

## Dans Rock Fall Migration Count: 2022 Season Report

Carl A. Engstrom

*161 Legion Lane, State College, Pennsylvania 16801*  
*carlengstrom@gmail.com*

**Abstract:** In the fall of 2022, the Maryland Biodiversity Project started the Dans Rock Fall Migration Count as a novel method to document southbound avian migration along the Allegheny Front in Maryland. Dans Rock Overlook is the highest point on Dans Mountain along the Allegheny Front in Allegany County, Maryland. The count was held from 1 August to 30 November 2022 using the same protocols as the Turkey Point Fall Migration Count and Cape May Bird Observatory morning flight count. The Dans Rock count was the first non-coastal morning flight count for the Mid-Atlantic and the first morning flight count for the Appalachian Mountains. It provided important quantitative insights into regional bird populations and the nature of their migrations (e.g., relative abundance, timing, weather impacts). The value is compounded when compared to the results of the Cape May Bird Observatory and Turkey Point counts. During the 2022 season, the Dans Rock count documented 52,746 individuals of 103 species in southbound migration. The count worked to document the abundance, diversity, and migratory behavior of southbound migrants at an inland site along the Allegheny Front. While the count's primary focus was the morning flight of land birds past Dans Rock, efforts were made to count all species, including migratory insects, moving down the ridge.

The annual migrations of birds are one of the most noticeable spectacles in the natural world. Each fall, millions of birds migrate south across the continent from their breeding grounds at northern latitudes to reach their wintering grounds. Despite its somewhat predictable schedule, accessibility, and annual cycle, there is still much to learn about migration. Morning flight is a novel approach that can further our understanding of bird migration. Most small passerine species migrate at night, and thus do not provide the same visual spectacle as diurnal migrants, such as raptors. However, it is possible to get a glimpse into this phenomenon by positioning observers in geographic areas conducive for concentrating migrants (e.g., the tip of a peninsula, on a ridgetop) near sunrise. As day breaks, birds that have been migrating at night begin searching for a suitable place to land and forage for the day. This opportunity to identify low-flying passerine migrants led to the advent of morning flight counts.

Over the years, Dans Rock has gained a reputation as a good hawk-watching location and one of the best places to see Golden Eagle in Maryland (eBird

2022). No formal count has been held at Dans Rock, but observers have visited this location on days with favorable conditions for raptor migration for many years. Formal hawk watches in Allegany County have been conducted at both Cumberland Gap and Town Hill Overlook, but neither of these locations has ever been monitored for morning flight. This count was the first non-coastal morning flight count in the Mid-Atlantic and the first morning flight count in the Appalachians. The goal for establishing this count was to collect a standardized data set that would further our understanding of the dynamics of bird migration in the Appalachians. Additionally, concurrent morning flight counts at similar latitudes at Cape May, New Jersey and Turkey Point, Maryland allow for an interesting comparison of migration across the three locations.

## METHODS

Dans Rock sits atop Dans Mountain which comprises part of the Allegheny Front in Allegany County, Maryland (Figure 1). The Allegheny Front serves as the divide between the Ridge and Valley region to the east, and the higher elevation Allegheny Plateau to the west. This ridgeline is well known for its use by raptors during migration, and this count examined whether passerine migrants follow this corridor as well. This section of ridgeline is nearly entirely forested with a few small fields, clearings for houses, and cell towers. Dans Rock Overlook sits at the highest point of the ridge and has two observation platforms atop a rocky outcropping that protrudes above canopy level. The Potomac River flows 3 mi (5 km) to the east of the overlook and forms a sizable valley, which Dans Rock overlooks.



**Figure 1. Dans Rock Overlook.** Located in western Maryland between Cumberland and Frostburg, the count site is located on the Allegheny Front, which provides a panoramic view for morning flight observation (Google Earth 2022).

The count was conducted daily from one of the two metal observation platforms that sit roughly 18 m (59 ft) apart at the top of Dans Rock Overlook. The counter selected which platform to stand on based on where the majority of that morning's flight was taking place. The southern platform provided a better vantage looking down into the Potomac River valley to the east of the ridge as well as back to the southwest through the powerline cut that ran from the parking area for the overlook. The northern platform provided a better vantage out to the northwest and was primarily used when a good raptor flight was underway. The count ran from 1 August through 30 November 2022. Each morning the count began 15 minutes before sunrise and ran for a minimum of three hours after sunrise. On days with strong migratory movement, the count was extended past the three-hour mark until migration activity ceased. The count was ended early or suspended on days with continuous heavy rain that prevented flights. Migration data were collected and entered in the field using the Dutch software *Trektellen* (2022a), allowing the live stream of sightings to Maryland Biodiversity Project's (MBP) count page and to the *Trektellen* website. Flight direction and time were recorded with each entry into the database. Daily reports were also filed with Cornell University's eBird application (eBird 2022). The count was conducted by experienced alternate counters on the mornings when the lead counter had days off. All alternate counters had many years of birding experience and were either trained by the lead counter or already had experience supporting morning flight counts.

## RESULTS

During the 2022 season, the count documented 52,746 individuals of 103 species in active migration (Table 1). Nine other taxonomic levels (e.g., "warbler sp.") were also tracked for a total of 2,366 individuals. The count was conducted on 121 of the 122 days during the count period for a total of 387 observation hours. The total number of individuals and overall species diversity varied by month, ranging from a high of 26,655 individuals in November to a low in August with 4,498 individuals. September had the highest diversity with 76 species and November had the lowest count with 44 species. All numbers in this report derive from totals of all identified species regardless of flight direction.

**Table. 1 2022 Dans Rock Fall Migration Count Results.**

Species	AUG	SEP	OCT	NOV	Total	Max. Count (Date)	First Observed	Last Observed
Canada Goose	0	7	16	0	23	10 (17 Oct)	15 Sep	17 Oct
Tundra Swan	0	0	0	5	5	5 (16 Nov)	16 Nov	16 Nov
duck sp.	0	0	7	0	7	7 (28 Oct)	28 Oct	28 Oct
Rock Pigeon	6	0	42	6	54	37 (16 Oct)	3 Aug	8 Nov
Mourning Dove	29	3	5	3	40	6 (7 Aug)	1 Aug	3 Nov
Yellow-billed Cuckoo	0	1	0	0	1	1 (24 Sep)	24 Sep	24 Sep
Common Nighthawk	0	1	0	0	1	1 (10 Sep)	10 Sep	10 Sep

Species	AUG	SEP	OCT	NOV	Total	Max. Count (Date)	First Observed	Last Observed
Chimney Swift	657	413	11	0	1,081	149 (20 Aug)	1 Aug	7 Oct
Ruby-throated Hummingbird	136	89	0	0	225	18 (15 Sep)	1 Aug	26 Sep
Killdeer	1	1	1	14	17	8 (8 Nov)	7 Aug	8 Nov
Upland Sandpiper	1	0	0	0	1	1 (1 Aug)	1 Aug	1 Aug
Ring-billed Gull	0	0	0	1	1	1 (8 Nov)	8 Nov	8 Nov
Double-crested Cormorant	0	1	22	0	23	19 (25 Oct)	16 Sep	25 Oct
Great Blue Heron	0	1	1	1	3	1 (15 Sep)	15 Sep	3 Nov
Black Vulture	0	0	0	4	4	4 (22 Nov)	22 Nov	22 Nov
Turkey Vulture	0	1	80	19	100	21 (24 Oct)	23 Sep	16 Nov
Osprey	0	6	0	0	6	1 (15 Sep)	15 Sep	29 Sep
Golden Eagle	0	0	0	12	12	3 (16 Nov)	3 Nov	28 Nov
Northern Harrier	0	3	1	2	6	2 (1 Nov)	15 Sep	1 Nov
Sharp-shinned Hawk	1	29	60	8	98	16 (16 Oct)	26 Aug	24 Nov
Cooper's Hawk	1	11	9	7	28	4 (27 Oct)	9 Aug	18 Nov
Bald Eagle	1	32	3	5	41	10 (27 Sep)	21 Aug	28 Nov
Red-shouldered Hawk	0	2	0	1	3	1 (14 Sep)	14 Sep	19 Nov
Broad-winged Hawk	1	474	1	0	476	169 (20 Sep)	8 Aug	16 Oct
Red-tailed Hawk	0	8	8	24	40	8 (7 Nov)	15 Sep	28 Nov
Rough-legged Hawk	0	0	0	1	1	1 (5 Nov)	5 Nov	5 Nov
Red-headed Woodpecker	0	4	0	0	4	2 (27 Sep)	6 Sep	27 Sep
Red-bellied Woodpecker	0	11	30	0	41	7 (3 Oct)	21 Sep	24 Oct
Yellow-bellied Sapsucker	0	2	2	0	4	1 (18 Sep)	18 Sep	21 Oct
Downy Woodpecker	0	0	9	0	9	3 (28 Oct)	6 Oct	28 Oct
Hairy Woodpecker	0	0	4	1	5	2 (25 Oct)	13 Oct	8 Nov
Northern Flicker (Yellow-Shafted)	0	8	3	0	11	2 (21 Sep)	21 Sep	13 Oct
American Kestrel	1	5	6	0	12	3 (18 Oct)	24 Aug	27 Oct
Merlin	0	1	3	1	5	1 (15 Sep)	15 Sep	1 Nov
Peregrine Falcon	0	2	1	0	3	1 (24 Sep)	24 Sep	19 Oct
Eastern Wood-Pewee	13	20	0	0	33	5 (26 Aug)	2 Aug	21 Sep
Traill's Flycatcher	1	0	0	0	1	1 (20 Aug)	20 Aug	20 Aug
<i>Empidonax</i> sp.	1	1	0	0	2	1 (3 Aug)	3 Aug	20 Sep
Eastern Phoebe	1	1	6	0	8	2 (7 Oct)	8 Aug	24 Oct
Blue-headed Vireo	0	1	8	0	9	3 (25 Oct)	22 Sep	25 Oct
Philadelphia Vireo	0	5	0	0	5	1 (17 Sep)	17 Sep	29 Sep
Red-eyed Vireo	9	12	1	0	22	6 (9 Sep)	2 Aug	5 Oct
Blue Jay	0	992	358	0	1,350	216 (29 Sep)	21 Sep	27 Oct
American Crow	0	0	16	15	31	11 (30 Oct)	28 Oct	18 Nov
Black-capped Chickadee	0	0	22	15	37	10 (3 Nov)	24 Oct	7 Nov
Horned Lark	1	0	0	3	4	1 (9 Aug)	9 Aug	23 Nov
Tree Swallow	0	1	2	0	3	2 (3 Oct)	17 Sep	3 Oct
Barn Swallow	272	4	0	0	276	32 (17 Aug)	1 Aug	15 Sep
Cliff Swallow	14	23	0	0	37	15 (1 Sep)	1 Aug	17 Sep
swallow sp.	0	6	0	0	6	3 (15 Sep)	15 Sep	29 Sep
Ruby-crowned Kinglet	0	19	50	1	70	14 (21 Oct)	14 Sep	6 Nov
Golden-crowned Kinglet	0	0	42	3	45	12 (29 Oct)	10 Oct	8 Nov
Cedar Waxwing	1,993	1,280	3,163	6,205	12,641	1,415 (3 Nov)	1 Aug	28 Nov
Red-breasted Nuthatch	22	93	51	3	169	19 (20 Sep)	10 Aug	7 Nov
White-breasted Nuthatch	0	4	116	6	126	16 (22 Oct)	24 Sep	9 Nov
Brown Creeper	0	1	2	0	3	1 (7 Sep)	7 Sep	21 Oct
Blue-gray Gnatcatcher	18	14	0	0	32	3 (17 Aug)	3 Aug	21 Sep
Winter Wren	0	0	0	1	1	1 (6 Nov)	6 Nov	6 Nov
European Starling	2	10	110	4,268	4,390	1,659 (18 Nov)	2 Aug	30 Nov
Eastern Bluebird	0	2	30	104	136	42 (3 Nov)	26 Sep	28 Nov
Swainson's Thrush	0	0	1	0	1	1 (7 Oct)	7 Oct	7 Oct
American Robin	39	48	5,825	11,158	17,070	3,652 (1 Nov)	2 Aug	29 Nov
American Pipit	0	1	25	8	34	15 (30 Oct)	24 Sep	8 Nov
Evening Grosbeak	0	0	0	8	8	4 (12 Nov)	2 Nov	12 Nov
House Finch	23	4	42	31	100	13 (24 Oct)	2 Aug	23 Nov
Purple Finch	1	14	219	113	347	96 (24 Oct)	11 Aug	26 Nov
Red Crossbill	0	0	5	1	6	5 (19 Oct)	19 Oct	8 Nov

Species	AUG	SEP	OCT	NOV	Total	Max. Count (Date)	First Observed	Last Observed
Pine Siskin	0	2	17	16	35	8 (30 Oct)	16 Sep	21 Nov
American Goldfinch	153	928	209	318	1,608	282 (16 Sep)	6 Aug	29 Nov
finch sp.	0	0	0	21	21	11 (3 Nov)	3 Nov	9 Nov
Chipping Sparrow	5	3	8	1	17	5 (25 Oct)	2 Aug	3 Nov
Field Sparrow	1	0	0	0	1	1 (2 Aug)	2 Aug	2 Aug
Fox Sparrow (Red)	0	0	2	1	3	1 (29 Oct)	29 Oct	6 Nov
Dark-eyed Junco (Slate-colored)	0	0	33	60	93	14 (30 Oct)	8 Oct	27 Nov
Bobolink	41	2	0	0	43	19 (22 Aug)	12 Aug	20 Sep
Baltimore Oriole	10	1	0	0	11	5 (17 Aug)	3 Aug	2 Sep
Red-winged Blackbird	92	1	4,306	3,329	7,728	2,548 (2 Nov)	3 Aug	28 Nov
Brown-headed Cowbird	1	0	0	0	1	1 (2 Aug)	2 Aug	2 Aug
Rusty Blackbird	0	0	1	2	3	2 (16 Nov)	25 Oct	16 Nov
Common Grackle	2	3	271	820	1,096	778 (2 Nov)	2 Aug	28 Nov
Ovenbird	20	2	0	0	22	2 (6 Aug)	2 Aug	2 Sep
Worm-eating Warbler	3	0	0	0	3	2 (3 Aug)	3 Aug	8 Aug
Northern Waterthrush	3	0	0	0	3	1 (20 Aug)	20 Aug	24 Aug
Louisiana/Northern Waterthrush	2	0	0	0	2	2 (10 Aug)	10 Aug	10 Aug
Black-and-white Warbler	20	5	1	0	26	3 (21 Aug)	2 Aug	3 Oct
Tennessee Warbler	11	110	9	0	130	15 (1 Sep)	1 Aug	8 Oct
Nashville Warbler	0	4	1	0	5	2 (21 Sep)	19 Sep	15 Oct
Connecticut Warbler	0	1	0	0	1	1 (11 Sep)	11 Sep	11 Sep
Hooded Warbler	2	0	0	0	2	1 (19 Aug)	19 Aug	30 Aug
American Redstart	29	42	0	0	71	6 (11 Aug)	2 Aug	22 Sep
Cape May Warbler	229	891	18	0	1,138	276 (1 Sep)	12 Aug	12 Oct
Cerulean Warbler	2	0	0	0	2	1 (3 Aug)	3 Aug	6 Aug
Northern Parula	0	5	0	0	5	3 (17 Sep)	17 Sep	24 Sep
Magnolia Warbler	0	62	2	0	64	10 (11 Sep)	2 Sep	4 Oct
Bay-breasted Warbler	0	56	2	0	58	7 (20 Sep)	1 Sep	3 Oct
Bay-breasted/Blackpoll Warbler	0	13	0	0	13	6 (10 Sep)	10 Sep	23 Sep
Blackburnian Warbler	100	63	1	0	164	19 (11 Aug)	8 Aug	3 Oct
Yellow Warbler	3	1	0	0	4	1 (1 Aug)	1 Aug	9 Sep
Chestnut-sided Warbler	11	11	0	0	22	4 (20 Aug)	3 Aug	24 Sep
Blackpoll Warbler	0	91	86	0	177	17 (3 Oct)	7 Sep	23 Oct
Black-throated Blue Warbler	14	69	4	0	87	8 (11 Sep)	10 Aug	17 Oct
Palm Warbler	0	2	1	0	3	1 (21 Sep)	21 Sep	25 Oct
Yellow-rumped Warbler (Myrtle)	1	4	370	29	404	84 (24 Oct)	29 Aug	12 Nov
Prairie Warbler	0	1	0	0	1	1 (27 Sep)	27 Sep	27 Sep
Black-throated Green Warbler	79	192	10	0	281	20 (20 Sep)	2 Aug	14 Oct
Canada Warbler	1	0	0	0	1	1 (7 Aug)	7 Aug	7 Aug
Wilson's Warbler	0	1	0	0	1	1 (9 Sep)	9 Sep	9 Sep
warbler sp.	371	1,793	100	0	2,264	548 (15 Sep)	1 Aug	17 Oct
Scarlet Tanager	18	18	0	0	36	3 (3 Aug)	1 Aug	27 Sep
Rose-breasted Grosbeak	4	3	0	0	7	2 (18 Sep)	3 Aug	18 Sep
Indigo Bunting	9	2	0	0	11	2 (17 Aug)	1 Aug	20 Sep
passerine sp.	15	26	9	0	50	7 (3 Sep)	11 Aug	14 Oct

## MONTHLY SUMMARIES

### August

The count tallied 4,497 individuals of 56 species during August. The count kicked off on 1 AUG with moderate west winds and foggy conditions. Arguably the rarest bird of the entire season was detected on the first day of the count when an Upland Sandpiper was heard calling in the fog. An early Tennessee Warbler on 1 AUG was also notable. Northwest winds and no fog the next morning made for a diverse flight with 22 species detected, including 3 more

Tennessee Warblers. Similar conditions on 3 AUG produced low numbers but good species diversity, with the clear highlight being a Cerulean Warbler. Unfavorable winds on the next four days really slowed migration down at the count site; Chimney Swifts, Cedar Waxwings, and a small number of warblers were the primary migrants on these mornings. West winds on 8 AUG brought the first substantial flight, when a Worm-eating Warbler was a highlight on a flight dominated by swifts and waxwings. A Horned Lark on 9 AUG was notable as being early and a scarce migrant in this region of Maryland (pers. obs.).

Migration started to develop a different feel around 10 AUG when some migrants typically found later in the fall began to appear. This included the season's first Red-breasted Nuthatch, a sign of things to come for numerous irruptive species here this fall. Northwest winds the next day provided a very early Purple Finch and the 19 Blackburnian Warblers, which ended up being the season's high count. The same was true of a flight of 6 American Redstarts. Light northwest winds on 12 AUG and 13 AUG did not generate much movement, but a highlight was the season's first Cape May Warbler and Bobolink. The winds switching to the south the next three days did not aid in moving birds. The winds finally shifted to the north on 17 AUG and brought with them some welcomed diversity to the count with 160 individuals of 17 species recorded. The counts of 32 Barn Swallows, 3 Blue-gray Gnatcatchers, 5 Baltimore Orioles, and 2 Indigo Buntings all ended up being those species' highest counts for the season. Northwest winds on 18 AUG produced 3 more Red-breasted Nuthatches and west winds on 19 AUG delivered the first Hooded Warbler of the season. Southwest winds on 20 AUG unexpectedly provided a solid flight of 376 individuals of 24 species. Highlights from this diverse flight included the season's first Northern Waterthrush, and the 149 Chimney Swifts and the 4 Chestnut-sided Warblers were both the highest counts for the season.

Fortunately, winds were out of the north for the next week, which provided a couple of decent days of activity. This early in the season individual numbers of birds were not very high, but the good days were defined by species diversity. Cedar Waxwings continued to be the primary migrant during this week, but Cape May Warblers became a banner species with some impressive counts. Highlights from this period of northerly winds included 19 Bobolinks on 22 AUG, an American Kestrel on 24 AUG (first raptor for the season), and 53 Cape May Warblers on 26 AUG. The winds swung around to the south-southwest on 29 AUG, but an early Yellow-rumped "Myrtle" Warbler was the first of many for the season. The southerly winds continued on 30 AUG which made for a very slow day. The final day of the month had west winds, and counts of 16 Ruby-throated Hummingbirds and 42 American Goldfinches were notable.

## **September**

The count tallied 8,080 individuals of 81 species during September. Northwest winds on 1 SEP generated what was probably the best flight of the season. Nearly 500 warblers were counted with an astonishing 276 Cape May Warblers leading the way. Counts of 15 Tennessee Warblers and 15 Cliff Swallows were both season highs. The season's first Bay-breasted Warbler was also recorded. North winds continued on the next day and produced another early Purple Finch, the first Magnolia Warbler for the season, and an additional 88 Cape May Warblers. Interestingly, more north winds on 3 SEP failed to produce much of a flight. A combination of south winds or rainy conditions the next five days failed to produce any quality flights and rained out the majority of the count on a couple of occasions. A Red-headed Woodpecker on 6 SEP and a Brown Creeper on 7 SEP were both firsts for the count.

North winds and clear skies had birds moving again on 9 SEP with 444 individuals of 27 species recorded. Highlights were another Red-headed Woodpecker, another good showing of 82 Cape May Warblers, the season's first migrating Red-eyed Vireo, and what would be the only Wilson's Warbler for the count. The winds held for 10 SEP which delivered 21 species, including the season's only Common Nighthawk. The winds shifted to the southeast for 11 SEP, but still produced some notable counts. Magnolia Warblers had a season high of 10, the 8 Black-throated Blue Warblers were also a season best, and the Connecticut Warbler was one of the best sightings of the season.

The next five days would all have a northwest wind component, but with varying flight quality. Rainy conditions on 12 SEP made for a slow flight. A big flight of 33 Cape May Warblers were tallied on 13 SEP. Red-shouldered Hawk and Ruby-crowned Kinglet were both new for the season among the 21 species recorded on 14 SEP. Despite similar conditions to the previous days, the flight on 15 SEP was excellent and the 37 species was the most diverse flight of the season. It was the best warbler day of the season with nearly 700 total individuals. Cape May Warblers led the way with 115. Ruby-throated Hummingbirds had their best day with 18 and American Goldfinches had a great day with 230 counted. Canada Goose, Great Blue Heron, Osprey, Northern Harrier, Red-tailed Hawk, and Merlin were all count firsts. More northwest winds on 16 AUG had birds flying, but with fewer warblers and more finches. Only around 400 warblers were counted, but the season high of 282 American Goldfinches, 2 Purple Finches, a very early Pine Siskin, and the season's first Double-crested Cormorant were highlights. A diverse flight of 26 species took place on 17 SEP despite light southeast winds. Highlights included the first Philadelphia Vireo and Tree Swallows of the season, as well as the season high count of 3 Northern Parulas.

Strong westerly winds the next two days did not generate much of a flight; the season's first Yellow-bellied Sapsucker was seen on 18 SEP and the season's

first Nashville Warbler was seen on 19 SEP. The winds switched to the northwest on 20 SEP and brought with them a 34 species morning and one of the best raptor flights of the season. Counts of 169 Broad-winged Hawks, 19 Red-breasted Nuthatches, 7 Bay-breasted Warblers, and 20 Black-throated Green Warblers were all their species' highest counts for the season. The northwest winds continued into the next day and the 35 species, including 13 species of warbler, was the highest species morning of the season. Some later season migrants that put in their first appearances of the season were Northern Flicker, Red-bellied Woodpecker, Blue Jay, and Palm Warbler. Rain moved into the area the next two days and really slowed down migration despite the winds remaining favorable. Two season firsts occurred with Blue-headed Vireo on 22 SEP and Turkey Vulture on 23 SEP; the season's second siskin on 23 SEP was also notable.

After a cold front passed, a notable flight took place on 24 SEP highlighted by the first American Pipit of the fall and the only Yellow-billed Cuckoo of the season. The next day had minimal flight due to rainy conditions and strong southwest winds. The first triple-digit Blue Jay day along with the first Eastern Bluebird and last hummingbird of the season were recorded on 26 SEP. The winds shifted out of the south on 27 SEP and brought several highlights with them including the season high count of 10 Bald Eagles, 2 Red-headed Woodpeckers, and the only Prairie Warbler of the count. Blackpoll Warblers became the dominant warbler for the count with 12 being tallied that day. A count of 196 Blue Jays recorded the only species moving in numbers during a foggy morning on 28 SEP. Light northwest winds the next day would produce the season high of 216 Blue Jays. White-breasted Nuthatches continued to move and began to outnumber Red-breasted Nuthatches. The final day of the month had an unremarkable flight on light northeast winds, but an adult Peregrine Falcon cruised by the platform as a final September highlight.

## **October**

The count tallied 15,882 individuals of 66 species during October. The first two days of the count were rained out by the remnants of Hurricane Ian. Light northeast winds on 3 OCT produced a very diverse flight with 29 species; it was also the last day of triple-digit Blue Jay numbers with 168 counted. The 7 Red-bellied Woodpeckers on 3 OCT were the highest count for the season. The first notable movement of American Robins occurred on 4 OCT, just the tip of the iceberg for what would come later in the season. The next few days had strong west or northwest birds and for the first time all season, the majority of the birds were actually seen moving north up the ridge. The first migrating Downy Woodpecker of the season flew by on 6 OCT along with a notable movement of 6 White-breasted Nuthatches. Strong northwest winds on 8 OCT and strong southwest winds on 9 OCT both failed to produce much of a flight.



With the first Golden-crowned Kinglet of the season on 10 OCT, it really began to feel like the later season migrants had arrived at Dans Rock. Cedar Waxwings once again became a dominant species on the count with 54 of the 106 individuals that day being this species. South winds on 11–13 OCT made for very slow days. The main migrants at this point were waxwings, robins, both nuthatch species, and Blackpoll and Yellow-rumped Warblers. The first migrant Hairy Woodpecker for the count went down the ridge on 13 OCT. Two more days of light southwesterly winds on 14 OCT and 15 OCT made for more slow counts, but a late Nashville Warbler on 15 OCT was notable.

The south winds finally stopped on 16 OCT and birds appeared ready to move. The streak of twelve consecutive days with fewer than 200 individuals finally broke on moderate west winds. A total of 16 Sharp-shinned Hawks and 37 Rock Pigeons were the season high counts for those species and White-breasted Nuthatches had their first double-digit day with 10 counted. The good numbers continued on 17 OCT as the winds remained out of the west. Robins had their first big day with 305 counted. The winds shifted to the southwest on 18 OCT and remained that way for the next day for two more slow mornings. The first snow of the season on 19 OCT did move some birds around, including the season's first Red Crossbills and a count of 15 Turkey Vultures, the first noteworthy movement documented for that species.

The final third of the month had some very good days, starting with the first large flock of Red-winged Blackbirds on 20 OCT. The flock of 400 Red-wingeds was the largest single flock of any species so far this season, but would pale in comparison with some of the flocks that would pass later in the month. Northwest winds on 21 OCT brought the season high count of 14 Ruby-crowned Kinglets as well as good numbers of White-breasted and Red-breasted Nuthatches. The northwest winds continued into 22 OCT, when 16 White-breasted Nuthatches were the season's highest count and part of a noteworthy season for the species. The 2,000 individual mark was eclipsed for the first time on 23 OCT on the third straight day of northwest winds. Cedar Waxwings, American Robins, and 1,002 Red-winged Blackbirds made up the vast majority of the flight with almost all the birds passing within the first 30 minutes after sunrise. One of the best days of the season was 24 OCT, which featured continued northwest winds. A major push of birds came through right after sunrise with 826 Cedar Waxwings, 790 American Robins, and 1,049 Red-winged Blackbirds leading the way. Other highlights included the first migrating Black-capped Chickadees of the season, and the season's high count of 96 Purple Finches. A diverse flight on 25 OCT included the season's first Rusty Blackbird, 19 Double-crested Cormorants, 2 Hairy Woodpeckers, and 69 Yellow-rumped Warblers. Fog and southeast winds on 26 OCT ended the stretch of good flights. The next four days had northerly winds which produced solid flights every morning with American Robins making up the bulk of the count.

The first migrating American Crows were recorded on 28 OCT and the season's first Fox Sparrow arrived on 29 OCT, Black-capped Chickadees were noted most mornings, and American Pipits were recorded in solid numbers. Surprisingly the only ducks of the season were a distant group on 28 OCT, but unfortunately, they remained too distant to be identified. Southeast winds and rainy conditions made for a slow flight on 31 OCT.

## **November**

The count tallied 26,655 individuals of 45 species during November, making it the month with the lowest species diversity but the highest individual tally. November was a month of two very different halves. The first half of the month had by far the biggest flights number-wise of the season, while the second half of the month had some very slow days accompanied with low diversity. The count broke the 3,000 individual mark on 1 NOV with 5,088 individuals tallied. Conditions were not great with moderate west winds and lots of rain in the area. One band of particularly heavy rain halted the count for almost half an hour around mid-morning. The 1,153 Cedar Waxwings and 3,652 American Robins made up the bulk of the flight. Just this single day had more individuals than the entire month of August. The big flight continued with northwest winds on 2 NOV with the season high of 5,171 individuals. Once again waxwings and robins dominated, but the 2,548 Red-winged Blackbirds and 778 Common Grackles were the season's highest counts for each. American Robin became the first species to surpass 10,000 individuals for the season. The main highlight of 2 NOV was the first Evening Grosbeak of the season, a highly anticipated species here with the ongoing irruption across the Mid-Atlantic this fall. A flight of 4,449 individuals on 3 NOV marked the last big movement of the fall; notable high counts included 1,415 Cedar Waxwings, 42 Eastern Bluebirds, and 10 Black-capped Chickadees. The waxwing count is the seventh highest count for the species in the Trektellen database (Trektellen 2022b). The first Golden Eagle of the season was also recorded late in the morning.

The next week of the count (4–10 NOV) averaged around 1,000 individuals per morning, but it appeared that the large numbers of birds the last few days were the final big push of migrants in western Maryland. The winds were a mixed bag with an even number of days of north and south winds, the only really slow day in this stretch came on 6 NOV when there were very strong southwest winds all morning. Robins and waxwings continued to be by far the two most numerous species, with Cedar Waxwing becoming the second species to reach 10,000 individuals on 5 NOV. One of the highlights of the season also appeared on 5 NOV when an early Rough-legged Hawk came down the ridge. Red-tailed Hawks became the default raptor during this period with a total of 24 during November. A Winter Wren on 6 NOV was the only one for the season and also the 100th species for the count. The finch numbers continued to be steady, mainly due to Purple Finches that were recorded in double digits most days this

week. The lone southbound Red Crossbill of the month went by on 8 NOV and Evening Grosbeaks were detected on 8 NOV, 10 NOV, and 12 NOV.

The remnants of Tropical Storm Nicole rained out the count on 11 NOV. From this point forward, numbers of individuals and species diminished for the remainder of the season. The last warbler of the year, a Yellow-rumped, was detected on 12 NOV. Light northeast winds on both 14 NOV and 15 NOV did not move many birds, but Golden Eagles on both days were highlights. The first winter storm of the season moved through the area the afternoon of 15 NOV and the next few days showed an uptick in numbers, likely in response to the adverse conditions that had taken hold of the region. The main species on the move were European Starlings: 4,268 were recorded during November with a high count of 1,659 on 18 NOV. Turkey Vultures also seemed ready to move after the snow and ice storm with 9 counted the morning after the storm. A family group of Tundra Swans was seen heading toward the Chesapeake Bay on 16 NOV, the only time they would be recorded here this season.

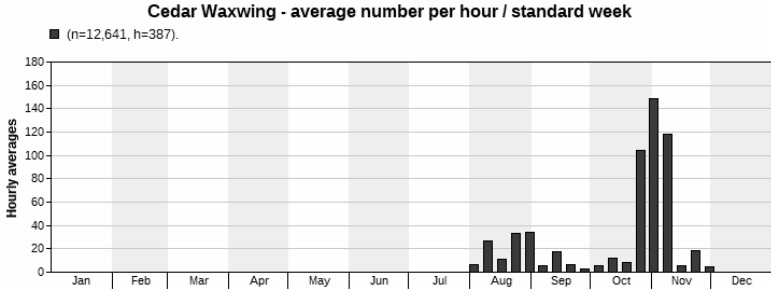
From 19 NOV until the end of the month, double-digit species totals would only be achieved twice. The only four species reliable each day during this stretch were Cedar Waxwing, American Robin, European Starling, and American Goldfinch. Most days during this final stretch had light southerly winds, but even the days with stronger north and west winds did not produce an increase in numbers. Some of the highlights during the final week and a half were a Red-shouldered Hawk on 19 NOV, the last Pine Siskin of the season on 21 NOV, and the 4 Black Vultures on 22 NOV, which become the 103rd and final new species for the count season. Golden Eagles were recorded on seven days during the month. The weather on the final day of the count was intense, with heavy rain and then dense fog making for challenging counting conditions. A hardy flock of 7 starlings were the only migrants recorded on the final day.

### **Species Accounts - The Season's Notable Five**

#### **Cedar Waxwing**

Cedar Waxwings are a nomadic species with a poorly understood and disjointed migration pattern (Witmer et al. 2020). Waxwings were a mainstay at Dans Rock as they were the only species with over 1,000 individuals in each count month, the species with the second highest individual count on the season, and the species detected on the most count days. There was a peak in numbers during the month of August where waxwings were the dominant migratory species at Dans Rock. In much of September and October waxwings were recorded on most days, but rarely in large numbers. A major push came through along with the main robin surge during the three-week period around the beginning of November. The first Cedar Waxwings were counted on 1 AUG and the last were noted on 28 NOV. The peak flight for the species occurred on 3

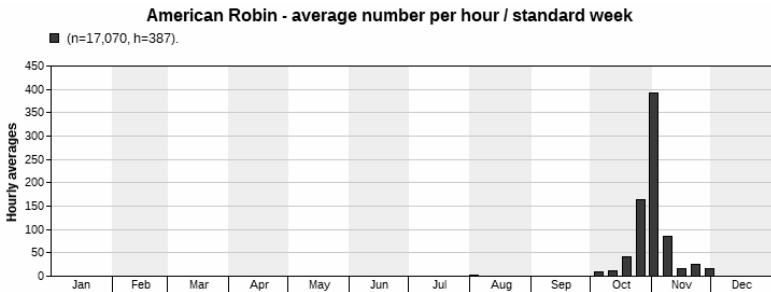
NOV when 1,415 were tallied (Figure 2). Monthly totals were 1,993 in August, 1,280 in September, 3,163 in October, and 6,205 in November with a season total of 12,641. Waxwings were present on 104 of the 121 days of monitoring.



**Figure 2. Timing of Cedar Waxwing movement in 2022 at Dans Rock, Allegany County, Maryland.**

**American Robin**

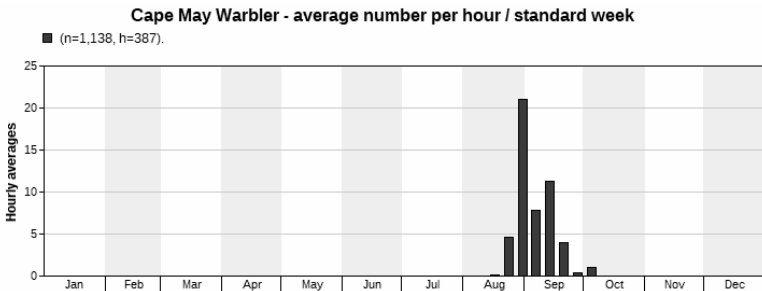
American Robins are a late season migrant that can often be seen moving in large, loose flocks at dawn and dusk all across the Mid-Atlantic. Robins earned the distinction of having the highest individual count for any species this season. Large numbers streamed by the count site around the end of October and early November, with the majority of the day’s birds passing by within the first half hour after sunrise. American Robin would have been one of the few species that would have continued moving in decent numbers after the count concluded. The first American Robins were counted on 2 AUG and the last were counted on 29 NOV. The peak flight occurred on 1 NOV when 3,652 were counted (Figure 3). Monthly totals were 39 in August, 48 in September, 5,825 in October, and 11,158 in November with a season total of 17,070. American Robins were present on 78 of the 121 days of monitoring.



**Figure 3. Timing of American Robin movement in 2022 at Dans Rock, Allegany County, Maryland.**

### Cape May Warbler

The fall of 2022 was an exceptional season for Cape May Warblers across the Mid-Atlantic. Cape May Warbler populations are linked to the severity of Eastern Spruce Budworm, *Archips fumiferana* Clemens (Lepidoptera: Tortricidae), outbreaks on their breeding grounds in the boreal forest. The budworms provide an abundance of food during outbreaks which lead to increases in population productivity and higher numbers of these budworm-linked species (Venier and Holmes 2010). The last few summers have seen widespread budworm outbreaks across the breeding range (Germain et al. 2021, Maine Forest Service 2021) for Cape May Warblers and as a result higher than normal numbers have been observed across the region during fall migration. At Dans Rock, Cape May Warblers arrived in good numbers unseasonably early in August, continued in excellent numbers through most of September, and were gone after the first week of October. The first Cape May Warbler was noted at Dans Rock on 12 AUG and the last came through on 12 OCT. The peak flight of the season occurred on 1 SEP when 276, a new Maryland high count, were tallied in a morning (Figure 4). Monthly totals were 229 in August, 891 in September, 18 in October, and zero in November, making for a season total of 1,138. Cape May Warblers were present for 45 of the 121 days of monitoring.

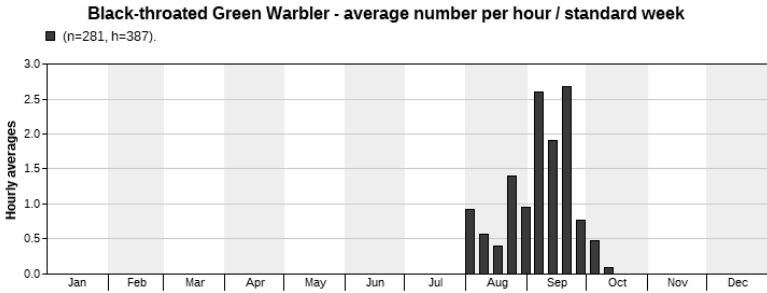


**Figure 4. Timing of Cape May Warbler movement in 2022 at Dans Rock, Allegany County, Maryland.**

### Black-throated Green Warbler

Black-throated Green Warblers were the third most abundant warbler at Dans Rock this fall, beaten out by an exceptional Cape May Warbler flight and the morning flight staple Yellow-rumped Warbler. Despite not having any huge flights, Black-throated Greens had a strong year at Dans Rock. Interestingly, despite documenting fewer overall migrants than the morning flight counts at Cape May and Turkey Point, Dans Rock recorded far more Black-throated Green Warblers than either site (Trekellen 2022a, Irons 2023b). This speaks to the value of having an inland morning flight count to document the different migratory corridors that closely related species are taking through the region. The first Black-throated Green Warbler of the season was noted on 2 AUG and the last moved through on 14 OCT. The peak flight for the species occurred on

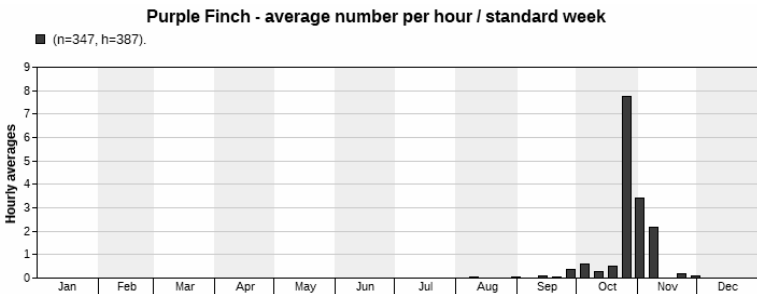
20 SEP when 20 were counted (Figure 5). Monthly totals were 79 in August, 192 in September, 10 in October, and none in November with a season total of 281. Black-throated Green Warblers were present on 55 of the 121 days of monitoring.



**Figure 5. Timing of Black-throated Green Warbler movement in 2022 at Dans Rock, Allegany County, Maryland.**

### Purple Finch

Well-known as an irruptive species, Purple Finches are recorded in dramatically different numbers year-to-year in Maryland and around the Mid-Atlantic. This fall was productive for documenting irruptive species, and Purple Finch was perhaps the most obvious example at Dans Rock. On days with northerly winds, the distinctive flight call for this species could be heard every few minutes as small groups passed down the ridge. An exceptionally early individual in August was a sign of things to come, but the bulk of birds came through during a stretch of conducive winds around the end of October. The first Purple Finch was detected on 11 AUG and the last was noted on 26 NOV. The peak flight occurred on 24 OCT when 96 were tallied in a morning (Figure 6). Monthly totals were 1 in August, 14 in September, 219 in October, and 113 in November, making for a season total of 347. Purple Finches were present on 35 of the 121 days of monitoring.



**Figure 6. Timing of Purple Finch movement in 2022 at Dans Rock, Allegany County, Maryland.**

The count data are publicly available via Trektellen at the MD Biodiversity Project - Dans Rock morning flight page (Trektellen 2022b), eBird (2022), and Avian Knowledge Network (2022). Highlights and photos of the 2022 morning flight count can be found at the MBP special project page (Maryland Biodiversity Project 2022a) and MBP blog (Maryland Biodiversity Project 2022b).

## DISCUSSION

There were many questions coming into this inaugural season that people were keen to have answered. Perhaps the biggest question was would Dans Rock get morning flight or any sort of consistent passerine migration? Unlike the morning flight counts at Cape May and Turkey Point, the Ridge and Valley region does not have any coastline or other large migration barriers to disrupt migration and funnel migrants. Dans Rock was ultimately selected as a count site due to its location on the Allegheny Front, a known raptor migration corridor, and the easily accessible vista for observation. After a season at Dans Rock, it is apparent that quality morning flight does occur here, but it lacks the consistent day-to-day numbers that coastal locations can achieve.

Just like any other aspect of migration monitoring, weather played an important role in how morning flight unfolded at this location. Nearly all of the most productive flights occurred on days with light winds out of the north or northwest. Strong winds seemed to keep smaller passerines from moving along the top of the ridge where they would have been visible from the platforms and likely meant that any movement in the area would have been occurring down in the valleys. Northerly winds provided a nice tailwind that seemed to encourage passerines to continue migrating beyond sunrise before dropping in to find a suitable area to forage for the day. All of the big warbler flights in September occurred on mornings with light, northerly winds. Winds from the south seemed to impact Dans Rock far more than other morning flight sites (Irons 2023a, Irons 2023b) in Maryland. Mornings with southerly winds were for the most part very unproductive, even if other weather conditions seemed conducive for migration. Once again, my best explanation for this is Dans Rock being positioned at the top of the ridgeline. Any birds moving that day would likely be more inclined to migrate down in the valley or off the eastern edge of the ridge where they would have to battle less of a headwind. One final weather factor that impacted the count was cloud cover. Mornings with clear skies tended to have fewer birds detected as they were able to pass by hundreds of meters above the ridgeline where they were out of earshot or undetectable against the blue sky. There were several occurrences where birds, particularly Bobolinks and finches, could be heard calling clearly as they passed directly overhead, but were invisible in the sky. Silent birds or ones with fainter flight calls would have gone completely undetected. Overcast days seemed to keep birds lower and made them much more detectable with some sort of backdrop in the sky.

The issue of not having geographic features to concentrate birds here was two-fold. Even the birds that did choose to migrate down the ridgeline were not forced to come close to the platforms. Passerines moved down the ridge in wide, loose waves and preferred flight paths changed daily. Often the majority of birds would be moving pretty distantly from the platforms, either over the plateau to the west or down below in the valley to the east. This was especially problematic for warblers as hearing them call or seeing diagnostic plumage details was necessary for identification. As a result, many of the warblers seen from Dans Rock had to be entered as “warbler sp.” in Trektellen. Issues with identifying passerines moving over the valley were compounded due to the sunrise occurring directly behind this flight line. Many passerines were simply too distant or too backlit to be identified from this location.

Different groups of birds were noted to have different and distinct flight paths at Dans Rock (Figure 7). The days with huge warbler flights saw most of the birds flying along the edge of the ridge to the east and below the overlook. At a site with primarily westerly winds, perhaps the smaller passerines liked moving out of the winds. Or perhaps this was the only geographic feature that concentrated passerines, birds moving over the plateau or cutting across the ridge were just too spread out for any sort of flight path to develop. Blue Jays and the majority of Monarch butterflies were seen using this same path as well. The huge blackbird, robin, and waxwing flocks that migrated through in late October and early November took a very different route. These birds were primarily observed through a spotting scope streaming over the plateau to the west of the platform. Raptors typically took one of two main flight paths depending on the time of day. Early in the morning before thermals developed, raptors would primarily cruise directly down the ridgetop on either side of the platform. Typically, it would be *Accipiters* and falcons moving in the first hours after sunrise, but occasionally a *Buteo* or Golden Eagle would be seen doing this. Later in the morning, most raptors would first be seen rising up into view off to the northwest of Dans Rock out towards Frostburg. After gaining altitude the raptors would glide along over the plateau to the west of the platform. A probable explanation for this occurring is that the predominant westerly winds would hit the back edge of Dans Mountain and create updrafts that larger soaring raptors such as *Buteos*, eagles, and vultures would utilize.

The contiguous tracts of mature forest that made up the ridgeline did seem to be a corridor that passerines would use in a sort of passive migration throughout the morning. Many passerines were noted moving purposefully south down the ridge in a series of several short flights until out of view. This was especially evident with Black-capped Chickadees, which seemed to prefer this method of migration over the long, sustained flights used by long-distance migrants. Mixed feeding flocks were also seen most days in September and October using the ridgetop as a land-based migration route during the day. Flocks would often



move through the trees right next to the platform as birds foraged their way south down the ridge early in the mornings. These flocks would have unique compositions that I would not encounter during the remainder of the morning or on subsequent days, which leads me to believe they were active migrants.



**Figure 7. The primary flight paths of different species assemblages at Dans Rock, Allegany County, Maryland.** The blue arrow shows the primary warbler flight path along the eastern side of the ridge below the overlook platform. The green arrow shows the primary late season flight path taken by robins, waxwings, and blackbirds. The yellow arrows show where raptors usually circled up into view and then moved down the ridge from that point.

We were fortunate to have the inaugural year for the count occur during a great fall for several irruptive species in the Mid-Atlantic. As mentioned in the species accounts, this fall was another banner year for Spruce Budworm-linked warbler species such as Cape May, Tennessee, and Blackpoll Warblers. The Dans Rock count detected early season movements for all of these species and it will be interesting to see how numbers for these species change during non-outbreak years. It was apparent early in the fall that it would be a good finch flight with early Purple Finches, early Pine Siskins, and huge American Goldfinch flights as indicators. The finch flight would continue all season with Red Crossbills being detected on two days and Evening Grosbeaks on four days. Many of our finch counts and numbers mirrored the predictions made in the 2022 winter finch forecast (Hoar 2022), especially for siskin, Evening Grosbeak, and Purple Finch. Red-breasted Nuthatches were also forecasted (Hoar 2022) to have a big flight and our count backed that up. These tiny nuthatches were moving through in good numbers from mid-August until late October. Perhaps the most interesting observation we documented at Dans Rock were good flights of species that are typically viewed as resident species and undergo irregular

irruptive movements rather than annual migrations. At Dans Rock those species were Black-capped Chickadee and White-breasted Nuthatch (Dunn et al. 2022). During the month of October, White-breasted Nuthatch became the dominant nuthatch species; 126 were counted here in the season. Black-capped Chickadees were more difficult to count as they were less inclined to engage in long, sustained flight while migrating. The season tally of 37 should probably be higher, but some migrating birds seen at the count were likely disregarded as locals. Red-bellied Woodpeckers were also recorded in good numbers, but the count here pales in comparison to the record-breaking totals at Turkey Point this season (Irons 2022a).

Having a full season count at Dans Rock deepens our understanding of bird migration across the Mid-Atlantic. With counts running concurrently at a coastal site in Cape May, a coastal plain location at Turkey Point, and an Appalachian site at Dans Rock we were able to see how different species move across the span of this region. It has already been interesting to compare flight composition at the three sites and will be even more informative as the dataset for the MBP counts continues to grow.

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