

Colorado State Forest Ecosystem Planning Project Strategic Plan



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DEPARTMENT OF
NATURAL
RESOURCES

STATUS AND MANAGEMENT OF MOOSE IN THE COLORADO STATE FOREST
AND ADJACENT AREA OF NORTH PARK

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Abstract: Prior to 1978, moose (*Alces alces shirasi*) were rare in Colorado. To augment the population 24 moose were transplanted into North Park near Rand, Colorado, in 1978 and 79. The east and southeast part of North Park (of which CFS is a large and important part) was selected for the transplant because it contains some of the best moose habitat in Colorado. The present moose population in North Park is estimated at 450 to 500 including 120 to 140 in the Colorado State Forest (CSF). Preferred habitat is primarily willow bottoms (*Salix* spp.) surrounded by lodgepole pine (*Pinus contorta*), Englemann spruce (*Picea engelmannii*) and aspen (*Populus tremuloides*) forests. Moose hunting in North Park was initiated on a very limited scale in 1985, and the number of licenses issued was substantially increased from 7 in 1991, to 62 in 1992, and 110 in 1993, to control a growing population. Poaching is a major management problem. Moose viewing has become a popular activity and together with hunting have much potential to benefit the economy of Jackson County by attracting hunters and others who want to see and photograph moose. At the present time management plans to maintain the North Park moose population, the largest in the state, at current levels until completion of a cooperatively funded state and federal land management agency study to evaluate impacts of moose and livestock browsing on willow habitat. Protection of moose habitat through proper management of livestock grazing, logging, and land development in and around the CSF is critical to perpetuation of the moose population.

HISTORY OF MOOSE IN NORTH PARK

Historically moose were rare in Colorado (Lechleitner 1969). During the 1800s and early to mid-1900s scattered animals were infrequently observed or killed in northcentral and northwestern Colorado (Warren 1942, Bailey 1944).

After considerable discussion with the public, private landowners and land management agencies, 12 moose (*Alces alces shirasi*) were transplanted in 1978 from the North Slope of the Uinta Mountains in Utah to North Park, Colorado. The release site was the Illinois River area approximately 8 miles southeast of Rand, in Jackson County. Twelve more moose were transplanted to this same site from Grand Teton National Park, Wyoming in 1979. The east and southeast sides of North Park, of which the Colorado State Forest makes up a large and important part, was selected for the moose reintroduction because the area supports some of the best moose habitat in Colorado. Details of these transplants, negotiations preceding them, and initial results have been described by Duvall and Schoonveld (1988). Movements of moose immediately following the North Park transplants were described by Nowlin (1985).

Following the North Park reintroductions there were 2 more moose transplants to Colorado. Twelve moose were transplanted in 1987 from Grand Teton National Park, Wyoming, to the Laramie River area in Larimer County, Colorado. During

December 1991, January 1992, and January 1993, 106 moose were transplanted from North Park, northeast Utah, and southwestern Wyoming to the upper Rio Grande River basin near Creede, Mineral County, Colorado (Olterman et al. 1994).

CURRENT ONGOING MOOSE RESEARCH IN NORTH PARK

Since 1991 to the present (March, 1995) a moose research project has been in progress by Colorado Division of Wildlife to determine moose sightability during aerial counts, home range size, migration routes and rates of emigration out of North Park, mortality rates and causes, and habitat selection. A total of 71 moose were captured and radio-collared in the east and southeast portions of North Park. These have been monitored for up to 3 years by radio-tracking at approximately 2-week intervals mostly by aircraft. Much of the following information presented herein is based on findings from that study.

CURRENT MOOSE POPULATION LEVELS

In January 1994, the moose population in North Park was estimated at 450 to 525 animals based on helicopter counts adjusted for 58% sightability. Approximately 27% (120 - 140 moose) occurred in Game Management Unit 6 (the Colorado State Forest) and approximately 56% (250 - 295 moose) occurred in Game Management Unit 171 (the area between Highways 14 and 125). Bull/cow (73 bulls/100 cows and calf/cow (56 calves/100 cows) ratios observed in North Park were similar to those reported for a hunted Shiras moose population in southeastern Idaho during a 7 year period (Ritchie 1978).

MOOSE HABITAT IN THE COLORADO STATE FOREST AND VICINITY

The east and southeast sides of North Park support extensive willow (*Salix* spp.) bottoms surrounded by forests of primarily lodgepole pine (*Pinus contorta*), Englemann spruce (*Picea englemannii*) and aspen (*Populus tremuloides*). This is considered excellent moose habitat, similar to that reported for Jackson Hole, Wyoming, by Houston (1968).

Moose feed heavily on willow throughout the year, and use willow and pine and spruce forests for hiding cover. Main willow species in North Park are *S. geyeriana*, *S. monticola*, *S. boothii*, *S. drummondiana*, *S. planifolia*, and *S. wolfii*. Aspen is also a preferred forage plant. Elevations range from approximately 2,400 to 4,000 m in North Park moose habitats. During winter most moose move to lower elevations where snow depth is less than 4 feet, and occupy willow dominated riparian habitats or nearby lodgepole pine forests. Winter temperatures in those habitats may be as low as -10° to -40°F.

High importance of moose habitat provided by the Colorado State Forest and adjacent area is illustrated in Fig. 1. which shows that moose use the willow bottoms of the Michigan River and Canadian River system heavily throughout the year. Sixty-one percent of the yearlong locations (Fig. 1.) were in willow vegetation. Another 34% were in mature lodgepole pine but almost always relatively close to a stand of willows. Consider the Michigan River system upstream from about 2 miles below Noffsinger's Three Rivers Ranch Headquarters upstream to its headwaters and the Canadian River system from Noffsinger's Canadian River Ranch Headquarters upstream to its headwaters to be yearlong critical moose habitat. The home ranges of most individual radio-collared moose encompassed much of upper Michigan and upper Canadian River system area. Individual animals move back and forth between Game Management Units 6 and 171

Game Management Units 6 and 171 contain the highest moose populations and best moose habitat in Colorado. The willow-lodgepole pine habitat in the upper Michigan and upper Canadian River systems (Fig. 2.) is critical for the survival of the moose population in the Gould and Colorado State Forest area.

ECONOMIC AND RECREATIONAL VALUES OF MOOSE IN NORTH PARK

MOOSE HUNTING

Hunting began in North Park in 1985 after the population grew large enough to sustain a small harvest. To date except for a very few licenses issued in the Laramie River area in 1993 and 1994, all Colorado moose hunting has been confined to North Park. Seven or fewer licenses were issued each year through 1991 (Table 1). In 1992, it became necessary to increase the number of permits substantially to control the population which had reached levels agreed upon with local residents and land management agencies when moose were transplanted to the area. Sixty-two licenses were issued in 1992. Another relatively large increase in licenses issued (110 licenses) occurred in 1993, and 110 were issued in 1994. In addition to these increases in license numbers 5 moose were transplanted from North Park to Creede in 1991-92 and 46 more were transplanted in 1992-93.

Table 1. Hunting season dates and structure for moose in Colorado.

1985	5 antlered licenses issued for North Park.	November 16 through 24.
1986	3 antlered licenses issued for North Park.	November 15 through 23.
1987	3 antlered licenses issued for North Park.	November 14 - 22.
1988	3 antlered licenses issued for North Park.	November 14 - 29.
1989	5 antlered licenses issued for North Park.	November 13 - 28.
1990	5 antlered licenses issued for North Park.	November 12 - 27.
1991	7 antlered licenses issued for North Park.	November 10 - 25.
1992	62 licenses issued for North Park. (32 antlered, 30 antlerless).	November 14 - 29.
1993	110 licenses issued for North Park: (48 antlered 62 antlerless)	
	Archery: September 7 - 26;	
	Muzzleloading rifle: September 11 - 19);	
	Regular rifle: October 16 - 20;	
	October 23 - 3;	
	November 6 - 14.	
1993	4 antlered licenses issued for Laramie River: Same dates as for North Park during 1993.	

Prior to 1993 the Colorado moose hunting season ran for approximately 2 weeks during the last half of November. In 1993, moose license applicants could

choose, on their application, one of 5 hunting seasons. Season choices are shown in Table 1. These 5 seasons corresponded to the established hunting seasons for deer (*Odocoileus hemionus* and *O. virginianus*), and elk (*Cervus elaphus*). It allowed hunters flexibility in choosing the time of year to hunt and allowed them to combine their hunt for moose, deer, and elk if desired. Comments on followup questionnaires indicated this new season structure was well received by moose hunters. Colorado moose hunters have enjoyed a high rate of success. Although few licenses were issued between 1985 and 1991 hunter success was 60% in 1985 and 100% from 1986 through 1991. Even after the number of licenses was increased in 1992, 93, and 94 (Fig. 3) hunter success was 92%. The economy of Jackson County is heavily dependent on big and small game hunting. In 1989 deer and elk hunting contributed 2.5 million dollars to the economy of Jackson County (Freddy et al. 1993). Moose hunting will continue to become an increasingly important economic contributor.

A major problem in managing Colorado moose is illegal harvest (Fig. 4). Moose are some times mistakenly killed by elk hunters, poached for meat, or shot and left. Illegal harvest estimates shown in Fig. 4 are conservative because they represent only known kills. Comparison of legal harvest by year in Fig. 3. to yearly illegal harvest in Fig. 4. suggests that illegal kill may approach 50% or more of the legal harvest once unreported illegal kills are considered.

MOOSE VIEWING

In Colorado during 1991, 997,000 people (residents and non-residents) spent 7,223,000 days on recreation trips specifically to view wildlife (Taisl and Southwick 1995). These people spent and estimated \$362.2 million in Colorado for these wildlife viewing trips for food, drink, refreshments, lodging, private transportation and other accommodations (Taisl and Southwick 1995). Moose is one of the most popular species sought by wildlife viewers. According to Standage Accureach (1990) moose ranked 6th out of 32 kinds of wildlife in popularity by Colorado wildlife watchers. Moose viewing in North Park, where moose are most abundant, has become a popular form of recreation. This activity has high potential to contribute to the economy of Jackson County. The value of moose as a watchable wildlife species should be a strong consideration in future moose management plans in and around the Colorado State Forest. Recently, legislation was passed by the Colorado General Assembly designating Walden as the moose viewing capital of Colorado. (See attachment A). This highlights the importance of moose as a watchable species which will invariably provide economic benefits to residents of North Park.

MOOSE AND OTHER LAND USES

COMPETITION WITH DEER AND ELK

Mule deer in North Park mainly use habitat types other than willow. According to food habits reported in the literature willow is not an important part of the diet of mule deer (Kufeld and Wallmo 1973). Elk are primarily grazers rather than browsers and willows are only eaten to any great extent by elk during winter (Kufeld 1973). Since moose have the ability to move freely in snow depths exceeding 1 m and need cold temperatures for thermoregulation they generally winter at much higher elevations than deer and elk. Thus, competition between moose, mule deer, and elk in North Park is minimal.

LIVESTOCK GRAZING

Cattle use willow bottoms frequented by moose mainly during summer and early fall. They eat mostly grasses and sedges that occur beneath the willows, although they do eat some willow forage. Due to the rapid rate of increase in the North Park moose population the need for studies to evaluate impacts of moose and livestock browsing on willows has been expressed by the U.S. Forest Service. A cooperative study involving the U.S. Forest Service, Colorado Division and Wildlife and a major university has been proposed and designed. However, to date, funding for that study has not been made available.

LOGGING

In the boreal forest region of north-central Ontario moose were found to be strongly associated with standing timber. Moose densities were higher in larger blocks of standing timber left after logging (0.7 km²) than in smaller leave blocks, and leave blocks greater than 5.0 km² had higher densities of moose than medium sized leave blocks (Eason 1989). The reason given was lack of cover in logged areas and improved access for hunters due to construction of logging roads. During the North Park moose study we have also found that moose relate strongly to standing, mature timber and tend to avoid clearcuts. Less than 1% of the 838 locations of 24 radio-collared moose relocated at 2-week intervals over a 2-year period in the Colorado State Forest - Gould area were in clearcuts, while 34% were in mature lodgepole pine. In some areas such as northeastern Minnesota (Peck et al. 1976) and Maine (Monthey 1984), where hardwood browse production increased as a result of opening the canopy increased moose use was observed in clearcuts. However, clearcuts in lodgepole pine and spruce forests of North Park do not result in improved moose forage conditions and they are open and devoid of cover. Thus, there is a need to maintain a mosaic of relatively large patches of uncut, mature timber during logging operations in order to maintain the moose population. These uncut patches should be adjacent to patches of willow.

DEVELOPMENT

Development can influence moose populations in 2 major ways. (1) The main habitat types used by moose in the vicinity of the Colorado State Forest (willows and lodgepole pine) could be converted to residential and commercial developments. (2) Increased human activity as a result of development can cause moose to leave the area assuming habitats elsewhere could accommodate them. If moose habitats elsewhere were at carrying capacity then displaced animals would have nowhere to go. In either case (1 or 2) the population would decline to the level at which the reduced available habitat could support it. In Elk Island National Park, Alberta (Ferguson and Keith 1982) cross-country skiing influenced the general overwinter distribution of moose in that they tended to move away from areas near heavily-used trails during the ski season (January-March). Mcen et al. (1982) and Freddy et al. (1986) reported that being approached by people on foot or on snowmobiles caused white-tailed and mule deer to expend more energy than they would otherwise at a time of year when they were under maximum stress due to cold weather and deep snow and when they should be conserving energy. It is likely that these same influences affect moose in a similar manner to deer. Mytton and Keith (1981) reported that moose were located farther from human disturbance than expected in a random distribution. Rolley and Keith (1980) reported that 4-wheel drive vehicles, snowmobiles and trail bike activity within 250 m of moose may cause them to leave an area. Increased development can also create conflicts between humans and moose such as moose-automobile collisions (McDonald 1991), and direct confrontations between moose and people.

MOOSE DAMAGE TO AGRICULTURE

Prior to the original transplant of moose to North Park concern was expressed by local ranchers that moose would damage their haystacks and fences. To date there have been very few complaints of moose damage. Unless haystacks are unprotected and in close proximity to willow habitat moose generally do not bother them. Moose simply jump over barbed wire fences without touching them. Haystacks near willow bottoms should be protected by panelling if they are attracting moose.

CONCLUSIONS

Since willow bottoms and adjacent lodgepole pine, spruce, and aspen forests in the Michigan and Canadian river drainages in and near the CSF constitute some of the best moose habitat in Colorado and support the highest moose population in the state, it is extremely important that this habitat be protected and that other uses such as livestock grazing, logging, and land development be managed in a manner that causes minimal impacts to the moose population.

It is important that moose numbers and habitat impacts be monitored and populations carefully controlled to keep them in balance with their habitat.

Moose hunting and viewing have much potential to benefit the economy of Jackson County by attracting hunters and others who want to see and photograph moose. These activities should be encouraged as much as possible, but not to exceed the point where too much activity adversely affects the moose population or its habitat.

The problem of illegal kill must be addressed and solutions found. This would allow increased opportunity for legal hunters to harvest moose, and would provide for more accurate estimates of moose mortality rates needed to properly manage the population.

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FIGURES

Fig. 1. Yearlong locations of 24 radio-collared moose during a 2-year period, December 7, 1991 thru December 31, 1993. There were 838 total locations, Moose were captured in the Gould and Colorado State Forest area. They were relocated at about 2-week intervals during the 2-year period.

Fig. 2. Critical moose habitat on the Colorado State Forest and Vicinity.

Fig. 3. Moose legally harvested in Colorado, 1985-93. All were harvested in North Park except that in 1993, 4 were harvested in the Laramie River area.

Fig. 4. Moose illegally killed in Colorado, 1985-93.

TABLES

Table 1. Hunting season dates and structure for moose in Colorado.

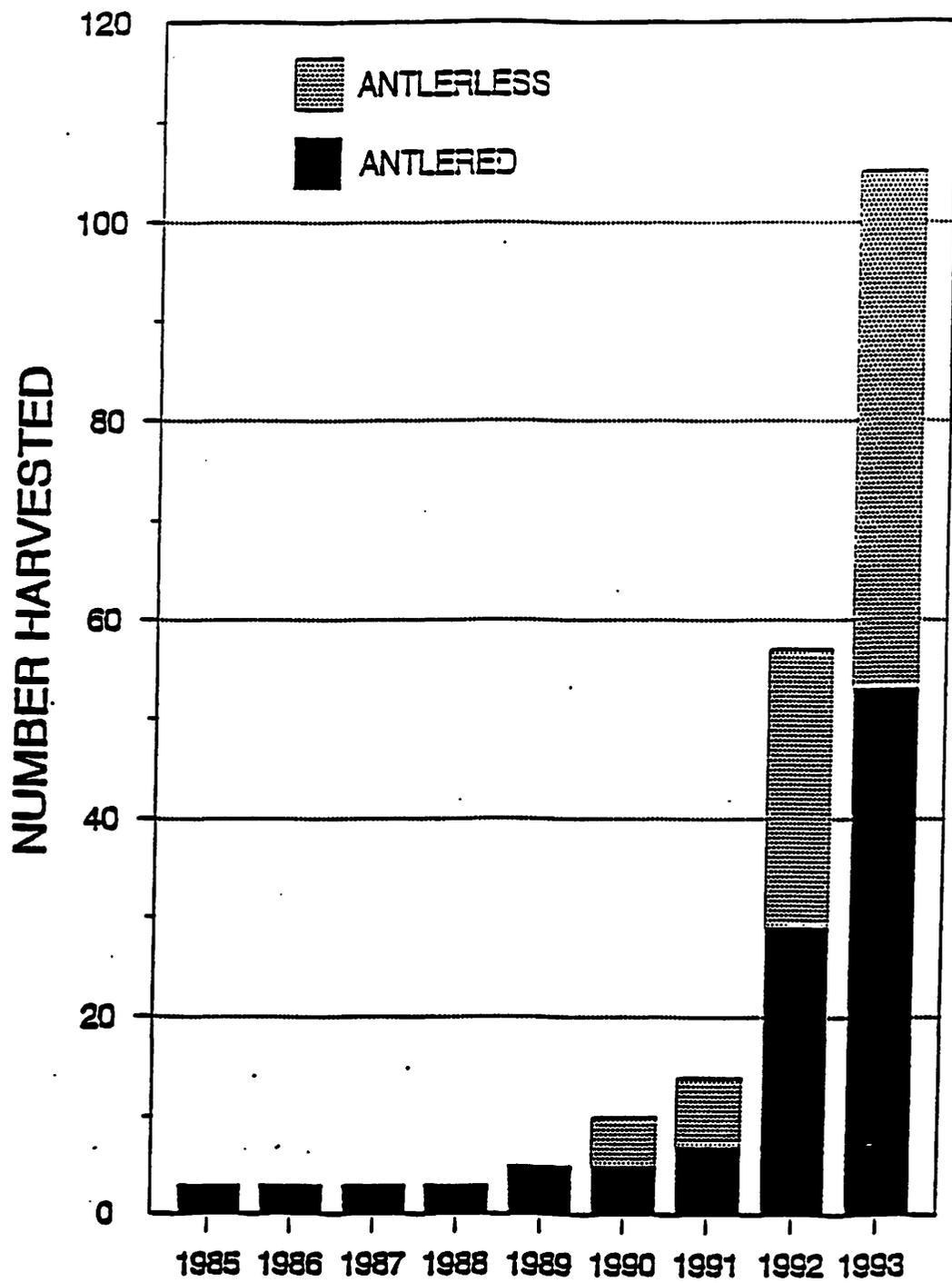


Fig. 3. Moose legally harvested in Colorado, 1985-93. All were harvested in North Park except that in 1993, 4 were harvested in the Laramie River area.

NUMBER KILLED ILLEGALLY

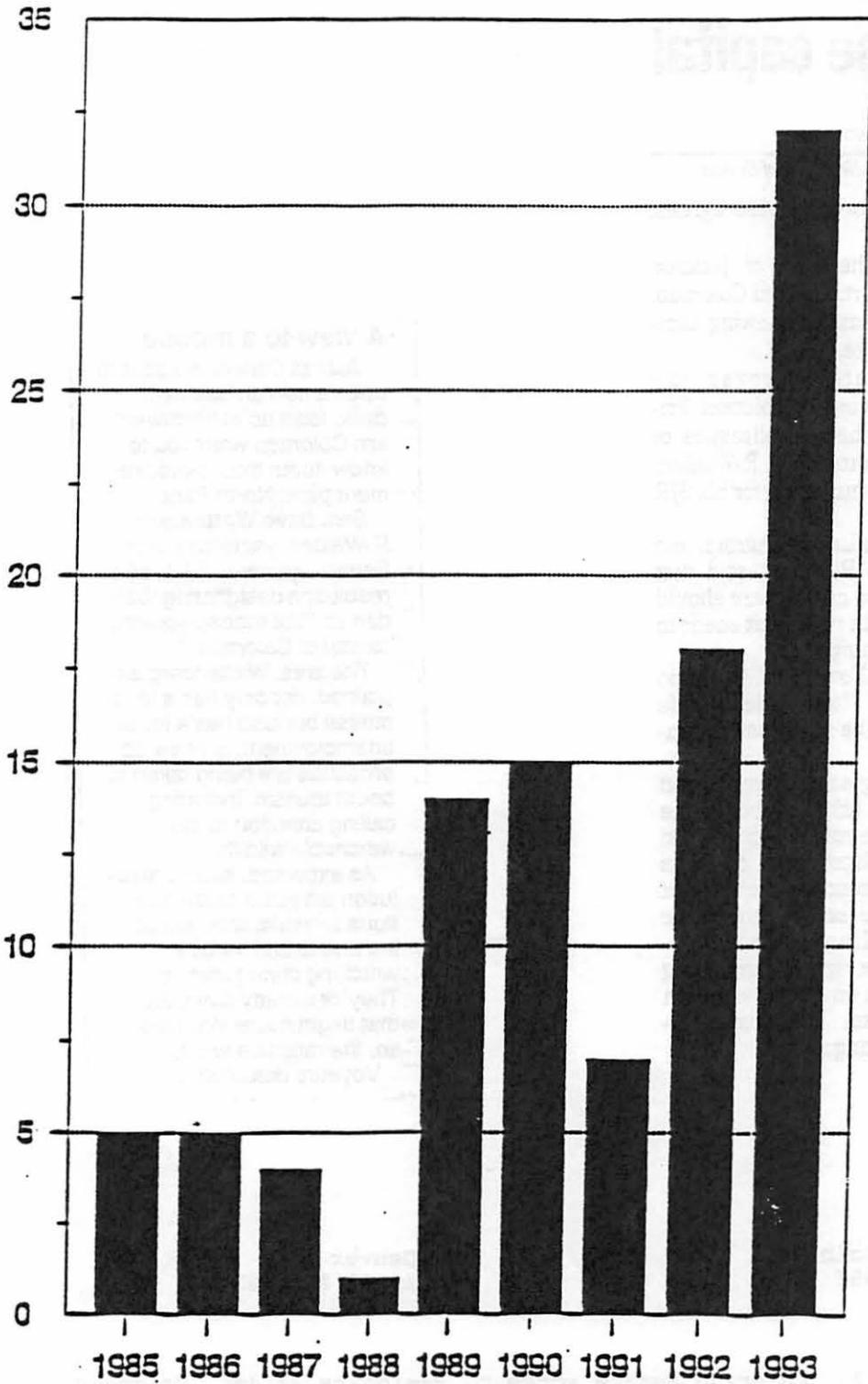


Fig. 4. Moose illegally killed in Colorado, 1985-93.

Senate votes to call Walden moose capital

By John Sanko

Rocky Mountain News Capital Bureau

If the Colorado House agrees, it's official.

Walden, the seat of Jackson County, in north-central Colorado, will be the "moose viewing capital" of the state.

The Senate approved the "moose viewing" resolution Friday, but not before colleagues of Sen. Dave Wattenberg, R-Walden, poked a little fun at him for his SJR 20.

Sens. Elsie Lacy, R-Aurora, and Gigi Dennis, R-Pueblo, said that moose are "so ugly," there should be a 15-minute time limit spent in Walden watching them.

Sen. Ray Powers, R-Colorado Springs, said "watchable wildlife sites" should be set up on Wattenberg's ranch.

Wattenberg said his resolution was just an effort to boost the economy. The community has had tough times lately with cutbacks in the coal industry and closing of a sawmill. He said he hopes the resolution will increase tourism.

The Senate agreed, approving the resolution on a 32-1 vote with only Sen. Paul Weissmann, D-Louisville, voting no.

A view to a moose

Just as Denver is about to open a new amusement park, folks up in northwestern Colorado want you to know about their a-moose-ment park: North Park.

Sen. Dave Wattenberg, R-Walden, yesterday won Senate approval, 32-1, of a resolution designating Walden as "the moose-viewing capital of Colorado."

The area, Wattenberg explained, not only has a lot of meese but also has a lot of unemployment. So new approaches are being taken to boost tourism, including calling attention to the watchable wildlife.

As expected, such a resolution attracted some facetious amendments, including one to ban moose watching during mating.

They're already timid, and that might make them more so, the rationale went. Voyeurs defeated it.

Rocky Mountain News
April 8, 1995

Denver Post
April 8, 1995

Attachment A. Colorado Senate votes to designate Walden, Colorado as "The Moose Viewing Capital of Colorado".

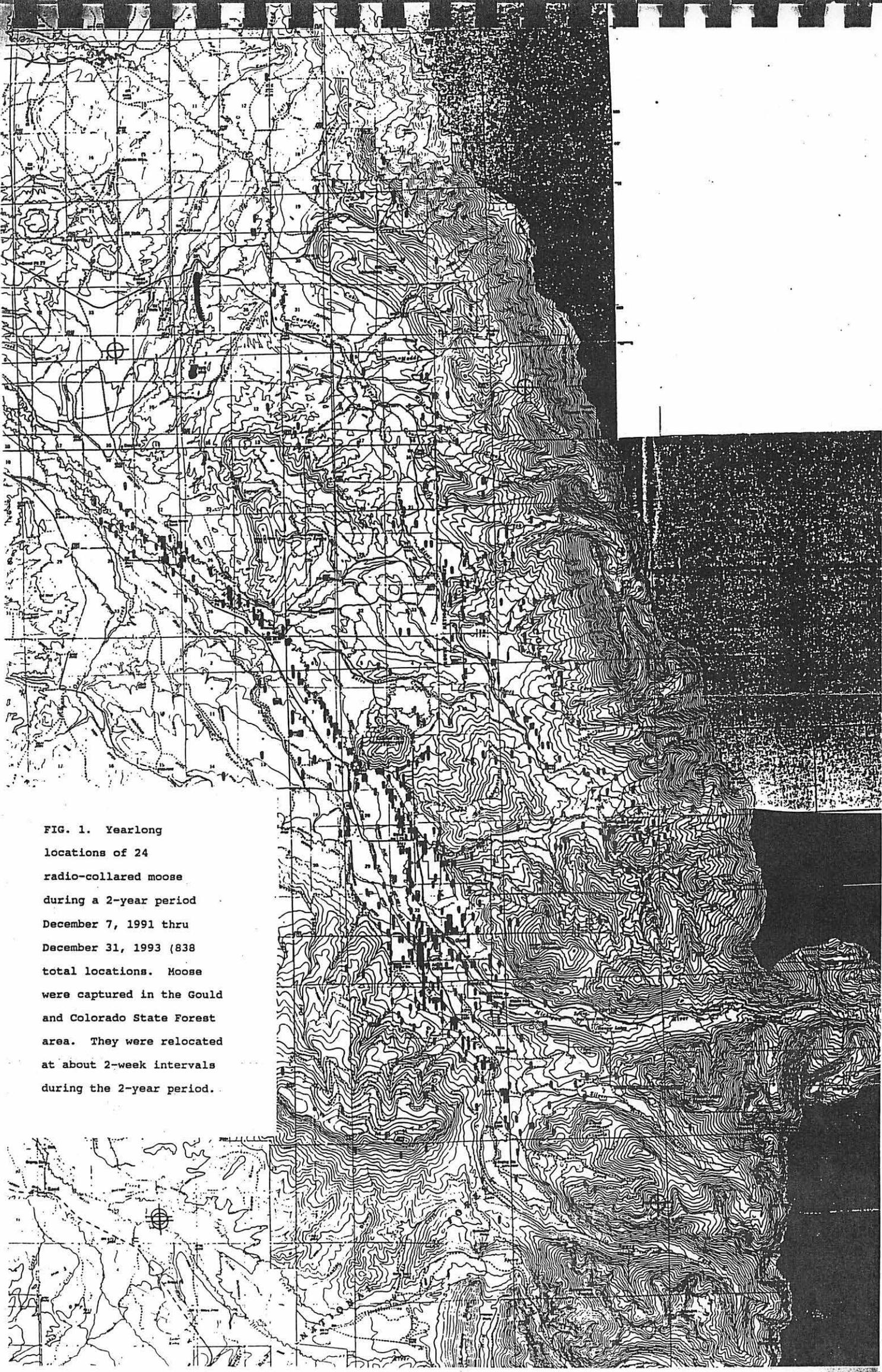


FIG. 1. Yearlong locations of 24 radio-collared moose during a 2-year period December 7, 1991 thru December 31, 1993 (838 total locations. Moose were captured in the Gould and Colorado State Forest area. They were relocated at about 2-week intervals during the 2-year period.

Colorado State Forest

Moose Distribution

Legend

- Significant Moose Habitat
- Moose Concentration Areas
- ▧ Jackson County
- ▧ Colorado State Forest

Scale

1 inch = 2.92 Miles

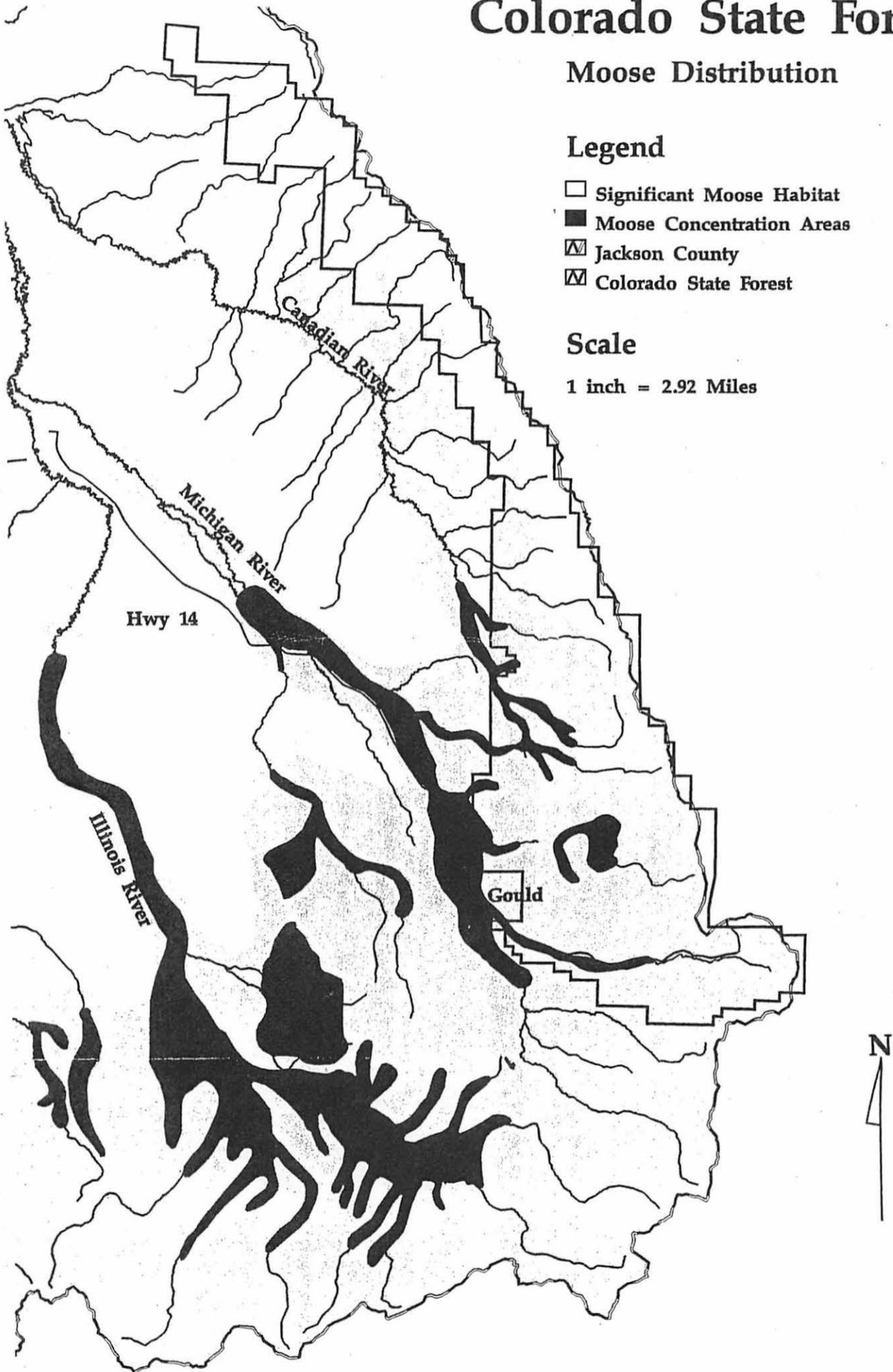


Fig. 2. Willow - lodgepole pine habitat critical for the survival of the moose population in the Gould and Colorado State Forest areas.