Intensive Management Options for Game Management Unit 16B (Mainland) Moose: A Report to the Alaska Board of Game

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INTRODUCTION

At their March 1999 meeting, the Board of Game (Board) identified the Unit 16(B) mainland moose population (mainland 16B) as important for providing high levels of human consumption under 5AAC 92.106. During their March 2001 meeting, the Board adopted management objectives for this moose population. The intensive management objectives call for 6,500-7,500 moose (post-hunt) with an annual harvest of 310-600.

Although moose numbers in mainland 16B were believed to be declining during the late 1980's, a more precipitous decline began during the severe winter of 1989-90. That decline came as a result of several deep-snow winters and a steadily increasing rate of predation by bears and wolves. The reduced availability of moose for hunting was compensated by antler restrictions for general season hunters beginning in 1993. A previously existing winter Tier II permit continued. During the winters of 1999-00 and 2000-01, deep snow again accelerated the decline. A subsequent low estimate of harvestable moose caused the Board to restrict all moose hunting to Tier II permit hunters only beginning in the 2001-02 season. This action triggered provisions under AS 16.05.255 (f) for the Board to consider, at its next regularly scheduled meeting, whether intensive management actions are warranted to restore the abundance or productivity of this herd.

During 1991—2001, the federal government through their subsistence management program offered a more liberal bag limit for qualified rural residents of the subunit. Qualified residents could obtain a permit to take any moose during 25—30 September or 1 December—28 February or any-bull during September 1—24. The permit allowed an alternative bag limit, not an additional moose. The number of registration permits issued was unlimited, and harvests were restricted to federal public lands.

This report with accompanying Department recommendations is provided to assist the Board in assessing the effectiveness of various intensive management practices.

BACKGROUND

Unit 16 was divided into Subunits 16A and 16B during 1972. Mainland 16B encompasses 10,380 square miles although not all is moose habitat (Figure 1). Our fall moose survey areas cover approximately 5,896 square miles, which includes most of the usable moose habitat for this population. This moose population apparently existed at a very low density during the late 1800's and the early 1900's. Habitat changes and reduced predation due to federal predator control during 1940s and1950's allowed higher moose densities to develop. Moose numbers increased rapidly and apparently peaked between the 1960s and early 1980s.

The population, however, has exhibited an overall-declining trend since 1984. Winter die-offs occurred in response to deep snow, but the population recovered during periods of mild winters. The most significant die-offs occurred during the winters of 1970-71

and 1989-90. The first statistically rigorous 'census' during February 1984 yielded an estimate of 1,369–1,613 (90% CI) moose in the southern portion of the Subunit (16B-S) (Figure 1). The remaining mainland portions of the subunit, 16B-north (16B-N) and 16B-middle (16B-M) (Figure 1) were censused during fall 1990, and resulted in a combined estimate of 5,842-7,070 (80% CI) moose (Table 1). During the winter of 1989-90, over-winter moose mortality within the lower Susitna River basin was estimated at 15-20%. Through back calculation, the mainland 16B population for fall 1989 was estimated to have been in the range of 8,000-10,000 moose.

During the early 1990s, consecutive moderately deep snow winters prevented population recovery from the effects of the1989-90 winter. Moose numbers began to steadily decline in the absence of adequate recruitment. Comparable subpopulation censuses were conducted again during 1993 (16B-N&16B-M) and 1995 (16B-S) (Table 1). The combined subpopulation point estimates equaled 6,740 moose, just above the recently adopted minimum objective (6,500). Subsequent censuses completed during the fall of 1999 and 2000 indicated the population had fallen substantially below the management objective.

Though deep snow was primarily responsible for causing major die-offs, predation on neonatal moose calves by bears began to significantly influence recruitment during the 1980s. Calf predation by bears is considered primarily responsible for maintaining an overall declining trend in recruitment. During 1993 and 1994, we estimated the bear populations in the subunit at 500–1,000 brown bears and 1,500–3,000 black bears. These population estimates were extrapolated from densities of nearby areas characterized by similar habitat where population censuses had been recently completed. During the March 1999 meeting, the Board adopted liberalized seasons for brown bears (10 August–25 May) and black bear baiting (15 April–June 30) in response to increasing bear predation on moose. During March 2000, the Board also changed the brown bear bag limit to one bear every regulatory, but counting against the one per four year bag limit in other units.

Predation by wolves was not considered an important factor until the mid-1990s. During March 1993, an aerial survey was conducted to estimate wolf numbers in Unit 16. The minimum population of mainland Unit 16 was calculated to be 39-42 wolves, which was assumed to be an increase from the previous 5-10 years (Figure 2). We estimated the 1993 moose/wolf ratio at 160-250/1 in Unit 16. During fall 1999, we estimated a minimum of 119 wolves in 13 packs in Subunit 16B; the estimated Subunit16B moose/wolf ratio had declined to near 40/1.

Past hunting seasons in mainland Subunit 16B have reflected an effort by the Board to take advantage of a poorly accessed, underutilized moose resource. During 1962—1974 hunting seasons in Subunit 16B were liberal, including August 20-September 30 and November 1—30 seasons for either-sex moose. Although 5-20 day antlerless moose hunts during September continued through 1989 (except 1975), late season hunts were absent during 1976—1982. Increasing numbers of hunters combined with lower moose recruitment caused late season hunts to be converted to permit hunts beginning in 1983.

To assure local residents an adequate opportunity to meet subsistence needs, registration permits were issued in the subunit or, in later years, Tier II permits were issued.

From 1972 through1992, annual reported harvest in Subunit16B averaged 387 moose (Figure 3). Annual harvest ranged from a low of 89 during 1990 to the peak of 842 during 1973. The harvest reported for 1973 reflected an effort by the Department to reduce moose numbers to avoid degradation of winter habitat through liberal seasons. Peaks in harvest also occurred during 1978 (589 total including 147 cows) and 1984 (569 total including 160 cows). Lower harvests subsequent to the 1984 peak reflected the general population decline. During fall 1989, the harvest was 327 moose, including 30 cows. The record low harvest of 89 bulls during 1990 was due to an abbreviated season length and elimination of nonresident hunters in response to the previous winter die-off.

The Board adopted antler restrictions for the bull moose bag limit beginning fall 1993 for most of southcentral Alaska, and portions of mainland 16B were included. In those portions of 16B north of Beluga River and west of the Kustatan River, a legal bull was required to have a spike, fork or 3 brow tines on one side or have an antler spread of 50 inches or greater (SF50). The SF50 antler restriction imposed in Subunit 16B was a precautionary regulation to aid in enforcement of the regulation where it was needed, i.e. on the road system. Beginning with 1997, all of mainland 16B came under SF50 restrictions.

Reported harvest during the SF50 years (1993—2000) averaged 161 bulls (Figure 3) by 620 general season hunters and 78 moose by 187 Tier II hunters. With the exception of 1993 when 21 females were harvested, the legal bag limit during the Tier II hunts was bulls only. The reported harvest during the SF50 restricted general season peaked at 209 bulls in 1997, while the Tier II harvest reached 90-104 bulls in most years. Minimum harvest objectives had been reached only once since 1989, and that was during 1997.

Other ungulate species in the subunit include the declining Rainy Pass caribou herd in the extreme western portion of the subunit estimated near 2,000 in 1996, and a declining sheep population, estimated near 800 in 1996 on the south slopes of the Alaska Range.

PRESENT SITUATION

Population Assessment

We estimated the mainland 16B moose population at 3,230–4,360 (80% CI) during November 2001. This estimate represents a 48% decline from the 1990 estimate, and a 44% decline from the 1993/1995 estimates. Most notable is the continued poor recruitment in all subpopulations (Figure 4). We observed an overall calf/cow ratio of 12/100. Calves represented only 8% of the total population. Calf/cow ratios once again failed to exceed a minimum of 20/100 that is generally considered the minimum ratio required to maintain stability or allow some growth. The low calf/cow ratio trend began in the mid-1990s. The overall bull/cow ratio observed during November 2001 was 34/100, which is near the long-term average for the unit (Figure 5).

The most recent mainland 16B wolf population estimate was 98-130 during fall 2001; the fall 2001 moose/wolf ratio is estimated at 25–45/1.

Recent bear survey investigations in northern Unit 16 gave us an opportunity to evaluate our past estimate of bear densities in the northern portion of the subunit. Results of these surveys indicated that the estimated density is 7 brown bears/100 mi^2 and 24 black bears/100 mi^2. These densities are similar or slightly higher than our original estimate.

Nutritional condition

No quantitative data are available to assess range conditions. However, qualitative visual evaluation of winter range suggests ample availability of browse in primary wintering areas along major rivers and creeks during a mild to moderate snow-depth winters. Alternative wintering habitat may be limited, particularly during winters characterized by deep snowfall.

Summary

The mainland 16B moose population dropped below the population objective between 1995 and 1999, and a continuing declining trend is likely. We cannot be sure of the relative importance of winter severity, predation and nutrition on the moose population decline. We realize those relationships are dynamic. However, we believe the decline was initiated by deep snow winters, perhaps due to declining habitat quantity and quality, and maintained by overwhelming predation levels from bears and wolves. Harvest levels have fallen short of objective levels for all but one year since 1989. Restrictive hunting regulations have been enacted in response to a declining population; however, even elimination of all hunting mortality is unlikely to arrest the decline. Considering the current status of this moose population, more restrictive hunting opportunities will become necessary in the future if the decline in moose numbers continues.

ASSESSMENT OF INTENSIVE MANAGEMENT OPTIONS

The Division considered a variety of intensive management options to increase the size and productivity of the mainland 16B moose population. Criteria for assessing options included effectiveness, feasibility, impacts to subsistence users, land status, and cost.

Reduce Bear predation

Neonatal calf survival is inadequate in all 3 subpopulations. By autumn, calf numbers are already below the target level (20 calves/100 cows) assumed necessary to maintain population stability. Bears kill calves primarily during their first couple weeks of life, and the low fall calf/cow ratios suggest that substantially reducing bear predation on calves would likely result in significant increases in summer survival. Current moose/bear ratios suggests that reducing the bear population by 20-50%, perhaps 700–2000 bears, would be required to effectively double fall calf survival rates. A narrowly focused program to target bears more likely to be involved in calf predation could be futile and prohibitively expensive if the distribution of calving was greatly dispersed.

Reducing bear predation on calves through hunting would necessarily include extreme liberalization of hunting seasons, bag limits and/or methods and means. Liberalizations would be needed to overcome the extremely poor hunter access to the majority of the subunit, and to be more attractive than other locally available hunting opportunities. The necessary liberalizations would require regulations that would likely exceed social/ethical limits of the public.

Non-lethal approaches to reducing bear predation such as diversionary spring feeding or selective sterilization are unlikely to effect a broad change in patterns in a large bear population such as that found in Subunit 16B without substantial funding.

Reduce wolf predation

Adult and calf moose losses to wolves during winter are likely substantial. Other ungulate species are available to only 3-4 of 18 packs in Subunit 16B. Recent studies in adjacent units suggest wolves are also likely responsible for the loss of a moderate percentage of calves during their first summer of life. Reducing wolf numbers should result in increased survival of calves and adults. Both lethal and non-lethal (sterilization) methods could effectively reduce wolf numbers in this system. Non-lethal methodologies are substantially more costly. However, lethal reductions in wolf numbers using aircraft would be cost effective due to the proximity of the subunit to human centers and better than average snow conditions during the fall and winter months. Only a small percentage of moose habitat is classified as federal public lands in Subunit 16B. Ground-based control methods would be least effective due to difficult travel conditions and remoteness of the subunit from the road system.

Liberalization of regulations could be effective in wolf population reduction in some treeless areas. Increasing bag limits is unlikely to effect a large increase in harvest; however, limiting the few individuals that might have an opportunity to harvest more than 5 wolves daily is counterproductive. Liberalized methods and means would be more effective at encouraging a higher trapper/hunter harvest.

Other methods to increase harvest might include private funding enticements to harvest wolves, including some type of wolf harvest competition.

Enhancement of winter range

We believe that, in the absence of overwhelming predation, current habitat capabilities are adequate and would allow for adequate population recruitment and population growth to reach the minimum population objective level. However, it can be argued that rejuvenation of large areas of winter range could enhance survival and increase productivity, particularly during deep snow winters.

Fire is the most practicable tool to effect changes over areas large enough to influence subpopulation recovery. Controlled burns would enhance winter range if they were conducted in areas of typically low snow depth and where moose typically move to winter. Complications arise with widely dispersed private lands and cabins within the lower Susitna valley. Potential for large scale controlled fires is limited by the land ownership patterns. Political pressures may hinder controlled burns because of fears of property damage and loss of forest resources.

Timber harvest on a large scale with proper post-harvest treatment can produce adequate plant rejuvenation. However, relatively poor access in most of Subunit 16B limits this opportunity. Enhanced winter range may support as much as 20 moose/square mile for much of a moderate snow-depth winter. Enhancing productivity would necessarily require large areas of enhancement – a minimum of 100 square miles/2,000 moose.

Enhancement of summer range

While enhancing winter range in 16B may result in measurable long-term effects to the population, measuring success of summer range enhancement would be difficult. Moose summer range is widely dispersed and not thought to be limiting the population. Any attempt to identify important summer range would be non-productive.

Winter supplemental feeding

Deep snow winters have made significant impacts on moose survival in 16B, but even with supplemental feeding, predation patterns by brown bears and wolves could negate efforts to bring moose through the winter. Moose do concentrate in key winter areas increasing the potential effectiveness of such a program, but the logistics and availability of adequate high quality resources would be prohibitively expensive and difficult to obtain. Such a program could rely in part on public participation where access was

adequate. Felling trees and constructing winter trails would be the most desirable method, but dispersing hay of the proper species by air would be effective only in localized areas under the most severe situations.

Population augmentation

A concerted effort to translocate excess cows from Subunits 14(A) and 14(C) to selective areas of good habitat with low predator levels could increase local subpopulation recovery rates. Survival of translocated cows would be expected to be lower than local cows, but perhaps higher than local female calves and yearlings. Any translocation program, to be effective, would necessarily require a substantial number of moose to be captured and moved, and could cost as much as $3,000/moose. The large number of moose required would make the program prohibitively expensive. Such a program could also negatively impact existing cow hunts, which are popular in both subunits. However, without concurrent predator control effort, such a program would not be feasible. Unknown movement and dispersal patterns of translocated moose could also be problematic.

Minimize detrimental human harvest

Encourage elimination of all cow moose harvest, which would include the federal subsistence harvest. The long standing any-moose federal hunt within the Denali National Preserve, while not producing a high harvest, does promote the concept that its acceptable to harvest cow moose even though the population is declining to extremely low levels. Additional enforcement and education efforts to curtail the existing illegal harvest of cows would be beneficial as well.

RECOMMENDATIONS TO THE BOARD

The mainland 16B moose population is below objective levels and declining due to frequency of deep-snow winters, high levels of predation and possibly low productivity. Reversing the current trend on a long-term basis would necessarily involve a multi-faceted approach including a long-term commitment to active manage bear and wolf populations. Actions to improve winter habitat through controlled fires, supplemental feeding in deep-snow winters and even cow moose translocations are doomed to failure without a concurrent reduction of predation. Although reduction of the wolf population can produce immediate positive results, reduction of bear populations is also deemed necessary to effect a more rapid recovery of the moose population. Although reduction of predation would initially result in improvements for the moose population, sustaining those gains over the long-term may require more active management of wintering habitat. Because each mainland 16B subpopulation of moose is currently deemed important to local hunters, each subpopulation needs to be enhanced.

The Division's evaluation suggests that intensive management as defined in Sec. 16.05.255 would be effective in the long-term only through an expensive multi-faceted approach, including a long-term commitment to active predator management.

The recovery program would require some or all of the following actions:

1. Reduce wolf population to no more than 20 individual wolves through aerial wolf control. Maintain for a minimum of 5 years a moose/wolf ratio of >200/1 in each subpopulation.

2. Identify any concentrated calving areas important to each subpopulation of 16B moose.

3. Entice bear hunters to harvest bears of both sexes and both species within important calving areas through liberalized hunting/and or trapping regulations. Enhance hunter access into key calving areas if limited (includes construction of landing strips).

4. Where hunter harvest of bears is inadequate, enact bear control measures. Concentrate on individual bears exhibiting moose predation tendencies within known calving areas.

5. Enhance, through controlled fires or forest management practices, a minimum of 100 square miles within each subpopulation's winter range over a 5-year period.

6. Discourage/eliminate any cow moose harvest within the subunit through improved enforcement and education, and by eliminating federal "any-moose" hunts.

7. Where recovery of subpopulations is slow, in spite of low predator density and favorable habitat, consider translocation of excess cow moose.

8. During winters of persistent deep snow, strategically provide supplemental winter-feed (tree felling and appropriate hay species) and access to it through winter trail construction.

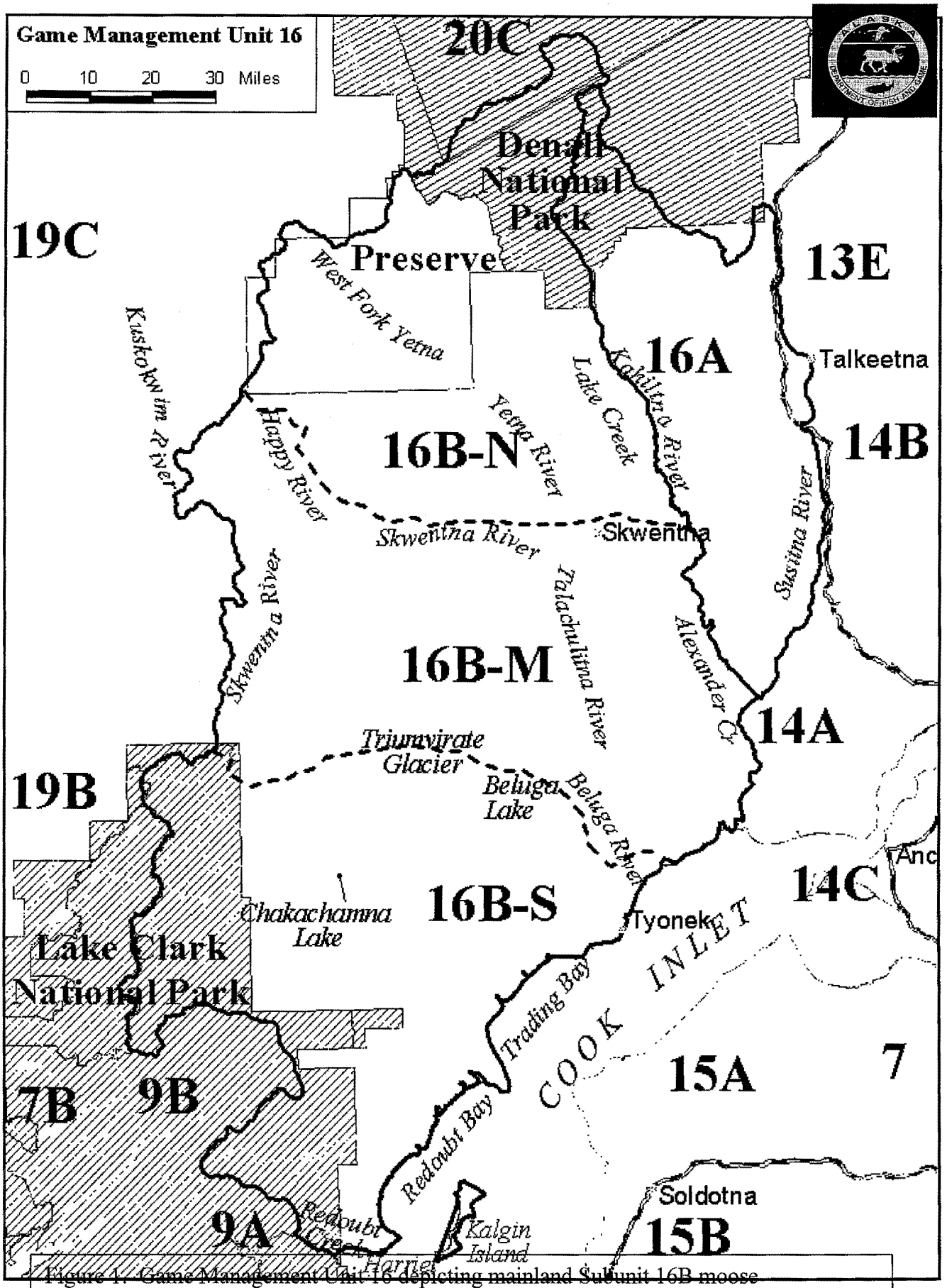

Figure 1. Game Management Unit 16 depicting mainland Subunit 16B moose subpopulations, 16B-north (16B-N), 16B-middle (16B-M), and 16B-south (16B-S).

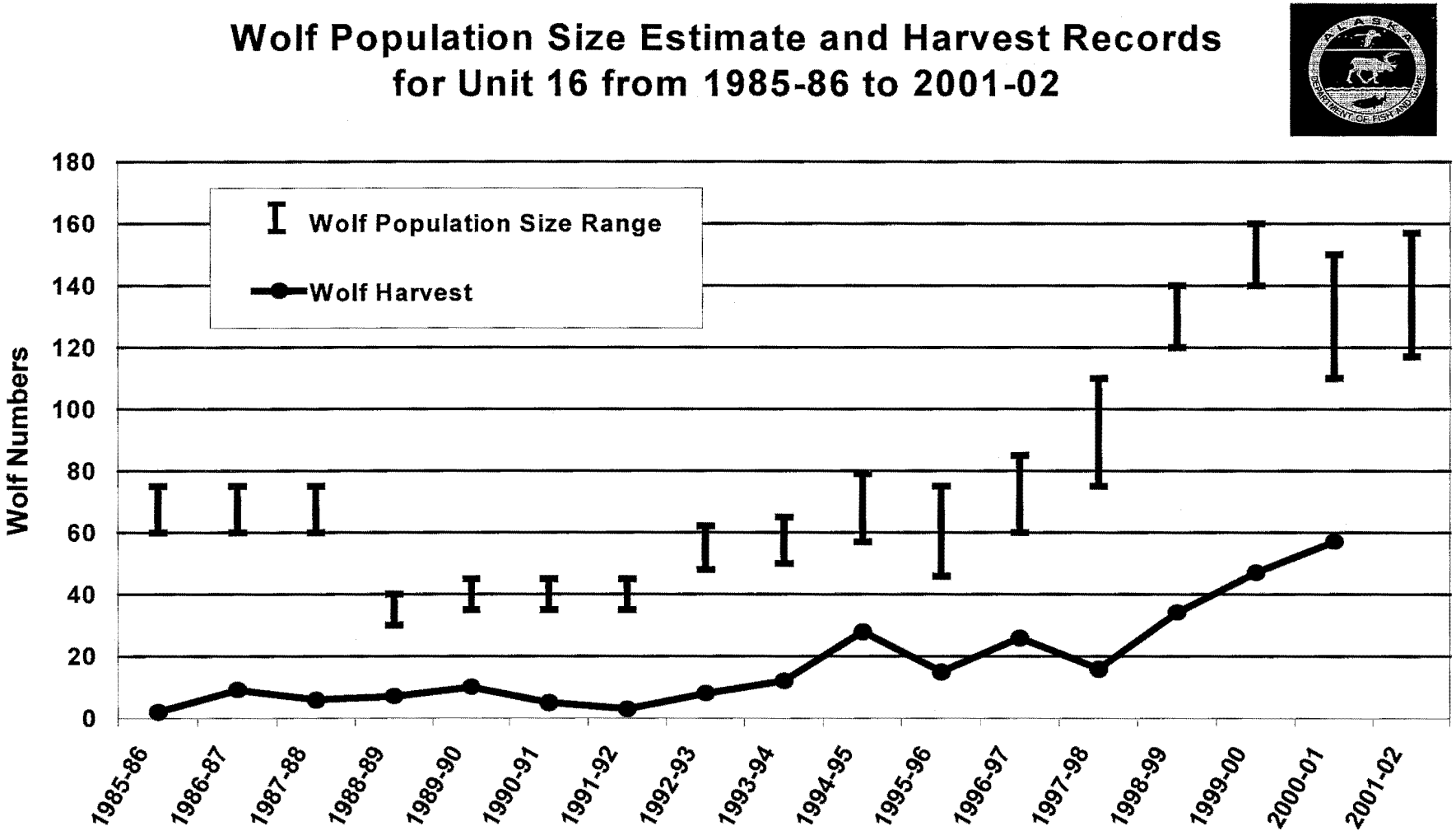

Figure 2. Game Managmenet Unit 16 wolf population estimate compared to reported harvest, 2001-2002.

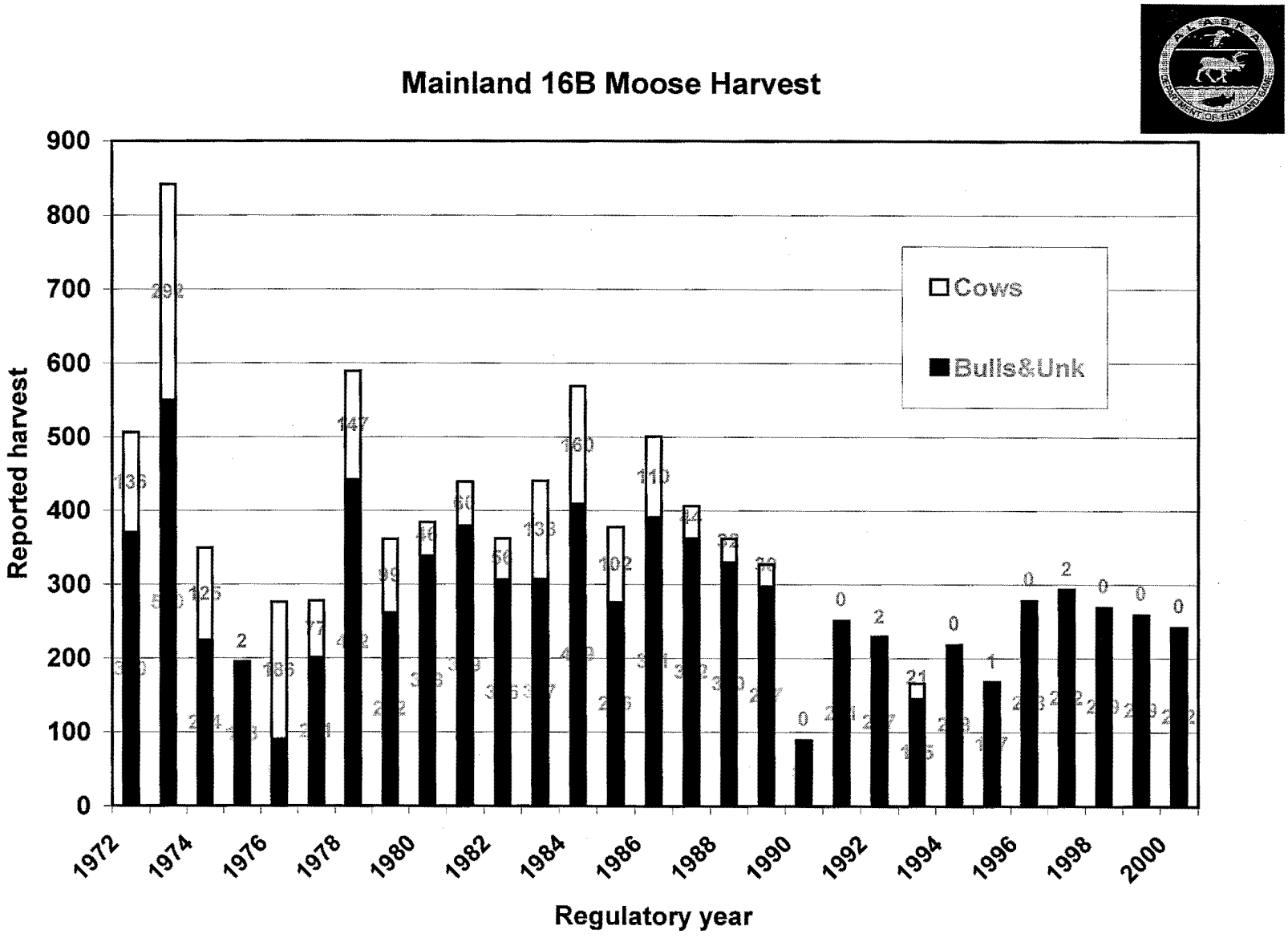

Figure 3. Mainland Unit 16B moose harvest by all hunters by sex, 1972-2000.

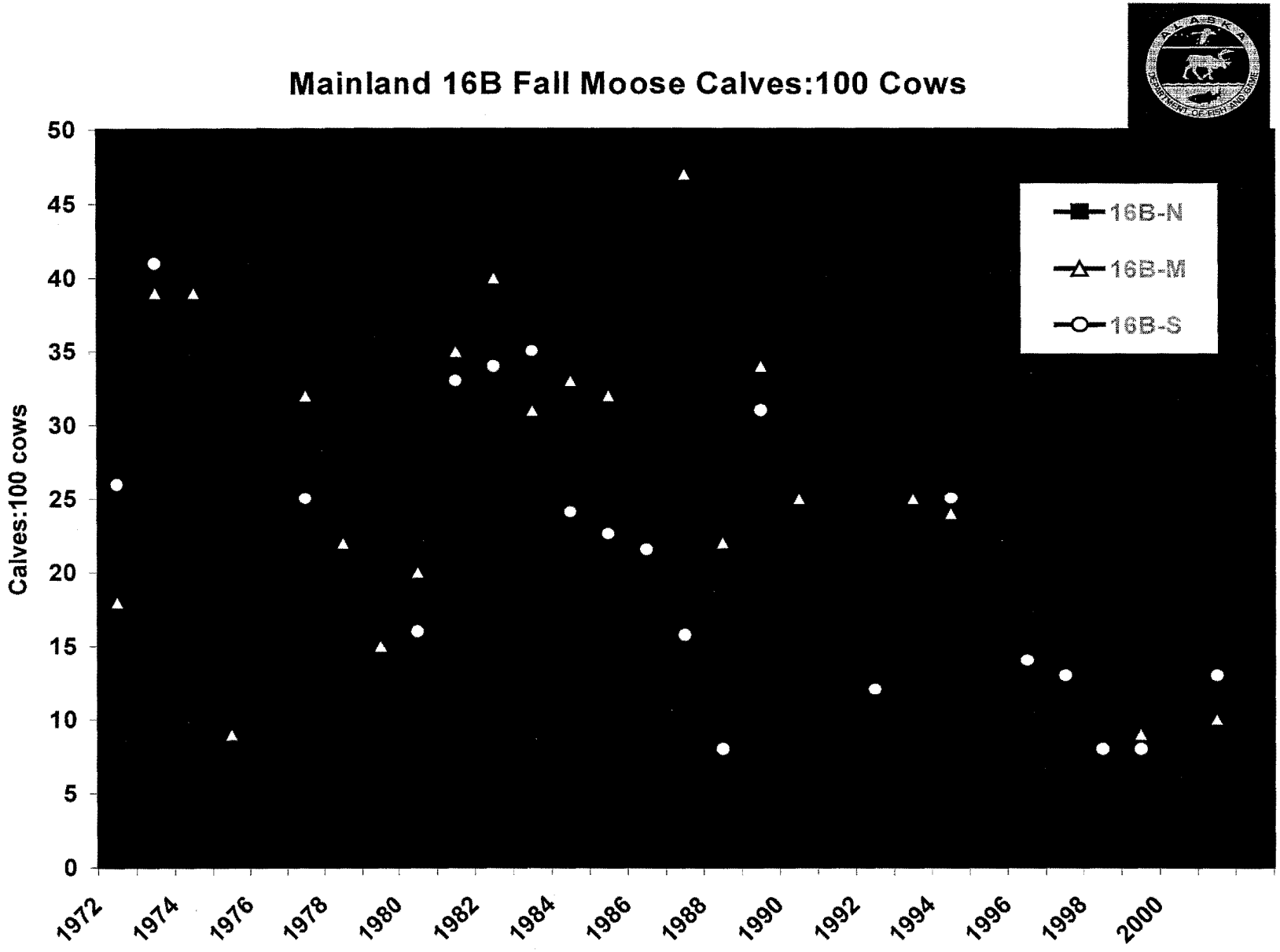

Figure 4. Mainland Unit 16B fall moose calf/cow ratios by subpopulation, 1972-2001.

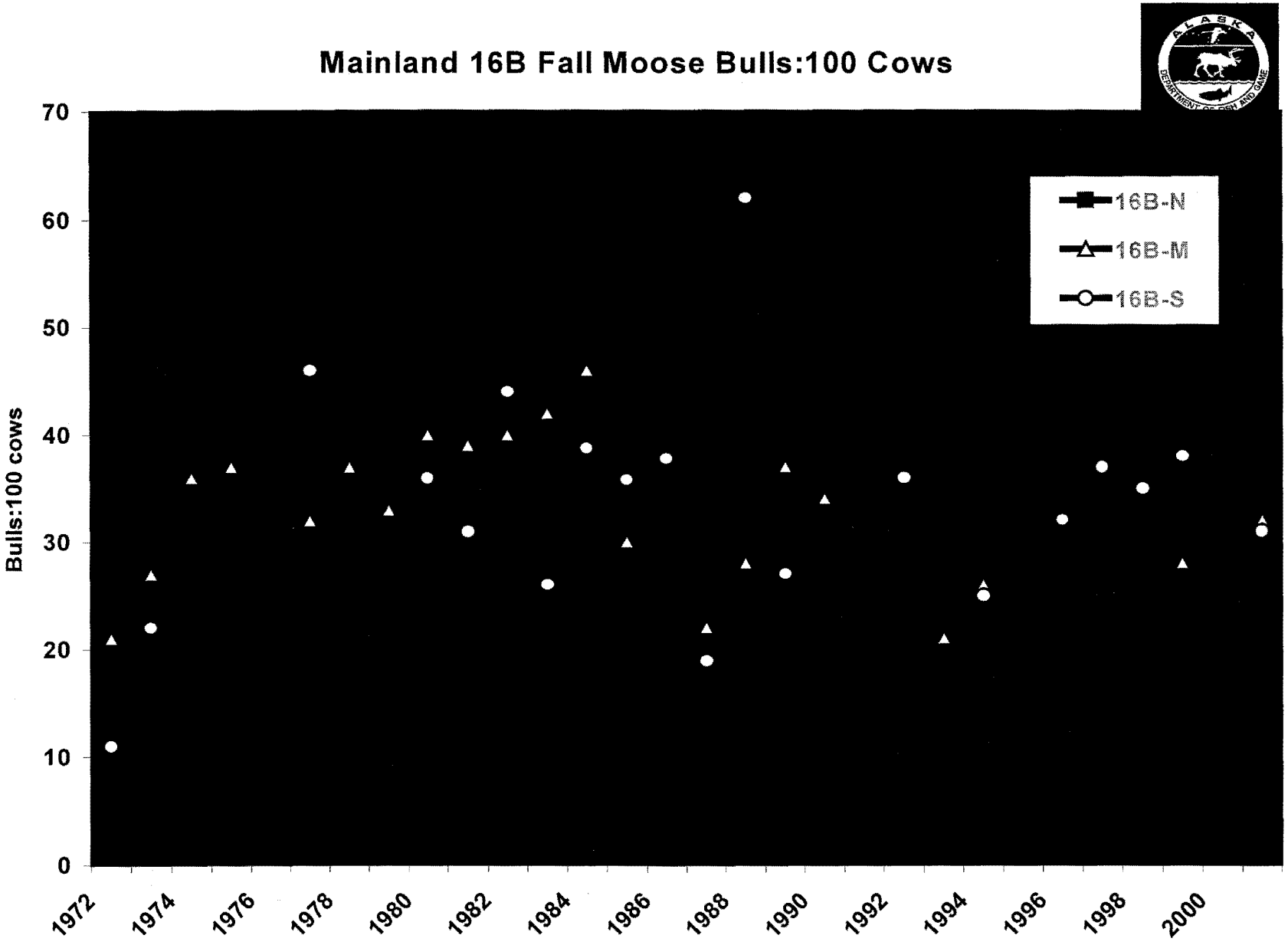

Figure 5. Mainland Unit 16B fall moose bull/cow ratio by subpopulation, 1973-2001.

Table 1 Mainland Unit 16B aerial moose composition counts and estimated subpopulation sizes, 1990–2001.

Regulatory year	Area	Date	Bulls: 100 cows	Yearling bulls: 100 cows	Calves: 100 cows	Calves(%)	Adults	Total moose observed	Moose observed/mi^2	Population estimate
1990/91	Northern	11/21-27	32	9	23	15	650	745	1.4	2,650±412 [a]
	Middle	12/8-21	35	5	25	16	673	789	1.4	3,880± 326 [a]
	Southern	2/27-3/1	--	--	--	7	260	282	0.4	884±262 [a]
1991/92	no surveys									
1992/93	Southern	12/15	36	5	12	12	109	124	--	--
1993/94	Northern	11/15-20	50	10	16	10	374	416	1.1	2,006±432 [a]
	Middle	11/28-12/3	21	9	25	17	391	463	1.4	3,653±1965 [a]
1994/95	Northern	11/13-18	42	10	12	7	405	431	--	--
	Middle	11/18–25	26	4	24	16	314	374	--	--
	Southern	11/29–12/2	25	5	25	17	220	261	--	--
1995/96	Northern	2/27–28	--	--	--	7	298	321	--	--
	Middle	2/27–28	--	--	--	12	855	969	--	--
	Southern	2/29–3/3	--	--	--	6	505	537	0.8	1,081±145 [a]
1996/97	Northern	11/1–2	38	7	23	14	422	484	1.0	1,912±325 [a]
	Southern	11/8–9	32	7	14	10	305	338	--	--
1997/98	Southern	11/25, 12/3	37	8	13	9	544	591	--	--
1998/99	Southern	11/22	35	7	8	6	337	357	--	--

1999/00	Middle	11/22-27	28	2	9	7	587	631	1.3	3,314±489 [a]
	Southern	11/15-22	38	4	8	6	432	458	--	--
2000/01	Northern	11/20-22	39	6	7	5	236	268	0.6	909±184 [a]
2001/02	Northern	11/05-07	40	7	14	9	393	438	0.8	1,187±182 [a]
	Middle	11/08-11	32	4	10	7	499	537	0.7	1,836±266 [a]
	Southern	10/30-11/04	31	11	13	9	539	594	--	655–890 [b]

[a] 80% confidence intervals
[b] (Observed moose x 1.3 ± 15%)