

ANTIFEAU, 1976

DESCRIPTIONS OF HABITAT IMPROVEMENT PROJECTS

WELLS GRAY PARK

1976

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Introduction

The purpose of this report is to give a general word and picture description of habitat improvement projects in, and immediately adjacent to, Wells Gray Park. Ted Antifeau spent almost two months visiting these projects and making a subjective evaluation on them; on two areas – Moose Clearing (#6) and Corral Ridge (5 a-b) – he carried out quantitative work including pellet group counts and browse assessments.

The overall picture is that these areas are producing good amounts of browse that is being moderately to heavily used by moose. While the browsed vegetation is not being seriously harmed by moose, it seems that any marked increase in browsing intensity would result in damage to the vegetation and, eventually, to the moose population itself.

Burn and Clearcut Areas

Wells Gray Park (refer to maps on pages  & ).

1. Green Mountain 1969/70 Burn.
2. Cake Mtn. Burn.
3. Foot of Battle Mountain Burn.
4. Green Mountain 1968 Burn.
5. Corral Ridge 1973 Clearcut.
 - a. South Half
 - b. North Half
6. Moose Clearing 1967 Clearcut.
7. Fire Guard.
8. Howling Hump.
9. Study Area C Burn.
10. McLeod Hill Burn.
11. McLeod Hill East Burn.

[-Insert Map areas 1 through 7]

[-Insert Map area 8 and 9]

Area 7. Fire Guard

Objective: Description of plant cover and photographs of the Fire Guard northeast of Blackwater Creek, Wells Gray Park.

Location: The Fire Guard is approximately 1 ½ miles east of the Park compound. The burn generally runs north-south, bordered on the west by Blackwater Creek and on the south by the McLeod Hill road.

Vegetation: Much of the slash is unburned and the plant cover is sparse. The herbaceous layer, consisting primarily of grass and mahonia (*Mahonia aquifolium*), predominated.

Trees: Willow clumps (avg. ht. 30 in.) and immature Aspen (avg. ht. 48 in.) and Bitter Cherry (*Prunus emarginata*) were scattered. Alder and older Birch, Aspen and Willow, all with heights of 6-10 feet, were concentrated at the fire guard edge near the McLeod Hill road.

Shrubs: Saskatoon berry (*Amelanchier spp.*), Soopolallie (*Shepherdia canadensis*), both with an average height of 30 inches, were scattered throughout.

Browse: Willow, Aspen and Birch were generally browsed lightly with the exception of the older, taller concentration near the road where they had sustained moderate to heavy utilization. Broken tops were observed on the taller (6-10 ft.) birch and aspen.

Saskatoon Berry and Bitter Cherry were browsed lightly with a few bushes browsed moderately.

Observations:

1. Very few 1975/76 winter moose pellet groups or recent tracks were observed. A few adult moose tracks observed at southern end.
2. Several common butterworts (*Pinguicula vulgaris*)*

*Not included in: Hämet-Ahti (1965).

[Insert image, “North half of Fire Guard.”]

[Insert image, “Middle section.”]

[Insert image, “South end of Fire Guard.”]

[Insert image, “Broken ends and aspen and birch browse.”]

Area 3. Foot of Battle Mountain Burn

Objective: General description of vegetation and photographs of the Battle Mountain Burn.

Location: The burn is located at the foot of Battle Mountain, approximately 1.4 miles east of the main road.

Vegetation: Generally, the vegetation cover was immature Lodgepole Pine (4-6 ft. in height), alder and grass, with mature and some immature aspen on the periphery of the burn. With the exception of the northeast segment, very little slash and few stumps remained unburned. Alder thickets occurred at the north, southeast and southern portions, while dense stands of immature Lodgepole Pine predominated in the northern and central portions of the burn.

With the exception of a few scattered and generally sparse willow, and aspen, both with average heights of 24 inches, the burn was barren of these two species due to intense cattle grazing. Some of the immature aspen on the periphery of the burn were browsed lightly.

Grass and dandelions were the predominant herbs throughout. Grass was heavily grazed and many recent cattle tracks and droppings were observed.

Observations:

1. 5-7 cattle grazing in burn – no picture, not an accurate count as truck scared them off.
2. 2 adult moose tracks and 1 winter '75 pellet group in northwest corner – at edge of alder thicket.
3. Numerous Columbian Ground Squirrels.
4. Chipping sparrows – several pairs.
5. Brewer's Blackbird – 2 pairs.
6. Solitary Vireo – 1.
7. Brown-headed Cowbird – 1♂.
8. Cassin's Finch – several.
9. Pine Siskins – many.
10. Robins – 2 to 3 pairs.
11. 1 unidentified raptor flew overhead.
12. Empidonax Flycatcher – 2.
13. Myrtle Warbler – 1.
14. Ruffed Grouse – 1 heard, to the west and just beyond the burn.

[Insert image, “Immature Lodgepole Pine stand.”]

[Insert image, “Immature Lodgepole Pine & alder.”]

[Insert images x2 (page 4), “South half – scattered immature lodgepole pine....”]

Area 10. McLeod Hill Burn

Objective: Description of willow abundance, use and degree of browsing in the McLeod Hill Burn.

Location: The burn is located on the top, south half and west slope of McLeod Hill.

Description: A fairly steep, uniform lower slope progresses to a central bench and

depression surrounded by exposed ridges and “humps” in the top portion. The soil is very rocky with a dense surface of lava-rocks, 3-10 inches in diameter.

Vegetation:

1. Ridge tops and upper west and south facing slopes:

The predominant tree was willow (*Salix spp.*) with an average height of 40” and an average density of 7 clumps per 1/100 acre plot (from random plots).

Immature aspen and lodgepole pine, both with an average height of 36 inches, were scattered in occurrence.

False Box and Soopolallie were the dominant shrubs. With the exception of scattered and patchy occurrence of grass and mosses, the herbaceous layer was generally barren. This portion of the burn is very rocky and exposed.

The willow clumps and aspen were browsed heavily with some willow browsed down to 18 inches in height.

2. Lower west and south facing slopes:

Willow and aspen, both with heights ranging from 3-4 feet, were generally denser here. Average willow abundance from random plots was 9 per 1/100 acre plot. Thickets of alder (*Alnus tenuifolia*) were scattered throughout.

The dominant shrubs were False Box and Soopolallie. Saskatoon berry was scattered in occurrence. Grass and mosses were denser here than on the ridge tops.

Browse on willow, aspen and Saskatoon berry was light with some willow and aspen browsed moderately.

3. The bench, depressions and north and east facing slopes were generally barren with very few immature trees and shrubs.

Observations:

1. Most of the 1975/76 winter moose pellet groups were observed on the ridge tops and upper slopes, while very few were seen elsewhere.
2. Townsend's Solitaire – 1.
3. Mountain Bluebird – 1♂.
4. Common Flicker – 1.
5. Raven – 1
6. Rufous Hummingbird – 1♂.

[Insert image, “Top- north end.”]

[Insert image, “Top- south end.”]

[Insert image, “Bench- middle section.”]

[Insert image, “Bottom of burn...”]

[Insert images x3 (page 5), “Top of burn....”]

Area 4. Green Mountain 1968 Burn

Objective: To describe the degree of moose use and the amount and availability of forage on the 1968 burn on the east slope of Green Mountain.

Description: The burn is located on the east slope, middle section of the Green Mountain ridge and extends from valley bottom to ridge top. The burn may be roughly divided into two halves, north and south, by a shoulder extending from valley bottom to ridge top. The southern half is generally open and well burned with a few pockets and ridges of unburned vegetation. The northern half is very patchy with many sections of incompletely and unburned forested areas. Many standing snags remain in both halves.

Vegetation:

Trees In both halves Alder (*Alnus sinuata*), Aspen and Willow were the dominant trees with Paper Birch subdominant and Douglas Maple scattered. In the southern half Alder and Aspen were roughly of the same abundance with Alder dominant in depressions, wetter sites, and burn edges and Aspen dominant in more exposed sites. South slopes, in particular, were

characterized by a dominant vegetation cover of Aspen, Lodgepole Pine, grass and some Willow.

In the northern half Alder thickets were more numerous. Willow and Aspen abundance and heights were fairly consistent throughout, averaging 4-6 and 12-16 per plot and 5 (4-6) and 6 (4-8) feet in height respectively (random plots).

Shrubs: Soopolallie and flat-topped Spirea were the dominant shrubs with False Box, Saskatoon berry (avg. ht. 5 ft.) and Thimbleberry subdominant. Some Spreading Dogbane and Redstem Ceanothus (avg. ht. 30 in.) were observed on more exposed sites.

Herbs: Grass was generally the dominant herb.

Browse: Willow and Saskatoon berry stems taller than 3 feet and Aspen and Birch taller than 4 feet were browsed heavily (50-75%) with some browsed very heavily (75-100%). Broken tops were observed on many Aspen and Birch and some Willow taller than 6 feet.

Douglas maple and Redstem Ceanothus were both browsed light-moderate with an average of 25%.

Pellets: Many winter 1975/76 moose pellets were observed in the general walk through this burn. The 6 random plots yielded 2 pellet groups.

Discussion: This burn can generally be described as containing high density, good quality browse that has been utilized well. And, although the burn is incomplete and much slash remains, particularly in the northern half, this did not seem to impede the moose from utilizing this burn extensively in the winter of 1975/76.

Observations:

1. 1 juvenile mule deer at the north edge of the burn just below Foot Lake.
2. Ravens – 2.

3. Song Sparrows – 2.
4. Juncos – several.
5. Audubon's Warbler – 1.
6. Yellow-bellied Sapsucker – 1.
7. Robins – several.
8. Pine Siskins – 3
9. Hairy Woodpecker – 1

[Insert images x9, from Green Mountain Burn, pages 3-6]

Area 1. Green Mountain 1969/70 Burn

Objective: A general description of forage availability and degree of use on the 1969/70 Green Mountain Burn.

Location: The burn is located on the south and southwest slopes at the south end of Green Mountain Ridge and extends from valley bottom to ridge top.

Vegetation & Utilization: The lower half of the burn was generally open and grassy with many benches and relatively barren of forage species. Mature and immature (hts. 4-7 ft.) Aspen and Lodgepole Pine were generally scattered, with Aspen concentrated in depressions, benches and wetter sites.

In the upper half of the burn, open grassy areas were interspersed among mature Aspen and Lodgepole Pine forested areas and sections of relatively productive, high quality mixed forage: immature Aspen, Willow, Paper Birch, and Northern Black Cottonwood, with heights ranging from 4-7 feet and abundances roughly in that order, and Saskatoon berry and Redstem Ceanothus, with heights ranging from 3-4 feet. These forage species were generally browsed heavily (50-75%) with many Willow, particularly, sustaining very heavy utilization.

Observations:

1. Winter 1975/76 moose pellets – several.

2. Fresh bear scats – 2; 100% vegetable matter – observed at the base of a bear-scratched Lodgepole Pine trunk.
3. Chipping Sparrow – 1.
4. Unidentified Sparrow – 1.
5. Pine Siskin – several.
6. Townsend’s Solitaire – 1.
7. Evening Grosbeak – 1.
8. Canada Jays – 2.

[Insert image, “General view of burn.”]

[Insert image, “General view – Top Portion.”]

Summary

1. FIRE GUARD:

The fire guard was generally in too early a seral stage to provide appreciable amounts of available forage for moose during the winter of 1975/76.

2. BATTLE MOUNTAIN (1967 burn):

Negligible winter forage, moose sign and utilization was observed throughout this burn. Intense cattle grazing has largely eliminated moose forage species, and aided in accelerating this burn into an advanced seral stage dominated by Lodgepole Pine and scattered alder.

3. McLEOD HILL BURN:

Willow and Aspen have both become fairly well established on the lava-rock of the south and west slopes of this burn. Benches, north and east slopes, on the other hand, were generally barren of forage species. In comparison to the lower half of the burn, the exposed top half sustained a more intense moose utilization – differential snow load may have been a factor.

4. GREEN MOUNTAIN:

- i.) 1968 BURN: This burn contained high density, good quality mixed

forage species which had sustained heavy moose utilization during the winter of 1975/76.

- ii.) 1969/70 BURN: Due to site characteristics of this south aspect burn, forage species were more scattered and less dense than in the 1968, east aspect burn. This burn, however, contained high quality forage heavily utilized by moose during the winter of 1975/76.

[4 photos of Green Mountain burn]

Area 6. Moose Clearing 1967 Clearcut

Objective: Pellet group counts on established transects, evaluation of browsing, and description of plant cover on the 1967 Moose Clearing Clearcut.

Location: The moose clearing is a clearcut block running north-south just to the east of the Wells Gray Park compound.

Vegetation: The clearcut is generally flat and gently rolling. Two small ridges running north-south are located in the northern half of the burn. The depressions between these ridges were open, grassy bogs. In addition, boggy alder thickets were dispersed throughout the clearcut.

Trees: The dominant immature trees were aspen and birch (hts. 4-12 ft.) and willow (hts. 4-8 ft.) with occasional alder (*Alnus tenuifolia* and *A. sinuata*) thickets (hts. 5-12 ft.). Immature Spruce, Lodgepole Pine, Bitter Cherry, Douglas Maple, and Northern Black Cottonwood, in roughly that order of abundance, were scattered throughout the burn. Scattered Alpine Fir (*Abies lasiocarpa*) and Rocky Mountain Juniper (*Juniperus scopulorum*) occurred at the more exposed, grassy clearcut edges.

Shrubs: The dominant shrubs were False Box and Soopolallie, with Saskatoon Berry subdominant, and Red-osier Dogwood very scattered.

Herbs: Grass was generally the dominant herb.

Utilization:

Table I: Utilization— Moose Clearing

	Willow	Aspen	Birch	Winter 75/76 Pellet Groups (per 1/100 acre plot)
# clumps per 1/100 acre plot	3.6	6.5	-	.85
Avg. height (inches)	66	66	66	(Range: 0-7)
Avg. % browse	50% (25-75%)	*55% (25-100%)	*50% (25-80%)	(54,400 per sq. mile)

*many broken tops on trees 6 ft. + in height.

Other:

1. Alpine Fir – browsed heavily (50-75%).
2. Northern Black Cottonwood, Douglas Maple, and Saskatoon Berry – generally light, with some browsed moderately (25-50%).
3. Red-osier Dogwood & Bitter Cherry – light (0-25%).

Observations:

1. Several groups of adult moose tracks were observed throughout the clearcut. It was noted that the highest concentrations of both moose droppings and tracks occurred in the northeast quarter of the clearcut especially on the tops and east slopes of the ridges.
2. A few fresh bear droppings were observed throughout – 100% vegetation.
3. Calliope Hummingbird – 1 pair.
4. Unidentified Owl – 1.

Area 8. Howling Hump

Objective: 100 sample plots, pellet group counts and estimation of percentage of 1975 willow twigs that have been browsed.

Location: The southern tip of the Howling Hump burn is located approximately one

mile northwest of Mile 4 of the McLeod Hill road. The main section of the burn is approximately one-half mile north of this southern tip and runs south-north, with the top of Howling Hump in the centre, northern third.

Topography: A gentle slope and then relatively flat in all directions from the Howling Hump.

Vegetation: The slash was generally well burned, but dense, partially burned sections remain on the lower slopes and flats around the Hump.

Trees: The dominant trees were immature aspen (avg. ht. 66 inches) and willow (avg. ht. 54 in.). Immature Alder, Paper Birch, Northern Black Cottonwood, Lodgepole Pine, and Douglas Maple, all with heights not exceeding 72 inches, were scattered and Bitter Cherry was sparse throughout the burn. A few stands of incompletely burned mature Lodgepole Pine and Douglas Fir remained in the southern part of the main burned block.

Shrubs: False Box and Soopolallie were the dominant shrubs. Saskatoon Berry was subdominant and generally scattered, and Redstem Ceanothus and Red-osier Dogwood were scarce.

Utilization:

Table II: Utilization— Howling Hump

	Willow	Aspen	Winter 75/76 Pellet Groups (per 1/100 acre plot)
# clumps per 1/100 acre plot	2.87	19	.65
Avg. height (inches)	54 (48-60)	66 (48-84)	(Range: 0-5)++
Avg. % browse	52	*26	(41,600 per sq. mile)
# Twigs browsed	.68 (based on 9 plots)	-	
# Twigs not browsed	40.5%	-	

* broken tops on some 72+ in height.

++ One plot, situated on the top of the Hump, contained 5 groups. The remainder of the plots ranged: 0-3 pellets groups/plot.

Other: Birch, Saskatoon Berry, Red-stem Ceanothus, and Red-osier Dogwood were generally browsed light-moderate (0-50%), and Northern Black Cottonwood and Douglas Maple browsed was light (0-25%).

Observations:

Many adult moose tracks on upper slopes of the Hump.

1. 1 ♀ moose at eastern edge of the burn.
2. Moose jaws – 4 sets (hunter kills).
3. Hairy Woodpecker – 1.
4. Pileated Woodpecker – 1.
5. Calliope Hummingbird – 1 ♂ (& possibly 1 ♀).
6. Rufous Hummingbird - 2 ♂ (& possibly 1 ♀).
7. Ravens – 2.
8. Robins – 3.
9. Flycatchers (*Empidonax* ?) – several
10. Mountain Bluebird - 1 ♂.
11. Common Butterwort (*Pinguicula vulgaris*) – several.

Area 9. Study Area C Burn

Objective: Sample plots on burned and unburned areas: pellet group counts, estimation of degree of browsing and general vegetation description.

Location: The burn is located on the east side of Murtle River, with the southern edge due east of Pyramid Mountain. It runs in a south – north direction paralleling the river for approximately 8 miles and varies from ½ - 2 miles in the east-west axis.

Topography: The topography is flat and rolling, with numerous small knolls and some boggy depressions and marshes. The southern half of the burn is patchy with a few large incompletely burned and unburned blocks.

Vegetation:

1) Burned Areas:

Trees: The dominant immature tree was Willow (avg. height 4 ft.), with Aspen (avg. height 4 1/2 ft.), and Lodgepole Pine (avg. height 4 ft.) subdominant and generally scattered. Northern Black Cottonwood and Birch were scarce, with greatest densities, particularly for Birch, at burn edges and depressions. Alder thickets (heights 6-7 ft.) predominated in depressions, bogs and at the edges of the burn.

Shrubs: Soopolallie and False Box were the dominant shrubs, with Saskatoon Berry generally scattered. Black Twin Berry was dominant in the Alder/Bog areas.

Herbs: Grass and mosses predominated. Several relatively barren sections in the southern end of the study area were covered primarily by grass, Sphagnum moss and scattered immature Lodgepole Pine.

2) Unburned Areas:

Trees: I. Mature: Mixture of Lodgepole Pine, Douglas Fir, Spruce, Aspen, Birch, Alder – thickets and scattered Alpine Fir and Northern Black Cottonwood. Red Cedar and Western Hemlock were generally sparse, confined to boggy areas and areas unburned in the old fires (1938).

II. Immature: Willow was dominant (height 4-6 ft.), with the above mentioned species, particularly Alder, subdominant, generally scattered and with heights ranging from 4-7+ feet.

Shrubs: The dominant shrubs were False Box and Soopolallie. Saskatoon Berry and Red Osier Dogwood, both with average heights of 3-4 feet, were subdominant.

Utilization:

Table III: — Utilization Area “C”:

Willow and Pellet Winter 75/76 group counts	Burned (218 plots)	Unburned (110 plots)
Avg. # pellet groups per 1/100 acre plot	0.19 * (range 0-2) (12,160/mi. square)	0.57 + (range 0-4) (36,480/mi. square)
Avg. # willow clumps per 1/100 acre plot	7.5	4.5
Average height (inches)	48 (30-60 in.)	54
Avg. % browse on Willow 36+ inches in height	+19% (range nil-50%)	56.7% (25-100%)

* A substantial proportion (19.5%) of these pellet group counts were taken in small, incompletely burned mature Lodgepole Pine and Douglas Fir forested pockets and on top of knolls.

- +1 Willowed knolls consistently contained moose pellets, the densest willow abundances and the heaviest browse.
- 2 The highest density of pellets were found in a series of 21 plots located in an unburned block, bordered on the west, south, and east sides by burned sections, in the southern third of the study: .86 pellet groups per 1/100 acre plot (range 0-3).
- + Heaviest browse on clumps 48+ inches; several clumps 60-70 inches in height were browsed 50-60%.

1. Burned:

Aspen: Immature Aspen was generally very scattered in the southern third of the study area, but was generally a bit denser in the remainder of the burn, where heights and abundances ranged from approximately 3-6 feet and 3-6 trees per plot respectively. Generally, Aspen was browsed light (nil-25%), with several plots containing trees 5+ feet in height browsed light-moderate (nil-50%) and a few heavy (50-75%).

Other: Birch was browsed light-moderate, while Northern Black Cottonwood and Saskatoon Berry generally sustained light use.

2. Unburned:

- i. Aspen and Birch – moderate-heavy (25-75%) with heaviest browse on 5-7 feet in height.
- ii. Saskatoon Berry and Red-Osier Dogwood – moderate-heavy.
- iii. Northern Black Cottonwood – light-moderate (nil-25%).
- iv. Alpine Fir – several browsed very heavy (75-100%) between heights of 4-8 feet.
- v. Red Cedar – some immature trees were browsed lightly (deer?).

Observations: (during transects)

1. Burned:

A) Mammals

- i. Wolf – 3 adults (May 31, 1976): dark bodies with white face markings. They emerged, startled by my presence, out of an Alder/Bog, west-edge of Burn, south-west corner of study area.
- ii. Moose – 1 live adult (suspected): I heard heavy crashing within the Alder/Bog just after the 3 above mentioned wolves vacated the area. –speculate a female and a calf(s).
-several recent adult tracks throughout the burn
-most were observed at the burn edges and on sparsely forested knolls.
-old skeletal remains of several (presumed) hunter kills.
- iii. Bear – 1 fresh dropping – Alder/Skunk Cabbage Bog, south-west edge.
- iv. Beaver – 1 old skull – edge of Beaver pond, south-east corner of study area.
- v. Squirrels – few at edges of burn.
- vi. Mice – several.

B) Birds (adults except where noted):

- i. Barrow's Goldeneye – 1♂ flew over burn.
- ii. Canada Geese— 2, marsh at edge of burn south-east corner
- iii. Red-tailed Hawk – 1.
- iv. American Kestrel – 1.
- v. Common Nighthawk – 1.
- vi. Rufous Hummingbird – several ♂'s, a few pairs.
- vii. Calliope Hummingbird - several ♂'s, 1 pair.

- viii. Common Flicker – several (Red-shafted) and one nest (approx. centre of burn in southern third of study area).
- ix. Empidonax Flycatcher – several.
- x. Western Wood Pewee – 3.
- xi. Olive-sided Flycatcher – several.
- xii. Tree Swallow – many (10-15 adults and juvs.).
- xiii. Common Raven – few.
- xiv. Black-capped Chickadee – 1.
- xv. Mountain Chickadee – 2.
- xvi. American Robin – several.
- xvii. Mountain Bluebird – 2 pairs.
- xviii. Solitary Vireo – 1
Vireos – a few heard but unidentified.
- xix. Audubon's Warbler – few.
- xx. Common Yellowthroat – 1 pair (alder thicket).
- xxi. Wilson's Warbler – 1 pair (alder thicket)
- xxii. American Redstart – 2 males (edge of burn).
- xxiii. Brewer's Blackbird – 2 pairs.
- xxiv. Brown-headed Cowbird – 1 male.
- xxv. Western Tanager – 1 pair.
- xxvi. Pine Siskin – several.
- xxvii. Junco – few.
- xxviii. Chipping Sparrow – several.
- xxix. Song Sparrow – 2.

Observations:

2. Unburned:

A) Mammals

- i. Moose – 1 recent (within a year) kill: skeleton almost intact – was able to find 2 front incisors.
-many tracks, some very fresh: adults and 1 juvenile.
- ii. Deer – 5 fresh droppings (in a group of 60 sample plots) southwest corner of study area.
- iii. Wolf – 2 adult tracks.

- iv. Bear – several fresh droppings – 100% vegetation and some tracks (Alder/Skunk Cabbage Bogs).
- v. Beaver – several ponds with lodges – most appeared occupied.
- vi. Squirrels – several.
- vii. Chipmunk – 1.
- viii. Mice – 1.

B) Birds

- i. Canada Goose – 1 pair and 1 juvenile, Beaver pond, west edge of study area near Murtle River (possibly the same pair that was observed at edge of the burn).
- ii. Green-winged Teal – 1 pair (at same Beaver pond as above).
- iii. Marsh Hawk – 1.
- iv. Grouse – a few droppings.
- v. Ruffed Grouse – 1 heard.
- vi. Rufous Hummingbird – 2♂ and 1♀.
- vii. Common Flicker – 3.
- viii. Empidonax Flycatcher – 1.
- ix. Olive-sided Flycatcher – 2.
- x. Tree Swallow – 10-15, adults and juveniles (suspected that this was the same group seen earlier in burn).
- xi. American Robin – a few.
- xii. Swainson's Thrush – 1.
- xiii. Vireo – a few heard, unidentified (red-eyed or solitary vireos).
- xiv. Yellow Warbler – 1♀ (suspected).
- xv. Audubon's Warbler – 1.
- xvi. Blackpoll Warbler – 1♂.
- xvii. Common Yellow-throat Warbler – 1♂.
- xviii. Red-winged Blackbird – 2.
- xix. Brewer's Blackbird – a few.
- xx. Western Tanager – 1♂.
- xxi. Junco – 3.
- xxii. Song Sparrow – 2.

Bird Sightings – Burned vs. Unburned Area:

These sightings were recorded during the course of moose survey transects. More survey time was devoted to the burned rather than the unburned areas. Nevertheless, these observations seem to indicate a greater abundance of Flycatchers (Empidonax & Olive-sided), Audubon's Warblers, Rufous Hummingbirds, Common Flickers, and Juncos in the burned areas. In addition, 1 American Kestrel, Calliope Hummingbirds, Western Wood Pewees, Common Ravens, 1 Black-capped Chickadee, Mountain Chickadees, Mountain Bluebirds, Brown-headed Cowbirds, and Chipping Sparrows were observed only in the burned areas. It should be noted that the two Mountain Chickadees were moving rapidly through the burn and I considered them to be just "passing through." Furthermore, given more survey concentration I would suspect that of the birds unobserved in the unburned areas Western Wood Pewees, Common Ravens, Black-capped Chickadees, Chipping Sparrows, and possibly Mountain Chickadees and American Kestrels would be somewhat represented here.

The sightings of the Wood Warblers other than the relatively common Audubon's Warbler (Common Yellowthroat, Wilson's, and American Redstart Warblers) and the Chipping Sparrows in the burned areas should be clarified: these birds were all observed in alder thickets, largely at the burn edges. Alder thickets, as were unidentified warblers, were more numerous in the unburned areas and I would suspect a higher number of warblers here.

[Insert images (x11) for Study Area "C" Burn]

Area 5. Corral Ridge

Objective: Moose pellet group counts, utilization survey and general description of vegetation in the 1973 Corral Ridge clearcut.

Location: The clearcut is located on the top of Corral Ridge and is divided into two halves, north and south, of approximately the same size by a public road.

Vegetation: The north half contained much unburned slash and several uncut,

incompletely burned forested pockets. The south half, on the other hand, was generally more completely burned, contained little slash, and no forested pockets.

The seral vegetation cover pattern in the north half was fairly consistent whereas one large and several small boggy areas and a few rocky, moss covered flats produced a diversity of site-types in the southern half.

Trees: In both halves, immature aspen and willow, both with average heights of four feet (3-6 ft.), were the dominant and subdominant trees, respectively, with immature Paper Birch, Douglas Maple, Bitter Cherry, and Northern Black Cottonwood scattered, and Lodgepole Pine sparse and confined largely to the rocky sites. Immature alder and Northern Black Cottonwood were concentrated in boggy areas.

Shrubs: False Box and Soopolallie were the dominant shrubs, with Flat-topped Spirea subdominant and Saskatoon Berry scattered. Black Twinberry was dominant and Scrub Birch sparse in the boggy areas.

Herbs: Grasses and mosses were dominant, with Mahonia (*Mahonia aquifolium*) and Indian Paintbrush (*Castilleja spp.*) subdominant.

Table IV: Pellet Group Counts and Utilization Winter 75/76 — Corral Ridge

Area	Pellet groups per 1/100 acre	Willow				Aspen		
		Avg. # per 1/100 acre plot	Avg. height	Avg. % browsed	# stems <u>browsed</u> # not browsed	# per 1/100 acre plot	Avg. height	Avg. browse
North half	(range: 0-2) .17	2.50	48"	39.0		10.15	36-72"	10
South half	(range: 0-1) .116	1.03	48"	28		30	36-72"	(0-25) light
Combined	.13 (8,320/sq. mi.)	1.38	48"	32.25	.478 (32.88%)	25.3	36-72"	(0-25) light

Other:

1. Aspen – Although the average browse was light, many trees 4+ feet in height were browsed moderate (25-50%) with some heavy (50-75%).
2. Saskatoon Berry and Paper Birch – generally light to moderate (nil-50%).
3. Bitter Cherry and Douglas Maple – light (nil-25%).
4. Soopolallie – some shrubs were browsed light.
5. It was generally observed that the heaviest browse on willow, aspen, and birch occurred at the edges of the clearcuts.

Discussion: The results (refer to Table IV) reveal that the clearcut in the north half compared to the south half had: first, a greater willow density (2.50 clumps per 1/100 acre plot vs. 1.03) which sustained more browse (39.0% vs. 28%); second, a lower aspen density (10.15 per 1/100 acre plot vs. 30); and third, higher pellet group counts (.17 vs. .116) which indicate both a higher forage density and moose utilization index for the northern half. Furthermore, although old cattle droppings were observed in both halves, the lower ratio of willow to aspen in the south half may indicate a higher cattle utilization in this relatively well-burned, easily accessible clearcut. It seems probable that cattle were somewhat impeded by unburned slash from ready access to willow in the northern half while moose were hindered little if at all.

Observations:

A) Mammals

1. Moose – 1 ♀ west edge, north half of clearcut.
2. Ground squirrel – several near road.
3. Chipmunk – 1.
4. Deer – 2 fresh droppings.

B) Birds

1. Canada Goose – 10 flew overhead.
2. Rufous Hummingbird – 2 ♂, 1 ♀.
3. Common Flicker – 1.
4. Yellow-bellied Sapsucker – 4.

5. Empidonax Flycatcher – 1.
6. Western Wood Pewee – 2.
7. Olive-sided Flycatcher – 1.
8. Common Raven – 1.
9. American Robin – 4.
10. Mountain Bluebird – 1♂.
11. Townsend's Solitaire – 1.
12. Audubon's Warbler – several.
13. Brewer's Blackbird – 1.
14. Western Tanager – 1♂.
15. Junco – several.
16. Song Sparrow – 2.

Summary

- 1) Although the Moose Clearing contained a medium Willow density, their average height was the highest, lending themselves more readily available during deep snow conditions. High moose intensity is reflected by the highest winter 1975/76 pellet group of all areas surveyed quantitatively.
- 2) Howling Hump sustained moose utilization reflected by both high winter 1975/76 pellet group counts and willow clumps with an average height of 54+ inches readily available during deep snow.
- 3) Study Area "C": The unburned compared to the burned areas sustained the heavier moose utilization due to higher average willow heights and, possibly, greater canopy and predator avoidance cover.
- 4) Corral Ridge sustained the lowest moose utilization as reflected in the lowest winter 1975/76 pellet group counts. Contributing factors may have been the low willow density due to cattle grazing and, possibly, proximity to human activity.

In general, available forage, particularly willow, was extensively utilized by moose during the winter of 1975/76, with most areas sustaining moderate to heavy browsing. In none of

the areas was forage over-browsed by moose nor, with the exception of broken tops on some of the taller immature trees, and in areas of cattle browsing, destroyed: there was no apparent sign of moose exceeding winter range carrying capacity.

The winter range appeared very resilient with forage vegetation, particularly willow, vigorously replacing browsed winter twigs with new spring growth.

Table V: Quantitative Data

Area	Winter 1975/76 pellet groups per 1/100 acre plot	# willow clumps per 1/100 acre plot	Avg. height of willow (inches)	Avg. % Browse sustained by willow
Moose Clearing	.85 (54,400/sq. mi.)	3.6	66+	50
Howling Hump	.65 (41,600/sq. mi.)	2.87	54	52
Study Area "C" i) Unburned	.57 (36,480/sq. mi.)	4.5	54+	56.7
Study Area "C" ii) Burned	.19 (12,160/sq. mi.)	7.5	48	19
Corral Ridge (north & south combined)	.13 (8,320/sq. mi.)	1.38	48	32.25

Appendix I. Incidental Wildlife Sightings

A. Mammals

1. Beaver :

- 1 adult, King's Meadow.

2. Black Bear:

- 1 sow & 2 cubs, May 12, junction of Green Mountain Road and main Park road.
- 1 adult, May 13, Helmcken Falls lookout.
- 1 adult, May 13, Ray Farm.
- 1 adult, May 18, Moose Clearing.
- 1 sow & 3 cubs (one cub was cinnamon brown), May 26, Spahats Creek Falls.

- 1 adult, May 30 & June 2, old farm at approx. Mile 1 of jeep road along Murtle River to Study Area "C."
- 1 adult, June 2, approx. mile 1.5 of main Wells Gray Park road.
- 3. Chipmunk:
 - several.
- 4. Coyote:
 - 1 adult, Hemp Creek, just below Helmcken Falls Lodge.
- 5. Ground Squirrel:
 - Common: Ray Farm, Hemp Creek, McLeod Hill Road, Battle Mountain Road.
- 6. Mule Deer:
 - 2 adult females, May 13, Ray Farm.
- 7. Red Squirrel:
 - Common.
- 8. Varying Hare:
 - 1 adult, crossed the main Wells Gray Park road, just south of the construction camp.

B. Birds

1. Canada Goose:
 - 12 adults, May 17, flew north up Blackwater Creek.
 - 2 adults, May 18, flew up Hemp Creek (sighted from Helmcken Falls Lodge).
 - 1 adult, May 31, island on Murtle River across from southern slope of Pyramid Mountain.
 - 2 adults, June 1, King's Meadow.

Taking into account both survey and incidental sightings of Canada geese, I felt that some of these sightings were repeats. I conservatively estimated 10-15 individual Canada geese sighted during my period in Wells Gray Park.

2. Mallard:
 - 1 male, King's Meadow.
 - 1 male, Murtle River – Majerus Farm.
 - 1 male, flew up Clearwater River (sighted at inlet of Deer Creek).

- 1 female, 1 male, Hemp Creek just south of Helmcken Falls Lodge.
- 3. Green-winged Teal:
 - 2 males, June 1, King's Meadow.
- 4. Blue-winged Teal:
 - 2 males, June 2, flew up Murtle River (sighted from east bank across from Pyramid Mountain).
- 5. Barrow's Goldeneye:
 - 1 female & 1 male, May 14, Alice Lake; copulated & afterwards appeared to be investigating prospective nest sites.
 - 4 males & 4 females (paired), May 20, Foot Lake.
 - 3 females (no broods sighted), + 1 female with 7 Cl. I juveniles, June 6, Foot Lake.
- 6. Common Merganser:
 - 1 male, Murtle River.
- 7. Raptor:
 - 1 unidentified buteo (suspected Red-tailed Hawk), Hemp Creek.
- 8. Red-tailed Hawk:
 - 1 immature, Majerus Farm.
- 9. American Kestrel:
 - 1 male, King's Meadow.
- 10. Grouse:
 - 1 unidentified; ruffed grouse or female blue grouse, east end of Foot Lake.
- 11. Blue Grouse:
 - 1 male, base of McLeod Hill.
 - 1 male, top of lava-rock slide along the ridge just north of the McLeod Hill burn.
- 12. Killdeer:
 - 3, Ray Farm.
- 13. Common Snipe:
 - 1, Majerus Farm.
- 14. Long-billed Curlew:
 - 1, Hemp Creek below Helmcken Falls Lodge.
- 15. Spotted Sandpiper:
 - 1, Foot Lake.

16. Rufous Hummingbird:
 - Common.
17. Calliope Hummingbird:
 - Several males, few identified females.
18. Belted Kingfisher:
 - 1 male, Hemp Creek by Kamloops Boys' Club cabin.
19. Red- shafted Flicker:
 - Several.
20. Yellow-shafted Flicker:
 - 1 pair, May 30 & 31, King's Meadow; copulating (May 30) & investigating 2 prospective nest sites (snags).
21. Yellow-bellied Sapsucker:
 - Several.
22. Black-backed or Northern, Three-toed Woodpecker:
 - 1, Foot Lake.
23. Eastern Kingbird:
 - 2, King's Meadow.
24. Western Kingbird:
 - 1 (suspected), near Corral Ridge.
25. Empidonax Flycatchers:
 - Several.
26. Western Wood Pewee:
 - A few.
27. Olive-sided Flycatcher:
 - A few.
28. Barn Swallow:
 - Several, Helmcken Falls Lodge and Majerus Farm.
29. Common Raven:
 - Common.
30. Common Crow:
 - Common.
31. Black-capped Chickadee:
 - A few.
32. American Dipper:

- 1, King's Meadow.
- 33. Winter Wren:
 - 1, McLeod Hill.
- 34. American Robin:
 - Common.
- 35. Varied Thrush:
 - A few heard.
- 36. Ruby-crowned Kinglet:
 - 1 (suspected), Foot Lake.
- 37. Vireos:
 - A few heard.
- 38. Audubon's Warbler:
 - Common.
- 39. Common Yellowthroat:
 - 1 male & 1 (suspected) female, Hemp Creek, base of Green Mountain.
- 40. Wilson's Warbler:
 - 1 male, Hemp Creek, base of Green Mountain.
- 41. Red-winged Blackbird:
 - 2 males, King's Meadow.
 - 1 male, Ray Farm.
- 42. Brewer's Blackbird:
 - Common.
- 43. Brown-headed Cowbird:
 - 2 males, Hemp Creek.
- 44. Western Tanager:
 - 4 males, 1 female.
- 45. Evening Grosbeak:
 - 2 heard.
- 46. Pine Siskin:
 - Many.
- 47. Oregon Junco:
 - Very common throughout.
- 48. Chipping Sparrow:
 - Several.

49. Song Sparrow:

- A few.

Appendix II. List of Common & Scientific Names of Plants and Animals Mentioned in Text.

A. Trees

Alder

i) Sitka Alder (*Alnus sinuata*). This species was the common one in the areas surveyed; alder mentioned in the text refers to this one.

ii) Mountain Alder (*Alnus tenuifolia*). This species was generally uncommon in the study areas and is specified in the text.

Alpine Fir	(<i>Abies lasiocarpa</i>)
Aspen	(<i>Populus tremuloides</i>)
Birch (Paper)	(<i>Betula papyrifera subcordata</i>)
Bitter Cherry	(<i>Prunus emarginata</i>)
Douglas Fir	(<i>Pseudotsuga menziesii</i>)
Douglas Maple	(<i>Acer glabrum var. douglasii</i>)
Lodgepole Pine	(<i>Pinus contorta latifolia</i>)
Northern Black Cottonwood	(<i>Populus trichocarpa</i>)
Spruce	(<i>Picea glauca</i>)
Western Hemlock	(<i>Tsuga heterophylla</i>)
Western Red Cedar	(<i>Thuja plicata</i>)
Willow	(<i>Salix spp.</i>)

B. Shrubs:

Black Twinberry	(<i>Lonicera involucrata</i>)
False Box	(<i>Pachistima myrsinites</i>)
Flat-top Spirea	Spirea (<i>Spirea lucida</i>)
Mahonia	(<i>Mahonia aquifolium</i>)
Red-osier Dogwood	(<i>Cornus stolonifera</i>)
Redstem Ceanothus	(<i>Ceanothus sanguineus</i>)
Saskatoon berry	(<i>Amelanchier spp.</i>)

Scrub Birch	(<i>Betula glandulosa</i>)
Soopolallie	(<i>Sheperdia canadensis</i>)
Spreading Dogbane	(<i>Apocynum androsaemifolium</i>)
Thimbleberry	(<i>Rubus parviflorus</i>)

C. Mammals:

Beaver	(<i>Castor canadensis sagittatus</i>)
Black Bear	(<i>Ursus americanus cinnamomum</i>)
Chipmunk	(<i>Eutamias amoenus ludibundus</i>)
Coyote	(<i>Canis latrans</i>)
Deer (Mule)	(<i>Odocoileus hemionus hemionus</i>)
Ground Squirrel	(<i>Spermophilus columbianus columbianus</i>)
Mice and/or voles – inadequate sightings	
Moose	(<i>Alces alces andersoni</i>)
Squirrel (Red)	(<i>Tamiasciurus hudsonicus columbiensis</i>)
Wolf	(<i>Canis lupus columbianus</i>)

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