

# RUSHTON WOODS Banding Station

Program of Willistown Conservation Trust

# 2022

Rushton Woods Banding Station (RWBS) Annual Songbird Banding Report

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Myrtle Yellow-rumped Warbler. Photo by Blake Goll.

#### Introduction

"Oh Canada, Canada, Canada"! The wistful song of the White-throated Sparrow languidly drifts over the early spring landscape of our region, heralding the end of winter and the coming vernal equinox. Even those not attuned to individual avian sonatas can recognize these indelible notes punctuating the change of seasons. Humans are hard-wired for connection to nature, and birds provide that copacetic anchor: watching them go about their day can make us feel grounded as fellow creatures of the earth; hearing them sing brings contentment and a sense of wellbeing; and admiring their colors and diversity ignites our curiosity and fascination.

> We need birds. Not only for the joy they bring to our lives but for the life they bring to our world. They pollinate plants, disperse seeds, eliminate insect pests, and play a critical role in many different ecosystems. To an ornithologist or a bird bander, monitoring the populations of birds is — quite literally — taking the pulse of the environment while measuring the success of science-based initiatives and quantifying the value of land conservation.

The Willistown Conservation Trust's (WCT) Bird Conservation Program team remained hard at work this year. During 2022, we successfully completed the 13<sup>TH</sup> year of migration banding and the 12<sup>th</sup> year of Monitoring Avian Productivity and Survivorship (MAPS), our breeding bird study at Rushton Woods.

We banded more than 1,300 birds this year, including spring and fall migration and the breeding birds (MAPS) at RWBS (Fig. 1). And after 13 years we are still banding new species! In the spring of 2022, we banded two Pileated Woodpeckers! While we have actually caught them before, this was the first time we were able to put bands on these large, football-sized woodpeckers. This brings our cumulative station total to 103 species banded.





Figure 2. Total Captures Per Season 2010-2022 at RWBS.

Since we opened our nets in 2010, we have banded a total of 18,570 songbirds of 103 species!

Most birds are captured during the fall due to the abundance of newly hatched birds and the length of the season; most birds take more time to travel to their wintering grounds, having to molt fresh feathers and many having to navigate the journey for the first time. Spring migration is shorter because the birds are driven to reach the breeding territories as fast as possible (Fig. 2). However, we capture nearly the same number of species in the spring and fall migratory season (Fig. 3).





Figure 3. Total number of species captured 2010-2022 at RWBS.

#### Spring Bounty— Warblers and Woodpeckers

April and May are mirthful months when Rushton Farm becomes a veritable jungle lit up with the tropical sounds and sights of the most delicate and breathtaking of the bird world—the wood warblers. These exquisite birds feed largely on insects gleaned from leaves, so their northward progression coincides with the leaf-out in our temperate throughway. Some will stay to breed in Rushton Woods Preserve like the Ovenbirds, Common Yellowthroats, and Wormeating Warbler, but most continue on to more preferable habitat or north as far as the boreal forest of Canada. Such passerby species included: Black-and-white Warbler, Black-throated Blue Warbler, Northern Waterthrush, Nashville Warbler, and Blue-winged Warbler.



Left: Hooded Warbler. Right: Blue-winged Warbler. Photos by Blake Goll.

This spring saw a record number of 16 warbler species though not as many individuals — 117 compared to 161 in 2021 (Fig. 4). One of the highlights was a male Hooded Warbler (second ever for the station), resplendent in lemon yellow contrasting with his ebony hood. This is a bird that seeks mature coniferous woodlands for breeding, or wooded swamps with labyrinthian undergrowth. Under the cool hemlock trees, it emphatically proclaims in a tone as clear and pure as the forest air, "tawee-tawee-tawee-tee-o!"



#### Total Number of Warbler Species and Individuals Banded Per Year During Spring Migration 2010-2022

*Figure 4. Total number of warbler species and individuals banded per year during spring migration 2010-2022.* 

Another unique occurrence this spring was the significant number of woodpeckers. Not only did we catch all five breeding species (Downy Woodpecker, Hairy Woodpecker, Pileated Woodpecker, Red-bellied Woodpecker and Yellow-shafted Flicker) for the first time ever in one season, but we caught double the number of individuals for a total of 18 (Fig. 5)! The increased presence of these birds indicates the habitat may be shifting to more dead standing trees — called snags — in the forest and hedgerows. Woodpeckers begin nesting early in the spring, so these individuals were likely already raising chicks in the snags.

> Their unique ability to excavate cavities with their strong bills makes woodpeckers keystone species, paving the way for other cavity-nesting birds and mammals who do not possess the tools and talent to make their own. More than 40 bird species in North America depend on woodpecker carpentry for their nest and roost cavities. The woodpeckers' need for dead or dying trees shows the importance of not over-tidying our landscapes; wherever they do not pose a threat to humans, dead trees should be left as vital components of the food web.



Total Number of Woodpecker Species and Individuals Captured Per Year During Spring Migration 2010-2022

Figure 5. Total number of woodpecker species and individuals banded per year during spring migration 2010-2022.

Downy Woodpecker. Photo by Celeste Sheehan.

Overall, spring 2022 produced our highest number of individual birds captured in any spring (510) as well as the highest diversity totaling 55 species (Fig. 2). As usual, the majority of migratory species arrive or pass through in just a few days, with the peak in 2022 falling around May 3rd with 89 new birds banded that day (Fig. 6). These record numbers for our station could be elucidating a phenomenon known as "The Central Park" effect; in the face of heavy development in the surrounding area, birds are being funneled to our preserved land because other options simply are not available.

Black and White Warbler. Photo by Jennifer Mathes.



Figure 6. Total numbers of birds banded each day during spring migration 2022.

# Top Five Species of Spring Migration

Table 1. Top five species per year banded during spring migration at Rushton Woods Banding Station.

Spring Migration Top Five Species Captured per Year													
Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
GRCA	19	124	98	53	91	87	63	119	67	91		115	144
WTSP		30	22	30	103	64	50	36	25	69		54	75
COYE	3	33	45	27	59	25	19	39	13	43		49	30
OVEN		11	13		15		11					41	
NOCA							10		14				25
AMRO				12					11				27
MAWA						14							
HOWR	3			13	12	10							
NOWA			26										
CACH		11											
BAOR	5												
BLJA	2												
AMGO								16		60		21	
BAWW								14		33			

Gray Catbird, White-throated Sparrow, and Common Yellowthroat remained the top three captures and accounted for 48% of all birds banded in spring 2022. Figure 7 shows the capture rates (birds per 100 net hours) decreasing over time for Gray Catbird and Common Yellowthroat and increasing for White-throated Sparrow. Blue Jay and Northern Waterthrush made the top ten list for only the second time in station history (Table 1).

We had high spring counts for Gray Catbird (144), Northern Cardinal (25), American Robin (27), Blue Jay (11), Blue-winged Warbler (6), Brown-headed Cowbird (4), Yellow-shafted Flicker (5), Nashville Warbler (3), and Red-eyed Vireo (3). Species notably absent this spring included Gray-cheeked Thrush, Lincoln's Sparrow, and White-eyed Vireo.



Figure 7. Spring migration capture rates for the top three species captured at RWBS 2011-2022. The linear line represents the trend over time. No net hours were available for 2010 and no data was collected in 2020 due to the COVID-19 Pandemic.

#### Summer Nursery — Cradle of Caterpillars

The end of May marks the close of spring migration and the start of the hurried nesting season. In the northern hemisphere, songbirds must take advantage of the relatively brief period of increased solar energy that allows for the creation of offspring — powered largely by the dazzling diversity of plant-eating insects. In particular, caterpillars are the herbivores that transfer more energy from plants to animals than any other plant-eaters. Birds, being experts at efficiency, capitalize on caterpillars because their large size and soft bodies make for easy energy packets for nestlings.

Caterpillars are also full of protein needed for nestling growth and antioxidants for plumage development and immune function. The only caveat is that caterpillars tend to be host plant specialists — having evolved over many years to be able to eat only one or two plant lineages to which they were exposed. Therefore, native plants hold the key to supporting population growth in birds. According to Doug Tallamy, author of Bringing Nature Home, one pair of Carolina Chickadees — a common breeder at Rushton — must find up to 500 caterpillars a day to rear one clutch. Chickadee parents attempting to raise chicks in a suburban neighborhood that is largely dominated by nonnative ornamental plants have a greater risk of failure.

One of the key vital rates that bird banders examine as determinants of birds' "success" is productivity (number of chicks reared), which is partly related to habitat quality on the breeding grounds. More than 1,000 banding stations in North America participate in MAPS (Monitoring Avian Productivity and Survivorship) through the Institute for Bird Populations to understand breeding success of songbirds as well as other vital rates like survival. Large datasets like these help scientists understand which life-stages may be most important in limiting population growth or causing declines.

Carolina Chickadee. Photo by Aaron Coolman.

# Total Number of New and Recaptured Birds During MAPS at Rushton Woods Preserve



Figure 8. Total number of birds banded and recaptured and total species. during MAPS at Rushton Woods Preserve 2011-2022. Our 12 years of MAPS data show that we have 38 breeding bird species nesting in or around Rushton Woods, including State Responsibility Species such as the Wood Thrush and Scarlet Tanager. Our capture rate (23.6 birds per 100 net hours) was relatively low last summer with only 107 individual birds (Figs. 8 & 9). With a record number of falling trees in the woodland habitat and plant communities shifting to nonnative plants, the low numbers could suggest the habitat quality is deteriorating.

However, there are myriad other factors in a bird's annual cycle that could also be affecting our breeding numbers, including natural fluctuations over time. For example, conditions on wintering grounds and migration routes can affect the survival rates and reproductive success of birds the following summer, known as "carry-over effect." Analyzing such trends requires datasets that are broad in time and geographic scale, which MAPS offers with over 30 years of effort.

The five most abundant breeding species at Rushton in all years have been Gray Catbird, Wood Thrush, Common Yellowthroat, Veery, and Ovenbird. Capture rates have remained fairly stable for all five species, with Gray Catbird and Wood Thrush showing an overall increase over time (Fig. 9).

Some surprises during the 2022 breeding season were a record high capture of five canopy-dwelling Red-eyed Vireos. In addition, thanks to nets placed at the edge of the woodland and meadow, we caught our first ever Indigo Bunting during MAPS. A second year female Indigo Bunting was caught on June 21, 2022 with a full brood patch, indicating that she had a nest full of young ones nearby!



Figure 9. Capture rates for top five species banded at Rushton MAPS station: Gray Catbird (GRCA), Wood Thrush (WOTH), Ovenbird (OVEN), Veery (VEER) and Common Yellowthroat (COYE)>

Indigo Bunting. Photo by Jennifer Mathes. 8

#### A Quiet Fall — Honing Habitat

Another of the key vital rates that bird banding can estimate —besides productivity and survivorship — is recruitment. This refers to the number of birds that survived life in the nest and are now out on their own. In the fall we age birds as adults (AHY) or hatch year (HY). Newly recruited "baby birds" (HY) bolster our fall catch significantly, making it typically our highest catch of all three seasons.



Figure 10. Percent of After hatch year (AHY), hatch year (HY), and Unknown birds captured at Rushton Woods Banding Station, fall 2022.

Last fall, however, marked the lowest fall capture rate (54.3 birds per 100 net hours) in our station's history with only 740 new birds (Fig. 2) of 52 species. The largest single-day catch was on October 18, with 53 new birds of 12 species (Fig. 11).

One contributing factor for the low total could have been the unpredictable weather; we were forced to close the station for six days due to rain and/or high winds. Another question arises though: was there a regional lower recruitment of birds due to factors such as climate change, development, or habitat changes? Further research may help tease out some of these answers.

One of the nuances of a bird's annual cycle is that they require different habitats at different life stages. This is one of the reasons we try to manage the Preserve for a variety of habitats, especially early successional shrubland. This is the amorphous, often underappreciated plant community of shrub thickets, vines, and small trees that would naturally exist after a meadow matures and before it becomes a forest. Ę

Despite our low numbers, we had high fall counts for Yellow-bellied Flycatcher (5), Cape-may Warbler (3) and Hairy Woodpecker (7). Species notably absent included Yellow Palm Warbler, Chestnut-sided Warbler, Canada Warbler, and Winter Wren. We had no foreign recaptures or encounters.

Some unique fall highlights included a beautiful Mourning Warbler in September as well as the three Cape-May Warblers. Cape May Warblers breed in the spruce balsam northern forests where they raise their chicks largely on spruce budworm. An eastern outbreak of this boreal pest may have contributed to a regional population boost for this warbler. During winter they can be found in shrubby gardens or even coffee plantations in the Bahamas and Greater Antilles.



Figure 11. Number of new and recaptured birds per day during fall migration 2022 at Rushton Woods Banding Station.

No new species we recorded for the station, leaving the cumulative total at 89 species caught during fall migration. Gray Catbird remains the top species, while White-throated Sparrow was unseated for second to American Robin for the first time. Some indicators from our data — the increase in woodpeckers, the decline in some shrub-loving migrant species like White-throated Sparrow, and our overall low fall catch — could suggest the maturation and deterioration of our shrub habitat and the need for targeted management. Replacing large trees and invasive species with native shrubs (a project that has begun thanks to our grant from Pennsylvania Society for Ornithology) will help improve the habitat integrity. For example, many migratory birds seek berries in fall, particularly those of native shrubs, because they provide the rich source of fats and antioxidants needed for their journeys.



rail Migration Top The Species Captured Fer Tear													
Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
			-					-					
GRCA	118	119	254	176	285	422	185	245	136	409	166	576	170
WTSP	113	202	131	165	127	125	138	83	145	111	80	84	64
SOSP		50	67	89	52	101	75	79	99	105	63	46	46
RCKI		44	70	89	55	53		58	106				
COYE					59		49	61	66	83	56	49	44
AMRO	48	42	71				47				74		67
AMGO										119		65	
HETH	32					35							
NOCA	30												

Table 2. Top five species captured per year during fall migration at Rushton.

# Summary of All Seasons 2010-2022

Season	Year	# Days Banding	# new birds	Total net hours	capture rate (b/100nh)
Spring	2010	4	47	200	23.5
Spring	2011	16	330	808.0	40.8
Spring	2012	20	361	1044.0	34.6
Spring	2013	14	235	889.8	26.4
Spring	2014	14	447	723.0	61.8
Spring	2015	14	344	740.0	46.5
Spring	2016	15	244	857.0	28.5
Spring	2017	16	365	1111.8	32.8
Spring	2018	14	254	887.3	28.6
Spring	2019	16	483	1276.8	37.8
Spring	2020	NA	NA	NA	Closed due to COVID
Spring	2021	16	493	1095.66	45.0
Spring	2022	17	510	1087.34	46.9
MAPS	2011	8	157	478.7	32.8
MAPS	2012	8	103	480.0	21.5
MAPS	2013	8	63	428.7	14.7
MAPS	2014	8	104	479.3	21.7
MAPS	2015	8	132	452.7	29.2
MAPS	2016	8	118	480.0	24.6
MAPS	2017	8	120	480.0	25.0
MAPS	2018	8	130	471.3	27.6
MAPS	2019	8	129	445.3	29.0
MAPS	2020	*7	143	420.0	34.0
MAPS	2021	8	129	446.8	28.9
MAPS	2022	8	108	456.8	23.6
Fall	2010	25	606	1000	60.6
Fall	2011	23	893	1097.6	81.4
Fall	2012	24	1036	1214.8	85.3
Fall	2013	20	1082	1030.3	105.0
Fall	2014	28	963	1333.0	72.2
Fall	2015	28	1149	1505.0	76.3
Fall	2016	24	896	1487.0	60.3
Fall	2017	23	902	1397.4	64.5
Fall	2018	24	1016	1578.1	64.4
Fall	2019	26	1427	1792.5	79.6
Fall	2020	16	940	1055.0	89.1
Fall	2021	23	1372	1331.7	103.0
Fall	2022	22	740	1364.0	54.3

Table 3. Summary of banding days, new birds, net hours and capture rates per year at Rushton Woods Banding Station.



Figure 12. Capture rates per year each season at Rushton Woods Banding Station, where the linear line represents the trend over time.

When we total our captures throughout the year, a few species dominate the landscape. Table 4 is a list of the top ten species captured across all seasons at the Rushton Woods Banding Station. These top ten species account for 67% of all captures!

Species	Spring	MAPS	Fall	Total
GRCA	1071	483	3261	4815
WTSP	558		1568	2126
COYE	385	78	689	1152
SOSP	49	7	895	951
AMRO	98	58	549	705
RCKI	53		626	679
WOTH	52	256	311	619
AMGO	136		350	486
NOCA	137	49	291	477
VEER	74	71	199	344
OVEN	154	86	186	426

Table 4. Top 10 Species captured at Rushton Woods Banding Station 2010-2022.

### Percent of Species Groups Represented Across All Seasons and All Years 2010-2022 Banded at Rushton Woods Banding Station



*Figure 13. Percent of species groups represented by the banding at Rushton Woods Banding Station.* 

#### Recaptures

Bird banding can also reveal habitat integrity through recaptures. In addition to the new birds banded in 2022, 309 birds were recorded as recaptures. These are birds already banded when captured. However, we can further delineate recaptured birds as repeats, returns, or foreign recaptures:

- Repeats are birds that were banded by us within the same season but caught multiple times (Fig. 14).
- Returns are birds that were also banded by us, but in previous years; meaning, they have returned to Rushton (Fig. 14)!
- Foreign recaptures are birds banded by another banding station and recaptured at Rushton. We have only caught three songbirds from other banding locations and none in 2022; however, two of our birds were caught at other stations (Fig. 15).
- Recoveries are birds banded at Rushton and recaptured at another banding station. Only two of our more than 18,000 birds have been recaptured elsewhere. Figure 14 shows a White-throated sparrow that we banded in fall 2016, recaptured in Cape May, NJ the following spring. And a Northern Parula, banded at Rushton in fall 2020, was then recaptured on its north bound route in spring 2022!



Figure 14. Percent of all birds recaptured during spring migration, MAPS, and fall migration at Rushton Woods Banding Station during 2022. Returns are birds that were banded in previous years; repeats are birds recaptured within the same year.

Approximately 1/3 of birds recaptured in 2022 were returning birds from previous years.

# **Foreign Recaptures and Recoveries**



Figure 15. Illustration of foreign recaptures (FR) and recoveries (RC) associated with Rushton. American Redstart, Gray Catbird, and American Goldfinch were banded elsewhere and recaptured at Rushton. The White-throated Sparrow and Northern Parula were banded at Rushton and recaptured elsewhere. Map by Sue Costello.

Recapturing birds can also allow us to determine their rate of weight gain (or loss) during stopover. For example, we recaptured one Ovenbird on September 14th that weighed 24.1 grams—an almost 25% increase in body mass from its original capture date on September 1st when it weighed only 19.4 grams. This may indicate that the habitat is satisfactory for Ovenbirds.

Furthermore, through the MAPS banding data, we can determine the local productivity (P) and survivorship (S) because of the returning birds each year. Former conservation intern and current Research Associate at Virginia, Phillys Gichuru, has been able to perform this analysis and will be sharing the results in a research paper in the near future.

In fact, the oldest bird banded at RWBS is a female Ovenbird that has returned to RWP to breed from at least 2011-2020, making her at least 13 years old. That is tied for the oldest known banded Ovenbird in the US!

#### The People



Visitors from University of Pennsylvania, Jerusalem Bird Observatory, University of Vermont and Tadoussac Bird Observatory. Photo by WCT Staff.

The diversity of people who visit, study, and train at RWBS make our labor as enjoyable as the array of birds. In the spring, we hosted French banders from Tadoussac Bird Observatory in Quebec as well as a drop-in bander from Israel's Jerusalem Bird Observatory. We also welcomed Hyla Howe, a visiting PhD student from the University of Vermont. In the fall, a growing partnership between WCT and BirdsCaribbean brought Omar Monzon Carmona and Dayamiris Candelario from Puerto Rico to train for one month at RWBS to support the Caribbean Bird Banding Network.



Dayamiris Candelario and Omar Monzon Carmona. Photo by Blake Goll. The Pennsylvania Game Commission (PGC) has remained a close partner. As they established their first MAPS station, our banders assisted in training the PGC crew to operate at their station at Middle Creek Wildlife Management Area. Dan Mummert of PGC also travelled to Kirkwood Preserve in the summer of 2022 to band the very first American Kestrel chicks on a WCT preserve! Another partnership with the Pennsylvania Game Commission allowed us to host a two-day intensive bird banding training workshop led by guest bander Holly Garrod from Montana.

Above: American Kestrel chick and Dan Mummert at nest box. Below: Banding workshop attendees: Top left: Alison Fetterman, Phillys Gichuru, Ryan Conner, Dan Mummert, Blake Goll, Lisa Kiziuk, Lauren Ferreri; Bottom left: Aaron Coolman Kaitlin Mucchio, Shelly Eshleman, Holly Garrod, Katie Hogue, Omar Carmona, Dayamiris Candelario, Kirsten Snyder. 19 Another first this year included the arrival of Rushton's very first Purple Martins! In May 2022, Aaron Coolman noticed four adult Purple Martins occupying the Martin apartment at the farm. In late June, Blake Goll returned to the newly established small colony to band three Purple Martin chicks!

Inspired by the activity, after the Purple Martins had left for their migratory staging grounds, through the generosity of Dick and Nancy Eales, a new gourd style Purple Martin condominium was established adjacent to the older apartment on the farm. We hope to see more of these important birds in the future!

First Purple Martins at Rushton Woods Preserve. Photo by Aaron Coolman.

Dick Eales with new Purple Martin condominium. Photo by Aaron Coolman.

#### Conclusion

Our banding station operates so successfully thanks to a dedicated team of staff and volunteers. Special thanks to Edwin Shafer, Jessica Shahan, Kirsten Snyder, Claudia Winter, Victoria Sindlinger, Heidi Herb, Katie Hogue, Noelle Raezer, Anna Willig, Barlow Herbst, Claire Jones, Gabby Solomon, Amanda Bebel, Sheryl and Kristen Johnson, Martin Sliwinski, Kaitlin Muchio, Phillys Gichuru and Zack Ruch. This research wouldn't be possible without their care and time put in at Rushton Woods Banding Station.

Like the Eastern Bluebirds, Tree Swallows, and other birds that returned to Rushton this year from previous years, we hope we'll see our old human friends again as well. Birds connect us across continents, returning to the places that supported them and allowed them to thrive throughout their annual cycle. Capable of taking to the skies, they are still forever tethered to the earth — a reminder to us to remain loyal to our roots, bringing hope and healing to the land just as the birds do.



# History of the Rushton Woods Banding Station

In May 2009, Willistown Conservation Trust (WCT) received a Conservation Grant from the Delaware Valley Ornithological Club (DVOC) and opened the Rushton Woods Bird Banding Station. Limited banding effort in 2009 ignited a successful program connecting science and education through bird conservation. What started as migratory bird banding in 2009 has grown to a full life-cycle study of birds using Rushton Woods Preserve (RWPR) during the spring and fall migratory seasons, a breeding bird program following MAPS protocol, and catching glimpses of overwintering birds through banding records. Banding operations take place in the shrub-scrub hedgerows during each migratory season. Starting with seven fixed net locations in 2010, we have expanded to running fifteen fixed nets in 2019. Breeding bird banding is operated within Rushton woods where ten fixed net locations have remained consistent since 2011.

### Why Band Birds?

Bird banding provides valuable information that helps us study dispersal, migration, behavior, social structure, life span, survival rate, reproductive success, and population growth. At Rushton Woods Preserve, we band to study the seasonal and long-term population patterns of migratory, breeding, overwintering, and year-round resident songbirds. Banding allows us to track individuals, which is important in factoring survival, migratory turnover rates, and longevity.

Over the years, bird banding at RWPR has revealed important information about the species abundance and diversity found on our conserved land. Additionally, it has helped us evaluate the impact of our land management initiatives as well as the value of preserving open space.



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