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Overview of Use Patterns, Regulations, and Harvest History of Moose in Game Management Unit 16B

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for the Southcentral Board of Game meeting, March 2019

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Alaska Department of Fish and Game **Division of Subsistence**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Division of Subsistence. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Department of Fish and Game	ADF&G
Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	HA
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, $\chi 2$,etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log2, etc.
minute (angular)	'
not significant	NS
null hypothesis	HO
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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OVERVIEW OF USE PATTERNS, REGULATIONS, AND HARVEST HISTORY OF MOOSE IN GAME MANAGEMENT UNIT 16B

by

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TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF APPENDIXES

Appendix **Page**

ABSTRACT

The moose populations of the western Susitna Basin, now Game Management Unit 16B, have long been an essential subsistence resource. The indigenous Dena'ina established traditional use patterns based upon fall and winter hunting, thorough use of harvested animals, and widespread sharing. Contemporary Dena'ina and other communities of the area have maintained these traditions.

From statehood until the mid-1970s, fall and winter seasons provided opportunities for harvesting moose in GMU 16B. However, declining moose populations due to several severe winters and growing hunting pressure from Alaska's urban areas caused the elimination of the winter season in 1976, resulting in hardships for local communities.

After the state passed its first subsistence law, the Board of Game recognized customary and traditional uses of moose in GMU 16B and, in 1983, re-established a winter season, with subsistence registration permits limited to local residents. An average annual harvest of 61 moose (0.17 moose per capita) during the six years this hunt was in place helped local communities and families meet their subsistence needs.

In late 1989, the Alaska Supreme Court's *McDowell* decision invalidated a rural preference in state law. After Alaska adopted a new subsistence law in 1992, the board reaffirmed the positive C&T finding for GMU 16B moose, identified the amounts reasonably necessary for subsistence (ANS) for moose populations in the GMU, and established fall and winter seasons to provide subsistence opportunities. Because all Alaska residents were now eligible for subsistence moose hunting, participation in the winter hunt had to be limited through Tier II permits. For the most part, this hunt structure remained in place into the 2018/2019 regulatory year.

Since the 1990/1991 season, an average of 215 moose have been harvested in GMU 16B in all hunts (excluding Kalgin Island). Of these, 11% were harvested by residents of GMU 16B, 78% by other Alaska residents, and 10% by non-Alaska residents. Nonlocal Alaska residents took 74% of their GMU 16B moose harvest in the fall and 26% in the winter. In contrast, just 23% of local residents' moose harvests occurred in fall, and 77% took place in winter. However, during that same time period, local residents received 20% of all Tier II permits issued, and other Alaskans received 80%, reflecting the small local population and the proximity of GMU 16B to Alaska's population centers. In all Tier II hunts in the subunit since 1990/91, 28% of applicants have received permits.

In the 25 years since the board established a minimum ANS of 199 moose for the entire subunit, harvests have achieved this minimum 11 times (44%). Harvests in the fall only have achieved the minimum ANS in six years. Harvests in all hunts by local residents since 1990/91 have averaged 25 moose, or 0.08 moose per capita, about half of the per capita harvest achieved in the 1980s when a local subsistence registration hunt was in place.

When interviewed in 2013 and 2014, residents of GMU 16B communities expressed concerns about impacts on the moose population by nonlocal hunters using powerful snowmachines to chase down animals, as well as abuse of the Tier II scoring system that disadvantages local residents. However, local residents expressed overall support for the Tier II hunt and, especially, winter hunting opportunities that provide the best access to moose populations, good travel conditions, and cold weather for meat storage.

INTRODUCTION

This report provides the Alaska Board of Game (board) with updated background information about subsistence and other hunting of moose *Alces alces* in Game Management Unit 16B (GMU 16B), the western Susitna River Basin of Southcentral Alaska (Figure 1). This report relates to Proposal 146—5 AAC 85.045(a)(14), which if passed would change the bag limit for the Tier II moose hunt[1] in Unit 16B to any moose and add a resident antlerless moose drawing hunt in Unit 16B. The report focuses on information that the board may find useful in formulating regulations that "provide a reasonable opportunity for subsistence uses" of GMU 16B moose, as required by AS 16.05.258(b). Subsistence uses are noncommercial, customary and traditional uses of fish and wildlife resources for food and other purposes (AS 16.05.940(34)). "Reasonable opportunity" is defined as an opportunity that "allows a subsistence user to participate in a subsistence hunt or fishery that provides a normally diligent person with a reasonable expectation of success of taking of fish or game." Reasonable opportunity is not to be regarded as a guarantee of success.

The patterns of use of moose summarized in this report correspond to the traditional use areas documented for Unit 16B residents living in the non-road-accessible communities of Tyonek, Beluga, Alexander Creek/Susitna, and Skwentna, including the more remote Lake Creek, Donkey Creek, Shell Lake, Hewitt Lake, and One Stone Lake areas. The northern portions of GMU 16B are within the Matanuska-Susitna Borough and the southern portions in the Kenai Peninsula Borough. All of GMU 16B is outside of the nonsubsistence areas defined by the Joint Board of Fisheries and Game (5 AAC 99.015).

CURRENT MOOSE HUNTING REGULATIONS IN GMU 16B

In the 2018/2019 regulatory year, the following state-managed opportunities existed for hunting moose in GMU 16B:[2] 1) a resident and nonresident general harvest ticket hunt, with an August 20–September 25 season and a bag limit of one bull with spike-fork or 50-inch antlers or antlers with three or more brow tines on at least one side (SF 50″ 3BT); 2) three location-specific Tier II subsistence hunts, with December 15–March 31 seasons, with one bull bag limits and a total of 260 available permits—only Alaska residents may participate in Tier II hunts; 3) a resident-only drawing hunt, with an August 20–September 25 season and a one bull bag limit: 40 permits were issued for 2018; 4) a resident-only youth drawing hunt, with August 20–September 25 and November 15–January 31 seasons and a bag limit of one bull moose: 150 permits were issued for 2018; and 5) a registration hunt that may be announced with a one bull bag limit (see Appendix A for a history of moose regulations in GMU 16B).

The three Tier II subsistence moose hunts in GMU 16B consist of the following hunt codes and geographic locations:

- TM565—Yentna, that portion north and west of the 16B North Beluga hunt area;

1. State Tier II hunts are held when there is not enough of a game population with customary and traditional uses to provide a reasonable opportunity for subsistence uses. Hunters must answer questions on an application concerning their dependence on the game for their livelihood and availability of alternative resources. Applications are scored based on responses to the questionnaire and permits are issued to those with the highest scores.
2. Federal lands in GMU 16B are limited and remote, and consist of portions of Lake Clark National Park, Denali National Park and Preserve, and some Bureau of Land Management lands. Only residents of GMU 16B may participate in federal subsistence hunts on these lands, and there are very few participants in the federal hunts.

- TM567—North Beluga, that portion draining into Susitna River south of the big bend of the Lower Yentna River (approximately river mile 23) and into Cook Inlet north of the Beluga River including all drainages into the north side of Beluga River and Beluga Lake;
- TM569—South Beluga, mainland drainages south and west of the Beluga River, Beluga Lake, and Triumvirate Glacier.

HISTORY OF LOCAL USES OF MOOSE IN GMU 16B

GMU 16B is within the traditional territory of the Upper Cook Inlet Dena'ina Athabascans, who have utilized the area for subsistence activities since before recorded history (Kari and Fall 2016). Moose (*dnigi* in the Upper Cook Inlet Dena'ina dialect), along with caribou, brown bears, and black bears, were the primary big game species hunted for subsistence by the Upper Cook Inlet Dena'ina. Early in the 20th century, diseases reduced the Dena'ina population in the Upper Cook Inlet region. Dena'ina residents of the area now live in Tyonek (Fall et al. 1983). Tyonek is located on the northwest shore of Cook Inlet, 43 airmiles southwest of Anchorage. During the twentieth century, alongside the remaining Dena'ina, a small, permanent non-Alaska Native population began to inhabit the area, particularly around Beluga, Alexander Creek, the former community of Susitna Station, and in the Upper Yentna River region (Fall et al. 1983). Skwentna, in the Upper Yentna area, approximately 65 airmiles northwest of Anchorage, is the cultural focal point for the western Susitna River basin. The Skwentna census designated place (CDP) covers approximately 450 square miles within GMU 16B. The Susitna (formerly Alexander) CDP covers approximately 160 square miles within GMU 16B with a primary airstrip centered at approximately 27 airmiles from Anchorage.

A traditional preference for winter moose hunting by GMU 16B residents is well-documented (Fall et al. 1983; Foster 1982; Holen et al. 2014; Jones et al. 2015; Stanek 1987; Stanek et al. 2007). Contemporary households have developed a pattern of moose hunting that resembles the historical resource use patterns of the area: a preference for hunting when temperatures create optimal travel conditions and when meat preservation is assisted by freezing temperatures. Additionally, during the winter months moose become most accessible to GMU 16B residents as the moose congregate in the lowlands after moving down from higher, summering locations (Fall et al. 1983; Foster 1982; Holen et al. 2014; Stanek et al. 2007).

As discussed in more detail below, annual fall and winter moose hunting seasons were in place in GMU 16B from statehood (1959) until 1976, and again from 1983 until the present. However, the majority of successful moose hunting by GMU 16B residents has taken place during winter, and winter moose hunting continues to be a primary traditional practice for Skwentna, Alexander Creek/Susitna, Beluga, and Tyonek residents (Holen et al. 2014; Jones et al. 2015; Stanek et al. 2007). Additionally, widespread sharing of moose products, including meat, internal organs, the nose, and the tongue, is an integral part of the way of life in Tyonek (Jones et al. 2015; Stanek et al. 2007).

Household interviews in Tyonek in the early 1980s about moose harvests from 1979 through 1982 (when the traditional winter season was closed) found high hunter effort but variable harvest levels, ranging from 9 (in 1982) to 20 (in 1979) (Table 1). Tyonek residents considered this level of harvest to be inadequate to meet their needs and attributed the low harvest to a scarcity of moose in Tyonek's hunting area during the fall open season (Fall et al. 1984:151).

HUMAN DEMOGRAPHY

GMU 16 is mostly within the Matanuska-Susitna Borough, but its southern reaches extend into the Kenai Peninsula Borough. Table 2 shows the population of the communities within GMU 16B as well the Anchorage Municipality and the Matanuska-Susitna Borough, between 1980 and 2018. Within GMU 16B the total estimated population in 2018 was 237. This estimate includes the CDPs of Skwentna (total population 35), Susitna (total population 15), Beluga (total population 19), and Tyonek (total population 168) (Figure 2). There are likely multiple permanent residences within GMU 16B outside of these CDPs that are only included in the balance of Matanuska-Susitna Borough's population. Therefore, the complete total population of GMU 16B is unknown. The total estimated Matanuska-Susitna Borough population in 2018 was 105,560. A portion of the Matanuska-Susitna Borough is within GMU 16 and its larger populace has road access to GMU 16A, with aircraft, motorboat, and snowmachine access to GMU 16B. Additionally, Anchorage Municipality residents (2018 total population 295,365) can easily access GMU 16B by aircraft or motorboat.

Figure 2 displays the populations of GMU 16B communities from 1980–2018. The combined populations of the four CDPs dropped from 384 in 1980 to 237 in 2018, a decline of 38%. Tyonek's population dropped from 239 in 1980 to 154 in 1990, then rose slightly to 168 in 2018. Skwentna's population peaked at 111 in 2000 but had dropped to 35 by 2018. Susitna CDP declined from 45 in 1990 to 15 in 2018. Beluga CDP had 60 people in 1990, but just 19 in 2018. Since 1980, the population of the Matanuska-Susitna Borough has increased by a factor of 5, from 17,816 (1980) to 105,560. During the same time period, the population of the Municipality of Anchorage increased by 69%, from 174,431 (1980) to 295,365 (2018).

CUSTOMARY AND TRADITIONAL (C&T) USE FINDINGS FOR MOOSE IN GMU 16B AND AMOUNTS REASONABLY NECESSARY FOR SUBSISTENCE (ANS)

In March 1983, the board made a positive customary and traditional (C&T) use finding for moose in GMU 16B and first established subsistence hunting regulations for moose in the subunit. The board determined that a winter season provided essential subsistence opportunity because winter was the time when moose were locally available, customarily taken, and easily preserved. In 1986, the board reaffirmed the positive C&T finding. In 1985, the board and the Alaska Department of Fish and Game (ADF&G) began to manage differently four separate areas of GMU 16B—Kalgin Island[3], Redoubt Bay drainages, the Tyonek area (the portion of GMU 16B south of the Beluga River and north of Redoubt Bay), and GMU 16B drainages north of the Beluga River.

In 1993, the board readopted its 1986 finding that moose in GMU 16B support customary and traditional uses (Alaska Board of Game 1993). The board also reaffirmed that moose in GMU 16B occur as roughly four geographically separate populations with different demographic characteristics, and that hunting conditions and hunter characteristics differ among the areas, with differences in accessibility and availability of moose, numbers and origin of hunters, and access methods used. Through review of information provided by the department on the historical numbers of resident moose hunters and moose

3. In 2016, the board adjusted the boundaries of GMU 16B and GMU 15B to move Kalgin Island to GMU 15B; the move did not change its designation as outside the Anchorage-Matsu-Kenai Nonsubsistence Area. Harvest summaries in this report exclude Kalgin Island.

harvests for each of the four areas in GMU 16B, the board in 1993 determined the amounts of moose reasonably necessary for subsistence (ANS) as follows:

- Kalgin Island—2 moose;
- Redoubt Bay drainages—10 moose;
- Tyonek area—29–37 moose;
- GMU 16B drainages north of the Beluga River—160–180 moose.

These ANS findings remain in regulation into the present (5 AAC 99.025 (8)).

OVERVIEW OF REGULATORY HISTORY FOR MOOSE IN GMU 16B [4]

1959–1978

A split moose hunting season regime with annual fall and winter (November) seasons was in place in GMU 16B from 1959 until 1976. Leading up to the mid-1970s, the growing Anchorage and Matanuska-Susitna Borough population increasingly began hunting moose in winter in GMU 16B using snowmachines and aircraft. At the same time GMU 16B residents noted that competition with nonlocal moose hunters was increasing (ADF&G 1985:8; Fall et al. 1984:33, 140; Foster 1982). Winters with heavy snow in the early 1970s also contributed to lower moose numbers (Peltier 2017:4). As a result of the growing hunting pressure and the decline in the GMU 16B moose population, the annual harvest soon began to increase over what the moose population could support. In 1976/1977, therefore, the board eliminated the winter hunt, restricting moose hunting to the fall season only[5]. Although the fall-only hunt helped protect the moose population, it severely limited the opportunity for GMU 16B residents to obtain moose for subsistence uses.

1978–1989

In 1978, the Alaska Legislature adopted the state's first subsistence law, which required the Board of Game to adopt regulations allowing the taking of game for customary and traditional subsistence uses. Regulations adopted by the Joint Board of Fisheries and Game allowed limiting participation in subsistence fisheries and hunts to rural residents of communities with customary and traditional subsistence uses.

In November of 1980, the Tyonek Village Council expressed concerns to the department about their community's declining moose harvests. The president of the Tyonek Village Council sent a letter to Division of Subsistence which said, "My people have a hard time getting moose to eat." Later, the Mount Yenlo Fish and Game Advisory Committee, representing the Skwentna area, voiced similar concerns. The Division of Subsistence responded in 1981 through 1983 by conducting research about moose utilization by Tyonek, Skwentna, and other western Susitna Basin residents. The research found that winter moose hunts provide the best conditions for subsistence moose hunting in GMU 16B; they are more efficient than fall hunts due to winter travel conditions and the ability to locate moose (Fall et al. 1983; Foster 1982). Local hunters reported that moose may not move into the lower river basins from the upper

4. See Appendix A for a complete history of moose hunting regulations in GMU 16B for 1980—2018.

5. Between regulatory years 1960 and 1974, GMU 16 (which later became subdivided into GMU 16A and 16B in RY72/73) season dates were November 1–30. The years 1971/1972 also included a November 1–December 31 season. In 1974/1975, the season was shortened to November 20. In 1975/1976 the season was further changed to include September 1–20, with the winter season shorted to November 1–10. In 1976/1977, GMU 16B had only the season of September 1–30, eliminating the winter season entirely.

elevations until December or January (Fall et al. 1983). Also important to local residents was the preservation of moose meat out-of-doors in winter. Additionally, some Tyonek residents at the time speculated that they would experience less competition from nonlocal hunters during a winter season Foster 1982:25).

At the March 1983 Board of Game meeting, the Mount Yenlo Fish and Game Advisory Committee submitted a proposal to re-establish a winter moose hunt in GMU 16B. The proposal was supported by Tyonek. During the board's deliberations, the Division of Subsistence presented information it had collected from its research in the area, and GMU 16B residents provided corroborating testimony. The board then made a positive C&T use determination for moose in GMU 16B. In making this finding, the board acknowledged that moose have long been a vitally important subsistence food for GMU 16B residents due to limited economic options in the area. The board found that local residents needed a late season because "winter snows drive moose from upland regions to areas closer and more accessible to unit residents" (Alaska Board of Game 1983:1). During summer (including September), moose in remote higher elevation areas of GMU 16B were extremely difficult to access compared to moose that populated the river valleys and lake areas following the onset of winter. The board noted that most GMU 16B residents could not afford airplanes for travelling long-distance to remote moose summering areas. Additionally, the use of electric freezers in GMU 16B communities was rare, and preservation of August–September harvested moose meat was difficult. Furthermore, the department area biologist for GMU 16B reported population monitoring results that found that moose in GMU 16B generally move in elevation relative to seasonal conditions, affirming local knowledge that a lowland, wintering subpopulation of moose provided key subsistence opportunity in GMU 16B.

Based on the ethnographic information on local moose hunting practices and biological information about the presence of distinct GMU 16B moose subpopulations provided by the department and the local advisory committees, the board concluded that opening a winter moose season in GMU 16B was justified; the board determined that winter moose hunts provided the best conditions for reasonable subsistence moose hunting opportunity and implemented a resident winter registration subsistence hunt with November 1–November 15 season dates, and with permits available at Tyonek and Skwentna (Alaska Board of Game 1983)(see also Appendix A). Additionally, a winter drawing hunt with 200 permits was authorized by the board to provide hunting opportunities for Alaskans not qualified for the subsistence hunt; the harvestable surplus during winter did not allow for a harvest ticket winter moose season without restrictions on participation. The board's implementation of winter hunts from this point forward did much to resolve the moose issues for GMU 16B residents, providing for subsistence opportunities that had not been available since the 1975/1976 season.

Despite the additional open season in the first two weeks of November 1983, warm temperatures and an absence of snowfall prevented local residents from obtaining moose. Tyonek submitted an emergency petition to the board asking for an extension of the season. A board finding in response to the petition addressed the need for an Emergency Order (EO) hunt (Alaska Board of Game 1983). It was estimated that 80 permitted hunters had harvested one moose during the November 1–15 season (Alaska Board of Game 1983). The board modified the winter registration hunt to occur during a two-week period established by EO between January and February 1984 with permits available at Tyonek and Skwentna. Subsequently, through the 1989/1990 season, the subsistence registration hunt occurred during a two-week period between December 1–February 28 established by EO (Alaska Board of Game 1993) (see also Appendix A).

In 1985, the department began to manage moose differently within four separate areas of GMU 16B: Kalgin Island, Redoubt Bay drainages, GMU 16B drainages north of the Beluga River, and the Tyonek area (the portion of GMU 16B south of the Beluga River and north of Redoubt Bay). From 1986 to the present the board has maintained specific season dates and bag limits for the subareas of GMU 16B. With varying modification, subsistence hunts with any bull bag limits have continued.

In 1985, in the *Madison* case, the Alaska Supreme Court invalidated the Joint Board regulations that limited participation in subsistence fisheries and hunts to rural residents. Consequently, in June 1985, the board established Tier II hunts for game populations for which limitations on participation were necessary, including moose in GMU 16B; the *Madison* ruling also required the adoption of subsistence hunting regulations separate from other types of hunts (Alaska Board of Game 1986). GMU16B moose hunting regulations continued the split fall and winter season framework. The winter season was December 1–January 31.

In 1986, the Alaska Legislature adopted a new state subsistence law with a rural preference. The board met to review subsistence regulations in light of the new law and reaffirmed the positive C&T use finding for GMU 16B moose. From 1986 through 1989, the winter subsistence season was open by registration permit, and limited to local rural residents. A two-week season was opened by emergency order within the period December 1–February 28. Also, 1986 was the first year of a fall nonresident hunt. Additionally, opportunities for harvesting cow moose for five days during either the fall subsistence hunt or fall harvest ticket hunts were implemented from 1986/1987–1989/1990 in the North Beluga and Tyonek areas.

In summary, from 1983 through 1989, subsistence moose hunting seasons in GMU 16B was by permit and had relatively long openings with any-moose or antlerless moose bag limits.

1989–1999

In December 1989, in the *McDowell* decision, the Alaska Supreme Court ruled that the rural residency provision in Alaska's 1986 subsistence law violated the Alaska Constitution. Subsistence permits for hunting moose in GMU 16B could no longer be limited to residents of the subunit. In response, the board authorized Tier II hunts for a winter moose season in GMU 16B in regulatory years 1990/1991 and 1991/1992 to ensure that 16B residents could meet their subsistence needs, while allowing other Alaska residents to also apply for permits (Peltier 2008:233).

In 1992, the Alaska Legislature adopted a new state subsistence law. In late 1992 and early 1993, the board met to review subsistence regulations for compliance with the new law. The board reviewed C&T use determinations, established ANS amounts, and assessed whether regulations provided a reasonable opportunity for success in harvesting moose for subsistence uses, as the new law required.

In March–April 1993, the board considered proposals concerning GMU 16B moose seasons and bag limits in the context of the new law. Introducing another complexity, moose populations in the subunit had begun to decline in the late 1980s. The board re-asserted the earlier (1983 and 1986) findings that moose in GMU 16B are customarily and traditionally taken and used for subsistence based on a pattern primarily established by local residents, and adopted regulations to provide a reasonable opportunity for success in harvesting moose for subsistence uses, open to all Alaskans.

At this meeting, the board (Alaska Board of Game 1993) adopted findings on GMU 16B moose with the following key points:

- The moose population in GMU 16B North consists of at least two subpopulations—the northern 16B North subpopulation and the central and western 16B North subpopulation (together known as the middle subpopulation).
- Moose in the unit occur as four more or less geographically separate populations with different demographic characteristics.
- These populations are distinct during the fall hunting and breeding season, but there is mixing between subpopulations and other unit populations during the winter.

The board then adopted regulations that established the number of moose reasonably necessary for subsistence in relation to the sustainable yield harvest level, length and timing of historical moose hunting

seasons, historical moose bag limits, hunter success rates, and expected numbers of hunters (Alaska Board of Game 1993). The board determined the subsistence moose hunting pattern justified an early harvest ticket season in the fall followed by a later winter subsistence-only season, but that the harvestable surplus during winter did not allow for unlimited participation in winter moose hunting. As a result, the board established a Tier II hunt structure for three geographically distinct winter subsistence hunts. These three Tier II moose hunts have continued to the 2018/2019 regulatory year and are detailed in the current regulatory overview in this report (above).

For the 1993/1994 and 1994/1995 regulatory years, the board continued to modify the GMU 16B moose hunt structure, with a focus on maintaining subsistence opportunity and increasing moose harvest by Tier II subsistence hunters to reach the ANS. This was achieved through a combination of Emergency Orders, Tier II harvest allocations, and various board findings (Alaska Board of Game 1996).

Until 1993, resident harvest ticket moose hunts had an any-bull moose bag limit in the GMU16B subareas, but starting in that year, harvest ticket fall moose hunts for Alaska residents for the Redoubt and Beluga North areas of GMU 16B were antler-size restricted, with a bag limit of one bull with spike fork, 50-inch antlers, or three or more brow tines on either side (SF 50″ 3BT). Additionally, a winter subsistence hunt for cow moose with a January 10–January 23 season was adopted for the North Beluga subarea. The allowable harvest of 30 cows was allocated by the board for subsistence uses only. With the harvestable surplus above ANS, the board found that a SF 50″ 3BT bag limit in the fall harvest ticket hunt in combination with a winter hunt, provided reasonable opportunity for success in harvesting moose for subsistence uses in the Redoubt and Beluga North subareas. The fall opportunity in the Tyonek area was for any bull moose under a Tier II subsistence permit.

For the 1994/1995 regulatory year, the board chose to replace the previous Tier II winter cow moose hunt north of Beluga River with an any-bull winter bag limit. The winter subsistence any bull Tier II hunt also continued in the Tyonek area. The board noted that the purpose of the Tier II any bull winter hunt was to provide increased opportunity and increased moose harvest by Tier II permittees to reach ANS. The board determined that "the migratory nature of bulls in this population will make bulls, not previously accessible by hunters, available during this winter hunt" (Alaska Board of Game 1994). The antler restricted SF 50″ 3BT harvest ticket hunt remained in place for the fall season in the Redoubt and Beluga North subareas.

In February 1996, the board determined that an emergency existed in the southern portion of GMU 16B because, due to a lack of snowfall, moose had failed to migrate to more accessible locations, and subsistence harvests were well below the allowable harvest: the board noted that "every available moose is important to subsistence users" (Alaska Board of Game 1996) and that accommodations should be made to allow for increased harvest. The board then acted quickly to open an EO Tier II hunt after a heavy snowfall occurred, which allowed residents of GMU 16B increased opportunity to harvest moose. In the following year, 1997, the board passed a proposal to provide a harvest ticket resident hunt of SF 50″ 3BT from August 20–September 30 and to extend the existing Tier II hunt by 60 days from November 15–February 28. The board again confirmed the importance of winter moose hunting and the reliability of this hunt for 16B residents and noted that, "during the fall, local hunters use boats, off-road vehicles, and highway vehicles, while nonresidents predominantly use aircraft for access" (Alaska Board of Game 1997). The board finding also stated that, "it is necessary to manage the winter hunt by limiting the number of permits in a Tier II hunt. Unlimited participation would likely lead to an overharvest of bulls due to accessibility and herd concentration in wintering areas, unless the season is short. However, a short season would not provide adequate opportunity for subsistence uses" (Alaska Board of Game 1997). The board acknowledged the need to balance hunt structures (Tier II and harvest ticket hunts), including a sufficient population of moose to provide for local resident and other Alaska resident users. The 1997 board finding confirmed that a SF 50″ 3BT fall season and long winter Tier II season "provides a reasonable opportunity for subsistence use by all Alaska residents" (Alaska Board of Game 1997).

1999–2018

In 1999 the board developed a new structure for GMU 16B regulations based on the ANS and the available harvestable surplus. The plan introduced triggers within hunt structures as follows: 1) Tier II only; 2) Tier I and Tier II; or 3) Tier II, Tier I, and harvest ticket harvest. This plan has remained in regulation into the present and is structured as follows.

- If the harvestable surplus of bulls is fewer than 199: only Tier II hunting opportunities are allowed for both the fall and winter seasons (up to 400 permits). Season dates for the fall hunt: August 20–September 30 with a one bull with SF 50″ 3BT bag limit. Season dates for the winter hunt: December 15–March 31 with a one bull bag limit.
- If the harvestable surplus of bulls is between 199 and 240: a fall harvest ticket hunt is authorized, and the winter hunt remains at Tier II (up to 260 permits). Season dates for the fall hunt: September 1–September 15 with a one bull with SF 50″ 3BT bag limit. Season dates for the winter hunt: December 15–March 31 with a one bull bag limit.
- If the harvestable surplus of bulls is more than 240: a fall nonresident hunt is authorized, alongside a fall harvest ticket hunt and a winter Tier II hunt (with up to 260 permits). Season dates for both the resident and nonresident fall hunts: August 20–September 25 with a one bull with SF 50″ 3BT bag limit. Season dates for the winter hunt: December 15–March 31 with a one bull bag limit.
- If the harvestable surplus of bulls is more than 310: multiple harvest opportunities can be authorized, including fall resident and nonresident harvest ticket hunts with season dates of August 20–September 25 with one bull with SF 50″ 3 BT bag limits. A drawing permit hunt with season dates: August 20–September 25 with a one bull bag limit (up to 600 permits), a youth only drawing permit hunt with season dates: August 20–September 25 and November 15–January 31 with a one bull bag limit, a winter drawing permit hunt with season dates: December 15–last day of February with a one bull bag limit (up to 500 permits), a registration permit hunt with season dates: December 15–last day of February with a one bull bag limit, and a winter Tier II hunt with season dates: December 15–March 31 with a one bull bag limit (with up to 260 permits).

In regulatory years 2000/2001 and 2001/2002 the general harvest ticket seasons for moose (with the SF 50″ 3BT antler restriction) in 16B were closed, and then again in 2006/2007 through 2008/2009, due to decreased population size and calf recruitment. Permit levels for the existing Tier II hunts were increased to provide for subsistence (Peltier 2017:5). Under the above 'harvest trigger' parameters, and because the harvestable surplus of bull moose had dropped below ANS, the board limited all of the GMU 16B fall moose hunts (with the exception of the Kalgin Island subarea) for regulatory years 2000/2001 and 2001/2002 to Tier II permit hunts. Harvest objectives had not been met since the year 2000, and the 16B moose population objectives had not been met since 1997 (Alaska Board of Game 2006). From 2002/2003 through 2004/2005, the fall hunts in GMU 16B (with the exception of the Kalgin Island subarea) reverted back to resident harvest ticket hunts with the SF 50″ 3BT antler restrictions remaining in place. From 2005/2006 through 2008/2009, the fall moose hunt was again restricted to Tier II only. Since 2009/2010 to the present, the fall opportunity has been maintained as a SF 50″ 3BT antler restricted harvest ticket hunt open to all Alaska residents.

Since 2000, several proposals have been submitted to the board to substantially change the GMU 16B moose hunting management regime in place since the 1990s. For example, at the March 2007 board meeting, the board failed to adopt proposals to increase GMU 16B moose opportunities for non-Tier II hunters. These proposals occurred in tandem with growing concerns from GMU 16B residents about efforts to open a harvest ticket moose hunt during the winter season in GMU 16B; these proposals were actively opposed by community of Tyonek.

At its March 2011 meeting, the board considered proposals to eliminate moose hunting in GMU 16B except for the Tier II subsistence hunt (Proposal 97), to eliminate the Tier II winter moose hunts in GMU 16B (Proposal 99), and to open a nonresident moose hunting season in GMU 16B (Proposal 94). Proposal 97, to eliminate moose hunting in GMU 16B (except for the Tier II subsistence hunt), failed and proposals 99 and 94 were tabled to be revisited later in March of that year, when both of these proposals were carried as amended by the board. Proposal 99, to eliminate the Tier II winter moose hunts in GMU 16B, was altered to change only the winter Tier II hunt season dates to December 15–March 31, and these changes were not to be implemented until the 2012/2013 regulatory year. Previously the Tier II winter hunt dates were November 15–February 28. This action shifted the Tier II winter hunt season later by one month. Since this change, the Tier II winter hunts have remained in regulation under the modified season dates. The proposal to open a nonresident moose hunting season in GMU 16B was amended to hold the nonresident fall moose season from August 25 to September 15, with a bag limit of one bull moose with SF 50″ 3BT antler restriction. For the 2013/2014 regulatory year, the board modified the nonresident season dates to August 20–September 25. For the 2014/2015 regulatory year, the board authorized a youth hunt (YM541) in GMU 16B for a bag limit of one bull with season dates of August 20–September 25 and November 15–December 15, and also authorized an any-bull drawing hunt in GMU 16B for August 20–September 25 (DM540).

For the 2016/2017 regulatory year, the board authorized an any-bull registration hunt (RM574) which 'may be announced', including a winter season. Also, in 2016, the Kalgin Island subarea was removed from GMU 16B and relocated to GMU 15B; it remained outside the Anchorage-Matsu-Kenai Nonsubsistence Area. In 2018, the board elected to retain the current hunt structure but increased the number of permits for DM540 to up to 600, and up to 25% for YM541. Additionally, the board lengthened the winter season for YM541 to January 31.

In summary, the overall fall-harvest ticket and winter-subsistence split season hunt structure with winter Tier II hunts in three geographically distinct areas remains in regulation for moose in GMU 16B.

COMMENTS ON MOOSE HUNTING ISSUES FROM HOUSEHOLD SURVEYS AND KEY RESPONDENT INTERVIEWS WITH GMU 16B RESIDENTS

When interviewed in 2005 and 2006 (Stanek et al. 2007), residents of Tyonek and Beluga expressed a preference for the winter moose hunt for meeting their subsistence needs. Tyonek residents reported that they could not generally compensate for failed moose harvests by using other subsistence resources. However, even while residents of Tyonek and Beluga have traditionally participated in winter moose hunts, including the Tier II hunts, study respondents also noted difficulties in reliable moose hunting access and abundance. Residents reported that moose in higher elevations are costly and difficult for local hunters to access. Local hunters also reported that warm weather during the early winter months had been delaying the return of moose to the lower elevations and that a longer season for the winter subsistence hunt was desired. Both Tyonek and Beluga residents expressed continuing concern about the impacts of moose hunters coming into GMU 16B from adjacent urban areas, especially by aircraft. Beluga residents expressed opposition to nonlocal hunters obtaining Tier II permits.

During 2013 and 2014, the Division of Subsistence conducted systematic household surveys and key respondent interviews in Tyonek, Alexander Creek/Susitna, and Skwentna (representing all GMU 16B communities except Beluga); this time period will be referred to here as "the most recent study year." The study findings appear in Division of Subsistence Technical Paper No. 385, "The Harvest and Use of Wild Resources in Cantwell, Chase, Talkeetna, Trapper Creek, Alexander/Susitna, and Skwentna, Alaska,

2012." Tyonek research was conducted in January 2014 and was published as Technical Paper No. 404, "The Harvest and Use of Wild Resources in Tyonek, Alaska, 2013."[6]

This research again found that moose are the primary large land mammal available to residents of GMU 16B and the most important resource used for subsistence overall, along with salmon (Holen et al. 2014; Jones et al. 2015). While bears are often available for harvest by residents of Tyonek, moose generally make up the entirety of Tyonek's large land mammals harvested for subsistence uses (Jones et al. 2015). In 2013, an estimated 74% of households used moose, which were hunted by 60% of households in Tyonek (Jones et al. 2015). Residents of the GMU 16B communities studied during this research reported that winter moose hunting is a primary traditional practice and, because the majority of their successful hunting for moose for subsistence uses takes place during winter, expressed the importance of the Tier II winter moose hunt for their communities. For these reasons Alexander Creek/Susitna residents stated that the Tier II moose hunt is the single most important subsistence activity for their households (Holen et al. 2014). "Tier II is a great benefit to the people who live here," reported an Alexander Creek hunter (Holen et al. 2014).

Respondents during 2013 again reported multiple reasons why winter moose hunting is preferred by GMU 16B residents, including ease of travel when thick summer vegetation thins out and the ground freezes, and because harvesting a moose in the winter makes meat care and preservation easier. "We need to be able to store our foods without refrigeration, winter is when we need to take a moose for that reason," said a Skwentna hunter, and an Alexander Creek hunter said, "You get a moose during winter you can cool it down and take care of your meat a lot better than you can in the fall hunt, so we prefer the winter hunt" (Holen et al. 2014).

Study participants in 2013 reiterated that the primary reason why winter moose hunting is preferred by GMU 16B residents is that many of the moose that spend winters in the uplands tend to migrate to the flatter river basin country closer to the communities at the onset of winter. "Moose don't come down here in the summertime. This is their winter country primarily," explained a Skwentna hunter (Holen et al. 2014). Alexander Creek residents told of the existence of a separate "mountain population" of moose, which spends summers at higher elevations in the Mount Susitna area and then migrates to the Susitna Flats after the first heavy snows. Respondents explained that it has been a long-time traditional practice for Alexander/Susitna residents to hunt this distinct population of moose during November and December. Alexander Creek hunters explained that moose are normally sparse in the Alexander area prior to winter before the "mountain population" begins to migrate to the lowlands and that moose hunting during the fall season has been historically unproductive for Alexander/Susitna residents when compared to the winter hunt. Hunters also explained that dense vegetation and low waters, which make boat travel difficult, also limit success during fall moose hunting. "This is a really hard area to hunt. It is really thick. It is not an easy area to hunt on foot or on a boat, and you can't get a 4-wheeler into these areas either," explained an Alexander hunter (Holen et al. 2014). For these reasons, few Skwentna or Alexander Creek hunters make any serious effort to harvest moose during the fall moose hunting season. Overall, both Skwentna and Alexander Creek hunters explained that the winter hunt provides them the opportunity to harvest a moose close to home and, in so doing, avoid excessive expenses for fuel and the lengthier amounts of time required to be successful during the late summer–fall hunt. As summarized by an Alexander Creek hunter, for all the above reasons, "Winter is the best time for a [GMU 16B] subsistence hunter to gather meat" (Holen et al. 2014).

Respondents during the most recent study year also stated the importance of the opportunity for a hunter to harvest moose without antler restrictions ("any bull") during the Tier II hunt as opposed to the SF 50″ 3BT antler restriction normally imposed during the fall season moose hunt in GMU 16B. Respondents explained that to them the any bull opportunity is a true subsistence hunting opportunity because they

6 Technical papers are available free of charge online at http://www.adfg.alaska.gov/sf/publications/

prefer the meat from a young bull moose for food rather than the trophy antlers obtained from a moose with a 50″or larger antler spread.

Comments provided by GMU 16B residents during the most recent study period also provide important local perspectives on how moose hunting opportunities are allocated in GMU 16B. Tyonek, Skwentna, and Alexander Creek/Susitna residents expressed concern about any possible closure or lack of opportunity for winter moose hunts in GMU 16B and especially efforts by nonlocal residents to open a harvest ticket hunt during the winter season in GMU 16B (Holen et al. 2014; Jones et al. 2015).

All Alaska residents are eligible to apply for a Tier II permit, and Tier II permits are scored according to specific personal criteria. Skwentna and Alexander Creek/Susitna community members expressed concern that hunters with no ties to the area are untruthful on their Tier II applications and are thus unjustly awarded a Tier II permit. In their view, there has been a lack of enforcement of Tier II questionnaire responses regarding history of use of the GMU16B moose population and believe, therefore, that hunters from outside the area are being awarded most of the Tier II permits. These respondents said that this has resulted in more difficulty for local residents to obtain winter moose hunting opportunities by obtaining a Tier II permit.

Some local community members reported applying for Tier II moose permits but not being awarded one. For example, a Skwentna hunter said, "If 60 people live here and they give 100 Tier II permits, and I hear time and time again that people locally aren't getting them, what is wrong? It should go to us first." (Holen et al. 2014). Respondents recalled that prior to the 1990s, local hunters obtained registration permits for hunting moose in GMU 16B in the winter. For these reasons GMU 16B residents believe that the state should give preference to local residents when issuing Tier II moose permits.[7]

Additionally, Skwentna hunters believed that the 2012/2013 change in regulation to begin the Tier II winter moose hunt in GMU 16B on December 15 rather than November 15 was implemented primarily to allow nonlocal residents who are awarded the Tier II permit access to GMU 16B during a time when the rivers are frozen enough to allow safe snowmachine travel from the road system. A Skwentna hunter explained:

> November 15 was a good time to start the moose hunt. It should not have been changed to December 15 just because no one [from the road system] can get out here in November. That allows locals to get first dibs on the moose. Moving the moose hunt from the 15th of December to the 15th of November would really help since nonlocals would have a hard time getting up here earlier. (Holen et al. 2014)

Skwentna community members also explained that the local moose population declined significantly due to heavy bear and wolf predation during the 1990s. In their view, recent department intensive management (IM) efforts to control bear populations and increase bear harvests in GMU 16B have been successful at increasing the moose population in the Skwentna area, but respondents also believed that the moose population remains several years away from recovery to past levels. One hunter observed that moose presence has increased in the lower Yentna River watershed but remained sparse in the upper Yentna River and upper Skwentna River areas. In recent years, Alexander Creek/Susitna hunters have found more moose in the area and the hunting has become easier. Nevertheless, Alexander Creek/Susitna respondents remained concerned that more hunters from outside the area will be awarded the Tier II permit and thereby make moose hunting opportunities increasingly difficult for local residents (Holen et al. 2014).

7 Prior to the 1989 Alaska Supreme Court ruling that the rural residency provision in Alaska's subsistence law violated the Alaska Constitution, subsistence permits were limited to residents of the subunit. In 1992. the Supreme Court further clarified that, "proximity to the user's domicile" could not be used in regulations to determine eligibility for Tier II permits.

While moose mortality from predation is an ongoing concern for residents of Skwentna, several community members reported observations that some moose hunters participating in the Tier II winter hunt are also having a detrimental impact on moose in the area. These respondents said that some nonlocal hunters using powerful modern snowmachine technology are putting unprecedented levels of pressure on overwintering moose. For example, according to a Skwentna hunter:

> Modern snowmachines are chasing moose hardcore through the snow in places that older machines could never get into. They are chasing the moose ragged and stressing them out. Nonlocals come to Skwentna on these huge, expensive super-wide snowmachines that can get anywhere. They run the moose down and exhaust them without even seeing if they have antlers until they are ready to kill them. The moose break their legs and pull muscles in the deep snow and the young ones become really stressed. This happens over and over to the same moose in the same season and it definitely has an impact on their health …. They separate mothers from calves and do a lot of harm. Pregnant cows often abort their calves or have stillborns because of this stress. If they do give birth, they often don't have the energy to put into milk production, or their milk isn't as good. This is a major factor in moose survival out here because there are a lot of people from town coming out here on their expensive machines. (Holen et al. 2014)

In summary, GMU 16B residents expressed the importance of the Tier II winter hunts as a subsistence opportunity, and most local residents were supportive of the intensive management programs implemented in GMU 16B and believed that these efforts should continue. Despite this, several respondents recognized that human pressure has increased as predator populations have declined. Skwentna and Alexander Creek/Susitna respondents believed that the activities of some nonlocal hunters greatly interfere with local residents' ability to harvest moose for subsistence. "These people that haven't lived in the area for several generations are grandfathered in [and awarded a Tier II permit]. They pull up to Deshka Landing on $40,000 trucks with huge trailers and huge snowmachines then claim they need the moose for 'subsistence.' That's not subsistence," said a Skwentna respondent (Holen et al. 2014).

HOUSEHOLD SUBSISTENCE SURVEY HARVEST AND USE FINDINGS

The Division of Subsistence first conducted comprehensive, systematic household harvest surveys in Tyonek for the study year of 1983, in Skwentna for study year 1982, and "western Susitna" (Skwentna, Alexander Creek, and Beluga areas) for study year 1984. In 1983 Tyonek residents harvested 30 moose, providing approximately 55 lb of moose meat per capita. In this same year, 31% of households harvested moose and 69% of households received moose in Tyonek. Skwentna residents harvested 30 moose in 1982, and 83% of households used the resource. In 1984, Skwentna, Alexander Creek, and Beluga, grouped as western Susitna, harvested 28 moose, which amounted to 318 mean pounds harvested per household and 109.4 pounds per capita. The 44 sampled households (128 people) harvested a total of 14,000 pounds of moose in 1984. Seventy-three percent of that region's households, in 1984, hunted moose, with 45% successfully harvesting. (Table 1)

During 2005 and 2006, the Division of Subsistence conducted research to update the previous baseline subsistence harvest and use information for Tyonek, and also surveyed Beluga (Stanek et al. 2007). Key findings were reported to the Board of Game. This research reaffirmed the importance of moose as a subsistence resource for Tyonek residents and affirmed the importance of subsistence-harvested moose for residents of Beluga. Widespread sharing of moose products, including meat, internal organs, the nose, and the tongue, was reported to be an integral part of the way of life in Tyonek. In 2006, Tyonek residents

harvested an estimated 16 moose, providing approximately 38 lb of moose meat per capita. Beluga residents harvested an estimated 3 moose, providing approximately 44 lb of moose meat per capita. In Tyonek, 19% of households harvested moose, 77% of households received moose, and 83% of households used moose. In Beluga, 21% of households harvested moose, 86% of households received moose, and 100% of households used moose (Table 1).

During 2013 and 2014, the Division of Subsistence conducted systematic household surveys and key respondent interviews in Tyonek, Alexander Creek/Susitna, and Skwentna, obtaining updated moose harvest and use information for all the GMU 16B communities except Beluga.

In 2012, Skwentna residents harvested an estimated 8 moose, providing approximately 59 lb of moose meat per capita. Susitna/Alexander Creek residents harvested an estimated 7 moose, providing approximately 135 lb of moose meat per capita. In Susitna/Alexander Creek, 55% of households harvested moose, 55% of households received moose, and 100% of households used moose. In Skwentna, 23% of households harvested moose, 47% of households received moose, and 70% of households used moose.

In 2013, Tyonek residents harvested an estimated 8 moose, providing approximately 24 lb of moose meat per capita. During 2013, 12% of Tyonek households reported harvesting moose, 67% of households reported receiving moose, and 74% of households reported using moose. Moose were shared widely throughout the community, with 67% of households receiving moose and 25% of households giving moose away (Jones et al. 2015).

The results of the 2013 Tyonek survey can be compared with findings for harvests and uses of moose for 1983 and 2006 (Table 1). Estimated moose harvests by Tyonek residents dropped from 30 animals in 1983 to 16 in 2006, and then to 8 in 2013. Although some of this decline might be attributed to a drop in the community's population, as expressed in usable pounds, the average household moose harvest declined 71%, from 188 lb in 1983 to 55 lb in 2013, and per capita harvest declined 56%, from 55 lb per person in 1983 to 24 lb per person in 2013 (Table 1). While the majority of Tyonek households hunted moose during 2006 and 2013—57% in 2006 and 59% in 2013—success rates dropped from 19% in 2005 to 12% in 2013. Likewise, 74% of Tyonek households used moose in 2013, down from 83% in 2006. This decrease likely resulted from a lower harvest, which led to less sharing: 43% of Tyonek households gave away moose in 2006, compared to 25% in 2013.

Comparing data for 2012 with that for 1982 for Skwentna shows a substantial decrease of moose harvested: 8 moose in 2012 compared to 30 moose in 1982 (Table 1) (Fall et al. 1983; Holen et al. 2014). Additionally, in 1982 83% of Skwentna households harvested moose, compared to 23% in 2012. The harvest decrease over time may be attributed to population decrease in some of the GMU16B communities, among other factors.

Despite the substantial drop in moose harvests, the 2012 and 2013 research documented the continuing importance of harvests of moose for subsistence uses for residents of GMU 16B communities, with a combined harvest for Tyonek, Skwentna, and Alexander Creek/Susitna of 45.4 lb per person of moose (Jones et al. 2015, Holen et al. 2014).

GMU 16B MOOSE HARVESTS IN SUBSISTENCE REGISTRATION HUNTS, 1983/1984–1989/1990

As discussed above, between 1984 and 1989, subsistence hunting in winter for moose in GMU 16B was managed through a local resident-only registration permit, except for 1985, when a Tier II hunt was in place. Although only local residents were eligible for the registration permits, department records show some issued to people with nonlocal addresses. It is likely that these individuals had mailing addresses in

nonlocal communities but were domiciled in GMU 16B. All registration permit holders will be considered local residents in this discussion.

For the six years in which the registration permit was available, an annual average of 132 individuals obtained permits, with a range of 126 (in 1987/1988 and 1988.89) to 158 (in 1983/1984). Most registration permit holders hunted: the 6-year average shows 94 hunters (71%). The 6-year annual average harvest in the registration hunt was 54 moose, with a range of 32 in 1983/1984 to 72 in1987/1988 (Table 3). Also, over the 6-year period, the combined fall and winter hunts provided a harvest of 0.17 moose per person for GMU 16B communities (about 84 lb per person; Figure 3).

GMU 16B MOOSE HARVESTS BY RESIDENCY AND SEASON FOR ALL HUNTS 1990/1991–2017/2018

Table 4 provides permit (Tier II, registration, and drawing) and harvest ticket data for moose harvests in GMU 16B for local resident hunters, other Alaska hunters, and nonresident hunters for the period 1990/1991 through 2017/2018. (Note that these harvest data do not include Kalgin Island hunts.) The table also includes preliminary data for 2018/19, but these data are incomplete and not included in long-term averages. Figure 4 depicts the percentage of moose harvests by GMU 16B residents, other Alaska residents, and non-Alaska residents for the same time period.

For the 28-year period from 1990/1991–2017/2018, local residents accounted for 11% of the moose harvest in GMU 16B in all hunts, while other Alaska residents harvested 78% (Figure 4). The successful local resident moose hunters in GMU 16B harvested an annual average of 24 animals (range of 10 to 47 moose) in that 28-year period (Table 4). In comparison, the successful other Alaska resident moose hunters harvested an average of 167 animals annually from 1990/1991–2017/2018 (range of 57 to 314 moose). Non-Alaska resident hunters harvested approximately 10% of the moose in GMU 16B over the 28-year period (an annual average of 22 moose, range of 0 to 69). In some years, moose hunting in GMU 16B has been closed to nonresidents.

The total annual average harvest for the 28-year period for all hunts in GMU 16B was 215 moose (range of 67 to 409 moose) (Table 4). Since 2007, total moose harvests in GMU 16B have increased nearly by a factor of four, from 108 in 2007/2008 to 409 in 2017/2018. During the time period 2007/2008–2016/2017, moose harvests by other Alaska residents have more than tripled (range of 87 to 314) and, due to new opportunities available, moose harvests by non-Alaska residents rose from 0 in 2007/2008 to 69 moose in 2017/2018. Meanwhile moose harvests by residents of GMU 16B from 2007/2008 through 2017/2018 averaged 22 moose annually, slightly lower than the 1990/1991–2017/2018 annual average of 24 moose. From 1991/1992 through 1998/1999 harvests of moose by GMU 16B residents peaked with an annual average of 35 total moose for that time period (range of 17 to 47 moose). In all hunts combined, GMU 16B residents harvested about 0.08 moose per person during this 28-year period (about 42 lb per person), a drop of about 50% compared to the 6 years in the 1980s when the subsistence registration hunt was in effect (Figure 3).

Figures 5 and 6 display the percentage of moose harvests within GMU 16B by GMU 16B residents and other Alaska residents, by season from 1983/1984 through 2017/2018. During this 33-year time period, 77% of the moose harvests by GMU 16B residents occurred during the winter (Figure 5). In contrast, only 26% of the moose harvested by other Alaska residents in GMU 16B has occurred during winter (Figure 6), with 74% of the harvest occurring during the fall hunt. Table 5 shows the marked pattern for residents of GMU 16B to harvest moose primarily in the winter, despite regulatory changes. During this 33-year period, the average annual winter moose harvest for residents of GMU 16B was 23 moose, compared to a mean of 7 fall moose harvested. A difference in harvest timing is also evidenced for other Alaska hunters:

they have focused their moose hunts in the fall, averaging 150 moose for the period 1983/1984–2017/2018 compared to 52 in the winter. For the period 1990/1991–2017/2018 winter hunts by Tier II permit holders who are residents of GMU 16B averaged 17 moose, while other Alaska residents who held Tier II permits averaged 59 winter moose (Table 6). Although the number of Tier II permits awarded to other Alaska residents far exceeds residents of GMU 16B (see Tier II Permits Awarded 1984–2017 section below), thus increasing the total moose harvest by other Alaska residents, the difference in seasonal use and harvest shows the dependence on the winter hunt by residents of GMU 16B.

GMU 16B MOOSE HARVESTS BY RESIDENCY FOR TIER II HUNTS 1990–2018

Figure 7 depicts the percentage of moose harvests in GMU 16B in Tier II permit hunts and in other hunts, for GMU 16B residents, other Alaska residents, and non-Alaska residents from 1990/1991 through 2017/2018. Nonlocal Alaska resident moose harvests, other than Tier II hunts, comprised about 49% of the GMU 16B moose harvests over the 28-year time period. Tier II hunts by other Alaska residents made up 29% of harvests. Hunters with Tier II permits who lived in GMU 16B accounted for 9% of the harvests and local residents participating in other hunts took 3% of the total. Non-Alaska residents took approximately 10% of the GMU 16B moose harvest from 1990/1991–2017/2018.

Figure 8 displays the percentage of the total moose harvest in GMU 16B that was taken in Tier II hunts by area of residence by year from 1990/1991–2017/2018. The vast majority of moose harvested by GMU 16B residents over the 28-year period were harvested during Tier II hunts (75% for all years combined). The percentage of moose taken by GMU 16B residents in Tier II hunts has never fallen below 50% and in some years has been 90% or more. The permit data show that GMU 16B residents have depended heavily on their participation in Tier II hunts for obtaining moose for subsistence uses. In comparison, over the 28-year period, Tier II hunts in GMU 16B provided only 38% of moose harvests for other Alaska residents. However, in some years (2001, 2002, 2006, 2007, and 2008) the percentage of moose harvests in Tier II hunts by other Alaska residents has been much higher because of closures to harvest ticket hunting in GMU 16B for moose hunting in those years.

TIER II AND OTHER SUBSISTENCE PERMITS AWARDED 1990–2017

Since 1990, subsistence hunting for moose in GMU 16B has been regulated through Tier II permits. The total number of Tier II permits awarded has remained relatively stable over time (Figure 9), ranging from a high of 400 in the years 2001/2002 and 2002/2003 (when the harvest ticket season for moose was closed), and a low of 105 in 1993/1994. The total number of applicants, however, has fluctuated, with the lowest number at 140 (in 1990), and the highest number at 1,386 applicants (in 1992). Since 1991, the demand for GMU 16B Tier II permits has been much higher than the available total. Roughly about 40% or fewer of the total number of applicants have received Tier II moose permits (Figure 10). Although the total number of applicants was above 800 for most years up to 2010/2011, starting in 2011/2012 the number of applicants ranged between 600–700 and averaged about 665 (Figure 9; Appendix B). This is likely due, in part, to the 2009 changeover of the fall hunt from Tier II to a general harvest ticket hunt.

From 1990/1991 through 2017/2018, the mean number of Tier II permits awarded was 257 (Table 7). The average number of permit applications was 929, with 28% of the applicants receiving permits. For resident hunters of 16B, the average number of permits awarded was 52, contrasted with 205 permits awarded to other Alaska residents. The number of local resident hunters with permits in this GMU was 37, almost one-quarter of the 141 other Alaska hunters with permits in the 16B unit. Although both

groups of hunters were close in success rate (51% local resident and 45% other Alaska), the number of moose harvested by local resident hunters was far less (an annual average of 19 moose), then for other Alaska hunters (63 moose). Table 8 shows the mean number of Tier II hunt permits awarded, hunters, and harvest by areas of residence for GMU16B, from 1990/1991–2017/2018.

After the *McDowell* decision of December 1989 and the change from local resident-only registration permits to Tier II permits, the number of permits issued to residents of the subunit decreased by almost half, from 132 in the 1980s to a mean of 52 permits from 1990/1991–2017/2018 (Table 3, Figure 11). After 1994/95, the number of Tier II permits issued to other Alaska residents increased, while the number issued to residents of the subunit gradually declined. Also after 1994/1995, resident hunters of 16B have never received more than 30% of permits awarded, although between 1990/1991 and 1993/1994 they received about 33%–45% of the permits, (Figure 12).

Moose harvests followed a similar pattern. Figures 13 and 14 show moose harvests, both by number of moose killed and percentage, by local resident and other Alaska resident Tier II permit holders. In the first four years of the Tier II hunt, harvests were relatively evenly distributed by residence category. However, since 1994/1995, other Alaska residents have taken most of the Tier II harvest: between 55% in 1995/1996 to 91% in 2012/2013. For all years since 1990/1991, local residents have taken 25% of the Tier II harvest, and other Alaska residents have harvested 75%.

GMU 16B MOOSE HARVESTS SINCE 1990/1991 COMPARED TO ANS

Figure 15 compares total moose harvests by Alaska residents in GMU 16B since 1990/1991 with the combined ANS range for the entire subunit of 199 to 227 moose, established in 1993. Since the ANS was established in 1993, the minimum has been achieved in 11 of 25 years (44%). However, the minimum ANS has been achieved every year since 2013/2014. In only 3 of these 11 years was the minimum ANS achieved during the fall hunt alone; these are the three most recent years for which complete harvest data are available (2015/2016–2017/2018). In the other eight years, the minimum ANS was achieved through a combination of fall and winter hunts, with the latter managed through Tier II permits.

DISCUSSION

Communities and families that depend upon harvests of wild resources for subsistence uses, including residents of GMU 16B and many other Alaska residents, have historically observed a pattern of hunting that emphasizes efficient harvests that take advantage of the availability of wildlife populations, travel conditions, and other factors. For GMU 16B residents who depend on harvesting a moose for subsistence uses, this emphasis has traditionally been on winter hunting opportunities. Preference for the winter season is linked directly to the migration of moose subpopulations to the accessible lowlands for wintering. This preference is also tied to meat storage requirements as well as the opportunity during winter to harvest "any bull" moose rather than the SF 50″ 3BT antler restriction currently imposed during the fall harvest ticket season moose hunt in GMU 16B (Holen et al. 2014).

To support this subsistence pattern of use, state regulations have maintained a winter moose harvest opportunity in GMU 16B in most years since 1959. During the late 20th century, the growing human populations in the Matanuska Valley and Anchorage began harvesting more moose in GMU 16B (Foster 1982:27; Fall et al. 1984:33,140; ADF&G 1985:8). During the 1970s, this expanding harvest pressure and declines in the moose population related to several severe winters resulted in challenges to maintaining the longstanding, winter subsistence hunting opportunities. The closure of the winter season in 1976 placed limitations on hunting moose for subsistence uses in GMU 16B. To provide for subsistence uses, the Board of Game in 1983 reopened winter moose hunting in GMU 16B, and state law through 1989

allowed a registration hunt for local residents (except 1985). After the Alaska Supreme Court's *McDowell* decision required providing the opportunity for all Alaska residents to participate in subsistence hunting, beginning in 1990, the board began to utilize the Tier II hunt structure to limit participation in the winter hunt, and sometimes the fall hunt as well. By 1993 the board had established hunts with two seasons for all of the subareas in GMU 16B: a harvest ticket hunt in September with a SF 50″ 3BT bag limit and a subsistence Tier II permit winter hunt with a bag limit of one bull moose per household. In combination, hunts in these two seasons were intended to provide a reasonable opportunity for Alaska residents to have success in harvesting moose for subsistence uses.

Since the 1990s, the majority of participants in GMU 16B Tier II moose hunts have been residents of populous nonlocal areas, such as Anchorage and the Matanuska-Susitna Valley. Nonlocal residents have also harvested most of the moose taken in the Tier II winter hunts. As discussed above, competition for Tier II permits has become an increasingly worrisome factor for residents of GMU 16B and the state's Tier II permit process has become the target of growing criticism from GMU 16B residents, linked to allegations of false applications and unfair allocation of the available permits.

Additionally, a growing moose population in GMU 16B, resulting from state intensive management programs and a number of relatively mild winters, has led to increasing interest by a variety of stakeholders to expand existing moose harvest opportunities in GMU 16B, including proposed elimination of Tier II hunts and expansion of winter moose hunting opportunities for a larger range of participants. For the five regulatory years 2013/2014 through 2017/2018, 260 Tier II permits have been available annually in GMU 16B, and the average number of applicants has been 638, yielding an applicant success rate of about 41%.

CONCLUSIONS

As further refinements to the regulations that govern subsistence hunting opportunities in GMU 16B are considered, it is instructive to keep in mind that Alaska is distinguished by its diversity of small, rural communities that are economically and culturally dependent on fish and game. Multiple ways of living have developed within these communities of users that include the traditional harvest and uses of wild resources, adapted to local ecological and economic circumstances. Many local subsistence traditions have developed within this diversity of peoples, ecologies, and economies. State and federal subsistence statues recognize the important roles of fishing and hunting within Alaska's diverse communities. One of the ongoing challenges of these subsistence laws is how to apply them in ways that allow for localized traditions to be sustainable (Wolfe 2004:55).

This report has provided moose harvest information and ethnographic information from studies conducted by the Division of Subsistence as well as studies and data from Division of Wildlife Conservation. The report illustrates how residents of GMU 16B have adapted to local ecological conditions to develop an efficient pattern of subsistence moose hunting occurring primarily in winter, when moose are most available, most accessible, and storable (Fall et al. 1983; Foster 1982; Holen et al. 2014; Jones et al. 2015; Stanek et al. 2007). This report has also provided details about the regulatory actions that have shaped the Board of Game's efforts to provide reasonable opportunities for subsistence hunting of moose in GMU 16B that support the customary and traditional hunting pattern identified by the board in 1982 and reaffirmed in 1986 and 1993. A goal of these regulatory actions was to provide efficiency for subsistence uses through adequate seasons and appropriate bag limits (such as the opportunity to harvest "any bull" moose, without antler restrictions). Current existing regulations reflect this goal: a winter season by Tier II permit with an any bull bag limit spanning 3.5 months from December 15–March 31, plus additional hunting opportunities in the fall.

Traditional seasons and past season lengths are appropriate guides for assessing reasonable opportunity for subsistence hunting. Season length provides flexibility for hunters, given certain variables from year

to year, such as weather patterns and the timing of GMU 16B moose subpopulations' migrations from summering areas in the uplands to wintering areas in the lowlands. Based on past documentation of harvests, ethnographic data, and reports from residents of local communities themselves, the winter season is key to providing a reasonable opportunity for success in harvesting a moose for subsistence uses in GMU 16B.

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TABLES AND FIGURES

Table 1.–Estimated harvests and uses of moose, communities of GMU 16B.

Community	Study year	Percentage of households					Estimated harvest, individual moose	95% confidence interval	Estimated harvest, pounds	Average harvest per household, pounds	Per capita harvest, pounds
		Use	Hunt	Harvest	Give away	Receive					
Beluga	2006	100.0%	64.3%	21.4%	42.9%	85.7%	3.0	30.0%	1,735	115.7	43.8
Skwentna	1982			83.0%			30.0				
Skwentna	2012	70.0%	53.3%	23.3%	20.0%	46.6%	8.1	26.0%	3,675	105.0	59.4
Susitna	2012	100.0%	72.7%	54.5%	63.6%	54.5%	7.0	25.2%	3,191	245.4	135.0
Tyonek	1979						20.0	0.0%			
Tyonek	1981						15.0	0.0%			
Tyonek	1982						9.0	0.0%			
Tyonek	1983			31.3%	26.3%	68.8%	30.0	0.0%	15,000	187.5	55.0
Tyonek	2006	83.0%	57.4%	19.1%	42.6%	76.6%	16.0	37.0%	7,583	117.4	37.5
Tyonek	2013	73.5%	59.2%	12.2%	24.5%	67.3%	7.7	36.6%	3,471	55.1	24.3
Western Susitna[a]	1984		73.0%	45.0%			28.0		14,000	318.2	109.4

Sources For estimates since 1983, Community Subsistence Information System (CSIS), which is available online: http://www.adfg.alaska.gov/sb/CSIS/. For Tyonek, 1979, 1981, and 1982: Fall et al. (1984:151). For Skwentna, 1982: Fall et al. (1983:22). For Western Susitna, 1984: Stanek (1987:37).

Note These estimates are based on household surveys.

Note Blank cells indicate data are not available.

a. Included Alexander (later named Susitna), Beluga, and Skwentna.

Table 2.–Population estimates of GMU 16B and areas adjacent and accessible to GMU 16B, 1980–2018.

	Population of _____ .						
	Communities inside GMU 16B				Adjacent areas		
Year	Beluga CDP[a]	Skwentna CDP	Susitna CDP[b]	Tyonek CDP	Municipality of Anchorage	Matanuska-Susitna Borough	Total area population
1980	13	93	39	239	174,431	17,816	192,486
1990	60	85	45	154	226,338	39,529	266,021
2000	32	111	37	193	260,283	59,092	319,568
2010	20	37	18	171	291,826	88,806	380,803
2018	19	35	15	168	295,365	105,560	401,093

Source Stanek (1986) for 1980 for Beluga, Skwentna, and Susitna—data pertain to 1984 study year; Alaska Department of Labor and Workforce Development for 1990–2018.

a. Population estimates for Beluga CDP for 1990 found in findings for the 2000 federal census.

b. Susitna CDP was called Alexander CDP in 1990. Source for 1990 population are findings for the 2000 federal census.

Note "CDP" indicates census-designated place.

Table 3.–Number of registration (981, 982, 981W, and 982W) subsistence moose hunt permits awarded, permits hunted, and successful hunters, GMU 16B, 1983/1984, 1984/1985, and 1986/1987–1989/1990.

Year	Hunter residence[a]	Total applications	Permits awarded	Permits hunted	Permit resulted in harvest
1983/1984	Unit 16B				
	Other Alaska				
	Unknown		158	124	32
	Total	**158**	**158**	**124**	**32**
1984/1985	Unit 16B		120	88	45
	Other Alaska		9	6	2
	Unknown		3	1	0
	Total	**132**	**132**	**95**	**47**
1986/1987	Unit 16B		115	77	48
	Other Alaska		13	9	8
	Total	**128**	**128**	**86**	**56**
1987/1988	Unit 16B		110	81	63
	Other Alaska		16	11	9
	Total	**126**	**126**	**92**	**72**
1988/1989	Unit 16B		110	74	48
	Other Alaska		16	8	4
	Total	**126**	**126**	**82**	**52**
1989/1990	Unit 16B		109	78	56
	Other Alaska		12	7	6
	Total	**121**	**121**	**85**	**62**

Source ADF&G Division of Wildlife Conservation WinfoNet database (accessed February 2019).

Note Kalgin Island harvests (registration hunt 980) are excluded from the data. The harvests include registration hunts 981, 982, 981W, and 982W.

Note Blank cells indicate data are not available.

a. Game Management Unit 16B includes residents of Alexander Creek, Beluga, Tyonek, and Skwentna.

Table 4.–Moose harvests, by hunt type and area of residence, GMU 16B, 1990/1991–2018/2019.

	Tier II					Other hunts					All hunts				
Year	GMU 16B residents	Other Alaska residents	Nonresidents	Unknown residents	Subtotal	GMU 16B residents	Other Alaska residents	Nonresidents	Unknown residents	Subtotal	GMU 16B residents	Other Alaska residents	Nonresidents	Unknown residents	Total harvest
1990/1991	16	14	0	0	30	2	65	2	0	69	18	79	2	0	99
1991/1992	19	32	0	0	51	11	157	36	1	205	30	189	36	1	256
1992/1993	21	22	0	0	43	15	139	38	3	195	36	161	38	3	238
1993/1994	27	17	0	0	44	14	80	36	1	131	41	97	36	1	175
1994/1995	43	61	0	0	104	4	83	38	1	126	47	144	38	1	230
1995/1996	13	16	0	0	29	4	126	38	2	170	17	142	38	2	199
1996/1997	32	64	0	0	96	10	157	40	2	209	42	221	40	2	305
1997/1998	22	68	0	0	90	12	177	48	4	241	34	245	48	4	331
1998/1999	24	68	0	0	92	7	160	37	1	205	31	228	37	1	297
1999/2000	17	86	0	0	103	6	117	40	5	168	23	203	40	5	271
2000/2001	13	59	0	0	72	10	129	30	2	171	23	188	30	2	243
2001/2002	22	98	0	0	120	1	1	0	0	2	23	99	0	0	122
2002/2003	10	57	0	0	67	0	0	0	0	0	10	57	0	0	67
2003/2004	11	68	0	0	79	7	90	1	1	99	18	158	1	1	178
2004/2005	12	67	0	0	79	7	77	0	1	85	19	144	0	1	164
2005/2006	12	65	0	0	77	3	59	0	0	62	15	124	0	0	139
2006/2007	12	92	0	0	104	1	3	0	0	4	13	95	0	0	108
2007/2008	21	81	0	0	102	0	6	0	0	6	21	87	0	0	108
2008/2009	22	93	0	0	115	1	5	1	0	7	23	98	1	0	122
2009/2010	20	65	0	0	85	6	92	0	2	100	26	157	0	2	185
2010/2011	20	83	0	0	103	8	89	0	0	97	28	172	0	0	200
2011/2012	16	74	0	0	90	3	93	9	4	109	19	167	9	4	199
2012/2013	8	83	0	0	91	4	64	17	0	85	12	147	17	0	176
2013/2014	16	75	0	0	91	4	109	26	0	139	20	184	26	0	230
2014/2015	9	40	0	0	49	7	155	36	1	199	16	195	36	1	248
2015/2016	18	70	0	0	88	12	214	43	0	269	30	284	43	0	357
2016/2017	19	68	0	0	87	5	225	33	0	263	24	293	33	0	350
2017/2018	18	76	0	0	94	6	238	69	2	315	24	314	69	2	409
2018/2019[a]	1	7	0	0	8	6	231	63	5	305	7	238	63	5	313
Average[b]	18.3	62.9	0.0	0.0	81.3	6.1	103.9	22.1	1.2	133.3	24.4	166.9	22.1	1.2	214.5

Source ADF&G Division of Wildlife Conservation WinfoNet database (accessed Fabruary 2019).

Note Kalgin Island harvests (registration hunt RM573) are excluded from the data.

Note In all years except 2001/2002, 2002/2003, 2006/2007, 2007/2008, and 2008/2009, hunting by Tier II permit was open during the winter season only. Reports of harvests by Tier II permit in other years in the fall season may be in error.

a. Complete data are not available; legal hunt season is in progress or harvest reports are still being collected.

b. Average does not include data for 2018/2019.

Table 5.–Moose harvests obtained through all hunts, by season and area of residence, GMU 16B, 1983/1984–2018/2019.

	Moose harvest							
	GMU 16B residents		Other Alaska residents		Nonresidents		Unknown residence	
Year	Fall	Winter	Fall	Winter	Fall	Winter	Fall	Winter
1983/1984	12	4	366	36	37	1	4	32
1984/1985	8	46	431	43	54		3	0
1985/1986	7	28	292	14	45		4	0
1986/1987	7	48	403	13	45		5	0
1987/1988	3	64	292	12	45		7	0
1988/1989	10	52	251	6	62		1	0
1989/1990	7	56	219	7	55		1	0
1990/1991	2	16	64	15	2		0	0
1991/1992	11	19	157	32	36		1	0
1992/1993	13	23	139	22	38		3	0
1993/1994	13	28	77	20	36		1	0
1994/1995	5	42	84	60	38		1	0
1995/1996	5	12	128	14	38		2	0
1996/1997	15	27	159	62	40		2	0
1997/1998	12	22	175	70	48		4	0
1998/1999	7	24	161	67	37		1	0
1999/2000	8	15	117	86	39	1	5	0
2000/2001	10	13	130	58	30		2	0
2001/2002	3	20	26	73	0		0	0
2002/2003	1	9	19	38	0		0	0
2003/2004	7	11	91	67	1		0	1
2004/2005	7	12	76	68	0		1	0
2005/2006	3	12	61	63	0		0	0
2006/2007	1	12	13	82	0		0	0
2007/2008	4	17	27	60	0		0	0
2008/2009	2	21	22	76	1		0	0
2009/2010	7	19	97	60	0		2	0
2010/2011	7	21	90	82	0		0	0
2011/2012	3	16	93	74	9		4	0
2012/2013	4	8	66	81	17		0	0
2013/2014	3	17	106	78	26		0	0
2014/2015	7	9	152	43	36		1	0
2015/2016	12	18	207	77	42	1	0	0
2016/2017	5	19	216	77	33		0	0
2017/2018	6	18	224	90	69		2	0
2018/2019[a]	6	1	228	10	63		5	0
5-year avg[b]	6.6	16.2	181.0	73.0	41.2	1.0	0.6	0.0
10-year avg[b]	5.6	16.6	127.3	73.8	23.3	1.0	0.9	0.0
All-year avg[b]	6.8	22.8	149.5	52.2	27.4	1.0	1.6	0.9

Source ADF&G Division of Wildlife Conservation WinfoNet database (accessed February 2019).

Note Kalgin Island harvests (registration 980 and RM 572) are excluded from the data.

Note Blank cells indicate that no legal hunt was available for the season.

a. Complete data are not available; legal hunt season is in progress or harvest reports are still being collected.

b. Averages do not include data for 2018/2019.

Table 6.–Moose harvests obtained through Tier II hunt, by season and area of residence, GMU 16B, 1990/1991–2018/2019.

	GMU 16B residents		Other Alaska residents		Total	
Year	Fall	Winter	Fall	Winter	Fall	Winter
1990/1991		16		14		30
1991/1992		19		32		51
1992/1993	1	20		22	1	42
1993/1994	4	23	1	16	5	39
1994/1995	1	42	2	59	3	101
1995/1996	2	11	3	13	5	24
1996/1997	6	26	2	62	8	88
1997/1998		22		68		90
1998/1999		24	1	67	1	91
1999/2000	2	15		86	2	101
2000/2001		13	1	58	1	71
2001/2002	3	19	25	73	28	92
2002/2003	1	9	19	38	20	47
2003/2004	1	10	1	67	2	77
2004/2005		12		67		79
2005/2006		12	2	63	2	75
2006/2007	1	11	10	82	11	93
2007/2008	4	17	22	59	26	76
2008/2009	2	20	17	76	19	96
2009/2010	1	19	5	60	6	79
2010/2011		20	1	82	1	102
2011/2012		16		74		90
2012/2013		8	2	81	2	89
2013/2014		16		75		91
2014/2015		9	1	39	1	48
2015/2016		18		70		88
2016/2017		19		68		87
2017/2018		18		76		94
2018/2019[a]		1		7		8
5-year avg[b, c]	–	16.0	–	65.6	–	81.6
10-year avg[b, c]	–	16.3	–	70.1	–	86.4
All-year avg[b, c]	2.2	17.3	18.6	58.8	20.8	76.1

Source ADF&G Division of Wildlife Conservation WinfoNet database (accessed February 2019).

Note A Tier II hunt occurred in 1985/1986 but data are not included in this table due to incompatability with how later Tier II hunts were administered.

Note Blank cells indicate that no legal hunt was available for the season. Only in 2001/2002, 2002/2003, 2006/2007, 2007/2008, and 2008/2009 was hunting by Tier II permit open during the fall season. Reports of harvests by Tier II permit in any other year in the fall season may be in error.

a. Complete data are not available; legal hunt season is in progress or harvest reports are still being collected.

b. Averages do not include data for 2018/2019.

c. There were only 5 years in which a Tier II hunt occurred in the fall season. Therefore, only the all-year average for the 5 years is provided.

Table 7.–Mean number of Tier II moose hunt permits applied for, awarded, and hunted, and mean successful harvesters and harvest amounts, GMU 16B, 1990/1991–2017/2018.

Characteristic	Annual mean
All participants	
Number of applications	928.8
Number of permits awarded	256.9
Percentage of applicants receiving permits	27.7%
Number of hunters	177.6
Percentage of permit holders hunting	69.2%
Number of moose harvested	81.9
Percentage of hunters successful	46.1%
GMU 16B residents only	
Number of applications	NA
Number of permits awarded	51.8
Percentage of applicants receiving permits	NA
Number of hunters	36.9
Percentage of permit holders hunting	71.3%
Number of moose harvested	18.7
Percentage of hunters successful	50.7%
Other Alaska residents only	
Number of applications	NA
Number of permits awarded	205.0
Percentage of applicants receiving permits	NA
Number of hunters	140.6
Percentage of permit holders hunting	68.6%
Number of moose harvested	63.2
Percentage of hunters successful	44.9%

Source ADF&G Division of Wildlife Conservation WinfoNet database (accessed February 2019).

Table 8.–Mean harvests of moose, by hunt type (Tier II or all other hunts) and area of residence, GMU 16B, 1990/1991–2017/2018.

Characteristic	Mean
GMU 16B residents, Tier II harvest	18.7
GMU 16B residents, other hunts harvest[a]	6.1
GMU 16B residents, total harvest[a]	24.4
GMU 16B residents, percentage of total harvest taken in Tier II hunts	76.7%
Other Alaska residents, Tier II harvest	63.2
Other Alaska residents, other hunts harvest[a]	103.9
Other Alaska residents, total harvest[a]	165.7
Other Alaska residents, percentage of total harvest taken in Tier II hunts	38.1%
Nonresidents, total harvest[a]	22.1

Source ADF&G Division of Wildlife Conservation WinfoNet database (accessed February 2019).

a. Kalgin Island harvests (registration hunt RM572) are excluded from the data.

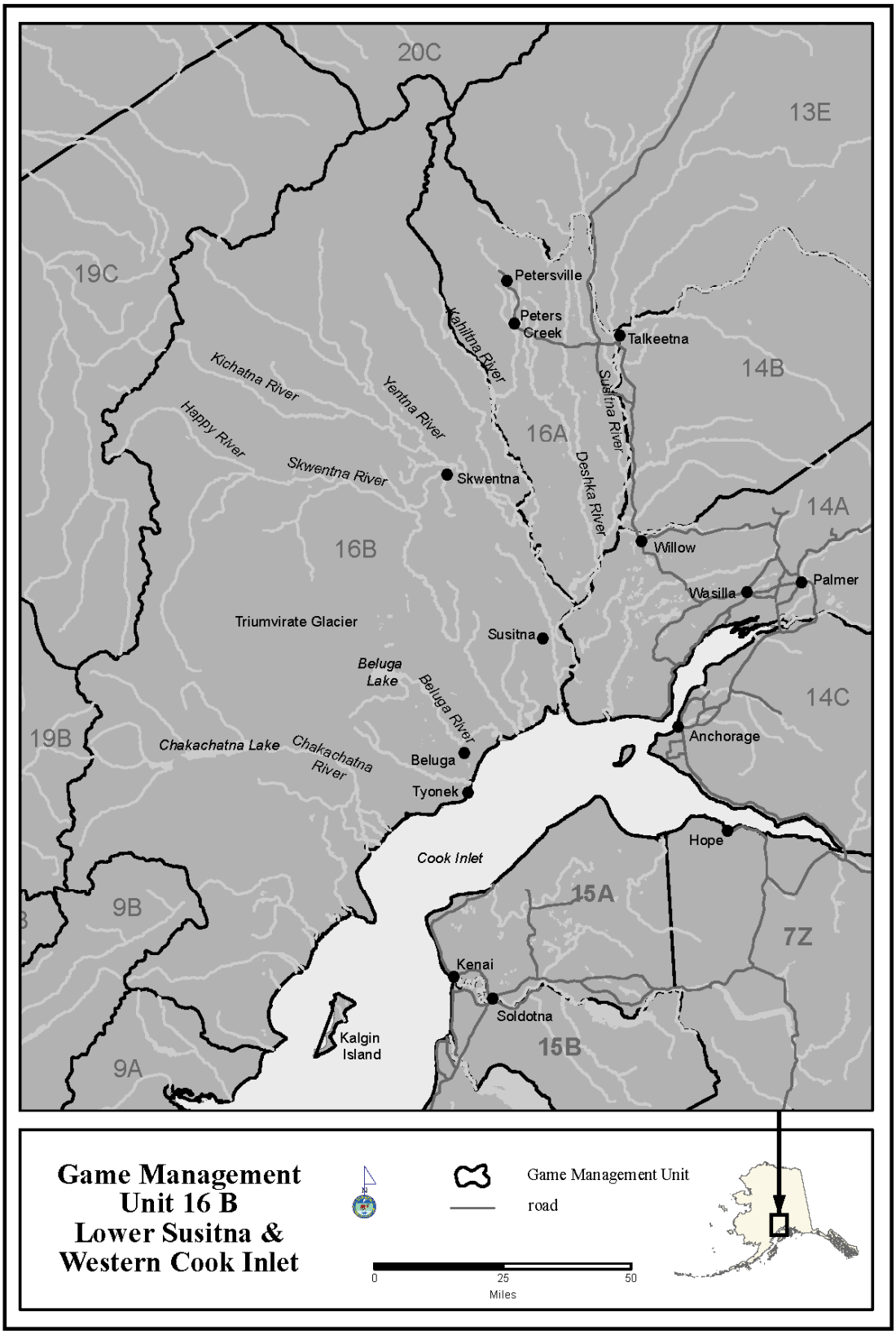


Figure 1.–Game Management Unit 16B.

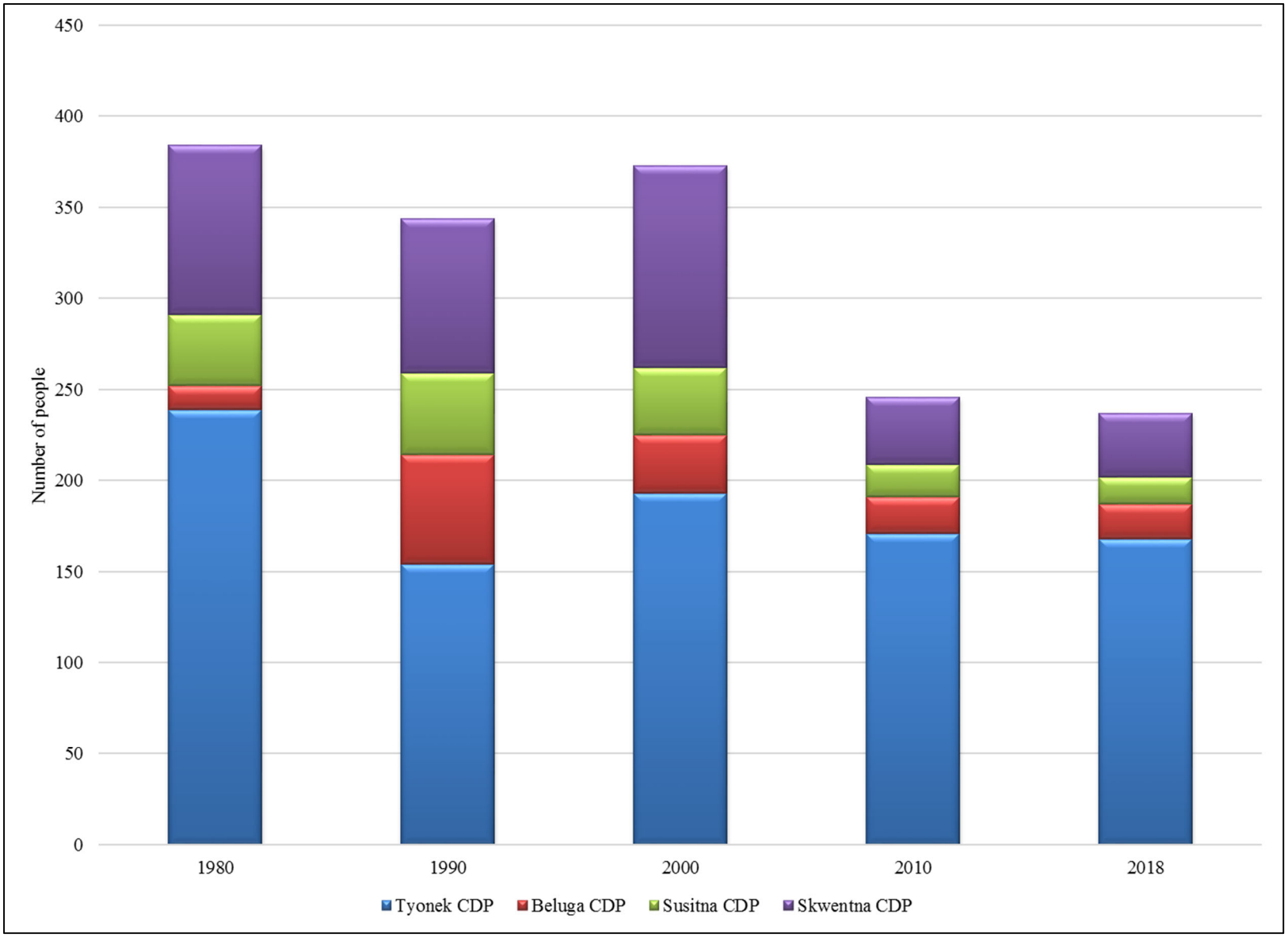


Figure 2.–Population estimates of communities in GMU 16B, 1980–2018.

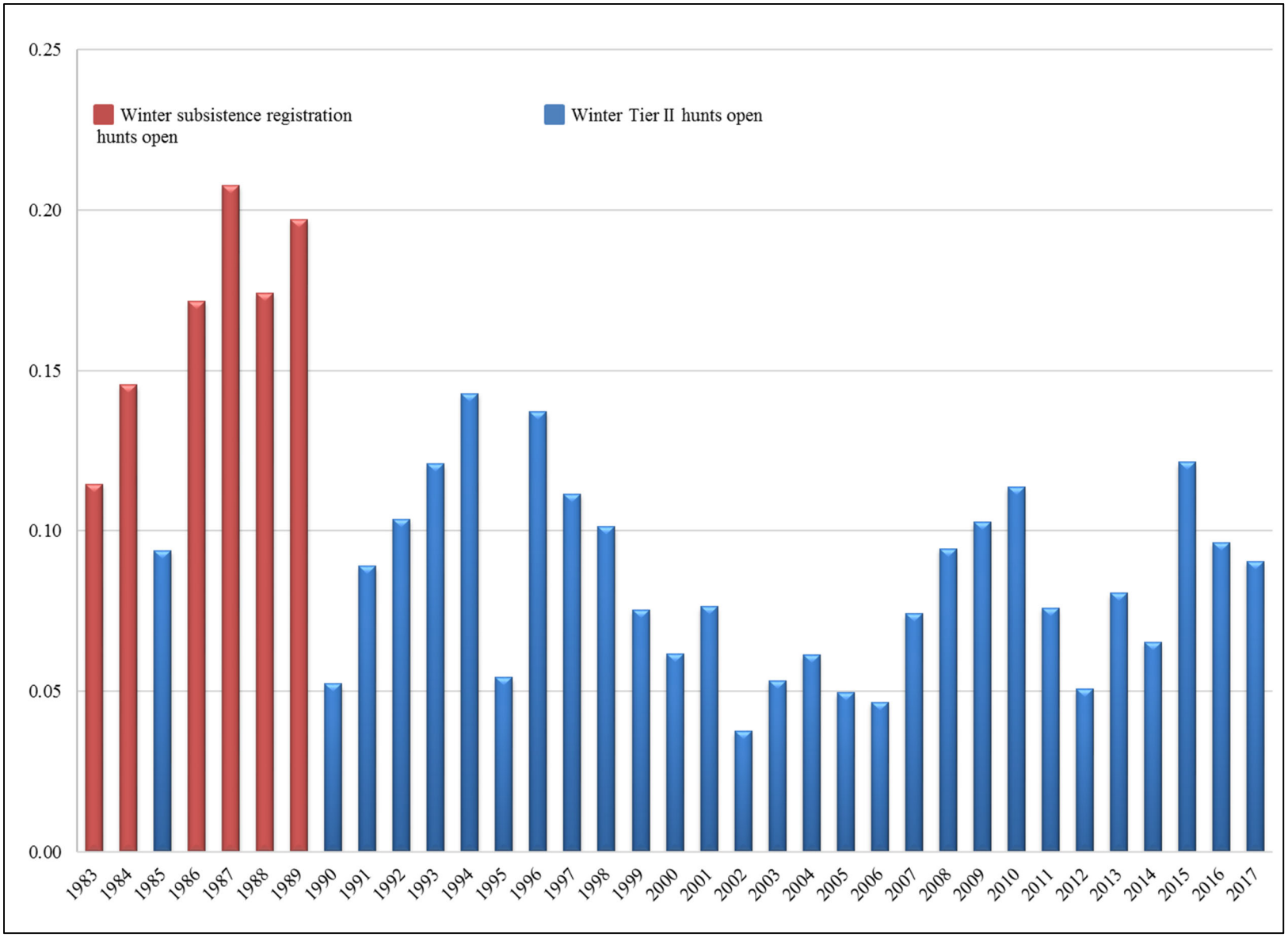


Figure 3.–Number of moose harvested per capita, communities of GMU 16B combined, all hunts, 1983–2017.

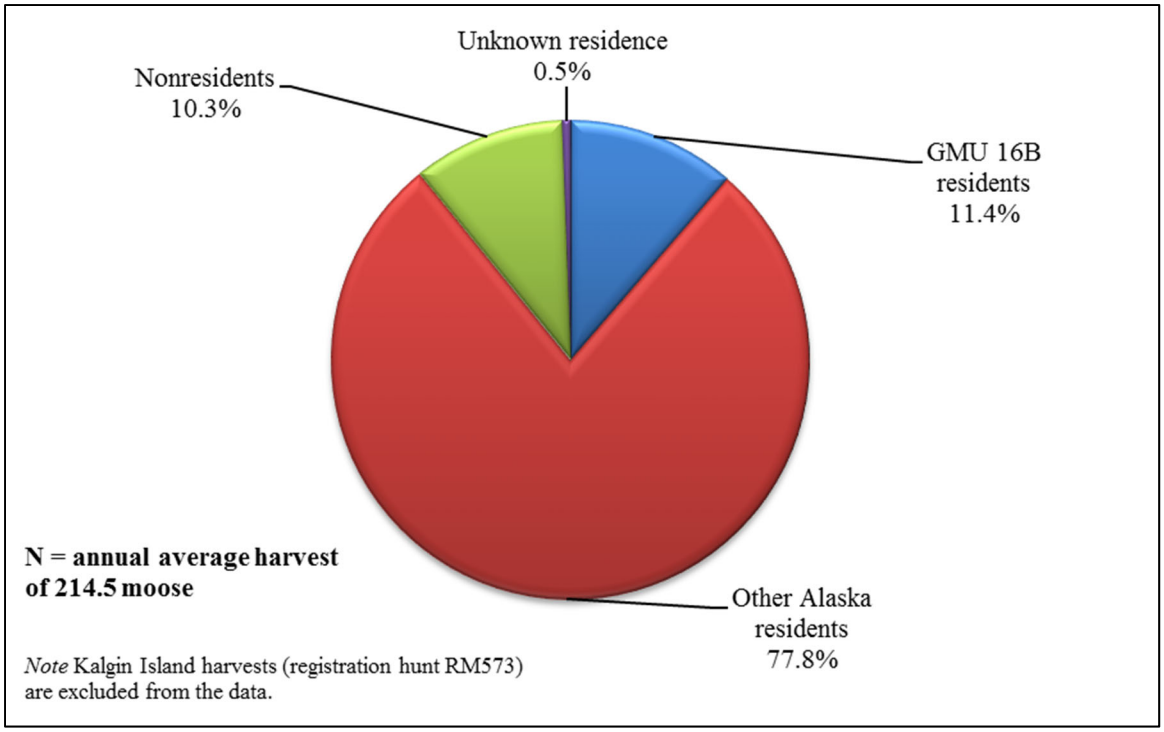
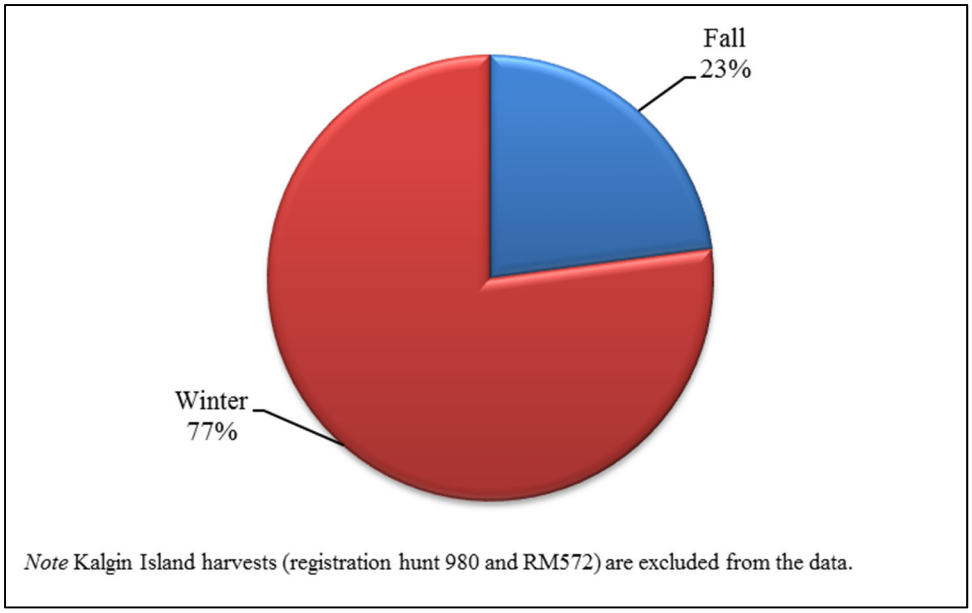


Figure 4.–Percentage of total moose harvest obtained through all hunts, by area of residence, GMU 16B, 1990/1991–2017/2018.



Note Kalgin Island harvests (registration hunt 980 and RM572) are excluded from the data.

Figure 5.–Proportion of moose harvest obtained through all hunts, by GMU 16B residents, by season, GMU 16B, 1983/1984–2017/2018.

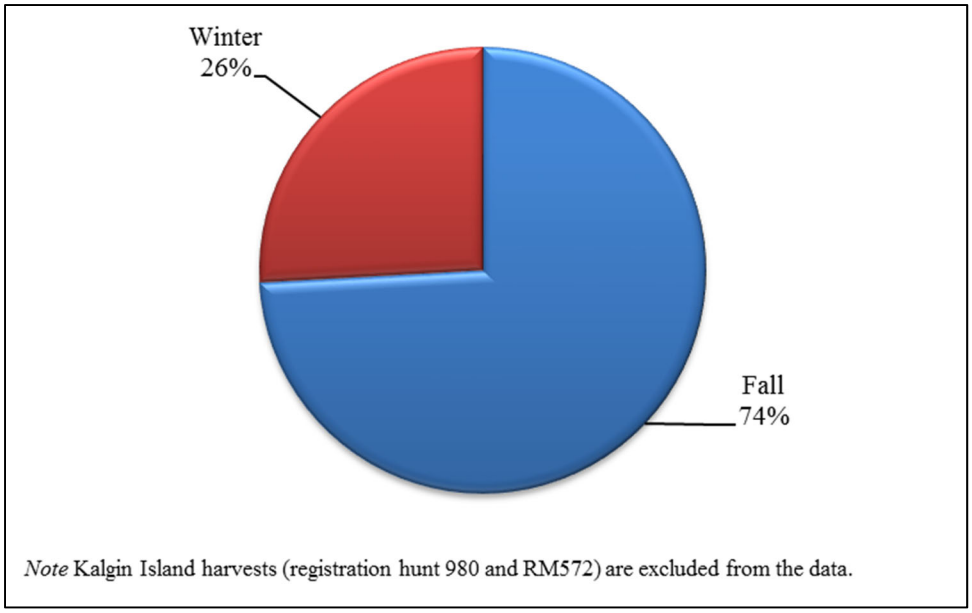


Figure 6.–Proportion of moose harvest obtained through all hunts, by Alaska residents living outside GMU 16B, by season, GMU 16B, 1983/1984–2017/2018.

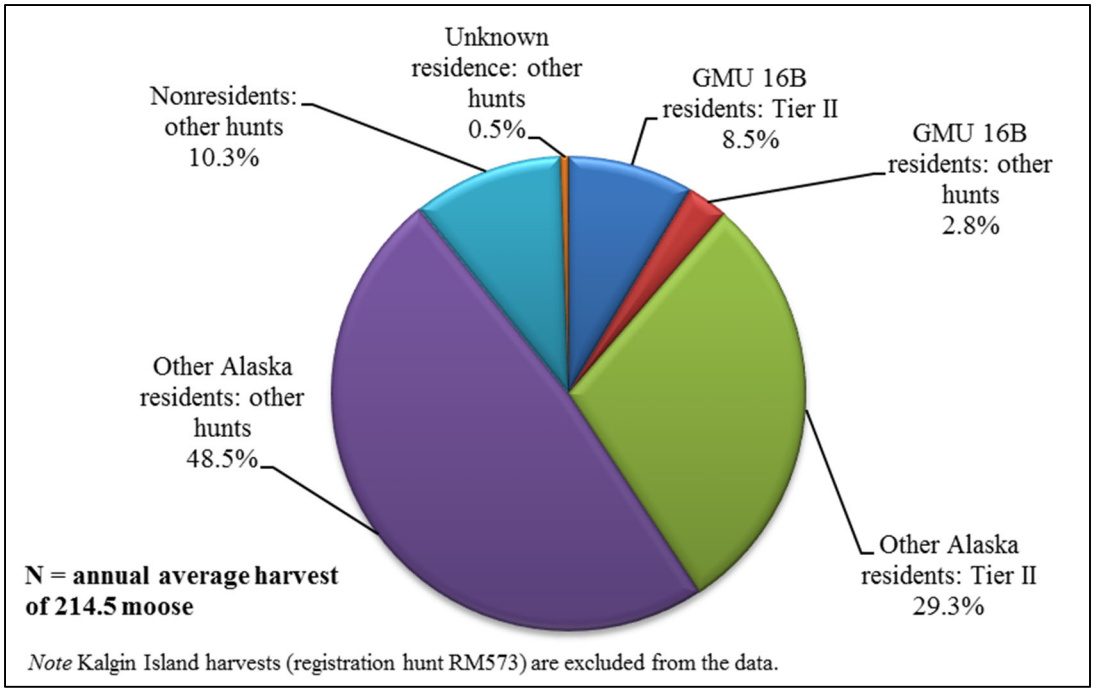


Figure 7.–Percentage of total moose harvest obtained through Tier II and other hunts, by area of residence, GMU 16B, 1990/1991–2017/2018.

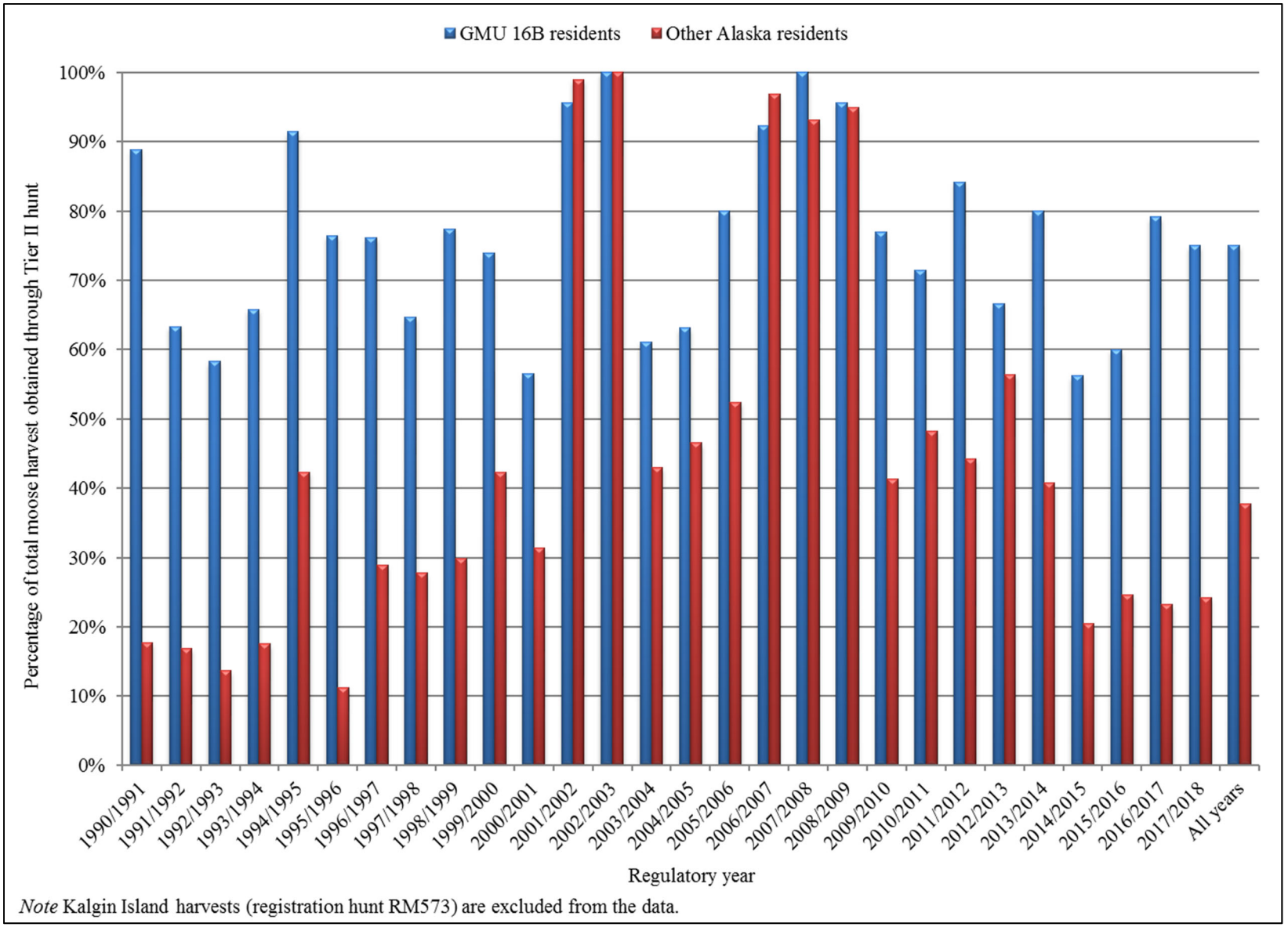


Figure 8.–Percentage of total moose harvest obtained through Tier II hunts, by area of residence, GMU 16B, 1990/1991–2017/2018.

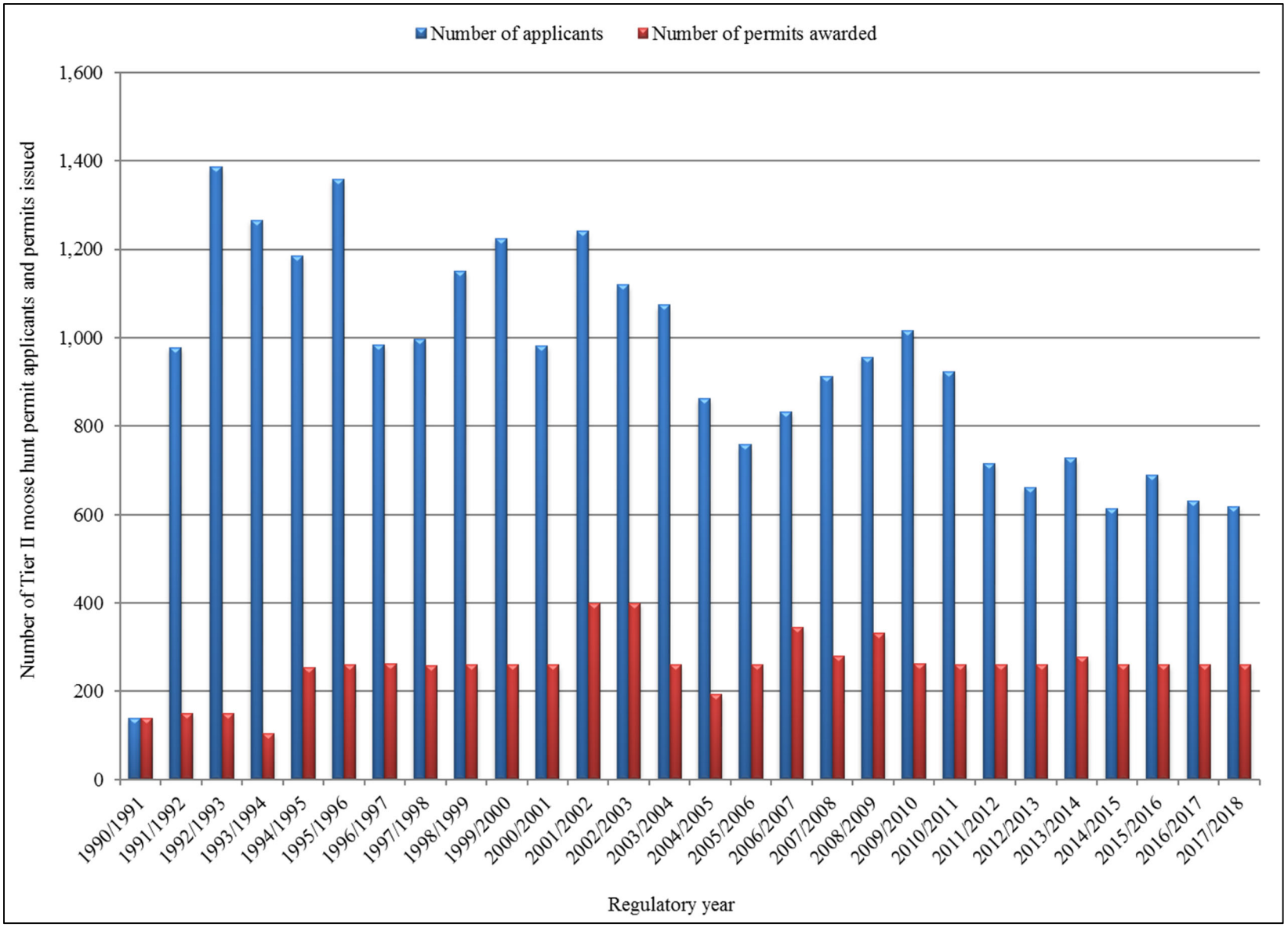


Figure 9.–Total number of Tier II moose hunt applicants and number of permits awarded, GMU 16B, 1990/1991–2017/2018.

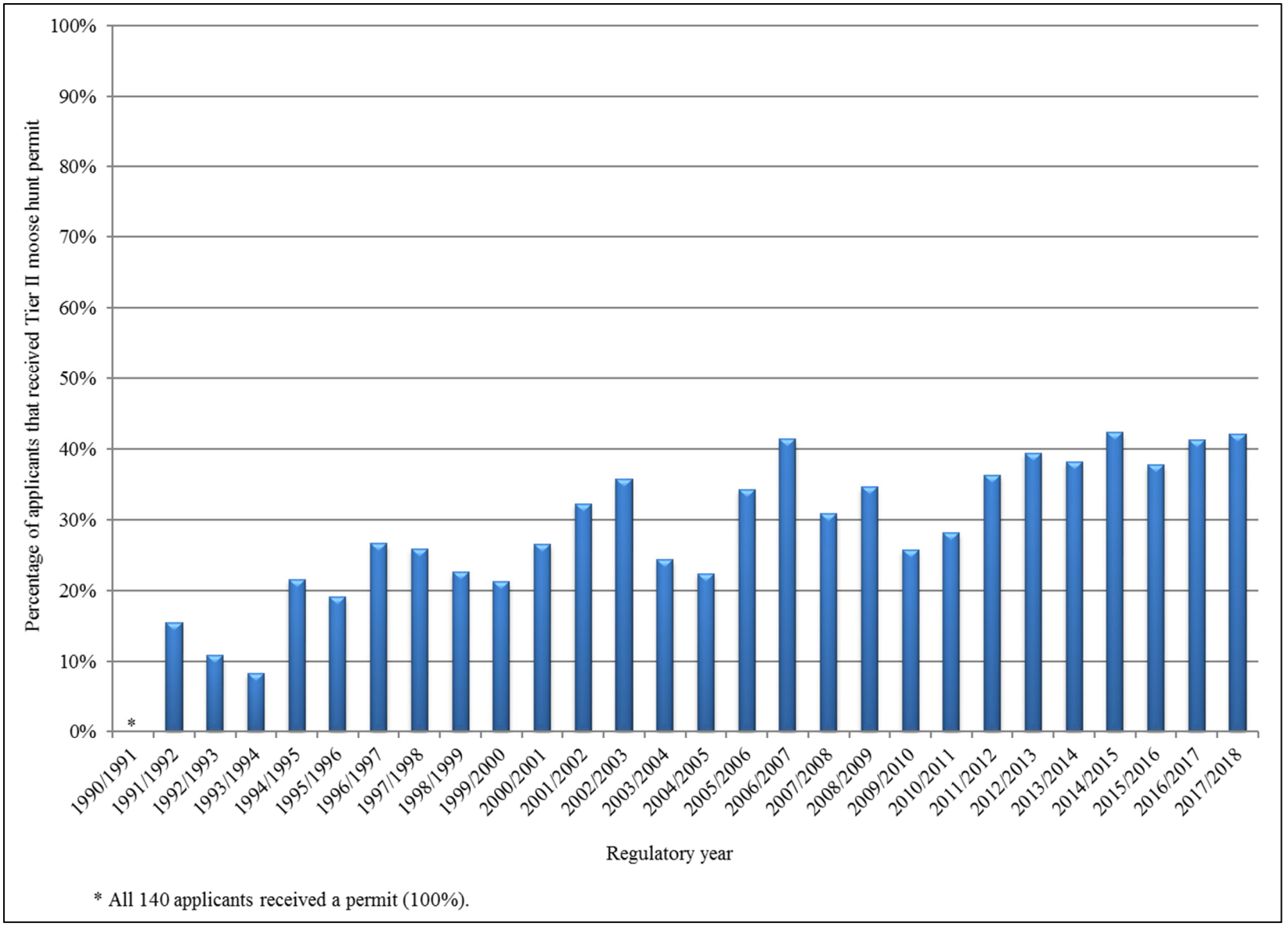


Figure 10.– Percentage of Tier II moose hunt applicants that received permits, GMU 16B, 1991/1992–2017/2018.

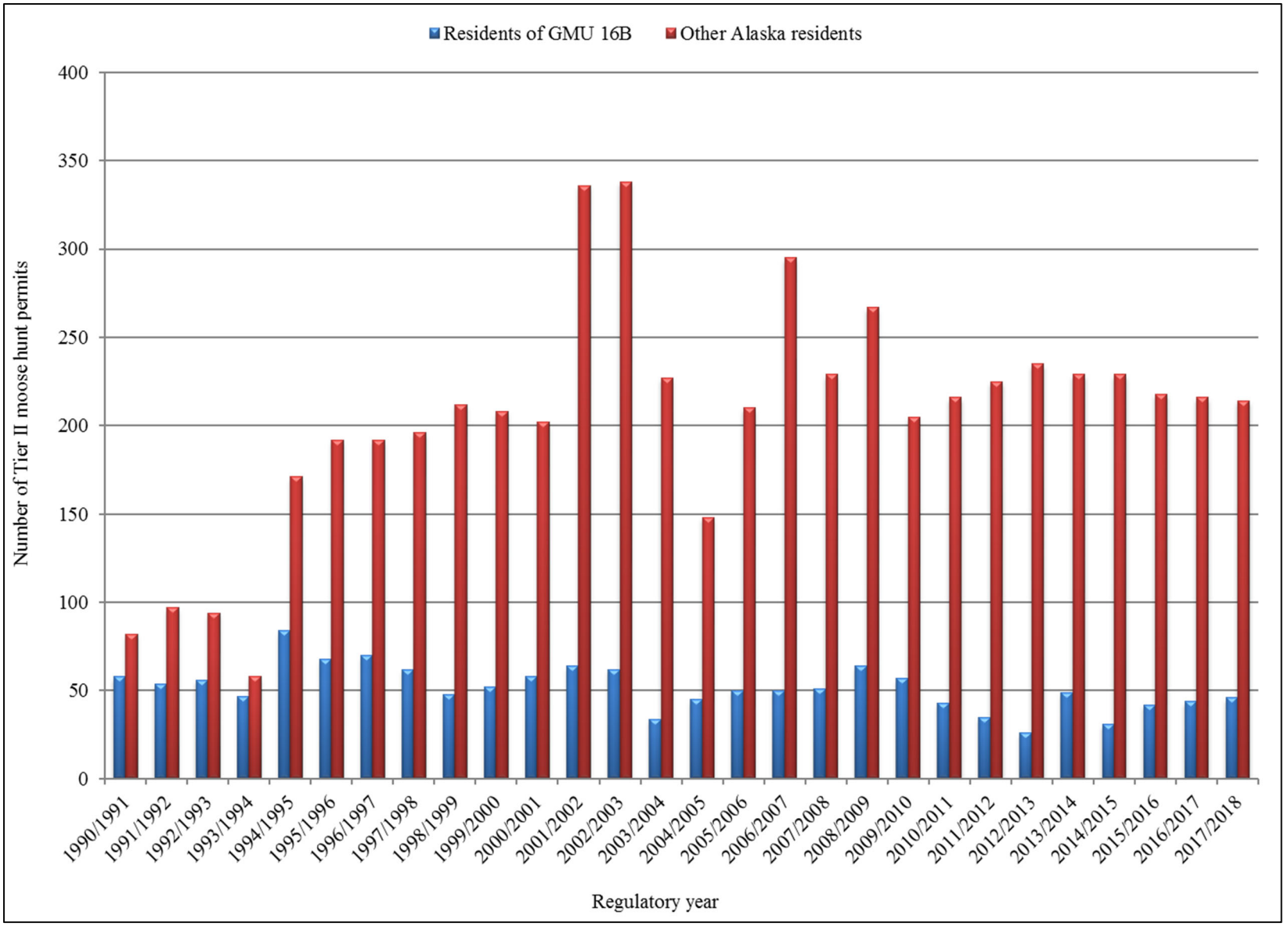


Figure 11.–Number of Tier II moose hunt permits awarded, by area of residence, GMU 16B, 1990/1991–2017/2018.

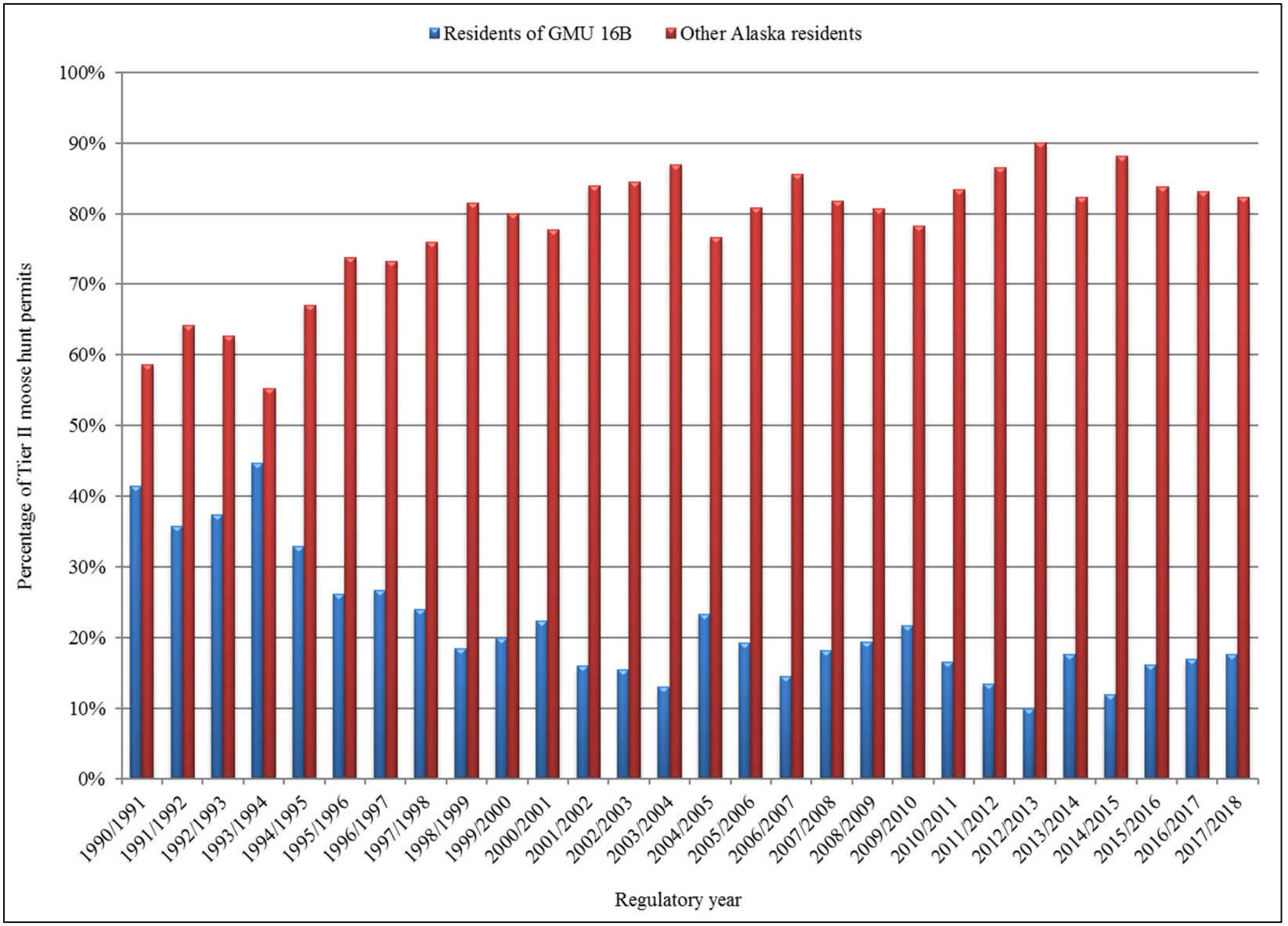


Figure 12.–Percentage of Tier II moose hunt permits awarded, by area of residence, GMU 16B, 1990/1991–2017/2018.

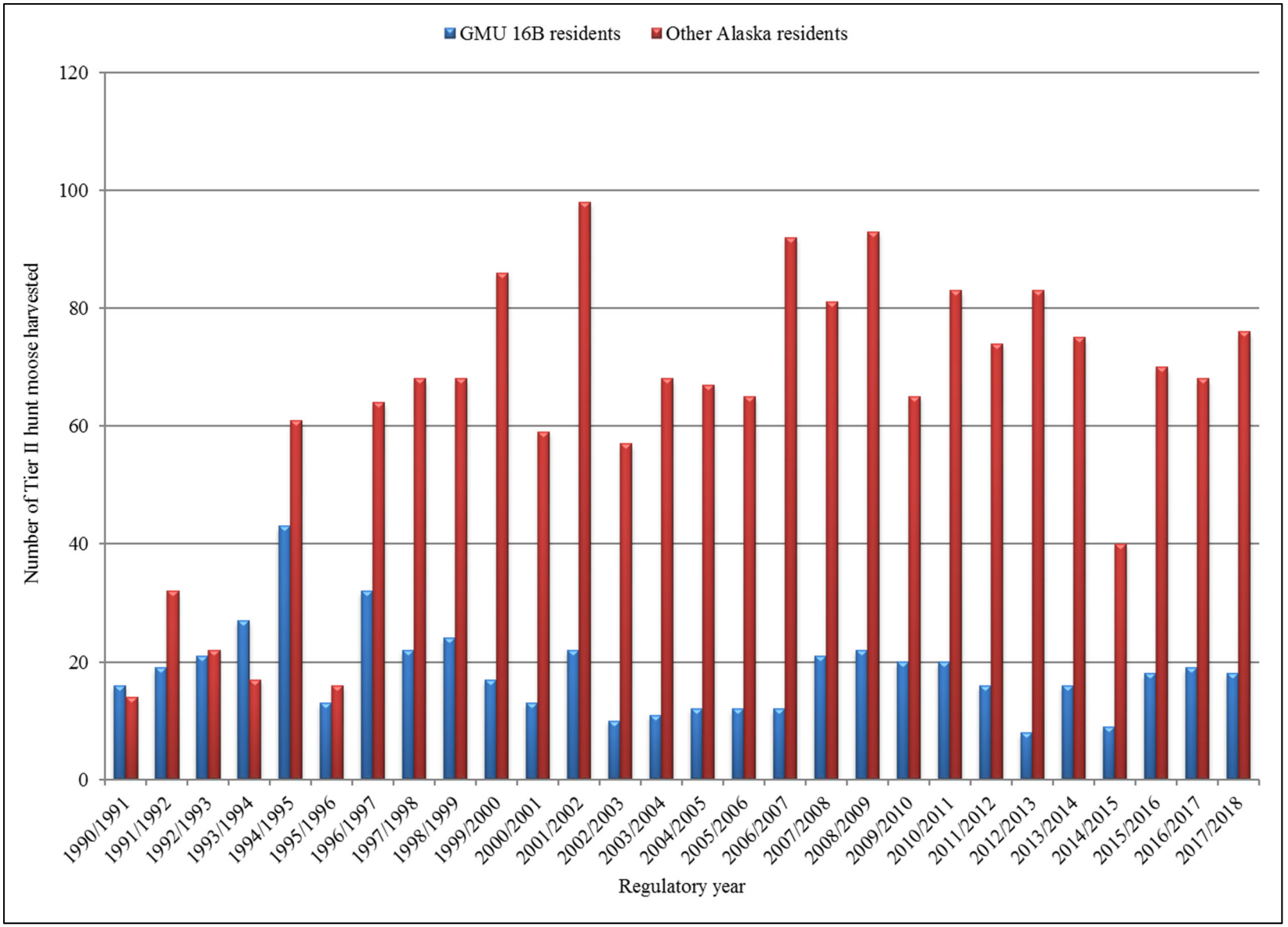


Figure 13.–Number of moose harvested, Tier II hunts, by area of residence, GMU 16B, 1990/1991–2017/2018.

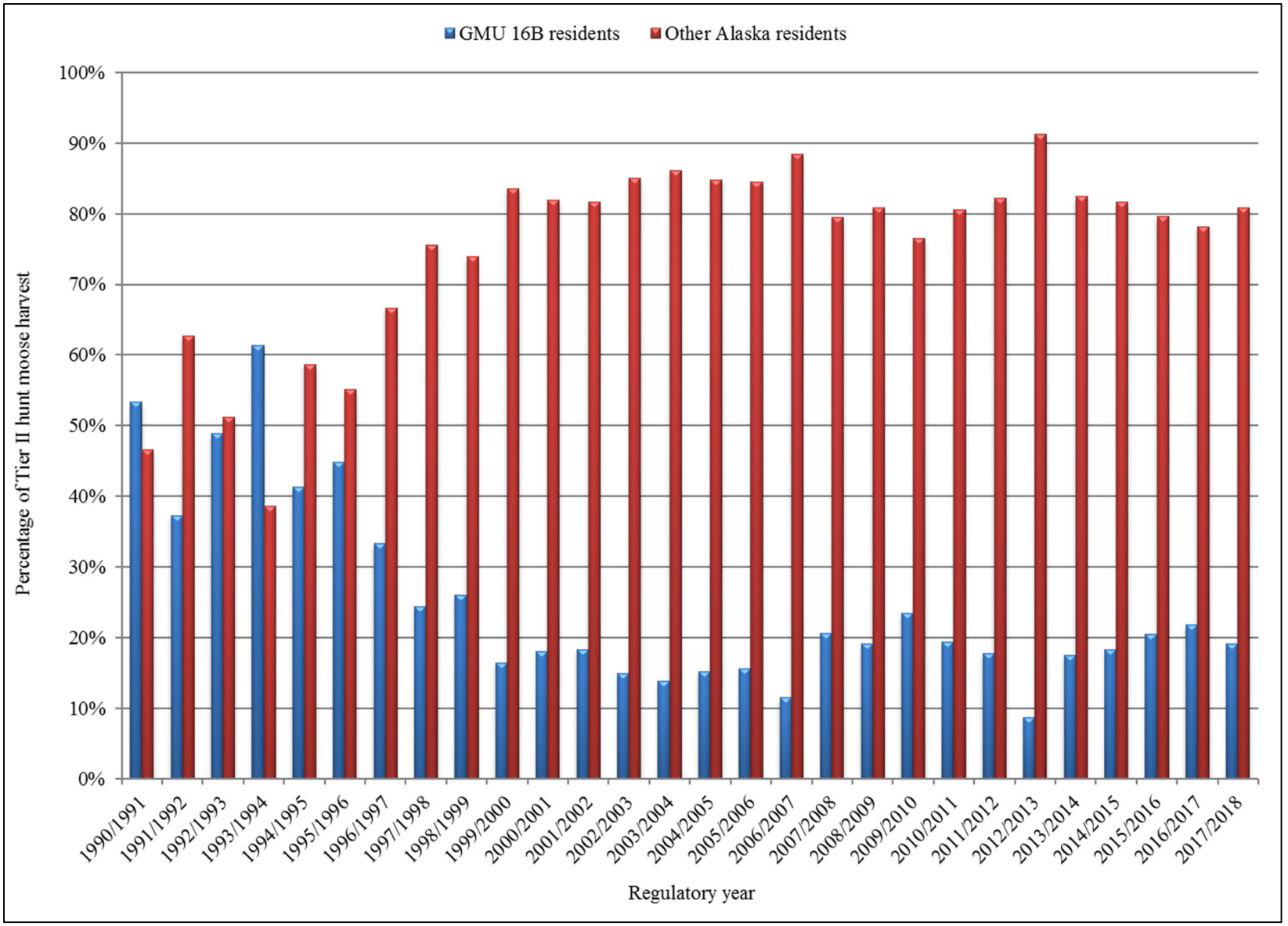


Figure 14.–Percentage of moose harvest, Tier II hunts, by area of residence, GMU 16B, 1990/1991–2017/2018.

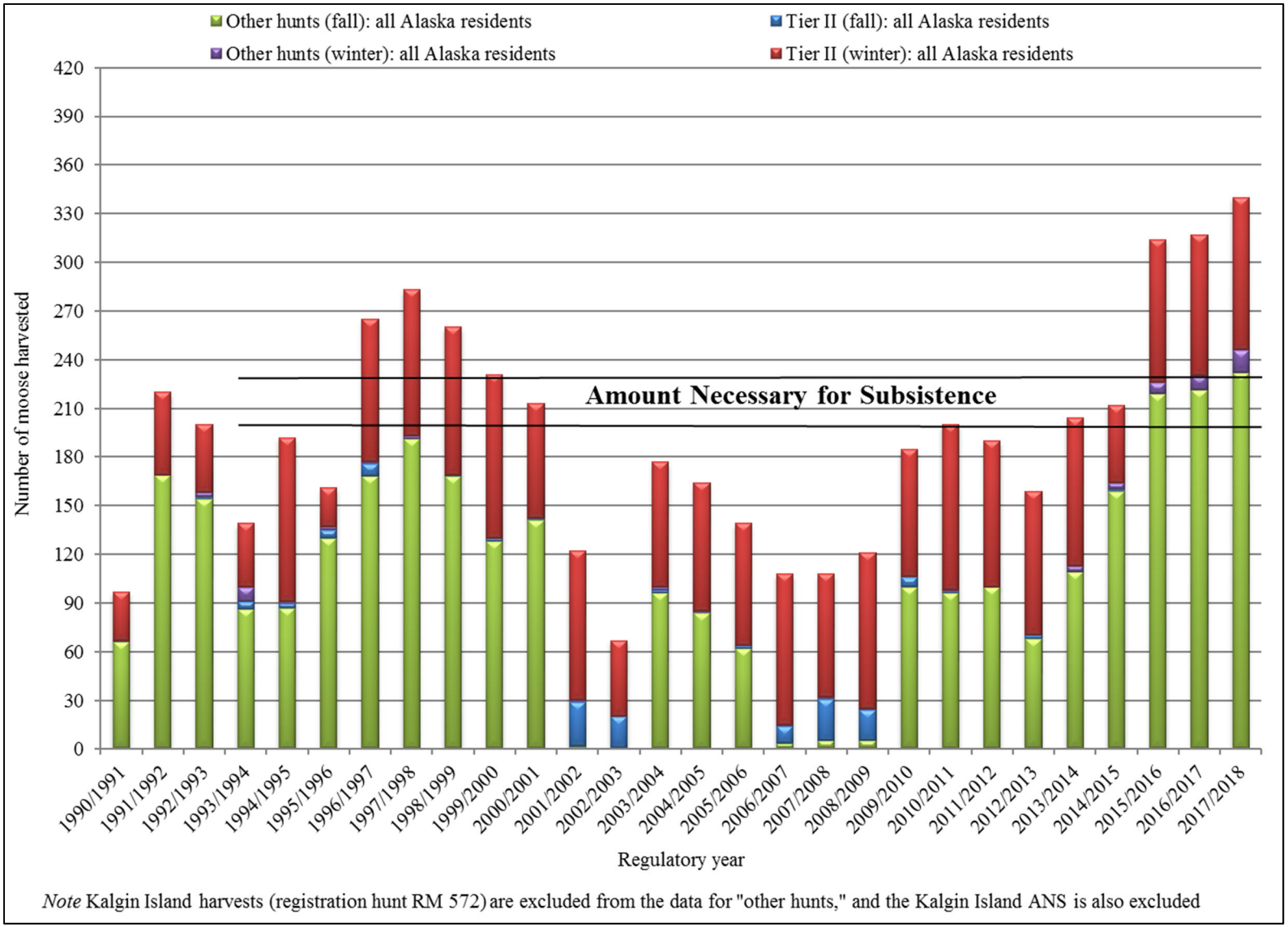


Figure 15.–Total moose harvests by Alaska residents in GMU 16B, 1990/1991 compared to the combined ANS range for the entire subunit, established in 1993.

APPENDIX A:
MOOSE REGULATORY HISTORY, GMU 16B, 1980–2018

Appendix A.– Moose Regulations GMU 16B 1980–2018.

Year/Area	Resident general hunt		Resident registration hunt		Resident draw permit hunt		Subsistence hunt/Tier II[a]		Nonresident hunt	
	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date
1980										
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	-	-	-	-
	Antlerless only	Sept 10–Sept 16	-	-	-	-	-	-	-	-
1981										
Kalgin Island	-	-	-	-	One moose	Sept 1–Sept 30	-	-	-	-
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	-	-	-	-
	Antlerless only	Sept 10–Sept 16	-	-	-	-	-	-	-	-
1982										
Kalgin Island			One antlerless							
	-	-	moose	Sept 1–Dec 31	-	-	-	-	-	-
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	-	-	-	-
	Antlerless only	Sept 1–Sept 20	-	-	-	-	-	-	-	-
1983										
Kalgin Island	-	-	One moose	Sept 1–Dec 31	-	-	-	-	-	-
Remainder										
	One moose	Sept 1–Sept 30			One moose	Nov 1–Nov 15	One moose	Nov 1–Nov 15	-	-
1984										
Kalgin Island	-	-	One moose	Sept 1–Sept 4	-	-	-	-	-	-
Remainder	One moose	Sept 1–Sept 30			One moose	Nov 1–Nov 15	One moose	Nov 1–Jan 31b	-	-
	Antlerless only	Sept 10–Sept 30	-	-	-	-	-	-	-	-
1985										
Kalgin Island	One moose	Aug 25–Aug 31	-	-	-	-	-	-	-	-
Redoubt Bay[c]	One bull	Sept 1–Sept 15	-	-	-	-	-	-	-	-
Beluga North[d]	One moose	Sept 1–Sept 30	-	-	-	-	One moose	Dec 1–Jan 31	-	-
	Antlerless only	Sept 20–Sept 30	-	-	-	-	-	-	-	-
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	One moose	Dec 1–Jan 31	-	-
	Antlerless only	Sept 20–Sept 30	-	-	-	-	-	-	-	-
1986										
Kalgin Island	One moose	Aug 25–Sept 20	-	-	-	-	-	-	One moose	Aug 25–Sept 20
Redoubt Bay	One bull	Sept 1–Sept 15	-	-	-	-	-	-	One bull	Sept 1–Sept 15
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	One bull	Dec 1–Feb 28[b]	-	-
	Antlerless only	Sept 25–Sept 30	-	-	-	-	-	-	-	-
1987										
Kalgin Island	One moose	Aug 25–Sept 20	-	-	-	-	-	-	One moose	Aug 25–Sept 20
Redoubt Bay	One bull	Sept 1–Sept 15	-	-	-	-	-	-	One bull	Sept 1–Sept 15
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	Antlerless only	Sept 25–Sept 30	-	-
	-	–	-	-	-	-	One bull	Dec 1–Feb 28[b]	-	-
1988										
Kalgin Island	One moose	Aug 25–Sept 20	-	-	-	-	-	-	One moose	Aug 25–Sept 20
Redoubt Bay	One bull	Sept 1–Sept 15	-	-	-	-	-	-	One bull	Sept 1–Sept 15
Remainder	One moose	Sept 1–Sept 30	-	-	-	-	One bull	Dec 1–Feb 28[b]	-	-
	Antlerless only	Sept 25–Sept 30	-	-	-	-	-	-	-	-

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Appendix A.–Page 2 of 6.

Year/Area	Resident general hunt		Resident registration hunt		Resident draw permit hunt		Subsistence hunt/Tier II[a]		Nonresident hunt	
	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date
1989										
Kalgin Island	One moose	Aug 25–Sept 30	-	-	-	-	-	-	One moose	Aug 25–Sept 30
Redoubt Bay	One bull	Sept 1–Sept 15	-	-	-	-	-	-	One bull	Sept 1–Sept 15
Remainder	One bull	Sept 1–Sept 30	-	-	-	-	Antlerless only	Sept 25–Sept 30	One bull	Sept 1–Sept 30
	-	-	-	-	-	-	One moose	Dec 1–Feb 28[b]	-	-
1990										
Kalgin Island	One moose	Aug 25–Sept 10	-	-	-	-	-	-	One moose	Aug 25–Sept 10
Redoubt Bay	One bull	Sept 1–Sept 10	-	-	-	-	-	-	One bull	Sept 1–Sept 10
Remainder	One bull	Sept 1–Sept 30	-	-	-	-	One bull	Dec 1–Feb 28[b]	-	-
1991										
Kalgin Island	One bull	Aug 25–Sept 20	-	-	-	-	-	-	One bull	Aug 25–Sept 20
Redoubt Bay	One bull	Sept 1–Sept 10	-	-	-	-	-	-	One bull	Sept 1–Sept 10
Remainder	One bull	Sept 1–Sept 20	-	-	-	-	One bull	Dec 1–Feb 28[b]	-	-
1992										
Kalgin Island	One bull	Sept 1–Sept 20	-	-	-	-	-	-	One bull	Sept 1–Sept 20
Redoubt Bay	One bull	Sept 1–Sept 10	-	-	-	-	-	-	One bull	Sept 1–Sept 10
Remainder	One bull	Sept 1–Sept 20	-	-	-	-	One bull	Dec 1–Feb 28[b]	One bull	Sept 1–Sept 20
1993										
Kalgin Island	One bull	Aug 20–Sept 20	-	-	-	-	-	-	One bull	Aug 20–Sept 20
Redoubt Bay	One bull -SF 50" 3BT[c]	Aug 20–Sept 20	-	-	-	-	-	-	-	-
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 20	-	-	-	-	One moose	Jan 10– Jan 23	-	-
Remainder	-	-	-	-	-	-	One bull	Aug 20–Sept 30	One bull	Sept 1–Sept 20
	-	-	-	-	-	-	One bull	Jan 1–Jan 28[b]	-	-
1994										
Kalgin Island	One bull	Aug 20–Sept 20	-	-	-	-	-	-	One bull	Aug 20–Sept 20
Redoubt Bay	One bull -SF 50" 3BT[c]	Aug 20–Sept 20	-	-	-	-	-	-	-	-
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 20	-	-	-	-	One bull	Dec 1–Jan 15	-	-
Remainder	-	-	-	-	-	-	One bull	Aug 20–Sept 30	One bull	Aug 20–Sept 20
	-	-	-	-	-	-	One bull	Jan 1–Jan 28[b]	-	-
1995										
Kalgin Island	One bull	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20
Redoubt Bay	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	-	-	-	-
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Dec 31	One bull -SF 50" 3BT	Aug 20–Sept 30
Remainder	-	-	-	-	-	-	One bull	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Dec 1–Jan 15	-	-
1996										
Kalgin Island	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20
Redoubt Bay	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	-	-	-	-
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Dec 31	One bull -SF 50" 3BT	Aug 20–Sept 30
Remainder	-	-	-	-	-	-	One bull	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Dec 1–Jan 15	-	-
1997										
Kalgin Island	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Remainder	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 20–Sept 30

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Appendix A.–Page 3 of 6.

Year/Area	Resident general hunt		Resident registration hunt		Resident draw permit hunt		Subsistence hunt/Tier II[a]		Nonresident hunt	
	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date
1998										
Kalgin Island	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20	-	-	One moose	Aug 20–Sept 20
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Remainder	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 20–Sept 30
1999										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Remainder	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 20–Sept 30
2000										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Remainder	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 20–Sept 30
2001										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	-	-	-	-	-	-	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South[f]	-	-	-	-	-	-	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna[g]	-	-	-	-	-	-	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2002										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	-	-	-	-	-	-	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	-	-	-	-	-	-	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	-	-	-	-	-	-	One bull -SF 50" 3BT	Aug 20–Sept 30	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2003										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2004										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2005										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2006										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30

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Appendix A.–Page 4 of 6.

Year/Area	Resident general hunt		Resident registration hunt		Resident draw permit hunt		Subsistence hunt/Tier II[a]		Nonresident hunt	
	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date
Beluga North	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2007										
Kalgin Island			One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20-Sept 30
Beluga North	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2008										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	-	-	-	-	-	-	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-
	-	-	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2009										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	One bull -SF 50" 3BT	Sept 1–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2010										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 20	-	-	-	-	One bull	Nov 15–Feb 28	-	-
2011										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 25–Sept 15
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 25–Sept 15
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Nov 15–Feb 28	One bull -SF 50" 3BT	Aug 25–Sept 15
2012										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 30
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 25–Sept 15
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 25–Sept 15
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 25–Sept 15
2013										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	-	One moose	Aug 20–Sept 25
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	-	-	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25

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Appendix A.–Page 5 of 6.

	Resident general hunt		Resident registration hunt		Resident draw permit hunt		Subsistence hunt/Tier II[a]		Nonresident hunt	
Year/Area	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date
2014										
Kalgin Island	-	-	One moose	Aug 20–Sept 30	-	-	-	–	One moose	Aug 20–Sept 25
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	One bull	Aug 20–Sept 25 & Youth only Nov 15–Dec 15	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	One bull	Aug 20–Sept 25 & Youth only Nov 15–Dec 15	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	One bull	Aug 20–Sept 25 & Youth only Nov 15–Dec 15	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
2015										
Kalgin Island[h]	-	-	One moose	Aug 20-Sept 30	-	-	-	-	One moose	Aug 20–Sept 25
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	One bull	Aug 20–Sept 25 & Youth only Nov 15–Dec 15	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	One bull	Aug 20–Sept 25 & Youth only Nov 15–Dec 15	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	-	-	One bull	Aug 20–Sept 25 & Youth only Nov 15–Dec 15	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
2016										
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
2017										
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25

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Year/Area	Resident general hunt		Resident registration hunt		Resident draw permit hunt		Subsistence hunt/Tier II[a]		Nonresident hunt	
	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date	Bag limit	Season date
2018										
Beluga North	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Beluga South	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25
Yentna	One bull -SF 50" 3BT	Aug 20–Sept 25	One bull	May be announced	One bull	Aug 20–Sept 25 & Youth only Nov 15–Jan 31	One bull	Dec 15–Mar 31	One bull -SF 50" 3BT	Aug 20–Sept 25

a. In regulatory years 1983/1984, 1984/1985, and 1986/1987 through 1989/1990, the subsistence hunt was a registration hunt open to local residents only.
b. A two-week season authorized by Emergency Order during this time period.
c. Redoubt Bay drainages west of , and including Kustatan River.
d. Beluga North-north and east of Beluga River, Beluga Lake, and Triumvirate Glacier.
e. SF 50" 3BT = one bull with spike, fork, 50 inch antlers, or antlers with 3 brow tines or larger.
f. Beluga South-mainland drainages south and west of the Beluga River, Beluga Lake, and Triumvirate Glacier.
g. Yentna-that portion north and west of the 16B North Beluga hunt area
h. Starting regulatory year 2016 Kalgin Island was relocated to GMU 15B.

APPENDIX B:
NUMBER OF TIER II (979T, TM565, TM567, TM569) MOOSE HUNT PERMITS AWARDED, PERMITS HUNTED, AND SUCCESSFUL HUNTERS, GMU 16B, 1985/1986 AND 1990/1991–2017/2018.

Appendix B.– Number of Tier II (979T, TM565, TM567, TM569) moose hunt permits awarded, permits hunted, and successful hunters, GMU 16B, 1985/1986 and 1990/1991–2017/2018.

Year	Hunter residence[a]	Total applications	Permits awarded	Permits hunted	Permit resulted in harvest
1985/1986	Unit 16B		56	44	28
	Other Alaska		43	23	14
	Total	**99**	**99**	**67**	**42**
1990/1991	Unit 16B		58	37	16
	Other Alaska		82	42	14
	Total	**140**	**140**	**79**	**30**
1991/1992	Unit 16B		54	34	19
	Other Alaska		97	51	32
	Total	**978**	**151**	**85**	**51**
1992/1993	Unit 16B		56	38	21
	Other Alaska		94	66	22
	Total	**1386**	**150**	**104**	**43**
1993/1994	Unit 16B		47	35	27
	Other Alaska		58	33	17
	Total	**1266**	**105**	**68**	**44**
1994/1995	Unit 16B		84	58	43
	Other Alaska		171	102	61
	Total	**1185**	**255**	**160**	**104**
1995/1996	Unit 16B		68	50	13
	Other Alaska		192	108	16
	Total	**1359**	**260**	**158**	**29**
1996/1997	Unit 16B		70	43	32
	Other Alaska		192	139	64
	Total	**984**	**262**	**182**	**96**
1997/1998	Unit 16B		62	38	22
	Other Alaska		196	134	68
	Total	**997**	**258**	**172**	**90**
1998/1999	Unit 16B		48	39	24
	Other Alaska		212	156	68
	Total	**1151**	**260**	**195**	**92**
1999/2000	Unit 16B		52	32	18
	Other Alaska		208	149	86
	Total	**1224**	**260**	**181**	**104**
2000/2001	Unit 16B		58	31	13
	Other Alaska		202	163	59
	Total	**982**	**260**	**194**	**72**
2001/2002	Unit 16B		64	49	24
	Other Alaska		336	266	99
	Total	**1241**	**400**	**315**	**123**

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Appendix B.–Page 2 of 3.

Year	Hunter residence[a]	Total applications	Permits awarded	Permits hunted	Permit resulted in harvest
2002/2003	Unit 16B		62	43	12
	Other Alaska		338	228	57
	Total	**1119**	**400**	**271**	**69**
2003/2004	Unit 16B		34	25	12
	Other Alaska		227	162	68
	Total	**1074**	**261**	**187**	**80**
2004/2005	Unit 16B		45	25	12
	Other Alaska		148	114	67
	Total	**863**	**193**	**139**	**79**
2005/2006	Unit 16B		50	36	12
	Other Alaska		210	140	65
	Total	**758**	**260**	**176**	**77**
2006/2007	Unit 16B		50	41	14
	Other Alaska		295	216	92
	Total	**833**	**345**	**257**	**106**
2007/2008	Unit 16B		51	39	21
	Other Alaska		229	182	82
	Unknown		1	1	0
	Total	**912**	**281**	**222**	**103**
2008/2009	Unit 16B		64	50	23
	Other Alaska		267	203	94
	Total	**956**	**331**	**253**	**117**
2009/2010	Unit 16B		57	46	20
	Other Alaska		205	145	65
	Total	**1017**	**262**	**191**	**85**
2010/2011	Unit 16B		43	37	20
	Other Alaska		216	146	83
	Unknown		1	1	0
	Total	**924**	**260**	**184**	**103**
2011/2012	Unit 16B		35	23	16
	Other Alaska		225	140	74
	Total	**716**	**260**	**163**	**90**
2012/2013	Unit 16B		26	19	8
	Other Alaska		235	159	84
	Total	**662**	**261**	**178**	**92**
2013/2014	Unit 16B		49	36	17
	Other Alaska		229	138	75
	Total	**728**	**278**	**174**	**92**
2014/2015	Unit 16B		31	26	10
	Other Alaska		229	120	40
	Total	**614**	**260**	**146**	**50**

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Appendix B.–Page 3 of 3.

Year	Hunter residence[a]	Total applications	Permits awarded	Permits hunted	Permit resulted in harvest
2015/2016	Unit 16B		42	31	18
	Other Alaska		218	148	70
	Total	**689**	**260**	**179**	**88**
2016/2017	Unit 16B		44	38	19
	Other Alaska		216	146	69
	Total	**630**	**260**	**184**	**88**
2017/2018	Unit 16B		46	35	18
	Other Alaska		214	142	78
	Total	**618**	**260**	**177**	**96**
2018/2019[b]	Unit 16B			1	1
	Other Alaska			7	7
	Total	**602**	**260**	**8**	**8**

Source ADF&G Division of Wildlife Conservation.

a. Game Management Unit 16B includes residents of Alexander Creek, Beluga, Tyonek, Skwentna, and Yentna.

b. Complete data are not available; legal hunt season is in progress or harvest reports are still being collected.