KOOTENAY NATIONAL PARK

ELK STUDY

1976 -- 1978

T. R. GIBBONS
PARK WARDEN
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INTRODUCTION

In the spring of 1972, with the help of John Stelfox, Canadian Wildlife Service and Ian Jack, Chief Park Naturalist, K.N.P., plans were made to monitor elk movement from Kootenay National Park. At that time Park officials believed that the elk population was moving beyond the park boundary during the winter months.

The purpose of this study was to determine migration patterns of park elk and to locate their winter range.

METHODS

A total of 12 elk were fitted with radio collars between October 11, 1976 and December 10, 1976. Collars were assigned numbers from 166 - 181 and the telemetry equipment was fitted inside pieces of rubber-lined one and on half inch fire hose; each of the prepared collars was then color-coded for easy identification (Appendix B).

Fourteen additional elk were radio collared between October 20, 1977 and December 15, 1977. Collars were numbered from 213 - 227. Telemetry equipment was embedded between layers of industrial belting, which were then banded and sealed. Individual collars were then color coded. Refer to Appendix D.
IMMOBILIZATION

All radio collared elk were immobilized using Anectine (succinylcholine chloride) at a concentration of one hundred -(100) milligrams per cubic centimeter. The average dosage used on cow elk was 24 mg.; the average dosage on bull elk was slightly higher at 27.3 mg. Refer to Appendix A and C.

MONITORING

76-77

Twelve radio collars and a receiver were purchased from the Canadian Wildlife Service Bioelectronics Section (F. Anderka), Ottawa. These collars were designed to transmit in the 170-180 megahertz (MHz) range. As of May 15, 1977 nine collars had been functioning for 24 weeks. Transmitter failure in collar #173 on November 11, 1976 reduced the number of collars functioning at that time to 11; collar #171 (which had not yet been placed on an animal) was fitted to the elk carrying #173 and the defective unit was removed on December 10, 1976. Data previously reported for collar #173 has been included in the records for #171. The telemetry equipment was accidently stripped from collars #166 and #175 by the animals after March 28, 1977 and April 11, 1977, respectively. (Dates noted are the last recorded signals). Monitoring of radio collared elk was discontinued during the summer 1977. Refer to Appendix B.

77-78

Fourteen additional radio collars were purchased from the C. W. S
for the 77-78 season.

These collars also transmitted in the 170-180 megahertz range. Radio collared elk were monitored in conjunction with routine road patrols throughout the winter of 77-78. Aerial monitoring of radio collared elk was carried out during January, February, March. As of April 18, 1978, thirteen of the fourteen radio collars were functioning. Transmitter failure in #227 secured within 3 - 4 days after November 15, 1977.

(Refer to Appendix D).
SUMMARY

Between November, 1972, and October, 1974, forty-two elk were ear-tagged and banded with colour coded collars.

Ground and aerial observations were initiated in January, 1973, and were carried out until the spring of 1976. Aerial reconnaissance flights by park personnel and the British Columbia Wildlife Service failed to locate banded elk beyond the park boundary. (Refer to Elk Study, Kootenay National Park, Interim Report, 1976).

The winter of 1975/76 was considered a trial period for the use of radio telemetry equipment. Four elk were fitted with radio collars. Data received from the four collared animals indicated that radio telemetry could provide the necessary information on herd movement.

During the winter of 1976/77 twelve elk were radio collared. Fourteen additional animals were collared during the winter of 1977/78.
Exchange between herds from the Bow valley and Upper Vermilion have been observed during this study. Since 1973, three colour coded bands and two radio collared animals have been sighted in the Bow valley. Reliable reports of a banded elk near Edgewater, B.C., in July of 1973, and another one west of Radium in 1976 indicate a minimal exchange between herds from the Columbia and Kootenay valleys.
RESULTS AND DISCUSSIONS

- Reports of a growing elk population within Kootenay National Park and suggestions that these elk are moving as far south as Canal Flats during the winter are unfounded;

- Yearly elk censuses show a gradual decrease in the elk population;

- Census counts in the 1960's ranged from a high of 484 in 1963 to a low of 353 in 1969. The gradual decrease in population has continued into the 70's. Census counts in the 1970's ranged from a high of 265 in 1973 to a low of 223 in 1978. The present population at this time is estimated at 250 animals.

- Reports of banded elk beyond the park's south boundary are rare. Ground and aerial surveys by park personnel and aerial census counts taken by the British Columbia Wildlife Service have failed to locate banded elk in the Canal Flats area. The 1976 interim elk report listed sightings of banded elk at Wasa Lake, Skookumchuk, Canal Flats, and Dutch creek areas. All of the above mentioned sightings were recorded by one individual. Information gathered throughout this study indicates reported sightings in these areas were false.

- Eight to ten reports of banded elk as far south as the Palliser river have been checked out and verified. Data collected from logging personnel and land owners indicate no more than 20 to 30 elk winter beyond the park's southern boundary.

- Results of this study indicate the park's elk population is a definable unit associated with the park. The majority of animals rut, calve, and winter within the park and thus can be considered a resident population and adjacent herds appear to be minimal.

- The use of radio telemetry equipment during the winters of 1976/77 & 1977/78 indicates that the majority of the park's elk winter within the boundaries of Kootenay National Park. With the exception of a small band of 12 to 14 animals that winter on Wardle Flats, in the Vermilion valley, the main body of elk winters in the northern section of the Kootenay valley.

- The winter range as determined by this study extends from the park's northern boundary on the Kootenay river south to approximately the junction of the Palliser and Kootenay rivers. Sightings and telemetry data received throughout the study show the heaviest concentrations occur along the river flats and terraces, from Nixon creek (mile 15 on highway #93) to the park's northern boundary on the Kootenay river.
APPENDIX A

INFORMATION ON IMMOBILIZATION

1976-77
<table>
<thead>
<tr>
<th>Location</th>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>Tumor Type</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospice</td>
<td>65</td>
<td>M</td>
<td>White</td>
<td>Lung</td>
<td>Chemotherapy</td>
<td>12 months</td>
<td>Died</td>
</tr>
<tr>
<td>Home</td>
<td>72</td>
<td>F</td>
<td>Black</td>
<td>Breast</td>
<td>Radiation</td>
<td>18 months</td>
<td>Improved</td>
</tr>
<tr>
<td>Hospital</td>
<td>50</td>
<td>M</td>
<td>Asian</td>
<td>Colorectal</td>
<td>Surgery</td>
<td>6 months</td>
<td>Recurrence</td>
</tr>
<tr>
<td>Clinic</td>
<td>45</td>
<td>F</td>
<td>Hispanic</td>
<td>Brain</td>
<td>Chemotherapy</td>
<td>9 months</td>
<td>Stable</td>
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<tr>
<td>Outpatient</td>
<td>35</td>
<td>M</td>
<td>Caucasian</td>
<td>Prostate</td>
<td>HIFU</td>
<td>12 months</td>
<td>Recurrence</td>
</tr>
</tbody>
</table>

Notes:
- Chemotherapy:顺铂
- Radiation:放疗
- Surgery:手术
- HIFU:高强度聚焦超声波治疗
APPENDIX B

1976–77

OBSERVATIONS FROM RADIO COLLARED ELK

AND COLLAR CODES
Radio Collar 166
Summary of Movements

This adult cow was banded October 19 at the Assiniboine Slide Area just south of Vermilion Crossing. It remained in the immediate area of Vermilion Crossing and the slide paths (within two miles of these areas) until November 30 when it began moving southward, reaching Wardle Picnic Site by December 1 and Kootenay Crossing by December 8. For the remainder of the winter this animal moved back and forth between Crooks meadows and McLeod meadows, moving as far north as the old airfield and as far south as the junction of Settlers Road.

Radio Collar #166
Frequency 171.808

1976

Oct. 19 Banded Assiniboine slide path #1 & 2
" 20 Opposite slide path #1 & 2
" 21 Opposite slide path #1 & 2
" 22 Opposite slide path #1 & 2
" 23 Opposite slide path #1 & 2 across river
" 24 Opposite slide path #1 & 2 across river
" 25 Sighted across river from Assiniboine slide #1 & 2
" 27 Sighted 0.75 mi. South of Vermillion Crossing

Nov. 1 Signal picked up 0.5 mi. North of Vermilion Crossing West of highway 93
" 2 Signal picked up 0.5 mi. North of Vermilion Crossing West of highway 93
" 3 Sighted 0.5 mi. South of Vermilion Crossing East of highway 93
" 5 Signal picked up at Assiniboine Viewpoint toward River Flats
" 6 Signal picked up at Assiniboine Viewpoint toward River Flats
" 8 Signal opposite slide path #1 & 2 River Flats
" 10 Located 1.9 mi., North of Shanks fire road
" 11 Located 1.9 mi. North of Shanks fire road
" 13 Signal East of Vermilion Crossing
" 14 Signal East of Vermilion Crossing
" 17 Signal picked up at Assiniboine Viewpoint toward River Flats
" 20 Signal picked up at Assiniboine Viewpoint toward River Flats
" 21 Located 0.5 mi. South of Vermilion Crossing West of highway 93
" 22 Signal East of Assiniboine Viewpoint toward River Flats

Yellow Collar
Adult Cow
Radio Collar #166

1976
Nov. 26 Signal 0.5 mi. South of Vermilion Crossing road side
" 27 Located 1.5 mi. North of Vermilion Crossing
" 30 Sighted at Simpsons Monument East side of highway 93
Dec. 1 Sighted 0.5 mi. North of Wardle Picnic Site
" 3 Sighted 0.5 mi. North of Wardle Picnic Site
" 8 Sighted at Kootenay Crossing
" 9 Sighted at Kootenay Crossing
" 10 Signal near old airfield East of highway 93
" 21 Located Crooks meadow
" 22 Located Crooks meadow
" 23 Signal 1.0 mi. North McLeod meadow
" 24 Located old airfield, aerial patrol

1977
Jan. 7 Sighted McLeod meadows
" 14 Sighted McLeod meadows West of highway 93
" 18 Sighted McLeod meadows no signal
" 21 Sighted 0.25 mi. North Settlers Road junction West of highway 93 no signal
Feb. 4 Signal to 4. North West of Dolly Varden (Beaver Ponds)
Mar. 3 Possible signal East of old airfield
" 15 Sighted at Mt. Harkin sign
" 16 Sighted at McLeod meadow
" 22 Signal to 4 at mile 16 East of highway 93, 0835 hours
" 28 Sighted 0.25 mi. South of Dolly Varden East of highway 93, no signal
April 11 Located McLeod meadow
" 26 Located McLeod meadow
May 1 Located Dolly Varden transmitter not working (sighted)
" 9 Sighted Crooks meadow
" 10 Located Crooks meadow
" 12 Sighted Crooks meadow, 0910 hours
Radio Collar #167
Summary of Movements

This animal, an adult cow, was banded November 4, 1.5 miles south of Hawk Creek. It moved slowly southward over the next three weeks, reaching Kootenay Crossing by November 25 and Crook meadows by November 30. It remained in the area between the old airfield and McLeod meadows until April 26 when it was located at Kootenay Crossing; by May 9 it had moved north to the Vermilion Crossing area.

Radio Collar #167
Yellow Collar with Red Stripe
Frequency 171.826
Adult Cow

1976

Nov. 4 Banded 1.5 mi. South Hawk Creek
" 5 Located 1.5 mi. South of Hawk Creek West of highway 93
" 6 Located 2.3 mi. South Hawk Creek on River Flats
" 8 Located on River Flats opposite Hawk Creek
" 10 Signal 0.3 mi. South of Snow Creek West of highway 93
" 11 Located 0.3 mi. South of Snow Creek West side of river on flats
" 13 Located at Snow Creek
" 17 Sighted across from Hawk Creek
" 20 Located at Mt. Shanks sign
" 21 Located 0.4 mi. South Simpson Monument North side of highway 93
" 22 Sighted at Wardle Picnic Site
" 23 Sighted 0.5 mi. South Wardle Picnic Site
" 25 Signal Kootenay Crossing Pasture
" 27 Located South of Hector Gorge Viewpoint
" 28 Sighted at Crooks meadow
" 30 Sighted at old airfield East side of highway 93

Dec. 1 Sighted 1.5 mi. North Dolly Varden
" 3 Signal picked up East of Dolly Varden Picnic Site
" 6 Signal picked up at Kootenay Crossing
" 8 Sighted at Kootenay Crossing
" 10 Sighted at Kootenay Crossing
" 19 Sighted at old airfield
" 20 Located 0.25 mi. South of old airfield
" 21 Located at Crooks meadow
" 22 Located at Crooks meadow
" 23 Signal 1.0 mi. North McLeod meadow East of highway 93
" 24 Located signal at old airfield, aerial patrol
" 27 Signal 1.5 mi. North of McLeod meadow
" 31 Located at Dolly Varden
Radio Collar #167

1977
Jan.  1  Sighted at Dolly Varden Picnic Site
      "  7  0.25 mi. South of East Kootenay fire road, West
           of highway 93
      "  11 Sighted at old airfield no signal from transmitter
      "  18 Sighted Crooks meadow strong signal
      "  28 Signal to 2 East of Crooks meadow River Flats
Feb.  4  Signal to 4 North East of Dolly Varden
      "  6  Signal to 3 West of Dolly Varden
      "  8  Located 0.5 mi. North of Crooks meadow West
           of highway 93
      "  9  Sighted 0.5 mi. South of old airfield West
           of highway 93
Mar.  4  Signal to 2 South East of Dolly Varden, 0935 hours
      " 10  Signal to 2 Dolly Varden Area, aerial patrol
      " 16  Sighted at 0.75 mi. North of Mt. Harkin sign
April 26 Located at Kootenay Crossing
May  9  Located 0.5 mi. North of Vermilion Crossing
      " 10  Sighted at Vermilion Crossing
Radio Collar #169
Summary of Movements

A five point bull was fitted with radio collar #169 at the Paint Pots on October 11. By October 16 it had reached the B.C. - Alberta boundary and by October 19 it had traveled further north to the Storm Mountain Lodge area. It remained in the area between Storm Mountain Lodge and Eisenhower Junction until at least November 17 when the transmitter ceased functioning. It probably remained in the Eisenhower Junction area for most of the winter as it was sighted near the junction, February 10. It appeared to move slowly eastward from the junction during the period March through May.

Radio Collar #169  Red Collar with Black Dots
Frequency 171.865  5 Point Bull

1976
Oct.  11 Banded at Paint Pots opposite parking lot
"  12 Signal picked up on slide path west of river west of
    Paint Pots
"  15 1 mi. North Marble Canyon Warden Station East side of
    highway 93
"  16 Located 0.25 mi. South of Great Divide West of highway 93
"  18 Located B.C. - Alberta boundary West of highway 93
"  19 Signal 0.5 mi. South of Storm Mountain Lodge West of
    highway 93
"  20 Signal back of Storm Mountain Lodge West of highway
"  21 Signal 1.5 mi. North of Storm Mountain Lodge East of
    highway 93
"  23 Signal 2½ mi. North Storm Mountain Lodge between
    TransCanada and highway 93
"  24 Located 1.2 mi. West of Eisenhower Junction South of
    TransCanada highway
"  26 Located West of Storm Mountain Lodge South of TransCanada
    highway

Nov.  1 Located 0.5 mi. North of Storm Mountain Lodge West of
    highway 93
"  5 Located 0.5 mi. North of Storm Mountain Lodge West of
    highway 93
"  6 Located 1 mi. South of Eisenhower Junction West of
    highway 93
"  8 1 mi. South of Eisenhower Junction West of highway 93
" 10 Located 1 mi. North of Storm Mountain Lodge East of
    highway 93
" 11 Sighted in Taylor Creek area, reported from Banff
" 12 Sighted 1 mi. North of Storm Mountain Lodge, reported from
    Banff
" 15 Sighted 100 yds. North of Storm Mountain Lodge along road
    side of highway 93
" 17 Signal South of Storm Mountain Lodge
Radio Collar #169

1977

Feb. 10  Sighted by Banff Maintenance 200 yds. East of Eisenhower Junction

May  7  Sighted at Red Earth Creek, Banff
        "  15  Sighted 4 mi. East of Eisenhower Junction, Banff
        "  17  Sighted 1 mi. North West of Hillside, Banff
Radio Collar #170
Summary of Movements

This adult cow was banded October 25 at Kootenay Crossing. It remained in the area until November 2 after which it moved north to Wardle Flats where it remained until November 28. It moved south again and reached McLeod meadows by December 31, remaining in the area between McLeod meadows and Kootenay Crossing for the winter. Last sighted at Dolly Varden Picnic Site April 27.

Radio Collar #170  Red Collar with Yellow Dots
Frequency 171.886  Adult Cow

1976

Oct.  25  Banded Kootenay Crossing Pasture
      26  Signal cow has moved Northward up Kootenay Valley toward boundary
      27  Located on North end of Kootenay Pond
      28  Sighted on North end of Kootenay Pond

Nov.  1  Signal pick up East of Kootenay Pond
      2  Signal pick up West of Kootenay Pond
      3  Signal 0.33 mi. North of 4 mi. Viewpoint West of highway
      5  Signal 0.5 mi. North of 4 mi. Viewpoint
      6  Signal 0.5 mi. North of 4 mi. Viewpoint
      7  Sighted on River Flats opposite Goat Lick
      8  Signal opposite Goat Lick
      10  Signal East of Wardle Creek
      14  Located 0.25 mi. South of Wardle Picnic Site River Flats
      17  Located 0.5 mi. North of Wardle Picnic Site
      18  Sighted at Wardle Picnic Site
      20  Located 0.5 mi. South Wardle Picnic Site
      21  Located 0.25 mi. South Wardle Picnic Site
      22  Located at Wardle Picnic Site
      23  Sighted 0.5 mi. South Wardle Picnic Site
      24  Sighted 1 mi. North Wardle Picnic Site
      27  Located 0.25 mi. South of Wardle Picnic Site
      28  Sighted Wardle Flats
      30  Sighted 0.3 mi. South of Kootenay Crossing West of highway 93

Dec.  1  Sighted 1.5 mi. North of Dolly Varden
      6  Signal .5 mi. South of Crooks meadow
      8  Sighted opposite Kootenay Crossing
      10  Signal and Sighted at Kootenay Crossing
      19  Sighted at Kootenay Crossing
      22  Located at horse pasture Kootenay Crossing
      23  Signal 1 mi. North of McLeod meadow East of highway 93
      24  Located Kootenay Crossing area, aerial patrol
      31  Signal 1 mi. North of McLeod meadow East of highway 93
Radio Collar #170

1977

Jan. 4 Sighted at Kootenay Pond Good signal above highway 93
    25 Very weak signal South East of Kootenay Crossing
    27 Sighted, no signal 0.5 mi. North of old airfield
Mar. 8 Signal to 2 Located at mile 16 East of highway 93
April 27 Sighted at Dolly Varden 0900 hours
Radio Collar #171
Summary of Movements

This animal, a spike bull, was banded November 5 just south of Crooks meadows. It remained in the area between McLeod meadows and Kootenay Crossing from November through until May. The most recent sighting was on August 29, 1977 at Wardle Flats.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>1976</td>
<td></td>
</tr>
<tr>
<td>Nov. 5</td>
<td>Banded 0.5 mi. South of Crooks meadow</td>
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<td></td>
<td>Located 1 mi. South of Crooks meadow</td>
</tr>
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<td></td>
<td>Located South of Crooks meadow</td>
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<tr>
<td></td>
<td>Sighted at Crooks meadow East of highway</td>
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<tr>
<td></td>
<td>Sighted 0.4 mi. South of Dolly Varden Picnic Site</td>
</tr>
<tr>
<td></td>
<td>Located at Crooks meadow</td>
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<td></td>
<td>Sighted at Dolly Varden Picnic Site</td>
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<td></td>
<td>Sighted at Crooks meadow</td>
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<tr>
<td>Dec. 6</td>
<td>Sighted at Kootenay Pond</td>
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<tr>
<td></td>
<td>Sighted 1 mi. South of Crooks meadow</td>
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<td>Sighted 1.5 mi. North of McLeod meadow</td>
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<td></td>
<td>Sighted .5 mi. North of McLeod meadow</td>
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<tr>
<td></td>
<td>Located 1.5 mi. North of McLeod meadow</td>
</tr>
<tr>
<td></td>
<td>Sighted at old airfield</td>
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<td>Located at old airfield</td>
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<td>Located at old airfield</td>
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<tr>
<td></td>
<td>Sighted at old airfield</td>
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<tr>
<td></td>
<td>Signal 1 mi. North of McLeod meadow East of highway 93</td>
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<tr>
<td></td>
<td>Signal old airfield area, aerial patrol</td>
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<tr>
<td></td>
<td>Signal 0.25 mi. North of Dolly Varden</td>
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<td></td>
<td>Signal at Dolly Varden</td>
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<td>1977</td>
<td></td>
</tr>
<tr>
<td>Jan. 2</td>
<td>Location 1 mi. North of Harkin sign signal East of highway 93</td>
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<tr>
<td></td>
<td>Signal at East Kootenay fire road West of highway 93</td>
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<tr>
<td></td>
<td>Signal West of Dolly Varden (near beaver ponds)</td>
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<tr>
<td></td>
<td>Signal West of Dolly Varden (near beaver ponds)</td>
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<td></td>
<td>Signal West of Dolly Varden (near beaver ponds)</td>
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<td>Signal to 3 West of Dolly Varden</td>
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<td>Feb. 2</td>
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<tr>
<td></td>
<td>Signal to 2 West of Dolly Varden</td>
</tr>
<tr>
<td></td>
<td>Sighted 0.5 mi. South of old airfield West of highway 93</td>
</tr>
</tbody>
</table>
Radio Collar #171

1977
Feb. 11 Located West of Dolly Varden
" 14 Located North of Dolly Varden West of highway 93
" 16 Located 0.5 mi. North of Dolly Varden East of highway 93
" 21 Signal to 2 East of Dolly Varden
" 22 Located 1 mi. North of Dolly Varden East of highway 93
Mar. 3 Located 0.5 mi. North of East Kootenay fire road West of highway 93
" 4 Signal to 4 East of Dolly Varden 0940 hours
" 8 Signal to 2 at mile 16 East of highway 93
" 10 Located McLeod meadow area, aerial patrol
" 16 Sighted at McLeod meadow
April 15 Signal to 2 East of Crooks meadow 0945 hours
" 25 Located at 4 mi. Gravel pit
" 26 Located at 4 mi.
May 12 Sighted at Dolly Varden 0900 hours
Aug. 29 Sighted at Wardle Flats near river
Radio Collar #172
Summary of Movements

An adult cow was fitted with radio collar #172 at Wardle Picnic Site on November 22. The animal moved south and reached McLeod meadows by December 3. It remained in the McLeod meadows area until April 15; after that date it moved north and a signal was picked up May 6 and 9 near Assiniboine slidepaths.

Radio Collar #172
Frequency 171.917
Red Collar with Yellow Stripe
Adult Cow

1976
Nov. 22 Banded at Wardle Picnic Site
  24 Sighted Hector Gorge
  25 Signal at Kootenay Crossing pasture
  30 Signal and sighted 0.5 mi. South of Crooks meadow
Dec. 3 Signal 0.5 mi. North of McLeod meadow East of highway 93
  6 Located 0.5 mi. North of McLeod meadow West of highway 93
  20 Sighted 0.25 mi. South of old airfield
  21 Located at Crooks meadow
  22 Located at Crooks meadow
  23 Signal 1 mi. South of Crooks meadow
  24 Located at old airfield, aerial patrol
  27 Located 0.25 mi. South of McLeod meadow
  31 Located 0.25 mi. South of McLeod meadow
Jan.  2 Signal opposite McLeod meadow
  3 Sighted and signal McLeod meadow
  7 Located 0.25 mi. North of McLeod meadow West of highway 93
  14 Sighted and good signal 0.25 mi. South Dolly Varden Picnic Site
  18 Sighted Crooks meadow good signal
  19 Sighted 0.75 mi. South of Crooks meadow
  25 Signal to 4, 0.25 mi. South of old airfield East of highway 93
  27 Signal to 4 South East of Crooks meadow (River Flats)
Feb.  4 Signal to 2, East of Dolly Varden
  6 Signal to 5, 1.0 mi. North of Mt. Harkin sign West of highway 93
  11 Located West of Dolly Varden
  21 Sighted 1.0 mi. North of Mt. Harkin sign
Mar.  3 Signal weak West of highway 93 Crooks meadow
  4 Signal to 2 East of Mt. Harkin sign 0910 hours
  7 Signal South East of Dolly Varden
  8 Signal to 4 at mile 16
  15 Sighted at mile 16
  16 Sighted at McLeod meadow 1930 hours
  22 Signal to 4 mi. 16 East of highway 93 0835 hours
April 15 Signal to 6, 0.5 mi. South of 21 mile West of highway 93
May  6 Located at Assiniboine Viewpoint Good signal
     9 Located at Assiniboine Viewpoint
Radio Collar # 174
Summary of Movements

A radio collar was fitted to a 5-point bull at the Paint Pots on October 21. It remained in the Paint Pots area until November 2, after which it moved slowly south reaching Kootenay Crossing by December 8. Remained in the area between McLeod meadows and Kootenay Crossing until March 28 when a signal was received between mile 6 and 7 on Settlers Road. It then moved back north; on May 9 it was sighted on a slide path southwest of Numa Picnic Site.

Radio Collar # 174
Yellow Collar with Black Marks
Frequency 171.957  5 Point Bull

1976

Oct.  21  Banded 0.5 mi. South of Paint Pots
      "  22  0.5 mi. South of Paint Pots
      "  23  0.5 mi. South of Paint Pots
      "  24  Sighted 0.25 mi. North of Numa picnic site
      "  25  Sighted 0.25 mi. South of Numa picnic site
      "  26  Located on old roadbed above Numa picnic site
      "  27  Sighted 1.3 mi. North of Numa picnic site West of highway 93

Nov.  1  Signal picked up East of Vermilion Peak sign at Numa Flats
      "  2  Sighted East of highway opposite Numa picnic site
      "  3  Sighted on River Flats 0.5 mi. North of Hawk creek
      "  4  Sighted Numa picnic site West of highway
      "  5  Located 0.5 mi. South of Hawk creek West of highway 93
      "  6  Sighted 2.5 mi. South of Hawk creek
      "  8  Located 1.5 mi. South of Hawk creek
      " 10  Located 1.5 mi. South of Hawk creek West of highway 93
      " 11  Sighted 3 mi. South of Hawk creek (Intermediate hill)
      " 13  Located 0.8 mi. North of Hawk creek on River Flats
      " 14  Located 0.8 mi. North of Snow creek on River Flats
      " 17  Located 1 mi. North of Snow creek Sighted on slide slope West side
      " 20  Located 0.75 mi. North of Hawk creek
      " 21  Located 0.5 mi. North of Hawk creek
      " 22  Located at Snow creek
      " 23  Located 0.75 mi. North of Hawk creek, River Flats
      " 24  Sighted 1 mi. South of Snow creek
      " 25  Located 0.5 mi. North of Hawk creek
      " 26  Located 1 mi. South of Hawk creek East of highway 93
      " 27  Located 2.5 mi. North of Vermilion Crossing
      " 28  Sighted at Vermilion Crossing
      " 30  Signal picked up at Assiniboine slides 1 & 2

Dec.  3  Sighted Wardle picnic site 0.5 mi. North of highway 93
      "  8  Sighted at Kootenay Crossing
      " 10  Sighted at Kootenay Crossing
      " 19  Sighted at old airport
Radio Collar #174

1976
Dec. 20 Located 0.25 mi. South of old airfield sighted
" 21 Located old airfield
" 22 Located old airfield
" 23 Signal 1 mi. North of McLeod East of highway 93
" 24 Located at old airfield, aerial patrol
" 31 Located at old airfield

1977
Jan. 2 Signal to 4 opposite Dolly Varden
" 3 Signal to 3, 0.25 mi. North of McLeod meadow
" 5 Sighted at McLeod meadow
" 7 Opposite Dolly Varden West of highway 93, located
" 11 Opposite Dolly Varden West of highway 93, located
" 14 Located near Dolly Varden weak signal
" 19 Located South of Dolly Varden weak signal
" 21 Signal East of 21 mi. River Flats
" 25 Signal to 4, 0.5 mi. South of old airfield East of highway 93
" 26 Signal to 3, East of 21 mile across river
" 27 Signal to 3, East of 21 mile across river
" 28 Signal to 3, East of Dolly Varden

Feb. 2 Signal to 4 Southeast of Crooks meadow, River Flats
" 4 Signal to 2 East of Dolly Varden
" 6 Faint signal West of Mt. Harkin sign

Mar. 8 Signal to 2, at mile 16 East of highway 93 0900 hours
" 28 Possible signal between mile 6 & 7 on Settlers Road, east of road

May 9 Located 0.5 mi. South of Numa West of Vermilion river, on slide path
Radio Collar #1/5
Summary of Movements

An adult cow was banded two miles south of Vermilion Crossing on October 21. It remained in the immediate area until November 2 when it began moving south. By November 10 it had reached Crooks meadows and remained in this area until December 27. It then moved to McLeod meadows and remained in that immediate area for the rest of the winter.

Radio Collar #175
Frequency 171.985
Red Collar with Black Marks
Adult Cow

1976
Oct. 21 Banded at Assiniboine Viewpoint
" 22 Located 0.5 mi. South of Assiniboine Viewpoint East side of highway 93
" 23 Located at Assiniboine slide path #1 & 2
" 24 Located at Assiniboine slide path #1 & 2
" 25 Located at Assiniboine slide path #1 & 2
" 26 East of highway across from Assiniboine slide path #1 & 2
" 27 Assiniboine slide between highway and river
Nov. 1 Sighted East side of highway opposite slide path #1 & 2
" 2 Located East of Animal Lick
" 3 Located 0.5 mi. North of Wardle picnic site East of highway 93
" 4 Signal picked up by Animal Lick East of highway 93
" 5 Signal picked up, opposite Hector Gorge
" 6 Signal South of old airport East of highway 93
" 10 Sighted 0.3 mi. South of Crooks meadow
" 11 Located 0.2 mi. South of Crooks meadow
" 13 Located at Crooks meadow
" 14 Sighted 0.75 mi. North of Crooks meadow
" 17 Sighted and signal at Crooks meadow
" 19 Located 1.0 mi. South of Crooks meadow, sighted and signal
" 20 Sighted 1.75 mi. South of Crooks meadow
" 21 Located 0.75 mi. North of Crooks meadow
" 22 Sighted at Crooks meadow
" 23 Sighted at Dolly Varden, West side of highway 93
" 24 Located 0.2 mi. South of Dolly Varden
" 25 Sighted at Dolly Varden
" 26 Located at Crooks meadow
" 27 Signal picked up at Crooks meadow
" 30 Signal at McLeod meadow East of highway 93
Dec. 3 Sighted at McLeod meadow, 0900 hours
" 6 Sighted at McLeod meadow
" 8 Sighted 1.5 mi. North of McLeod meadow
" 21 Located at Crooks meadow
" 22 Located at Crooks meadow
" 24 Sighted and signal McLeod meadow, aerial patrol
" 31 Signal at Mt. Harkin sign, East of highway 93
Radio Collar #175

1977

Jan.  7  Signal at mile 16 East of Kootenay River
     "  11  Located at McLeod meadow
     "  14  Signal at Kootenay River picnic site from East side of river
     "  18  Located near McLeod meadow, East side of river, faint signal
     "  21  Faint signal, to East side of river at mile 21
     "  26  Signal to 2, East of McLeod meadow
     "  27  Signal to, 2, East of McLeod meadow
     "  28  Signal to, 2, East of old airfield
Mar.  3  Signal to 2, at horse pasture Kootenay Crossing
     "  4  Signal to 3, East of McLeod meadow 0905 hours
     " 10  Signal to 3, North of McLeod meadow area, aerial patrol
     " 13  Sighted 0.75 mi. North of mile 16
     " 16  Sighted at mile 16
     " 22  Signal to 2, 0.25 mi. South of Kootenay Crossing West of highway, 1020 hours

April 11  Located McLeod meadow
     " 21  Sighted at mile 16, 1915 hours
     " 26  Located at McLeod meadow
     " 28  Sighted at McLeod meadows, no signal, battery pack hanging down from collar approximately 3".

May  1  Sighted Mt. Harkin sign, transmitter not working
     "  6  Sighted at mile 16
     "  9  Located at mile 16, feeding along the road
     " 10  Located at McLeod meadow
Radio Collar #176
Summary of Movements

This adult cow was banded November 29 at Crooks meadows. It moved to Kootenay Crossing and remained in the area from December 6 to December 31. By January 4 it had moved to the Wardle picnic site area and remained in this area until January 19 when it again moved southward. By February 11 the animal had moved as far south as mile 2 on Settlers road. By March 3, the elk had moved back to Kootenay Crossing where it remained for the rest of the winter.

Radio Collar #176               Yellow Collar with Red Slashes
Frequency 172.013              Adult Cow

1976
Nov. 29 Banded at Crooks meadow
Dec.  6 Signal at Kootenay Crossing West of highway 93
     " 10 Sighted in front yard of bunkhouse at Kootenay Crossing
     " 19 Sighted at Kootenay Crossing
     " 21 Located at Crooks meadow
     " 22 Located at Crooks meadow
     " 26 Located Kootenay Crossing area, aerial patrol
     " 27 Signal Kootenay Crossing
     " 31 Signal Kootenay Crossing

1977
Jan.  4 Sighted 0.5 mi. North of Wardle picnic site
     " 11 Sighted at old goat trap
     " 14 Sighted 0.5 mi. North of Wardle picnic site
     " 19 Signal to 4, sighted at Wardle Flats
     " 26 Faint signal, South East Hector Gorge Viewpoint
     " 28 Signal to 6, sighted at old airfield
Feb. 11 Weak signal to south of Kootenay Valley Viewpoint gravel pit area Settlers road
Mar.  3 Signal to 2, at horse pasture Kootenay Crossing
     " 10 Signal to 2, South of old airfield, aerial patrol
April 11 Sighted at Kootenay Crossing Warden Station
     " 21 Sighted in bunkhouse yard at Kootenay Crossing
Radio Collar #180
Summary of Movements

An adult cow was banded at Hawk creek on October 12. The animal remained in the Hawk creek area until December 30 at which time it had moved as far south as McLeod meadows. It stayed in the area between Crooks meadows and McLeod meadows (and slightly North and South of these areas) for much of the winter and early spring, but moved rapidly northward after 21 April; by April 26 it had reached Shanks Bridge Crossing (near Simpson Monument). By May 6 however, it had moved back South again to mile 21 (approximately 2 miles North of McLeod meadows).

Radio Collar #180

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Red Collar with White Bars</th>
<th>Adult Cow</th>
</tr>
</thead>
<tbody>
<tr>
<td>172.086</td>
<td>Banded at Hawk creek</td>
<td></td>
</tr>
</tbody>
</table>
1976 Oct. 12  | Located 0.5 mi. North of Hawk creek |
" 13         | Located 1.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 14         | Located 2.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 15         | Located 2.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 18         | Located 2.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 20         | Located 2.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 21         | Located 2.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 22         | Located 2.0 mi. North of Hawk creek, West of highway 93 River Flats |
" 23         | Located West of Mt. Haffner sign River Flats |
" 24         | Located 0.5 mi. North of Mt. Haffner sign West of highway 93 River Flats |
" 26         | Signal 0.5 mi. North of Hawk creek River Flats |
" 27         | Sighted at Hawk creek old maintenance camp East side of highway 93 |
Nov. 1       | Signal 0.5 mi. North of Hawk creek West of highway 93 Road side |
" 2         | Sighted 0.25 mi. North of Hawk creek East of highway 93 Road side |
" 3         | Sighted at old maintenance camp Hawk creek |
" 4         | Signal 1.5 mi. South of Hawk creek West of highway 93 |
" 5         | Signal 1.5 mi. South of Hawk creek West of highway 93 |
" 6         | Signal 2.0 mi. South of Hawk creek West of highway 93 |
" 8         | Located 1.0 mi. South of Hawk creek West of highway 93 |
" 10        | Signal 2.3 mi. South of Hawk creek West of highway 93 |
" 11        | Sighted 3.0 mi. South of Hawk creek |
" 13        | Located 1.3 mi. North of Hawk creek River Flats |
" 14        | Located 1.0 mi. North of Snow creek |
" 17        | Located 0.5 mi. South of Snow creek |
" 20        | Located at Hawk creek |
" 21        | Located 0.7 mi. South of Snow creek |
" 22        | Located at Snow creek |
1976

Nov. 23  Signal 0.75 mi. North of Hawk creek River Flats
" 25  Signal 0.3 mi. South of Snow creek East of highway 93
" 26  1 mi. South of Snow creek
" 27  Located 0.25 mi. of Hawk creek
" 30  Sighted opposite Assiniboine slide path 1 & 2

Dec.  3  Sighted opposite animal lick
"  8  Sighted at old airfield
" 19  Sighted at old airfield
" 20  Sighted 0.25 mi. South of old airfield
" 21  Located at Crooks meadow
" 22  Located at Crooks meadow
" 23  Signal and sighted 1 mi. North of McLeod meadow
" 24  Located at old airfield area, aerial patrol
" 27  Sighted 0.25 mi. South of old airfield

1977

Jan.  2  Sighted at McLeod meadow
"  3  Sighted at McLeod meadow
"  7  Located at McLeod meadow
" 11  Located at McLeod meadow
" 18  Signal to 6, sighted at McLeod meadow
" 21  Signal to 6, sighted at 0.25 mi. North of Settlers Junction
       West of highway 93
" 26  Signal to 5, 0.5 mi. South of McLeod meadow East side
       of Kootenay River
" 27  Signal to 2, West of McLeod meadow
" 28  Signal to 7, Sighted at mile 16 (Road side)

Feb.  1  Signal to 2, East of Mt. Harkin sign
"  2  Signal to 3, East of Mt. Harkin sign
"  3  Signal to 4, 0.25 mi. South of McLeod meadow West of highway 93
"  8  Located 1.0 mi. South of McLeod West of highway 93
" 11  Located 1.0 mi. South of McLeod West of highway 93
" 14  Located 0.5 mi. South of McLeod East of highway 93
" 22  Sighted 0.5 mi. North of McLeod meadow
" 24  Located at mile 16

Mar.  3  Signal to 5, and sighted 0.5 mi. North of Mt. Harkin sign
"  4  Signal to 4, 0.5 mi. North of Mt. Harkin sign West of
       highway 93
" 10  Signal to 2 in McLeod meadow area, aerial patrol
" 13  Sighted at Mt. Harkin sign
" 15  Sighted at McLeod meadow

April 13  Located at Kootenay River picnic site
" 21  Sighted 0.5 mi. South of Crooks meadow

May  6  Located at mile 21
"  8  Sighted at Crooks meadow
" 10  Located at mile 21
Radio Collar #181
Summary of Movements

A spike bull elk was fitted with radio collar #181 on 20 October near Numa Picnic Site. It did not leave the area between the Paint Pots and Snow creek until November 20 when it started to move slowly south. By December 3, this animal was in the area of the old airfield; it remained in the area between Crooks meadow and the Kootenay River picnic area for the rest of the winter (except for one sighting above Kootenay Pond January 14).

Radio Collar #181  Yellow Collar with Black Edges
Frequency 172.107  Spike Bull

1976
Oct.  20  Banded 0.5 mi. North Numa picnic site
      "  21  Sighted 0.75 mi. North of Numa picnic site on old road bed
      "  22  Sighted 0.75 mi. North of Numa picnic site on old road bed
      "  23  Located 1.0 mi. North of Numa picnic site
      "  24  Located 1.0 mi. North of Numa picnic site
      "  25  Located 0.5 mi. South of Numa picnic site East of highway 93
      "  26  Located above Numa picnic site on old road bed
      "  27  Located 1.6 mi. North of Snow creek, between highway 93 and Vermilion River

Nov.  1  Signal East of Vermilion Peak sign
      "  2  Sighted 1.0 mi. South of Paint Pots East side of highway 93
      "  3  Sighted at Vermilion sign East of highway 93
      "  5  Located on old highway above Numa picnic site
      "  6  Located 0.5 mi. North of Numa picnic site East of highway 93
      "  8  Located 0.5 mi. North of Numa picnic site East of highway 93
      " 10  Located 1.7 mi. North of Numa picnic site West of highway 93
      " 11  Located on Vermilion Peak slide path above old highway
      " 13  Located 0.8 mi. North Numa picnic site
      " 14  Located 0.9 mi. North of Numa picnic site
      " 17  Located 0.25 mi. South Numa picnic site old road bed
      " 20  Located 1.3 mi. North of Numa picnic site
      " 21  Located 0.5 mi. South of Snow creek
      " 22  Located at Snow creek
      " 23  Located at Hawk creek opposite old maintenance yard
      " 24  Sighted 1.0 mi. North of Hawk creek
      " 25  Located 0.3 mi. South of Snow creek East of highway 93
      " 26  Located 1.0 mi. North of Hawk creek
      " 27  Located 2.0 mi. South of Hawk creek
      " 30  Sighted opposite Assiniboine slides #1 & 2

Dec.  1  Sighted at animal lick
      "  3  Sighted 0.5 mi. North of old airfield
      "  6  Sighted at old airfield
Radio Collar #181

1976
Dec.  8 Sighted 0.5 mi. North of Crooks meadow
"  9 Located 0.5 mi. North of McLeod meadow
" 19 Sighted at old airport
" 20 Sighted 0.25 mi. South of old airfield
" 21 Located at Crooks meadow
" 22 Located at Crooks meadow
" 23 Signal 1.0 mi. North of McLeod meadow East of highway 93
" 24 Located in old airfield area, aerial patrol
" 27 Located 1.5 mi. North of McLeod meadow West of highway 93
" 31 Signal opposite old airfield

1977
Jan.  2 Signal opposite Dolly Varden
"  3 Signal opposite Dolly Varden
"  7 Located, old airfield East of highway 93
" 14 Sighted and good signal above highway 93 at Kootenay Pond
" 19 Signal to 4, 0.5 mi. South of Dolly Varden
" 26 Weak signal 0.5 mi. South of McLeod meadow East of highway 93
" 27 Located across river from Kootenay River picnic site, signal to 3

Feb.  2 Sighted 0.5 mi. North of old airfield West side of road
Mar.  3 Signal to 4, 0.5 mi. North of Mt. Harkin sign east of highway 93
APPENDIX C

INFORMATION ON IMMOBILIZATION

1977-78
<table>
<thead>
<tr>
<th>DATE</th>
<th>LOCATION</th>
<th>AGE</th>
<th>DOSE</th>
<th>PLACEMENT</th>
<th>DARTED</th>
<th>DOWN</th>
<th>UP</th>
<th>COLLAR</th>
<th>TAGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 20</td>
<td>Hawk Creek</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>6:23 p.m.</td>
<td>6:32 p.m.</td>
<td>6:50 p.m.</td>
<td>#213</td>
<td>Old radio #180</td>
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<tr>
<td>Oct. 21</td>
<td>Marble Canyon W.S.</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>5:38 p.m.</td>
<td>5:45 p.m.</td>
<td>6:09 p.m.</td>
<td>#214</td>
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<tr>
<td>Nov. 6</td>
<td>Hawk Creek</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>8:40 a.m.</td>
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<td>Nov. 7</td>
<td>McLeod Meadows</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>8:05 a.m.</td>
<td>Located</td>
<td>8:44 a.m.</td>
<td>#215</td>
<td>Old radio #175</td>
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<td>Nov. 8</td>
<td>Crooks Meadow</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>8:35 a.m.</td>
<td>Located</td>
<td>9:20 a.m.</td>
<td>#216</td>
<td>L R</td>
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<tr>
<td>Nov. 8</td>
<td>Crooks Meadow</td>
<td>Spike</td>
<td>24 mg.</td>
<td>hip</td>
<td>10:20 a.m.</td>
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<td>---</td>
<td>---</td>
<td>No reaction from animal</td>
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<tr>
<td>Nov. 8</td>
<td>Mt. Harkin</td>
<td>Spike</td>
<td>24 mg.</td>
<td>hip</td>
<td>5:10 a.m.</td>
<td>---</td>
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<td>No reaction from animal</td>
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<tr>
<td>Nov. 9</td>
<td>Crooks Meadow</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>7:50 a.m.</td>
<td>Located</td>
<td>8:58 a.m.</td>
<td>#217</td>
<td>L 10 R</td>
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<tr>
<td>Nov. 10</td>
<td>Kootenay Pond</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>9:10 a.m.</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Good recovery</td>
</tr>
<tr>
<td>Nov. 14</td>
<td>Mt. Harkin</td>
<td>4 pt.</td>
<td>25 mg.</td>
<td>hip</td>
<td>4:03 p.m.</td>
<td>4:16 p.m.</td>
<td>5 p.m.</td>
<td>#219</td>
<td>Good recovery</td>
</tr>
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<td>Nov. 18</td>
<td>Mi 16</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>8:10 a.m.</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>No reaction from animal</td>
</tr>
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<td>Nov. 18</td>
<td>Crooks Meadow</td>
<td>Spike</td>
<td>25 mg.</td>
<td>hip</td>
<td>2:10 p.m.</td>
<td>2:24 p.m.</td>
<td>3:09 p.m.</td>
<td>#224</td>
<td>Good recovery</td>
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<tr>
<td>Nov. 18</td>
<td>Airfield</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>3:50 p.m.</td>
<td>4:09 p.m.</td>
<td>5 p.m.</td>
<td>#223</td>
<td>Good recovery</td>
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<td>Nov. 29</td>
<td>McLeod Meadows</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>8:24 a.m.</td>
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<td>No reaction</td>
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<tr>
<td>Nov. 29</td>
<td>K.R. Picnic Site</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>4:34 p.m.</td>
<td>4:51 p.m.</td>
<td>5:08 p.m.</td>
<td>#222</td>
<td>Good recovery</td>
</tr>
<tr>
<td>Nov. 30</td>
<td>Crook Meadow</td>
<td>Spike</td>
<td>25 mg.</td>
<td>hip</td>
<td>8:22 a.m.</td>
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<td>Mt. Harkin</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>11:05 a.m.</td>
<td>Located</td>
<td>11:46 a.m.</td>
<td>#221</td>
<td>Good recovery</td>
</tr>
<tr>
<td>Nov. 30</td>
<td>Mt. Harkin</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>3:54 p.m.</td>
<td>6:20 p.m.</td>
<td>5 p.m.</td>
<td>#226</td>
<td>Good recovery</td>
</tr>
<tr>
<td>DATE</td>
<td>LOCATION</td>
<td>AGE</td>
<td>SEX</td>
<td>DOSE</td>
<td>PLACEMENT</td>
<td>DARTED</td>
<td>DOWN</td>
<td>UP</td>
<td>COLLAR</td>
</tr>
<tr>
<td>--------</td>
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<td>---------------</td>
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</tr>
<tr>
<td>Dec. 1</td>
<td>K. R. Picnic Site</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>10:07 a.m.</td>
<td>Located 10:23</td>
<td>10:38 a.m.</td>
<td>#225</td>
<td>Good recovery</td>
</tr>
<tr>
<td>Dec. 14</td>
<td>K. R. Picnic Site</td>
<td>5 pt.</td>
<td>27 mg.</td>
<td>hip</td>
<td>9:10 a.m.</td>
<td>9:16 a.m.</td>
<td>9:52 a.m.</td>
<td>#220</td>
<td>Good recovery</td>
</tr>
<tr>
<td>Dec. 15</td>
<td>Mi 16</td>
<td>Spike</td>
<td>26 mg.</td>
<td>hip</td>
<td>8:57 a.m.</td>
<td>Located 9:30 a.m.</td>
<td>9:07 a.m.</td>
<td>#227</td>
<td>Good recovery</td>
</tr>
<tr>
<td>Nov. 7</td>
<td>McLeod Meadows</td>
<td>A</td>
<td>24 mg.</td>
<td>hip</td>
<td>3:14 p.m.</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>No reaction</td>
</tr>
<tr>
<td>Nov. 7</td>
<td>Wardle Flats</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>10:47 a.m.</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Unable to locate</td>
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<td>Nov. 8</td>
<td>Wardle Flats</td>
<td>A</td>
<td>25 mg.</td>
<td>hip</td>
<td>4:19 p.m.</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>No reaction</td>
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</tbody>
</table>
APPENDIX D

1977-78

OBSERVATIONS FROM RADIO COLLARED ELK

AND COLLAR CODES
<table>
<thead>
<tr>
<th>Date</th>
<th>1977</th>
<th>1978</th>
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<tbody>
<tr>
<td>Oct.</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Radio Collared Cow, #180, banded at Hawk Creek</td>
<td>Sighted ml. 16</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>Signal W. Of Hawk Creek</td>
<td>Signal N. E. mile 16</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Signal W. of Hawk Creek</td>
<td>Sighted Harkin Sign Post</td>
</tr>
<tr>
<td>Nov.</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Signal 1 mi. N of Hawk Creek, W. of Hwy.</td>
<td>Sighted at mile 21</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Sighted Vermilion Xing</td>
<td>Sighted at mile 21</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Sighted on Wardle Flats</td>
<td>Sighted at mile 21</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Sighted at Crooks Meadow</td>
<td>Sighted at mile 21</td>
</tr>
<tr>
<td></td>
<td>15</td>
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</tr>
<tr>
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<td>Signal W. of Crooks Meadow</td>
<td></td>
</tr>
<tr>
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<td>22</td>
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</tr>
<tr>
<td></td>
<td>Sighted ml. 21, Signal to 7</td>
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</tr>
<tr>
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<td>Signal S. E. Mt. Kindersley post</td>
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<tr>
<td>Dec.</td>
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</tr>
<tr>
<td></td>
<td>Sighted McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sighted McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signal W. of McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signal E. of McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td>Jan.</td>
<td>5</td>
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</tr>
<tr>
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<td>Sighted ml. 16</td>
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<tr>
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</tr>
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<td></td>
<td>Sighted Harkin Sign Post</td>
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<tr>
<td></td>
<td>20</td>
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<td></td>
</tr>
<tr>
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<td>Sighted at mile 21</td>
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</tr>
<tr>
<td>Feb.</td>
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</tr>
<tr>
<td></td>
<td>Sighted at McLeod Meadows</td>
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</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sighted at McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
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</tr>
<tr>
<td></td>
<td>Sighted at mile 21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
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</tr>
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<td>Sighted at mile 16</td>
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</tr>
<tr>
<td></td>
<td>20</td>
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</tr>
<tr>
<td></td>
<td>Signal S. W. McLeod Meadows</td>
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</tr>
<tr>
<td></td>
<td>21</td>
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<tr>
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<td>Signal W of Nixon Creek</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
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</tr>
<tr>
<td></td>
<td>Sighted Nixon Creek</td>
<td></td>
</tr>
<tr>
<td></td>
<td>27</td>
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</tr>
<tr>
<td></td>
<td>Signal E McLeod</td>
<td></td>
</tr>
<tr>
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<td>28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signal E McLeod</td>
<td></td>
</tr>
<tr>
<td>Mar</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signal E McLeod</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sighted McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sighted Harkin Sign Post</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signal E. of McLeod</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signal E. of McLeod</td>
<td></td>
</tr>
</tbody>
</table>
RADIO COLLAR #214
Summary of Movements

Radio Collar #214
Frequency 172.207

1977
Oct.  21  #214 Placed on cow near Paint Pots
Nov.  1  Signal picked up S. E. of Marble Warden Station
     "  8  Sighted at Wardle Creek
     "  9  Sighted on Wardle Flats
     " 10  Sighted at Hector Gorge View Point
     " 15  Signal E of K. C. Warden Station
     " 16  Sighted in pasture at K. C.
Dec.  6  Sighted at Airfield
     " 10  Sighted at Airfield
     " 12  Sighted at Airfield
     " 14  Sighted at Airfield
     " 16  Sighted at Airfield
     " 27  Strong Signal E of Airfield

1978
Jan.  5  Sighted at Airfield
     "  9  Signal E of Airfield
     " 19  Sighted at Airfield
     " 20  Sighted at Airfield
     " 24  Sighted at Airfield
     " 27  Sighted at Airfield
Feb.  1  Sighted at Airfield
     " 13  Signal E of Airfield
     " 20  Signal E of Airfield
     " 21  Signal E of Airfield
     " 27  Sighted at Airfield
     " 28  Sighted at Airfield
Mar  6  Sighted at Airfield
     "  8  Signal at Airfield
     " 10  Signal at Airfield
     " 14  Signal at Airfield
     " 16  Signal at Airfield
April 10  Sighted Dolly Varden Picnic Site
     " 13  Sighted Crooks Meadow
     " 18  Sighted Harkin Sign Post
Radio Collar #215

Radio Collar #215
Frequency 172.270  
Adult Cow

1977
Nov.  7  #215 Placed on #175, Adult cow at Hawk Creek
"    15  Signal W of K. C. H. Q.
"    30  Sighted at 21 mi.
Dec.  6  Sighted at Harkin Sign Post
"     12  Signal E of Harkin Sign Post
"     16  Signal E of Harkin Sign Post
"    28  Signal S. E. of Airfield

1978
Jan.  6  Signal N. E. of mi 16 (Dog Lake Area)
"    19  Signal S. E. Harkin (Dog Lake Area)
"    27  Signal S. E. Harkin (Dog Lake Area)
Feb.  3  Signal S. E. Harkin (Dog Lake Area)
"    13  Signal S. E. Harkin (Dog Lake Area)
"    20  Signal S. E. Harkin (Dog Lake Area)
"    27  Signal S. E. Harkin (Dog Lake Area)
"    28  Signal S. E. Harkin (Dog Lake Area)
Mar    6  Signal S. E. Harkin (Dog Lake Area)
April 10  Signal S. E. Harkin (Dog Lake Area)
Radio Collar #216

Summary of Movements

Radio Collar #216
FREQUENCY 172.316

ADULT COW

<table>
<thead>
<tr>
<th>Date</th>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov.</td>
<td>8</td>
<td>Adult cow banded at Crook Meadow</td>
</tr>
<tr>
<td>&quot;</td>
<td>15</td>
<td>Signal picked up E of Crooks Meadow</td>
</tr>
<tr>
<td>&quot;</td>
<td>22</td>
<td>Signal N. E. of Daer Tower</td>
</tr>
<tr>
<td>Dec.</td>
<td>6</td>
<td>Signal Dog Lake Area</td>
</tr>
<tr>
<td>&quot;</td>
<td>10</td>
<td>Signal Dog Lake Area</td>
</tr>
<tr>
<td>Jan.</td>
<td>5</td>
<td>Signal N. E. of mi 16</td>
</tr>
<tr>
<td>&quot;</td>
<td>19</td>
<td>Signal N. E. of mi 16</td>
</tr>
<tr>
<td>&quot;</td>
<td>30</td>
<td>Signal N. E. of mi 16</td>
</tr>
<tr>
<td>Feb.</td>
<td>3</td>
<td>Signal N. E. of mi 16</td>
</tr>
<tr>
<td>&quot;</td>
<td>20</td>
<td>Signal N. E. of mi 16</td>
</tr>
<tr>
<td>&quot;</td>
<td>24</td>
<td>Signal N. E. of mi 16</td>
</tr>
<tr>
<td>Mar.</td>
<td>6</td>
<td>Signal E mi 21</td>
</tr>
<tr>
<td>&quot;</td>
<td>28</td>
<td>Signal E mi 21</td>
</tr>
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</table>
Radio Collar #217
Summary of Movement

Radio Collar #217
FREQUENCY 172.413
ADULT COW

1977

Nov.      9  Adult Cow banded at Crook Meadow
          "  14  Sighted at Crooks Meadows
          "  15  Sighted at Crooks Meadows
          "  30  Sighted at Crooks Meadows
Dec.      3  Sighted at 21 mi
          "  6  Sighted at McLeod Meadows
          " 10  Signal W. of McLeod Meadows
Jan.      5  Sighted at mile 16
          "  9  Signal N. E. mile 16
          " 19  Signal E of 21 mile
          " 24  Signal E of 21 mile
          " 27  Signal E of 21 mile
          " 30  Signal E of 21 mile
Feb.      1  Signal E of 21 mile
          "  3  Signal E of 21 mile
          " 13  Signal S. E. of mile 21
          " 18  Signal S. E. of mile 21
          " 20  Signal N. E. of mile 21
          " 21  Signal N. E. of mile 21
          " 27  Signal N. E. of mile 21
          " 28  Signal E of mile 21
Mar.      6  Signal E of mile 21
          " 10  Signal E of mile 21
          " 14  Signal E of mile 21
Apr.      10 Signal Crooks Meadows
          " 12  Sighted 21 mile
          " 14  Sighted 21 mile
          " 18  Sighted Harkin Sign Post
Radio Collar #219
Summary of Movement

Radio Collar #219
FREQUENCY 171.941

1977

Nov.
14 4 Pt. Bull banded near Mt. Harkin #219
" 15 Signal picked up E mile 21
" 22 Signal N. E. of Crooks Meadow
" 30 Signal N. E. of Crooks Meadow

Dec.
6 Sighted at Crooks Meadow
" 10 Sighted at Mile 21
" 12 Signal E mile 21
" 16 Signal N. E. mile 21
" 27 Signal E mile 21

1978

Jan.
6 Signal N. W. mile 21
" 9 Signal N. W. mile 21
" 19 Signal N. W. Crooks Meadow
" 24 Signal W of Dolly Varden (Beaver Dams)
" 27 Signal W of Dolly Varden (Beaver Dams)
" 29 Signal W of Dolly Varden (Beaver Dams)

Feb.
1 Signal W of Dolly Varden (Beaver Dams)
" 13 Signal W of Dolly Varden (Beaver Dams)
" 18 Signal W of Dolly Varden (Beaver Dams)
" 20 Signal W of Dolly Varden (Beaver Dams)
" 21 Signal W of Dolly Varden (Beaver Dams)
" 27 Signal W of Dolly Varden (Beaver Dams)
" 28 Signal W of Dolly Varden (Beaver Dams)

Mar.
6 Signal W of Dolly Varden (Beaver Dams)
" 10 Signal W of Dolly Varden (Neaver Dams)
" 14 Signal W of Dolly Varden (Beaver Dams)
" 16 Signal W of Dolly Varden (Beaver Dams)

Apr.
10 Signal W of Crooks Meadow
" 13 Signal W of Crooks Meadow
" 18 Signal W of Crooks Meadow
Radio Collar #220
Summary of Movement

Radio Collar #220
FREQUENCY 171.925

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<td>14</td>
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<tr>
<td>Apr.</td>
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</table>
## Radio Collar #221
### Summary of Movement

**Radio Collar #221**  
**FREQUENCY 171.901**  
**ADULT COW**

1977  
Nov.  30  Adult cow banded at Mt. Harkin, #221  
Dec.  6  Signal E of McLeod Meadows  
"  10  Signal E of McLeod Meadows  
"  14  Signal E of McLeod Meadows  
"  16  Signal E of McLeod Meadows  

1978  
Jan.  5  Sighted at McLeod Meadows  
"  9  Signal S. W. McLeod Meadows  
"  19  Signal W mile 21  
"  24  Signal E mile 21  
"  27  Signal E mile 21  
"  30  Signal E mile 21  
Feb.  1  Sighted at 21 mile  
"  13  Signal S. E. of Dolly Varden  
"  20  Signal S. E. of Dolly Varden  
"  21  Signal E of Dolly Varden  
"  22  Signal E of Dolly Varden  
"  27  Signal E of Dolly Varden  
"  28  Signal E of Dolly Varden  
Mar.  6  Signal E of E Kootenay Fire Road  
"  10  Signal E of Dolly Varden  
"  14  Signal E of Dolly Varden  
Apr.  10  Signal E of mile 21
Radio Collar #222
Summary of Movement

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<td></td>
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<tr>
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<tr>
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<td>5</td>
<td>Signal N. W. mile 16</td>
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<tr>
<td></td>
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<td>Signal N. W. mile 16</td>
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<tr>
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<td>19</td>
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<td>26</td>
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<tr>
<td>Feb.</td>
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<td>Signal N. W. of mile 21</td>
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<tr>
<td></td>
<td>13</td>
<td>Signal N. W. of mile 21</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Signal W of Dolly Varden</td>
</tr>
<tr>
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<td>22</td>
<td>Signal W of Dolly Varden</td>
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<tr>
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<td>28</td>
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<td>14</td>
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<tr>
<td>Apr.</td>
<td>10</td>
<td>Signal E of mile 16</td>
</tr>
<tr>
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<td>12</td>
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<td>Sighted Nixon Creek</td>
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<tr>
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<td>18</td>
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Radio Collar #223
Summary of Movement

Radio Collar #223
FREQUENCY 171.862
ADULT COW

1977
Nov.  18  Adult cow banded at Airfield #223
      "  22  Signal E of Dolly Varden picnic site
      "  30  Signal E of mile 21
Dec.  6   Signal E of McLeod Meadows
      " 10   Signal E of McLeod Meadows
      " 14   Signal N. E. mile 21
      " 16   Signal N. E. mile 21
1978
Jan.  5   Signal N. E. of mile 21
      "  9   Signal N. E. of mile 21
      " 13   Signal N. E. of mile 21
      " 20   Signal N. E. of mile 21
      " 27   Signal N. E. of mile 21
      " 28   Signal N. E. of mile 21
Feb.  1   Signal N. W. of mile 21
      " 13   Signal N. W. of mile 21
      " 20   Signal N. W. of mile 21
      " 22   Signal N. W. of mile 21
Mar.  6   Signal N. W. of mile 21
April 24  Sighted at Kootenay Pond
Radio Collar #224
Summary of Movements

Radio Collar #224
FREQUENCY 171.825

SPIKE BULL

1977
Nov. 18 Spike Bull banded at Crooks Meadow
     22 Signal E of mile 21
     30 Signal S. E. of mile 21
Dec.  6 Signal E of McLeod Meadows
     10 Signal E of McLeod Meadows
     14 Signal E of mile 16
     16 Signal E of mile 16

1978
Jan.  5 Signal E of mile 16
     9 Signal E of K. R. Picnic Site
     19 Signal E of mile 21
     20 Signal E of mile 21
     24 Signal E of mile 21
     27 Signal E of mile 21
Feb.  1 Signal E of mile 21
     13 Signal S. E. of McLeod Meadow
     20 Signal N. E. of K. R. picnic site
     21 Signal S. E. of McLeod Meadows
     27 Signal E of K. R. picnic site
     28 Signal E of K. R. Picnic site
Mar.  6 Signal N. E. of Kootenay Viewpoint
     9 Signal S. E. of K. R. picnic site (Beaver Dams)
     10 Signal S. E. of K. R. Picnic Site (Beaver Dams)
     14 Signal S. E. of K. R. Picnic Site (Beaver Dams)
April 10 Signal S. E. of K. R. Picnic Site
Radio Collar #225
Summary of Movement

Radio Collar #225
FREQUENCY 171.803

1977
Dec.  1 Adult cow banded near Nixon Creek #225
    "  6 Sighted near McLeod Meadows
    " 10 Sighted near McLeod Meadows
    " 14 Sighted near McLeod Meadows
    " 16 Sighted near McLeod Meadows
    " 21 Sighted near McLeod Meadows

1978
Jan.  5 Sighted N. E. of mile 16
    "  9 Signal N. E. of mile 16
    " 18 Sighted Harkin Sign Post
    " 19 Sighted Harkin Sign Post
    " 20 Sighted 21 mile
    " 24 Signal E of 21 mile
    " 28 Sighted 21 mile
    " 30 Sighted 21 mile
Feb.  1 Sighted McLeod Meadows
     "  2 Sighted McLeod Meadows
     "  3 Sighted McLeod Meadows
     " 13 Sighted mile 16
     " 20 Signal E of McLeod Meadows
     " 21 Signal E of McLeod Meadows
     " 22 Sighted Harkin Sign
     " 27 Sighted Harkin Sign
Mar.  6 Signal E Harkin sign
     " 10 Signal E Harkin sign
     " 14 Signal E Harkin sign
April 10 Signal E of 21 mile
     " 12 Sighted at 21 mile
     " 17 Sighted McLeod Meadows
     " 18 Sighted McLeod Meadows
Radio Collar #226
Summary of Movement

Radio Collar #216
FREQUENCY 171.782
ADULT COW

1977
Nov. 30 Adult cow darted near Mt. Harkin
Dec. 6 Signal E of Mt. Daer
" 10 Sighted 21 mile
" 12 Signal E of 21 mile
" 14 Signal E of 21 mile
" 16 Signal E of 21 mile

1978
Jan. 5 Signal W of Crooks Meadow
" 9 Signal W of Dolly Varden
" 18 Sighted at Crooks Meadow
" 19 Sighted at Crooks Meadow
" 24 Sighted at 21 mile
" 27 Sightee at 21 mile
" 30 Sighted at 21 mile

Feb. 1 Sighted McLeod Meadows
" 3 Sighted McLeod Meadows
" 13 Signal S. E. McLeod Meadows
" 18 Signal E of McLeod Meadows
" 20 Signal E of Harkin Sign
" 21 Signal N. E. of K. R. Viewpoint
" 27 Signal N. E. of K. R. Viewpoint

Mar. 6 Signal E of Harkin Sign
" 10 Signal E of Harkin Sign
" 14 Signal E of Harkin Sign

April 10 Signal E of 21 mile
" 12 Signal E of 21 mile
" 13 Signal E of 21 mile
Radio Collar #227
Summary of Movement

Radio Collar #227
FREQUENCY 171.765

SPIKE BULL

1977
Nov. 15 Spike bull banded mile 16
Transmitter failure occurred within two to three days
after placing collar on animal.