High Elevation Landbird Program

Mountain Birdwatch 2.0 2016 report

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EXECUTIVE SUMMARY

To understand, track, and mitigate the implications of habitat degradation and loss on breeding Bicknell's Thrush, Bird Studies Canada (BSC) has been monitoring high elevation landbirds, focusing on the federally-threatened Bicknell's Thrush, since 2002.

In 2016, Bird Studies Canada completed its 14th year Bicknell's Thrush monitoring in New Brunswick (NB) and Nova Scotia (NS) through the 5th year of Mountain Birdwatch 2.0. This year we surveyed a total 50 routes (288 points) in NB and 28 routes (153 points) in NS.

Frequency of occurrence of Bicknell's Thrush in 2015 was 14% (39/288 points) in NB and 1.3% (2/153 points) in NS. Using models that incorporate probability of detection, the estimated abundance of Bicknell's Thrush has been modelled every year since 2012. In 2016, estimated abundance was the lowest on record in NS (0.04 per point), and among the highest recorded for NB (0.22 per point).

Following the 2015 field season, analyses of the first four years of MBW showed that it would not be possible to detect any population change because of a lack of Bicknell's Thrush detections on the randomly selected routes. We decided that the species' distribution model that was used was too broad to be used as the basis for a population monitoring tool, as it included only elevation, latitude and longitude. A new distribution model was created and tested for New Brunswick in 2016 that included habitat and an elevation threshold. Routes randomly selected from the new distribution model showed a threefold increase in detections compared to previous years.

For 2017, we will continue monitoring the newly established routes in NB and we will revise the distribution model for NS.

INTRODUCTION

The Bicknell's Thrush breeds in high elevation coniferous forests in eastern Canada and the north-eastern United States (Atwood *et al*. 1996, Connolly *et al*. 2002). These forests are chronically disturbed by windthrows, ice and snow damage, and fire and insect outbreaks (Rimmer *et al*. 2001). They are also found on exposed peaks in stunted-tree stands sometimes characterized as krummholtz (Bredin and Whittam 2009). Rarely, the species is found in coastal areas where dense spruce-fir stands are maintained by cool sea breezes and a high precipitation regime (COSEWIC 2009). In Canada and Maine, Bicknell's Thrush are also found in regenerating clear cuts (Ouellet 1993, Nixon *et al*. 2001, Connolly *et al*. 2002, Gardiner 2006, Chisholm 2008, McKinnon 2009), where forestry operations mimic natural disturbance events, but often at a much larger scale. However, regenerating clearcuts are typically not left to re-grow but are instead subjected to precommercial thinning, a practice which reduces stem density to maximize growth of the remaining trees. Following thinning, Bicknell's Thrush are mostly restricted to unthinned patches (Aubry *et al*. 2011, McKinnon *et al*. 2014).

Bird Studies Canada has been monitoring Bicknell's Thrush and other high elevation birds in New Brunswick and Nova Scotia since 2002. The High Elevation Landbird Program (HELP) ran

for 10 years, from 2002 to 2011, and was modeled after the U.S. program Mountain Birdwatch. Data from HELP showed steep a declining trend in Bicknell's Thrush populations over 10 years, with a 7.4% annual decrease in Nova Scotia and 11.5% in New Brunswick (Campbell and Stewart 2012). Results from the second Maritimes Breeding Bird Atlas (www.mba-aom.ca) showed a 40% decrease in the distribution of the species since 1990 (Erskine 1992). In addition, the Bicknell's Thrush is believed to be extirpated from some coastal sites where it was once found. As a result of these trends and indications of population declines in Quebec, Bicknell's Thrush and its critical habitat is now listed as *Threatened* and is legally protected under the Species At Risk Act (SARA).

Following the release of the document "A Conservation Action Plan for Bicknell's Thrush" (IBTCG 2010) efforts were made to standardize monitoring protocols throughout the species' range by using the internationally adopted Mountain Birdwatch 2.0 protocol. The program uses a Generalized Random Tessellation Stratified (GRTS) sampling design, which ensures a spatially balanced but randomized selection of survey routes throughout the whole breeding range. The main goals of Mountain Birdwatch 2.0 are: 1) to measure the annual population status of target species in terms of distribution, abundance, and occupancy; 2) to measure changes in populations of target species over time; and 3) to relate population trend information to biotic and abiotic variables that may affect target species. Following the 2015 field season, analyses of the first four years of MBW showed that it would not be possible to detect any population change because of a lack of Bicknell's Thrush detections on the randomly selected routes. In order to detect the minimum 3% annual change over 30 years that is outlined in in the Conservation Action Plan, detections are needed on approximately 30% of routes (F. Rivera, USGS, pers. comm.). Bicknell's Thrushes were detected on approximately 5% of routes in 2015. We decided that the species' distribution model that was used was too broad to form the basis for a population monitoring tool, as it included only elevation, latitude and longitude. A new distribution model was created and tested for New Brunswick in 2016 that included habitat and an elevation threshold. This report provides an analysis of the frequency of occurrence and annual abundance for the first five years of MBW 2.0 (goal 1), as well as a description of the methods used to create a new Bicknell's Thrush distribution model for Mountain Birdwatch in New Brunswick.

METHODS

Site selection

From 2012 to 2015 we used a Bicknell's Thrush distribution model developed by the Vermont Center for Ecostudies (VCE 2008) to determine the area from which to randomly select survey points. The model was similar to that developed for the United States by Lambert *et al*. (2005), but also included longitude in order to make the model fit better in Canada. We then used the GRTS design to create a 1 km x 1 km grid over all the area defined by the model, and assigned a random number to each square. Routes were then selected by creating a series of 4 to 6 points along roads or trails with the lowest randomly-assigned numbers. Each of the points was separated by 250 metres. In Nova Scotia, random selection was further stratified to include only

grid cells in protected areas (Cape Breton Highlands National Park and Polletts Cove Wilderness Area) as previous HELP surveys and MBW 2.0 pilot surveys detected no Bicknell's Thrushes south of Cape Breton Highlands National Park. Initially, we selected 30 routes in New Brunswick and 30 in Nova Scotia for determining regional trends (Figures 1 and 2). In late 2012, analysis of 10 years of HELP data showed that detectability of Bicknell's Thrushes is higher in the evening than in the morning, so we added evening surveys to the protocol starting in 2013 which added an additional 20 randomly-selected routes to New Brunswick, for a total of 50 routes in NB and 30 routes in NS.

For 2016, we created a new distribution model for New Brunswick using only habitat and an elevation threshold. To determine the minimum elevation threshold, we examined all Bicknell's Thrush detections in the BSC Bicknell's Thrush database for New Brunswick, which includes 628 detections from 2002-2015 and ranked them by decreasing elevation. Then we removed the bottom 25% and used the lowest elevation that remained as the threshold, so that it included 75% of all Bicknell's Thrush detected from 2002-2015. This threshold elevation is 585 metres. Then we used the New Brunswick Forest Inventory Database and extracted all forest blocks at 585 m and above with balsam fir or red spruce as the dominant forest layer (referred to by L1FUNA in the forest inventory). Balsam fir and red spruce were identified by the Maritimes Breeding Bird Atlas as the dominant species influencing Bicknell's Thrush detection during the Atlas (Stewart *et al*. 2015). There is no dominant forest layer for many blocks in the Christmas Mountains of NB because they have recently been cut and have no forest canopy. For those blocks, we identified those with a secondary forest layer consisting of balsam or red spruce (the L2FUNA attribute in the inventory). See appendix 1 for a list of tree species classes that were retained in the model. The new distribution model has a total area of approximately 28,000 ha, while the previous model covered over 176,000 ha.

Of the 50 MBW routes surveyed in NB from 2012 to 2015, only 10 remained in the new distribution model. These were retained for 2016, and 40 new routes were selected using the same methodology as above, for a total of 50 routes in NB. There were no changes to the NS MBW routes in 2016, we continued surveying the same previously surveyed routes.

Survey protocol

The Mountain Birdwatch morning survey protocol consists of four consecutive 5-minute counts at each survey station, for a total sampling period of 20 minutes per point. Observers are asked to conduct repeated simple counts for all target species during each 5-minute period (see Table 1 for target species). During the first 10 minutes of the survey, observers also track individual Bicknell's Thrushes within four distance categories on a minute-by-minute basis. For the final 10 minutes, Bicknell's Thrush are counted using the same method as the other species. Evening surveys are similar, but consist of only two consecutive 5-minute counts periods. All surveys are conducted starting 45 minutes before sunrise or 30 minutes before sunset, between 1 June and 30 June. Surveys are not conducted in temperatures below 0° C, or in wind above 4 on the Beaufort scale (> 30 km/h). Surveys are also not conducted in rain.

Table 1: Species surveyed by Mountain Birdwatch 2.0.

Common Name	Scientific Name	Species Code
Bicknell's Thrush	*Catharus bicknelli*	BITH
Swainson's Thrush	*Catharus ustulatus*	SWTH
Hermit Thrush	*Catharus guttatus*	HETH
Winter Wren	*Troglodytes troglodytes*	WIWR
Black-capped Chickadee	*Poecile atricopilla*	BCCH
Boreal Chickadee	*Poecile hudsonica*	BOCH
Blackpoll Warbler	*Setophaga striata*	BLPW
Fox Sparrow	*Passerella iliaca*	FOSP
White-throated Sparrow	*Zonotrichia albicollis*	WTSP
Yellow-bellied Flycatcher	*Empidonax flaviventris*	YBFL

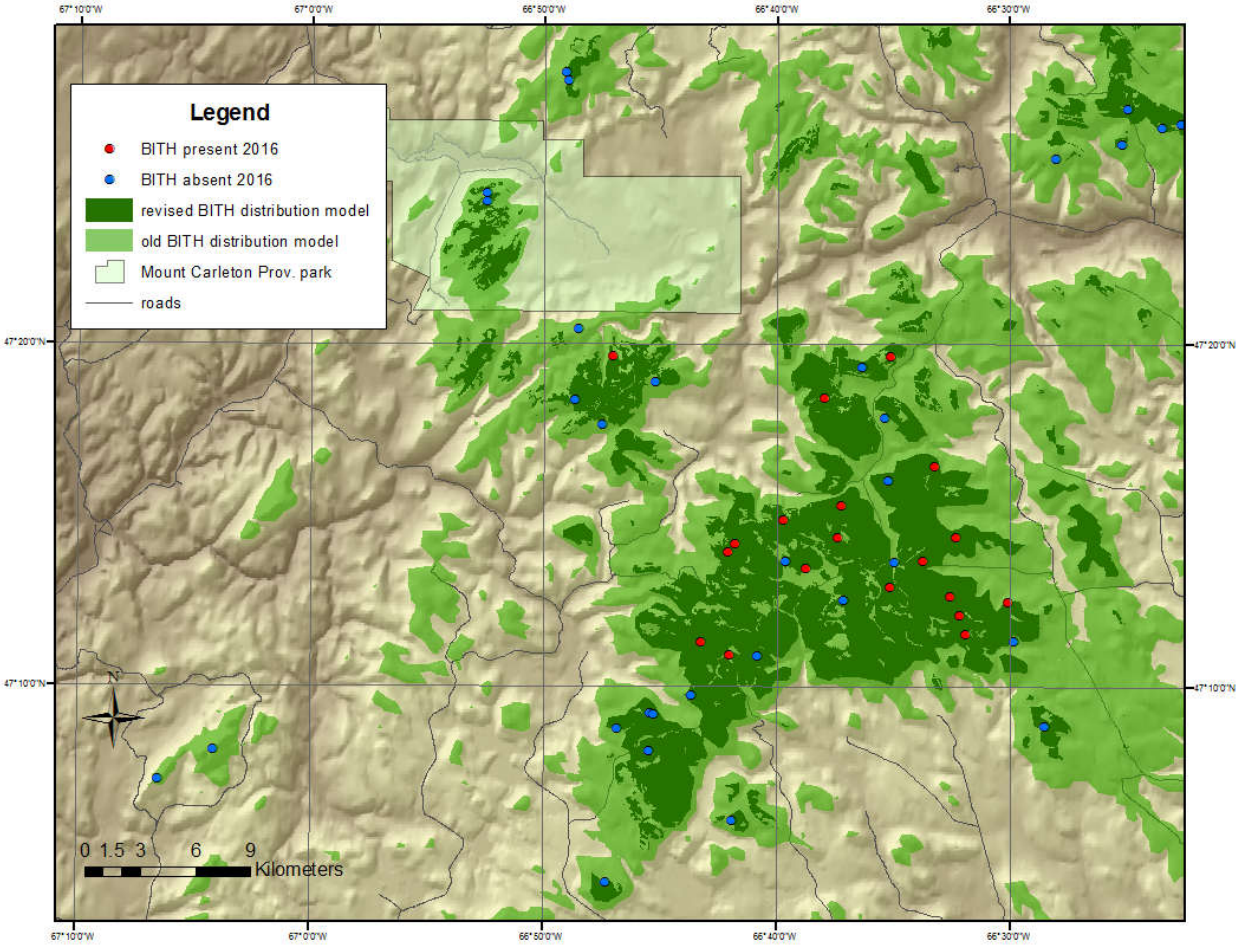

Figure 1: Mountain Birdwatch 2.0 routes surveyed in New Brunswick in 2016.

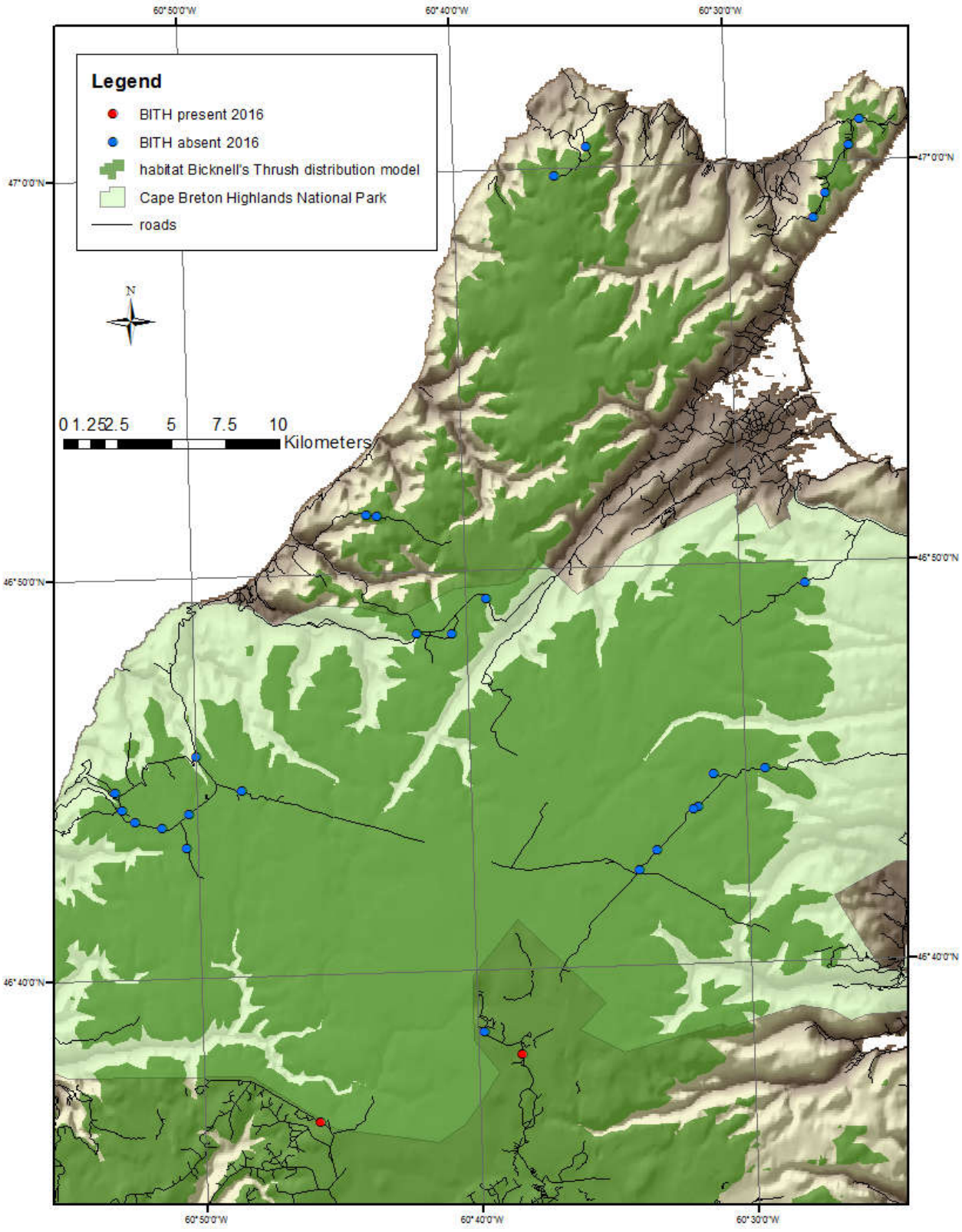

Figure 2: Mountain Birdwatch 2.0 routes surveyed in Nova Scotia 2016.

Analyses

A basic mark-recapture modelling framework was used to model MBW 2.0 data. Abundance and detection probability were modelled in R (R Core Team 2014) using the pcountOpen function "unmarked" package, which uses a generalized N-mixture model for open populations (Dail and Madsen 2011). The multi-year open N-mixture model includes terms for estimates of abundance, detection probability, and colonization and extinction rates. Points were closed to immigration and emigration between 5-minute intervals within years, but open to movement between years. This allows for generating one detection probability and abundance estimate for each species over five years of the program, but we modelled abundance by year in order to compare between years.

General Model Structure:

$$\text{Population} = \lambda + \gamma + \omega + p + \varepsilon$$

Where λ = initial abundance
γ = recruitment rate
ω = survival probability
p = detection probability
ε = error

Models were fit using a combination of time of day, survey date (Julian date), year, and province. Habitat information was not included in the models because vegetation has not been sampled at all points. Models tested included single and multi-term detection models, nested detection models, single and multi-term abundance models and mixed abundance and detection models. Models were ranked according to Akaike's Information Criterion (AIC). Estimates of detection probability were generated with the best model (lowest AIC value) using the "predict" function in unmarked (Fiske and Chandler 2011). Annual abundance estimates were generated using the model random effects ("ranef" function) and Bayesian prior probability distributions to generate the annual best unbiased predictors (BUPs) of initial abundance.

RESULTS

Frequency of occurrence in 2016

We surveyed a total 288 points (50 routes) in New Brunswick and 153 points (28 routes) in Nova Scotia. 128 of the NB points (22 routes) and 56 of the NS points (10 routes) were surveyed in the morning. Bicknell's Thrush was detected on 39 total points (19 routes) in NB and only 2 points on 2 routes in NS (Table 2). White-throated Sparrow was the only species that was common in both provinces. Black-capped Chickadee was observed at only seven points in New Brunswick and at two points in Nova Scotia.

Table 2. Frequency of occurrence (% points with species) for MBW 2.0 target species in 2016.

Species	NB (n=288)	NS (n=153)
Bicknell's Thrush	14	1.3
Swainson's Thrush	94	29
Hermit Thrush	28	61
Winter Wren	40	4.6
Black-capped Chickadee	2.4	1.3
Boreal Chickadee	8	5.9
Blackpoll Warbler	48	5.9
Fox Sparrow	72	27
White-throated Sparrow	82	76
Yellow-bellied Flycatcher	13	3.9

Abundance 2012-2016

The best fit model for Bicknell's Thrush included only province and time as a covariate in the detection term of the model (Appendix 2). Probability of detection was significantly different between provinces, and decreased closer to sunlight hours (decreased later in the morning and earlier in the evening).

Estimated Bicknell's Thrush abundance was higher in Nova Scotia than in New Brunswick in every year from 2012 to 2015, but not in 2016 (Table 3). Over five years, abundances in New Brunswick have ranged from a low of 0.11 Bicknell's Thrush per point (± 0.02 SE) to 0.25 (± 0.07 SE). In Nova Scotia, abundance estimates range from 0.04 (± 0.02 SE) to 0.30 (± 0.07 SE). Nova Scotia recorded its lowest Bicknell's Thrush abundance in 2016, while abundance in New Brunswick increased due to more detections on the new routes selected from the revised distribution model.

Table 3: Estimated yearly abundance (number of birds per point ± standard error) for 10 focal species in New Brunswick and Nova Scotia from 2012 to 2015.

Species	2012	2013	2014	2015	2016
New Brunswick					
Bicknell's Thrush	0.25 ± 0.07	0.11 ± 0.03	0.12 ± 0.02	0.11 ± 0.02	0.22 ± 0.04
Swainson's Thrush	3.77 ± 0.11	3.39 ± 0.13	3.37 ± 0.11	3.78 ± 0.11	3.50 ± 0.10
Hermit Thrush	0.97 ± 0.05	0.92 ± 0.06	0.58 ± 0.05	0.48 ± 0.04	0.41 ± 0.04
Winter Wren	0.98 ± 0.05	0.86 ± 0.05	0.39 ± 0.03	0.17 ± 0.02	0.75 ± 0.04
Black-capped Chickadee	0.04 ± 0.01	0.06 ± 0.01	0.03 ± 0.01	0.04 ± 0.01	0.08 ± 0.02
Boreal Chickadee	0.32 ± 0.06	0.38 ± 0.02	0.38 ± 0.02	0.40 ± 0.02	0.09 ± 0.02
Blackpoll Warbler	0.36 ± 0.03	0.31 ± 0.04	0.35 ± 0.04	0.30 ± 0.04	0.77 ± 0.05
Fox Sparrow	1.32 ± 0.07	1.33 ± 0.08	0.85 ± 0.05	0.83 ± 0.05	1.27 ± 0.07
White-throated Sparrow	3.66 ± 0.10	3.49 ± 0.13	2.24 ± 0.09	2.45 ± 0.10	1.87 ± 0.08
Yellow-bellied Flycatcher	0.21 ± 0.02	0.29 ± 0.03	0.28 ± 0.02	0.26 ± 0.02	0.42 ± 0.04
Nova Scotia					
Bicknell's Thrush	0.28 ± 0.06	0.30 ± 0.07	0.22 ± 0.04	0.14 ± 0.02	0.04 ± 0.02
Swainson's Thrush	4.23 ± 0.17	3.92 ± 0.13	3.47 ± 0.09	3.48 ± 0.08	0.58 ± 0.07
Hermit Thrush	1.47 ± 0.08	1.13 ± 0.09	0.83 ± 0.08	0.43 ± 0.05	1.34 ± 0.10
Winter Wren	0.22 ± 0.03	0.23 ± 0.02	0.23 ± 0.02	0.14 ± 0.01	0.25 ± 0.04
Black-capped Chickadee	0.07 ± 0.02	0.03 ± 0.01	0.03 ± 0.00	0.03 ± 0.00	0.08 ± 0.01
Boreal Chickadee	0.29 ± 0.06	0.38 ± 0.02	0.43 ± 0.03	0.35 ± 0.01	0.09 ± 0.02
Blackpoll Warbler	0.32 ± 0.04	0.34 ± 0.03	0.29 ± 0.02	0.27 ± 0.02	1.99 ± 0.16
Fox Sparrow	0.37 ± 0.04	0.43 ± 0.04	0.39 ± 0.04	0.47 ± 0.05	0.53 ± 0.07
White-throated Sparrow	2.90 ± 0.12	2.55 ± 0.11	2.54 ± 0.10	2.00 ± 0.11	2.20 ± 0.14
Yellow-bellied Flycatcher	0.39 ± 0.04	0.33 ± 0.04	0.23 ± 0.02	0.18 ± 0.02	0.06 ± 0.02

DISCUSSION

Bicknell's Thrush numbers continue to decline in Nova Scotia, with only four birds heard in 2015 and two in 2016. There have been no Bicknell's Thrushes detected at Money Point for the past two years, an area that was previously a stronghold for the species and hosted the highest density of Bicknell's Thrush in Atlantic Canada. These declines have occurred despite their being no obvious changes to the habitat. There were 25 Bicknell's Thrushes detected in total on Mountain Birdwatch in Nova Scotia in 2013 (Campbell 2014), yet numbers declined to a low of two in 2016. The lack of changes to habitat quality suggests that these declines are likely not related to habitat changes on the breeding grounds.

In New Brunswick, changes to the distribution model resulted in the highest number of Bicknell's Thrush detections since Mountain Birdwatch began in 2012. Bicknell's Thrushes were detected on 38% of routes, nearly double the previous high, which was from 2014 (Campbell 2015). This relatively high number of detections should allow us to meet the goal outlined in the Conservation Action Plan of being able to detect a minimum 3% annual change over 30 years with a coefficient of variation of 0.2, and should provide a method for evaluating Bicknell's Thrush recovery efforts in New Brunswick.

In 2017, we will develop a new Bicknell's Thrush distribution model for Nova Scotia, based on habitat variables similar to what was used in New Brunswick, and latitude and longitude. We are hopeful that this will increase our Bicknell's Thrush detections, however, many current Mountain

Birdwatch routes are already in places that had Bicknell's Thrushes in the past but no longer do so this may be overly optimistic.

REFERENCES

Atwood, J. L, C. C. Rimmer, K. P. McFarland, S. H. Tsai, and L. R. Nagy. 1996. Distribution of Bicknell's Thrush in New England and New York. Wilson Bulletin 108: 650-661.

Aubry, Y., A. Desrochers, and G. Seutin. 2011. Response of Bicknell's Thrush (*Catharus bicknelli*) to boreal silviculture and forest stand edges: a radio-tracking study. Canadian Journal of Zoology 89: 474-482.

Bredin, K. and B. Whittam. 2009. Conserving the Bicknell's Thrush. Stewardship and management practices for Nova Scotia's high elevation forest. Unpublished report by Bird Studies Canada (Atlantic Region), Sackville, NB.

Campbell, G. and Stewart, B. 2012. High Elevation Landbird Program 10-year Report. Unpublished report by Bird Studies Canada (Atlantic Region), Sackville NB.

Campbell, G. 2015. High Elevation Landbird Program, Mountain Birdwatch 2.0 2014 report. Unpublished report by Bird Studies Canada (Atlantic Region), Sackville NB.

Campbell, G. 2016. High Elevation Landbird Program, Mountain Birdwatch 2.0 2015 report. Unpublished report by Bird Studies Canada (Atlantic Region), Sackville NB.

Chisholm, S. E., and M. L. Leonard. 2008. Effect of forest management on a rare habitat specialist, the Bicknell's Thrush (*Catharus bicknelli*) Canadian Journal of Zoology 86: 217-223.

Connolly, V., G. Seutin, J-P. L. Savard, and G. Rompré. 2002. Habitat use by the Bicknell's Thrush in the Estrie region, Quebec. Wilson Bulletin 114: 333-341.

COSEWIC. 2009. Unsolicited update: COSEWIC status report on the Bicknell's Thrush Catharus bicknelli in Canada, v + 41pp. Submitted to the Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON.

Dail, D., and L. Madsen. Models for estimating abundance from repeated counts of an open metapopulation. Biometrics 67: 577-587.

Erskine, A. J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing Limited and Nova Scotia Museum, Halifax, NS.

Fiske, I. J., and R. B. Chandler. 2011. Unmarked: an R package for fitting hierarchical models of wildlife occurrence and abundance. Journal of Statistical Software 43: 1-23.

Gardiner, R. J. 2006. The long-term effects of pre-commercial thinning on Bicknell's Thrushes and four other high elevation songbirds in the New Brunswick highlands. B.Sc. Thesis, Mount Allison University, Sackville, NB.

IBTCG. 2010. A Conservation Action Plan for the Bicknell's Thrush (*Catharus bicknelli).* J. A. Hart, C. C. Rimmer, R. Dettmers, R. M. Whittam, E. A. McKinnon, and K. P. McFarland, eds. International Bicknell's Thrush Conservation Group. Available at www.bicknellsthrush.org.

Lambert, J. D., K. P. McFarland, C. C. Rimmer, S. D. Faccio, and J. L. Atwood. 2005. A practical model of Bicknell's Thrush distribution in the northeastern United States. Wilson Bulletin 117: 1-11.

McKinnon, E. A. 2009. Bicknell's Thrush (*Catharus bicknelli*) in managed forests: nest-site selection, diet, and co-occurrence with Swainson's Thrush (*C. ustulatus*). M.Sc. Thesis, University of New Brunswick, Fredericton, NB.

McKinnon, E. A., H. Askanas, and A. W. Diamond. 2014. Nest-patch characteristics of Bicknell's Thrush in regenerating clearcuts, and implications for precommercial thinning. Northeastern Naturalist 21: 259-270.

Nixon, E. A., S. B. Holmes, and A. W. Diamond. 2001. Bicknell's Thrushes (*Catharus bicknelli*) in New Brunswick clear cuts: their habitat associations and co-occurrence with Swainson's Thrushes (*Catharus ustulatus*). Wilson Bulletin 113: 33-40.

Ouellet, H. 1993. Bicknell's Thrush: taxonomic status and distribution. Wilson Bulletin 105: 545-572.

R Core Team. 2014. R: a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. http://www.r-project.org.

Rimmer, C. C., K. P. McFarland, W. G. Ellison, and J. E. Goetz. 2001. Bicknell's Thrush (*Catharus bicknelli*). *In* The Birds of North America, No. 592 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Thompson, S. K. 1990. Adaptive Cluster Sampling. Journal of the American Statistical Association 85: 1050-1059.

VCE 2008. Production of a Bicknell's Thrush global breeding distribution model based on known occurrence and potential habitat. Unpublished report by Vermont Center for Ecostudies, Woodstock, VT.

APPENDICES

Appendix 1 – Habitat classes from New Brunswick Forest Inventory included in Bicknell's Thrush distribution model.

Code	Description
BFIH	balsam fir and shade intolerant hardwood
BFIR	softwood with greater than 60% balsam fir
BFMX	mixed wood with ≥ than 50% softwood with ≥ 30% balsam fir
BFSP	balsam fir and spruce
BFTH	balsam fir and shade tolerant hardwood
BSBF	softwood with ≥ 40% black spruce and ≥ 10% balsam fir
RSBF	softwood with ≥ 40% red spruce and ≥ 10% balsam fir
RSMX	mixed wood with ≥ than 40% red spruce
RSPR	softwood with ≥ 70% red spruce
SPBF	softwood with ≥ 40% spruce and ≥ 10% balsam fir
SPMX	mixed wood with ≥ 50% softwood with ≥ 30% spruce
SPRC	softwood with ≥ 60% spruce
WSPR	softwood with ≥ 70% white spruce

Appendix 2 - Best fit model for each target species using Mountain Birdwatch 2.0 data from 2012-2016.

Species	Model
Bicknell's Thrush	pcountOpen(~1,~1,~1,~(prov-1)/time)
Swainson's Thrush	pcountOpen(~1,~1,~1,~(prov-1)/(time+date)
Hermit Thrush	pcountOpen(~prov-1,~1,~1,~time+date+prov-1)
Winter Wren	pcountOpen(~prov-1,~1,~1,~(prov-1)/(time+date)
Black-capped Chickadee	pcountOpen(~1,~1,~1,~time+date)
Boreal Chickadee	pcountOpen(~prov-1,~1,~1,~time+date+prov-1)
Blackpoll Warbler	pcountOpen(~prov-1,~1,~1,~ prov-1)
Fox Sparrow	pcountOpen(~prov-1,~1,~1,~(prov-1)/(time+date))
White-throated Sparrow	pcountOpen(~prov-1,~1,~1,~time+date+prov-1)
Yellow-bellied Flycatcher	pcountOpen(~prov-1,~1,~1,~time+year)