British Columbia Community Bat Program

BC Annual Bat Count (2012-2024)

Mandy Kellner, BC WLRS and Paula Rodriguez de la Vega, BC CBP

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Executive Summary

White-nose syndrome (WNS) is an emerging fungal disease that results in high mortality of susceptible bat species. While the causative fungus has been found in British Columbia, the disease itself has not yet been detected but is spreading northwards in Washington State and westward from Alberta, and is expected in BC in the near future. The BC Annual Bat Count is one potential method to assist with monitoring the spread of the disease, identify species-specific impacts, and track recovery of affected species.

The Annual Bat Count involves repeated emergence counts at bat roosts in anthropogenic structures including buildings, bridges, and bat boxes. Currently, it is the only long-term roost-monitoring program in the province. It covers much of BC and is cost-effective due to the large volunteer component and implementation through the BC Community Bat Program. The Annual Bat Count is also a valuable engagement tool that may lead to increased appreciation of bats and increased roost stewardship, and the project provides ecological data on bats species in anthropogenic structures. Begun in 2012, the Annual Bat Count has data on seven bat species at 1008 anthropogenic roost sites. Species with the largest number of known roost sites are Little Brown Myotis and Yuma Myotis, both of which are susceptible to WNS.

Challenges in using the data for trend monitoring include that not all sites are monitored each year due to change in land ownership and/or availability of people to count sites, high variability observed in count data within and between years, movement of bats between different roost sites (roost switching), the small sample size of roosts for some species, and the occurrence of multi-species roosts, where a structure is used by two or more species.

Bat Count sites may provide valuable information on bat population declines without statistical analyses, if catastrophic declines occur such as those observed in bat populations of eastern North America. However, additional work is needed to address the complications in using statistics to detect lesser changes. This work is beyond the scope of the BC Community Bat Program and partnerships are needed to advance the utility of the monitoring program.

Key successes of the Annual Bat Count in 2024 are:

1. Contributions to WNS surveillance and population monitoring, specifically:
    - 1089 counts at 268 roost sites across the province in 2024; 223 of the sites are in the regions where WNS is first expected (Fraser Valley/ Vancouver, Sunshine Coast, Vancouver Island /Gulf Islands, Okanagan, Kootenay),
    - Identification of species of bat by genetics or acoustics at 47 % of sites,
    - an increasing network of roost stewards who can monitor for spring mortality events associated with WNS.

2. Ongoing stewardship and participation to engage roost stewards and volunteers in bat conservation actions.
3. Contributions to knowledge of bat ecology across BC, specifically:
    - Contribution to provincial knowledge of species that use anthropogenic structures. For example, the Bat Count has confirmed use of anthropogenic roosts by Californian Myotis in coastal BC and the Okanagan, and Long-legged Myotis in coastal BC, Skeena, Cariboo, and Kootenay regions.
    - Information on the timing of use of structures and dates of first pups across the province,
    - Monitoring for and documenting impacts from unusual weather events (e.g., cold rainy June 2022 and 2024, heat wave of late June/early July 2021, widespread fires and smoke in 2023),
    - Collection of carcasses from mortalities at roost sites for research into cause of death, and
    - Increased understanding of use of bat boxes specifically, to inform the BC Community Bat Program's Best Management Practices for bat boxes (Kellner/CBP 2024) and national/international bat box guidance (WCSC 2024).

This report provides a summary of the data available to-date, to identify gaps and prioritize future data collection efforts. Review of the data up to 2024 has highlighted the benefits of this program and the need to continue to emphasize the same key actions, to ensure that the Annual Bat Count continues to evolve into a more effective, robust monitoring program. These recommendations for 2024 include:

- improving retention of all interested homeowners and volunteers through communication and increased feedback, to increase the number of multi-year samples,
- improving sample sizes and multi-year data collection first at priority sites and then across all regions and for all species. To achieve this, we need to:
    - communicate and follow-up (including an early May check-in) with regional coordinators and volunteers to ensure priority sites are counted and secure other counters if needed,
    - emphasize conducting at least **two** counts in the pre-pup period especially at priority sites, to better estimate maximum colony size, and
    - emphasize annual, multi-year sampling especially at priority sites, for data to contribute to trend analysis,
- identify species, particularly at priority sites and other sites with multi-year monitoring, by communicating (to regional coordinators and volunteers) where there are data gaps and directly encouraging sample collection and submission,
- develop consistent methodology to flag sites showing potential population declines (e.g. significant percent decrease in maximum pre-pup counts) in a timely way for immediate action (e.g. swabbing sites for Pd, testing preventions/cures),
- continue to partner with the BC government to incorporate count data into NABat and initiate analyses, and

- continue to work with the province and research partners (BC Water, Land and Resource Stewardship, Wildlife Conservation Society Canada) on methods to assess composition of bat species in multi-species roost sites.

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Introduction

White-nose syndrome (WNS) is an emerging, invasive disease of North American bats caused by the introduced fungus, *Pseudogymnoascus destructans* (Pd). The disease has killed millions of bats across North America since 2006. It has nearly extirpated (90% -100% mortality) some previously abundant species (e.g. Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*M. septentrionalis*)), in some areas. These two species are now listed by the *Species at Risk Act* (SARA) as endangered in Canada (B.C. Conservation Data Centre 2023). In 2022, Pd was confirmed in southern BC, and the disease WNS continues to spread north in Washington State and west in Alberta, putting BC's bats at extreme risk from the disease. Several of BC's 15 bat species have not yet been exposed to WNS, and it is unknown what the full impact of the disease will be in BC.

Bats are important to our environment and our economy, helping to control forest, agricultural, and urban pests. The endangered Little Brown Myotis can eat 600 mosquitoes per hour (Griffin et al. 1960) and researchers estimate that bats provide billions of dollars in pest control services annually in the United States (Kunz et al. 2011, Kasso and Balakrishnan 2013). A rapid response to WNS is required to understand and mitigate this significant threat, protect our bat populations, and reduce economic impacts.

One component of WNS response is monitoring the impacts to, and potential recovery of, different species of bats. The ability to reliably detect trends in bat populations through counts depends on a number of factors, including years sampled, number of sites counted, number of bats per site, and annual variation (Walsh et al. 2001). Statistically robust methods for monitoring bat populations have been developed in several European countries in response to long-term population declines and the need to determine if recovery targets are reached (e.g. Walsh et al. 2001, Warren and Witter 2002, Barlow et al. 2015).

The BC Community Bat Program independently conducts the only long-term roost monitoring project in the province. Beginning in 2012 with the Kootenay Community Bat Project, the BC Community Bat Program has expanded remarkably quickly across the province. One facet of the Program is the Annual Bat Count, which involves exit counts conducted at summer day roost sites in anthropogenic structures. Goals of the Annual Bat Count include raising awareness of bats, promoting stewardship of colonies, and ultimately providing information on bat species and numbers.

The Annual Bat Count is coordinated at the provincial level by the BC Community Bat Program, providing consistent methods and datasheets, plus data management and storage. Data without personal information is warehoused with the Province of BC, and data summaries and reporting are done in partnership with BC Ministry of Water, Land and Resource Stewardship and the BC Community Bat Program. On the ground, the Annual Bat Count is organized and implemented by regional coordinators. As part of their contribution to the Program, regional coordinators are responsible for ensuring that a number of counts occur in their regions. Coordinators usually do several counts themselves, particularly at strategically important sentinel roost sites. They also recruit, organize, and train volunteers to assist with counts, as is done in the United Kingdom's National Bat Monitoring Program (Barlow et al. 2015).

Volunteer involvement varies by region and depends in part on the direction and goals of the Regional Community Bat Project. Overall, the program has included diverse volunteers including private landowners, local stewardship groups, naturalists, interested citizen-scientists, and government staff (e.g. BC Parks, WLRS and ENV biologists, Canadian Wildlife Service).

The Annual Bat Count has a strong potential to provide trend data for those bat species in BC that regularly use anthropogenic structures. The program has expanded greatly in recent years, but continues to need focus on some aspects of the program to obtain statistically robust trends, most notably on ensuring retention of sites to establish multi-year trends. Specific recommendations to prioritize and improve data collection have been made prior to past field seasons. Several of these recommendations have been addressed, while new recommendations have also been added for 2025.

The purposes of this report are to:

1) update the summary of available BC Annual Bat Counts from across the province to include data from 2024,
2) assess the success of the program in meeting the recommendations made, prior to the 2025 field season, and
3) continue to provide recommendations to improve the program in order to make it an effective tool for monitoring the arrival, impacts, and response of selected bat populations to WNS and other threats.

This report is preliminary in nature and does not include any statistical analyses of the data.

Acknowledgements

This report is a partnership between BC WLRS and the BC Community Bat Program. Data is collected entirely through the BC Community Bat Program, which is a joint venture of regional bat projects across the province. It is administered by the BC Conservation Foundation and funded by Habitat Conservation Trust Foundation, Forest Enhancement Society of BC, Habitat Stewardship Program, the Province of BC, and many regional funding partners. Thank you to all the Regional Coordinators who locate roost sites, identify candidate sites for the Annual Bat Count, and engage, organize, and train volunteers. BC Parks has done an exceptional job of ongoing counts at many sites over the years. Orville Dyer (retired from BC MoE) has provided valuable guidance and input to the program in the past. We especially thank Juliet Craig and the Kootenay Community Bat Project, who started the Annual Bat Count in BC. Finally, the Annual Bat Count could not occur without our many dedicated partners and volunteers (including, but not limited to, Nanaimo Area Land Trust, Habitat Acquisition Trust, Sunshine Coast Wildlife Project, Mayne Island Conservancy, Thetis Island Nature Conservancy, Kamloops Naturalist Club, Scout Island Nature Centre, Peachland BEEPS, BC Nature clubs across BC, and many other NGOs), who collect data for the program.

Methods

The Annual Bat Count is a repeated count of bats as they leave a roost site in summer (i.e. emergence count or exit count). It focusses on day roosts in anthropogenic structures (e.g. houses, barns, bat boxes). These roost sites are usually identified through the work of the BC Community Bat Program. Regional Coordinators conduct and promote volunteer participation in conducting bat exit counts at roost sites during designated sampling periods. The program covers much of BC, although sites tend to be clustered where there is a longer history of bat programs or a larger human population (Figure 1).

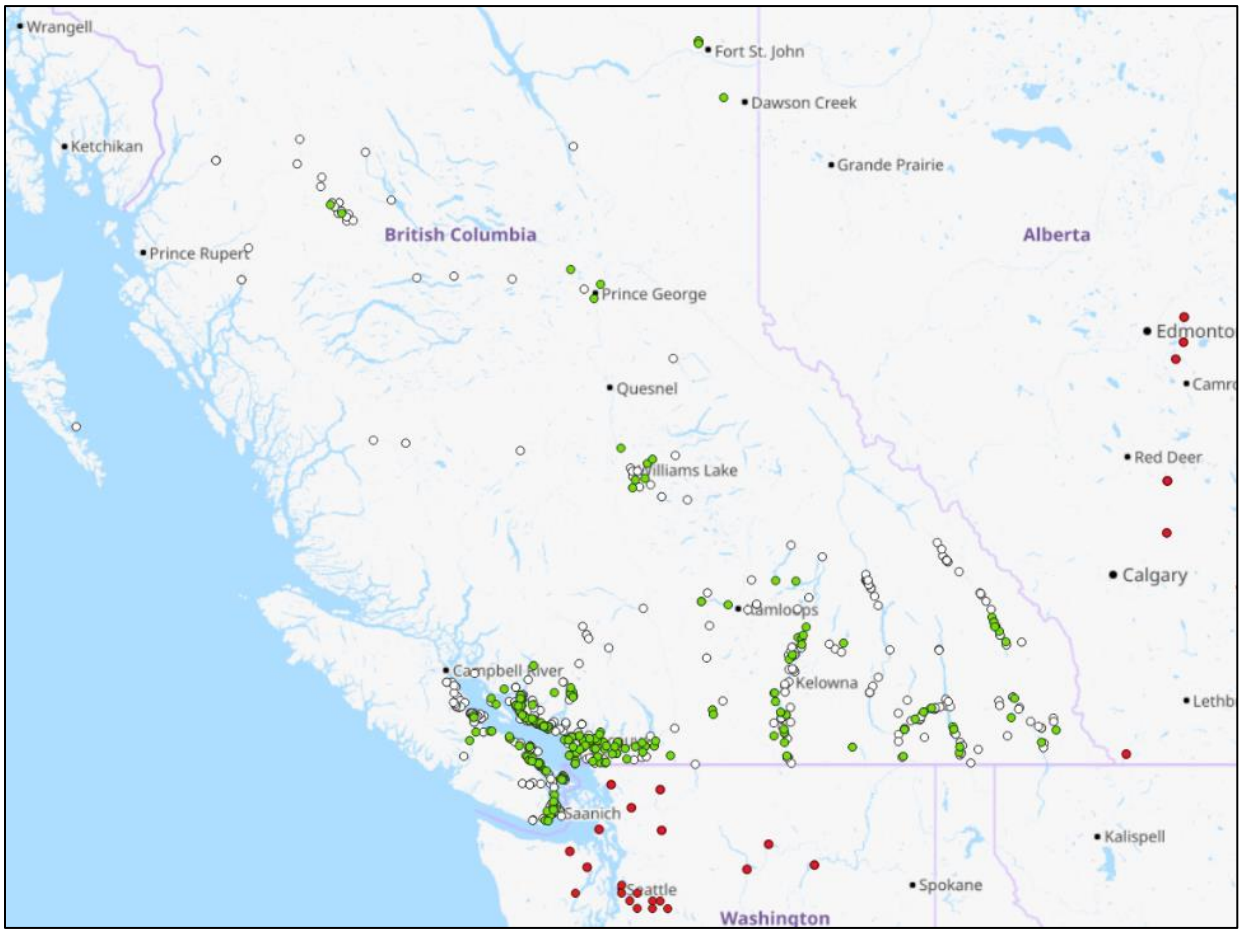

Figure 1. Map of sites sampled in the Annual Bat Count (2012 to 2024). Green dots are roost sites counted in 2024 in the BC Annual Bat Count; white are sites counted in previous years but not 2024. Red dots indicate WNS or Pd detection sites in Washington State and Alberta to December 2024.

Roost sites and roost locations

The terms 'site' and 'location' have specific meanings in this report. Counts are done at day roost sites; there are occasionally several sites at one location, with each site being counted separately and ideally on the same night. The location is the larger area with the roost sites. For example, a property with an attic roost and two bat boxes in the yard would be one location with three count sites, and multiple counts are done at each site. Data are generally analyzed by site, a structural feature with bats exiting (or not), instead of by location, which is a subjective grouping of known roost sites in an area.

Roost sites are classified into ten structure types: barn, unoccupied house, occupied house, church, outbuilding, bridge, tree, bat box/condo, other (e.g., cave, woodpile), and unknown.

Coordinators and/or volunteers conduct between one and four visual counts of bats exiting roosts at dusk. Ideally, two counts occur between June 1 and 21 (the 'pre-pup period', i.e. before pups can fly). These counts are the highest priority, and are consistent with North American Bat Monitoring Program (NABat) protocols (Loeb et al. 2015). Two more counts are recommended once pups are flying (called the 'post-pup period'). In 2018, dates for post-pup counts were switched to July 11 – August 5 (from July 21 – Aug 15 in 2017 and earlier), because of many reports of colonies being vacated by early to mid-August. We hoped that the earlier count window would facilitate counts before colonies began to disperse.

In 2019, we began requesting multiple independent counts on the same night, when possible, given the constraints of volunteer time / availability. This was based on discussion with the NABAT team and is intended to provide a measure of observer error and assess variability.

The Annual Bat Count is meant to be repeated yearly for as long as possible, but depends on funding, access to count sites, and volunteer availability. Data are recorded for each count and submitted to the regional or provincial coordinator or BC Ministry of Water, Lands and Resource Stewardship staff. Ultimately, count data are entered into the BC Wildlife Species Inventory database[1]. Detailed methods can be found on our website[2] .

Species identification

Verification of the species using a roost site is done through DNA analysis of guano samples. To date, our DNA analysis has been completed by Wildlife Genetics International, Nelson. Alternatively, some regional coordinators have access to ultrasonic bat detectors (e.g. Echometer Touch (Wildlife Acoustics), Anabat Walkabout (Titley Electronics), RoostLogger (Titley Electronics)), which can inform species identification. Identifications based solely on acoustics are taken as confirmation if the acoustic files are analyzed by a trained bat biologist. Species identification may also be done by qualified biologists through identification of dead bats or live capture by mist-netting. Although these three methods 'confirm' species identification for this report, final confirmation of species presence generally requires genetic verification and is the preferred method, if available.

Criteria for identifying maternity roosts

Several methods of identifying maternity roosts have been investigated (BC Community Bat Program 2021). Sightings of pups, including mortalities found at the roost, can be used to confidently confirm a site as a maternity roost. However, confirmed pup sightings are not available for the majority of sites. The two methods employed in this report are a) to compare the maximum counts from the pre-pup and post-pup periods - sites where the maximum count increased between periods were considered maternity colonies, and b) sites with more than 20 bats. Rationale was explored in previous reports

[1] http://a100.gov.bc.ca/pub/siwe/search_reset.do

[2] http://www.bcbats.ca/index.php/get-involved/participate-in-the-bc-bat-count.

(Kellner 2019). Potential maternity sites were identified using both methods, and sites were manually reviewed to ensure that known maternity colonies were correctly identified.

Trends across years: screening for declines

Maximum pre-pup counts were graphed for each roost site, and the results visually screened for declines. Subjective assessment was used to identify sites that needed further follow-up. These sites were then individually investigated to determine if there were known causes for decline. In 2018, variation within the pre-pup period and post-pup period were assessed. Methods to quantitatively assess yearly variation in relation to this within-year variation have not yet been employed.

Results

Volunteer involvement

Volunteer involvement is essential to the Annual Bat Count, providing many or most of the bat counts in some regions. Volunteers either assist regional coordinators or conducted counts on their own. Volunteers may have assisted at more than one count, and many counts required multiple volunteers to ensure all exits were monitored, so the number of unique volunteers is unknown. Recording volunteer effort began in 2016. Volunteers participated in a minimum of 338/403 counts (84%) in 2016, 418/550 counts (76%) in 2017, 540/809 counts (67%) in 2018, 612/920 counts (66 %) in 2019, 772/1003 counts (77%) in 2020, 913/948 counts (96%) in 2021, 969/1120 (86%) in 2022, 589/888 counts (66%) in 2023, and 998/1089 counts (92%) in 2024 (Figure 2). The number of volunteer-evenings (total number of evenings that volunteers participated) was a minimum of 465 in 2016, 430 in 2017, 613 in 2018, 1308 in 2019 (large increase due to improved tracking), 1635 in 2020, 1932 in 2021, 1809 in 2022, 2035 in 2023, and 2323 in 2024.

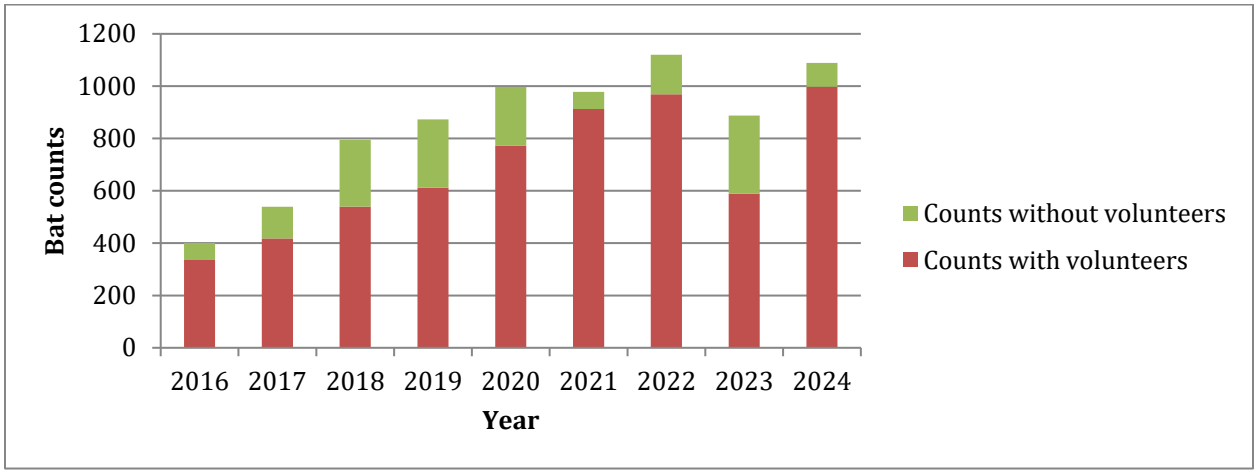

Figure 2 The number of bat counts done with volunteer involvement, from 2016 to 2024. Counts with volunteers include those done entirely by volunteers, such as landowners with a colony, and counts with a CBP coordinator and volunteers.

Number of sites and counts

Seven thousand, nine hundred and sixty-seven (7967) counts have been conducted at 1008 sites between 2012 and 2024 (Figure 1; Table 1). Sites counted in one year may not have been counted in

subsequent years, and sites counted for multiple years were often but not always counted in consecutive years. The number of sites increased with the expansion of the Community Bat Program across the province and increased efforts by coordinators to establish count sites and gather baseline pre-WNS data.

Table 1. Number of locations, roost sites, and counts per year. Not all sites from a year were counted in successive years.

Year	Locations	Roost sites	Counts
2012	11	11	27
2013	24	31	82
2014	36	45	113
2015	54	77	201
2016	116	153	393
2017	138	189	539
2018	172	227	787
2019	252	341	896
2020	242	350	946
2021	236	327	905
2022	206	287	1093
2023	195	284	902
2024	186	268	1089
Unique locations, roost sites and counts, all years	716	1008	7967

Number of sampling years

Sites have been monitored for between one and thirteen years (Table 2).

Sites that have been monitored for two or more years can be used in trend analysis using the methods employed in UK's National Bat Monitoring Programme (Bat Conservation Trust 2019). As of 2024 in BC, there are 606/1008 sites (65 %) with two or more years of data, for all species combined (Table 2).

Table 2. Number of roost sites that have from one to thirteen years of count data, and the percentage of sites sampled two or more years. Sites with two or more years of data can be used in trend analysis (Bat Conservation Trust 2019).

Number of years counted	Number of roost sites as of								
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**

1	136	156	219	344	443	302	429	464	348
2	34	45	93	113	146	131	173	171	137
3	12	32	35	52	53	61	103	95	59
4	7	9	21	33	53	34	64	69	46
5	1	14	9	19	21	23	36	57	34
6		1	11	10	22	23	37	35	33
7			1	8	4	5	14	21	15
8				1	8	5	10	14	16
9					1	6	7	10	15
10						2	6	4	2
11							0	6	4
12								0	6
13									1
Total	190	257	389	580	751	835	879	946	1008
Percent with 2+ years	28	39	44	41	41	64	51	51	65

Distribution of sites

Roost count sites are distributed throughout B.C. but are focused in areas of higher human habitation and where Community Bat Programs have been established for longer times (Table 3, Figure 1).

Table 3. Distribution of roost sites counted in the Annual Bat Count, by region and year.

	Year – 20XX												
Region	12	13	14	15	16	17	18	19	20	21	22	23	24
Fraser Valley/Lower Mainland	0	0	0	1	11	21	32	64	68	76	63	60	79
Okanagan	1	3	15	17	27	30	39	28	34	19	22	42	48
Sunshine Coast	0	0	0	0	31	41	48	105	61	83	54	28	41
Southern Vancouver Island/Gulf Islands[1]	0	7	7	11	21	35	44	52	55	57	45	52	35
Kootenay	10	20	20	31	25	26	27	46	64	33	37	46	20
Mid Vancouver Island	0	0	0	1	2	1	2	3	5	5	8	16	19
Cariboo	0	0	1	1	9	14	18	17	28	21	22	18	13
Thompson	0	1	1	2	3	2	3	4	4	1	6	3	4
Peace	0	0	1	0	3	3	3	3	2	0	0	2	3
Omineca	0	0	0	0	1	0	1	0	0	1	1	0	3
Skeena	0	0	0	12	13	8	6	12	13	10	9	7	2
Columbia Shuswap	0	0	0	1	6	8	4	7	6	9	7	0	1
Northern Vancouver Island	0	0	0	0	1	0	0	0	10	12	13	10	0
All sites	11	31	45	77	153	189	227	341	350	327	287	284	268

[1]Includes data from bat programs on Salt Spring, Thetis, Mayne, Gabriola, Denman/Hornby, and Texada Islands.

Structure type

Most roost sites that were monitored from 2012 to 2024 were occupied human houses (435 sites; 48%) and bat boxes or bat condos (362 sites; 37%; Table 4).

Table 4. Type of structure for each site monitored during the Annual Bat Count, 2012-2024, by region.

Region	Unoccupied house	Occupied house	Outbuilding / barn	Bat box / bat condo	Other[1]	Unk	Total
Sunshine Coast	9	133	24	48	28	3	245
Fraser Valley/Lower Mainland	3	94	20	57	5	0	179
Kootenay	4	52	21	74	1	0	152
Southern Vancouver Island/Gulf Islands	1	73	9	64	0	2	149
Okanagan	2	26	11	61	4	1	105
Cariboo	1	11	3	35	0	0	50
Skeena	0	18	2	10	1	0	31
Columbia Shuswap	0	10	0	16	0	0	26
Mid Vancouver Island	0	9	3	12	2	0	26
Northern Vancouver Island	0	16	0	2	1	0	19
Thompson	0	5	1	10	0	0	16
Omineca	0	2	1	3	0	0	6
Peace	0	1	0	3	0	0	4
Total	20	450	95	395	42	6	1008
Percent of all roosts	2	45	9	39	4	1	

[1] 'Other' includes 'Umbrella' (n=28), 'Rock/cave' (n=2), 'Church' (n=1), 'Tree' (n=1), and 'Bridge' (n=7).

Bat species

Proportion of count sites with bat species identified

For all sites across years, there are 470/1008 (47 %) sites that have a species identified, with an additional 15 sites classified as *Myotis* species. There are an additional 17 sites with samples submitted and genetic results pending early 2025. Many of the unidentified sites have not been visited for several years and it is unlikely that the bat species using these sites will ever be determined.

Species confirmed in roosts sites

There are seven species of bats recorded roosting in anthropogenic structures in the Annual Bat Count data. These are Little Brown Myotis (*Myotis lucifugus*), Yuma Myotis (*M. yumanensis*), Big Brown Bat (*Eptesicus fuscus*), Californian Myotis (*M. californicus*), Long-legged Myotis (*M. volans*), Long-eared Myotis (*M. evotis*), and Townsend's Big-eared Bat (*Corynorhinus townsendii;* Table 5). DNA identification from guano, which is used to confirm species, used only one pellet per site so species that rarely use structures or are a small percentage of the bats using the site are likely under-represented in these data, especially at sites with large numbers of bats. This method also leads to under-estimation of roosts where multiple species occur, as often only one sample is analyzed per site. At present, 19 % (90/470) roost sites are believed to be used by multiple species of bats (Table 5).

Little Brown Myotis are more commonly found in artificial structures than any other bat in BC (Table 6) and occur alone or with other species at 257/470 (55%) of sites with confirmed species identification. When multiple species are identified at a roost, Little Brown Myotis are commonly found with Yuma Myotis, and sometimes co-roost with Big Brown Bat, California Myotis, Long-legged Myotis or Long-eared Myotis (Table 6).

Yuma Myotis are the second most common bat in anthropogenic structures and are confirmed at 166/470 (35 %) of sites. They often are found alone or in roosts with Little Brown Myotis and occasionally co-roost with other species including Big Brown Bat, California Myotis and Townsend's Big-eared Bat (Table 6).

There are eighteen sites identified as having Long-eared Myotis, including four bat boxes, a shed, a cave, and occupied buildings. Long-eared Myotis were also confirmed genetically at a bat box roost in the Skeena Region in 2015. However, this site has since been identified as Little Brown Myotis through improved DNA analysis procedures including testing for a gene (muc-11) to positively differentiate Long-eared Myotis from a coastal genotype of Little Brown Myotis. This improved testing from 2016 onwards allowed differentiation of these species.

California Myotis was confirmed genetically or through capture at occupied houses, barns, umbrellas, and bat boxes on Southern and Northern Vancouver Island, the Gulf Islands, the Sunshine Coast, Fraser Valley / Lower Mainland, and in a bat box in the Okanagan.

Long-legged Myotis has been genetically confirmed using building roosts (including under cedar siding on an occupied house), barns, and several bat boxes.

Table 5. Species, number of roost sites monitored for which species has been confirmed, and regions monitored by the Annual Bat Count.

Species	Number of roost sites with confirmed species identification (percent of all 470 roost sites with an ID)[1]	Regions
Little Brown Myotis	257 (55%)	All
Yuma Myotis	166 (35%)	All except Peace and interior portion of Skeena
California Myotis	54 (11%)	Fraser Valley / Lower Mainland, North Island, Okanagan, Southern Vancouver Island/ Gulf Islands, Sunshine Coast
Big Brown Bat	58 (12%)	All except Peace
Long-eared Myotis	18 (4%)	Fraser Valley / Lower Mainland, Haida Gwaii, Kootenays, Southern Vancouver Island/Gulf Islands, Sunshine Coast
Townsend ’s Big-eared Bat	13 (3%)	Fraser Valley / Lower Mainland, Kootenay, Mid-Island, Okanagan, Southern Vancouver Island/ Gulf Islands, Sunshine Coast
Long-legged Myotis	10 (2%)	Cariboo, Fraser Valley / Lower Mainland, Kootenays, Southern Vancouver Island/Gulf Islands, Skeena
Multi-species roost suspected	**90 (19%)**	

[1] Note that more than one species can occupy the same roost site.

Table 6. Species assemblages and the number of roost sites found for each species and species group, at 1008 anthropogenic roost sites in BC.

Species in roost site	# roost sites	% of 470 roost sites with known species ID
Little Brown Myotis	175	37
Little Brown Myotis / Yuma Myotis	51	11
Little Brown Myotis / Yuma Myotis / Big Brown Bat	2	<1
Little Brown Myotis / Yuma Myotis / California Myotis	8	2
Little Brown Myotis / Yuma Myotis / Long-eared Myotis	1	< 1
Little Brown Myotis / California Myotis	3	< 1
Little Brown Myotis / Big Brown Bat	1	< 1
Little Brown Myotis / Long-legged Myotis	2	< 1
Little Brown Myotis /Long-eared Myotis	11	2
Little Brown Myotis /Long-eared Myotis / Big Brown Bat	1	< 1
Little Brown Myotis OR Long-eared Myotis	2	< 1
Yuma Myotis	99	21
Yuma Myotis/ California Myotis / Long-eared Myotis	1	< 1
Yuma Myotis/ California Myotis / Long-legged Myotis	1	< 1
Yuma Myotis/ California Myotis	1	< 1
Yuma Myotis/ Big Brown Bat	2	< 1
California Myotis OR Small-footed Myotis	1	<1
California Myotis / Long-eared Myotis	1	< 1
California Myotis / Big Brown Bat	2	< 1
California Myotis	36	8
Long-eared Myotis	1	<1
Long-legged Myotis	6	1
Long-legged Myotis / Big Brown Bat	1	
Townsend's Big-eared Bat	12	3
Townsend's Big-eared Bat / Big Brown Bat	1	< 1
Big Brown Bat	48	10
Myotis spp.	15	
No ID	506	
TBD	17	
Total	1008	

Identification of maternity colonies

Using the criteria for maternity colony of colonies > 20 bats or showing an increase in numbers between first and second count periods, 59 % (597/1008) of all sites monitored to-date are maternity colonies.

Maternity colonies were found in all types of structures monitored. The majority of maternity colonies were found in occupied houses (277/597 maternity colonies, 46 %) and bat boxes / bat condos (224/597, 38 %, Figure 3, Table 8). These results are very similar to those for all roost sites monitored including the sites not flagged as possible maternity roosts (e.g. 45 % in occupied houses, 39 % in bat boxes).

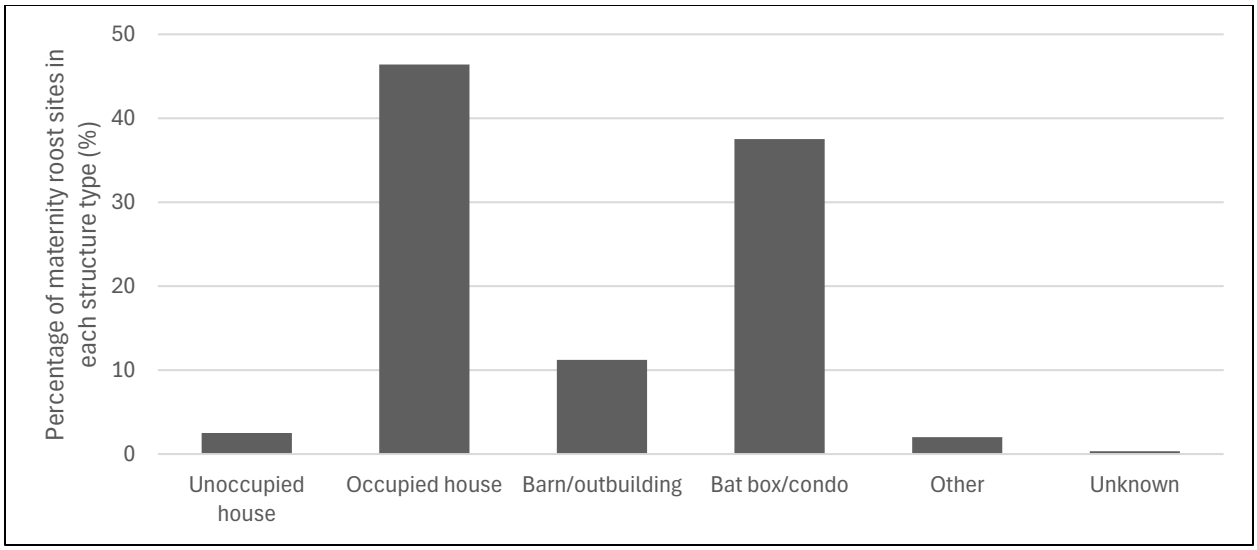

Figure 3. The distribution of 597 maternity roost sites by structure type. Maternity roost sites were identified by having either 20+ bats or an increase from pre- to post-pup counts.

Table 7. Summary of roost sites by structure type and colony type.

Structure type	Maternity sites	Total sites	% of structure type housing a maternity colony	% of all maternity roosts in a given structure type
Unoccupied house	15	20	75	3
Occupied house	277	450	62	46
Outbuilding /barn	67	95	71	11
Bat box/ bat condo[1]	224	395	57	37
Other	12	42	29	2
Unknown	2	6	33	<1
Total	597	1008	59	100

Two hundred and nineteen (219/597, 37 %) of these maternity colony roost sites were confirmed as Little Brown Myotis, either alone or with other species (Table 9). Little Brown Myotis maternity roost sites were in all structure types with many colonies in occupied houses (93/277, 34 %) and in bat boxes/ bat condos (86/224, 38 %; Table 9).

Table 9. Number of maternity colonies by species and structure type.

Structure type	Little Brown	Little Brown mix	Yuma	Myotis mix, no Little Brown	Long-legged	California	Townsends	Townsends / Big Brown	Big Brown	TBD	Myotis spp.	NoID	Sum
Unoccupied house	2	4	2	0	0	0	1	1	0	0	0	5	15
Occupied house	61	32	33	8	2	10	1	0	15	4	7	104	277
Outbuilding/barn	18	10	6	0	0	1	6	0	3	1	0	22	67
Bat box/ bat condo	61	25	33	0	2	5	0	0	10	5	3	80	224
Other[1]	1	4	1	0	0	0	0	0	1	0	0	5	12
Unknown	1	0	1	0	0	0	0	0	0	0	0	0	2
Total	144	75	76	8	4	16	8	1	29	10	10	216	597

[1] 'Other' includes 'Umbrella', 'Rock/cave', and 'Other' categories.

Variability within count periods

There is large variation in count results within a site and within designated count periods. There is also variation between years in the timing of when colonies reach maximum size and then begin to decline (Figure 4). The observed variability emphasizes the importance of doing at least two counts, to better estimate maximum number of bats in the roost and to be able to estimate variability for that site.

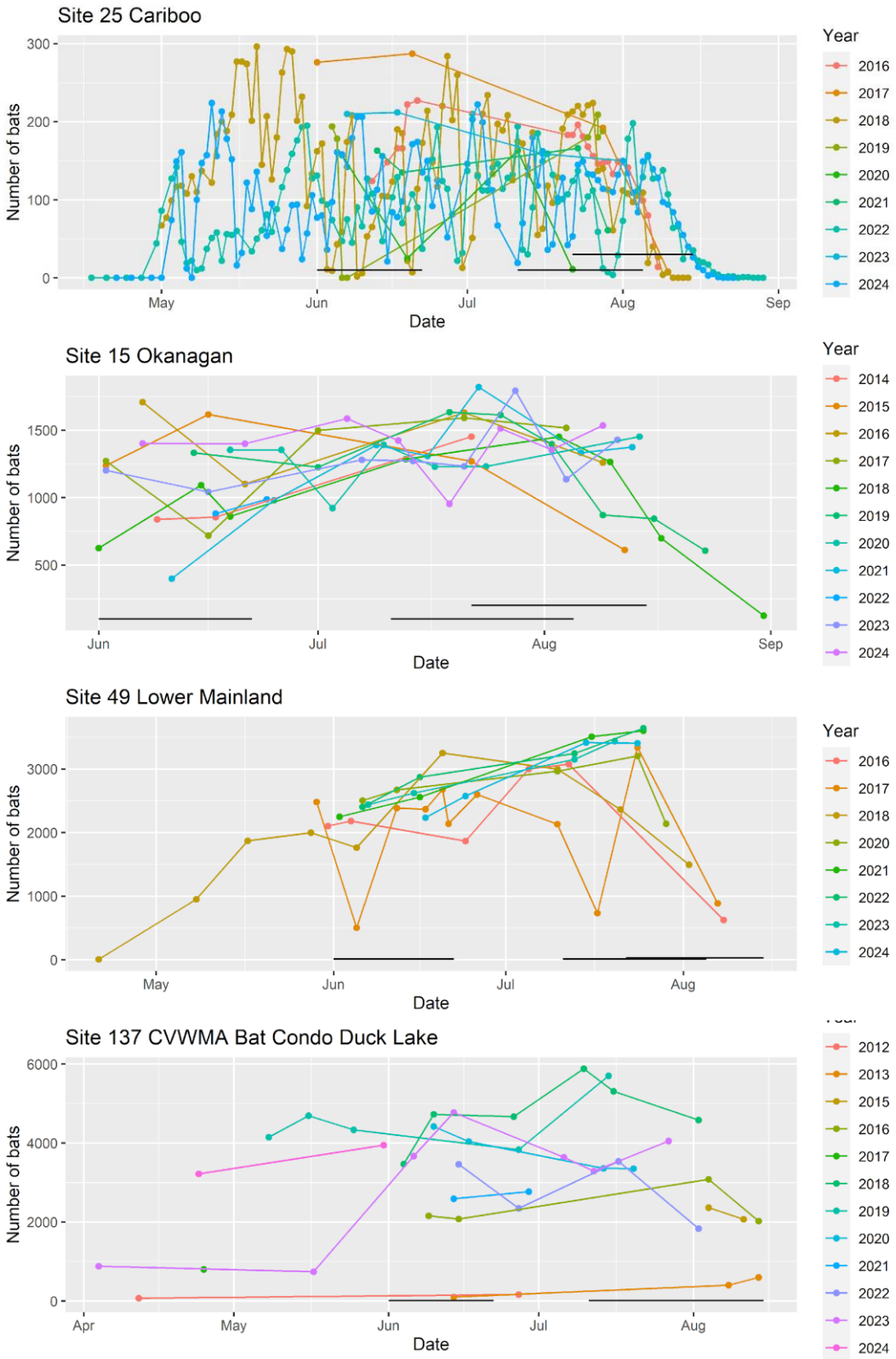

Figure 4. Counts for five sites with more than four counts in a year, showing nightly and yearly variation in count numbers. Horizontal lines indicate Bat Count periods in the pre-pup (Jun 1-22) and post-pup (Jul 22- Aug 15 (pre-2018) / Jul 11- Aug 5 (2018 onwards) count periods.

Dates of first pups

Observations of first pups of the year were obtained from several roost sites (Table 10). These observations show yearly variability in the start of parturition. These dates also suggest that any counts prior to ~ July 9 would not include volant pups (assuming around three weeks until pups begin flying). The current pre-pup count period is June 1 – 22 and therefore prior to volancy of pups. The current post-pup count period is July 11 – August 4.

Table 10. Dates of first pup (or lactating female) observed, by Region.

Region	Species	Year	Date
Kootenay	MYLU	2016	Jun 16
Okanagan	MYLU/MYYU	2017	Jun 26
Peace	MYLU	2017	Jun 30
Cariboo	MYLU	2018	Jun 18
Okanagan	MYLU/MYYU	2018	Jun 21
Peace	MYLU	2018	Jun 21
Kootenay	MYYU	2019	Jun 14
Okanagan	MYLU/MYYU	2019	Jun 16
Okanagan	COTO	2019	Jun 18
Sunshine Coast (Clowhom)	MYLU/MYYU/MYCA	2019	Jun 17
Sunshine Coast (Jervis Inlet)	MYLU/MYYU/MYCA	2019	Jul 19
Vancouver Island/Gulf Islands	MYLU/MYYU	2019	Jun 16
Cariboo	UNK	2020	Jul 1
Okanagan	MYLU/MYYU	2020	Jun 26
Peace	MYLU	2020	Jun 28
Thompson	MYLU/MYYU	2020	Jun 19
Vancouver/Fraser Valley	MYLU/MYYU	2020	Jun 19
Vancouver/Fraser Valley	MYLU/MYYU	2020	Jun 24
Okanagan	MYYU	2021	Jun 17
Okanagan	MYLU	2021	Jun 22
Shuswap	UNK	2021	Jul 1
Vancouver/Fraser Valley	MYLU/MYYU	2021	Jun 26
Vancouver/Fraser Valley	MYLU/MYYU	2021	Jun 26
Vancouver/Fraser Valley	MYLU/MYYU	2021	Jul 4
Okanagan	MYLU/MYYU	2022	Jul 10
Omineca	UNK	2022	Jul 12
Vancouver/Fraser Valley	MYLU/MYYU	2022	Jun 25
Okanagan	UNK	2023	Jun 16
Okanagan	MYLU/MYYU	2023	Jun 26
Vancouver/Fraser Valley	EPFU	2024	Jun 1
Vancouver/Fraser Valley	MYLU/MYYU	2024	Jun 9
Okanagan	MYYU	2024	Jun 11
Vancouver Island/Gulf Islands	COTO	2024	Jun 16

Trends across years

Three hundred and forty-six (346) locations (can include multiple roost sites) sites have two or more years of pre-pup count data, and 363 locations have two or more years of post-pup data. These locations were graphically screened for year-to-year declines in the pre-pup period (Appendix 2) and in the post-pup where additional information was required.

Visual inspection of sites with two or more years of pre-pup data subjectively identified fourteen of these sites as having a 'large' decline in maximum pre-pup counts. These sites were investigated individually to determine if there were obvious causes for declines (excessive heat, bat exclusion, new roost sites nearby, large amount of variation normally at the site, etc.; Appendix 2, Table 13). Changes in maximum pre-pup counts between years must be considered in context of the large variation within count periods in a year (see Variability, above) and the observed variability between years.

The majority of the sites with potentially large declines were assessed as being affected by other factors, and not actually having a real trend of declining bat counts. These other factors were:

- exclusion,
- cool June temperatures impacting bat use of structures,
- only two years of sampling and/or no repetition of sampling within 2022, making decline impossible to tell from expected levels of variability in emergence and use,
- low pre-pup numbers but with post-pup numbers as expected, and
- suspected or known movement around a roost complex (all of which may or may not get counted).

At this time, there are three sites flagged for attention next summer. There are no consistent declines detected at any Bat Count sites in BC.

Discussion

Participation and support

Volunteer participation is the foundation of the BC Annual Bat Count. Participation steadily increased between 2012 and 2022, dipped in 2023, and rose in 2024. Regional coordinators have reported that it has been challenging to recruit volunteers the last few years. The reasons listed are illness, volunteers are away, busy, or moved. It is recommended that an online survey be sent to volunteers. The survey would help assess if there is something the BC Community Bat Program can do to help retain volunteer bat counters. Questions should include whether volunteers live on-site where the bat colony is, or if they drive to the site from afar, how long they have been volunteering for, rating of bat count training provided, comfort level in doing bat counts, how many have taken the Bat Ambassador training, and assessment on what are the obstacles and what would encourage them to continue to volunteer for bat counts annually. New approaches should be explored to engage, retain, and 'reward' volunteers since the success of this broad-scale monitoring program depends on recruiting and retaining volunteers. The program currently recruits new colonies and volunteer counters through community presentations,

press releases, and our website. Program evaluation should be done to identify if volunteers are retained and for how long, what proportion of volunteers are new recruits, and if conducting a bat count on your own or other property leads to increased conservation actions such as increased interest in colony protection.

The large number of volunteers has allowed for the monitoring of additional sites, as well as more counts at sites. There are multiple benefits of volunteer involvement, including increasing the number of counts done, increasing the geographic scope of the project, and (we believe) increased local awareness and stewardship. However, the growth of this component of the Community Bat Program also dramatically increases the number of hours, and associated cost, invested by regional coordinators to train, coordinate, and follow-up with volunteers.

Continued financial support for Annual Bat Count provincial and regional coordinators is critical to ensure that priority roost sites are counted yearly. Coordination is required at the provincial level to set program priorities and goals, monitor progress, analyze results and ensure that the results are available to guide species monitoring and recovery actions. Regional coordinators need to have time to review data, contribute to or modify the priority site list generated at the provincial-level, organize volunteers and landowners, assist in conducting counts, and enter data. Without adequate time for planning and coordinating the many volunteers, sampling is left in the hands of volunteers who may not be trained, and may or may not participate in the program, and it is unlikely that all targeted sites will be counted.

The primary sources of funding and in-kind time to-date for the Annual Bat Count at the provincial level have been from Habitat Conservation Trust Foundation / Forest Enhancement Society of BC, the BC Ministry of Environment and Climate Change Strategy, and the BC Ministry of Water, Land and Resource Stewardship. Federally, the support has been primarily from the Habitat Stewardship Program for Species at Risk. Uncertainty about funding for 2025 comes at a critical monitoring time, with WNS just south of the border, close to many of our large colonies. Regional bat projects are encouraged to apply for and access other funds to support additional counts. As the program has expanded across the province and new sites are sought out and added to the long-term monitoring program, funding levels for this aspect of the Community Bat Program have not increased accordingly. Future growth of the program will likely be hampered by available funding. We need to secure alternate funds at the provincial level, plus encourage and support regions to apply for region-specific grants. One promising avenue is increasing partnerships with BC Parks across the province. A new partnership with BC Nature has increased recruitment and interest of new Bat Ambassadors. These volunteers generally do not have bat roosts on their properties, but rather are looking for sites to count. Regional coordinators are needed to match up bat counters with roost sites, and to coordinate permission with those homeowners with the roost sites.

The Program will explore opportunities to partner with municipalities who are certified as Bat-Friendly Communities. Some larger municipalities might have the capacity to designate a staff member to help recruit volunteers, recruit staff members, or even to coordinate some of the bat counts. Some municipalities may also have access to grants that could assist the Regional Coordinators.

Species identification and multi-species roosts

One ongoing recommendation to improve the Bat Count data has been to increase the number of sites with confirmed species identification. Species identification is necessary to understand the implications of any changes in colony size. As in 2024, species identification in 2025 should target:

- species at all priority sites that do not have ID, and
- sites with 2+ years of monitoring data.

At other roosts, species identification should occur as budget allows. To encourage species identification at sentinel sites, data gaps will be highlighted with regional coordinators. Coordinators will be responsible for ensuring sample collection for these sites, or for remote sites, obtaining mailing addresses to which we can send a DNA collection kit.

Many large roosts are composed of multiple bat species. The method used to identify species at a roost involves analysis of a single pellet. Often if multiple single pellets are analyzed, in the same or different years, other species will be detected. This is interpreted as the site being a mixed species roost. 'Community' analyses of pooled guano samples could be considered to improve our understanding of which roosts are indeed multi-species roosts. Community analysis (done at Species for Feces lab, https://in.nau.edu/bat-ecology-genetics/sff/) is however significantly more expensive than single-pellet.

The data from monitoring of mixed-species roosts is challenging to use for assessing changes in the size of a colony, because a decrease in one species may be hidden by an increase in other species. Research is underway at several Annual Bat Count sites, in partnership with Wildlife Conservation Society Canada

and BC Water, Land and Resource Stewardship, to explore using acoustic samples to estimate the proportion of Little Brown:Yuma Myotis in mixed-species roosts.

Providing identification of the species in a roost also serves to engage landowners and encourage stewardship. However, many new roost sites are now reported to the CBP yearly. Although the costs and effort to collect samples are low and volunteers/landowners can easily accomplish collection, DNA analysis of guano from all sites each year is not usually financially realistic. Increased reliance on acoustic monitoring may help identify species at non-sentinel sites. The CBP has bat detectors available for use, but capturing useful calls for ID usually requires a user with some knowledge of acoustic equipment and sampling. Acoustic monitoring may be useful for some regions who have regional coordinators who are trained in acoustic monitoring, but it is not applicable for those regions that do not have trained coordinators A few regions also have keen volunteers who are learning acoustic monitoring.

Potential for monitoring population trends

Number of sites and duration of monitoring

Population trend data are important for monitoring population changes that are expected from white-nose syndrome. Catastrophic declines are expected for species that are susceptible to WNS – for example, bat counts at hibernacula of some species in eastern North America declined by 30 – 99 % yearly after WNS arrived (Frick et al. 2010). Detection of such large declines is easily done and does not require statistical analyses.

However, the different winter and summer roosting ecology of western bats compared to bats east of the Rockies may result in a different, perhaps slower, response, which would require more sites and longer sampling duration to detect. Recovery rates will also obviously be slow and will definitely require many sites and a long sampling duration to detect trends with high confidence.

The power of the BC Annual Bat Count as a trend monitoring program can be improved in several ways including:

- Increasing within-year replication (Walsh et al. 2001) - Many BC sites continue to have only one count per year; replication should continue to be emphasized in 2025,
- Focussing on increasing the number of pre-pup counts in particular,
- Aiming to reduce variation by increasing understanding of roost-switching and potentially adjusting sampling times or combining sites into biologically-meaningful locations (likely requires focussed site-specific research), and
- Increasing sample sizes and number of sites with multiple years of monitoring (ongoing into 2025).

Species monitored and utility for population monitoring

Bats appear to have different vulnerabilities to WNS, based on patterns of mortality in affected species (WNS.org 2023) so species-specific trends are needed to monitor impacts and recovery. The Annual Bat Count focuses on anthropogenic structures so will only be useful for monitoring BC species that regularly use these structures. The two species with the largest number of roosts are Little Brown Myotis (231 roosts) and Yuma Myotis (149 sites). However, many of these may be in multi-species

roosts so analysis will likely rely on solving the challenges of discerning species in mixed-species roosts or only using data from single-species roosts (if confirmation of single species is possible). For many other species, there are too few roost sites to detect anything other than a catastrophic decline.

Methods for detecting declines

Yearly variation in pre-pup counts was assessed graphically to identify sites of potential concern. In future, declines in sites should be quantitatively assessed. One option is to compare the percent decrease in pre-pup count to the variation observed in pre-pup counts in previous years. Reviewing site-specific variation over previous years should assist in determining a realistic value for concern (e.g., 20 % decline). In 2018, the average percent difference in first and second pre-pup counts was assessed as 146 % across all counts (Kellner 2019); this reflects the large range in colony sizes and the need to use site-specific variation to assess changes at each site.

Additionally, methods to analyze repeated count data should be investigated (e.g. program TRIM - Trends and Indices for Monitoring data (van Strien et al 2004), Generalized Additive Models (Bat Conservation Trust 2019), and power analyses should be run to determine if counts have power to detect a pre-determined level of change. Again, this level of change should be determined in consultation with provincial biologists and after considering the normal variation seen in counts pre-WNS.

Bat boxes and the Annual Bat Count

The large number of bat boxes deployed through the Community Bat Program over time has potential to increase our knowledge about the effectiveness of bat boxes as habitat enhancement and mitigation. Data on bat box installation and use by bats can be captured through the Annual Bat Count or through visual inspection and/or guano catchers. There are currently 224 bat boxes in the Annual Bat Count database; however, many are lacking data on box type and installation details. To increase the value of monitoring these boxes, data gaps should be filled when possible. To ensure installed bat boxes contribute to population monitoring goals, it is necessary to continue to:

- promote registration of installed bat boxes with the Community Bat Program,
- promote yearly monitoring for occupancy by using a guano catcher or looking into the box, and
- promote monitoring during the Annual Bat Count.

These additional priorities need to be communicated to regional coordinators and volunteers, and data submitted online through our "Register Your Bat Box" link.

Summary of recommendations and priorities for 2025

Volunteer recruitment and retention

1) Increase information flow back to program participants

a) In addition to the provincial public summary, prepare regional summaries for key regions where more volunteer engagement is needed, for use by regional coordinators and distribution to volunteers and landowners. Topics should include:
    - level of volunteer involvement,
    - number of counts and for which species, to identify regions that require more roost counts for effective species monitoring,
    - map showing colonies currently monitored (and species), plus historical colonies and species (with location offset for privacy),
    - # of sampling years per site,
    - multi-year trends by species to identify sites where data has not been continuously collected and may require extra attention (e.g. landowner follow-up, recruitment or organization of volunteers).
b) Ensure genetic results on bat species are communicated to roost owners/stewards. These results are passed from the Provincial Coordinator to the Regional Coordinators. A reminder after two weeks, or requesting acknowledgement from Regional Coordinators that results have been passed on may increase communication to roost stewards.

2) Emphasize re-contact with bat counters and home owners, sharing regional summary of results to-date, public celebration of volunteers, email reminders to counters before and in early June, and tokens of gratitude (pencils, stickers).

3) Develop and distribute questions to bat count participants to determine the effect of participation in bat counts on their intent and actions to protect roost habitat for bats. Questions can be easily incorporated as part of the data form used for monitoring.

Promoting ongoing monitoring at priority sites

4) Monitoring of priority sites will be promoted by:
    a) reviewing the Bat Count goals and identified priority sites with regional coordinators to ensure these sites are recognized as important,
    b) providing coordinators with a pre-filled datasheet clearly identifying priority sites,
    c) reminding coordinators to contact landowners individually to provide feedback on past counts and encourage participation to ensure counts happen at these locations,
    d) checking in with roost stewards/volunteer counters in early/mid May to allow arrangement for alternate counters if needed.
        - Sites identified as lower priority/not sentinel sites will continue to be monitored for community engagement and stewardship promotion.
    e) Focussing on obtaining two counts in the pre-pup window if funds for coordinators are limiting.

5) Promote continuing roost counts at sites with strong volunteer support even if the sites are not flagged as priority, to encourage stewardship, increase the number of multi-year samples to support detection of statistical trends, and scan for significant colonies.

6) At all sites, it will be important to:
   a) continue monitoring of previously-counted sites, to increase the number of sites with 2+ years of data,
   b) emphasize efforts for June, to obtain two or more counts in the pre-pup period, and
   c) when possible, obtain independent counts on the same night, and
   d) make efforts to encourage continuing participation, retaining interested homeowners and trained volunteers, to obtain multi-year samples.

Increasing effectiveness for monitoring

7) Continue to work with partners and seek new partnerships to investigate
   a) statistical methods for trend analyses,
   b) roost switching, and
   c) methods to assess percent composition of multispecies roosts.

8) Coordinate with broader-scale bat monitoring programs, including data submission to NABAT.

9) Identify methods (e.g. % decrease in yearly prep-pup counts) that can be used to flag sites with declining counts
   a) Develop standard, simple, and rapid R-scripted methods: Visual screening of graphs has been used to-date and this is time consuming and could introduce unnecessary errors. Analyses should consider the site-specific within-year and between-year variation.
   b) Based on the results of a power analysis, modify Annual Bat Count protocols if needed to ensure counts and replicates occur in the ideal time periods

10) Ensure species are confirmed through genetics and/or acoustic means in 2025 by specifically approaching regional coordinators/ roost stewards to communicate data gaps,

11) Seek out new funding sources to support the Annual Bat Count.
   a) Regional programs are encouraged to source regional funding.
   b) Partnerships with BC Parks has ensured counts are done in Okanagan and Skagit Parks.
   c) Develop relationships with other Parks to encourage stewardship and bat counts.
   d) Seek funding for 'tokens of appreciation' for bat counters/roost stewards (e.g., FWCP, HCTF Community Grants).

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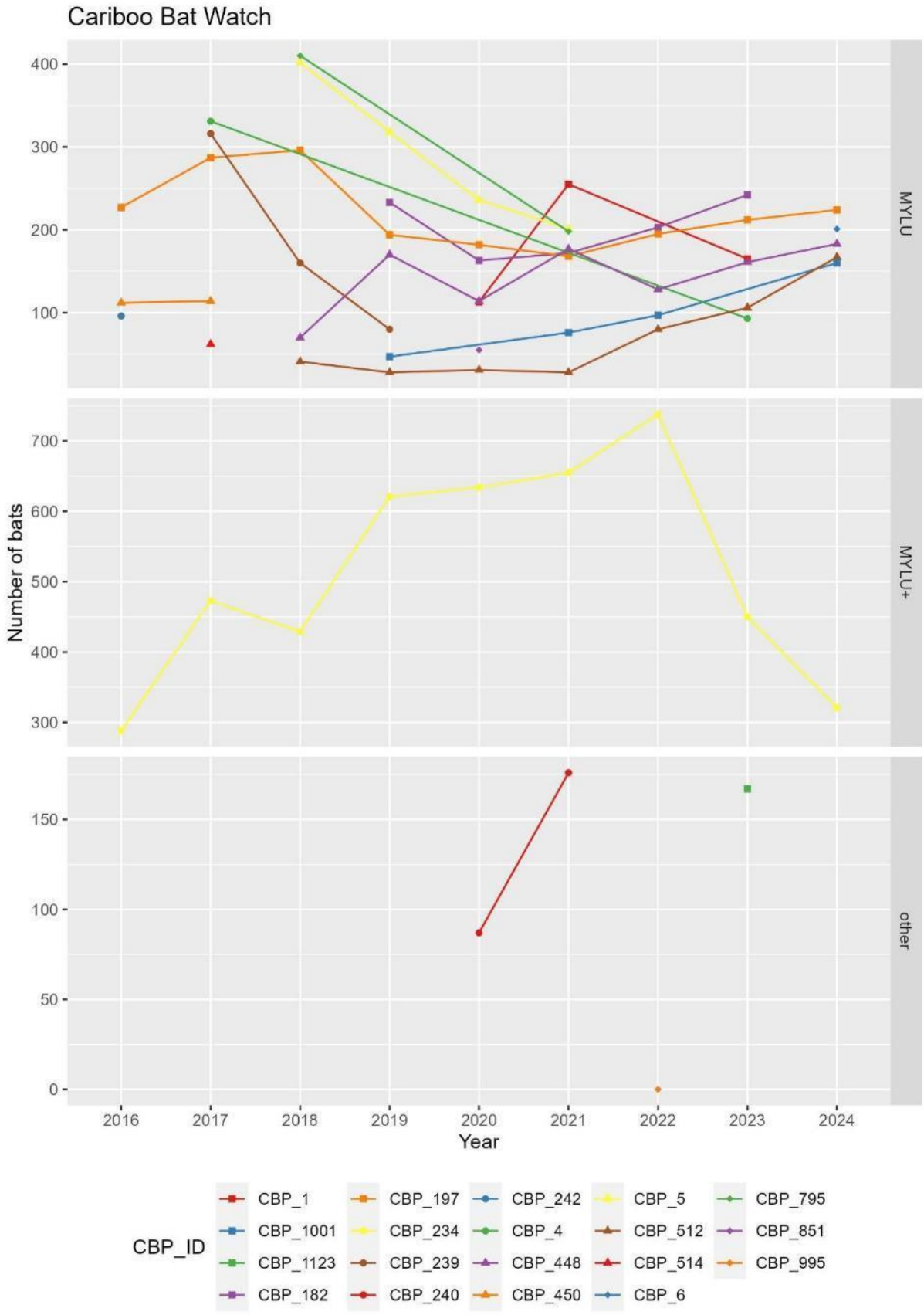
Appendix 1. Yearly trends

Maximum bat counts in the pre-pup period, by region, species and location over time. Colours represent different roost sites; dots are counts and lines connect counts across years. Note that the y-axis scale varies with region and species group to facilitate looking for changes.

Species categories are: MYLU (colonies with Little Brown Myotis), MYLU+ (colonies with Little Brown Myotis and other species, usually Yuma Myotis), MYYU/MYYU+ (colonies with Yuma Myotis or Yuma Myotis and other species but NOT Little Brown Myotis), and Other (colonies with other species, other mixed species, and where species is unknown).

Graphed data from BC Community Bat Program regions with multi-year data are presented in alphabetical order by region:

- Cariboo
- Columbia Shuswap
- Denman Hornby
- Gabriola
- HAT
- KCBP
- Mayne Island
- Mid Island
- North Island
- Okanagan
- Peace
- SCBat
- SCWP
- Skeena
- Texada Powell River
- Thetis
- Thompson


Cariboo Bat Watch
Number of bats
Year
MYLU
MYLU+
other
2016
2017
2018
2019
2020
2021
2022
2023
2024
CBP_ID
CBP_1
CBP_1001
CBP_1123
CBP_182
CBP_197
CBP_234
CBP_239
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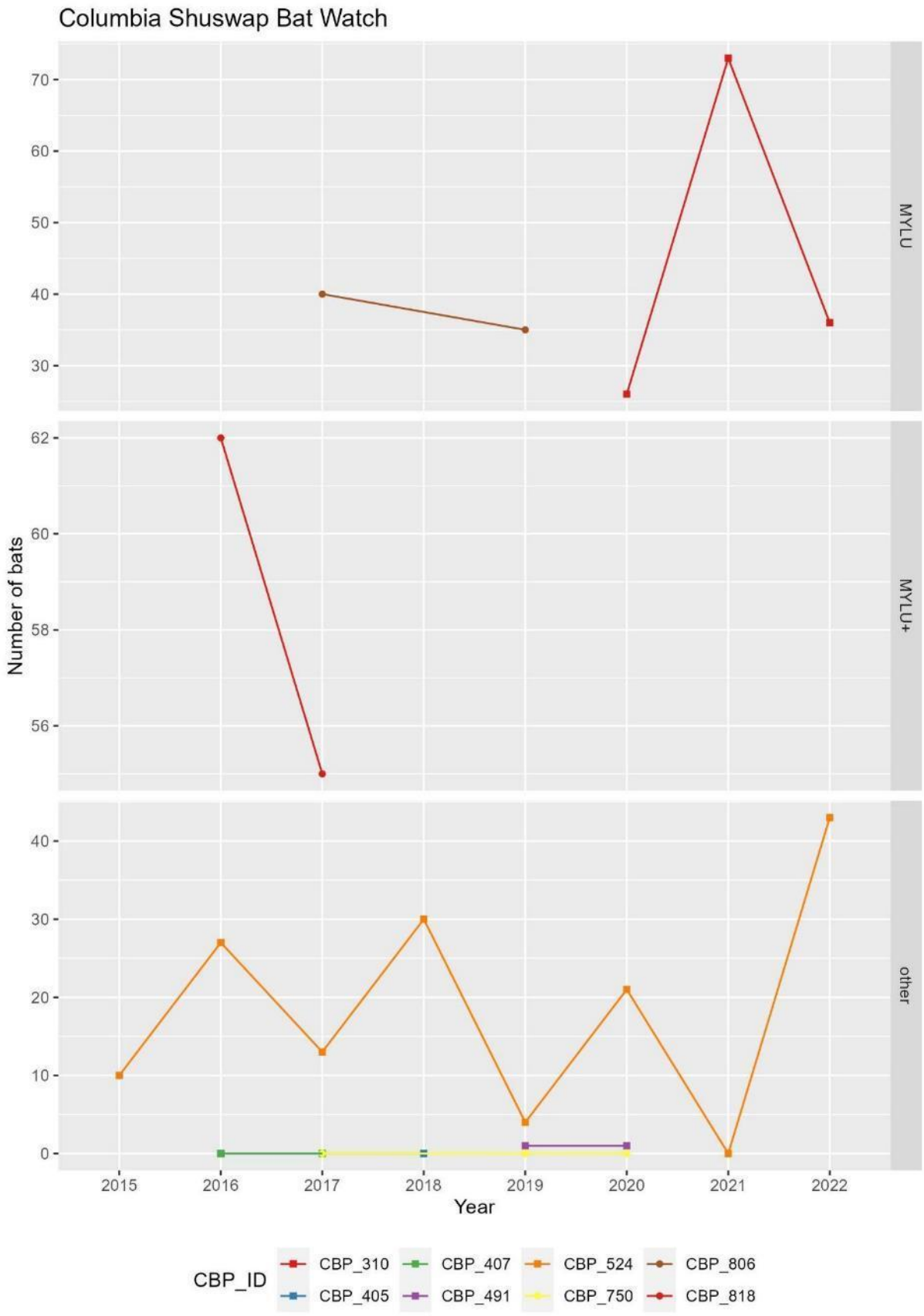
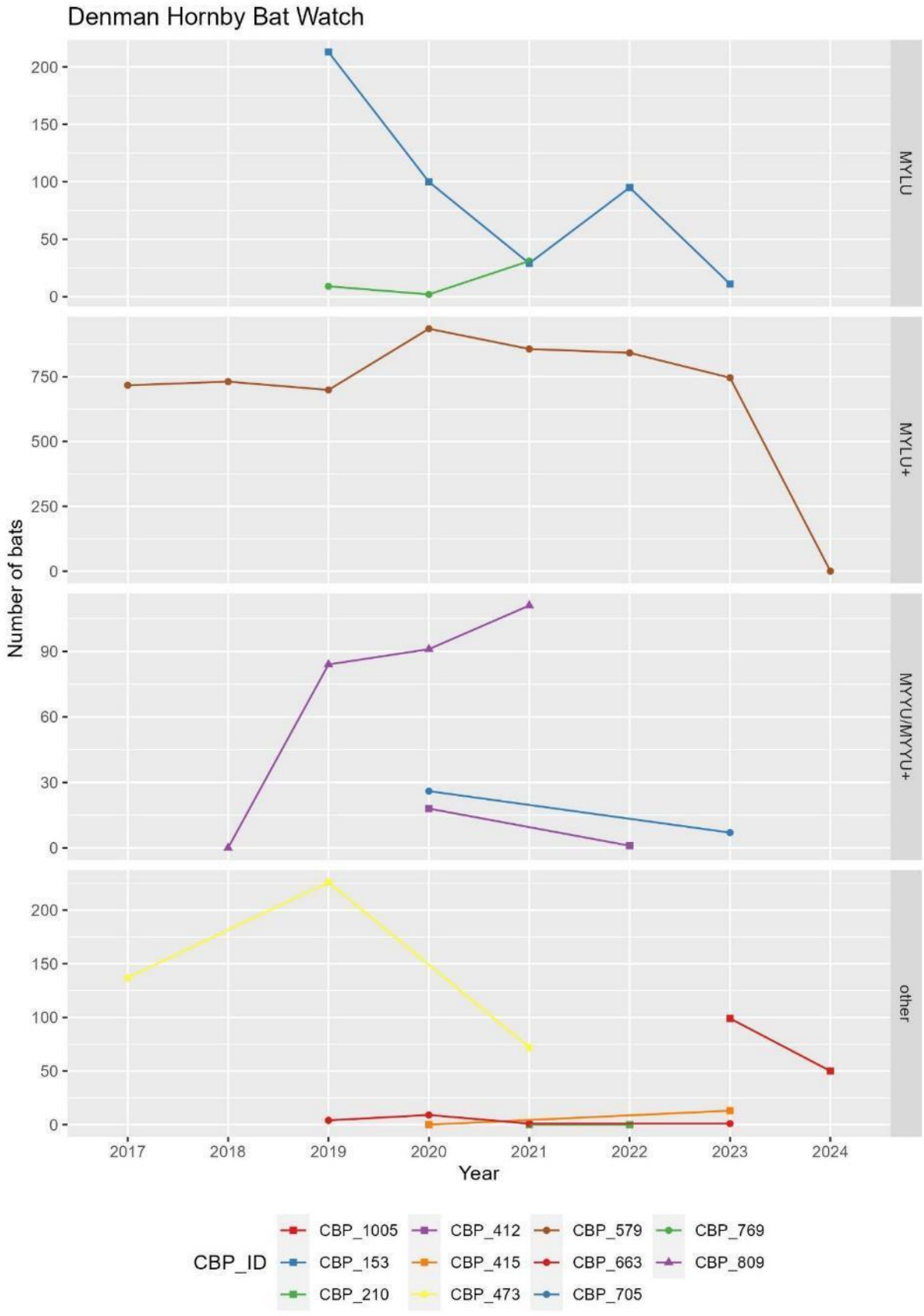
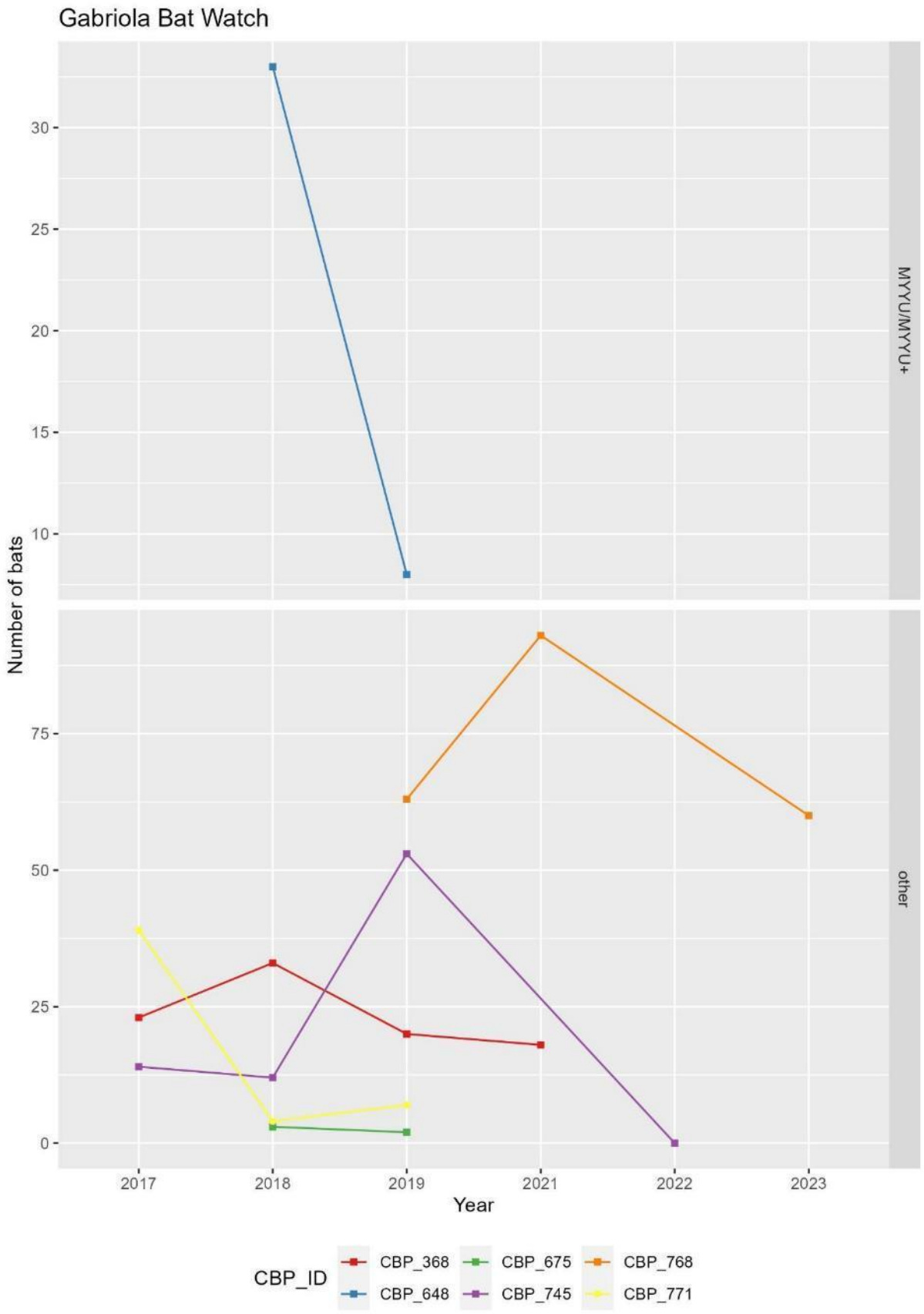
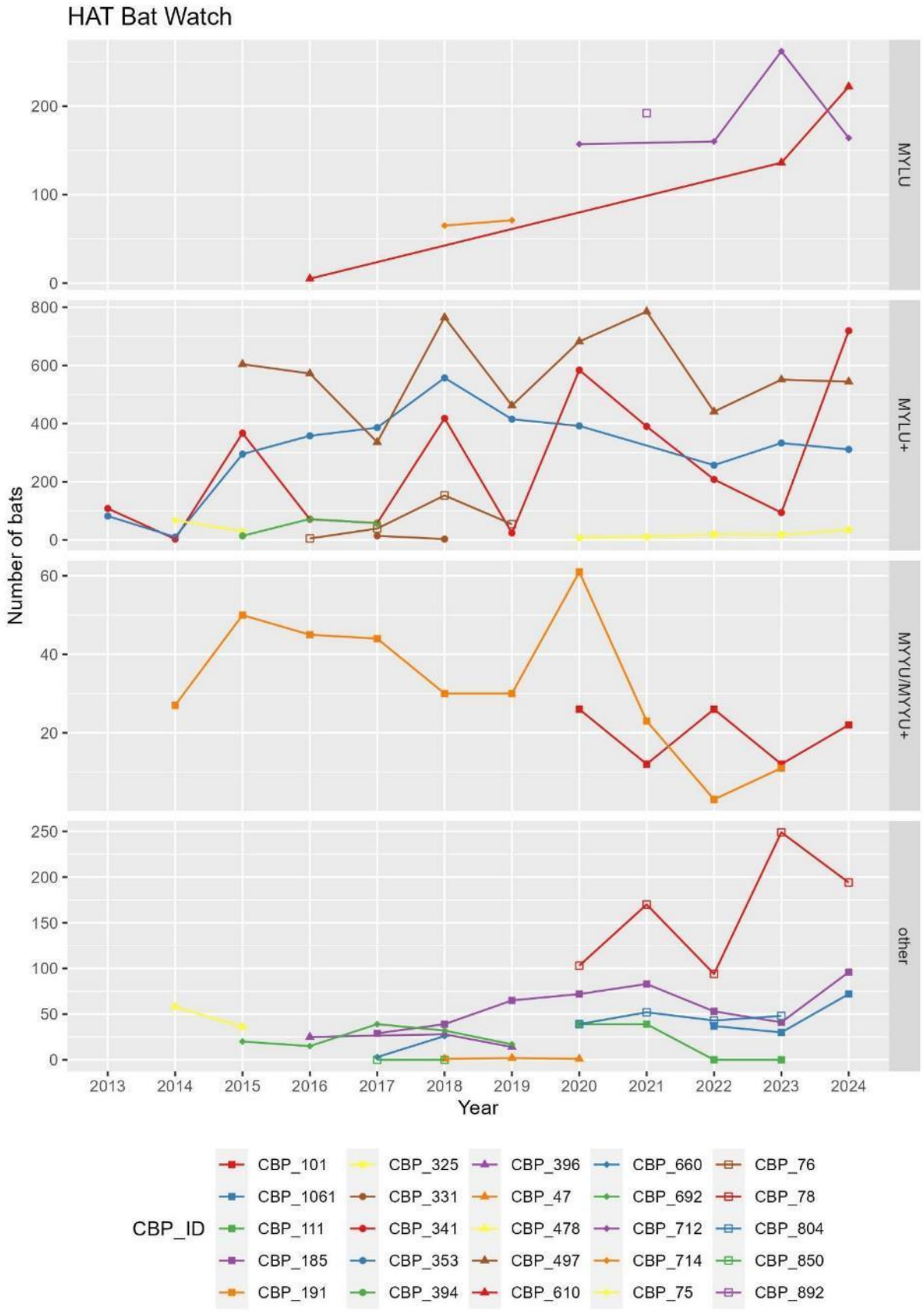
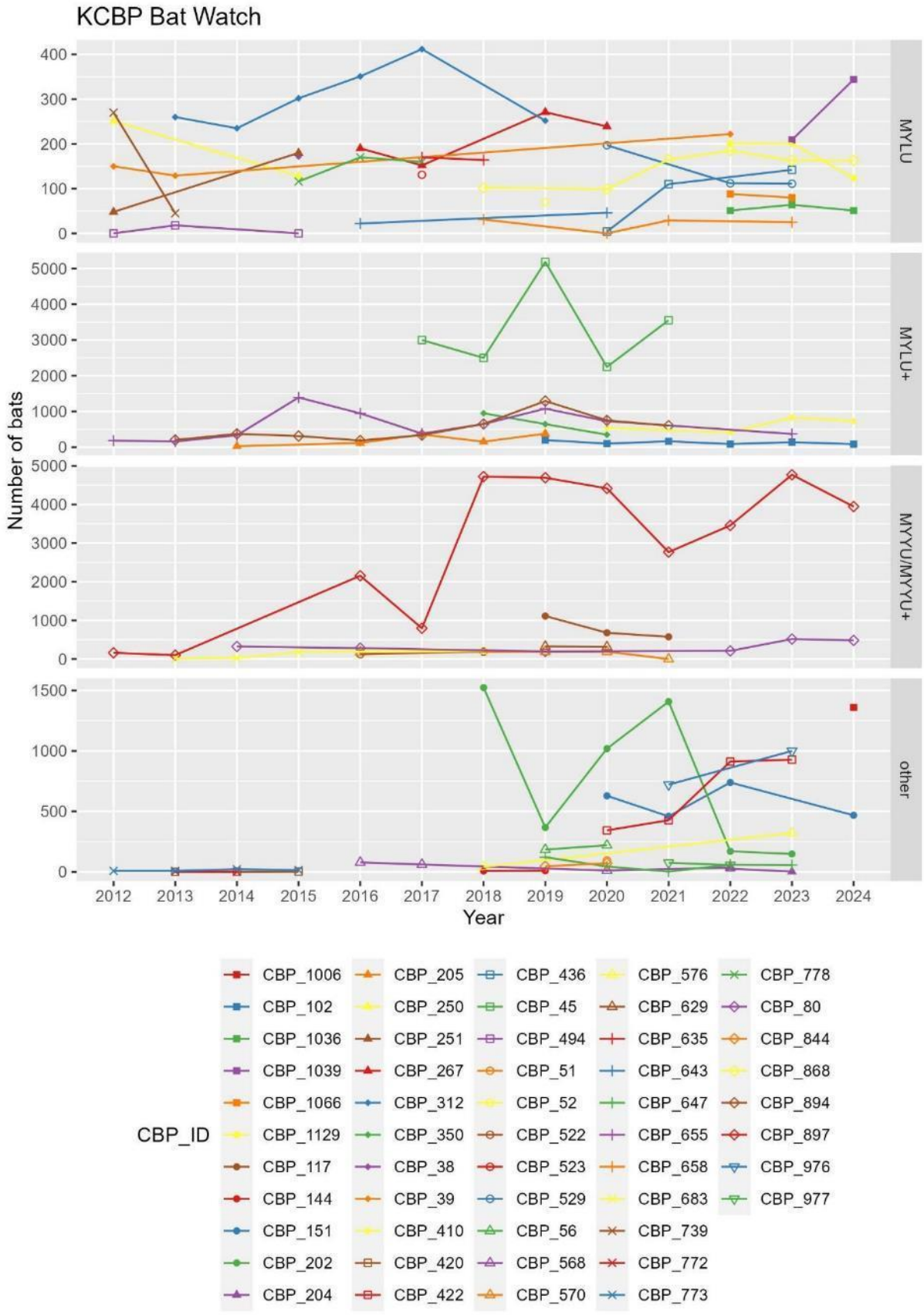
CBP_514
CBP_6
CBP_795
CBP_851
CBP_995

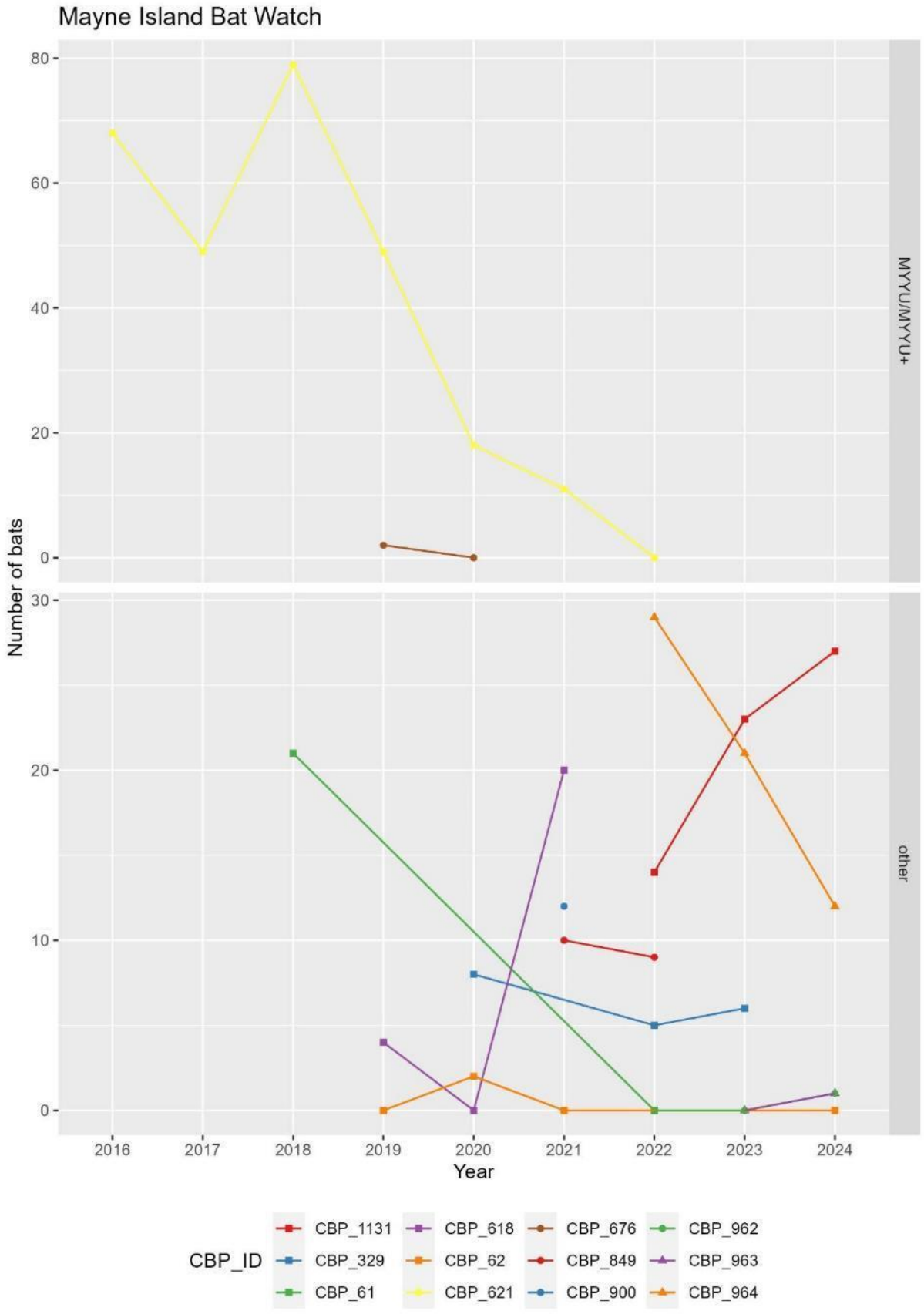

Columbia Shuswap Bat Watch
Number of bats
Year
MYLU
MYLU+
other
2015
2016
2017
2018
2019
2020
2021
2022
CBP_ID
CBP_310
CBP_405
CBP_407
CBP_491
CBP_524
CBP_750
CBP_806
CBP_818

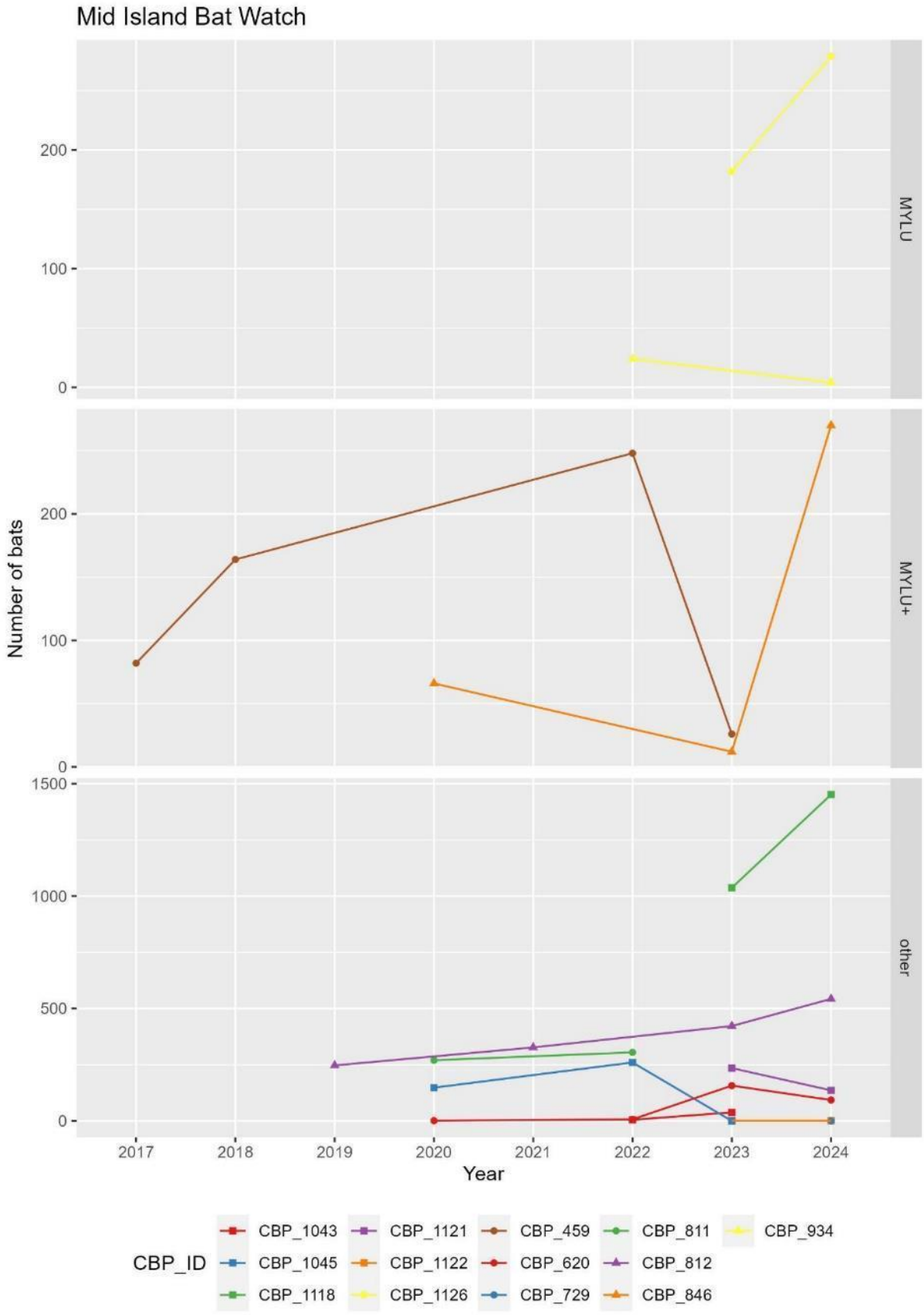

Denman Hornby Bat Watch
Number of bats
Year
MYLU
MYLU+
MYYU/MYYU+
other
2017
2018
2019
2020
2021
2022
2023
2024
CBP_ID
CBP_1005
CBP_153
CBP_210
CBP_412
CBP_415
CBP_473
CBP_579
CBP_663
CBP_705
CBP_769
CBP_809

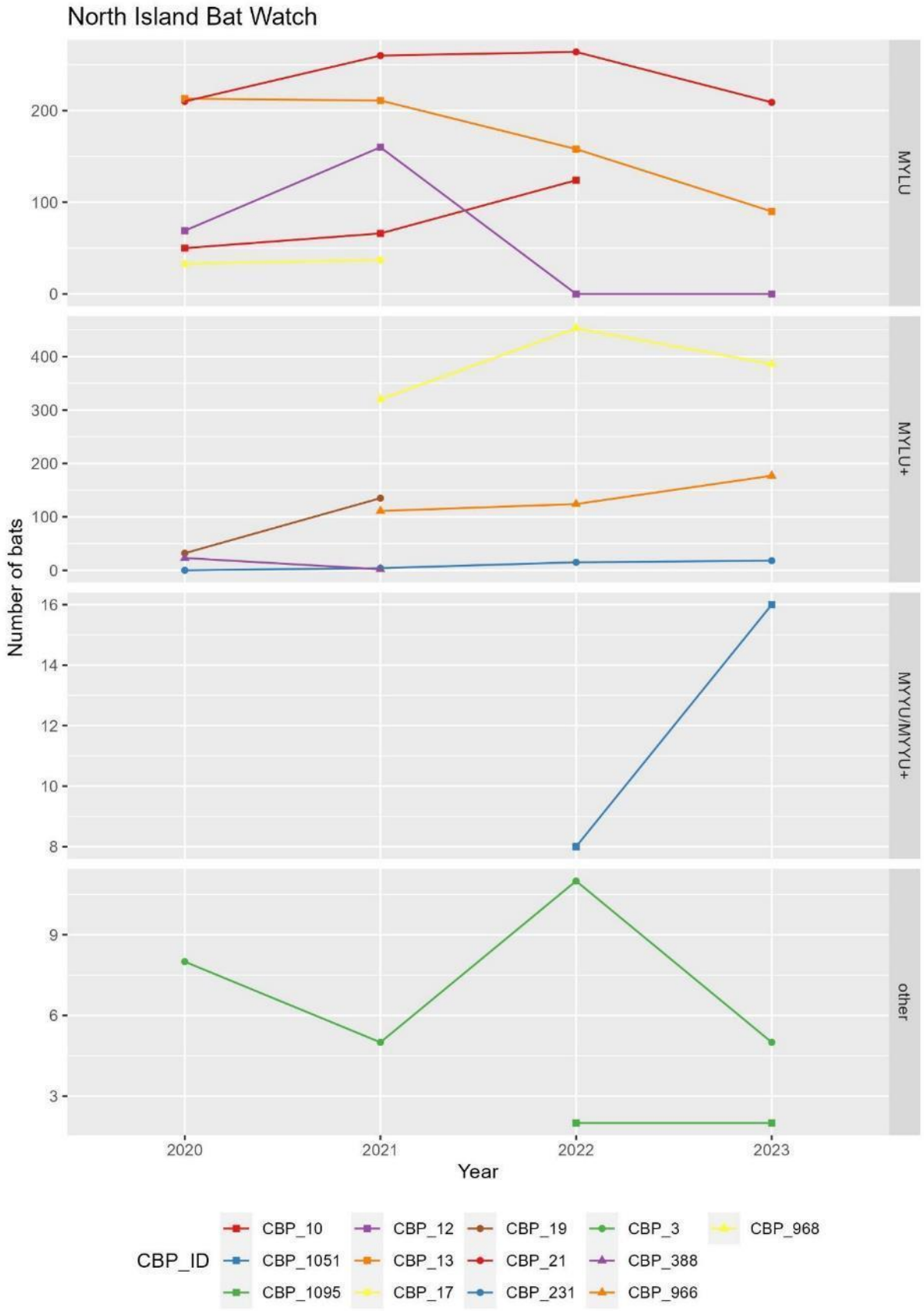

Gabriola Bat Watch
Number of bats
30
25
20
15
10
75
50
25
0
MYYU/MYYU+
other
2017
2018
2019
2021
2022
2023
Year
CBP_ID
CBP_368
CBP_675
CBP_768
CBP_648
CBP_745
CBP_771

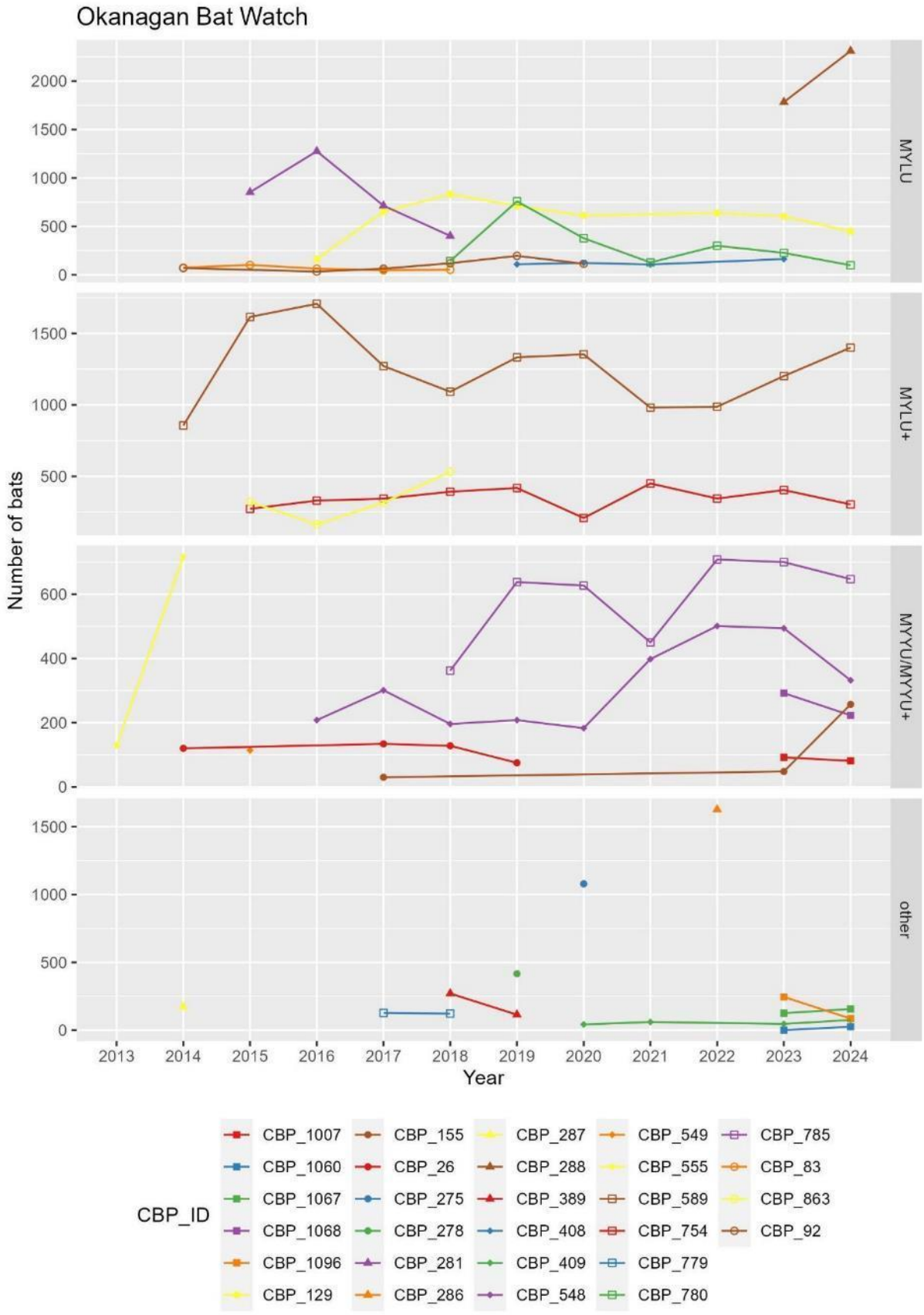

HAT Bat Watch
MYLU
MYLU+
MYYU/MYYU+
other
Number of bats
Year
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
CBP_ID
CBP_101
CBP_1061
CBP_111
CBP_185
CBP_191
CBP_325
CBP_331
CBP_341
CBP_353
CBP_394
CBP_396
CBP_47
CBP_478
CBP_497
CBP_610
CBP_660
CBP_692
CBP_712
CBP_714
CBP_75
CBP_76
CBP_78
CBP_804
CBP_850
CBP_892

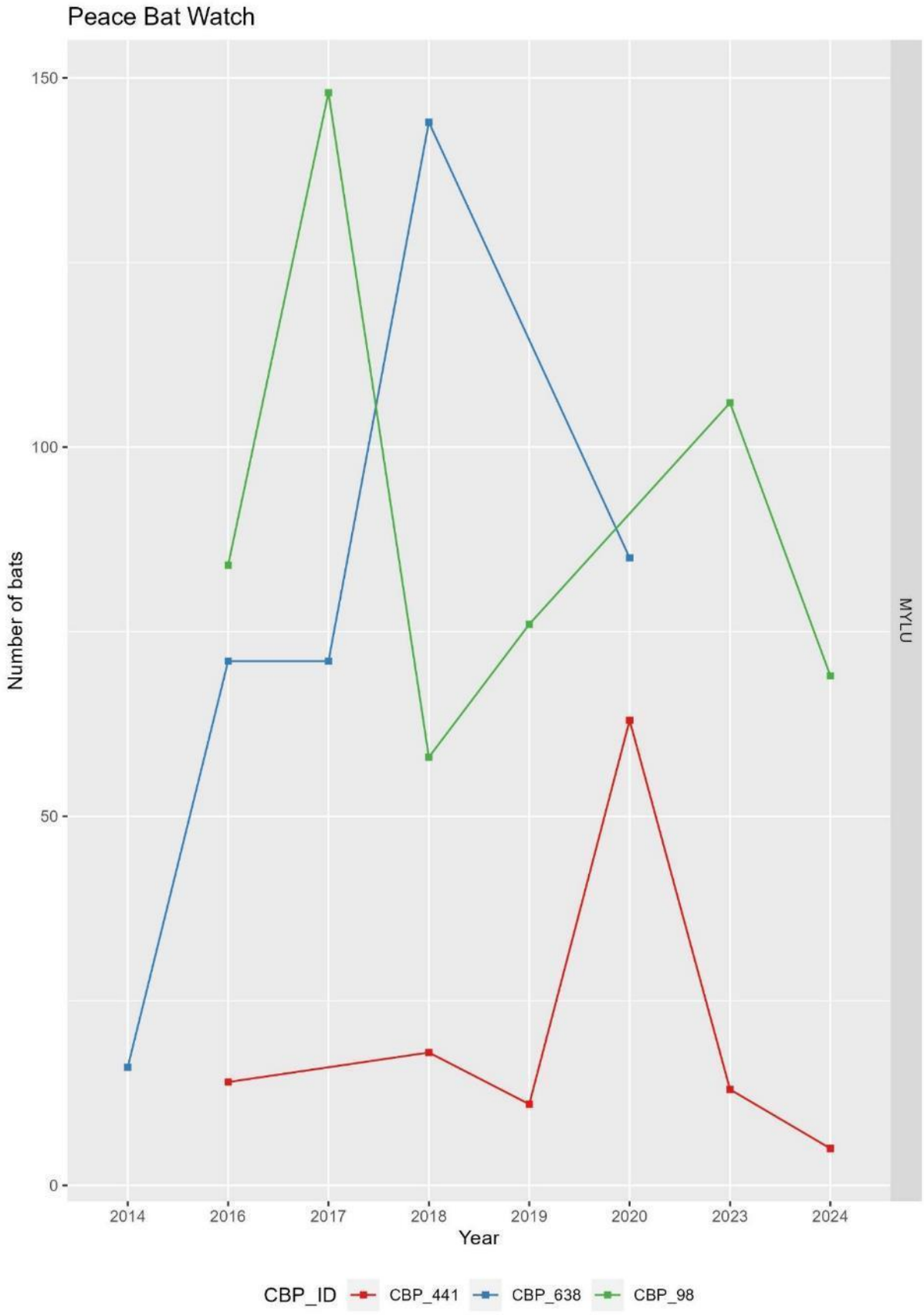

KCBP Bat Watch
Number of bats
Year
MYLU
MYLU+
MYYU/MYYU+
other
CBP_ID
CBP_1006
CBP_102
CBP_1036
CBP_1039
CBP_1066
CBP_1129
CBP_117
CBP_144
CBP_151
CBP_202
CBP_204
CBP_205
CBP_250
CBP_251
CBP_267
CBP_312
CBP_350
CBP_38
CBP_39
CBP_410
CBP_420
CBP_422
CBP_436
CBP_45
CBP_494
CBP_51
CBP_52
CBP_522
CBP_523
CBP_529
CBP_56
CBP_568
CBP_570
CBP_576
CBP_629
CBP_635
CBP_643
CBP_647
CBP_655
CBP_658
CBP_683
CBP_739
CBP_772
CBP_773
CBP_778
CBP_80
CBP_844
CBP_868
CBP_894
CBP_897
CBP_976
CBP_977

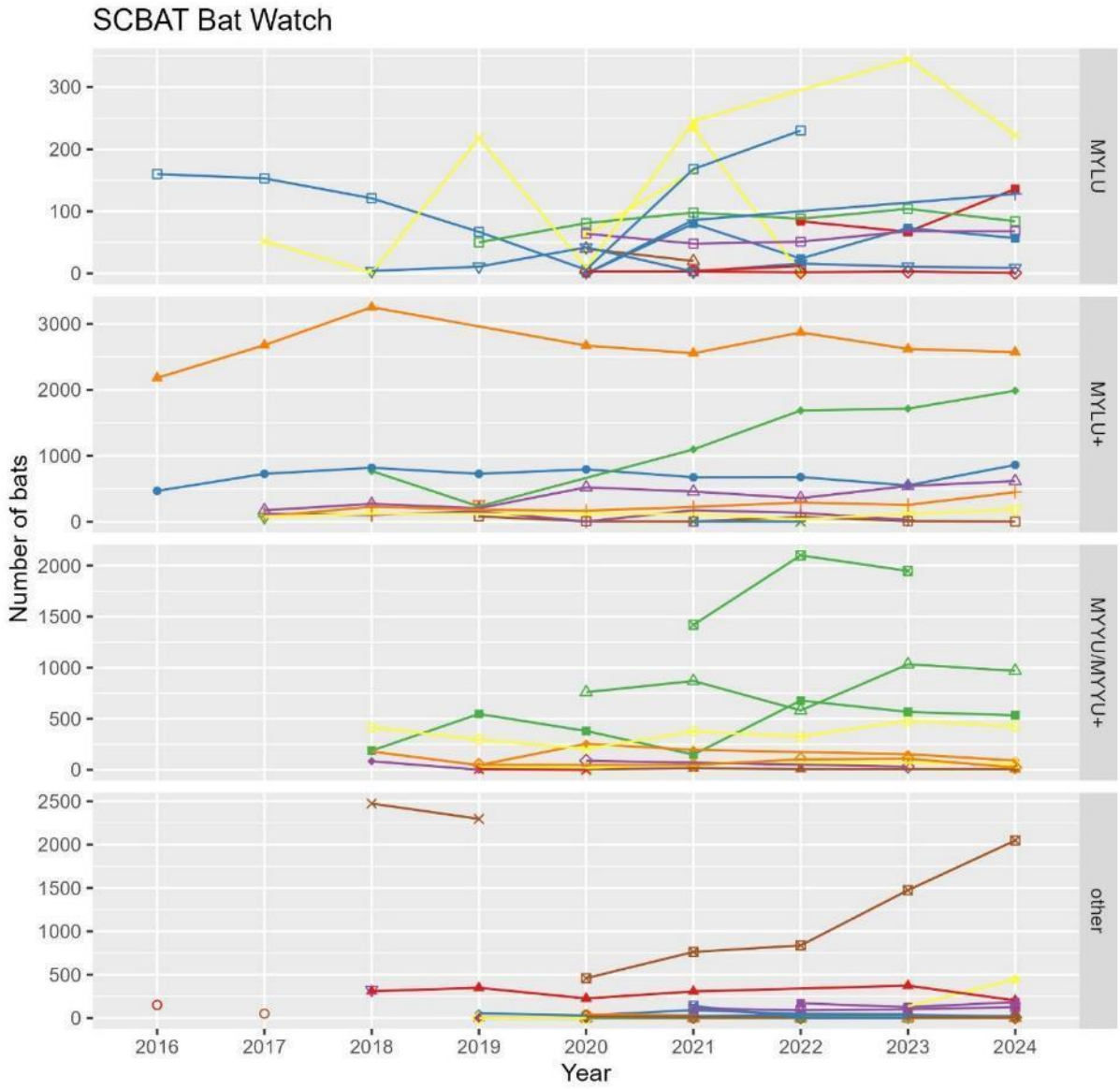

Mayne Island Bat Watch
Number of bats
80
60
40
20
0
30
20
10
0
MYYU/MYYU+
other
2016
2017
2018
2019
2020
2021
2022
2023
2024
Year
CBP_ID
CBP_1131
CBP_329
CBP_61
CBP_618
CBP_62
CBP_621
CBP_676
CBP_849
CBP_900
CBP_962
CBP_963
CBP_964

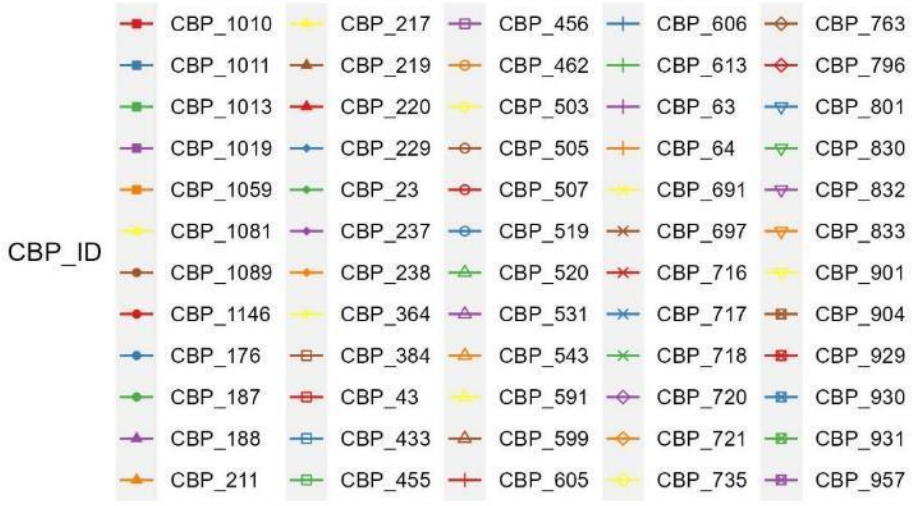

Mid Island Bat Watch
MYLU
MYLU+
other
Number of bats
0
100
200
0
100
200
0
500
1000
1500
2017
2018
2019
2020
2021
2022
2023
2024
Year
CBP_ID
CBP_1043
CBP_1045
CBP_1118
CBP_1121
CBP_1122
CBP_1126
CBP_459
CBP_620
CBP_729
CBP_811
CBP_812
CBP_846
CBP_934

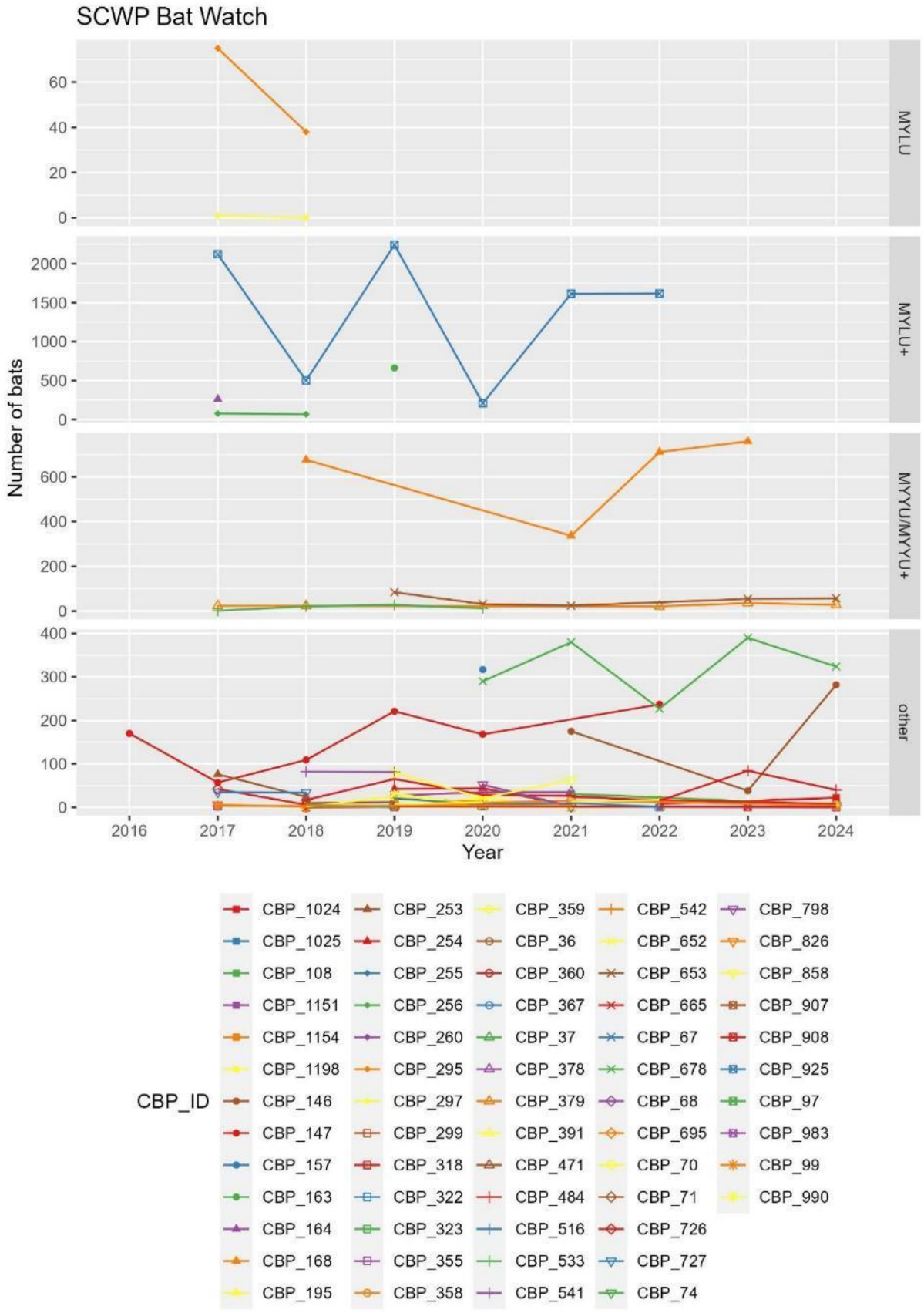

North Island Bat Watch
MYLU
MYLU+
MYYU/MYYU+
other
Number of bats
Year
2020
2021
2022
2023
CBP_ID
CBP_10
CBP_1051
CBP_1095
CBP_12
CBP_13
CBP_17
CBP_19
CBP_21
CBP_231
CBP_3
CBP_388
CBP_966
CBP_968

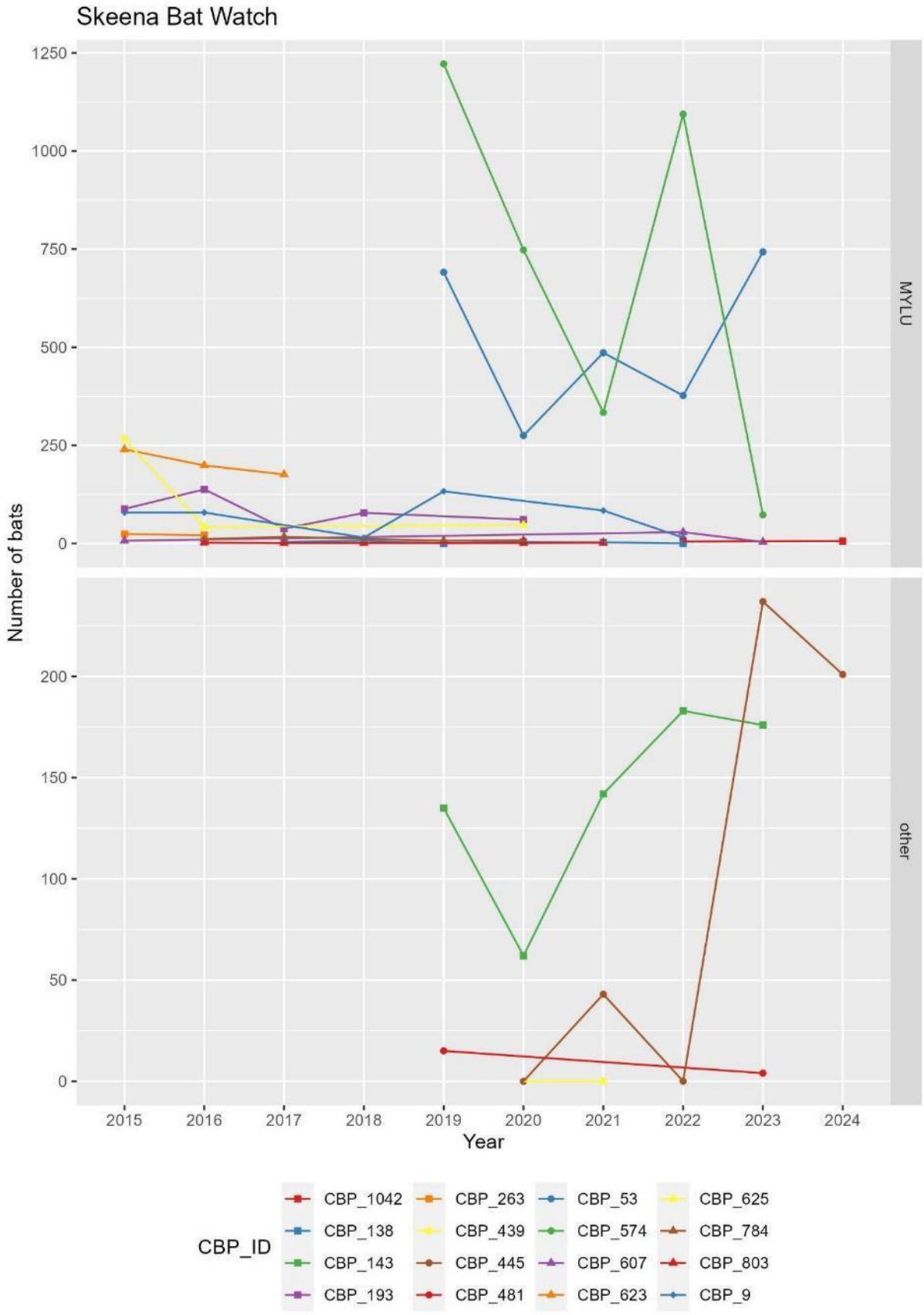

Okanagan Bat Watch
Number of bats
Year
MYLU
MYLU+
MYYU/MYYU+
other
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
CBP_ID
CBP_1007
CBP_1060
CBP_1067
CBP_1068
CBP_1096
CBP_129
CBP_155
CBP_26
CBP_275
CBP_278
CBP_281
CBP_286
CBP_287
CBP_288
CBP_389
CBP_408
CBP_409
CBP_548
CBP_549
CBP_555
CBP_589
CBP_754
CBP_779
CBP_780
CBP_785
CBP_83
CBP_863
CBP_92

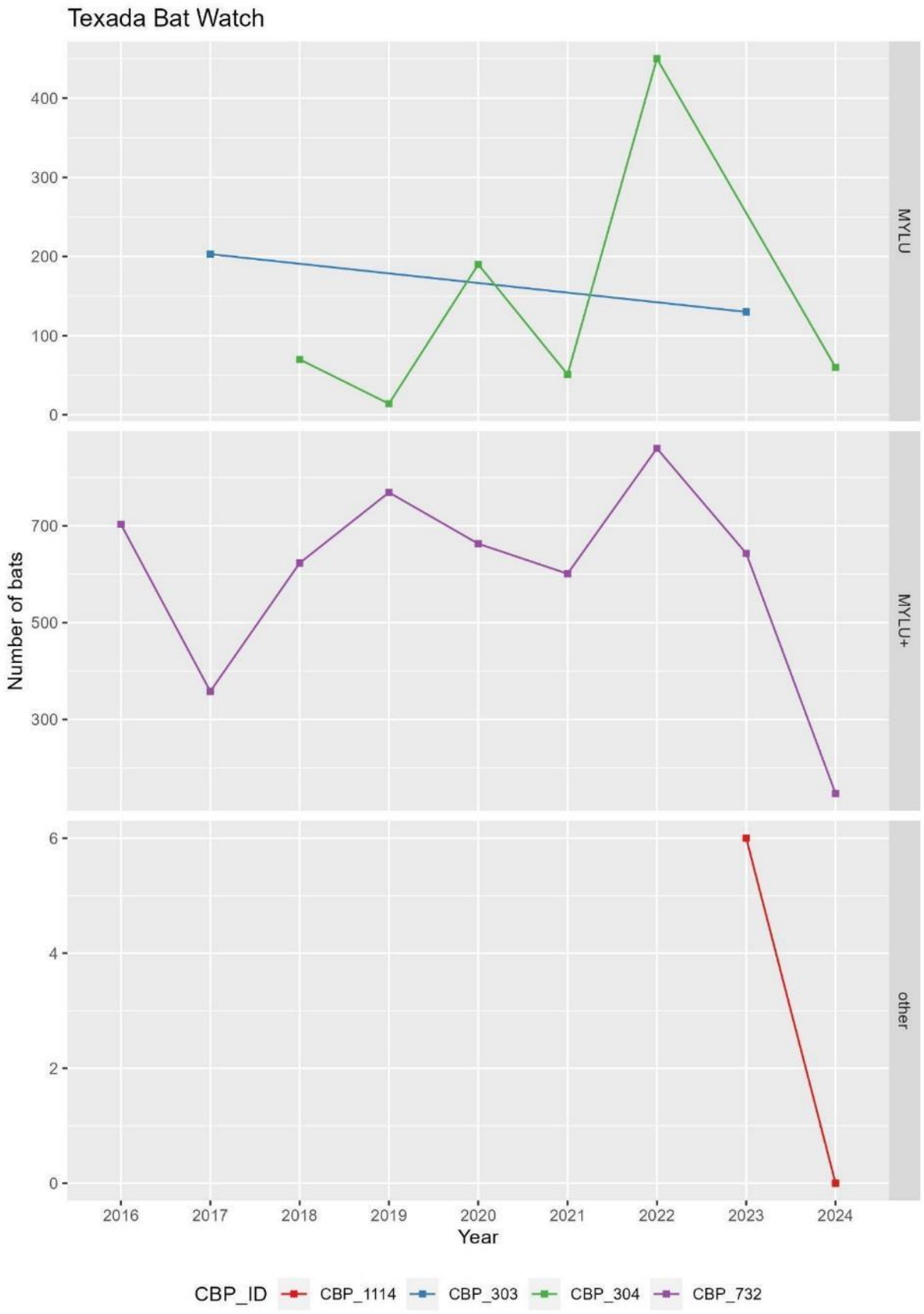

Peace Bat Watch
150
100
50
0
Number of bats
2014
2016
2017
2018
2019
2020
2023
2024
Year
MYLU
CBP_ID
CBP_441
CBP_638
CBP_98

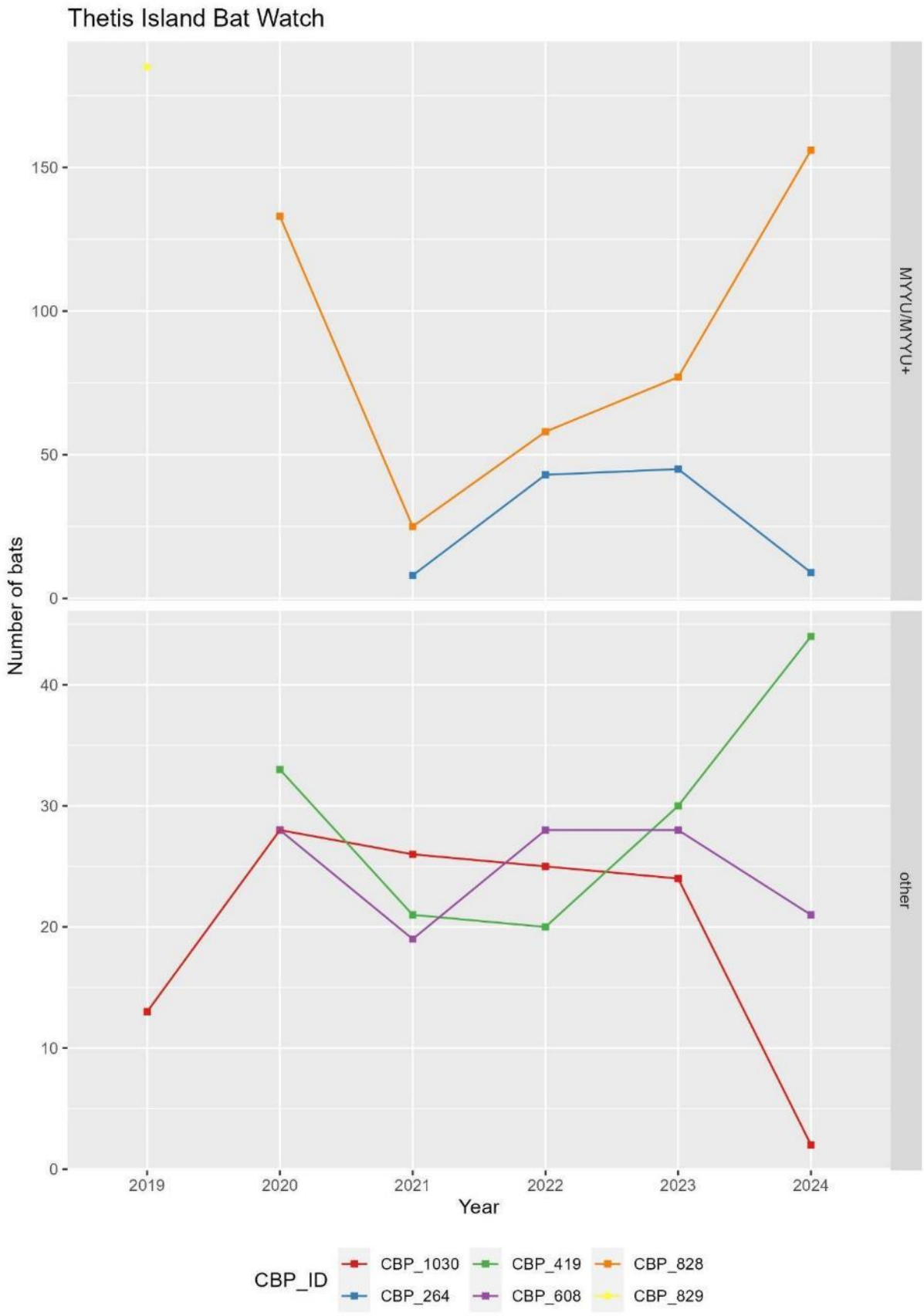

SCBAT Bat Watch
Number of bats
Year
MYLU
MYLU+
MYYU/MYYU+
other
2016
2017
2018
2019
2020
2021
2022
2023
2024

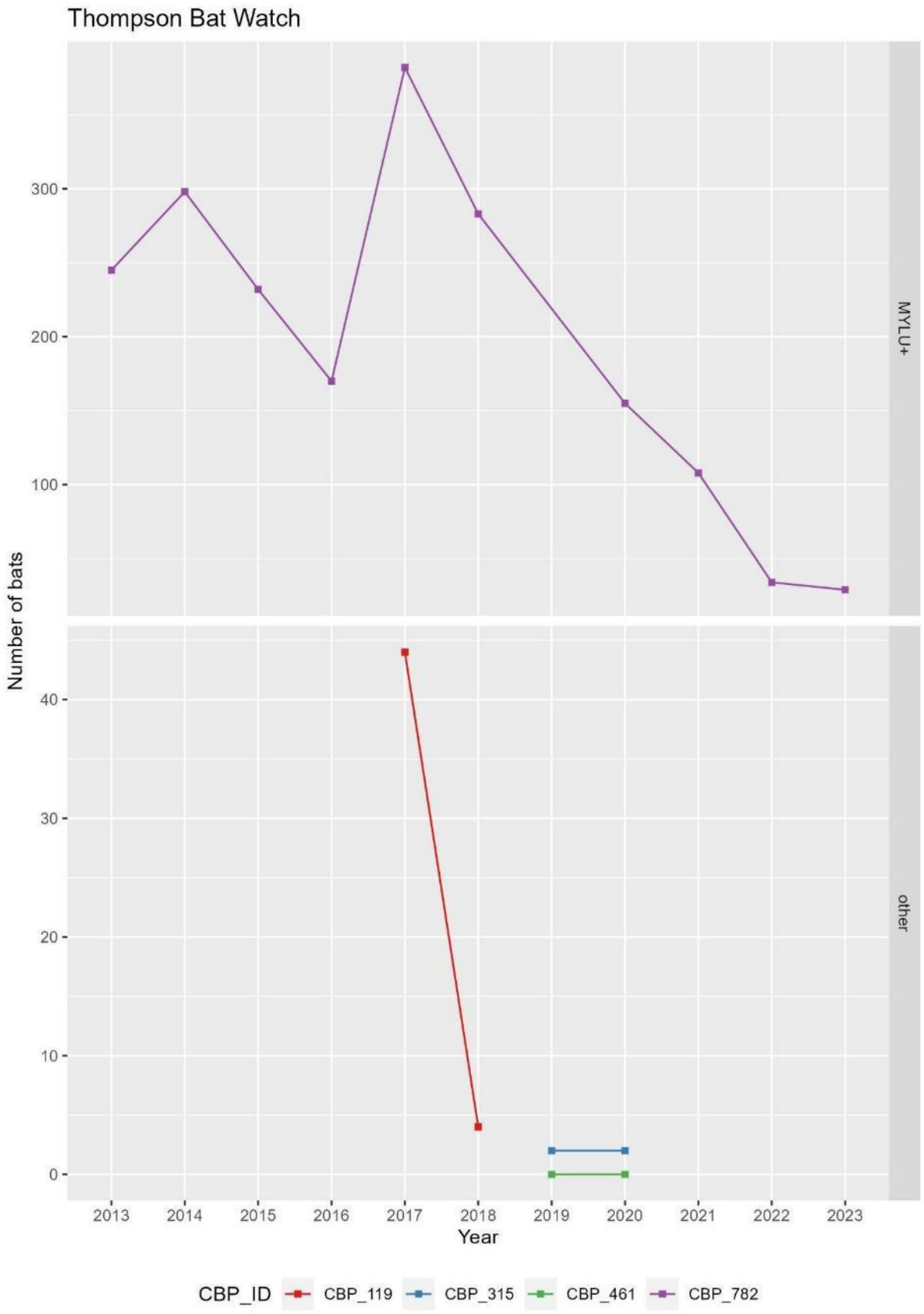

CBP_ID
CBP_1010
CBP_1011
CBP_1013
CBP_1019
CBP_1059
CBP_1081
CBP_1089
CBP_1146
CBP_176
CBP_187
CBP_188
CBP_211
CBP_217
CBP_219
CBP_220
CBP_229
CBP_23
CBP_237
CBP_238
CBP_364
CBP_384
CBP_43
CBP_433
CBP_455
CBP_456
CBP_462
CBP_503
CBP_505
CBP_507
CBP_519
CBP_520
CBP_531
CBP_543
CBP_591
CBP_599
CBP_605
CBP_606
CBP_613
CBP_63
CBP_64
CBP_691
CBP_697
CBP_716
CBP_717
CBP_718
CBP_720
CBP_721
CBP_735
CBP_763
CBP_796
CBP_801
CBP_830
CBP_832
CBP_833
CBP_901
CBP_904
CBP_929
CBP_930
CBP_931
CBP_957


SCWP Bat Watch
Number of bats
Year
MYLU
MYLU+
MYYU/MYYU+
other
2016
2017
2018
2019
2020
2021
2022
2023
2024
CBP_ID
CBP_1024
CBP_1025
CBP_108
CBP_1151
CBP_1154
CBP_1198
CBP_146
CBP_147
CBP_157
CBP_163
CBP_164
CBP_168
CBP_195
CBP_253
CBP_254
CBP_255
CBP_256
CBP_260
CBP_295
CBP_297
CBP_299
CBP_318
CBP_322
CBP_323
CBP_355
CBP_358
CBP_359
CBP_36
CBP_360
CBP_367
CBP_37
CBP_378
CBP_379
CBP_391
CBP_471
CBP_484
CBP_516
CBP_533
CBP_541
CBP_542
CBP_652
CBP_653
CBP_665
CBP_67
CBP_678
CBP_68
CBP_695
CBP_70
CBP_71
CBP_726
CBP_727
CBP_74
CBP_798
CBP_826
CBP_858
CBP_907
CBP_908
CBP_925
CBP_97
CBP_983
CBP_99
CBP_990


Skeena Bat Watch
Number of bats
Year
MYLU
other
1250
1000
750
500
250
0
200
150
100
50
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
CBP_ID
CBP_1042
CBP_138
CBP_143
CBP_193
CBP_263
CBP_439
CBP_445
CBP_481
CBP_53
CBP_574
CBP_607
CBP_623
CBP_625
CBP_784
CBP_803
CBP_9


Texada Bat Watch
Number of bats
Year
MYLU
MYLU+
other
CBP_ID
CBP_1114
CBP_303
CBP_304
CBP_732


Thetis Island Bat Watch
Number of bats
150
100
50
0
MYYU/MYYU+
40
30
20
10
0
other
2019
2020
2021
2022
2023
2024
Year
CBP_ID
CBP_1030
CBP_419
CBP_828
CBP_264
CBP_608
CBP_829


Thompson Bat Watch
Number of bats
300
200
100
40
30
20
10
0
MYLU+
other
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year
CBP_ID
CBP_119
CBP_315
CBP_461
CBP_782

Appendix 2. Sites with declines in 2024.

Table 8. Detail on 15 sites with obvious declines in pre-pup maximum counts in 2024, by region. Grey bands indicate sites with unexplained decreases.

Region	CB_ID	Comment	Summary
Cariboo	234	Low single pre-pup count; post-pup numbers high	Post-pup recovery
Denman Hornby	579	Light left on in roost; slight recovery once turned off in post-pup counts	Change in roost characteristics; post-pup recovery
Denman Hornby	1005	Decrease pre- and post- MAX. Variable data; using MEAN, values increase	Variable counts
Kootenay	1129	Decline in pre- and post-pup	Bat box decaying; roost complex not counted
Mayne Island	964	Small colony; only 1 prepup count. Post-pup number back up.	Post-pup recovery
Mid Island	934	Small colony; Post-pup number back up.	Post-pup recovery
Mid Island	1121	Low pre-pup; post-pup numbers high. Many boxes in area.	Post-pup recovery; roost complex
Okanagan	780	Low pre-pup	Post-pup recovery
Okanagan	1068		Post-pup recovery
Okanagan	1096		Post-pup recovery
Peace	441		Post-pup recovery
Texada	732		Post-pup recovery
Texada	1114	very small roost; no post-pup counts. 0-6 bats.	Variable counts
Thompson	782	Roost complex in area; other roosts not counted	Roost complex; post-pup recovery
Thompson	1046	Only 1 prep-pup count in one year; two years of post-pup	