sullivan 1942, 64).

While the Gwich'in, Koyukon, Upper Tanana, and Ahtna terms glossed as 'morning star(s)' correlate with the constellation Aquila, the identity of 'morning star' terms in the remaining Alaska Athabascan languages is not known. However, 'morning star' terms in other Northern Athabascan languages are also likely associated with Aquila, as people across the Arctic use this constellation as a time-referent. For example, the neighboring Inuit observed Altair, and Tarazed, (and in some localities Alshain) as an important constellation utilized in seasonal time-reckoning. In his book on Inuit astronomy MacDonald wrote:

> By all accounts, *Aagjuuk* [i.e. Altair, Tarazed, and sometimes Alashain] was for Inuit everywhere one of the most important constellations. It seems to have been known by this name, or a variant of it, across the entire Arctic . . . For the Iglulingmiut, and probably for most other Inuit groups, *Aagjuuk* was a distinctly seasonal constellation which took on significance only after its first appearance of the year in the northeastern sector of the morning sky, usually during the second week of December . . . *Aajuuk* was one of the principal constellations used by Inuit for the reckoning of time, particularly during the winter dark period. Its appearance in the morning sky indicated the proximity of dawn or twilight in those more northerly regions where the sun did not rise above the horizon (MacDonald 1998, 45-46).

In most respects, the Inuit stellar time-referent *aagjuuk* functions in nearly the same manner as the Alaska Athabascan morning star(s). While additional research is needed to properly flesh out the identities of the morning stars for the majority of the Alaska Athabascan languages, it is at least probable that Altair (and perhaps Tarazed and Alshain) is widely recognized as the morning star(s) throughout the Athabascan region of Alaska. In contrast,

Venus, which is identified as the 'morning star' in English, is a rather poor candidate and exhibits several characteristics that greatly diminish its utility as a consistent morning time-referent from one year to the next.

A 263 day interval separates Venus's first morning and evening appearances (Aveni 2002, 197), which cannot be observed at high latitudes due to prolonged periods of summer daylight (MacDonald 1998, 293). In addition, eight years elapse before Venus recurs in the same position in the sky (Aveni 2002, 200). As MacDonald (1998, 51) noted, at high latitudes these characteristics cause Venus to "appear erratic" from one year to the next and "compared with the constancy of Altair, [it] seems an unlikely choice for a seasonal marker."

However, the possibility that some Alaska Athabascan terms glossed as morning star may actually be Venus cannot be ignored. Some consultants stated that the morning stars are used as dawn time-referents throughout the fall, winter, and spring, as opposed to the more restricted period from late December through April when Altair is located in the dawn sky. Because stars rise approximately four minutes earlier on each successive day, there is no single star or group of stars that can be used as a dawn time-referent throughout several seasons.

Discrepancies related to the seasons when consultants claim the morning star(s) can be used as dawn time-referents may be explained by the fact that some individuals may mistake Venus for the morning star (Altair). Altair does not appear in the dawn sky until after the winter solstice in December. However, the combination of a dawn appearance by Venus in fall or early winter, combined with Altair's regular dawn appearance in late December through spring might lead some consultants to conclude that the morning star appears at dawn throughout several seasons.

Perhaps the strongest evidence that terms glossed as ‘morning star’ could actually refer to Venus was provided by testimony from an Upper Kuskokwim consultant in Nikolai in April 2014. This individual expressed concern that the ‘morning star’ “did something strange”, noting that during winter it appeared in the evening sky instead of at dawn. This statement is consistent with Venus’s appearance as an ‘evening star’ in late December of 2013. However, this testimony does not resolve the issue regarding the identity of a consistent dawn time-referent from one year to the next. In all cases it is most probable that Altair is recognized as the primary Alaska Athabascan morning star, sometimes interchanged with or mistaken for the planet Venus when in its morning appearance.

An additional discrepancy that complicates the identification of the morning stars is found in conflicting statements by consultants regarding the approximate one hour separation between the stars Altair, Tarazed and Alshain. While these stars rise vertically one above the other preceding daylight, their risings are actually only spaced about 15 or 20 minutes apart and essentially appear together in the dawn sky. While no other group of stars seems to fit the stated criteria, the small temporal separation between the appearance of Altair, Tarazed, and Alshain is a significant discrepancy that may be better sorted out with further fieldwork and verification by other additional Gwich’in consultants. It should also be noted that while Altair, Tarazed and Alshain are easily recognized in the evening sky prior to the winter solstice, attention is only afforded to them when they appear on the dawn horizon after mid-December. To this point, MacDonald made a similar observation among the neighboring Inuit:

> . . . because throughout autumn and winter months at latitudes above the Arctic Circle *Aagkuuk’s* principal star, Altair, is one of the brightest and most visible stars in the south and western sectors of the sky. But so completely is *Aagjuuk*

> identified with mid-December and the winter solstice that one Igloolik elder, invited to point to the constellation in early November, firmly replied that we do not see it until around Christmas, and this in spite of the fact that Altair was at the time in full view to the southwest. It would be no contradiction then to claim that *Aagjuuk*, appearing outside its respected position in the winter morning sky is, in a real sense, seen but not noticed (MacDonald 1998, 46).

While the identification of Alaska Athabascan morning star(s) terms with stellar bodies is complicated by conflicting testimony and the fact that Venus closely mimics Altair when in its morning appearance, the morning stars are no doubt a crucial component of an Alaska Athabascan time-reckoning system. Whether the morning stars rise at 4 a.m. or 6 a.m. does not matter as long as long as individuals are awake and begin preparing for the day's activities prior to the appearance of the first light of dawn. The self-adjusting and sequential replacement of one diurnal time-referent after another is a defining feature of Gwich'in and Ahtna Athabascan stellar time-reckoning systems. In the springtime when the returning daylight overtakes the morning star(s), the sun replaces them as the primary diurnal time-referent until September when the Big Dipper resumes its prominence and function as a nocturnal time-referent.

4.1.4 The Sun in Time-Reckoning

While a comprehensive discussion on the utility of the sun in Alaska Athabascan astronomy is beyond the scope of this thesis, its utility in time-reckoning is briefly described in this section. The sun is the final component of an Alaska Athabascan tripartite stellar time-reckoning system. Alaska Athabascans employ the sun as a time-referent throughout the spring, summer, and fall. The divisions of the day are based on the apparent magnitude or quality of daylight (e.g. whiteness of daylight), as well as on the sun's position in relation to the local

geography (e.g. sun is setting). While the named divisions of the day may exhibit some variation from one Athabascan speaker to the next, the fundamental purpose of naming solar periods is to unambiguously and accurately describe the quality or magnitude of daylight or the position of the sun. Temporal periods based on the quality of light are employed around dawn and dusk, while diurnal divisions based on the sun's position exhibit greater utility during periods of full daylight, from sunrise to sunset.

Because the temporal divisions of the day are based on observations of celestial bodies, these named periods change from one season to the next. For example, in mid-summer the named diurnal divisions almost exclusively reflect the position or quality of light emitted by the sun. Conversely, in late winter or early spring the diurnal temporal divisions reflect observations based on the positions of other celestial bodies including the Big Dipper/humanoid constellation, the morning stars, the sun, and the quality of daylight.[53] Among the Gwich'in at Fort Yukon, Osgood (1936, 101-102) documented 32 named divisions of the day based on the sun's summer positions. In comparison, Nelson (1983, 40) reported 16 Koyukon divisions of the day for an unidentified period of the year based on the positions of the stars, sun and moon, and on the quality of light.

While there are no doubt hundreds of Alaska Athabascan time phrases based on solar observations, a list of named diurnal divisions elicited from a single Ahtna consultant in Gulkana provides an example. The temporal periods listed in Table 4.3 align with a spring schedule and are based on each of the three primary components of an Alaska Athabascan stellar time-reckoning system.

[53] The moon is seldom reported as a diurnal time-referent though it plays a significant role in reckoning temporal periods longer than 24 hours.

Table 4.3. Ahtna diurnal divisions of time based on a spring schedule. Terms provided by an Ahtna consultant in Gulkana. Note that the temporal divisions are most concentrated around dawn and dusk (Cannon 2013b).

Name	Translation	Division of Time
yikaas ts'e' cila' ilts'iitl'	the fish tail has gotten curved toward dawn	early morning around 3–5a.m. when the Big Dipper has rotated toward dawn
son' nadalts'et	stars are fading from light	early morning when stars just barely begin to fade from the approaching dawn light
son' dasdzax	light (of daylight star) is coming	just before the appearance of the morning star
son' kadghiłdza	star shows brightly (name of the morning star used as a time term)	when the morning star first appears
kahwbaadghighel	early light of dawn?	first light of dawn, just behind the morning star
kutba'	whiteness of daylight	period just before full daylight
kay'ghi'aan	(sun) came up, rose	sunrise
ts'idzaenniidze	midday	noon
'unse di'a'	(sun) is about to set	just before sunset
nay'ghi'aan	(sun) went down, set	sunset
naghilghaetl'	"walking around dark"	evening, but still light enough light to walk around
naxełnghelghot	darkness is bent	complete darkness (no moonlight) can't see anything.
son' ta'itggey	stars are bright	period at night when stars are their brightest

The temporal periods provided in the Ahtna schedule (Table 4.2) are concentrated around dawn and dusk, which suggests that these are the most critical or salient periods for reckoning time in Ahtna culture.

In addition to its function as a diurnal time-referent, the position of the sun or the amount of visible daylight is often observed as a marker of the solstices and the equinoxes. The Upper Tanana refer to the equinoxes as *tadn eh dzin niłchidat'ah*, literally 'night and day touch each other', a direct reference to the equal proportion of daylight and darkness within a 24 hour

interval. While terms for the equinoxes are seldom documented in the extant literature, Alaska Athabascan names for the summer and winter solstices are commonly referred to as 'longest day' and 'shortest day' respectively (de Laguna and McClellan 1960; Kari 1990a; Kari 1993; Kari 2007, 160) or they may reference the change in the length of daylight (Arnold, Thoman, and Holton 2009, 245; Kari 1990a, 142). For example, the Upper Tanana refer to the summer solstice as *shin ditloh tl'ädn* 'longest day' or perhaps 'mid-summer' as determined by the relatively long period of visible daylight. Conversely, the winter solstice is called *dziin uniik'ul,* 'shortest day', but is apparently delineated by the appearance of an unidentified star (presumably Altair). At latitudes north of the Arctic Circle the Alaska Gwich'in also observe the sun's first winter appearance above the horizon following the solstice. This appearance is called *shree ineegwiilkįį* 'the sun got marked again' (Peter 1979, 39) and functions as a temporal marker. Douglas Leechman (1954, 33) also reported that the older people of Old Crow (Yukon, Canada) used: "The trick of marking the position of the shadow of an upright stick", apparently for the purpose of delineating time and/or direction.

As observed among Canadian Athabascans, temporal periods based on the position of the sun were also conveyed from one traveler to the next by means of winter trail signs. During fieldwork with the Satu Dene (Great Bear Lake People) in the Northwest Territories in 1928-29, Osgood (1932, 65-66) wrote: "Sometimes a time sign is made by drawing an arc in the snow, with a straight line to designate the position of the sun. This is left to tell the time of departure of one party for the benefit of another following" (Figure 4.3).

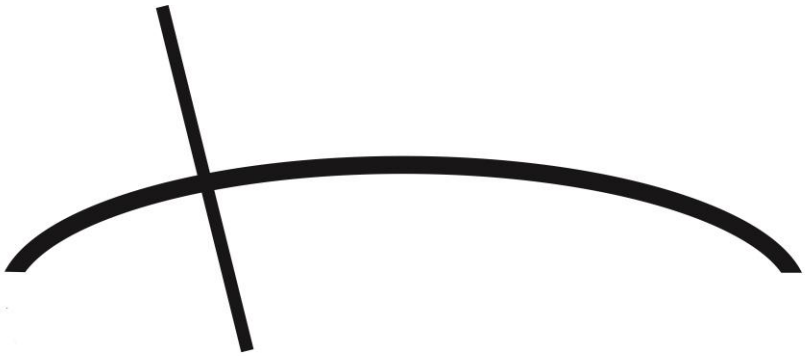

Figure 4.3. A trail sign for time based on the sun's position. Winter trail sign utilized by the Satu Dene of Great Bear Lake, Northwest Territories that conveys temporal information based on the position of the sun (straight vertical line) in relation the horizon (arc) as described by Osgood (1932, 65-66).

The association of the sun with time-reckoning is well established in Alaska. The Gwich'in term for clock or wristwatch is known as *shree kaachyaa* 'measuring the movement of the sun' (Peter 1979, 31). The neighboring Alaska Inupiaq similarly employ a solar reference calling a clock *siqiñġuraq* 'the sun's smaller version' (MacLean 2014, 309).[54]

In conclusion, the three primary referents observed in diurnal time-reckoning are the Big Dipper/humanoid constellation, the morning star(s), and the sun. Each of these three celestial entities exerts prominence over the others at different times of the day, as well as at different seasons of the year. In the spring each of the three celestial entities is employed in sequential order as time-referents. However, during the summer when daylight is nearly continuous, the sun is almost exclusively employed as a diurnal time-referent. Then in early autumn when the stars are visible once again, both the sun and stars (principally the Big Dipper) are observed as time-referents. The sequential observance of the three primary stellar time-referents comprises a time-

[54] Translation provided by Adeline Peter. Note the common term for clock in other Alaska Athabascan languages is borrowed from Russian *chasý* (e.g. *jise* in Upper Kuskokwim).

reckoning system that is completely self-adjusting. Such a system satisfies the social, economic, and political activities of Alaska Athabascan peoples.

No simple rule of thumb will instruct an individual to reckon time from the stellar bodies; rather, those individuals who invest in memorizing the various positions of the stars throughout different diurnal and seasonal intervals benefit from knowledge that orients them in both time and space.

4.2 Stellar Orientation

Cross-country travel and successful orientation strategies are essential to the subarctic Athabascan hunter-gatherer economy, which requires exploiting comparatively large areas of the environment to satisfy dietary and other subsistence needs (Vanstone 1974, 24-26). Alaska Athabascan orientation strategies frequently rely on observing rivers, streams, mountains, or ridges, as well as memorizing other unique features of the environment such as prominent rocks, meadows, or conspicuous flora (Osgood 1936; Osgood 1958, 252; Nelson 1973, 184-185). The Northern Athabascan directional system or spatial orientation system is based on a riverine configuration with absolute directions aligned to the major local watercourse (Kari 2011, 254-255). While this river-based directional system is quite elaborate, the four primary directions refer to positions down the river, up the river, toward the river, and away from the river or inland (Kari 2011, 254-255). Trails and other primary routes of travel are marked using various methods such as blazing trees, hanging moss on limb or bush, topping saplings or breaking tree boughs (Osgood 1936, 58; 65). Other trail signs are made with sticks, articles of clothing, or are drawn in the snow or on trees to convey information regarding game animals, direction of travel, the number of members in a party, a group's time of departure from a given point on the trail, or

any other information that may be pertinent to a subsequent party (Schmitter 1910, 16; Osgood 1932, 65-66; Osgood 1936, 92-93; John and Kari 1986, 159).

While networks of trails and waterways serve as the primary routes of travel (Nelson 1973, 185), few data are available on Athabascan orientation strategies for journeys off established trails, in new territories, or on terrains with relatively uniform topographies. However, stellar orientation strategies appear best preserved if not especially developed in Athabascan ethnolinguistic groups that reside within regions dominated by thick vegetation and inconspicuous or otherwise uniform topographies.

The *Gwichyaa* and *Draanjik* Gwich'in are especially adept at utilizing stars for orientation purposes, which likely derives from frequent travels through the Yukon Flats and the Black River country, where thick vegetation combined with relatively flat topography affords few vantage points from which to obtain a bearing.[55] Likewise, the Upper Tanana in the vicinity of Tetlin and Northway exhibit well-developed stellar orientation methods, though the Tetlin Hills, the Wrangell Mountains, and the Alaska Range are prominent landmarks on the local horizon. However, a diverse network of hydrographic features in lowland areas provides the Upper Tanana with their primary routes of travel. Excursions on numerous small side streams and sloughs surrounded by thick vegetation may obscure prominent geographical features and require the observation of other navigational markers such as the sun and stars. In addition, the Upper Tanana make frequent trips across Tetlin Lake, which is approximately five by seven miles in area. Consultants from Tetlin also describe situations where orienting by the wind or stars is necessary at certain locations on the Tetlin Lake where the shoreline is not visible.

It should also be mentioned that while stellar orientation greatly facilitates Northern Athabascan travel, some individuals are adept at orienting exclusively by non-stellar navigational

[55] Also known as the *Draanjik* River.

methods. However, stellar orientation strategies often eliminate the need to follow a back trail or to strictly adhere to a trail system or river course and provide individuals with a higher level of situational awareness after dark, or in new and unfamiliar areas.

Northern Athabascan stellar orientation techniques are not described previously in the literature, but the existence of stellar orientation strategies is hinted at by vague general statements such as "both sun and stars indicate direction" (Osgood 1976, 115) or "they use the Big Dipper as a compass" (Wassillie, Kari, and Boffa 1979, 29). Other scholars posit that subarctic Athabascans exclusively orient by the geography and as a consequence have rudimentary systems of stellar knowledge in relation to their Eskimo/Inuit neighbors. To this point, Nelson stated:

> The difference between boreal forest and open tundra may explain the Indians' concentration upon geographical knowledge for direction-finding as contrasted to the Eskimo's reliance upon indicators of the cardinal directions (e.g. compasses, stars, sun, wind direction). The Tranjik Kutchin [*Draanjik* Gwich'in] always refer to trails, lakes, sloughs, meadows, rivers, direction of current, hills, and similar features whenever speaking of directions, and points of the compass are practically never referred to excepts for indicating wind direction . . . It is interesting in this regard that the Indians have very little knowledge of astronomical phenomena, with names for only a few stars and constellations (Nelson 1973, 184-185).

While stellar orientation strategies are most frequently employed during travel in thick vegetation or across relatively uniform terrains such as the Yukon Flats, Osgood (1936, 64-65) erroneously suggests that the landscape itself has led to a more sedentary lifestyle among the

Gwichyaa Gwich'in: "In regard to travel, one of my informants pointed out that the Yukon Flat Kutchin were more sedentary than the other groups because of the nature of their country which, as he said, contains too many sloughs, mosquitos, and bushes which combined with its flatness leaves the traveler unable to see where he is going." In contrast to the statement made by Osgood's consultant, my research suggests that inherent pressures encountered in landscapes such as the Yukon Flats have led to the adaptation of unique navigational strategies among the *Gwichyaa* Gwich'in and other Alaska Athabascan groups; namely advanced stellar orientation methods (Figure 4.4).

Figure 4.4. Aerial and ground views of the Yukon Flats. Photos taken near Fort Yukon, Alaska in November (Cannon 2013b; 2014).

In comparison to time-reckoning systems, Alaska Athabascans also look to the environment for the most consistent and reliable signs from which to orient themselves. In areas with prominent geographic features, the topography or hydrography may offer the most reliable directional markers for orientation purposes. However, in the middle of large lakes or in other uniform, flat, or heavily forested landscapes the celestial bodies may serve as the most reliable and observable directional markers. During a spring journey with a group of Slavey Athabascan guides, Kennicott commented on his companions' abilities to navigate across the expansive frozen surface of Great Slave Lake in Northwestern Canada:

> We had a track to follow – that made by my Indian companion by going from Resolution to Fort Rae the previous week. But the Indians and voyageurs make a very straight cut, with only the sun and stars for a guide. Occasionally, however, voyageurs have lost their way upon the lake, and wandered about for some days ere finding the shore (Kennicott 1869, 169).

Likewise, Le Goff (1916, IX) mentions that the Chipewyan utilized constellations for orientation purposes on their "frequent" journeys. Kennicott and Le Goff's observations not only provide evidence for a wider distribution of stellar orientation methods among Northern Athabascan groups, but they further illustrate that stellar orientation strategies are well suited to the subarctic environment.

Prior to discussing specific stellar orientation methods and techniques it should be noted, however, that Northern Athabascans draw from a large repertoire of environmental knowledge and often employ multiple orientation methods throughout the course of a single journey or outing. When stellar orientation is utilized, these methods fall under one of two general strategies: a basic strategy utilized during short excursions, and a complex strategy that is more

versatile and may be utilized during long or short excursions. The following two sections address these strategies.

4.2.1 Stellar Orientation: A Basic Strategy

The most basic stellar orientation method requires only general knowledge of the paths of the celestial bodies across the sky. This method includes choosing a conveniently located celestial object, such as the sun, moon, or a bright star and maintaining its position relative to the traveler's direction of travel (e.g. keeping a chosen star to his left side) while heading outbound off an established trail or waterway. On the return leg, the traveler simply reverses his position so that the celestial target is oriented on the opposite side of his body (e.g. to the right of his body). Because celestial objects move across the sky at approximately 15° per hour, small adjustments may be necessary on the return leg to correct for the change in position of the target object. Likewise, the accuracy of this method decreases with time and therefore exhibits its greatest utility when employed for short excursions off an established trail; say less than three hours. It should also be noted that on the return leg of a journey individuals using this method often bisect the main trail or watercourse slightly above or below their departure point and may have to travel a short distance along the trail, river, or stream to reach their target destination, such as a parked team of dogs. This drift is related to the traveler's ability to correct for the change in position of his celestial target as well as the extent to which he meanders back and forth around obstacles during the outbound and return legs of his excursion.

The basic stellar orientation method is analogous to observing a geographic landmark as a reference point except that the observer may freely choose any object conveniently located in the sky, and he may have to adjustment for the object's gradual movement over time. This method is especially useful for short excursions off the trail system in areas that are flat and

heavily forested, in which case the celestial bodies are often the most conspicuous markers for maintaining a heading or orienting oneself to the landscape.

One expert Gwich'in consultant in Fort Yukon discussed employing the basic method while hunting small game in winter. The consultant and his hunting partner began their journey by following an established winter trail by dog team and travelled until they discovered a porcupine track that transected their route of travel. The hunting partners subsequently parked their dog teams to follow the porcupine track on foot through the thick boreal forest. Prior to leaving their dog teams the consultant noted the position of the moon in relation to the winter trail and his parked dog team. While the porcupine track meandered in a circuitous path, the consultant vigilantly observed the relationship of the moon to his outbound direction of travel. After walking a distance of "five lakes" the hunters sighted the porcupine and dispatched the animal. The hunters then returned to their dog teams by heading in a direction back toward the moon, making a small correction to adjust for elapsed time. While the moon served as the primary navigational aid in this example, other strategies also facilitated the hunter's orientation across the landscape, such as counting lakes and using the winter trail and dog teams as a home-reference. In addition, utilizing the moon as a directional aid eliminated the hunters' need to follow their meandering back trail enabling them to return to their dog teams by the most direct route.[56]

The same Gwich'in consultant similarly described observing the aurora borealis as a directional aid to locate his boat during an autumn moose hunt in the Yukon Flats. When the aurora borealis appears as an arc in interior Alaska it consistently displays in an east to west, or east to northwest direction. Directional information interpreted from the auroral arc enabled the consultant to reorient himself to the river where he emerged from a thick spruce forest just

[56] A similar stellar orientation strategy is also reported among the Canadian Inuit (MacDonald 1998, 166).

downstream of his boat. In comparison, the Inupiaq of Wainwright, Alaska also utilize auroral arcs as directional aids, noting the same regularity in its east to west orientation (Nelson 1969:138).

While nearly any conspicuous and reliable celestial marker may be utilized in conjunction with the basic stellar orientation method, this strategy exhibits its greatest utility when employed for short durations. A more advanced stellar orientation method facilitates travel for much longer periods of time, but requires a thorough understanding of the different diurnal and seasonal positions of the stars.

4.2.3 Stellar Orientation: A Complex Strategy

A more complex Alaska Athabascan stellar orientation strategy requires memorizing the various positions of the stars throughout the night as well as throughout the fall, winter, and spring. This orientation strategy closely corresponds to stellar time-reckoning methods and similarly employs the body part metaphor embodied in a whole-sky humanoid constellation as a mnemonic for learning and remembering the relationship of the stars relative to one another. Gwich'in observers who can locate a single part of *yahdii*, such as *shreets'ąįį vakwai'* (its right foot), can readily discern other parts of the whole-sky humanoid constellation based on an existing mental map of the human body. When an observer combines his knowledge of the body part metaphor with his memory of the different diurnal and seasonal positions of the humanoid constellation, he can orient himself in both time and space.

Whole-sky humanoid constellations such as *yahdii* are essentially bilaterally symmetrical and provide multiple reference points and axes for observers to orient themselves to the landscape. For example, *yahdii's* feet and hands appear as low altitude asterisms, each located in a separate quadrant of the sky. In the event of partial cloud cover or when traveling through a

thick boreal forest a practiced observer will only require a couple stars within *yahdii* to mentally locate the remaining body part asterisms overhead. The concept of a single unified whole-sky constellation based on the configuration of a human body is highly functional in the subarctic where the majority of stars within *yahdii* are circumpolar. Even when the lowest altitude body part asterism (i.e. *yahdii'*s his left hand) dips below the horizon in autumn, observers can readily distinguish its position based on an existing mental map of the human body.

Memorizing the various diurnal and seasonal positions of the stars, however, requires astute observation and a significant investment in time. Consultants who have invested in memorizing the different diurnal and seasonal positions of the stars emphasize the importance of habitually observing the sky until it becomes second nature, like observing the face of a clock or referencing the needle of a compass. It should also be noted that the various diurnal and seasonal positions of *yahdii* are relatively generalized. For example, in the springtime just before the morning crepuscular, *yahdii's* head is said to face the dawn (i.e. east-northeast). Likewise, during the early evening in autumn or early winter, *yahdii's* tail might be described as pointing downstream (i.e. west-southwest) when viewed from Fort Yukon. In the event that an individual becomes disoriented during this temporal period, he or she can simply reference *yahdii* and immediately discern his or her position on the landscape in relation to the orientation of the Yukon River, even when traveling miles from the watercourse. Crucially, the stars serve as both compass and clock in a variety of Alaska Athabascan cultures.

However, stellar orientation is not strictly reserved for emergency situations or when one is lost or disoriented on the landscape, but it is also utilized to maintain a bearing on a cross-country journey. One consultant from Fort Yukon explained that he seldom travels at night, but often references the stars from his evening camp to check his bearing and confirm his direction

of travel. In the morning he continues on his journey based on directional information interpreted from his evening or dawn observations of the stars. This consultant explained:

> As soon as it gets dark, you know where your directions are. No matter where you are, you know. So that's how they know - what heading to take in the morning. You know what heading to go by looking at the stars at night. You know where you're at. You know where south is, you know where east, north, you know. And if you're going kind of diagonal toward Central, well you know what way to go. Tonight when it gets dark, you look at the stars; Oh, Central is right over there. So in the morning you just start walking that way, [motions with hands] going that way (Cannon 2013a).

Other consultants employ specific components of a whole-sky constellation for orientation purposes. Specifically, an Upper Tanana consultant from Tetlin explained that he primarily orients by a unique asterism called *san' di'ehtsąą*, literally, 'it's defecating stars', comprised of the Big Dipper and three other stars within Ursa Minor and Cassiopeia (Figure 4.5).

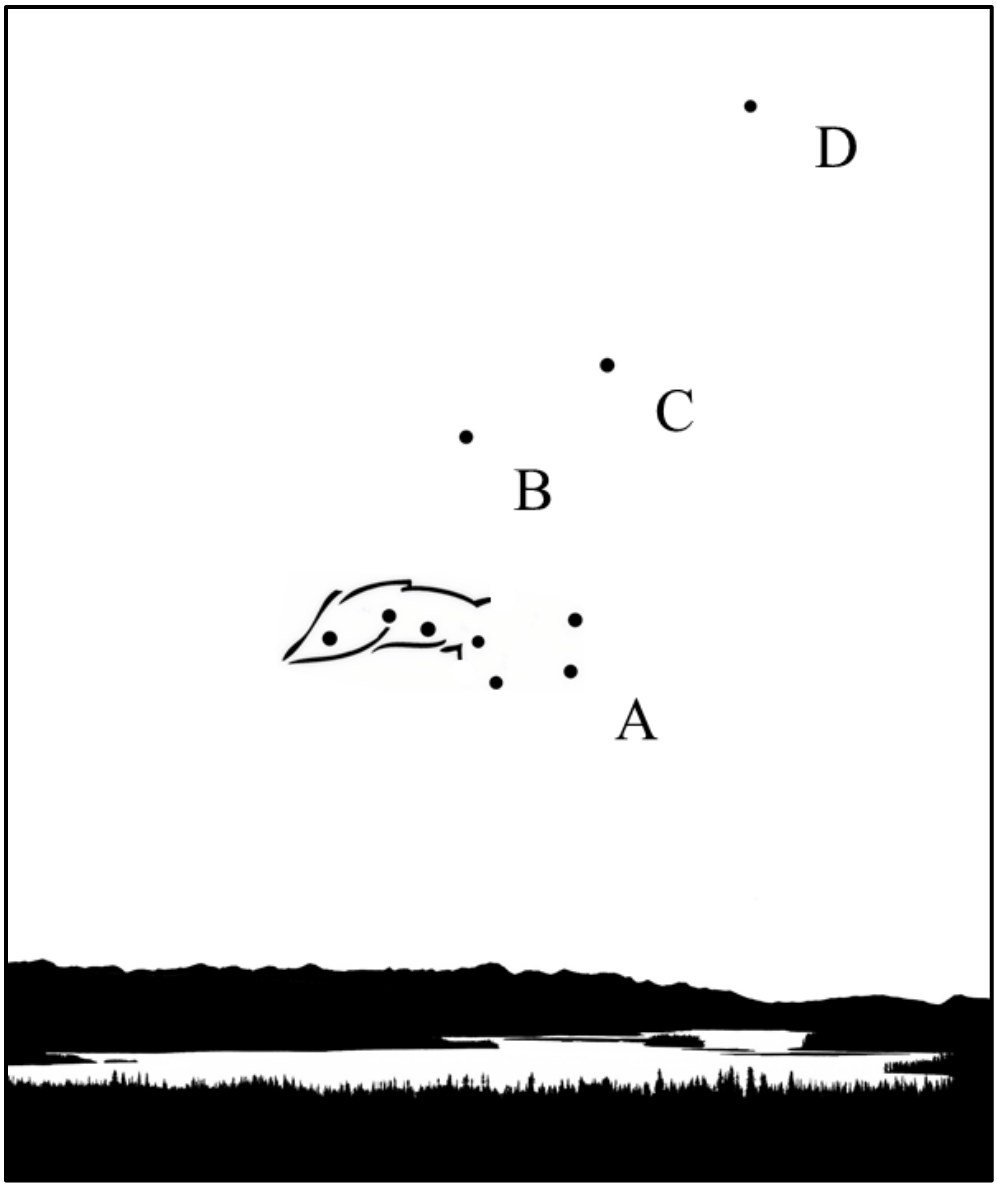

Figure 4.5. The Upper Tanana (Tetlin) stellar group *san' di'ehtsąą'*. S*an' di'ehtsąą'* 'it's defecating stars' comprised of *san' uche'* (Big Dipper located at position A) and three other stars including Kochab (B), Polaris (C), and Caph (D). Stars depicted as they appear in Tetlin, Alaska on September 15, 2013 at 11:00 p.m. local time. The Big Dipper is said to resemble a fox tail belonging to the whole sky humanoid constellation *yihdaa*, otherwise known as *dineh san'* (Cannon 2013a).

The asterism, *san' di'ehtsąą'* is envisioned as three pieces of feces shooting out from beneath the tail of the whole-sky humanoid constellation *yihdaa*, otherwise known as *dineh san'* (star man). *Yihdaa* is said to have a fox tail comprised of the Big Dipper. The three pieces of feces shooting out from beneath *yihdaa's* tail correlate with the stars Kochab, Polaris, and Caph

(Figure 4.5). *San' di'ehstąą* functions as a celestial grid that rotates about Polaris (position C) like two hands on the face of a clock. The tail or handle of the Big Dipper points in one direction while the stars Kocab, Polaris, and Caph point in another direction providing two points of reference. Like Gwich'in, the different diurnal and seasonal positions of s*an' di'ehtsąą'* are also memorized in relation to their attitude or position over the landscape.

It may also be of interest to note that the three pieces of feces (Kocab, Polaris, and Caph) were located by noting their relationship to the second star in the handle of the Big Dipper (Mizar). In contrast, students of Western astronomy generally learn to identify Polaris by following the pointer stars (Dubhe and Merak) located in the cup of the Big Dipper, which lead to the North Star. In addition, consultants seldom take special notice of the North Star or find utility in its unique stationary position in the sky.[57] The apparent lack of interest in the North Star may owe in part to a directional system based on a riverine configuration in combination with the development of a highly functional stellar orientation strategy based on the positions of circumpolar stars.

Bradley (2002) reports similar orientation strategies based on memorizing the various diurnal and seasonal positions of the stars for the Yup'ik of Southwest Alaska, demonstrating the functional power of arctic astronomy across language and culture groups. What is unique to Alaska Athabascans is the unifying power of the single whole-sky constellation. Where Yup'ik rely on external tools to measure angles from known star or star groups, the Gwich'in, Upper Tanana, and Ahtna can immediately discern the orientation of all asterisms within a whole-sky humanoid constellation by applying a single cognitive map based on the body part metaphor. When this knowledge is combined with a memory of the constellation's different diurnal and

[57] Osgood (1959, 54) mentioned that the Deg Hit'an utilized the North Star for orientation purposes.

seasonal positions, practiced observers can orient themselves in both time and space. Such a stellar orientation strategy is not reported previously in the Athabascan literature.

4.3 Weather Signs Interpreted from the Stars

While Alaska Athabascans observe a diverse range of weather signs interpreted from nature, stars play only a minor role in Athabascan meteorology. Among the few weather signs interpreted from stellar observations are brightly twinkling stars, which Athabascans utilize to forecast a strong wind. Star twinkle, also known as atmospheric scintillation, is caused by the refraction of light from different densities of hotter and cooler air that move between a star and the observer's line of sight (Schneider and Arny 2009, 220). In Alaska Gwich'in, the phrase *są' ch'adzah* 'stars dance' describes brightly twinkling stars that indicate wind. A connection between wind and twinkling stars is similarly observed in the Ahtna region where atmospheric scintillation is termed *son' neke nałts'iihwdelae* 'the wind is sweeping the stars'. An Ahtna consultant from Gulkana explained:

> We know wind blew too. *Son'* [i.e. star] it start moving all over. Big wind is headed down here pretty soon . . . *Son'* you know. *Son'e neke nałts'iihwdelae*. This world pretty soon going to be big wind down here. We know that, you know. *Son'e neke nałts'iihwdelae*, just like he sweep over. Not hanging in one place, you know; everyplace (Cannon 2013b).

The Koyukon similarly describe brightly twinkling stars with the phrase *tloon' naa'ełts'eeyhleyaah* 'the wind swings the stars' which also forecasts a wind (Jetté and Jones 2000, 585). However, the additional Koyukon phrase *tloon' tl'oł yee daadletl'ee* 'the stars are sitting in their cradles' refers to atmospheric mist or frost based on the blurred appearance of stars (Jetté and Jones 2000, 585). In addition, Kari (1978a, 49) glossed the Ahtna term *bełet'i'a*

'smoke hits it (star)' as an unidentified weather sign. While numerous Athabascan terms describe the appearance of stars, only a handful of these phrases are confirmed as weather signs (Table 4.4).

Table 4.4. Alaska Athabascan weather signs based on the appearance of stars.

Name	Language	Translation	Weather Sign	Source
bełet'i'a'	Ahtna	smoke hits it (star)	unidentified	(Kari 1978a, 49)
son' neke nałts'iihwdelae	Ahtna	the wind is sweeping the stars	brightly twinkling stars that forecast a wind	(Cannon 2013b, 92-94)
tloon' tl'ołeł yee daadletl'ee	Koyukon	the stars are sitting in their cradles	indicates the presence of atmospheric frost or mist based on the blurred appearance of stars	(Jetté and Jones 2000, 585)
tloon' naa'ełts'eeyhleyaah	Koyukon	the wind swings the stars	unusual twinkling of stars presages a wind	(Jetté and Jones 2000, 585)
są' ch'adzah	Gwich'in	stars dance	twinkling stars indicate an approaching wind	(Cannon 2013a, 86)

Variations in atmospheric density that alter the appearance of stars also facilitate Dena'ina weather forecasting. The Dena'ina expect warm weather when the Big Dipper's stars appear close together, and they forecast cold weather when an unidentified star in the Dipper is farther away from another unspecified star (Rooth 1971, 73).[58] The Upper Kuskokwim also traditionally observed the Big Dipper (*moghiltale*) and the Pleiades (*midzish*) to predict the weather, though has been only approximately explained:

> That star they used to call *noghitale.* From that one they know, they know it's going to be cold. They use that *noghitale* up there. The stars bunch up in one place [i.e. *midzizh*], the wind that's there, that one they call the caribou. That star

[58] Perhaps this star is Alcor relative to its brighter companion star Mizar.

up there too, they are watchful over that. [It would tell] what it would look like in the future [the weather?]. They used to be watchful over that one too (Deaphon 1977).[59]

The observation of bright stars situated in close proximity to the moon also facilitates weather forecasting. These bright stars are often personified as the moon's dog, which indicate various weather signs or other prognostications about the future depending on the star's position relative to the moon. According to Jetté and Jones (2000, 550) the Koyukon apply the term *dołt'ol leege* (moon's dog) or *so leege* (sun's/moon's dog) to any generic star situated in the appropriate position near the moon. For the Koyukon, *dołt'ol leege* presages starvation, a food shortage, or warm weather when the star is behind the moon's east to west direction of travel (Jetté and Jones 2000, 550). This prediction is explained by the interpretation that the moon's dog is trailing behind its owner picking up scraps of food (Jetté and Jones 2000, 550). Conversely, if the Koyukon observed *dołt'ol leege* positioned ahead of the moon, they expected an abundance of game or cold weather (Jetté and Jones 2000, 550). There is, however, no widely corroborated agreement on weather signs interpreted from the position of the moon's dog within or across ethnolinguistic groups. Jetté and Jones (2000, 388) also reported that the Koyukon predict cold weather when the moon's dog is above or below the moon. In addition, the Koyukon believe that the moon's dog portends snow when positioned behind the moon, while others expect bad weather when *dołt'ol leege* is positioned ahead of the moon (Jetté and Jones 2000, 388).

Other Alaska Athabascan languages accord the moon's dog different names depending on its position in relation to the moon. In the Upper Kuskokwim community of Nikolai, the moon's dog is called *diłech'a dodeltan* 'driving the dogs', when it is observed ahead of the

[59] Translated from Dinak'i on April 4, 2014 by Stephen Nikolai and Gary Holton (Cannon 2013b).

moon. Appropriately, *diłech'a dodeltan* is personified as a team of sled-dogs driven by the moon, and it forecasts a snowstorm.[60]

While Ahtna consultants did not directly refer to the star as 'the moon's dog', the concept is the same. When a particularly bright star is observed ahead of the moon it is called *utse'edae'* 'his blanket' and indicates warm weather. According to one consultant "the boss [i.e. moon] let him [dog?] pass." Conversely, when the star trails behind the moon its name changes to *son' ucii saadetse'e'* 'the tip of it (star) is moving', which indicates cold weather (Figure 4.6).

[60] No other Upper Kuskokwim terms were elicited for other positions of the star around the moon.

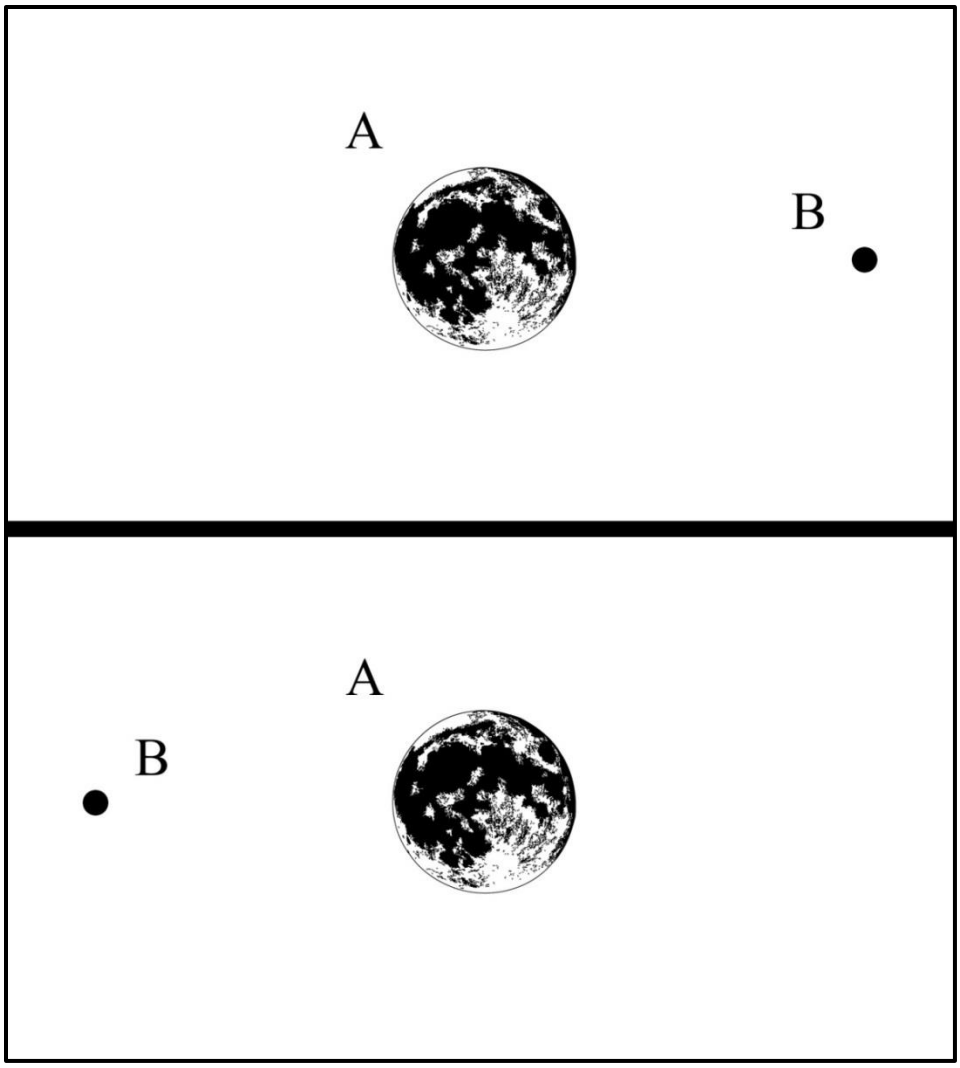

Figure 4.6. A bright star known generally as the moon's dog. The upper frame depicts the Ahtna star (B) *utse'edae'* 'his blanket', which indicates warm weather when observed ahead of the moon (A). Conversely, the lower frame depicts the same Ahtna star (B) called *son' ucii saadetse'e'* 'the tip of it (star) is moving', which forecasts cold weather when observed behind the moon (A). The direction of the moon's travel is from left to right, or from east to west (Cannon 2013b).

The Dena'ina also utilize the term *gheljayi lik'a* 'moon's dog' (Tenenbaum 1975, 67), identified as a bright star near the moon, as well as the term *gheljay ch'naqa*, 'the moon's children', which refers to stars (pl.) near the moon or an unidentified square-shaped constellation

(Kari 1977a, 137; Kari 2007, 150).[61] Table 4.5 lists names and weather signs interpreted from Alaska Athabascan stars identified or interpreted as the moon's dog.

[61] Perhaps the square of Pegasus?

Table 4.5. Names and weather signs interpreted from stars near the moon.

Name	Language	Translation	Weather Sign	Source
son' ucii saadetse'e'	Ahtna	the tip of it (star) is moving	cold weather when a certain bright star (Jupiter?) trails behind the moon	(Cannon 2013b, 74-77)
utse'edae'	Ahtna	his blanket	warm weather when a certain bright star (Jupiter?) is ahead of the moon	(Cannon 2013b, 74-77)
ghelgayi lik'a	Dena'ina	moon's dog	?	(Tenenbaum 1975, 67)
gheljay ch'naqa	Dena'ina	the moon's children	?	(Kari 2007, 150)
dałt'ol mileg	Holikachuck	moon's dog	?	(Kari, Alexander, and Deacon 1978, 25)
dołt'ol leege	Koyukon	moon's dog	abundant food, cold weather, or a storm when a star is ahead of the moon; starvation, a snowstorm, or warm weather when a star lags behind the moon; or cold weather when the star is above or below the moon	(Jetté and Jones 2000, 550)
so leege'	Koyukon	sun's/moon/s dog	same as dołt'ol leege	(Jetté and Jones 2000, 388)
diłech'a dodeltan	Upper Kuskokwim	driving the dogs	sign of snow, when a certain star in front of the moon	(Cannon 2013b, 167-168)
?	Upper Kuskokwim	?	starvation or abundant game/food (positions in relation to the moon not specified)	(Cannon 2014, 11)
deleege' nottha nee'eeltaanh	Tanana	it puts its dog ahead of itself	cold weather when a certain star is ahead of the moon	(Jones 1988)
ch'àldzěek łįįk	Upper Tanana	moon dog	?	(John and Tlen 1997, 65)

While the identity of the moon's dog may correspond to a variety of generic stars near the moon, the planet Jupiter is an excellent candidate. Jupiter is not only highly visible when close to the fully illuminated moon, but it is perfectly positioned ahead or behind the lunar body at various times of the year. It should be noted that the Central Alaskan Yup'ik also refer to the star Sirius as *iralum qimugtii* 'moon's dog' (Jacobson 2012, 307), though Sirius's flickering appearance rather than its position relative to the moon is the prominent feature observed in Yupik/Inuit weather forecasting (MacDonald 1998, 74-75).

Alaska Athabascan weather forecasting makes use of a variety of other natural, celestial, and atmospheric phenomena, such as rainbows, atmospheric haloes, parhelia, the aurora borealis, the hue or color of the sky, different shapes of the moon, clouds, plants, and animals. In particular, extremely subtle differences in the shape and color of atmospheric haloes and parhelia facilitate Alaska Athabascan weather forecasting. While these other non-stellar weather signs extend beyond the scope of this thesis, this section concludes with a description of one type of lunar halo as it relates to stellar astronomy and weather forecasting. As explained by an Upper Tanana consultant from Northway, he was taught, when a large halo forms around the moon, to count the number of stars caught within the halo. The summation of stars within the halo is equal to the number of days before the weather will change.

4.4 Stars in Cosmology and Religion

Cosmological and religious beliefs about stars comprise a fourth major functional domain of Alaska Athabascan stellar astronomy. Stellar origin beliefs and some transcendent properties of stars are described in a several widely documented Northern Athabascan narratives, while other stellar concepts, such as individual attitudes, spiritual experiences, or perceptions of stars are seldom reported in the documentation. The stellar concepts and beliefs presented in this

section not only draw from the literature, but rely on work with consultants, especially Upper Tanana consultants in Tetlin and Northway, where especially informed discussions on the cosmological and spiritual significance of stars took place. While Upper Tanana stellar beliefs are by no means representative of all other Northern Athabascan groups, the goal of this section is to provide a glimpse into Alaska Athabascan stellar ideology and to illustrate a fourth major use of stars in Alaska Athabascan culture.

This section includes descriptions of the relatively well-documented exploit of Raven's theft and placement of the celestial bodies in the sky, stellar spirits and cultural taboos and protocols related to stars, and the significance of humanoid constellations in Alaska Athabascan belief systems.

4.4.1 The Creation or Placement of the Stars

Northern Athabascan oral tradition credits the culture hero and trickster, Raven, for stealing the sun, moon, and stars and placing them in the sky (McKennan 1959, 190-191; Rooth 1971, 231-233; Osgood 1971, 122-123; Vanstone 1974, 60; de Laguna, Reynolds, and DeArmond 1995, 201-214).[62] Numerous variants of Raven's exploit appear in the oral traditions of other indigenous North American cultures, especially the Alaska Eskimo (Nelson 1900, 483-185; Rasmussen and Ostermann 1952, 184-185) and peoples of the Pacific Northwest Coast (Birket Smith and de Laguna 1938, 251; de Laguna 1972, 796; Mackenzie 1891, 54).

While variants of this celestial origin story are widespread across the subarctic, an Upper Tanana consultant from Tetlin provided a particularly articulate summary of Raven's theft and subsequent placement of the sun, moon and stars. According to this Tetlin variant, Raven recovered the sun and moon by deception and trickery, thereby restoring light to the sky.

[62] In some narratives Raven is only credited with placing the sun, moon, or stars in the sky, while in other variants Raven places each of the celestial entities in the sky (i.e. sun, moon, and stars).

However, Raven placed just a single star in the firmament, identified as *san' choh* (big star). *San' choh* corresponds to the brightest star in the celestial vault and because of its magnitude people identify it as the first star placed by Raven.[63] In addition, *san' choh* is also known as *san' uta'* (star's father) and *san' unąą* (star's mother), regarded as the parent from which all other stars originated. Any star of lesser magnitude is identified with other kinship terminology. These stellar kinship terms are: *san' bade'* (star's older sister), *san' udia'* (star's younger sister), *san' uchil* (star's younger brother), and *san' moondąą* (star's older brother). The very dimmest stars are known as *san' ugaay* (star's baby/child) and correspond to the youngest stars in the sky. Bright stars are therefore the oldest, while dim stars are considered the youngest or most recent additions to an ever increasing population of stars.

Collectively, the stars represent a single unified family in which *san' choh* is the great ancestor. Kinship terminology applied to stars functions as a means of delineating the apparent magnitude of one star relative to others around it. A caveat is that the whole-sky humanoid constellation is said to be above the stars and not amongst them, mimicking their appearance. In other words, the Upper Tanana humanoid constellation does not belong to the stellar ancestry initiated by Raven, but arrived in or above the sky by some other means in Distant Time (Figure 4.6).

[63] *San' choh* is identified as Jupiter by Upper Tanana and Gwich'in consultants, though the linguistic record sometimes glosses *san' choh* and cognates thereof as Polaris, which is far from the brightest star /planet in the subarctic sky.

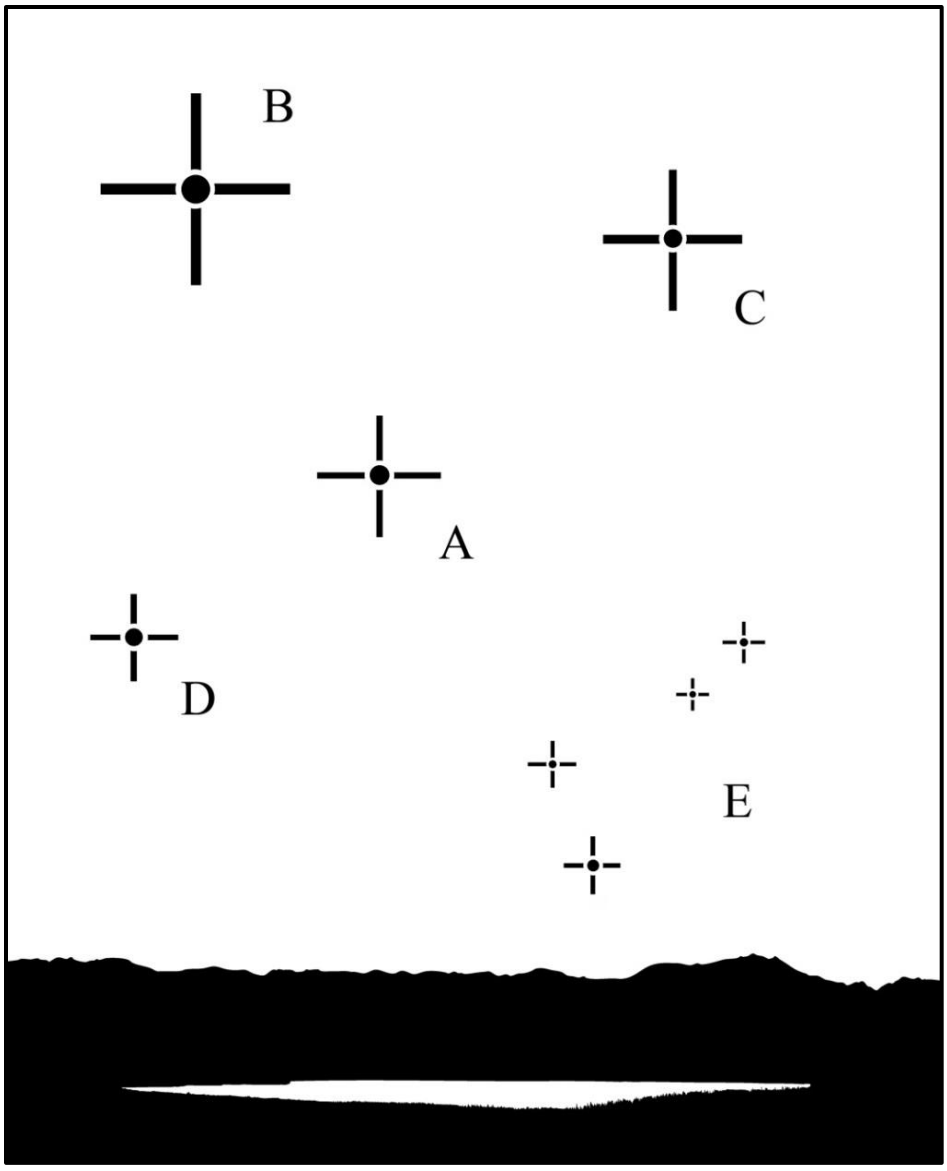

Figure 4.7. Upper Tanana kinship terminology applied to stars. Kinship terminology functions as a means of delineating the apparent magnitude of one star relative to others around it. This figure is labeled with respect to the star at position A and depicts a hypothetical arrangement of stars above the Tetlin Hills. The stars shown in this figure represent the style depicted by a consultant in his field sketch of *san' choh*. Position B = *san' choh* (big star), C = *san' bade'* (star's older sister) or *san' moondąą* (star's older brother), D = *san' udia'* (star's younger sister) or *san' uchil* (star's younger brother), and E = *san' ugaay* (star's baby/child) (Cannon 2014).

The same Upper Tanana consultant added that stars give their light to the moon, as if "charging it like a battery." This explains why relatively few stars are visible during a full moon (*ch'aldzeek choh* 'big moon'), and why stars are more prominent and numerous as the moon

wanes. Finally, during the new moon phase (*ch'aldzeek dał k'ent'eey* 'moon looks like blood') every star in the firmament is visible. However, explanations for the waning and waxing of the moon vary among Alaskan Athabascan ethnolinguistic groups.

The Upper Tanana stellar origin story also compares to Southern Athabascan narratives. Navajo oral tradition explains that a figure known as Black God created an "orderly arrangement" of the constellations by pulling stars from a leather pouch and selectively placing them in the sky (Haile 1947, 1). However, the Navajo trickster figure, Coyote, interrupted Black God's work by stealing his leather bag, and then scattered the remaining stars chaotically across the sky (Haile 1947, 1-4). In both accounts, the Athabascan trickster figure is primarily responsible for the placement or creation of stolen stars, while the arrangement of the constellations represents the work of some other figure or event.

Work with Alaska Athabascan consultants suggests that star knowledge belonged to both men and women. Table 4.6 lists the general terms for 'star' in each of the eleven recognized Alaska Athabascan languages and Proto-Athabascan.

Table 4.6. General terms for stars in each Alaska Athabascan language.

Name	Language	Source
*səm'	Proto-Athabascan	(Krauss and Leer 1981, 65)
son'	Ahtna	(Kari and Buck 1975, 88)
sin, sem, sim, sen	Dena'ina	(Kari 2007, 150)
tthen'	Deg Hit'an	(Kari 1978b, 45)
tthoon'	Holikachuck	(Kari, Alexander, and Deacon 1978, 25)
tloon'	Koyukon	(Jetté and Jones 2000, 585)
srwn', swn'	Upper Kuskokwim	(Collins and Petruska 1979, 98)
sen'	Tanana	(Krauss 1974, 31)
sén'	Tanacross	(Arnold, Thoman, and Holton 2009, 252)
san'	Upper Tanana	(Milanowski and John 1979, 96)
sän'	Han	(Ritter and Paul 1980, 74)
są'	Gwich'in	(Peter 1979, 122)

The term for star can be reconstructed to Proto-Athabascan *səm' and is regularly reflected in each of the Alaska Athabascan languages (Krauss and Leer 1981, 65).

4.4.2 Taboos, Protocols, and Other Stellar Beliefs

While the literature seldom reports the personal spiritual significance of stars in Northern Athabascan culture, some consultants stated that stars or groups of stars possess spirits.[64] Moreover, these spirits may act in a beneficent manner, or they may take retribution for inappropriate actions or behaviors exhibited by people. The concept of stellar spirits aligns with other aspects of Alaskan Athabascan spiritual philosophy as supported by Nelson's summary of the Koyukon worldview:

> From Distant Time stories, Koyukon people learn rules for proper conduct toward nature. But punishment for offenses against rules is given by powerful spirits that are part of the living, present-day world. All animals, some plants, and some inanimate things have spirits, vaguely conceptualized essences that protect the welfare of their materials counterparts (Nelson 1983, 22).

Nelson (1983, 229) added: "Humans and natural entities are involved in a constant spiritual interchange that profoundly affects human behavior. This is the crux of the Koyukon worldview, the meeting ground of humanity and nature."

In any case, discussions about the spiritual or cosmological aspects of stars are not treated casually. One Upper Tanana consultant from Tetlin explained that because of the association stars have with medicine, her mother forbid her and her siblings from ever mentioning the generic term *san'* (star). In addition, pointing to stars while calling them by name is considered an act of cursing a person:

[64] Some spiritual aspects of stars are found in Osgood (1976, 174) and John and Kari (1986, 27-29).

> Our days, we can't say *san'* [star], mom would just have a fit with us. *Įįjih* [taboo/forbidden] they say, because they make bad medicine to people. They just point [to a star] and call the name and then point to people. *San'* [star] they call, and they point to just person. I don't know, just bad thing (Cannon 2013a).

Gwich'in and Ahtna consultants also corroborated the taboo nature of discussing the transcendent properties of stars, while others claimed that star knowledge strictly belonged to shamans. Dena'ina shamans reputedly read the stars like tea leaves to foretell future events (Pete et al. 1981). The late Dena'ina elder Peter Kalifornsky (1984, 55) explained: "Whatever they [Dena'ina people] wanted to be as they were growing to adulthood, they fasted, and tried to become that. They tried to have shamanistic dreams, to speak words that would come true, and to read the stars." Upper Tanana shamans reputedly traveled to a land on the other side of the sky via a passageway aligned with the North Star (Guédon 2005, 470, 480).

Star spirits or "star people" and their associated interactions with humans are identified in Deg Hit'an (Osgood 1959, 110), Gwich'in (Osgood 1936, 155), and Dena'ina (Osgood 1976, 130) cultures. Likewise, the Navajo regard stars as powerful "holy people" (Griffin-Pierce 1992, 103, 150). The interaction of stars or star spirits with humans is also portrayed in numerous versions of a widely dispersed Northern Athabascan narrative commonly known as "Star Husband".[65] These narratives recount the abduction of two girls by stars after they point to the stellar bodies, each claiming one as its own (Osgood 1976, 130; McKennan 1965, 139-140; Rooth 1971, 314-315; Moore and Wheelock 1990, 3-6). The Star Husband narrative not only suggests a taboo against pointing or staring at stars without purpose, but has seemingly broader implications related to the origin beliefs of particular Northern Athabascan clans. The Ahtna Sky Clan, *noltsiine* 'people made descending' (Kari 1990a, 290) allegedly have a stellar ancestry

[65] The Star Husband theme is found in the oral tradition of numerous indigenous peoples of North America.

originating from "the union of a women and a Star Husband" (de Laguna, Reynolds, and DeArmond 1995, 289). Likewise, the Dena'ina Sky Clan, *nulchina* (Kari 2007, 66) originated from the abduction of a girl by a rich man from the North Star (Osgood 1976, 130). In addition, the origin beliefs of the Upper Tanana Sky Clan *naltsiina* and a sib division thereof also derive from the stars. Guédon wrote:

> *Naltsina* people are said to be 'the first ones,' the first inhabitants of the land, although not the first inhabitants of the Upper Tanana area. All informants agree on a few points: *Naltsina* came from the sky, they are sometimes called 'Star People;' the *Naltsina* are always associated with the crow . . . long time ago stars used to be close to trees. People could touch them: the sky was close to the ground. Each person had one star. They were all star people. One man, two daughters. One lady went to the village. She was offered slaves, but refused them. She started praying. She wanted more people. Other people came down like snow and became people. That's why there are *Dik'agiyu* people (Guédon 1974, 67, 70).

Naltsina/nolstseene clans also belong to the Tanacross and Koyukon social systems, respectively (Jetté and Jones 2000, 622; Arnold, Thoman, and Holton 2009, 81). The first members of Alaska Athabascan Sky Clans and some divisions thereof are usually described as floating down from the sky or stars as downy feathers (McKennan 1959, 124), snowflakes, fireweed cotton/seeds (Guédon 1974, 70), or on a spider's web (Andrews 1975, 87). In addition, members of the Upper Tanana *natltsina* clan are highly regarded for their possession of "great medicine" (Guédon 1974, 70), an Athabascan trait commonly associated with stars.

The directional motion of the sun, moon, and stars (i.e. from east to west) is also significant to Alaska Athabascan ceremonialism. During the course of fieldwork, consultants often emphasized the requirement that any formal event or activity occur in the same direction as the motion taken by celestial bodies across the sky (i.e. east to west). Examples of formal events where ceremonial direction is important include but are not limited to passing a talking stick or food, dancing at a potlatch, and the procession of pallbearers at a funeral. In Ahtna for example, the formal sunwise (east to west) direction is called *c'a'aałdze'* (Kari 1990a, 73), while the taboo direction against the path of the celestial bodies is called *sadiłgha* (Kari 1990a, 155) or *sadiłgha naadets.* Sunwise direction is also critical in Apache ceremonials (Farrer 1991, 40).

4.4.3 Humanoid Constellations in Athabascan Belief Systems

In addition to facilitating time-reckoning and navigation, humanoid constellations serve a functional role in Alaska Athabascan belief systems. While consultants from a variety of ethnolinguistic groups readily identified stars comprising humanoid constellations, I made less progress toward clarifying the identity and origin of these stellar figures. However, as a generalization, Alaska Athabascan humanoid constellations are conceptualized as: 1) human forms comprised of some animal features, and 2) they are regarded as aboriginal deities.[66]

While humanoid stellar deities are described as part of ancient aboriginal belief systems, Alaska Athabascan consultants often compare or equate humanoid constellations with the Christian concept of God. This evidence is supported by the linguistic record where contemporary usage of the Dena'ina term *naq'eltani* and the Ahtna term *nek'eltaenn* correspond to both a constellation of stars and the Christian God (Radloff and Schiefner 1874, 11; John and Kari 1986, 29). Some of the earliest documentation articulates the apparent syncretism of two

[66] Perhaps from Distant Time when animals and humans were one.

deities or belief systems. In the dictionary *Worterbuch der Kinai-sprache*, Radloff and Schiefner stated:

> When on page 11 of the dictionary under word God *nakltanē* [*naq'eltani*] is given as also meaning the constellation of the Big Bear, it has come to apply to the idea of God with the Russians. It is also called *čiatka* [*cheyakda*] 'our grandfather', who send men fish and from whom the Raven stole first in the beginning in order to give them to people (Radloff and Schiefner 1874, vi).[67]

Osgood provided additional context regarding the Dena'ina deity:[68]

> In Sheldon's brief account of the Tanaina, he says that they believed in a supreme deity called *nachritahny* [*naq'eltani*]. This (*nákdeldáni*) is the common word in use for the Christian God introduced by the Russians. It seems also, however, to be an abbreviated form of the earlier *náq'óčkdélдáni*, a native deity . . . At Kenai *náq'óčkdélдáni* is said to live in the North Star and to travel around the sky all the time. He is never visible in the daytime and only a few old people ever saw him at all. He is said to be responsible for the weather. People standing with legs outstretched appeal to him for aid, raising their arms, and asking for what they want . . . At Tyonek, *náq'óčkdélдáni* is said to embody the whole constellation of the Little Bear. When people lie down and think of *náq'óčkdélдáni* what they dream they think is real. Men appeal to him by holding up a hand and saying *kóẋt'ana yéyóni* (you who made the people), and then they ask for what they wish (Osgood 1976, 174).

[67] Translated by Cannon.
[68] Also quoted in Chapter Two.

The humanoid stellar deity *nek'eltaenn* apparently underwent a similar transformation in the Ahtna belief system. Kari and John (1986, 29) stated: "The word *Nek'eltaenn* is now translated as God, but its literal meaning is 'the one that moves above us.' According to Katie John, before the white man's arrival, this word referred to a certain constellation of stars that looks like a man." During fieldwork in 2013, an Ahtna consultant from Gulkana corroborated Katie John's statement and further explained that *nek'eltaeni* (the constellation) is a lynx or a wolverine-like man that was aboriginally revered as a beneficent figure prior to Ahtna Christianization:

> That's what they call *nekeghaltaexi.* Don't know why they call it a man, you know. . . I guess Lord, must have been . . . They don't know there was a Lord though [i.e. aboriginally]. They believe in wolverine. He's a man you know. You see sometime. Got eye and nose and mouth you know . . . star is made by that guy there . . . Everything just fit there. Must have been Lord, you know. But we don't know from beginning, you know. Only taught animal, we believe in animal [as God]. *Nek'eltaeni*, everything made by *nek'eltaeni*. We say other animals made it; no, not other animals. You know, that's the way they describe. They don't know Lord you know. *Nałtsiis* [i.e. wolverine] they say, you know. Wolverine's the only one that make it you know. *Saghani ggaay* [i.e. Raven] and *nałtsiis* (Cannon 2013b).

The depiction of an indigenous world creator in the principal Ahtna constellation suggests that stars serve a greater role in Ahtna cosmology and religion than previously described. In addition, an Ahtna consultant corroborated that *nek'eltaeni* is a taboo topic of conversation and that if a person requires this knowledge then it is explained just once.

While Dena'ina and Ahtna are apparently the only Alaska Athabascan languages that employ the same term to identify both their principal constellation and the Christian God, equivalent concepts emerge in other Athabascan ethnolinguistic groups. For example, a Tanacross consultant from Mansfield explained that the humanoid stellar figure, *neek'e'elteen* has an ancient *yaniidą'ą* story (i.e. old time story) and that people prayed to it prior to the introduction of Christian concepts. However, she explained that the old time beliefs are "all mixed up" with Christian concepts and she has never completely sorted out the different belief systems:

> *Neek'e'elteen*, I don't know. I hear they always say that. But *neek'elelteen*, right now its *wut'axdįht'eey* [i.e. their God], you know; Tanacross. Tanacross people, they say *wut'axdįht'eey*. *Neek'e'elteen*, *wut'axdįht'eey*. It's not only one village; everybody, they know. They pray for that thing. Not only Tanacross, the other people. They use their own language and they call different, that *neek'e'elteen* . . . *Dendeh shuh*, that's old people. It's not like right now. Right now is different. *Dendeh shuh*, long, way back. They don't mix up with white man; they don't mix up with white man. *Dindeh shuh*, that's Indians, old Indian. Right now white man and Indian, they all mixed up . . . If you ask them [i.e. *Dindeh shuh*/Tanacross elders], the one who know way back story, [about] white people [arriving in Alaska]. I bet you they going to straighten it out. Who's the one in Alaska and whatever they know about *neek'e'elteen* and *saa* [sun] and *ghaldzeey* [moon], that's the moon (Cannon 2014).

Gwich'in consultants described *yahdii* as a friend and a teacher, and his identity is regarded as deeply sacred personal knowledge not meant to be discussed. Consultants also

explained that "he's up there watching over us." An Upper Tanana consultant stated similarly "it [*yihdaa*] sees us." Another Gwich'in consultant mentioned that if the stars in *yahdii* become skewed or change their positions relative to one another, it indicates the world is old and near its end. Tagish Athabascans in Yukon, Canada similarly explained that when the Big Dipper turns upside down and stops rotating in the sky, then "the last day has come" (McClellan 1975, 78).

However, Alaska Athabascan humanoid constellations are not only beneficent figures. In Koyukon three separate stellar origin stories identify the humanoid constellation *noghiltale* or *nosekgheltaale* as either an "ermine shaman" or some other type of evil spirit responsible for a fatal sickness avenged by the culture hero, Raven (Nelson 1880; Jetté 1898; Brush 1985). Likewise, Mary Tyone's Upper Tanana narrative, *tsa ushaa* 'smart beaver', describes the constellation *yihdaa* as the ghost of the *che' t'iin* 'tailed people' (Tyone 1994), whom the Upper Tanana people regard as former enemies (David and Lovick 2011, 77). Other Upper Tanana consultants in Tetlin and Northway seem to associate the humanoid constellation *yihdaa* or *neek'e'eltiin* with the *stsǫǫ kelahdzeey* 'my grandmother spider' story, which takes place in a land in the sky. However, the association of the humanoid stellar figures and the grandmother spider story requires additional clarification.[69]

While terms describing humanoid constellations are highly congruent across Northern Athabascan ethnolinguistic groups, the identity and role of these stellar figures in Athabascan belief systems exhibits more variability. This variability may be explained in part by the relatively individualistic nature of Alaska Athabascan spiritualism. Vanstone stated:

> Another characteristic feature of traditional northern Athapaskan religion was its individualism. The cultures of hunting peoples must of necessity socialize individuals to a high degree of independence, since survival depends to a high

[69] See David and Lovick (2011, 118-133) for an example of an Upper Tanana *stsǫǫ kelahdzee* narrative.

> degree on individual skill. From the standpoint of religion, this meant that a great deal of emphasis was placed on individual rituals rather than on community rights (Vanstone 1974, 59).

In addition, indigenous Alaska Athabascan spirituality is seemingly more elastic than dogmatic. Concerning the relativism of Koyukon spiritual beliefs Nelson stated:

> . . . who will say of another's belief or behavior, 'That's just his way.' What works or is meaningful for one person may not for another and neither party seems troubled by it. With this in mind, individuals may test out beliefs or practices to see which ones they should follow. This is usually done only with the less spiritually powerful animals, however, or with rules of fairly minor consequence (Nelson 1983, 236).

Although less progress was made toward articulately delineating the identity and origin of humanoid constellations, these stellar deities comprise an important, yet enigmatic component of indigenous Alaska Athabascan spirituality. Variation in the identity and religious significance of humanoid constellations is likely reinforced by spiritual individualism/relativism, cultural taboos related to discussing the transcendent properties of stars, and the apparent blurring or syncretism of Christian concepts with aboriginal beliefs. Nonetheless, spiritualism associated with humanoid constellations still persists in the contemporary repertoire of Alaska Athabascan stellar knowledge.

4.5 Chapter Four Conclusion

Alaska Athabascan stellar astronomy serves four main purposes: time-reckoning, navigation, weather forecasting, and cosmology. Among these functions, time-reckoning is the most widely used. However, learning stellar time-reckoning and navigational methods requires a

significant investment in time, as they which are based on 1) observing the location of the stars in relation to the terrain in combination with 2) a memory of the different diurnal and seasonal positions of the stars. While anecdotes describing stars as time-referents (especially the Big Dipper) are moderately common among contemporary Alaska Athabascan consultants, few can explicitly describe how stars are used to determine time. The significant investment required to learn stellar navigation and time-reckoning concepts, combined with the introduction of more convenient technologies such as clocks, compasses, and global positioning systems (GPS), has contributed to the disuse and loss of traditional Athabascan stellar knowledge. Likewise, the spiritual significance of whole-sky stellar figures has been replaced or blended with other more recently introduced religious concepts.

While whole-sky humanoid constellations serve every major use of indigenous astronomy and represent systems of astronomical knowledge in themselves, few consultants today can identify these constellations, and fewer yet can articulate their function in traditional Alaska Athabascan stellar astronomy.

Conclusion

The collective knowledge presented in this thesis demonstrates that Alaska Athabascan stellar astronomy is much more detailed than previously believed and represents a fundamental component of Athabascan culture that greatly facilitates life in the subarctic.

Chapter two provides an introduction to Alaska Athabascan stellar astronomy by describing the most salient features of the Alaska Athabascan starscape, language by language. Evidence presented in chapter two demonstrates that constellation terms previously glossed as the Big Dipper actually correspond to larger humanoid constellations comprised of numerous body part asterism in at least a handful of Alaska Athabascan languages. In Alaska Gwich'in, Upper Tanana, and Ahtna these humanoid constellations span nearly the entire sky (>133°) and represent dominant features of the Alaska Athabascan starscape. Additional evidence gathered in the field and in the linguistic record suggests that large humanoid constellations of varying sizes may be common across all Alaska Athabascan languages. However, an Athabascan constellation larger than Ursa Major is not reported previously in the literature. While few constellation terms other than Ursa Major/Big Dipper have been reported previously, the identification of these terms with larger humanoid constellations (comprised of body part asterisms) provides evidence for the expected missing constellations absent from the extant documentation.

Chapter three explores how Alaska Athabascan humanoid constellations compare to other Athabascan systems of mapping the sky. Linguistic comparisons show that terms associated with Ursa Major/Big Dipper are the only widely attested constellations across the Athabascan family. However, stars named after body parts are also found throughout some Northern and Southern Athabascan languages. These comparisons suggests that a humanoid constellation comprised of

body part asterisms may be a defining linguistic and cultural feature of Northern Athabascan languages more broadly.

The use of body part terminology to delineate asterisms within a larger constellation may also have antiquity within the Athabascan family beyond the northern group. Navajo, a Southern Athabascan or Apachean culture, divides most constellations into asterisms named after body parts (Griffin-Pierce 1992, 168; Haile 1947). While Navajo does not delineate a single whole-sky constellation, at least five of the eight primary Navajo constellations depict human forms that are subdivided into body part asterisms (Griffin-Pierce 1992, 168). Many of the body part terms used to denote asterisms within Navajo constellations are the same as those found in Northern Athabascan, suggesting that the strategy of using body part asterisms may have some antiquity within the Athabascan family.

Chapter four provides examples and explanations of the major uses of stars in Alaska Athabascan cultures and articulates the functional role of whole-sky humanoid constellations. Whole-sky humanoid constellations not only map the sky with a highly mnemonic system, but they facilitate every major use of Alaska Athabascan stellar astronomy, representing systems of stellar knowledge in themselves. Alaska Athabascan astronomy is not only much richer than previously believed; it also provides evidence for a completely novel and previously undocumented way of conceptualizing the sky—one that is unique to the subarctic and uniquely adapted to northern cultures. However, it is not altogether surprising that Alaska Athabascan stellar astronomy has been overlooked by ethnographers of Alaska.

The task of documenting cultural astronomy in Alaska is complicated by recent rapid language shift, and this may partly explain previous claims regarding the paucity of astronomical knowledge in the subarctic (McKennan 1965, 73; McKennan 1959, 110; Birket Smith 1930, 78;

Nelson 1973, 184-185). Likely much indigenous knowledge of the sky has been lost in the past few decades as modern technology has replaced every aspect in which astronomy was formerly utilized. Nonetheless, it remains possible to reconstruct indigenous knowledge of the subarctic sky by combining archival research, ethnographic interviews, and an understanding of scientific astronomy. A brief recounting of my research experiences for this work serves to illustrate this point.

My interest in documenting Alaska Athabascan astronomy began in September, 2009 with a survey of the literature and archival records. Preliminary research focused on assessing the role of astronomy in each of Alaska's 20 recognized Native languages and determining the extent and depth of the existing documentation. After two years of data compilation, several patterns emerged. Primarily, I identified that 1) little data on Alaska Athabascan astronomy existed in any single source, 2) terms corresponding to the Big Dipper are the only widely attested constellations across the Northern Athabascan languages, and 3) inconsistencies in the documentation could not be resolved with archival research alone.[70] In addition, a few key archival sources identified body part terms corresponding to stars in or near the Big Dipper (Jetté 1900; Jetté 1909; Jetté 1905a; de Laguna and McClellan 1960). Taken together, this evidence suggested that I consult with Alaskan Athabascan consultants, with the goal of clarifying and possibly expanding the existing data.

In November, 2011 I conducted my first field sessions in Fort Yukon, coordinating my work with a key facilitator from the local tribal office. Just hours before my return flight back to Fairbanks I met with an expert consultant and learned that the Gwich'in constellation *yahdii* corresponds to additional stars beyond those delimited by the Big Dipper. However, due to a

[70] For example, names for particular Athabascan constellations were correlated with different groups of stars in different sources; e.g. (Kari 2007, 148) versus (Radloff and Schiefner 1874, 20).

time constraint I did not have the opportunity to directly observe the stars under the night sky and elicited only a couple asterism names, not fully grasping the extent to which *yahdii* maps the sky. However, this consultant clarified that the Big Dipper points to other named stars, but in order to document them he encouraged me to return on a clear dark night.

Motivated by the potential viability of Gwich'in stellar knowledge, I returned to Fairbanks, and my advisory committee chair and I drafted a grant proposal to document Alaskan Gwich'in astronomy knowledge. By March, 2013 I received financial support from the National Science Foundation and returned to Fort Yukon to meet with several key consultants. While discussing archival documentation on the evening of March 23, my primary consultant invited me outdoors and promptly identified each of the body part asterism within *yahdii*, formerly identified as the Big Dipper. I was impressed with the extent to which *yahdii* covered the sky, as well as the rapidity and ease with which this consultant/instructor located each of the asterisms in the night sky. Over the course of several nights we made multiple observations of the sky, and I met with a second Gwich'in consultant who independently corroborated the asterisms located within *yahdii*. Moreover, consultants demonstrated a high aptitude regarding the utility of *yahdii* in the context of time-reckoning, orientation, weather forecasting, and cosmology that suggested a potentially rich system of Athabascan stellar knowledge.

In the subsequent year and half (March 2013-September 2014), I continued to verify locations of stars within *yahdii* and obtained significant other detailed information regarding Gwich'in astronomy more broadly. Collaborative work with Gwich'in consultants in Fort Yukon not only implied a correction to the literature, but equipped me with better questions to elicit stellar information in other Northern Athabascan cultures. Experience and collaboration with consultants in Fort Yukon encouraged the expansion of my research agenda cross-culturally. In

May 2013 I began working with traditional knowledge experts in other Alaska Athabascan cultures with the primary goal of documenting Northern Athabascan systems of stellar knowledge.

Initial work in Fort Yukon was invaluable to broadening my understanding of Alaska Athabascan stellar astronomy and greatly facilitated the subsequent documentation of whole-sky humanoid constellations in the Ahtna and Upper Tanana languages. My primary Gwich'in consultant has continued this mentorship, stressing the importance of learning traditional astronomy concepts by firsthand experience on the land, as opposed to discussing them via the interview process. To date I have worked with several dozen Alaska Athabascan consultants to document a diverse range of sky related knowledge including some 60 previously undescribed star and constellation names in the Gwich'in, Ahtna, Upper Tanana, Tanacross, and Upper Kuskokwim languages (Cannon 2013a; Cannon 2013b; Cannon 2014). A cross-cultural research agenda has not only facilitated the identification of overarching themes in Northern Athabascan astronomy, but has also helped delineate those stellar concepts that may be unique or specialized to particular ethnolinguistic groups. Ruggles and Saunders (1993, 11) also corroborate the value of comparative astronomy research, stating: "Comparative studies of cultural astronomy are shown to have particular potential to bring into focus the social and political dynamics of cross-cultural interactions."

Alaska Athabascan stellar concepts have been largely ignored if not misinterpreted by ethnographers of Alaska. The failure of ethnographers to detect Athabascan stellar concepts likely owes to 1) specialized knowledge required to document cultural astronomy, 2) conducting fieldwork during summer months, 3) ethnocentric biases, 4) cultural taboos associated with discussing spiritual aspects of stars, and 5) the apparent reduction of large indigenous humanoid

constellations to fit the Western paradigm, Big Dipper. While my documentation no doubt has errors of its own, several illuminating experiences confirm the relative importance of minimizing ethnocentric bias in the documentation of cultural knowledge, especially regarding indigenous folk-categories. Ruggles and Saunders (1993, 8) explained: "Indigenous folk-categories are not necessarily predictable in the Linnaean sense, either in their meaning or their ordering, but they may nonetheless be methodically established in their own terms and exhibit a greater or lesser correspondence with Western scientific categories." As this research has shown, a variety of Alaska Athabascan terms previously glossed as the Big Dipper actually reference much larger groups of stars. Identifying this single major discrepancy proved the deciding factor between documenting an extremely detailed system of stellar knowledge, versus confirming or accepting the status quo perspective of the Big Dipper.

In several instances Athabascans use of Western colloquialisms such as 'Little Dipper' and 'morning star' refer to completely different groups of stars than conceptualized in Western astronomy. For example, Alaska Athabascan consultants consistently, if not always referred the Pleiades (i.e. Seven Sisters) as the 'Little Dipper'. This designation directly contrasts with the Western conceptualization, which associates the 'Little Dipper' with the circumpolar constellation Ursa Minor (i.e. Little Bear). Similarly, in Western astronomy the 'morning star' refers to the morning appearance of Venus; yet consultants generally used the term 'morning star(s)' to identify one or more stars in the classical constellation Aquila. The 'morning star' discrepancy has been overlooked if not misinterpreted in the linguistic record, as dictionaries of Alaska Athabascan languages frequently gloss these star names with the vague and generally unqualified term 'morning star' (Kari 2007, 150; 1990a, 169, 230, 330; Collins and Petruska 1979, 98; Tuttle 2009, 137; Krauss 1974, 31; Tenenbaum 1975, 67). The unqualified use of

colloquialisms such as 'Little Dipper' and 'morning star' are not only vague in an Alaska Athabascan context, but hinder the ability to recover cultural astronomy knowledge from archival sources. While the presence of constellation names in Athabascan dictionaries attests to linguists' attention to lexicographic detail, the lack of astronomical identification reveals the relatively low importance's placed on cultural astronomy. However, I am not suggesting that linguistic sources were not invaluable to my understanding and documentation of Alaska Athabascan stellar astronomy.[71] In fact, star names found in the literature often contributed to the elicitation of additional stellar knowledge, even when these terms were minimally glossed as "a constellation".

While this research has described the names, locations, and uses of numerous Alaska Athabascan stars, certain aspects of stellar astronomy were not addressed in significant detail. In particular, I have devoted little attention to describing star lore, yet the literature and archival record provide a variety of examples of Alaska Athabascan star lore (Nelson and Vanstone 1978, 56-58; Tyone 1994; McKennan 1965, 73; Brush 1985; Jetté 1898; Ellanna and Balluta 1992, 99; Rooth 1971, 91-92). In addition, I gave some of the less widely attested constellations little if any attention in this thesis; yet these smaller groups exhibits some of the unique stellar innovations of specific Northern Athabascan cultures.[72]

It should also be taken into consideration that my knowledge of Athabascan astronomy may be considered rudimentary from the standpoint of my most expert consultants, as I still have much to learn and understand. Additional work regarding the identity and origin of Alaska Athabascan humanoid constellations represents a significant area for future research that would greatly enhance the existing documentation. Likewise, additional documentation of

[71] The three most cited sources in this thesis are dictionaries of Alaska Athabascan languages; (Jetté and Jones 2000; Kari 2007; Kari 1990a).
[72] All star and constellation names encountered during this research are listed in Appendix A.

stars/constellations and their associated functions should be continued in future research to better facilitate astronomy comparisons within and across cultures.

Moreover, Northern Athabascan astronomy encompasses much more than stellar knowledge. Alaska Athabascans makes use of a diverse range of objects and phenomena in the sky including, atmospheric halos and parhelia, rainbows, the aurora borealis, meteors/shooting stars, comets, the sun, moon, eclipses, the magnitude of daylight and darkness, the color of the sky, thunder and lightning, and of course stars, planets, and constellations. While astronomical knowledge has been systematically investigated in other arctic cultures (e.g. Eastern Canadian Inuit; see (MacDonald 1998)), the holistic treatment of Alaska Athabascan astronomy represents a significant area for future research.

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Appendix A

Alaska Athabascan star and constellation names

This appendix includes each of the Alaska Athabascan star and constellation terms encountered in this research, arranged by language. This catalogue may serve as a finding aid for Alaska Athabascan constellations terms scattered throughout numerous published and archival sources. While some of the terms from archival sources (such as fieldnotes) received editorial corrections by the authors at a later date or in a final published source (such as dictionaries), I have attempted to include each term as found in its respective source. However, I have taken the editorial liberty to group variations of similar terms together to expedite comparisons, and in some cases I have added translations of the terms. In other cases I have made footnotes for additional clarification. In most cases, however, the terms appear exactly as found in their respected sources. Brackets [ ] appearing next to a star term indicate a modern spelling of the same term. Brackets appearing next to the citation indicate the dialect or community where the speaker that provided the term was from. An em dash indicates that the term was spelled exactly as the previous term or phrase, but was glossed differently. An indentation indicates that the term is an asterism of the preceding constellation. Asterisms are the only terms that are indented. Alaska Athabascan languages are separated by a solid horizontal line.

Ahtna

Large Humanoid Constellations & Ursa Major (Big Dipper)

nek'e nekeghaltaexi: 'that which moves in a circle following us', a whole-sky humanoid constellation comprised of the body part asterisms listed below [Tazlina & Gulkana] (Cannon 2013b)

———. a constellation around the Big Dipper [Central & Lower dialects] (Kari and Buck 1975, 88)

———. 'that which turns in a circle over us', a constellation of stars [Central & Lower dialects] (Kari 1990a, 330)

uce': 'its tail', Big Dipper; an asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

kuzuun ts'ene ula': 'its right hand', Pleiades; an asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

tl'asts'en ula': 'its left hand', an unidentified asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

kuzuun ts'ene uke': 'its right foot', α Lyr (Vega), β Lyr (Sheliak), γ Lyr (Sulafat); an asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

tl'asts'en uke': 'its left foot', α Boo (Arcturus), η Boo (Muphrid); an asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

bentsiis: 'its nose', three unidentified bright stars in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

kuzuun ts'ene udzaghe': 'its right ear', an unidentified asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

tl'asts'en udzaghe': 'its left ear', an unidentified asterism in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

unaegge': 'its eyes', an unidentified asterism of two stars in *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

udzedze': its kidney', an unidentified star near the cup of the Big Dipper in the constellation *nek'e nekeghaltaexi* or *nek'eltaeni* [Tazlina & Gulkana] (Cannon 2013b)

nakxlx tēnē: Ursa Major (Radloff and Schiefner 1874, 6)

nek'eltaeni or **nek'eltaenn**: 'that which moves following us', a whole-sky humanoid constellation comprised of the same body part asterisms listed under *nek'e nekeghaltaexi*; also the name for God [Tazlina & Gulkana] (Cannon 2013b)

———. a constellation around Big Dipper; God [Mentasta-Batzulnetas dialect] (Kari and Buck 1975, 88, 169)

———. 'the one that moves above us', a constellation that looks like a man; God [Mentasta-Batzulnetas dialect] (John and Kari 1986, 29)

c'ece': '*something's tail*', Big Dipper; presumably an asterism in *nek'eltaenn* [Mentasta-Batzulnetas dialect] (Kari and Buck 1975, 88; Kari 1990a, 112)

excịē: Ursa Major (Radloff and Schiefner 1874, 6)

c'entl'aa dezdlaay: 'that which is placed/extends on something's rear', two stars together; presumably an asterism in *nek'eltaenn* [Mentasta-Batzulnetas dialect] (Kari and Buck 1975, 88)

c'elak'aedi: 'something's hand/palm cavity', Polaris; presumably an asterism in *nek'eltaenn* (Kari 1990a, 254)

kelakaedih: Polaris; presumably an asterism in *nek'eltaenn* [Copper Center] (Shinen 1958, 14)

c'etutiil: 'something's cup', four stars together; presumably an asterism in *nek'eltaenn* [Mentasta-Batzulnetas dialect] (Kari and Buck 1975, 88; Kari 1990a, 598)

nekena c'uyaaxi: 'he goes/walks around', a circumpolar constellation that resembles a fox (de Laguna and McClellan 1960)[73]

uce': 'its tail', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

son' ggaay: 'small little stars', an unidentified asterism in the tail of *nekena c'uyaaxi* (de Laguna and McClellan 1960)[74]

uk'ay' c'elode: 'its femur head' an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

uk'aye: 'its pelvis', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

udzedze': 'its kidney', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

ucez'aani: 'its heart', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

udzage': 'its ear', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

bentsiis: 'its nose', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

ula'k'aedi: 'its palm of hand, of foot', an unidentified asterism in *nekena c'uyaaxi* (de Laguna and McClellan 1960)

[73] Constellation and asterisms terms in de Laguna and McClellan (1960) are standardized to modern orthography
[74] This asterism term is derived based on the English name provided "small little stars" (de Laguna and McClellan 1960).

utse': 'its head', an unidentified asterism (de Laguna and McClellan 1960)

uggaan': 'its arm', an unidentified asterism (de Laguna and McClellan 1960)

Milky Way Galaxy

ciił hwyaa yates ghilyaa: 'smart boy stepped over the sky', Milky Way galaxy [Gulkana] (Cannon 2013b)

Moon's Dog - Star(s) near the Moon

son' ucii saadetse'e': 'the tip of it (star) is moving', when a particular star/planet (Jupiter?) is positioned behind the moon; means cold weather [Gulkana] (Cannon 2013b)

uts'edae': 'its blanket', when a particular star/planet (Jupiter?) is positioned ahead of the moon; means warm weather [Gulkana] (Cannon 2013b)

Morning Star(s)

son' kadghiłdza: αAql (Altair) as morning star [Gulkana] (Cannon 2013b)

son' yikaas k'edghiłzaxi: an unidentified morning star (Kari 1990a, 169)

yikaas k'edełdzaxi: an unidentified morning star [Central & Lower dialects] (Kari and Buck 1975, 88)

yikaas k'eghaltaen: an unidentified morning star [Mentasta-Batzulnetas dialect] (Kari and Buck 1975, 88; Kari 1990a, 230, 330)

Dena'ina

Ursa Major (Big Dipper)

nakltanē [*naq'eltani*]: 'that which moves over us', Ursa Major, God (Radloff and Schiefner 1874, VI, 11)

naktaltani [*naq'deltani*]: Ursa Major, God (Radloff and Schiefner 1874, 11)

naḱ teltaáne [*naq'deltani*]: Ursa Major, God (Radloff and Schiefner 1874, 11)

nakxtḍiltane [*naq'deltani*]: Ursa Major, God (Radloff and Schiefner 1874, 11)

yuq'eltani: 'the one over the sky', bear constellation [Ursa Major], and bear constellation spirit [Upper Cook Inlet dialect] (Kari 1973, 61; 1977a, 136; 2007, 148, 309)

———. Ursa Major with Polaris [Upper Cook Inlet dialect] (Kari 1976c, 25, 55)

———. a big bodied animal constellation [Upper Cook Inlet dialect] (Pete et al. 1981)

kala q'edi: 'the one on the tail', an unidentified constellation; presumably an asterism in *yuq'eltani* [Upper Cook Inlet dialect] (Kari 1976c, 26; 2007, 148)

belaq'a q'edi: 'the one on the palm', an unidentified constellation; presumably an asterism in *yuq'eltani* [Upper Cook Inlet dialect] (Kari 1976c, 26; 2007, 148)

bejech'a: 'its kidney', an unidentified star; presumably an asterism in *yuq'eltani* [Upper Cook Inlet dialect] (Kari 2007, 148)

bedzets'a: an unidentified star; presumably an asterism in *yuq'eltani* [Upper Cook Inlet dialect] (Kari 1976c, 25; 1977a, 137)

k'tsikiq'edi: 'the one on the top of the head', an unidentified constellation; presumably an asterism in *yuq'eltani* [Upper Cook Inlet dialect] (Kari 1976c, 26; 2007, 148)

beghuni tsuts'elyasi: a clump of stars (Kari 1976c, 129)[75]

beghu nuchich'elyashi: 'one we repeatedly dream by', Big Dipper; used as clock (Kari 1977a, 136; 2007, 148)

beghuni tsits'elyasi: Big Dipper (Kari 1976c, 126)

beghunu tsich'elyashi: a star (Kari 1976b, 23)

beghu nutsits' k'nelyashi: Big Dipper (Kari 1976b, 177)

beghuya nugheghał: 'carrying his/her children', Big Dipper (Kari 1976c, 25)

čiatka [*cheyatda*]: 'our grandfather', Ursa Major (Radloff and Schiefner 1874, VI)

naa'yidehch' niqaghuqesi: Big Dipper (Kari 1974b, 82)

naqaghuqesi: Big Dipper, used as clock [Outer Cook Inlet dialect] (Kari 1976b, 177; 1977a, 136; 2007, 148)[76]

naqaghelbesi: a constellation (Kari 1974a, 117)

[75] This term and variation thereof are more likely associated with the Pleiades, which Athabascan speakers often refer to as the "Dipper" or 'Little Dipper'.
[76] Staffeif and Petroff (1885, 133) identify this constellation as the Pleiades.

naq'ech' niqahdghuqesi: 'one that turns over us', Big Dipper, used as clock (Tenenbaum 1973, 92; 1975, 67; Kari 1975, 117; 1976b, 13; 1977a, 136; 2007, 148; Wassillie, Kari, and Boffa 1979, 29)

niłq'eytl'udelyut: 'following each other', Big Dipper [Upper Cook Inlet dialect] (Kari 1976c, 129; 1977a, 136; 2007, 148)

Ursa Minor (Little Dipper)[77]

náq'óčkdéldáni: Ursa Minor or Polaris; a native deity [Tyonek & Kenai] (Osgood 1976, 174)

nenlayi: Little Dipper (Kari 1987, 8)

nindlay or **ninlay**: 'objects extend', Little Dipper; used as clock [Inland & Illiamna dialects] (Tenenbaum 1973, 93; Kari 1976b, 13; 1977a, 136; 2007, 148)

nindlayi: Little Dipper [Inland dialect] (Tenenbaum 1975, 67; Wassillie, Kari, and Boffa 1979, 29; Kari 1987, 8)

nyila'i: 'objects extend', Little Dipper, used as a clock [Upper Cook Inlet dialect] (Kari 1976c, 14; 1977a, 136; 2007, 148)

udunuyultali: 'the one he is carrying back in', Jesus' ghost; Little Dipper [Upper Cook Inlet dialect] (Kari 1976c, 59; 2007, 148)

unudu yultali: a constellation (Kari 1977a, 137)

yelay: 'objects extend', Little Dipper, used as clock [Upper Cook Inlet dialect] (Kari 1976b, 23; 1977a, 136; 2007, 148)

Milky Way Galaxy[78]

chulyin tusghiyu: 'Raven went through pass', an unidentified constellation [Inland Dialect] (Kari 2007, 148)

chulyin veq': 'Raven tracks', an unidentified constellation (Kari 2007, 148)

chuntałen: 'excrement current', Milky Way [Inland dialect] (Kari 1977a, 136)

jun tałen: 'dark current', Milky Way [Inland dialect] (Kari 2007, 148)

[77] Some of the terms glossed as 'Little Dipper' terms may actually correspond to the Pleiades.
[78] While some of the terms listed under this heading are glossed as unidentified constellations, they are probably names for the Milky Way Galaxy.

k'uzhaghałen naq'tusgheyu: '*k'uzghałen's* tracks over us', Milky Way [Nondalton] (1973, 67; Tenenbaum 1975)

k'uzhaghałen ten: 'trail of [*kuszghałen*] the one packing his nephew', Milky Way [Nondalton] (Kari 1976b, 13; 2007, 148)

k'uzhaghałen tinituna: Milky Way [Inland dialect] (Wassillie, Kari, and Boffa 1979, 63)

yuq' niyunen beq': 'tracks of one that walked in the sky', Milky Way [Outer Cook Inlet dialect] (Kari 1973, 61; 2007, 148)

yuq' qitgguy: 'white patch in the sky', Milky Way [Upper Cook Inlet dialect] (Kari 1976c, 59; 2007, 148)

yubugh tayqan: 'one who paddled around the world', an unidentified constellation; traveler/navigator figure in Milky Way [Upper Cook Inlet dialect] (Kari 1976b, 14; 2007, 148, 310)

Morning Star(s)

beq'a nelqun: an unidentified morning star [Outer Cook Inlet dialect] (Kari 1974a, 117; 1976b, 177)

beq'en yełquy: an unidentified morning star [Inland & Upper Inlet dialects] (Kari 1976b, 13; 1976c, 25; 1977a, 137)

beq' nelquyi: an unidentified morning star (Kari 1977a, 137)

bükanělke: an unidentified morning star (Petroff and Staffeief 1885, 133)

q'ut'unteh hu'uhi: 'one coming up in morning', unidentified morning star(s) [Upper Cook Inlet dialect] (Kari 2007, 150)

veq'enuyełquyi: 'daylight is upon it', unidentified morning star(s) [Inland dialect] (Kari 2007, 150)

veq'enyełqu'i: 'daylight is upon it', unidentified morning star(s) [Inland dialect] (Kari 2007, 150)

veq'enyiłqu'i: an unidentified morning star [Inland dialect] (Tenenbaum 1975, 67; Wassillie, Kari, and Boffa 1979, 95)

veq'enyełquy: an unidentified morning star (Kari 1976b, 23)

Evening Star(s)

beł tak'e'ushi: 'with it goes into water', unidentified evening star(s) [Outer Cook Inlet dialect] (Kari 1977a, 137; 2007, 150)

dałnut'i: 'the shiny one', unidentified evening star(s) [Upper Cook Inlet & Inland dialects] (Kari 1976b, 13; 1977a, 137; 2007, 150)

hełch' ghe'uli: **an** unidentified evening star(s) (Kari 2007, 150)

hełch'i sem: 'evening star', North Star and evening star [Nondalton] (Tenenbaum 1975, 67; Wassillie, Kari, and Boffa 1979, 95; 2007, 150)[79]

hełch'teh qe'uhi: 'the one moving in evening', unidentified evening star(s) [Inland dialect] (Kari 1977a, 137; 2007, 150)

Moon's Dog - Bright Star(s) near the Moon

gheljay ch'naqa: 'the moon's children', stars near moon; also a square-shaped constellation [Upper Inlet dialect] (Kari 2007, 150)

gheljay ts'naqa: 'the moon's children', a square-shaped constellation [Upper Cook Inlet dialect] (Kari 1976c, 59; 1977a, 137)

gheljayi lik'a: 'moon's dog', big star near the moon [Nondalton] (Tenenbaum 1973, 93; 1975, 67)

Orion's Belt

kutlilxhal kuken: Orion's Belt (Radloff and Schiefner 1874, III)

Pleiades

čitalčini: Pleiades, the tail of Ursa Major [*nakxtḍiltane*?] (Radloff and Schiefner 1874, III)

nhilla: Pleiades (Radloff and Schiefner 1874, 20)

nakaqüksaie [*nagaghuqesi*]: Pleiades (Petroff and Staffeief 1885, 133)[80]

Polaris (North Star)

beghu k'eghztuni: North Star [Outer Cook Inlet dialect] (Kari 1977a, 137; 2007, 150)

[79] While this term literally translates as 'evening star' Tenenbaum (1975, 67) and Wasillie (1979, 95) gloss it as both 'North Star' and 'evening star'; Kari (2007, 150) just has as 'evening star(s)'.
[80] Handwriting in manuscript is difficult to read.

hełch'i sem: 'evening star', North Star and evening star [Inland dialect] (Tenenbaum 1975, 67; Wassillie, Kari, and Boffa 1979, 95)

k'tsik'q'e dałtuni: 'the one on top', North Star [Upper Cook Inlet dialect] (Kari 1976c, 126; 2007, 150)

naq'ets' z'uni: 'the one over us', North Star [Lime Village] (Kari 1976c, 140; 1977a, 137; 2007, 150)

ts'ideq daztuni: 'the one straight up', North Star [Outer Cook Inlet dialect] (Kari 1977a, 137; 2007, 150)

yuq' ts'itayanq' zuni: 'one in the center of the sky', North Star [Nondalton] (Kari 1975, 117; 2007, 150)

Deg Hit'an

Ursa Major (Big Dipper)

vighun' xidiłt'ay: 'according to it', Big Dipper [Yukon dialect] (Kari 1977b, 81; 1978b, 45)

voû-qáihlt-ái: 'the governor (of the universe)', the Big Dipper (Chapman 1911)

yekhtsye: Ursa Major (Zagoskin and Michael 1967, 309)[81]

Morning Star

dakawiyokoixałni: 'lifting up of the daylight', an unidentified morning star [Anvik-Shageluk dialect] (Osgood 1959, 183)

diq viyoqoyh iłney: an unidentified morning star (Kari 1976a, 17)

tritr viq'alniq: an unidentified morning star (Kari 1976a, 17)

Evening Star

ç̣e·nčoxden'a: 'star big doll', Evening Star Man; presumably an unidentified evening star [Anvik-Shageluk dialect] (Osgood 1959, 181)

wiyiłnaʔałɣal: 'start the dark', Evening Star Man; presumably an unidentified evening star [Anvik-Shageluk dialect] (Osgood 1959, 181)

[81] Possibly *yuxgitsiy* 'Raven' or 'grandfather'.

Polaris (North Star)

tthen' chux: 'big star', North Star (Kari 1977b, 61)

Taurus

tçĕn' tcoq vŏ'qŏyo' ṫroqaiʃtû'xû: the star αTau (Aldebaran) (Chapman 1911)

Unidentified Constellations

tcĕn' tcoq vŏq'ŏyo' ĥiz-sīn': an unidentified white star (Chapman 1911)

Holikachuk

Ursa Major (Big Dipper)

magha t'inixin'ney: Big Dipper [Grayling] (Kari, Alexander, and Deacon 1978, 25; Kari 1999, 21)

moghot t'inixin'ney: Big Dipper [Grayling] (Kari 1977c, 61)

Moon's Dog - Bright Star(s) near the Moon

dałt'ol mileg: 'moon's dog', star near moon [Grayling] (Kari 1977c, 54; 1999, 16; Kari, Alexander, and Deacon 1978, 25)

Unidentified Constellations

gizik: 'body of fish trap', constellation with seven stars [Grayling] (Kari 1977c, 54; 1999, 38; Kari, Alexander, and Deacon 1978, 25)[82]

gi'ot: constellation with six stars [Grayling] (Kari 1977c, 54; 1999, 3; Kari, Alexander, and Deacon 1978, 25)

Koyukon

Humanoid Constellation & Ursa Major (Big Dipper)

naraltale: Ursa Major, Big Dipper. [North and Upper dialects] (Jetté 1905a)

na-ralę̣tāle: 'the (living thing) which is carried around', Ursa Major, the Big Dipper [Upper dialect] (Jetté 1898; 1900; 1909; Sullivan 1942, 59)

[82] C.f. the Central Alaskan Yup'ik constellation *tuluyat* 'fish traps', identified as the constellation Boötes (Jacobson 2012, 609).

nághəl táli: Big Dipper [Stevens Village] (Benveniste 1953, 12)

naagheltaale: 'that (animate) which is revolving', Ursa Major, the Big Dipper (Jetté and Jones 2000, 500)[83]

metlee': 'its head', the star η UMa (Alkaid) in Ursa Major/Big Dipper; an asterism in *naagheltaale/segheltaale* (Jetté 1905a)

metl'o: 'its behind/buttocks', the stars α UMa (Dubhe) and β UMa (Merak) in Ursa Major/Big Dipper; an asterism in *naagheltaale/segheltaale* (Jetté 1905a; 1905b, 48)

nagheltaale melo' or **sekgheltaale melo'**: '*nagheltaale's/segheltaale's hand',* α UMi (North Star/Polaris); an asterism in *naagheltaale/segheltaale* (Jetté 1905a)

k'ehʉdetlgets: 'crooked/humped', the star ζ UMa (Mizar) in the handle of the Big Dipper; an asterism in *naagheltaale/segheltaale* (Jetté 1898)

meggontekk'et: 'its space between its arms', presumably another name for the star ζ UMa (Mizar) in the handle of the Big Dipper; an asterism in *naagheltaale/segheltaale* (Jetté 1898)

metl'ene: 'its legs', the minor stars in front of the Big Dipper's Pointers; an asterism in *naagheltaale/segheltaale* (Jetté 1900; Jetté and Jones 2000, 500)[84]

nosekgheltaale: 'that which is revolving its body' Ursa Major, the Big Dipper (Brush 1985; Jetté and Jones 2000, 500, 733)

nosikghaltaala: 'it rotates its body', Ursa Major, the Big Dipper (Nelson 1983, 39)

no-sek-raletale: 'the body carried around', Ursa Major, the Big Dipper (Jetté 1905a; 1909)

sekgheltaale: 'that which revolves its body', Ursa Major, the Big Dipper [Lower dialect] (Jetté and Jones 2000, 733)

sekeraldale: Ursa Major, the Big Dipper (Jetté 1905a)

sek-ralę̣tāle: 'the body carried', Ursa Major, the Big Dipper [Lower dialect] (Jetté 1900; 1905b; 1909)

[83] The following asterism terms have been standardized using contemporary Koyukon orthography. The same asterism terms also correspond to the synonymous constellation ***s**ekgheltaale.*

[84] This asterism term is derived, based on Jetté's (1900) description that "the legs are formed by the minor stars in front of the pointers."

bogho nohʉdolele: ‘according to it the year is measured’, Big Dipper, the constellation Ursa Major [Upper dialect] (Jetté and Jones 2000, 398)

mo-rō-no-rodōlele: ‘the thing according to which time goes’, Ursa Major, or the Big Dipper (Jetté 1900; 1905a; 1905b, 48; 1909)

mo-rō-no-roletaiye: Ursa Major, or the Big Dipper [Lower dialect] (Jetté 1900)

tɬ’eeyegge hʉt’aane k’esaasee’: ‘the natives clock’, Ursa Major, the Big Dipper (Jetté and Jones 2000, 500)

tɬiyéka rotna ke sasi'i: ‘the clock of the aborigines’, Ursa Major, the Big Dipper (Jetté 1900; 1905a; 1909)

kɬeyeka rotana ke sasie: ‘the natives’ clock’, the small star Alcor in the tail of Ursa Major (Jetté 1905a)

saasee: clock, wristwatch, the Big Dipper (Jetté and Jones 2000, 725)[85]

Aquila (Morning Stars)

yokkolaaye: ‘it leads the light into day’, αAgl (Altair) and γAql (Tarazed) in constellation Aquila (Moses and Jones 1989; Jetté and Jones 2000, 696)

yokolaīha: ‘it leads the light into day’, αAgl (Altair) and γAql (Tarazed) in constellation Aquila (Jetté 1905a; 1909)

yokolāya: ‘it leads the light into day’, αAgl (Altair) and γAql (Tarazed) in constellation Aquila (Jetté 1905a)

yŏkŏlāiya: ‘it leads the light into day’, αAgl (Altair) and γAql (Tarazed) in constellation Aquila (Jetté 1900)

yo yekkoyh gho deɬt’oye: ‘that which customarily shines along the northern lights’, unidentified morning star(s) (Jetté and Jones 2000, 550)

Evening Star

tsegheɬ k’ots’e deteɬt’oye: ‘that which customarily shines ahead/opposite the darkness’, an unidentified evening star (Jetté and Jones 2000, 234, 550)

Cassiopeia

detsey kk’aatl’o neenaa’edoye: ‘the one that comes back in his grandfather’s place’, the constellation Cassiopeia. “Alludes to the fact that Cassiopeia in the diurnal motion

[85] Loanword from Russian *chasý* ‘o’clock, clocks, watches’ (Jetté and Jones 2000, 725).

of the heavens comes to the place where Ursa Major has been some hours before. This latter (*na'raletale* [*naagheltale*]) being the grandfather of Cassiopeia" (Jetté and Jones 2000, 637)

tế-tsi-katlo-nẹ-na-aṭ'oiye: the constellation Cassiopeia (Jetté 1900; 1905a)

tế-tsi-yar-nẹ-na-aṭ'oiye: the constellation Cassiopeia (Jetté 1900; 1905a; 1909)

Ursa Major (Big Dipper) & Cassiopeia Combined

nił taká sek raletalé: Cassiopeia (*detsey kk'aatl'o neenaa'edoye*) and the Big Dipper (*sekgheltaale*) together (Jetté 1905a)

Milky Way Galaxy

yuhtseeyh yo teł oyh hu: 'where your grandfather (Raven) snowshoed over the sky', the Milky Way galaxy [Lower dialect] (Jetté and Jones 2000, 637)

Moon's Dog

dołt'ol leege: 'the moon's dog', any star in close proximity to the moon (Jetté and Jones 2000, 550)

dołtol le'ka: 'moon dog', a star near the moon (Jetté 1905a)

so leege': 'sun's/moon's dog', any star in close proximity to the moon (Jetté and Jones 2000, 388)

so leka: 'sun's/moon's dog', any star in close proximity to the moon (Jetté 1905a; 1911, 249)

Orion's Belt

k'enodele: 'those that are following something', the three stars of Orion's Belt (Jetté and Jones 2000, 118, 411)

kenodele: 'the ones that go', the three stars of Orion's Belt (Jetté 1900; 1905a; 1909)

yokk'e tok'enodele: 'the travelers upon the sky', the three stars of Orion's Belt; the explanatory form of **k'enodele** (Jetté and Jones 2000, 118)[86]

yō kato kenodele: the three stars of Orion's Belt (Jetté 1900; 1905a)

[86] C.f. the Inupiaq constellation *ta-rout-san* 'the travelers', the three stars in the belt of Orion (Maguire and Bockstoce 1988, 351).

neneełtelyaaye: ‘those that move with each other, travel together,’ male and female bears staying together during the mating season in the spring; the three stars of Orion’s Belt, usually called **k’enodele** [Lower dialect] (Jetté and Jones 2000, 411)

ne-nił-teleyaih’e: ‘those that move with each other, travel together,’ the three stars of Orion’s Belt [Lower dialect] (Jetté 1905a)

ne-nił teleyaitie: ‘those that move with each other, travel together,’ the three stars of Orion’s Belt [Upper dialect] (Jetté 1905a)

Pleiades

ghededzuyhdle: ‘those multiple objects which are moving along’, the Pleiades; refers to a multitude of small objects, ‘the many things thrown or placed’ (Moses and Jones 1989; Jetté and Jones 2000, 178)

radedzuihtle: ‘the group of small ones’, the Pleiades (Jetté 1905a; 1909)

rădędzŭixtłe: ‘the many things thrown or places’, the Pleiades, refers to a multitude of small objects (Jetté 1900)

Unidentified Constellations

hełdlekeł: ‘he’s wearing a belt’, an unidentified star (Moses and Jones 1989)

Upper Kuskokwim

Ursa Major (Big Dipper)

noghiltale: ‘that (animate) which moves back & forth’, Big Dipper (Deaphon 1977; Collins and Petruska 1979, 98; Esai and Kibrik 2001; Cannon 2013b; 2014)

Moon’s Dog

diłech’a dodeltan: ‘driving the dogs’, an unidentified star/planet (Jupiter?) positioned ahead of the moon’s east to west direction of travel; a sign of snow (Cannon 2013b)

Morning Star

mihoyołkole: an unidentified morning star (Collins and Petruska 1979, 98)

Pleiades

midzish ‘caribou’, Pleiades (Deaphon 1977; Esai and Kibrik 2001; Cannon 2013b)

Unidentified Constellations

An unidentified constellation comprised of two bright stars was described as two brothers in pursuit of the Pleiades or *midzish* 'caribou' (Deaphon 1977; Esai and Kibrik 2001; Cannon 2013b)[87]

Lower Tanana

Ursa Major (Big Dipper)

nogheyoli: 'the one that walks around', Big Dipper (Kari 1994, 333; Tuttle 2009, 22)

———. two unidentified stars that go around [Minto] (Kari 1991b)

nogheeyolee: Big Dipper [Minto & Nenana] (Krauss 1974, 31)

nogheyolee: Big Dipper (Kari 1990c)

noghiyoli: Big Dipper (Kari and Krauss 1994, 19)

bachade'oyi: 'ladle', Big Dipper [Minto] (Kari 1991b; Tuttle 2009, 22)

becha' xulani: 'ladle', Big Dipper (Kari 1991b)

ten-nā-gā-chet-thun: Big Dipper (Wickersham 1903, 9)[88]

Moon's Dog

deleege' nottha nee'eeltaanh: 'it puts its dog ahead of itself', a unidentified star in front of the moon/sun; sign of cold weather [Minto] (Jones 1988)

Morning Star

bek'wghw yiłkoyi: an unidentified morning star (Kari 1994, 155)

bek'wghw yełko'i: a star; presumably an unidentified morning star (Kari 1991b)

bek'eghw yiłkoyi: an unidentified morning star (Charlie, John, and Kari 1991, 11)

bek'eghw yełkoyi: an unidentified morning star (Kari and Krauss 1994, 19)

bek'oghuyełko'ee: an unidentified morning star [Minto & Nenana] (Krauss 1974, 31)

bek'at xwyełko'i: a star; presumably an unidentified morning star (Kari 1991b)

[87] Jenness (1934, 138-143) similarly describes the Pleiades as a group of caribou pursued by brothers in a Carrier Athabascan narrative.
[88] This term may have something to do with a man's tail *denacha'*.

sen' dołt'oli: an unidentified morning star [Minto] (Kari 1994, 256, 346; Tuttle 2009, 137, 195)

tsagheeł k'adełt'e'e: 'one that keeps it dark', an unidentified morning star [Salcha] (Tuttle 1991, 25, 49)

Evening Star

bek'eghw ełghali: an unidentified evening star (Charlie, John, and Kari 1991, 12; Kari 1994, 124; Kari and Krauss 1994, 19)

bek'ughu' ełghalee: Evening Star (Krauss 1974, 31)

bek'wghw ełghali: Star [Peter John] (Kari 1991b)

Polaris (North Star)

nor-ḱ-yaw-le [*nogheyoli*?]: North Star (Wickersham 1903, 9)

Tanacross

Large Humanoid Constellations & Ursa Major (Big Dipper)

neek'e'elteen: 'that which moves following us', an unidentified humanoid constellation described as a "long man" now synonymous with the Christian God **wut'axdi̱ht'eey** (Cannon 2014).

k'eltah: Big Dipper (Arnold, Thoman, and Holton 2009, 58)

k'eltaa: Big Dipper (Brean and Leer 1990, 31)

ełd,a,a: Big Dipper and North Star; Indian clock (Mishler and Simeone 2012)

Upper Tanana

Large Humanoid Constellations & Ursa Major (Big Dipper)

yihdaa or **dineh san'**: 'sitting in its house' or 'star man' respectively, a large full-sky humanoid constellation described as a man with a fox tail comprised of the body part asterisms listed below [Tetlin] (Cannon 2013a)[89]

[89] C.f. the Deg Hit'an terms **detsan' dina** 'star man', **tthen' chux dina** 'star man', and **viyił ni'iłghil** 'star man' (Kari 1976a, 10-11) and **deca·nʔdenaʔa** 'star man' (Osgood 1959, 181).

san' uche': 'star tail', Big Dipper, also called **uche'** 'his tail'; an asterism in *yihdaa* [Tetlin] (Cannon 2013a)

san' di'ehtsanh: 'he's defecating stars', the stars β Umi (Kocab), α UMi (Polaris), and β Cas (Caph); an asterism in *yihdaa* envisioned as three pieces of feces flying out from beneath *yihdaa's* tail (**san' uche'**) [Tetlin] (Cannon 2013a)

ha'aldag san': 'stars shoot out', an alternative term for the asterism of three stars in *yihdaa*; β Umi (Kocab), α UMi (Polaris), and β Cas (Caph) [Tetlin] (Cannon 2013a)

diła' i̱i̱'ah: 'he raises his hand', the stars α Gem (Castor) and β Gem (Pollux); an asterism in *yihdaa* [Tetlin] (Cannon 2013a)

utl'ahbat: 'his cheek', Pleiades; an asterism in *yihdaa* [Tetlin] (Cannon 2013a)

mi̱i̱tsi̱i̱: 'his nose', an unidentified asterism in *yihdaa* [Tetlin] (Cannon 2013a)

uthaat: 'his mouth', an unidentified asterism in *yihdaa* [Tetlin] (Cannon 2013a)

unaagn': 'his eyes', the sun and moon as *yihdaa's* eyes [Tetlin] (Cannon 2013a)

san' tą': 'star trail', Milky Way, also given as **utą** 'his trail' but corrected to **san' tą'**; an asterism in *yihdaa* [Tetlin] (Cannon 2013a)

yihdaa: Big Dipper used as a clock comprised of the asterisms listed below [Scottie Creek] (Kari 1989b, 1; 1991a; Tyone 1994)

yihdâa: Big Dipper [Scottie Creek] (John and Tlen 1997, 63)

yihdah: two stars in the sky (Kari 1990b, 18)[90]

yihdax: an unidentified constellation [Scottie Creek] (Kari 1992)

et-da [*yihdaa*]: Big Dipper (McKennan 1959, 110)

umbaagh iiti̱i̱: 'sun comes up at daylight', an unidentified asterism (or time term?) in *yihdaa* [Scottie Creek] (Kari 1989b, 1)

xał uudenaaxaał: 'darkness disappears', an unidentified asterism (or time term?) in *yihdaa* [Scottie Creek] (Kari 1989b, 1)

[90] Perhaps the stars Alcor and Mizar. C.f. **kleyeka rotana ke sasie** 'the natives' clock', the small star Alcor in the tail of Ursa Major (Jetté 1905a).

chech'ilts'ik: 'curls tail' an unidentified asterism (or time term?) in *yihdaa* [Scottie Creek] (Kari 1989b, 1)[91]

łeek'ąy delyaa: 'pelvis', an unidentified asterism in *yihdaa* [Scottie Creek] (Kari 1989b, 1)

nił na 'eł nes: 'put hands one on another', an unidentified asterism in *yihdaa* [Scottie Creek] (Kari 1989b, 1)

neek'e'eltiin: a whole-sky humanoid constellation envisioned as a tailed man comprised of the asterisms listed below [Northway] (Cannon 2013b; 2014)

uche': 'its tail', Big Dipper; an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

tł'ahts'ąy udziit: 'its left hearing/inner ear', α Gem (Castor); an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

tł'ahts'ąy udzagn': 'its left ear', β Gem (Pollux); an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

hǫǫsǫǫ ts'ąy udziit: 'its right hearing/inner ear', β Aur (Menkalinan); an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

hǫǫsǫǫ ts'ąy udzagn': 'its right ear', α Aur (Capella); an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

mįįtsįį: 'its nose', Pleiades; an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

hǫǫsǫǫ ts'ąy uke': 'its right foot', an unidentified asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

tł'ahts'ąy uke': 'its left foot', α Boo (Arcturus) and η Boo (Muphrid); an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

hǫǫsǫǫ ts'ąy uła': 'its right hand', an unidentified asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

tł'ahts'ąy uła': 'its left hand', o Leo (Subra) and α Leo (Regulus); an asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

unaagn': 'its eyes', an unidentified asterism in *neek'e'eltiin* [Northway] (Cannon 2013b)

[91] C.f. the Ahtna temporal period **yikaas ts'e' cila' ilts'iitl'** 'the fish tail has gotten curved toward dawn' (Cannon 2013b).

san' niłkah eedlah: 'stars are close together', Big Dipper; an alternative term for the Big Dipper also identified as **san' uche'** 'star tail' [Tetlin] (Cannon 2013a)

neek'it sts'äna'aahaal: Big Dipper [Scottie Creek] (Kari 1991a)[92]

neek'itts'inaahaal: Big Dipper [Scottie Creek] (Kari 1992)

Moon's Dog

ch'aldzeek łįįk: 'moon's dog', presumably a bright star near the moon [Scottie Creek] (John and Tlen 1997, 65)

Morning Star

ikaay kadeht'ąą'a: 'it's dark before the first dawn light', Altair as the morning star [Northway] (Lovick et al. 2007; Cannon 2013b; 2014)

san' dog eedlah ha'eldayh hu: 'stars are above, they're shooting out', Altair as the morning star [Tetlin] (Cannon 2013a)

Polaris (North Star)

san' teldagn: North Star/Polaris [Tetlin] (Cannon 2013a)

Ursa Minor (Little Dipper)

sǫ' gaay: 'little/small star(s)', Little Dipper [Scottie Creek] (John and Tlen 1997, 65)[93]

Unidentified Constellations

klin-tco [*łįį choh*]: 'big dog', an unidentified constellation envisioned as a "wolf bitch" (McKennan 1959, 110)

Han

Ursa Major (Big Dipper)

yihjah: Big Dipper (Ritter and Paul 1980, 74)

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[92] Perhaps this term more appropriately designates the motion of the Big Dipper. C.f. Gwich'in **yahdii ahaa** 'yahdii is walking' (Cannon 2013a) and Upper Tanana **yaa nałts'aa aahaał**: '*lit. it's walking around the sky'* (Cannon 2013b).

[93] This term may also refer to the Pleiades as many Athabascans generally refer to the Pleiades as 'Little Dipper'. Also c.f. the Ahtna phrase **son' ggaay**: 'small little stars' in de Laguna and McClellan (1960).

Evening Star

sà̱n' choo: an unidentified evening star (Ritter and Paul 1980, 74)

Little Dipper

yihjah tsöll: 'little *yihjah*', Little Dipper (Ritter and Paul 1980, 74)[94]

Gwich'in

Ursa Major (Big Dipper)

eutyae [*yuhdyee*]: Ursa Major (Simpson 1843, 187)

yutié: Big Dipper, Ursa Major (Petitot 1876, 80, 261)

yă̋h-te: Big Dipper (Wickersham 1903, 9)

yah-tē: Big Dipper (Wickersham 1903, 9)

yăhdí: Big Dipper (Benveniste 1953, 17)

yati: 'the seat', Big Dipper, Ursa Major [Chandalar Gwich'in] (McKennan 1965, 73)[95]

yuhdii: Big Dipper [Teetl'it Gwich'in dialect] (Ritter 1976, 50; Gwich'in Social and Cultural Institute and Gwich'in Language Center 2003, 22)

yuhdii choo: 'big *yuhdii*', Big Dipper [Teetl'it Gwich'in] (Gwich'in Social and Cultural Institute and Gwich'in Language Center 1999, 150)

yuhdyee: Big Dipper [Gwichya Gwich'in dialect] (Gwich'in Social and Cultural Institute and Gwich'in Language Center 2003, 22)

huhdyee: Big Dipper [Gwichya Gwich'in] (Gwich'in Social and Cultural Institute and Gwich'in Language Center 1999, 49)

yahdii: whole-sky humanoid constellation comprised of the body part asterisms listed below [Western Gwich'in dialects] (Mishler and Ginnis 1986; Cannon 2013a; 2013b)

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[94] Very likely a neologism calqued from the English name "Little Dipper".

[95] The Gwich'in term *yahdii* derives from combining the Proto-Athabascan term *yəχd 'house' with the gerundive *həsda 'sitting'. McKennan mistranslates the term *yati* (i.e. *yahdii*) as 'the seat' and *yatiqul* (Little Dipper) as 'the little seat'.

———. Big Dipper (Mueller 1964, 12; 1978, 26; 1991, 107; Peter 1976; 1979, 41; Garnett and Mueller 1991; Mishler 1995, 174-175; Leer and Peter 1996; Alexander and Alexander 2011, 314)

vitsi': 'its tail', Big Dipper (of Ursa Major); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

tł'ǫhts'ąįį vanli': 'its left hand', o Leo (Subra), α Leo (Regulus); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

shreets'ąįį vanli': 'its right hand', γ And (Almaak), β Tri; an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

tł'ǫhts'ąįį vatth'an': 'its left leg', an unidentified asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)[96]

shreets'ąįį vatth'an': 'its right leg', an unidentified asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

tł'ǫhts'ąįį vidzee: 'its left ear', α Gem (Castor), β Gem (Pollux); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

shreets'ąįį vidzee: 'its right ear', α Aur (Capella), β Aur (Menkalinan); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

vanhtral or **vanzhał**: 'its snout', Messier object 45 (Pleiades); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

vantsįh: 'its nose', Messier object 45 (Pleiades); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

vendee: 'its eyes', an unidentified asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

viki': 'its head', all stars in the ears, eyes, and snout; an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

vatthąį: 'its body', an unidentified asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

tł'ǫhts'ąįį vakwai': 'its left foot', α Boo (Arcturus), η Boo (Muphrid); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

[96] Asterisms glossed as "unidentified asterisms" were only approximately located in the sky.

shreets'ą́į́ vakwai': 'its right foot', α Cyg (Deneb), γ Cyg (Sadr); an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

tł'ǫhts'ą́į́ vigin: 'its left arm', an unidentified asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2014)

shreets'ą́į́ vigin: 'its right arm', an unidentified asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2014)

vatą́į́: 'its trail', Milky Way Galaxy; an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

są' gwat'an tą́į́: 'trail of stars', Milky Way Galaxy; an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)

(**vigwiitsii**): 'crooked knife', η Leo, γ Leo (Algieba), ζ Leo (Adhafera), μ Leo (Rasalas), ε Leo; an asterism in *yahdii* [Western Gwich'in dialects] (Cannon 2013a)[97]

Ursa Minor (Little Dipper)

łaii atł'yaa: 'dogs strung together', Little Dipper/Ursa Minor [Teetł'it Gwich'in] (Ritter 1976, 50; Gwich'in Social and Cultural Institute and Gwich'in Language Center 1999, 71; 2003, 117)

łą́į́ ch'ihiił'oh: 'a group of dogs chasing', Little Dipper (Mishler and Ginnis 1986)

yutié-tsig: 'little *yutié*', Little Dipper/Ursa Minor (Petitot 1876, 261)[98]

yutié-tsigoe: 'little *yutié*', Little Dipper (Petitot 1876, 80)

yə̀hdìc?ə́́k: 'little *yəhdí*', small Dipper (Benveniste 1953, 17)

yatiqul: 'the little seat', Little Dipper/Ursa Minor [Chandalar Gwich'in] (McKennan 1965, 73)

yahdii tsal: 'little *yahdii*', Little Dipper (Mueller 1964, 12; 1991, 107; Peter 1979, 41; Leer and Peter 1996)

yuhdyee tsal: 'little *yuhdyee*', Little Dipper [Gwich'ya Gwich'in] (Gwich'in Social and Cultural Institute and Gwich'in Language Center 2003, 117)

[97] The Gwich'in term for 'crooked knife' is *vigwiitsii*; however we were not able to verify that this term is also used to denote the asterisms which is referred to in English as 'yahdii's knife'.
[98] This term and variations thereof are likely neologisms calqued from the English name "Little Dipper".

uhdyee tsal: ‘little *uhdyee*’, Little Dipper (Gwich'in Social and Cultural Institute and Gwich'in Language Center 1999, 134)

yahdii: Little Dipper (Leer and Peter 1999)

Aquila (Three Morning Stars)

yeendak gahaajil: ‘they went up (as if rising skyward like a person’s spirit after death)’, γ Aql (Tarazed), α Aql (Altair), β Aql (Alshain) in the constellation Aquila; a constellation of three morning stars used as a time referent (Cannon 2013a)

vats’a’ gach’agahaajil: ‘they went toward it’, a constellation of three morning stars; presumably γ Aql (Tarazed), α Aql (Altair), β Aql (Alshain) in the constellation Aquila (Salmon 1992)

vành oozhrii: ‘morning shines’, γ Aql (Tarazed), α Aql (Altair), β Aql (Alshain) in the constellation Aquila; a constellation of three morning stars used as a time referent (Cannon 2013a)

Morning Star

koet’è˝ég: morning star, Venus, Shepherd Star (Petitot 1876, 172)

koet’è˝ék: Venus (Petitot 1876, 360)

gwidheh’ek: Venus as the morning star (Bourcier and Kunnizzi 1999, 87)

koet’è-tèll: morning star, Venus, Shepherd Star (Petitot 1876, 172, 360)

gwidheh-tał: Venus as the morning star (Bourcier and Kunnizzi 1999, 87)

saa’-chooh: Venus [Western Gwich’in] (Mueller 1964, 12)

san’ choo: ‘big star’, an unidentified morning star and evening star [Fort McPherson dialect] (Ritter 1976, 50)

Evening Star

są choo: ‘big star’, an unidentified evening star, Bethlehem star (Peter 1979, 19; Mueller 1991, 108; Alexander and Alexander 2011, 240)

———. Jupiter as the evening star (Cannon 2013a)

san’ choo: ‘big star’, evening star [Teetł’it & Gwichya Gwich’in] (Gwich'in Social and Cultural Institute and Gwich'in Language Center 1997, 22; 1999, 94; 2003, 183)

———.‘big star’, an unidentified morning star and evening star [Fort McPherson dialect] (Ritter 1976, 50)

sàn’ choo: ‘big star,’ evening star [Gwichya Gwich’in dialect] (Gwich'in Social and Cultural Institute and Gwich'in Language Center 1997, 22)

Milky Way Galaxy[99]

są’il: ‘cluster of stars’, Milky Way (Peter 1979, 82; Mueller 1991, 107; Alexander and Alexander 2011, 240)[100]

są’ił: ‘cluster of stars’, Milky Way (Mueller 1978, 20, 22; 1991, 107; Peter 1979, 82)

sa’ił: Milky Way (Mueller 1978, 20, 22)

saa’-’ił: Milky Way [Western Gwich’in] (Mueller 1964, 12)

thlitrelchil chintssi: ‘great group/assemblage’, Galaxy (McDonald 1912, 136)

Boötes (Arcturus)

voedzi-tchi: ‘owl head’, Arcturus (Petitot 1876, 28)

Draco

gaigulsut: ‘the crotch’, Draco [Chandalar Gwich’in] (McKennan 1965, 73)

Orion’s Belt

koet’ètélloe: three stars of Orion’s Belt (Petitot 1876, 260)[101]

l’énatlla: three stars of Orion’s Belt (Petitot 1876, 354)

Perseus:

koet’ètèll: Perseus (Petitot 1876, 275)[102]

Pleiades

są’il: ‘cluster of stars’, constellation, or perhaps the Pleiades (Leer and Peter 1996)

są’ił or **są’il**: ‘cluster of stars’, Pleiades (Leer and Peter 1999)

———. ‘cluster of stars’, the name for any generic grouping of stars (Cannon 2013a)

[99] C.f. other Gwich’in Milky Way Terms glossed as asterisms in *yahdii*.
[100] My fieldwork suggests that the term **są’ił** and variations thereof refers to any group or cluster of stars and is used in the same fashion as the English term ‘constellation’.
[101] C.f. *łaii atł’yaa* ‘dogs strung together’, Little Dipper/Ursa Minor [Teetł’it Gwich’in] (Ritter 1983:50).
[102] Same as *koet’è-tèll*, Venus, morning star (Petitot 1876: 172, 360)

sén-atlla: ‘stars aligned/strung’, Pleiades (Petitot 1876, 280)

sén tchɒan-tellzjié: ‘stars together in a pile’, Pleiades (Petitot 1876, 280)

Polaris (North Star)

ye-tē-nē-jik: North Star/Polaris (Wickersham 1903, 9)[103]

zheetl’an dha’ąįį: ‘(star) in the middle of the sky’, Polaris [Western Gwich’in dialects] (Cannon 2014)

zjiété-ṣoen: North Star/ Polaris (Petitot 1876, 172)

zhi’iidii san’: North Star/ Polaris (Bourcier and Kunnizzi 1999, 87)

soen-té″a: fixed star; presumably Polaris/North Star (Petitot 1876, 172)

san’ dha’àih: ‘star in one place’, fixed star; presumably Polaris/North Star (Bourcier and Kunnizzi 1999, 87)

ṣoen-a″a: fixed star; presumably Polaris/North Star (Petitot 1876)

shinee’àh: ‘leading me’, fixed star; presumably Polaris/North Star (Bourcier and Kunnizzi 1999, 87)

Unidentified Constellations

k’aii gwijiltsoo: constellation [Fort McPherson dialect] (Ritter 1976, 50)

[103] Presumably part of *yah-tē* (i.e. *yahdii*).

Appendix B

Institutional Review Board (IRB) approval letter

Institutional Review Board
909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

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(907) 474-5444 fax
fyirb@uaf.edu
www.uaf.edu/irb

February 15, 2013

To: Gary Holton, PhD
Principal Investigator

From: University of Alaska Fairbanks IRB

Re: [432041-1] Documenting Gwich'in Indigenous Astronomy

Thank you for submitting the New Project referenced below. The submission was handled by Exempt Review. The Office of Research Integrity has determined that the proposed research qualifies for exemption from the requirements of 45 CFR 46. This exemption does not waive the researchers' responsibility to adhere to basic ethical principles for the responsible conduct of research and discipline specific professional standards.

Title:	Documenting Gwich'in Indigenous Astronomy
Received:	February 14, 2013
Exemption Category:	*2*
Effective Date:	February 15, 2013

This action is included on the March 6, 2013 IRB Agenda.

Prior to making substantive changes to the scope of research, research tools, or personnel involved on the project, please contact the Office of Research Integrity to determine whether or not additional review is required. Additional review is not required for small editorial changes to improve the clarity or readability of the research tools or other documents.