FEWER AND FEWER

Declining diversity and abundance in two decades of community science bird counts at Seattle green spaces

BIRDS CONNECT SEATTLE

Joshua Morris, April 2026

BIRDS CONNECT SEATTLE

Birds Connect Seattle is a nonprofit environmental organization. Our mission is to advocate and organize for cities where people and birds thrive. Through our education, science, and conservation programs, we seek to connect people and create community; to contribute positively to people's mental health; to inspire joy, wonder, and hope; and to maintain a stable, comfortable environment for all who live in and visit Seattle—human, bird, and beyond.

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Common Goldeneye

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Executive Summary

In 1994 a small group of volunteers with Seattle Audubon (now Birds Connect Seattle) began conducting standardized bird surveys in Seattle-area green spaces. Their "Neighborhood Bird Project" (NBP) has since grown into one of the longest-running urban bird monitoring efforts in history. For more than 30 years, hundreds of community scientists have conducted thousands of surveys, building a unique dataset on the bird communities at each survey site.

This report presents findings from an analysis of NBP data collected at eight sites from 2005 to 2023. The results suggest troubling declines in species richness and average bird counts.

Species richness declined 18%.

We estimate that species richness—the total number of species present across sites—fell from 141 species in 2005 to 118 in 2023.Some of this decline is explained by fewer detections of accidental or occasional species. However, many instances of decline also appear among native species that were once relatively common on surveys. This latter group includes species like Sanderling, Wilson's Snipe, American Barn Owl.

Average bird counts declined by 21%.

The number of birds observed per survey decreased across most sites, with six of eight showing overall declines. Some of the steepest declines occurred at major parks such as Discovery Park, Magnuson Park, and Washington Park Arboretum. These declines were driven by lower counts across a wide range of species, including both native and introduced birds.

A majority of species showed declining trends.

Counts declined for 58% of assessed species from diverse bird groups. The steepest declines were observed among shorebirds, blackbirds, swallows, kinglets, Band-tailed Pigeon, and Bushtit. Our findings are broadly consistent with continental and regional trends, increasing confidence that the observed patterns reflect real ecological signals rather than methodological artifacts.

Larger group sizes were linked to steeper declines.

Species that formed larger groups early in the study period—such as Golden-crowned Kinglet, American Crow, and American Robin—were more likely to decline. A tenfold increase in group size was associated with an additional 3% decline in counts. Because group size is influenced by factors such as resource availability, predation, seasonality, and social behavior, further study may provide important insights for conservation and management.

Climate change increases risk for most species.

Comparing NBP results with climate vulnerability assessments from the National Audubon Society shows that 61% of species with declining trends—and 54% of those stable or increasing—are moderately to highly vulnerable to climate change. This suggests that climate impacts are likely to exacerbate existing declines and threaten currently stable species.

A call to action.

Taken together, these findings suggest that Seattle's bird communities are in trouble. While no single dataset is without limitations, the consistency of these results—alongside regional and continental trends—points to the need for immediate action.

We recommend prioritizing the protection and enhancement of urban habitats with a focus on urban forests, meadows, and aquatic systems; addressing climate impacts; supporting insect populations, reducing human-related bird mortality, and creating nesting opportunities in the built environment.

Acting now is critical to reversing current trends and ensuring that the future of Seattle's birds will not be described by *fewer and fewer,* but by *more and more*.

PART I: BACKGROUND

Canada Goose

History of the Neighborhood Bird Project

Flash back to Seattle in 1994: a one-bedroom apartment in Capitol Hill rented for $500 a month. A small online bookseller called Amazon.com had just started taking orders. And a group of intrepid volunteers began conducting bird surveys at urban green spaces.

Their surveys began at Carkeek Park and a handful of private green spaces, like Shadow Lake Nature Preserve. Over the years, new sites were added, some were dropped, but for more than thirty years, community science volunteers with Seattle Audubon, now Birds Connect Seattle, have been counting birds.

The Neighborhood Bird Project (NBP), as the effort came to be known, is now one of the longest-running urban bird monitoring efforts in history. By the end of 2023, some 500 community scientists had conducted 5,847 surveys—roughly one in seven done in rain, sleet, or snow—recording more than 700,000 bird observations across sixteen sites in and around Seattle.

Why do they do it?

NBP—conceived by Anne Zavitsovski, vice president of then Seattle Audubon—was at the vanguard of participatory science. In 1994, projects like this were rare; eBird was still eight years away from launch. But Anne and her colleagues anticipated the benefits of engaging community in ecological data collection: not only could participants generate meaningful scientific data, they could develop personal connections to the wildlife, habitats, and natural cycles in their own neighborhoods. These connections, in turn, could inspire stewardship and advocacy to protect urban green spaces (Bragg, 2016).

Today, NBP is active at ten sites in and around Seattle. Participants have deep, long-term relationships with their parks—some spanning decades. They have witnessed and recorded gradual changes that might otherwise have gone unnoticed. And, as anticipated, we have seen NBP participants become strong advocates for habitat protection. For example, they were the first to alert and mobilize community when Seattle Parks and Recreation attempted to build outdoor pickleball courts adjacent to important urban habitat areas at Lincoln Park and Magnuson Park.

Bald Eagle and American Crows

How NBP Works

NBP follows a standardized point count protocol common in bird monitoring studies such as the Breeding Bird Survey.

Sites, Loops, and Stations

NBP bird count surveys occur within a nested hierarchy of sampling units: sites, loops, and stations.

Sites are the primary sampling units where surveys occur. Most sites are public parks, though some early sites—and one currently active site (Lake Forest Park)—are on private property.

Loops are fixed survey routes within sites, designed to capture the range of habitats present. Some sites may have just a single loop, while larger sites (e.g., Discovery Park) have more than ten.

Stations are fixed locations along loops where observers record birds. There may be between 2 to 9 stations per loop. Stations are spaced at least 200 meters (656 feet) apart to reduce double-counting and ensure statistical independence between stations. Each station is established by GPS coordinates and detailed landmark descriptions to ensure consistency over time.

During a survey, observations are recorded at each station. Station counts can be aggregated into loop-level totals, loop totals can be aggregated into site-level metrics, and site-level metrics can be combined to produce project-wide summaries.

Counting Birds

Each survey is led by an experienced birder trained in the NBP protocol, which is based on point count methods described in the *Handbook of Field Methods for Monitoring Landbirds* (Ralph et al., 1993). Upon arriving at a survey station, participants stand quietly for at least one minute to allow birds to acclimate to their presence. Next, they count every bird seen, heard, or flying over within a 50-meter radius for five minutes. Surveyors also record factors that may affect bird presence or detection, such as weather, human activity, and off-leash dogs.

On average, surveys are done by two participants, but party size ranges between 1 to 15 participants.

Survey Frequency

NBP surveys are conducted once per month. Each site is surveyed on the same weekend each month following a fixed cadence. For example, Carkeek Park is surveyed on the first Saturday of the month, Seward Park on the second Saturday, and so on.

Understanding the Data

NBP data provide a unique glimpse into Seattle's changing bird communities, but there are limitations to what we can confidently conclude from it.

What Bird Counts Measure

Data from bird point count surveys like NBP can serve as a bird population index, that is, a measure proportional to true bird abundance, though the precise relationship between the two is unknown and exact population sizes cannot be determined (Johnson, 1995). The logic goes like this: if we count 10 birds one year and 20 the next using identical methods, we can reasonably infer the population has grown, even without knowing the true population size in either year. Similarly, if Site A consistently yields higher counts than Site B under comparable conditions, Site A likely supports greater abundance. In this way point counts are analogous to an uncalibrated thermometer: imprecise in absolute terms, but still capable of revealing whether things are warming or cooling.

Detection Probability and Sources of Variation

This interpretation, however, depends on the key assumption that detection probability remains relatively constant across surveys or is appropriately accounted for. Detection probability depends not only on species presence but also on observer skill, group size, time of day, habitat structure, weather, and other factors. The NBP protocol controls for some of these, but substantial variability remains.

Limitations and Scope of Inference

This limits what we can confidently infer from the data. A statistically significant decline could reflect true population declines, or it could reflect changes in observer ability, habitat density, or other factors. Analytical results from NBP data should therefore be interpreted cautiously and, when possible, corroborated with evidence from other sources.

Further, NBP sites are not a random sample of urban green spaces. Because site selection is non-random, trends cannot be extrapolated beyond these locations. Inferences should remain limited to counts within our surveyed sites.

These limitations do not diminish the dataset's value. Few cities have comparable long-term, fine-scale monitoring coverage across so many species. All of us concerned about conserving urban nature should carefully consider what the data show and seek to understand the implications for the residents of Seattle—human, bird, and beyond.

About This Report

Analysis Objectives

Our analysis objectives were to identify trends in species richness, total survey counts, and species-specific counts for active sites. We explored trends at two scales: project-wide trends are the result of combining data from all sites and survey loops into a single model. Site-level trends were evaluated by modeling each site individually.

An over-arching objective of this analysis was to familiarize ourselves with the strengths, weaknesses, and peculiarities of the NBP dataset; to establish an approach for regular reporting on results; and to provide recommendations for possible adjustments to ensure the project runs efficiently and serves Birds Connect Seattle's mission and organizational goals.

Study Period

We restricted this analysis to the years from 2005 to 2023, inclusive. This 19-year period contained the most complete data for the greatest number of sites and survey loops. NBP was paused in 2020 and 2021 due to the COVID-19 pandemic, so any data from those years were omitted.

Study Area

The study area comprises twenty-one survey loops from eight sites (Figure 1.1 and Table 1.1, pg. 7), including only locations with consistent coverage throughout the study period. Lincoln Park and Cheasty Greenspace, which were added to the project more recently, were excluded, as were loops added or dropped mid-study period at Discovery Park. Magnuson Park's Wetland Loop was also excluded, as it is conducted as a census rather than point counts. These exclusions simplify interpretation of results by ensuring methodological consistency and reducing confounding factors.

Figure 1.1: Map of active NBP sites. As of March 2026, there are ten active NBP sites. In this report, we share findings from analysis of count data at the eight sites shown in dark green. The other two active NBP sites, Lincoln Park and Cheasty Greenspace, are shown for context.

Table 1.1: List of NBP sites and loops included in this analysis. These specific sites and loops were selected based on data completeness from 2005 to 2023.

Active sites and loops included in this analysis	
Site	**Loop**
Carkeek Park	Pipers Creek Loop Venema Meadow Loop
Discovery Park	Beaches Daybreak Star Eastern Edge Hidden Valley Trail North Beach North Loop Trail South Loop Trail South Meadow Wolf Tree Nature Trail
Genesee Park	Main Loop
Golden Gardens	Main Loop
Lake Forest Park	Main Loop
Magnuson Park	Back Fence Loop Main Drag South End Loop Waterfront Loop
Seward Park	East Loop West Loop
Washington Park Arboretum	Main Loop

Table 1.2: List of active NBP sites and loops **excluded** from this analysis. Data from these sites were not used in this analysis to ensure methodological consistency and to reduce confounding factors from adding/dropping sites mid-study period.

Active sites and loops excluded from this analysis	
Site	**Loop**
Discovery Park	Capehart NIKE/500 Cemetery
Magnuson Park	Wetland Loop
Cheasty Greenspace	North Loop South Loop
Lincoln Park	North Loop South Loop

A Guide to Data Visualizations

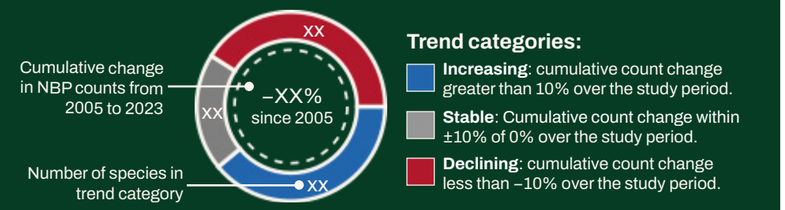
Project-wide and site-level results are presented in two-page spreads, following a layout similar to the example shown below. The information provided here is intended to aid interpretation of the maps and visualizations that follow.

SITE CONTEXT MAPS

Site context maps show all active survey loops and stations (including those excluded from this analysis) and the surrounding environment. Survey stations are represented by circles with a black center. Each circle has a 50-meter radius, representing the area within which NBP participants count birds seen, heard, or flying overhead. Survey stations are color-coded by loop and connected by a line of the same color.

Results Overview Charts

These charts provide an at-a-glance summary of results for each site. The center value shows the cumulative percent change in total survey counts and segment labels indicate the number of species within each trend category.



Trend categories:

- **Increasing**: cumulative count change greater than 10% over the study period.
- **Stable**: Cumulative count change within ±10% of 0% over the study period.
- **Declining**: cumulative count change less than –10% over the study period.

Species Richness Charts

Species richness is a measure of biodiversity based on the number of species detected in a given area over a specific time period. However, species counts are sensitive to sampling effort—more surveys generally detect more species—so raw counts are not always directly comparable across sites or years. See Analytical Methods (pg 38) for details.

Species richness charts show year on the x-axis and number of species on the y-axis, and include two elements:

- Black circles: Bias-corrected (jackknife) estimate of annual species richness.
- Lines and bands: Model-predicted values of species richness. Predictions are shown as a dashed line, with 95% confidence intervals as a shaded band. Statistically significant declines are shown in red/pink, while non-significant trends are shown in black/gray. Across all sites analyzed, no statistically significant increases in species richness were detected.

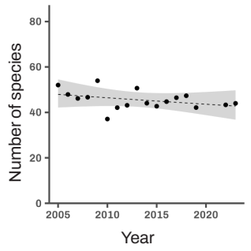


Figure 1.2: Example species richness chart. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals Charts

Survey totals represent the total number of birds of any species detected along a survey loop on a given same day.

Survey total charts show year on the x-axis and the average number of birds on the y-axis, and include two elements:

- Black circles: annual averages from observed data shown as black points.
- Lines and bands: Model-predicted values of survey totals. Predictions are shown as a dashed line, with 95% confidence intervals as a shaded band. Statistically significant declines are shown in red/pink, while non-significant trends are shown in black/gray. Across all sites analyzed, no statistically significant increases in survey totals were detected.

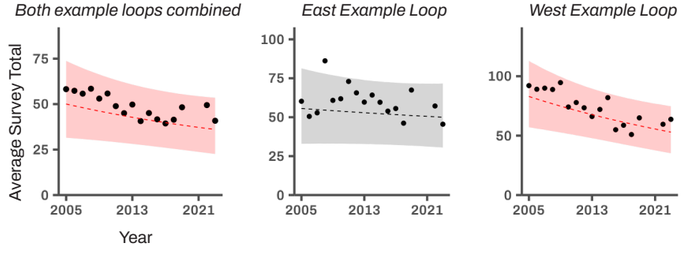


Figure 1.3: Example survey total charts. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise. Labels above panels, when provided, indicate the specific survey locations to which each visualization applies.

Species Trends Charts

Species trends describe how the average per-survey abundance of specific species changed over the study period.

Species trends were aggregated within bird groups, generally defined by taxonomic family, with two exceptions: swallows and swifts were combined into a single group, and four introduced species (California Quail, European Starling, House Sparrow, and Rock Pigeon) were pulled out and group together so that all remaining groups represent native species. See Appendix D for species-to-group assignments.

Species trends charts show bird group on the y-axis and estimated average number of individuals detected per survey on the x-axis. Note that the x-axis scale differs between panels. This allows us to show trends across different magnitudes of change. The charts include the following elements:

- White circles with black outline: observed average number of individuals per survey during the baseline period (2005–2009)
- Filled circles: Model-estimated average number of individuals per survey in 2023. Color indicates direction and magnitude of change relative to baseline: blue = increase; gray = stable (within ±10% of baseline); red = decline.
- Lines: Model-estimated change in average count per survey from the baseline period to 2023. Line color follows the same scheme as the filled circles. Solid lines indicate statistically significant changes (95% confidence interval does not include zero), whereas dashed lines indicate uncertain changes (95% confidence interval includes zero).

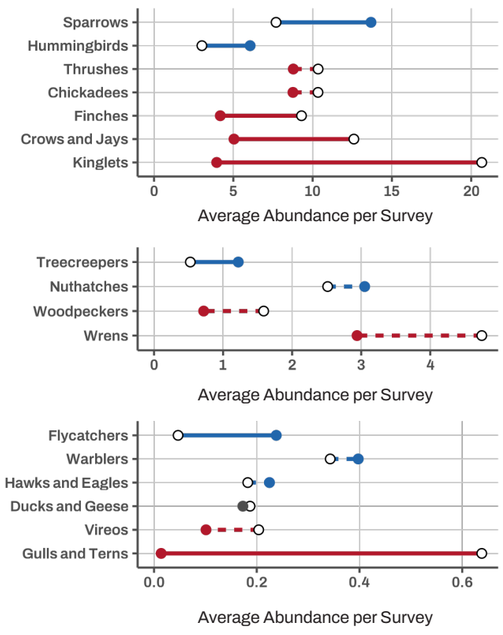


Figure 1.4: Example species trends chart. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

PART II: RESULTS

Anna's Hummingbird

Species Superlatives

Just for fun: a few species that stood out in notable ways in the NBP dataset.

MOST FREQUENTLY SEEN

American Crow

The constant compation of NBP participants is the American Crow, recorded on more than 94% of surveys. Crows won this title handily; their closest competitor—Song Sparrows—lagged 8 points behind, reported on "just" 86% of surveys.

LARGEST GROUP

American Coot

Surveyors record American Coots on only 8% of surveys, but when they do, they record a lot of them. The average raft size observed during counts is 71 individuals. Observers at Genesee once reported 3,000 individuals at a single count station.

HARDEST TO ID

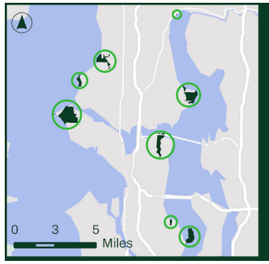
Gulls

With our ten relatively common gull species, their hybrids, and the yearly variations of juvenile winter plumage, its no surprise that gulls make up 54% of all “spuh” records—observations not identified to species level.

MOST SPURIOUS ID

Spotted Owl

A Spotted Owl was reported at Magnuson Park in August 2006. We searched the Seattle Times archives but found no headline corroborating this newsworthy observation. We suppose that, through data transcription error, a common Spotted Towhee transformed into this improbable rarity.

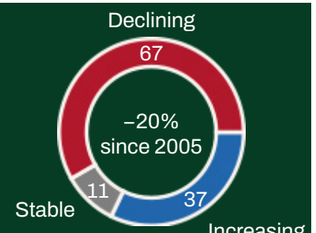


PROJECT-WIDE RESULTS

Project-wide results show patterns across the eight sites included in this analysis. Note that large and more intensely surveyed sites, like Discovery Park and Magnuson Park, tend to influence project-wide results more strongly than smaller sites.

Quick Facts

Study period:	2005-2023
Sites:	8
Survey loops:	21
Survey stations:	153
Total species:	200



Species Richness

Species richness fell by 18%.

Participants observed an average of 117 species per year across sites. Correcting for species present but not detected during surveys, we estimate average annual project-wide species richness at around 135 species (95% CI: 133–137).

The number of species recorded across the study area fell by 1.1% per year, resulting in an cumulative decline of 18% from 2005 to 2023 (95% CI: –29% to –6%). This result is statistically significant. In real terms, we estimate species richness to have been 141 species in 2005 and 118 in 2023.

This decline may reflect both fewer rare and accidental species appearing during surveys as well as loss of once regularly occurring species. The number of species reported only once in the dataset has steadily declined. This pattern is not unexpected: there are a finite number of species that occur in an area, and the longer surveys continue, the more likely it becomes that most species will have been detected at least once. Still, the change in frequency of these rare events is notable: of the 31 species seen only once across the dataset, 17 were detected between 2005–2009, 13 between 2010–2015, and just one between 2016–2023.

At the same time, several species which were once relatively common on NBP surveys have not been recorded in recent years. These include American Barn Owl, Black Scoter, Bullock's Oriole, California Quail, Canvasback, Green-winged Teal, Harlequin Duck, MacGillivray's Warbler, Mourning Dove, Northern Shrike, Sanderling, and Wilson's Snipe. It is possible that changes in habitat or other conditions have reduced the suitability of NBP sites for these species.

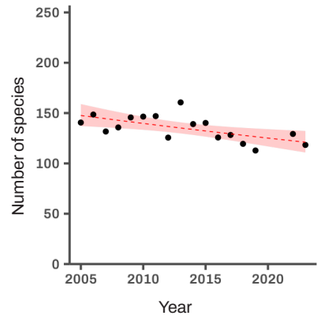


Figure 2.1: Project-wide species richness over time. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

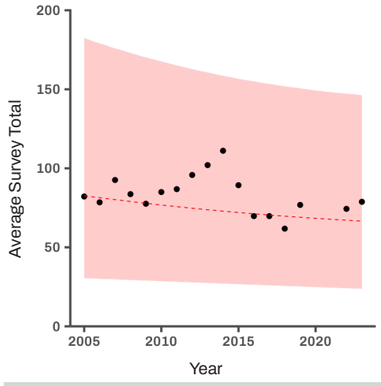


Figure 2.2: Project-wide average survey totals over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Total counts fell by 21%.

The average total number of birds reported per survey loop declined at an average rate of 1.3% per year, resulting in a cumulative decline of 21% (95% CI: –33% to –9%) over the study period. This result is statistically significant. We find similar results when restricting the analysis to native species only, indicating that count declines are driven largely by changes in counts of native species. If count trends accurately reflect proportional changes in true abundance, this would correspond to a loss of approximately one in five birds across NBP sites since 2005.

While average survey counts dropped by 21%, the decline was even steeper at the upper end of the count distribution. The 97.5th percentile of counts of native species fell from 249 individuals in 2005 to 164 in 2023, a 34% decrease. This could indicate that maximum bird group size became smaller since 2005. Consistent with this observation, we found a negative relationship between group size and count trends (see next page).

Species Trends

We estimated yearly count trends for 115 species across NBP sites. See Appendix D.1 for full details.

Counts declined for more than half of species.

Counts declined for 67 of the 115 assessed species (58%). Declines occurred across diverse bird groups, including both native and non-native species. Our findings are broadly consistent with North American bird population trends reported by Rosenberg et al. (2019) and regional relative abundance eBird trends (Fink et al., 2022).

Among native species, we found that group size was negatively associated with count trend: a 10-fold increase in maximum group size was associated with a 3 percentage point greater decline over the study period (p = 0.03). Because group size is influenced by numerous interacting factors, including resource availability, predation pressure, season, and social structure (Sherry, 2016), the mechanisms underlying this relationship remain unclear.

We also note that 61% of species with declining trends and 54% of species with stable or increasing trends are moderately to highly vulnerable to climate change (Bateman et al., 2020). Climate change therefore threatens to exacerbate declines and alter trajectories for species that are currently stable or growing.

Combined analysis reveals hidden trends.

To ensure robust estimation, we limited trend analysis to species with at least 20 detections across a minimum of 10 years. Some species only meet these criteria in the project-wide analysis.

Among these species, Common Raven (pictured above) showed the largest relative increase. Ravens were first recorded in 2011 at Seward Park and later at Discovery Park (2012), Carkeek Park (2013), and the Arboretum (2019). Though still uncommon—detected just once every 12 surveys by 2023—this represents a huge increase from complete absence.

At the other extreme is Brant, a sea goose. Although observed at both Golden Gardens and Discovery Park, neither site alone had sufficient data for trend estimation; together, however, they did. Across sites, Brant declined by 94% (95% CI: –97% to –87%). Because Brant depend on eelgrass meadows, this could indicate degrading eelgrass along our shorelines.

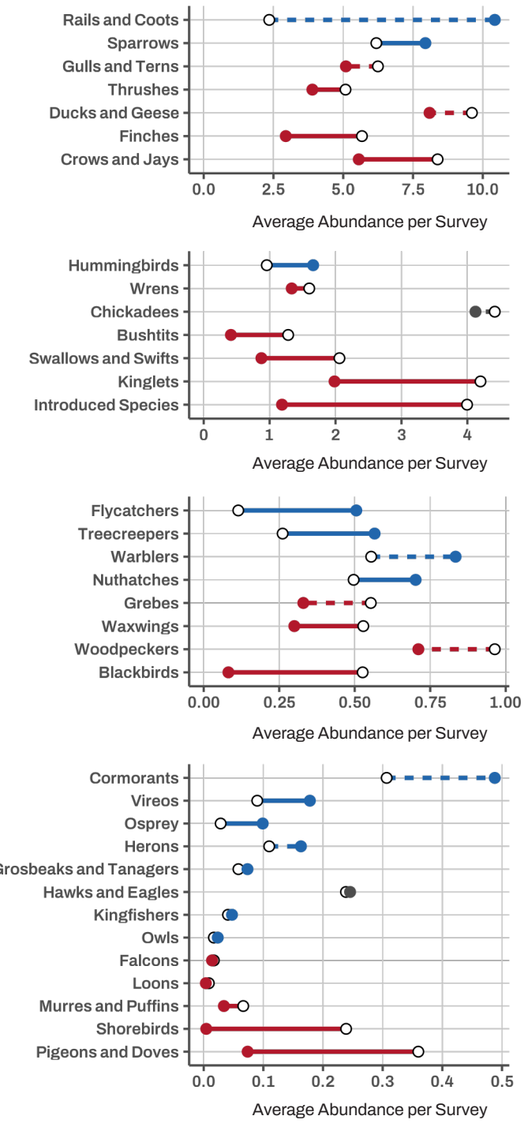


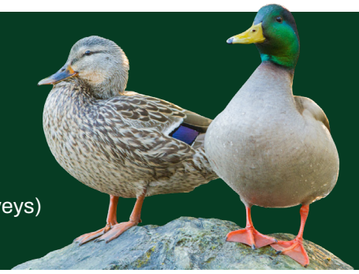
Figure 2.3: Estimated project-wide change in average abundance per survey across bird groups. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

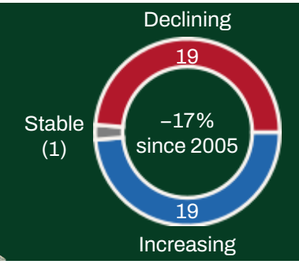
CARKEEK PARK

Much of Carkeek Park's 220-acres are steep ravines supporting mixed evergreen and deciduous forests. Two streams create lush riparian corridors and forested wetlands that drain into Puget Sound via a small brackish lagoon. Carkeek is an original NBP site, surveyed continuously since 1994.

Quick Facts

Years active:	1994-present
Survey loops:	2
Survey stations:	16
Total species:	111
Frequent flier:	Song Sparrow (99.5% of surveys)
Largest flock:	203 Pine Siskin





Species Richness

Species richness held stable.

Participants observed an average of 47 species per year. Both Pipers Creek Loop and Venema Meadow Loop reported an average of 38 species per year.

Some species that are present during surveys invariably go undetected. Correcting for this using a first-order jackknife estimator, we estimate combined park annual species richness at around 59 species (95% CI: 56–61).

The number of species recorded per year at Carkeek Park remained largely stable over the study period, increasing an estimated total of only 2.4% from 2005 to 2023 (95% CI: –17% to 26%). However, this result is not statistically significant and provides no clear evidence of a directional trend in species richness.

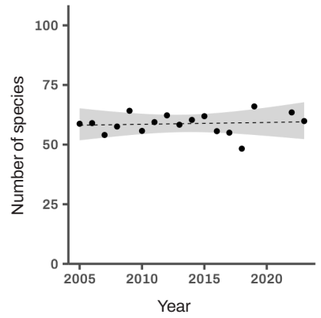


Figure 2.4: Species richness over time at Carkeek Park. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Total counts declined by 17%.

The total number of birds observed per survey at Carkeek Park decreased at an average annual rate of just more than 1%, resulting in a cumulative decline of 17% (95% CI: –36% to 14%). The estimate is uncertain though, and does not provide clear evidence of a directional trend in overall bird counts at Carkeek Park. Observed data show complex cyclical patterns that we did not attempt to model, as overall trend identification was our primary goal.

The trend along Pipers Creek Loop was more pronounced and statistically significant. Counts there declined at an average rate of –2.8% per year, for a cumulative decline of 40% (95% CI: –56% to –17%). In contrast, counts along the Venema Meadow Loop increased slightly, growing a total of 15% (95% CI: –20% to 91%), but this finding is uncertain.

Black-capped Chickadee, House Finch, and European Starling may be behind much of the decline along Pipers Creek Loop. All of these species were reported in flocks of 50 or more in early years but by 2023, maximum numbers were 20 or fewer. High counts of Mallard and Pine Siskin along Venema Meadow Loop in 2022 and 2023 contribute to the apparent increase there. However, Pine Siskin are highly irruptive and nomadic (Dawson, 2020), and their irregular presence in large numbers may be obscuring a trend at Venema Meadow that would be more similar to Pipers Creek Loop if the large flocks of Pine Siskin had not boosted counts in later years.

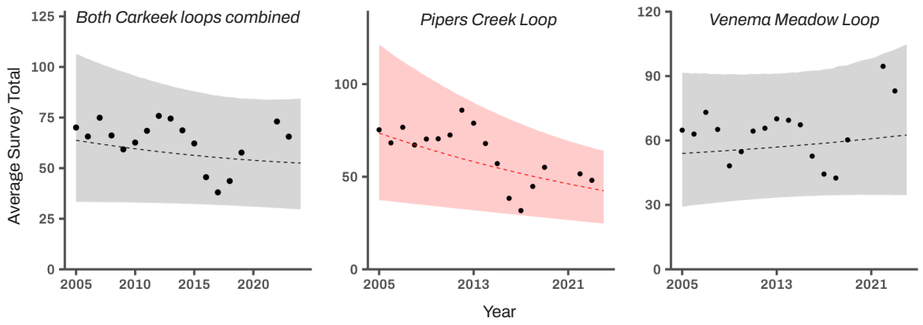


Figure 2.5: Average survey totals at Carkeek Park over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Species Trends

We estimated yearly count trends for 39 species at Carkeek Park. See Appendix D.2 for full results.

Mallards surged.

Mallard (pictured above) counts rose dramatically at Carkeek Park, specifically along the Venema Meadow Loop at count station seven. This station is adjacent to wetlands recently altered by beaver activity (Zhou, 2023), creating deeper, more persistent ponds that appear to have pleased the local Mallards. In 2005, participants recorded roughly 1 Mallard every 5 surveys; by 2023, that had increased to nearly 35 per survey—a more-than-100-fold increase (95% CI: 12,255% to 24,186%).

Common neighborhood birds declined sharply.

Several familiar species declined substantially. Black-capped Chickadee fell by 56% (95% CI: –64% to –46%), from about 9 individuals per survey in 2005 to 5 in 2023. Bushtit dropped by more than 90% (95% CI: –97% to –82%), from over 3 per survey to fewer than 1 every other survey. Kinglets also declined, driven by Ruby-crowned Kinglet, which fell from 2 per survey to 1 every 8 surveys—an 88% decline (95% CI: –94% to –75%). These patterns are broadly consistent with regional trends in eBird data (Fink et al., 2022).

Forest species show diverging trends.

Forest-associated species showed mixed trajectories. Band-tailed Pigeon declined by 88% (95% CI: –94% to –60%), and Pacific Wren fell by 50% (95% CI: –64% to –20%). In contrast, Western Flycatcher increased strongly, rising from 1 individual every 8 surveys in 2005 to nearly 2 per survey in 2023—a 13-fold increase (95% CI: 563% to 3,008%).

Tree canopy loss at Carkeek Park was greater than at any other site in this assessment. Between 2016 and 2021, canopy cover declined from 89% to 80%—a loss of nearly 16 acres (University of Vermont, 2022 & 2023). Changes in canopy cover and forest composition may be contributing to divergent responses among forest-associated species, benefiting some while disadvantaging others.

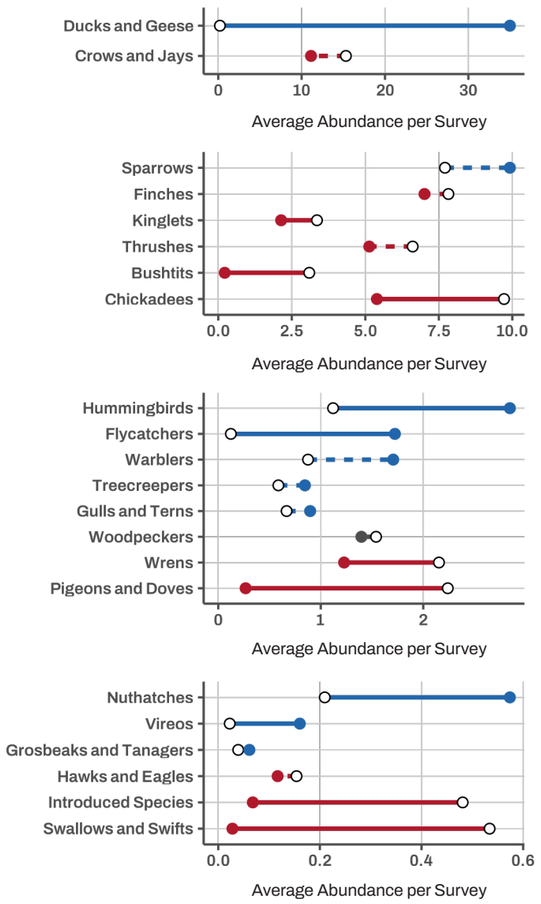


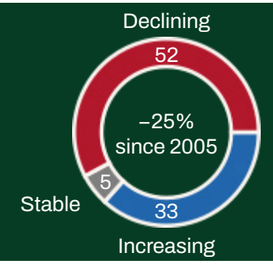
Figure 2.6: Estimated change in average abundance per survey across bird groups at Carkeek Park. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

DISCOVERY PARK

At 534 acres, Discovery Park is Seattle's largest park. Its size, diversity of habitats, and position along Puget Sound also make it our birdiest park, and in fact, one of the birdiest places in the state: birders have documented more species here than at any of Washington's National Wildlife Refuges.

Quick Facts

Years active:	2003-present
Survey loops:	13
Survey stations:	105
Total species:	185
Frequent flier:	Song Sparrow (97% of surveys)
Largest flock:	500 Dunlin



Species Richness

Species richness fell by 23%.

Participants observed an average of 94 species per year at Discovery Park. The Beaches Loop was the most diverse, reporting an average of 51 species per year, followed by South Meadow (48), Daybreak Star (46), North Loop Trail (42), South Loop Trail (37), Eastern Edge (36), Wolf Tree Nature Trail (26), Hidden Valley Trail (22), and North Beach Trail (16).

Some species that are present during surveys invariably go undetected. Correcting for this using a first-order jackknife estimator, we estimate the average park annual species richness at around 114 species (95% CI: 112–116).

The number of species recorded at Discovery Park fell by 1.4% annually, resulting in a cumulative decline of 23% (95% CI: –34% to –10%). This is the second largest decline in species richness across sites, exceeded only by Golden Gardens.

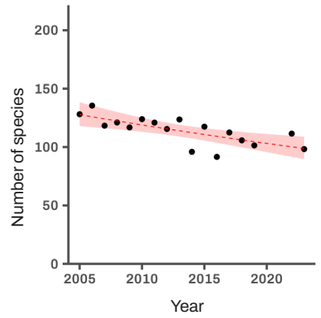


Figure 2.7: Species richness over time at Discovery Park. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Total counts fell by 25%

Total bird counts per survey declined at an average annual rate of 1.6%, resulting in a cumulative decline of 25% (95% CI: –34% to –13%). This finding is statistically significant. Counts fell at 6 of the 9 assessed loops, held relatively stable at 2, and increased at 1, though most loop-level trends were not statistically significant.

While uncertain, the upward trend at Wolf Tree Nature Trail appears to be driven by stable counts for many species along with increases in Anna's Hummingbird, Dark-eyed Junco, Chestnut-backed Chickadee, and Western Flycatcher.

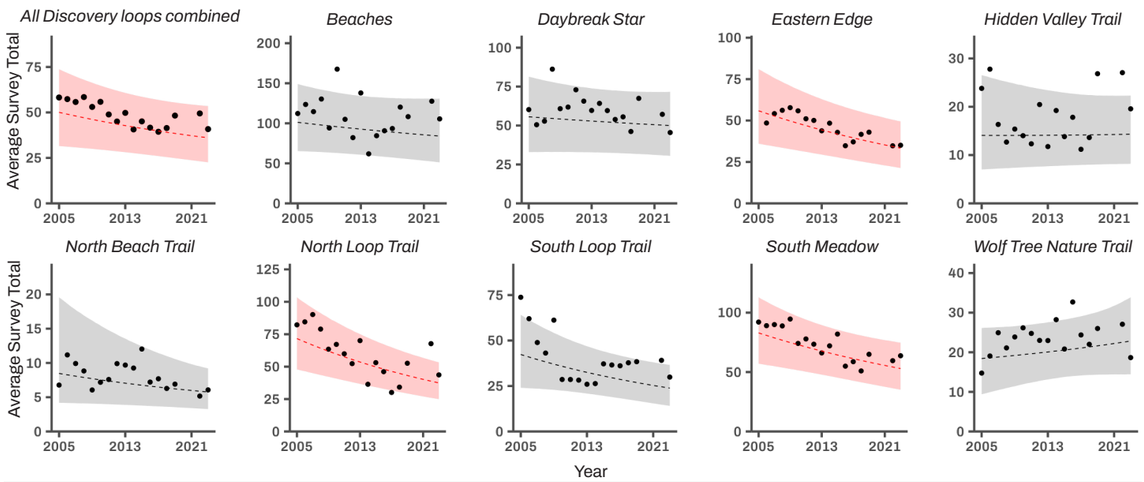


Figure 2.8: Average survey totals at Discovery Park over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Species Trends

We estimated yearly count trends for 90 species at Discovery Park. See Appendix D.3 for full results.

A good turn for gulls and terns.

Gull and tern counts showed the strongest real growth, up from an average count of 6.4 per survey to 8 per survey by 2023, a 25% increase. This was largely driven by Short-billed Gull, which increased from about 4 to 6 individuals per survey, a 33% increase (95% CI: 11% to 67%). Caspian Tern counts showed large relative growth (95% CI: 50% to 432%), though this represents a small absolute change—from about 1 detection every 8 surveys to 1 every 3. This growth may not last, though, as heat waves, avian influenza, and exclusion from nesting sites impacted local Caspian Terns in later years (WSB, 2023) .

Juncos soared while other sparrows shrunk.

Dark-eyed Junco (pictured above) counts grew from an average of fewer than 1 per survey to nearly 3 per survey by 2023, a 180% increase (95% CI:116% to 275%). Meanwhile, counts of all other sparrows fell. This could indicate that conditions are changing in favor of adaptable species like Dark-eyed Junco over species with more specific habitat requirements. Meadows in particular may be degrading at Discovery due to mowing practices, off-trail disturbance by park visitors and pets, and other factors.

Introduced species declined precipitously.

House Sparrow has not been recorded at Discovery Park since 2017. European Starling fell by 86% (95% CI: –94% to –69%), and Rock Pigeon by 70% (95% CI: –94% to –23%). Regional trends explain some loss; these species have declined regionally (Fink et al., 2022) and across North America (Rosenberg et al., 2019). Successful habitat restoration may also play a role by reducing the extent of disturbed habitats preferred by human-associated species (Battey & Ross, 2014). Additionally, Barred Owl counts increased significantly. This generalist predator, itself a recent arrival to the Pacific Northwest (Bierregaard et al., 2025), may be exerting additional pressure on these and other species.

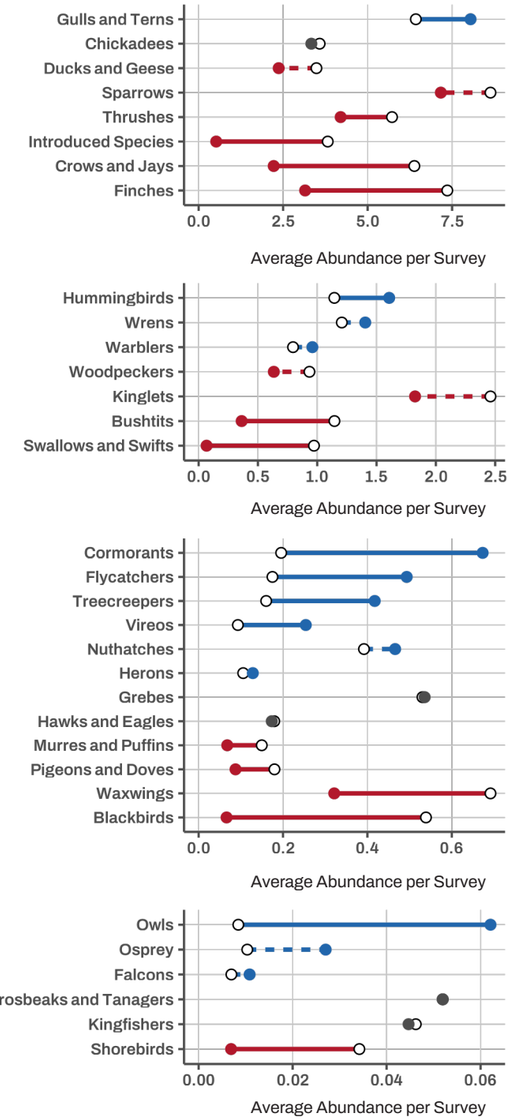


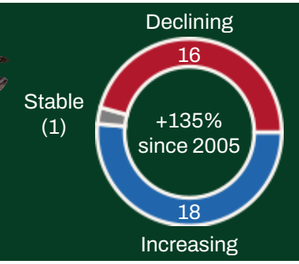
Figure 2.9: *Estimated change in average abundance per survey across bird groups at Discovery Park. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.*

GENESEE PARK

Genesee Park is a developed park adjacent to Lake Washington in the Lakewood/Seward Park neighborhood. It packs a variety of habitats into its 55 acres: meadows, wetlands, shrub, open woodlands, freshwater shorelines, and a patch of mixed deciduous/conifer forest along its eastern edge.

Quick Facts

Years active:	1995-present
Survey loops:	1
Survey stations:	7
Total species:	116
Frequent flier:	American Crow (99.7% of surveys)
Largest flock:	3,000 American Coot



Species Richness

Species richness declined by 11%.

Participants observed an average of 34 species per year. Correcting for species present but not detected during surveys, we estimate average species richness to be about 46 species (95% CI: 40–51).

The number of species recorded per year at Genesee Park declined slightly over the study period, declining by less than 1% annually for an estimated total decline of 10.8% from 2005 to 2023 (95% CI: −30% to +14)%. However, this result is not statistically significant and provides no clear evidence of a directional trend in species richness.

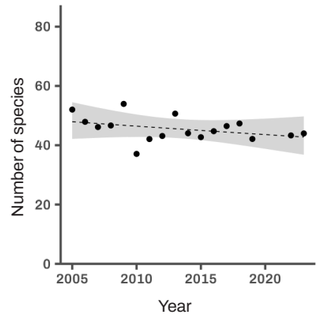


Figure 2.10: Species richness over time at Genesee Park. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Counts grew by 135%, driven by a single species.

Genesee Park was the only site where overall survey totals appeared to increase. Models suggest counts grew at an average rate of 4.9% per year, for a cumulative increase of 135% (95% CI: −23% to +358%). However, this estimate is highly uncertain and appears to be driven largely by a single species: American Coot.

Large rafts of American Coot (pictured at the top of the opposite page) were recorded more frequently toward the end of the study period. Although still relatively rare, these flocks could be enormous—for example, a 2023 survey recorded 3,000 coots at a single station. Such extreme counts can overwhelm more typical observations and create the appearance of strong growth in overall bird numbers. When American Coot are excluded from the analysis, the estimated trend drops to less than 1% growth per year, a cumulative increase of 11.6% (95% confidence interval: −23% to +32%), which is not statistically significant.

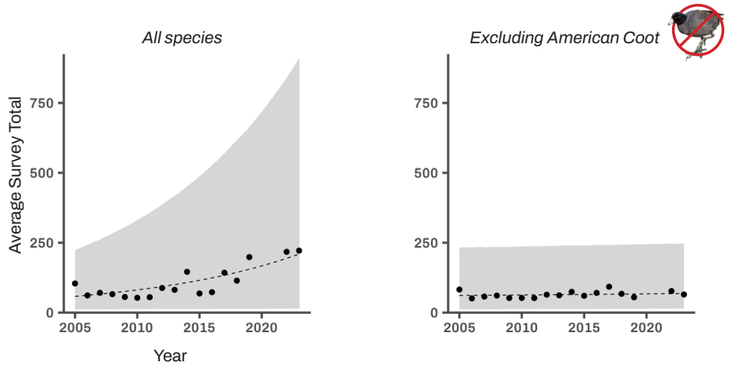


Figure 2.11: Average survey totals at Genesee Park over time for all species (left panel) and for all species except American Coot (right panel). Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Species Trends

We estimated yearly count trends for 35 species at Genesee Park. See Appendix D.4 for full results.

American Coot plays in a league of its own.

American Coot counts surged from an average of 11 per survey to nearly 292 by 2023—a 26-fold increase (95% CI: 2,412%–2,959%)—driven by huge aggregations late in the study period. However, trends varied by site: counts declined at Magnuson Park and Lake Forest Park and grew only modestly at Seward Park. These inconsistent patterns suggest shifts in where coots congregate, possibly following food resources. We note, though, that global and regional American Coot abundance has declined (Rosenberg et al., 2019; Fink et al., 2022), raising the possibility that large rafts of coot reflect crowding into a smaller areas of remaining suitable habitat.

Common species drove growth in ducks and geese.

As a group, counts of ducks and geese showed strong growth at Genesee Park, increasing from an average of 19 per survey to 33 per survey. This growth was not shared evenly among members of this group. Growth is attributable primarily to Mallard, which increased from an average of 1 or 2 per survey to 8 per survey by 2023—a 446% increase (95% CI: 172% to 690%). American Wigeon increased from about 4 per survey to 12 per survey and Canada Goose counts increased from about 4 per survey to 9 per survey.

Strong growth among these three common and abundant species hides declines among the other waterfowl species assessed here: Lesser Scaup down 97% (95% CI: −98% to −95%), Hooded Merganser down 89% (95% CI: −96% to −74%), Gadwall counts were down 61% (95% CI: −72% to −44%); Bufflehead down 38% (95% CI: −56% to −14%), Common Goldeneye down 29% (95% CI: −61% to 38%), and Common Merganser down 35% (95% CI: −60% to 3%), though findings for the last two are uncertain.

Steller's Jay counts grew only at Genesee.

While Steller's Jay have never been reported frequently on surveys at Genesee Park, they do appear to be increasing. At the start of the study period, they were reported at a rate of about 1 in 100 surveys. By 2023, counts grew to an estimated 1 every 6 surveys, an 18-fold increase (95% CI: 402% to 7,550%). Still infrequent, but this finding was statistically significant and a bright spot for the species, which was trending down at all other sites.

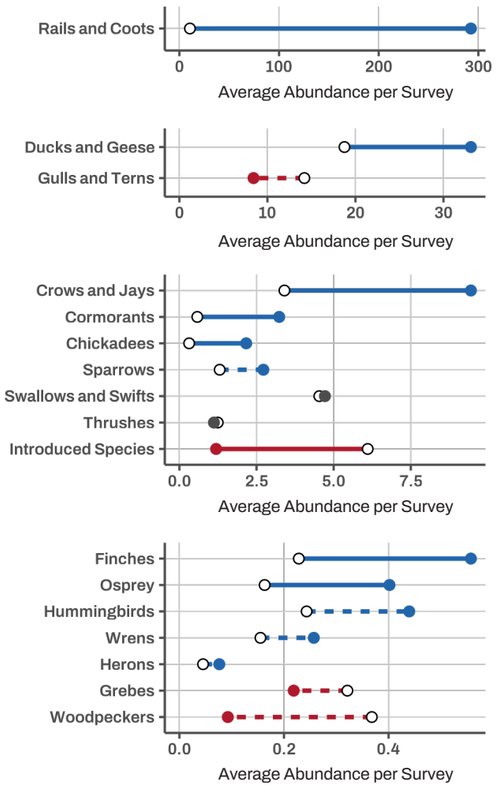


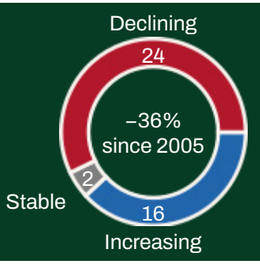
Figure 2.12: Estimated change in average abundance per survey across bird groups at Genesee Park. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

GOLDEN GARDENS

Golden Gardens is just 60 acres, but it punches above its weight in terms of diversity. It contains forests, riparian areas, dunes, wetlands, lagoons, and intertidal and marine habitats at which more species have been recorded than from much larger sites like Seward Park or Washington Park Arboretum.

Quick Facts

Years active:	2000-present
Survey loops:	1
Survey stations:	6
Total species:	124
Frequent flier:	American Crow (100% of surveys)
Largest flock:	545 Heermann's Gull



Species Richness

Species richness fell by 24%.

Participants observed an average of 54 species per year. Some species that are present during surveys invariably go undetected. Correcting for this using a first-order jackknife estimator, we estimate combined loop annual species richness at around 69 species (95% CI: 66–73).

The number of species recorded per year at Golden Gardens declined significantly over the study period, falling by 1.5% annually, resulting in an estimated total decline of 24% from 2005 to 2023 (95% CI: –37% to –7.3%). This is the steepest decline in species richness among all sites assessed.

Species that were recorded for at least five years and that have not been seen since 2015 or earlier include House Sparrow, Harlequin Duck, and Western Grebe. Other species like Marbled Murrelet, Pigeon Guillemot, Black Scoter, Common Murre, Hermit Thrush, Pied-billed Grebe, Rufous Hummingbird, and Sanderling were detected on just one survey in early years and have not be reported since.

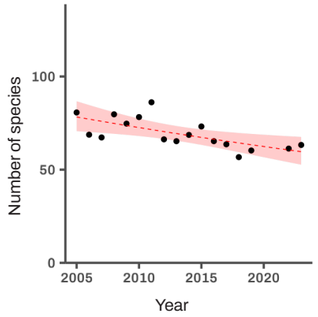


Figure 2.13: Species richness over time at Golden Gardens. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

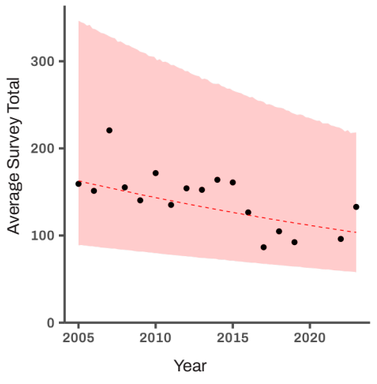


Figure 2.14: Average survey totals at Golden Gardens over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Total counts fell by 36%.

The total number of birds observed per survey at Golden Gardens decreased since 2005 at an average annual rate of –2.4%, representing a cumulative decline of 36% over the 19-year study period (95% CI: –46% to –25%). This result is statistically significant and represents one of the largest declines in absolute numbers, as average counts here are much higher than at other sites.

Some of the decline could be considered "good" news: House Sparrow and European Starling—both introduced species—have all but disappeared from Golden Gardens NBP surveys in recent years. However, declines in several once-abundant native species are also contributing to the overall trend. Over the study period, the maximum and average observed flock size declined for a range of species, including American Robin, American Wigeon, Barn Swallow, Brant, Gadwall, Glaucous-winged Gull, Horned Grebe, Mallard, and Red-winged Blackbird.

Together, these patterns suggest the downward trend is being driven by declining counts across multiple species and ecological groups, rather than changes in just a few species.

Species Trends

We estimated yearly count trends for 42 species at Golden Gardens. See appendix D.5 for full details.

Rock Pigeon drove growth of introduced species.

Rock Pigeon counts increased by 58% (95% CI: 40% to 79%) at Golden Gardens, rising from an average of 12 individuals per survey to 19 by 2023. This moved Rock Pigeon into the most abundant species at the site, overtaking Mallard, American Wigeon, American Crow, and Glaucous-winged Gull, all of which had higher average counts at the start of the study period.

Large declines in American Robin counts.

Counts of American Robin—the only thrush species assessed at Golden Gardens—declined by 66% (95% CI: –74% to –57%), falling from about 7 individuals per survey to just over 2. Although declines among American Robin counts were observed across sites, this represents the largest drop. Regional data from eBird also suggest declining American Robin counts around the Puget Sound (Fink et al., 2023). These trends may reflect increasing urban densification and reduced lawn habitat, a favorite of robins, as well as shifting migration patterns and a northward expansion of their winter range (Niven & Butcher, 2009).

Counts fell for waterfowl and waterbirds.

Some of the largest losses occurred among counts of ducks and geese. All eight waterfowl species assessed declined, including American Wigeon (–53%; 95% CI: –57% to –50%) and Mallard (–76%; 95% CI: –96% to –21%). Overall, duck and goose counts fell from an average of 48 individuals per survey to 18 by 2023.

Gull counts also declined markedly. Glaucous-winged Gull (pictured above) decreased by 66% (95% CI: –70% to –62%) and Western Gull by 88% (95% CI: –95% to –65%). Because gulls are notoriously difficult to identify and hybridize readily in our region, we examined whether declines in these species were offset by increased reports of Glaucous-winged Gull x Western Gull hybrids or "Gull sp." Both categories increased slightly in later years, but not enough to sufficiently explain the large declines in Glaucous-winged Gull and Western Gull counts.

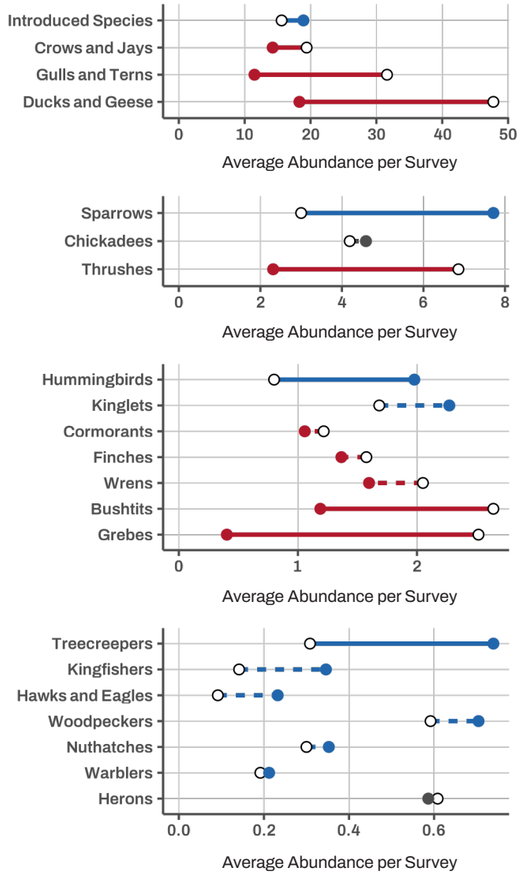


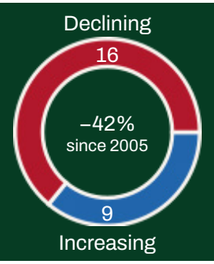
Figure 2.15: Estimated change in average abundance per survey across bird groups at Golden Gardens. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

LAKE FOREST PARK

This site is located on private property at the north end of Lake Washington, adjacent to the Lyon Creek Waterfront Preserve. It includes a small section of natural lake shore, a stretch of hardened shoreline, a dock, manicured lawn, and groves of mature trees.

Quick Facts

Years active:	2000-present
Survey loops:	1
Survey stations:	2
Total species:	91
Frequent flier:	Mallard (87% of surveys)
Largest flock:	1,000 American Coot



Species Richness

Species richness declined by 12%.

Participants observed an average of 22 species per year. Some species that are present during surveys invariably go undetected. Correcting for this using a first-order jackknife estimator, we estimate combined loop annual species richness at around 31 species (95% CI: 28– 34).

The number of species recorded per year at Lake Forest Park declined modestly over the study period, changing by less than –1% annually, resulting in an estimated total decline of 11.9% from 2005 to 2023 (95% CI: –34.2% to 18%). However, this result is not statistically significant and provides no clear evidence of a directional trend in species richness.

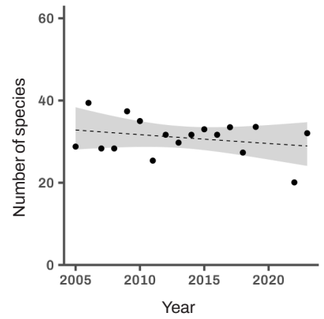


Figure 2.16: Species richness over time at Lake Forest Park. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

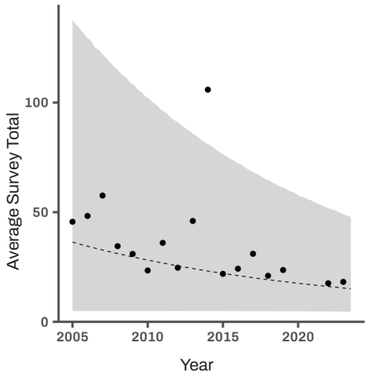


Figure 2.17: Average survey totals at Lake Forest Park over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Total counts fell by 42%.

The total number of birds observed per survey at Lake Forest Park decreased since 2005 at an average annual rate of –3.0%, representing a cumulative decline of 42% over the 19-year study period (95% confidence interval –74% to +23%). This is the largest relative decline observed at any site assessed in this study. However, this result is not statistically significant, as indicated by the wide confidence interval, and does not provide clear evidence of a directional trend in total counts at Lake Forest Park.

Several once-abundant species at Lake Forest Park declined significantly over the study period, including Canada Goose, Gadwall, and Killdeer. Each began the study with high average abundance per survey but declined steeply over time. These losses are not balanced by increases in species such as Dark-eyed Junco and American Wigeon. Although these species show large proportional increases, they started the study with low average abundance per survey, meaning their gains contribute relatively little to overall bird numbers.

Species Trends

We estimated yearly count trends for 25 species at Lake Forest Park. See appendix D.6 for full details.

Counts for most species declined.

Lake Forest Park had the highest proportion of species with declining counts among all sites assessed, with 64% showing decreases. Declines were observed across most bird families, including introduced species.

The largest absolute decline was observed in American Coot counts, which dropped from an average of 17 individuals per survey to about four—a 78% decline (95% CI: –80% to –76%). However, mixed trends at other sites suggest changing coot counts reflect shifts in coot behavior or aggregation locations rather than population decline.

Killdeer decline: real or random?

Killdeer were once abundant at Lake Forest Park. Early surveys recorded an average of 6 individuals, and sometimes up to 25. Surveyors recall Killdeer covering the beach or dock and attempting to nest on the lawn (J. Bragg, pers. comm., March 10, 2026). By 2023, however, the average number reported had fallen to fewer than 1 individual per survey.

The cause is unclear. The site and its habitats did not undergo obvious changes during the study period. One participant suggested changes in food availability may be a factor. Killdeer are invertivores, feeding on worms, insects, and mollusks; declines in these prey could help explain their disappearance.

Alternatively, the declines may reflect random chance. Birders still occasionally record large numbers of Killdeer here—for example, 13 individuals were observed on January 5, 2025 (D. Hepp, pers. comm., March 20, 2026). The once-monthly, five-minute point count NBP protocol at this small site may be particularly sensitive to chance variation in detection.

Steepest decline for swallows at Lake Forest Park.

Barn Swallow and Violet-green Swallow (pictured above) counts had the steepest declines at Lake Forest Park. Both declined by 97%, with Barn Swallow dropping from an average of about 1 individual per survey to 1 every 27 surveys. Violet-green Swallow declined from about 1 individual per survey to 1 every 13 surveys.

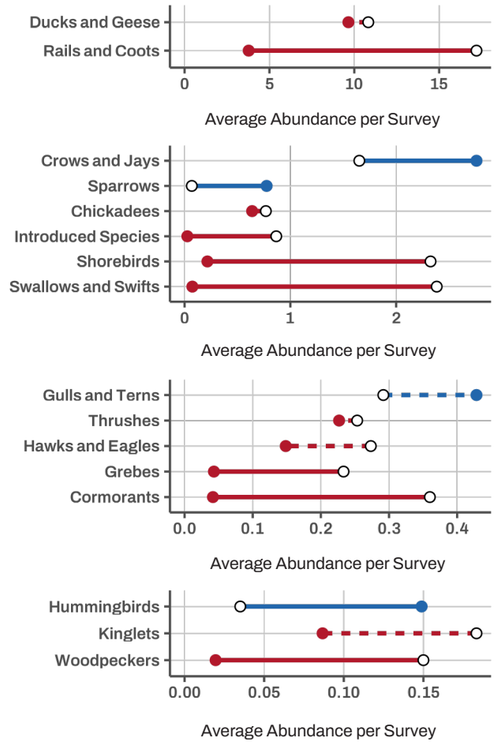


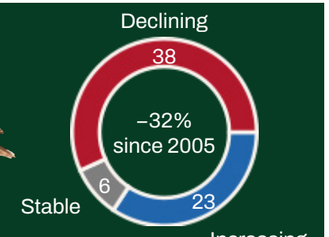
Figure 2.18: Estimated change in average abundance per survey across bird groups at Lake Forest Park. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

MAGNUSON PARK

Magnuson, Seattle's second largest park, offers something for everyone: more than 100 natural acres of wetlands, woods, and meadows; a historic district preserving 20th century military history; the city's largest off-leash dog area; a community garden; and more.

Quick Facts

Years active:	1995-present
Survey loops:	5
Survey stations:	28
Total species:	91
Frequent flier:	American Crow (94% of all surveys)
Largest flock:	500 American Coot



Species Richness

Species richness held stable.

Participants observed an average of 68 species per year along four loops at Magnuson Park. The Back Fence Loop recorded the highest number of species per year on average (36), followed by South End Loop (35), Waterfront Loop (33), and Main Drag Loop (27).

Some species that are present during surveys invariably go undetected. Correcting for this using a first-order jackknife estimator, we estimate combined loop annual species richness at around 83 species (95% CI 81– 86).

The number of species recorded per year at Magnuson Park remained largely stable over the study period, changing by less than –1% annually, resulting in an estimated total decline of 9.8% from 2005 to 2023 (95% CI: –25.5% to +7.8%). However, this result is not statistically significant and provides no clear evidence of a directional trend in species richness.

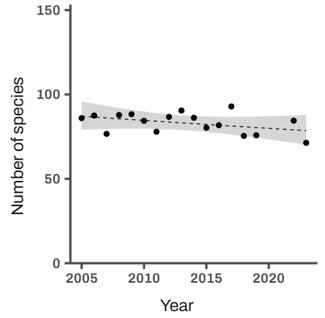


Figure 2.19: Species richness over time at Magnuson Park. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

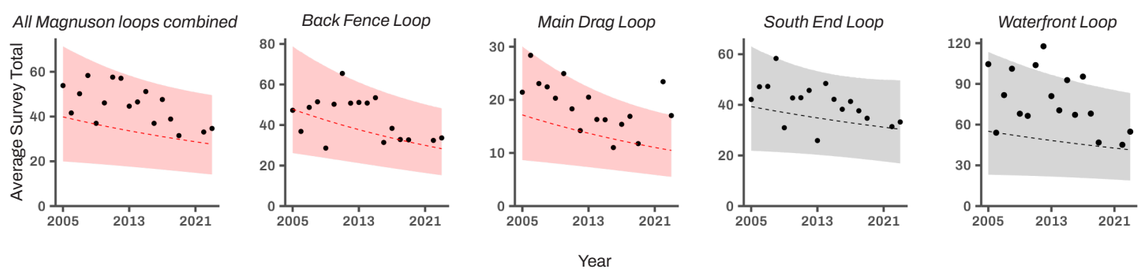
Survey Totals

Total counts fell by 32%.

The total number of birds observed per survey at Magnuson Park decreased since 2005 at an average annual rate of –2.1%, representing a cumulative decline of 32% over the 19-year study period (95% Confidence Interval: –44.6 to –15.7). This result is statistically significant and one of the largest magnitude changes of any site assessed.

Total counts fell for each assessed survey loop at Magnuson Park as well, but directional trends were only significant for the Backfence Loop and Main Drag Loop, which fell by 41% and 38%, respectively. The Waterfront Loop typically reports the largest average survey totals, driven by large flocks of waterbirds or waterfowl. The Waterfront Loop reports flock sizes exceeding 100 individuals 11 to 15 times more frequently than the other loops.

Figure 2.20: Average survey totals at Magnuson Park over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.



Species Trends

We estimated yearly count trends for 67 species at Magnuson Park. See appendix D.7 for full details.

Osprey increases driven by successful nesting.

Osprey counts increased at several sites, but nowhere as dramatically as at Magnuson Park. Early surveys recorded roughly 1 Osprey every 120 surveys; between 2005 and 2010, they were observed on just two occasions. By 2022, however, multiple individuals were reported during most spring and summer surveys—a nearly 30-fold increase. This growth was driven by a breeding pair of that successfully nested and fledged young on a light pole near the athletic fields in recent years.

Killdeer declines: real, not random.

As at Lake Forest Park, Killdeer (pictured above) counts declined sharply, from an average of 1 individual every 2 surveys to just 1 or 2 individuals per year. Historically, Killdeer were occasionally recorded in large numbers (e.g., 40 individuals along the Back Fence Loop in February 2005), but reports of more than 2 have not occurred at since 2016.

Unlike the Lake Forest Park site, Magnuson Park is one of the most intensively sampled sites in the project, making sampling variation an unlikely explanation. These results suggest a real decline, which could be related to Phase two of the wetland restoration project, which increased willow and shrub cover along the lake shore and reduced shoreline habitat for Killdeer and other shorebirds (A. McCormick, pers. comm., March 24, 2025).

Decline for swallows and swifts despite signs of growth among some species.

As a group, counts of swallows and swifts dropped from more than 3 individuals per survey to fewer than 2 by 2023. Declines were driven by Cliff Swallow (–95%, 95% CI: –97% to –89%; pictured above), Vaux's Swift (–92%, 95% CI: –97% to –73%), and Barn Swallow (–73%, 95% CI: –83% to –55%). Steep Cliff Swallow declines likely reflect the destruction of more than 100 mud nests at Building 27 (now Arena Sports) around 2010 (J. Bragg, pers. comm., Feb. 17, 2026).

However, not all trends were negative: Violet-green Swallow (24%, 95% CI: –36% to 125%) and Tree Swallow (16%, 95% CI: –36% to 119%) increased, though these results are uncertain.

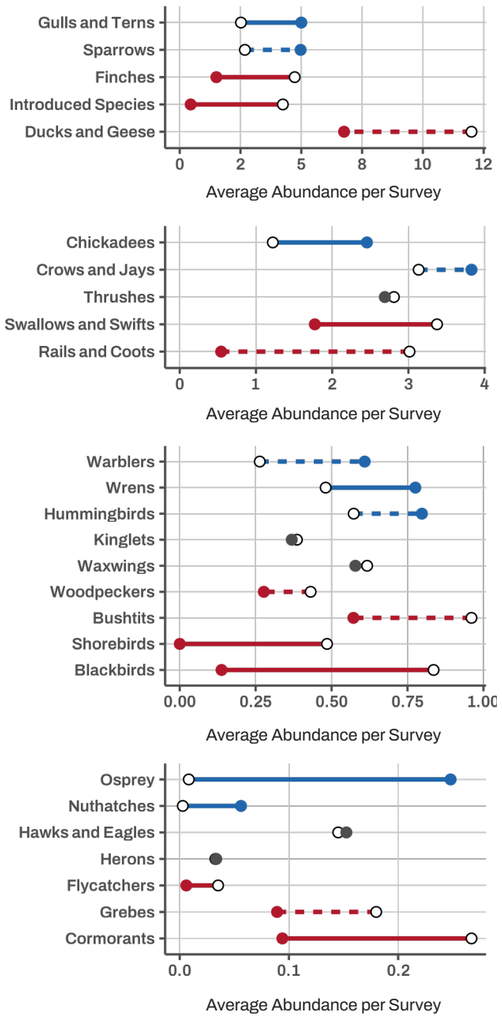


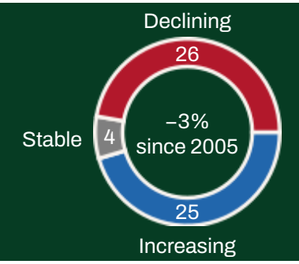
Figure 2.21: Estimated change in average abundance per survey across bird groups at Magnuson Park. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

SEWARD PARK

Seward Park occupies the entire Bailey Peninsula, a thumb of land jutting into Lake Washington. Here you will find Seattle's largest remnant patch of old-growth forest dotted with meadows and fringed by lake shore and wetlands.

Quick Facts

Years active:	2004-present
Survey loops:	2
Survey stations:	16
Total species:	120
Frequent flier:	American Crow (99.7% of surveys)
Largest flock:	600 American Coot



Species Richness

Species richness declined by 15%.

Participants directly observed an average of 59 species per year at Seward Park. Both loops reported similar numbers of species: 47 on average for the East Loop and 48 on average for the West Loop.

Some species that are present invariably go undetected during surveys. Correcting for this using a first-order jackknife estimator, we estimate Seward Park's true average annual species richness at around 74 (95% CI: 72–76) species per year.

The number of species recorded per year at Seward Park was relatively stable over the study period, declining by less than 1% annually from 2005 to 2023, a cumulative change of –14.7% (95% CI: –30%% to +3%). However, this result is not statistically significant and does not provide clear evidence of a directional trend in species richness at Seward Park.

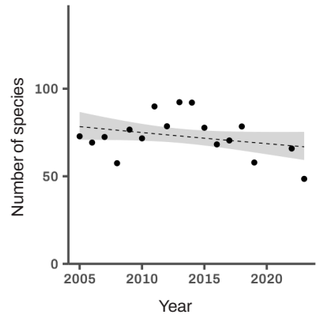


Figure 2.22: Species richness over time at Seward Park. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

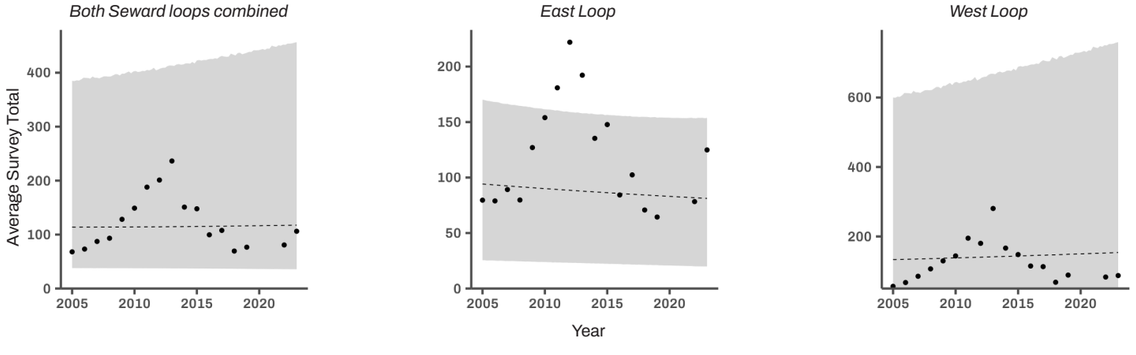
Survey totals show large variability but start and end counts were similar.

Total counts at Seward Park showed complex, non-linear patterns over the study period. While counts vary greatly over the years, cumulative change since 2005 was a meager –3%, though this result is uncertain (95% CI: –24% to +24%).

Higher-order polynomial models fit the data better than our first-order model, but we had no strong mechanistic hypothesis to justify the additional model complexity. The years 2011–2013 saw the largest average counts for dozens of species at Seward Park, including Golden-crowned Kinglet, Red Crossbill, Chestnut-backed Chickadee, American Coot, and more. Is there a natural cycle behind this phenomenon? Or is it noise in the data? Other sites do not show this particular pattern.

The West Loop tends to report a greater number of birds per survey than the East Loop. Both loops show similar non-linear observed count patterns and estimates have wide confidence intervals.

Figure 2.23: Average survey totals at Seward Park over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.



Species Trends

We estimated yearly count trends for 55 species at Seward Park. See appendix D.8 for full details.

Divergent trends among woodpeckers.

We assessed trends for three woodpecker species at Seward Park. Downy Woodpecker declined sharply, by 72% (95% CI: –91% to –53%), with counts dropping from roughly 1 detection every 3 surveys to 1 every 11 by 2023.

In contrast, Pileated Woodpecker (pictured above) increased by 77%, though this result is uncertain (95% CI: –25% to 312%). Counts grew from about 1 detection every 7 surveys at the start of the study period to roughly 1 every 3 or 4 surveys by the end.

Northern Flicker fell between these extremes, with counts remaining relatively stable, declining by less than 10% (95% CI: –34% to 24%) .

Kinglet counts declined sharply.

Counts of both kinglet species declined significantly. Golden-crowned Kinglet fell by 57% (95% CI: –67% to –45%), and Ruby-crowned Kinglet by 69% (95% CI: –84% to –48%). At the start of the study period, surveys averaged about 16 kinglets; by 2023, that dropped to fewer than 7 per survey. These findings are broadly consistent with regional trends (Fink et al., 2022).

Wren counts also declined.

Both Pacific Wren and Bewick's Wren declined over the study period, although the trend for Bewick's Wren is uncertain. Pacific Wren decreased by 59% (95% CI: –75% to –34%). This species is strongly associated with forested habitats and is generally less adaptable to urban environments than the more generalist Bewick's Wren (Farwell & Marzluff, 2013).

The extensive mature forest at Seward Park would be expected to provide high-quality habitat for Pacific Wren. However, as an understory-dependent species, it may be sensitive to changes in vegetation structure. Could the die-off of sword ferns at the site (Billo, 2022) have reduced understory cover and contributed to the observed declines?

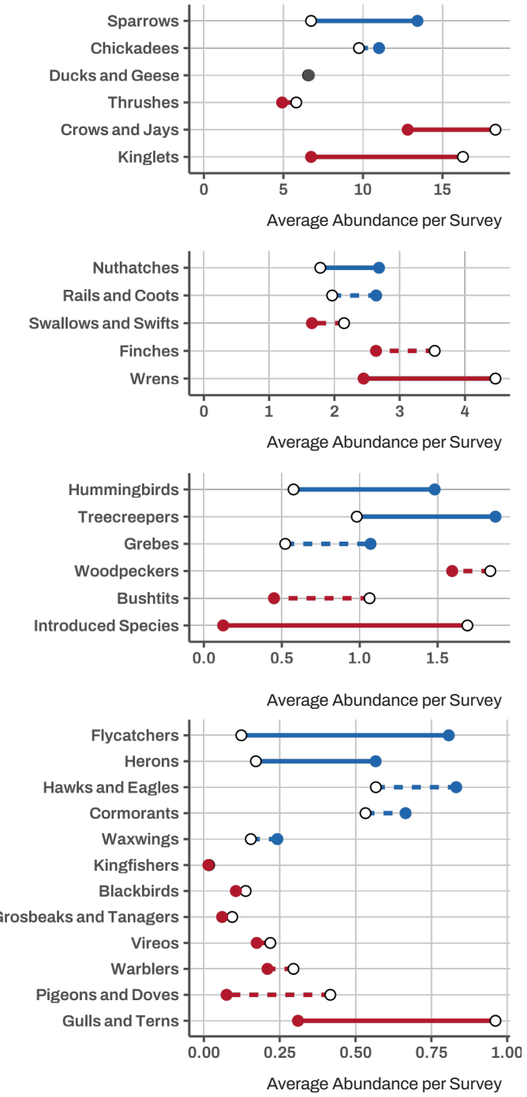


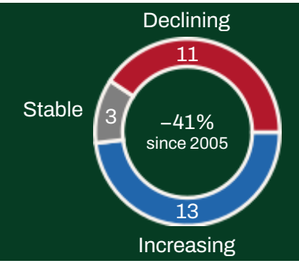
Figure 2.24: Estimated change in average abundance per survey across bird groups at Seward Park. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

WASHINGTON PARK ARBORETUM

Here you'll find one of the most diverse and important scientific collections of plants in North America; a celebrated Japanese Garden; a Mothers Day destination among the blooms of Azalea Way; the largest remaining wetland in Seattle; and large patches of native conifer forest.

Quick Facts

Years active:	2005-present
Survey loops:	1
Survey stations:	10
Total species:	89
Frequent flier:	American Crow (99.7% of surveys)
Largest flock:	105 Pine Siskin



Species Richness

Species richness held stable.

Participants observed an average of 38 species per year. Some species that are present invariably go undetected during surveys. Correcting for this using a first-order jackknife estimator, we estimate Washington Park Arboretum's true average annual species richness at around 49 species (95% CI: 46–50) species per year.

The number of species recorded per year at Washington Park Arboretum increased by less than 1% annually over the study period, resulting in an estimated total increase of 8.5% from 2005 to 2023 (95% CI: –14% to +37%). However, this result is not statistically significant and provides no clear evidence of a directional trend in species richness.

Five species have not been recorded since 2010 at Washington Park Arboretum, including Purple Martin, Cliff Swallow, and Western Wood-Pewee. Ten species were observed only during the period from 2011–2016. Five species were recorded for the first time in more recent years, including Common Raven, Caspian Tern, and Golden-crowned Sparrow.

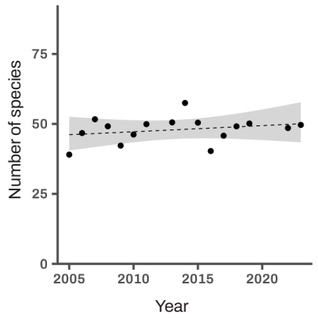


Figure 2.25: Species richness over time at Washington Park Arboretum. Black points show bias-corrected estimate of annual species richness from observed data. Dashed line shows model-predicted richness values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

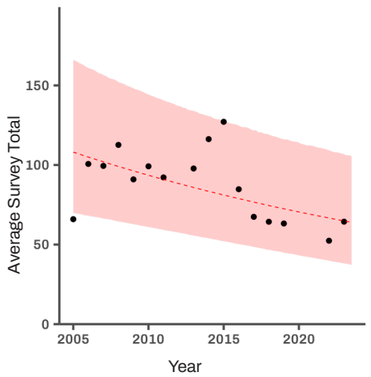


Figure 2.26: Average survey totals at Washington Park Arboretum over time. Black points show observed yearly averages. Dashed line shows average model-predicted values. Shaded region shows the 95% confidence interval, which is pink for statistically significant declines and gray otherwise.

Survey Totals

Total counts fell by 41%.

The total number of birds observed per survey at Washington Park Arboretum decreased since 2005 at an average annual rate of –2.8%, representing a cumulative decline of 41% (95% CI: –60% to –23%) over the 19-year study period. This result is statistically significant.

The magnitude of overall count decline at Washington Park Arboretum is second only to the overall count declines estimated for the Lake Forest Park site, however that result was uncertain.

Declining counts for Golden-crowned Kinglet appear to play an important role in overall declines. Golden-crowned Kinglet used to be the most abundant species, on average, at the Arboretum—more so than even crows, chickadees or robins. This once abundant species has now dropped precipitously, by a total of 87% since 2005. When Golden-crowned Kinglets are excluded from this analysis, the estimated annual decline decreases from 2.8% to 1.7%, indicating Golden-crowned Kinglet strongly influences the overall trend.

Species Trends

We estimated yearly count trends for 27 species at Washington Park Arboretum. See appendix D.9 for full results.

Crows on the move might look like decline.

American Crow counts showed a strong downward trend. At the start of the study period, participants recorded an average of nearly 12 crows per survey. By 2023, that had fallen to about 4 per survey, a 64% decline (95% CI: –76% to –47%).

While we found count declines for American Crow at several other sites, whether or not this reflects a shrinking crow population is not clear. Crows roost communally, and roost locations shift over time. In the early 2000s, there was a roost on Foster Island at the north end of the Arboretum. By 2008, the roost relocated to the University of Washington Bothell campus (Doughton, 2018). Declining crow counts at the Arboretum are probably associated with this shift.

Kinglets saw sharp declines.

As at Seward Park, counts of kinglet fell sharply at the Arboretum. Changes in Ruby-crowned Kinglet were uncertain (95% CI: –54% to 34%) but the trend was clearer for Golden-crowned Kinglets, which fell by 85% (95% CI: –92% to –75%). Where participants once recorded nearly 20 Golden-crowned Kinglets per survey, by 2023 it was fewer than 3 per survey.

eBird Trends also shows regional declines among Golden-crowned Kinglet (Fink et al., 2023). As a mature forest specialist (Swanson, Ingold & Galati, 2020), they may be sensitive to small changes in forest habitat quality. Consistent with this, tree canopy cover at the Arboretum declined over the study period. Between 2016 and 2021, canopy cover decreased from 64% to 58%—a loss of nearly 16 acres and one of the largest canopy declines among all sites in this assessment (University of Vermont, 2022 & 2023).

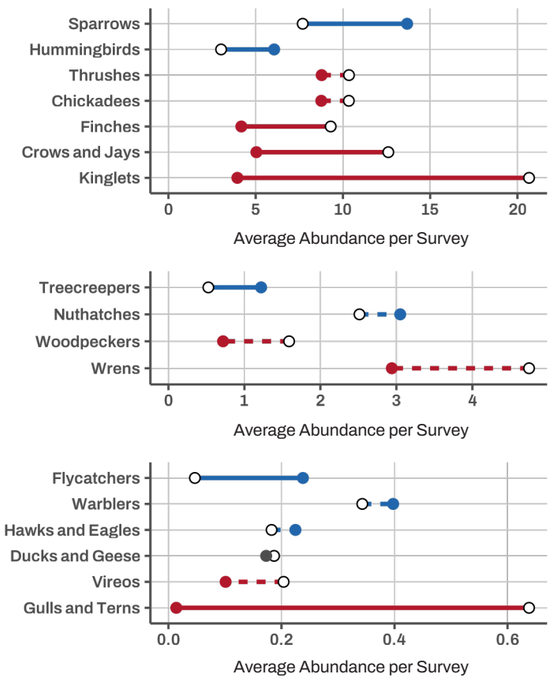


Figure 2.27: Estimated change in average abundance per survey across bird groups at Washington Park Arboretum. Blue lines indicate increases, red declines, and gray stable counts. Solid lines denote statistically significant trends; dashed lines indicate uncertainty. White circles show baseline abundance, and colored circles show ending abundance.

PART III: DISCUSSION AND RECOMMENDATIONS

Savannah Sparrow

Discussion

The overall theme that emerged from this study is *fewer and fewer*: by 2023, NBP surveys tended to show fewer birds and fewer species than in 2005. Six of eight sites showed overall count declines, and five sites showed reduced species richness. Only Genesee Park showed overall count increases, but this was driven by huge rafts of American Coot observed later in the study period. Similarly, apparent count increases at Venema Meadow Loop can largely be attributed to large counts of just two species—Mallard and Pine Siskin—rather than sustained gains across the avian community. Cumulative change in count totals at Seward Park and two loops at Discovery Park—Daybreak Star and Hidden Valley Trail—were relatively stable over the study period, though at Seward Park this masks considerable growth and decline over the study period, even as starting and ending totals remained similar. Only one loop—Wolf Tree Nature Trail at Discovery Park—appeared to gain count increases due to general count stability plus increases among a variety of species.

Species richness fell by 18% across sites. In 2005, we estimated richness at around 141 species; by 2023, that had dropped to 118— 23 fewer species. Some of this decline may reflect fewer incidental observations of rare or accidental visitors. Several species observed only in the early part of the study period—including American Black Duck, Baird's Sandpiper, Pectoral Sandpiper, Blue Jay, Lark Sparrow, Mountain Chickadee, and Black-backed Woodpecker—are not necessarily expected here. More concerning, species that reasonably could occur in or pass through Seattle—such as Black-bellied Plover, Sanderling, Common Murre, Black Scoter, and Greater Yellowlegs—have not been recorded on NBP surveys in more than a decade. We note that many of the species that have not been detected recently are shorebirds and seabirds. Because NBP counts are conducted primarily in forested and upland areas, with relatively few count stations along saltwater coastlines, shore- and seabirds may be underrepresented due to bias in sampling design. However, shorebirds and seabirds are also among the most threatened bird groups globally (NABCI, 2025), and their absence in later years on NBP surveys warrants attention.

More than half of the species assessed showed species-specific count declines. Notably, species with larger maximum observed group sizes tended to show steeper declines, and maximum group size itself decreased over the study period, suggesting that bird aggregations have become smaller over time. Group size is influenced by numerous interacting factors—including resource availability, predation pressure, seasonality, and social structure. Exploring this association could yield valuable insights for the conservation and management of urban bird populations.

Effective and evidence-based conservation will be increasingly important, especially in our era of climate change. As discussed in the Project Wide Results (pg 13), 61% of species with declining count trends and 54% of species with stable or increasing count trends are moderately to highly vulnerable to climate impacts (Bateman et al., 2020). Climate change therefore worsens the outlook for most species, including those that seem to be doing well currently.

While these findings come with limitations (pg 6), the broad consistency of results across sites and species, their general agreement with continental and regional trends, and the looming threat of climate change should drive us to action. Waiting for unequivocal evidence of local bird population declines risks delaying intervention until recovery becomes far more difficult, costly, and uncertain—if not impossible.

We therefore recommend renewed and reinvigorated efforts to protect and enhance habitat, address and adapt to climate impacts, and reduce known stressors—so that the next chapter in the story of birds in Seattle's green spaces is not one of *fewer and fewer,* but of *more and more.*

Conservation and Management Recommendations

1. Protect and enhance urban habitat.
Habitat loss remains one of the leading threats to birds globally and occurs continuously within and around Seattle. While habitat destruction—such as converting forest to development—is the most visible form, habitat loss also occurs through fragmentation, where continuous habitat is broken into smaller, isolated patches that limit movement and reduce access to resources; and degradation, where habitat persists but declines in quality due to stressors such as pollution (chemical, noise, and light), harmful introduced species, or other alterations in structure and diversity that diminish ecological function.

Conserving quality, functioning urban habitat is key. We specifically call out urban forests, aquatic systems, and meadows due to their important role in supporting avian diversity in the Seattle area.

1.A. Protect and enhance urban forests.

We found mixed results for forest-dependent species. Some, like Brown Creeper and Red-breasted Nuthatch, saw counts increase across all sites. Others, like Band-tailed Pigeon and Golden-crowned Kinglet fell sharply. While the factors driving the different trajectories are not clear, we know that hundreds of acres of tree canopy have been lost in Seattle in recent years, with significant losses at parks natural areas (OSE, 2023). Indeed, all sites except Magnuson Park lost canopy cover over the study period. In addition, count declines of Pacific Wren at Seward Park highlight the importance of structural diversity within forests, including the understory, not just canopy cover.

Recommended actions: Advocate for land use and development policies that support tree protection and planting; prioritize native tree planting where appropriate; incorporate canopy and understory diversity into urban forest management; seek opportunities to expand core forest habitat and increase connectivity between forest patches; support funding for urban forestry; educate community on importance of and care for trees.

1.B. Protect and enhance meadows.

Open, grassy habitats are relatively limited in Seattle, with our largest examples at Discovery Park, Magnuson Park, and Genesee Park. Despite meadow restoration at these sites, species that rely on grassy habitats, like Savannah Sparrow, have declined, suggesting that additional stressors are limiting habitat use. The timing and frequency of management activities, such as mowing, may be an issue, along with trampling and disturbance by park visitors and their pets.

Recommended actions: Coordinate with Seattle Parks on wildlife-friendly mowing schedules; restore areas of non-native turf grass lawns with native grasses and forbs; restore areas that have been trampled by social trails and prevent new social trails from emerging by restricting access in sensitive areas and educating park visitors; enforce leash laws; cultivate partnerships with Seattle City Light to enhance meadow habitat along Chief Sealth Trail.

1.C. Protect and enhance aquatic systems.

Counts for many species of waterfowl and waterbirds declined. To see species which had been doing well in recent decades decline, such as Gadwall and Brant, may signal degrading wetland habitat quality and loss of key habitats such as eelgrass beds. Likewise, the absence of many shorebird species from later NBP counts may point to the need for improved shoreline management and restoration.

Polluted stormwater runoff is a significant threat to water quality and aquatic life. Pesticides easily end up in water bodies, killing aquatic organisms and diminishing the prey base for many species.

Recommended actions: Restore shorelines with structural diversity; enforce laws barring pets from entering public beaches; protect and restore nearshore eelgrass habitat; investigate and mitigate chemical contamination in water bodies.

2. Mitigate and prepare for climate impacts.
Given that most of all species assessed—regardless of count trajectory—are moderately to highly vulnerable to climate change, the future of Seattle's birds depends on our ability to mitigate climate change and to help habitats and birds adapt.

Recommended actions: Support climate adaptation strategies for resilient, high quality bird habitat within urban areas; advocate for biodiversity strategies to be included in city and regional climate action plans; partner with and support organizations working for an equitable transition to a green economy.

3. Support insect populations.
Insects are critical to ecosystem health, resilience, and functioning. They underpin biodiversity, including bird diversity: the vast majority of terrestrial bird species rely on insects as a food source, especially while rearing chicks. There are alarming signs that global insect populations are crashing (van der Sluijs, 2020). The steep declines we found for counts of swifts, swallows, and other aerial insectivores may be a warning of losses in the insect prey base here at home.

Insects are facing "death by a thousand cuts," with pressures from habitat loss, insecticides, climate change, and more taking a toll (Wagner et al., 2021). Despite their ecological importance, myriad threats, and widespread declines, insect conservation receives far less attention and support than that of many other taxa.

Recommended actions: Reduce or eliminate insecticide use, especially broad-spectrum outdoor sprays and granules; grow native plants and trees, especially "keystone plants" that best support beneficial insects; support organic farming; create pollinator gardens; retain fall leaves and dead plant material in place for overwintering habitat; reduce artificial light at night; learn about and appreciate insects; partner with and learn from invertebrate conservation organizations.

Tree Swallow

The decline of aerial insectivores, such as Tree Swallows, may indicate a declining insect prey base. While swallows, swifts, and flycatchers are particularly sensitive to changes in insect abundance, insect decline has serious implications for biodiversity more generally. Conserving and supporting insect populations deserve more attention and resources.

4. Reduce human-related bird morality
Urban environments create hazards for birds, including bird window-collisions, entanglement, predation and disturbance by pets, poisoning, vehicle collisions, and more. These hazards can be sources of additive bird mortality that kill billions of birds across North America each year (Loss, Will & Marra, 2015). Local impacts may be significant, too: early results from the Seattle Bird Collision Monitoring Project suggest that window collision mortality at residential structures in Seattle could exceed 80,000 deaths per year (BCS, 2024).

Recommended actions: Install bird-safe window treatments; keep cats and dogs leashed or indoors; support integrated pest management and avoid anticoagulant rodenticides; clean bird feeders regularly and site them to reduce collision risk; clear improperly discarded fishing line from aquatic systems; reduce artificial light at night; report incidents of human-related bird mortality at DBIRD.ORG.

This Orange-crowned Warbler died after colliding with a window on the Seattle University campus. Window collisions kill tens of thousands of birds every year in Seattle. Reducing stressors like these is an important strategy for urban bird conservation.

5. Support nesting opportunities for species that nest on human structures.
Modern building design and management practices seek to exclude birds from nesting, which may negatively impact species that nest on human structures like Barn Swallows and Cliff Swallows. The destruction of mud nests at Building 27 in Magnuson Park and the subsequent crash in Cliff Swallow counts is a poignant example. But coexistence is possible, as demonstrated by Seattle City Light's support of Osprey nesting on light poles and even building dedicated nesting platforms.

Recommended actions: Find ways to accommodate nesting while managing genuine human-wildlife conflicts; promote policies and practices that follow the Osprey example.

6. Inspire individual action.
The threats birds face are daunting—but a better future is possible. We all have a role to play in creating a world where people and birds thrive. Whether it's creating habitat at home, contacting elected officials, or supporting conservation organizations, every action matters. Explore the resources below to learn more and get involved.

LEARN

See our blog for 10 actions we can all take to protect birds.

DONATE

Financial support is one of the most impactful ways you can help right now.

JOIN US

Check our calendar for classes, outings, volunteer opportunities, and more.

PART IV: SUPPORTING INFORMATION

Brant

Analytical Methods

Data analysis was done in R (R Core Team, 2025) using RStudio (Posit Team, 2025) and Tidyverse package suite (Wickham et al., 2019). Spatial analyses and products were done in ArcGIS Pro (Esri, 2024).

Overcoming Spatial Sampling Flaws

The Neighborhood Bird Project's spatial sampling design required survey stations to be at least 200 meters apart to prevent double-counting and ensure statistical independence. However, this analysis found that only 21 of 207 active stations (10%) met this threshold.

To address this sampling flaw, we subset the data to include only stations meeting the distance requirement. Given the station arrangement, the number of valid subset permutations is extremely large. Analyzing just a single permutation could produce biased results, while analyzing all permutations would be time and computationally prohibitive.

We therefore generated 100 spatial subsets using a greedy randomized algorithm (Feo & Resende, 1995). For each subset:

1. An initial station was selected at random.
2. Additional stations were randomly selected one at a time, evaluated, and included only if ≥200 m from all previously selected stations.
3. The process continued until all stations were evaluated.

This approach balanced randomness with computational efficiency while maximizing subset size for each permutation.

Figure 4.1 illustrates the spatial sampling flaw along a hypothetical loop and shows possible subset permutations.

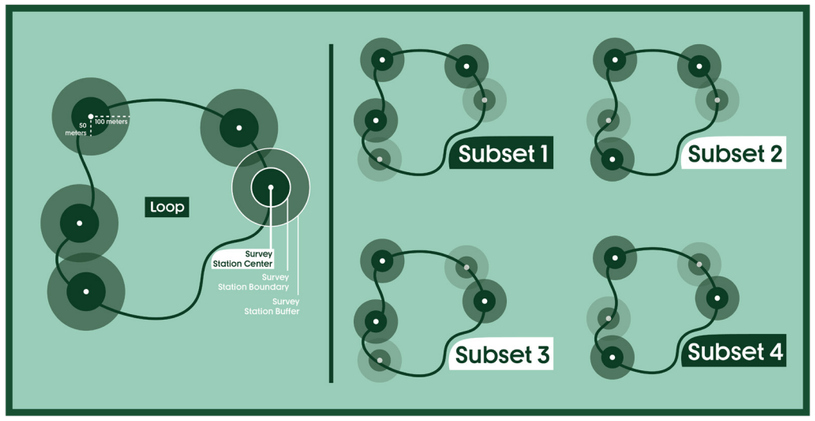


Figure 4.1: Illustration of spatial sampling flaws and potential subsetting along a hypothetical survey loop. In this example, four subsets meet the distance requirement. Across all NBP count stations, the number of valid subsets is extremely large—likely on the order of millions or more.

Estimating Species Richness

Species richness estimates were derived from using the vegan package (Oksanen et al., 2026). We estimated and report on first-order jackknife estimates of species richness, a widely used method for estimating species richness (Smith & van Belle, 1984). This approach adjusts observed richness based on the number of rarely detected species, accounting for those that may have gone undetected. As a result, jackknife estimates are typically higher than observed ("naïve") richness.

Yearly richness was estimated for each site using jackknife estimator repeated across multiple subsets of the data. To quantify uncertainty, we simulated values from the jackknife estimates using their associated standard errors and combined these simulations across subsets. Final annual richness estimates and 95% confidence intervals were derived from the distribution of simulated values.

Richness trends were assessed using a Poisson generalized linear model with a log link function. Estimated yearly richness served as the response variable, and z-standardized year was included as a fixed effect. Because the objective was to identify broad temporal trends rather than to infer mechanisms, no additional covariates were included in the model.

Modeling Overall Count Trends

Total bird counts were modeled as generalized linear mixed-effect Poisson-distributed models with a log link. Fixed effects include year (z-standardized); site, month, and precipitation as factors; and survey effort. We also included an interaction between year and park and random intercepts for survey loop and observation ID to account for variability not explained by the fixed effects. Models were fit with the glmmTMB package (Brooks et al., 2017); dispersion, outlier, and zero-inflation statistics were calculated from simulations from the DHARMa package (Hartig, 2024); and mean trends were calculated using the emmeans package (Lenth & Piaskowksi, 2026).

For park- and loop-specific count trends, the variables included in the final model may differ slightly from the overall model or other park-specific model based on diagnostics such as Akaike Information Criterion and performance under leave one out cross validation.

We estimated temporal trends using generalized linear mixed-effects models fit to multiple subsets of the data. We then used estimated marginal trends to extract the slope of year (i.e., the rate of change over time) both overall and for each loop when applicable. Repeating this process across all subsets yielded a distribution of trend estimates, allowing us to assess consistency and uncertainty in model-derived coefficients.

To quantify uncertainty in predicted values, we simulated model outcomes under a range of plausible parameter values. For each model, we generated repeated predictions by drawing from the estimated uncertainty around the model's fitted values and transforming these to the response scale. We then combined simulations across all candidate models, allowing both within-model uncertainty and differences among models to contribute to the final estimates. Summary statistics (means and 95% intervals) were calculated from the full set of simulated predictions.

Modeling Species-specific Count Trends

Trends were estimated only for species detected in at least 10 years and with a minimum of 20 total individuals recorded across surveys, ensuring sufficient data for reliable inference.

Species-specific counts were modeled as Poisson-distributed generalized linear models with a log link. Because of the large number of models to run, species-specific count models were simplified relative to overall count models. Fixed effects included year (z-standardized), month (categorical), and survey effort. Models were fit with the glmmTMB package (Brooks et al., 2017); dispersion, outlier, and zero-inflation statistics were calculated from simulations from the DHARMa package (Hartig, 2024); and mean trends were calculated using the emmeans package (Lenth & Piaskowksi, 2026).

For each model, we extracted the coefficient for year and its standard error, then generated simulated draws from these estimates. Simulations were pooled across all subsets to produce average trends and corresponding 95% uncertainty intervals for each species.

Exploring Correlates of Species-specific Count Trends

After estimating project-wide, species-specific count trends, we examined how annual rates of change in counts were associated with a range of life-history and ecological traits. These included migratory behavior, body size, habitat preferences, trophic level and niche, feeder use, regional establishment status, and other characteristics (Rosenberg et al., 2019; Tobias et al. 2022; Project FeederWatch, 2024). We also calculated maximum observed group size for each species during the baseline period (2005 to 2009). We also calculated the maximum observed group size for each species during the baseline period (2005–2009). Associations were evaluated using appropriate statistical approaches, including generalized linear models, analysis of variance, and t-tests.

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NBP Participants at Lake Forest Park on March 1, 2026. Left to right: Rory Kliewer, Linda Phillips, David Hepp. Photo courtesy of Jeremy Schwartz.

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Cover Brant. Photo: Matthew Leaman / Audubon Photography Awards; I**nside Front** Common Goldeneye. Photo: Matthew Leaman / Audubon Photography Awards; **Pg 3** Canada Goose. Photo: Frank Hildebrand / Audubon Photography Awards; **Pgs 4–5** Bald Eagle and American Crows. Photo: Matt D'Alessio / Audubon Photography Awards; **Pg 10** Anna's Hummingbird. Photo: Chelsey Morar / Audubon Photography Awards; **Pg 11** American Crow; American Coot / Dyer Kennedy / Audubon Photography Awards; Herring Gull. Photo: Tasha Thomas / Audubon Photography Awards; Spotted Owl. Photo: Sylvia Hunt / Audubon Photography Awards; **Pg 13** Common Raven. Photo: Wirestock / Canva; **Pg 15** Mallard. Photo: Mirceau / Getty Images / Canva; **Pg 17** Dark-eyed Junco. Photo: Ray Bilcliff / Pexels / Canva; **Pg 19** American Coot. Photo: Todd Nelson / Audubon Photography Awards; **Pg 21** Glaucous-winged Gull. Photo: pilipenkoD / Getty Images / Canva; **Pg 23** Violet-green Swallow / James Smith / Audubon Photography Awards; Pg 25: Killdeer. Photo: Paul Kusmin / Audubon Photography Awards; **Pg 24** Cliff Swallow. Photo: Ben Knoot / Audubon Photography Awards; **Pg 27** Pileated Woodpecker. Photo: Jocelyn Anders / Audubon Photography Awards; **Pg 29** Golden-crowned Kinglet. Photo: Dale Vanderheyden / Audubon Photography Awards; **Pgs 30–31** Savannah Sparrow. Photo: Susan Ward / Audubon Photography Awards; **Pg 32** Purple Finch. Photo: WilliamSherman / Getty Images Signature / Canva; Red-breasted Nuthatch. Photo: Megumi-Aita / Audubon Photography Awards; **Pg 35:** Tree Swallow. Photo: Pamala Monahan / Audubon Photography Awards; **Pg 36** Orange-crowned Warbler collision at Seattle University. Photo: Joshua Morris / Birds Connect Seattle; **Pgs 37–38** Brant. Photo: Ryan Leimbach / Audubon Photography Awards; **Pg 40** NBP participants at Magnuson Park, Dec. 10, 2005. Photo: Birds Connect Seattle; **Pgs 42–43** NBP participants at Lake Forest Park, March 1, 2026. Photo: Jeremy Schwartz

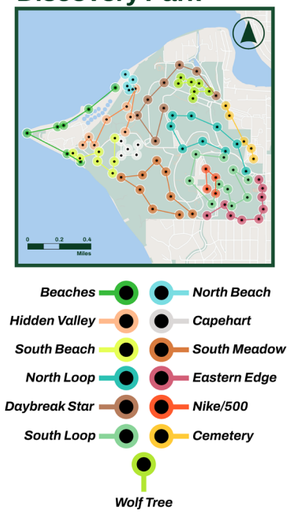
(Opposite page) NBP participants at Magnuson Park, December 10, 2005.
Back row (left to right): Herb Curl, Barbara Blaire, Jeffrey Nystuen, Mary Ann Soltez, Donna Schaeffer.
Front row (left to right): Etta Cosey, Alice Arnold, Eric Wagner, Janice Bragg, Pam Cahn.

Appendix A: Site and Loop Context Maps

Carkeek Park

Cheasty Greenspace

Discovery Park



Genesee Park

Golden Gardens

Lake Forest Park

Lincoln Park

Magnuson Park

Seward Park

Wash. Arboretum

Appendix B: Species Richness by Site and Year

	Project-wide		Carkeek Park		Discovery Park		Genesee Park		Golden Gardens		Lake Forest Park		Magnuson Park		Seward Park		Wash. Park Arboretum	
Year	Obs	Jack	Obs	Jack	Obs	Jack	Obs	Jack	Obs	Jack	Obs	Jack	Obs	Jack	Obs	Jack	Obs	Jack
2005	122	141	45	59	103	128	39	52	63	81	21	29	71	86	59	73	32	39
2006	127	149	46	59	108	135	36	48	55	69	28	39	72	88	57	69	40	47
2007	117	132	44	54	97	118	35	46	55	67	21	28	65	77	57	72	41	52
2008	122	136	46	58	103	121	34	47	62	80	21	28	70	88	47	57	39	49
2009	124	146	49	64	96	117	38	54	58	75	26	37	69	88	61	77	36	42
2010	124	146	45	56	100	124	29	37	62	78	24	35	69	84	58	72	39	46
2011	127	147	49	59	100	121	32	42	67	86	19	25	67	78	73	90	39	50
2012	114	126	48	62	94	115	32	43	53	66	23	32	70	87	67	79		
2013	132	161	47	58	101	124	35	51	53	65	22	30	71	90	77	92	40	51
2014	118	139	49	60	80	96	34	44	53	69	23	32	71	86	74	92	45	57
2015	121	140	50	62	96	117	32	43	55	73	22	33	68	80	63	78	42	50
2016	111	126	45	56	78	92	34	45	53	65	23	32	67	82	57	68	34	40
2017	114	128	44	55	95	112	33	46	47	64	23	34	73	93	58	70	36	46
2018	107	119	40	48	89	106	35	47	44	57	20	27	63	75	59	78	38	49
2019	102	113	52	66	86	101	31	42	49	60	23	34	61	76	46	58	39	50
2020																		
2021																		
2022	113	129	53	63	95	111	33	43	51	61	16	20	65	84	54	66	38	49
2023	104	118	49	60	85	98	33	44	50	63	22	32	58	71	39	49	38	50

Obs = Observed species richness; the number of distinct species recorded per year at a given site.
Jack = First-order jackknife estimate of species richness; a bias-corrected estimate that accounts for species likely present but not detected.

Surveys were not conducted in 2020 and 2021. Data were not available for Wash. Park Arboretum in 2012.

Appendix C: Survey Total Count Trends by Site and Loop

Site/Loop	Count trend	Stat. sig?	% change	Lower % change	Upper % change
Carkeek Park: Overall	Declining	No	-17%	-36%	14%
Carkeek Park: Pipers Creek Loop	Declining	Yes	-40%	-56%	-17%
Carkeek Park: Venema Meadow Loop	Increasing	No	15%	-20%	91%
Discovery Park: Overall	Declining	Yes	-25%	-34%	-13%
Discovery Park: Beaches	Declining	No	-18%	-43%	18%
Discovery Park: Daybreak Star	Stable	No	-10%	-34%	24%
Discovery Park: Eastern Edge	Declining	Yes	-40%	-56%	-18%
Discovery Park: Hidden Valley Trail	Stable	No	4%	-32%	57%
Discovery Park: North Beach Trail	Declining	No	-28%	-63%	18%
Discovery Park: North Loop Trail	Declining	Yes	-48%	-60%	-31%
Discovery Park: South Loop Trail	Declining	No	-44%	-65%	6%
Discovery Park: South Meadow	Declining	Yes	-36%	-54%	-10%
Discovery Park: Wolf Tree Nature Trail	Increasing	No	25%	-15%	205%
Genesee Park: Overall	Increasing	No	135%	-23%	358%
Golden Gardens: Overall	Declining	Yes	-36%	-46%	-25%
Lake Forest Park: Overall	Declining	No	-42%	-74%	23%
Magnuson Park: Overall	Declining	Yes	-32%	-45%	-15%
Magnuson Park: Back Fence Loop	Declining	Yes	-41%	-58%	-14%
Magnuson Park: Main Drag Loop	Declining	Yes	-38%	-59%	-7%
Magnuson Park: South End Loop	Declining	No	-23%	-50%	18%
Magnuson Park: Waterfront Loop	Declining	No	-24%	-48%	18%
Seward Park: Overall	Stable	No	-3%	-24%	24%
Seward Park: East Loop	Declining	No	-15%	-41%	24%
Seward Park: West Loop	Increasing	No	10%	-23%	59%
Washington Park Arboretum: Overall	Declining	Yes	-41%	-60%	-23%

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.

Appendix D.1: Species Count Trends: Project-wide

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Coot	Rails and Coots	Increasing	No	344%	-77%	1770%	2.35	10.43
American Crow	Crows and Jays	Declining	Yes	-35%	-41%	-27%	8.07	5.26
American Goldfinch	Finches	Declining	Yes	-63%	-69%	-56%	1.34	0.49
American Robin	Thrushes	Declining	Yes	-27%	-35%	-17%	4.81	3.52
American Wigeon	Ducks and Geese	Stable	No	4%	-47%	105%	2.61	2.72
Anna's Hummingbird	Hummingbirds	Increasing	Yes	83%	58%	112%	0.89	1.63
Bald Eagle	Hawks and Eagles	Increasing	No	26%	-14%	84%	0.13	0.16
Band-tailed Pigeon	Pigeons and Doves	Declining	Yes	-80%	-87%	-55%	0.36	0.07
Barn Swallow	Swallows and Swifts	Declining	Yes	-81%	-92%	-71%	0.71	0.13
Barred Owl	Owls	Increasing	No	38%	-58%	312%	0.02	0.02
Barrow's Goldeneye	Ducks and Geese	Declining	Yes	-79%	-89%	-53%	0.09	0.02
Belted Kingfisher	Kingfishers	Increasing	No	17%	-32%	102%	0.04	0.05
Bewick's Wren	Wrens	Stable	No	1%	-14%	19%	0.79	0.8
Black-capped Chickadee	Chickadees	Declining	Yes	-19%	-28%	-11%	3.28	2.65
Black-headed Grosbeak	Grosbeaks and Tanagers	Increasing	No	39%	-43%	225%	0.03	0.03
Black-throated Gray Warbler	Warblers	Increasing	Yes	492%	221%	1010%	0.01	0.08
Brant	Ducks and Geese	Declining	Yes	-94%	-97%	-87%	0.28	0.02
Brown Creeper	Treecreepers	Increasing	Yes	117%	71%	178%	0.26	0.57
Brown-headed Cowbird	Blackbirds	Declining	Yes	-81%	-89%	-67%	0.16	0.03
Bufflehead	Ducks and Geese	Declining	Yes	-38%	-54%	-11%	0.53	0.33
Bushtit	Bushtits	Declining	Yes	-68%	-77%	-56%	1.28	0.41
California Gull	Gulls and Terns	Declining	Yes	-29%	-43%	-15%	0.61	0.44
California Quail	Introduced Species	Declining	Yes	-99%	-100%	-97%	0.04	0
Canada Goose	Ducks and Geese	Stable	No	0%	-41%	39%	1.02	1.01
Canvasback	Ducks and Geese	Declining	Yes	-97%	-99%	-92%	0.09	0

Count trend = Qualitative description of the trend in count totals.
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Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Caspian Tern	Gulls and Terns	Increasing	Yes	136%	52%	324%	0.07	0.16
Cedar Waxwing	Waxwings	Declining	Yes	-43%	-59%	-20%	0.53	0.3
Chestnut-backed Chickadee	Chickadees	Increasing	Yes	30%	10%	51%	1.14	1.48
Cliff Swallow	Swallows and Swifts	Declining	Yes	-96%	-98%	-92%	0.23	0.01
Common Goldeneye	Ducks and Geese	Increasing	No	59%	-3%	183%	0.22	0.35
Common Loon	Loons	Declining	No	-58%	-89%	66%	0.01	0
Common Merganser	Ducks and Geese	Increasing	Yes	115%	6%	512%	0.19	0.41
Common Raven	Crows and Jays	Increasing	Yes	17871%	6766%	48384%	0	0.08
Common Yellowthroat	Warblers	Increasing	Yes	643%	55%	3040%	0	0.03
Cooper's Hawk	Hawks and Eagles	Increasing	No	13%	-34%	92%	0.06	0.06
Dark-eyed Junco	Sparrows	Increasing	Yes	412%	323%	536%	0.62	3.19
Double-crested Cormorant	Cormorants	Increasing	No	59%	-1%	126%	0.31	0.49
Downy Woodpecker	Woodpeckers	Stable	No	4%	-29%	51%	0.14	0.14
Eurasian Wigeon	Ducks and Geese	Declining	No	-59%	-88%	50%	0.01	0
European Starling	Introduced Species	Declining	Yes	-89%	-93%	-85%	2.83	0.3
Evening Grosbeak	Finches	Declining	Yes	-79%	-92%	-49%	0.01	0
Fox Sparrow	Sparrows	Increasing	No	28%	-24%	119%	0.09	0.11
Gadwall	Ducks and Geese	Declining	Yes	-69%	-79%	-47%	0.71	0.22
Glaucous-winged Gull	Gulls and Terns	Declining	Yes	-38%	-48%	-27%	2.46	1.54
Golden-crowned Kinglet	Kinglets	Declining	Yes	-53%	-60%	-45%	3.52	1.66
Golden-crowned Sparrow	Sparrows	Declining	Yes	-58%	-78%	-12%	0.23	0.1
Great Blue Heron	Herons	Increasing	No	48%	-5%	154%	0.11	0.16
Greater Scaup	Ducks and Geese	Declining	Yes	-68%	-94%	-11%	0.56	0.18
Green-winged Teal	Ducks and Geese	Declining	Yes	-89%	-95%	-72%	0.01	0
Hairy Woodpecker	Woodpeckers	Increasing	No	73%	-29%	312%	0.02	0.03

Count trend = Qualitative description of the trend in count totals.
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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.1: Species Count Trends: Project Wide

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Heermann's Gull	Gulls and Terns	Declining	Yes	-97%	-98%	-96%	0.48	0.01
Hermit Thrush	Thrushes	Increasing	No	118%	-27%	521%	0.01	0.03
Herring Gull	Gulls and Terns	Declining	Yes	-67%	-86%	-21%	0.01	0
Hooded Merganser	Ducks and Geese	Declining	Yes	-78%	-91%	-35%	0.05	0.01
Horned Grebe	Grebes	Stable	No	-3%	-36%	48%	0.21	0.2
House Finch	Finches	Declining	Yes	-58%	-73%	-29%	1.59	0.67
House Sparrow	Introduced Species	Declining	Yes	-100%	-100%	-100%	0.22	0
Hutton's Vireo	Vireos	Increasing	No	57%	-15%	198%	0.06	0.09
Killdeer	Shorebirds	Declining	Yes	-99%	-100%	-93%	0.23	0
Lesser Scaup	Ducks and Geese	Declining	Yes	-86%	-96%	-44%	0.57	0.08
Lincoln's Sparrow	Sparrows	Declining	Yes	-90%	-97%	-70%	0.03	0
Mallard	Ducks and Geese	Increasing	No	14%	-20%	109%	2.18	2.48
Merlin	Falcons	Stable	No	7%	-65%	220%	0.01	0.01
Northern Flicker	Woodpeckers	Declining	Yes	-46%	-55%	-34%	0.76	0.41
Northern Rough-winged Swallow	Swallows and Swifts	Declining	No	-61%	-89%	36%	0.02	0.01
Northern Shoveler	Ducks and Geese	Declining	No	-63%	-91%	40%	0.07	0.03
Olive-sided Flycatcher	Flycatchers	Declining	No	-39%	-83%	124%	0.01	0.01
Orange-crowned Warbler	Warblers	Stable	No	-3%	-35%	50%	0.12	0.12
Osprey	Osprey	Increasing	Yes	248%	87%	577%	0.03	0.1
Pacific Wren	Wrens	Declining	Yes	-34%	-46%	-20%	0.81	0.53
Peregrine Falcon	Falcons	Declining	No	-59%	-92%	98%	0.01	0
Pied-billed Grebe	Grebes	Increasing	No	27%	-34%	191%	0.09	0.11
Pigeon Guillemot	Murres and Puffins	Declining	Yes	-80%	-95%	-34%	0.02	0
Pileated Woodpecker	Woodpeckers	Increasing	Yes	133%	33%	293%	0.04	0.1
Pine Siskin	Finches	Declining	Yes	-40%	-58%	-11%	2.69	1.62

Count trend = Qualitative description of the trend in count totals.
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Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Purple Finch	Finches	Increasing	Yes	2092%	986%	4577%	0.01	0.13
Red Crossbill	Finches	Declining	No	-20%	-41%	12%	0.03	0.03
Red-breasted Merganser	Ducks and Geese	Declining	Yes	-70%	-85%	-42%	0.13	0.04
Red-breasted Nuthatch	Nuthatches	Increasing	Yes	41%	18%	70%	0.5	0.7
Red-breasted Sapsucker	Woodpeckers	Increasing	No	232%	-11%	1144%	0.01	0.02
Red-necked Grebe	Grebes	Declining	Yes	-83%	-93%	-62%	0.08	0.01
Red-tailed Hawk	Hawks and Eagles	Declining	No	-47%	-75%	10%	0.03	0.02
Red-winged Blackbird	Blackbirds	Declining	Yes	-86%	-95%	-72%	0.37	0.05
Rhinoceros Auklet	Murres and Puffins	Declining	No	-37%	-63%	5%	0.05	0.03
Ring-billed Gull	Gulls and Terns	Declining	No	-51%	-75%	14%	0.35	0.17
Ring-necked Duck	Ducks and Geese	Declining	No	-40%	-63%	14%	0.15	0.09
Rock Pigeon	Introduced Species	Stable	No	-1%	-16%	23%	0.9	0.89
Ruby-crowned Kinglet	Kinglets	Declining	Yes	-52%	-63%	-39%	0.68	0.33
Rufous Hummingbird	Hummingbirds	Declining	No	-50%	-78%	3%	0.06	0.03
Savannah Sparrow	Sparrows	Declining	Yes	-72%	-83%	-56%	0.44	0.12
Sharp-shinned Hawk	Hawks and Eagles	Declining	Yes	-90%	-98%	-56%	0.02	0
Short-billed Gull	Gulls and Terns	Increasing	No	24%	-3%	57%	2.23	2.77
Song Sparrow	Sparrows	Stable	No	-2%	-12%	10%	3.07	3.02
Spotted Sandpiper	Shorebirds	Declining	Yes	-83%	-96%	-20%	0.01	0
Spotted Towhee	Sparrows	Stable	No	2%	-12%	18%	1.24	1.27
Steller's Jay	Crows and Jays	Declining	Yes	-32%	-50%	-9%	0.31	0.21
Surf Scoter	Ducks and Geese	Declining	No	-10%	-61%	92%	0.1	0.09
Swainson's Thrush	Thrushes	Increasing	No	21%	-27%	98%	0.09	0.11
Townsend's Warbler	Warblers	Stable	No	10%	-44%	115%	0.05	0.06
Tree Swallow	Swallows and Swifts	Declining	No	-13%	-66%	94%	0.15	0.13

Count trend = Qualitative description of the trend in count totals.
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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.1: Species Count Trends: Project Wide

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Varied Thrush	Thrushes	Increasing	No	37%	-13%	97%	0.17	0.23
Vaux's Swift	Swallows and Swifts	Declining	Yes	-92%	-96%	-84%	0.28	0.02
Violet-green Swallow	Swallows and Swifts	Declining	No	-15%	-47%	22%	0.68	0.57
Warbling Vireo	Vireos	Increasing	Yes	175%	57%	384%	0.03	0.09
Western Flycatcher	Flycatchers	Increasing	Yes	487%	348%	680%	0.08	0.49
Western Grebe	Grebes	Declining	Yes	-97%	-99%	-82%	0.18	0.01
Western Gull	Gulls and Terns	Declining	Yes	-87%	-95%	-66%	0.03	0
Western Tanager	Grosbeaks and Tanagers	Increasing	No	16%	-37%	115%	0.03	0.04
Western Wood-Pewee	Flycatchers	Declining	No	-39%	-80%	81%	0.01	0
White-crowned Sparrow	Sparrows	Declining	Yes	-72%	-81%	-60%	0.47	0.13
White-winged Scoter	Ducks and Geese	Declining	Yes	-88%	-98%	-45%	0.03	0
Willow Flycatcher	Flycatchers	Declining	No	-76%	-95%	5%	0.02	0
Wilson's Warbler	Warblers	Increasing	Yes	157%	88%	248%	0.09	0.24
Yellow Warbler	Warblers	Declining	No	-56%	-90%	81%	0.01	0
Yellow-rumped Warbler	Warblers	Increasing	No	17%	-44%	157%	0.26	0.31

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.2: Species Count Trends: Carkeek Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Crow	Crows and Jays	Declining	No	-28%	-44%	1%	14.82	10.67
American Goldfinch	Finches	Declining	Yes	-70%	-86%	-36%	1.03	0.3
American Robin	Thrushes	Declining	Yes	-25%	-43%	-5%	6.22	4.64
Anna's Hummingbird	Hummingbirds	Increasing	Yes	154%	50%	331%	1.12	2.84
Bald Eagle	Hawks and Eagles	Increasing	No	89%	-46%	570%	0.04	0.08
Band-tailed Pigeon	Pigeons and Doves	Declining	Yes	-88%	-94%	-60%	2.24	0.27
Bewick's Wren	Wrens	Declining	No	-35%	-59%	5%	0.83	0.54
Black-capped Chickadee	Chickadees	Declining	Yes	-56%	-64%	-46%	8.8	3.88
Black-headed Grosbeak	Grosbeaks and Tanagers	Increasing	No	56%	-57%	391%	0.04	0.06
Black-throated Gray Warbler	Warblers	Increasing	Yes	545%	121%	1759%	0.03	0.2
Brown Creeper	Treecreepers	Increasing	No	44%	-24%	172%	0.59	0.85
Bushtit	Bushtits	Declining	Yes	-93%	-97%	-82%	3.09	0.22
Chestnut-backed Chickadee	Chickadees	Increasing	Yes	65%	17%	141%	0.92	1.51
Cooper's Hawk	Hawks and Eagles	Declining	No	-65%	-89%	8%	0.11	0.04
Dark-eyed Junco	Sparrows	Increasing	Yes	2023%	453%	11676%	0.13	2.85
Downy Woodpecker	Woodpeckers	Declining	No	-12%	-60%	95%	0.18	0.16
Glaucous-winged Gull	Gulls and Terns	Increasing	No	35%	-19%	109%	0.67	0.9
Golden-crowned Kinglet	Kinglets	Declining	No	-13%	-39%	26%	2.3	2.01
Hairy Woodpecker	Woodpeckers	Increasing	No	93%	-42%	560%	0.07	0.13
House Finch	Finches	Declining	No	-80%	-93%	2%	3.07	0.6
Mallard	Ducks and Geese	Increasing	Yes	17313%	12256%	24186%	0.2	34.98
Northern Flicker	Woodpeckers	Declining	No	-31%	-55%	5%	1.15	0.79
Orange-crowned Warbler	Warblers	Increasing	No	78%	-35%	475%	0.08	0.15
Pacific Wren	Wrens	Declining	Yes	-48%	-64%	-20%	1.32	0.69
Pileated Woodpecker	Woodpeckers	Increasing	No	121%	-45%	516%	0.14	0.31

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Stat. sig? = Indicates whether the trend is statistically significant.
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Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Pine Siskin	Finches	Increasing	No	64%	-37%	266%	3.72	6.11
Red-breasted Nuthatch	Nuthatches	Increasing	Yes	174%	34%	433%	0.21	0.57
Rock Pigeon	Introduced Species	Declining	Yes	-86%	-97%	-58%	0.48	0.07
Ruby-crowned Kinglet	Kinglets	Declining	Yes	-88%	-94%	-75%	1.05	0.13
Song Sparrow	Sparrows	Declining	No	-13%	-29%	7%	6.18	5.38
Spotted Towhee	Sparrows	Increasing	No	21%	-17%	96%	1.39	1.69
Steller's Jay	Crows and Jays	Stable	No	-9%	-46%	53%	0.49	0.45
Swainson's Thrush	Thrushes	Declining	No	-28%	-61%	44%	0.32	0.23
Varied Thrush	Thrushes	Increasing	Yes	290%	22%	1358%	0.07	0.27
Violet-green Swallow	Swallows and Swifts	Declining	Yes	-95%	-99%	-75%	0.53	0.03
Warbling Vireo	Vireos	Increasing	Yes	611%	132%	2081%	0.02	0.16
Western Flycatcher	Flycatchers	Increasing	Yes	1300%	564%	3008%	0.12	1.72
Wilson's Warbler	Warblers	Increasing	Yes	242%	107%	488%	0.33	1.13
Yellow-rumped Warbler	Warblers	Declining	No	-47%	-85%	96%	0.43	0.23

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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.3: Species Count Trends: Discovery Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Crow	Crows and Jays	Declining	Yes	-66%	-72%	-59%	6.08	2.08
American Goldfinch	Finches	Declining	Yes	-67%	-74%	-57%	2.22	0.74
American Robin	Thrushes	Declining	Yes	-30%	-42%	-16%	5.37	3.77
American Wigeon	Ducks and Geese	Declining	No	-61%	-99%	105%	0.87	0.34
Anna's Hummingbird	Hummingbirds	Increasing	Yes	51%	18%	98%	1.02	1.53
Bald Eagle	Hawks and Eagles	Increasing	No	31%	-35%	165%	0.08	0.1
Band-tailed Pigeon	Pigeons and Doves	Declining	Yes	-51%	-75%	-5%	0.18	0.09
Barn Swallow	Swallows and Swifts	Declining	Yes	-97%	-99%	-91%	0.51	0.02
Barred Owl	Owls	Increasing	Yes	636%	47%	3686%	0.01	0.06
Barrow's Goldeneye	Ducks and Geese	Declining	Yes	-84%	-96%	-42%	0.11	0.02
Belted Kingfisher	Kingfishers	Stable	No	-3%	-69%	227%	0.05	0.04
Bewick's Wren	Wrens	Increasing	No	24%	-4%	61%	0.56	0.7
Black-capped Chickadee	Chickadees	Declining	Yes	-27%	-40%	-12%	2.9	2.12
Black-headed Grosbeak	Grosbeaks and Tanagers	Stable	No	-6%	-64%	144%	0.04	0.04
Black-throated Gray Warbler	Warblers	Increasing	Yes	382%	92%	1077%	0.02	0.1
Brown Creeper	Treecreepers	Increasing	Yes	161%	67%	320%	0.16	0.42
Brown-headed Cowbird	Blackbirds	Declining	Yes	-78%	-90%	-46%	0.22	0.05
Bufflehead	Ducks and Geese	Declining	No	-36%	-79%	102%	0.25	0.16
Bushtit	Bushtits	Declining	Yes	-68%	-82%	-44%	1.15	0.36
California Gull	Gulls and Terns	Declining	No	-29%	-56%	14%	0.17	0.12
Canada Goose	Ducks and Geese	Declining	No	-71%	-95%	213%	0.25	0.07
Caspian Tern	Gulls and Terns	Increasing	Yes	154%	50%	432%	0.12	0.32
Cedar Waxwing	Waxwings	Declining	Yes	-54%	-68%	-34%	0.69	0.32
Chestnut-backed Chickadee	Chickadees	Increasing	Yes	77%	30%	145%	0.68	1.21
Common Goldeneye	Ducks and Geese	Increasing	Yes	660%	196%	1641%	0.11	0.81

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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Cooper's Hawk	Hawks and Eagles	Declining	No	-28%	-71%	76%	0.06	0.05
Dark-eyed Junco	Sparrows	Increasing	Yes	180%	116%	275%	0.96	2.69
Double-crested Cormorant	Cormorants	Increasing	Yes	244%	128%	448%	0.2	0.67
Downy Woodpecker	Woodpeckers	Increasing	No	28%	-30%	133%	0.13	0.17
European Starling	Introduced Species	Declining	Yes	-86%	-94%	-69%	3.48	0.48
Fox Sparrow	Sparrows	Increasing	No	72%	-19%	334%	0.11	0.19
Gadwall	Ducks and Geese	Declining	Yes	-99%	-100%	-90%	0.22	0
Glaucous-winged Gull	Gulls and Terns	Stable	No	3%	-23%	37%	1.82	1.88
Golden-crowned Kinglet	Kinglets	Declining	No	-20%	-42%	14%	1.82	1.46
Golden-crowned Sparrow	Sparrows	Declining	No	-66%	-85%	15%	0.37	0.13
Great Blue Heron	Herons	Increasing	No	22%	-53%	235%	0.11	0.13
Greater Scaup	Ducks and Geese	Declining	Yes	-87%	-96%	-73%	0.27	0.03
Hairy Woodpecker	Woodpeckers	Increasing	No	126%	-54%	989%	0.02	0.03
Hermit Thrush	Thrushes	Increasing	No	35%	-67%	463%	0.02	0.02
Horned Grebe	Grebes	Increasing	Yes	127%	31%	267%	0.22	0.49
House Finch	Finches	Declining	No	-37%	-59%	1%	1.11	0.69
House Sparrow	Introduced Species	Declining	Yes	-100%	-100%	-99%	0.21	0
Hutton's Vireo	Vireos	Increasing	Yes	233%	38%	694%	0.04	0.13
Killdeer	Shorebirds	Declining	Yes	-80%	-95%	-19%	0.03	0.01
Lincoln's Sparrow	Sparrows	Declining	Yes	-89%	-97%	-62%	0.05	0.01
Mallard	Ducks and Geese	Declining	No	-44%	-74%	90%	0.93	0.52
Merlin	Falcons	Increasing	No	56%	-63%	588%	0.01	0.01
Northern Flicker	Woodpeckers	Declining	Yes	-56%	-70%	-36%	0.75	0.33
Northern Rough-winged Swallow	Swallows and Swifts	Declining	Yes	-72%	-91%	-15%	0.04	0.01
Northern Shoveler	Ducks and Geese	Declining	No	-68%	-96%	112%	0.08	0.03

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Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Olive-sided Flycatcher	Flycatchers	Declining	No	-19%	-85%	316%	0.02	0.01
Orange-crowned Warbler	Warblers	Stable	No	4%	-37%	78%	0.23	0.24
Osprey	Osprey	Increasing	No	161%	-35%	1169%	0.01	0.03
Pacific Wren	Wrens	Increasing	No	10%	-15%	46%	0.64	0.71
Pigeon Guillemot	Murres and Puffins	Declining	Yes	-70%	-90%	-14%	0.03	0.01
Pileated Woodpecker	Woodpeckers	Increasing	Yes	184%	8%	601%	0.03	0.1
Pine Siskin	Finches	Declining	Yes	-67%	-80%	-35%	3.98	1.33
Purple Finch	Finches	Increasing	Yes	2453%	815%	9609%	0.01	0.36
Red Crossbill	Finches	Declining	No	-28%	-66%	123%	0.04	0.03
Red-breasted Merganser	Ducks and Geese	Increasing	No	18%	-42%	113%	0.12	0.14
Red-breasted Nuthatch	Nuthatches	Increasing	No	19%	-18%	74%	0.39	0.47
Red-necked Grebe	Grebes	Declining	Yes	-56%	-85%	-2%	0.09	0.04
Red-tailed Hawk	Hawks and Eagles	Declining	No	-32%	-77%	103%	0.04	0.03
Red-winged Blackbird	Blackbirds	Declining	Yes	-94%	-98%	-77%	0.32	0.02
Rhinoceros Auklet	Murres and Puffins	Declining	Yes	-50%	-72%	-15%	0.12	0.06
Rock Pigeon	Introduced Species	Declining	Yes	-70%	-94%	-23%	0.13	0.04
Ruby-crowned Kinglet	Kinglets	Declining	Yes	-43%	-63%	-14%	0.64	0.36
Rufous Hummingbird	Hummingbirds	Declining	No	-42%	-76%	33%	0.13	0.07
Savannah Sparrow	Sparrows	Declining	Yes	-77%	-87%	-60%	0.77	0.18
Short-billed Gull	Gulls and Terns	Increasing	Yes	33%	11%	67%	4.31	5.73
Song Sparrow	Sparrows	Declining	Yes	-30%	-42%	-15%	3.92	2.73
Spotted Towhee	Sparrows	Declining	Yes	-35%	-49%	-16%	1.54	1
Steller's Jay	Crows and Jays	Declining	Yes	-53%	-75%	-17%	0.3	0.14
Surf Scoter	Ducks and Geese	Increasing	No	11%	-54%	141%	0.22	0.24
Swainson's Thrush	Thrushes	Increasing	No	58%	-22%	223%	0.11	0.18

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Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.3: Species Count Trends: Discovery Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Townsend's Warbler	Warblers	Increasing	No	144%	-42%	937%	0.02	0.06
Tree Swallow	Swallows and Swifts	Declining	Yes	-99%	-100%	-91%	0.1	0
Varied Thrush	Thrushes	Stable	No	6%	-39%	79%	0.22	0.23
Violet-green Swallow	Swallows and Swifts	Declining	Yes	-89%	-94%	-74%	0.32	0.04
Warbling Vireo	Vireos	Increasing	Yes	128%	8%	393%	0.05	0.12
Western Flycatcher	Flycatchers	Increasing	Yes	253%	146%	417%	0.13	0.47
Western Grebe	Grebes	Declining	Yes	-99%	-100%	-95%	0.23	0
Western Tanager	Grosbeaks and Tanagers	Increasing	No	22%	-67%	299%	0.01	0.01
Western Wood-Pewee	Flycatchers	Declining	No	-25%	-84%	228%	0.01	0
White-crowned Sparrow	Sparrows	Declining	Yes	-74%	-81%	-64%	0.92	0.24
White-winged Scoter	Ducks and Geese	Declining	Yes	-89%	-98%	-42%	0.06	0.01
Willow Flycatcher	Flycatchers	Declining	No	-73%	-97%	77%	0.02	0.01
Wilson's Warbler	Warblers	Increasing	Yes	255%	87%	516%	0.06	0.22
Yellow Warbler	Warblers	Declining	No	-46%	-87%	153%	0.01	0.01
Yellow-rumped Warbler	Warblers	Declining	No	-25%	-74%	175%	0.45	0.33

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Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.4: Species Count Trends: Genesee Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Coot	Rails and Coots	Increasing	Yes	2666%	2413%	2959%	10.58	292.52
American Crow	Crows and Jays	Increasing	Yes	173%	67%	308%	3.39	9.27
American Robin	Thrushes	Stable	No	-10%	-79%	138%	1.24	1.12
American Wigeon	Ducks and Geese	Increasing	Yes	213%	175%	253%	3.90	12.20
Anna's Hummingbird	Hummingbirds	Increasing	No	81%	-44%	715%	0.24	0.44
Barn Swallow	Swallows and Swifts	Declining	No	-31%	-71%	4%	2.66	1.84
Black-capped Chickadee	Chickadees	Increasing	Yes	585%	132%	3423%	0.32	2.16
Bewick's Wren	Wrens	Increasing	No	66%	-21%	258%	0.15	0.26
Bufflehead	Ducks and Geese	Declining	Yes	-38%	-56%	-14%	0.91	0.56
California Gull	Gulls and Terns	Declining	Yes	-26%	-40%	-10%	4.05	2.98
Canada Goose	Ducks and Geese	Increasing	Yes	106%	75%	143%	4.31	8.89
Common Goldeneye	Ducks and Geese	Declining	No	-29%	-61%	38%	0.32	0.23
Common Merganser	Ducks and Geese	Declining	No	-35%	-60%	3%	0.94	0.61
Double-crested Cormorant	Cormorants	Increasing	Yes	458%	269%	762%	0.58	3.24
European Starling	Introduced Species	Declining	Yes	-84%	-97%	-53%	3.82	0.60
Gadwall	Ducks and Geese	Declining	Yes	-61%	-72%	-44%	3.49	1.35
Great Blue Heron	Herons	Increasing	No	69%	-60%	585%	0.05	0.08
Glaucous-winged Gull	Gulls and Terns	Increasing	Yes	186%	66%	590%	1.30	3.70
House Finch	Finches	Increasing	Yes	144%	10%	411%	0.23	0.56
Horned Grebe	Grebes	Increasing	No	21%	-50%	203%	0.12	0.14
Hooded Merganser	Ducks and Geese	Declining	Yes	-89%	-96%	-74%	0.29	0.03
Lesser Scaup	Ducks and Geese	Declining	Yes	-97%	-98%	-95%	1.47	0.04
Mallard	Ducks and Geese	Increasing	Yes	446%	172%	690%	1.54	8.41
Northern Flicker	Woodpeckers	Declining	No	-75%	-98%	34%	0.37	0.09
Osprey	Osprey	Increasing	Yes	146%	7%	507%	0.16	0.40

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Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Pied-billed Grebe	Grebes	Declining	Yes	-62%	-88%	0%	0.21	0.08
Ring-billed Gull	Gulls and Terns	Declining	No	-63%	-89%	196%	2.09	0.78
Ring-necked Duck	Ducks and Geese	Declining	Yes	-50%	-65%	-30%	1.59	0.80
Rock Pigeon	Introduced Species	Declining	No	-74%	-98%	86%	2.29	0.59
Savannah Sparrow	Sparrows	Declining	Yes	-84%	-97%	-27%	0.88	0.14
Short-billed Gull	Gulls and Terns	Declining	Yes	-86%	-97%	-30%	6.77	0.97
Song Sparrow	Sparrows	Increasing	Yes	576%	143%	2502%	0.36	2.45
Spotted Towhee	Sparrows	Increasing	No	116%	-42%	573%	0.06	0.13
Steller's Jay	Crows and Jays	Increasing	Yes	1728%	402%	7550%	0.01	0.17
Violet-green Swallow	Swallows and Swifts	Increasing	Yes	54%	19%	98%	1.87	2.88

Count trend = Qualitative description of the trend in count totals.
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Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.5: Species Count Trends: Golden Gardens

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Crow	Crows and Jays	Declining	Yes	-27%	-36%	-16%	19.408	14.249
American Goldfinch	Finches	Declining	No	-40%	-61%	2%	1.150	0.686
American Robin	Thrushes	Declining	Yes	-66%	-74%	-57%	6.858	2.313
American Wigeon	Ducks and Geese	Declining	Yes	-53%	-57%	-50%	23.725	11.061
Anna's Hummingbird	Hummingbirds	Increasing	Yes	147%	45%	365%	0.800	1.978
Bald Eagle	Hawks and Eagles	Increasing	No	154%	-28%	741%	0.092	0.232
Barrow's Goldeneye	Ducks and Geese	Declining	Yes	-78%	-90%	-40%	0.792	0.176
Belted Kingfisher	Kingfishers	Increasing	No	144%	-3%	485%	0.142	0.346
Bewick's Wren	Wrens	Increasing	Yes	102%	19%	223%	0.658	1.330
Black-capped Chickadee	Chickadees	Declining	Yes	-23%	-41%	0%	3.608	2.788
Brown Creeper	Treecreepers	Increasing	Yes	140%	40%	343%	0.308	0.739
Bufflehead	Ducks and Geese	Declining	Yes	-67%	-80%	-51%	0.742	0.241
Bushtit	Bushtits	Declining	Yes	-55%	-76%	-21%	2.642	1.189
California Gull	Gulls and Terns	Declining	Yes	-45%	-63%	-23%	2.483	1.368
Canada Goose	Ducks and Geese	Declining	Yes	-25%	-43%	-2%	3.200	2.394
Caspian Tern	Gulls and Terns	Increasing	No	29%	-42%	195%	0.175	0.226
Chestnut-backed Chickadee	Chickadees	Increasing	Yes	209%	77%	466%	0.583	1.802
Common Goldeneye	Ducks and Geese	Declining	No	-42%	-77%	50%	0.358	0.208
Dark-eyed Junco	Sparrows	Increasing	Yes	3842%	1895%	8005%	0.033	1.314
Double-crested Cormorant	Cormorants	Declining	No	-13%	-51%	57%	1.217	1.058
European Starling	Introduced Species	Declining	Yes	-96%	-98%	-94%	3.750	0.142
Glaucous-winged Gull	Gulls and Terns	Declining	Yes	-66%	-70%	-62%	28.033	9.533
Golden-crowned Kinglet	Kinglets	Increasing	Yes	60%	15%	120%	1.333	2.137
Great Blue Heron	Herons	Stable	No	-4%	-52%	134%	0.608	0.586
Horned Grebe	Grebes	Declining	Yes	-79%	-89%	-59%	1.842	0.388

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Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
House Finch	Finches	Increasing	No	60%	-17%	208%	0.425	0.679
Mallard	Ducks and Geese	Declining	Yes	-76%	-96%	-21%	16.842	3.982
Northern Flicker	Woodpeckers	Increasing	No	19%	-37%	141%	0.592	0.704
Northern Shoveler	Ducks and Geese	Declining	Yes	-57%	-74%	-22%	0.475	0.203
Pacific Wren	Wrens	Declining	Yes	-81%	-89%	-66%	1.392	0.268
Red-breasted Merganser	Ducks and Geese	Declining	Yes	-97%	-99%	-94%	1.633	0.047
Red-breasted Nuthatch	Nuthatches	Increasing	No	18%	-42%	151%	0.300	0.353
Red-necked Grebe	Grebes	Declining	Yes	-98%	-100%	-91%	0.675	0.015
Ring-billed Gull	Gulls and Terns	Declining	Yes	-79%	-95%	-34%	0.300	0.063
Rock Pigeon	Introduced Species	Increasing	Yes	58%	40%	79%	11.858	18.779
Ruby-crowned Kinglet	Kinglets	Declining	No	-62%	-87%	11%	0.350	0.134
Short-billed Gull	Gulls and Terns	Increasing	Yes	214%	18%	616%	0.075	0.236
Song Sparrow	Sparrows	Increasing	Yes	254%	160%	372%	1.492	5.282
Spotted Towhee	Sparrows	Stable	No	-2%	-46%	83%	0.858	0.843
Western Gull	Gulls and Terns	Declining	Yes	-88%	-95%	-65%	0.550	0.065
White-crowned Sparrow	Sparrows	Declining	No	-55%	-80%	8%	0.617	0.277
Wilson's Warbler	Warblers	Increasing	No	11%	-62%	186%	0.192	0.212

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.6: Species Count Trends: Lake Forest Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Coot	Rails and Coots	Declining	Yes	-78%	-80%	-76%	17.20	3.78
American Crow	Crows and Jays	Increasing	Yes	67%	15%	141%	1.65	2.76
American Robin	Thrushes	Declining	No	-10%	-54%	111%	0.25	0.23
American Wigeon	Ducks and Geese	Increasing	Yes	425%	321%	542%	0.53	2.80
Anna's Hummingbird	Hummingbirds	Increasing	Yes	325%	30%	1202%	0.04	0.15
Bald Eagle	Hawks and Eagles	Declining	No	-46%	-90%	103%	0.27	0.15
Barn Swallow	Swallows and Swifts	Declining	Yes	-97%	-99%	-95%	1.32	0.04
Black-capped Chickadee	Chickadees	Declining	No	-19%	-46%	24%	0.74	0.59
Bufflehead	Ducks and Geese	Declining	Yes	-52%	-68%	-29%	0.88	0.42
Canada Goose	Ducks and Geese	Declining	Yes	-93%	-96%	-89%	1.41	0.10
Chestnut-backed Chickadee	Chickadees	Increasing	No	36%	-45%	182%	0.03	0.05
Common Merganser	Ducks and Geese	Increasing	No	30%	-49%	238%	0.16	0.21
Double-crested Cormorant	Cormorants	Declining	Yes	-88%	-95%	-72%	0.36	0.04
Dark-eyed Junco	Sparrows	Increasing	Yes	1335%	742%	2265%	0.03	0.36
Downy Woodpecker	Woodpeckers	Declining	Yes	-87%	-97%	-54%	0.15	0.02
European Starling	Introduced Species	Declining	Yes	-97%	-99%	-92%	0.87	0.03
Gadwall	Ducks and Geese	Declining	Yes	-92%	-94%	-88%	2.69	0.21
Golden-crowned Kinglet	Kinglets	Declining	No	-53%	-80%	2%	0.18	0.09
Glaucous-winged Gull	Gulls and Terns	Increasing	Yes	157%	8%	430%	0.13	0.32
Killdeer	Shorebirds	Declining	Yes	-91%	-93%	-87%	2.33	0.22
Mallard	Ducks and Geese	Increasing	Yes	15%	1%	29%	5.16	5.93
Pied-billed Grebe	Grebes	Declining	Yes	-82%	-93%	-56%	0.23	0.04
Ring-billed Gull	Gulls and Terns	Declining	No	-36%	-63%	21%	0.17	0.11
Song Sparrow	Sparrows	Increasing	Yes	862%	267%	2209%	0.04	0.42
Violet-green Swallow	Swallows and Swifts	Declining	Yes	-97%	-98%	-93%	1.07	0.04

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
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Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.7: Species Count Trends: Magnuson Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Coot	Rails and Coots	Declining	No	-82%	-99%	176%	3.01	0.54
American Crow	Crows and Jays	Increasing	No	23%	-8%	77%	3.08	3.80
American Goldfinch	Finches	Declining	Yes	-59%	-73%	-38%	1.21	0.49
American Robin	Thrushes	Stable	No	-4%	-38%	67%	2.81	2.69
American Wigeon	Ducks and Geese	Declining	No	-41%	-79%	5%	3.17	1.87
Anna's Hummingbird	Hummingbirds	Increasing	No	39%	-3%	105%	0.57	0.80
Bald Eagle	Hawks and Eagles	Declining	No	-59%	-88%	34%	0.07	0.03
Barn Swallow	Swallows and Swifts	Declining	Yes	-73%	-83%	-55%	0.70	0.19
Bewick's Wren	Wrens	Increasing	Yes	62%	13%	131%	0.44	0.71
Black-capped Chickadee	Chickadees	Increasing	Yes	100%	56%	156%	1.22	2.44
Brown-headed Cowbird	Blackbirds	Declining	Yes	-85%	-93%	-66%	0.26	0.04
Bufflehead	Ducks and Geese	Declining	Yes	-53%	-75%	-6%	0.93	0.44
Bushtit	Bushtits	Declining	No	-40%	-77%	20%	0.96	0.57
California Gull	Gulls and Terns	Increasing	No	101%	-27%	874%	0.73	1.47
Canada Goose	Ducks and Geese	Declining	No	-14%	-52%	50%	1.41	1.21
Caspian Tern	Gulls and Terns	Increasing	No	214%	-9%	987%	0.03	0.08
Cedar Waxwing	Waxwings	Stable	No	-6%	-47%	113%	0.62	0.58
Chestnut-backed Chickadee	Chickadees	Increasing	Yes	580%	129%	1925%	0.00	0.02
Cliff Swallow	Swallows and Swifts	Declining	Yes	-95%	-97%	-89%	0.91	0.05
Common Goldeneye	Ducks and Geese	Increasing	No	26%	-40%	134%	0.46	0.58
Common Merganser	Ducks and Geese	Declining	No	-16%	-77%	107%	0.28	0.24
Common Yellowthroat	Warblers	Increasing	Yes	1018%	102%	5088%	0.01	0.09
Cooper's Hawk	Hawks and Eagles	Increasing	Yes	576%	86%	2832%	0.02	0.12
Dark-eyed Junco	Sparrows	Increasing	Yes	1120%	346%	3470%	0.20	2.42
Double-crested Cormorant	Cormorants	Declining	Yes	-65%	-87%	-17%	0.27	0.09

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Downy Woodpecker	Woodpeckers	Increasing	Yes	221%	2%	863%	0.05	0.15
European Starling	Introduced Species	Declining	Yes	-89%	-92%	-81%	3.81	0.43
Fox Sparrow	Sparrows	Stable	No	-9%	-61%	114%	0.15	0.14
Gadwall	Ducks and Geese	Declining	No	-41%	-65%	2%	0.38	0.22
Glaucous-winged Gull	Gulls and Terns	Stable	No	1%	-45%	112%	0.44	0.44
Golden-crowned Kinglet	Kinglets	Increasing	No	76%	-26%	372%	0.08	0.13
Golden-crowned Sparrow	Sparrows	Declining	Yes	-66%	-85%	-25%	0.33	0.11
Great Blue Heron	Herons	Stable	No	3%	-77%	319%	0.03	0.03
Greater Scaup	Ducks and Geese	Declining	No	-57%	-93%	41%	1.74	0.75
Herring Gull	Gulls and Terns	Declining	Yes	-68%	-88%	-20%	0.04	0.01
Horned Grebe	Grebes	Declining	No	-43%	-85%	96%	0.07	0.04
House Finch	Finches	Declining	Yes	-71%	-81%	-47%	3.52	1.01
Killdeer	Shorebirds	Declining	Yes	-100%	-100%	-100%	0.49	0.00
Lesser Scaup	Ducks and Geese	Declining	Yes	-90%	-100%	-24%	2.11	0.21
Lincoln's Sparrow	Sparrows	Declining	Yes	-84%	-97%	-25%	0.04	0.01
Mallard	Ducks and Geese	Declining	No	-18%	-44%	26%	1.52	1.24
Northern Flicker	Woodpeckers	Declining	Yes	-68%	-82%	-43%	0.38	0.12
Orange-crowned Warbler	Warblers	Declining	No	-77%	-96%	2%	0.05	0.01
Osprey	Osprey	Increasing	Yes	2890%	666%	11225%	0.01	0.25
Pacific Wren	Wrens	Increasing	No	60%	-46%	370%	0.04	0.07
Pied-billed Grebe	Grebes	Declining	No	-52%	-95%	349%	0.05	0.03
Red-breasted Nuthatch	Nuthatches	Increasing	Yes	1921%	352%	9069%	0.00	0.06
Red-necked Grebe	Grebes	Declining	No	-71%	-94%	24%	0.03	0.01
Red-tailed Hawk	Hawks and Eagles	Declining	Yes	-91%	-98%	-61%	0.06	0.00
Red-winged Blackbird	Blackbirds	Declining	Yes	-83%	-97%	-48%	0.58	0.10

Count trend = Qualitative description of the trend in count totals.
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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.7: Species Count Trends: Magnuson Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Ring-billed Gull	Gulls and Terns	Increasing	No	36%	-22%	264%	0.73	1.00
Rock Pigeon	Introduced Species	Declining	Yes	-94%	-99%	-80%	0.43	0.03
Ruby-crowned Kinglet	Kinglets	Declining	No	-24%	-66%	56%	0.31	0.23
Savannah Sparrow	Sparrows	Declining	Yes	-65%	-86%	-31%	0.37	0.13
Short-billed Gull	Gulls and Terns	Increasing	Yes	264%	120%	1029%	0.55	2.00
Song Sparrow	Sparrows	Increasing	No	21%	-18%	79%	0.72	0.87
Spotted Towhee	Sparrows	Increasing	Yes	66%	21%	123%	0.74	1.22
Steller's Jay	Crows and Jays	Declining	No	-45%	-93%	195%	0.06	0.03
Tree Swallow	Swallows and Swifts	Increasing	No	16%	-36%	119%	0.27	0.32
Vaux's Swift	Swallows and Swifts	Declining	Yes	-92%	-97%	-73%	0.55	0.05
Violet-green Swallow	Swallows and Swifts	Increasing	No	24%	-36%	125%	0.94	1.17
Western Grebe	Grebes	Declining	No	-43%	-84%	101%	0.03	0.01
White-crowned Sparrow	Sparrows	Declining	No	-45%	-80%	169%	0.13	0.07
Willow Flycatcher	Flycatchers	Declining	Yes	-83%	-96%	-21%	0.04	0.01
Wilson's Warbler	Warblers	Stable	No	5%	-70%	251%	0.03	0.03
Yellow Warbler	Warblers	Declining	Yes	-89%	-97%	-56%	0.02	0.00
Yellow-rumped Warbler	Warblers	Increasing	Yes	194%	10%	542%	0.16	0.48

Count trend = Qualitative description of the trend in count totals.
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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.8: Species Count Trends: Seward Park

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Coot	Rails and Coots	Increasing	No	34%	-50%	242%	1.97	2.64
American Crow	Crows and Jays	Declining	Yes	-30%	-44%	-16%	17.63	12.39
American Robin	Thrushes	Declining	No	-19%	-45%	18%	5.36	4.36
American Wigeon	Ducks and Geese	Increasing	No	37%	-12%	99%	0.05	0.07
Anna's Hummingbird	Hummingbirds	Increasing	Yes	185%	82%	369%	0.51	1.45
Bald Eagle	Hawks and Eagles	Increasing	No	47%	-22%	187%	0.57	0.83
Band-tailed Pigeon	Pigeons and Doves	Declining	No	-82%	-97%	5%	0.42	0.07
Barn Swallow	Swallows and Swifts	Declining	Yes	-90%	-97%	-68%	0.29	0.03
Belted Kingfisher	Kingfishers	Declining	No	-14%	-71%	141%	0.02	0.01
Bewick's Wren	Wrens	Declining	No	-16%	-42%	21%	1.41	1.18
Black-capped Chickadee	Chickadees	Increasing	No	35%	-11%	89%	3.54	4.79
Brown Creeper	Treecreepers	Increasing	Yes	91%	28%	189%	0.98	1.87
Bufflehead	Ducks and Geese	Increasing	No	21%	-24%	125%	0.99	1.19
Bushtit	Bushtits	Declining	No	-58%	-86%	8%	1.06	0.45
Canada Goose	Ducks and Geese	Stable	No	3%	-40%	92%	1.10	1.13
Cedar Waxwing	Waxwings	Increasing	No	56%	-24%	222%	0.15	0.24
Chestnut-backed Chickadee	Chickadees	Stable	No	0%	-22%	21%	6.21	6.22
Common Goldeneye	Ducks and Geese	Declining	No	-49%	-77%	21%	0.40	0.20
Common Merganser	Ducks and Geese	Stable	No	7%	-65%	129%	0.65	0.70
Dark-eyed Junco	Sparrows	Increasing	Yes	1275%	803%	1956%	0.35	4.87
Double-crested Cormorant	Cormorants	Increasing	No	25%	-32%	132%	0.53	0.66
Downy Woodpecker	Woodpeckers	Declining	Yes	-72%	-91%	-23%	0.32	0.09
European Starling	Introduced Species	Declining	Yes	-93%	-100%	-70%	1.69	0.12
Gadwall	Ducks and Geese	Declining	No	-43%	-73%	27%	1.13	0.64
Glaucous-winged Gull	Gulls and Terns	Declining	Yes	-69%	-90%	-15%	0.61	0.19

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
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Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Golden-crowned Kinglet	Kinglets	Declining	Yes	-57%	-67%	-45%	14.73	6.26
Great Blue Heron	Herons	Increasing	Yes	230%	26%	959%	0.17	0.57
Horned Grebe	Grebes	Increasing	No	89%	-15%	346%	0.03	0.06
House Finch	Finches	Declining	No	-16%	-59%	75%	0.24	0.21
Hutton's Vireo	Vireos	Declining	No	-20%	-74%	182%	0.22	0.17
Mallard	Ducks and Geese	Increasing	No	28%	-30%	125%	1.92	2.45
Northern Flicker	Woodpeckers	Stable	No	-10%	-34%	24%	1.37	1.24
Pacific Wren	Wrens	Declining	Yes	-59%	-75%	-34%	3.05	1.26
Pied-billed Grebe	Grebes	Increasing	No	106%	-2%	455%	0.49	1.01
Pileated Woodpecker	Woodpeckers	Increasing	No	77%	-25%	312%	0.15	0.27
Pine Siskin	Finches	Declining	Yes	-53%	-72%	-20%	3.29	1.56
Purple Finch	Finches	Increasing	Yes	1642%	670%	4277%	0.00	0.87
Red-breasted Nuthatch	Nuthatches	Increasing	Yes	50%	10%	112%	1.78	2.68
Red-winged Blackbird	Blackbirds	Declining	No	-23%	-53%	26%	0.14	0.11
Ring-billed Gull	Gulls and Terns	Declining	Yes	-65%	-84%	-14%	0.35	0.12
Ring-necked Duck	Ducks and Geese	Declining	No	-33%	-72%	39%	0.31	0.21
Ruby-crowned Kinglet	Kinglets	Declining	Yes	-69%	-84%	-48%	1.56	0.48
Rufous Hummingbird	Hummingbirds	Declining	No	-60%	-90%	60%	0.07	0.03
Song Sparrow	Sparrows	Increasing	Yes	36%	10%	65%	4.49	6.11
Spotted Towhee	Sparrows	Increasing	No	29%	-5%	71%	1.89	2.44
Steller's Jay	Crows and Jays	Declining	No	-39%	-69%	16%	0.70	0.43
Swainson's Thrush	Thrushes	Increasing	No	133%	-37%	757%	0.03	0.08
Townsend's Warbler	Warblers	Declining	No	-63%	-89%	27%	0.20	0.07
Varied Thrush	Thrushes	Increasing	No	17%	-54%	162%	0.41	0.48
Vaux's Swift	Swallows and Swifts	Declining	Yes	-92%	-97%	-77%	1.14	0.09

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
Violet-green Swallow	Swallows and Swifts	Increasing	Yes	114%	40%	324%	0.72	1.54
Western Flycatcher	Flycatchers	Increasing	Yes	554%	237%	1108%	0.12	0.81
Western Tanager	Grosbeaks and Tanagers	Declining	No	-36%	-83%	130%	0.09	0.06
Wilson's Warbler	Warblers	Increasing	No	12%	-58%	182%	0.08	0.09
Yellow-rumped Warbler	Warblers	Increasing	No	119%	-33%	664%	0.02	0.05

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

Appendix D.9: Species Count Trends: Wash. Park Arboretum

Common Name	Bird Group	Count trend	Stat. sig?	% change	Lower % change	Upper % change	Baseline mean abund per survey	Final mean abund per survey
American Crow	Crows and Jays	Declining	Yes	-64%	-76%	-47%	11.57	4.12
American Goldfinch	Finches	Increasing	Yes	139%	46%	345%	0.10	0.24
American Robin	Thrushes	Declining	No	-25%	-49%	8%	9.80	7.37
Anna's Hummingbird	Hummingbirds	Increasing	Yes	101%	20%	193%	3.02	6.06
Bewick's Wren	Wrens	Declining	Yes	-45%	-65%	-15%	4.08	2.24
Black-capped Chickadee	Chickadees	Declining	Yes	-35%	-56%	-17%	7.82	5.11
Brown Creeper	Treecreepers	Increasing	Yes	132%	6%	358%	0.53	1.22
Chestnut-backed Chickadee	Chickadees	Increasing	No	45%	-20%	169%	2.52	3.65
Cooper's Hawk	Hawks and Eagles	Increasing	No	23%	-56%	274%	0.18	0.22
Dark-eyed Junco	Sparrows	Increasing	Yes	146%	69%	251%	2.54	6.26
Downy Woodpecker	Woodpeckers	Stable	No	-2%	-79%	316%	0.20	0.20
Glaucous-winged Gull	Gulls and Terns	Declining	Yes	-98%	-100%	-90%	0.64	0.01
Golden-crowned Kinglet	Kinglets	Declining	Yes	-86%	-92%	-75%	19.21	2.76
House Finch	Finches	Increasing	No	39%	-29%	170%	1.80	2.50
Hutton's Vireo	Vireos	Declining	No	-50%	-89%	110%	0.20	0.10
Mallard	Ducks and Geese	Stable	No	-7%	-80%	273%	0.19	0.17
Northern Flicker	Woodpeckers	Declining	Yes	-62%	-79%	-36%	1.39	0.52
Pacific Wren	Wrens	Stable	No	5%	-46%	99%	0.67	0.70
Pine Siskin	Finches	Declining	Yes	-81%	-91%	-58%	7.40	1.43
Red-breasted Nuthatch	Nuthatches	Increasing	No	21%	-12%	64%	2.51	3.05
Ruby-crowned Kinglet	Kinglets	Declining	No	-18%	-55%	34%	1.46	1.19
Song Sparrow	Sparrows	Increasing	Yes	42%	7%	82%	3.28	4.64
Spotted Towhee	Sparrows	Increasing	No	48%	-11%	121%	1.88	2.79
Steller's Jay	Crows and Jays	Declining	No	-11%	-55%	59%	1.03	0.92
Townsend's Warbler	Warblers	Increasing	No	16%	-70%	422%	0.34	0.40
Varied Thrush	Thrushes	Increasing	Yes	156%	9%	484%	0.55	1.41
Western Flycatcher	Flycatchers	Increasing	Yes	409%	86%	1316%	0.05	0.24

Count trend = Qualitative description of the trend in count totals.
Stat. sig? = Indicates whether the trend is statistically significant.
% change = Estimated cumulative percent change in count totals.
Lower % change = Lower bound of the 95% confidence interval for the estimated cumulative percent change.
Upper % change = Upper bound of the 95% confidence interval for the estimated cumulative percent change.
Baseline mean abund per survey = Estimated average abundance per survey over the baseline period (2005–2009)
Final mean abund per survey = Estimated average abundance per survey in 2023.

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Pictured: A single Brant goose in the mist at Carkeek Park