SOME NOTES ON THE FALL MIGRATION OF BICKNELL'S AND GRAY-CHEEKED THRUSHES IN NEW YORK STATE AND EASTERN UNITED STATES

Elizabeth Brooks and Dominic Sherony
Braddock Bay Bird Observatory, Greece NY

***Abstract*—**Banding data for Bicknell's and Gray-cheeked Thrushes were obtained and analyzed across the northern United States and Canada in order to understand fall migratory paths and timing. A series of inland records, including 12 from Braddock Bay Bird Observatory, near Rochester, New York, shows that some immature Bicknell's Thrushes regularly migrate west of the main coastal route and these birds possibly go south on the west side of the Appalachian Mountains. Coastal timing of Bicknell's Thrush and Gray-cheeked Thrush are both later than inland timing. And finally, the relative abundance of Bicknell's Thrush with respect to Gray-cheeked Thrush seems to have decreased between 1972 and 2001.

About 1996, revised criteria were established to distinguish Bicknell's Thrush (*Catharus bicknelli*) and Gary-cheeked Thrush (*C. minimus*) in the hand (Ouellet 1993; Wilson and Watts 1997; Rimmer, *et. al.* 2001). Collectively, these two thrushes can be separated from all other *Catharus* thrushes by plumage, but these two are extremely similar in appearance, differing most consistently in terms of wing chord: values of 93 mm or less indicate Bicknell's Thrush; values of 94-98 mm are indeterminate; and values of 99 mm and greater indicate Gray-cheeked Thrush. Birds with intermediate wing chords are mostly male Bicknell's and female Gray-cheeked Thrushes. This method allows recognition of at least 85% of all Bicknell's Thrushes.

Survey work was carried out to map the extent of the breeding range of Bicknell's Thrush (Atwood, *et. al.* 1996; Ouellet 1993). The breeding range is restricted to New York, Vermont, New Hampshire, Maine, Quebec, New Brunswick, and Nova Scotia. At least 85% of the breeding range is north of Lake Ontario and virtually 100% of this range is east of that lake. Bicknell's Thrush is known to be a coastal migrant in fall with few records south of Virginia, and they winter primarily in the Dominican Republic (Rimmer, *et. al.* 2001).

Banders at Braddock Bay Bird Observatory (BBBO), on the south shore of Lake Ontario, near Rochester, NY, have captured an average of one Bicknell's Thrush each fall season for the past 11 years (12 records in 11 years). This location is approximately 140 miles west of the breeding range. Although this is a small sample, it constitutes a significant fraction of the total number of Bicknell's Thrushes banded in fall in the eastern US over this time period. The purpose of this work is to review the data from BBBO for Bicknell's Thrush and

Gray-cheeked Thrush in the context of the migratory pattern of these species as it is defined by eastern US banding records.

METHODS

Banding data for the fall migration period (1 August to mid-November) were obtained from the USGS Bird Banding Laboratory (BBL) for all Bicknell's, Gray-cheeked and indeterminate Bicknell's/Gray-cheeked Thrushes banded in the eastern US between 1996 and 2006. Banding data were also obtained from the Canadian Wildlife Service for the same species for banding stations on the north side of the Great Lakes. The year 1996 was chosen as a start date for this study because banders could use a robust wing chord criterion to identify Bicknell's Thrush after that date. Bird banding data submitted to the government agencies do not include wing chord measurements, and no effort was made to contact banding stations to obtain wing chord data for captures prior to 1996. For a few records that were at the extreme ranges of date or location, the original banders were contacted and the method of identification verified. A very small number of banding records listed as Bicknell's Thrush but not meeting the 1996 criteria were found and not used in this analysis.

For US data, the present analysis is based on fall records from the following states: MA, RI, CT, NY, NJ, MD, VA, PA, OH, and WV. There were no records for MI, IL, and IN. Bicknell's Thrushes banded on their breeding grounds in VT between 1 August and 26 September (N = 49) were considered non-migrants and were not used in the analysis. Single fall records from NC, SC, FL, and GA were not used in this analysis because they were south of the region of interest. Twelve records from AL were south of the region of interest and furthermore open to doubt because DNA work showed that some were not Bicknell's Thrushes and because there are at present no fully verified records for AL (G. Hill, pers. comm.). Three of four records from West Virginia involved wing chords outside of the 1996 criteria and were not included. A bird banded on 22 August 1998, just east of the species' known breeding range in NY, was not verified using the 1996 criteria and was earlier than any known fall migrant. This record might represent an instance of post-breeding dispersal and was not included in the analysis. A Gray-cheeked Thrush banded on 4 August in the coastal US was not included because it was out of character with the full set of data.

The remaining data were separated by three geographic regions: Canada, interior US, and coastal US. Coastal US was defined as the region within 100 miles of the Atlantic Ocean. The geographic sampling included 13 major banding locations in Canada, 12 in interior US, and 13 in coastal US, as well as numerous sites reporting smaller numbers of these thrushes in each of the regions. Most of the Canadian and interior US banding locations were near Lakes Ontario and Erie.

Migration timing distributions were calculated by daily totals over the 11 year period and the data were again divided by the regions cited above. Records of indeterminate thrushes were not used in determining timing distributions or average properties. The ratio of Bicknell's Thrush to Gray-cheeked Thrush was calculated for banding locations where sufficient data had been obtained.

RESULTS

Between 1996 and 2006, 97 Bicknell's Thrushes were banded during fall migration in the northeastern US (MA, RI, CT, NY, NJ, MD, VA, PA, OH, and WV), and four were banded in Ontario (one from Prince Edward Point, on the north side of Lake Ontario, and three from Selkirk Provincial Park on the north side of Lake Erie, opposite Erie, PA). During the same period there were 2,800 records for Gray-cheeked Thrush in the northeastern US and 3,836 in Ontario. A majority of Bicknell's Thrush records (72 of 101) were from the coastal US. The 25 interior US records included 12 from BBBO, NY, one from nearby Hamlin Beach State Park, one from Erie, PA, two from just south of Lake Erie in OH, and one from West Virginia. Considering the Ontario and interior US data together, no fewer than 20 records came from the shores of Lakes Ontario (14) and Erie (6).

Table 1 summarizes capture totals, median dates, average dates, standard deviations (SD), and earliest and latest records for both species, segregated by the three geographic regions: Ontario, interior US, and coastal US.

Table 1. Fall migration dates for Bicknell's and Gray-cheeked Thrushes in Ontario, interior US, and coastal US, 1996-2006.

	N	Median	Mean	SD	Earliest	Latest
GCTH, Ontario,	3,836	23 Sep	22 Sep	7.7	18 Aug	31 Oct
GCTH, int US	1,650	26 Sep	26 Sep	6.6	31 Aug	3 Nov
GCTH, coast US	1,110	2 Oct	2 Oct	7.9	1 Sep	11 Nov
GCTH, all US	**2,800**	**28 Sep**	**28 Sep**	**7.6**	**31 Aug**	**11 Nov**
BITH, Ontario	4	-	-	-	-	-
BITH, int US	25	24 Sep	25 Sep	8.5	13 Sep	28 Oct
BITH, coast US	72	7 Oct	8 Oct	11.0	19 Sep	5 Nov
BITH, all US	**97**	**5 Oct**	**4 Oct**	**12.0**	**13 Sep**	**5 Nov**

For both species, records from inland areas appear to be consistently earlier than those from coastal areas, in terms of median dates, mean dates, and extreme dates. For Bicknell's Thrush, the mean date of inland records is 13 days earlier than the mean date of coastal records, but the inland sample is small (25).

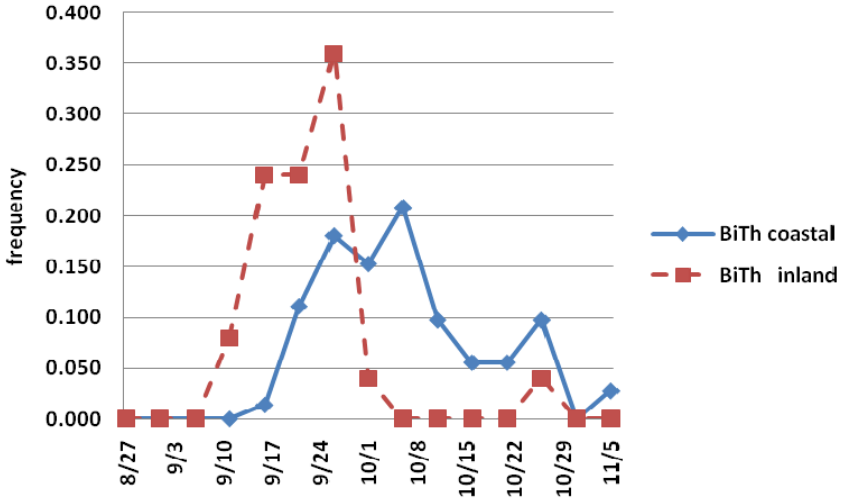

Figure 1. Bicknell's Thrush fall timing distribution separated by coastal and interior US, 1996-2006. Frequency refers to the proportion of each region's total captures that were recorded within each five-day interval (N = 72 for coastal US and N = 25 for interior US).

The peak of Bicknell's Thrush migration in inland areas also appears to be more concentrated around the average date than the peak of migration in coastal areas (SD = 8.5 inland vs. 11.0 coastal; Fig. 1), perhaps implying that birds are more apt to linger along the coast; however, this is based on samples of only 25 and 72 records.

Figure 2 compares the timing distributions for Gray-cheeked Thrush in the three geographic regions. The majority (> 85%) of Ontario data came from the north sides of Lakes Erie and Ontario. The average fall timing for Gray-cheeked Thrush in Ontario was four days earlier than in the interior US, as would be expected because of Ontario's position further north. Even though there was a difference in mean dates between Ontario and the interior US, the distributions for these two regions were virtually the same (chi squared test). In contrast, the earlier timing of interior US vs. coastal US migrants (six days) was statistically significant (chi squared test, $p < 0.0001$; $z = 24.3$, $p < .0001$).

Over the eleven year period 1996-2006, the percentage of adults (after hatching-year birds) among all birds aged was 23% for Gray-cheeked Thrush, in both coastal and inland locations. Bicknell's Thrush averaged 22% adults on the coast, but only 8% adults in the interior: of 24 birds aged at inland sites, only two were adults, one each from Ithaca, NY, and West Virginia; all of the others were hatching-year birds.

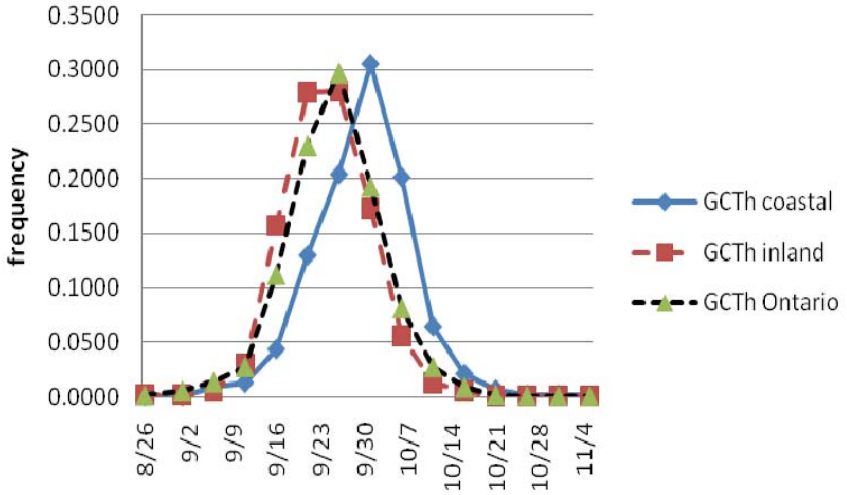

Figure 2. Gray-cheeked Thrush fall timing distribution separated by Ontario, interior US, and coastal US, 1996-2006. Frequency refers to the proportion of each region's total captures that were recorded within each five-day interval (N = 3,836 for Ontario; N = 1,650 for interior US; and N = 1,110 for coastal US).

DISCUSSION

Two trends in the fall banding data deserve discussion. First, there was an unexpectedly large number of records of Bicknell's Thrush from interior sites. Based on banding reports, as many as 20% of fall migrant Bicknell's Thrushes were detected as far west as the eastern Great Lakes. Admittedly, this estimate is based on small samples and on assumptions that capture probabilities were comparable among sites and that data reported to the Bird Banding Lab were representative of all actual captures. Despite these uncertainties, however, it is clear that Bicknell's Thrush occurs regularly in fall along the eastern Great Lakes. The positions of records along the north shore of Lake Ontario (1), south shore of Lake Ontario (13), north shore of Lake Erie (3), and south shore of Lake Erie (3) suggest that Bicknell's Thrushes regularly cross these lakes during fall migration (Fig. 3). Based on verified banding records from as far west as OH and as far southwest as WV, it appears likely that some individuals proceed south on the west side of the Appalachian Mountains. Virtually all (92%) of Bicknell's Thrushes banded in the interior US were hatching-year birds.

The second point of interest in the migration data is the fact that, for both Bicknell's and Gray-cheeked Thrushes, fall migration dates were consistently earlier in the interior than along the coast. For the Gray-cheeked Thrush, these differences in timing could reflect differences in migration strategies among various populations such as those breeding in Manitoba versus those breeding in Atlantic Canada.

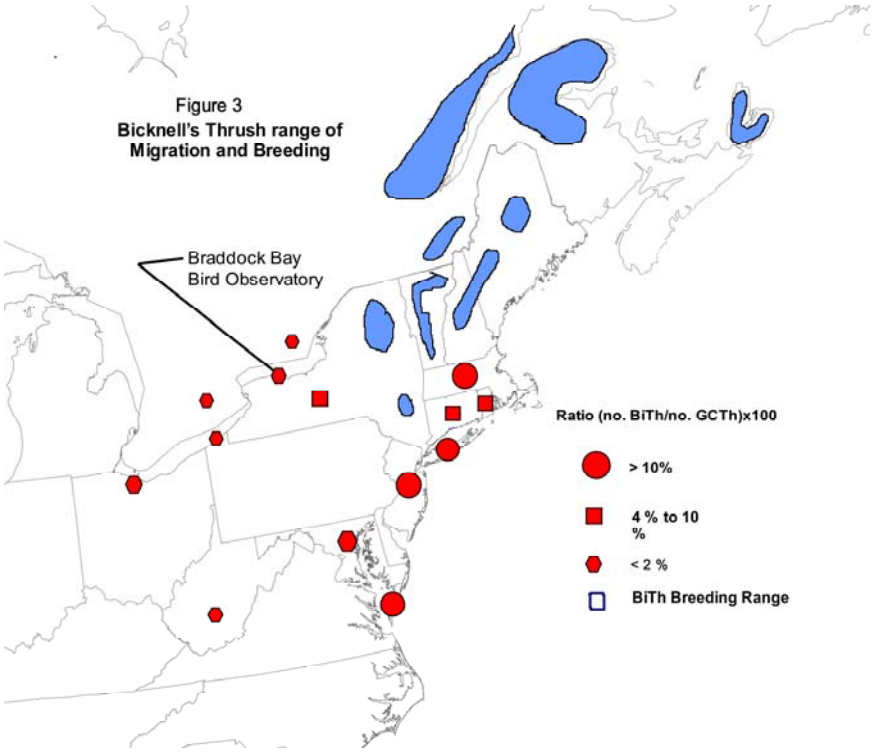

Figure 3. Relative numbers of Bicknell's and Gray-cheeked Thrushes captured during fall migration in Ontario and the eastern United States, 1996-2006. The breeding range is from Rimmer *et. al.* (2001). Data are displayed as ratios because effort data were not available to normalize capture rates among different banding stations.

Wilson and Watts (1997) measured and compared the timing of migration for Bicknell's and Gray-cheeked Thrushes at Kiptopeke, VA, based on daily summed captures, and compared the variation in timing in four of the 27 years of their studies (1968, 1969, 1971, and 1980). Identification was based on the wing chord criteria described above and indeterminate individuals were not included in the averages cited below. They found that the median timing of the two species was statistically the same in three of the four years. Bicknell's Thrush had median dates ranging from 4 to 7 October, and Gray-cheeked ranged from 2 to 7 October. These dates are consistent with the summed data from the coastal region for the 1996 to 2006 time period, which had median dates of 7 October for Bicknell's Thrush and 2 October for Gray-cheeked Thrush.

In their four selected years, Wilson and Watts' data showed an average ratio of Bicknell's to Gray-cheeked of 44% (excluding indeterminate birds), or 30% (including them). In the present work, the comparable ratio was calculated for

banding stations that had sufficient numbers of captures to make a reasonable estimate. For such sites in the coastal region, the ratio was above 10%, whereas it averaged 6.5% over the entire coastal region, including sites with small capture totals. The ratio of Bicknell's to Gray-cheeked was 1% at the inland BBBO site. The most recent results are different from those obtained by Wilson and Watts, but those authors had more data and possibly more reliable identification information as a basis for their ratio. Nevertheless, differences between the two sets of data could suggest that the absolute number of Bicknell's Thrush has decreased in the approximately 30-year time span between these estimates (ca. 1972 vs. ca. 2001). During the four years when Wilson and Watts estimated average timing, they captured about 70 Bicknell's Thrushes per year, significantly higher numbers than the data we obtained from the BBL for the entire US. It is possible that not all data are reported to the BBL or that some banders are still not properly identifying some of the captured thrushes. Or it could mean that the number of Bicknell's Thrushes captured on migration has, indeed, decreased, both in total, and relative to the number of Gray-cheeked Thrushes captured.

Even though the number of fall migrant Bicknell's Thrushes banded in the eastern part of the continent averages only about nine birds per year, there is enough evidence over the past 11 years to draw some inferences about their migration habits when the data are sorted by coastal and inland areas and compared to records of Gray-cheeked Thrush. More Bicknell's Thrushes are found in the inland part of the continent than would be expected based on their winter range, and there are slight differences in the timing of migration between interior and coastal regions.

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