2001 Moose Trend Surveys in the Upper Koyukuk River Drainage: Kanuti Canyon, Henshaw Creek, Wild River, and Middle Fork Koyukuk Trend Areas

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Kanuti National Wildlife Refuge
Moose Trend Surveys
2001 Progress Report

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Abstract
Four moose trend survey areas (Kanuti Canyon, Henshaw Creek, Wild River, and Middle Fork Koyukuk trend areas), each comprised of 15-20 survey units, were surveyed 29 October-1 November 2001. Survey units were classified as having high or low moose density based largely on habitat characteristics. This marks the second year that the trend areas have been surveyed. Twenty randomly selected units, equally divided between the two density strata, were also surveyed to allow calculation of a population estimate for the region. Moose density (moose/mi^2) was as follows: Henshaw Creek 0.36; Kanuti Canyon 0.66; Wild River 0.13; and Middle Fork 0.44. Bull:cow ratios were: Henshaw Creek 106 bulls:100 cows; Kanuti Canyon 40 bulls:100 cows; Wild River 33 bulls:100 cows; and Middle Fork 36 bulls:100 cows. There were 31 calves:100 cows in Henshaw Creek, 23 calves:100 cows in Kanuti Canyon, 33 calves:100 cows in Wild River, and 18 calves:100 cows in the Middle Fork. The population estimate for the area was 2,836.8 moose with a 90% confidence interval of 1,952 - 3,721. The large confidence interval is due in part to small sample size and high variability in the number of moose in the low stratum.

Introduction and Methods
Information about the moose population in northern Game Management Unit (GMU) 24, the upper Koyukuk River region, has been obtained from several different types of surveys since 1983. Intensive population surveys involving numerous survey units selected from a stratified random sample are conducted at five-year intervals. Intensive surveys in 1989 and 1993 were only for the Kanuti National Wildlife Refuge (NWR; Martin and Zirkle 1996). The most recent survey, conducted 27 October - 9 November 1999, consisted of 194 survey units within a 8,390 mi^2 block of GMU 24 that included the refuge (Stout 2000). Annual trend surveys were conducted in relatively small blocks of contiguous survey units (trend count areas) between 1983-1992 and were reinitiated in 2000 (Saperstein 2001). These surveys provide data on sex and age composition that are used to predict trend of the moose population. Moose density can be calculated for a particular trend count area, but this method does not provide a population estimate. The third method, also designed as an annual survey, uses data from trend count areas and randomly selected units to calculate population estimates. Total number of units is considerably lower than for the intensive surveys due to time and budget constraints, which results in a less precise population estimate. Nevertheless, these annual estimates provide valuable information on moose numbers within the region between intensive surveys. This combination survey was conducted in upper GMU 24 for the first time in 2001.

Four trend count areas (Kanuti Canyon, Henshaw Creek, Wild River, and Middle Fork Koyukuk) and 20 randomly selected survey units were surveyed between 29 October-1 November 2001. Two trend areas, Kanuti Canyon and Henshaw Creek, are within the Kanuti NWR. The Kanuti Canyon trend area is in a 1972 burn and most of the Henshaw Creek area burned in 1991. The Wild River trend area is on State land, and the Middle Fork Koyukuk (Middle Fork) trend area is in an area

managed by the Bureau of Land Management (BLM). Trend areas, but not randomly selected units, had also been surveyed 8 November-1 December 2000. Three to four years of data are required to evaluate trend, so results from 2000 and 2001 should be interpreted with caution.

Survey methods followed those developed by Gasaway et al. (1986) and modified by VerHoef (2001). This technique was also used by the Alaska Department of Fish and Game (ADFG) and Kanuti NWR during the intensive 1999 population survey of northern GMU 24 that included the entire refuge. Survey units are from a statewide grid of rectangular units approximately 5.3 mi^2 in size. Each trend area consists of a block of 15-20 units (Fig. 1). In preparation for the 1999 survey, all units in the survey area were classified as having either high or low moose density based largely on habitat characteristics. This stratification was slightly fine-tuned in 2000 to better reflect observed moose densities. For the 2001 survey, random units were equally divided between high and low density units while trend areas contained an unequal mixture of the two strata (Table 1).

ADFG and BLM survey crews, each consisting of a pilot and observer, arrived in Bettles on 28 October and began surveying the following day. ADFG had chartered a Maule M-8 aircraft and BLM had chartered a Supercub. The two Fish and Wildlife Service Supercubs were unable to leave Fairbanks until 31 October due to poor weather conditions. The ADFG crew could not fly on 30 October due to snow, but the weather was better to the north and the BLM crew was able to complete the Middle Fork area and return to Fairbanks. The other crews finished surveying the remaining trend areas and random units on 1 November. Survey conditions were good throughout the survey period, with the exception of the one weather day. Snow cover was either complete or with low vegetation showing, and the new snow made it easy to detect fresh moose tracks. Light conditions were also good during the survey.

Results

Results from the 2001 trend survey are presented in Table 2, and 2000 and 2001 results are compared in Table 3. Fewer moose were counted in all trend areas in 2001 compared to 2000. The difference was only five moose in the Henshaw Creek and Wild River trend areas, but differences were more pronounced in the Kanuti Canyon and Middle Fork areas. The Kanuti Canyon trend area is within an extensive 1972 burn and has a history of high moose densities (Saperstein 2001). Suitable moose habitat is found beyond the trend area boundaries, and moose movement can easily result in differences between years. Snow characteristics also contribute to variability among years. Thirty-four moose were seen in the Middle Fork trend area in 2001 compared to 62 in 2000. Tim Craig, the BLM biologist who conducted the Middle Fork survey, suspects that snow was not deep enough to concentrate moose within the trend area in 2001 (pers. comm.).

These potential sources of variation emphasize the earlier premise that at least three to four years of data are required prior to evaluating trend and that the strength of trend surveys is their ability to monitor sex and age composition. Bull:cow and calf:cow ratios were good in all trend areas in 2001 (Table 2). Normal breeding activity can occur if there are more than 20 bulls:100 cows, but in low density areas where cows may be sparsely distributed, ratios of 30-40 bulls:100 cows may be necessary for adequate breeding (ADFG and the Koyukuk River Moose Hunters' Working Group 2001). All trend areas exceeded 30 bulls:100 cows in 2001, and Henshaw Creek had more than 100 bulls:100 cows in 2000 and 2001. Increases in the bull:cow ratio in some trend areas between years, however, were not due to an increase in bulls, but rather to a larger decline in cows relative to

Recommendations

- Revise stratification in units to reduce the likelihood of counting ≥5 moose in low density units.
- If poor weather results in an extended break in the middle of surveying a trend area, consider redoing the entire trend area to avoid potential double-counting. Census methods allow extended weather breaks, but the likelihood of double-counting moose is increased in trend areas where moose can easily move among contiguous units.
- Ensure that all pilots fly the same number of transects across survey units in an attempt to standardize the survey. Develop an inventory plan clearly detailing the procedure. Also, keep in touch with ADFG statisticians about calculation of sightability correction factors. The current methods were designed with a particular search intensity (minutes/mi^2) in mind, but many biologists have found that units in open habitat require much less time. Recent discussions have centered on potential methods to quantify moose sightability and further standardize survey techniques.

Cost Summary

Each agency contributed considerable time, money, and effort to make this survey possible. Total cost was about $11,877. ADFG spent a total of $5,553 consisting of $4,031 for 18.8 hours of flight time, $551 on fuel, and $971 for flight time accrued by BLM beyond their budget. BLM spent $1,048 for flight time, fuel, and food. Kanuti NWR spent a total of $5,276 on 28.9 hours of flight time ($2,688), fuel ($808), miscellaneous items ($789- food, freight, and commercial air tickets), and BLM flight time ($986). Kanuti NWR provided lodging in the Bettles bunkhouse.

Acknowledgments

This survey would not have been possible without interagency cooperation. Glenn Stout, ADFG area biologist for GMU 24 helped coordinate the survey, served as observer, and provided the other cooperators with the computerized results. Other observers included Steve Stroka (ADFG), Tim Craig (BLM), Harvey Williams, and Lisa Saperstein (Kanuti NWR). Pilots were Colin Brown (Yukon Eagle Air), John Martin (Arctic Air Alaska), Dave Sowards, and Don Carlson (Arctic NWR). Jay VerHoef, ADFG biostatistician, ran the analysis for the population estimate and provided insight on how the survey could be improved.

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Table 1. Number and stratification of survey units in trend areas, northern Game Management Unit 24.

Trend Area	Total Survey Units	Number of High Density Units	Number of Low Density Units
Henshaw Creek	20	2	18
Kanuti Canyon	16	5	11
Wild River	15	2	13
Middle Koyukuk	15	1	14

Table 2. Results of moose trend surveys in northern Game Management Unit 24, 2001

Trend Area	Total Bulls	Total Cows	Total Calves	Total Moose	Total Adults	Yearling Bulls	Bulls: 100 Cows	Calves: 100 Cows	Yrlng Bulls: 100 Cows	Med&Lg Bulls: 100 Cows	Area (mi^2)	Moose/ mi^2	Adults/ mi^2
Henshaw Cr	17	16	5	38	33	0	106	31	0	106	105.84	0.36	0.31
Kanuti Canyon	14	35	8	57	46	3	40	23	9	31	85.82	0.66	0.54
Middle Fork	8	22	4	34	28	2	36	18	9	27	77.46	0.44	0.36
Wild River	2	6	2	10	7	1	33	33	17	17	78.11	0.13	0.09

Table 3. Comparison of 2000 and 2001 moose trend surveys in northern Game Management Unit 24.

	Henshaw Creek		Kanuti Canyon		Middle Fork		Wild River	
	2000	2001	2000	2001	2000	2001	2000	2001
Total Moose	43	38	87	57	62	34	15	10
Cows	17	16	60	35	40	22	9	6
Bulls	22	17	23	14	5	8	2	2
Calves	4	5	4	8	17	4	4	2
Bulls: 100 Cows	129	106	38	40	13	36	22	33
Calves: 100 Cows	24	31	7	23	43	18	44	33
Yearling Bulls: 100 Cows	18	0	7	9	0	9	22	17
Med&Lg Bulls: 100 Cows	112	106	32	31	13	27	0	17
Moose/mi^2	0.41	0.36	1.01	0.66	0.80	0.44	0.19	0.13
Adults/mi^2	0.34	0.31	0.92	0.54	0.58	0.36	0.12	0.09

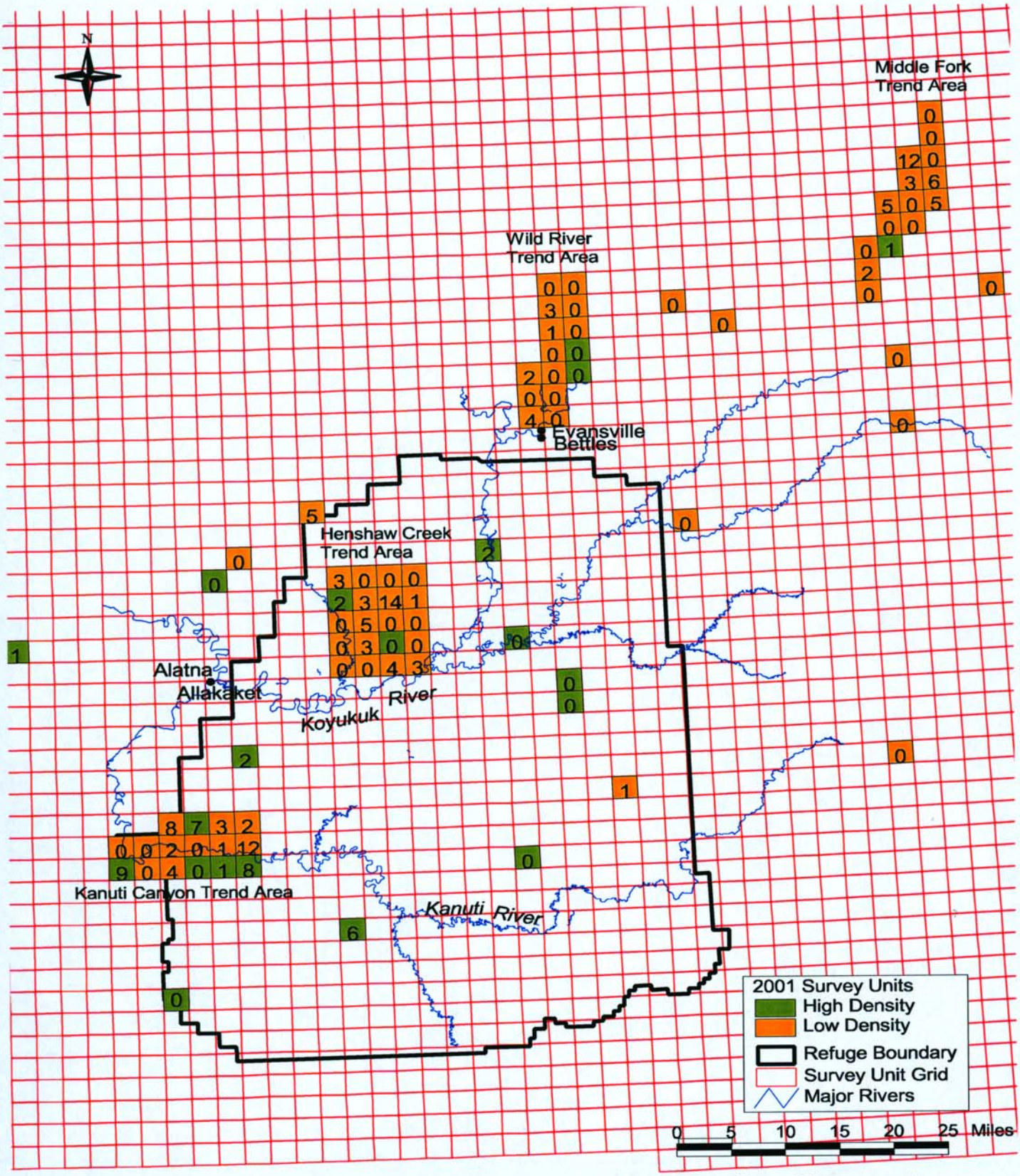

Figure 1. Moose observations during the 2001 trend survey in northern Game Managment Unit 24.

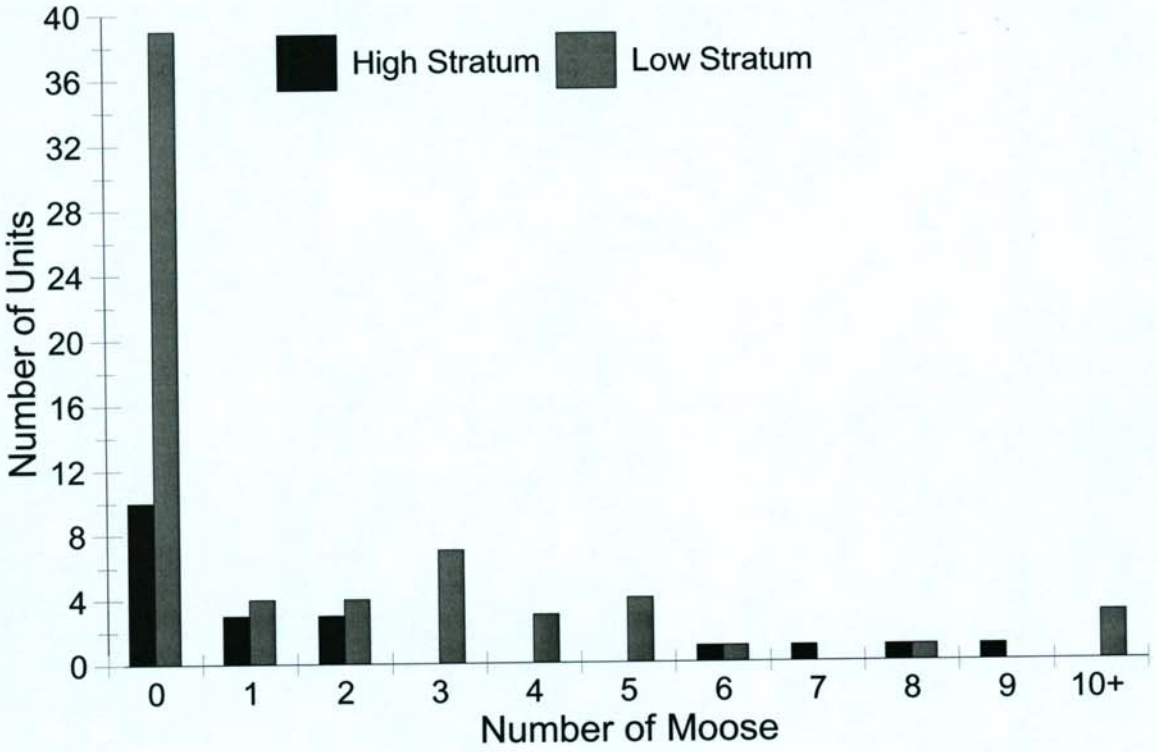

Figure 2. Number of moose counted in high and low density survey units during the 2001 trend survey in northern Game Management Unit 24. Eighty-six units were surveyed (66 low density, 20 high density), including trend areas and randomly selected units.

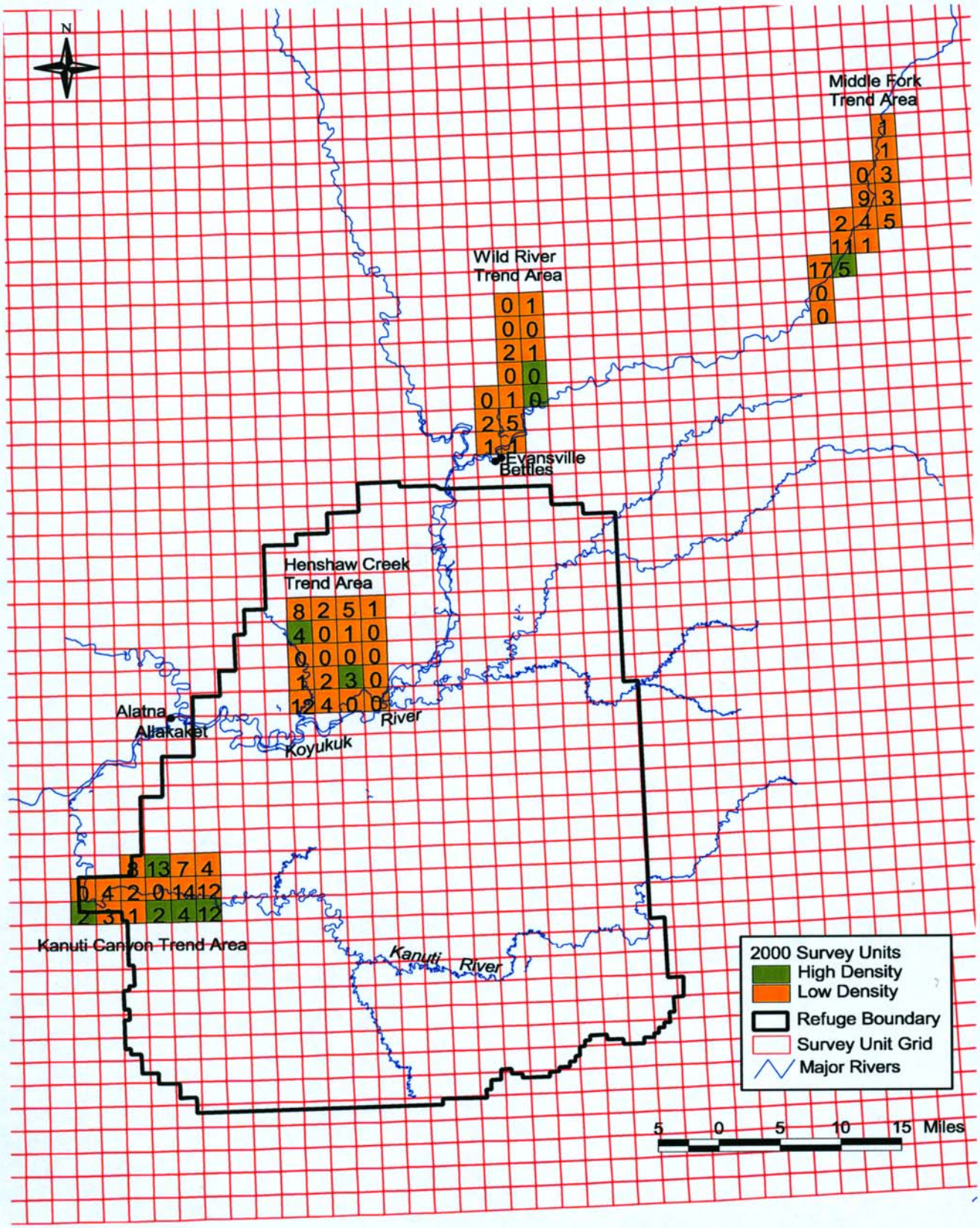

Figure 3. Moose observations during the 2000 trend survey in northern Game Management Unit 24.