

Bring Back the Boreal: North Mountain Moose Population Reduction 2017 Harvest Summary

1. Introduction

Cape Breton Highlands National Park (CBHNP) is experiencing severe forest loss due to overbrowsing by a hyperabundant moose population. To address this issue, Bring Back the Boreal (BBB) was established in 2014. This Conservation and Restoration (CoRe) project had an initial duration of four years, but has been extended for a fifth year and is currently scheduled for completion in March 2019. BBB seeks to test a range of restoration strategies, such as planting and moose population reduction, to inform an eventual long-term restoration program. One of the most impacted areas is North Mountain, which has seen greater than half its boreal forest cover converted to open grasslands. Here, BBB established a 20 km² moose population reduction study area, covering approximately 2% of the park. CBHNP has developed a Hyperabundant Moose Management Plan for this area, as required by Parks Canada Management Directive 4.4.11: Management of Hyperabundant Wildlife Populations in Canada's National Parks.

Following stakeholder and expert consultation, this plan was approved and the first year of the BBB North Mountain moose removal program, via Mi'kmaq-led harvest, was implemented in 2015. Building on the experiences and lessons learned in 2015 and 2016, the third moose population reduction was completed in 2017. The planning and harvest implementation was conducted in collaboration with the Mi'kmaq of Nova Scotia, through the Kwi'mu'kw Maw-klusuaqn Negotiation Office (KMKNO) and with our long-standing partner, the Unama'ki Institute of Natural Resources (UINR).

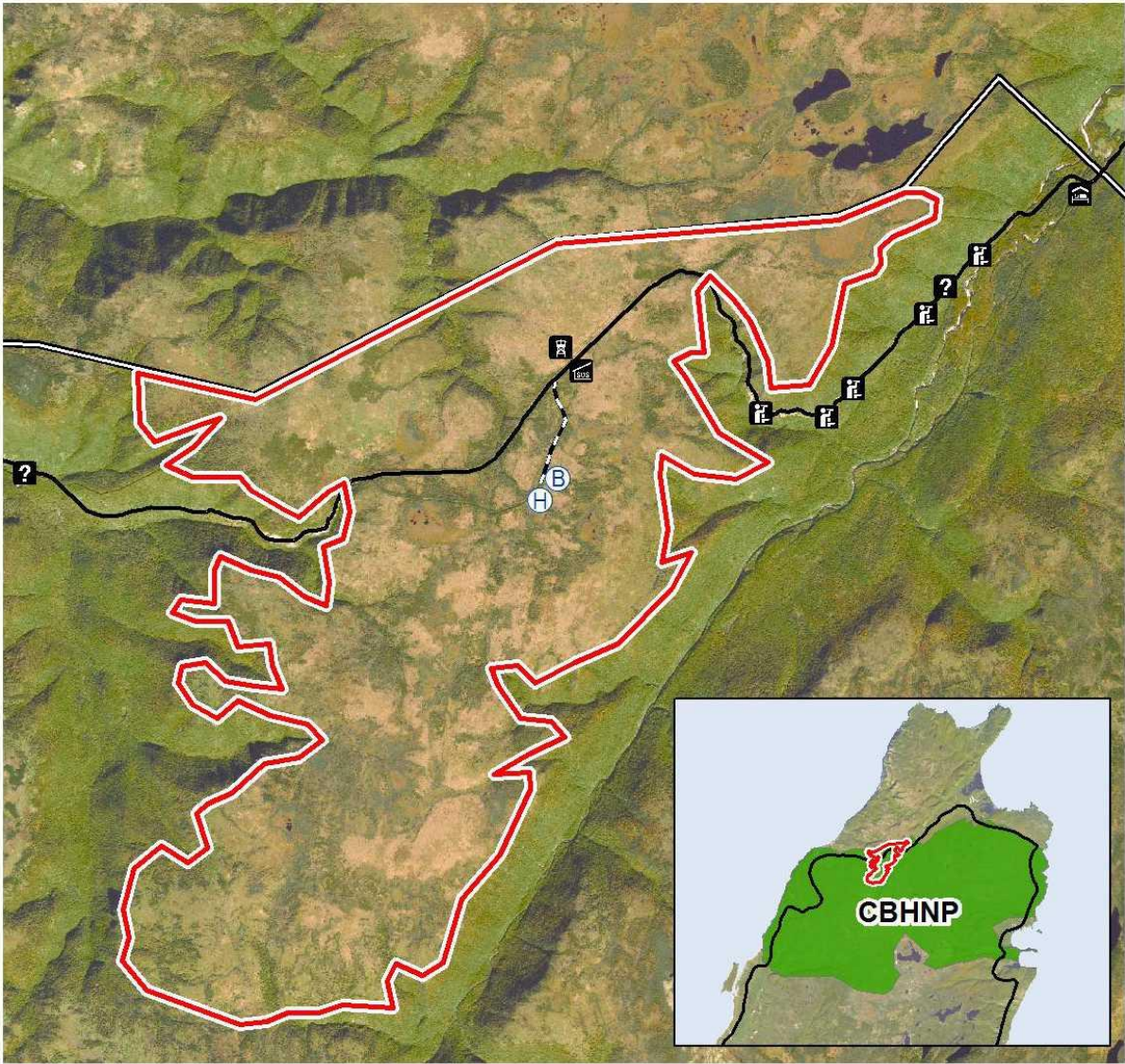
2. Study area

The 2017 harvest took place within the same 20 km² area of CBHNP as prior harvests, covering the North Mountain plateau (Figure 1). Other than through travel along the Cabot Trail, this area was closed to public access for the duration of the harvest operational period, from November 6 to December 1. During harvest operations a base camp (with a canvas tent, wood stove and first aid station) was set up at the end of the service road on North Mountain. A helipad was established near the base camp.

3. Pre-harvest moose survey

A pre-harvest moose population survey was scheduled for Monday, December 6, prior to beginning harvest operations on December 7. However, poor weather conditions prevented this survey from taking place.

North Mountain Authorized Moose Harvest Area 



Coordinate System: NAD83 UTM zone 20N



0 500 1,000 2,000 Meters











- | | | | |
|---|-----------------------|---|-----------------|
|  | Base Camp |  | Cabot Trail |
|  | Helipad |  | Old Cabot Trail |
|  | Tower |  | Park Boundary |
|  | Big Intervale Station | | |
|  | Info Station | | |
|  | Scenic Lookout | | |
|  | Emergency Shelter | | |

Figure 1: Map of 20 km² North Mountain study area

4. Harvest operations overview

The first harvest period was November 7-10. Subsequent harvest periods ran from Thursday to Sunday each week for the following four weeks, beginning November 16 (*Error! Reference source not found.*). The harvest operational period was from 7 a.m. to 5 p.m. daily, weather permitting.

There were ten active harvest days during this period. Harvesters were standing by but unable to conduct operations on an additional four days due to weather conditions. Harvest operations ceased and the staging area was dismantled and cleared on December 2.

The minimum moose removal target for each season is 60% of the animals within the study area during the harvest season. See Section 9 for details on how this is calculated. The decision to end harvest operations prior to the pre-established date is made when repeated reconnaissance flights show virtually no moose within the study boundaries.

5. Personnel

Seventeen UINR harvesters participated in 2017 operations, including eight from Unama'ki (Cape Breton Island) and nine from Mainland Nova Scotia. At least one of three harvest coordinators, which included the UINR Moose Management Coordinator, was on site during harvest operations, coordinating all aspects related to the harvesters. Typically, three teams of two harvesters were on site each day, with two harvest teams deployed at one time.

Two to three CBHNP staff were on-site for all harvesting hours. One CBHNP staff member was based in the Ingonish Resource Conservation office during all harvest hours, providing logistical and communications support. One CBHNP staff member was based in the Chéticamp Resource Conservation Office for logistical support, and overseeing the helicopter refueling station, and was later stationed on North Mountain for traffic control support. For a summary of Parks Canada staffing requirements, see Section 11.

Similarly to 2015 and 2016, a contract for moose removal was sought with local haulers, who declined the offer to participate.

The above-mentioned personnel, plus the helicopter pilot, formed the Harvest Group of a unified Incident Command System (ICS) organization that was developed to support the harvest operation. This Unified Command organization, with representation from CBHNP, Parks Canada Law Enforcement Branch, and RCMP, consisted of an additional 7 – 10 personnel on each operational day that worked to ensure public peace and National Parks Act compliance needs were integrated into each harvest operational period. Law enforcement personnel were deployed and maintained consistent coverage throughout the harvest operation, as well as between operational periods.

6. Safety

UINR provided safety requirements to participating harvesters, with additional information provided by CBHNP during briefing sessions. Comprehensive helicopter safety training was provided by Vision Air pilots each morning with new participants on site, and additional briefings were held as necessary based on updated information, operating procedures, and weather conditions. No injuries were reported in the 2017 harvest season.

7. Helicopter usage

Contracted helicopter services were utilized for harvest operations as of November 7 and were on-site for subsequent harvest periods, weather permitting. The helicopter was used for 47.2 hours of flight time for harvest operations, including travel between Chéticamp and the staging area, moose spotting, harvester transportation between the staging area and harvest locations, and slinging 34 of the 35 harvested moose. Approximately 22 barrels of fuel were provided by CBHNP for harvest activities. All helicopter activities were under the direction of the CBHNP on-site staff and communicated to the Law Enforcement Branch and participants as necessary. The aircraft departed on December 2, following the final harvest day. The helicopter returned December 7 for the post-harvest survey.

8. Harvest results

Thirty-five moose were removed from the study area (

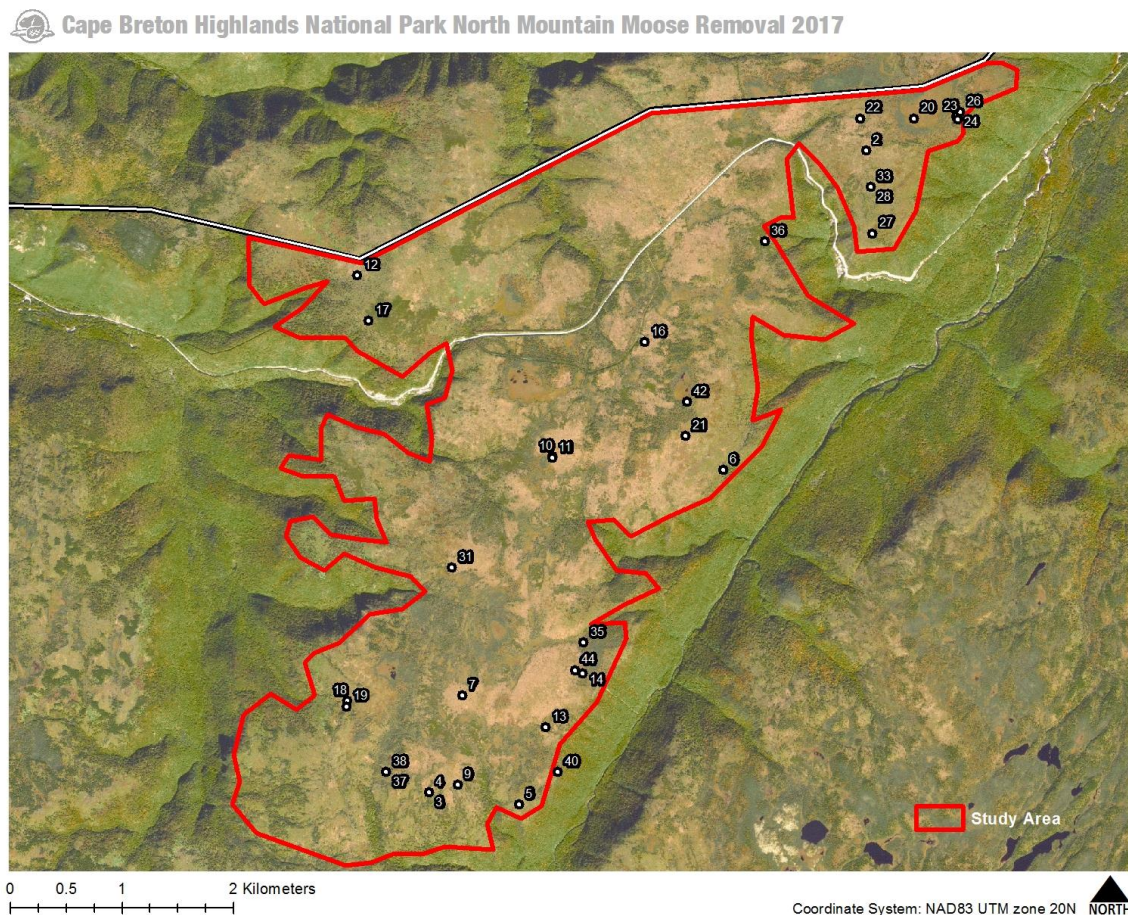


Table 1, Figure 3). The bull:cow ratio of harvested animals was 0.93 for adults and 1.06 overall, with the sex of two animals not recorded (

Table 2). The overall adult sex ratio of harvested animals has progressively equalized through the past three harvests, from 0.44 in 2015, 0.72 in 2016, to 0.93 in 2017. The calf:cow ratio in 2017, at 0.33, was similar to the 2015 ratio (0.38), and higher than in 2016 (0.14). Three of the four (75%) cows assessed were pregnant, compared to nine of twenty (45%) in 2016, and five (71%) of seven examined in 2015.

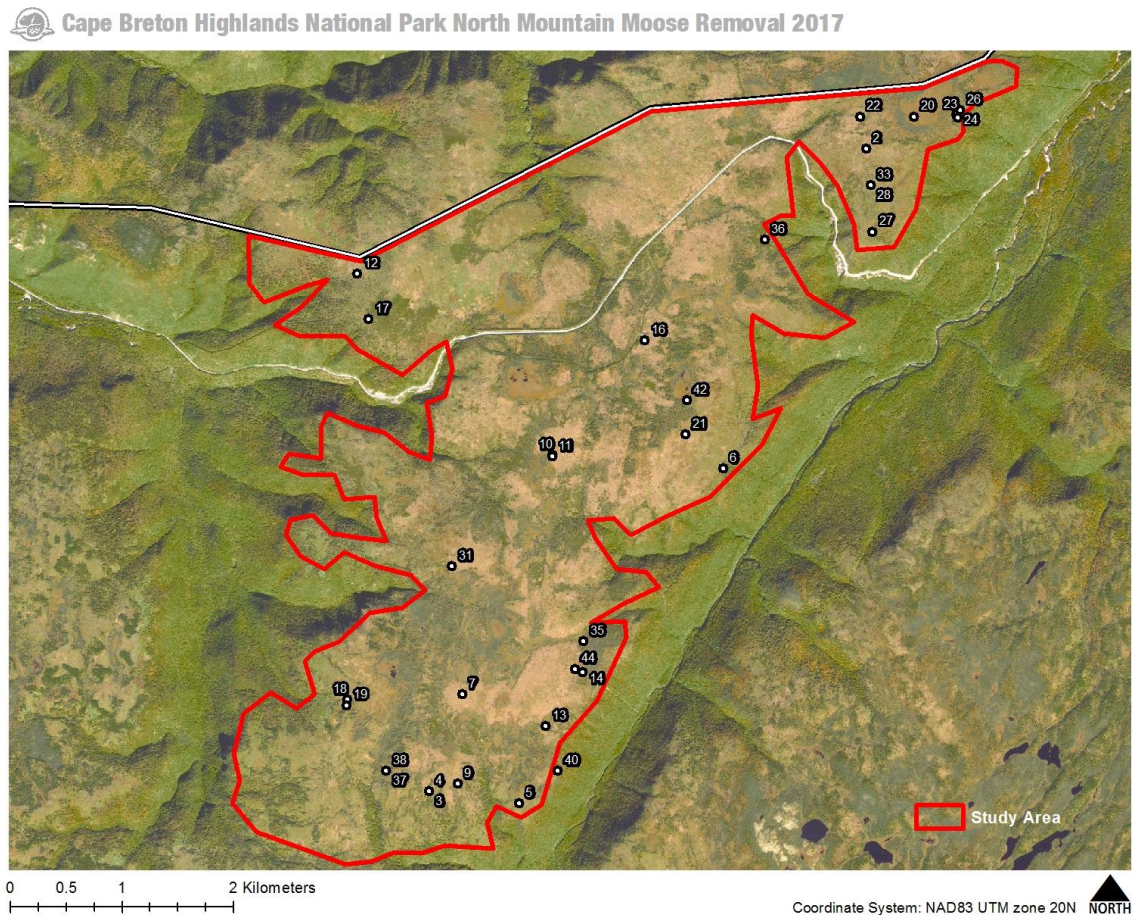


Figure 3: 2016 harvest locations. Labels indicate tag numbers.

Table 1: Summary of harvest operations for each harvest period of 2017

Harvest period	# active harvest days	# helicopter support days	# moose harvested
1	3	3	12
2	3	2	15
3	2	2	7
4	2	2	1
Total:	10	9	35

Table 2: Summary of harvested moose in 2017 by sex and age class. Note that the sex of two animals, one adult and one calf, was not recorded.

Age Class	Female	Male	Unknown	Total
Adult	15	14	1	30
Calf	1	3	1	5
Total:	16	17	2	35

Pursuit time is defined as the amount of the time between when the animal was spotted and when the kill was confirmed. From available harvest information, average pursuit time was just under six minutes. If a helicopter was used for spotting and transport, this would be the time between the harvester drop-off (if nearby) and time of kill.

The number of shots per animal ranged from one to six, with an average of 2.7 shots per animal.

Blood and hair samples were collected by harvesters in the field as close to the time of kill as possible. Sample collection was highly successful, with thirty-five hair samples and thirty-four blood samples obtained. Hair samples can be used to determine long-term stress of the animal, and blood samples can be used to determine presence of disease in the population. There is currently no reason to suspect long-term stress or disease have a significant impact on the northern Cape Breton moose population, so the samples will not be analyzed at this time. The samples will be stored at the Verschuren Centre at Cape Breton University at -20 °C to be analyzed in the future for potential research projects or to provide important archived material for comparison if concerns arise regarding the health of the moose population.

Overall body condition was assessed in the field by the harvesters. No parasites were observed and all but one animal looked to be in good condition. One animal showed some hair patchiness around the shoulders, but otherwise appeared in good condition.

Metatarsi from each animal were collected, and jawbones were measured on-site. The metatarsi were used to estimate fat content of the bone marrow, which provides an indicator of body condition. Typically, the femur is collected for marrow analysis but the metatarsi were used in 2015 and 2016, and are much easier to remove from freshly harvested animals. While not as extensively studied as the femur, the metatarsi should still provide a fair indication of animal body condition. The majority of 2017 samples showed low (50%) to very low (25%) fat content (Table 3). Fat content differed by sex; female fat content was largely distributed between low (50%) and good (85-90%), while most males showed very low (25%) fat content. Calves also showed very little fat build up, showing low (50%) or less fat content. Summer and fall 2017 were fairly warm and dry, which may have placed greater stress upon the moose in the region, limiting fat build up before winter. The lower fat content of bulls compared to cows has been consistent year to year, and may be due to fat reserve depletion during the rut, and slow building of fat reserves into the winter.

Table 3: Fat content estimated from bone marrow of metatarsi in 49 of the harvested animals

Estimated fat content (%)	Bull	Cow	Calf	2017 Total	2016 Total	2015 Total
10	0	0	1	1	0	0
25	8	1	2	12*	14	1
50	3	5	2	10	6	4

75	1	3	0	4	16	2
85-90	2	6	0	8	13*	25

*Includes one adult of unknown sex

The jawbones were used to determine approximate age (Table 4). Jawbone measurements were taken at the North Mountain base camp.

Table 4: Age of moose harvested, estimated by tooth eruption for individuals under 1.5 years and by measurement of second molar in individuals greater than 1.5 years

Age (years)	2015	2016	2017
0.5	10	6	5
1.5-2.5	0	5	5
2.5	2	3	1
2.5-3.5	0	2	0
3.5	4	7	4
3.5-4.5	0	2	3
4.5	4	7	4
4.5-5.5	2	3	2
5.5-6.5	1	6	2
6.5-7.5	0	1	6
7.5-8.5	1	4	0
8.5-9.5	1	3	0
10.5-11.5	0	1	0

9. Post-harvest survey

A post-harvest survey was conducted on December 7, five days after the last day of active harvesting, with one moose spotted inside the study area (Figure 4). The formula used by the project to report on moose removal is as follows:

$$\% \text{ moose removed} = \frac{\# \text{ moose removed}}{\# \text{ moose removed} + \# \text{ moose remaining}} \times 100\%$$

Where # moose remaining is the number of moose observed inside the 20 km² zone in the post-harvest survey.

Using this equation, 97% of moose were removed from the study area in 2017, as compared to 96% in 2016, and 64% in 2015. Snow cover during the 2017 post-harvest aerial survey was sparse, limiting the ability to spot moose, particularly those that were not moving during fly over. Based on approximately six hours of reconnaissance flight time near the end of harvest operations, with no moose spotted within the designated harvest area, the low number of moose recorded during the survey can be viewed with confidence.

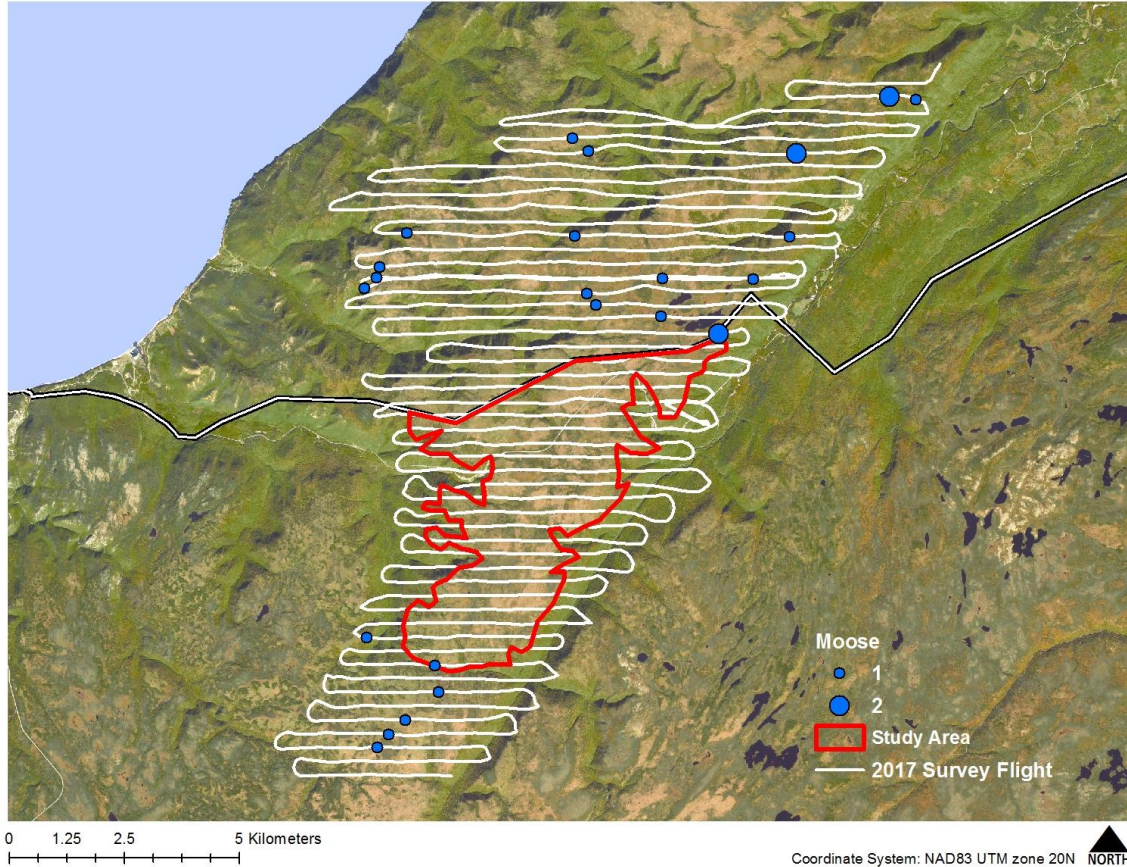


Figure 4: Post-harvest moose survey, conducted December 7, 2017, five days after harvesting ceased.

10. Financial Summary

Expenditure type	2015 Cost (000s of dollars)	2016 Cost (000s of dollars)	2017 Cost (000s of dollars)	2017 Comments
Harvester expenses	15	18	19	UINR contribution agreement
Moose surveys	18.7	19.2	13.9	\$12.5k for helicopter rental; ~\$1.2k for fuel
Helicopter	46.1	68	74.5	\$67.3k for helicopter rental and pilot expenses; ~\$7.2k for fuel
Hauling	7	8	0	
Law Enforcement Branch	187.3	106.5	49.4	Estimate for extraordinary expenses (OT, travel)
Signage	2.3	NA	0.4	Enhanced road signage
Security	4.6	11.6	4.7	Overnight security
CBHNP salaries	10	9.8	8.6	Estimate for overtime, other extra duty
Project management	NA	3.7	3.2	Travel

Other	1.3	5.6	4.7	Additional costs (e.g. portable toilet, firewood, batteries, sampling supplies)
Total:	292.3	250.4	178.4	

11. PCA Staffing Summary

Section	# Person Days	Comments
Law Enforcement Branch	136	
On-site	95	Includes both Day and Night shifts
Command Post	41	LEB Unified Commander and Plans Section Chief
Resource Conservation	91	
On-site	28	
Office Support	40	Includes prep time of data packs, etc.
Command Post	20	CBHNP Unified Commander
Aerial Surveys	3	Post-Harvest Survey; no Pre-Harvest Survey
Asset Management	1	
Total	228	