Government of Northwest Territories
Gouvernement des Territoires du Nord-Ouest

Surveys of the Nahanni Wood Bison Population 2002-2018

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Environment and Natural Resources
Government of the Northwest Territories

2021

Manuscript Report No. 294

A TRIBUTE TO DANNY ALLAIRE

The sudden passing of Danny Allaire (ENR Fort Simpson) on 12 January 2019 closed a chapter of the Dehcho Bison Program. From the inception of the program in 2002, Danny was a key component of its success. After being trained to classify bison into different sex and age classes Danny constantly worked at honing this craft and mentored others in it. Danny loved field work and being out on the land. He was an active participant in all 17 summer river surveys conducted from 2002-2018, including being responsible for all aspects of the 2008 and 2012 surveys. He completed all GIS applications and maps for the river surveys and the three population surveys, for which he was also an observer in the aircraft. Danny has left a lasting legacy of commitment and dedication to wood bison conservation. He will be greatly missed.

ABSTRACT

River-based classification surveys were conducted in the month of July annually from 2002 to 2018. Bison were classified into seven different and recognizable sex and age classes: calf, yearling, ≥2 year-old females, and four classes of males (B1-B4). Number of bison classified ranged from 112 to 360 and increased over time. Calf production, estimated by the number of calves per 100 ≥2year-old females, varied annually ranging from 27.8-64.7 and showed an increasing trend. Overwinter survival of calves ranged from 13.2-88.5% and showed a decreasing trend. Winter 2015-2016 had by far the lowest overwinter survival and was characterized by an extreme late winter freeze-thaw event. Only two yearlings were observed during the 2016 classification survey. Aerial surveys to estimate population size were conducted in March in 2004, 2011, and 2017. The number of animals observed was highest in 2017. We used individual collared bison to derive a sightability correction factor for transects flown over forested habitat. The estimated non-calf population (±95% CI) was 511±202, 408±197, and 962±367 for the 2004, 2011, and 2017 surveys respectively, showing a positive trend.

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INTRODUCTION

The Nahanni wood bison population was established in 1980, when an initial 28 wood bison from Elk Island National Park (EINP) were released into the Nahanni Butte area near the Mackenzie Mountains of the southwestern Northwest Territories (NWT) (Gates et al. 2001). Supplemental releases in 1989 and 1998 bolstered the population. Non-repeatable aerial surveys of primary bison range were conducted in 1995, 1996, and 1997 to monitor the population and to generate a minimum population estimate (Larter and Allaire 2007). In 1998 the Nahanni population was estimated to number *ca*. 160 individuals (Gates et al. 2001). Currently the population inhabits an area of *ca.* 10,000km^2 in the southwestern NWT, southeastern Yukon Territory (YT), and northeastern British Columbia (BC). The Liard River and its tributaries bisect the range.

One of the recommendations from a regional wildlife workshop held in Fort Simpson in 2002 was to establish a program to monitor the Nahanni wood bison population (Larter 2002). Residents in the communities of Fort Liard and Nahanni Butte were concerned about the lack of monitoring of the newly established wood bison population and the need for a current population estimate. Surveys were an integral part of the wood bison program. Sex and age classification surveys were to be conducted annually. An aerial survey to estimate population size was to be conducted as soon as possible, with future surveys to be conducted with a ≥5-year periodicity. A more detailed description of the Nahanni bison program can be found in Larter and Allaire (2007).

This report provides the results from all 17 sex and age classification surveys and all three population surveys conducted during 2002-2018. The results of the 2004 and 2011 population surveys have been published previously, (Larter et al. 2007; Larter and Allaire 2013), however after the survey in 2017 a reanalysis of all three surveys was undertaken and an estimate of population trend was made. This report provides details of the reanalysis and integrates the classification survey results into the discussion of the Nahanni wood bison population.

METHODS

Sex and Age Classification Surveys

River surveys were scheduled for roughly the third week in July after the freshet and before river water levels were too low to limit travel to the main river channels (see Appendix A for dates and water levels). One driver and ≥2 observers used a 22' welded aluminum boat with a 125hp outboard motor for the surveys. Most surveys covered the Liard River from Sandy Creek to Blackstone, including all accessible river islands, and a portion of the South Nahanni river no further than "The Splits". On only two occasions was the Netla River included in the survey (Figure 1). Each annual survey route was tracked with handheld GPS and waypoints were made for all observations of wildlife. A more detailed description of the river survey methodology is provided in Larter and Allaire (2007). We recorded the noon water levels in front of the community of Fort Liard for all days of the survey from the Environment Canada water station 10ED001. Any bison observed during road travel to and from Fort Liard or Blackstone were classified and included in the survey results.

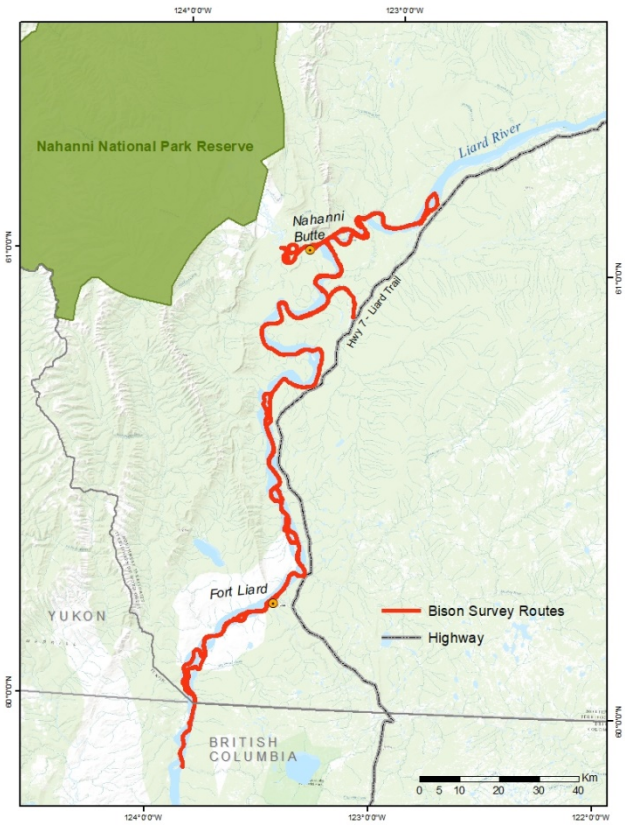


Figure 1: The cumulative extent of survey routes from 17 river surveys (2002-2018).

Bison were classified into seven different sex and age classes based upon body size, pelage, horn shape and horn wear (following Fuller 1959; Komers et al. 1992; Larter and Gates 1994; see Appendix B):

1) Calves – Young of the year of both sexes, typically being born in April-May. Their reddish-tan coats turn dark chocolate brown at about three months of age and by four to six months horn nubs may be visible.

2) Yearlings – Animals 12 to 18 months old of both sexes with spike shaped horns of 10-30 cm in length. Body size is smaller than adult females.

3) Cows or adult females – Animals of two years and older. Their horns are more slender than those of all males and have a pronounced recurve toward the middle line of the skull resulting in a distinct S-shape in older cows. The front of the skull is narrower than that of adult males.

4) B1 males or juvenile bulls – Animals two to three years of age. Body size is similar to or slightly smaller than cows however the horn base is wider than cows. The horns point upward or outwards and always point away from each other.

5) B2 males or sub-adult bulls – Animals four to six years of age. Body size ranges between that of cows and adult bulls. Horn base is wider than cows and the horns point straight up or towards the middle line of the skull (Fuller's (1959) "spike-horn" males). The hair on the head and shoulders is shorter than in adult bulls.

6) B3 males or young-mature adult bulls – Animals of seven to 12 years of age. Body size is much larger than cows. Horns are curved toward the middle line of the skull and may show the start of wear on the tips. Hair on the chest and head is fully developed leaving no open space between the horns.

7) B4 males or old-mature adult bulls – Animals of at least ten years of age. The distinction between B3 males is the noticeable wear on the horns, often resulting in wide blunt ends.

For each year we calculated the number of calves, yearlings, and mature males (B3+B4) per 100 adult females. The number of calves per 100 adult females was used as a surrogate for productivity. We calculated the overwinter survival of calves by dividing the number of yearlings per 100 adult females in a given year by the number of calves per 100 adult females during the previous year.

Aerial Population Surveys

Line transect surveys were conducted in the month of March in 2004, 2011, and 2017 on the winter range of Nahanni population. We used a Cessna 185 fixed-wing aircraft and a strip-transect technique with the transect being the sample unit (Norton-Griffiths 1978). The plane flew at an elevation of 122 m (400 feet) above ground level and attempted to maintain a flight speed of *ca*. 160 km/h. We flew predetermined parallel line transects over the survey area with transect spacing between *ca.* 3.5-4.5 km. Wing struts of the aircraft were marked so that a 500 m wide strip on both sides of the aircraft could be used as the sample unit. The survey crew consisted of a pilot, a navigator/recorder and two observers. We recorded all bison, and any other wildlife, observed whether inside or outside of the 500 m strips. Larger groups of bison were photographed to verify numbers. We estimated population size using the Jolly (1969) method for unequal sized sampling units, following Norton-Griffiths (1978), found in the aerial survey methods of quadrat sampling in Krebs (2011) to generate population estimates. Starting in 2011 we used a spaghetti transect to complete a total count of bison on the access road to the Liard Highway and its right of way (1.5 km wide) south to km 118 on the BC side of the border.

2004 Survey

A detailed accounting of the survey and results can be found in Larter et al. (2007). The survey was flown 22-23 March, 2004. Weather conditions were generally clear and calm. All of the 60 planned line transects were flown; 1,288 km of transect line and over 12 hours of flying (Figure 2). No sightability correction factor was used for the population estimate of non-calf animals.

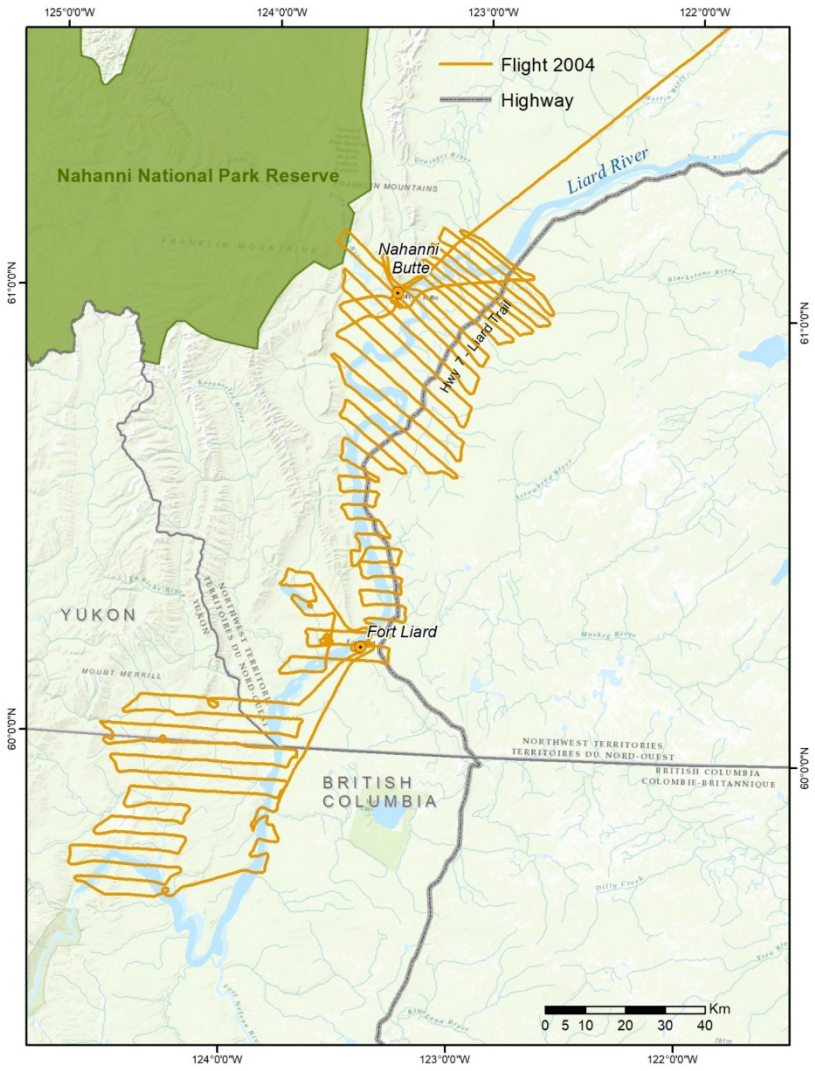


Figure 2: Flight lines for the 2004 Nahanni bison aerial survey.

2011 Survey

The survey area for 2011 added more of the Liard Valley to the east of the river and more area in BC than the 2004 survey. The survey was flown 15-17 March, 2011. Weather conditions were generally clear and calm with some local wind gusts of 20km/hr. All of the 55 planned line transects were flown; 2,155 km of transect line and over 19 hours of flying (Figure 3). An *a posteriori* sightability correction factor was derived from observations of collared bison during the survey. Transects flown over densely forested habitat had a visibility swath of 200m (100m either side of the aircraft). This correction factor was incorporated into the population estimate of total animals. A detailed accounting of the survey area, sightability correction, and results can be found in Larter and Allaire (2013).

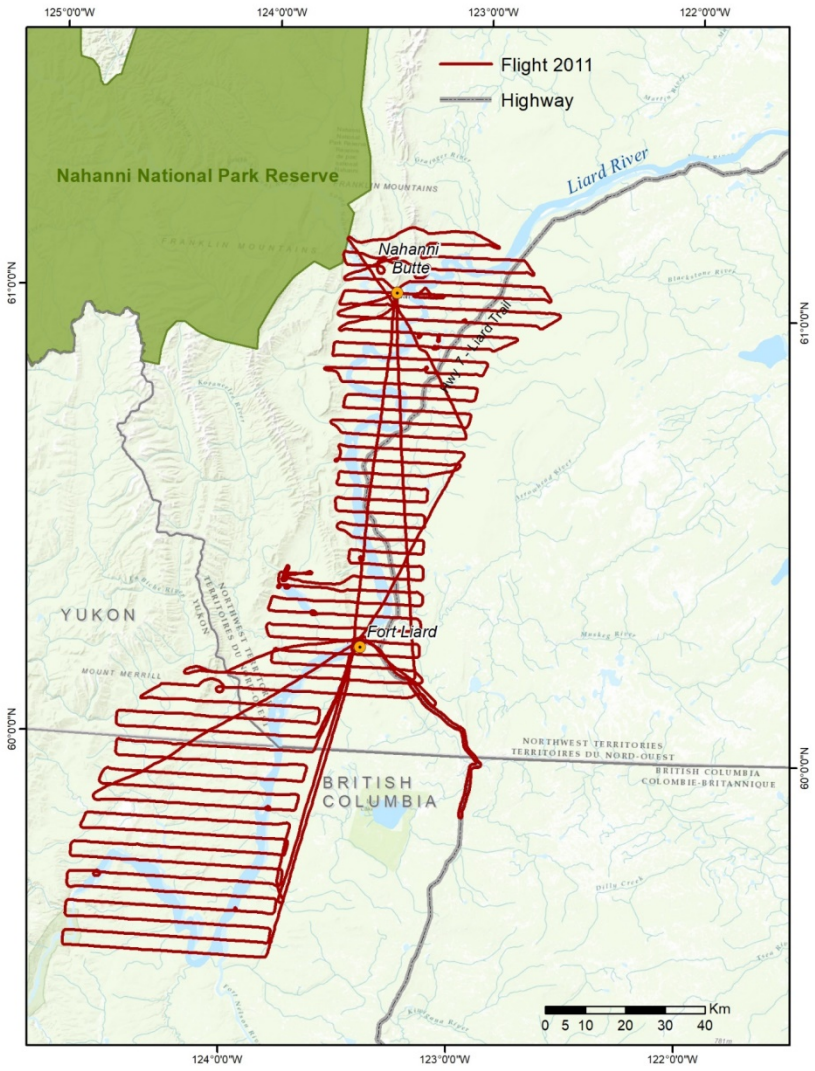


Figure 3: Flight lines for the 2011 Nahanni bison survey.

2017 Survey

The survey area for 2017 added a portion of the Kotaneelee River Valley to the west and to the northeast added the Liard River from Blackstone to Poplar River. The survey was conducted during 15-21 March, 2017. Three days were lost due to blizzard conditions or aircraft mechanical issues. Weather conditions on the four days when flying was possible were good to excellent for counting wildlife. Of the planned 67 transects, 63 were flown, covering 2,200 km of line transect in over 21 hours of flying (Figure 4). Additional collared bison were used to refine the *a posteriori* sightability correction factor. Again, the visibility in closed forested habitat was determined to be 100 m either side of the aircraft. This correction factor was incorporated into the population estimate of non-calf animals. A brief report of the survey can be found in Larter (2017).

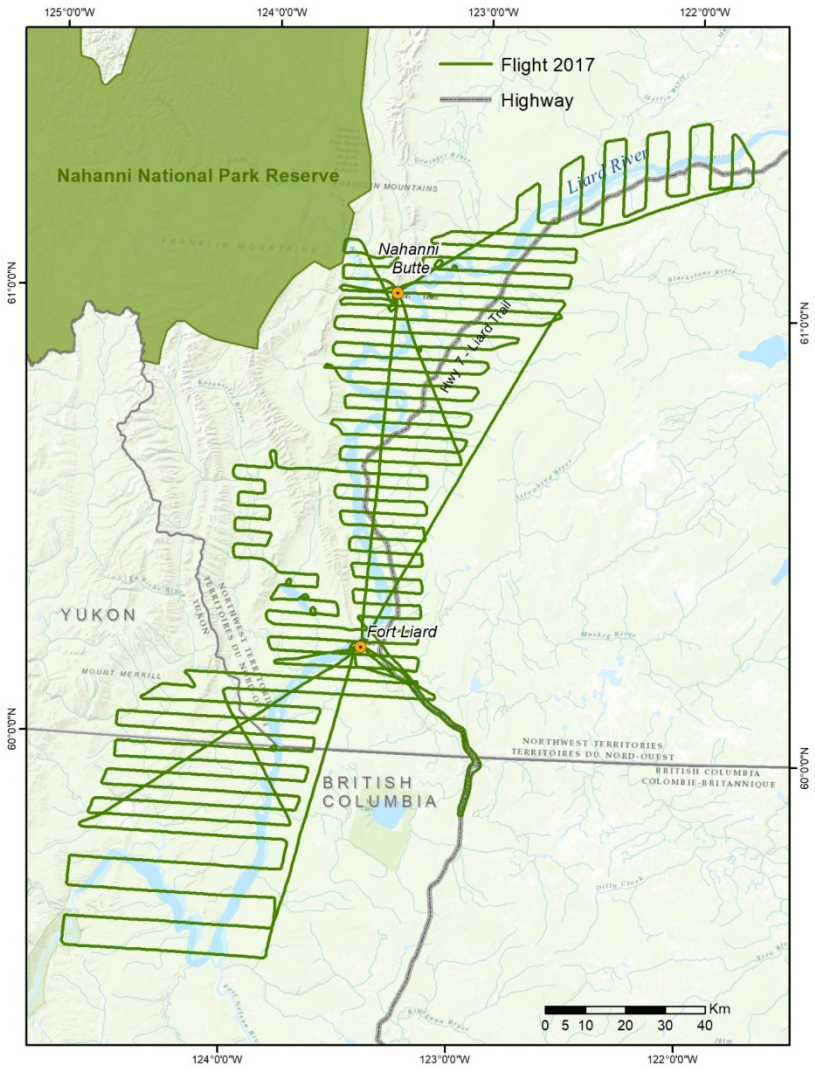


Figure 4: Flight lines for the 2017 Nahanni bison survey.

Reanalysis and Determination of Trend

Population surveys were reanalyzed to provide a best estimate of animals that had been recruited into the population, and provide a trend in that recruited population size over time. There is a reasonably high probability that some calf bison can be missed during surveys which would add more variability to total animals versus a non-calf estimate. It is also important to note that in 2015-2016 there was high late-winter mortality caused by unseasonably high temperatures (+10°C) followed by an extended period of freezing temperatures in March and April of that year. Forage was covered by a virtually impenetrable cover of snow and ice. As a result, there were almost no yearlings observed during the July 2016 river survey. The 2017 survey was analyzed and the 2004 and 2011 surveys were reanalyzed to derive non-calf estimates. Additionally, the 2004 survey was reanalyzed using the same *a posteriori* sightability correction factor used for the 2011 and

2017 surveys. All analyses used AERIAL CENSUS – Method 2 (Program AERIAL, Version 7.2), Krebs Ecological Methodology Software.

RESULTS

Sex and Age Classification Surveys

Seventeen surveys were conducted from 2002-2018 (see Appendix C). Two surveys were truncated at the BC border due to inclement weather (2003 and 2018). All but three of the remaining surveys went as far south as Sandy Creek (59° 51.34'N X 123° 50.19'W). Starting in 2008 most surveys circled the islands north of Blackstone (exceptions being 2012 and 2014). Equipment problems prevented the 2014 survey from covering approximately 65 km of the Liard River between Flett Rapids and Netla River (Figure. 1).

In high water years (>5.5m at water station 10ED001) many of the sandbars and island shorelines were submerged by water. In most years water levels permitted surveying the river and most river islands. In low water years some islands were missed by the survey because water channels were too low for the boat.

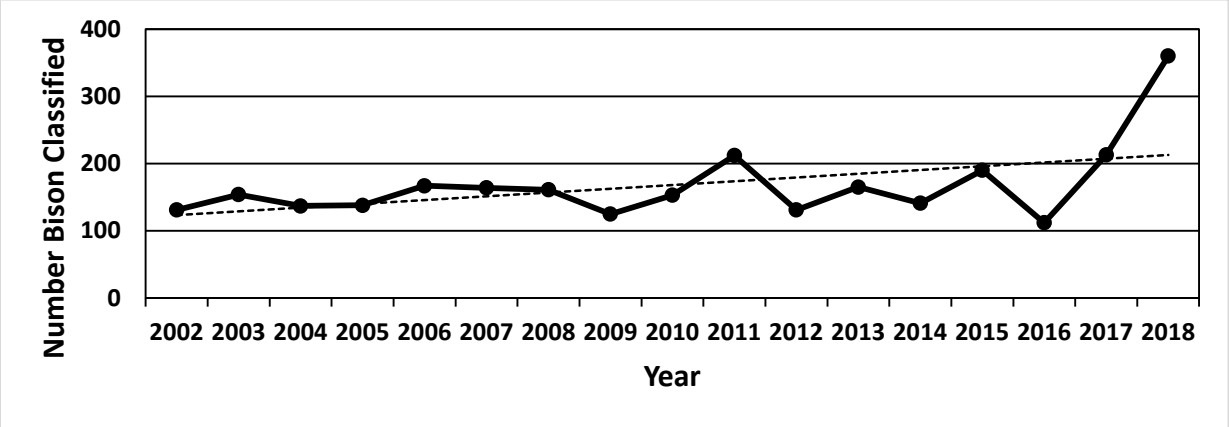
The number of bison classified ranged from 112-360 (mean 168, median 154) with generally more bison being observed during surveys in 2015-2018 (Figure 5A). More animals were observed on the 2018 river survey than the 2017 aerial population survey. Larger groups of bison were seen more frequently during the 2018 survey (Appendix C).

The number of calves per 100 adult females ranged from 27.8-64.7 (mean 42.6, median 42.9) and was fairly consistent over time showing a minimal increasing trend (Figure 5B).

The number of mature males per 100 adult females ranged from 30.1-71.9 (mean 48.5, median 53.6). Numbers have shown annual variability and a slightly decreasing trend over time (Figure 5C).

The number of yearlings per 100 adult females showed more annual variability ranging from 4.4-36.5 (mean 21.9, median 24.1) but showed no trend over time (Figure 6A). Overwinter survival of calves showed somewhat more annual variability ranging from 13.2-88.5% (mean 53.0%, median 53.6%), and showed a decreasing trend over time. Winters 2011-2012 and 2015-2016 had particularly poor overwinter survival of calves (Figure 6B).

a



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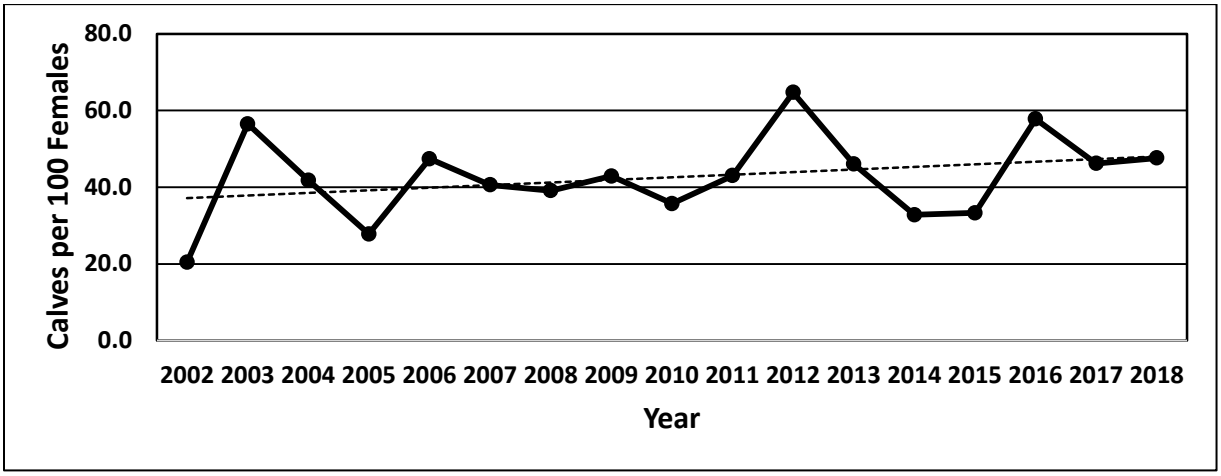

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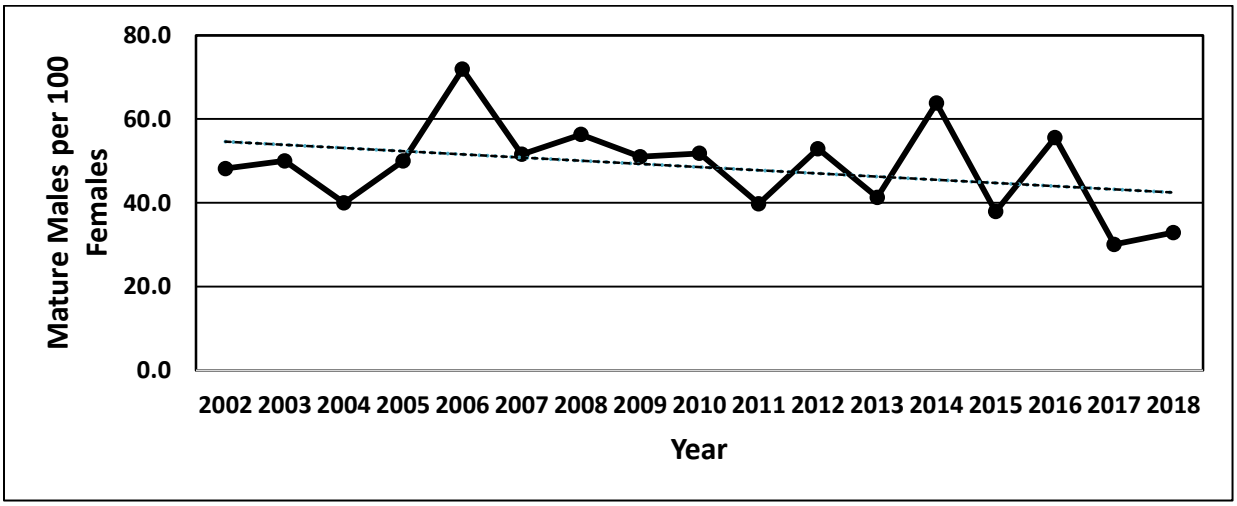
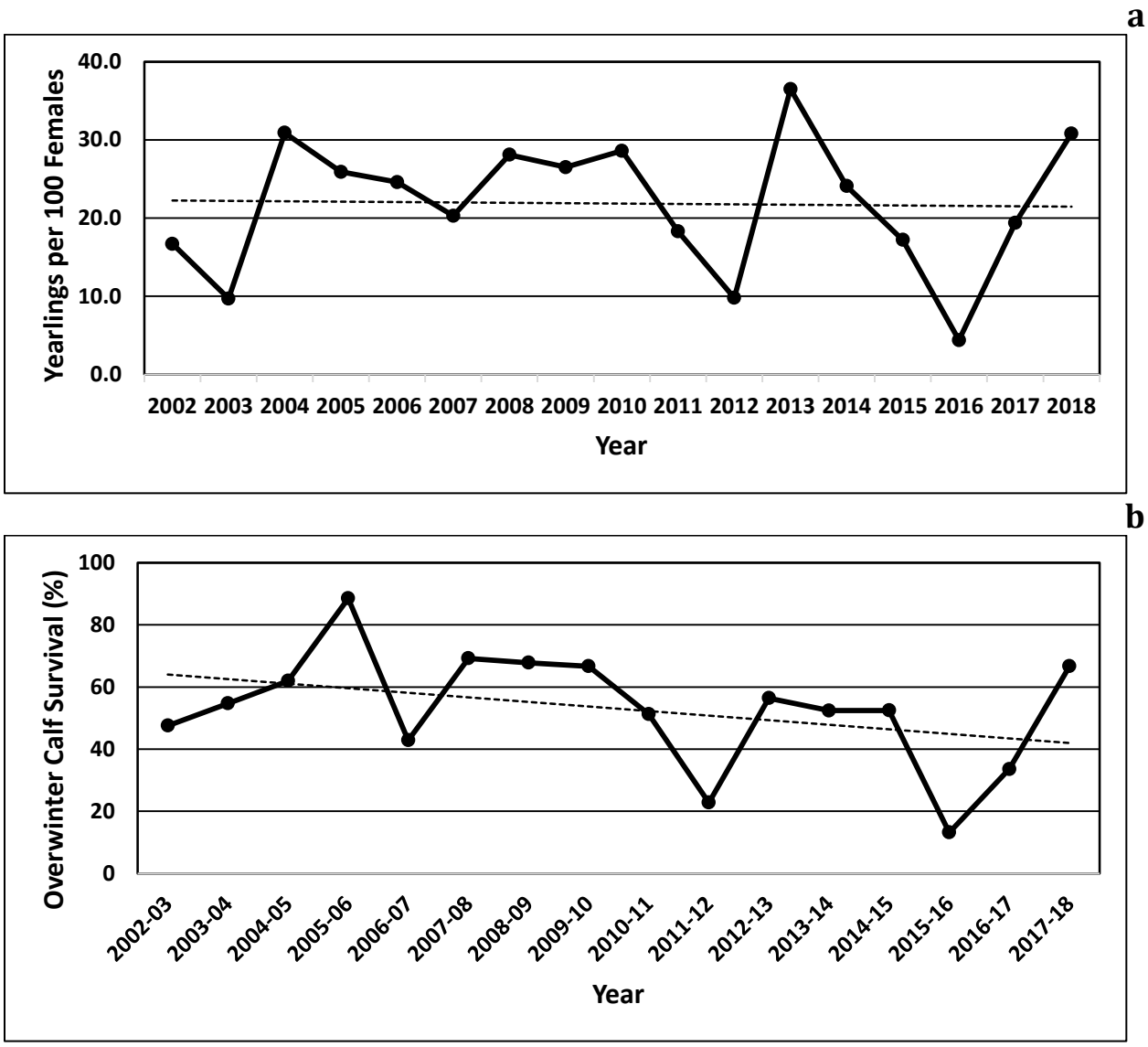


Figures 5 a-c: The number of Nahanni bison classified, calves and mature males per 100 adult female bison.



Figures 6 a-b: The number of yearlings per 100 adult female Nahanni bison and the overwinter survival (%) of calves.

Other wildlife species observed during the surveys were black bears (n=14; with half of them observed swimming the Liard River), beaver (n=6), moose (n=3), fox (n=3), wolves (n=2), and single observations of wolverine, coyote, and white-tailed deer.

Aerial Population Surveys

2004 Survey

The survey area was 4,926km^2, with 68% of the area in the NWT (Table 1). A total of 117 bison, including one calf, were observed, all in the NWT (Table 2). A total of 48 moose were observed.

Table 1: The area surveyed in each jurisdiction (not including the Liard Highway right-of-way total count) and the percent of Nahanni bison observed in each jurisdiction for the three surveys.

Survey Year	Area (km^2) Surveyed	NWT Area Surveyed	BC Area Surveyed	YT Area Surveyed	% of all bison observed in NWT/BC/YT
2004	4,926.0	3,350.0	1,097.0	479.0	100/0/0
2011	7,518.9	4,243.2	2,791.7	484.0	97/3/0
2017	8,120.8	5,640.1	1,963.5	517.2	74/26/0

Table 2: The total number of Nahanni bison observed (number of calves), the number of non-calves and calves observed on transect and the non-calf population estimate (±95% CI).

Survey Year	Total Bison Observed	Non-calves on-Transect	Calves on-Transect	Non-calf Population Estimate (±95% CI)
2004	117 (1)	101	1	511±202
2011	198 (12)	93	5	408±197
2017	296 (47)	185	40	962±367

2011 Survey

The survey area was 7,518.9 km^2 (not including the Liard Highway right-of-way), with 56% of the area in the NWT (Table 1). A total of 198 bison, including 12 calves, were observed. Two groups, totaling six bison were observed in BC; all other bison were observed in the NWT (Table 2). A total of 79 moose and one otter were observed.

2017 Survey

The survey area was 8,120.8 km^2 (not including the Liard Highway right-of-way), with 69% of the area in the NWT (Table 1). A total of 296 bison, including 47 calves, were observed. For the first time bison were observed in the Kotaneelee River Valley. A total of 77 bison were observed in BC; all other bison were observed in the NWT (Table 2). More bison and groups of bison were observed in 2017 than in any of the previous surveys. A total of 58 moose and four boreal caribou were observed.

Reanalysis and Determination of Trend

The reanalysis of the 2004 survey resulted in an estimate of non-calf animals that was greater than originally reported, 511±202 (±95% CI; Figure 7.). The reanalysis of the 2011 survey resulted in an estimate lower than originally reported, 408±197 (±95% CI; Figure 7). The results show an increasing trend in the number of non-calf animals from 2004 to 2017.

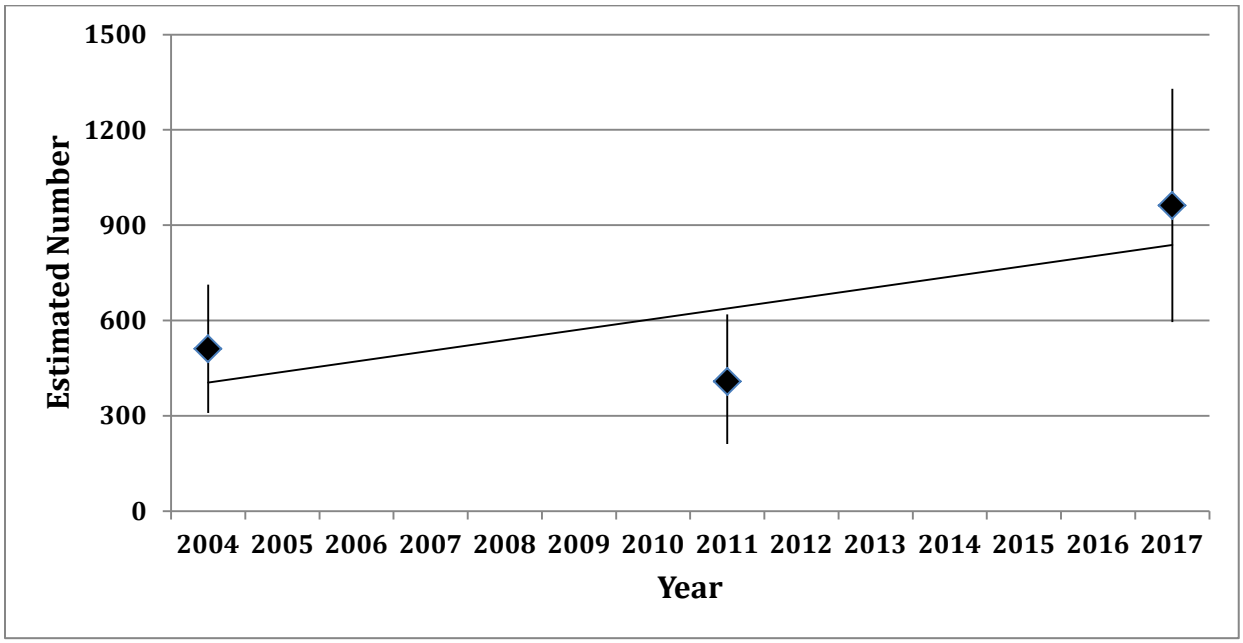


Figure 7: Nahanni wood bison population survey results for 2004, 2011, and 2017. Error bars are 95% confidence limits.

DISCUSSION

Sex and Age Classification Surveys

The Government of the Northwest Territories (GNWT) pioneered the seven sex and age classification system for wood bison in the 1980s publishing a brochure with photo descriptions for distribution to tourists. The system has been widely used throughout the NWT and by neighbouring jurisdictions where wood bison range. Because the summer river classification survey used a boat capable of carrying eight people, ENR Fort Simpson actively solicited participation by wildlife staff from the NWT and adjacent jurisdictions. Many different GNWT staff, in addition to Danny Allaire and the author, participated in early surveys (2002-2008). Staff from BC, Alberta and YT participated in all but two surveys from 2009-2018; in 2013 Danny Allaire and the author were invited to assist the BC wildlife staff in classifying the Norquist population near Liard Hot Springs. These joint ventures ensured consistency in classifying bison between different jurisdictions and facilitated communication about bison programs between jurisdictions, extremely useful when dealing with shared and newly established wood bison populations.

The 17-year time series of different demographic parameters has used the same methodology and consistency in observers making the sex and age classifications. The surveys have covered substantially the same route and have been conducted at similar dates after the freshet. The only real differences between surveys have been the river depth (Appendix A), however whether this might bias the sample of bison observed is unknown. Therefore, each survey should represent a comparable sample.

Aerial Population Surveys

Since its establishment in 1980, the Nahanni wood bison population has increased in number, the amount of range it occupies, and has become an important component of the National Recovery Strategy for wood bison in Canada. Larter et al. (2000) described the recolonization of the Mackenzie wood bison population as occurring through “a series of increases in local areas followed by pulses of dispersal and range expansion”. It is possible a similar situation occurred with the Nahanni population. Nahanni bison were rarely seen north and east of Blackstone River, however during summer 2014, many animals (≥60 including calves and a collared female) followed the Liard Highway right-of-way past Blackstone Territorial Park traveling up to the Poplar River bridge. Animals frequented the new area through the rest of the summer and because of this event the 2017 survey area was extended northwest to Poplar River. A similar event occurred in summer 2020 when many bison (≥60 including calves) followed the Liard Highway right-of-way to Checkpoint

and then followed the Mackenzie Highway right-of-way about 30 km north towards the Liard River ferry crossing. This was a larger pulse of area than that event in summer 2014. Future population surveys will need to consider an enlarged survey area from that in 2017.

Wood bison have a clumped distribution and open meadow habitats are widely dispersed across the landscape. Most observations are generally of smaller groups and the majority of transects have zero observations. This situation leads to population estimates with wide confidence intervals. The presence of one or two large groups on transect increases the standard error and decreases the precision of the point estimate. The coefficient of variation (CV) was 0.19 for the 2017 estimate, indicating a more precise estimate than for either of the 2004 (CV=0.32) and 2011 (CV=.25) surveys.

Based upon local observations, and the increase in range a moderate increase in population size from the 2011 to 2017 surveys was anticipated. The population estimate from the 2017 survey was 962 non-calf bison (95% confidence interval 595-1,329 bison), higher than anticipated, especially since the reanalysis had reduced the 2011 population estimate. There was a large increase in the Nahanni population from the 2011 to 2017. The instantaneous rate of growth (r) was 0.14, a rate attained by bison populations elsewhere. Analyzing the river survey data reveals a rate of growth of r=0.05 between 2004 and 2017. In recent years more bison and more larger groups have been observed (Figure 5A). The number of calves per 100 adult females has shown an increasing trend (Figure 5B). These values are also comparable to those reported in the Mackenzie wood bison population during a period when the population was increasing (Larter et al. 2000). The number of yearlings per 100 adult females reported from 2002-2018 is also similar to that reported for the Mackenze population (Larter 2000). Although there is a decreasing trend in the overwinter survival of calves from 2002-2018, average overwinter calf survival is 53% and all but the 2011-2012 (22.8%) and 2015-2016 (13.2%) overwinter survival estimates fall outside the range reported for the Mackenzie wood bison population.

There is little doubt that the Nahanni population increased in number since the first aerial population survey in 2004. With the 2017 population estimate nearing 1,000 bison and being higher than anticipated, there was renewed discussion about increasing harvest (the current harvest quota is seven adult males). Using the annual demographic information collected since 2002 with the population estimates derived from the three aerial surveys, it was decided that significant changes in Nahanni bison population mangement should not be made prior to a future aerial survey corroborated numbers of about 1,000 animals. It was recommended that the next aerial survey be conducted within the next four years (Larter 2017).

ACKNOWLEDGEMENTS

Many observers have assisted in the river and aerial surveys over the years including: Danny Allaire, Terry Armstrong, Floyd Bertrand, George Bertrand, Francis Betsaka, Tommy Betsaka, Bruce Dauphiné, Jim Deneron, Troy Ellsworth, Audrey Gagne-Delorme, Deborah Johnson, Tom Jung, Julie Kline, David Konisenta, Leon Konisenta, William Konisenta, Derwin Kotchea, Daniel Lirette, Peter Marcellais, Natalka Melnycky, Gavin More, Jack Mouye, John Nishi, Garrott Sassie, Michael Sassie, George Tsetso, Manny Vital, Raymond Vital, and Steve Vital. Their assistance is greatly appreciated.

Wolverine Air (2004 and 2011 surveys) and Simpson Air (2017 survey) have provided skillful piloting.

I appreciate the long-standing support of Nahanni Butte Dene Band and Acho Dene Koe Band for the Nahanni wood bison monitoring program.

I thank Bonnie Fournier and Patricia Lacroix for assistance with figures and formatting.

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APPENDIX A. The dates classification surveys were conducted and the range in noon water depth (M) at the Liard River across from Fort Liard (Station 10ED001).

Year of Survey	Dates of Survey	Range in Water Depth (m)
2002	12-17 July	5.58-6.11
2003	15-17 July	5.26-5.34
2004	19-21 July	4.39-4.44
2005	17-20 July	4.70-4.76
2006	17-20 July	4.66-5.10
2007	14-19 July	5.73-5.91
2008	20-23 July	5.21-5.56
2009	20-23 July	4.80-4.98
2010	19-23 July	3.94-4.10
2011	17-20 July	4.38-5.14
2012	16-18 July	4.30-4.50
2013	15-19 July	4.02-4.12
2014	14-17 July	5.30-5.45
2015	13-16 July	3.55-3.68
2016	17-20 July	4.21-4.48
2017	17-20 July	5.84-5.88
2018	15-18 July	3.81-3.95

APPENDIX B. Images showing the seven different sex and age classes of wood bison (reprinted from Larter and Allaire (2007)).

Cow, Cow, Calf

B4 (see broomed horn), B3

Cow, Yearling

Cow, B3, Cow, Yearling

B3, B2, Yearling, Cow, Cow, Calf

Yearling, B1

Cow, Calf, Cow

B3, B3, B1, B3, B3, B2

B2, B3

Appendix C. Bison sex and age classification results from annual surveys conducted 2002-2018. Adult (Ad.) females are ≥2-year-old females. Subadult males are B1 and B2 males. Mature males are B3 and B4 males. Overwinter survival is calculated for the preceding winter.

	2002	2003	2004	2005	2006	2007
# bison classified	131	154	137	138	167	164
# groups ≥ 10 bison incl. calves	4	7	3	4	4	8
# groups ≥ 20 bison incl. calves	2	2	3	3	4	1
# bison in largest group	42	39	48	27	42	37
# calves/100 ≥ adult females	20.4	56.5	41.8	27.8	47.4	40.6
# yearlings/100 adult females	16.7	9.7	30.9	25.9	24.6	20.3
# subadult males/100 ad. females	57.4	32.6	36.4	51.9	49.1	43.8
# mature males/100 ad. females	48.2	50.0	40.0	50.0	71.9	51.6
% overwinter calf survival		47.5	54.7	62.0	88.5	42.8

	2008	2009	2010	2011	2012	2013
# bison classified	161	125	153	212	131	165
# groups ≥ 10 bison incl. calves	5	4	6	4	3	5
# groups ≥ 20 bison incl. calves	4	3	2	3	2	4
# bison in largest group	35	38	39	65	51	34
# calves/100 ≥ adult females	39.1	42.9	35.7	43.0	64.7	46.0
# yearlings/100 adult females	28.1	26.5	28.6	18.3	9.8	36.5
# subadult males/100 ad. females	28.1	34.7	57.1	26.9	29.4	38.1
# mature males/100 ad. females	56.3	51.0	51.8	39.8	52.9	41.3
% overwinter calf survival	69.2	67.8	66.7	51.3	22.8	56.4

	2014	2015	2016	2017	2018	Mean
# bison classified	141	190	112	213	360	**168**
# groups ≥ 10 bison incl. calves	3	6	3	10	14	**5.5**
# groups ≥ 20 bison incl. calves	1	4	3	4	8	**3.1**
# bison in largest group	35	50	29	30	51	**40.7**
# calves/100 ≥ adult females	32.8	33.3	57.8	46.2	47.6	**42.6**
# yearlings/100 adult females	24.1	17.2	4.4	19.4	30.8	**21.9**
# subadult males/100 ad. females	22.4	29.9	31.1	32.3	40.6	**37.8**
# mature males/100 ad. females	63.8	37.9	55.6	30.1	32.9	**48.5**
% overwinter calf survival	52.4	52.4	13.2	33.6	66.7	**53.0**

Appendix D. List of transect lines, total length, length of closed habitat, and number of non-calf bison and moose observed on transect.

Transect Number	Total Length (km)	Length Closed Habitat (km)	Number Non-calf Bison	Number Moose
1	49.334	29.295		1
2	49.886		**NOT FLOWN**	**NOT FLOWN**
3	50.155	31.407		1
4	50.752		**NOT FLOWN**	**NOT FLOWN**
5	50.971	26.662		
6	51.464		**NOT FLOWN**	**NOT FLOWN**
7	51.710	26.802		
8	51.690		**NOT FLOWN**	**NOT FLOWN**
9	50.388	14.763		2
10	49.959	14.922		1
11	49.376	9.482		
12	48.797	23.538		
13	48.064	21.846		
14	47.565	15.399	1	
15	48.194	12.434	54	2
16	48.600	28.016		
17	48.928	24.145		
18	44.203	18.297		
19	58.551	34.419		
20	57.222	49.419		
21	34.897	27.363		
22	35.543	26.045		
23	35.960	19.654	16	
24	36.454	18.004		
25	31.479	20.893	27	
26	31.749	7.283	30	

27	25.062	9.150		1
28	25.114	6.908	1	1
29	23.822	11.100		
30	24.846	11.769		
31	25.941	8.419	3	
32	26.884	6.449		
33	27.457	7.197		1
34	27.208	10.089		
35	27.186	8.333		
36	28.348	8.982		1
37	29.731	9.462		
38	29.629	6.414		
39	30.417	9.706		4
40	33.568	13.722		
41	31.100	4.077		
42	31.293	7.064		
43	32.739	6.012		6
44	38.381	7.778		2
45	37.464	6.206		1
46	38.973	9.234	12	
47	44.521	12.239		
48	50.792	7.527		
49	55.220	9.674	4	2
50	55.754	5.102	26	3
51	48.899	14.493		2
52	47.975	5.092	10	2
53	49.686	10.897	1	3
54	38.546	5.009		7
55	31.578	1.219		
56	4.435	2.073		

57	12.253	2.750	3
58	15.259	3.377	
59	15.260	3.010	2
60	14.809	3.214	
61	16.988	4.747	1
62	18266	3.667	
63	19.393	3.964	
64	15.710	3.748	
65	12.177	5.682	
66	8.569	1.232	
67	4.811	0.276	