Appendix 1. Station descriptions and examples of data structure.

This appendix contains additional information describing the locations where data were collected (Table A1.1) and illustrates the structure of the data used for analysis (Figs. A1.1 to A1.4).

Table A1.1. Locations of migration monitoring stations and summary of data contributing data to continental analysis of Blackpoll Warbler population trends. "Catchment Estimate Method" refers to the way in which migrants were assigned to particular geographic strata (i.e., either using stable isotopes in feathers, fixed based on knowledge of Blackpoll Warbler migration routes, or not estimated).

Station code	Station name	Country	Lat	Lon	Year range	Mean annual count	Min annual count	Max annual count	Catchment Estimate Method
Pre-breeding ("spring") migration monitoring stations									
ACBO	Albert Creek Bird Observatory	CAN	60.1	-128.9	2007 - 2018	80.1	21	169	West only
LMBO	Last Mountain Bird Observatory	CAN	51.4	-105.2	1998 - 2018	9.6	0	33	West only
BSBO	Black Swamp Bird Observatory	USA	41.6	-83.2	1998 - 2018	78.4	20	176	-
PIBO	Pelee Island Bird Observatory	CAN	41.7	-82.7	2003 - 2018	15.4	1	35	-
LPBO	Long Point Bird Observatory	CAN	42.6	-80.3	1998 - 2018	261.6	68	577	Isotopes
RUTH	Haldimand Bird Observatory - Ruthven	CAN	42.6	-79.5	1998 - 2018	20.8	1	70	Isotopes
TTPBRS	Tommy Thompson Park Bird Research Station	CAN	43.6	-79.3	2005 - 2018	37.7	13	75	Isotopes
PEPBO	Prince Edward Point Bird Observatory	CAN	43.9	-76.9	1998 - 2018	18.8	5	43	Isotopes
FBBO	Foreman's Branch Bird Observatory	USA	39.2	-76.1	2006 - 2018	8.2	0	21	-
IPBO	Innis Point Bird Observatory	CAN	45.4	-75.9	1998 - 2018	22.6	4	52	-
MGBO	McGill Bird Observatory	CAN	45.4	-73.9	2006 - 2018	39.4	3	85	Isotopes
AIMS	Appledore Island Migration Station	USA	43	-70.6	1998 - 2018	72	31	144	East only
MBO	Manomet Observatory	USA	41.9	-70.5	1998 - 2018	13.6	1	34	East only
Post-breeding ("fall") migration monitoring stations									
CFMS	Creamer's Field Migration Station	USA	64.9	-147.7	1998 - 2018	34	1	180	West only
TLBBS	Teslin Lake Bird Banding Station	CAN	60.2	-133	2009 - 2018	159.4	89	277	West only
MNO	Mackenzie Nature Observatory	CAN	55.3	-123.1	1998 - 2018	33.1	12	71	West only
LMBO	Last Mountain Bird Observatory	CAN	51.4	-105.2	1998 - 2017	58.8	0	124	West only
TCBO	Thunder Cape Bird Observatory	CAN	48.3	-88.9	1998 - 2018	112.5	10	448	Isotopes
BSBO	Black Swamp Bird Observatory	USA	41.6	-83.2	1998 - 2018	536.8	117	1129	-
PIBO	Pelee Island Bird Observatory	CAN	41.7	-82.7	2003 - 2018	113.6	39	256	-
BPBO	Bruce Peninsula Bird Observatory	CAN	45.2	-81.4	2002 - 2018	18.9	4	80	-
LPBO	Long Point Bird Observatory	CAN	42.6	-80.3	1998 - 2018	2560	613	5000	Isotopes
RUTH	Haldimand Bird Observatory - Ruthven	CAN	42.6	-79.5	1998 - 2018	65.8	15	229	Isotopes

TTPBRS	Tommy Thompson Park Bird Research Station	CAN	43.6	-79.3	2005 - 2018	50.1	13	99	Isotopes
PARC	Powdermill Avian Research Center	USA	40.2	-79.3	1998 - 2018	33	18	92	Isotopes
PEPBO	Prince Edward Point Bird Observatory	CAN	43.9	-76.9	2001 - 2018	142.4	58	371	-
FBBO	Foreman's Branch Bird Observatory	USA	39.2	-76.1	2006 - 2018	17.8	4	68	-
MGBO	McGill Bird Observatory	CAN	45.4	-73.9	2006 - 2018	26.4	3	55	-
BIBS	Block Island Banding Station	USA	41.2	-71.6	1998 - 2018	15.8	0	100	-
KWRS	Kingston Wildlife Research Station	USA	41.5	-71.5	1998 - 2018	21.1	0	65	Isotopes
MBO	Manomet Observatory	USA	41.9	-70.5	1998 - 2018	87.8	14	303	Isotopes

Data at each migration monitoring station are collected daily. Daily counts of migrants, corrected for survey effort, are illustrated for Long Point Bird Observatory in Figs. A1.1 (for pre-breeding migration) and A1.2 (for post-breeding migration). Note that for Canadian migration monitoring stations, daily effort was not available as "net-hours" but each station uses standardized protocols. Thus, to express $T_{s,y}$ (an index of summed daily counts per net hour across a season; see Table 1 in manuscript) on a similar scale to US stations, we assigned daily net-hours as the mean of US stations (257 in pre-breeding migration, and 232 for post-breeding migration).

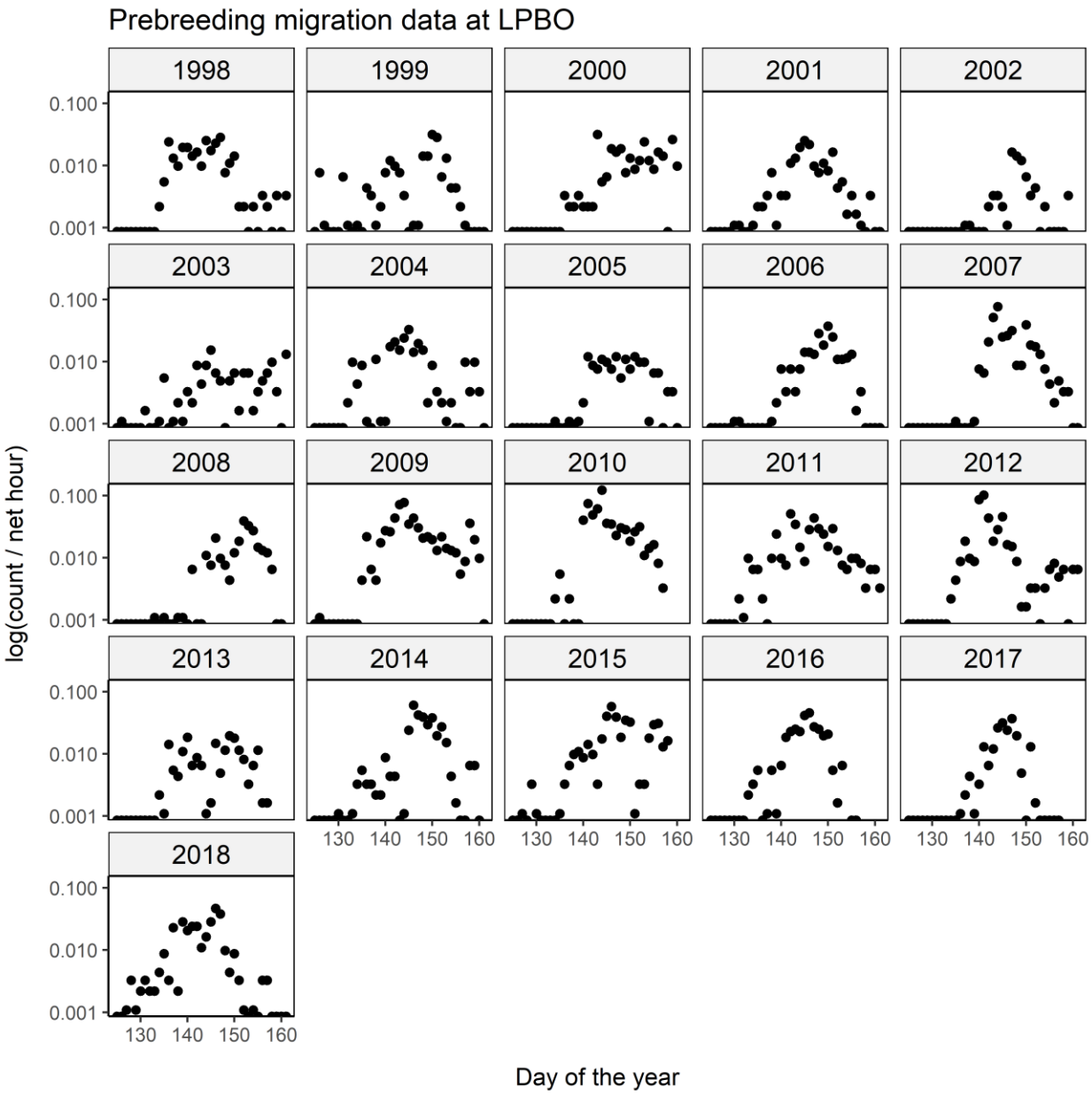

Fig. A1.1. Number of birds counted daily each year at Long Point Bird Observatory (LPBO) during pre-breeding migration, on an adjusted scale as described in text above.

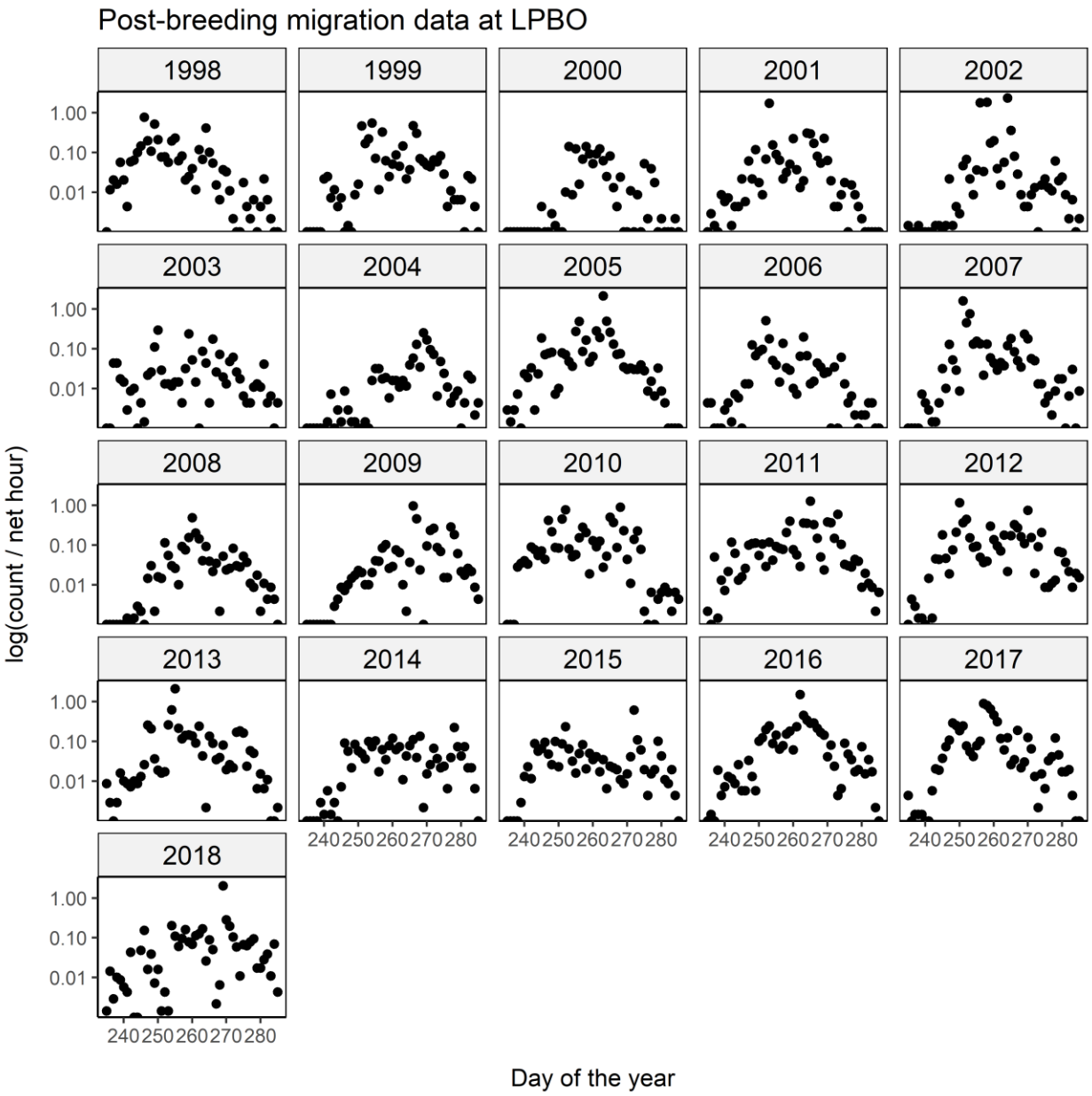

Fig. A1.2. Number of birds counted daily each year at Long Point Bird Observatory (LPBO) during post-breeding migration, on an adjusted scale as described in text above.

Stable isotopes of hydrogen within feather samples from migrating birds were analyzed and used to assign birds to geographic strata of origin. The numbers of migrants assigned to particular geographic strata, at each station within each year, were used as raw data in the Bayesian statistical model described in the main text of this manuscript (i.e., the breeding origin assignments represent $\boldsymbol{Y}_{s,y}$ in equation 6). Breeding origin assignments were used as data for stations within 250 km of the location where feather isotopes were collected. The resulting assignments are depicted in the figures below.

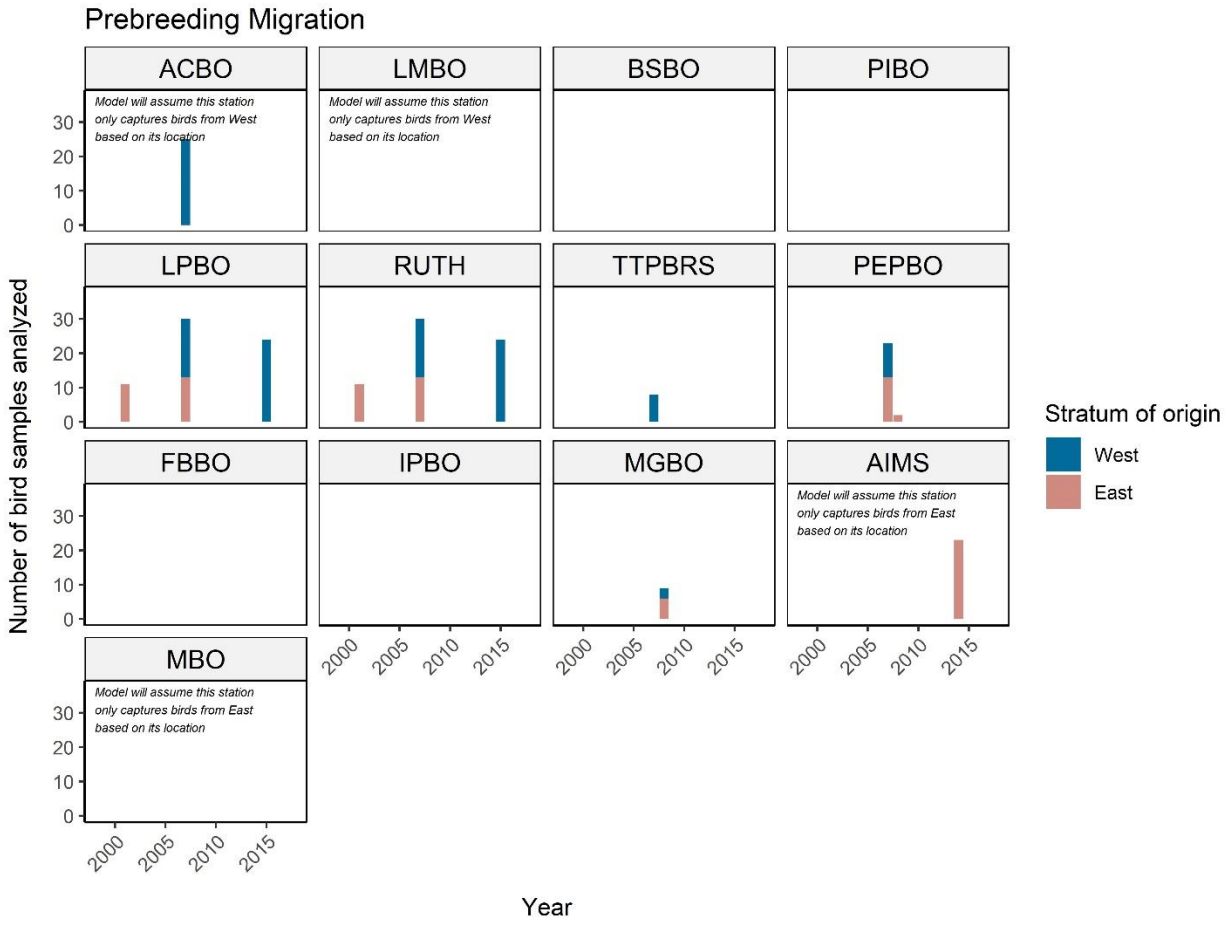

Fig. A1.3. Number of birds assigned to discrete geographic strata based on analysis of stable isotopes of hydrogen in feather samples during pre-breeding ('Spring' migration), used as data ($\boldsymbol{Y}_{s,y}$ in equation 6) in the Bayesian statistical analysis in combination with time-series of migration counts. Some stations were also assumed to only capture birds from a single stratum in our statistical analysis, based on their geographic location. Panels are arranged from farthest west to farthest east when read from top left to bottom right.

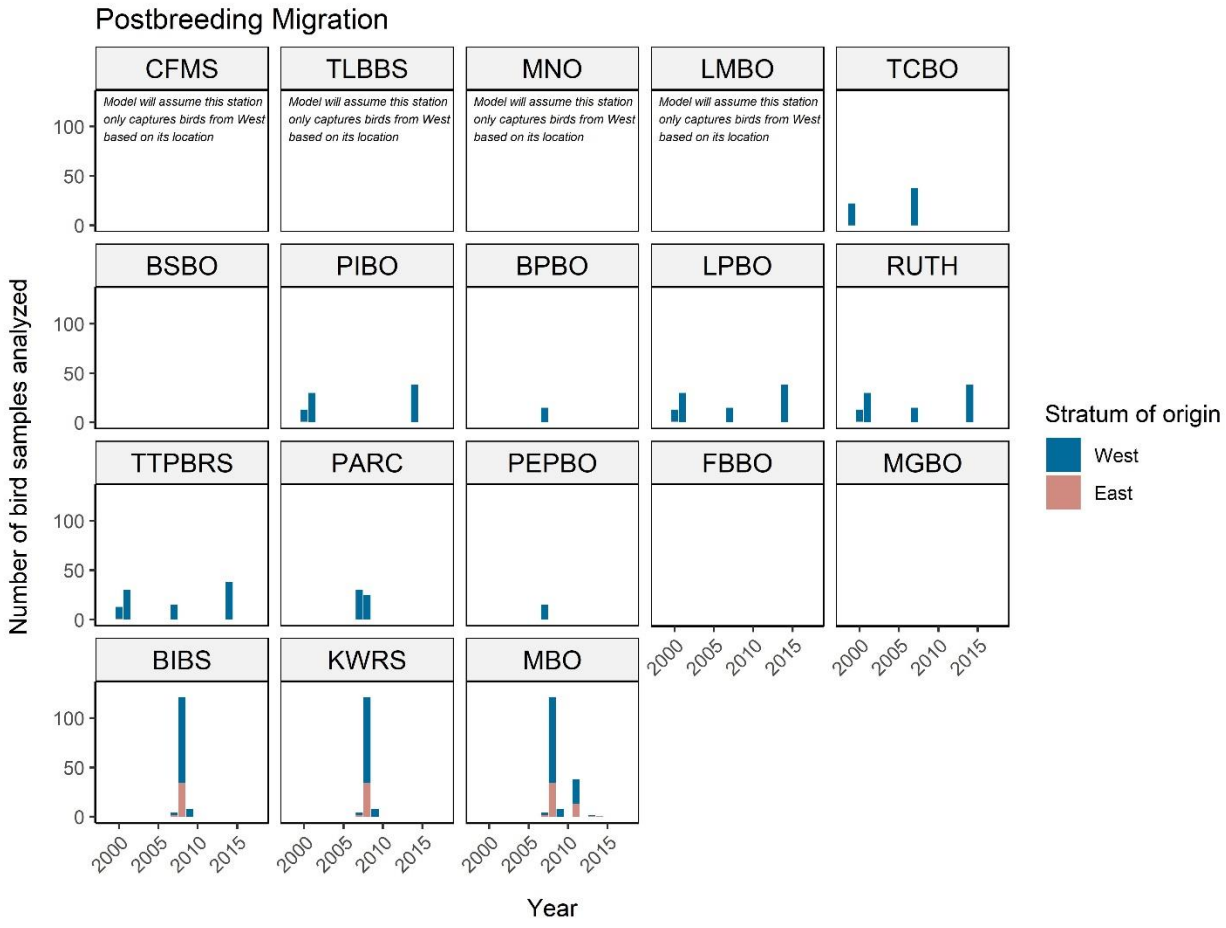

Fig. A1.4. Number of birds at each station assigned to discrete geographic strata based on analysis of stable isotopes of hydrogen in feather samples during post-breeding ('Fall' migration), used as data ($\boldsymbol{Y}_{s,y}$ in equation 6) in the Bayesian statistical analysis in combination with time-series of migration counts. Some stations were also assumed to only capture birds from a single stratum in our statistical analysis, based on their geographic location. Panels are arranged from farthest west to farthest east when read from top left to bottom right.