Novakowski, N.S.

Aerial resurvey of bison in Wood Buffalo National Park and surrounding areas, 1957. Fort Smith, Canadian Wildlife Service, 1957. 12 ℓ. (maps in pocket)

1. Bison - Aerial survey - Wood Buffalo N.P. 2. Bison - Aerial survey - N.W.T. 3. Wood Buffalo National Park. I. Title.

Duplicate report & maps

AERIAL RESURVEY OF BISON IN WOOD BUFFALO NATIONAL PARK AND SURROUNDING AREAS, 1957

N. S. Novakowski
Canadian Wildlife Service
Fort Smith, N.W.T.
April, 1957

Introduction

An aerial census of bison in Wood Buffalo National Park and surrounding areas was carried out in late February and early March of this year. The main purpose of the census was to establish the total population of bison in the Park. This was done by counting bison in a proportional area of the Park, obtaining a coverage of approximately 25 per cent. Reports of bison being observed outside of the Park boundaries led also to a strip census in the Fort Smith - Fort Resolution areas and observations in other scattered points.

The last complete census in the Park was made by W. A. Fuller in 1949 and it was felt that some changes in the population of bison would be evident after such a wide lapse of time. To be directly comparable to the census by Fuller the survey plan and technique for the present survey was adopted from his report (Fuller, 1950).

Methods

The sampling method consisted of parallel lines, 8 miles apart, flown throughout the Park from east and west boundaries. An observation width of one mile on each side of

this line was established. This was done by marking on the windows and struts of the aircraft, a Cessna 180, an angle of 69° from the vertical for an altitude of 2,000 feet above the ground.

The writer occupied the forward observation position and second observers, used at different times, were Warden K. Cooper, Patrolman L. Heron, and Superintendent of Game, Dr. W. E. Stevens. Each observer would place the number of bison counted on his respective side of the strip, record the time of the observation on prepared sheets and in some cases attempt to break down the number observed into bulls, cows and calves.

Results

Population Estimate Within the Park

A total of 22 transect lines were flown within the Park. The total mileage flown (excluding mileage over major lakes) was 2,089 miles covering an area of 4,178 square miles. Only large lakes were excluded since it was commonly observed that bison used small lakes for forage around the margins and for bedding grounds. The total area of large lakes was found to be 848 square miles by planimeter measurement. When this was deducted from the total area of the Park (17,300 square miles) and the result divided by the area observed the multiplication factor was found to be 3.937. This would mean that 1/3.937 of the Park was covered by our census and the total number of bison observed and recorded would be 1/3.937 of the total population.

The number of bison counted in the census was 2,988 and the total number of bison in Wood Buffalo National Park was therefore found to be 11,763, by calculation. This population total is subject to the errors likely to be encountered in a census of this nature. The following discussion presents probably the major sources of error involved.

(a) Mechanical Error - This involves discrepancies in the handling of the aircraft such as unavoidable dips or losses or gain in altitude. As a result bison actually in the strip would be omitted or conversely would be included in the count when actually outside of the strip. The ideal weather conditions under which the survey was flown minimized this source of error.

(b) Visual Error - This type of error has two ramifications, the first being the possibility of miscounting a herd, the second missing or not being able to see bison that were on the flight line but were obscured either by the aircraft or trees. Since the herds encountered were not large miscounting was reduced to a minimum. It is the opinion of the writer that numerous animals were missed in heavily wooded areas probably in sufficient number to raise the total population arrived at to a somewhat higher level.

(c) Bias Error - Though the writer at all times occupied the cockpit observation position, three people were used as second observers at various times. The total count for each observation position is as follows:

Observer #1 Position - 1,409 bison.
Observer #2 Position - 1,579 bison.

The difference between the counts was subjected to a t test for paired observations (Cox, 1954) and the result (t=1.26 D. F. 21) showed that there was no significant difference in the counts between the observers in the #2 position and the writer in the #1 position.

It can, therefore, be predicted with some degree of certainty that the population of bison within Wood Buffalo Park is above the calculated figure, probably in the range of 12,000 - 14,000 animals.

Results of Calf Counts

Two aerial counts of bison were done during the summer for the purpose of determining the percentage of calves in herds at a time when they were readily discernable. The results are outlined:

July 5, 1956 - of 7 herds observed the percentage of calves was 19.4 (total of 1007 animals of which 164 were calves).

September 8, 1956 - of 14 herds observed the percentage of calves was 23.3 (total of 296 animals of which 56 were calves).

The percentage of calves found in various herds during the present count was 21.1 (total of 308 animals of which 55 were calves).

The increment for this season appears to be consistent and at a rather high level. The percentages quoted are herd statistics and do not take into account the numerous groups of bulls which are seemingly isolated from the herds most of the time.

An increment of this magnitude would eventually increase the population to a much larger figure than presently found in comparison with previous estimates by Soper in 1934 as 12,000 (Soper, 1941) and by Fuller in 1949 as 10,000 - 12,500 (Fuller, 1950). Various factors such as predation, disease, organized slaughter and movement out of the Park play a large part in minimizing increases in population by recruitment. The following discussion is presented to indicate the importance of each factor.

(a) Predation - The only predator that is of any significance in the bison range is the timber wolf, Canis lupus occidentalis. Six wolves were sighted on Lake Claire and another group of wolves were sighted at a fresh kill of one bison east of Copp Lake. One individual was sighted near a herd of bison in the 27th baseline area. Wolf studies on part of the bison range known locally as the Salt Plains have shown that there is a very low population of wolves in the area. These various observations tend to indicate that predation by wolves is not heavy at present though efforts should be continued in their control.

(b) Disease - The disease factor has been outlined in detail by Stevens (1954). The major diseases involved are tuberculosis and Bang's disease. Previous years of testing and autopsy have shown that tuberculosis infection ranges from 15 per cent to 45 per cent in various herds. The incidence of Bang's disease is yet to be determined. The elimination of these disease factors should continue to be one of the prime requisites in any slaughter-

ing operation to be carried out in Wood Buffalo Park.

(c) Organized Slaughter - Population reduction by organized slaughter has accounted for 1,971 animals since the last full-scale census by Fuller in 1949. This kill is at present a small fraction of the annual increment.

(d) Movement Out of the Park - This feature will be fully discussed in a later chapter. However, a considerable increase in population has occurred outside of the Park and must be attributed to movements or migration from the Park. It is presently apparent that all factors combined have not been of enough magnitude to prevent an increase in the bison population. Each factor is to a certain degree measurable and will be carefully observed in management of the bison herds.

Winter Distribution Within The Park

The major wintering range of bison in the Park remains to be the lowlands or meadows in the Lake Mamawi, Lake Claire and Baril Lake areas and extending north to the 60th parallel in a belt east of the Alberta Plateau to the Slave River. The most favourable part of this range on the basis of utilization appears to be the numerous levees formed by the Peace River. These levees consist of meadows bounded by heavy stands of spruce.

A distribution map, Figure 1, indicates the range and distribution of the bison. The most significant differences between the distribution of the bison in 1949 and in 1957 is the small number of animals in the western section of the Park west of Lake Claire, the foothills of the Caribou Mountains and west of the Ninshith Hills. Only a few individuals and small groups were

found in the Big Buffalo area. These individuals and groups are widely separated from any concentrations of bison within the Park. There is reason to believe that the scattered individuals found in the Big Buffalo Lake area are possibly Wood Bison and photographs on the ground were taken of one lone individual in the Nyarling River area which might validate this if some clear differentiation can be found.

It should be noted that only very small numbers of bison wintered around the Hay Camp area as shown on the distribution map, Figure 1. This area was subjected to a great deal of hunting pressure from the slaughtering operations of previous years. A population of 3000 animals was estimated by Stevens (1954) for that area.

The largest concentration of bison remains to be in the Lake Claire meadows, an area on the north shores of Claire and Baril Lakes. In the area south of the Peace River and north of the north shores of Claire and Baril Lakes the winter population is estimated to be 4,000 animals, based on our census. This concentration appears to be relatively stable from previous years. A further population of 1,000 animals is estimated to be in the area south of Lake Mamawi and east of Lake Claire.

Census of Bison Outside the Park

A census by the transect method was done in that area bounded by the 60th parallel on the south, the Little Buffalo River on the west, the Tethul and Taltson Rivers on the east, and terminated on a straight line from Fort Resolution east to

the Taltson River. The area involved was 3,593 square miles and the coverage in 11 transect lines was 903 square miles or 1/3.98 of the total.

The number of bison counted was 664 and the total population of the area on the basis of the fraction of the area covered was calculated to be 2,643 animals. Observations of numerous bison outside of the strips would indicate that the total figure is reliable. SRL

The figure of 2,643 animals in the outlined area is much above that indicated by Fuller (1950) who estimated a population of 500 animals. This area is a favourable habitat for bison, resembling to a large extent the meadows in the Lake Claire area. The winter distribution of these herds is shown on a map, Figure 2. A large part of the animals are east of the Slave River and some distance from the Park boundary. It is the opinion of the writer that the majority of the bison have moved north along the lowlands east of the Plateau to their present territory and will remain in this territory. As winter residents outside of the Park and in the Northwest Territories they are vulnerable to hunting pressure and as a result should receive some consideration for management.

Other Observations Outside the Park

In the course of travelling between transects, 65 bison were counted east of the Embarras River, on the Alberta side. These had not penetrated far east of the river and it is likely they would return to the Park in the spring.

While at 5th Meridian, in the latter part of March, the writer was informed that a large herd of bison had gone west of the Park boundary in 1926 and were still to be found in the vicinity of the Wabiskaw River. A flight was made into the area and the search extended to the foothills of the Buffalo Head Hills without any sign of the bison being seen. On the return trip to 5th Meridian six bison were seen north of the Peace River west of Wentzel River. The fate of the 400 bison reported and recorded by Fuller (1950) in this area is not known, therefore, they are not included in the count at this time.

Summary

1. An aerial strip census of bison in Wood Buffalo Park and surrounding areas was made in late February and early March of 1957. The transect strips were 8 miles apart and the observation width was 1 mile on each side of the strip at an altitude of 2000 feet above the ground.

2. A total of 2,089 miles was flown in observation covering an area of 4,178 square miles. In this area 2,988 bison were counted and the total population of bison within the Park was calculated to be 11,763 animals. This is an increase from 1949 of approximately 2,500 animals.

3. The increment for the last breeding season was found to be quite high, the seasonal weighted average being 20.6 per cent. This is higher than the 15 per cent found by Fuller (1950) on counts of herds having calves.

4. The winter distribution of bison shows that the

area east of the Caribou Mountains is largely unoccupied as is the area west of Lake Claire to Fifth Meridian. The Big Buffalo Lake and Nyarling River region is very sparsely populated. The major concentration of bison was found to be in the Lake Claire meadows and a population of 4,000 animals is estimated for that area. The area in the vicinity of the Hay Camp is almost completely devoid of bison where Stevens (1954) had estimated 3,000 animals at that time.

5. The population of bison in the Northwest Territories east of the Little Buffalo River is estimated to be 2,643 animals. This was based on a coverage of the area by an aerial strip count in which 1/3.98 of the area was censused and 664 animals counted. The total arrived at is much in excess of the figure of 500 recorded by Fuller (1950) for this area. It is believed that this population will remain outside of the Park boundary throughout the year. SRL

6. The total number of bison estimated to exist throughout the bison range is between 14,00 - 16,000 animals. In the period of 8 years between counts this is an increase of approximately 4,500 over the estimate by Fuller.

Recommendations

1. The kill of bison in organized hunts totalled 1,971 animals since 1949 to the present. This kill appears to have made no inroad into the bison population since it has apparently increased in spite of the hunts and other factors tending to reduce the population. Therefore, the present level

of hunting of 400 - 500 animals annually can be continued without depletion on a sustained yield basis, barring unforseen circumstances.

The present population in the vicinity of the Sweetgrass abattoir site is substantial and attempts should be made not to deplete the local concentration as seems to have occurred in the Hay Camp area.

2. The population of bison between the Little Buffalo River and the Taltson River in the Northwest Territories is worthy of some consideration. At present they are subject to hunting pressure by holders of general hunting and trapping licences and are utilized by them, in some case, in an adverse manner. It is the opinion of the writer that a pronounced reduction in this population can be made by indiscriminate hunting, and that the privilege of hunting bison in the Northwest Territories be revoked until some method of properly utilizing this resource can be established.

SRV

3. The sampling method used for this survey should be continued in subsequent surveys for the purpose of estimating populations of bison. Some attempt should be made to establish a proper interval of time between surveys and it is recommended that a 5 year period be used. Allowance should be made, however, for calf counts and area counts on a yearly basis.

Literature Cited

Cox, Constance E., 1954 - Handbook on Statistical Methods - Department of Agriculture, Canada. December, 1954.

Fuller, W. A. - Aerial Census of Northern Bison in Wood Buffalo Park and Vicinity. Journal Wildlife Management, Vol. 14, No. 4, October, 1950, pp. 445 - 451.

Soper, J. Dewey, 1941 - History, Range and Home Life of the Northern Bison. Ecological Monographs, Vol. 11, October 1941, pp. 347 - 412.

Stevens, W. E., 1954 - Bison Report. Unpublished. Department of Northern Affairs and National Resources, September, 1954.

GREAT SLAVE
N.W. 60/116

NATIONAL TOPOGRAPHIC SYSTEM

CANADA
DEPARTMENT OF
MINES AND TECHNICAL SURVEYS
SURVEYS AND MAPPING BRANCH
(Rae 85 N.W. and 85 N.E.)

FOURTH EDITION

SHEET 85 S.E.

HYPSOMETRIC TINTS
HIGHEST KNOWN ELEVATION
60° 00' N
114° 55' W
1050
609 2000
305 1000
0 Sea Level

GREAT SLAVE LAKE
WOOD BUFFALO PARK
BUFFALO LAKE
Lonely Bay
Iles Bay
Hearne Channel
CARIBOU ISLANDS
Iles Basses
Gros Cap
Mirage Pt
Gypsum Pt
Bloomfield Pt
Hardisty I
Long I
Northwest Pt
Moraine Pt
Caribou Pt
Jones Pt
Sulphur Bay
Windy B
Windy Pt
Burnt Pt
Slave Bay
Slave Pt
Jackson Islands
WILSON ISLAND
Inconnu Channel
SIMPSON ISLANDS
Union Island
Hornby Channel
BLANCHET I
Westhead Islands
Seton I
Keith
ILES DU LARGE
Outpost Islands
Butte I
Iron Is
Iles du Goulet
PREBLE ISLAND
La Loche R
Petitot Islands
Les Iles Terribles
Thubun Lakes
Thubun River
Grant Pt
Willow Pt
William Pt
Driftwood
Gaudet Bay
Taltson Bay
Rocher River
Jean River
Nagle Chan
Nagle B
Moose Deer I
Mission I
Round I
Fort Resolution
Loutit I
Ring L
TALTSON Channel
Rat River
Oracha Falls
McConnell
Resolution Bay
Burnt Is
Birch I
Green Islands
Pine Pt
Dawson Landing
Paulette
Salt L
Deskenatbata Lake
SLAVE RIVER
Hanbury Creek
Pine Point
Swampy Lakes
Little Buffalo River
Hook Lake
Pte Ennuyeuse
Long Island
Vale I
Hay River
MACKENZIE HIGHWAY
HAY RIVER
Sandy River
Birch Ck
Buffalo River
High Pt
False Pt
Fish Pt
Breynat Pt
Sulphur Pt
Presqu'ile Pt
WINTER ROAD
34th Base Line
Snake Creek
Deschaine L
Needle L
Copp Lake
Hawkes L
Skillet L
Buffalo River
Nyarling River
Bear Creek
Kleweé
Sass R
Pichle Creek
Tetcho River
Brûlé Pt
Grand Detour
Rat River
Salt River
Salt R
Sawmill I
Cunningham Landing
Bell Rock
Yates River
Tsu Tsaut'ezondi R
Tousangeau Ck
Buchan Lake
NORTHWEST TERRITORIES (DISTRICT OF MACKENZIE)
ALBERTA

27
26
25
24
23
22
21
20
19
18

(Providence 85 S.W.)
(Fort Smith - Nonacho 75 S.W.)

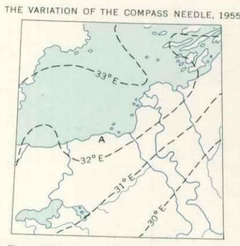
Base Map, 4th Edition 1959

(Fort Vermilion 84 N.E.)

Kilometres 10 0 20 40 60 80 100 Kilometres
Nautical Miles 5 0 10 20 30 40 50 Nautical Miles
Statute Miles 5 0 10 20 30 40 50 60 Statute Miles

SCALE 1:500,000

THE VARIATION OF THE COMPASS NEEDLE, 1955



The variation of the compass needle at any place along a broken line is the variation given on that broken line. At other places the variation is between those given on the neighbouring broken lines; thus at the place marked A, the variation is between 32°E and 33°E. The variation of the compass needle is decreasing about 7 minutes annually.

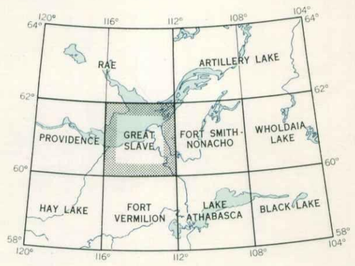
REFERENCE

- Boundary: Provincial
- Boundary: Park
- Surveyed Line
- Main Highway
- Secondary Road
- Trail
- 1000 Contours
- Gravel, Sand or Mud
- Marsh or Swamp
- Rapids or Falls
- Lake: Non - perennial
- Stream: Non - perennial
- O Town
- o Village or Settlement
- P Post Office
- TP Trading Post
- R.C.M.P. Post
- .850 Spot Elevation in Feet

Fig. 2. - Winter Distribution of Bison + outside W.B.P. Boundary.
(Copy)

Produced by the Surveys and Mapping Branch, Department of Mines and Technical Surveys, Ottawa, Canada. Copies may be obtained from the Map Distribution Office, at 25 cents each.

GREAT SLAVE N.W. 60/116
NORTHWEST TERRITORIES (DISTRICT OF MACKENZIE)



INDEX TO ADJOINING SHEETS

SHEET 85 S.E.

Canada

Department of Mines and Resources

SURVEYS AND ENGINEERING BRANCH

HYDROGRAPHIC AND MAP SERVICE

WOOD BUFFALO PARK

ALBERTA AND NORTHWEST TERRITORIES

(PRELIMINARY EDITION)

Scale 8 miles to 1 inch or 1:506,880

Miles 4 0 4 8 12 16 20 24 28 Miles

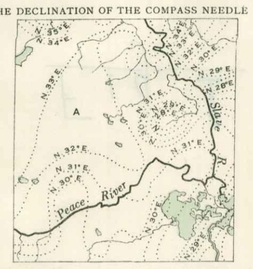
Datum is mean sea level

NOTE: The boundary of the park follows the centre of the main channel of the Athabaska River, the Embarras River, the Rivière des Rochers and the Slave River.

Price 25 cents

Reproduced from the eight mile sheets of the National Topographic Series at the Hydrographic and Map Service, Labelle Building, Ottawa, 1947, where additional copies may be obtained.

THE DECLINATION OF THE COMPASS NEEDLE 1940



The declination of the compass needle at any place along a dotted line is the declination given on that dotted line. At other places the declination is between those given on the neighbouring dotted lines; thus at the place marked A, because it is halfway between the two dotted lines marked N. 32° E. and N. 33° E., the declination of the compass needle is N. 32° 30' E.

The declination of the compass needle is decreasing 7 minutes annually.

The complete area is covered by trimetrogon photography.

REFERENCE

- *Boundary: provincial*
- *" Wood Buffalo Park*
- *Surveyed line*
- *Town or village*
- *Settlement* ■ *Cabin* C ■
- *Wagon road*
- *Marsh or swamp*
- *Rapids and falls with drop in feet* 25
- *Lookout tower* 1 *with telephone or radio* r1
- *Ranger cabin* 3 *with telephone or radio* r3
- *Wireless station with call letters* CY4F
- *Height in feet* 2941

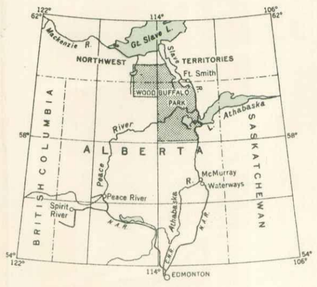


Fig 1. Winter Distribution of Bison - 1957.
(copy)

TITLE

DATE LOANED	BORROWER'S NAME