Wildlife Management Report ADF&G/DWC/WMR-2014-3

Trends in Alaska Sheep Populations, Hunting, and Harvests

Division of Wildlife Conservation

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Alaska Department of Fish and Game Division of Wildlife Conservation

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Cover Photo: A full-curl ram in the Alaska Range in June of 2008. ©2008 Rick Merizon.

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Introduction

In recent years, increased public interest in Dall sheep management has resulted in proposed regulatory changes that could substantially alter current sheep management and harvest strategies. These proposals address dissatisfaction some hunters have expressed regarding sheep harvest opportunities and crowded hunting areas. Hunters have identified competition between hunters and guides for quality sheep hunting areas, unethical hunter behavior, hunting access challenges, and fewer full-curl rams available for harvest as key concerns. These concerns have been reflected in complaints to the Alaska Big Game Commercial Services Board (Appendix A) and large numbers of proposals for regulatory changes submitted to the Alaska Board of Game over a number of board cycles.

At meetings in Wasilla (February 2015) and Anchorage (March 2015) this coming winter, the Alaska Board of Game will consider possible changes to sheep hunting regulations. The following, as well as other actions, may be considered:

- Change general season hunts to registration or drawing permit hunts.
- Establish earlier seasons for residents or shorten seasons for nonresidents.
- Require drawing permits for all nonresidents.
- Reduce available tags and permits for nonresidents.
- Establish quotas or specific percentages of tags and permits for nonresidents.
- Limit nonresidents hunting with second degree of kindred relatives.
- Limit hunters to only one area, create smaller hunt areas, or limit participation.
- Change sealing requirement or the mandatory reporting requirement.
- Change the full-curl bag limit and/or change the any-ram bag limit.
- Reduce bag limits (for example, 1 sheep every 3 years).
- Change same-day-airborne restriction or restrict transportation methods.
- Create or expand youth, restricted weapons, walk-in only hunts.

Specific information about the 2015 Board of Game meetings and the associated proposals can be found on the Alaska Department of Fish and Game (ADF&G) website: http://www.adfg.alaska.gov/index.cfm?adfg=gameboard.main.

In 2013, to prepare for the meetings and discussion of proposed sheep hunting regulations and allocations, the board asked ADF&G to gather information and data to help inform the discussion. ADF&G commissioned a survey of hunters, guides, and transporters that was conducted by Dr. Todd Brinkman, Assistant Professor of Wildlife Biology at the University of Alaska Fairbanks. Also, ADF&G Division of Wildlife Conservation (DWC) staff reviewed available data in DWC's published sheep management reports and in its electronic databases of hunter harvest reports. DWC also obtained and reviewed information about the licensed guides

and transporters provided by the Division of Corporations, Businesses, and Professional Licensing (Professional Licensing) in the Alaska Department of Commerce, Community, and Economic Development.

This report summarizes what the available data reviewed by DWC show about Alaska's sheep populations, numbers of resident and nonresident hunters, numbers of sheep harvested, available hunting opportunities, harvest trends and characteristics, methods of transportation, and hunter use of guide and other commercial services. Data were available from 1972 through 2013, except that no data were available for 1980. We have not been able to determine why these data are missing. Most data are presented by resident and nonresident sheep hunter categories and organized by mountain range. Most data are also organized into four historical time periods that reflect differences in sheep management strategies or constraints:

Period 1: 1972–1980 (Pre-ANILCA). This time period occurred before the Alaska National Interest Lands Conservation Act (ANILCA) was signed into law in 1980, which resulted in the loss of significant portions of state land to general sheep hunting opportunity. This Pre-ANILCA period was also when the department began formally collecting and electronically cataloging sheep harvest information on a statewide basis.

Period 2: 1981–1988 (Post-ANILCA). This period led up to the 1988 Alaska Supreme Court decision in *Owsichek v. State, Guide Licensing and Control Board*, which effectively eliminated exclusive guide use areas on state land in Alaska. This period also marks the beginning of a period when full-curl ram bag limit regulations were implemented in portions of the state.

Period 3: 1989–2000 (Post-*Owsichek*). This was the period after the *Owsichek* decision and statewide implementation of the full-curl bag limit that has been the basis for most of the current sheep management direction. There was a substantial decline in sheep hunter numbers during this time.

Period 4: 2001–2013 (Current)**.** The most current time period has been characterized by a continued decline in sheep hunters and the implementation of statewide mandatory sheep sealing in 2004, and horn plugging in 2005. Sheep populations also declined in several areas due to severe weather events. While the full-curl bag limit remains the most common management strategy across the state, an any-ram bag limit was offered for the first time in some of the new drawing hunts that were implemented in 2008 in parts of the Chugach range.

The intent of this report is to provide a resource for the Board of Game as it develops regulations for the management and allocation of sheep harvest, to complement the hunter and guide survey information collected by Dr. Brinkman, and to help sheep hunters and others prepare proposal comments for the board.

Sheep Population Status

Sheep occur in many mountain ranges in Alaska. These include the Kenai Mountains; the Alaska and Brooks ranges; the Chugach, Talkeetna, and Wrangell mountains; and several smaller mountain ranges and areas including the Tanana Hills, the White Mountains, the Mentasta and Nutzotin areas, and the Chulitna–Watana Hills. There are also some less known smaller areas such as the Ogilvie Mountains where sheep periodically occur.

ADF&G staff has produced Dall sheep management reports about survey and inventory (S&I) activities for 14 report areas, every three years. A few of these specifically cover significant sheep areas of the state (e.g., Alaska Range). The reporting areas (managed by mountain range, portion of specific range, or hunt area) are listed in Table 1.

Table 1. ADF&G Dall sheep management report areas.

S&I Report Area	Game Management Unit(s)
Kenai Peninsula	7, 15
Alaska Range west	9B, 16, 17B, 19B, and 19C
South Wrangell Mountains	Portion of 11
Chugach Mountains	13D, 14A, 14C, Portion of 11
Mentasta, Nutzotin, N. Wrangell Mountains	Portion of 12
Tok Management Area	Portions of 12, 13C, and 20D
Talkeetna Mountains, Chulitna-Watana Hills	Portions of 13A, 13E, 14A, and 14B
Delta Controlled Use Area	Portions of 13B, 20A, and 20D
N AK Range, E Nenana River, W Delta River	20A
White Mountains	Portions of 20B, 20F, and 25C
Tanana Hills	Portions of 20B, 20D, and 20E
Western Brooks Range	Portions of 23 and 26A
Central Brooks Range	Portions of 23, 24A, 24B, and 26A
Eastern Brooks Range	Portions of 24A, 25A, 26B, and 26C

The management reports provide information related to Dall sheep management, with emphasis on management objectives, work accomplished, and harvest and population data. Most reports include numbers of sheep counted in portions of the report areas used as an indication of population trend. Some reports include population estimates, others report minimum counts, composition counts, or numbers of sheep observed per hour of flight time. Counts or estimates for smaller localized groups of sheep (subpopulations) in some areas are incomplete or nonexistent due to their size and location and the challenges associated with surveying mountainous areas. These management reports are available on ADF&G's website (www.adfg.alaska.gov/index.cfm?adfg=librarypublications.wildlifemanagement#sheep).

Historically, areawide and regional population estimates reported by ADF&G have been based on combinations of surveys, hunter and guide reports, and the observations of field biologists. The department does not maintain or have estimates of populations by ranges. It's not critical for management in most cases due to the full-curl harvest bag limit. Limiting harvest to older full-curl rams ensures that the population's productivity is not affected by harvest. Indeed, compared to harvest of other ungulates, the harvest rates of sheep in Alaska are extremely low and expected effects of human take on sheep populations is accordingly negligible.

For the purposes of this report and to provide comparable information to the data provided in UAF's sheep hunter survey summary, the 14 management report areas were consolidated into eight major mountain sheep range areas of the state (Table 2).

Table 2. Mountain range areas recognized as sheep population areas in Alaska.

Range Area	Game Management Unit(s)
Alaska Range East	(Portions of Units 12, 13C, 20A, 20C, 20D)
Alaska Range West	(Portions of Units 9B, 17B, 16, 19)
Brooks Range	(Portions of Units 23, 24, 25A, 26)
Chugach Range	(Portions of Units 13D, 14A, 14C)
Kenai Mountains	(Units 7, 15)
Talkeetna Mtns., Chulitna–Watana Hills	(Portions of Units 13A, 13E, 14A, 14B)
Tanana Hills, White Mountains	(Portions of Units 20B, 20D, 20E, 25C)
Wrangell Mountains	(Units 11, 12)

The population summary provided in the chapter on Alaska's Dall sheep in the book "Return of Royalty – Wild Sheep of North America" (Toweill and Geist 1999) lists a 1999 statewide population estimate of 50,400–64,300. The chapter outlines rough population estimates for eight regions, many of which are the same as the mountain range areas for sheep listed in Table 2 above. These include rough estimates for the Kenai Mountains (1,500–1,800), Chugach Mountains (6,000–7,000), Wrangell Mountains (15,000–22,000), Talkeetna Mountains (2,000–2,500), the Alaska Range (11,000–14,000), White Mountains (400–500), Tanana Hills (500), and the Brooks Range (14,000–16,000).

Subsequent review of management reports by ADF&G staff suggest that these numbers were high. This review resulted in statewide historical estimates produced in 2010 for the Wild Sheep Working Group of the Western Association of Fish and Wildlife Agencies (WAFWA) that included a 1990 estimate of 56,740 (53,900–62,400), a 2000 estimate of 50,850 (48,300–55,900), and a 2010 estimate of 45,010 (42,800–49,500). The ranges reflect each estimate number plus or minus 5% of the number; they were not intended to and do not reflect a scientific review or analysis of the estimates.

Sheep Habitat and Distribution

Sheep are distributed across Alaska from the Brooks Range to the Kenai and Wrangell mountains. A digital elevation model was designed to approximately delineate potential sheep habitat (Appendix B). Basic assumptions for this model are that areas below 3,000 ft elevation are used periodically by sheep but typically lack escape terrain for year-round habitation. Areas between 3,000 ft and 4,000 ft in elevation are typically used by sheep throughout the winter. Also, areas that are between 4,000 ft and 7,000 ft, specifically wind-blown ridgelines, are assumed to be used by sheep during critical winter months. This elevation range typically contains all components of habitat necessary for year-round sheep occupancy. The areas of the state within this last elevation range known to not contain sheep are mostly maritime, in Units 1–6 (Southeast Alaska and Prince William Sound), and Unit 8.

Sheep habitat and distribution are further delineated by snow fall depth. Lyman Nichols (an ADF&G sheep researcher in the 1960s and 1970s) documented that sheep were unable to reach winter forage when a combination of snow hardness and depth exceeded a characteristic threshold level (Nichols 1988). It is probable that some areas currently uninhabited or occupied by small numbers of sheep simply receive too much snow to support sheep during the winter months. Other areas may be subject to unique periodic weather events such as icing and high incidence of avalanche conditions that result in dramatic declines in available habitat during critical periods and reduced overwinter survival.

The current map of potential habitat was developed using the digital elevation map and has been reviewed and edited by ADF&G staff to include known distributions of sheep either not included in the elevation model or not present in the elevation areas that were defined on the map. Figure 1, which is a map of the eight range areas in Alaska identified in Table 2, shows the most current known sheep distribution for Alaska.

Sheep Population Trends

Population data are normally collected by ADF&G to assist with ensuring that harvest strategies are sustainable. This information has not been as necessary for Dall sheep populations as it has been for other species because restricting harvest to older mature rams (full-curl) helps to ensure harvests are not negatively impacting populations. Also, it is logistically difficult and expensive to count sheep populations in vast rugged terrain that is subject to weather and observation conditions often dependent on short windows of time between snow melt and the start of hunting season.

Most sheep populations are not monitored on a regular basis and in many circumstances are counted only to obtain only sex and age composition of the population, not overall numbers. Without rigorous population estimates, small to moderate fluctuations in population abundance cannot be detected. Based on available but limited data, qualitative population trends as assessed by area managers and regional staffs appear for some areas to be stable or increasing, while others have shown indications of decline during the last few years (Table 3). For purposes of this report, trends are defined as the current estimated trajectory (increasing, decreasing, etc.) of the population, given the available information.

Overall, the statewide population trend appears to be stable or decreasing. While subpopulations in some portions of the Chugach and Talkeetna mountains were starting to show improvement over the past five years, deep snow in the winter of 2011–2012 and late snow in 2012–2013 appear to have had a negative effect. Also, the winter of 2013–2014 appears to have caused a decline in sheep numbers in the Brooks Range. Recent surveys with observed low numbers of lambs and legal rams resulted in the decision to close the sheep seasons in Units 23 and 26A for regulatory year (RY) 2014 (a regulatory year runs 1 July through 30 June; e.g., RY14 = 1 July 2014–30 June 2015). In contrast, recent counts in portions of the western Alaska Range appeared to show an increasing population trend over the last several years.

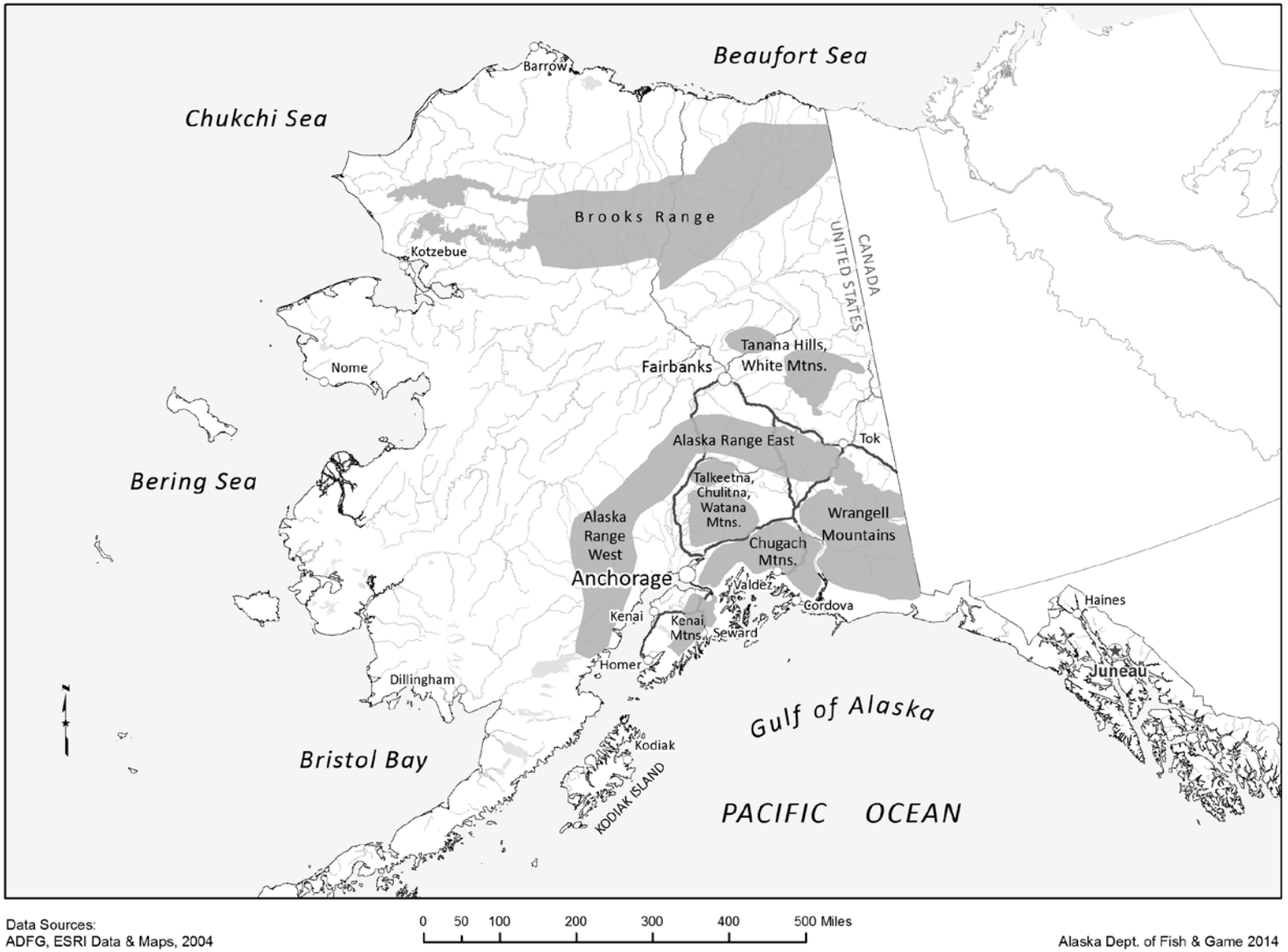


Figure 1. General Dall sheep range distribution in Alaska, identifying the eight range areas referred to in this report.

Table 3. Sheep population trends in the 14 management report areas.

S&I Report Area	Population Trend
Kenai Peninsula	Decreasing
Alaska Range west	Unknown
South Wrangell Mountains	Stable or increasing
Chugach Mountains	Stable at low levels
Mentasta, Nutzotin, N. Wrangell Mountains	Stable or decreasing
Tok Management Area	Stable or decreasing
Talkeetna Mountains, Chulitna-Watana Hills	Stable at low levels
Delta Controlled Use Area	Stable
N AK Range, E Nenana Riv., W Delta Riv.	Stable
White Mountains	Stable
Tanana Hills	Stable
Western Brooks Range	Decreasing
Central Brooks Range	Decreasing
Eastern Brooks Range	Decreasing

The high variability in population trends is normal and expected to continue. If bad weather, including rain on snow and icing events, continue to occur at higher frequency in sheep habitat, they will negatively affect sheep populations. Where they occur, fluctuations in predator populations that result in increased predation on lambs may negatively affect recruitment and local population trends.

Hunting Opportunities and Access

Hunting is allowed for at least a portion of all of the recognized sheep populations in Alaska (Appendix C) except for portions of some populations which occur across jurisdictional boundaries. For example, there are portions of some sheep populations that occur inside specific areas of national park units such as Denali National Park that are closed to all hunting. Other federal park units such as Wrangell–St. Elias National Park and Preserve allow subsistence hunting throughout major portions of the park. In addition, National Preserves are open to hunting by residents as well as nonresidents. Specific National Park Service (NPS) units identified in ANILCA are only open only to federally-qualified rural subsistence hunting and aircraft access is not permitted. There is considerable hunting activity in areas of the state where good access exists to specific drainages or ranges. In areas that are very difficult or logistically challenging to access there is little or no activity.

Sheep hunting seasons across the state occur primarily in August and September, with a few exceptions. Types of hunts include general harvest ticket hunts, drawing permit hunts, registration permit hunts, and/or combinations of these (Fig. 2). Figure 2 shows where general and registration hunts occur in the same area, but these do not occur at the same time. Registration hunts typically occur over the winter and spring and usually have access restrictions (e.g., no aircraft allowed) resulting in little conflict with more common general hunting seasons. Most of Alaska's sheep hunting opportunity is during the general harvest seasons that typically occur from August 10 through September 20. These hunts are open to residents and nonresidents usually with no special limitations. The only special opportunity (archery, muzzleloader, youth,

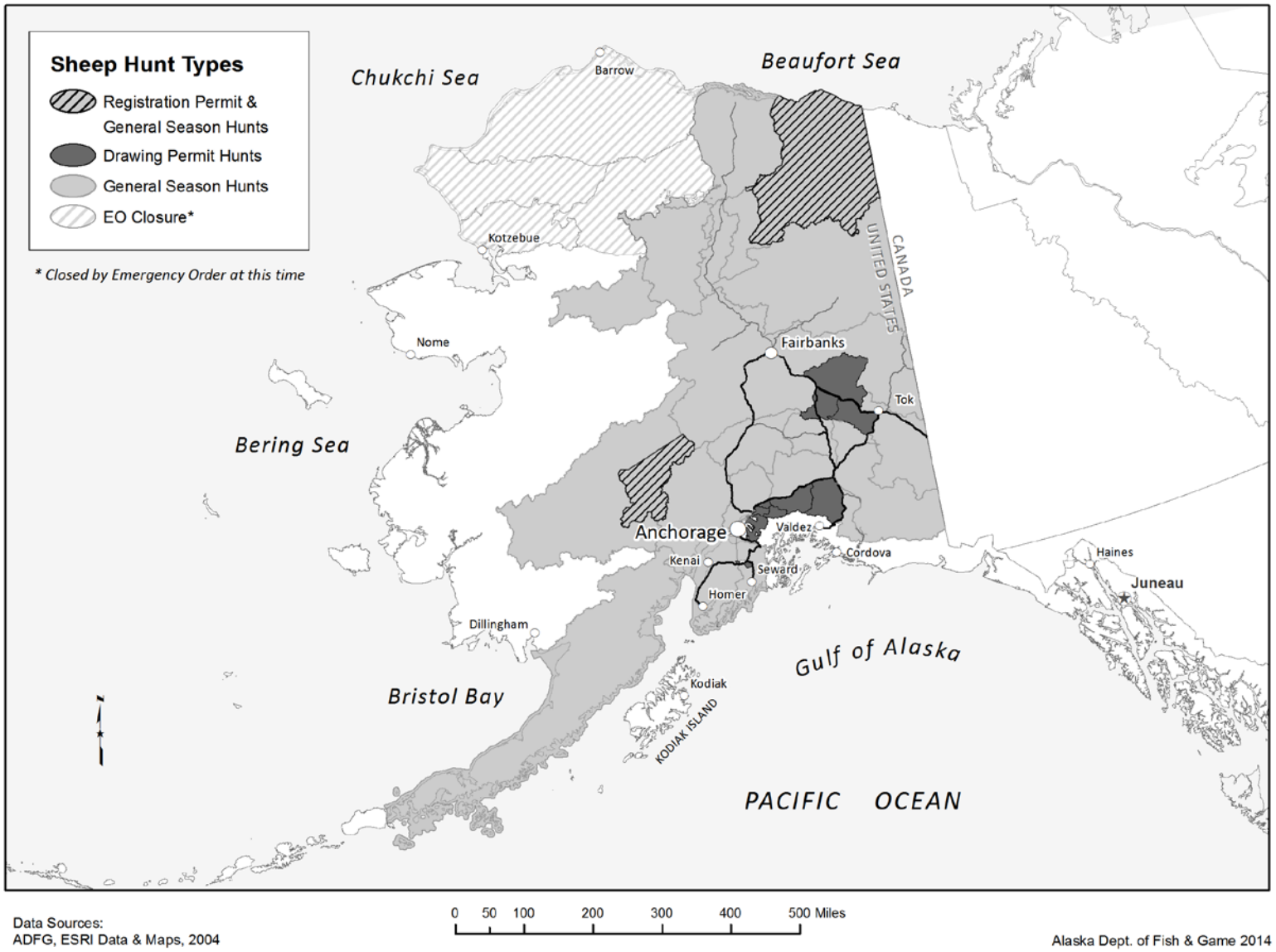


Figure 2. Current Sheep hunt types (2014).

disabled, etc.) hunts available are four archery-only draw permit hunts in the Chugach Mountains, which are offered under state regulations.

Bag limit restrictions vary across the state but there are three primary categories: full-curl, any ram, and any sheep (Fig. 3). A legal ram under the full-curl bag limit definition includes rams that are full curl, 8 years old, or the horns are broken on both tips (sometimes hunters refer to this as "broomed"). This bag limit is the most common and applies to all general season hunts and many draw permit hunts. The any ram bag limit applies to specific draw permit hunts in the Chugach Mountains. The any sheep bag limit is currently applied to the registration hunts in northeastern Alaska and the archery-only draw permit hunts in Unit 14C. For comparison purposes, a list of sheep bag limit restrictions for states and Canadian provinces is provided in Appendix D.

The hunt type and bag limit maps (Figs. 2 and 3) are based on game management units and the legal description of areas covered by the hunts as identified in regulation. However, sheep populations exist in only portions of these units so the maps do not reflect the actual location of the sheep populations that may be hunted.

There are a limited number of units which are open to general harvest hunting that contain very few sheep (e.g., Units 9A and 16A). These exist primarily to provide opportunity should a legal sheep happen to be available. Other areas often contain sheep during summer months, though due to a lack of suitable winter habitat, they move away to other areas in the fall.

Currently, allocation of sheep hunting opportunity between residents and nonresidents in registration Tier I hunts is based on the harvest quota and specific drawing hunts based on regulation and Board of Game policy. Previous to the Emergency Order (EO) closure in Units 23 and 26A, nonresidents were excluded in some years from the registration hunt based on the harvest quota. Guidelines the department uses to issue specific drawing permits are provided in the adopted regulations (Title 5 AAC 92.057) and findings (Policy 2007-173) from the Board of Game. For the Tok Management Area (TMA), no more than 10% of drawing permits can be issued to nonresidents and no less than 90% to residents. In addition, a maximum of 50% of the nonresident permits can be awarded to a second degree kindred relative (the only current allocation for nonresident second degree kindred relatives for sheep). For Unit 13D, the department can issue up to 20% to nonresidents with residents awarded a minimum of 80%. The percentages are 10% for nonresidents and 90% for residents in Unit 14A. In Unit 14C, the department is directed to issue no more than 5% of the archery drawing permits to nonresidents and a maximum of 13% of the remaining drawing permits to nonresidents. For the Delta Controlled Use Area (DCUA), the department can issue up to 10% of the permits to nonresidents with a minimum of 90% available to residents.

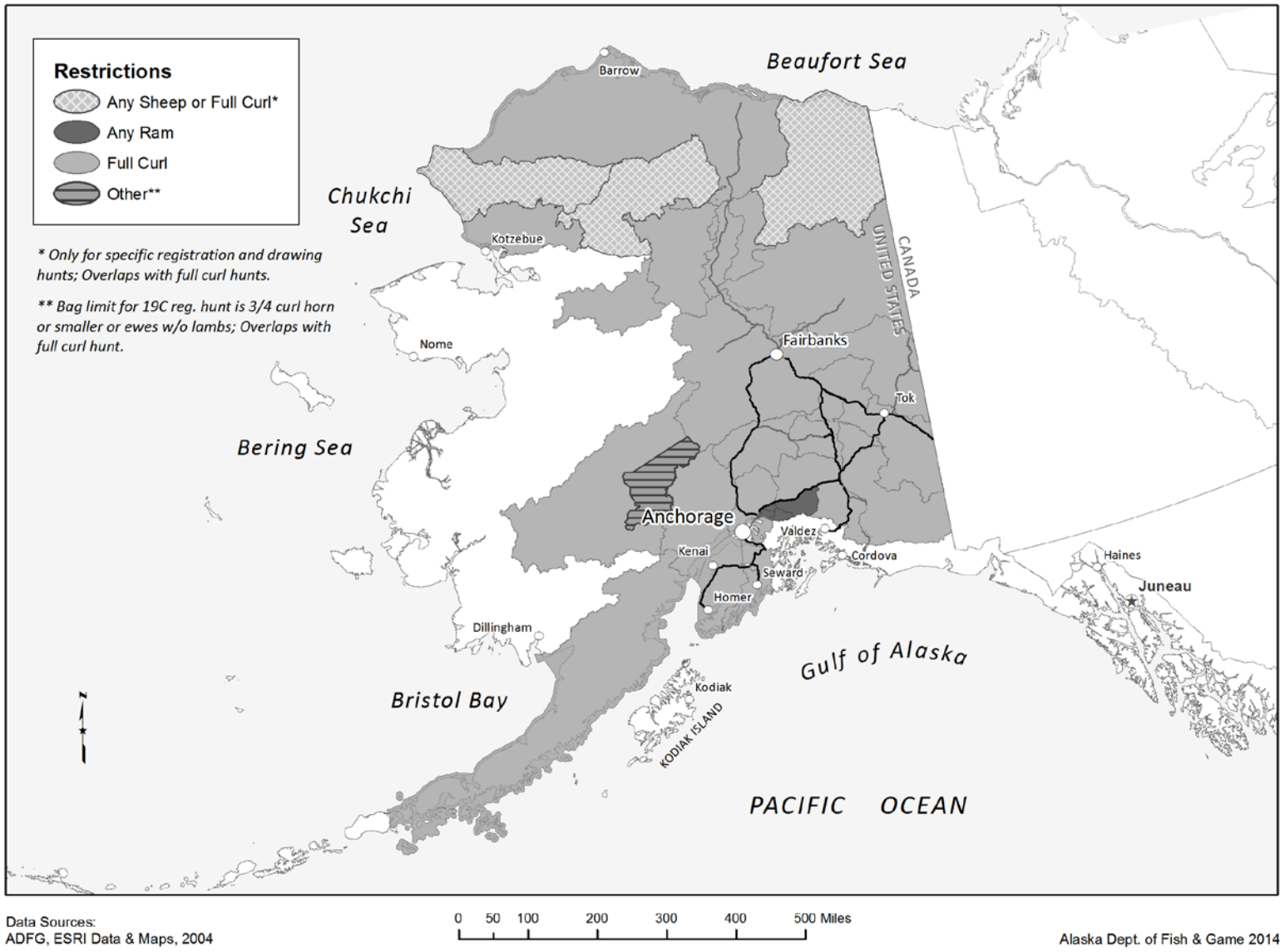


Figure 3. Current bag limit restrictions for sheep hunts by area (overlap between registration and some general season hunts).

Hunter Method of Transportation

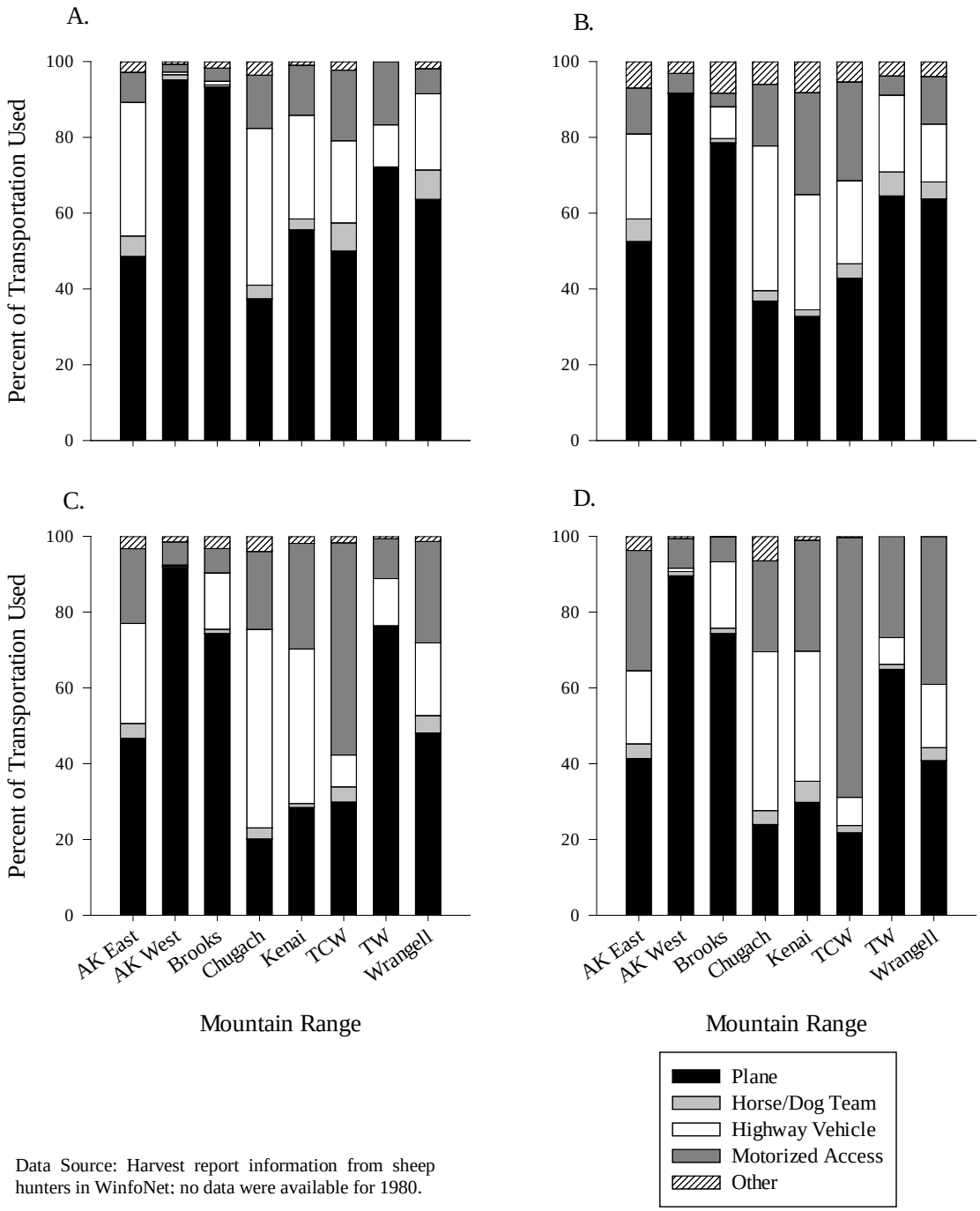
There were very distinct patterns in method of transportation reported for the four time periods and eight ranges reviewed for this report (Figs. 4 and 5). Airplanes were the most common means of transporting both residents and nonresident sheep hunters, with a few exceptions. For instance, Unit 14C, in the Chugach Mountains, has very limited airplane access so residents made use of good highway vehicle access to trailheads and other points. The Kenai Mountains also showed a higher percentage of highway vehicle transportation for resident access. The majority of the Chugach Range (13D and 14A) and the Kenai Mountains showed a different pattern for nonresident sheep hunters where airplanes were reported to be the most common method of transportation.

There were a few periods for nonresidents when horses were the second most reported method of access for the eastern Alaska Range, the Kenai Mountains, and the Wrangell Mountains. All of these areas have been known for big game hunting with the use of horses. For example, both the eastern Alaska Range and the Wrangell Mountains have historically shown nonresident hunters using horses as much as airplanes as a method of access. Often, pack stock were located in remote areas accessible only by aircraft.

One pattern that was emerging in the last two time periods is the growing use of all-terrain and off-road vehicles (ATVs and ORVs), especially for resident hunters (Appendices E and F). There has been a clear increase of ORV and ATV use in the Talkeetna Mountains, and to a lesser extent, in the Wrangell Mountains, the western Alaska Range, the Chugach Mountains, and the Tanana Hills. This is similar to the pattern for their areas described by agency representatives and others from the Yukon and British Columbia at the Thinhorn Summit last year (Wild Sheep Foundation 2014). It is likely that this trend will continue given the growing population of hunters who own ATVs as well as the increasing capabilities and dependability of the newer and more powerful models that are now available.

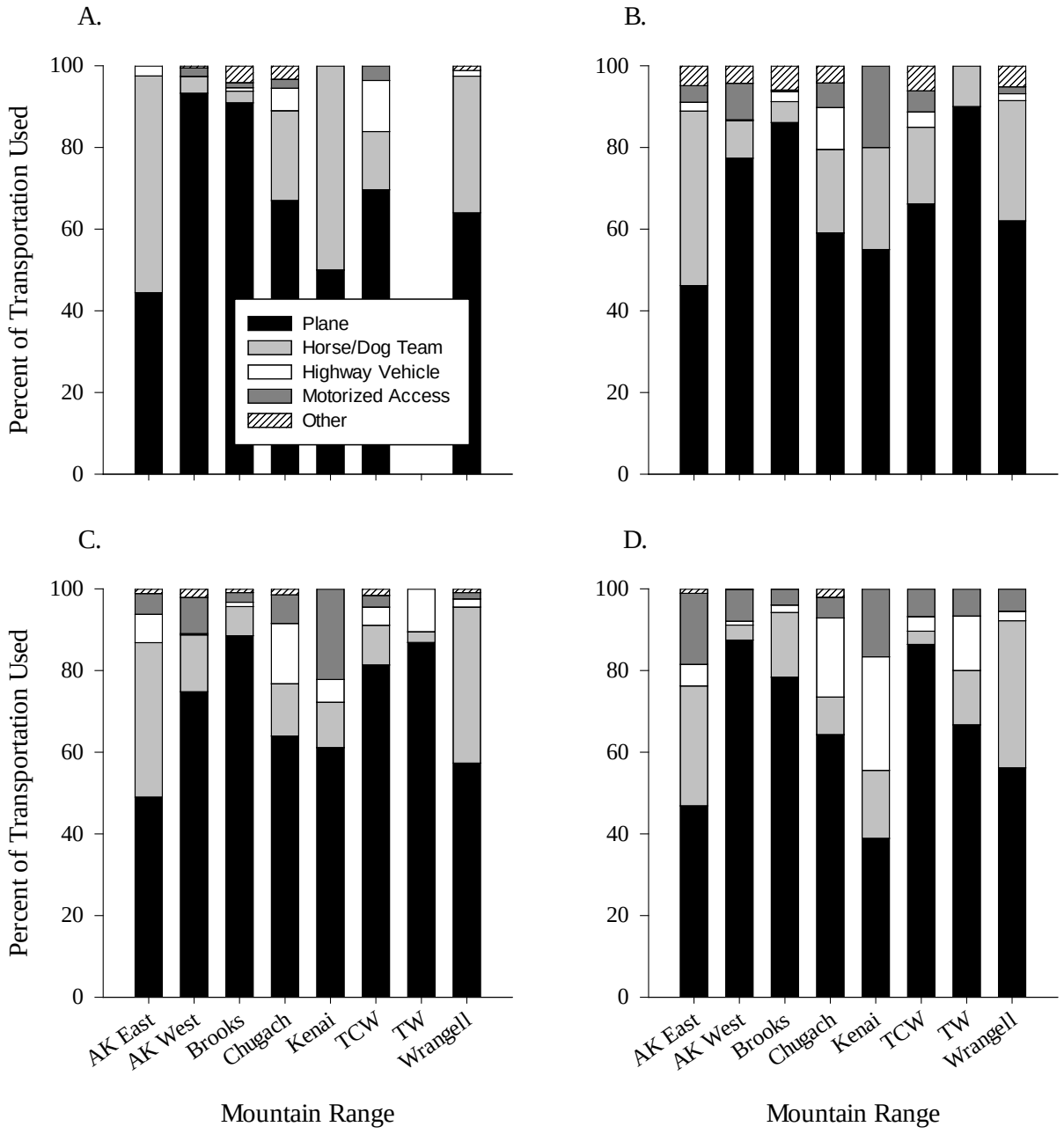
Hunter Participation and Harvest

Total statewide harvest and hunter numbers from 1977 to 2013 are shown in Figures 6 and 7. Both graphs show an increase in resident hunters and harvest until about 1990 and a statewide declining trend since then. The reported number of resident hunters 2011–2013 (1,882–1,919) was the lowest since 1979–1982 (1,716–1,772). Resident harvest also declined during the last five years to some of the lowest levels (434–475) recorded since 1977. Over the same time period, the number of nonresident hunters statewide each year has varied between 311 and 652 with about 450-550 nonresident hunters in most years. Nonresident harvest has similarly been roughly stable over time and fluctuated similar to nonresident hunter numbers since 1977. Statewide totals show the trend in nonresident harvest and hunter numbers as stable over the last nearly four decades. Resident harvest and hunter numbers show increases that began about 1980 (near the start of Period 2) and then a declining trend since about 1990 (early in Period 3).



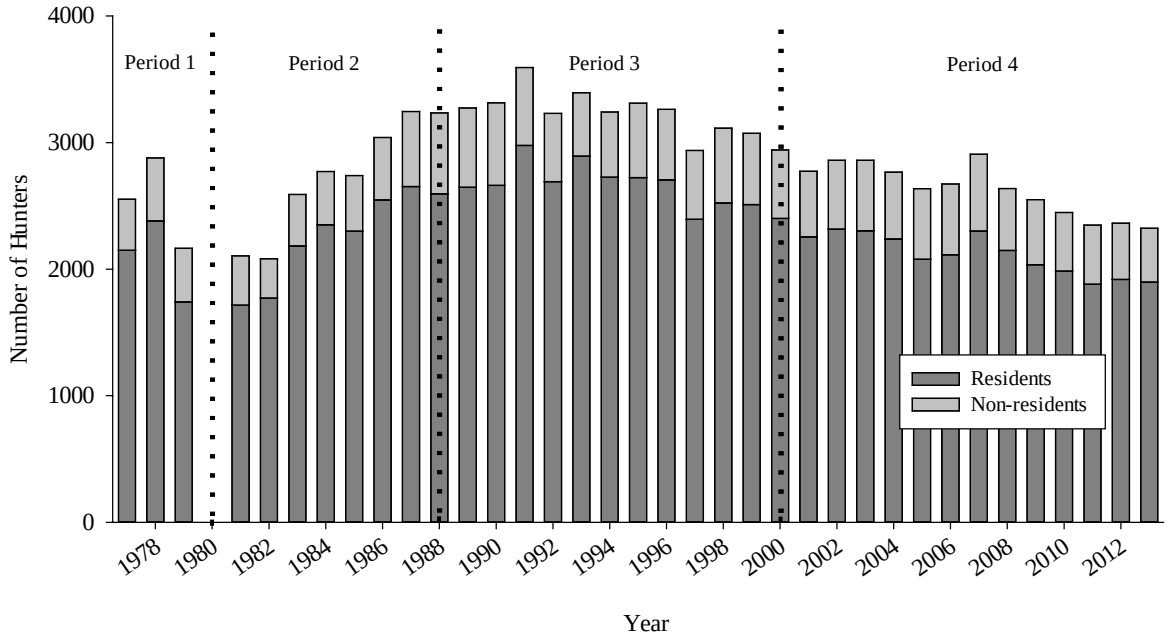
Data Source: Harvest report information from sheep hunters in WinfoNet; no data were available for 1980.

Figure 4. Types of transportation used by resident hunters to access sheep hunt areas in eight mountain ranges in Alaska (Alaska Range East, Alaska Range West, Brooks Range, Chugach Mountains, Kenai Mountains, Talkeetna/Chulitna/Watana Mountains (TCW), Tanana Hills/White Mountains (TW), and Wrangell Mountains) during four time periods: A. Period 1: 1972–1980, B. Period 2: 1981–1988, C. Period 3: 1989–2000, and D. Period 4: 2001–2013. Motorized Access includes boats, airboats, ORVs, and ATVs. Other includes foot transportation, and other unspecified transportation methods.



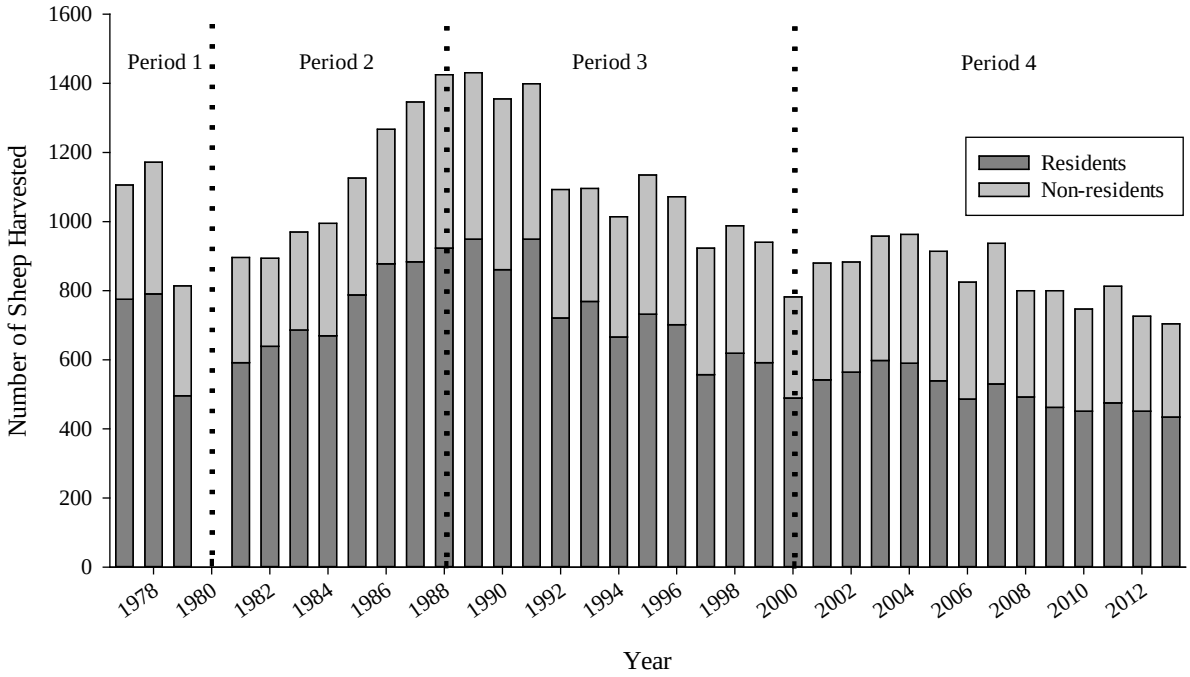
Data Source: Harvest report information from sheep hunters in WinfoNet; no data were available for 1980.

Figure 5. Types of transportation used by nonresident hunters to access sheep hunt areas in eight mountain ranges in Alaska (Alaska Range East, Alaska Range West, Brooks Range, Chugach Mountains, Kenai Mountains, Talkeetna Mountains/Chulitna-Watana Hills (TCW), Tanana Hills/White Mountains (TW), and Wrangell Mountains) during four time periods: A. Period 1: 1972–1980, B. Period 2: 1981–1988, C. Period 3: 1989–2000, and D. Period 4: 2001–2013. Motorized Access includes boats, airboats, ORVs, and ATVs. Other includes foot transportation, and other unspecified transportation methods.



Data Source: Harvest report information from sheep hunters in WinfoNet; no data were available for 1980

Figure 6. The number of resident and nonresident sheep hunters in Alaska from 1977 to 2013. The four time periods delineated are: Period 1: 1972–1980, Period 2: 1981–1988, Period 3: 1989–2000, and Period 4: 2001–2013.



Data Source: Harvest report information from sheep hunters in WinfoNet; no data were available for 1980.

Figure 7. The number of sheep harvested by resident and nonresident sheep hunters in Alaska 1977–2013. The four time periods delineated are: Period 1: 1972–1980, Period 2: 1981–1988, Period 3: 1989–2000, and Period 4: 2001–2013.

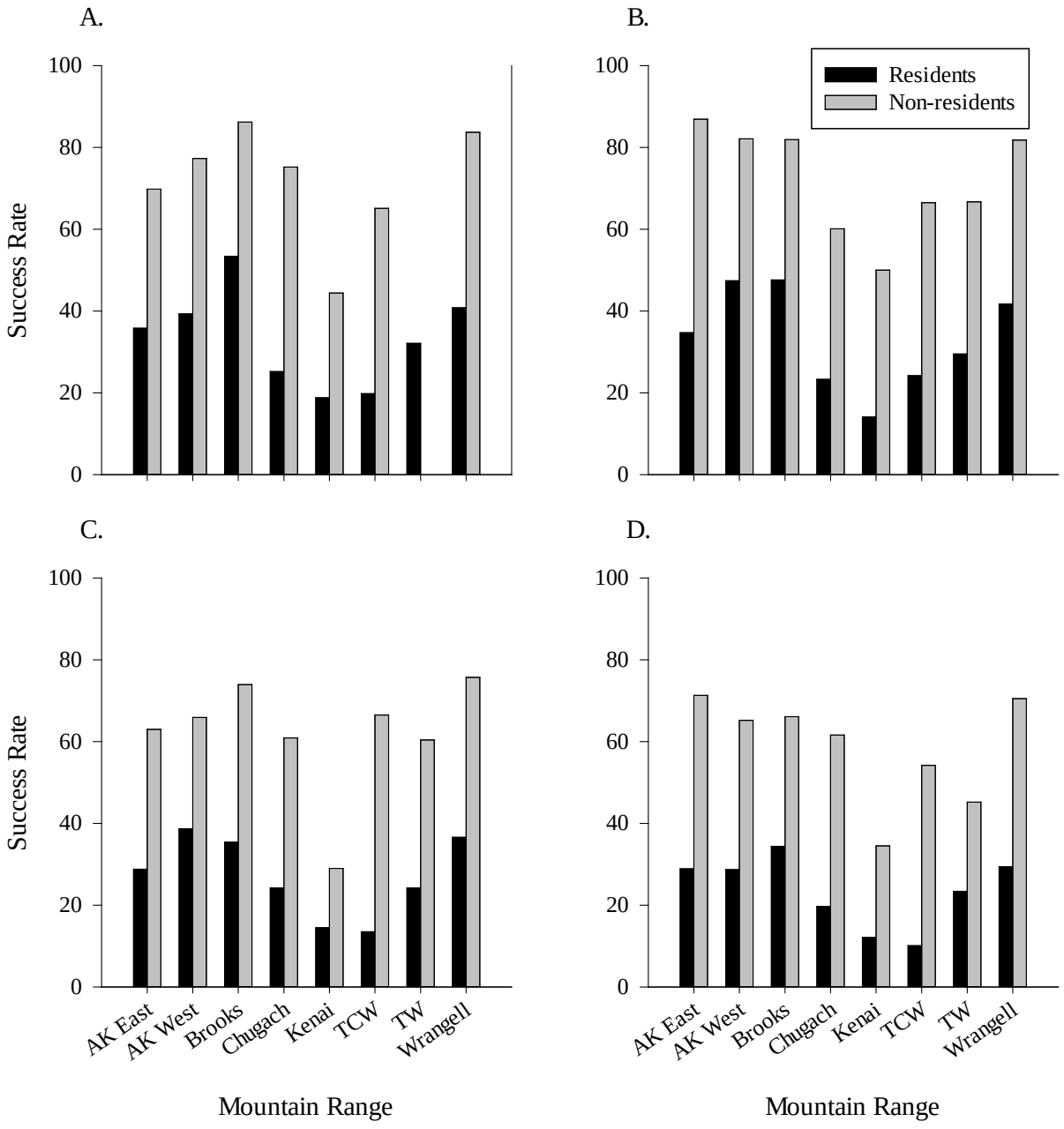
Success Rates and Harvest Chronology

Hunter success rate, the percentage of hunters who harvested a sheep, was determined for resident and nonresident hunters for each of the four time periods and eight mountain ranges. Success rates showed a general trend of declining success for both residents and nonresidents across the time periods as shown in the four charts in Figure 8. Residents had lower success rates for all mountain ranges and for all periods with reported harvest, which was expected because most nonresidents hunt with a guide. In a few areas, there were large differences between resident and nonresident success rates throughout all periods. Other areas showed much less difference, with resident success rate also declining less dramatically than nonresident success rate.

Some patterns and trends in the data were expected while others were less so. The unpredictable trends are likely due to weather patterns or fire conditions affecting access to sheep, differences between nonresident and resident behavior, fluctuation in area sheep populations, or changes to hunting regulations or guide regulations. A comparison of the average number of hunters by period and range is provided in Appendix G.

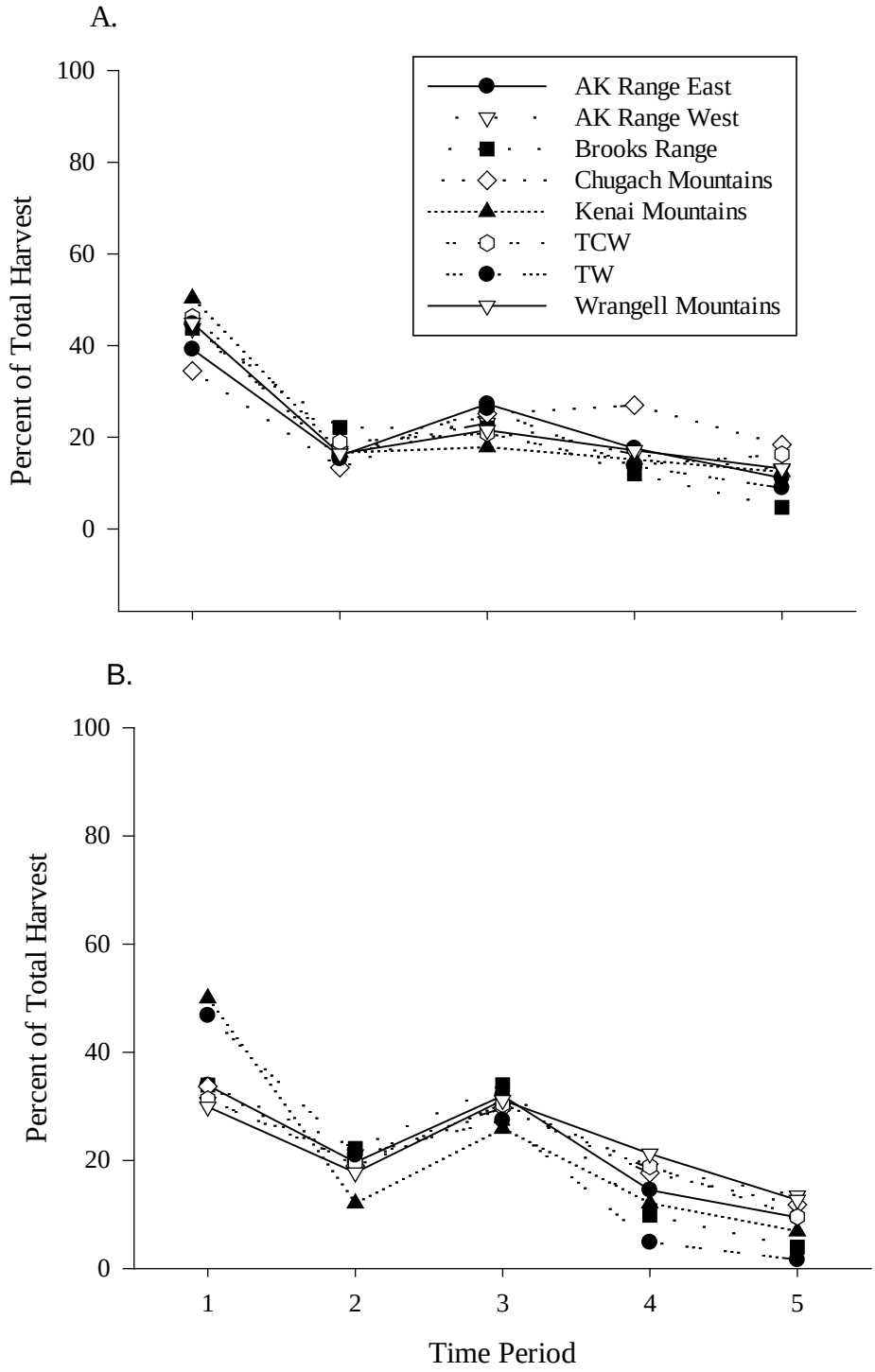
Harvest chronology was totaled for the traditional fall hunting period (August 10 – September 20) by range area for years 1977–2013. In general, for both residents and nonresidents, most sheep (> 50% of the total) were harvested during the first 10 days of the season (Fig. 9). The percent of resident harvest during this time period was higher for most of the mountain range areas. Data showed that around 40% of the reported harvest occurred in the first five days in most ranges. About 75 % or more of the harvest was reported to be before September 1. This would be expected for several reasons including weather and travel limitations in some sheep hunting areas, hunter interest in pursuing other species in September (e.g., moose or caribou), and perceived declining availability of legal rams.

Data for the Chugach Mountains showed an exception to the harvest chronology patterns. The three season periods for drawing hunts that occur in unit 14C effectively distributed harvest in Unit 14C over the course of the season period from August 10 through September 20. The harvest percentage for the first 10 days for the entire Chugach range is still higher than would be expected for 14C itself because it was included with the other Chugach units, 14A and 13D, where there are fewer seasons that open after August 10. Unit 14A has two season periods and 13D has one season period.



Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Figure 8. Success rates of residents and nonresident sheep hunters in eight mountain ranges in Alaska (Alaska Range East, Alaska Range West, Brooks Range, Chugach Mountains, Kenai Mountains, Talkeetna Mountains/Chulitna-Watana Hills, Tanana Hills/White Mountains, and Wrangell Mountains) during four time periods: A. Period 1, 1972-1980, B. Period 2, 1981-1988, C. Period 3, 1989-2000, and D. Period 4, 2001-2013.



Data Source: Harvest report information from sheep hunters in WinfoNet.

Figure 9. Chronology of resident (A.) and nonresident (B.) Dall sheep harvest 1977–2013 in eight mountain ranges in Alaska (Alaska Range East, Alaska Range West, Brooks Range, Chugach Mountains, Kenai Mountains, Talkeetna/Chulitna–Watana Hills (TCW), Tanana Hills/White Mountains (TW), and Wrangell Mountains). The time periods of harvest include: 1) August 10–14, 2) August 15–20, 3) August 21–31, 4) September 1–10, and 5) September 11–20.

Age and Size of Harvested Rams

The size and age of harvested rams taken by residents and nonresidents were averaged for resident and nonresident harvest and for the eight range areas and by time period (Tables 4 and 5). Size, in terms of horn length, was averaged for the four time periods while age was averaged for the last three (because ram ages were not collected during 1972–1980). It was found that nonresidents generally harvested slightly older and larger rams than did residents, with a few exceptions. These exceptions occurred where limited nonresident sheep hunting activity and harvest was low, such as in the Kenai Mountains and the Tanana Hills. Overall for all ranges and time periods, there was little difference between residents and nonresidents regarding average size and age of sheep harvested.

Table 4. Mean horn length (in inches to the nearest tenth) for rams harvested by resident and nonresident hunters by mountain range and period.

Mountain Range	Residency	Average Length (inches)	Period 1 '72–'80	Period 2 '81– '88	Period 3 '89– '00	Period 4 '01–'13
Alaska Range East	Resident	35.0	33.3	34.7	35.5	35.1
	Nonresident	35.2	34.9	35.3	35.3	35.2
Alaska Range West	Resident	35.4	33.7	35.0	36.0	35.8
	Nonresident	35.4	34.1	35.6	35.7	35.3
Brooks Range	Resident	34.6	34.2	34.4	34.3	35.2
	Nonresident	35.2	35.2	35.1	35.2	35.3
Chugach Mountains	Resident	34.7	34.1	34.8	34.6	35.0
	Nonresident	36.5	34.5	35.4	37.0	36.8
Kenai Mountains	Resident	33.8	30.8	33.0	34.6	34.7
	Nonresident	34.4	32.8	32.8	35.5	35.8
Talkeetna Mtns., Chulitna-Watana Hills	Resident	34.2	32.7	33.5	34.7	34.9
	Nonresident	35.1	34.9	33.8	35.5	35.5
Tanana Hills and White Mountains	Resident	34.7	34.1	35.2	35.7	34.0
	Nonresident	35.0	--	33.9	35.4	34.7
Wrangell Mountains	Resident	33.4	32.6	33.7	33.1	33.7
	Nonresident	34.9	34.3	34.5	35.3	35.2

Data Source: Harvest report information from sheep hunters in WinfoNet; no data were available for 1980.

Table 5. Mean age, in years, of rams harvested by mountain range, residency, and period.

Mountain Range	Residency	Average Age (years)	Period '81–'88	Period '89–'00	Period '01– '13
Alaska Range East	Resident	8.6	8.2	8.9	8.6
	Nonresident	9.0	9.1	9.3	8.7
Alaska Range West	Resident	8.7	8.4	9.0	8.6
	Nonresident	9.0	9.0	9.1	8.8
Brooks Range	Resident	9.1	8.7	9.3	9.1
	Nonresident	9.4	9.2	9.6	9.3
Chugach Mountains	Resident	8.0	7.7	8.0	8.1
	Nonresident	8.6	8.0	8.9	8.7
Kenai Mountains	Resident	7.9	7.1	8.1	8.4
	Nonresident	7.8	7.1	8.1	8.1
Talkeetna Mtns., Chulitna-Watana Hills	Resident	8.0	7.6	8.3	8.0
	Nonresident	8.6	7.8	9.0	8.5
Tanana Hills and White Mountains	Resident	9.2	8.9	9.6	9.2
	Nonresident	8.9	8.6	9.0	8.9
Wrangell Mountains	Resident	7.9	7.8	8.0	7.8
	Nonresident	8.6	8.2	9.0	8.5

Data Source: Harvest report information from sheep hunters in WinfoNet; no data were available for 1980.

Hunter Effort

Sheep hunting generally lends itself to a higher level of personal and financial commitment from the hunter as compared to other big game hunting. The number of days hunted, method of transportation, and commercial services used were reviewed to help identify differences and similarities between resident and nonresident sheep hunter efforts. Percent success for resident and nonresident hunters also provided some insight into some of the inherent differences (or lack thereof) between resident and nonresident sheep hunters. For example (Table 6), there appears to be some difference in the reported number of days hunted between unsuccessful resident and nonresident sheep hunters in most of the sheep range areas. This was expected given the larger amount or resources expended by most nonresidents to hunt sheep (e.g., guided sheep hunting trips are planned to be for 7 to 10 days).

Table 6. The average number of days unsuccessful hunters hunted, by mountain range and period.

Mountain Range	Residency	Mean Days Hunted	Period 1 '72 – '80	Period 2 '81 – '88	Period 3 '89 – '00	Period 4 '01 – '13
Alaska Range East	Resident	5.5	5.2	5.1	5.6	5.6
	Nonresident	7.2	6.8	7.0	7.1	7.3
Alaska Range West	Resident	5.8	5.2	6.0	5.7	5.8
	Nonresident	7.1	6.3	8.1	7.2	6.8
Brooks Range	Resident	6.1	6.4	6.3	5.9	6.2
	Nonresident	7.5	7.3	7.2	7.4	7.6
Chugach Mountains	Resident	4.8	4.8	4.9	4.7	5.0
	Nonresident	7.3	7.9	8.7	6.9	7.0
Kenai Mountains	Resident	4.2	4.2	4.3	4.0	4.4
	Nonresident	7.1	6.7	8.6	6.4	7.2
Talkeetna Mtns., Chulitna-Watana Hills	Resident	5.5	4.4	4.7	5.8	5.6
	Nonresident	7.7	8.1	8.1	7.3	7.7
Tanana Hills and White Mountains	Resident	5.5	6.3	5.8	5.3	5.5
	Nonresident	6.6	--	8.4	5.8	7.0
Wrangell Mountains	Resident	5.5	5.6	5.8	5.3	5.6
	Nonresident	7.0	7.4	7.9	6.5	7.2

Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

The average number of days hunted for unsuccessful sheep hunters (Table 6) didn't show any obvious trends for any of the eight mountain ranges except that nonresidents reported spending more days hunting. Unsuccessful nonresident hunters generally spent one or two more days hunting than unsuccessful resident hunters. Unsuccessful resident hunters who hunted in the Brooks and western Alaska ranges reported spending a little more time hunting as compared to unsuccessful hunters in the other six range areas. Overall it appeared that there was likely some difference between residents and nonresidents in total days hunted for all time periods and mountain ranges although there appeared to be little difference in days hunted for each group (residents and nonresidents) between time periods.

Similar comparisons were done for resident and nonresident hunters who reported harvesting a sheep (Table 7). These results showed similar patterns for residents and nonresidents for most

areas with the possible exception of the Brooks Range where residents spent a little more time to harvest a ram and the Kenai Mountains where nonresidents spent an average of about a day more. The latter example is possibly a result of lower numbers of nonresident hunters pursuing sheep on the Kenai Peninsula.

Table 7. The average number of days successful hunters hunted, by mountain range and period.

Mountain Range	Residency	Mean Days Hunted	Period 1 '72 – '80	Period 2 '81 – '88	Period 3 '89 – '00	Period 4 '01 – '13
Alaska Range East	Resident	4.9	4.0	5.2	5.0	4.7
	Nonresident	4.7	3.9	5.1	4.9	4.4
Alaska Range West	Resident	4.8	4.6	4.8	5.1	4.5
	Nonresident	4.7	4.5	5.5	4.8	4.3
Brooks Range	Resident	5.6	4.6	6.0	5.7	5.4
	Nonresident	4.9	4.0	5.7	4.5	4.8
Chugach Mountains	Resident	4.5	4.1	5.3	4.3	4.4
	Nonresident	4.8	5.5	5.9	4.6	4.3
Kenai Mountains	Resident	3.8	3.6	4.0	3.8	3.5
	Nonresident	4.9	8.1	5.3	4.6	3.6
Talkeetna Mtns., Chulitna– Watana Hills	Resident	4.5	3.8	4.7	4.6	4.2
	Nonresident	5.0	6.5	5.5	5.3	4.0
Tanana Hills and White Mountains	Resident	5.1	5.7	7.3	4.8	4.7
	Nonresident	5.9	--	14.1	3.9	5.2
Wrangell Mountains	Resident	5.2	4.6	5.9	5.2	4.6
	Nonresident	4.7	4.4	6.1	4.3	4.2

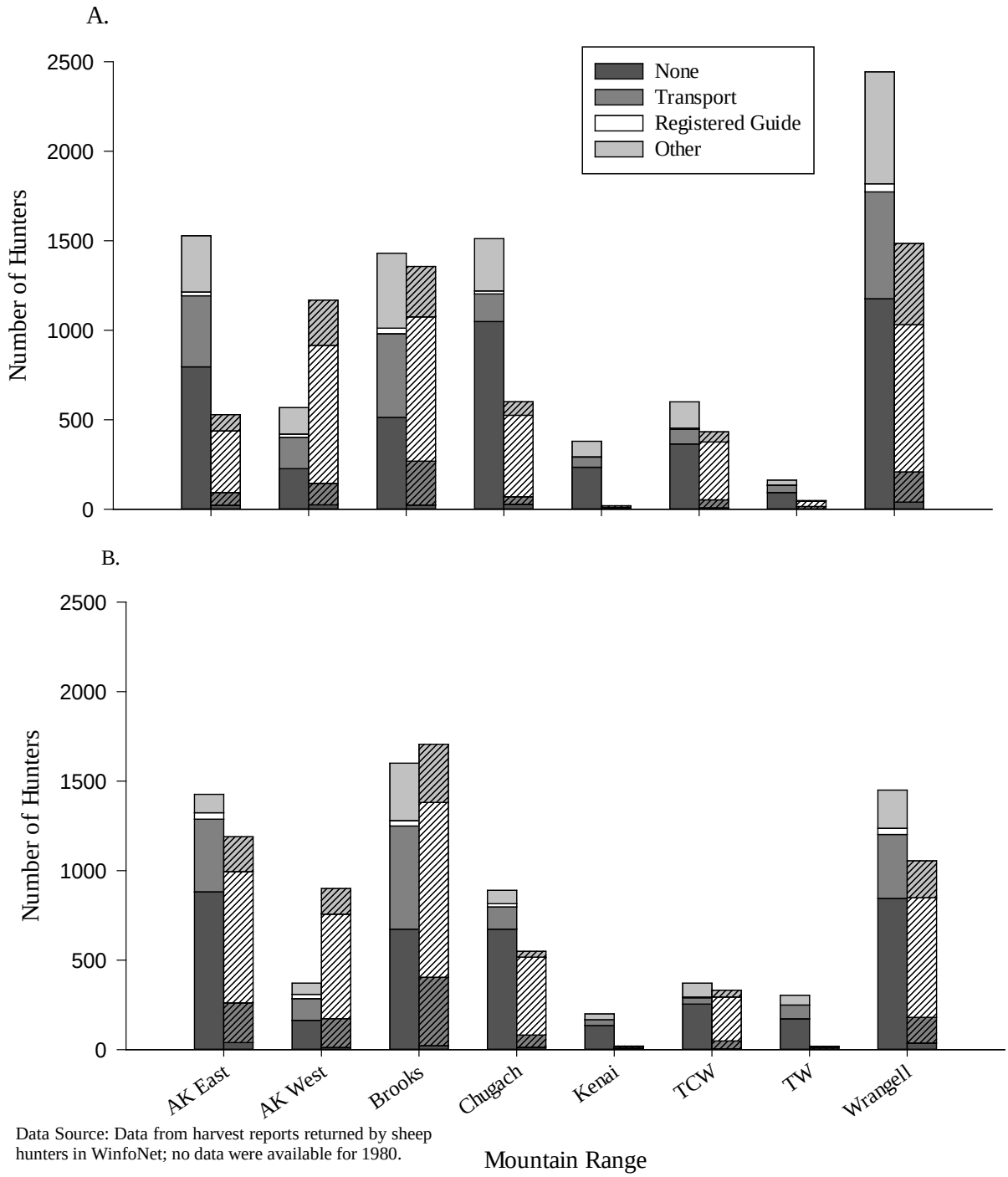
Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Commercial Services Used

ADF&G has collected data regarding commercial services since the early 1990s (Appendices I and J). Both resident and nonresident sheep hunters have reported using commercial services to some extent although nonresident hunters clearly have used commercial services significantly more because they have been required to have a guide. Both residents and nonresidents reported using commercial transporters, for some ranges in similar proportions relative to total hunters. There were some differences between ranges and across types of commercial services (Fig. 10). There were a few patterns shown in the data and this provided some additional description to the related activities and reported conflict associated with sheep hunting. For example, nonresident hunters used commercial services most of the time and especially guided services much more frequently than resident hunters. In contrast, half of the residents for some ranges reported no commercial services used at all. Those that did report using commercial services showed transportation to be the most important of the identified options.

Results presented in Figure 10 provide some insight into the number of nonresidents hunting with second degree kindred relatives. Because these data are not specifically collected in the harvest reports, it is difficult to determine the level of hunting effort by nonresident second-degree kindred relatives. However, an approximate number can be extrapolated from the nonresident hunter total after deducting the number of nonresidents that report using guided services. It should be noted here that some nonresident hunters may mistakenly report their guide service under the "hunter service" or "lodge/camp" categories. Although these data may be less precise, the extrapolated numbers provide a rough estimate of the number of nonresidents hunting with relatives. The commercial services data were never intended to provide the number of nonresident hunters hunting with relatives, but the information may be useful if allocations for the different nonresident user groups are considered.

Results suggest that nonresident second degree kindred relatives are possibly as much as 30% of the nonresident sheep hunter numbers in some units. Because second degree kindred relatives are not identified for most areas (e.g., hunts not requiring the guide to be identified), the proportion is based primarily on nonresident hunter general harvest reports that indicate using a registered guide.



Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Figure 10. The number of resident (solid bars) and nonresident (hashed bars) hunters who used commercial services to hunt Dall sheep in eight mountain ranges in Alaska (Alaska Range East, Alaska Range West, Brooks Range, Chugach Mountains, Kenai Mountains, Talkeetna/Chulitna-Watana Hills, Tanana Hills/White Mountains, and Wrangell Mountains) during two time periods: A. Period 3: 1989–2000, B. Period 4: 2001–2013. Other includes the combined categories of hunter services, lodge/commercial camp, other and unspecified.

Guides and Transporters

Information regarding guides (Registered, Master, and Assistant Guides) and transporters was provided to the division in 2014 by the Professional Licensing section (Professional Licensing) of the State of Alaska's Division of Corporations, Business, and Professional Licensing in the Department of Commerce, Community, and Economic Development to help identify the level of guiding and transporting activities that may influence sheep hunters' perceptions of crowding and conflicts between user groups (Appendix H). However, information available was not detailed enough to draw conclusions regarding guided hunt impact on resident hunters.

The information regarding transporters is limited as these data are not quantified by Professional Licensing in details relevant to questions related to sheep hunting. Since January 2000, 483 transporter licenses issued. Of these, 222 have submitted activity reports. For fall 2014, Professional Licensing reported that there were 140 reported active licensed transporters operating in the state. This includes all types of transporters (e.g., boat, airplane, ATV, etc.). Of this total, 108 were listed as currently operating in game management units that have sheep hunting. Because transporters often operate in multiple areas, it is likely that there is some duplication within this total. The annual reports sent in by these operators provide the only data regarding activities. Unfortunately, many transporters fail to send in a report at all. In addition, when they do report they are not required to specifically report on who or how many they transported to hunt sheep. Consequently, this information is not very useful for this report. Another issue that complicates this discussion is the fact that any review of commercial transportation of sheep hunters is complicated by the presence of air taxis. These commercial operators, who fall under Federal Aviation Administration regulation, are not required to report to the state. Because of this, there is no information available at all on the transportation of sheep hunters by this group.

Data provided by Professional Licensing on guides were more complete. This group of operators was separated out by four guide categories with totals for registered and master guides listed by Guide Use Area (GUA) on the Big Game Commercial Services Board website (http://commerce.state.ak.us/dnn/cbpl/ProfessionalLicensing/BigGameCommercialServicesBoard/ListofLicensees.aspx, accessed September 2014). Based on the information in this database, there were 373 Registered Guide-Outfitters, 125 Master Guides, 95 Class A Assistant Guides, and 685 Assistant Guides licensed in the state in 2014. There is also a requirement to be certified to guide sheep. Professional Licensing reported 58 Master and Registered Guide-Outfitters have been listed in their database as certified to guide sheep since 2007. This number is only for the last seven years and is considered an incomplete list because it doesn't include long-time Master and Registered Guides who were not originally required to be certified to hunt sheep. Also, there are other guides that have become certified to hunt sheep that are not included in the database. It is therefore likely that the number of guides who currently hunt sheep is greater than the number listed in this report as being certified to hunt sheep.

Another way to quantify guided sheep activity is to look at the number of sheep hunters who reported to ADF&G that they used a guide by Guide Use Area (GUA; Fig. 11). For example, during regulatory years 2010–2012 the number of guided sheep hunts averaged 56 per season in

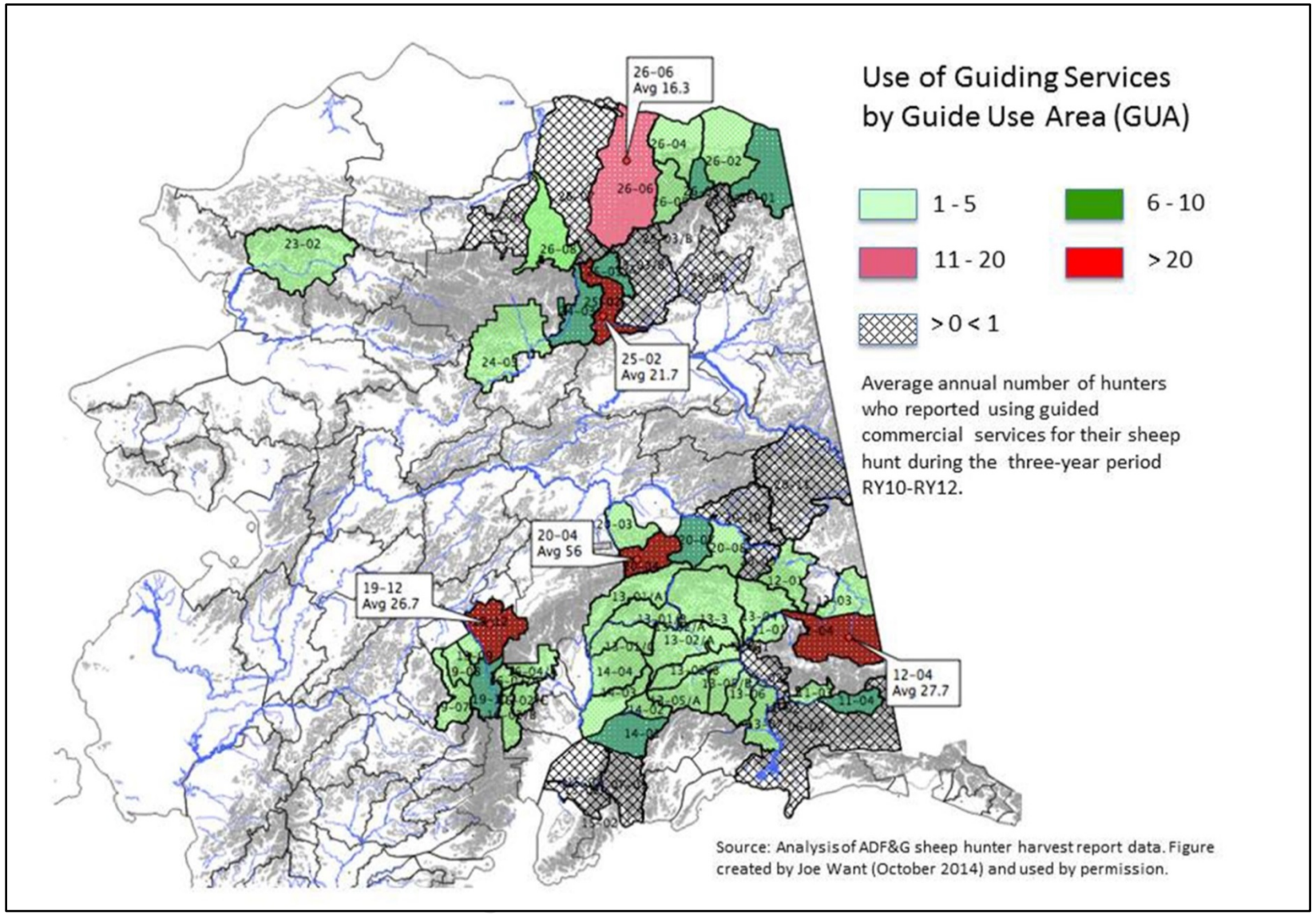


Figure 11. Reported average annual number of guided sheep hunts from ADF&G harvest reports 2010–2012, by guide use area.

GUA 20-04. A statewide average of 535 nonresident hunters reported annually 2010–2012 and although a portion of these hunted with resident relatives, the remainder hunted with guides.

Assuming that at least 80 percent of the nonresident hunters reporting hired a guide, it is likely that more than 10% of the total nonresidents were guided in GUA 20-04. As an example, these data showed a more refined view of the level of guided sheep hunting activity for this specific GUA. There is likely other, more detailed information collected or potentially available such as guide hunt reports and guide-client contracts but these data are either unavailable or otherwise difficult to quantify (e.g., guide-client contracts are not collected, cataloged, or tracked by Professional Licensing).

Conclusion

Information and data available and reviewed for this report illustrate the following core trends and characteristics of sheep populations, hunters, and harvests in Alaska:

- While there is currently no reliable estimate of the statewide sheep population, individual sheep population trends in Alaska are generally considered to be stable or decreasing.

- For over twenty years, there have been declines in the total number of hunters and number of sheep harvested.

- Nonresident sheep hunter success rates are most often twice that of residents although there is very little difference in the number of days hunted between residents and nonresidents.

- Over half of the total harvest occurs in the first 10 days of the season with a majority of this occurring in the first 5 days.

- Nonresident sheep hunters reported using airplanes and horses more often than other methods for accessing areas to hunt sheep.

- Residents reported using airplanes the most, with ORVs and highway vehicles also listed as being used more often than other methods of transportation for access.

- Most nonresident hunters hire guides and/or other commercial services while the majority of residents do not.

- Residents that use commercial services hire transporters more than all other types of commercial services.

While it is expected these findings and those from the surveys conducted by Dr. Brinkman will help inform discussions about regulatory changes to sheep hunting in Alaska, the division is fully aware that available data were not able to answer all questions pertinent to the discussion. Additional data will be analyzed as it becomes available.

Acknowledgments

This report was made possible by the work of many staff members of the Division of Wildlife Conservation, with some assistance provided by staff of the Professional Licensing section in the Division of Corporations, Business, and Professional Licensing, Department of Commerce, Community, and Economic Development. Tony Kavalok was the primary author and project leader, with other DWC staff members providing assistance, support, and guidance. Patti Harper was the principal editor and provided insight and comments throughout the project. Kurt Kamletz with DWC's Information Services provided most of the sheep harvest and hunter information and Cindy Hansen of Professional Licensing provided guide and transporter information. Maps were created and edited by Liz Solomon and Miles Spathelf. Figures and graphs were designed and formatted by Jessy Coltrane. Draft review and edits were provided by Doug Vincent-Lang, Bruce Dale, Kim Titus, Lem Butler, Doreen Parker McNeill, Gino DelFrate, Peter Bente, Natalie Weber, Darren Bruning, Tom Lohuis, Jessy Coltrane, Todd Rinaldi, Tony Hollis, Jim Dau, and Brandon Saito. Other management and research staff provided comments through the regional management coordinators in Regions II, III, and V.

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Appendices

Appendix A: Letter from BGCSB Investigator to Unit 13 Guides.

STATE OF ALASKA
DEPARTMENT OF
COMMERCE
COMMUNITY AND
ECONOMIC DEVELOPMENT

Sarah Palin, Governor
Emil Notti, Commissioner
Mark Davis, Director

Division of Corporations, Business and Professional Licensing

July 22, 2008

I am an investigator with the State of Alaska, Division of Corporations, Business and Professional Licensing (Division) tasked with investigating complaints on behalf of the Alaska Big Game Commercial Services Board. I am sending this to all Registered Big Game Guides-Outfitters registered for Guide Use Area (GUA 13-2).

Our office has received numerous complaints regarding interfering and obstructing hunts, violating buffer zones, using aircraft to herd animals, failing to respect the gear and equipment of others and numerous other acts that would constitute Unlawful Acts as prescribed in AS 08.54.720(a).

As of the date of this letter, there are 20 guides-outfitters registered for GUA 13-2, and there are only a few viable locations for registered guides to provide a quality sheep hunts; not to mention the many safety concerns. I must implore you to be conscientious of your neighbors and remind you that any unprofessional or unethical conduct could reflect poorly upon the professional hunting community and have impact not only in our state but within the international hunting community. I ask that you as Licensed Professionals assist in achieving that goal by being professional and ethical in your operation.

This Division will seek the maximum sanctions for any violation proven to be true. This letter also serves as a reminder that you must always comply with the provisions of AS 08.54 and 12 AAC 75 when providing Big Game Commercial services or when licensed in accordance with AS 08.54.

If you have any questions concerning this letter, I can be reached at (907) 269-7646.

Cordially,

Quinten Warren, Investigator
State of Alaska, DCCED
Division of Corporations, Business & Professional Licensing
550 W. 7th Ave, suite 1500
Anchorage, AK 99501

(907) 269-7646 FAX (907) 269-8195
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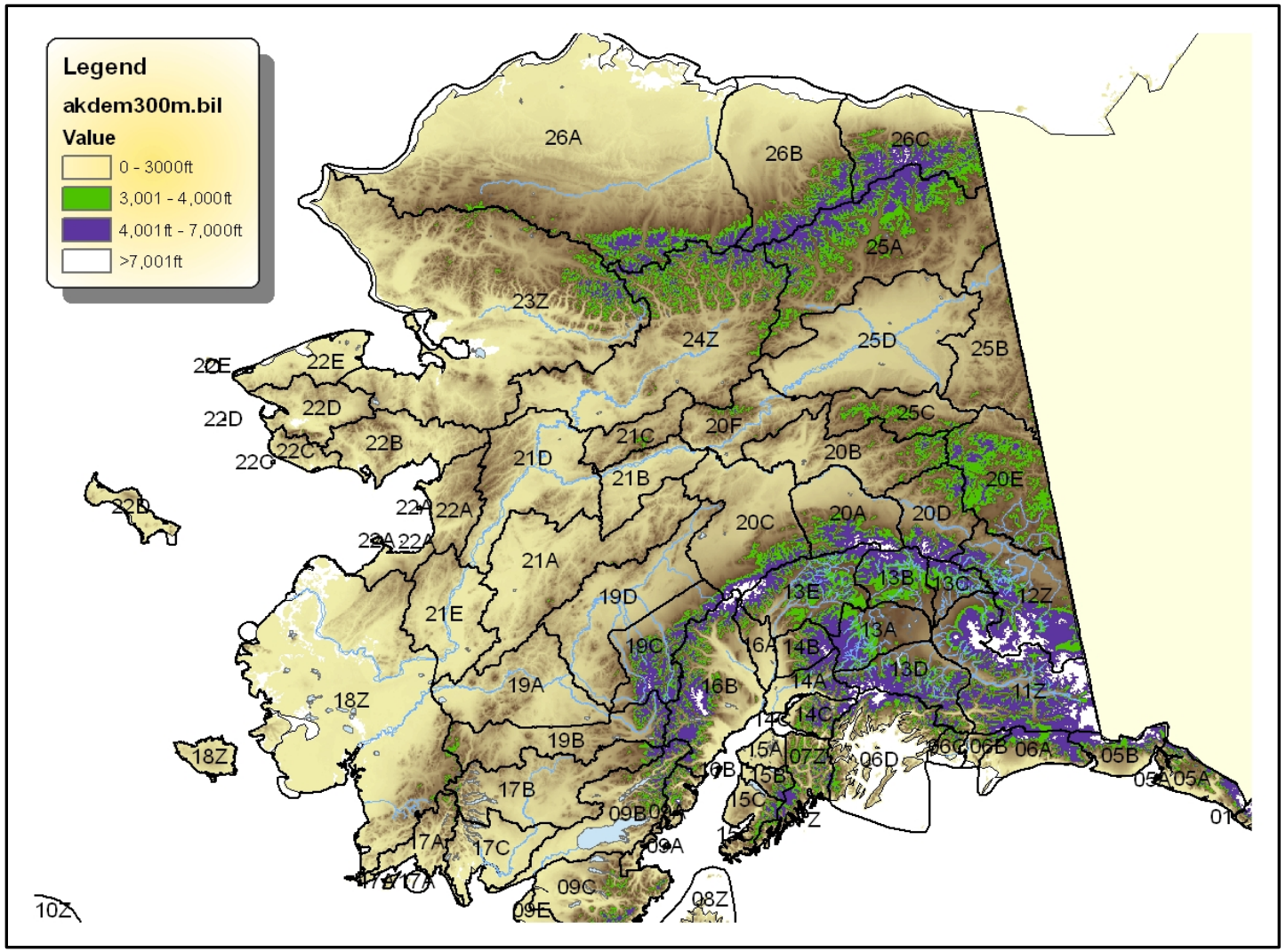
CC: Division of Corporations, Business & Professional Licensing, Juneau Office
Department of Public Safety, Alaska Wildlife Troopers
Alaska Department of Fish & Game, Wildlife Conservation
Department of Natural Resources, Division of Mining, Land & Water

550 West 7th Avenue, Suite 1500, Anchorage, AK 99501-3567
Telephone: (907) 269-8160 Fax: (907) 269-8156 Website: www.commerce.state.ak.us/occ

Appendix B: Alaska Digital Elevation Model



Source: ADF&G, USGS Alaska 300 m digital elevation model (19970512) Alaska Department of Fish and Game

Figure B1. Map of elevation levels in Alaska relevant to sheep habitat.

Appendix C: Alaska Dall Sheep Hunting Opportunities.

Table C-1. Sheep hunting opportunities, 2014, by Division of Wildlife Conservation region and game management unit (GMU).

	REGION I	REGION II	REGION III	REGION IV	REGION V
GMU	-none-	7, 14C, 15	12, 19, 20, 24 25, 26B, 26C	9B, 11, 13, 14A, 14B, 16	23, 26A

General Harvest (HT) for all GMUs or portions of GMUs with exceptions /additions as follows:

Draw Hunts (DS)

GMU	HUNT NUMBERS	CURRENT HORN MIN /BAG
7	DS150, DS156	FC (Full Curl)
12, 13C, 20D (TMA)	DS102, DS103	FC
13D	DS160, DS260	AR(Any Ram)
	DS165, DS265	FC
14A	DS170, DS175, DS180, DS185, DS190, DS195	AR
	DS270, DS275, DS280, DS285, DS290, DS295	AR
14C	DS123 – DS139, DS224, DS227, DS230 – DS233	FC
	DS236 – DS239	FC
	DS140, DS240, DS141, DS241(archery-only hunts)	Any sheep
15	DS150	FC
13B, 20A, 20D	DS203, DS204	FC
20D, 20E	DS206	FC

Registration Hunts (RS)

GMU	HUNT HUMBERS	BAG LIMIT RESTRICTIONS
19C	RS380	Ewes w/o lambs or Rams 3/4 curl or less
23/26A	RS388, RS389	Any Sheep, no more than 3 total
25A/26B	RS595	Any Sheep, no more than 3 total

Federal Subsistence Hunts

GMU	HUNT NUMBERS	BAG LIMIT RESTRICTIONS
9, 11, 12, 19, 20, 23, 25, 26	FS1104, FS1201, FS2304, FS2503, FS2602, FS2603	Varies: any-sheep, any-ram, ewes w/o lambs, 3/4, 7/8, quotas, etc.

Seasons

- HT / DS hunts are between 10 August – 20 September (many DS hunts for shorter specific periods within 10 August – 20 September season timeframe)
- RS dates start in August (2 hunts) or October (2 hunts), all end on 30 April

Federal subsistence hunts generally match adjacent state hunts for qualified rural residents on federal land units around the state.

Appendix D: Sheep Ram Bag Limits

Table D-1. Sheep ram minimum legal size (bag limit) for states other than Alaska and for Canadian provinces.

Other States

AZ - Any-ram (draw hunts)

ID - Any-ram (draw hunts)

NM - Any-ram (draw hunts)

NV - Any-ram (draw hunts)

OR - Any-ram (draw hunts)

MT - Any-ram (draw hunts); ¾ curl (open hunts)

CA - ¾ curl (draw hunts)

CO - ½ and ¾ curl (draw hunts)

UT - Any-ram and any sheep (draw hunts)

WA - Any-ram (draw hunts)

Canadian Provinces

AB - Full curl* and ¾ curl (draw hunts)

BC - Full curl* and ¾ curl (open / draw hunts)

NWT – ¾ curl (open hunts)

YK – Full curl* (open / draw hunts)

*Full curl definition varies by jurisdiction and is generally more liberal than the definition in Alaska.

All of the above jurisdictions that had full-curl regulation definitions included either (1) allowance for harvesting 8-yr-old rams and/or "broomed" rams or (2) discouraged the counting of annuli rings to age rams in order to determine legal minimum.

Appendix E: Methods of Hunter Transportation—Residents

Table E-1. Percentage of sheep hunters using various methods of transportation, by time period for eight mountain range areas.

Period	Mountain Range	% Airplane	% Horse/Dog	% Boat	% ATV	% Snowmachine	% ORV	% Highway vehicle	% Other	% Not provided
'72 - '80	Alaska Range East	48.6	5.4	0.5			7.5	35.3	2.8	
'72 - '80	Alaska Range West	95.2	1.4	0.7			1.4	0.7	0.7	
'72 - '80	Brooks Range	93.4	0.5	2.7		0.49	0.2	1.0	1.7	
'72 - '80	Chugach Mountains	37.4	3.6	11.5	0.4		2.2	41.4	3.6	
'72 - '80	Kenai Mountains	55.7	2.8	12.3	0.9			27.4	0.9	
'72 - '80	Talkeetna Mtns., Chulitna-Watana Hills	50.0	7.5		1.5		17.2	21.6	2.2	
'72 - '80	Tanana Hills, White Mountains	72.2		5.6			11.1	11.1		
'72 - '80	Wrangell Mountains	63.7	7.8	1.7	0.7		4.2	20.1	1.9	
'81 - '88	Alaska Range East	52.5	6.0	0.6	2.9		8.7	22.4	6.9	
'81 - '88	Alaska Range West	91.5		2.8	0.3		2.1	0.3	3.1	
'81 - '88	Brooks Range	77.6	1.1	2.1	0.8	0.5	0.3	8.3	8.2	1.3
'81 - '88	Chugach Mountains	36.8	2.8	8.9	4.3		3.1	38.2	6.0	
'81 - '88	Kenai Mountains	32.8	1.8	26.3			0.6	30.4	8.2	
'81 - '88	Talkeetna Mtns., Chulitna-Watana Hills	42.9	3.9	1.0	14.0		11.1	21.9	5.3	
'81 - '88	Tanana Hills, White Mountains	61.1	6.9		1.4		4.2	22.2	4.2	
'81 - '88	Wrangell Mountains	63.8	4.4	3.1	3.6		5.9	15.3	3.9	
'89 - '00	Alaska Range East	46.6	3.9	1.0	14.6	0.1	4.1	26.3	3.2	0.3
'89 - '00	Alaska Range West	91.7	0.4	3.6	2.0		0.5	0.4	1.4	
'89 - '00	Brooks Range	73.9	1.1	1.8	0.1	4.2	0.2	14.8	3.3	0.5
'89 - '00	Chugach Mountains	20.0	2.9	10.0	8.0		2.5	52.1	4.0	0.5
'89 - '00	Kenai Mountains	28.4	1.1	27.1	0.5		0.3	40.8	1.8	

Period	Mountain Range	% Airplane	% Horse/Dog	% Boat	% ATV	% Snowmachine	% ORV	% Highway vehicle	% Other	% Not provided
'89 - '00	Talkeetna Mtns., Chulitna-Watana Hills	29.9	4.0	0.7	51.2		4.2	8.4	1.7	
'89 - '00	Tanana Hills, White Mountains	77.5		5.1	3.1		0.6	12.8	0.6	
'89 - '00	Wrangell Mountains	47.9	4.6	5.6	18.1		3.1	19.1	1.3	0.2
'01 - '13	Alaska Range East	40.8	3.8	2.1	25.1	0.2	3.7	19.1	4.0	1.2
'01 - '13	Alaska Range West	88.0	1.2	2.6	5.1			0.9	0.6	1.7
'01 - '13	Brooks Range	72.3	1.4	1.8	0.4	3.7	0.5	17.1	0.2	2.6
'01 - '13	Chugach Mountains	23.5	3.6	6.3	15.9		1.3	41.2	6.6	1.6
'01 - '13	Kenai Mountains	29.5	5.5	28.0	1.0			34.0	1.0	1.0
'01 - '13	Talkeetna Mtns., Chulitna-Watana Hills	21.4	1.9	0.5	64.7		2.5	7.3	0.3	1.4
'01 - '13	Tanana Hills, White Mountains	65.1	1.4	6.3	15.6		0.4	7.8	1.9	1.5
'01 - '13	Wrangell Mountains	40.2	3.3	12.2	23.5		2.4	16.4	0.4	1.5

Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Appendix F: Methods of Hunter Transportation—Nonresidents

Table F-1. Percentage of sheep hunters using various methods of transportation, by time period for eight mountain range areas.

Period	Mountain Range	% Airplane	% Horse/Dog	% Boat	% ATV	% Snowmachine	% ORV	% Highway vehicle	% Other	% Not provided
'72–'80	Alaska Range East	44.4	53.1					2.4		
'72–'80	Alaska Range West	93.3	4.1				2.1		0.5	
'72–'80	Brooks Range	91.0	2.9	1.2				0.8	4.1	
'72–'80	Chugach Mountains	67.0	22.0	2.2				5.5	3.3	
'72–'80	Kenai Mountains	50.0	50.0							
'72–'80	Talkeetna Mtns., Chulitna-Watana Hills	69.6	14.3				3.6	12.5		
'72–'80	Tanana Hills, White Mountains									
'72–'80	Wrangell Mountains	64.0	33.4					1.4	1.1	
'81–'88	Alaska Range East	46.2	42.7				4.1	2.2	4.9	
'81–'88	Alaska Range West	77.4	9.2	0.6	2.4	0.2	5.8	0.2	4.3	
'81–'88	Brooks Range	86.1	5.1	0.3			0.1	2.4	5.9	
'81–'88	Chugach Mountains	59.1	20.5	5.1			0.9	10.2	4.2	
'81–'88	Kenai Mountains	55.0	25.0	20.0						
'81–'88	Talkeetna Mtns., Chulitna-Watana Hills	66.2	18.8	0.9	0.9		3.3	3.8	6.1	
'81–'88	Tanana Hills, White Mountains	90.0	10.0							
'81–'88	Wrangell Mountains	62.0	29.5	0.3	0.3		1.2	1.7	5.1	
'89–'00	Alaska Range East	48.9	37.7	1.6	3.4		0.2	6.9	1.1	0.2
'89–'00	Alaska Range West	74.7	13.9	0.7	3.7		4.5	0.3	2.1	0.1
'89 - '00	Brooks Range	88.5	7.2	2.1			0.3	1.1	0.9	
'89–'00	Chugach Mountains	63.9	12.8	3.6	2.7		0.7	14.8	1.4	0.2

Period	Mountain Range	% Airplane	% Horse/Dog	% Boat	% ATV	% Snowmachine	% ORV	% Highway vehicle	% Other	% Not provided
'89–'00	Kenai Mountains	61.1	11.1	22.2				5.6		
'89–'00	Talkeetna Mtns., Chulitna-Watana Hills	80.7	9.6		1.8		0.8	4.4	1.8	0.8
'89–'00	Tanana Hills, White Mountains	82.7	3.5					13.8		
'89–'00	Wrangell Mountains	57.3	38.2	0.5	0.6		0.4	2.0	0.9	0.1
'01–'13	Alaska Range East	45.6	28.6	0.9	12.9	0.1	3.0	5.1	1.1	2.7
'01–'13	Alaska Range West	85.9	3.6	0.3	2.4		5.0	0.9	0.2	1.8
'01–'13	Brooks Range	77.5	15.7	3.5	0.1		0.2	1.8	0.2	1.1
'01–'13	Chugach Mountains	63.4	9.1	2.6	2.2		0.2	19.1	2.0	1.4
'01–'13	Kenai Mountains	36.8	15.8	15.8				26.3		5.3
'01–'13	Talkeetna Mtns., Chulitna-Watana Hills	84.9	3.2		6.7			3.5		1.8
'01–'13	Tanana Hills, White Mountains	64.3	14.3		7.1			14.3		
'01–'13	Wrangell Mountains	55.7	35.8	1.3	3.9		0.3	2.3		0.8

Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Appendix G: Hunter Success

Table G-1. Average number and percentages of successful and unsuccessful sheep hunters by range and period, and by resident or nonresident.

Mountain Range	Period	Resident Successful		Resident Unsuccessful		Nonresident Successful		Nonresident Unsuccessful	
		#	%	#	%	#	%	#	%
Alaska Range East	'72–'80	142.3	35.8	255.0	64.2	27.0	69.8	11.7	30.2
	'81–'88	155.1	34.7	292.5	65.3	46.3	81.9	10.3	18.1
	'89–'00	125.2	28.8	309.9	71.2	37.1	63.0	21.8	37.0
	'01–'13	108.7	28.9	267.2	71.1	66.2	71.3	26.6	28.7
Alaska Range West	'72–'80	48.3	39.3	74.7	60.7	64.7	77.3	19.0	22.7
	'81–'88	48.3	47.4	53.6	52.6	58.4	82.1	12.8	17.9
	'89–'00	46.0	38.7	73.0	61.3	79.5	65.9	41.2	34.1
	'01–'13	26.9	28.7	66.9	71.3	51.2	65.2	27.3	34.8
Brooks Range	'72–'80	135.0	53.4	117.7	46.6	81.0	86.2	13.0	13.8
	'81–'88	138.1	47.6	151.9	52.4	97.1	81.9	21.5	18.1
	'89–'00	113.3	35.4	206.9	64.6	84.8	73.9	30.0	26.1
	'01–'13	118.9	34.4	226.5	65.6	88.2	66.1	45.2	33.9
Chugach Mountains	'72–'80	92.3	25.2	273.7	74.8	30.3	75.2	10.0	24.8
	'81–'88	98.1	23.3	323.6	76.7	26.8	60.1	17.8	39.9
	'89–'00	125.0	24.2	391.8	75.8	46.3	60.9	29.8	39.1
	'01–'13	67.9	19.7	277.2	80.3	38.2	61.6	23.9	38.4
Kenai Mountains	'72–'80	35.3	18.8	153.0	81.2	2.7	44.4	3.3	55.6
	'81–'88	21.4	14.1	129.9	85.9	2.5	50.0	2.5	50.0
	'89–'00	31.6	14.5	186.6	85.5	1.5	29.0	3.7	71.0
	'01–'13	15.4	12.1	112.1	87.9	1.5	34.5	2.8	65.5

Mountain Range	Period	Resident Successful		Resident Unsuccessful		Nonresident Successful		Nonresident Unsuccessful	
		#	%	#	%	#	%	#	%
Talkeetna Mtns., Chulitna-Watana Hills	'72–'80	44.3	19.8	179.7	80.2	18.7	65.1	10.0	34.9
	'81–'88	63.3	24.2	197.8	75.8	26.5	66.5	13.4	33.5
	'89–'00	49.5	13.5	318.2	86.5	31.9	66.5	16.1	33.5
	'01–'13	28.3	10.1	251.9	89.9	21.9	54.2	18.5	45.8
Tanana Hills, White Mountains	'72–'80	6.0	32.1%	12.7	67.9%	0.0	0.0	0.0	0.0
	'81–'88	8.9	29.5%	21.3	70.5%	1.3	66.7	0.6	33.3
	'89–'00	12.8	24.2%	40.3	75.8%	2.4	60.4	1.6	39.6
	'01–'13	20.8	23.4%	68.1	76.6%	1.1	45.2	1.3	54.8
Wrangell Mountains	'72–'80	180.7	40.8%	261.67	59.2%	118.33	83.7	23.00	16.3
	'81–'88	213.8	41.7%	299.25	58.3%	95.25	81.8	21.13	18.2
	'89–'00	198.4	36.6%	343.92	63.4%	95.42	75.7	30.67	24.3
	'01–'13	109.3	29.4%	262.38	70.6%	60.46	70.5	25.31	29.5

Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Appendix H: Guide and Transporter Numbers

Table H-1. Number of guide and transporter licenses issued from the Division of Corporations, Business, and Professional Licensing January 2000 through July 2014, by game management unit.

Guide licenses issued	GMU 7	GMU 9	GMU 11	GMU 12	GMU 13	GMU 14	GMU 15	GMU 16	GMU 19	GMU 20	GMU 23	GMU 24	GMU 25	GMU 26
1/1/2000-12/31/2004	3	22	2	7	23	14	1	23	30	16	5	7	7	5
1/1/2005-12/31/2009	3	22	3	4	16	10	3	15	8	13	2	3	3	7
1/1/2010-10/10/2014	0	19	0	1	4	6	1	10	8	9	0	1	4	7
Total (w/o duplication)	6	63	5	12	43	30	5	48	46	38	7	11	14	19

Transporter licenses issued	GMU 7	GMU 9	GMU 11	GMU 12	GMU 13	GMU 14	GMU 15	GMU 16	GMU 19	GMU 20	GMU 23	GMU 24	GMU 25	GMU 26
1/1/2000-12/31/2004	3	8	0	2	0	0	6	4	5	3	9	1	1	2
1/1/2005-12/31/2009	3	5	2	2	2	1	6	2	3	3	4	0	3	2
1/1/2010-10/10/2014	1	1	0	1	2	3	4	4	0	2	1	1	0	6
Total	7	14	2	5	4	4	16	10	8	8	14	2	4	10

Source: Alaska Department of Commerce, Community, and Economic Development, Division of Corporations, Businesses, and Professional Licensing.

Appendix I: Commercial Services Used by Resident Sheep Hunters

Table I-1. Reported commercial services used by resident sheep hunters for Period 3: 1989–2000, and Period 4: 2001–2003, by mountain range.

Period	Mountain Range	None	Transport	Hunt Services	Registered Guide	Lodge/Camp	Other	Unspecified	Total
'89–'00	Alaska Range East	796	397	24	21	3	12	275	1,512
'89–'00	Alaska Range West	227	176	32	17	2	5	109	555
'89–'00	Brooks Range	513	468	58	31	10	12	339	1,400
'89–'00	Chugach Mountains	1,049	154	21	17	1	9	261	1,508
'89–'00	Kenai Mountains	235	57	10	1	1	3	73	380
'89–'00	Talkeetnas, Chulitna-Watana Hills	365	82	16	7	1	1	128	596
'89–'00	Tanana Hills, White Mountains	94	39	5	2	0	1	22	161
'89–'00	Wrangell Mountains	1,176	597	128	46	49	19	429	2,384
'01–'13	Alaska Range East	881	406	22	36	4	2	75	1,415
'01–'13	Alaska Range West	164	121	10	24	9	2	41	350
'01–'13	Brooks Range	673	576	40	30	13	7	261	1,559
'01–'13	Chugach Mountains	673	124	8	18	2	2	63	883
'01–'13	Kenai Mountains	134	33	0	0	0	0	33	200
'01–'13	Talkeetnas, Chulitna-Watana Hills	254	34	7	5	1	0	70	368
'01–'13	Tanana Hills, White Mountains	172	77	2	0	0	3	50	303
'01–'13	Wrangell Mountains	844	358	28	34	15	5	166	1,423

Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Appendix J: Commercial Services Used by Nonresident Sheep Hunters

Table J-1. Reported commercial services used by nonresident sheep hunters for Period 3: 1989–2000, and Period 4: 2001–2013, by mountain range.

Period	Mountain Range	None	Transport	Hunt services	Registered guide	Lodge/Camp	Other	Unspecified	Total
'89–'00	Alaska Range East	23	71	3	344	36	5	47	448
'89–'00	Alaska Range West	25	120	5	772	121	2	124	957
'89–'00	Brooks Range	24	245	7	806	136	7	132	1,020
'89–'00	Chugach Mountains	28	42	2	455	16	5	53	556
'89–'00	Kenai Mountains	4	1	2	7	0	1	5	18
'89–'00	Talkeetnas, Chulitna-Watana Hills	8	45	0	323	13	1	43	384
'89–'00	Tanana Hills, White Mountains	0	16	0	30	0	0	3	38
'89–'00	Wrangell Mountains	41	168	16	822	241	36	161	1,147
'89–'00	Unknown	0	5	1	42	6	0	8	54
'01–'13	Alaska Range East	39	222	4	733	145	7	39	860
'01–'13	Alaska Range West	12	161	1	584	92	7	43	665
'01–'13	Brooks Range	22	382	9	976	244	21	52	1,148
'01–'13	Chugach Mountains	13	68	3	435	5	1	24	497
'01–'13	Kenai Mountains	4	4	0	9	0	0	3	19
'01–'13	Talkeetnas, Chulitna-Watana Hills	4	44	1	246	6	5	26	284
'01–'13	Tanana Hills, White Mountains	3	9	0	6	0	0	1	15
'01–'13	Wrangell Mountains	37	143	6	668	155	5	41	786
'01–'13	Unknown	3	6	0	45	1	1	13	62

Data Source: Data from harvest reports returned by sheep hunters in WinfoNet; no data were available for 1980.

Appendix K: Sheep Permit Auction Prices

Sheep Permit Auction prices

Chugach Sheep Permit (2014)	$170,000 (third highest ever for AK)
Chugach Sheep Permit (2013)	$180,000 (second highest ever for AK)
Chugach Sheep Permit (2012)	$75,000
Chugach Sheep Permit (2011)	$41,000
Chugach Sheep Permit (2010)	$52,000
Chugach Sheep Permit (2009)	$31,000
TMA Sheep Permit (2009)	$18,000
Chugach Sheep Permit (2008)	$85,000
TMA Sheep Permit (2008)	$17,000
Chugach Sheep Permit (2007)	$65,000
Chugach Sheep Permit (2006)	$100,000
Chugach Sheep Permit (2005)	$14,000
TMA Sheep Permit (2005)	$13,000
Chugach Sheep Permit 2004)	$15,000
TMA Sheep Permit (2004)	$13,500
Chugach Sheep Permit (2003)	$40,000
Chugach Sheep Permit (2002)	$19,000
TMA Sheep Permit (2002)	$9,500
Chugach Sheep Permit (2001)	$27,500
TMA Sheep Permit (2001)	$9,500
Chugach Sheep Permit (2000)	$30,000
Chugach Sheep Permit (1999)	$22,500
Chugach Sheep Permit (1998)	$50,000
Chugach Sheep Permit (1997)	$200,000 (highest ever for AK)

Montana State Bighorn Permit (2013)	$480,000 (record for N.A. Big Game permit)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