

CHRONIC WASTING DISEASE EXPOSURE RISKS FROM COLORADO DIVISION OF WILDLIFE RESEARCH ACTIVITIES

Historical records and interviews have been used to ascertain the potential to which wild cervid populations may have been exposed to chronic wasting disease (CWD) from research activities of the Colorado Division of Wildlife (CDOW) and collaborators that used animals from the CDOW's Foothills Wildlife Research Facility (FWRF) in Fort Collins, Colorado. The general principle at FWRF, at least since 1985, has been that deer or elk, once born in, or brought to the facility, do not leave. This was not always true, and the following are summaries of projects where captive animals associated with FWRF could have been placed in contact with wild populations.

Elk Research in Rocky Mountain National Park (RMNP) *(Further details appended at the end of this report)*. – Conducted between 1976 and 1978, this study used 5 tame elk obtained from Sybille Wildlife Research Unit in Wyoming and the Denver Zoo. The tame elk grazed freely in selected areas of the park for 75 - minute feeding trials. The total time each animal spent in feeding trials was 260 hours over the 2 years of fieldwork. The tame animals were maintained in a holding pen at Little Horseshoe Park at RMNP in November – March and June – September both years. The tame animals never were held at FWRF prior to or during the study, but instead were reared and held at holding pens south of the Division offices on Prospect Road, Fort Collins. There is no record of CWD occurrence at these pens.

The tame elk were taken to FWRF after the study in 1978 and, approximately 3 years after they had last been at RMNP, 2 of the animals showed clinical symptoms of CWD and died in 1981. The remaining 3 were euthanized in 1985 (when all cervids at FWRF were killed). CWD was not detected *via* histopathology.

Elk – Cattle Competition Research at Little Snake Wildlife Management Area ~ 19 mi. north of Maybell, CO *(Further details appended at the end of this report)* – Conducted between 1986 and 1990, any potential exposure to CWD would have occurred in the final 2 years, 1989 – 1990. Eleven elk captured as calves in RMNP and then reared in chlorine-treated pens at FWRF were used in the study and were returned to FWRF at the end of each field season. 4 of these elk eventually were found to have CWD; the remainder, including 4 that still live, did not contract the disease. One of the CWD elk died at FWRF, between the 1989 and 1990 field seasons. Another died in May 1991, more than 1 year after the study was terminated. The other CWD deaths occurred in June 1992 and February 1995, again at FWRF. These cases are described in Miller et al., 1998.

152 wild elk were also at the Little Snake study facility during the time of potential exposure, and subsequently were released in place, back to the wild. The maximum potential exposure consisted of the potential for nose-to-nose contact between 10 wild elk and from 1 to 4 possible CWD elk (tame) across an electrified fence during two 4.5-month periods. The remaining wild elk had potential exposure from the excreta deposited by tame elk during a single 2-hour grazing trial in each pasture each of two years (4 hours total/pasture). Since not all tame elk entered all pastures, and numbers of wild elk in each pasture varied, the numbers given are the maxima.

Middle Park Deer Studies, Federal Aid Projects W-038-R *(Source data are lacking – the following information comes from secondary sources, including Federal Aid reports)*. – The Junction Butte captive animal facility (near Kremmling, CO) and FWRF shared a number of deer during the late 1970s - these deer typically were held at Junction Butte during the summer and at FWRF during the winter. In the period 1975 – 1985, at least 2 mule deer at Junction Butte displayed symptoms thought to indicate CWD and died. Other mule deer (5 – 7) at Junction Butte displayed similar symptoms and were destroyed at FWRF. In 1976, wild does (number not known) were trapped and held at Junction Butte until fawning. Fawns were transported to FWRF for hand-rearing for research purposes, and the adult does were released into the wild. From September 1985 until March 1991, no animals were held at Junction Butte. From March through September 1991, about 40 confiscated elk and their calves were held at Junction Butte. There is no indication from available surveillance data that CWD infected these elk, or has become established in free-ranging deer associated with Junction Butte. Examinations of 410 harvested mule deer from DAU D-9

(Middle Park) in 1999 did not yield any CWD-positive animals. There is a 98% probability that a CWD-positive animal would have been detected at a prevalence of ≥ 0.01 .

Little Hills (Piceance Basin, southwest of Meeker) Studies (*Source data are lacking – the following information comes from secondary sources*) – Between 40 and 50 captive deer were moved between FWRP or Colorado State University pens and Little Hills for food habits studies between 1975-1980 (4 deer were from Junction Butte). Typically fawns were obtained at Little Hills, taken to FWRP for hand rearing, and then transported to Little Hills for research. It is not clear whether CWD cases were diagnosed at the Little Hills facility. A report (80W101) on a CWD case from May 1980 includes, as part of the history narrative, a statement that the subject deer was “raised at Little Hills where there has not been a confirmed cases of chronic wasting disease”. However, this deer had spent 1 winter at Junction Butte (Kremmling). It is unclear from the report whether this deer died at Little Hills, Kremmling, or Fort Collins; the “Location of origin” is listed as “Meeker (Little Hills) Colorado, Division of Wildlife”, but whether that is the ultimate or proximate origin of this deer can’t be discerned. One tame deer escaped the Little Hills facility in 1979 and another escaped in 1980. Additionally, 2 were lost to predators in the Little Hills facility. The remaining animals were apparently returned to the FWRP. There is no indication from available surveillance data that CWD has become established in free-ranging deer that could have been associated with the Little Hills studies. Examinations of 434 harvested mule deer from DAU D-7 (White River), primarily GMU’s 22,23,11, and 211 had not yielded any CWD-positive animals prior to 2002. There is a 99% probability that a CWD-positive animal would have been detected at a prevalence of ≥ 0.01 .

STUDY DETAILS FROM ROCKY MOUNTAIN NATIONAL PARK
and
LITTLE SNAKE STATE WILDLIFE AREA

- INVESTIGATIONS:
1. WINTER DIET QUALITY AND NUTRITIONAL STATUS OF ELK IN THE UPPER MONTANE ZONE, ROCKY MOUNTAIN NATIONAL PARK, COLORADO.
 2. COMPOSITION AND QUALITY OF ELK SUMMER DIETS IN ROCKY MOUNTAIN NATIONAL PARK, COLORADO.
- INVESTIGATORS:
- Dan L. Baker - Colorado Division of Wildlife
N. Thompson Hobbs - Colorado State University
James E. Ellis - Colorado State University
David M. Swift - Colorado State University
R. Bruce Gill - Colorado Division of Wildlife
- DATE:
- 1976-1978
- COLLABORATORS:
- Colorado Division of Wildlife, Colorado State University,
U. S. Forest Service, National Park Service – Rocky Mountain National Park (RMNP)
- OBJECTIVES:
1. Estimate carrying capacity of winter range for elk in Rocky Mountain National Park based on quantification of forage energy and nitrogen supply and extant knowledge of elk energy and nitrogen requirements.

2. Describe the processes affecting the nutritional quality of elk diets in Rocky Mountain National Park and predict the potential effects of variation in diet quality on animal condition.

METHODS:

Study Area. Winter investigations were conducted in RMNP on upper montane winter range on the east slope of the Continental Divide between 2,500 and 2,800 m in elevation and 8 km west of the town of Estes Park, Colorado. Summer investigations were conducted in subalpine forest and alpine tundra climax zones on the east side of the Continental Divide, Fall River Drainage (Hobbs 1979, Hobbs and Baker 1979, Baker and Hobbs 1982, Hobbs and Baker 1976-1978)

Food Habits Measurements. Botanical composition of diets was estimated by bite counts of forage intake of 5 tame, trained elk. Elk calves were obtained in May and June 1976 from Sybille Wildlife Research Unit, Sybille, Wyoming, and Denver Zoo, Denver, Colorado and raised and maintained until 1978 at CDOW pens on Prospect St., Fort Collins, Colorado (Hobbs and Baker 1979, Neil 1977-78). Winter diet composition was determined during November to March, 1976-78; summer diets determined from June - September 1977-78. The elk used in these experiments were 6-10 month -old calves the first year of sampling; yearlings the second year. Diets were sampled during 10, 8-day grazing trials during winter and 3, 8-day grazing trials in summer. During a grazing trial, each animal was released each day in one of eight plant communities and allowed to feed and wander freely for 75 min. As each animal grazed, one observer recorded diet choices and the other collected plant samples for chemical analysis. At the end of the day, tame elk were returned to a holding corral in Little Horseshoe Park, although that location is not specifically mentioned in the publications. Between grazing trials, tame elk were transported back to Fort Collins and maintained in holding pens at the south end of the DOW office complex on Prospect Street (Hobbs 1979, Hobbs et al. 1981, Baker and Hobbs 1982, Neil 1977-1978, Hobbs and Baker 1976-1979). There is no record of CWD occurrence at these pens.

NOTE: Elk used in this study were maintained in pens behind the DOW office on Prospect St. until after food habits sampling in 1978. After completion of the study in 1978, tame elk were placed in new paddocks at the FWRF (Neil 1977-1978)

DOCUMENTATION:

A more detailed description of the methods used in this investigation and subsequent results can be found in the following publications:

1. Hobbs, N. T. 1979. Winter diet quality and nutritional status of elk in the upper montane zone, Colorado. Ph. D. Dissertation, Colorado State University.
2. Hobbs, N. T., D. L. Baker. 1979. Rearing and training elk calves for use in food habits studies. J. Wildl. Manage. 43:568-570.
3. Hobbs, N. T., D. L. Baker, J. E. Ellis, and D. M. Swift. 1981. Composition and quality of elk winter diets in Colorado. J. Wildl. Manage. 45:156-171.
4. Baker, D. L., and N. T. Hobbs. 1982. Composition and quality of elk diets in summer. J. Wildl. Manage. 46:1982.

5. Hobbs, N. T., and D. L. Baker. 1976-1978. Systems Modeling Big Game Populations: Simulations of the Carrying Capacity of the Rocky Mountain National Park Elk Winter Range. Colo. Div. Wildl., Game Res. Div., Fed. Aid. Proj. W-38-R-32. Game Research Report.
6. Williams, E. S., and S. Young. 1982. Spongiform encephalopathy of Rocky Mountain Elk. J. Wildl. Diseases 18:465-471.
9. Neil, P. H. 1977-1978. Animal and Pen Support Facilities for Deer-Elk Research. Colo. Div. Wildl., Game Res. Div., Fed Aid Proj. W-38-R-32, WP 23, Job 1, Game Research Report.

FATE OF TAME ELK: According to Williams and Young (1982), two of five elk used in these investigations showed clinical signs of the CWD and died in 1981, 3 years after the study was completed. The remaining 3 elk were euthanized in 1985 when all of cervids at the FWRP were killed, and all 3 tested negative. (M. Miller, pers. comm.)

WILD ELK EXPOSURE: Elk used in the study did not inhabit FWRP, only the Prospect Road holding pens. There is no record of CWD occurrence at these holding pens, thus we cannot conclude there was any wild elk or deer exposure to CWD from this study. However, Seabird Wildlife Research Unit, the source of some of the animals, does have a history of CWD dating to at least the early 1980's, so the possibility of some level of exposure cannot be completely discounted.

INVESTIGATION: EFFECTS OF ELK GRAZING DURING WINTER ON PERFORMANCE OF CATTLE DURING SPRING

INVESTIGATORS: N. T. Hobbs - Colorado Division of Wildlife
Dan L. Baker - Colorado Division of Wildlife
George D. Bear - Colorado Division of Wildlife
David C. Bowden - Colorado State University

DATE: 1986-1990

OBJECTIVES:

1. Test the hypothesis that elk grazing during winter influences the productivity of spring forage, and the productivity of cattle using that forage.
2. Describe the mechanisms by which elk use of winter forage influences the nutritional status and reproductive performance of cattle during spring.

METHODS: *Study Area.* Experiments were conducted on the Little Snake Wildlife Management Area in northwestern Colorado (40 N, 108 W). The area is about 35 km (19 mi) north of Maybell, Colorado on County 19 (Hobbs et al. 1996a , Hobbs et al. 1996b, Hobbs et al. 1986-1990)

Twelve 80-acre pastures were constructed of high-tensile electric fence that was 10 feet high. Responses of forage and cattle to four levels of elk population densities -- (0, 9, 15, 31 elk/km², or 0, 20, 40, 80 elk /

mi²) -- replicated 3 times, were examined. Three pastures contained 0 elk, 3 contained 3 elk, 3 contained 5 elk, and 3 contained 10 elk during the trials. Thus 54 wild elk were maintained in the pastures each year during the study period. In addition, 10-30 replacement wild elk were maintained in a separate holding pen in the center of the facility (not in the experimental pastures) each winter and early spring. The experiment was repeated annually during four consecutive years (1987-1990). Wild elk (greater than 2 yrs. of age) were captured in different locations within the surrounding area and transported to the pasture complex and released into the designated pastures. Average date of release of elk into the pastures was December 27. Elk were held in pastures until approximately April 7-May 1 each year of the study, then released into the surrounding rangeland. Five elk in 1986-87 and 6 replacement elk in 1988-89 were radio-collared and monitored periodically for the duration of the study (Bear 1986-1990). Some died in the pastures and were replaced and some were replaced before they died. According to Bear (1987-90), a total of 257 wild elk (including the replacement elk) was in the pastures over the 4 years of the study.

Elk Trapping Locations and Movements After Release From Little Snake Wildlife Management Area.

1986-87 - Elk were trapped from Godiva Rim (approximately 15 mi. north of Maybell and Axial Basin (25 mi. southeast of Maybell). All elk were marked with numbered ear tags and neckbands. In addition, 4 cow elk released into the pastures were fitted with telemetry collars. Three of four radio-collared cows released from the pastures returned to the Axial Basin area, where they were trapped. By May 11, these cows were southeast of Hamilton in the Wilson Mesa area. On June 12, they were on the summer range around Pagoda Peak and Sand Peak. The fourth radio-collared elk remained east of Maybell.

1987-1988. Wild elk were trapped at the following sites : 1) northeast of Craig (5 mi east of Ralph White Reservoir near the Don Cook Ranch; 2) 1 mile south of Iles Grove - Axial Basin, 3) 3 miles south of Meeker, 4) south of Lay. None were radio-collared so movements when released from the pastures are unknown.

1988-89. Wild elk were trapped at the following sites: 1) 5 mi southeast of Meeker, 2) Trapper Mine - 5 mi south of Craig, 3) Senica Mine - 10 mi southeast of Hayden. Telemetry collars were placed on 6 replacement elk released from the pens on March 29. These elk were observed in the vicinity of Godiva Rim during winter where they intermingled with large herds of elk. They then moved south toward Lay, Colorado and then eastward to the summer range on Black Mountain and Slater Creek north of Craig and Hayden, Colorado. The 5 radio-collared elk from 1986-87 mingled with these six elk then moved to summer ranges up Marapos Creek and Williams Fork to Sand Peak and Pagoda Peak.

1989-90. Wild elk were trapped at the following sites: 1) 5 mi southeast of Meeker, 2) 28 mi east of Meeker on the Marvine Ranch 3) Trapper Mine, 4) Senica Mine - 10 mi southeast of Hayden. The radio-collared elk from previous years, migrated to the same summer ranges north of Hayden and Craig as before (Bear 1987-1990).

Elk Diet Composition. Food habits of elk were measured using bite counts with tame animals in early April during 1989 and again in 1990 (the final 2 years of the previously-described study). Twelve elk calves were captured in Rocky Mountain National Park, during early summer 1986, and raised and maintained at FWRP in pastures that had been extensively disinfected against CWD (Miller et al. 1998). One elk calf died during the bottle rearing process in July, 1986. In January 1989, the remaining 11 tame, apparently healthy elk were transported to the Little Snake Wildlife Management Area and released into a 25-hectare conditioning pasture adjacent to one of the pastures (pasture #8) containing 5 wild elk (Fig. 1). Tame and wild elk were maintained in this way from approximately 1 January to the 15 April – 15 May timeframe, when wild elk were released from the pasture. During this time period, tame and wild elk were separated by a 10-ft. high tensile electric fence. (Nose to nose contact by tame and wild elk was possible during this time period, although recollections of researchers are that the elk had developed strong avoidance to the electrified fence line).

Grazing trials were conducted by moving tame elk from the conditioning pen into each pasture containing wild elk via a connecting alleyway (Fig. 1). Diet selection of tame elk was observed in all pastures over a 12-day period. Tame elk were placed in a pasture, 2 at a time, for a period of up to 2 hours. At the end of each sampling trial, tame elk were removed from the pastures containing wild elk and returned to their holding pen. (Tame elk did not ever mix with wild elk or stay overnight in the pastures with wild elk but did defecate and urinate in these pastures during the food habits sampling). At the end of the 1989 grazing trial, all tame elk were returned to FWRP in Fort Collins (Hobbs and Baker unpublished data). Approximately 5 months following the 1989 grazing trial, one of the tame elk used in the food habits study developed clinical signs of CWD and was euthanized (Miller et al. 1998).

In January, 1990, the 10 remaining tame elk were transported back to the Little Snake Wildlife Management Area and placed in the same holding pen as in 1989. Food habits sampling followed the same protocol, as previously described, and the elk were returned to FWRP in April 1990. In May, 1991 a second tame elk used in the food habits study developed clinical symptoms of CWD and was euthanized. Subsequently, 2 additional elk in this group died of CWD at FWRP in June, 1992 and February 1995 (Miller et al. 1998).

FATE OF TAME ELK:

1 elk died as a calf during bottle-rearing
4 elk died from CWD (9/89, 5/91, 6/92, 2/95)
3 elk died of non-CWD related illness at FWRP
4 elk are currently (May 2002) alive and well at FWRP

WILD ELK EXPOSURE:

A total of 152 wild elk (including replacement animals) were potentially exposed to CWD from 1 to 4 tame elk during 4.5 month periods in 1989 and 1990. Approximately 10 wild animals potentially had nose-to-nose contact across electrified fence, the remainder were potentially exposed via excreta deposited in each pasture for up to 2 hours (during the grazing trials) each of 2 years (Bear 1987 – 90).

DOCUMENTATION:

1. Hobbs, N. T., D. L. Baker, G. D. Bear, and D. C. Bowden. 1996. Ungulate grazing in sagebrush grassland: mechanisms of resource competition. *Ecological Applications* 6:200-217.
2. Hobbs, N. T., D. L. Baker, G. D. Bear, and D. C. Bowden 1996. Ungulate grazing in sagebrush grassland: effects of resource competition on secondary production. *Ecological Applications* 6:218-227.
3. Miller, M. M., M. A. Wild, and E. S. Williams. 1998. Epidemiology of chronic wasting disease in captive Rocky Mountain elk. *J. Wildl. Diseases* 34:532-538.
4. Bear, G. D. 1987-1990. Trapping, Transporting, and Maintenance of Elk at Livestock-Elk Grazing Study. Colo. Div. Wildl., Wildl. Res. Rep., Fed Aid Proj. W-153-R-3, WP 3, J 2, Job Progress Report.
5. Hobbs, N. T., D. L. Baker, and G. D. Bear. 1986-1990. Impact of Elk Winter Grazing on Livestock Production. Colo. Div. Wildl., Wildl. Res. Rep., Fed. Aid Proj. W-153-R-3, WP 9A, J 1, Job Progress Report.
6. The methods and results of the comparative food habits experiment between elk and cattle have not been published or reported in any document.

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