South Bay Salt Pond Waterbird Surveys
September 2024 – May 2025

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Executive Summary

This report summarizes waterbird and water quality monitoring efforts by the San Francisco Bay Bird Observatory between September 2024 and May 2025 at 82 ponds within the South Bay Salt Pond Restoration Project (SBSPRP) and remaining nearby salt production ponds. For over two decades the SBSPRP has been restoring 15,000 acres of former salt evaporation ponds to a mix of tidal marsh and enhanced managed pond habitats. Monitoring has shown declines in some taxa but evidence of cyclical trends in others, which might be the result of external flyway-level climatic or habitat factors or density-dependent regulation. It is important to assess if observed declines were driven by SBSPRP actions or these other factors. As restoration proceeds, understanding waterbirds' habitat use to adaptively manage ponds and restoration planning can help maintain and recover waterbirds in the South Bay.

We examined species richness, abundance, and behavior of waterbird assemblages within pond complexes based on either foraging guild (e.g., diving ducks) or specific species of special concern (e.g., Ruddy Ducks). Multi-year abundances in each taxa's target season (fall, winter, or spring) were compared to baseline values from near the start of the project (2005–2007) to assess long-term trends. To understand the drivers of observed changes we developed and applied a model relating changes in seasonal abundance of each species/guild's abundance to changes in habitat conditions, annual weather, and static site characteristics. For the first time this year, these models were expanded to cover fisheaters, gulls, herons and egrets, and terns, which do not have formal management triggers set.

Counts compared to *last year* include:

- **Recovery from last year:** In 2023–2024 abundances for many species/guilds were at or near record-lows, corresponding with a historically strong El Niño year. Taxa generally recovered this year, with nearly all taxa in the middle-of-the-road distributions of total seasonal abundances.
    - We recorded 1,137,917 total waterbird observations of 86 species (all sites combined), an increase of 355,091 compared to last year.
- **Taxa that increased:** dabbling ducks, diving ducks, medium shorebirds, Ruddy Ducks, and small shorebirds.
    - **Medium shorebirds** had their highest total annual sightings since the modern monitoring analysis began in 2016.
- **Taxa that decreased:** Bonaparte's Gulls, Eared Grebes, fisheaters, gulls, herons and egrets, phalaropes, and terns.
    - **Eared Grebes** were the only guild that remained below-average compared to the last decade of typical abundances.

Key findings from *multi-year trendlines* and comparisons to 2005–2007 baselines include:

- Current multi-year trends are still negative in the SBSPRP despite these increases for seven taxa (dabbling ducks, diving ducks, Ruddy Duck, Eared Grebes, fisheaters, gulls, and small shorebirds) and are stable for the remaining taxa.
- No taxa have notably positive trendlines within the SBSPRP.
- Abundances of seven taxa have fallen below management trigger thresholds (or otherwise below 2005–2007 baseline values) based on average abundances in the *last three years*: small shorebirds, phalaropes, Bonaparte's Gulls, dabbling ducks, fisheaters, herons and egrets, and gulls.

Key findings from habitat models fit to *all years of data* include:

- **Ponds that had been breached** to restore tidal habitat were more likely to see **declines** in abundances of small shorebirds, potentially indicating the negative effects of transitions from mudflat to vegetation.

- Models strongly demonstrate the benefit of reductions in salinity for non-saline-specialist guilds. **Decreases in salinity** were associated with increased abundance of Ruddy Ducks, diving ducks, small shorebirds, phalaropes, dabbling ducks, medium shorebirds, fisheaters, herons and egrets, and terns.
- **Decreases in water depth** were associated with increased abundance of small shorebirds, phalaropes, medium shorebirds, and gulls, but decreased abundance of Eared Grebes.
- **Decreases in water temperature** were associated with increased abundance of small shorebirds, Bonaparte's Gulls, and gulls.
- **Increases in dissolved oxygen** were associated with increased abundance of Ruddy Ducks, dabbling ducks, and fisheaters.
- **Decreases in pH** were associated with increased abundance of Ruddy Ducks and fisheaters.
- **Precipitation had divergent effects across guilds**. Increases in precipitation were associated with increased abundance of dabbling, diving ducks, and fisheaters, but decreased abundance of phalaropes and gulls.
- **Increases in maximum and minimum temperature** were associated with increased abundance of medium shorebirds and Bonaparte's Gulls, respectively.

We recommend that managers use these results to identify probable impacts of management actions before altering any pond management, and cross-reference their knowledge of management changes over the last year with reported actual and predicted shifts in pond conditions and corresponding waterbird abundances.

Introduction

Since 2002, the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) have been restoring 15,100 acres of former salt evaporator ponds in the South San Francisco Bay. The South Bay Salt Pond Restoration Project (SBSPRP) is restoring the area to a mix of tidal wetlands and enhanced pond habitats managed for wildlife. Additional Project goals include enhancing flood protection and improving public access to these wetland areas.

These ponds were previously managed by Cargill Salt for commercial salt production and have been present in the San Francisco Bay for over 150 years (Ver Planck 1958). Both current and former salt ponds have significant wildlife value (Anderson 1970, Accurso 1992, Takekawa et al. 2001, Warnock et al. 2002). As a part of the Pacific Flyway, the San Francisco Bay is a key habitat for migratory and wintering waterbirds, supporting more than a million birds throughout the year (Page et al. 1999, Warnock et al. 2002). The ponds may have become disproportionately important foraging and roosting areas for waterbirds due to the loss of wetlands elsewhere during European settlement, including the draining of over 90% of the wetlands in the Central Valley that form the core of the California's portion of the Pacific Flyway (Dahl 1990). Recognizing the value of the ponds, the SBSPRP plans to retain some of these areas as enhanced pond habitats for wildlife, while restoring many to their historical state as tidal marsh.

Information is needed to ensure that habitat requirements of large numbers of waterbirds can be met with reduced pond acreage, including both salt production ponds and ponds managed for wildlife. After two decades of management changes and restoration, analyses of long-term population trends have shown some species and guilds have increased within the SBSPRP footprint, highlighting benefits of management changes, but others have declined (Van Schmidt & Parsons 2024). Some specialist guilds/species may be at risk of declining as salt ponds altered into enhanced pond habitats and/or restored to tidal action experience changes in water quality characteristics (i.e., salinity, pH, dissolved oxygen, and temperature) that may affect the invertebrate communities that are their food sources. Current and former salt ponds notably support many hypersaline specialist species, such as phalaropes, Eared Grebe, and Bonaparte's Gull, whose saline lake habitats elsewhere in the Great Basin are imperiled by climate change and water withdrawals (Carle et al. 2023, Herring et al. 2025).

The objectives of this ongoing study are to document avian use of current and former salt evaporation ponds in the South San Francisco Bay and to use data collected on waterbird abundance, distribution, and habitat associations to inform regional conservation, management, and habitat restoration efforts. Restoration and monitoring are entering their third decade, and long-term population analyses have shown declines in some species and guilds, but evidence of cyclical trends—regular increases and decreases—in others, which may be driven by climate patterns or density-dependent regulation. It is therefore important to determine the drivers of these long-term trends, and to contextualize local trends with population trends elsewhere in the range, to assess whether observed declines are driven by SBSPRP actions rather than other factors. Understanding how waterbirds use ponds, identifying key habitat associations, and incorporating features essential to pond-dependent species into restoration plans is important to maintaining baseline numbers of waterbirds in the South Bay and recovering populations that have experienced long-term declines.

This report summarizes the results of surveys conducted by San Francisco Bay Bird Observatory (SFBBO) in the South San Francisco Bay pond complexes from **September 2024 to May 2025**.

Methods

Study Area

The study area includes 82 current and former salt ponds in the Santa Clara, Alameda and San Mateo counties of California. The ponds monitored by SFBBO include 25 ponds in the Alviso complex, 12 ponds in the Coyote Hills complex, 4 ponds in the Dumbarton complex, 25 ponds in the Eden Landing complex (pond CP3C is owned by Cargill Salt), 6 ponds in the Mowry complex and 10 ponds in the Ravenswood complex (Fig. 1). Although the Coyote Hills, Dumbarton, and Mowry ponds are owned by Don Edwards San Francisco Bay National Wildlife Refuge, Cargill Salt retains salt-making rights and regulates water flow for salt production. The salinity and depth of all surveyed ponds varied over the course of the year due to management practices and business needs of these organizations.

The salinity and depth of all ponds varies from year to year due to restoration and pond enhancement activities, and the management practices and business needs of salt production. Though not directly the target of management, this results in changes in other water quality parameters—temperature, pH, dissolved oxygen, and specific conductivity—which may also affect invertebrate communities and waterbird abundance.

Waterbird Surveys

We conducted waterbird surveys at each of the 82 ponds in the Alviso, Coyote Hills, Dumbarton, Eden Landing, Mowry, and Ravenswood complexes (Table 1). We performed surveys exclusively at high tide, defined as a tide of 4.0 ft or greater at the Alameda Creek Tide Sub-Station (37° 35.70' N, 122° 08.70' W). Pond surveys were randomized as follows: ponds were split into 6 groups based on geographic location and pond complex (Newark & Mowry, Northern Eden Landing, Southern Eden Landing, Ravenswood, Western Alviso, Eastern Alviso); a random list of these groups was generated, field crews surveyed any accessible ponds within 1 area each survey day and moved to the next area if no ponds were accessible in that area. Each survey round lasted 6 weeks, during which all ponds were visited. Exceptions to this survey schedule occurred in past years due to changes in funding and land access restrictions due to COVID-19.

During each survey, we observed birds from the nearest drivable road or levee using spotting scopes and binoculars. We identified birds to the species level whenever possible, with the exception of long-billed and short-billed dowitchers (identified as "dowitchers"), and greater and lesser scaup (identified as "scaup"). When species identification was not possible, we identified birds to genus (e.g., *Calidris*) or foraging guild (e.g., gulls, small shorebirds, medium shorebirds, phalaropes). For each sighting of an individual bird or bird group of the same species, we recorded behavioral data (whether the bird or bird group was foraging or roosting). For roosting birds only, we recorded whether we observed the bird or bird group on a levee, an island, or a manmade/artificial structure (e.g., blind, fence post).

Water Quality Sampling

During each bird survey, we recorded water levels by reading the water level on staff gauges if present. See Appendix 8 for a list of all ponds and 2025 staff gauge statuses. On occasion, staff gauges were removed, replaced, or moved to a different location. We assumed that staff gauges were redeployed in a standardized manner, and therefore that staff gauge levels are comparable before and after all changes within a pond. In ponds with multiple staff gauges, we recorded only the master staff gauge (indicated by a circle of yellow paint on the gauge post). Observers also visually estimated the proportion of any pond substrate exposed to the air (dry pond bottom or mudflat exposed) to provide a finer-scale characterization of habitat variability.

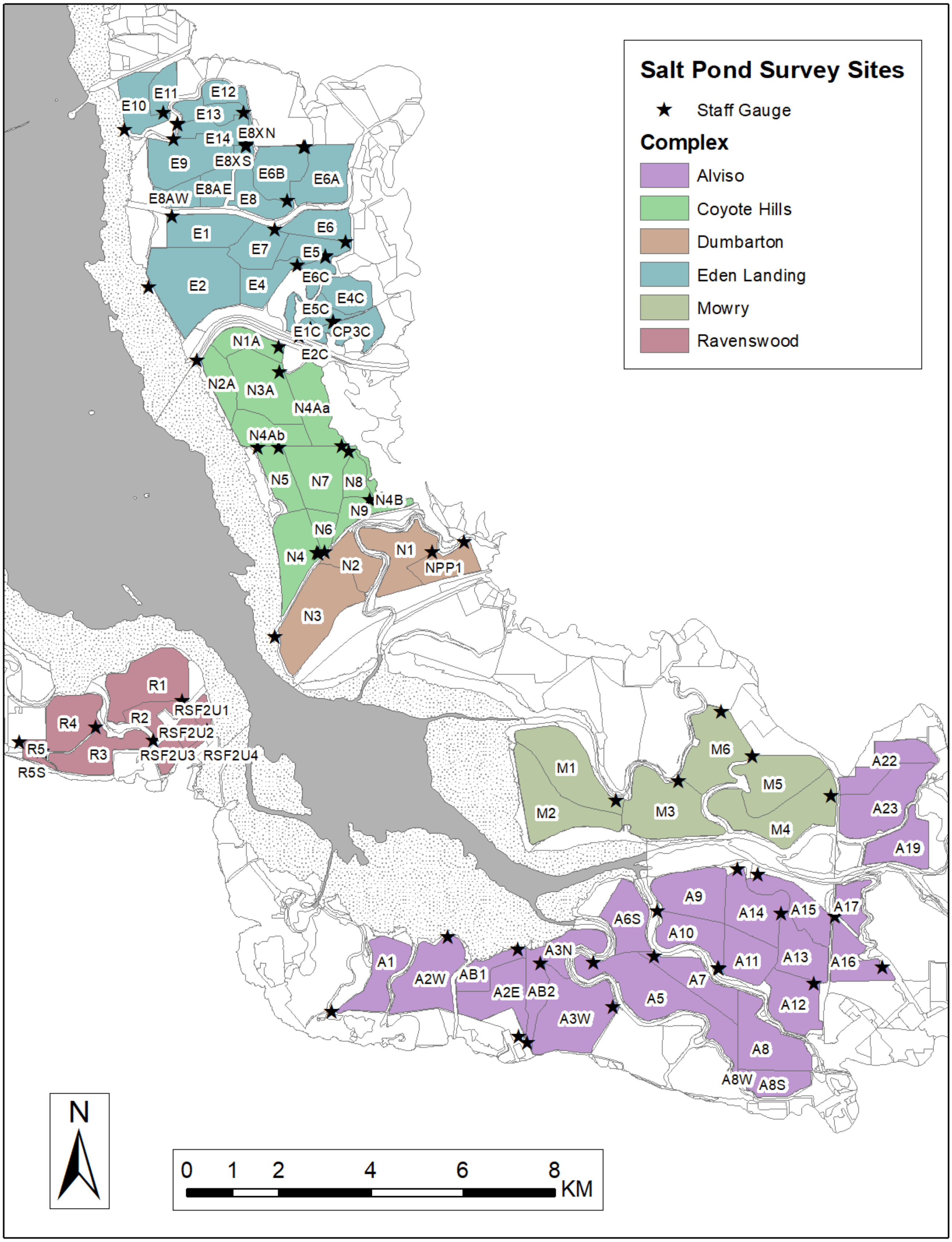

Figure 1. Map of the study area and all current and former ponds surveyed by the San Francisco Bay Bird Observatory from September 2024 – May 2025 in South San Francisco Bay, California.

Table 1. Schedule of surveys for the reporting period. Survey numbers are generated consecutively, dating back to when SFBBO began surveying ponds in 2005. Current surveys comprise visits to 82 ponds at all complexes in a 6-week period and occur twice per season in fall, winter, and spring.

Survey	Season	Month Year	Start Date	End Date
156	Fall	September 2024	2024-09-03	2024-10-11
157	Fall	October 2024	2024-10-15	2024-11-18
158	Winter	December 2024	2024-12-02	2025-01-10
159	Winter	January 2025	2025-01-15	2025-02-26
160	Spring	March 2025	2025-03-03	2025-04-11
161	Spring	April 2025	2025-04-15	2025-05-27

We followed water quality monitoring methods outlined by Murphy et al. (2007). Water quality samples were collected from the surface of the water (depth of <0.5 m). The number of sampling points per pond varied based on the size, configuration, and accessibility of the pond. Most of the 82 total ponds had three (32 ponds, 39%) or two (21 ponds, 26%) sampling points, but a few had one (14 ponds, 17%) or four (12 ponds, 15%). Three ponds (A8W, E8AE, E8AW; 3%), had no water quality points due to inaccessibility of the water surface (e.g., due to being restored to tidal marsh). Some sampling points could also temporarily not be reached due to low water levels within the pond during some surveys. Whenever possible, water quality data was collected on the day of the bird survey, but otherwise was collected as close to the date of the bird survey as possible. We recorded dissolved oxygen (mg/L), salinity (ppt), conductivity (mS), pH, temperature (°C), and barometric pressure (not used as a water quality measure) at 1-4 pre-determined sampling sites at each pond using a Hanna HI98494 Sonde (Hanna Instruments Inc, Woonsocket, RI). When salinities exceeded approximately 70 ppt (the maximum value registered by the Hanna HI98494 Sonde), we calculated salinity using a hydrometer (Ertco, West Paterson, NJ) to measure specific gravity in combination with a temperature reading from the water sample. We calibrated the LDO sensor before the start of each sampling day, and conductivity and pH sensors at the beginning of each week of sampling.

Historical Surveys

Prior to October 2013, two entities, the U.S. Geological Survey (USGS) and SFBBO, conducted monthly waterbird surveys and water quality sampling at South Bay ponds. Beginning in 2002, USGS monitored ponds located within the SBSPRP footprint, while beginning in 2005, SFBBO monitored ponds managed by Cargill Salt for salt production. From October 2013 – January 2014 no waterbird surveys were conducted while the project was in transition. Beginning in January 2014, SFBBO conducted waterbird surveys and water quality sampling at all South Bay ponds (Cargill-managed and SBSPRP ponds). Surveys from January 2014 – November 2017 were conducted twice during the spring, fall, and winter seasons and once during the summer season. No surveys were completed from February 2018 – December 2018. The survey from December 2018 – mid-January 2019 was canceled after counts occurred at four ponds due to funding restrictions; these data are excluded from summary figures. From mid-January 2019 to February 2020, surveys were conducted twice per season in winter, spring, and fall at all 82 accessible ponds. Due to site access limitations associated with the COVID-19 pandemic, 45 ponds were surveyed from March to April 11, 2020 and the 25 ponds within Eden Landing Ecological Reserve were surveyed from April 15 to May 2020 and December 2020 to February 2021 (Tarjan &

Burns 2021). Beginning in September 2021, regular surveys were conducted twice in the fall, winter, and spring at all 82 ponds.

Prior to January 2019, we counted the total number of individuals of all waterbird species present on each pond and recorded the location of each using aerial site photos superimposed with 250x250 m^2 individually labeled grids. Starting in January 2019, birds were only assigned to sites and use of grids was discontinued. All data summarized in this report is at the pond level.

As sites have been breached to restore tidal action, survey units have changed due to loss of access and/or subdivision sites. In 2007, surveys ceased at ponds E10X. In 2010, the southern three units of pond A8 were split off into A8S (eastern unit) and A8W. In 2012, the northern half of pond A6 (A6N) was no longer surveyable from the southern levee, so only the southern half (A6S) has been surveyed since. In 2014, surveys ceased at A20 and A21. In fall 2021, we began surveying pond A19 from the Newby Island Landfill, which substantially increased the area of this tidally restored pond that was visible to surveyors.

Data Summary

Data were analyzed and figures generated in R version 3.5.1 (R Development Core Team 2018). Data were loaded from Microsoft Access in R x86, but all subsequent processing was done in R x64.

Water Quality

We calculated average salinity, temperature, dissolved oxygen, pH, and water level (based on staff gauge values) for each pond by averaging values taken across all sampling locations within that pond during the survey period. Staff gauge values were averaged between all surveys (bird surveys and water quality surveys), but treated as a single value due to potential duplication of data between tables. If ponds were dry enough that no water reached the staff gauge, we did not record any staff gauge reading. For each complex, we calculated average salinity for each season (using the season definitions above). In addition, for discussion purposes, we characterized each pond as low (0-60 ppt), moderate (61-120 ppt), or high (>120 ppt) salinity by averaging means across the study period.

Species Richness

We calculated species richness as the total number of waterbird species observed (with dowitchers and scaup each counting as one "species" because individual species were not distinguished for those taxa) at each pond and pond complex across all surveys from **September 2024 to May 2025**. When calculating species richness we included waterbird species not in the focal guilds (i.e., geese, rallids, and flamingos).

Guilds

We categorized each species into a foraging guild based on foraging methods and prey requirements (see Appendix 1). Guilds of primary interest include dabbling ducks (dabblers), diving ducks (divers), Eared Grebes, fish-eating birds (fisheaters), gulls, herons and egrets, medium shorebirds, phalaropes, small shorebirds, and terns. Geese, rallids, and flamingos were not analyzed. We calculated abundance by guild for each site within the survey area, and then used these abundances to create guild-specific maps of abundance distributions. We also examined guild abundance by pond, complex, season, and year.

For analyses that utilized data from multiple years, we defined years as the year in which the study year started. Generally, this was a four-season year from September through August 2005-2017 for years 2005-2016, and a three-season year from September to May from 2019-present. Due to a hiatus in surveys from January 2018 to December 2018, year 2017 included data from only from September 2017 to January 2018, and year 2018 only from January 2019 to May 2019. There was another hiatus in year 2020 due to COVID-19, where surveys only ran from December 2020 to February 2021. We defined seasons as fall (September, October, and November), winter (December, January, and February), spring (March, April, and May), and summer (June, July, and August). Prior to 2013, the annual reports covered a period from October to September. For the fall season, this meant that data collected in October and November 2011 (for example) were lumped together with data from September 2012. In the 2013 report, we shifted the reporting period to September – August to match our seasonal definitions and to facilitate data interpretation.

Abundance

We estimated "seasonal abundance" (fall, winter, or spring) as the mean number of sightings across the two survey rounds within each season, and used this as our primary measure of inter-annual change and habitat relationship modeling. Due to site fidelity of many birds, we believe that the same individuals were likely re-sighted on surveys close together in time and space, so abundance estimates in this report should be interpreted carefully. Therefore, when discussing the entire year we report only "total sightings" (rather than abundance) as the sum of all bird sightings for each species or guild encountered across all surveys from September 2024 to May 2025. We calculated both total sightings and seasonal abundance at both the pond and complex levels. When reporting total sightings and seasonal abundance of waterbirds as a group, we included species that were not in the focal guilds (i.e., geese, rallids, and flamingos).

To highlight ponds experiencing unusual declines as an early alert, or identify potential beneficial waterbird responses to conditions, we identified unusually high or low abundance of guilds in each pond during each of the three seasons. We listed ponds as having exceptionally low abundance when they were in the 5th percentile of all surveys across all years for a given guild in each season. We identified ponds as having exceptionally high abundance of a given guild when they had both (1) record high mean seasonal counts as compared to all counts in all years for that guild in any season (excluding summer, because these surveys are no longer conducted), and (2) an average seasonal abundance of ten or more (to prevent flagging "high abundance" from unusual observations of a handful of birds at a pond they are generally absent from).

Behavior

Of the total bird sightings (across all surveys), we calculated the proportions of birds observed foraging, roosting, and resting on islands, levees, and manmade structures for each pond. We also examined these proportions at the guild level.

Long-term Trends

Annual variability in count data has historically been high within South San Francisco Bay (De La Cruz et al. 2018), likely due to both real variability in populations (i.e., due to annual weather effects on fecundity and mortality) and stochastic differences in detection rate from year to year (e.g., whether birds happen to be present when on a pond when surveying). Year-to-year changes in abundance may therefore be misleading when drawing inferences about the health of local populations.

Therefore, we used non-parametric locally weighted smoothing (LOESS) regression (package *ggplot2*) and running three-year averages to assess long-term trends (De La Cruz et al. 2018, Tarjan 2021). Earlier reports had also explored linear trends (base package *stats*) and generalized additive models (GAMs), but found these less suitable (De La Cruz et al. 2018, Tarjan 2021). We estimated long-term waterbird trends by selecting the counts within the peak season for each species/guild (i.e., the season when the species/guild was most abundant). Trends were estimated for the entire study area, within the Cargill-managed salt ponds, within the SBSPRP-managed ponds that have so far been retained as managed wildlife ponds, and within the SBSPRP-managed ponds that have been tidally breached (ponds that were eventually breached are included in this group from the start of the study even before they were breached).

Adaptive Management Triggers

Management guidelines are provided by the SBSPRP Adaptive Management Plan (AMP; SBSPRP 2007) to ensure the SBSPRP improves the ecological function and health of San Francisco Bay as part of the Project's NEPA/CEQA requirements. Methods for calculating and comparing current waterbird abundances to baseline values were updated in an effort from 2016-2018 (Tarjan & Heyse 2018). Annual monitoring is based on monitoring of population abundances and comparing these to "trigger values", with higher thresholds for three-year declines and more strict thresholds for one-year declines (Table 2). Triggers were set based on each population's abundance during 2002–2005, before the start of most management activities. Eared Grebes (*Podiceps nigricollis*), Bonaparte's Gulls (*Chroicocephalus philadelphia*), phalaropes, diving ducks, Ruddy Ducks (*Oxyura jamaicensis*), and small shorebirds have had NEPA/CEQA thresholds defined, and the USFWS has also set target levels for dabbling ducks and medium shorebirds (South Bay Salt Pond Restoration Project 2007, Tarjan 2019a). However, the AMP triggers are stricter than NEPA/CEQA thresholds and were intentionally designed as an early warning system. Threshold levels were set for each species/guilds based on abundances during a single focal season (except for small shorebirds, which are assessed for both fall and spring migration; Table 2).

We assessed directional changes in counts over time by comparing the most recent three-year average of complete counts to baseline counts or NEPA/CEQA thresholds when applicable. NEPA/CEQA targets were used for this assessment for each guild/species addressed in the AMP (Appendix I in Tarjan 2021). Formal management triggers have not been set for the remaining guilds: fisheaters, gulls, herons and egrets, and terns. We report hypothetical triggers compared to their baseline values, using their most abundant season as the target season, in order to provide a more complete picture of how waterbird abundance has changed in the South Bay over the past decades.

Change Model

We iterated on a model relating static pond characteristics, changes in pond characteristics, and annual weather to changes in waterbird abundance in order to identify drivers of observed changes in waterbird populations (Van Schmidt & Parsons 2024). Because summer monitoring efforts are no longer conducted and other recent efforts have assessed changes in breeding waterbird habitat selection in salt ponds vs. tidal marsh (Hartman et al. 2021, Schacter et al. 2023), we assessed only non-breeding (migratory and wintering) populations of waterbirds within South San Francisco Bay. Phalaropes were included in our assessment, but it was based on summer records within the long-term SBSPRP monitoring dataset rather than the new Phalarope Migration Surveys (Van Schmidt & Parsons 2024), which will be the subject of a different report. Least Terns were excluded because they had prohibitively low abundances, which made fitting complex models difficult, and because summer surveys of this target species are now covered by other recent studies at SFBBO (Schwarz et al., 2024).

Model Description

A detailed description of the model's development process and methods is provided in Van Schmidt & Parsons (2024). Briefly, we modeled per-pond inter-annual change in abundance of water species or guilds with linear mixed models (package *lme4*), with a random effect for year. Loading and initial reprocessing of habitat variables was done in R v4.1.3 (x86) to permit pulling from Microsoft Access databases, and all other steps were done in R v4.3.1 (x64; R Core Team 2017). For each species/guild, we calculated abundance in a given season as the average count at that pond across all surveys during that season. We calculated response variable, percent change in abundance, as:

$$\%\ Change\ in\ Abundance = Ln(1 + ((Abundance[t] - Abundance[t\text{-}1]) / (Abundance[t\text{-}1] + 1)))\quad (Eq.\ 1)$$

We took the natural log and added 1 to equalize the leverage of percent increases and percent decreases. Because this function is undefined for years where abundance in the first year is zero, we added an adjustment factor (+1) to the denominator to allow us to capture new colonizations. Lastly, zero percent change could indicate either a stable population, or an unoccupied site in both years (i.e., a likely unsuitable site). Because we sought explicitly to model drivers of observed changes in populations, not habitat selection, we removed all rows that were zero in both years from the dataset.

Table 2. Summary of the most recent three-year average waterbird trends (generally water year 2023-2025) compared with SBSPRP targets or baseline values (2005–2007). For phalaropes, counts from the most recent three summers of targeted phalarope surveys (2022-2024; Van Schmidt & Parsons 2024) are compared to a revised July-September baseline (Burns & Van Schmidt 2023). Season = the season(s) in which the taxon's counts are highest. Target = either a comparison to a baseline count without a formal target set (None), a trigger defined by the SBSPRP Adaptive Management Plan (SBSPRP 2007, Appendix 3), or restoration targets set by USFWS Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (USFWS 2013), as originally compiled in Tarjan & Heyse (2018). Baseline = the comparison abundance value, generally the 2005-2007 mean seasonal count. Threshold = NEPA/CEQA significance threshold. % Change = difference between the most recent three-year mean counts and Target/Baseline value. Trigger = true if a trigger was detected; for most taxa, triggers were true if two out of the most recent three consecutive years had counts below baseline values, but for PHAL, BOGU, and EAGR, the trigger was three consecutive years more than 25% below target, or any single year more than 50% below target.

Species/Guild	Season	Target	Baseline	Threshold	Percent Change	Trigger	Years Below	Years >25% Below	Years >50% Below
Ruddy Ducks	Winter	SBSPRP	12,602	-15	0%	FALSE	1		
Diving ducks	Winter	SBSPRP	39,645	-20	12%	FALSE	1		
Small shorebirds	Fall	SBSPRP	60,623	-20	58%	FALSE	1		
Small shorebirds	Spring	SBSPRP	73,728	-20	-18%	TRUE	2		
Eared Grebes	Winter	SBSPRP	5,640	-50	40%	FALSE	0	0	0
Phalaropes	Summer	SBSPRP	5,324	-50	-63%	TRUE	3	2	3
Bonaparte's Gulls	Winter	SBSPRP	1,270	-50	-39%	TRUE	3	0	3
Dabbling ducks	Winter	USFWS	48,524		-9%	TRUE	3		
Medium shorebirds	Winter	USFWS	23,312		13%	FALSE	1		
Fisheaters	Fall	None	7,638		-26%	TRUE	3		
Herons and egrets	Fall	None	1,142		-25%	TRUE	3		
Gulls	Spring	None	28,720		-42%	TRUE	3		
Terns	Fall	None	1,109		29%	FALSE	0		

Model Assessment

We assessed goodness-of-fit of the best model for each guild based on R^2. We report two values: (1) R^2c, which is the proportion of variance attributable to both the fixed effect covariates (i.e., the habitat conditions and accounted for weather variables) and the random effect for year (i.e., the unexplained annual variation, which likely represents both broader population trends and unaccounted for weather variables), and (2) R^2m, which is the proportion of variance attributable to only the fixed effect covariates.

To estimate the impact of the habitat changes and weather on trends within the current year, we used an approach based on effect partitioning and counterfactual analysis. We first predicted the expected percent change for each pond included in the model (i.e., excluding ponds that had missing habitat data for some variables and ponds that were unoccupied in both years). We then predicted the percent change at each pond under four counterfactual alternatives with groups of covariates altered: (1) no random effect for year, (2) no change in site hydrology (breached, gated, and water quality measurements set to last year's values, and "AC" water quality change variables set to 0), (3) average weather (weather variable set to their mean long-term value across all site-years), and (4) each static site characteristic set to the mean value across all site-years. Because the log percent change measure is difficult to interpret in terms of meaningful impacts at the population-scale, we transformed site-scale predictions to predicted actual change in mean abundance by applying the inverse of equation Eq. 1 with the actual value of abundance in the previous year t-1. We then summed these values for each alternative scenario across all sites included in the model. The effect of each of the four groups of covariates on change in overall abundance was then calculated as:

Overall Effect = Sum Abundance Change - Sum Abundance Change in Alternative (Eq. 2)

It is important to note that these estimated effect sizes are based on holding other variables at their real values, and additional variation may arise from the intercept term and residual model error. Therefore, estimated effects from each group of models do not sum to the total predicted change, and should only be compared in terms of the relative magnitude and direction of effects rather than a conclusive determination of drivers of abundance change. Furthermore, R^2 values were generally low, with the majority of variation in population changes was unexplained by the models ($R^2 < 0.5$). Therefore, the ponds with the greatest predicted changes are not always those with the greatest actual change. We report pond-scale changes to draw attention to where changes in site hydrology are most likely to have negatively impacted the birds, but these predictions should be cross-referenced with actual changes and on-the-ground knowledge of pond conditions to understand potential impacts.

Model Improvements

This year, we expanded the analysis to cover all twelve focal species/guilds with the change model, adding fisheaters, gulls, herons and egrets, and terns. The modeling approach otherwise remained the same as in Van Schmidt & Parsons (2025a).

Table 3. Predictor variables used to predict change in seasonal mean waterbird abundance within current and former salt ponds of the South San Francisco Bay. “Base” stage variables were included in all models for a given species/guild, if and only if they were significant in De La Cruz et al. (2018), while “Main” indicates AICc model selection was carried on out on the variable (Appendix 5). “Change model” column indicates whether the variable varied was static across years, varied annually, or was modeled as the year-to-year change in this variable (“Change”, with name suffix “_AC”).

Stage	Group	Name	Description	Units	Change model
Base	Site characteristics	Area_km2	Pond area	km2	Static
		Islands_num	Number of islands	count	Static
		OpenPublic_pct	Maximum % of levees open to public across all years	%	Static
		OpenHunting_pct	Maximum % of levees open for hunting across all years	%	Static
		BayDist_km	Distance to San Francisco Bay	km	Static
		CreekDist_km	Distance to creek/slough	km	Static
		LandfillDist_km	Distance to Tri-cities Landfill	km	Static
Main	Hydrology	Breached	Breached to tidal action	Binary 1 / 0	Annual
		Gated	Gated culvert / semi-tidal	Binary 1 / 0	Annual
		WaterElev_m	Mean water depth	cm	Change
		Salinity	Mean salinity	ppt	Annual + Change
		pH	Mean pH	pH scale	Annual + Change
		LDO_mgL	Mean dissolved oxygen	mg/L	Annual + Change
		Temp_C	Mean water temperature	°C	Annual + Change
	Weather	PPT0	Cumulative annual precipitation – year-to-date	mm	Annual
		PPT1	Cumulative annual precipitation – last year’s only	mm	Annual
		PPT3	Cumulative annual precipitation – last three years	mm	Annual
		TMX	Mean daily maximum temperature for the season	°C	Annual
		TMN	Mean daily minimum temperature for the season	°C	Annual

Results

Overview

Abundance and Trends

Overall, we recorded 1,137,917 total sightings of 86 waterbird species in the Alviso, Coyote Hills, Dumbarton, Eden Landing, Mowry, and Ravenswood pond complexes from September 2024 to May 2025 (Table 4, Fig. 2). This was 355,091 more waterbirds than were detected over the same timespan last year (+45.4%; Fig. 3). This trend was driven by notable increases in small shorebirds (+195,785 sightings; +69.7%), medium shorebirds (+91,958 sightings; +100.3%), diving ducks (+55,605 sightings; +43.2%), Ruddy Ducks (+38,997 sightings; +49.5%), and dabbling ducks (+22,618 sightings; +14.2%), which outpaced notable decreases in Eared Grebes (-4,542 sightings; -16.6%), phalaropes (-1,491 sightings; -29.2%), Bonaparte's Gulls (-1,260 sightings; -31.6%), and terns (-677 sightings; -11.9%) (Appendix 2; Table A2.2). The remaining guilds had minor changes, with slight decreases in gulls (-1,873 sightings; -3.0%), fisheaters (-1,051 sightings; -6.6%), and herons and egrets (-77 sightings; -2.4%) (Table A2.2). The Eden Landing complex supported the highest overall bird count, and the Eden Landing complex had the highest species richness. The lowest overall bird count occurred in the Coyote Hills complex, and lowest species richness was found in the Mowry complex.

In the previous year (2023–2024), abundances for many species/guilds were at or near record-lows, corresponding with a historically strong El Niño year. Nearly all guilds showed signs of recovery this year, with nearly all taxa in the middle-of-the-road distributions of total seasonal abundances compared to the most recent decade of counts (since 2016). Medium shorebirds in particular had their highest total annual sightings since the modern monitoring protocol began in 2016. Only Eared Grebes remained below-average in comparison to the last decade of counts.

Comparing counts to the baseline values in 2005–2007, before most restoration began, abundance of 5 out of 13 taxa assessed (counting small shorebirds twice in both fall and spring) have increased. Small shorebirds, phalaropes, Bonaparte's Gulls, dabbling ducks, fisheaters, herons and egrets, and gulls have declined. As a result of low abundance over the past three survey years, management triggers are currently passed for 7 species/guilds: Bonaparte's Gulls, dabbling ducks, fisheaters, gulls, herons and egrets, phalaropes, and small shorebirds. Note that because triggers could be activated based on just two of the last three years being below the baseline (or for saline specialists just one year more than 50% below), it is possible for a trigger to be TRUE even if the current three-year average is above the baseline.

Table 4. Waterbird species richness, abundance (total sightings for all species combined), and acreage by pond complex and individual pond, South San Francisco Bay, California; September 2024 - May 2025.

Complex	Pond	Species Richness	Total Sightings	% of Total Sightings	% of Total Area	Most Common Taxa
Alviso	A1	42	15837	1.39	1.38	DIVER
	A10	37	7323	0.64	1.26	DIVER
	A11	40	8515	0.75	1.32	DIVER
	A12	13	4785	0.42	1.55	GULL
	A13	19	1458	0.13	1.35	SMSHORE
	A14	42	17174	1.51	1.71	DIVER
	A15	12	1295	0.11	1.27	GULL
	A16	54	40500	3.56	1.22	DABBLER
	A17	38	19356	1.70	0.66	DABBLER
	A19	17	5262	0.46	1.32	DABBLER
	A22	23	10484	0.92	1.35	SMSHORE
	A23	14	10186	0.90	2.25	GULL
	A2E	26	12260	1.08	1.60	DIVER
	A2W	45	16649	1.46	2.16	DIVER
	A3N	24	1549	0.14	0.83	MEDSHORE
	A3W	41	38235	3.36	2.82	DIVER
	A5	47	22906	2.01	3.17	DABBLER
	A6S	23	2175	0.19	1.38	SMSHORE
	A7	41	16795	1.48	1.33	DABBLER
	A8	47	10016	0.88	2.04	DIVER
	A8S	45	4033	0.35	0.84	DIVER
	A8W	41	1081	0.09	0.08	GULL
	A9	45	49977	4.39	1.83	MEDSHORE
	AB1	32	10157	0.89	0.76	DABBLER
	AB2	41	15146	1.33	0.90	MEDSHORE
	Subtotal	**69**	**343154**	**30.16**	**36.37**	**DIVER**
Coyote Hills	N1A	36	2692	0.24	0.83	DIVER
	N2A	37	11210	0.99	0.84	DIVER
	N3A	39	20809	1.83	2.07	DABBLER
	N4	31	6091	0.54	1.68	MEDSHORE
	N4AA	44	10388	0.91	1.49	DABBLER
	N4AB	34	9366	0.82	1.17	DIVER
	N4B	24	3162	0.28	0.32	DIVER
	N5	24	517	0.05	0.95	FISHEAT
	N6	32	4990	0.44	0.46	GULL
	N7	32	4544	0.40	1.88	GULL
	N8	30	2659	0.23	0.56	DIVER
	N9	33	9051	0.80	0.67	DIVER
	Subtotal	59	85479	7.51	12.91	DIVER
Dumbarton	N1	29	15776	1.39	1.70	DABBLER
	N2	25	9698	0.85	0.96	DABBLER
	N3	34	19342	1.70	2.72	SMSHORE
	NPP1	32	58409	5.13	0.95	SMSHORE
	Subtotal	45	103225	9.07	6.32	DIVER

Complex	Pond	Species Richness	Total Sightings	% of Total Sightings	% of Total Area	Most Common Taxa
Eden Landing	CP3C	41	34829	3.06	0.82	SMSHORE
	E1	39	1910	0.17	1.46	DIVER
	E10	33	5280	0.46	1.06	DIVER
	E11	32	14169	1.25	0.62	MEDSHORE
	E12	44	19243	1.69	0.53	SMSHORE
	E13	33	18501	1.63	0.71	SMSHORE
	E14	29	19411	1.71	0.82	SMSHORE
	E1C	15	4747	0.42	0.32	SMSHORE
	E2	46	16054	1.41	3.37	SMSHORE
	E2C	22	2386	0.21	0.14	SMSHORE
	E4	35	12555	1.10	0.96	MEDSHORE
	E4C	26	48567	4.27	0.87	SMSHORE
	E5	23	4458	0.39	0.82	DABBLER
	E5C	22	7264	0.64	0.47	SMSHORE
	E6	35	10102	0.89	0.96	SMSHORE
	E6A	46	27158	2.39	1.58	SMSHORE
	E6B	37	53845	4.73	1.40	SMSHORE
	E6C	23	4508	0.40	0.41	MEDSHORE
	E7	38	6084	0.53	1.07	SMSHORE
	E8	35	22252	1.96	0.93	SMSHORE
	E8AE	17	1103	0.10	0.65	SMSHORE
	E8AW	11	612	0.05	0.60	MEDSHORE
	E8XN	11	1066	0.09	0.05	DIVER
	E8XS	10	265	0.02	0.16	SMSHORE
	E9	36	8483	0.75	1.87	DABBLER
	Subtotal	71	344852	30.31	22.64	DIVER
Mowry	M1	28	39321	3.46	2.45	SMSHORE
	M2	33	29659	2.61	2.39	SMSHORE
	M3	26	22859	2.01	2.71	SMSHORE
	M4	19	19000	1.67	2.64	EAREDGR
	M5	13	14918	1.31	2.05	SMSHORE
	M6	17	7269	0.64	2.20	SMSHORE
	Subtotal	43	133026	11.69	14.44	DIVER
Ravenswood	R1	43	55981	4.92	2.22	SMSHORE
	R2	13	12618	1.11	0.70	SMSHORE
	R3	20	2398	0.21	1.40	SMSHORE
	R4	40	12417	1.09	1.47	SMSHORE
	R5	25	1479	0.13	0.15	DABBLER
	R5S	25	2284	0.20	0.15	MEDSHORE
	RSF2U1	36	25763	2.26	0.28	MEDSHORE
	RSF2U2	40	12664	1.11	0.41	DABBLER
	RSF2U3	16	837	0.07	0.44	SMSHORE
	RSF2U4	21	1740	0.15	0.08	DIVER
	Subtotal	59	128181	11.26	7.31	DIVER
Study Area	**Total**	85	1137917	100.00	100.00	SMSHORE

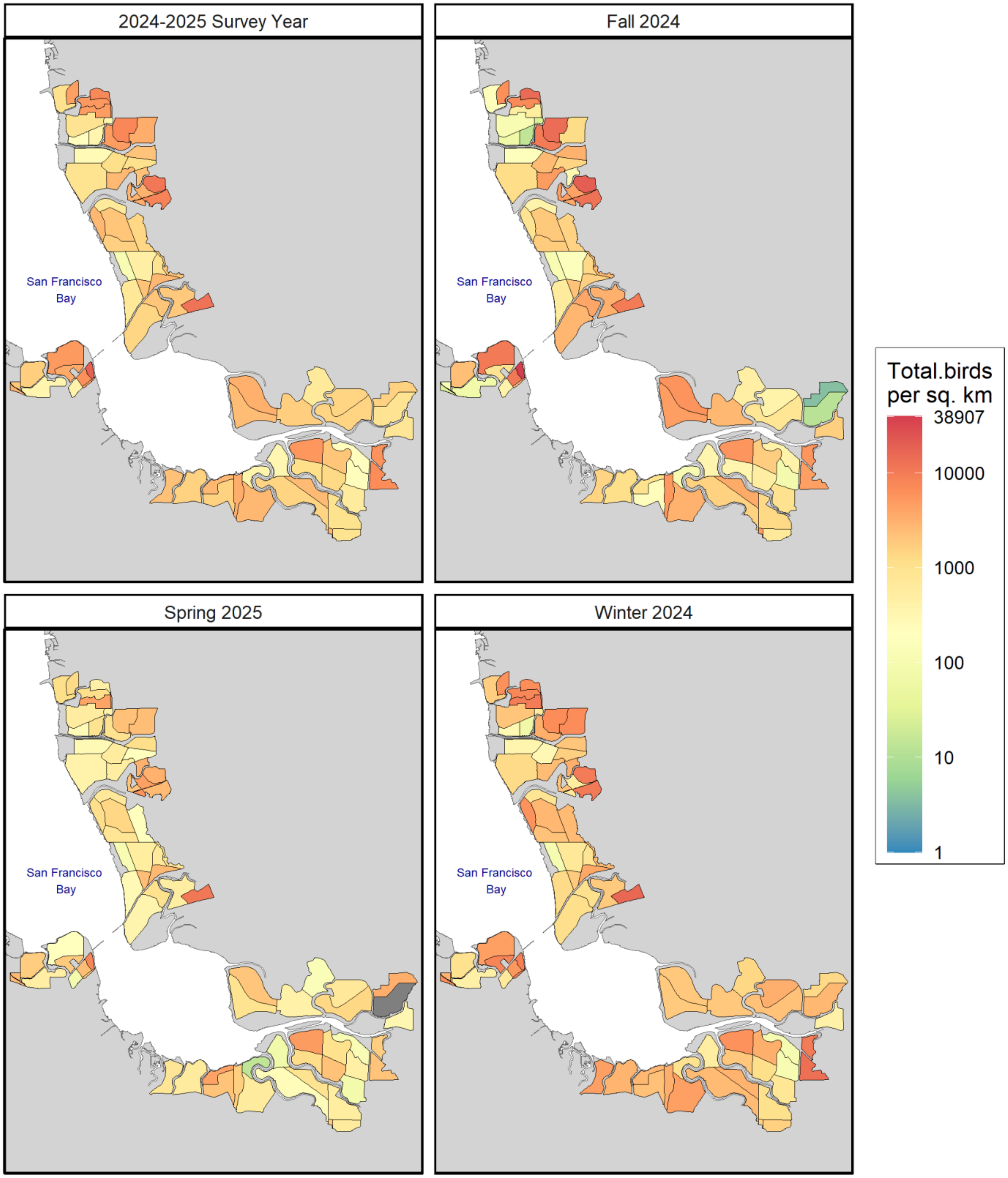

Figure 2. Density of waterbirds (all guilds) averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

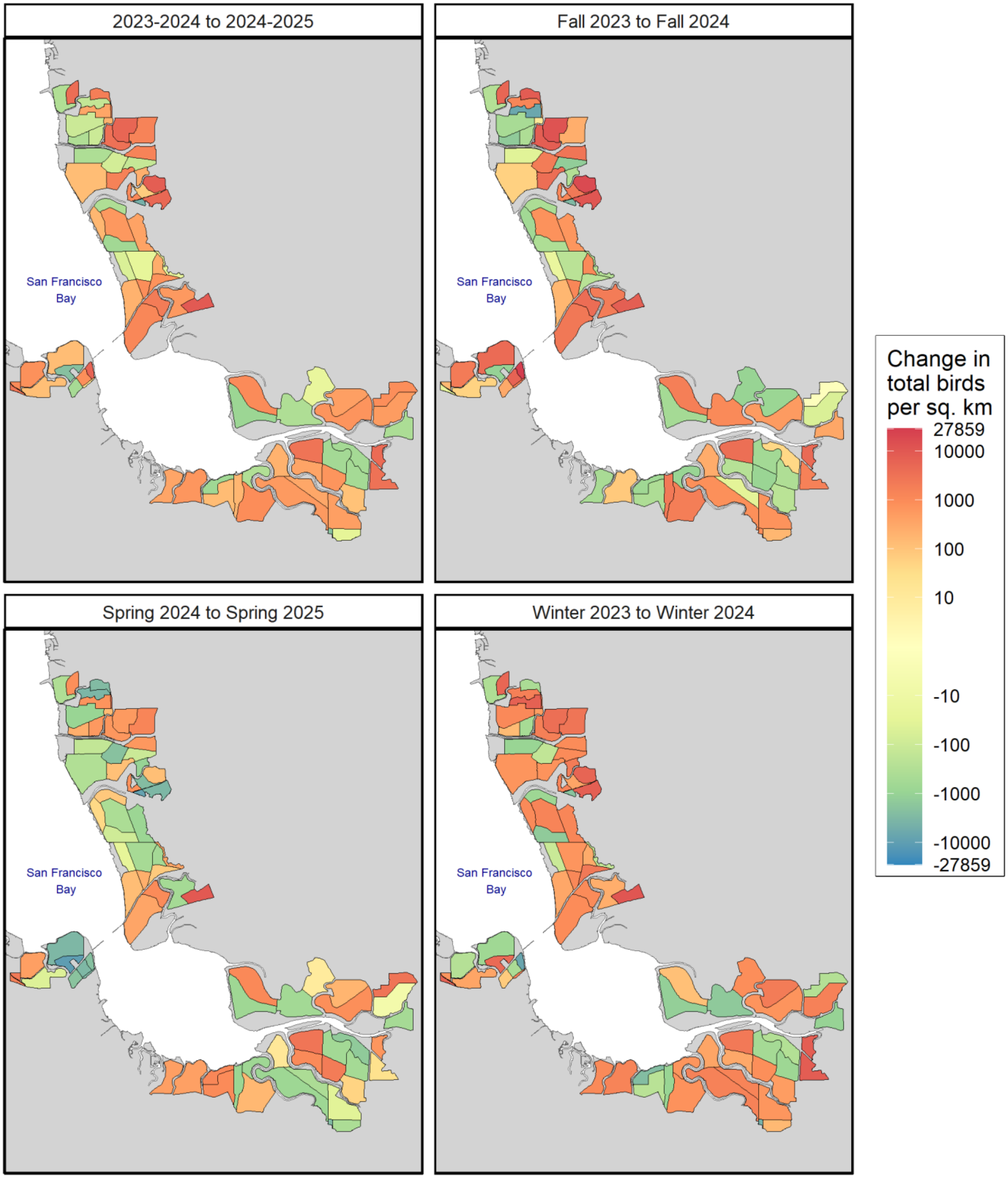

Figure 3. Change in density of waterbirds (all guilds) between September 2023–May 2024 and September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds had no birds in both seasons.

Pond Conditions

Changes in abundance from year to year (Appendix 2) and season to season (Appendix 3) are likely driven by both the timing of species' migrations, weather, and by changes in pond conditions (Appendices 6, 7). Water level and quality parameters likely affected prey availability of foraging birds, contributing to observed guild distribution patterns (Velasquez 1992, Warnock et al. 2002, Takekawa et al. 2006). We found that in Cargill-managed ponds, water quality parameters (Table A6.1) had positive, negative, and no effects on guild abundances (Appendix 5), depending on the guild and the water quality parameter, in agreement with other studies (Scullen et al. 2013, De La Cruz et al. 2018). Due to their connectedness, ponds in the same general area exhibited similar water quality patterns. In the salt-production pond complexes (Coyote Hills, Dumbarton and Mowry) salinity tended to increase as water moved through the system. Seasonal fluctuations occur in salinity and water temperatures, with lower salinities and colder temperatures in the winter months and higher salinities with warmer temperatures in the fall or summer months (Figs. A7.1 – A7.8). Over the course of the year, ponds A8, A19, and A8S were the least saline ponds monitored in the study area, while ponds A12, A15, and A13 were the most saline (Figs. A7.1 – A7.4). Since cold water tends to hold more dissolved oxygen than warm water, ponds tended to show higher dissolved oxygen concentrations in winter months than in summer months (Figs. A7.9 – A7.12). pH values varied between ponds but did not generally show seasonal fluctuations (Figs. A7.13 – A7.16). Influxes of water from rainfall and management practices, time-of-day effects, algal blooms, and rates of photosynthesis and respiration by aquatic biota may also have contributed to fluctuations in water quality parameters. The latter three factors can be particularly important determinants of dissolved oxygen levels and pH (Carpelan 1957).

Staff gauge readings also showed significant season fluctuations in water levels, and some were often dry enough that no water reached the staff gauge such that no staff gauge reading is available for that survey period. (Figs. A7.17 – A7.20). Several other ponds did not have staff gauges present for the entire study period: A10, A11, A12, A15, A19, A22, A23, A2E, A6S, A8, A8S, A8W, N4AB, N4B, NPP1, E4C, E6, E7, E8AE, E8AW, M4, M6, R3, R4, R5, R5S (Table A8.1).

Because annual weather conditions—both air temperature and precipitation—can affect the hydrologic conditions within ponds, it is challenging to disentangle the ultimate drivers of changes in pond abundance. In the subsequent sections we attribute predicted changes in abundance to changes in hydrologic conditions. Managers should interpret such data in conjunction with their own knowledge of what management actions were taken in what ponds to identify where changes in conditions are likely the result of changes in management, versus being driven by weather.

Waterbird Guilds

Dabblers

Abundance

Across all complexes, there were 182,220 total sightings of dabbling ducks (sum sightings during the entire survey period). Compared to last year, this was an increase of 22,618 total sightings (+14.2%; Fig. 4). In their target season of winter they increased by 7.8%. There were on average 12,374 more dabbling ducks detected per survey in fall (Table A2.4), 3,210 more detected in winter (Table A2.6), and 4,275 fewer detected in spring (Table A2.8, Fig. 4).

At the pond level, A16 had the highest abundance (mean count of 4,921 per survey), followed by A5 (1,852) and A7 (1,644; Fig. 5). At these sites, we observed the majority of dabbling ducks roosting on the pond (62.8%, 82.2%, and 53.9%, respectively; Table A4.2). Across all six surveys, the sites with the largest increases in dabbling ducks from last year were A16 (+2,483 mean abundance per visit), A5

(+1,458), and N3 (+1,165), while the sites with the largest decreases were M2 (-1,676), A14 (-1,475), and A3W (-1,206; Fig. 6). Seasonal abundance of dabbling ducks was exceptionally low (5th percentile) at A2E (1 birds in fall). At M1 (2,627 birds in fall), R5 (150 in spring), and R5 (166 in winter), abundance of dabbling ducks was higher than ever previously recorded there.

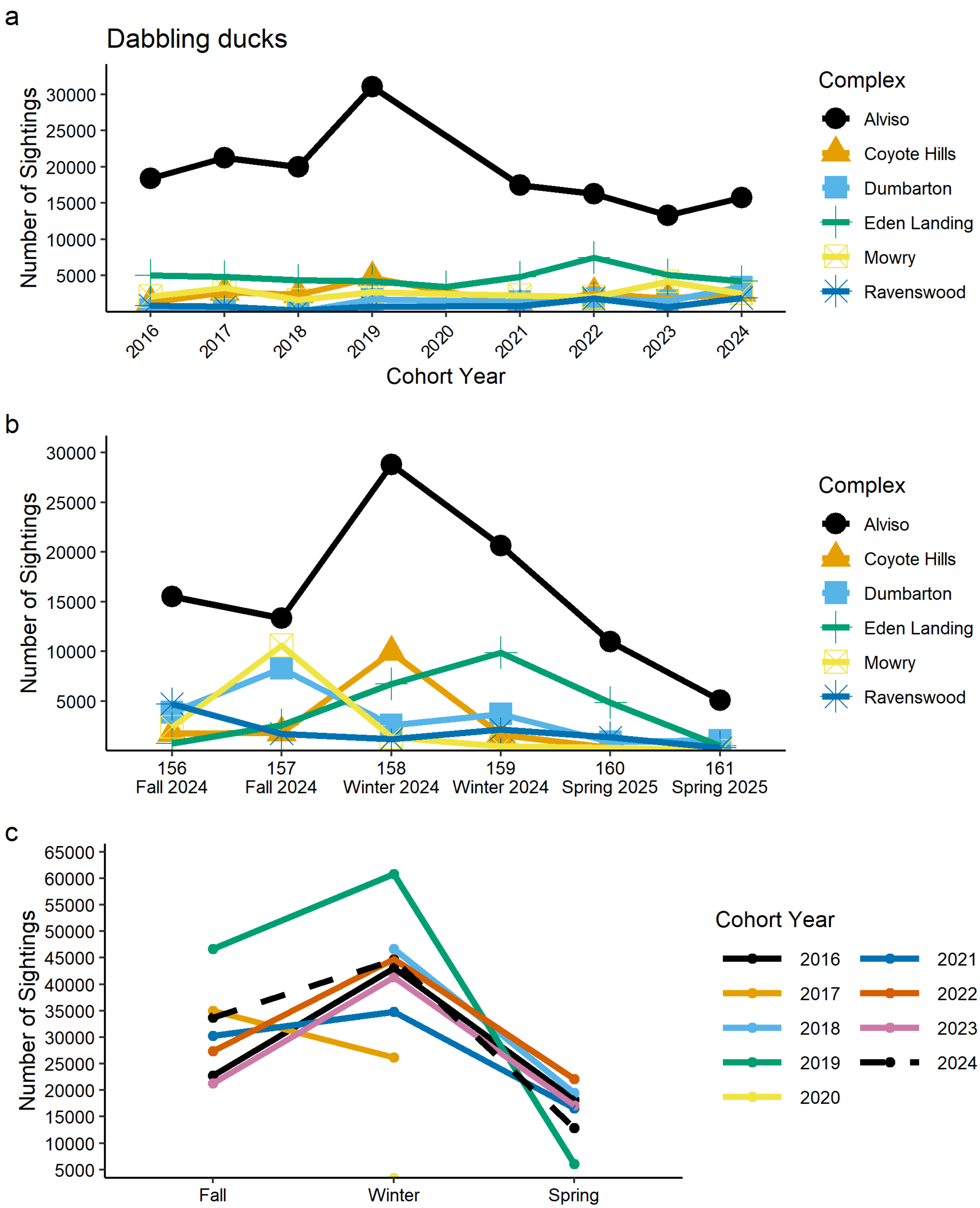

Figure 4. Abundance of dabbling ducks by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

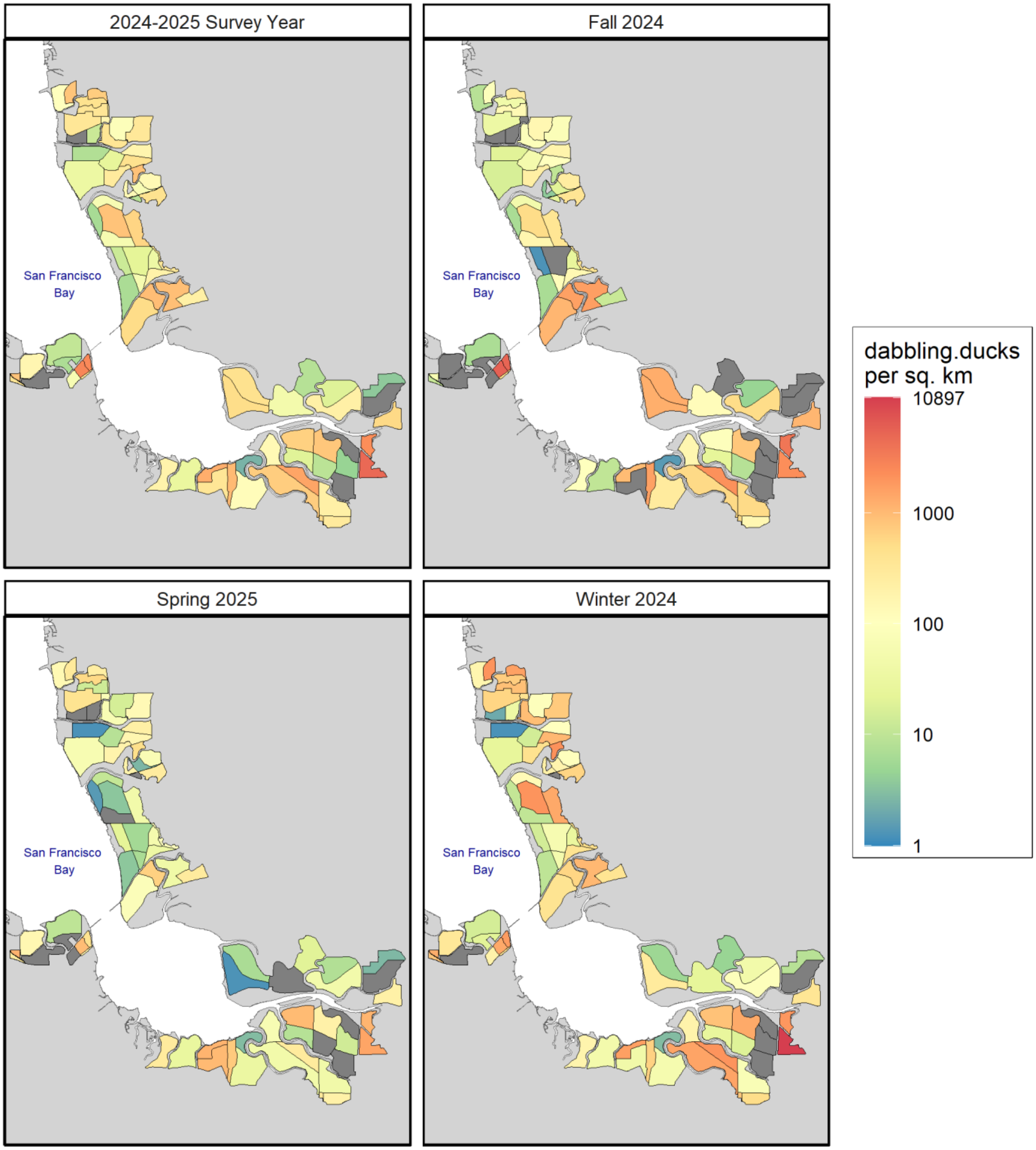

Figure 5. Density of dabbling ducks averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

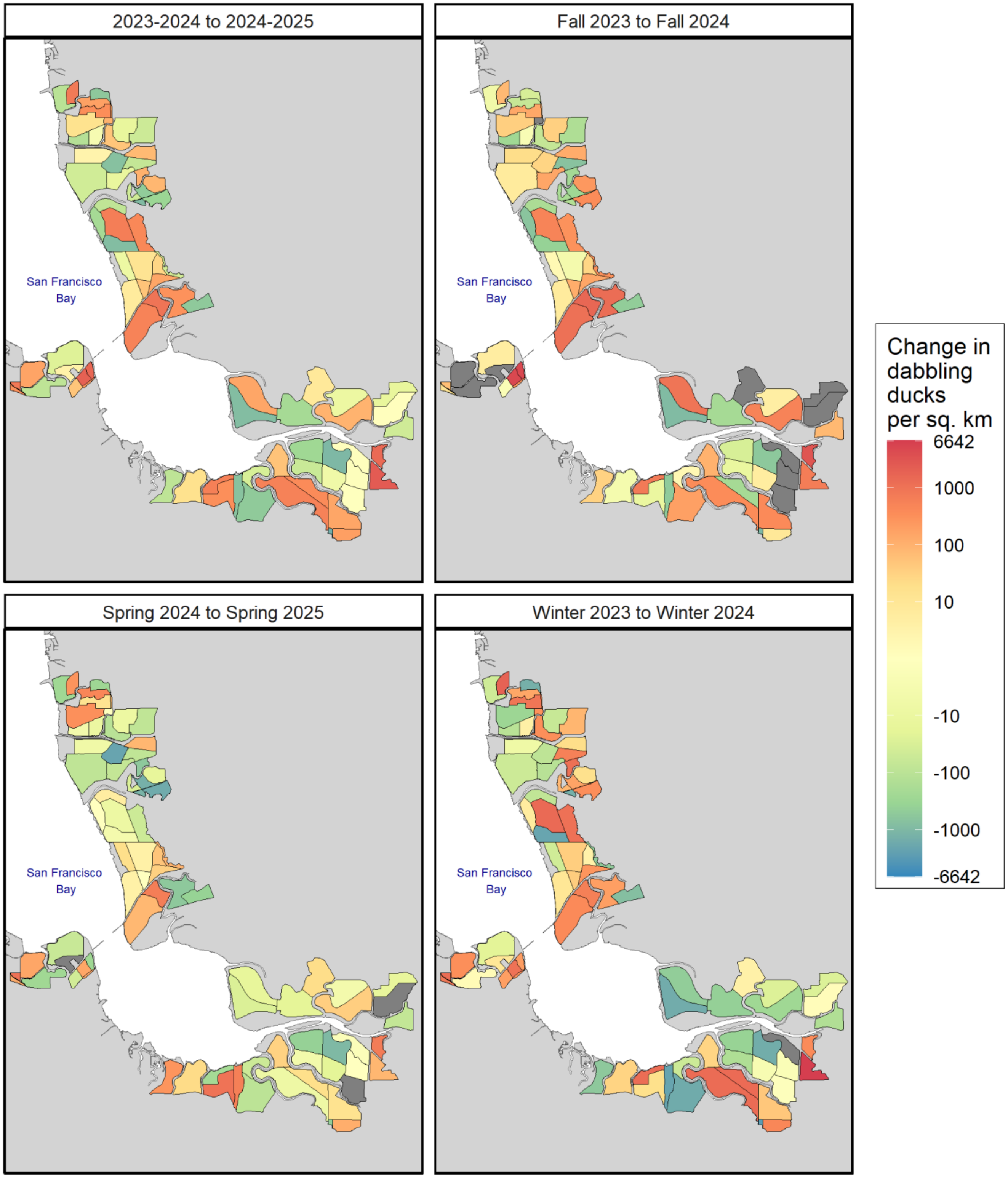

Figure 6. Interannual change in density of dabbling ducks between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For dabbling ducks in winter, their management trigger—two or more of the past three years of winter abundance below the 2005-2007 baseline value—was tripped this year because average seasonal abundance was below this threshold in all three of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average winter abundance of dabbling ducks across the study area was -1,280 at the end of winter 2025 (Fig. 7). The trend within the SBSPRP was -1,539 (-32.12 per km^2) within the wildlife ponds and -45 (-6.75 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was +329 (+11.85 per km^2).

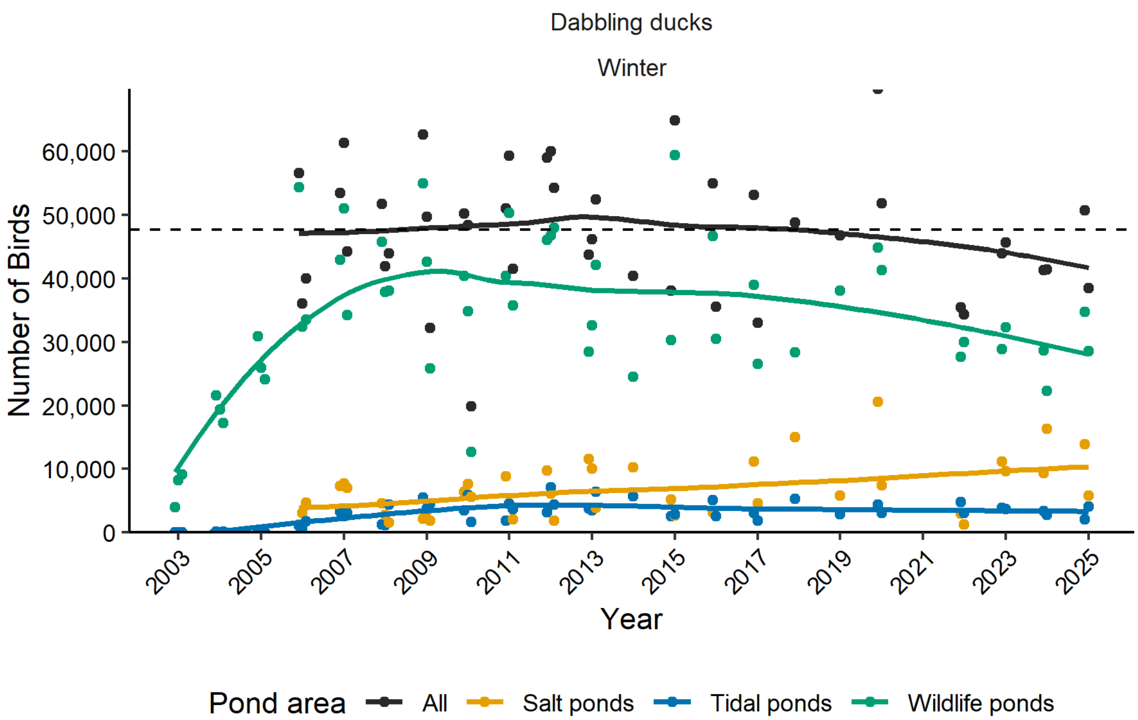

Figure 7. Counts of dabbling ducks during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

Increases in dabbling duck abundance were most strongly driven by reductions in pond salinity (Fig. 8; Table A5.1). De La Cruz et al. (2018) found that dabbling ducks were most abundant on ponds with low salinity (≤33 ppt), though Scullen et al. (2013) did not find support for such a relationship in the salt production pond complexes. Higher precipitation in the previous year was also positively related to change in abundance of dabbling ducks. The positive relationship between changes in dissolved oxygen and increases in abundance may be the result of the benefits of dissolved oxygen for invertebrate prey abundance (Scullen et al. 2013). For both salinity and dissolved oxygen, changes in water quality parameters more strongly drove changes in abundance than the parameters themselves. De La Cruz et al. (2018) also found that islands and lower percentage of the pond open to hunting predict higher abundance by De La Cruz et al. (2018), which our results also supported, though more weakly.

We report predictions made by the change model within 75 ponds, excluding sites that were unoccupied by dabbling ducks in winter of both 2025 and 2024 (A15) and sites with missing water quality measurements (A19, A6S, A8W, E8AE and E8AW). Across this set of sites, the actual change in abundance of dabbling ducks in winter was +2,611 (+6,477 birds [+129 birds per km^2] in the SBSPRP and -3,866 [-139 per km^2] in the salt ponds). In comparison, the model predicted a total change of +6,505 (+4,276 [+85 per km^2] in the SBSPRP and +2,230 [+80 per km^2] in the salt ponds), with this predicted increase driven by effects of weather, as well as effects of static site characteristics. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.15$, $R^2m = 0.10$).

The change model estimated that changes in site hydrology could explain a 3,615 decrease (-1,496 [-30 per km^2] in the SBSPRP and -2,119 [-76 per km^2] in the salt ponds) in abundance of dabbling ducks from last year due to decreasing dissolved oxygen and/or increasing salinity. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of dabbling ducks due to hydrology changes in winter 2025 were AB2, A1, and RSF2U1, while R4, A23, and RSF2U2 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 5). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were E9, A14, and A16 and the sites with the largest predicted decreases in habitat suitability were A12, A13, and A22. A16 and A13 were both drawn down for construction of the Shoreline Levee. In the salt pond footprint, the largest predicted increases in dabbling ducks winter abundance were in M4, N3A, and N4B and the largest predicted increases in habitat suitability were in N9, N7, and N5, while the sites with predicted largest decreases were M3, M1, and M2 and M5, M1, and M6 for abundance and habitat suitability, respectively (Table 5).

Static site characteristics (number of islands and hunting access) accounted for an increase of 875 birds. This effect was +683 [+14 per km^2] in the SBSPRP and +192 [+7 per km^2] in the salt ponds.

The change model predicted that deviations from mean weather could drive a 3,105 increase (+1,983 [+39 per km^2] in the SBSPRP and +1,122 [+40 per km^2] in the salt ponds) in abundance due to high precipitation last year (Table 5). There was also a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 1,421 (+946 [+19 per km^2] in the SBSPRP and +474 [+17 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

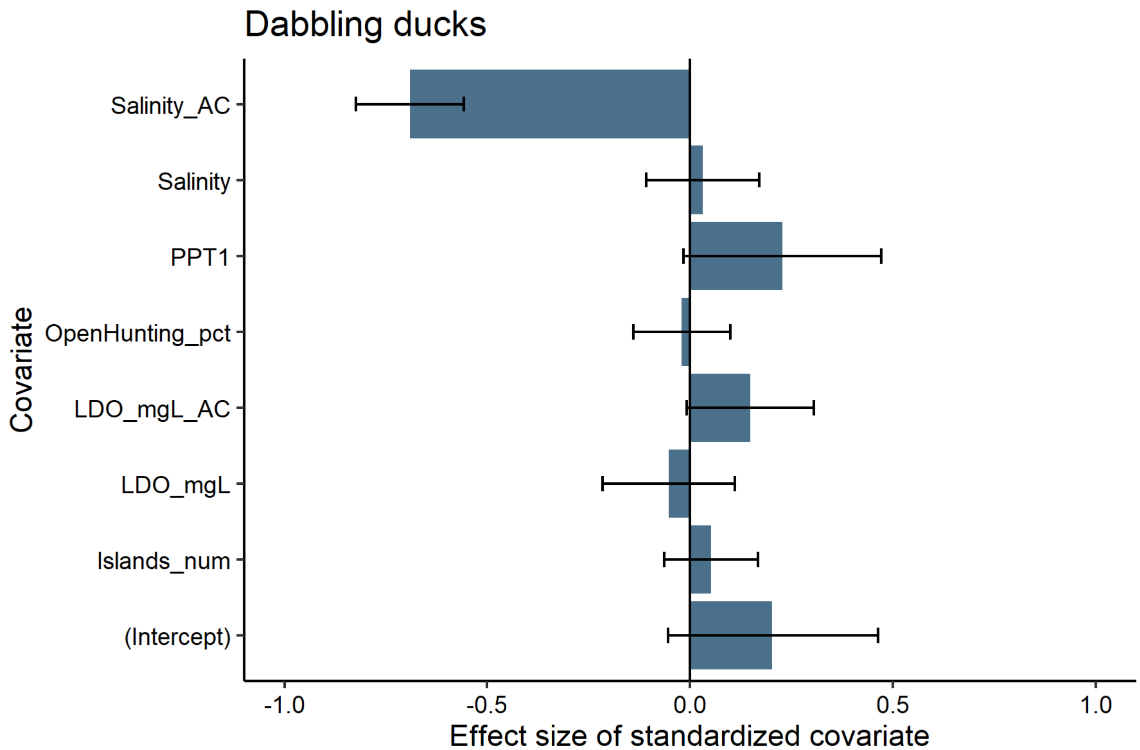

Figure 8. Fixed effects for the top model for interannual change in abundance of dabbling ducks during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 1,322). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.264.

Table 5. Actual and predicted changes in mean abundance per survey of dabbling ducks from winter 2024 to winter 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (dissolved oxygen and salinity; compared to no change from last year), weather (precipitation last year; compared to mean annual weather), static site characteristics (number of islands and hunting access; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
A3W	3,954	130	-3,824 (-3.40)	+522 (+0.12)	+24 (+0.01)	+208 (+0.05)	-177 (-0.04)	+132 (+0.03)
M2	3,700	569	-3,130 (-1.87)	+170 (+0.04)	-1,235 (-0.28)	+214 (+0.06)	+201 (+0.05)	+114 (+0.03)
A14	4,152	1,934	-2,218 (-0.76)	+640 (+0.14)	-370 (-0.07)	+192 (+0.04)	-41 (-0.01)	+142 (+0.03)
N4AB	2,083	10	-2,073 (-5.24)	+616 (+0.26)	-13 (-0.00)	+251 (+0.10)	-23 (-0.01)	+80 (+0.03)
AB2	2,111	482	-1,630 (-1.48)	+1,600 (+0.56)	+527 (+0.15)	+171 (+0.05)	+807 (+0.25)	+110 (+0.03)
M4	1,596	197	-1,399 (-2.09)	+974 (+0.48)	+381 (+0.16)	+106 (+0.04)	-22 (-0.01)	+76 (+0.03)
M1	970	10	-960 (-4.44)	-264 (-0.32)	-608 (-0.62)	+41 (+0.06)	+16 (+0.02)	+21 (+0.03)
M3	1,004	54	-950 (-2.91)	-24 (-0.02)	-430 (-0.36)	+49 (+0.05)	+93 (+0.10)	+29 (+0.03)
A1	848	201	-647 (-1.44)	+551 (+0.50)	+274 (+0.22)	+71 (+0.05)	+31 (+0.02)	+41 (+0.03)
NPP1	922	302	-620 (-1.12)	+248 (+0.24)	-180 (-0.14)	+90 (+0.08)	-10 (-0.01)	+35 (+0.03)
E12	1,309	704	-606 (-0.62)	+320 (+0.22)	-71 (-0.04)	+200 (+0.13)	-99 (-0.06)	+48 (+0.03)
A9	1,898	1,330	-568 (-0.36)	+282 (+0.14)	-124 (-0.06)	+105 (+0.05)	-19 (-0.01)	+64 (+0.03)
E9	1,402	924	-478 (-0.42)	+259 (+0.17)	-202 (-0.11)	+202 (+0.13)	-47 (-0.03)	+49 (+0.03)
A10	194	28	-166 (-1.91)	+28 (+0.13)	-15 (-0.06)	+11 (+0.05)	-2 (-0.01)	+7 (+0.03)
E2C	160	0	-160 (-5.08)	+72 (+0.37)	+14 (+0.06)	+23 (+0.10)	+2 (+0.01)	+7 (+0.03)
E2	210	68	-142 (-1.12)	+46 (+0.20)	-40 (-0.14)	+29 (+0.12)	+11 (+0.04)	+8 (+0.03)
N4B	256	122	-134 (-0.74)	+141 (+0.44)	+54 (+0.15)	+34 (+0.09)	-3 (-0.01)	+12 (+0.03)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
R1	130	28	-102 (-1.51)	+39 (+0.26)	+7 (+0.04)	+13 (+0.08)	-10 (-0.06)	+5 (+0.03)
E4	436	347	-90 (-0.23)	+70 (+0.15)	-92 (-0.17)	+52 (+0.11)	+12 (+0.02)	+15 (+0.03)
M5	243	154	-89 (-0.45)	+7 (+0.03)	-129 (-0.41)	+11 (+0.04)	+17 (+0.07)	+7 (+0.03)
N5	92	12	-80 (-2.01)	+63 (+0.51)	+28 (+0.20)	+14 (+0.09)	-1 (-0.01)	+5 (+0.03)
E7	90	13	-78 (-1.88)	+26 (+0.25)	-7 (-0.06)	+12 (+0.11)	-3 (-0.03)	+3 (+0.03)
E6B	180	106	-74 (-0.52)	+50 (+0.25)	-4 (-0.02)	+26 (+0.12)	-14 (-0.06)	+7 (+0.03)
A22	80	10	-70 (-2.04)	-69 (-1.93)	-90 (-2.16)	+0 (+0.04)	-0 (-0.01)	+0 (+0.03)
N1A	144	90	-54 (-0.46)	+36 (+0.22)	-10 (-0.05)	+18 (+0.11)	-2 (-0.01)	+5 (+0.03)
E4C	117	70	-46 (-0.50)	+5 (+0.04)	-61 (-0.40)	+12 (+0.10)	+10 (+0.08)	+4 (+0.03)
E10	188	146	-42 (-0.25)	+57 (+0.26)	-17 (-0.07)	+32 (+0.14)	+2 (+0.01)	+7 (+0.03)
A3N	38	4	-34 (-2.04)	-6 (-0.15)	-7 (-0.20)	+2 (+0.05)	-2 (-0.05)	+1 (+0.03)
E1	9	3	-6 (-0.92)	+0 (+0.02)	-3 (-0.22)	+1 (+0.12)	-0 (-0.04)	+0 (+0.03)
A13	3	0	-3 (-1.39)	-2 (-0.54)	-3 (-0.83)	+0 (+0.04)	+0 (+0.02)	+0 (+0.03)
A11	23	20	-2 (-0.11)	+1 (+0.05)	-4 (-0.16)	+1 (+0.04)	-0 (-0.01)	+1 (+0.03)
A12	1	0	-1 (-0.69)	-0 (-0.06)	-1 (-0.47)	+0 (+0.04)	-0 (-0.01)	+0 (+0.03)
N8	12	14	+2 (+0.11)	+2 (+0.13)	-3 (-0.16)	+1 (+0.09)	-0 (-0.01)	+0 (+0.03)
A23	0	2	+2 (+1.10)	+5 (+1.84)	+5 (+1.38)	+0 (+0.04)	-0 (-0.01)	+0 (+0.03)
R3	0	2	+2 (+1.10)	-0 (-0.04)	-0 (-0.41)	+0 (+0.08)	-0 (-0.01)	+0 (+0.03)
R2	13	24	+11 (+0.58)	+0 (+0.03)	-5 (-0.28)	+1 (+0.08)	-0 (-0.03)	+0 (+0.03)
N2A	4	15	+12 (+1.27)	+1 (+0.21)	-0 (-0.05)	+1 (+0.10)	-0 (-0.01)	+0 (+0.03)
M6	5	17	+12	-3	-6	+0	-0	+0

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
			(+1.10)	(-0.71)	(-1.09)	(+0.05)	(-0.01)	(+0.03)
N4	0	14	+14	+1	+0	+0	-0	+0
			(+2.67)	(+0.45)	(+0.14)	(+0.09)	(-0.01)	(+0.03)
N6	6	20	+15	+3	+1	+1	-0	+0
			(+1.20)	(+0.36)	(+0.09)	(+0.09)	(-0.01)	(+0.03)
E6	68	84	+16	+28	+3	+10	-4	+3
			(+0.20)	(+0.34)	(+0.03)	(+0.11)	(-0.04)	(+0.03)
E1C	34	54	+20	+18	+4	+5	-0	+2
			(+0.47)	(+0.41)	(+0.08)	(+0.10)	(-0.01)	(+0.03)
A2E	34	58	+24	+5	-4	+2	-1	+1
			(+0.51)	(+0.12)	(-0.10)	(+0.05)	(-0.03)	(+0.03)
RSF2U4	3	43	+40	+2	+1	+0	-0	+0
			(+2.40)	(+0.36)	(+0.11)	(+0.07)	(-0.01)	(+0.03)
RSF2U1	357	405	+48	+224	+103	+39	+63	+17
			(+0.13)	(+0.49)	(+0.20)	(+0.07)	(+0.12)	(+0.03)
A2W	36	88	+52	+13	+1	+3	+2	+2
			(+0.86)	(+0.30)	(+0.03)	(+0.05)	(+0.04)	(+0.03)
E8X	22	74	+52	+4	-2	+3	-2	+1
			(+1.18)	(+0.18)	(-0.06)	(+0.12)	(-0.06)	(+0.03)
N7	36	93	+56	+28	+15	+6	-1	+2
			(+0.92)	(+0.56)	(+0.26)	(+0.09)	(-0.01)	(+0.03)
E5C	11	68	+58	+6	+2	+2	-0	+1
			(+1.76)	(+0.41)	(+0.09)	(+0.10)	(-0.01)	(+0.03)
A8	42	121	+80	+10	+0	+2	-2	+2
			(+1.05)	(+0.21)	(+0.01)	(+0.04)	(-0.03)	(+0.03)
E13	328	414	+86	+127	+24	+56	-28	+13
			(+0.23)	(+0.33)	(+0.05)	(+0.13)	(-0.06)	(+0.03)
R5S	8	100	+92	+2	-1	+1	-0	+0
			(+2.41)	(+0.21)	(-0.05)	(+0.10)	(-0.01)	(+0.03)
E6A	874	986	+113	+162	-70	+112	-8	+31
			(+0.12)	(+0.17)	(-0.07)	(+0.11)	(-0.01)	(+0.03)
RSF2U3	0	140	+140	+1	+0	+0	-0	+0
			(+4.95)	(+0.60)	(+0.24)	(+0.07)	(-0.01)	(+0.03)
N9	78	227	+150	+71	+35	+12	-1	+4
			(+1.07)	(+0.64)	(+0.26)	(+0.09)	(-0.01)	(+0.03)
R5	4	166	+162	+1	+0	+1	-0	+0
			(+3.51)	(+0.26)	(+0.01)	(+0.10)	(-0.01)	(+0.03)
A17	846	1,058	+212	+226	+10	+36	-9	+32
			(+0.22)	(+0.24)	(+0.01)	(+0.03)	(-0.01)	(+0.03)
E3C	182	412	+230	+75	-6	+24	+13	+8
			(+0.82)	(+0.34)	(-0.02)	(+0.10)	(+0.05)	(+0.03)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
E8	476	728	+252 (+0.42)	+109 (+0.21)	-17 (-0.03)	+64 (+0.12)	-36 (-0.06)	+17 (+0.03)
N1	1,212	1,484	+272 (+0.20)	+412 (+0.29)	-132 (-0.08)	+131 (+0.08)	-14 (-0.01)	+48 (+0.03)
A8S	38	351	+312 (+2.19)	-5 (-0.13)	-8 (-0.21)	+1 (+0.04)	-1 (-0.03)	+1 (+0.03)
RSF2U2	122	479	+356 (+1.36)	+154 (+0.81)	+63 (+0.26)	+19 (+0.07)	+79 (+0.33)	+8 (+0.03)
E6C	344	724	+380 (+0.74)	+56 (+0.15)	-88 (-0.20)	+40 (+0.11)	-8 (-0.02)	+12 (+0.03)
E5	322	706	+384 (+0.78)	-4 (-0.01)	-95 (-0.26)	+33 (+0.11)	-19 (-0.06)	+9 (+0.03)
R4	0	396	+396 (+5.98)	+50 (+3.93)	+49 (+3.51)	+4 (+0.09)	-0 (-0.01)	+2 (+0.03)
N2	1	474	+472 (+5.47)	+1 (+0.40)	+0 (+0.02)	+0 (+0.08)	+0 (+0.04)	+0 (+0.03)
E14	43	614	+572 (+2.64)	+9 (+0.19)	-4 (-0.08)	+6 (+0.13)	-3 (-0.06)	+2 (+0.03)
AB1	245	1,031	+786 (+1.43)	+43 (+0.16)	-0 (-0.00)	+14 (+0.05)	-5 (-0.02)	+9 (+0.03)
N3	0	884	+884 (+6.79)	+1 (+0.42)	-0 (-0.00)	+0 (+0.08)	+0 (+0.10)	+0 (+0.03)
E11	76	1,052	+976 (+2.62)	+29 (+0.32)	+1 (+0.01)	+14 (+0.14)	-6 (-0.06)	+3 (+0.03)
N4AA	400	1,708	+1,308 (+1.45)	+116 (+0.25)	+2 (+0.00)	+49 (+0.10)	-4 (-0.01)	+15 (+0.03)
A7	772	2,252	+1,480 (+1.07)	+96 (+0.12)	-128 (-0.14)	+39 (+0.05)	+67 (+0.08)	+26 (+0.03)
N3A	1,030	3,458	+2,428 (+1.21)	+408 (+0.33)	+92 (+0.07)	+138 (+0.10)	-12 (-0.01)	+43 (+0.03)
A5	554	4,000	+3,446 (+1.98)	-46 (-0.09)	-88 (-0.16)	+24 (+0.05)	-15 (-0.03)	+15 (+0.03)
A16	4,285	10,972	+6,686 (+0.94)	-346 (-0.08)	-962 (-0.22)	+129 (+0.03)	+263 (+0.07)	+117 (+0.03)

Divers

Abundance

Across all complexes, there were 184,366 total sightings of diving ducks (sum sightings during the entire survey period). Compared to last year, this was an increase of 55,605 total sightings (+43.2%; Fig. 9). In their target season of winter they increased by 47.0%. There were on average 4,956 more diving ducks detected per survey in fall (Table A2.4), 18,235 more detected in winter (Table A2.6), and 4,612 more detected in spring (Table A2.8, Fig. 9).

At the pond level, A3W had the highest abundance (mean count of 5,839 per survey), followed by A2W (2,238) and A1 (2,207; Fig. 10). At these sites, we observed the majority of diving ducks roosting on the pond surface (96.3%, 92.4%, and 91.2%, respectively; Table A4.3). Across all six surveys, the sites with the largest increases in diving ducks from last year were A3W (+3,323 mean abundance per visit), A14 (+858), and A2W (+842), while the sites with the largest decreases were AB1 (-480), E1 (-378), and E6B (-287; Fig. 11). Seasonal abundance of diving ducks was exceptionally low (5th percentile) at E1 (263 birds in winter) and E7 (12 in winter). At N2A (3,654 birds in winter), abundance of diving ducks was higher than ever previously recorded there.

Note that the numbers in this section and the next two sections include counts of Ruddy Ducks. We also report trends in Ruddy Ducks as a separate sub-group below.

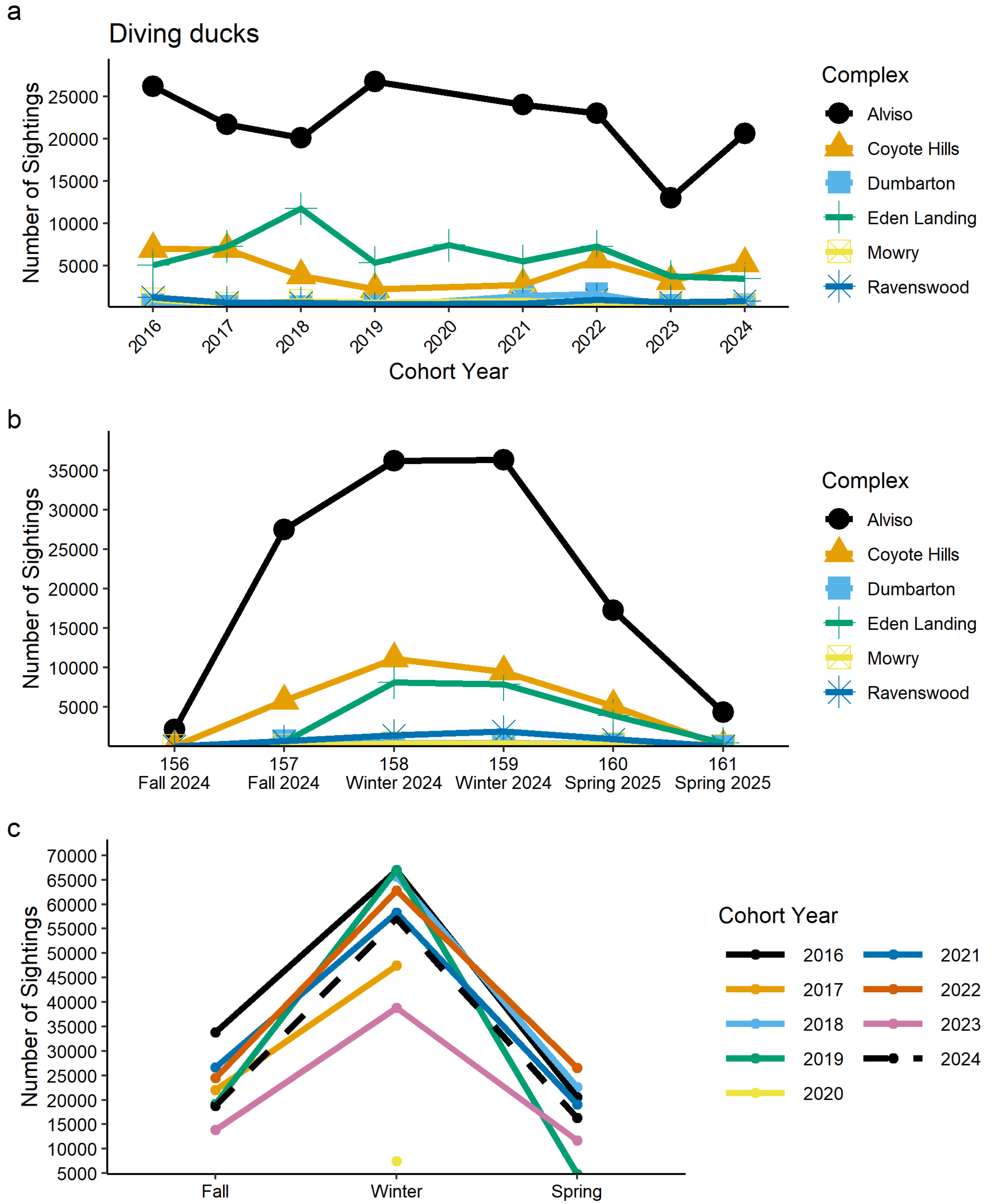

Figure 9. Abundance of diving ducks by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

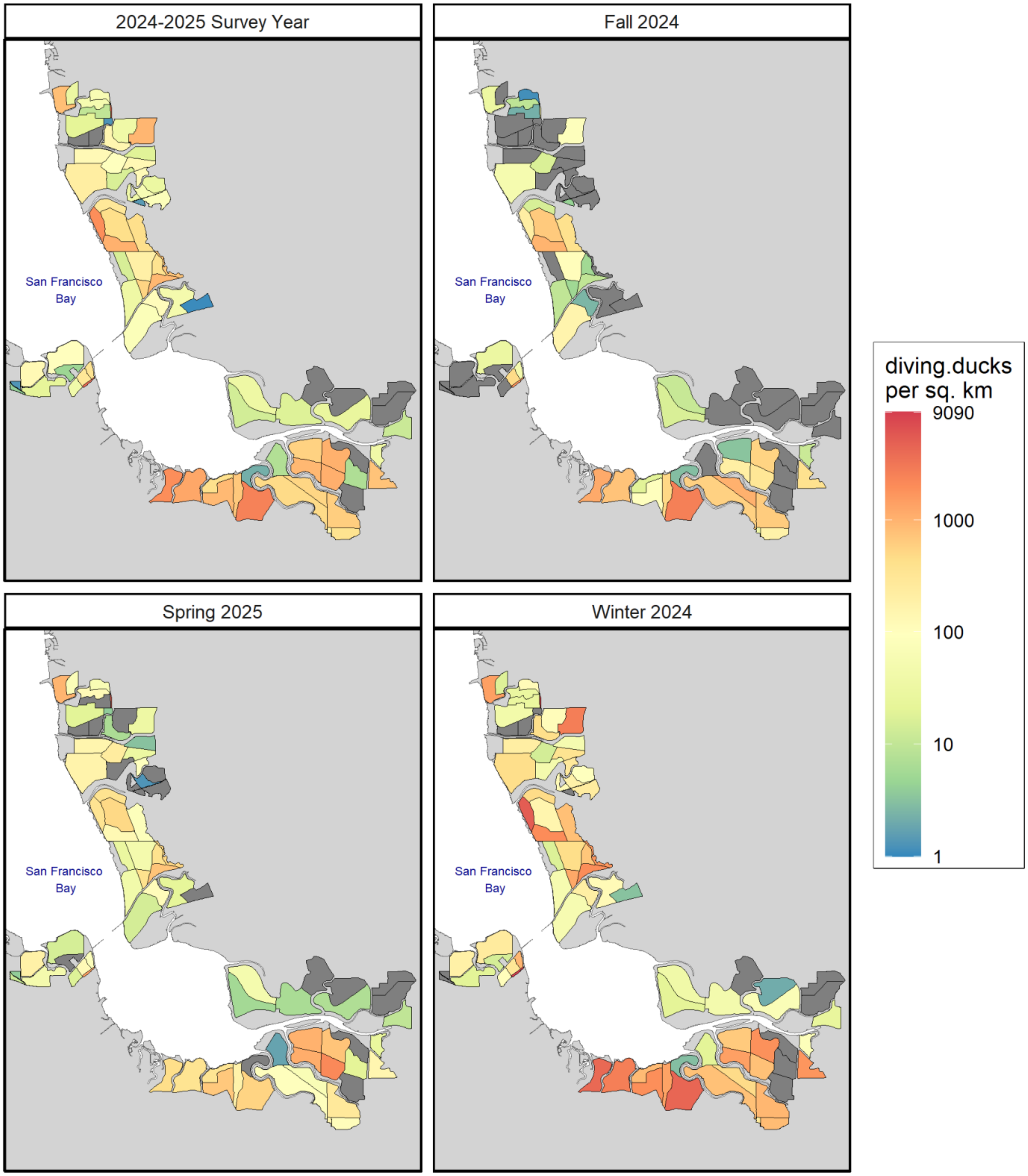

Figure 10. Density of diving ducks averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

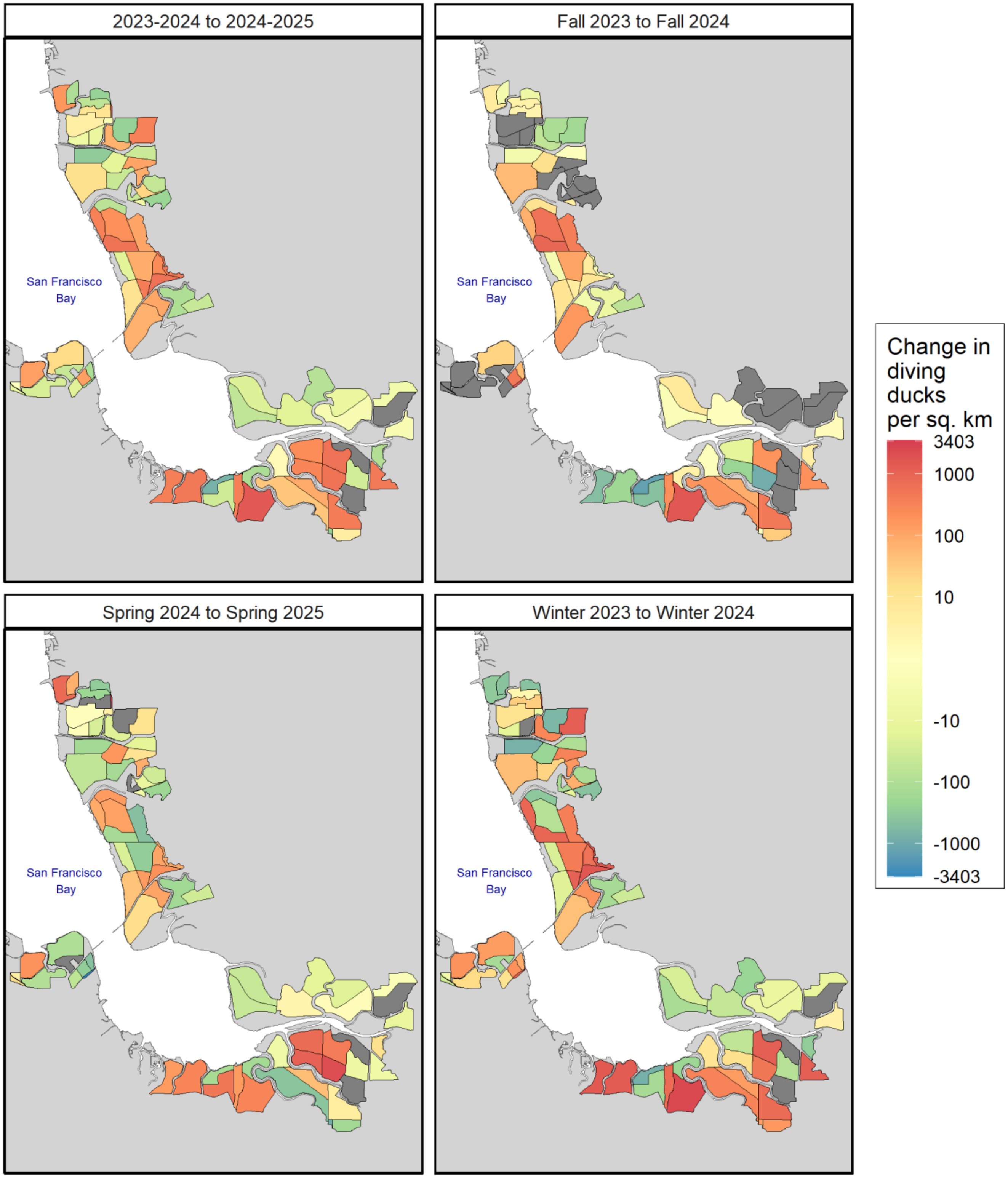

Figure 11. Interannual change in density of diving ducks between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For diving ducks in winter, their management trigger—two or more of the past three years of winter abundance below the 2005-2007 baseline value—was not tripped this year because average seasonal abundance was below this threshold in only one of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average winter abundance of diving ducks across the study area was -5,097 at the end of winter 2025 (Fig. 12). The trend within the SBSPRP was -5,558 (-116.01 per km^2) within the wildlife ponds and -12 (-1.75 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was +158 (+5.69 per km^2).

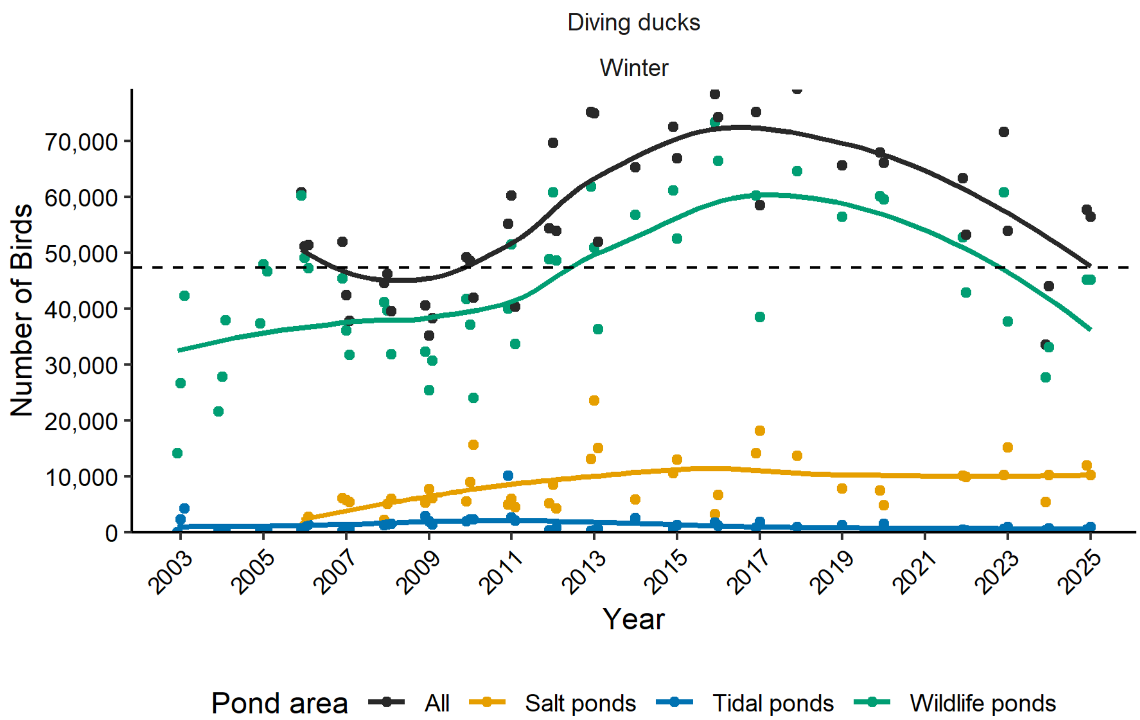

Figure 12. Counts of diving ducks during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

Increases in diving duck abundance were very strongly related to decreases in salinity, and to a lesser degree less saline ponds in general (Fig. 13), echoing previous studies that have found that less saline ponds have higher overall abundance of diving ducks (Scullen et al. 2013, De La Cruz et al. 2019). There were weaker but nearly significant effects of precipitation in the focal year (Sept–Feb), with rainier years showing higher abundance. This finding agreed with results from the 2023 model, but contrasted to those in 2024, which found that abundance was higher when rainfall in the previous year (Sept–Feb) was lower and in more temperate years. These complex relationships highlight that a model-averaging approach may improve stability of model estimates, given that several alternative models have roughly equal weight (Table A5.2). As in dabbling ducks, the base pond characteristics showed little influence on change in abundance. Previous research has also found that diving ducks demonstrated a higher abundance in larger ponds and in ponds with higher staff gauge levels (at the grid level, abundance was highest at 0.33 – 2.51 m deep), while they had lower abundance in breached ponds (De La Cruz et al. 2018).

We report predictions made by the change model within 73 ponds, excluding sites that were unoccupied by diving ducks in winter of both 2025 and 2024 (A12, A15, A23 and E8AE) and sites with missing water quality measurements (A19, A6S, A8W and E8AW). Across this set of sites, the actual change in abundance of diving ducks in winter was +17,608 (+14,918 birds [+316 birds per km^2] in the SBSPRP and +2,690 [+97 per km^2] in the salt ponds). In comparison, the model predicted a total change of -1,245 (-558 [-12 per km^2] in the SBSPRP and -688 [-25 per km^2] in the salt ponds), with this predicted decrease driven by effects of changes in site hydrology, as well as effects of weather. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.19$, $R^2m = 0.18$).

The change model estimated that changes in site hydrology could explain a 2,457 decrease (-1,865 [-40 per km^2] in the SBSPRP and -592 [-21 per km^2] in the salt ponds) in abundance of diving ducks from last year due to increasing salinity. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of diving ducks due to hydrology changes in winter 2025 were A1, R4, and RSF2U1, while R4, RSF2U3, and A1 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 6). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were E2, E1, and A2E and the sites with the largest predicted decreases in habitat suitability were R3, A13, and A22. In the salt pond footprint, the largest predicted increases in abundance were in M4, N4AB, and N4 and the largest predicted increases in habitat suitability were in M4, N7, and N5, while the sites with predicted largest decreases were M2, N2A, and M6 and M5, M1, and M6 for abundance and habitat suitability, respectively (Table 6).

Static site characteristics (distance to bay, number of islands, and pond area) accounted for an increase of 62 birds. This effect was +113 [+2 per km^2] in the SBSPRP and -51 [-2 per km^2] in the salt ponds.

The change model predicted that deviations from mean weather could drive a 717 decrease (-625 [-13 per km^2] in the SBSPRP and -91 [-3 per km^2] in the salt ponds) in abundance due to low year-to-date precipitation (Table 6). There was also a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 475 (+378 [+8 per km^2] in the SBSPRP and +96 [+3 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

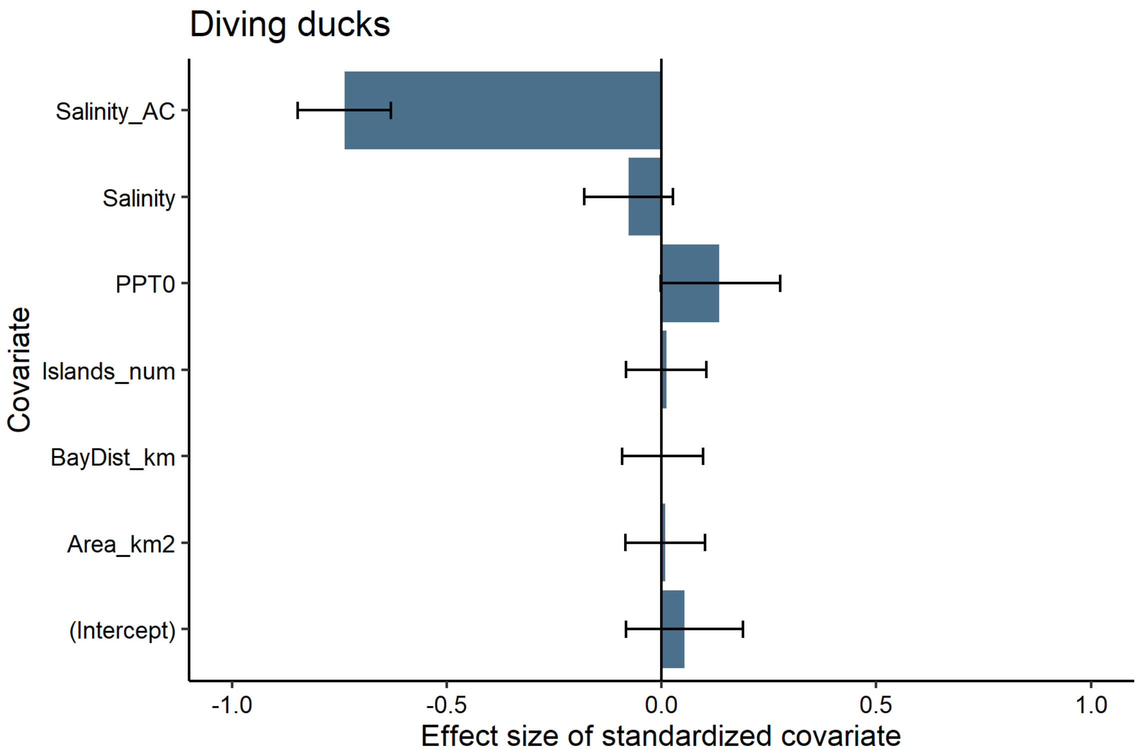

Figure 13. Fixed effects for the top model for interannual change in abundance of diving ducks during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 1,375). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.044.

Table 6. Actual and predicted changes in mean abundance per survey of diving ducks from winter 2024 to winter 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (salinity; compared to no change from last year), weather (year-to-date precipitation; compared to mean annual weather), static site characteristics (distance to bay, number of islands, and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
E1	1,198	263	-936 (-1.51)	-250 (-0.23)	-271 (-0.25)	-64 (-0.07)	-0 (-0.00)	+12 (+0.01)
M6	827	0	-827 (-6.72)	-623 (-1.39)	-445 (-1.15)	-20 (-0.09)	+1 (+0.01)	+3 (+0.01)
E6B	850	126	-724 (-1.90)	-99 (-0.12)	-111 (-0.14)	-52 (-0.07)	-1 (-0.00)	+9 (+0.01)
AB1	1,042	538	-504 (-0.66)	-59 (-0.06)	-60 (-0.06)	-83 (-0.08)	-11 (-0.01)	+12 (+0.01)
E10	1,534	1,248	-286 (-0.21)	-70 (-0.05)	-100 (-0.07)	-90 (-0.06)	-1 (-0.00)	+18 (+0.01)
E3C	448	162	-286 (-1.02)	-22 (-0.05)	-23 (-0.05)	-35 (-0.08)	+3 (+0.01)	+5 (+0.01)
N1A	566	320	-246 (-0.57)	-20 (-0.04)	-18 (-0.03)	-37 (-0.07)	-6 (-0.01)	+7 (+0.01)
M2	282	40	-242 (-1.93)	-79 (-0.32)	-63 (-0.27)	-18 (-0.09)	+4 (+0.02)	+3 (+0.01)
E11	214	9	-204 (-3.07)	-13 (-0.06)	-13 (-0.06)	-14 (-0.07)	-3 (-0.01)	+2 (+0.01)
E7	214	12	-202 (-2.77)	-49 (-0.26)	-51 (-0.27)	-11 (-0.07)	+0 (+0.00)	+2 (+0.01)
N1	365	166	-198 (-0.78)	-74 (-0.22)	-35 (-0.11)	-24 (-0.08)	+0 (+0.00)	+4 (+0.01)
A2E	2,738	2,546	-192 (-0.07)	-381 (-0.15)	-374 (-0.15)	-209 (-0.08)	-8 (-0.00)	+29 (+0.01)
A13	192	1	-191 (-4.57)	-122 (-0.99)	-82 (-0.77)	-7 (-0.09)	+0 (+0.01)	+1 (+0.01)
M4	342	154	-188 (-0.79)	+40 (+0.11)	+124 (+0.39)	-36 (-0.09)	+7 (+0.02)	+5 (+0.01)
E12	236	52	-185 (-1.51)	+6 (+0.03)	+7 (+0.03)	-17 (-0.07)	-3 (-0.01)	+3 (+0.01)
A17	206	44	-162 (-1.54)	-5 (-0.02)	-6 (-0.03)	-20 (-0.09)	-1 (-0.01)	+2 (+0.01)
N3A	414	266	-148 (-0.44)	+7 (+0.02)	+1 (+0.00)	-25 (-0.06)	+1 (+0.00)	+5 (+0.01)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
A3N	136	2	-134 (-3.82)	-11 (-0.09)	-6 (-0.05)	-11 (-0.09)	-2 (-0.01)	+2 (+0.01)
M3	223	104	-119 (-0.76)	-62 (-0.33)	-40 (-0.22)	-15 (-0.09)	+6 (+0.04)	+2 (+0.01)
A9	1,086	996	-90 (-0.09)	-87 (-0.08)	-81 (-0.08)	-94 (-0.09)	+0 (+0.00)	+12 (+0.01)
E4C	154	66	-88 (-0.84)	-59 (-0.48)	-55 (-0.45)	-8 (-0.08)	+1 (+0.01)	+1 (+0.01)
E6	124	42	-82 (-1.07)	-5 (-0.04)	+0 (+0.00)	-10 (-0.08)	-0 (-0.00)	+1 (+0.01)
R2	88	17	-70 (-1.59)	-29 (-0.39)	-24 (-0.34)	-3 (-0.05)	-1 (-0.01)	+1 (+0.01)
M1	130	79	-52 (-0.50)	-66 (-0.70)	-58 (-0.64)	-6 (-0.09)	+1 (+0.01)	+1 (+0.01)
E1C	63	31	-32 (-0.69)	+1 (+0.01)	+3 (+0.04)	-5 (-0.07)	-1 (-0.02)	+1 (+0.01)
M5	38	7	-31 (-1.58)	-18 (-0.61)	-9 (-0.34)	-2 (-0.09)	+1 (+0.03)	+0 (+0.01)
RSF2U3	70	39	-31 (-0.57)	+11 (+0.14)	+20 (+0.28)	-5 (-0.06)	-1 (-0.02)	+1 (+0.01)
NPP1	33	5	-28 (-1.73)	-9 (-0.32)	-5 (-0.18)	-2 (-0.08)	-0 (-0.01)	+0 (+0.01)
N4	101	74	-26 (-0.30)	+8 (+0.08)	+11 (+0.10)	-7 (-0.06)	-0 (-0.00)	+1 (+0.01)
N5	32	14	-18 (-0.82)	+5 (+0.14)	+6 (+0.17)	-2 (-0.06)	-0 (-0.01)	+0 (+0.01)
A22	12	0	-12 (-2.53)	-11 (-2.45)	-11 (-2.43)	-0 (-0.09)	+0 (+0.00)	+0 (+0.01)
R5S	8	0	-8 (-2.20)	-1 (-0.08)	-1 (-0.11)	-0 (-0.03)	-0 (-0.02)	+0 (+0.01)
E2C	3	0	-3 (-1.39)	+0 (+0.03)	+0 (+0.04)	-0 (-0.08)	-0 (-0.01)	+0 (+0.01)
R5	1	0	-1 (-0.69)	+0 (+0.04)	+0 (+0.03)	-0 (-0.03)	-0 (-0.02)	+0 (+0.01)
E13	16	16	+1 (+0.06)	+1 (+0.04)	+1 (+0.04)	-1 (-0.07)	-0 (-0.01)	+0 (+0.01)
A10	1,460	1,474	+14 (+0.01)	-230 (-0.17)	-214 (-0.16)	-116 (-0.09)	-6 (-0.01)	+15 (+0.01)
E4	20	38	+17 (+0.58)	-3 (-0.17)	-3 (-0.15)	-1 (-0.07)	+0 (+0.00)	+0 (+0.01)
E9	48	66	+17	-4	-5	-3	+0	+1

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
			(+0.30)	(-0.08)	(-0.10)	(-0.07)	(+0.01)	(+0.01)
E14	0	18	+18	-0	-0	-0	-0	+0
			(+2.97)	(-0.08)	(-0.08)	(-0.07)	(-0.01)	(+0.01)
RSF2U1	200	218	+18	+28	+22	-13	+1	+3
			(+0.09)	(+0.13)	(+0.10)	(-0.06)	(+0.01)	(+0.01)
E5C	44	72	+28	+1	+3	-4	-1	+1
			(+0.49)	(+0.02)	(+0.07)	(-0.08)	(-0.01)	(+0.01)
R3	5	45	+40	-3	-2	-0	-0	+0
			(+2.04)	(-0.56)	(-0.48)	(-0.04)	(-0.00)	(+0.01)
E8X	239	296	+58	-14	-14	-16	-4	+3
			(+0.21)	(-0.06)	(-0.06)	(-0.07)	(-0.02)	(+0.01)
RSF2U2	34	104	+69	+5	+2	-2	+2	+0
			(+1.08)	(+0.12)	(+0.05)	(-0.06)	(+0.05)	(+0.01)
RSF2U4	494	569	+75	+22	+21	-30	-11	+6
			(+0.14)	(+0.04)	(+0.04)	(-0.06)	(-0.02)	(+0.01)
N3	28	122	+94	-1	-1	-2	+1	+0
			(+1.46)	(-0.05)	(-0.03)	(-0.07)	(+0.03)	(+0.01)
A8S	483	590	+106	-52	-54	-44	-1	+5
			(+0.20)	(-0.11)	(-0.12)	(-0.10)	(-0.00)	(+0.01)
E2	1,093	1,224	+132	-215	-268	-59	+31	+11
			(+0.11)	(-0.22)	(-0.27)	(-0.07)	(+0.04)	(+0.01)
E6C	40	186	+146	-10	-4	-2	-0	+0
			(+1.52)	(-0.29)	(-0.11)	(-0.08)	(-0.01)	(+0.01)
A7	360	511	+151	-25	-38	-32	+7	+4
			(+0.35)	(-0.07)	(-0.11)	(-0.09)	(+0.02)	(+0.01)
N2	13	168	+154	-1	-0	-1	+0	+0
			(+2.49)	(-0.09)	(-0.02)	(-0.08)	(+0.00)	(+0.01)
E8	118	334	+215	-3	-3	-8	-1	+1
			(+1.03)	(-0.02)	(-0.03)	(-0.07)	(-0.01)	(+0.01)
E5	27	244	+218	-7	-5	-2	-0	+0
			(+2.17)	(-0.28)	(-0.20)	(-0.07)	(-0.01)	(+0.01)
R4	0	230	+230	+39	+39	-1	-0	+0
			(+5.44)	(+3.68)	(+3.95)	(-0.03)	(-0.01)	(+0.01)
R1	206	460	+255	-2	-9	-10	+1	+3
			(+0.80)	(-0.01)	(-0.04)	(-0.05)	(+0.00)	(+0.01)
N8	44	330	+286	-11	-11	-3	-0	+0
			(+2.00)	(-0.29)	(-0.28)	(-0.08)	(-0.01)	(+0.01)
N4B	94	438	+344	-8	-5	-7	-1	+1
			(+1.53)	(-0.08)	(-0.06)	(-0.08)	(-0.02)	(+0.01)
N6	59	469	+410	-7	-6	-4	-1	+1
			(+2.06)	(-0.13)	(-0.10)	(-0.08)	(-0.02)	(+0.01)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
N4AA	516	980	+464 (+0.64)	+1 (+0.00)	+6 (+0.01)	-41 (-0.08)	-1 (-0.00)	+6 (+0.01)
A11	300	840	+541 (+1.03)	-58 (-0.22)	-56 (-0.21)	-23 (-0.09)	-1 (-0.00)	+3 (+0.01)
AB2	422	995	+572 (+0.86)	+23 (+0.05)	+4 (+0.01)	-40 (-0.09)	+19 (+0.04)	+6 (+0.01)
N2A	3,040	3,654	+614 (+0.18)	-67 (-0.02)	-65 (-0.02)	-180 (-0.06)	-39 (-0.01)	+37 (+0.01)
N7	26	690	+664 (+3.22)	+6 (+0.19)	+7 (+0.22)	-3 (-0.08)	+0 (+0.00)	+0 (+0.01)
A5	1,199	2,042	+842 (+0.53)	-60 (-0.05)	-103 (-0.09)	-108 (-0.09)	+24 (+0.02)	+14 (+0.01)
N9	222	1,111	+889 (+1.61)	+2 (+0.01)	+9 (+0.04)	-19 (-0.08)	-3 (-0.01)	+3 (+0.01)
N4AB	1,056	1,952	+896 (+0.61)	+55 (+0.05)	+55 (+0.05)	-66 (-0.06)	-10 (-0.01)	+14 (+0.01)
A16	508	1,715	+1,208 (+1.22)	-42 (-0.09)	-55 (-0.11)	-45 (-0.09)	+8 (+0.02)	+6 (+0.01)
A8	288	1,578	+1,290 (+1.70)	+5 (+0.02)	-1 (-0.00)	-30 (-0.10)	+3 (+0.01)	+4 (+0.01)
E6A	1,964	3,579	+1,615 (+0.60)	-174 (-0.09)	-211 (-0.11)	-141 (-0.08)	+17 (+0.01)	+22 (+0.01)
A1	3,128	4,770	+1,642 (+0.42)	+855 (+0.24)	+884 (+0.25)	-307 (-0.07)	+3 (+0.00)	+49 (+0.01)
A14	928	2,630	+1,702 (+1.04)	-149 (-0.18)	-144 (-0.17)	-73 (-0.09)	+1 (+0.00)	+10 (+0.01)
A2W	2,432	4,760	+2,328 (+0.67)	-70 (-0.03)	-130 (-0.05)	-182 (-0.07)	+29 (+0.01)	+29 (+0.01)
A3W	4,390	10,184	+5,794 (+0.84)	-76 (-0.02)	-118 (-0.03)	-394 (-0.09)	+52 (+0.01)	+53 (+0.01)

Ruddy Duck

Abundance

Across all complexes, there were 117,701 total sightings of Ruddy Ducks (sum sightings during the entire survey period). Compared to last year, this was an increase of 38,997 total sightings (+49.5%; Fig. 14). In their target season of winter they increased by 53.5%. There were on average 5,210 more Ruddy Ducks detected per survey in fall (Table A2.4), 12,795 more detected in winter (Table A2.6), and 1,494 more detected in spring (Table A2.8, Fig. 14).

At the pond level, A3W had the highest abundance (mean count of 4,697 per survey), followed by A1 (1,458) and E6A (1,206; Fig. 15). At these sites, we observed the majority of Ruddy Ducks roosting on the pond (97.4%, 91.0%, and 99.6%, respectively; Table A4.4). Across all six surveys, the sites with the largest increases in Ruddy Ducks from last year were A3W (+2,411 mean abundance per visit), A8 (+637), and A1 (+557), while the sites with the largest decreases were AB1 (-502), N2A (-308), and E6B (-272; Fig. 16). Seasonal abundance of Ruddy Ducks was exceptionally low (5th percentile) at E1 (64 birds in winter).

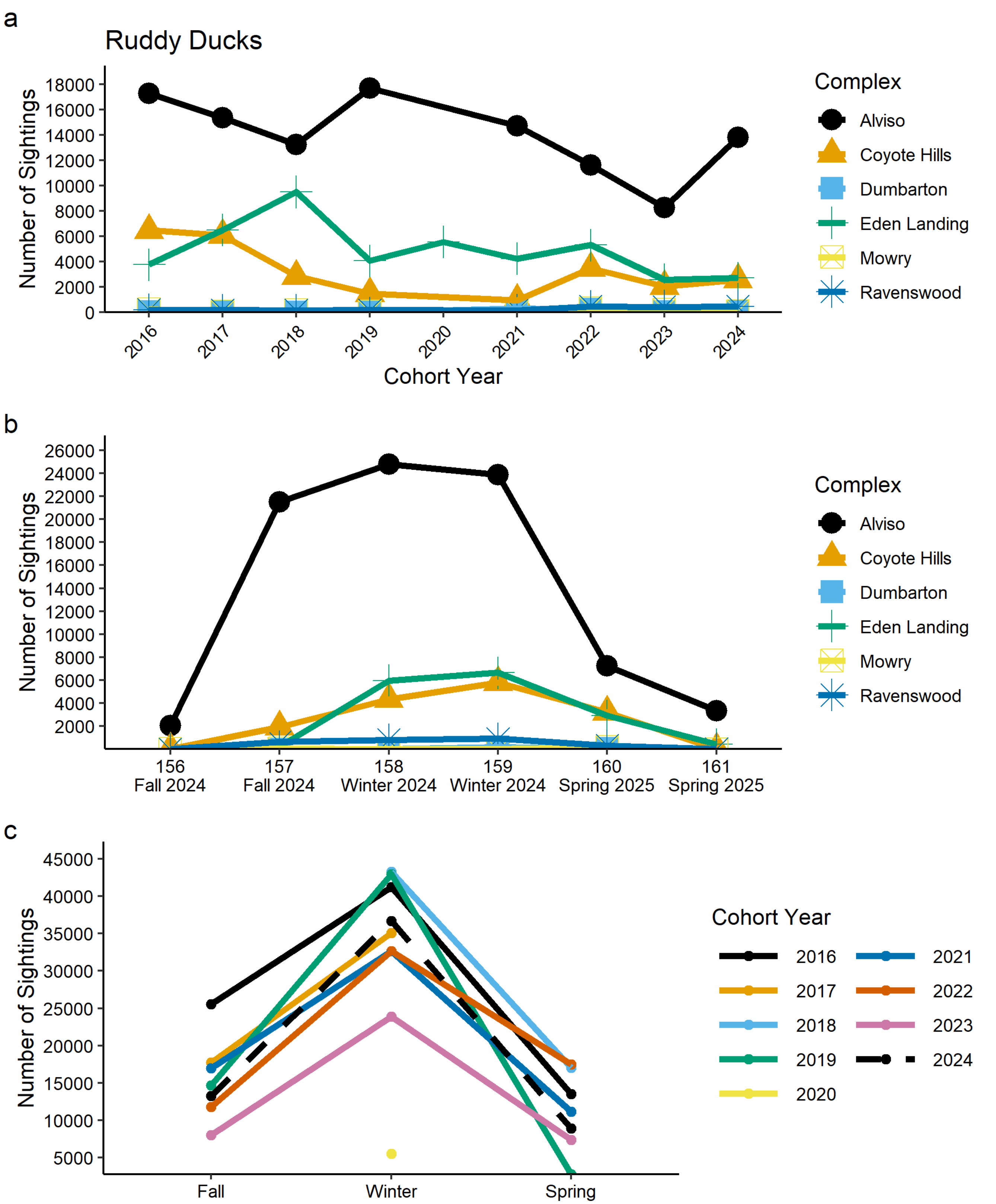

Figure 14. Abundance of Ruddy Ducks by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

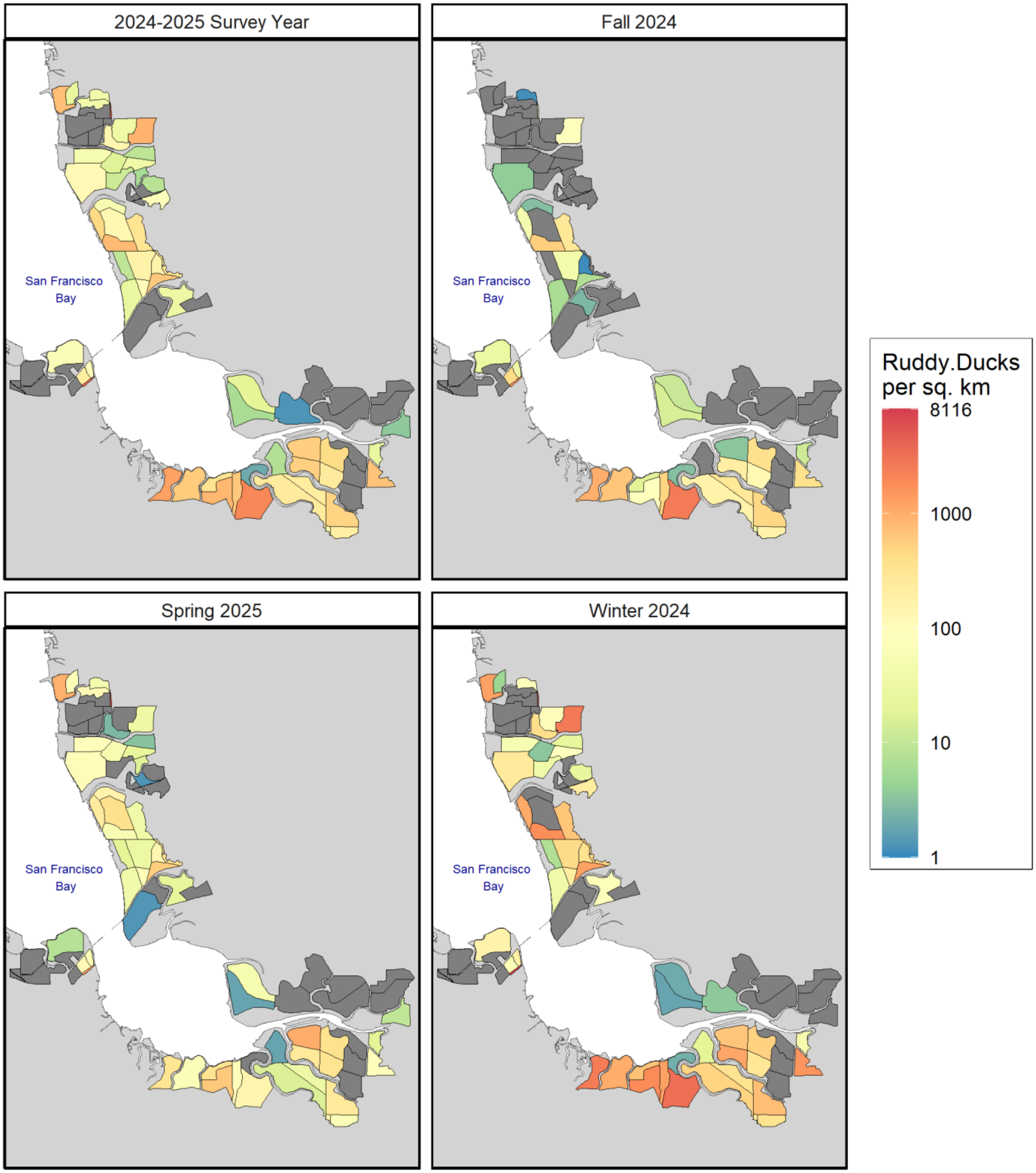

Figure 15. Density of Ruddy Ducks averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

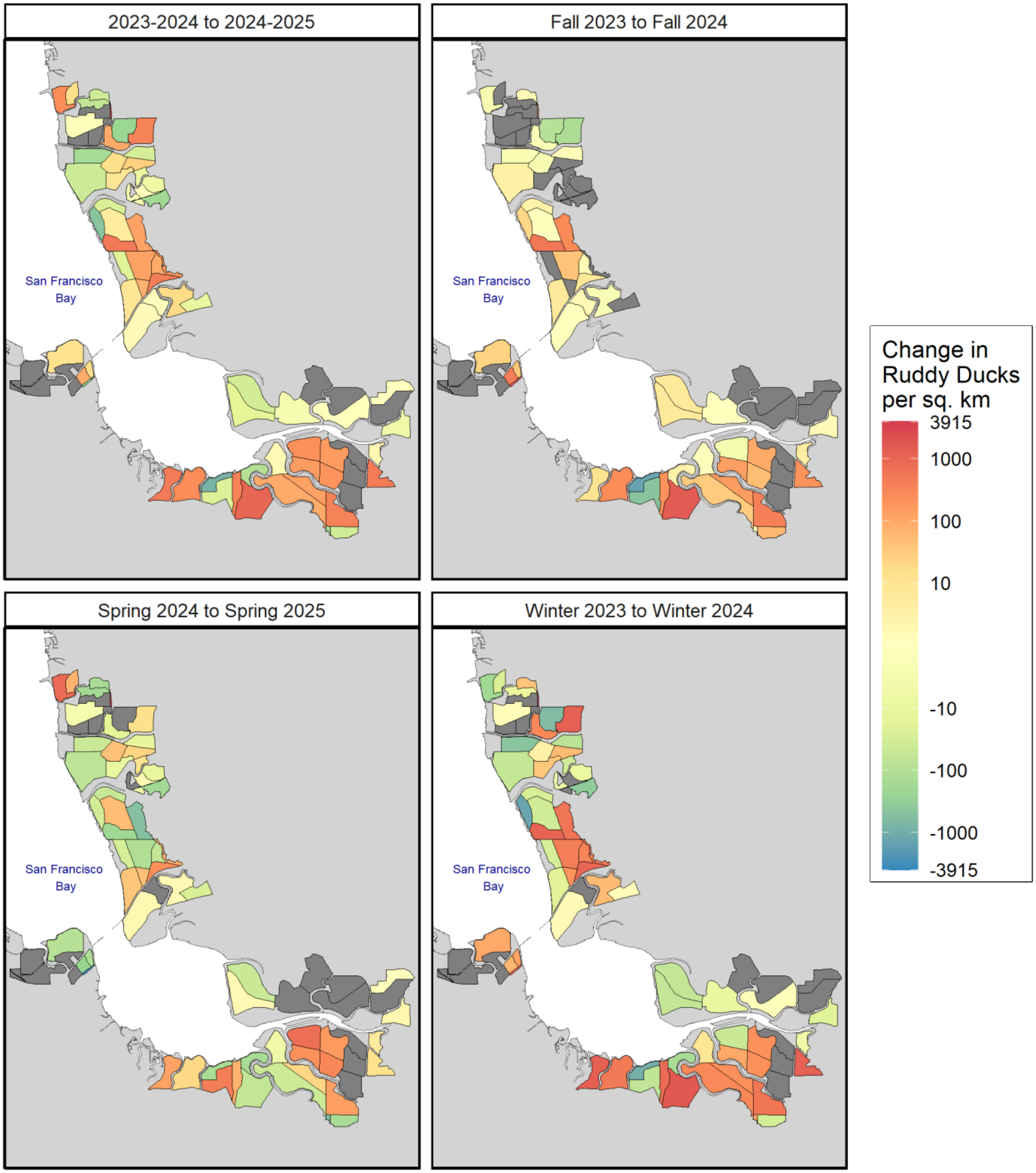

Figure 16. Interannual change in density of Ruddy Ducks between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For Ruddy Ducks in winter, their management trigger—two or more of the past three years of winter abundance below the 2005-2007 baseline value—was not tripped this year because average seasonal abundance was below this threshold in only one of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average winter abundance of Ruddy Ducks across the study area was -3,896 at the end of winter 2025 (Fig. 17). The trend within the SBSPRP was -3,921 (-81.85 per km^2) within the wildlife ponds and +98 (+14.63 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was -489 (-17.63 per km^2).

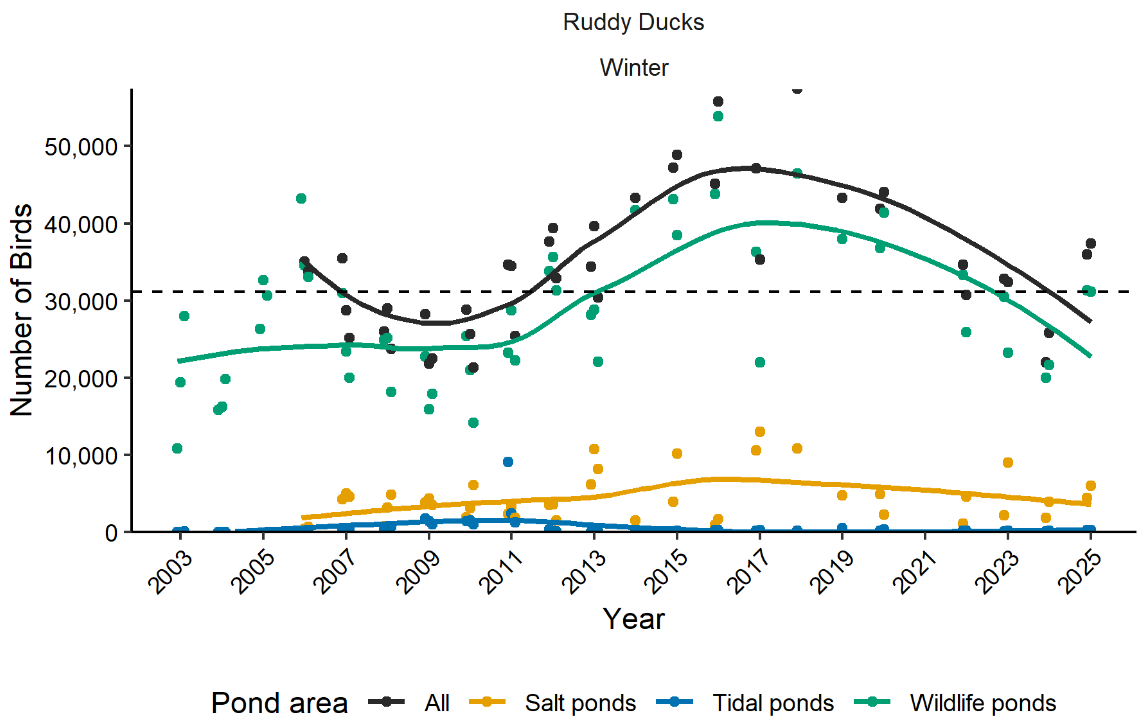

Figure 17. Counts of Ruddy Ducks during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

The best change model for Ruddy Ducks differed from the best change model for diving ducks. Decreasing salinity, decreasing pH, and increasing dissolved oxygen all very strongly predicted increases in abundance (Fig. 18). This year, the top model no longer included a positive relationship between Ruddy Duck population growth and increases in water depth, though this term was included in a fairly well-supported model (ΔAIC < 2; Table A5.3), which is in line with expectations for a species of diving duck. Like dabbling and diving ducks, base site characteristics did not strongly predict percent changes in abundance.

We report predictions made by the change model within 59 ponds, excluding sites that were unoccupied by Ruddy Ducks in winter of both 2025 and 2024 (A12, A13, A15, A22, A23, E14, E2C, E5C, E8AE, E8AW, M5, M6, N2, R2, R3, R4, R5, R5S and RSF2U3) and sites with missing water quality measurements (A19, A6S and A8W). Across this set of sites, the actual change in abundance of Ruddy Ducks in winter was +12,980 (+10,766 birds [+268 birds per km^2] in the SBSPRP and +2,213 [+94 per km^2] in the salt ponds). In comparison, the model predicted a total change of +12,634 (+12,259 [+305 per km^2] in the SBSPRP and +375 [+16 per km^2] in the salt ponds), with this predicted increase driven by effects of changes in site hydrology. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.14$, $R^2m = 0.10$).

The change model estimated that changes in site hydrology could explain a 1,535 increase (+2,322 [+58 per km^2] in the SBSPRP and -786 [-34 per km^2] in the salt ponds) in abundance of Ruddy Ducks from last year due to increasing dissolved oxygen, decreasing pH, and/or decreasing salinity. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of Ruddy Ducks due to hydrology changes in winter 2025 were A9, A2W, and A1, while RSF2U2, A9, and A2W were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 7). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were E10, A3W, and A2E and the sites with the largest predicted decreases in habitat suitability were E5, A8S, and A3N. In the salt pond footprint, the largest predicted increases in abundance were in N9, N4B, and N4 and the largest predicted increases in habitat suitability were in N9, N4B, and N7, while the sites with predicted largest decreases were M1, N4AB, and N2A and M3, M4, and N8 for abundance and habitat suitability, respectively (Table 7).

Static site characteristics (distance to bay, number of islands, and pond area) accounted for a decrease of 738 birds. This effect was -733 [-18 per km^2] in the SBSPRP and -5 [-0 per km^2] in the salt ponds.

Weather covariates were not included in the top model. However, there was a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 10,052 (+9,123 [+227 per km^2] in the SBSPRP and +930 [+40 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

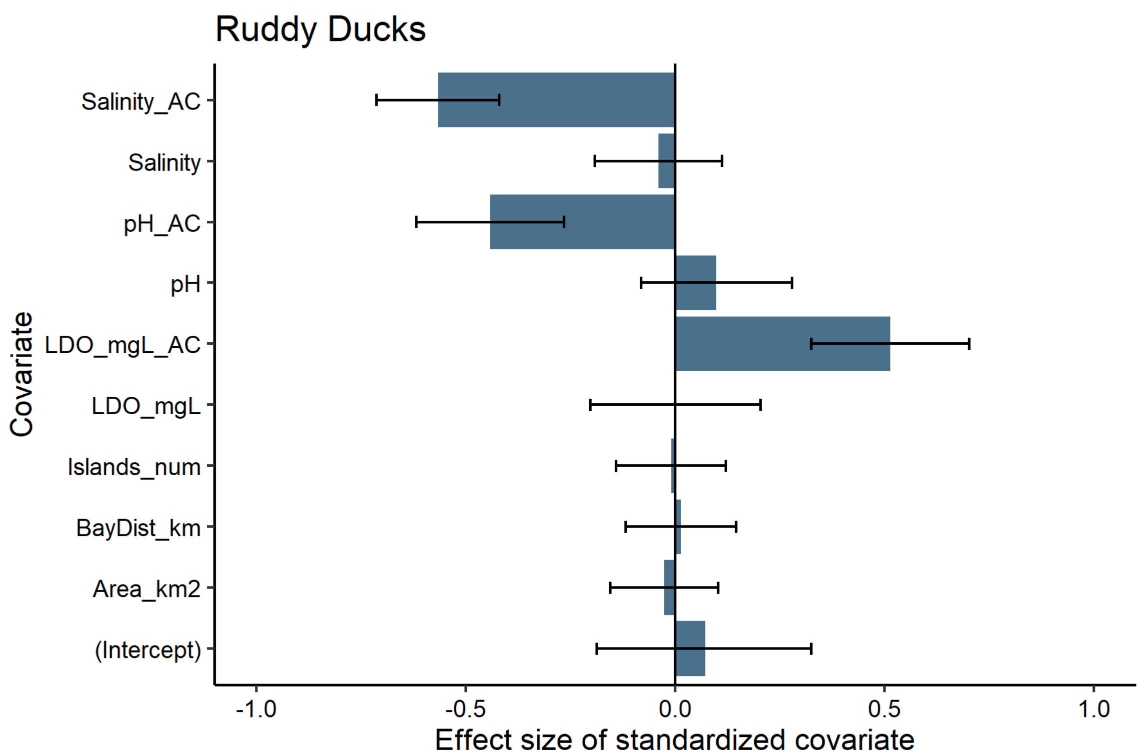

Figure 18. Fixed effects for the top model for interannual change in abundance of Ruddy Ducks during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 1,138). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.236.

Table 7. Actual and predicted changes in mean abundance per survey of Ruddy Ducks from winter 2024 to winter 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (dissolved oxygen, pH, and salinity; compared to no change from last year), static site characteristics (distance to bay, number of islands, and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
N2A	1,670	752	-918 (-0.80)	-129 (-0.08)	-709 (-0.38)	+3 (+0.00)	+422 (+0.32)
E6B	829	118	-711 (-1.94)	+641 (+0.57)	+321 (+0.25)	+14 (+0.01)	+402 (+0.32)
AB1	1,006	432	-574 (-0.84)	+213 (+0.19)	-287 (-0.21)	+1 (+0.00)	+334 (+0.32)
E1	593	129	-464 (-1.52)	-205 (-0.42)	-358 (-0.65)	-5 (-0.01)	+106 (+0.32)
E10	1,277	1,114	-164 (-0.14)	-80 (-0.06)	-473 (-0.33)	-16 (-0.01)	+328 (+0.32)
E2	848	696	-152 (-0.20)	+187 (+0.20)	-39 (-0.04)	-107 (-0.10)	+283 (+0.32)
N3A	124	2	-122 (-3.91)	+40 (+0.28)	-6 (-0.04)	-6 (-0.03)	+45 (+0.32)
M1	120	8	-112 (-2.60)	-73 (-0.92)	-112 (-1.20)	-3 (-0.05)	+13 (+0.32)
M2	112	7	-106 (-2.65)	-45 (-0.51)	-80 (-0.77)	-4 (-0.06)	+19 (+0.32)
A3N	98	2	-96 (-3.67)	-39 (-0.50)	-102 (-1.00)	+0 (+0.00)	+16 (+0.32)
E3C	384	290	-94 (-0.28)	+219 (+0.45)	+28 (+0.05)	+13 (+0.02)	+165 (+0.32)
A2E	2,530	2,450	-80 (-0.03)	+225 (+0.09)	-928 (-0.29)	-56 (-0.02)	+754 (+0.32)
A9	1,047	980	-66 (-0.07)	+2,993 (+1.35)	+2,109 (+0.74)	-92 (-0.02)	+1,105 (+0.32)
E6	78	37	-41 (-0.73)	+56 (+0.54)	+9 (+0.07)	+4 (+0.03)	+37 (+0.32)
E11	30	5	-25 (-1.64)	-3 (-0.09)	-8 (-0.26)	+0 (+0.02)	+8 (+0.32)
N4	75	51	-24 (-0.38)	+56 (+0.55)	+31 (+0.26)	-4 (-0.03)	+36 (+0.32)
E6C	23	0	-23 (-3.18)	-12 (-0.67)	-18 (-0.89)	+1 (+0.04)	+3 (+0.32)
N5	28	6	-22	+22	+12	+0	+14

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
			(-1.48)	(+0.58)	(+0.27)	(+0.00)	(+0.32)
A8S	266	244	-21 (-0.08)	-109 (-0.52)	-278 (-1.01)	+8 (+0.05)	+43 (+0.32)
N1A	18	0	-18 (-2.94)	-2 (-0.13)	-9 (-0.41)	+0 (+0.01)	+5 (+0.32)
E4C	47	36	-11 (-0.26)	-9 (-0.20)	-31 (-0.57)	+1 (+0.01)	+11 (+0.32)
M3	26	16	-10 (-0.44)	-16 (-0.88)	-23 (-1.13)	-1 (-0.06)	+3 (+0.32)
E13	6	0	-6 (-1.87)	+0 (+0.06)	-2 (-0.24)	+0 (+0.02)	+2 (+0.32)
A17	31	28	-3 (-0.10)	-5 (-0.17)	-12 (-0.37)	+1 (+0.05)	+7 (+0.32)
M4	3	0	-3 (-1.39)	-3 (-1.05)	-2 (-0.99)	-0 (-0.01)	+0 (+0.32)
E1C	2	0	-2 (-1.10)	+3 (+0.67)	+2 (+0.30)	+0 (+0.04)	+2 (+0.32)
NPP1	0	1	+1 (+0.69)	-0 (-0.21)	-0 (-0.36)	+0 (+0.03)	+0 (+0.32)
E9	0	2	+2 (+1.10)	-0 (-0.27)	-0 (-0.49)	-0 (-0.03)	+0 (+0.32)
N3	0	4	+4 (+1.61)	-0 (-0.14)	-0 (-0.34)	-0 (-0.08)	+0 (+0.32)
E7	0	6	+6 (+1.95)	+1 (+0.59)	+0 (+0.26)	+0 (+0.01)	+0 (+0.32)
RSF2U1	29	42	+14 (+0.37)	+23 (+0.58)	+13 (+0.28)	-0 (-0.00)	+15 (+0.32)
E5	44	60	+16 (+0.31)	-19 (-0.57)	-40 (-0.94)	+1 (+0.03)	+7 (+0.32)
RSF2U2	0	43	+43 (+3.78)	+3 (+1.33)	+3 (+1.11)	-0 (-0.04)	+1 (+0.32)
E12	18	72	+54 (+1.32)	-6 (-0.35)	-11 (-0.58)	+0 (+0.03)	+4 (+0.32)
E4	0	57	+57 (+4.06)	-0 (-0.15)	-1 (-0.52)	+0 (+0.00)	+0 (+0.32)
N6	15	80	+64 (+1.62)	+13 (+0.60)	+8 (+0.32)	+1 (+0.02)	+8 (+0.32)
RSF2U4	441	508	+67 (+0.14)	-75 (-0.19)	-119 (-0.28)	+10 (+0.03)	+100 (+0.32)
N1	27	104	+77 (+1.32)	-2 (-0.07)	-7 (-0.24)	-0 (-0.00)	+7 (+0.32)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
N4B	20	126	+106 (+1.80)	+53 (+1.27)	+42 (+0.83)	+3 (+0.04)	+20 (+0.32)
A10	1,107	1,216	+110 (+0.09)	+700 (+0.49)	+224 (+0.13)	+4 (+0.00)	+495 (+0.32)
N8	11	164	+152 (+2.62)	-9 (-1.42)	-9 (-1.37)	+0 (+0.03)	+1 (+0.32)
E8X	79	236	+156 (+1.08)	+8 (+0.10)	-21 (-0.22)	+4 (+0.04)	+24 (+0.32)
R1	112	294	+183 (+0.97)	+104 (+0.66)	+57 (+0.30)	-10 (-0.04)	+59 (+0.32)
E8	76	306	+230 (+1.38)	-21 (-0.32)	-31 (-0.44)	+1 (+0.02)	+15 (+0.32)
A7	128	374	+246 (+1.07)	+195 (+0.92)	+117 (+0.45)	-4 (-0.01)	+89 (+0.32)
A11	62	310	+248 (+1.60)	+14 (+0.20)	-10 (-0.12)	+1 (+0.01)	+21 (+0.32)
A14	431	741	+310 (+0.54)	+246 (+0.45)	+91 (+0.14)	-4 (-0.01)	+185 (+0.32)
N9	118	710	+592 (+1.79)	+283 (+1.22)	+247 (+0.95)	+9 (+0.02)	+110 (+0.32)
AB2	326	944	+618 (+1.06)	+429 (+0.84)	+291 (+0.49)	-33 (-0.04)	+207 (+0.32)
N7	0	682	+682 (+6.53)	+2 (+0.96)	+1 (+0.61)	-0 (-0.02)	+1 (+0.32)
N4AA	42	800	+758 (+2.91)	-0 (-0.01)	-20 (-0.39)	-0 (-0.00)	+12 (+0.32)
A5	546	1,324	+778 (+0.88)	+44 (+0.08)	-280 (-0.39)	-38 (-0.06)	+162 (+0.32)
A2W	934	1,821	+888 (+0.67)	+1,465 (+0.94)	+1,046 (+0.57)	-120 (-0.05)	+657 (+0.32)
A8	258	1,266	+1,008 (+1.59)	+213 (+0.60)	+130 (+0.32)	+1 (+0.00)	+129 (+0.32)
N4AB	596	1,707	+1,112 (+1.05)	+35 (+0.06)	-180 (-0.25)	-4 (-0.01)	+173 (+0.32)
A16	350	1,578	+1,228 (+1.50)	-76 (-0.24)	-337 (-0.80)	+5 (+0.02)	+75 (+0.32)
A1	1,362	2,878	+1,516 (+0.75)	+2,006 (+0.90)	+1,340 (+0.51)	-58 (-0.02)	+922 (+0.32)
E6A	1,824	3,467	+1,644 (+0.64)	+892 (+0.40)	+103 (+0.04)	+15 (+0.01)	+743 (+0.32)
A3W	3,826	7,707	+3,882 (+0.70)	+1,263 (+0.29)	-557 (-0.10)	-287 (-0.05)	+1,393 (+0.32)

Eared Grebes

Abundance

Across all complexes, there were 22,768 total sightings of Eared Grebes (sum sightings during the entire survey period). Compared to last year, this was a decrease of 4,542 total sightings (-16.6%; Fig. 19). In their target season of winter they decreased by 6.8%. There were on average 2,224 fewer Eared Grebes detected per survey in fall (Table A2.4), 418 fewer detected in winter (Table A2.6), and 372 more detected in spring (Table A2.8, Fig. 19).

At the pond level, M4 had the highest abundance (mean count of 1,813 per survey), followed by M3 (564) and M1 (336; Fig. 20). At these sites, we observed the majority of Eared Grebes roosting on the pond (65.1%), foraging (85.4%), and roosting on the pond (68.0%), respectively (Table A4.5). Across all six surveys, the sites with the largest increases in Eared Grebes from last year were M4 (+1,015 mean abundance per visit), A11 (+86), and N1 (+68), while the sites with the largest decreases were M3 (-855), M2 (-634), and M1 (-479; Fig. 21).

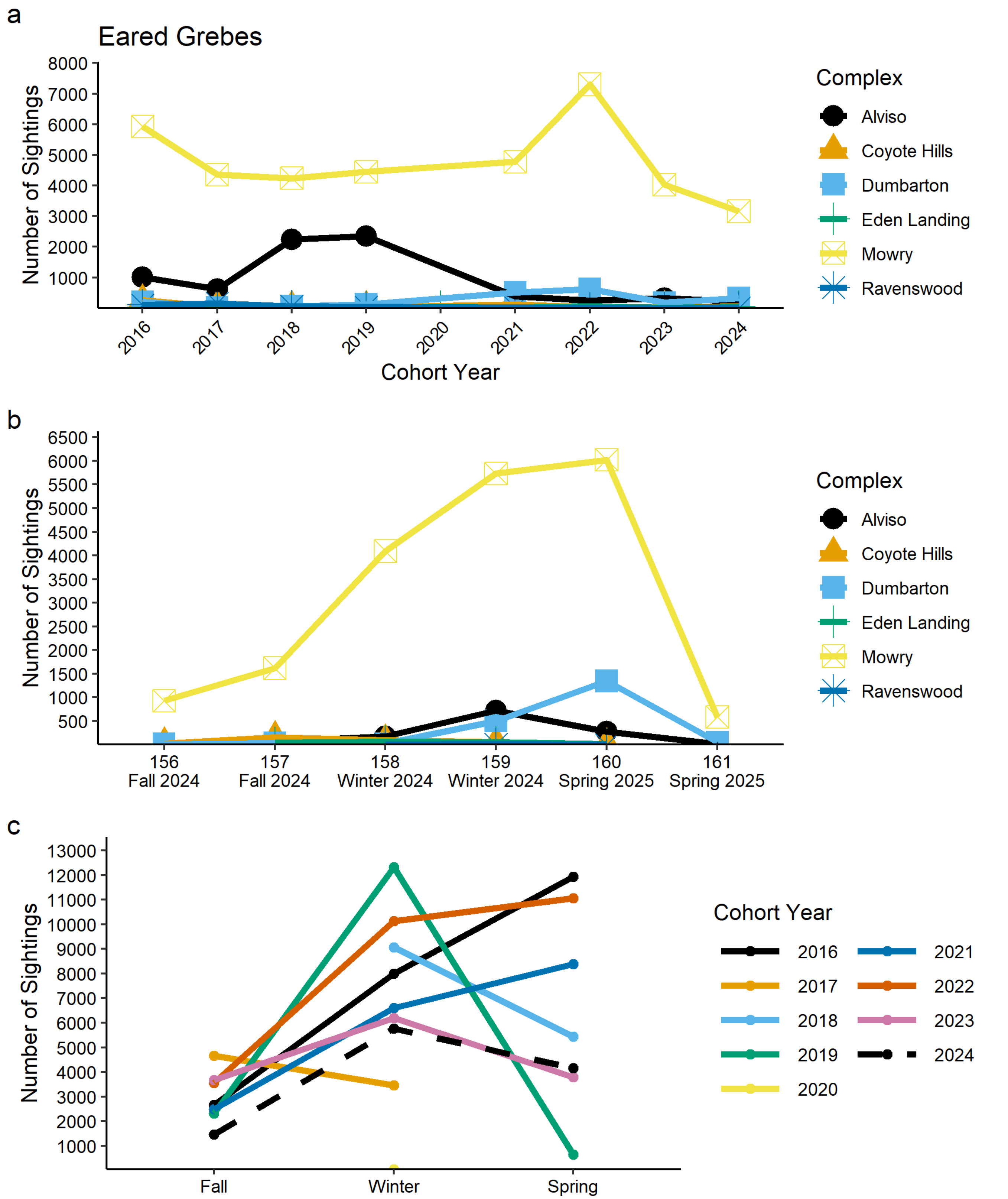

Figure 19. Abundance of Eared Grebes by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

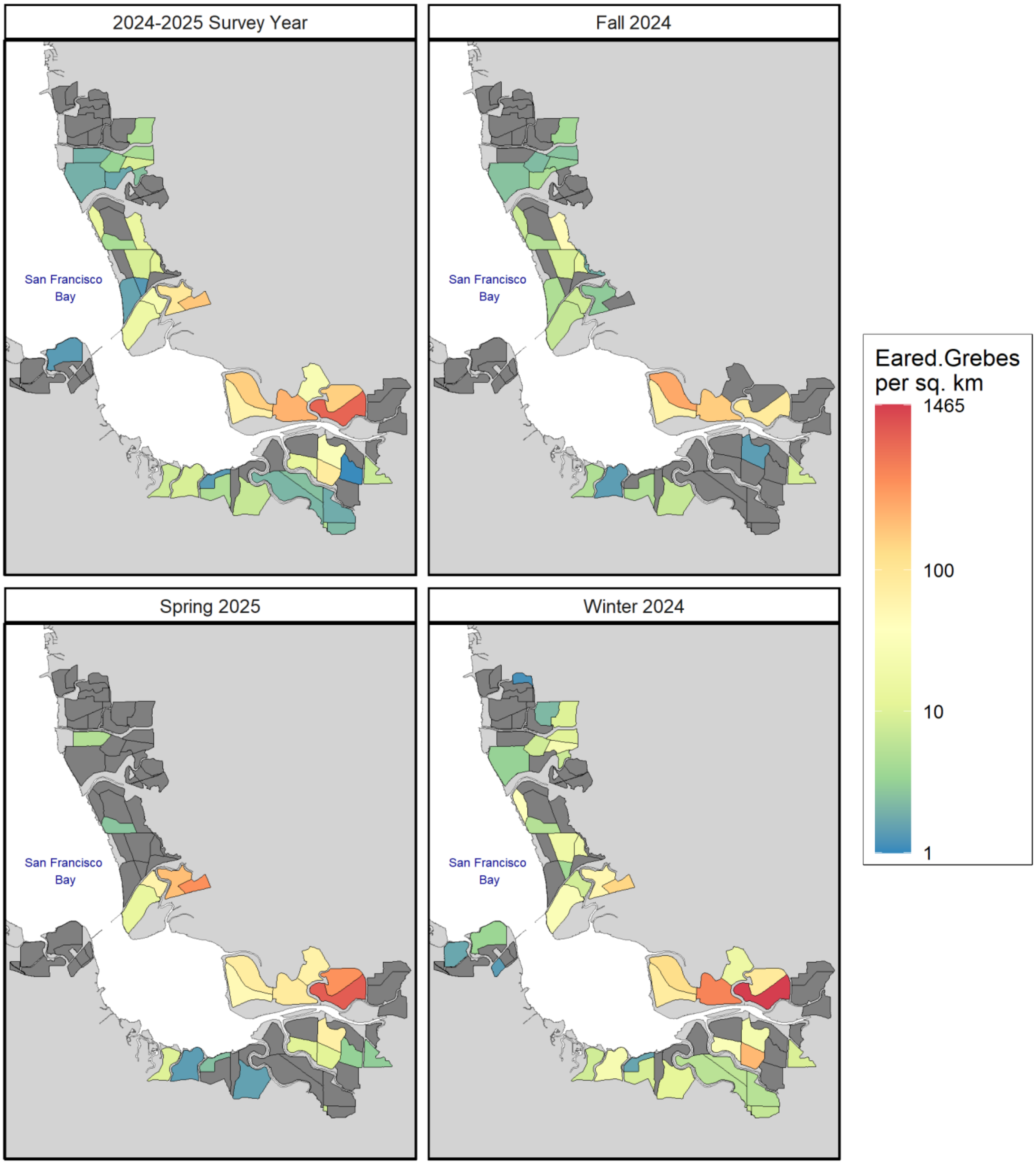

Figure 20. Density of Eared Grebes averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

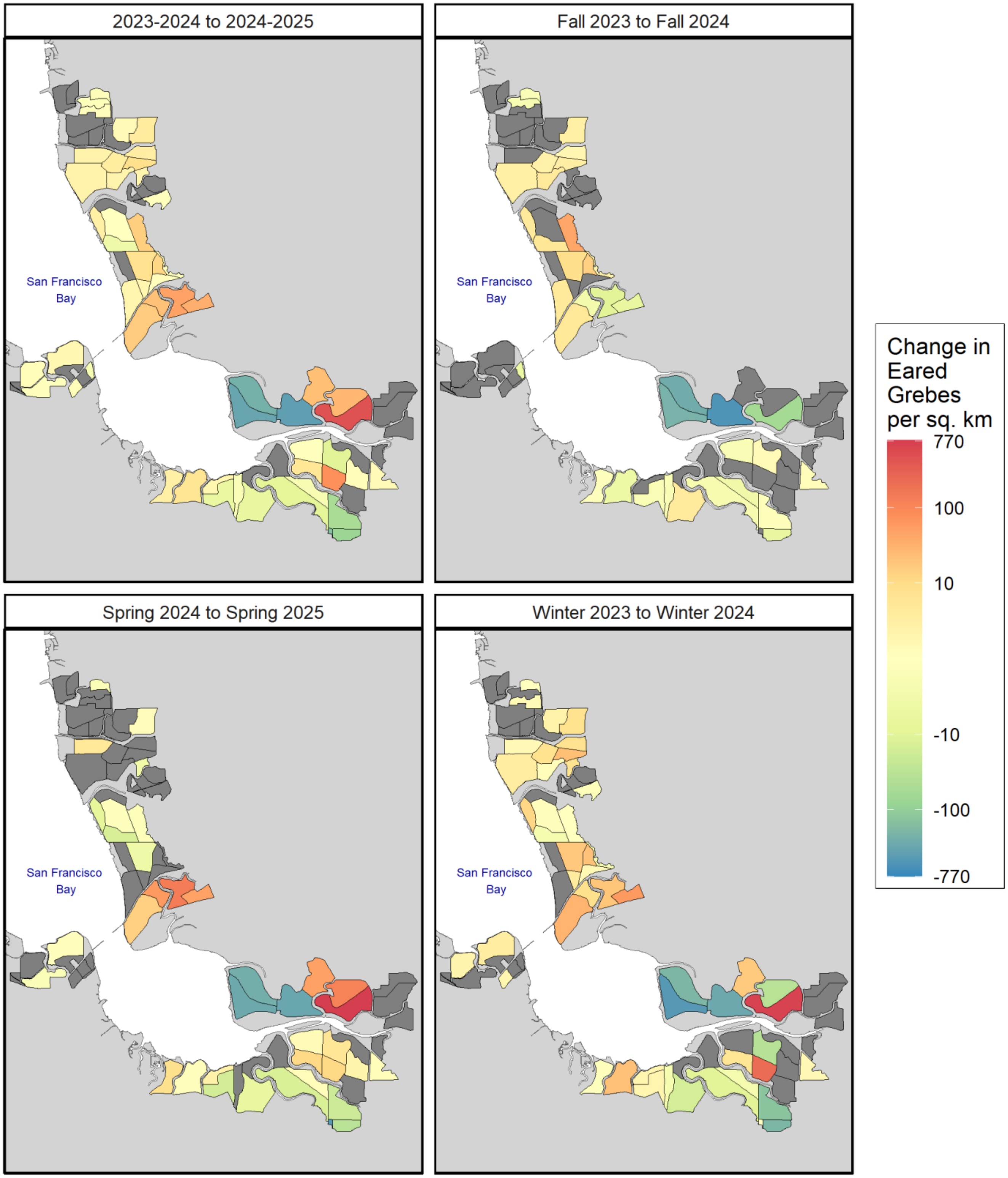

Figure 21. Interannual change in density of Eared Grebes between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For Eared Grebes in winter, their management trigger—more than 25% below the 2005-2007 baseline winter abundance for the past three years, or more than 50% below in any single year—was not tripped this year because neither of these conditions were met, with counts below the 25% threshold in none of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average winter abundance of Eared Grebes across the study area was -1,082 at the end of winter 2025 (Fig. 22). The trend within the SBSPRP was -870 (-18.15 per km^2) within the wildlife ponds and +5 (+0.79 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was -261 (-9.40 per km^2).

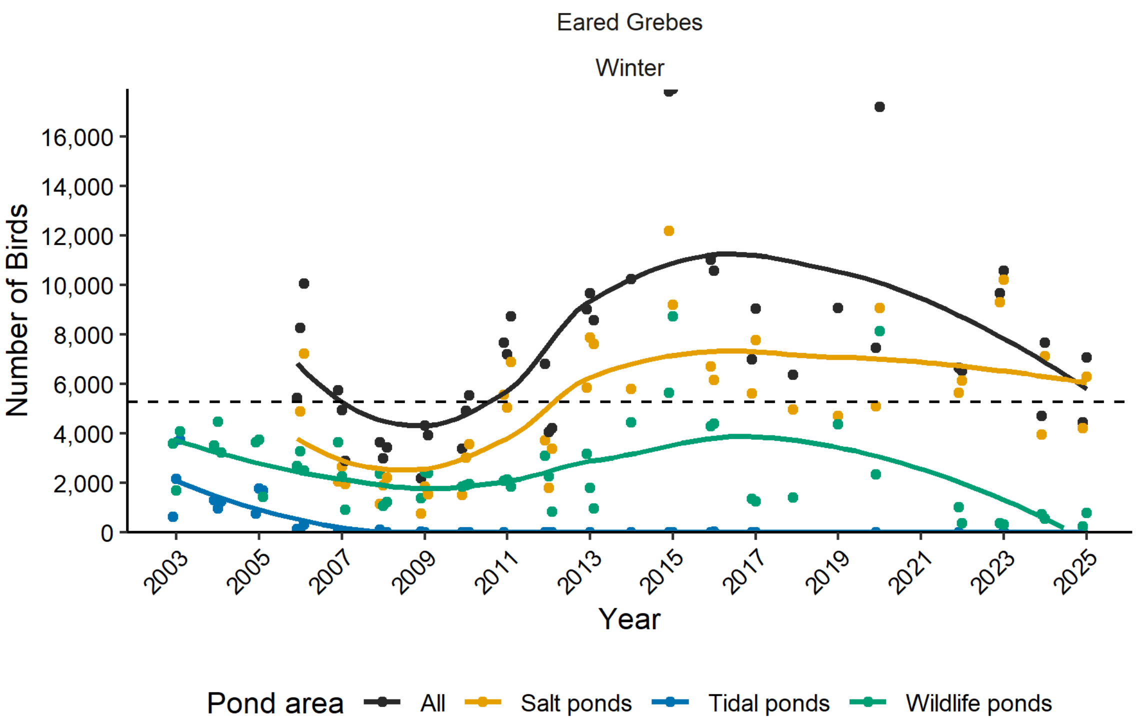

Figure 22. Counts of Eared Grebes during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

As the SBSPRP continues, state and federal land managers are concerned that the loss of medium and high salinity ponds may impact species like Eared Grebes that depend on these habitats. However, despite strongly divergent patterns of decline within the SBSPRP footprint and increase within the salt production ponds (Fig. 22), change in Eared Grebes abundance was not strongly related to salinity or any other water quality variable (Fig. 23). De La Cruz et al. (2018) also did not find any relationships between abundance and water quality measures, though Scullen et al. (2013) found support for higher abundances at ponds with higher pH, higher salinity, and lower temperature. The one significant relationship found was a positive relationship between increasing abundance and interannual increases in water elevation (a proxy for increasing water depth; Fig. 40). Both De La Cruz (2018) and Scullen et al. (2013) found that Eared Grebe abundances were higher at ponds with greater staff gauge values, which makes sense given Eared Grebes forage by diving. This suggests possibly that the restoration activities or pond drawdowns could be a driving factor in the observed changes, but more analyses are necessary to disentangle whether this relationship could explain the decline within the SBSPRP, the increase within salt production ponds, or both. Changes in Eared Grebe abundance were not strongly related to pond characteristics.

We report predictions made by the change model within 48 ponds, excluding sites that were unoccupied by Eared Grebes in winter of both 2025 and 2024 (A12, A13, A15, A17, A19, A22, A23, A3N, A6S, A9, E10, E11, E13, E1C, E2C, E4C, E5C, E8, E8AE, E8AW, E8X, E9, N1A, N4, N5, R2, R3, R5, R5S, RSF2U1, RSF2U2 and RSF2U4) and sites with missing water quality measurements (A8W). Across this set of sites, the actual change in abundance of Eared Grebes in winter was -573 (-120 birds [-4 birds per km^2] in the SBSPRP and -454 [-18 per km^2] in the salt ponds). In comparison, the model predicted a total change of +3,724 (+455 [+14 per km^2] in the SBSPRP and +3,269 [+131 per km^2] in the salt ponds), with this predicted increase driven by effects of static site characteristics. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.11$, $R^2m = 0.01$).

The change model estimated that changes in site hydrology could explain a 1,378 decrease (+7 [+0 per km^2] in the SBSPRP and -1,386 [-56 per km^2] in the salt ponds) in abundance of Eared Grebes from last year due to decreasing depth. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of Eared Grebes due to hydrology changes in winter 2025 were A3W, E6B, and A7, while E6B, A3W, and AB1 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 8). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were AB2, A1, and E12 and the sites with the largest predicted decreases in habitat suitability were AB2, E14, and E12. In the salt pond footprint, the largest predicted increases in abundance were in N3A, N4AA, and N7 and the largest predicted increases in habitat suitability were in N3A, N9, and N8, while the sites with predicted largest decreases were M1, M2, and M3 and M2, M1, and M3 for abundance and habitat suitability, respectively (Table 8).

Static site characteristics (number of islands and pond area) accounted for an increase of 1,156 birds. This effect was +51 [+2 per km^2] in the SBSPRP and +1,105 [+44 per km^2] in the salt ponds.

Weather covariates were not included in the top model. However, there was a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 4,327 (+486 [+14 per km^2] in the SBSPRP and +3,841 [+154 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

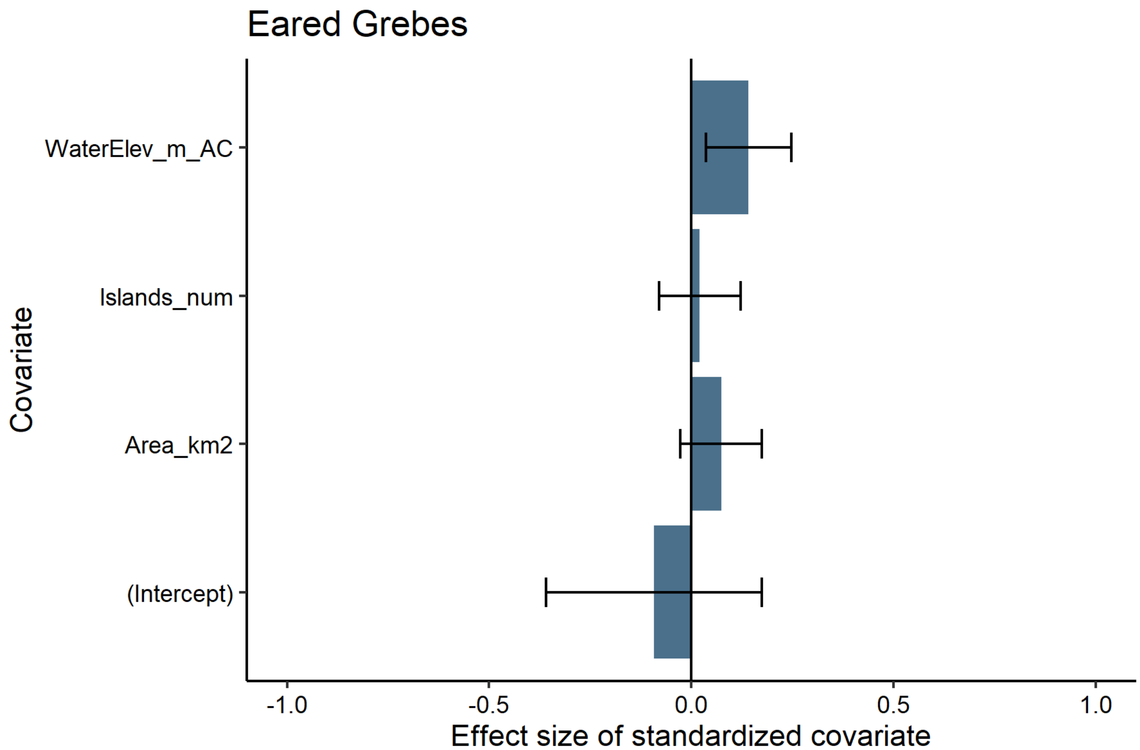

Figure 23. Fixed effects for the top model for interannual change in abundance of Eared Grebes during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 1,071). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.302.

Table 8. Actual and predicted changes in mean abundance per survey of Eared Grebes from winter 2024 to winter 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (depth; compared to no change from last year), static site characteristics (number of islands and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
M2	1,056	157	-898	+591	-231	+186	+701
			(-1.90)	(+0.44)	(-0.13)	(+0.12)	(+0.55)
M3	1,792	1,128	-663	+786	-773	+402	+1,097
			(-0.46)	(+0.36)	(-0.26)	(+0.17)	(+0.55)
M1	660	262	-397	+353	-154	+108	+431
			(-0.92)	(+0.43)	(-0.14)	(+0.11)	(+0.55)
M5	410	146	-264	+265	-35	+59	+287
			(-1.02)	(+0.50)	(-0.05)	(+0.09)	(+0.55)
A8	238	9	-228	+161	0	+23	+170
			(-3.17)	(+0.51)	(0.00)	(+0.06)	(+0.55)
A8S	141	4	-136	+68	0	-14	+90
			(-3.25)	(+0.39)	(0.00)	(-0.06)	(+0.55)
A14	84	32	-52	+53	0	+4	+59
			(-0.96)	(+0.48)	(0.00)	(+0.03)	(+0.55)
A3W	64	28	-36	+67	+14	+17	+56
			(-0.81)	(+0.70)	(+0.11)	(+0.14)	(+0.55)
A5	40	14	-26	+36	-1	+13	+33
			(-0.98)	(+0.63)	(-0.01)	(+0.18)	(+0.55)
AB2	3	0	-3	+1	-1	+0	+2
			(-1.39)	(+0.27)	(-0.23)	(+0.05)	(+0.55)
A7	9	6	-2	+6	+0	+0	+7
			(-0.29)	(+0.49)	(+0.01)	(+0.03)	(+0.55)
N4AB	7	5	-2	+4	0	-0	+5
			(-0.29)	(+0.43)	(0.00)	(-0.03)	(+0.55)
E3C	1	0	-1	+1	-0	-0	+1
			(-0.69)	(+0.38)	(-0.03)	(-0.04)	(+0.55)
N4B	1	0	-1	+1	0	-0	+1
			(-0.69)	(+0.34)	(0.00)	(-0.12)	(+0.55)
A1	10	9	-0	+4	-2	+0	+6
			(-0.05)	(+0.35)	(-0.11)	(+0.00)	(+0.55)
E12	1	1	0	-1	-2	-0	+0

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
			(0.00)	(-1.21)	(-1.57)	(-0.09)	(+0.55)
A16	8	10	+1	+5	-1	+0	+6
			(+0.10)	(+0.40)	(-0.06)	(+0.01)	(+0.55)
AB1	0	1	+1	+1	+0	-0	+1
			(+0.69)	(+0.43)	(+0.04)	(-0.06)	(+0.55)
E1	0	1	+1	+1	0	+0	+1
			(+0.69)	(+0.46)	(0.00)	(+0.01)	(+0.55)
E14	0	1	+1	+0	-0	-0	+0
			(+0.69)	(+0.00)	(-0.39)	(-0.06)	(+0.55)
E4	0	1	+1	+0	-0	-0	+1
			(+0.69)	(+0.36)	(-0.07)	(-0.03)	(+0.55)
N3A	0	1	+1	+14	+13	+1	+6
			(+0.69)	(+2.70)	(+2.18)	(+0.06)	(+0.55)
N4AA	1	2	+1	+2	+1	+0	+2
			(+0.41)	(+0.62)	(+0.16)	(+0.00)	(+0.55)
N9	0	1	+1	+1	+0	-0	+1
			(+0.69)	(+0.62)	(+0.24)	(-0.08)	(+0.55)
RSF2U3	0	1	+1	+0	0	-0	+1
			(+0.69)	(+0.35)	(0.00)	(-0.10)	(+0.55)
A2E	10	12	+2	+7	0	+0	+7
			(+0.17)	(+0.47)	(0.00)	(+0.01)	(+0.55)
N6	0	3	+3	+0	+0	-0	+1
			(+1.39)	(+0.38)	(+0.02)	(-0.10)	(+0.55)
R4	0	4	+4	+1	0	+0	+1
			(+1.61)	(+0.46)	(0.00)	(+0.00)	(+0.55)
E6B	0	5	+5	+1	+1	-0	+1
			(+1.79)	(+0.74)	(+0.29)	(-0.01)	(+0.55)
E6C	0	5	+5	+0	-0	-0	+1
			(+1.79)	(+0.23)	(-0.12)	(-0.11)	(+0.55)
R1	1	6	+6	+1	0	+0	+1
			(+1.32)	(+0.53)	(0.00)	(+0.08)	(+0.55)
A10	26	32	+6	+14	0	-1	+17
			(+0.20)	(+0.44)	(0.00)	(-0.02)	(+0.55)
N2	0	6	+6	+1	0	-0	+1
			(+2.01)	(+0.42)	(0.00)	(-0.03)	(+0.55)
E7	0	7	+7	+1	0	-0	+1
			(+2.08)	(+0.43)	(0.00)	(-0.03)	(+0.55)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
E2	1	9	+8 (+1.61)	+2 (+0.67)	-0 (-0.02)	+1 (+0.23)	+2 (+0.55)
N2A	17	25	+8 (+0.37)	+9 (+0.39)	0 (0.00)	-2 (-0.06)	+11 (+0.55)
E6A	2	13	+10 (+1.39)	+2 (+0.38)	-1 (-0.10)	+0 (+0.03)	+2 (+0.55)
E6	5	17	+12 (+1.10)	+3 (+0.41)	0 (0.00)	-0 (-0.04)	+4 (+0.55)
E5	2	16	+15 (+1.95)	+1 (+0.39)	0 (0.00)	-0 (-0.06)	+2 (+0.55)
N8	0	19	+19 (+3.00)	+1 (+0.53)	+0 (+0.16)	-0 (-0.09)	+1 (+0.55)
N1	48	74	+26 (+0.43)	+29 (+0.47)	-1 (-0.01)	+2 (+0.02)	+33 (+0.55)
N7	1	28	+27 (+2.67)	+2 (+0.65)	+1 (+0.15)	+0 (+0.04)	+2 (+0.55)
A2W	4	44	+39 (+2.09)	+3 (+0.49)	-1 (-0.06)	+1 (+0.09)	+4 (+0.55)
NPP1	68	116	+48 (+0.52)	+34 (+0.40)	0 (0.00)	-5 (-0.05)	+44 (+0.55)
M6	1	62	+61 (+3.45)	+1 (+0.53)	0 (0.00)	+0 (+0.08)	+1 (+0.55)
N3	0	66	+66 (+4.21)	+1 (+0.70)	+0 (+0.07)	+0 (+0.17)	+1 (+0.55)
A11	7	250	+242 (+3.44)	+4 (+0.44)	0 (0.00)	-0 (-0.01)	+5 (+0.55)
M4	1,682	3,186	+1,504 (+0.64)	+1,311 (+0.58)	0 (0.00)	+338 (+0.12)	+1,274 (+0.55)

Fisheaters

Abundance

Across all complexes, there were 14,964 total sightings of fisheaters (sum sightings during the entire survey period). Compared to last year, this was a decrease of 1,051 total sightings (-6.6%; Fig. 24). In their target season of fall they increased by 9.6%. There were on average 490 more fisheaters detected per survey in fall (Table A2.4), 568 fewer detected in winter (Table A2.6), and 448 fewer detected in spring (Table A2.8, Fig. 24).

At the pond level, A5 had the highest abundance (mean count of 224 per survey), followed by N3A (213) and A16 (206; Fig. 25). At these sites, we observed the majority of fisheaters roosting on levees (63.7%), roosting on levees (60.1%), and roosting on islands (76.7%), respectively (Table A4.6). Across all six surveys, the sites with the largest increases in fisheaters from last year were E7 (+72 mean abundance per visit), A16 (+57), and A14 (+38), while the sites with the largest decreases were N4AB (-293), N9 (-102), and N3A (-50; Fig. 26). Seasonal abundance of fisheaters was exceptionally low (5th percentile) at A2E (2 birds in spring) and A3W (17 in spring).

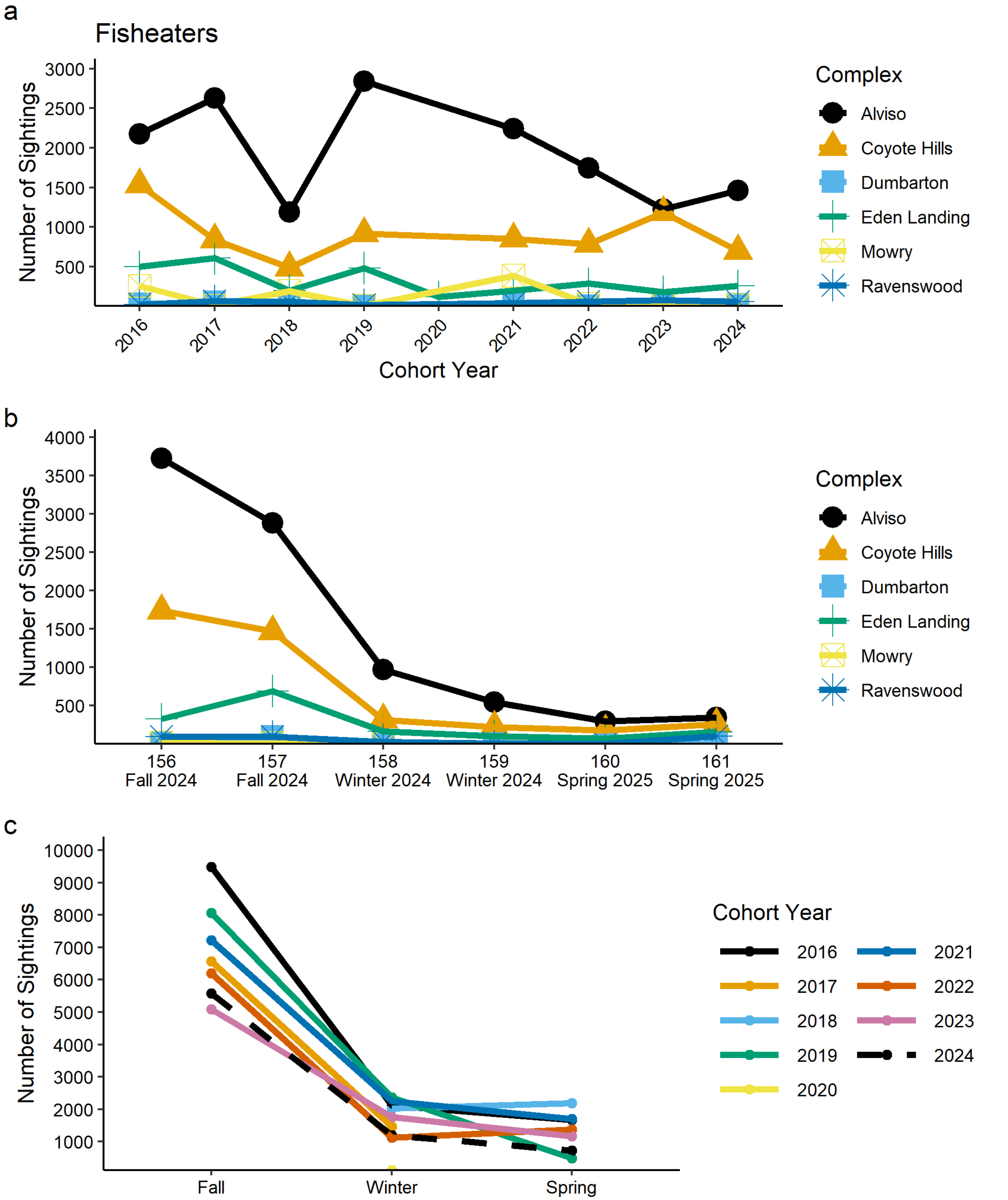

Figure 24. Abundance of fisheaters by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

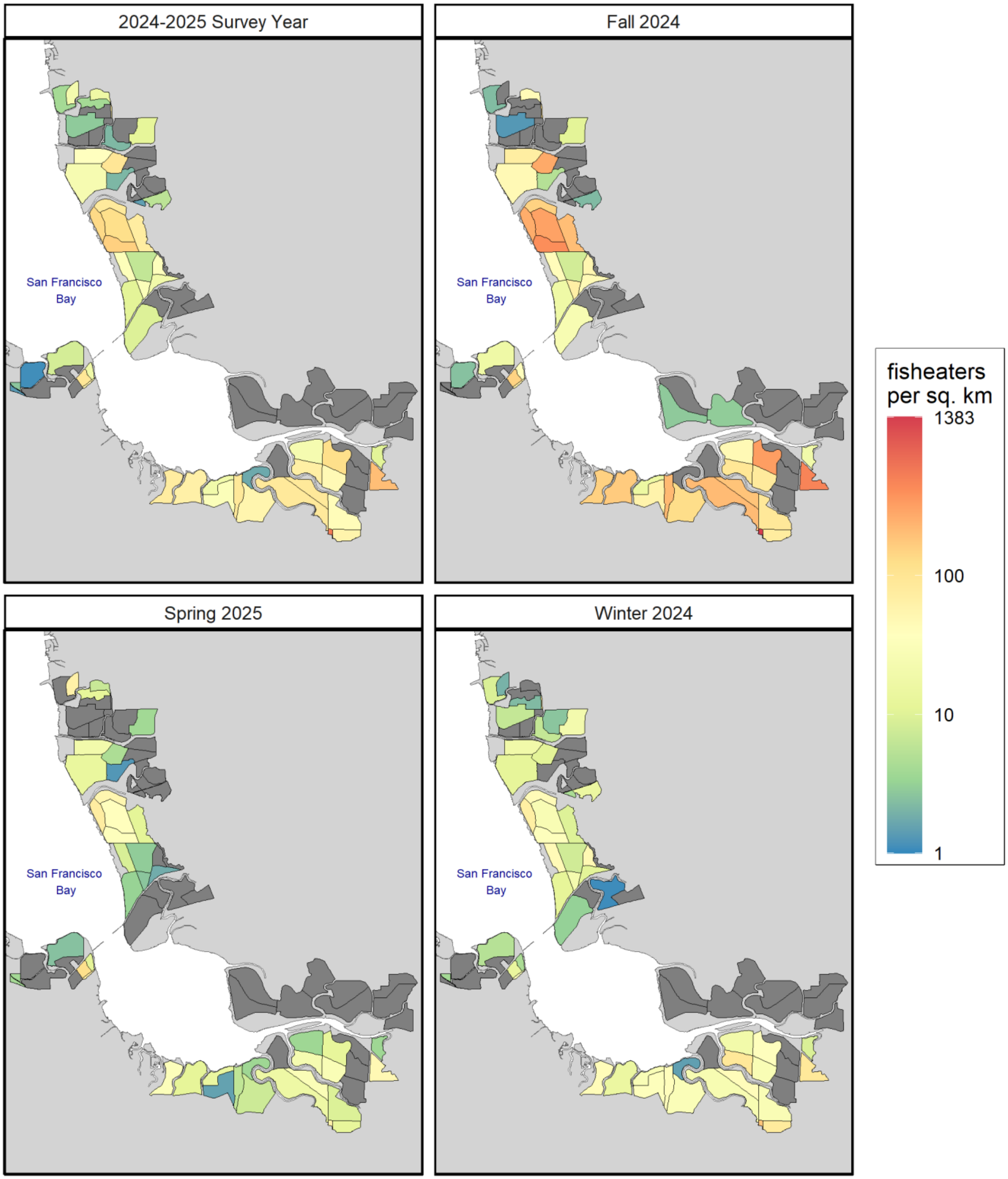

Figure 25. Density of fisheaters averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

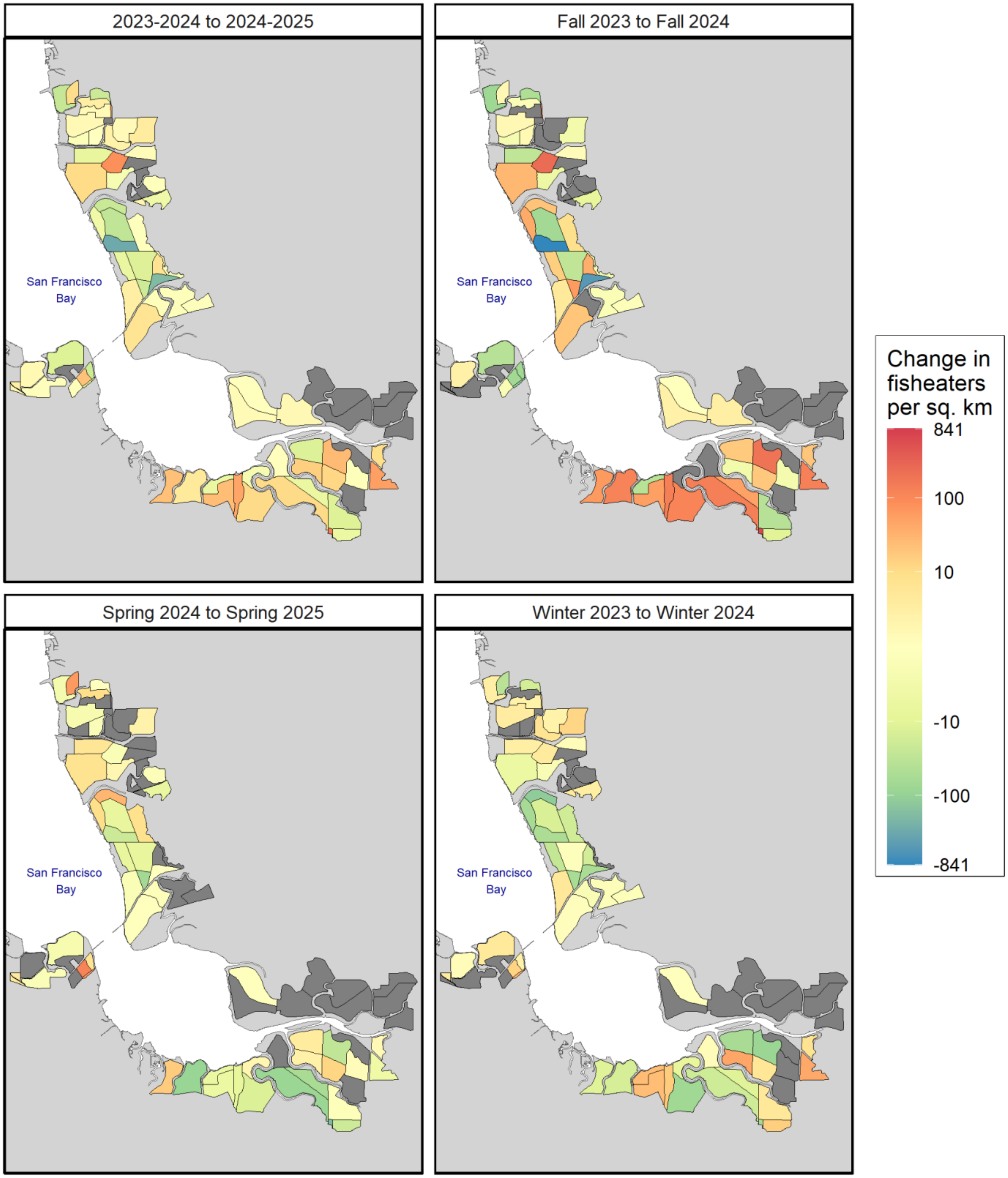

Figure 26. Interannual change in density of fisheaters between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

No formal targets have been set for fisheaters, but we still provide a comparison to a hypothetical management trigger based on baseline abundance for a more comprehensive assessment of waterbird populations within the South Bay. For fisheaters in fall, this hypothetical trigger—two or more of the past three years of fall abundance below the 2005-2007 baseline value—was tripped this year because average seasonal abundance was below this threshold in all three of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average fall abundance of fisheaters across the study area was -775 at the end of fall 2025 (Fig. 27). The trend within the SBSPRP was -617 (-12.87 per km^2) within the wildlife ponds and +8 (+1.20 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was -132 (-4.77 per km^2).

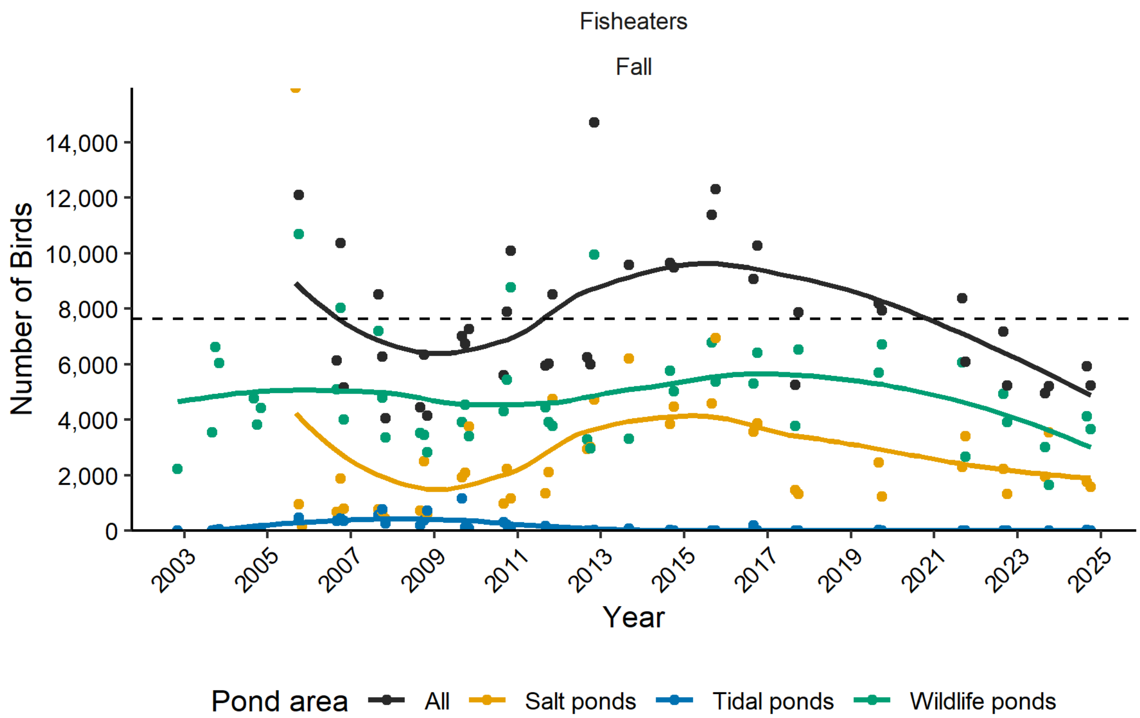

Figure 27. Counts of fisheaters during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

We found that as salinity and pH fell, and dissolved oxygen increased, abundance of fisheaters significantly increased (or vice versa; Fig. 28). Previous reports showed that fisheaters were more abundant in ponds with higher staff gauge values (i.e., higher water levels), and significantly less abundant at ponds with higher dissolved oxygen or salinity (Scullen et al. 2013). While our results confirm the relationship with salinity, we found the opposite effect for dissolved oxygen. Fish cannot survive in salinities greater than 80 ppt (Carpelan 1957), which limits the salinity range where we would expect to observe fish-eating birds foraging. Higher dissolved oxygen levels are also likely to support fish. Lastly, we also found that autumn abundance of fisheaters was higher in years with greater September–November precipitation (Fig. 8), though confidence intervals for this term overlapped zero.

We report predictions made by the change model within 54 ponds, excluding sites that were unoccupied by fisheaters in fall of both 2025 and 2024 (A12, A15, A19, A22, A23, A3N, A6S, E14, E1C, E2C, E4C, E5, E5C, E6B, E6C, E8, M4, M5, M6, N2, R2, R3, R5 and R5S) and sites with missing water quality measurements (A8W, E8AE and E8AW). Across this set of sites, the actual change in abundance of fisheaters in fall was +428 (+1,508 birds [+39 birds per km^2] in the SBSPRP and -1,080 [-51 per km^2] in the salt ponds). In comparison, the model predicted a total change of -327 (-402 [-10 per km^2] in the SBSPRP and +74 [+3 per km^2] in the salt ponds), with this predicted decrease driven by effects of weather, as well as effects of changes in site hydrology. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.07$, $R^2m = 0.06$).

The change model estimated that changes in site hydrology could explain a 44 decrease (-209 [-5 per km^2] in the SBSPRP and +165 [+8 per km^2] in the salt ponds) in abundance of fisheaters from last year due to decreasing dissolved oxygen, increasing pH, and/or increasing salinity. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of fisheaters due to hydrology changes in fall 2025 were A5, E10, and A10, while R4, E13, and A17 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 9). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were E1, A14, and A16 and the sites with the largest predicted decreases in habitat suitability were RSF2U1, A13, and RSF2U3. In the salt pond footprint, the largest predicted increases in abundance were in N4AA, N4AB, and N3A and the largest predicted increases in habitat suitability were in N4AA, N7, and M2, while the sites with predicted largest decreases were N3, N2A, and N9 and N6, N1, and NPP1 for abundance and habitat suitability, respectively (Table 9).

Static site characteristics (distance to creek, number of islands, hunting access, and pond area) accounted for an increase of 26 birds. This effect was -13 [-0 per km^2] in the SBSPRP and +39 [+2 per km^2] in the salt ponds.

The change model predicted that deviations from mean weather could drive a 798 decrease (-327 [-9 per km^2] in the SBSPRP and -471 [-22 per km^2] in the salt ponds) in abundance due to low year-to-date precipitation (Table 9). There was also a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 532 (+216 [+6 per km^2] in the SBSPRP and +315 [+15 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

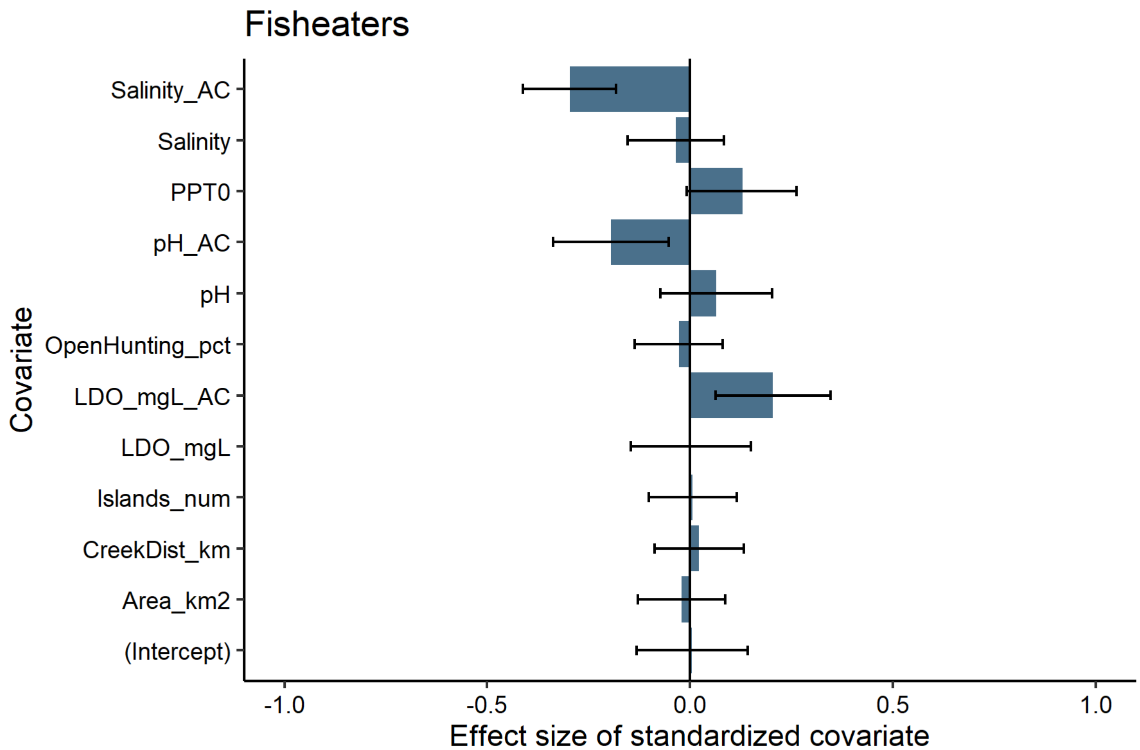

Figure 28. Fixed effects for the top model for interannual change in abundance of fisheaters during fall in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 880). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.027.

Table 9. Actual and predicted changes in mean abundance per survey of fisheaters from fall 2023 to fall 2024 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (dissolved oxygen, pH, and salinity; compared to no change from last year), weather (year-to-date precipitation; compared to mean annual weather), static site characteristics (distance to creek, number of islands, hunting access, and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
N4AB	1,204	394	-810 (-1.12)	+230 (+0.17)	+59 (+0.04)	-87 (-0.06)	+37 (+0.03)	+159 (+0.12)
N9	302	26	-276 (-2.43)	-60 (-0.22)	-37 (-0.14)	-20 (-0.08)	+13 (+0.06)	+27 (+0.12)
N3A	641	526	-114 (-0.20)	+64 (+0.10)	+27 (+0.04)	-43 (-0.06)	-10 (-0.01)	+78 (+0.12)
R1	102	32	-70 (-1.15)	-11 (-0.12)	-11 (-0.12)	-6 (-0.06)	-1 (-0.02)	+10 (+0.12)
A8	217	152	-65 (-0.35)	-8 (-0.04)	-15 (-0.07)	-20 (-0.09)	-2 (-0.01)	+23 (+0.12)
E10	68	4	-64 (-2.62)	+11 (+0.15)	+10 (+0.13)	-4 (-0.05)	-2 (-0.03)	+9 (+0.12)
N7	58	12	-45 (-1.47)	+23 (+0.33)	+19 (+0.26)	-6 (-0.07)	+1 (+0.01)	+9 (+0.12)
E1	123	88	-36 (-0.34)	-65 (-0.74)	-36 (-0.47)	-4 (-0.07)	-5 (-0.08)	+7 (+0.12)
AB1	32	10	-23 (-1.16)	-4 (-0.14)	-4 (-0.12)	-2 (-0.07)	-1 (-0.02)	+3 (+0.12)
RSF2U2	74	51	-23 (-0.37)	-27 (-0.44)	-24 (-0.41)	-3 (-0.06)	+5 (+0.10)	+5 (+0.12)
E12	40	19	-21 (-0.72)	+1 (+0.03)	+3 (+0.07)	-3 (-0.06)	-2 (-0.05)	+5 (+0.12)
RSF2U4	23	4	-19 (-1.57)	-3 (-0.13)	+0 (+0.01)	-1 (-0.06)	+1 (+0.07)	+2 (+0.12)
RSF2U1	24	9	-16 (-0.94)	-13 (-0.73)	-12 (-0.67)	-1 (-0.06)	+1 (+0.08)	+1 (+0.12)
A8S	60	54	-7 (-0.12)	-12 (-0.22)	-14 (-0.25)	-5 (-0.09)	-1 (-0.03)	+5 (+0.12)
E4	15	8	-7 (-0.58)	-2 (-0.12)	-3 (-0.20)	-1 (-0.07)	-0 (-0.02)	+2 (+0.12)
A13	5	0	-5 (-1.79)	-4 (-1.28)	-3 (-1.01)	-0 (-0.08)	+0 (+0.02)	+0 (+0.12)
E3C	6	2	-5 (-1.10)	+1 (+0.17)	+1 (+0.08)	-1 (-0.08)	+0 (+0.02)	+1 (+0.12)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
E6A	18	14	-4 (-0.21)	-8 (-0.54)	-8 (-0.55)	-1 (-0.08)	-1 (-0.05)	+1 (+0.12)
A10	102	99	-3 (-0.03)	+12 (+0.11)	+9 (+0.08)	-9 (-0.08)	+2 (+0.02)	+13 (+0.12)
N1	2	0	-2 (-0.92)	-1 (-0.44)	-1 (-0.36)	-0 (-0.08)	+0 (+0.04)	+0 (+0.12)
E13	1	0	-1 (-0.69)	+1 (+0.33)	+1 (+0.38)	-0 (-0.06)	-0 (-0.05)	+0 (+0.12)
M1	3	2	-1 (-0.29)	-0 (-0.01)	+0 (+0.04)	-0 (-0.08)	-0 (-0.00)	+0 (+0.12)
N4B	1	0	-1 (-0.69)	-0 (-0.03)	-0 (-0.15)	-0 (-0.08)	+0 (+0.06)	+0 (+0.12)
NPP1	1	0	-1 (-0.69)	-1 (-0.51)	-1 (-0.45)	-0 (-0.08)	+0 (+0.07)	+0 (+0.12)
RSF2U3	1	0	-1 (-0.69)	-2 (-1.40)	-1 (-1.06)	-0 (-0.06)	+0 (+0.06)	+0 (+0.12)
E11	0	1	+1 (+0.69)	-0 (-0.03)	-0 (-0.02)	-0 (-0.06)	-0 (-0.06)	+0 (+0.12)
E6	0	1	+1 (+0.69)	+0 (+0.02)	-0 (-0.00)	-0 (-0.08)	-0 (-0.06)	+0 (+0.12)
E9	1	2	+1 (+0.41)	-0 (-0.17)	-0 (-0.11)	-0 (-0.06)	-0 (-0.07)	+0 (+0.12)
R4	0	3	+3 (+1.39)	+5 (+1.75)	+5 (+2.02)	-0 (-0.05)	+0 (+0.06)	+1 (+0.12)
E8X	1	4	+4 (+1.01)	-0 (-0.10)	-0 (-0.06)	-0 (-0.06)	-0 (-0.03)	+0 (+0.12)
M2	2	6	+4 (+0.77)	+0 (+0.07)	+0 (+0.14)	-0 (-0.08)	-0 (-0.01)	+0 (+0.12)
N4	18	24	+6 (+0.30)	-0 (-0.00)	-3 (-0.15)	-1 (-0.06)	+1 (+0.05)	+2 (+0.12)
A17	0	10	+10 (+2.44)	+0 (+0.22)	+0 (+0.18)	-0 (-0.08)	+0 (+0.02)	+0 (+0.12)
N4AA	240	250	+10 (+0.04)	+201 (+0.61)	+213 (+0.66)	-34 (-0.07)	+1 (+0.00)	+49 (+0.12)
N5	20	32	+12 (+0.44)	+3 (+0.13)	+0 (+0.00)	-1 (-0.06)	+1 (+0.04)	+3 (+0.12)
M3	0	13	+13 (+2.64)	-0 (-0.09)	+0 (+0.10)	-0 (-0.08)	-0 (-0.02)	+0 (+0.12)
N1A	90	104	+14 (+0.14)	+5 (+0.06)	-1 (-0.01)	-7 (-0.07)	+1 (+0.01)	+11 (+0.12)
N8	7	24	+18	+0	-2	-1	+0	+1

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
			(+1.16)	(+0.00)	(-0.20)	(-0.08)	(+0.05)	(+0.12)
A11	71	91	+20	-5	-6	-5	+1	+7
			(+0.25)	(-0.07)	(-0.08)	(-0.08)	(+0.02)	(+0.12)
N6	5	26	+21	-2	-2	-0	+0	+0
			(+1.50)	(-0.35)	(-0.32)	(-0.08)	(+0.07)	(+0.12)
A9	44	70	+26	-10	-11	-3	-0	+4
			(+0.46)	(-0.26)	(-0.27)	(-0.08)	(-0.01)	(+0.12)
N2A	154	182	+29	-16	-34	-9	+2	+15
			(+0.17)	(-0.11)	(-0.22)	(-0.06)	(+0.01)	(+0.12)
N3	12	56	+44	-2	-3	-1	+1	+1
			(+1.47)	(-0.17)	(-0.23)	(-0.07)	(+0.06)	(+0.12)
A7	151	208	+56	+10	-4	-13	+9	+18
			(+0.32)	(+0.06)	(-0.02)	(-0.08)	(+0.06)	(+0.12)
A2E	11	77	+66	-1	-2	-1	-0	+1
			(+1.87)	(-0.13)	(-0.16)	(-0.08)	(-0.03)	(+0.12)
A1	104	176	+72	-0	-4	-8	+1	+12
			(+0.52)	(-0.00)	(-0.04)	(-0.07)	(+0.01)	(+0.12)
E2	48	128	+80	-8	-9	-3	-4	+5
			(+0.96)	(-0.18)	(-0.20)	(-0.07)	(-0.10)	(+0.12)
AB2	67	164	+97	+13	+1	-7	+3	+9
			(+0.89)	(+0.17)	(+0.01)	(-0.08)	(+0.04)	(+0.12)
A16	350	482	+131	-52	-70	-24	+8	+33
			(+0.32)	(-0.16)	(-0.21)	(-0.08)	(+0.03)	(+0.12)
A2W	94	302	+209	+8	+4	-8	-2	+11
			(+1.17)	(+0.08)	(+0.04)	(-0.07)	(-0.02)	(+0.12)
E7	30	244	+214	-6	-6	-2	-2	+3
			(+2.08)	(-0.21)	(-0.20)	(-0.07)	(-0.06)	(+0.12)
A14	194	462	+267	-53	-56	-11	-1	+16
			(+0.86)	(-0.31)	(-0.33)	(-0.08)	(-0.01)	(+0.12)
A3W	27	296	+269	+5	+4	-3	-2	+4
			(+2.36)	(+0.18)	(+0.12)	(-0.08)	(-0.05)	(+0.12)
A5	214	562	+348	+36	+38	-22	-18	+28
			(+0.96)	(+0.16)	(+0.17)	(-0.08)	(-0.07)	(+0.12)

Gulls

Abundance

Across all complexes, there were 60,773 total sightings of gulls (sum sightings during the entire survey period). Compared to last year, this was a decrease of 1,873 total sightings (-3.0%; Fig. 29). In their target season of spring they decreased by 16.4%. There were on average 604 fewer gulls detected per survey in fall (Table A2.4), 2,169 more detected in winter (Table A2.6), and 2,501 fewer detected in spring (Table A2.8, Fig. 29).

At the pond level, A23 had the highest abundance (mean count of 829 per survey), followed by A12 (754) and N3A (711; Fig. 30). At these sites, we observed the majority of gulls roosting on the pond (99.7%), roosting on the pond (100.0%), and roosting on levees (98.8%), respectively (Table A4.7). Across all six surveys, the sites with the largest increases in gulls from last year were A23 (+415 mean abundance per visit), A17 (+195), and M4 (+171), while the sites with the largest decreases were A19 (-456), AB2 (-289), and A2E (-246; Fig. 31). Seasonal abundance of gulls was exceptionally low (5th percentile) at A1 (6 birds in spring), A10 (6 in fall), A14 (2 in spring), A16 (62 in winter), AB1 (0 in fall), and E2 (2 in winter).

Note that the numbers in this and the next two subsections include counts of Bonaparte's Gulls, which we also assessed as a separate sub-group in the following section. In addition, while in the winter there are a diversity of gull species present, the presence of gulls on levees in the spring is largely due to summer California Gull breeding colonies. Supplementary surveys of California Gull nesting colonies (methods described in Parsons & Van Schmidt 2025) found an estimated 40,064 breeding pairs of California Gulls in May 2025, a decrease of 3,498 (8.0%) since May 2024.

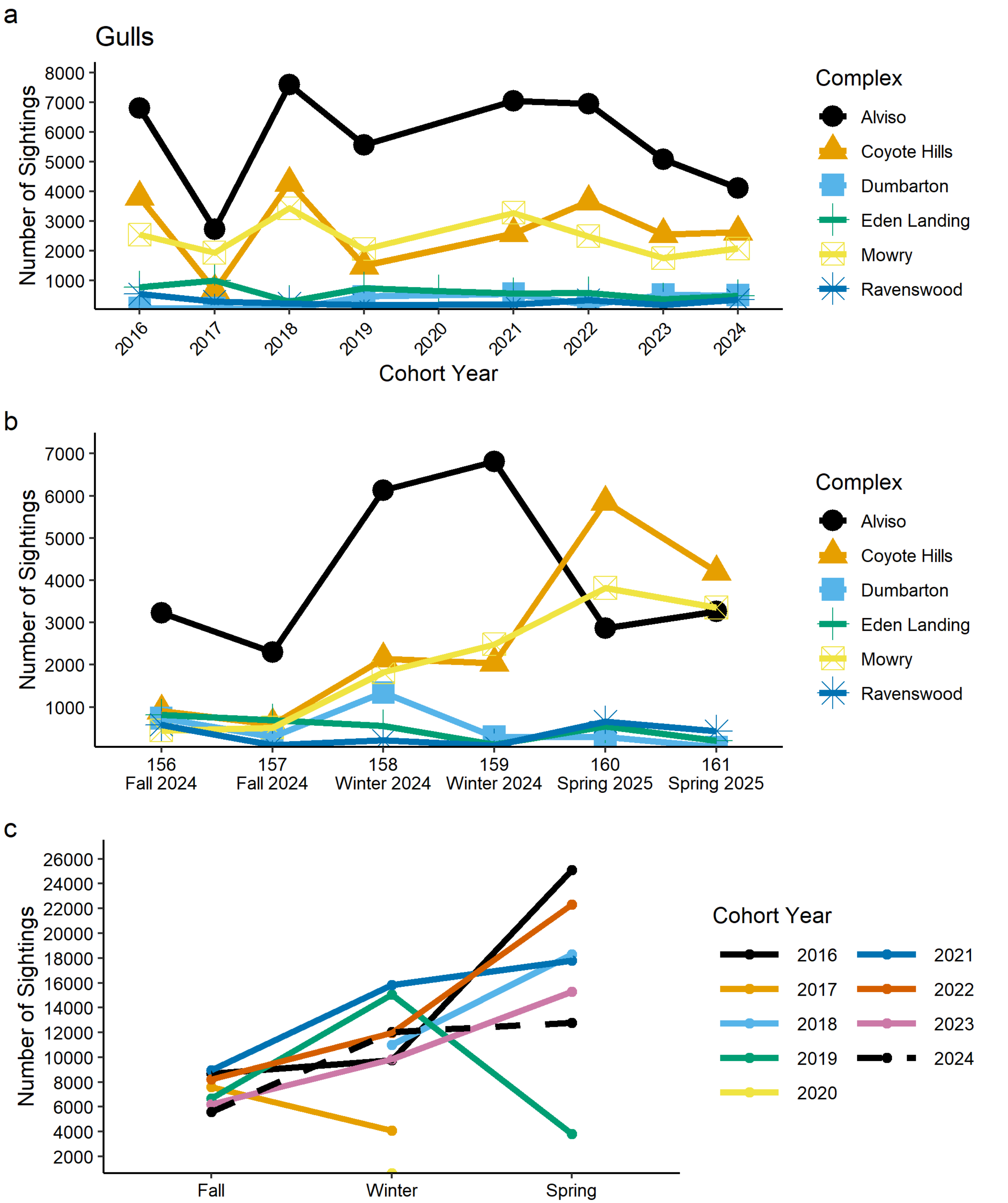

Figure 29. Abundance of gulls by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

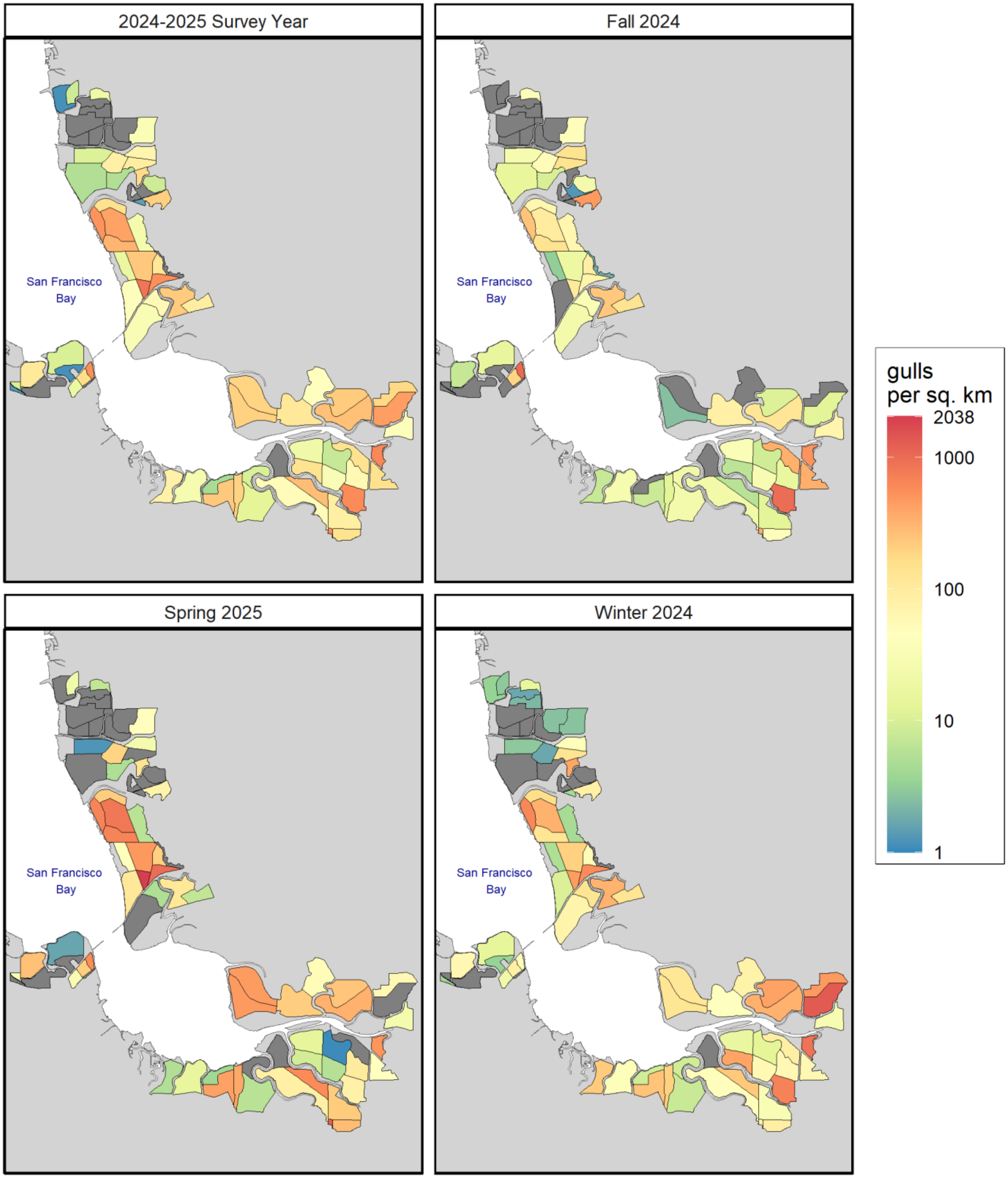

Figure 30. Density of gulls averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

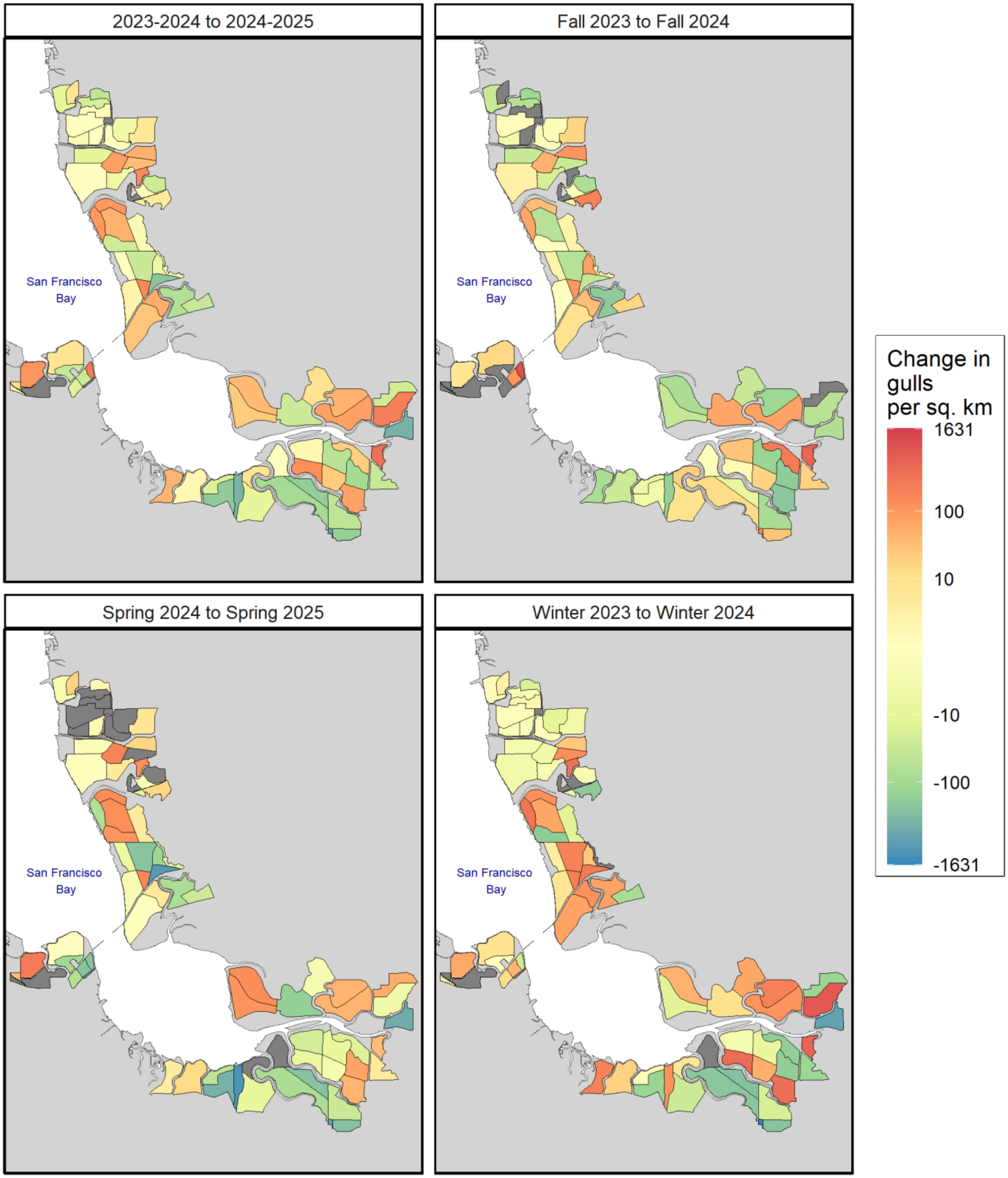

Figure 31. Interannual change in density of gulls between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

No formal targets have been set for gulls, but we still provide a comparison to a hypothetical management trigger based on baseline abundance for a more comprehensive assessment of waterbird populations within the South Bay. For gulls in spring, this hypothetical trigger—two or more of the past three years of spring abundance below the 2005-2007 baseline value—was tripped this year because average seasonal abundance was below this threshold in all three of the three most recent years of complete surveys (Table 2). Given that managers have made efforts to reduce breeding (spring) California Gull abundance in recent years, this finding is not necessarily a problem, but does warrant attention (see Discussion).

The current slope of the estimated multi-year trend for average spring abundance of gulls across the study area was -1,730 at the end of spring 2025 (Fig. 32). The trend within the SBSPRP was -2,091 (-43.64 per km^2) within the wildlife ponds and +426 (+63.34 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was -170 (-6.13 per km^2).

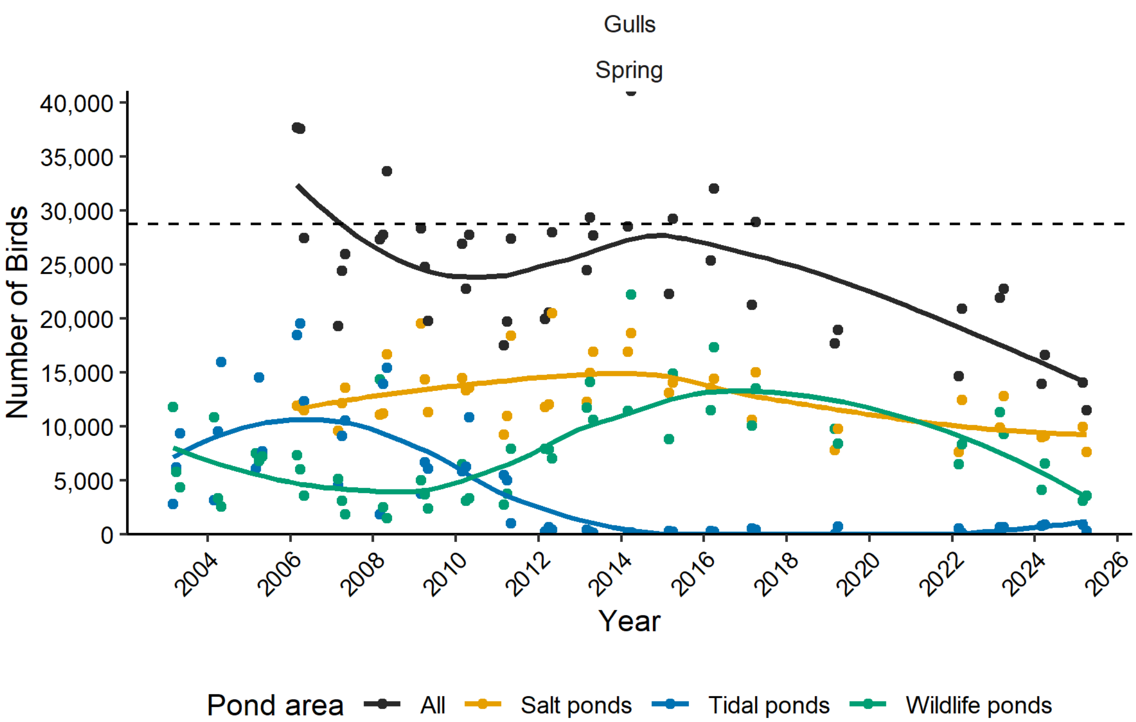

Figure 32. Counts of gulls during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

The strongest driver of changes in spring gull abundance was the previous year's precipitation, with rainier years showing lower abundances the following year (Fig. 33). At the site-level, the gull abundance decreased at ponds whose water elevations and temperature rose compared to the previous spring; the latter relationship was not statistically significant but was supported by AIC model selection (Table A5.6). Previous reports found that gulls were more abundant at sites with higher pH, salinity, or staff gauge levels (Scullen et al. 2013); we did not find support for any of these relationships, though that study covered only the Cargill-managed ponds. We do consistently observe gulls foraging in high numbers at medium and high salinity ponds (e.g., E5, E6C, and M6), likely on the abundance of brine shrimp and brine flies at these locations.

We report predictions made by the change model within 63 ponds, excluding sites that were unoccupied by gulls in spring of both 2025 and 2024 (A3N, A6S, E13, E14, E1C, E4C, E5, E6B, E8, E8AW, E8X, E9, R3, R5S and RSF2U4) and sites with missing water quality measurements (A23, A8W and E8AE). Across this set of sites, the actual change in abundance of gulls in spring was -2,453 (-2,030 birds [-48 birds per km^2] in the SBSPRP and -422 [-15 per km^2] in the salt ponds). In comparison, the model predicted a total change of -35 (-485 [-12 per km^2] in the SBSPRP and +451 [+16 per km^2] in the salt ponds), with this predicted decrease driven by effects of weather. The proportion of variance in percent change in counts explained by the best model was very low ($R^2c = 0.03$, $R^2m = 0.02$).

The change model estimated that changes in site hydrology could explain a 971 increase (-31 [-1 per km^2] in the SBSPRP and +1,002 [+36 per km^2] in the salt ponds) in abundance of gulls from last year due to decreasing water temperature and/or decreasing depth. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of gulls due to hydrology changes in spring 2025 were A2E, AB2, and A5, while E10, A9, and E6A were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 10). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were RSF2U2, RSF2U1, and A8 and the sites with the largest predicted decreases in habitat suitability were E2C, RSF2U2, and RSF2U1. In the salt pond footprint, the largest predicted increases in abundance were in M1, N6, and M5 and the largest predicted increases in habitat suitability were in M5, M1, and N6, while the sites with predicted largest decreases were M4, N2A, and N4AB and N4AB, N4AA, and N5 for abundance and habitat suitability, respectively (Table 10).

Static site characteristics (distance to landfill, distance to bay, number of islands, hunting access, public access, and pond area) accounted for an increase of 14 birds. This effect was +2 [+0 per km^2] in the SBSPRP and +11 [+0 per km^2] in the salt ponds.

The change model predicted that deviations from mean weather could drive a 771 decrease (-209 [-5 per km^2] in the SBSPRP and -562 [-20 per km^2] in the salt ponds) in abundance due to high precipitation last year (Table 10). There was also a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 124 (+46 [+1 per km^2] in the SBSPRP and +78 [+3 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

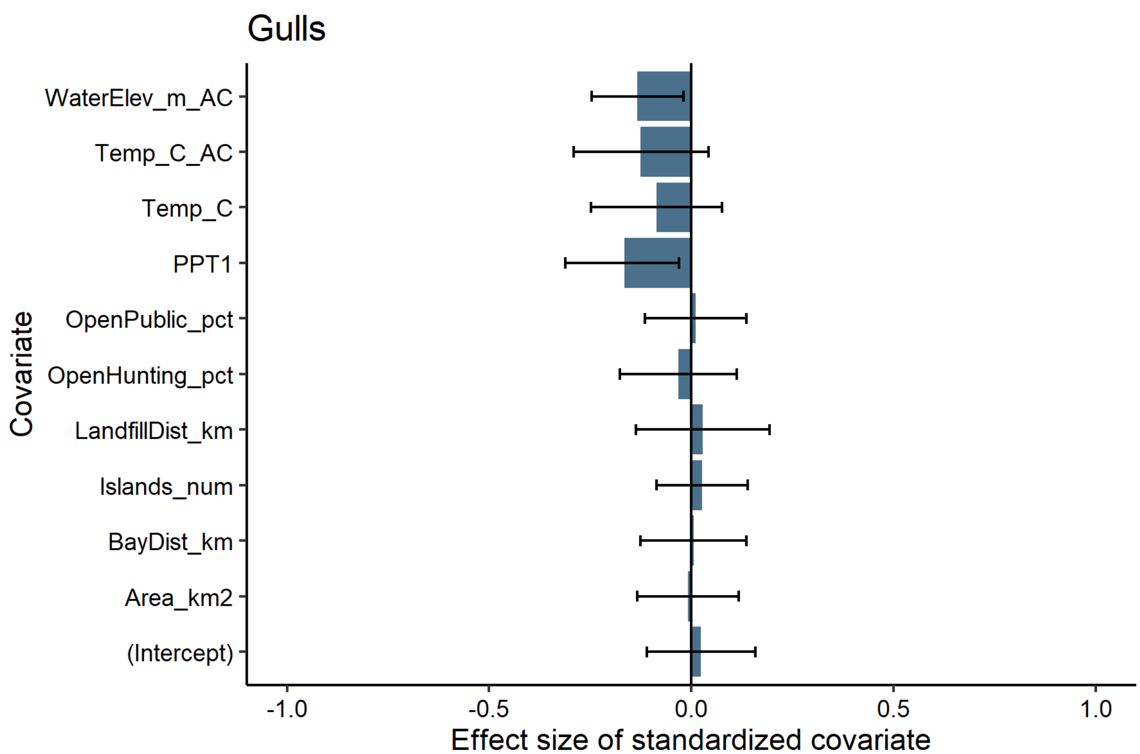

Figure 33. Fixed effects for the top model for interannual change in abundance of gulls during spring in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 1,083). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.016.

Table 10. Actual and predicted changes in mean abundance per survey of gulls from spring 2024 to spring 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (water temperature and depth; compared to no change from last year), weather (precipitation last year; compared to mean annual weather), static site characteristics (distance to landfill, distance to bay, number of islands, hunting access, public access, and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
AB2	1,118	278	-840 (-1.39)	+169 (+0.14)	+104 (+0.08)	-62 (-0.05)	+124 (+0.10)	+10 (+0.01)
A2E	1,120	564	-556 (-0.69)	+71 (+0.06)	+153 (+0.14)	-58 (-0.05)	-39 (-0.03)	+10 (+0.01)
A19	575	56	-519 (-2.31)	-179 (-0.37)	-18 (-0.05)	-15 (-0.04)	-43 (-0.10)	+3 (+0.01)
N9	1,046	548	-498 (-0.65)	+302 (+0.25)	+234 (+0.19)	-109 (-0.08)	+20 (+0.02)	+11 (+0.01)
N7	1,112	750	-362 (-0.39)	+64 (+0.06)	-26 (-0.02)	-100 (-0.08)	+13 (+0.01)	+9 (+0.01)
M3	838	482	-356 (-0.55)	+125 (+0.14)	+203 (+0.24)	-49 (-0.05)	+1 (+0.00)	+8 (+0.01)
A7	910	638	-272 (-0.36)	-23 (-0.03)	+32 (+0.04)	-42 (-0.05)	-2 (-0.00)	+7 (+0.01)
N8	297	94	-203 (-1.14)	+24 (+0.08)	-2 (-0.01)	-27 (-0.08)	+9 (+0.03)	+3 (+0.01)
A5	415	222	-193 (-0.62)	-20 (-0.05)	+42 (+0.11)	-19 (-0.05)	-37 (-0.09)	+3 (+0.01)
A8S	376	196	-180 (-0.65)	-48 (-0.14)	-91 (-0.24)	-14 (-0.04)	-11 (-0.03)	+3 (+0.01)
R2	120	0	-120 (-4.80)	+0 (+0.00)	-5 (-0.04)	-9 (-0.07)	+1 (+0.01)	+1 (+0.01)
N1	272	163	-109 (-0.51)	-27 (-0.10)	-26 (-0.10)	-19 (-0.08)	+6 (+0.02)	+2 (+0.01)
RSF2U2	154	72	-82 (-0.76)	-53 (-0.42)	-88 (-0.63)	-7 (-0.07)	+18 (+0.20)	+1 (+0.01)
RSF2U1	189	132	-57 (-0.36)	-102 (-0.77)	-109 (-0.81)	-6 (-0.07)	+9 (+0.10)	+1 (+0.01)
A8	422	372	-50 (-0.13)	-100 (-0.27)	-139 (-0.36)	-14 (-0.04)	-19 (-0.06)	+3 (+0.01)
N2A	506	462	-44 (-0.09)	-142 (-0.33)	-159 (-0.36)	-35 (-0.09)	+16 (+0.04)	+3 (+0.01)
RSF2U3	67	23	-44 (-1.04)	-1 (-0.02)	+1 (+0.02)	-5 (-0.07)	+3 (+0.05)	+1 (+0.01)
A9	55	21	-34 (-0.93)	+19 (+0.29)	+35 (+0.62)	-4 (-0.05)	-2 (-0.02)	+1 (+0.01)
A15	32	0	-32	-0	+6	-1	+0	+0

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
			(-3.50)	(-0.00)	(+0.20)	(-0.04)	(+0.01)	(+0.01)
AB1	30	5	-25	+4	+6	-2	-1	+0
			(-1.64)	(+0.12)	(+0.19)	(-0.05)	(-0.04)	(+0.01)
A3W	34	14	-20	-1	+3	-2	-3	+0
			(-0.85)	(-0.03)	(+0.09)	(-0.05)	(-0.07)	(+0.01)
NPP1	27	11	-16	-4	-2	-2	+1	+0
			(-0.85)	(-0.15)	(-0.09)	(-0.07)	(+0.03)	(+0.01)
A14	12	3	-10	-1	+1	-1	-0	+0
			(-1.22)	(-0.09)	(+0.07)	(-0.04)	(-0.02)	(+0.01)
A10	16	10	-6	+3	+7	-1	-0	+0
			(-0.48)	(+0.14)	(+0.42)	(-0.05)	(-0.01)	(+0.01)
N5	38	34	-4	-17	-21	-2	+1	+0
			(-0.12)	(-0.57)	(-0.66)	(-0.08)	(+0.03)	(+0.01)
M6	99	95	-4	-22	-4	-4	-5	+1
			(-0.04)	(-0.25)	(-0.05)	(-0.05)	(-0.06)	(+0.01)
E2C	3	0	-3	-2	-2	-0	+0	+0
			(-1.39)	(-0.54)	(-0.51)	(-0.09)	(+0.04)	(+0.01)
A11	8	6	-2	-0	+2	-0	-0	+0
			(-0.31)	(-0.03)	(+0.21)	(-0.04)	(-0.01)	(+0.01)
N4	160	158	-2	+50	+65	-17	+2	+2
			(-0.02)	(+0.27)	(+0.37)	(-0.08)	(+0.01)	(+0.01)
E1	5	3	-2	-0	+1	-1	-0	+0
			(-0.41)	(-0.03)	(+0.18)	(-0.11)	(-0.04)	(+0.01)
N4B	2	0	-2	+0	+0	-0	+0	+0
			(-1.10)	(+0.14)	(+0.07)	(-0.08)	(+0.01)	(+0.01)
E10	2	0	-2	+2	+2	-1	+0	+0
			(-0.92)	(+0.53)	(+0.72)	(-0.12)	(+0.03)	(+0.01)
E2	4	2	-2	+0	+1	-1	-0	+0
			(-0.36)	(+0.01)	(+0.30)	(-0.10)	(-0.01)	(+0.01)
E5C	1	0	-1	-0	+0	-0	+0	+0
			(-0.69)	(-0.03)	(+0.11)	(-0.09)	(+0.03)	(+0.01)
N3	1	0	-1	+0	+1	-0	+0	+0
			(-0.69)	(+0.18)	(+0.27)	(-0.08)	(+0.03)	(+0.01)
E12	5	6	+1	-0	+0	-1	-0	+0
			(+0.15)	(-0.05)	(+0.02)	(-0.11)	(-0.02)	(+0.01)
R1	3	6	+3	-1	-1	-0	-0	+0
			(+0.56)	(-0.44)	(-0.39)	(-0.07)	(-0.08)	(+0.01)
N2	0	4	+4	+0	+0	-0	+0	+0
			(+1.61)	(+0.15)	(+0.28)	(-0.08)	(+0.03)	(+0.01)
A1	1	6	+5	-1	-1	-0	+0	+0
			(+1.25)	(-0.38)	(-0.36)	(-0.05)	(+0.01)	(+0.01)
A16	40	45	+6	+5	+7	-2	+3	+0
			(+0.13)	(+0.12)	(+0.18)	(-0.04)	(+0.06)	(+0.01)
E4	0	8	+8	+0	+0	-0	+0	+0
			(+2.20)	(+0.02)	(+0.08)	(-0.10)	(+0.01)	(+0.01)
R5	0	8	+8	+0	+0	-0	+0	+0

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
			(+2.20)	(+0.34)	(+0.36)	(-0.09)	(+0.06)	(+0.01)
E6A	52	61	+9	+20	+29	-8	+0	+1
			(+0.16)	(+0.33)	(+0.50)	(-0.10)	(+0.00)	(+0.01)
E3C	38	48	+10	-2	+1	-3	+2	+0
			(+0.23)	(-0.06)	(+0.04)	(-0.09)	(+0.05)	(+0.01)
N4AA	3	15	+12	-2	-2	-0	+0	+0
			(+1.39)	(-0.48)	(-0.54)	(-0.09)	(+0.01)	(+0.01)
A17	261	279	+18	-78	-42	-7	-1	+1
			(+0.07)	(-0.35)	(-0.20)	(-0.04)	(-0.00)	(+0.01)
E11	5	23	+18	+1	+2	-1	-0	+0
			(+1.39)	(+0.16)	(+0.28)	(-0.12)	(-0.02)	(+0.01)
A2W	4	27	+24	+0	+1	-0	+0	+0
			(+1.83)	(+0.05)	(+0.15)	(-0.05)	(+0.00)	(+0.01)
E6	17	41	+24	-4	-3	-1	-1	+0
			(+0.85)	(-0.28)	(-0.21)	(-0.10)	(-0.04)	(+0.01)
A13	64	112	+48	+4	+15	-3	+1	+1
			(+0.55)	(+0.05)	(+0.24)	(-0.04)	(+0.01)	(+0.01)
A12	44	101	+58	-4	+7	-2	+1	+0
			(+0.83)	(-0.09)	(+0.18)	(-0.04)	(+0.01)	(+0.01)
A22	8	66	+58	+0	+2	-0	-0	+0
			(+2.00)	(+0.01)	(+0.21)	(-0.04)	(-0.02)	(+0.01)
N6	715	778	+62	+287	+331	-82	+10	+8
			(+0.08)	(+0.34)	(+0.40)	(-0.08)	(+0.01)	(+0.01)
M5	342	418	+76	+212	+229	-25	-5	+4
			(+0.20)	(+0.48)	(+0.53)	(-0.04)	(-0.01)	(+0.01)
E6C	2	90	+88	-0	-0	-0	+0	+0
			(+3.41)	(-0.14)	(-0.10)	(-0.09)	(+0.02)	(+0.01)
N1A	51	148	+96	-16	-18	-3	+2	+0
			(+1.05)	(-0.38)	(-0.41)	(-0.09)	(+0.05)	(+0.01)
M4	634	730	+97	-110	-62	-23	-23	+4
			(+0.14)	(-0.19)	(-0.11)	(-0.04)	(-0.04)	(+0.01)
N4AB	545	653	+108	-160	-204	-35	+12	+3
			(+0.18)	(-0.35)	(-0.42)	(-0.09)	(+0.03)	(+0.01)
N3A	1,176	1,398	+222	+97	+65	-119	+10	+10
			(+0.17)	(+0.08)	(+0.05)	(-0.09)	(+0.01)	(+0.01)
M2	701	928	+226	+128	+205	-47	-12	+7
			(+0.28)	(+0.17)	(+0.28)	(-0.05)	(-0.01)	(+0.01)
M1	658	933	+276	+234	+332	-52	-29	+7
			(+0.35)	(+0.30)	(+0.46)	(-0.06)	(-0.03)	(+0.01)
R4	29	322	+294	+4	+4	-3	+1	+0
			(+2.38)	(+0.13)	(+0.11)	(-0.08)	(+0.03)	(+0.01)
E7	0	345	+345	+0	+0	-0	-0	+0
			(+5.85)	(+0.09)	(+0.40)	(-0.10)	(-0.03)	(+0.01)

Bonaparte's Gulls

Abundance

Across all complexes, there were 2,726 total sightings of Bonaparte's Gulls (sum sightings during the entire survey period). Compared to last year, this was a decrease of 1,260 total sightings (-31.6%; Fig. 34). In their target season of winter they increased by 31.8%. There were on average 665 fewer Bonaparte's Gulls detected per survey in fall (Table A2.4), 259 more detected in winter (Table A2.6), and 224 fewer detected in spring (Table A2.8, Fig. 34).

At the pond level, N1 had the highest abundance (mean count of 178 per survey), followed by E7 (58) and N3 (44; Fig. 35). At these sites, we observed the majority of Bonaparte's Gulls foraging (95.5%), roosting on the pond (56.2%), and foraging (99.6%), respectively (Table A4.8). Across all six surveys, the sites with the largest increases in Bonaparte's Gulls from last year were E7 (+56 mean abundance per visit), N3 (+44), and E6C (+36), while the sites with the largest decreases were N1 (-171), A5 (-116), and A7 (-28; Fig. 36). At A10 (96 birds in winter), abundance of Bonaparte's Gulls was higher than ever previously recorded there.

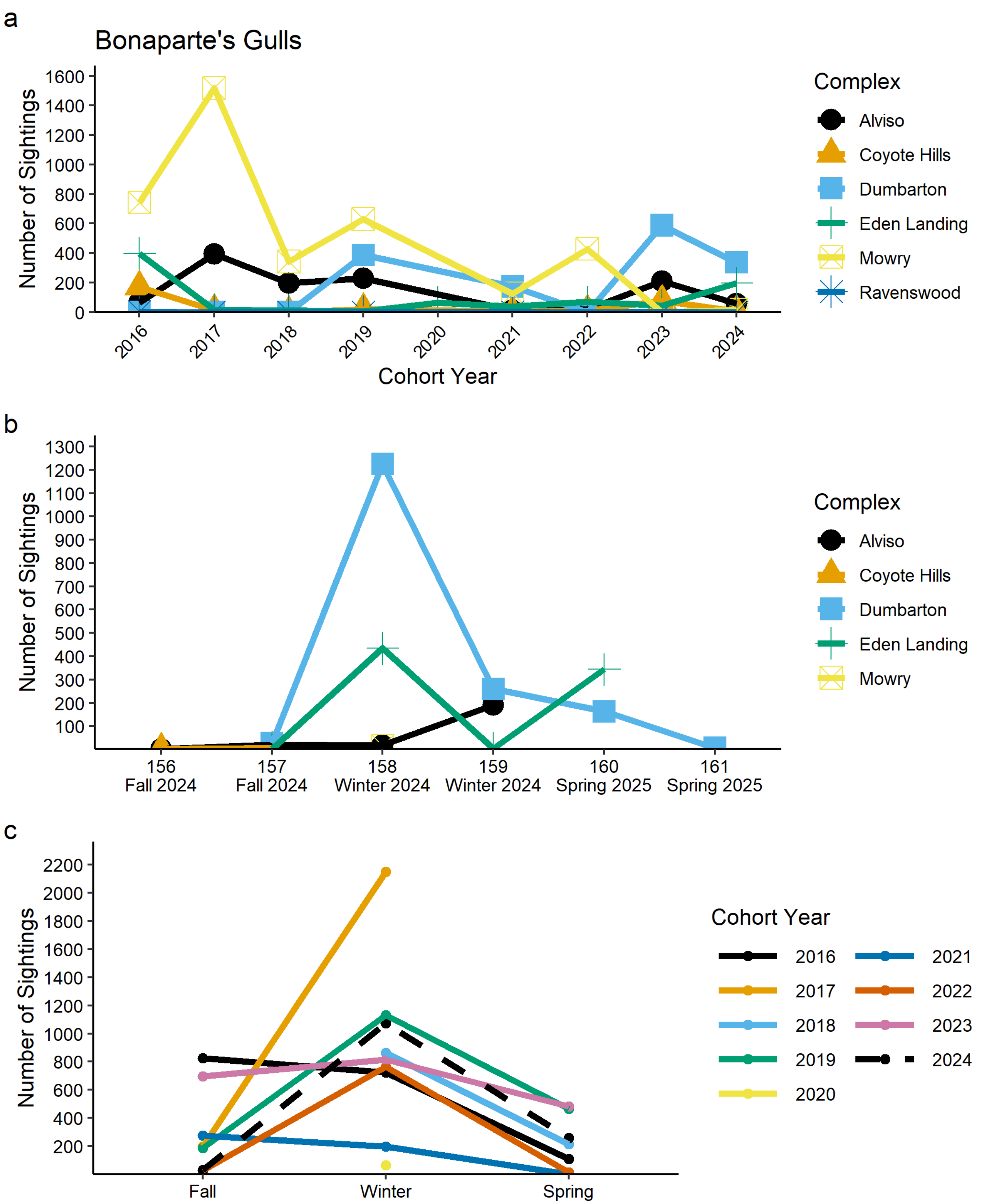

Figure 34. Abundance of Bonaparte's Gulls by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

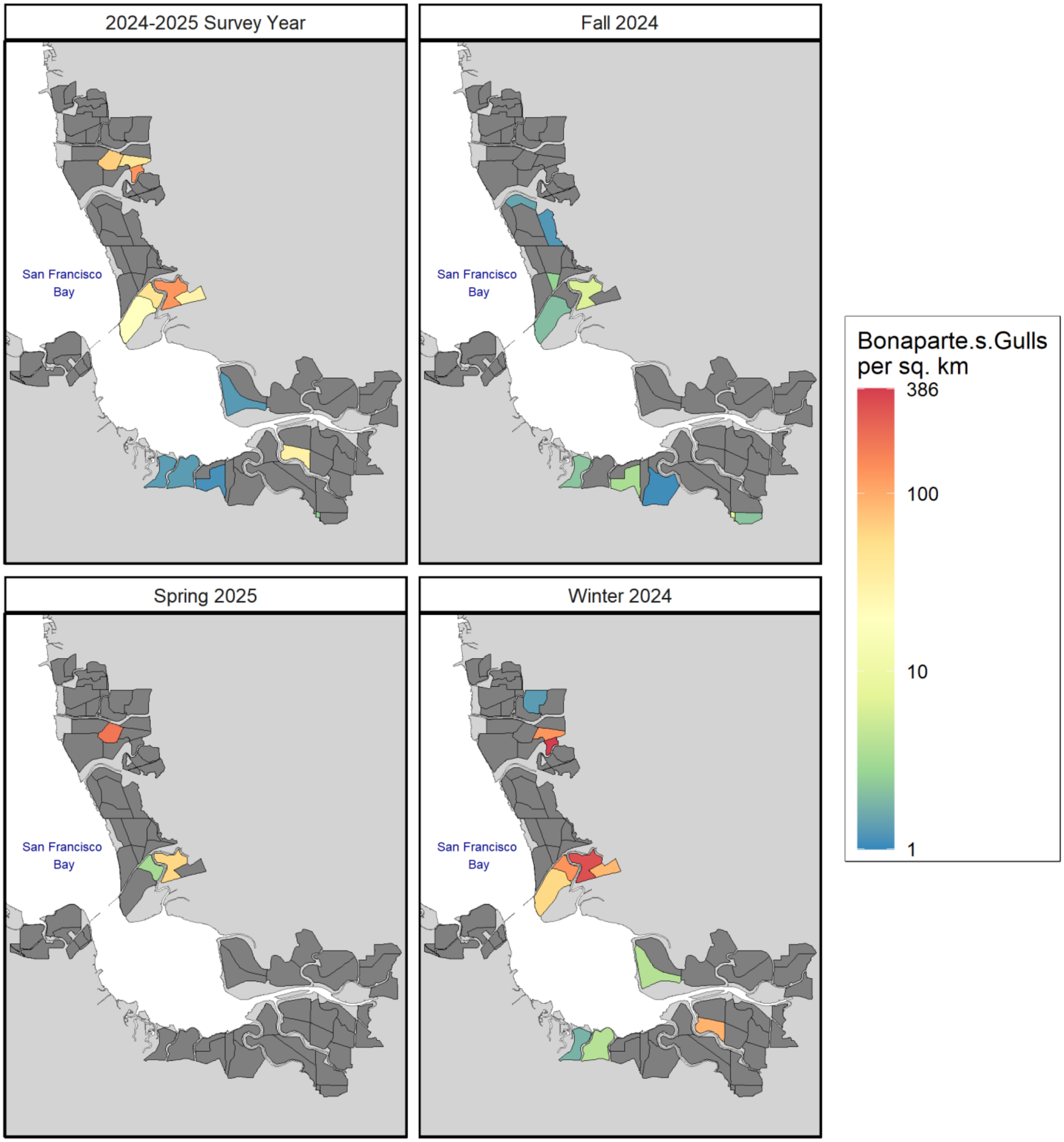

Figure 35. Density of Bonaparte's Gulls averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

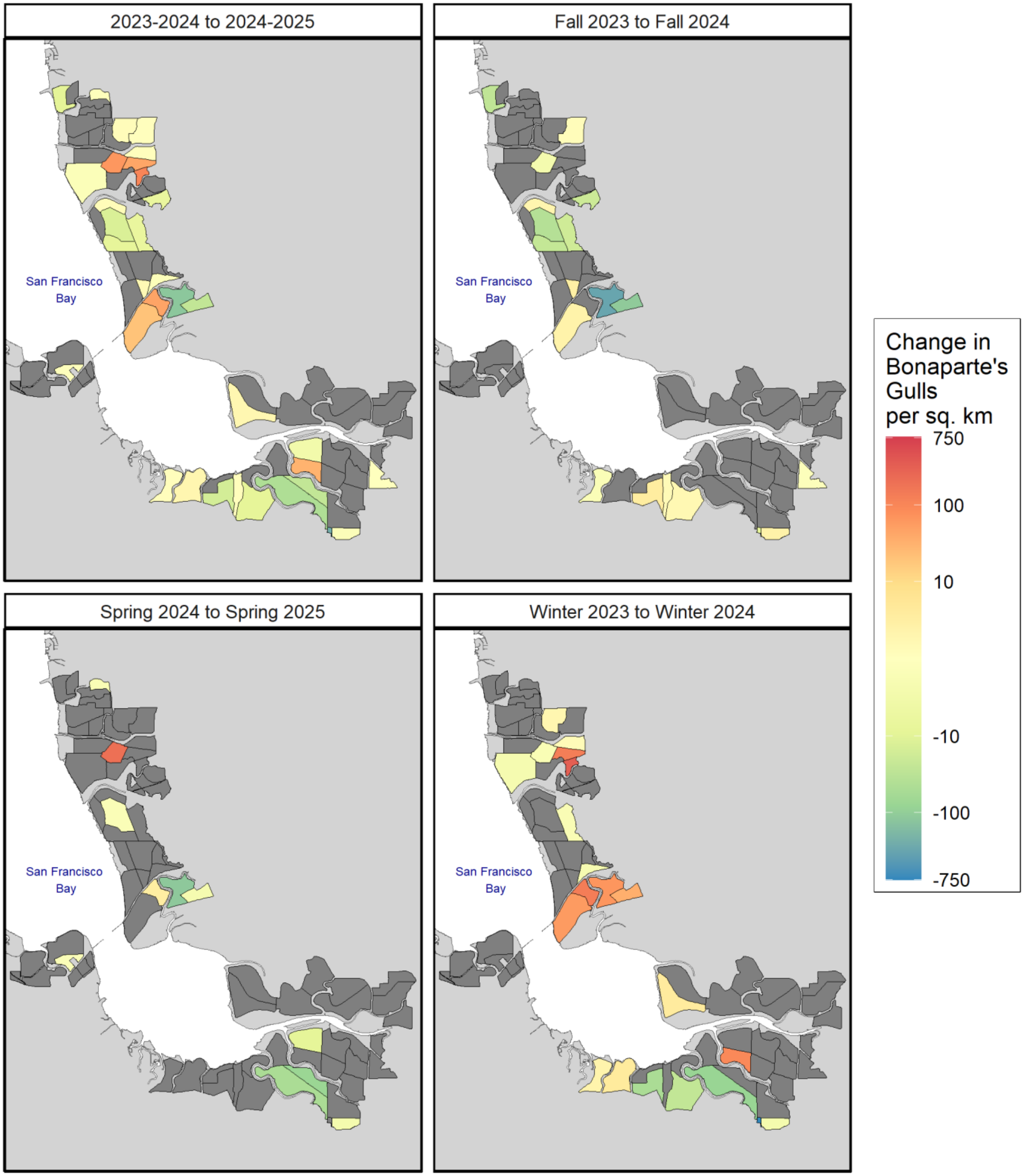

Figure 36. Interannual change in density of Bonaparte's Gulls between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For Bonaparte's Gulls in winter, their management trigger—more than 25% below the 2005-2007 baseline winter abundance for the past three years, or more than 50% below in any single year—was tripped this year because declines exceeded 25% in all three years, though they did not exceed 50% (Table 2).

The current slope of the estimated multi-year trend for average winter abundance of Bonaparte's Gulls across the study area was -21 at the end of winter 2025 (Fig. 37). The trend within the SBSPRP was +2 (+0.03 per km^2) within the wildlife ponds and -8 (-1.20 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was -13 (-0.47 per km^2).

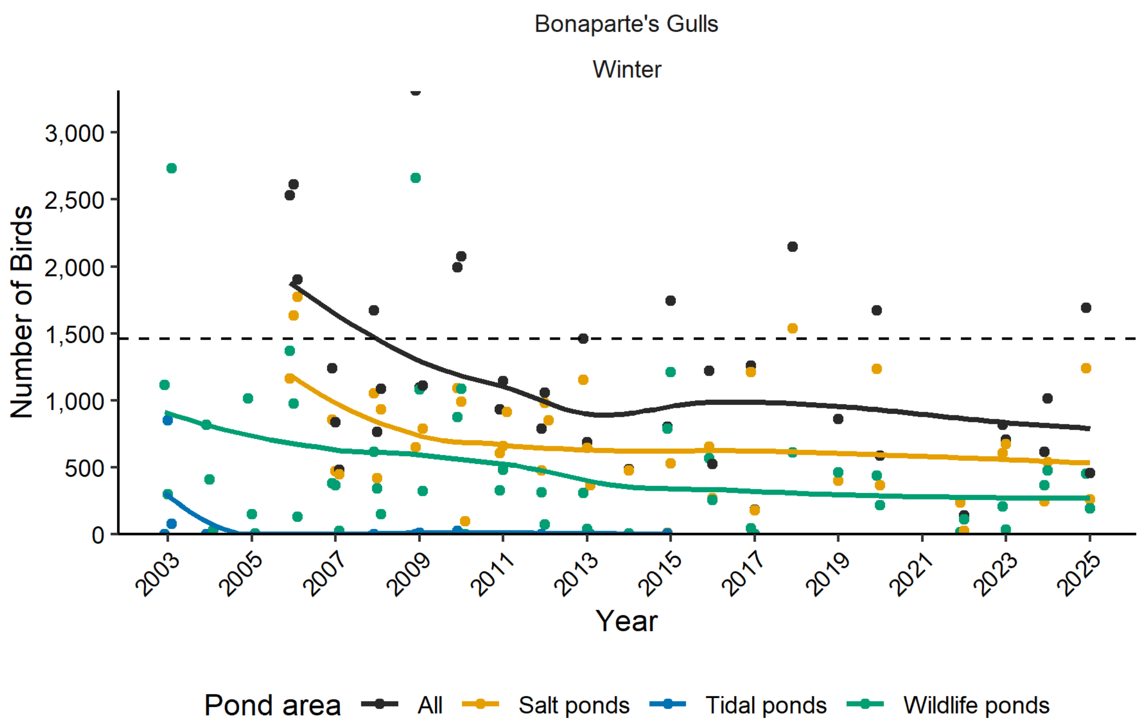

Figure 37. Counts of Bonaparte's Gulls during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

In the population change models, all assessed variables had confidence intervals that overlapped zero for Bonaparte's Gulls, indicating our models had weak explanatory power for identifying drivers of changes in abundance of this species (Fig. 38). However, support for several variables was observed based on AICc (Table A5.7). Temperature showed the largest effect sizes, but effects were inconsistent, with trends showing that increasing minimum air temperature related to increased population size but warmer water temperatures related to decreased population size (or vice-versa). Benefits from higher dissolved oxygen were weakly supported, with very large confidence intervals. Base model selection on site covariates showed that site covariates did not affect change in abundance (Table A5.13).

We report predictions made by the change model within 20 ponds, excluding sites that were unoccupied by Bonaparte's Gulls in winter of both 2025 and 2024 (A11, A12, A13, A14, A15, A16, A17, A19, A22, A23, A3N, A6S, A7, A8, A9, AB1, AB2, E1, E10, E11, E12, E13, E14, E1C, E2C, E3C, E4, E4C, E5C, E6A, E8, E8AE, E8AW, E8X, E9, M1, M3, M4, M5, M6, N1A, N2A, N3A, N4, N4AB, N4B, N5, N6, N7, N8, R1, R2, R3, R4, R5, R5S, RSF2U1, RSF2U2, RSF2U3 and RSF2U4) and sites with missing water quality measurements (A8W). Across this set of sites, the actual change in abundance of Bonaparte's Gulls in winter was +540 (+91 birds [+5 birds per km^2] in the SBSPRP and +449 [+50 per km^2] in the salt ponds). In comparison, the model predicted a total change of +326 (+221 [+13 per km^2] in the SBSPRP and +104 [+12 per km^2] in the salt ponds), with this predicted increase driven by effects of changes in site hydrology, as well as effects of weather. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.08$, $R^2m = 0.04$).

The change model estimated that changes in site hydrology could explain a 124 increase (+125 [+7 per km^2] in the SBSPRP and -1 [-0 per km^2] in the salt ponds) in abundance of Bonaparte's Gulls from last year due to decreasing water temperature. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of Bonaparte's Gulls due to hydrology changes in winter 2025 were A2E, A3W, and E6C, while E5, E6C, and A3W were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 11). The SBSPRP sites predicted to have the largest decreases in abundance and habitat suitability due to hydrology changes were A1, E2, and E7. In the salt pond footprint, the largest predicted increases in both abundance and habitat suitability were in N1, N3, and N2, while the sites with predicted largest decreases were in N9, N4AA, and NPP1 (Table 11).

The change model predicted that deviations from mean weather could drive a 2 increase (+6 [+0 per km^2] in the SBSPRP and -4 [-0 per km^2] in the salt ponds) in abundance due to high minimum temperature (Table 11). There was also a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 93 (+53 [+3 per km^2] in the SBSPRP and +41 [+5 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

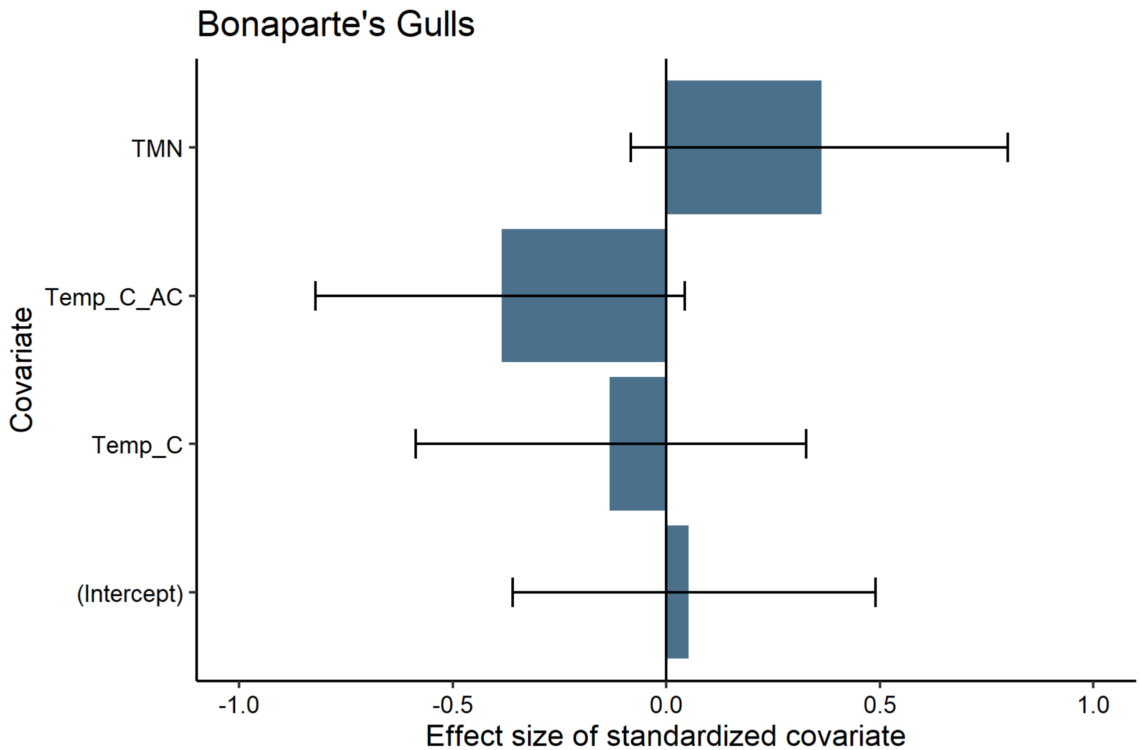

Figure 38. Fixed effects for the top model for interannual change in abundance of Bonaparte's Gulls during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 401). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.397.

Table 11. Actual and predicted changes in mean abundance per survey of Bonaparte's Gulls from winter 2024 to winter 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (water temperature; compared to no change from last year), weather (minimum temperature; compared to mean annual weather), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Year effect
A5	216	0	-216 (-5.38)	+70 (+0.28)	+0 (+0.00)	+63 (+0.25)	+21 (+0.08)
A2E	134	0	-134 (-4.91)	+63 (+0.38)	+58 (+0.35)	+10 (+0.05)	+15 (+0.08)
A3W	60	0	-60 (-4.12)	+58 (+0.66)	+57 (+0.65)	+2 (+0.02)	+9 (+0.08)
NPP1	82	68	-14 (-0.19)	+1 (+0.01)	-15 (-0.16)	+4 (+0.05)	+6 (+0.08)
E2	11	0	-11 (-2.48)	+4 (+0.32)	-1 (-0.04)	+4 (+0.27)	+1 (+0.08)
A8S	3	0	-3 (-1.39)	+6 (+0.87)	+4 (+0.60)	+2 (+0.20)	+1 (+0.08)
N4AA	3	0	-3 (-1.39)	-1 (-0.30)	-2 (-0.57)	+0 (+0.08)	+0 (+0.08)
E7	2	0	-2 (-1.10)	-1 (-0.33)	-2 (-0.72)	+1 (+0.27)	+0 (+0.08)
N9	2	0	-2 (-1.10)	+0 (+0.13)	-0 (-0.12)	+0 (+0.04)	+0 (+0.08)
E6	0	1	+1 (+0.69)	+1 (+0.75)	+1 (+0.54)	+0 (+0.11)	+0 (+0.08)
E6B	0	3	+3 (+1.39)	+1 (+0.91)	+1 (+0.63)	+1 (+0.28)	+0 (+0.08)
A1	0	4	+4 (+1.61)	-0 (-0.03)	-0 (-0.06)	-0 (-0.18)	+0 (+0.08)
A2W	0	14	+14 (+2.71)	+0 (+0.15)	+0 (+0.23)	-0 (-0.17)	+0 (+0.08)
M2	0	15	+15 (+2.77)	+0 (+0.24)	-0 (-0.02)	+0 (+0.20)	+0 (+0.08)
E5	0	88	+88 (+4.48)	+2 (+0.94)	+1 (+0.79)	+0 (+0.14)	+0 (+0.08)
N1	350	442	+92 (+0.23)	+84 (+0.22)	+16 (+0.04)	+28 (+0.07)	+32 (+0.08)
N2	0	105	+105 (+4.66)	+0 (+0.25)	+0 (+0.11)	+0 (+0.06)	+0 (+0.08)
A10	0	191	+191 (+5.26)	+2 (+1.07)	+1 (+0.58)	+1 (+0.50)	+0 (+0.08)
E6C	44	261	+217 (+1.76)	+45 (+0.70)	+46 (+0.71)	+7 (+0.08)	+7 (+0.08)
N3	0	257	+257 (+5.55)	+0 (+0.29)	+0 (+0.22)	+0 (+0.11)	+0 (+0.08)

Herons and Egrets

Abundance

Across all complexes, there were 3,198 total sightings of herons and egrets (sum sightings during the entire survey period). Compared to last year, this was a decrease of 77 total sightings (-2.4%; Fig. 39). In their target season of fall they increased by 1.1%. There were on average 10 more herons and egrets detected per survey in fall (Table A2.4), 24 more detected in winter (Table A2.6), and 72 fewer detected in spring (Table A2.8, Fig. 39).

At the pond level, N4AA had the highest abundance (mean count of 46 per survey), followed by A9 (23) and N2A (24; Fig. 40). At these sites, we observed the majority of herons and egrets foraging (95.6%, 91.8%, and 97.2%, respectively; Table A4.9). Across all six surveys, the sites with the largest increases in herons and egrets from last year were N4AA (+32 mean abundance per visit), A9 (+22), and N2A (+20), while the sites with the largest decreases were A16 (-31), N3A (-24), and E2 (-21; Fig. 41). At N2A (66 birds in fall) and R4 (21 in fall), abundance of herons and egrets was higher than ever previously recorded there.

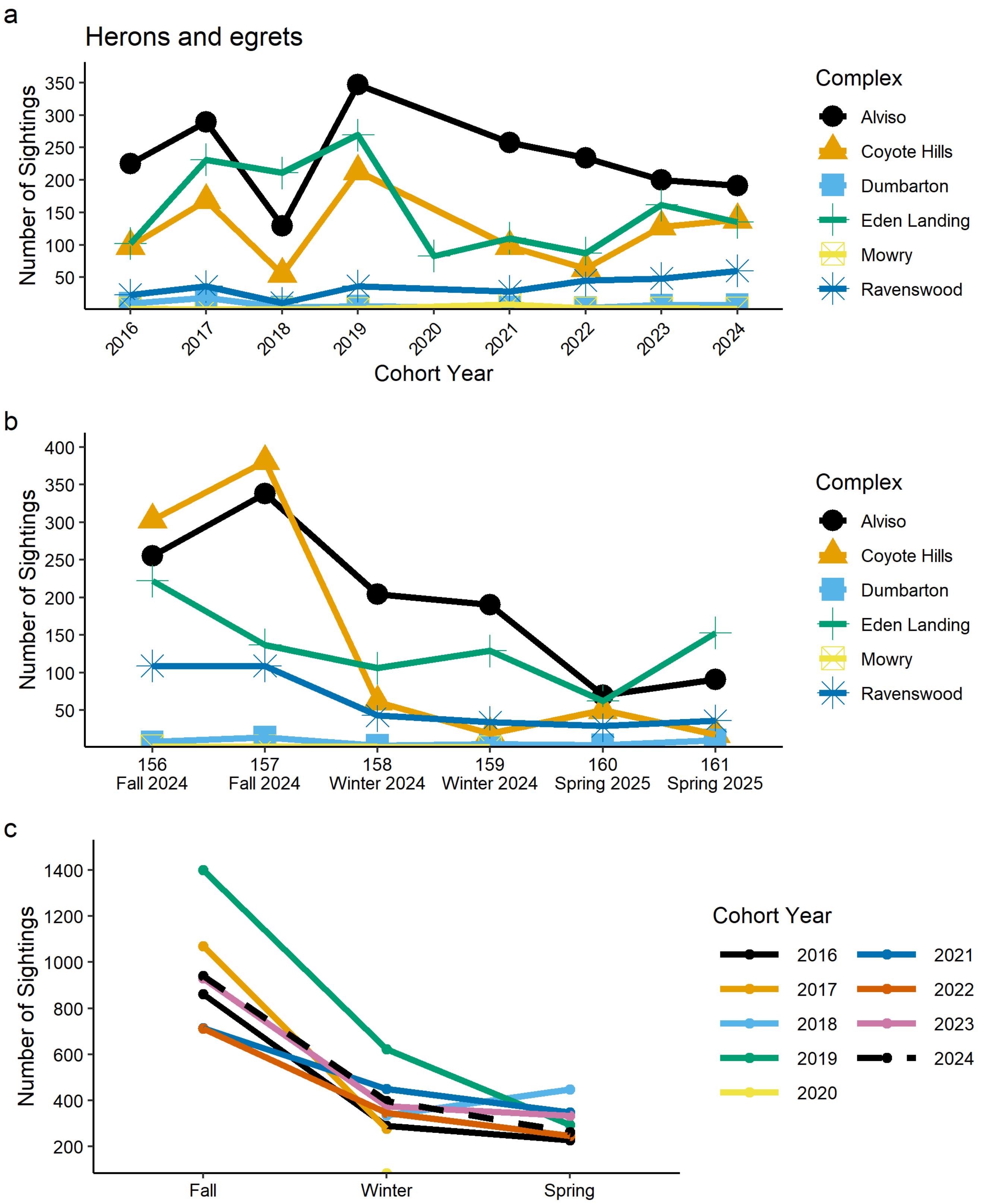

Figure 39. Abundance of herons and egrets by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

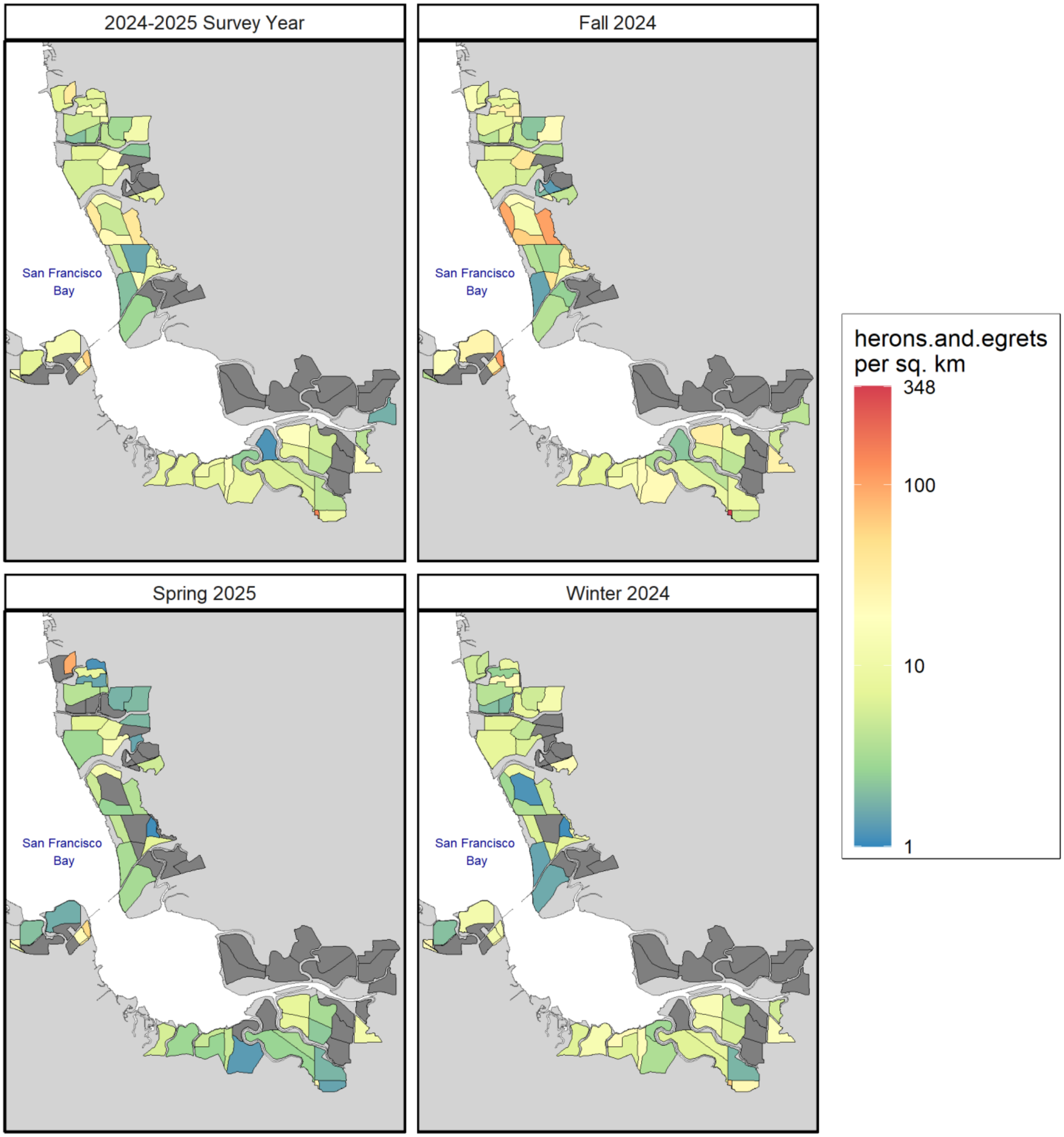

Figure 40. Density of herons and egrets averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

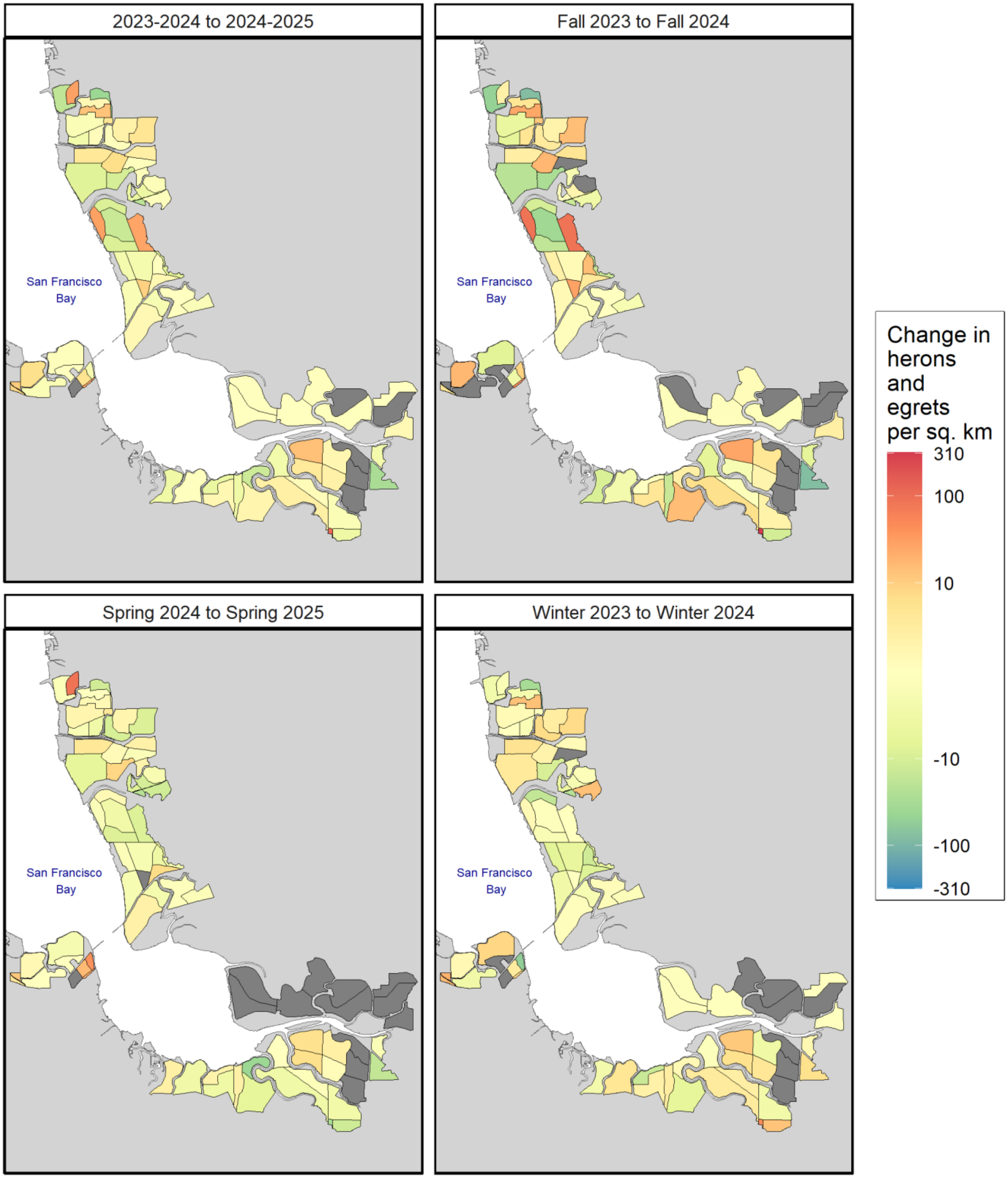

Figure 41. Interannual change in density of herons and egrets between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

No formal targets have been set for herons and egrets, but we still provide a comparison to a hypothetical management trigger based on baseline abundance for a more comprehensive assessment of waterbird populations within the South Bay. For herons and egrets in fall, this hypothetical trigger—two or more of the past three years of fall abundance below the 2005-2007 baseline value—was tripped this year because average seasonal abundance was below this threshold in all three of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average fall abundance of herons and egrets across the study area was -56 at the end of fall 2025 (Fig. 42). The trend within the SBSPRP was -51 (-1.07 per km^2) within the wildlife ponds and +3 (+0.41 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was +1 (+0.04 per km^2).

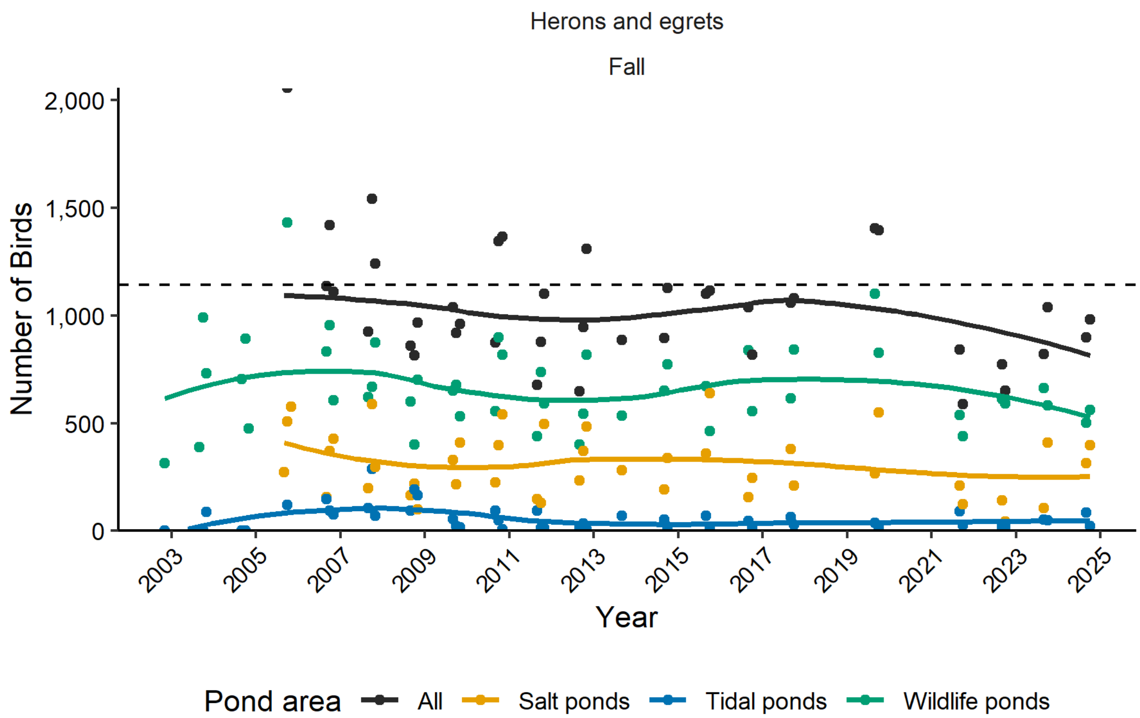

Figure 42. Counts of herons and egrets during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

We found that heron and egret abundances significantly increased in abundance at ponds where salinity had decreased (or vice versa; Fig. 43). No other relationships were supported, with all static site characteristic terms near-zero. Previous reports had also found that herons and egrets had higher abundance at sites with lower salinity (as well as lower staff gauge values, which we did not find support for; Scullen et al. 2013). Higher salinity levels (above 80 ppt) are generally detrimental to fish survival, and fish are a primary prey item for herons and egrets. Increased pond depths may allow fish to escape beyond the reach of herons and egrets, while shallow ponds may provide better (or simply a larger area of) foraging habitat.

We report predictions made by the change model within 63 ponds, excluding sites that were unoccupied by herons and egrets in fall of both 2025 and 2024 (A12, A13, A15, A22, A23, E4C, E5, M1, M5, R2, R3, R5 and RSF2U3) and sites with missing water quality measurements (A6S, A8W, E8AE, E8AW and R5S). Across this set of sites, the actual change in abundance of herons and egrets in fall was +4 (-90 birds [-2 birds per km^2] in the SBSPRP and +94 [+4 per km^2] in the salt ponds). In comparison, the model predicted a total change of +106 (+65 [+2 per km^2] in the SBSPRP and +41 [+2 per km^2] in the salt ponds), with this predicted increase driven by no fixed effects, with declines driven by unexplained. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.07$, $R^2m = 0.04$).

The change model estimated that changes in site hydrology could explain a 3 decrease (-11 [-0 per km^2] in the SBSPRP and +9 [+0 per km^2] in the salt ponds) in abundance of herons and egrets from last year due to increasing salinity. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of herons and egrets due to hydrology changes in fall 2025 were R4, E2, and E1C, while R4, E1C, and E6 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 12). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were E4, R1, and E7 and the sites with the largest predicted decreases in habitat suitability were E4, E7, and E6C. In the salt pond footprint, the largests predicted increases in herons and egrets fall abundance were in N4AA, M4, and M2 and the largest predicted increases in habitat suitability were in N4AA, M3, and M4, while the sites with predicted largest decreases were N4B, N4AB, and N6 and N2A, N2, and N6 for abundance and habitat suitability, respectively (Table 12).

Static site characteristics (number of islands, hunting access, and pond area) accounted for a decrease of 3 birds. This effect was -3 [-0 per km^2] in the SBSPRP and no change in the salt ponds.

Weather covariates were not included in the top model. However, there was a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 89 (+62 [+1 per km^2] in the SBSPRP and +27 [+1 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

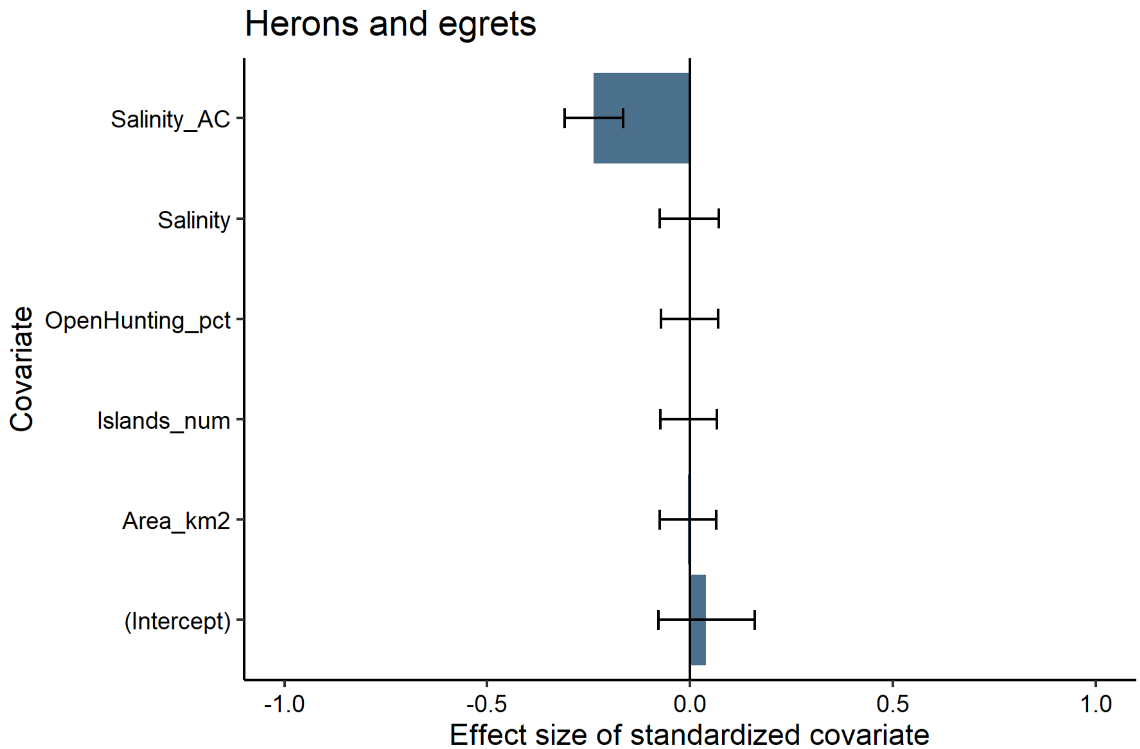

Figure 43. Fixed effects for the top model for interannual change in abundance of herons and egrets during fall in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 990). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.034.

Table 12. Actual and predicted changes in mean abundance per survey of herons and egrets from fall 2023 to fall 2024 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (salinity; compared to no change from last year), static site characteristics (number of islands, hunting access, and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
A16	110	28	-82 (-1.35)	+11 (+0.09)	-1 (-0.01)	-0 (-0.00)	+10 (+0.08)
N3A	88	22	-66 (-1.37)	+10 (+0.10)	+0 (+0.00)	-0 (-0.00)	+8 (+0.08)
E2	75	18	-57 (-1.39)	+7 (+0.09)	+1 (+0.01)	-2 (-0.02)	+7 (+0.08)
E10	56	14	-43 (-1.38)	+5 (+0.09)	-1 (-0.02)	-0 (-0.00)	+5 (+0.08)
E12	40	6	-35 (-1.85)	+4 (+0.09)	-1 (-0.02)	+0 (+0.00)	+4 (+0.08)
E4	28	4	-23 (-1.65)	+1 (+0.02)	-2 (-0.08)	-0 (-0.00)	+2 (+0.08)
N4AB	74	58	-16 (-0.25)	+8 (+0.10)	-0 (-0.00)	+0 (+0.00)	+7 (+0.08)
R1	60	47	-14 (-0.25)	+4 (+0.06)	-3 (-0.04)	-0 (-0.01)	+5 (+0.08)
A1	26	15	-10 (-0.50)	+3 (+0.09)	-0 (-0.01)	+0 (+0.00)	+2 (+0.08)
AB2	26	15	-10 (-0.50)	+2 (+0.08)	-0 (-0.01)	-0 (-0.01)	+2 (+0.08)
E9	20	13	-8 (-0.43)	+2 (+0.09)	-0 (-0.01)	-0 (-0.01)	+2 (+0.08)
N1A	20	14	-7 (-0.39)	+2 (+0.10)	-0 (-0.01)	+0 (+0.01)	+2 (+0.08)
A8S	11	7	-4 (-0.41)	+1 (+0.07)	-0 (-0.03)	+0 (+0.00)	+1 (+0.08)
A17	6	3	-4 (-0.63)	+1 (+0.10)	-0 (-0.01)	+0 (+0.01)	+1 (+0.08)
A2W	16	12	-4 (-0.23)	+2 (+0.09)	-0 (-0.00)	-0 (-0.01)	+2 (+0.08)
N4B	15	12	-4 (-0.25)	+2 (+0.10)	-0 (-0.01)	+0 (+0.01)	+1 (+0.08)
N7	7	4	-2 (-0.37)	+1 (+0.11)	+0 (+0.01)	-0 (-0.00)	+1 (+0.08)
E3C	5	3	-2 (-0.41)	+0 (+0.05)	-0 (-0.05)	+0 (+0.00)	+1 (+0.08)
M4	3	1	-2	+2	+1	-0	+0

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
			(-0.69)	(+0.37)	(+0.28)	(-0.01)	(+0.08)
NPP1	2	0	-2 (-1.10)	+0 (+0.08)	-0 (-0.02)	+0 (+0.00)	+0 (+0.08)
A10	8	6	-2 (-0.18)	+0 (+0.05)	-1 (-0.06)	+0 (+0.00)	+1 (+0.08)
A11	6	4	-2 (-0.24)	+0 (+0.04)	-1 (-0.07)	+0 (+0.00)	+1 (+0.08)
E2C	4	2	-2 (-0.36)	+1 (+0.11)	-0 (-0.00)	+0 (+0.01)	+0 (+0.08)
E6C	1	0	-1 (-0.69)	-0 (-0.27)	-1 (-0.38)	+0 (+0.01)	+0 (+0.08)
E8X	4	4	-1 (-0.20)	+1 (+0.11)	+0 (+0.00)	+0 (+0.01)	+0 (+0.08)
M2	1	0	-1 (-0.69)	+1 (+0.30)	+1 (+0.21)	-0 (-0.01)	+0 (+0.08)
N2	5	4	-1 (-0.18)	+0 (+0.08)	-0 (-0.03)	+0 (+0.00)	+1 (+0.08)
RSF2U2	11	10	-1 (-0.09)	+1 (+0.09)	+0 (+0.00)	-0 (-0.01)	+1 (+0.08)
A7	5	4	-0 (-0.09)	+1 (+0.09)	-0 (-0.01)	-0 (-0.01)	+1 (+0.08)
AB1	6	6	0 (0.00)	+1 (+0.09)	-0 (-0.02)	+0 (+0.00)	+1 (+0.08)
E1C	1	1	0 (0.00)	+1 (+0.32)	+1 (+0.21)	+0 (+0.01)	+0 (+0.08)
N1	1	1	0 (0.00)	+0 (+0.08)	-0 (-0.02)	+0 (+0.00)	+0 (+0.08)
N3	8	8	+0 (+0.05)	+1 (+0.10)	+0 (+0.01)	-0 (-0.01)	+1 (+0.08)
E11	3	4	+1 (+0.22)	+0 (+0.07)	-0 (-0.04)	+0 (+0.00)	+0 (+0.08)
E5C	0	1	+1 (+0.69)	+0 (+0.10)	-0 (-0.01)	+0 (+0.01)	+0 (+0.08)
M3	0	1	+1 (+0.69)	+0 (+0.37)	+0 (+0.28)	-0 (-0.01)	+0 (+0.08)
M6	0	1	+1 (+0.69)	+0 (+0.24)	+0 (+0.15)	-0 (-0.00)	+0 (+0.08)
A3N	1	2	+2 (+0.56)	+0 (+0.05)	-0 (-0.06)	+0 (+0.00)	+0 (+0.08)
N5	2	3	+2 (+0.47)	+0 (+0.11)	+0 (+0.01)	+0 (+0.00)	+0 (+0.08)
N9	4	6	+2 (+0.31)	+1 (+0.09)	-0 (-0.02)	+0 (+0.01)	+0 (+0.08)
RSF2U1	24	26	+2 (+0.08)	+2 (+0.09)	-0 (-0.01)	+0 (+0.00)	+2 (+0.08)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
A19	2	4	+2 (+0.61)	+0 (+0.11)	+0 (+0.01)	-0 (-0.00)	+0 (+0.08)
A8	12	16	+3 (+0.20)	+2 (+0.11)	+0 (+0.02)	-0 (-0.00)	+1 (+0.08)
E1	6	10	+3 (+0.34)	+0 (+0.04)	-0 (-0.06)	-0 (-0.00)	+1 (+0.08)
N4	1	4	+3 (+0.92)	+0 (+0.08)	-0 (-0.02)	+0 (+0.00)	+0 (+0.08)
RSF2U4	2	4	+3 (+0.79)	+0 (+0.10)	-0 (-0.02)	+0 (+0.01)	+0 (+0.08)
E6B	1	5	+4 (+1.10)	+0 (+0.05)	-0 (-0.05)	-0 (-0.00)	+0 (+0.08)
E8	2	7	+5 (+0.98)	+0 (+0.09)	-0 (-0.01)	+0 (+0.00)	+0 (+0.08)
A2E	13	18	+6 (+0.33)	+1 (+0.06)	-1 (-0.04)	-0 (-0.00)	+1 (+0.08)
A14	6	12	+6 (+0.62)	+0 (+0.05)	-0 (-0.05)	-0 (-0.00)	+1 (+0.08)
E13	2	9	+7 (+1.20)	+0 (+0.10)	-0 (-0.01)	+0 (+0.00)	+0 (+0.08)
E6	0	7	+7 (+2.08)	+0 (+0.14)	+0 (+0.04)	+0 (+0.00)	+0 (+0.08)
N8	6	14	+7 (+0.66)	+1 (+0.09)	-0 (-0.02)	+0 (+0.01)	+1 (+0.08)
N6	5	16	+11 (+1.04)	+0 (+0.05)	-0 (-0.06)	+0 (+0.01)	+1 (+0.08)
E14	6	20	+14 (+1.10)	+1 (+0.07)	-0 (-0.03)	+0 (+0.00)	+1 (+0.08)
E7	20	35	+16 (+0.56)	-0 (-0.02)	-3 (-0.12)	-0 (-0.00)	+2 (+0.08)
A5	8	24	+16 (+1.04)	+1 (+0.07)	-0 (-0.02)	-0 (-0.01)	+1 (+0.08)
E6A	7	26	+20 (+1.23)	+1 (+0.09)	-0 (-0.01)	-0 (-0.00)	+1 (+0.08)
R4	0	21	+21 (+3.09)	+3 (+1.47)	+3 (+1.38)	+0 (+0.00)	+0 (+0.08)
A3W	14	50	+36 (+1.22)	+1 (+0.08)	-0 (-0.01)	-0 (-0.01)	+1 (+0.08)
A9	6	46	+40 (+1.84)	+1 (+0.09)	-0 (-0.02)	-0 (-0.00)	+1 (+0.08)
N2A	6	66	+60 (+2.26)	+1 (+0.08)	-0 (-0.03)	+0 (+0.01)	+1 (+0.08)
N4AA	18	126	+108 (+1.88)	+11 (+0.45)	+9 (+0.35)	+0 (+0.00)	+2 (+0.08)

Phalaropes

Abundance

Across all complexes, there were 3,610 total sightings of phalaropes (sum sightings during the entire survey period). Compared to last year, this was a decrease of 1,491 total sightings (-29.2%; Fig. 44). There were on average 1,018 fewer phalaropes detected per survey in fall (Table A2.4), 0 more detected in winter (Table A2.6), and 272 more detected in spring (Table A2.8, Fig. 44).

At the pond level, M1 had the highest abundance (mean count of 284 per survey), followed by E7 (79) and E4 (57; Fig. 45). At these sites, we observed the majority of phalaropes foraging (98.1%, 73.9%, and 98.3%, respectively; Table A4.10). Across all six surveys, the sites with the largest increases in phalaropes from last year were M1 (+284 mean abundance per visit), E7 (+72), and E4 (+57), while the sites with the largest decreases were E5 (-174), E13 (-162), and A5 (-150; Fig. 46).

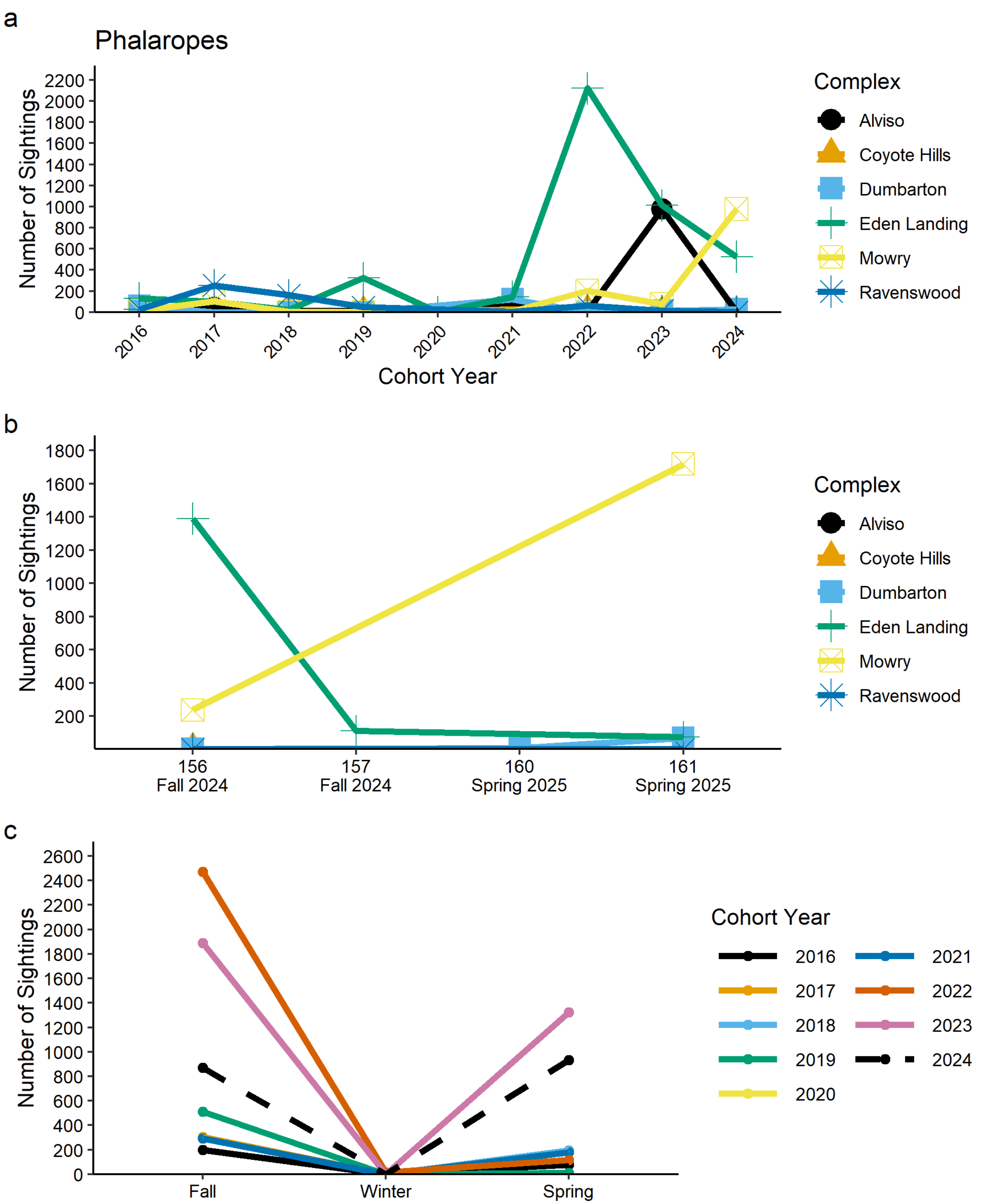

Figure 44. Abundance of phalaropes by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

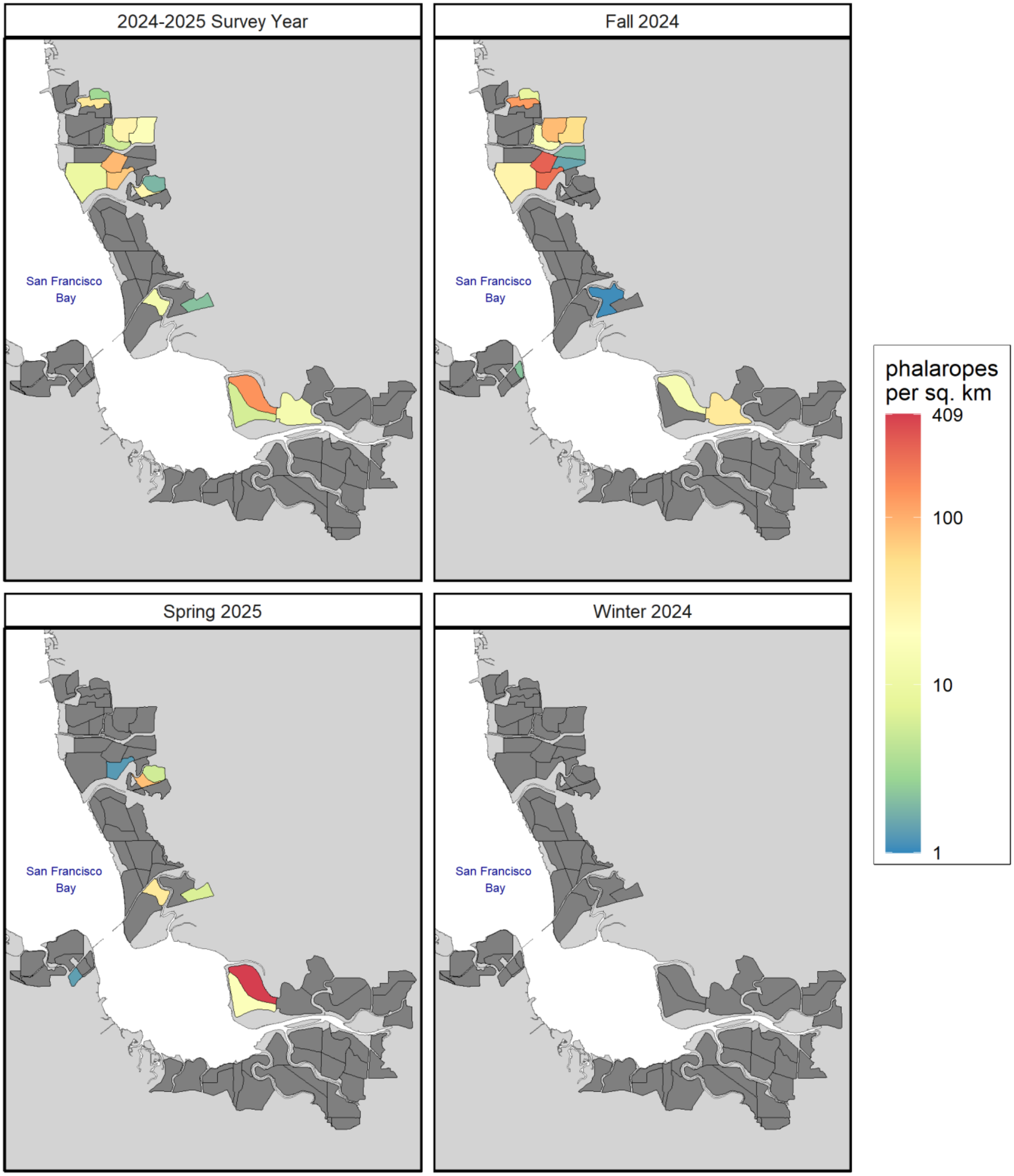

Figure 45. Density of phalaropes averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

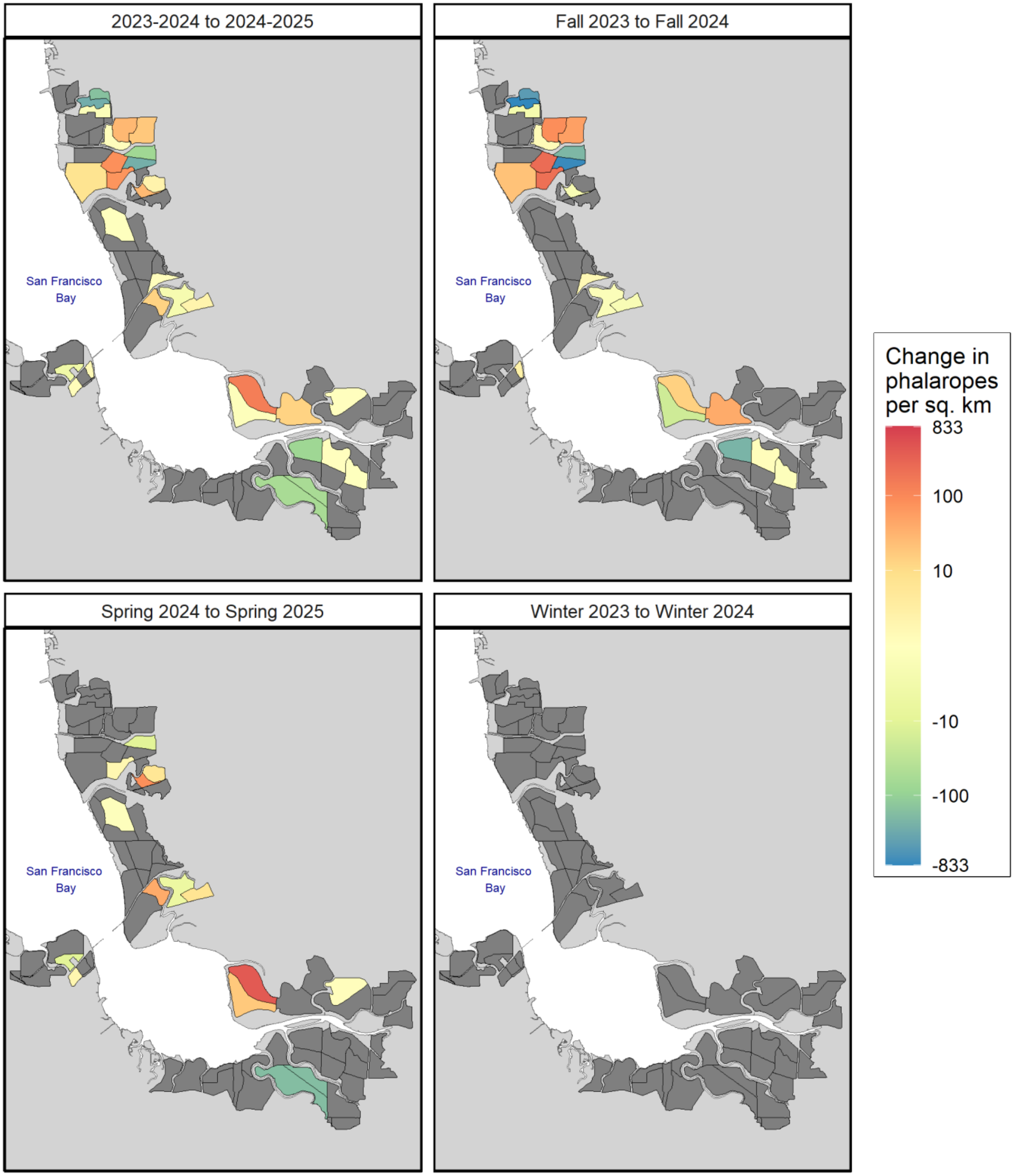

Figure 46. Interannual change in density of phalaropes between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

Like Eared Grebes, land managers are concerned that the loss of medium and high salinity ponds may impact phalaropes, which depend on highly saline bodies of water that host brine flies (*Ephydra* spp.) and brine shrimp (*Artemia* spp.; Cullen et al. 1999). Recent research has shown phalaropes in San Francisco Bay prefer habitats in the 30–150 ppt range, which is the optimal range for the local species of brine flies (Van Schmidt & Parsons, 2025b). Since the onset of this project in 2005, sightings of phalaropes have fluctuated widely (e.g., over 10,000 observations in the 2006–2007 study year, versus fewer than 1,000 in the 2009-2010 study year; Tarjan 2021). The last year of general summer waterbird surveys was in 2017, at which time phalaropes exceeded their AMP trigger threshold with >50% declines in all three years 2015–2017 (Tarjan 2021). Since pond surveys are poorly timed to capture comparable counts during peak phalarope migration, we have conducted targeted phalarope migration surveys starting in 2019 (Burns et al. 2023). We advise using these targeted surveys rather than this report to draw conclusions about contemporary trends in phalarope population dynamics and design management plans to recover phalarope populations within South San Francisco Bay. In summer of 2023, within the SBSPRP and salt pond area the July–September 2023 survey round mean count was 1,974 birds, 62% below the revised baseline of 5,324. Therefore, counts remain worse than the 50% decline the single-year AMP trigger threshold for phalaropes (Van Schmidt & Parsons 2025b).

Change Model

The phalarope dataset has low statistical power because of high variability in counts during their summer migration (Tarjan 2019b), resulting in several large average effect sizes which had low confidence. Despite this, the historical seasonal waterbird surveys still provide the best currently available dataset for understanding how phalaropes have responded to past habitat changes because the new targeted phalarope surveys only began in earnest in 2021 after their decline had already occurred. Neither of the previous studies of habitat relationships within South Bay assessed phalaropes (Scullen et al. 2013, De La Cruz et al. 2018).

The modeling approach did not change this year; therefore, the phalarope model results are the same as in the previous annual report. Salinity was the only predictor of the observed decreases in phalarope populations with confidence intervals not overlapping zero—but surprisingly, decreases in salinity corresponded with increases in phalaropes, opposite of expectations (Fig. 47). This is likely because phalaropes exhibit higher rates of habitat use and foraging in marine to moderately hypersaline ponds (30–150 ppt salinity), rather than highly hypersaline ponds (>150 ppt), likely because the former have alkali flies while the latter are dominated by less nutritious brine shrimp (Van Schmidt & Parsons 2025b, Rubega & Inouye 1994). Decreasing dissolved oxygen levels also increased phalaropes, as did decreasing water levels. We hypothesize that these effects may be because lower dissolved oxygen translates to fewer fish and therefore more invertebrates, while shallower ponds may make it easier for phalarope's unique circular foraging movement to bring invertebrates up from the pond bottom (though phalaropes can also forage in very deep water). A reduction in population growth one year after rainier years was supported in model selection, albeit weakly (Table A5.9). Lag effects of one year have also been seen in other migratory phalarope populations (Jehl et al. 1999). Time-lagged effects occur because influences on adult condition can take years to trickle down through juvenile recruitment to eventual population size (Metzger et al. 2009). Base model selection on site covariates found little support for any site covariates affecting change in abundance (Table A5.13).

Because this change model was fit to historical phalarope salt pond count data ending in 2018, we do not report annual predictions for phalaropes from this change model.

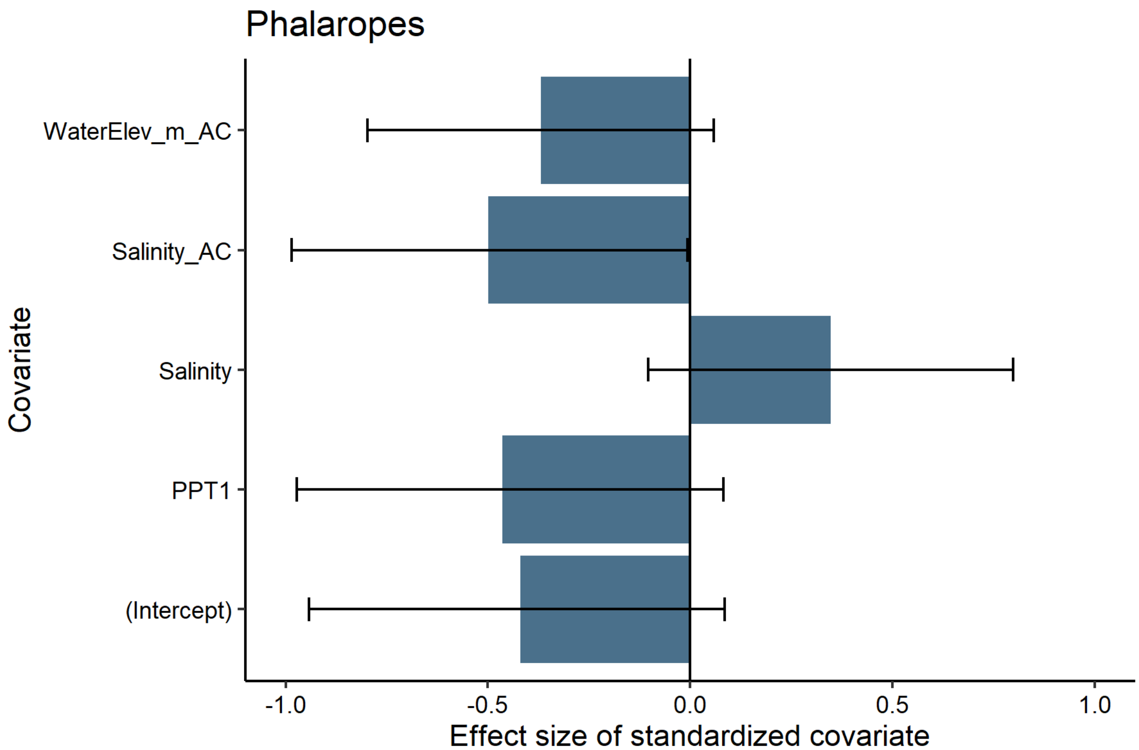

Figure 47. Fixed effects for the top model for interannual change in abundance of phalaropes during summer in current and former salt ponds in South San Francisco Bay, California, water year 2003–2018 (n = 233). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.122.

Medium Shorebirds

Abundance

Across all complexes, there were 183,643 total sightings of medium shorebirds (sum sightings during the entire survey period). Compared to last year, this was an increase of 91,958 total sightings (+100.3%; Fig. 48). In their target season of winter they increased by 71.7%. There were on average 28,359 more medium shorebirds detected per survey in fall (Table A2.4), 14,139 more detected in winter (Table A2.6), and 3,482 more detected in spring (Table A2.8, Fig. 48).

At the pond level, A9 had the highest abundance (mean count of 3,128 per survey), followed by RSF2U1 (2,700) and E4C (2,071; Fig. 49). At these sites, we observed the majority of medium shorebirds roosting on the pond (79.1%, 67.7%, and 76.8%, respectively; Table A4.11). Across all six surveys, the sites with the largest increases in medium shorebirds from last year were A9 (+2,504 mean abundance per visit), E4C (+1,713), and M1 (+1,532), while the sites with the largest decreases were RSF2U2 (-456), AB1 (-370), and E10 (-220; Fig. 50). At RSF2U1 (6,424 birds in fall), abundance of medium shorebirds was higher than ever previously recorded there.

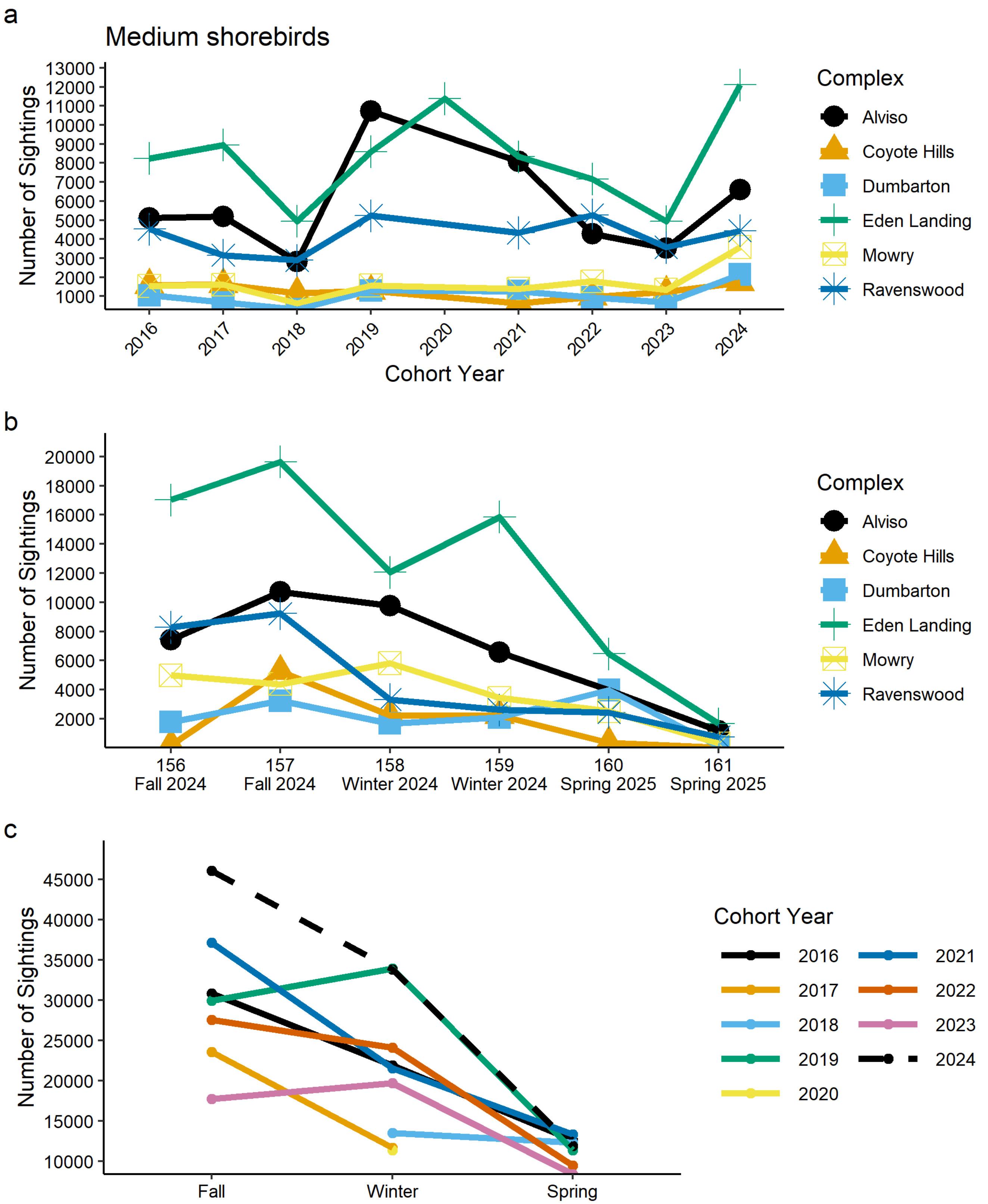

Figure 48. Abundance of medium shorebirds by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

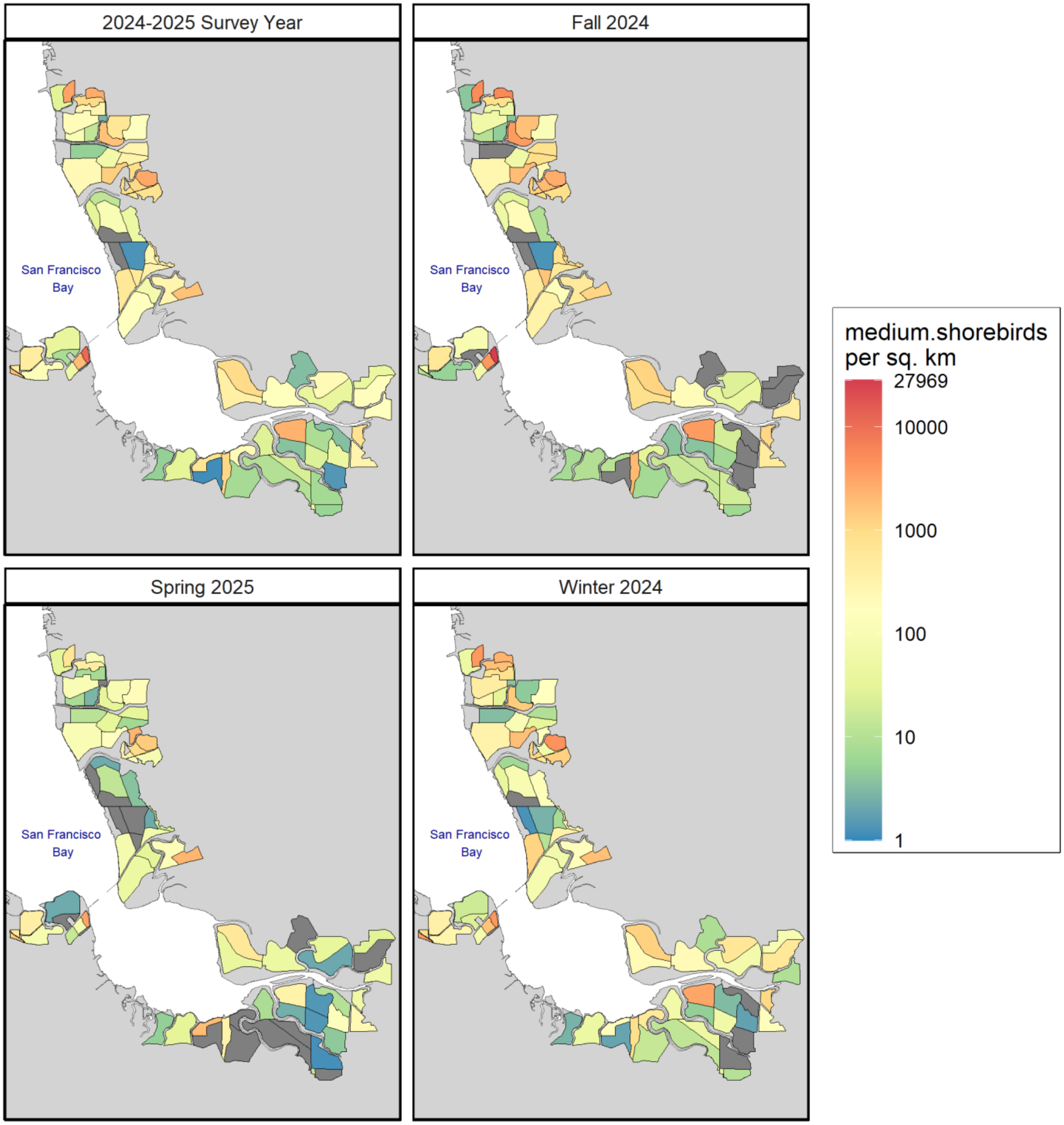

Figure 49. Density of medium shorebirds averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

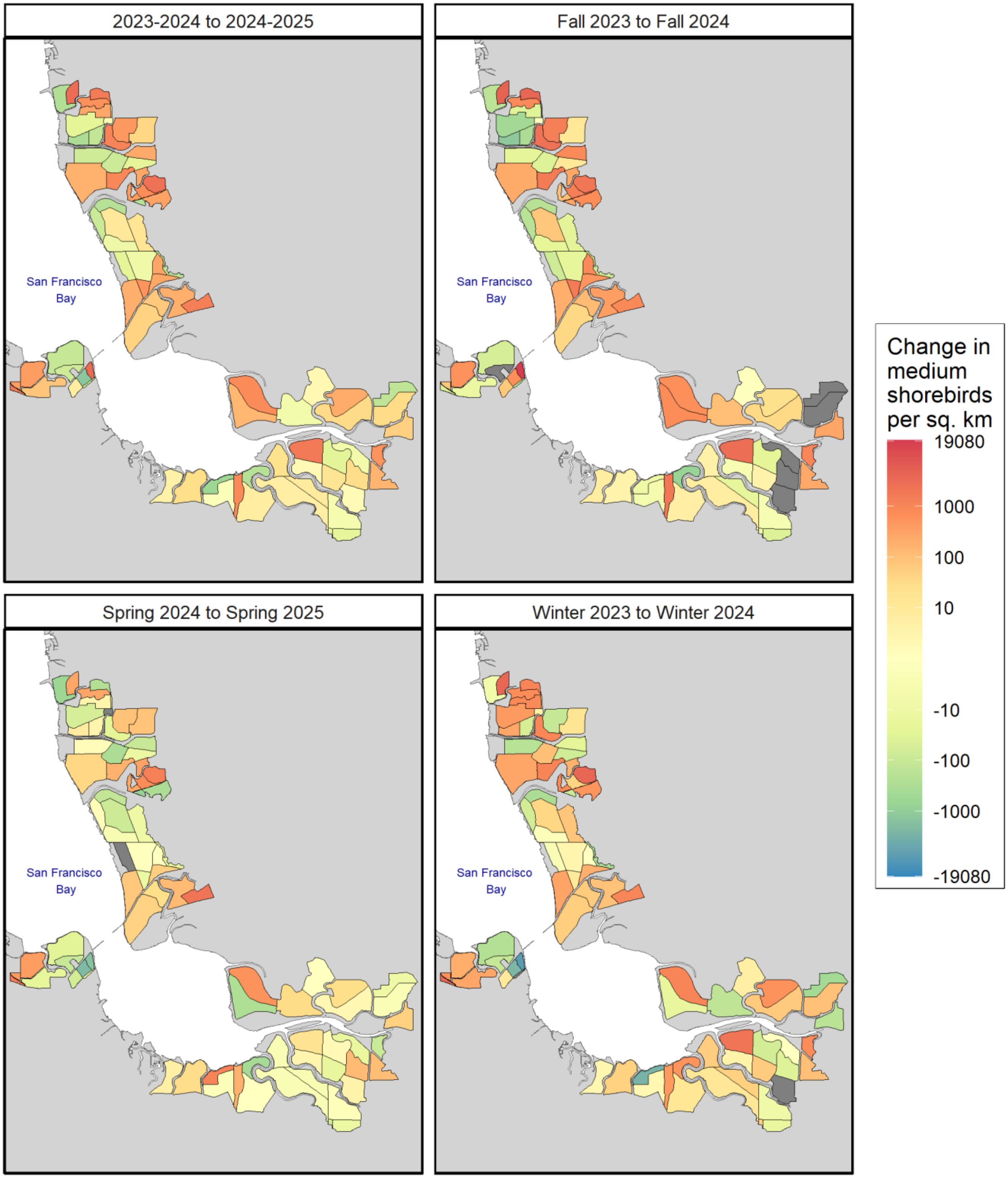

Figure 50. Interannual change in density of medium shorebirds between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For medium shorebirds in winter, their management trigger—two or more of the past three years of winter abundance below the 2005-2007 baseline value—was not tripped this year because average seasonal abundance was below this threshold in only one of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average winter abundance of medium shorebirds across the study area was +1,225 at the end of winter 2025 (Fig. 51). The trend within the SBSPRP was +359 (+7.50 per km^2) within the wildlife ponds and -629 (-93.43 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was +596 (+21.47 per km^2).

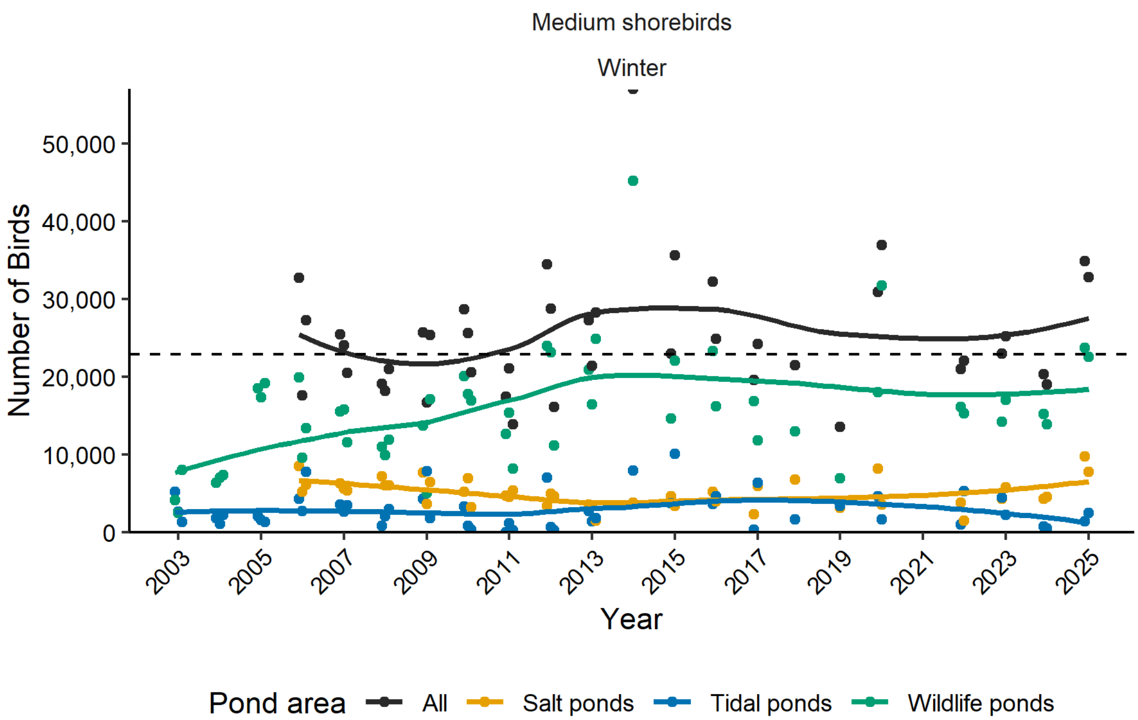

Figure 51. Counts of medium shorebirds during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

Reductions in water levels, which presumably resulted in a greater extent of mudflats for foraging, were the most significant predictor of changes in medium shorebird populations (Fig. 52). As seen in other guilds, decreasing salinity was a strong predictor of abundance of medium shorebirds increasing in that site. There was also support for years with higher mean maximum temperature exhibiting more growth in medium shorebirds, though confidence intervals overlapped zero (Fig. 52). Unlike the initial change model (Van Schmidt & Parsons 2024), greater year to date rain (Sept–Feb) did not correlate to reduced abundance, despite the unusually severe rains this winter and declines in this guild. However, it was included in a competitive model with <2 ΔAICc (Table A5.7). As in other species/guilds, pond characteristics had little influence, but islands did weakly predict increasing abundance, as expected (De La Cruz et al. 2018). Previous reports showed that at the pond scale medium shorebirds were associated with widely varying topography and the presence of islands and levees for foraging and roosting, respectively (De La Cruz et al. 2018).

We report predictions made by the change model within 74 ponds, excluding sites that were unoccupied by medium shorebirds in winter of both 2025 and 2024 (A12 and RSF2U4) and sites with missing water quality measurements (A19, A6S, A8W, E8AE and E8AW). Across this set of sites, the actual change in abundance of medium shorebirds in winter was +14,996 (+10,816 birds [+216 birds per km^2] in the SBSPRP and +4,180 [+151 per km^2] in the salt ponds). In comparison, the model predicted a total change of +28,991 (+26,808 [+536 per km^2] in the SBSPRP and +2,183 [+79 per km^2] in the salt ponds), with this predicted increase driven by effects of changes in site hydrology, effects of static site characteristics, and effects of weather. The proportion of variance in percent change in counts explained by the best model was low ($R^2c = 0.05$, $R^2m = 0.02$).

The change model estimated that changes in site hydrology could explain a 20,131 increase (+19,793 [+396 per km^2] in the SBSPRP and +338 [+12 per km^2] in the salt ponds) in abundance of medium shorebirds from last year due to decreasing salinity and/or decreasing depth. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of medium shorebirds due to hydrology changes in winter 2025 were E12, E13, and A23, while E12, E13, and R4 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 13). E12 and E13 both notably experienced decreasing water depths that drove predicted changes (comparing winter 2025 to winter 2024). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were A22, A9, and RSF2U1 and the sites with the largest predicted decreases in habitat suitability were A15, E6B, and A22. In the salt pond footprint, the largest predicted increases in abundance were in M3, M2, and M1 and the largest predicted increases in habitat suitability were in M3, M2, and M4, while the sites with predicted largest decreases were NPP1, N4, and N3A and N9, N5, and N3A for abundance and habitat suitability, respectively (Table 13).

Static site characteristics (distance to creek and number of islands) accounted for an increase of 1,253 birds. This effect was +1,251 [+25 per km^2] in the SBSPRP and +2 [+0 per km^2] in the salt ponds.

The change model predicted that deviations from mean weather could drive a 1,244 increase (+1,078 [+22 per km^2] in the SBSPRP and +165 [+6 per km^2] in the salt ponds) in abundance due to high maximum temperature (Table 13). There was also a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 10,386 (+8,926 [+179 per km^2] in the SBSPRP and +1,460 [+53 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

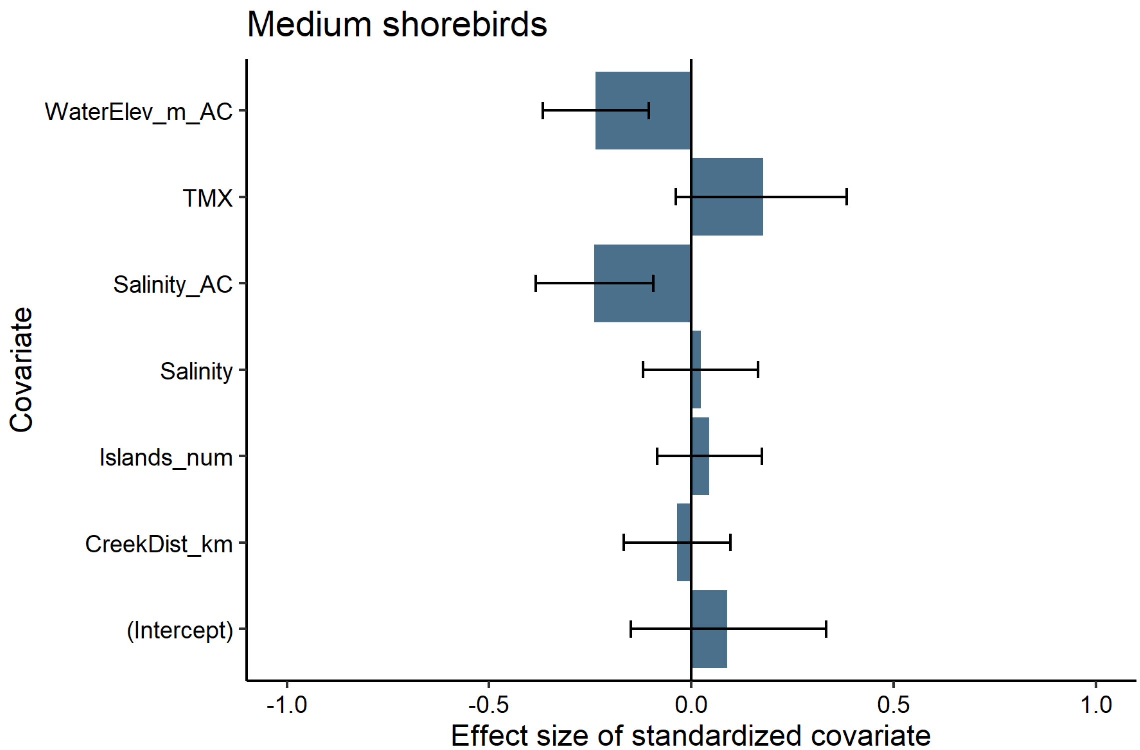

Figure 52. Fixed effects for the top model for interannual change in abundance of medium shorebirds during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 1,357). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.193.

Table 13. Actual and predicted changes in mean abundance per survey of medium shorebirds from winter 2024 to winter 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (salinity and depth; compared to no change from last year), weather (maximum temperature; compared to mean annual weather), static site characteristics (distance to creek and number of islands; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
RSF2U1	2,762	943	-1,820 (-1.07)	+503 (+0.17)	-1,392 (-0.36)	+496 (+0.16)	+159 (+0.05)	+693 (+0.24)
AB1	1,932	230	-1,702 (-2.12)	+1,018 (+0.42)	-263 (-0.09)	+487 (+0.18)	+70 (+0.02)	+626 (+0.24)
RSF2U2	1,420	569	-851 (-0.91)	+1,929 (+0.86)	+473 (+0.15)	+509 (+0.16)	+697 (+0.23)	+710 (+0.24)
A22	592	108	-484 (-1.70)	-58 (-0.10)	-496 (-0.66)	+119 (+0.25)	-5 (-0.01)	+113 (+0.24)
R1	460	32	-428 (-2.65)	+192 (+0.35)	-8 (-0.01)	+97 (+0.16)	-74 (-0.11)	+138 (+0.24)
M3	809	482	-327 (-0.52)	+1,488 (+1.04)	+745 (+0.39)	+445 (+0.22)	+202 (+0.09)	+487 (+0.24)
E1	238	4	-234 (-3.87)	+109 (+0.37)	-24 (-0.07)	+37 (+0.11)	+8 (+0.02)	+74 (+0.24)
N1A	218	4	-214 (-3.68)	+110 (+0.41)	-9 (-0.03)	+35 (+0.11)	+4 (+0.01)	+70 (+0.24)
E6B	128	5	-122 (-3.06)	-14 (-0.12)	-82 (-0.54)	+13 (+0.12)	-0 (-0.00)	+24 (+0.24)
E5	142	24	-118 (-1.74)	+70 (+0.40)	-12 (-0.05)	+25 (+0.12)	+0 (+0.00)	+45 (+0.24)
A14	94	9	-84 (-2.25)	+60 (+0.49)	-7 (-0.05)	+32 (+0.23)	-0 (-0.00)	+33 (+0.24)
A13	84	4	-80 (-2.83)	+43 (+0.41)	-29 (-0.21)	+27 (+0.24)	+1 (+0.01)	+27 (+0.24)
R2	80	14	-65 (-1.65)	+56 (+0.53)	+19 (+0.15)	+21 (+0.16)	-17 (-0.11)	+29 (+0.24)
E6	59	8	-52 (-1.95)	+36 (+0.47)	+0 (+0.00)	+11 (+0.13)	+2 (+0.02)	+20 (+0.24)
E10	91	41	-50 (-0.78)	+78 (+0.61)	+25 (+0.16)	+17 (+0.11)	+7 (+0.04)	+36 (+0.24)
M2	472	438	-34 (-0.07)	+477 (+0.70)	+135 (+0.15)	+155 (+0.18)	+38 (+0.04)	+201 (+0.24)
N3A	188	160	-28 (-0.16)	-182 (-3.34)	-279 (-3.76)	+1 (+0.11)	-0 (-0.00)	+1 (+0.24)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
A8	28	2	-26 (-2.45)	+23 (+0.58)	-0 (-0.00)	+15 (+0.34)	-3 (-0.06)	+11 (+0.24)
A8S	34	14	-20 (-0.85)	+30 (+0.62)	-2 (-0.03)	+19 (+0.34)	+1 (+0.01)	+14 (+0.24)
N2A	68	51	-18 (-0.29)	+36 (+0.42)	-1 (-0.01)	+11 (+0.11)	+1 (+0.00)	+22 (+0.24)
E2C	83	74	-10 (-0.12)	+76 (+0.65)	+27 (+0.18)	+19 (+0.13)	+4 (+0.03)	+34 (+0.24)
N4B	178	171	-7 (-0.04)	+84 (+0.39)	-4 (-0.01)	+32 (+0.13)	-10 (-0.04)	+56 (+0.24)
N5	5	2	-3 (-0.69)	-3 (-0.72)	-6 (-1.10)	+0 (+0.11)	-0 (-0.04)	+1 (+0.24)
N4AB	2	0	-2 (-1.10)	+2 (+0.41)	+0 (+0.01)	+0 (+0.11)	-0 (-0.03)	+1 (+0.24)
A15	1	1	0 (0.00)	+1 (+0.23)	-1 (-0.40)	+1 (+0.24)	+0 (+0.01)	+1 (+0.24)
N8	4	4	0 (0.00)	+0 (+0.05)	-2 (-0.36)	+1 (+0.13)	-0 (-0.03)	+1 (+0.24)
E8X	0	2	+2 (+1.10)	+1 (+0.42)	-0 (-0.03)	+0 (+0.15)	-0 (-0.01)	+0 (+0.24)
N6	1	4	+3 (+0.92)	+1 (+0.32)	-0 (-0.06)	+0 (+0.13)	-0 (-0.06)	+1 (+0.24)
RSF2U3	26	30	+4 (+0.12)	+20 (+0.54)	+3 (+0.08)	+7 (+0.16)	-2 (-0.04)	+10 (+0.24)
A10	1	5	+4 (+1.10)	+1 (+0.47)	-0 (-0.04)	+1 (+0.23)	-0 (-0.02)	+1 (+0.24)
N7	0	4	+4 (+1.61)	+0 (+0.20)	-0 (-0.20)	+0 (+0.12)	-0 (-0.04)	+0 (+0.24)
A1	1	6	+5 (+1.25)	+2 (+0.78)	+1 (+0.25)	+1 (+0.19)	+0 (+0.03)	+1 (+0.24)
A2E	0	5	+5 (+1.79)	+1 (+0.48)	-0 (-0.04)	+0 (+0.21)	-0 (-0.00)	+0 (+0.24)
M6	6	16	+10 (+0.86)	+2 (+0.25)	-3 (-0.31)	+2 (+0.20)	-0 (-0.01)	+2 (+0.24)
E5C	11	27	+16 (+0.85)	+9 (+0.57)	+2 (+0.12)	+3 (+0.13)	+0 (+0.00)	+5 (+0.24)
E6A	194	216	+21 (+0.10)	+167 (+0.62)	+49 (+0.14)	+46 (+0.14)	+12 (+0.03)	+77 (+0.24)
A3W	2	33	+30 (+2.27)	+1 (+0.30)	-1 (-0.20)	+1 (+0.23)	-0 (-0.04)	+1 (+0.24)
A5	2	34	+32	+2	-0	+1	-0	+1

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
			(+2.32)	(+0.52)	(-0.01)	(+0.26)	(-0.03)	(+0.24)
N2	9	52	+43	+5	-0	+2	-1	+3
			(+1.67)	(+0.41)	(-0.01)	(+0.13)	(-0.04)	(+0.24)
A7	3	56	+54	+3	-0	+1	-0	+1
			(+2.67)	(+0.50)	(-0.04)	(+0.25)	(-0.01)	(+0.24)
E6C	1	58	+57	+2	+1	+0	-0	+1
			(+3.38)	(+0.65)	(+0.18)	(+0.13)	(-0.01)	(+0.24)
N3	123	187	+64	+48	-24	+25	-5	+36
			(+0.42)	(+0.33)	(-0.13)	(+0.16)	(-0.03)	(+0.24)
A11	4	70	+66	+3	-0	+2	-0	+2
			(+2.65)	(+0.46)	(-0.06)	(+0.23)	(-0.02)	(+0.24)
R5	30	107	+76	+15	+0	+7	-4	+10
			(+1.23)	(+0.40)	(+0.01)	(+0.15)	(-0.07)	(+0.24)
A2W	7	88	+81	+7	+1	+3	+1	+3
			(+2.41)	(+0.63)	(+0.09)	(+0.19)	(+0.05)	(+0.24)
E7	5	92	+87	+3	-1	+1	+0	+2
			(+2.74)	(+0.38)	(-0.07)	(+0.11)	(+0.03)	(+0.24)
N4AA	63	162	+100	+11	-24	+9	-0	+16
			(+0.94)	(+0.15)	(-0.28)	(+0.12)	(-0.00)	(+0.24)
A16	86	189	+103	+86	+12	+41	+8	+37
			(+0.78)	(+0.69)	(+0.07)	(+0.27)	(+0.05)	(+0.24)
N9	76	182	+106	-1	-38	+9	-4	+16
			(+0.86)	(-0.01)	(-0.40)	(+0.13)	(-0.05)	(+0.24)
M4	33	156	+124	+37	+7	+15	+1	+15
			(+1.53)	(+0.74)	(+0.11)	(+0.24)	(+0.01)	(+0.24)
N1	142	268	+125	+69	-3	+27	-15	+45
			(+0.63)	(+0.39)	(-0.01)	(+0.13)	(-0.07)	(+0.24)
A23	880	1,059	+180	+1,645	+833	+585	+23	+536
			(+0.19)	(+1.05)	(+0.40)	(+0.26)	(+0.01)	(+0.24)
E1C	65	293	+228	+55	+19	+13	+1	+26
			(+1.49)	(+0.61)	(+0.17)	(+0.12)	(+0.01)	(+0.24)
R4	204	450	+246	+742	+622	+135	-82	+201
			(+0.79)	(+1.53)	(+1.07)	(+0.15)	(-0.08)	(+0.24)
R3	25	342	+316	+8	-5	+5	-4	+7
			(+2.58)	(+0.26)	(-0.13)	(+0.15)	(-0.10)	(+0.24)
AB2	336	664	+328	+688	+340	+188	+188	+217
			(+0.68)	(+1.11)	(+0.40)	(+0.20)	(+0.20)	(+0.24)
E3C	494	845	+350	+352	+36	+103	+44	+180
			(+0.53)	(+0.54)	(+0.04)	(+0.13)	(+0.05)	(+0.24)
A17	184	585	+401	+142	-3	+77	+3	+69
			(+1.15)	(+0.57)	(-0.01)	(+0.27)	(+0.01)	(+0.24)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Weather effect	Site effect	Year effect
N4	1,188	1,604	+416 (+0.30)	+333 (+0.25)	-179 (-0.11)	+174 (+0.12)	-129 (-0.08)	+323 (+0.24)
E13	635	1,058	+424 (+0.51)	+2,398 (+1.56)	+1,996 (+1.07)	+500 (+0.18)	+8 (+0.00)	+643 (+0.24)
E12	562	1,022	+460 (+0.60)	+13,570 (+3.22)	+13,204 (+2.72)	+2,328 (+0.18)	+191 (+0.01)	+2,997 (+0.24)
R5S	8	486	+478 (+3.94)	+5 (+0.44)	-0 (-0.03)	+2 (+0.15)	+0 (+0.01)	+3 (+0.24)
E14	11	548	+538 (+3.82)	+26 (+1.14)	+18 (+0.65)	+6 (+0.18)	+0 (+0.01)	+8 (+0.24)
E8	378	1,090	+712 (+1.06)	+199 (+0.42)	-4 (-0.01)	+61 (+0.11)	+5 (+0.01)	+123 (+0.24)
A3N	1	758	+757 (+5.94)	+1 (+0.53)	+0 (+0.07)	+1 (+0.18)	-0 (-0.04)	+1 (+0.24)
E2	116	889	+774 (+2.03)	+68 (+0.46)	-7 (-0.04)	+20 (+0.11)	+13 (+0.07)	+39 (+0.24)
NPP1	602	1,381	+779 (+0.83)	+246 (+0.34)	-42 (-0.05)	+105 (+0.13)	-76 (-0.09)	+180 (+0.24)
E4	672	1,468	+796 (+0.78)	+508 (+0.56)	+92 (+0.08)	+125 (+0.11)	+57 (+0.05)	+250 (+0.24)
M5	87	1,036	+948 (+2.47)	+80 (+0.65)	-1 (-0.00)	+32 (+0.21)	+9 (+0.06)	+36 (+0.24)
E9	20	1,370	+1,350 (+4.18)	+43 (+1.11)	+30 (+0.65)	+8 (+0.14)	+1 (+0.02)	+14 (+0.24)
E11	22	2,046	+2,024 (+4.49)	+18 (+0.57)	+3 (+0.07)	+7 (+0.18)	+1 (+0.01)	+9 (+0.24)
M1	406	2,498	+2,092 (+1.81)	+306 (+0.56)	+49 (+0.07)	+110 (+0.17)	-2 (-0.00)	+151 (+0.24)
E4C	530	3,302	+2,773 (+1.83)	+256 (+0.39)	-103 (-0.12)	+95 (+0.13)	+52 (+0.07)	+167 (+0.24)
A9	1,494	4,678	+3,185 (+1.14)	+569 (+0.32)	-488 (-0.21)	+425 (+0.23)	-4 (-0.00)	+437 (+0.24)

Small Shorebirds

Abundance

Across all complexes, there were 476,799 total sightings of small shorebirds (sum sightings during the entire survey period). Compared to last year, this was an increase of 195,785 total sightings (+69.7%; Fig. 53). In their target seasons of fall and spring their abundance changed by +113.3% and -16.0%, respectively. There were on average 62,242 more small shorebirds detected per survey in fall (Table A2.4), 42,645 more detected in winter (Table A2.6), and 6,994 fewer detected in spring (Table A2.8, Fig. 53).

At the pond level, R1 had the highest abundance (mean count of 8,993 per survey), followed by E6B (8,065) and NPP1 (8,006; Fig. 54). At these sites, we observed the majority of small shorebirds roosting on the pond (53.9%, 62.1%, and 88.8%, respectively; Table A4.12). Across all six surveys, the sites with the largest increases in small shorebirds from last year were NPP1 (+6,706 mean abundance per visit), E6B (+6,189), and E4C (+3,879), while the sites with the largest decreases were R2 (-1,191), A15 (-606), and A13 (-506; Fig. 55). Seasonal abundance of small shorebirds was exceptionally low (5th percentile) at E12 (2 birds in spring), E13 (9 in spring), E8AE (0 in winter), and E8AW (0 in fall). At A17 (3,508 birds in winter), abundance of small shorebirds was higher than ever previously recorded there.

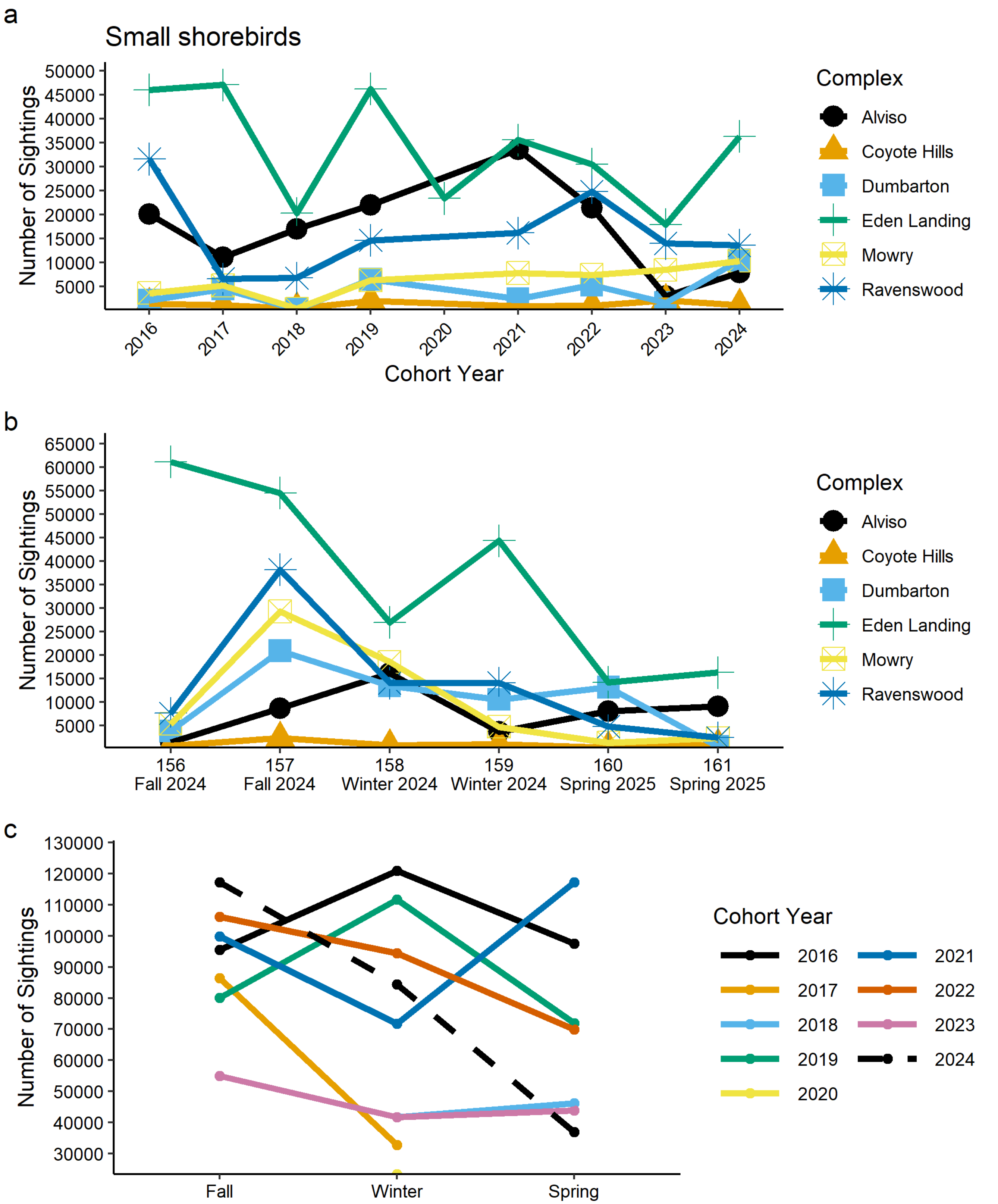

Figure 53. Abundance of small shorebirds by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

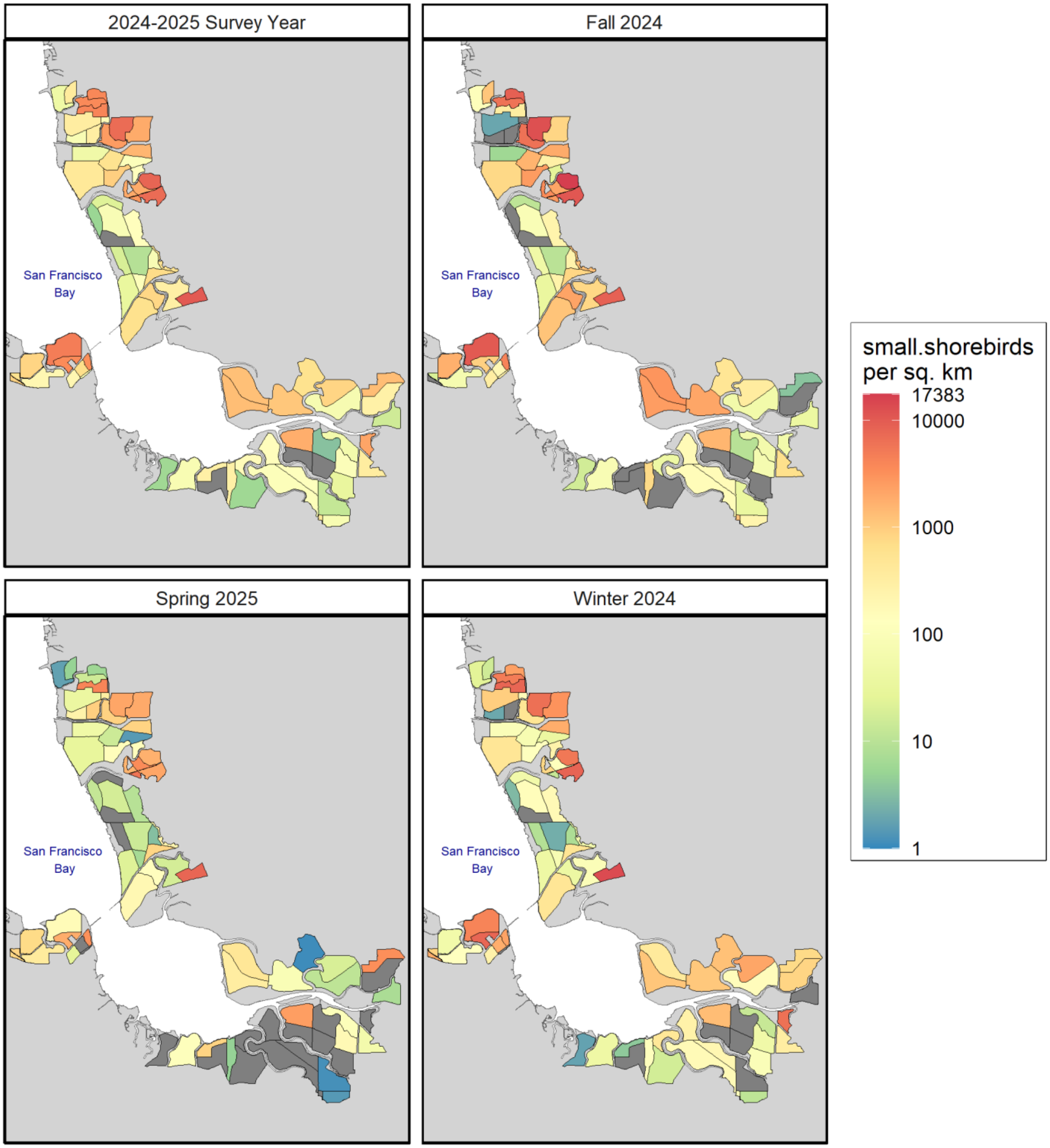

Figure 54. Density of small shorebirds averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

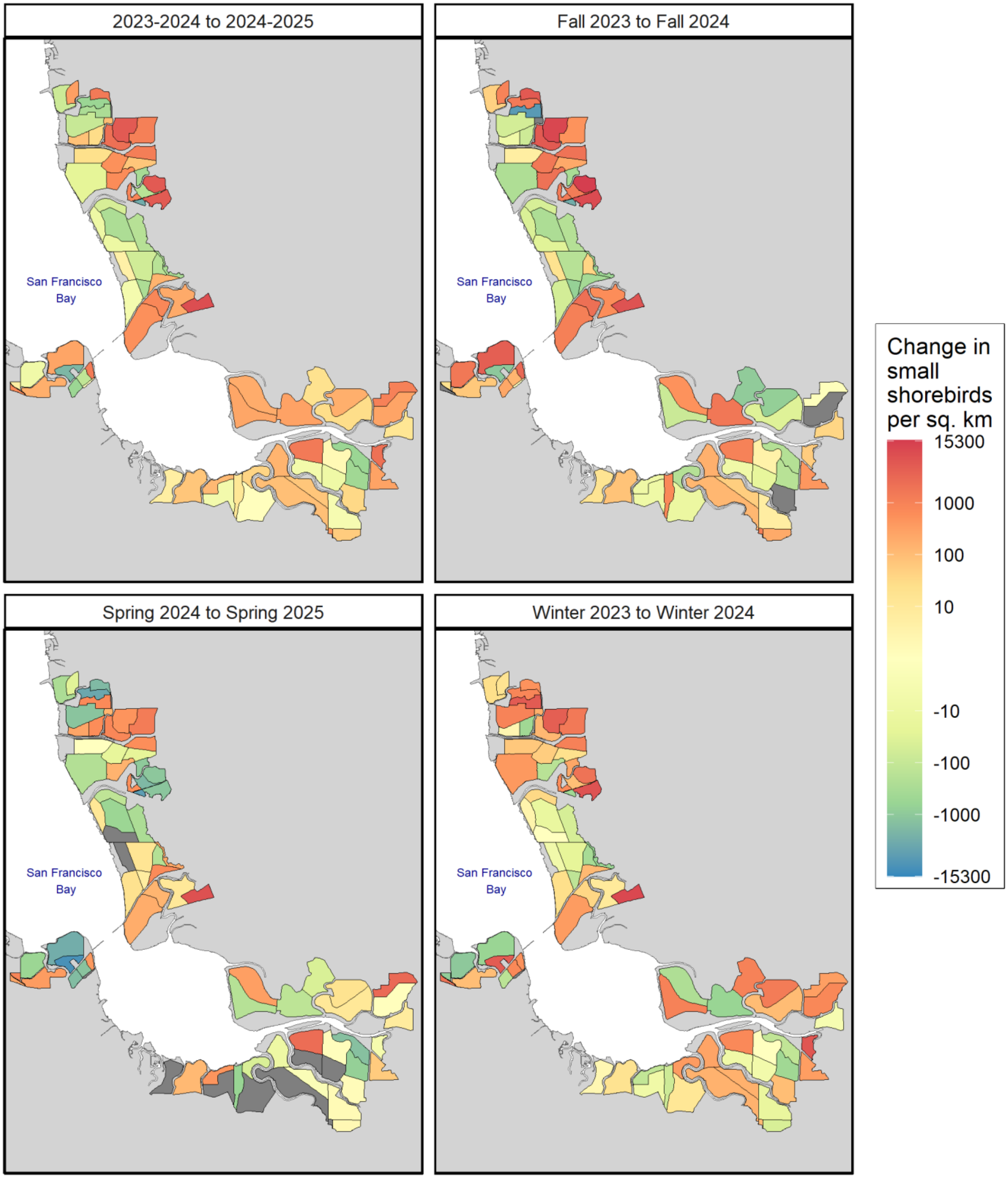

Figure 55. Interannual change in density of small shorebirds between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

For small shorebirds in fall, their management trigger—two or more of the past three years of fall abundance below the 2005-2007 baseline value—was not tripped this year because average seasonal abundance was below this threshold in only one of the three most recent years of complete surveys (Table 2). The current slope of the estimated multi-year trend for average fall abundance of small shorebirds across the study area was +975 at the end of fall 2025 (Fig. 56). The trend within the SBSPRP was -5,252 (-109.63 per km^2) within the wildlife ponds and +645 (+95.90 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was +4,515 (+162.75 per km^2).

For small shorebirds in spring, their management trigger—two or more of the past three years of spring abundance below the 2005-2007 baseline value—was tripped this year because average seasonal abundance was below this threshold in two of the three most recent years of complete surveys (Table 2). The current slope of the estimated multi-year trend for average spring abundance of small shorebirds across the study area was -12,017 at the end of spring 2025 (Fig. 56). The trend within the SBSPRP was -10,509 (-219.35 per km^2) within the wildlife ponds and -1,335 (-198.37 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was +789 (+28.44 per km^2).

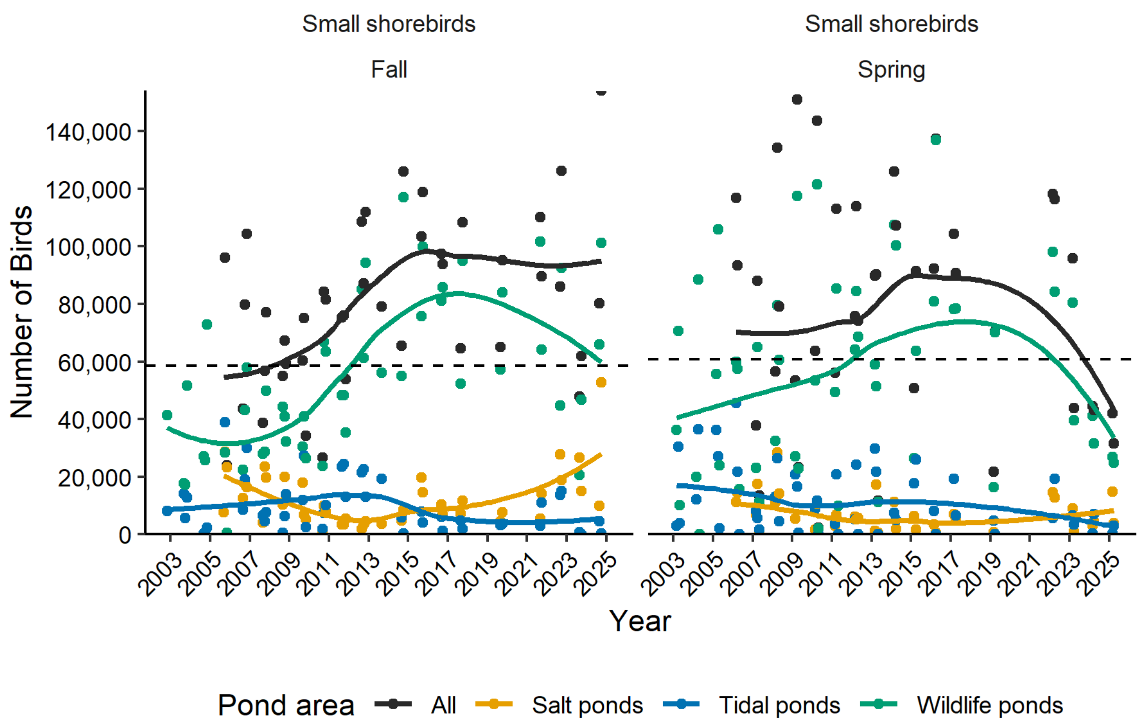

Figure 56. Counts of small shorebirds during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

We fit a single model for small shorebirds that encompassed both spring and fall migration periods and found that spring migration had slightly higher population growth (Fig. 57). Surprisingly, we found that breached ponds had markedly larger population declines, which was the strongest effect though with very wide confidence intervals (Fig. 57). This contrasts with De La Cruz et al. (2018), who found small shorebirds had higher abundance in breached ponds. As seen for medium shorebirds, decreasing water elevation and salinity were two of the most significant predictors of increases in small shorebird abundance during migration. This contrasts with Scullen et al. (2013), who found small shorebirds were more abundant at ponds with higher salinity and warmer water (and less abundant at ponds with higher pH); however, in line with that finding, our model did find the salinity and water temperature were positively associated with increasing abundance (it was change in those variables was inversely related). The top model this year did not include negative effects of precipitation, unlike last year's model (Van Schmidt & Parsons 2025a) or the findings of Warnock et al. (2021). Results weakly supported that sites with closer proximity to creeks/sloughs showed increased growth (Fig. 57). Islands and levees in the ponds may offer high tide refugia for shorebirds in the San Francisco Bay (De La Cruz et al. 2018), though we did not find increasing abundance at sites with islands.

We report predictions made by the change model within 67 ponds, excluding sites that were unoccupied by small shorebirds in spring of both 2025 and 2024 (A1, A10, A11, A2E, A3W, A5, A8W, N4AB, N5 and RSF2U4) and sites with missing water quality measurements (A23, E4C, E8AE and E8AW). Because a single model was fit for small shorebirds from both fall and spring data with a dummy variable for season, we here report only predictions for the later spring season. Across this set of sites, the actual change in abundance of small shorebirds in spring was -2,660 (-8,591 birds [-207 birds per km^2] in the SBSPRP and +5,931 [+228 per km^2] in the salt ponds). In comparison, the model predicted a total change of +417 (-1,401 [-34 per km^2] in the SBSPRP and +1,818 [+70 per km^2] in the salt ponds), with this predicted increase driven by effects of changes in site hydrology. The proportion of variance in percent change in counts explained by the best model was very low ($R^2c = 0.04$, $R^2m = 0.02$).

The change model estimated that changes in site hydrology could explain a 2,737 increase (+1,124 [+27 per km^2] in the SBSPRP and +1,612 [+62 per km^2] in the salt ponds) in abundance of small shorebirds from last year due to decreasing breached, decreasing salinity, decreasing water temperature, and/or decreasing depth. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of small shorebirds due to hydrology changes in spring 2025 were E13, E6B, and E14, while E13, E10, and A9 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 14). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were E9, E2C, and R1 and the sites with the largest predicted decreases in habitat suitability were RSF2U1, E8X, and E9. In the salt pond footprint, the largest predicted increases in abundance were in M1, M2, and M3 and the largest predicted increases in habitat suitability were in M5, M1, and M3, while the sites with predicted largest decreases were NPP1, N1A, and N4AA and M6, N1A, and N4AA for abundance and habitat suitability, respectively (Table 14).

Static site characteristics (distance to creek, number of islands, and public access) accounted for a decrease of 914 birds. This effect was -1,045 [-25 per km^2] in the SBSPRP and +131 [+5 per km^2] in the salt ponds.

No weather covariates were in the top model However, there was a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 decreasing abundance by 1,998 (-1,722 [-42 per km^2] in the SBSPRP and -276 [-11 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

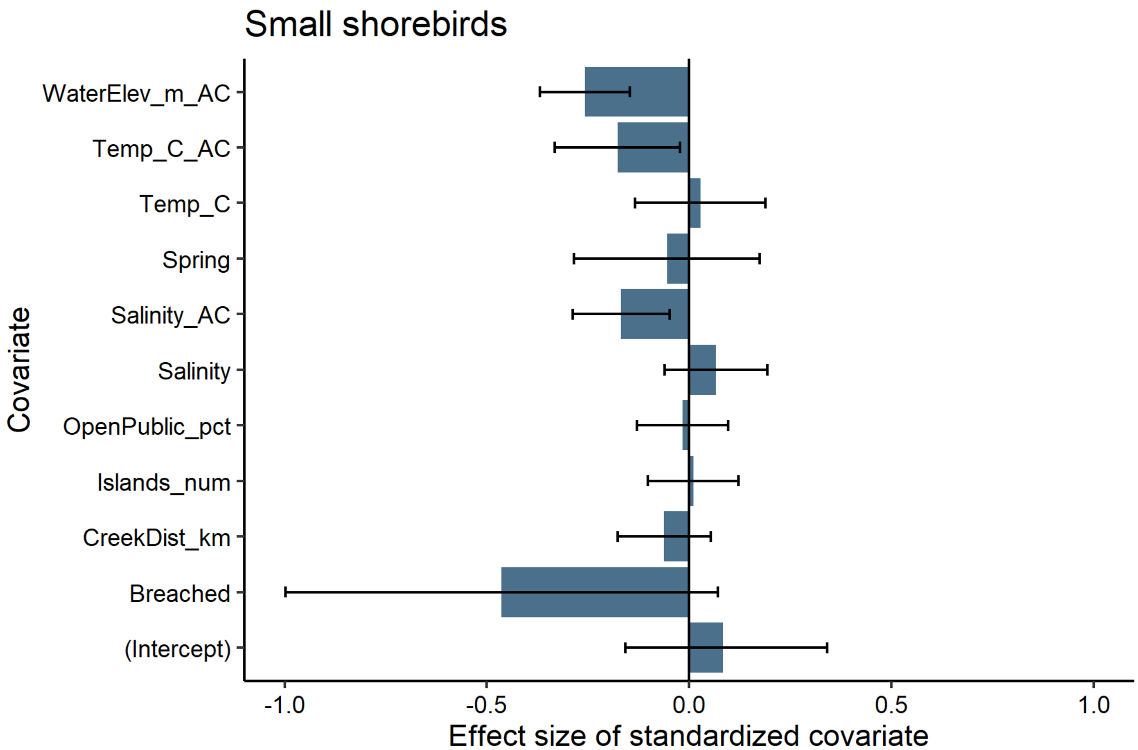

Figure 57. Fixed effects for the top model for interannual change in abundance of small shorebirds during fall and spring in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 2,297). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.155.

Table 15. Actual and predicted changes in mean abundance per survey of small shorebirds from spring 2024 to spring 2025 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (breached, salinity, water temperature, and depth; compared to no change from last year), static site characteristics (distance to creek, number of islands, and public access; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
R2	6,914	1,074	-5,840 (-1.86)	+777 (+0.11)	+1,836 (+0.27)	-1,534 (-0.18)	-348 (-0.04)
R1	5,916	300	-5,616 (-2.98)	-2,289 (-0.49)	-994 (-0.24)	-572 (-0.15)	-164 (-0.04)
E13	2,354	9	-2,345 (-5.46)	+2,191 (+0.66)	+2,280 (+0.70)	+210 (+0.05)	-206 (-0.04)
E9	1,904	57	-1,848 (-3.49)	-1,629 (-1.93)	-856 (-1.41)	+10 (+0.04)	-13 (-0.04)
A15	1,587	113	-1,474 (-2.63)	-27 (-0.02)	-239 (-0.14)	-8 (-0.00)	-71 (-0.04)
AB2	907	7	-900 (-4.73)	+23 (+0.02)	+40 (+0.04)	+55 (+0.06)	-42 (-0.04)
N3A	946	60	-886 (-2.74)	-28 (-0.03)	+27 (+0.03)	+32 (+0.04)	-42 (-0.04)
A13	1,034	202	-832 (-1.63)	+20 (+0.02)	-58 (-0.05)	-8 (-0.01)	-48 (-0.04)
E12	810	5	-804 (-4.91)	-11 (-0.01)	+7 (+0.01)	+52 (+0.07)	-36 (-0.04)
E3C	2,211	1,424	-787 (-0.44)	+26 (+0.01)	+18 (+0.01)	+129 (+0.06)	-101 (-0.04)
E5C	2,111	1,360	-751 (-0.44)	+342 (+0.15)	+298 (+0.13)	+113 (+0.05)	-111 (-0.04)
E2C	1,374	670	-704 (-0.72)	-864 (-0.99)	-873 (-1.00)	+34 (+0.07)	-23 (-0.04)
R4	1,538	884	-654 (-0.55)	-697 (-0.60)	+55 (+0.07)	-103 (-0.12)	-38 (-0.04)
RSF2U3	629	10	-619 (-4.05)	+54 (+0.08)	+100 (+0.16)	-45 (-0.06)	-31 (-0.04)
E2	686	85	-600 (-2.08)	+122 (+0.16)	+91 (+0.12)	+45 (+0.06)	-37 (-0.04)
E10	514	3	-511 (-4.86)	+294 (+0.45)	+281 (+0.43)	+47 (+0.06)	-37 (-0.04)
RSF2U2	430	0	-430 (-6.07)	-161 (-0.47)	-123 (-0.38)	+1 (+0.01)	-12 (-0.04)
N4AA	370	23	-346 (-2.74)	-102 (-0.32)	-76 (-0.25)	+8 (+0.03)	-12 (-0.04)
E6C	373	48	-326 (-2.04)	+8 (+0.02)	-3 (-0.01)	+11 (+0.03)	-17 (-0.04)
M3	522	204	-318 (-0.94)	+705 (+0.85)	+623 (+0.71)	+81 (+0.07)	-56 (-0.04)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
N8	193	3	-190 (-3.88)	-47 (-0.28)	-22 (-0.14)	-6 (-0.04)	-7 (-0.04)
N1A	178	0	-178 (-5.19)	-54 (-0.36)	-44 (-0.30)	+4 (+0.03)	-6 (-0.04)
M6	80	4	-76 (-2.79)	-9 (-0.11)	-21 (-0.25)	+2 (+0.03)	-3 (-0.04)
A3N	60	0	-60 (-4.11)	-13 (-0.24)	-8 (-0.15)	-1 (-0.03)	-2 (-0.04)
R5S	140	100	-40 (-0.33)	+31 (+0.20)	+34 (+0.22)	+5 (+0.03)	-8 (-0.04)
E5	33	1	-32 (-2.83)	-5 (-0.17)	-5 (-0.17)	+1 (+0.04)	-1 (-0.04)
A6S	21	0	-21 (-3.09)	-11 (-0.72)	-1 (-0.13)	-1 (-0.06)	-0 (-0.04)
E7	30	13	-17 (-0.79)	+10 (+0.28)	+8 (+0.23)	+2 (+0.06)	-2 (-0.04)
E11	18	5	-12 (-1.13)	+3 (+0.17)	+4 (+0.18)	+1 (+0.07)	-1 (-0.04)
A17	4	0	-4 (-1.61)	-4 (-1.48)	-2 (-1.00)	+0 (+0.04)	-0 (-0.04)
A7	3	0	-3 (-1.39)	-1 (-0.27)	-0 (-0.08)	-0 (-0.11)	-0 (-0.04)
E1	118	118	0 (0.00)	+14 (+0.11)	+12 (+0.10)	+8 (+0.07)	-6 (-0.04)
A14	0	1	+1 (+0.69)	-0 (-0.06)	-0 (-0.03)	+0 (+0.02)	-0 (-0.04)
A8S	0	1	+1 (+0.69)	-0 (-0.23)	-0 (-0.15)	+0 (+0.06)	-0 (-0.04)
A12	0	2	+2 (+1.10)	+0 (+0.11)	-0 (-0.04)	-0 (-0.07)	-0 (-0.04)
A8	0	4	+4 (+1.61)	-0 (-0.43)	-0 (-0.22)	-0 (-0.06)	-0 (-0.04)
N6	0	5	+5 (+1.79)	-0 (-0.00)	+0 (+0.11)	-0 (-0.06)	-0 (-0.04)
A19	0	16	+16 (+2.83)	-0 (-0.47)	-0 (-0.04)	+0 (+0.06)	-0 (-0.04)
N2A	0	17	+17 (+2.89)	-0 (-0.26)	-0 (-0.19)	+0 (+0.02)	-0 (-0.04)
N7	0	22	+22 (+3.16)	-0 (-0.23)	-0 (-0.09)	-0 (-0.04)	-0 (-0.04)
M4	0	24	+24 (+3.20)	-0 (-0.09)	-0 (-0.21)	+0 (+0.06)	-0 (-0.04)
N4	7	31	+24 (+1.39)	-0 (-0.01)	+1 (+0.15)	-1 (-0.12)	-0 (-0.04)
N1	20	49	+29 (+0.87)	-1 (-0.04)	+2 (+0.10)	-3 (-0.12)	-1 (-0.04)
A16	3	60	+56 (+2.72)	+0 (+0.00)	+0 (+0.09)	-0 (-0.03)	-0 (-0.04)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
E8X	25	85	+60 (+1.20)	-21 (-1.59)	-10 (-1.05)	+0 (+0.03)	-0 (-0.04)
M5	2	65	+63 (+3.09)	+9 (+1.40)	+9 (+1.27)	+1 (+0.04)	-1 (-0.04)
RSF2U1	645	732	+87 (+0.13)	-391 (-0.93)	-308 (-0.79)	-16 (-0.06)	-12 (-0.04)
N2	3	108	+106 (+3.31)	+0 (+0.04)	+0 (+0.13)	-0 (-0.10)	-0 (-0.04)
R5	0	106	+106 (+4.67)	+0 (+0.10)	+0 (+0.26)	-0 (-0.11)	-0 (-0.04)
N4B	0	110	+110 (+4.71)	-0 (-0.11)	+0 (+0.02)	-0 (-0.02)	-0 (-0.04)
E4	0	117	+117 (+4.77)	+0 (+0.36)	+0 (+0.37)	+0 (+0.05)	-0 (-0.04)
E1C	262	412	+150 (+0.45)	+24 (+0.09)	+24 (+0.09)	+15 (+0.06)	-13 (-0.04)
A2W	0	203	+203 (+5.32)	+0 (+0.10)	+0 (+0.09)	+0 (+0.07)	-0 (-0.04)
AB1	242	532	+290 (+0.78)	+47 (+0.18)	+54 (+0.21)	+15 (+0.05)	-13 (-0.04)
M2	1,038	1,335	+298 (+0.25)	+768 (+0.55)	+721 (+0.51)	+64 (+0.04)	-82 (-0.04)
M1	592	940	+348 (+0.46)	+838 (+0.88)	+828 (+0.86)	-1 (-0.00)	-65 (-0.04)
R3	67	440	+374 (+1.87)	-22 (-0.40)	-10 (-0.20)	-7 (-0.13)	-2 (-0.04)
N9	75	455	+380 (+1.79)	-10 (-0.14)	+1 (+0.01)	-4 (-0.05)	-3 (-0.04)
N3	9	424	+416 (+3.75)	-0 (-0.02)	+1 (+0.14)	-1 (-0.14)	-0 (-0.04)
E14	2,298	2,762	+464 (+0.18)	+337 (+0.14)	+440 (+0.18)	+141 (+0.06)	-119 (-0.04)
E6B	1,899	2,438	+538 (+0.25)	+472 (+0.22)	+527 (+0.25)	+92 (+0.04)	-107 (-0.04)
E6	204	1,351	+1,147 (+1.89)	-36 (-0.20)	-34 (-0.19)	+10 (+0.06)	-8 (-0.04)
E8	155	1,374	+1,219 (+2.18)	-46 (-0.35)	-45 (-0.35)	+6 (+0.06)	-5 (-0.04)
E6A	830	2,556	+1,726 (+1.12)	+150 (+0.17)	+145 (+0.16)	+58 (+0.06)	-44 (-0.04)
A9	104	3,778	+3,674 (+3.59)	+46 (+0.37)	+45 (+0.36)	+1 (+0.01)	-7 (-0.04)
NPP1	230	6,314	+6,085 (+3.31)	-50 (-0.24)	-22 (-0.11)	-29 (-0.15)	-8 (-0.04)
A22	923	7,328	+6,405 (+2.07)	-102 (-0.12)	-126 (-0.14)	+13 (+0.02)	-37 (-0.04)

Terns

Abundance

Across all complexes, there were 4,996 total sightings of terns (sum sightings during the entire survey period). Compared to last year, this was a decrease of 677 total sightings (-11.9%; Fig. 58). In their target season of fall they decreased by 2.6%. There were on average 32 fewer terns detected per survey in fall (Table A2.4), 298 fewer detected in winter (Table A2.6), and 8 fewer detected in spring (Table A2.8, Fig. 58).

At the pond level, RSF2U2 had the highest abundance (mean count of 106 per survey), followed by A2W (94) and E7 (88; Fig. 59). At these sites, we observed the majority of terns roosting on islands (88.7%), roosting on manmade structures (65.8%), and roosting on manmade structures (89.4%), respectively (Table A4.13). Across all six surveys, the sites with the largest increases in terns from last year were A2W (+83 mean abundance per visit), RSF2U2 (+59), and AB2 (+32), while the sites with the largest decreases were A14 (-128), A16 (-60), and N4AA (-38; Fig. 60).

Least Terns have post-breeding foraging targets set within the AMP (67 birds), but these apply to the summer season, when salt pond surveys are no longer conducted. Least Terns are now monitored by SFBBO in a separate program to help inform their conservation and recovery, and we recommended using that report to assess their current status and trends (Schwarz et al. 2025).

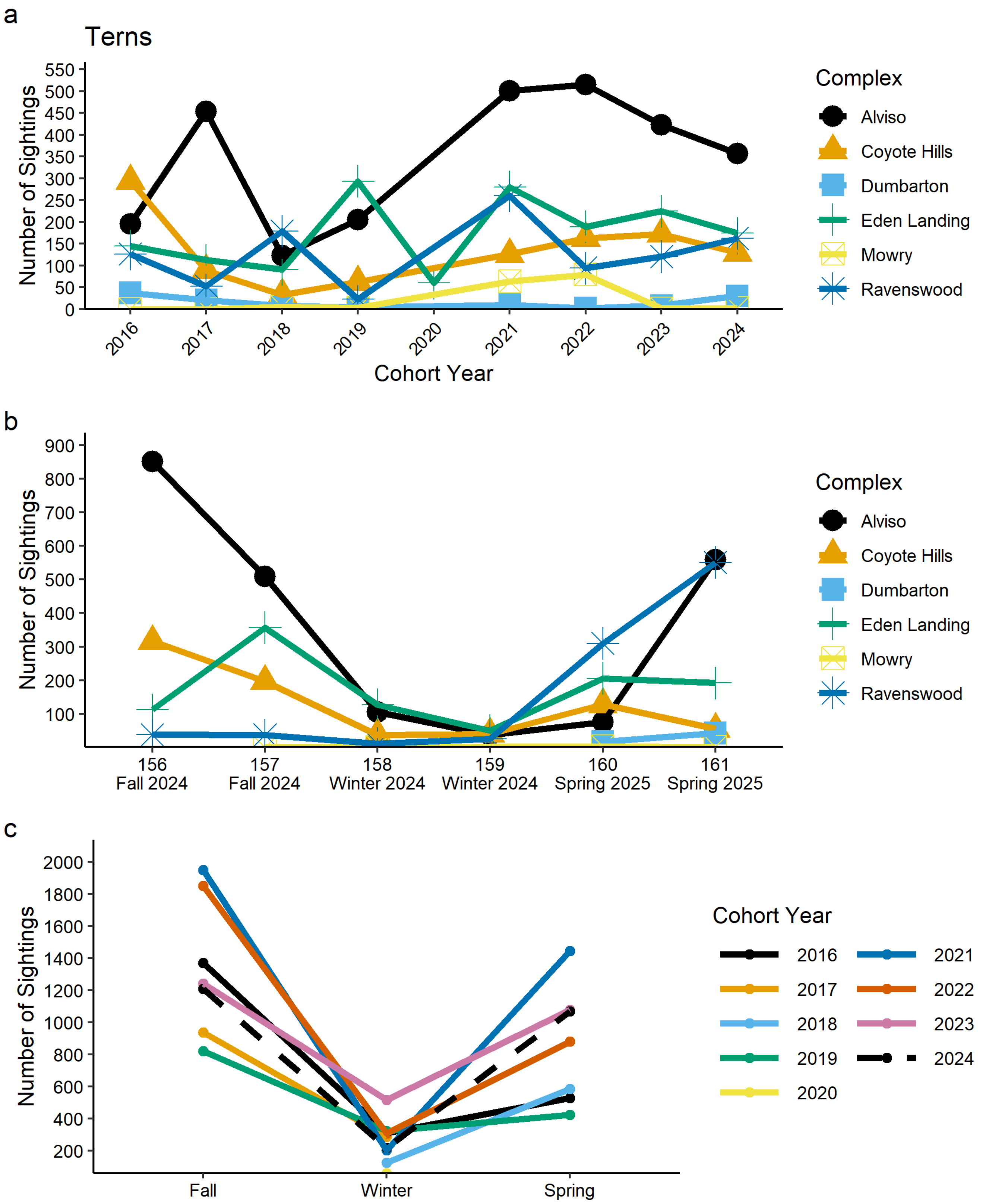

Figure 58. Abundance of terns by (a) study year (September to August of the following year) for each complex (averaged across surveys), (b) survey period for each complex during the current report period (September 2024 – May 2025), and (c) season for each study year at all salt production ponds combined; South San Francisco Bay, California, Sept. 2005 – May 2025 (averaged across surveys). Study years 2019 and 2020 contain incomplete survey rounds.

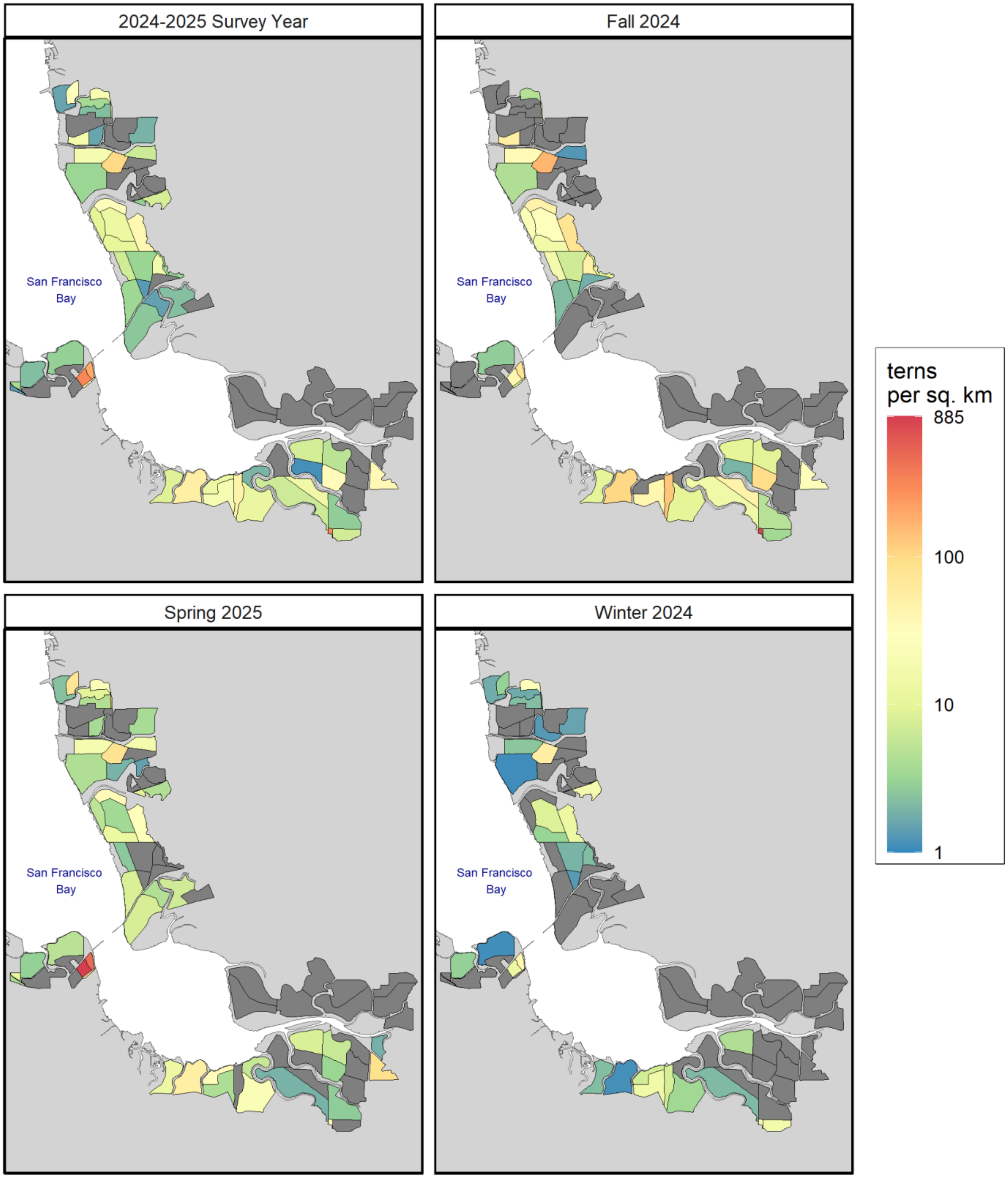

Figure 59. Density of terns averaged across survey rounds by season, South San Francisco Bay, California; September 2024–May 2025. Dark grey ponds had no birds.

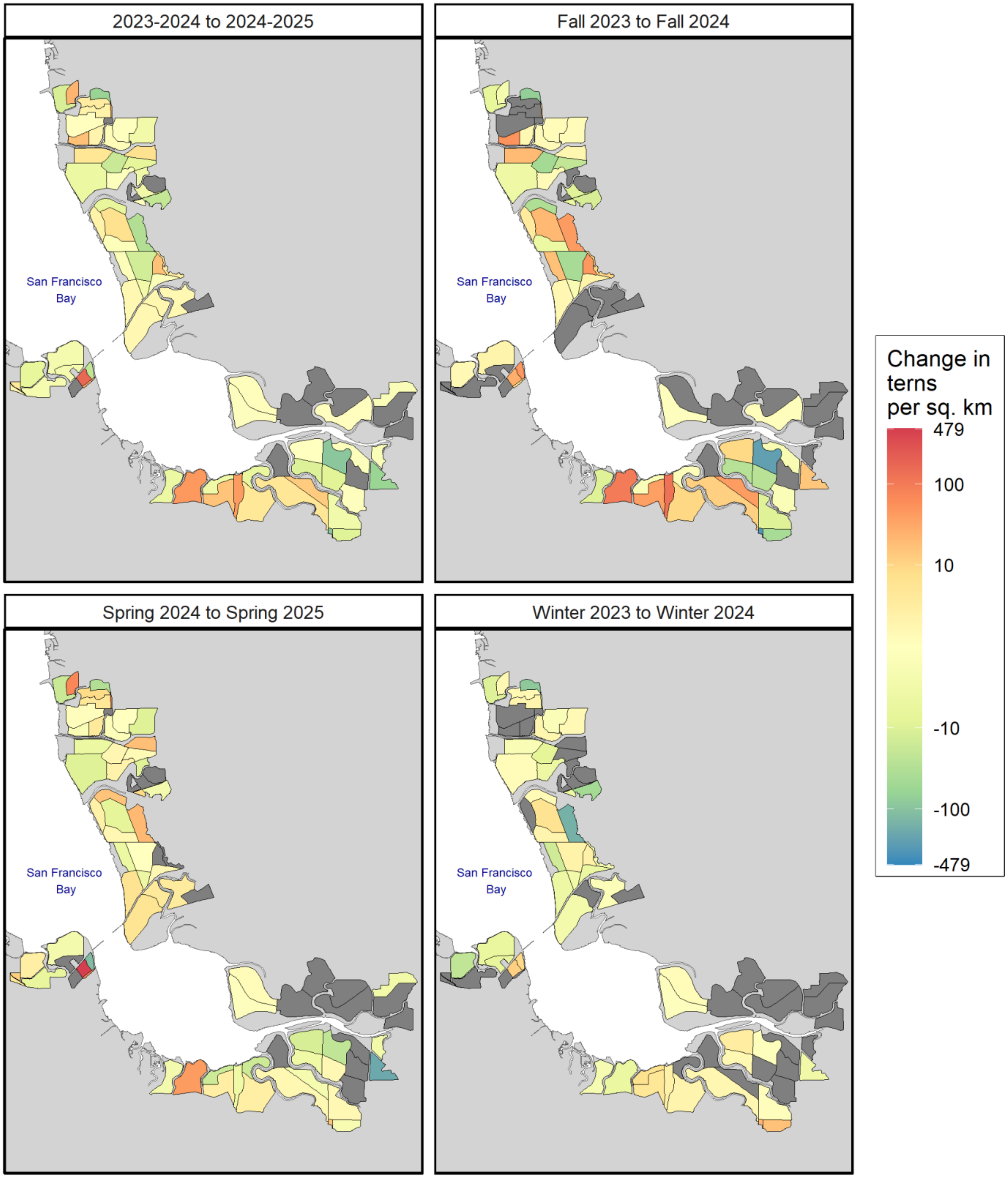

Figure 60. Interannual change in density of terns between September 2023–May 2024 and September 2024–May 2025 in pond habitats of South San Francisco Bay, California. Seasonal panels are density averaged across survey rounds by season, while the Overall panel is averaged across all six survey periods. Dark grey ponds had no birds during that seasonal window in both the current and previous year.

Trends and Trigger Status

No formal targets have been set for terns as a guild, but we still provide a comparison to a hypothetical management trigger based on baseline abundance for a more comprehensive assessment of waterbird populations within the South Bay. For terns in fall, this hypothetical trigger—two or more of the past three years of fall abundance below the 2005-2007 baseline value—was not tripped this year because average seasonal abundance was below this threshold in none of the three most recent years of complete surveys (Table 2).

The current slope of the estimated multi-year trend for average fall abundance of terns across the study area was +21 at the end of fall 2025 (Fig. 61). The trend within the SBSPRP was +18 (+0.38 per km^2) within the wildlife ponds and -0 (-0.04 per km^2) in the former ponds that had been breached to restore tidal marsh. The trend within the Cargill-managed salt ponds was -8 (-0.30 per km^2).

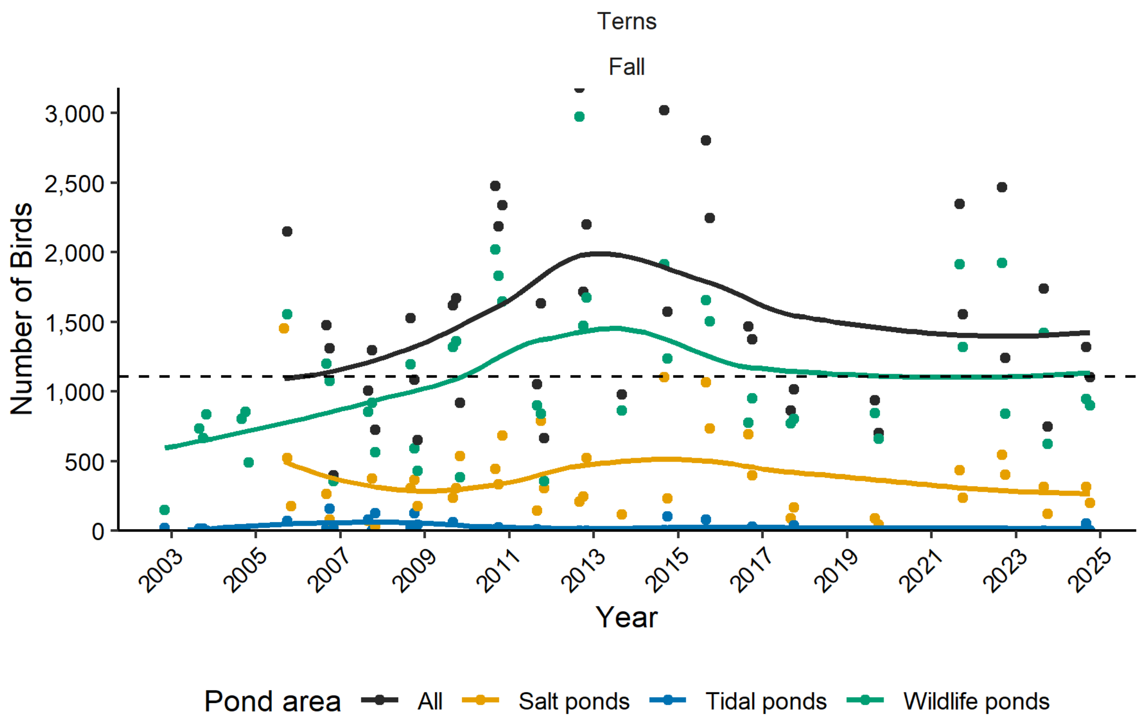

Figure 61. Counts of terns during target season(s) within the South Bay Salt Pond Restoration Project (SBSPRP) and salt production ponds. Lines represent LOESS curves and the dashed lines denote SBSPRP targets or baseline values (average counts from 2005-2007). Ponds A20, A21, A6N, and E10X were excluded from analysis because they were not surveyed after tidal restoration.

Change Model

Echoing results from other guilds, decreases in salinity were the strongest (and only significant) predictor of year-to-year increases in tern abundance, while static site characteristics showed little effects (Fig. 62). This supports the hypothesis that the early reduction in salinity as part of the Initial Stewardship Plan benefitted most populations of waterbirds using the ponds.

The change model estimated that changes in site hydrology could explain a 70 decrease (-99 [-2 per km^2] in the SBSPRP and +30 [+2 per km^2] in the salt ponds) in abundance of terns from last year due to increasing salinity. Within the SBSPRP footprint, the sites predicted to experience the largest increase in abundance of terns due to hydrology changes in fall 2025 were R4, A8, and E2, while R4, E6, and A8 were predicted to increase most in habitat suitability (predicted percent change irrespective of actual abundance last year; Table 15). The SBSPRP sites predicted to have the largest decreases in abundance due to hydrology changes were A11, E7, and A14 and the sites with the largest predicted decreases in habitat suitability were E7, A15, and E5. In the salt pond footprint, the largests predicted increases in terns fall abundance were in N4AA, N7, and M2 and the largest predicted increases in habitat suitability were in N4AA, M4, and M2, while the sites with predicted largest decreases were N6, N1A, and N2A and N4, N2A, and N6 for abundance and habitat suitability, respectively (Table 15).

Static site characteristics (number of islands, hunting access, and pond area) accounted for an increase of 15 birds. This predicted effect included no change in the SBSPRP and +15 [+1 per km^2] in the salt ponds.

No weather covariates were included in the top model. However, there was a substantial amount of change in abundance attributable to the unexplained annual variability (the random year effect), with this term in 2025 increasing abundance by 262 (+199 [+5 per km^2] in the SBSPRP and +63 [+4 per km^2] in the salt ponds), some of which is likely due to complex effects of weather not included in the model.

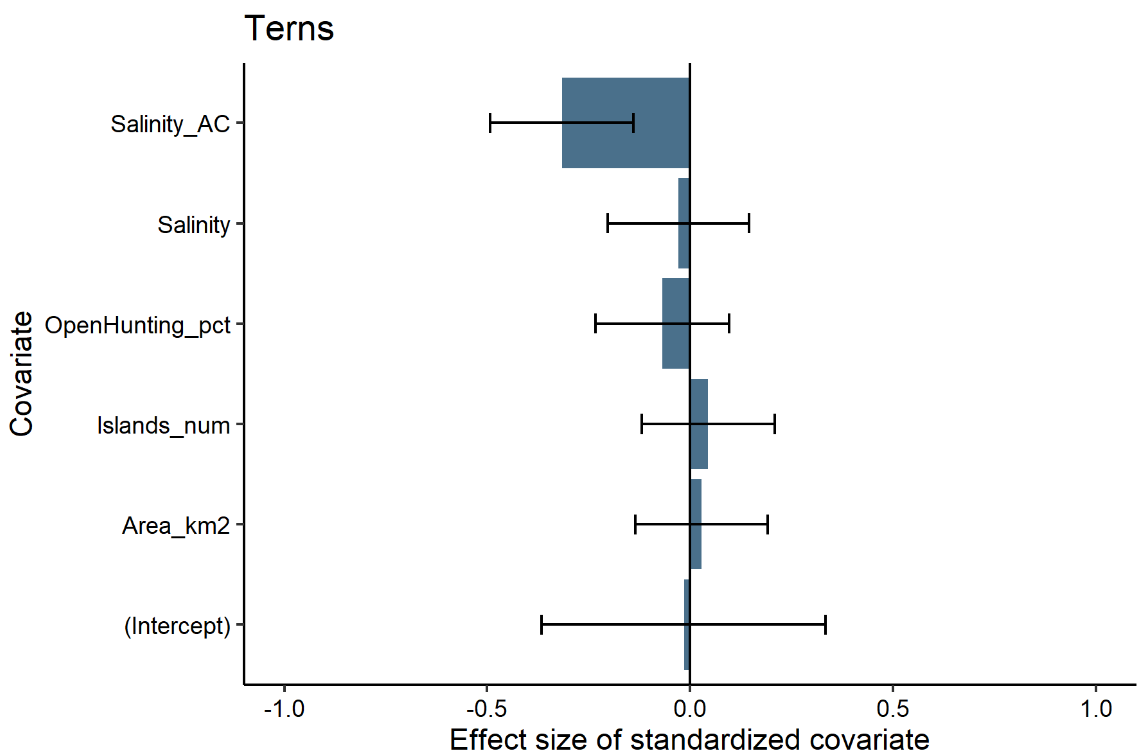

Figure 62. Fixed effects for the top model for interannual change in abundance of terns during fall in current and former salt ponds in South San Francisco Bay, California, water year 2003–2025 (n = 720). Dark bars show coefficients and error bars show 95% confidence intervals. The year random effect was 0.38.

Table 15. Actual and predicted changes in mean abundance per survey of terns from fall 2023 to fall 2024 (sorted greatest decrease to greatest increase). Predicted effect sizes of covariate groups are shown for hydrology (salinity; compared to no change from last year), static site characteristics (number of islands, hunting access, and pond area; compared to mean across all sites), and a year random effect. Change values were calculated by back-transforming the predictions on the ln(% change + 1) scale (shown in parentheses and interpretable as change in relative habitat suitability) and then multiplying by the actual previous year's abundance.

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
A14	364	26	-338 (-2.61)	+38 (+0.10)	-40 (-0.09)	+16 (+0.04)	+61 (+0.16)
A11	263	102	-160 (-0.94)	+13 (+0.05)	-39 (-0.13)	+7 (+0.03)	+42 (+0.16)
N7	151	10	-140 (-2.58)	+35 (+0.20)	+4 (+0.02)	+9 (+0.05)	+28 (+0.16)
A10	62	2	-60 (-3.04)	+4 (+0.07)	-8 (-0.11)	+2 (+0.02)	+10 (+0.16)
A8S	63	5	-58 (-2.37)	+1 (+0.02)	-4 (-0.06)	-5 (-0.08)	+10 (+0.16)
E7	186	146	-40 (-0.24)	-38 (-0.23)	-38 (-0.23)	-22 (-0.14)	+23 (+0.16)
E12	33	2	-31 (-2.43)	-2 (-0.08)	-1 (-0.04)	-6 (-0.18)	+5 (+0.16)
E5	28	0	-28 (-3.37)	-15 (-0.73)	-13 (-0.67)	-3 (-0.17)	+2 (+0.16)
N1A	55	31	-24 (-0.56)	+8 (+0.14)	-1 (-0.01)	+0 (+0.01)	+10 (+0.16)
E3C	16	0	-16 (-2.83)	+2 (+0.10)	-2 (-0.09)	+1 (+0.05)	+3 (+0.16)
N2A	27	16	-11 (-0.50)	+3 (+0.11)	-2 (-0.05)	+0 (+0.01)	+5 (+0.16)
A8	24	16	-8 (-0.39)	+4 (+0.15)	+1 (+0.03)	-1 (-0.03)	+4 (+0.16)
E5C	7	0	-7 (-2.08)	+1 (+0.10)	-0 (-0.03)	-0 (-0.01)	+1 (+0.16)
E10	6	1	-5 (-1.25)	+0 (+0.06)	-0 (-0.03)	-0 (-0.05)	+1 (+0.16)
A15	3	0	-3 (-1.39)	-1 (-0.35)	-1 (-0.33)	+0 (+0.02)	+0 (+0.16)
A12	2	0	-2 (-1.10)	-0 (-0.12)	-0 (-0.09)	+0 (+0.04)	+0 (+0.16)

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
A3N	1	0	-1 (-0.69)	-0 (-0.10)	-0 (-0.11)	-0 (-0.13)	+0 (+0.16)
AB1	1	0	-1 (-0.69)	+0 (+0.05)	-0 (-0.03)	-0 (-0.07)	+0 (+0.16)
E11	1	0	-1 (-0.69)	-0 (-0.10)	-0 (-0.07)	-0 (-0.18)	+0 (+0.16)
E2C	1	0	-1 (-0.69)	+0 (+0.13)	-0 (-0.00)	-0 (-0.01)	+0 (+0.16)
M2	1	0	-1 (-0.69)	+2 (+0.61)	+1 (+0.40)	+0 (+0.11)	+1 (+0.16)
N6	3	2	-1 (-0.29)	+0 (+0.01)	-1 (-0.12)	-0 (-0.01)	+1 (+0.16)
A1	22	23	+1 (+0.04)	+5 (+0.18)	-1 (-0.02)	+1 (+0.05)	+4 (+0.16)
E4	0	1	+1 (+0.69)	-0 (-0.07)	-0 (-0.15)	-0 (-0.05)	+0 (+0.16)
E6A	0	1	+1 (+0.69)	+0 (+0.07)	-0 (-0.03)	-0 (-0.05)	+0 (+0.16)
E6B	0	1	+1 (+0.69)	-0 (-0.09)	-0 (-0.09)	-0 (-0.15)	+0 (+0.16)
E8	0	1	+1 (+0.69)	-0 (-0.04)	-0 (-0.02)	-0 (-0.16)	+0 (+0.16)
E8X	0	1	+1 (+0.69)	-0 (-0.04)	+0 (+0.00)	-0 (-0.19)	+0 (+0.16)
M4	0	1	+1 (+0.69)	+1 (+0.60)	+1 (+0.53)	+0 (+0.08)	+0 (+0.16)
N9	0	1	+1 (+0.69)	+0 (+0.11)	-0 (-0.03)	+0 (+0.00)	+0 (+0.16)
R4	0	1	+1 (+0.69)	+13 (+2.67)	+13 (+2.62)	+0 (+0.03)	+2 (+0.16)
RSF2U4	0	1	+1 (+0.69)	+0 (+0.09)	-0 (-0.03)	-0 (-0.02)	+0 (+0.16)
E2	22	24	+2 (+0.06)	+5 (+0.18)	+0 (+0.01)	+1 (+0.03)	+4 (+0.16)
E6	0	2	+2 (+1.10)	+0 (+0.03)	+0 (+0.08)	-0 (-0.15)	+0 (+0.16)
N4B	0	2	+2 (+1.25)	+0 (+0.10)	-0 (-0.03)	-0 (-0.01)	+0 (+0.16)
N4	3	6	+3	+1	-0	+0	+1

Pond	Previous abun.	Current abun.	Actual change	Predicted change	Hydrology effect	Site effect	Year effect
			(+0.56)	(+0.14)	(-0.04)	(+0.04)	(+0.16)
R1	2	5	+3	-0	-0	-0	+0
			(+0.69)	(-0.04)	(-0.07)	(-0.11)	(+0.16)
RSF2U2	4	14	+10	+2	+0	+2	+1
			(+1.06)	(+0.39)	(+0.00)	(+0.24)	(+0.16)
RSF2U1	7	18	+10	+2	-0	+1	+1
			(+0.84)	(+0.21)	(-0.02)	(+0.08)	(+0.16)
N4AB	20	31	+12	+4	-0	+0	+4
			(+0.45)	(+0.16)	(-0.01)	(+0.02)	(+0.16)
N5	1	14	+13	+0	+0	+0	+0
			(+2.01)	(+0.15)	(+0.01)	(+0.01)	(+0.16)
N8	1	22	+22	+0	-0	-0	+0
			(+2.46)	(+0.10)	(-0.04)	(-0.00)	(+0.16)
A3W	1	23	+22	+0	-0	-0	+0
			(+2.48)	(+0.11)	(-0.02)	(-0.02)	(+0.16)
E1	20	44	+24	-2	-2	-3	+3
			(+0.78)	(-0.10)	(-0.11)	(-0.13)	(+0.16)
A9	2	29	+27	+1	-0	+0	+1
			(+2.30)	(+0.16)	(-0.03)	(+0.05)	(+0.16)
A16	22	52	+30	+6	-0	+2	+4
			(+0.83)	(+0.22)	(-0.01)	(+0.08)	(+0.16)
A5	10	40	+30	+1	-0	-0	+2
			(+1.36)	(+0.11)	(-0.03)	(-0.01)	(+0.16)
N3A	10	46	+36	+2	+0	+1	+2
			(+1.44)	(+0.20)	(+0.01)	(+0.06)	(+0.16)
N4AA	42	94	+52	+53	+46	+3	+15
			(+0.79)	(+0.80)	(+0.66)	(+0.03)	(+0.16)
A7	10	101	+91	+2	-0	+0	+2
			(+2.23)	(+0.17)	(-0.02)	(+0.04)	(+0.16)
AB2	0	96	+96	+0	-0	+0	+0
			(+4.57)	(+0.30)	(-0.02)	(+0.17)	(+0.16)
A2E	2	108	+106	+0	-0	-0	+0
			(+3.59)	(+0.03)	(-0.08)	(-0.03)	(+0.16)
A2W	4	184	+180	+1	-0	+1	+1
			(+3.71)	(+0.23)	(-0.01)	(+0.09)	(+0.16)

Pond Conditions

Alviso

Alviso includes five tidally breached sites (A6S, A17, and A19, as well as A20, A21, and the northern portion of A6, which are no longer surveyed) and a muted tidal pond complex (A5, A7, A8, A8W, A8S). Average salinities in the Alviso complex tended to be highest in the fall and summer survey periods, with the minimum occurring in either the winter or spring survey periods. Average salinity ranged from 0.46 ppt (A8, winter) to 329.67 ppt (A12, fall; Figs. 63, A7.5). Compared to last year, changes in seasonal salinity ranged from -134.5 ppt at A22 in fall to +112.26 ppt at A22 in winter (Fig. 64). The mean interannual change in salinity across all sites was +0.56 ppt in fall, +7.38 ppt in winter, and +20.05 ppt in spring.

Average dissolved oxygen concentrations ranged from a low of 0.1 mg/L (A22, fall) to a high of 22.28 mg/L (AB2, winter; Figs. 65, A7.5). Changes in seasonal average dissolved oxygen since last year ranged from -10.64 mg/L at A13 in spring to +4.64 mg/L at A3N fall (Fig. 66). The mean interannual change in dissolved oxygen across all sites was -0.13 mg/L in fall, +7.38 mg/L in winter, and +20.05 mg/L in spring.

Average pH values ranged from a low of 6.31 in A19 in fall to a high of 9.47 in A16 in spring, and generally did not display strong seasonal patterns (Figs. 67, A7.9). Changes in seasonal pH from last year ranged from -1.7 at A22 in spring to +1.65 at A23 in winter (Fig. 68). The mean interannual change in pH across all sites was +0.21 in fall, +0.15 in winter, and -0.08 in spring.

Following expected seasonal patterns, water temperature at the surface ranged from 6.82 ˚C (A9 in winter) to 29.82 ˚C (A12 in fall; Figs. 69, A7.13). Compared to last year average seasonal water temperature changes in ponds ranged from -9.08 ˚C at A9 in spring to +10.02 ˚C at A22 in fall (Fig. 70). The mean interannual change in temperature across all sites was +0.19 ˚C in fall, -2.05 ˚C in winter, and -1.53 ˚C in spring.

Staff gauges are present and functional on all ponds in the Alviso complex except A10, A11, A12, A15, A19, A22, A23, A2E, A6S, A8, A8S, and A8W. Staff gauge levels ranged in the Alviso complex from -1.2 ft at A3W in fall, to 7.8 ft in A17 in spring (Figs. 71, A7.17). For ponds where staff gauge measurements could be obtained in both years, changes in seasonal water depth from last year ranged from -1.4 ft at AB2 in fall to +2.1 ft at A17 in spring (Fig. 72). The mean interannual change in water level across all sites was -0.46 ft in fall, -0.1 ft in winter, and +0.46 ft in spring.

Some water quality information was unavailable for certain surveys at ponds A1, A12, A13, A15, A17, A22, A23, A5, A6S, A7, and A8W because they were surveyed on days when they were dry or when water quality equipment was malfunctioning.

Coyote Hills

The Coyote Hills complex was characterized by a series of relatively low salinity ponds. The more northern ponds tend to be less saline and salinity increases in the southern ponds. Average salinity ranged from 6.63 ppt (N2A, spring) to 56.62 ppt (N4, spring; Figs. 63, A7.6). Compared to last year, changes in seasonal salinity ranged from -48.55 ppt at N4AA in fall to +14.39 ppt at N8 in winter (Fig. 64). The mean interannual change in salinity across all sites was -2.11 ppt in fall, +0.05 ppt in winter, and +3.99 ppt in spring.

Average dissolved oxygen concentrations ranged from a low of 3.46 mg/L (N3A, winter) to a high of 21.23 mg/L (N3A, winter; (Figs. 65, A7.6). Changes in seasonal average dissolved oxygen since last year ranged from -3.92 mg/L at N8 in fall to +8.34 mg/L at N9 winter (Fig. 66). The mean interannual change in dissolved oxygen across all sites was +0.04 mg/L in fall, +0.05 mg/L in winter, and +3.99 mg/L in spring.

Average pH values ranged from a low of 7.8 in N4AB in spring to a high of 9.21 in N6 in winter, and generally did not display strong seasonal patterns (Figs. 67, A7.10). Changes in seasonal pH from last year ranged from -0.43 at N2A in spring to +1.98 at N8 in winter (Fig. 68). The mean interannual change in pH across all sites was +0.58 in fall, +0.49 in winter, and +0.02 in spring.

Following expected seasonal patterns, water temperature at the surface ranged from 9.96 ˚C (N3A in winter) to 31.54 ˚C (N6 in fall; Figs. 69, A7.14). Compared to last year average seasonal water temperature changes in ponds ranged from -7.73 ˚C at N4 in fall to +8.67 ˚C at N4AA in spring (Fig. 70). The mean interannual change in temperature across all sites was -1.63 ˚C in fall, -0.03 ˚C in winter, and +0.66 ˚C in spring.

Staff gauges are present and functional on all ponds in the Coyote Hills complex except N4AB and N4B. Staff gauge levels ranged in the Coyote Hills complex from 1.0 ft at N7 in fall, to 7.3 ft in N5 in winter (Figs. 71, A7.18). For ponds where staff gauge measurements could be obtained in both years, changes in seasonal water depth from last year ranged from -1.15 ft at N6 in winter to +3.3 ft at N5 in winter (Fig. 72). The mean interannual change in water level across all sites was +0.03 ft in fall, +0.66 ft in winter, and +0.38 ft in spring.

Some water quality information was unavailable for certain surveys at pond N6 because it was surveyed on days when it was dry or when water quality equipment was malfunctioning.

Dumbarton

The Dumbarton complex was characterized by moderate salinities, and salinity tended to increase as water moved east within the system. Average salinity ranged from 64.02 ppt (N3, winter) to 152.5 ppt (NPP1, spring; Figs. 63, A7.6). Compared to last year, changes in seasonal salinity ranged from -1.35 ppt at N3 in fall to +24.5 ppt at NPP1 in spring (Fig. 64). The mean interannual change in salinity across all sites was +4.2 ppt in fall, +4.38 ppt in winter, and +8.24 ppt in spring.

Average dissolved oxygen concentrations ranged from a low of 3.17 mg/L (NPP1, fall) to a high of 9.27 mg/L (N2, winter; Figs. 65, A7.6). Changes in seasonal average dissolved oxygen since last year ranged from -10.5 mg/L at NPP1 in fall to +1.57 mg/L at N2 winter (Fig. 66). The mean interannual change in dissolved oxygen across all sites was -4.58 mg/L in fall, +4.38 mg/L in winter, and +8.24 mg/L in spring.

Average pH values ranged from a low of 7.58 in NPP1 in spring to a high of 8.91 in N2 in spring, and generally did not display strong seasonal patterns (Figs. 67, A7.10). Changes in seasonal pH from last year ranged from -0.36 at N1 in spring to +0.82 at N2 in winter (Fig. 68). The mean interannual change in pH across all sites was +0.43 in fall, +0.5 in winter, and -0.04 in spring.

Following expected seasonal patterns, water temperature at the surface ranged from 10.73 ˚C (N1 in winter) to 26.79 ˚C (NPP1 in fall; Figs. 69, A7.14). Compared to last year average seasonal water temperature changes in ponds ranged from -4.29 ˚C at N2 in spring to +2.89 ˚C at N1 in spring (Fig. 70). The mean interannual change in temperature across all sites was -2.38 °C in fall, -0.24 °C in winter, and -1.09 °C in spring.

Staff gauges are present and functional on all ponds in the Dumbarton complex except NPP1. Staff gauge levels ranged in the Dumbarton complex from 0.3 ft at N1 in fall, to 3.8 ft in N3 in winter (Figs. 71, A7.18). For ponds where staff gauge measurements could be obtained in both years, changes in seasonal water depth from last year ranged from -0.45 ft at N1 in fall to +0.35 ft at N3 in winter (Fig. 72). The mean interannual change in water level across all sites was -0.21 ft in fall, +0.15 ft in winter, and +0.02 ft in spring.

Eden Landing

The Eden Landing complex had five tidally breached sites (E8AE, E8AW, E8XN, E8XS, and E9) and was otherwise characterized by mostly low to moderate salinities, with one high salinity pond (E6C). Average salinity ranged from 6.61 ppt (E11, spring) to 248.5 ppt (E6C, fall; Figs. 63, A7.8). Compared to last year, changes in seasonal salinity ranged from -29.53 ppt at E1C in fall to +52.75 ppt at E6C in fall (Fig. 64). The mean interannual change in salinity across all sites was +6.41 ppt in fall, +4.43 ppt in winter, and +2.98 ppt in spring.

Average dissolved oxygen concentrations ranged from a low of 1.72 mg/L (E5, fall) to a high of 24.21 mg/L (E4, spring; Figs. 65, A7.8). Changes in seasonal average dissolved oxygen since last year ranged from -6.73 mg/L at E6A in fall to +8.52 mg/L at E13 fall (Fig. 66). The mean interannual change in dissolved oxygen across all sites was +0.1 mg/L in fall, +4.43 mg/L in winter, and +2.98 mg/L in spring.

Average pH values ranged from a low of 6.52 in E11 in fall to a high of 9.22 in E6 in winter, and generally did not display strong seasonal patterns (Figs. 67, A7.12). Changes in seasonal pH from last year ranged from -1.55 at E11 in spring to +1.86 at E1 in fall (Fig. 68). The mean interannual change in pH across all sites was +0.16 in fall, +0.25 in winter, and -0.19 in spring.

Following expected seasonal patterns, water temperature at the surface ranged from 8.87 ˚C (E5 in winter) to 31.81 ˚C (E4C in fall; Figs. 69, A7.16). Compared to last year average seasonal water temperature changes in ponds ranged from -12.36 ˚C at E4C in spring to +7.48 ˚C at E6C in fall (Fig. 70). The mean interannual change in temperature across all sites was +0.34 ˚C in fall, -1.23 ˚C in winter, and -2.6 ˚C in spring.

Staff gauges are present and functional on all ponds in the Eden Landing complex except E4C, E6, E7, E8AE, and E8AW. Staff gauge levels ranged in the Eden Landing complex from 0.2 ft at E13 in winter, to 7.8 ft in E9 in winter (Figs. 71, A7.20). The value of -0.3 in winter is anomalous and likely reflects measurement error (i.e., due to algae obscuring the staff gauge). For ponds where staff gauge measurements could be obtained in both years, changes in seasonal water depth from last year ranged from -3.05 ft at E13 in winter to +2.75 ft at E9 in spring (Fig. 72). The mean interannual change in water level across all sites was -0.04 ft in fall, -0.49 ft in winter, and +0.51 ft in spring.

Some water quality information was unavailable for certain surveys at ponds E4C and E9 because they were surveyed on days when they were dry or when water quality equipment was malfunctioning.

Mowry

The Mowry complex was characterized by moderate to high salinity ponds. Salinity increased as water moved east within the system, with ponds M1, M2, and M3 generally having lower salinity than ponds M4, M5, and M6. Average salinity ranged from 43.04 ppt (M1, spring) to 280.33 ppt (M6, fall; Figs. 63, A7.6). Compared to last year, changes in seasonal salinity ranged from -39.63 ppt at M3 in fall to +75.83 ppt at M6 in spring (Fig. 64). The mean interannual change in salinity across all sites was -29.72 ppt in fall, +16.98 ppt in winter, and +21.23 ppt in spring.

Average dissolved oxygen concentrations ranged from a low of 2.06 mg/L (M6, fall) to a high of 8.15 mg/L (M2, winter; Figs. 65, A7.6). Changes in seasonal average dissolved oxygen since last year ranged from -6.81 mg/L at M4 in winter to +0.7 mg/L at M3 spring (Fig. 66). The mean interannual change in dissolved oxygen across all sites was -1.45 mg/L in fall, +16.98 mg/L in winter, and +21.23 mg/L in spring.

Average pH values ranged from a low of 7.45 in M6 in spring to a high of 8.73 in M2 in fall, and generally did not display strong seasonal patterns (Figs. 67, A7.10). Changes in seasonal pH from last year ranged from -0.33 at M6 in spring to +0.66 at M2 in fall (Fig. 68). The mean interannual change in pH across all sites was +0.45 in fall, +0.15 in winter, and -0.08 in spring.

Following expected seasonal patterns, water temperature at the surface ranged from 12.78 ˚C (M3 in winter) to 29.52 ˚C (M5 in fall; (Figs. 69, A7.14). Compared to last year average seasonal water temperature changes in ponds ranged from -2.35 ˚C at M1 in spring to +5.68 ˚C at M6 in winter (Fig. 70). The mean interannual change in temperature across all sites was +1.08 ˚C in fall, +1.78 ˚C in winter, and +0.26 ˚C in spring.

Staff gauges are present and functional on all ponds in the Mowry complex except M4 and M6. Staff gauge levels ranged in the Mowry complex from 1.3 ft at M1 in winter, to 3.9 ft in M2 in spring (Figs. 71, A7.18). For ponds where staff gauge measurements could be obtained in both years, changes in seasonal water depth from last year ranged from -2.7 ft at M5 in spring to +1.3 ft at M3 in fall (Fig. 72). The mean interannual change in water level across all sites was +0.33 ft in fall, -0.73 ft in winter, and -1.5 ft in spring.

Some water quality information was unavailable for certain surveys at ponds M1, M2, and M3 because they were surveyed on days when they were dry or when water quality equipment was malfunctioning.

Ravenswood

The Ravenswood complex was characterized by six high salinity ponds, three low salinity ponds (RSF2U1, U2 and U4), and one tidally breached site (R4). The ponds on the north end of the complex tend to be the highest salinities and the RSF2 ponds on the south end of the complex tend to be the lowest salinity, with the exception of RSF2U3. Average salinity ranged from 15.71 ppt (R4, spring) to 314 ppt (R2, fall; Figs. 63, A7.7). Compared to last year, changes in seasonal salinity ranged from -196.79 ppt at R4 in fall to +83.12 ppt at R3 in spring (Fig. 64). The mean interannual change in salinity across all sites was -21.34 ppt in fall, -12.63 ppt in winter, and +21.34 ppt in spring.

Average dissolved oxygen concentrations ranged from a low of 1.79 mg/L (RSF2U3, fall) to a high of 20.37 mg/L (RSF2U2, winter; Figs. 65, A7.7). Changes in seasonal average dissolved oxygen since last year ranged from -4.73 mg/L at RSF2U2 in spring to +8.08 mg/L at RSF2U2 winter (Fig. 66). The mean interannual change in dissolved oxygen across all sites was +0.71 mg/L in fall, -12.63 mg/L in winter, and +21.34 mg/L in spring.

Average pH values ranged from a low of 6.56 in RSF2U4 in fall to a high of 8.79 in R1 in winter, and generally did not display strong seasonal patterns (Figs. 67, A7.11). Changes in seasonal pH from last year ranged from -0.66 at R3 in spring to +2.89 at R3 in fall (Fig. 68). The mean interannual change in pH across all sites was +1.47 in fall, +0.26 in winter, and -0.26 in spring.

Following expected seasonal patterns, water temperature at the surface ranged from 10.02 ˚C (R2 in winter) to 29.01 ˚C (RSF2U1 in spring; (Figs. 69, A7.15). Compared to last year average seasonal water temperature changes in ponds ranged from -7.01 ˚C at R1SF2U2 in fall to +9.18 ˚C at RSF2U2 in spring (Fig. 70). The mean interannual change in temperature across all sites was -3.37 ˚C in fall, +0.33 ˚C in winter, and +2.22 ˚C in spring.

Staff gauges are present and functional on all ponds in the Ravenswood complex except R3, R4, R5, and R5S. Staff gauge levels ranged in the Ravenswood complex from 0.8 ft at R2 in spring, to 6.9 ft in RSF2U1 in fall (Figs. 71, A7.19). For ponds where staff gauge measurements could be obtained in both years, changes in seasonal water depth from last year ranged from -1.2 ft at R2 in spring to +1.0 ft at

RSF2U1 in winter (Fig. 72). The mean interannual change in water level across all sites was -0.17 ft in fall, -0.08 ft in winter, and -0.48 ft in spring.

Some water quality information was unavailable for certain surveys at ponds RSF2U1, RSF2U1, and RSF2U2 because they were surveyed on days when they were dry or when water quality equipment was malfunctioning.

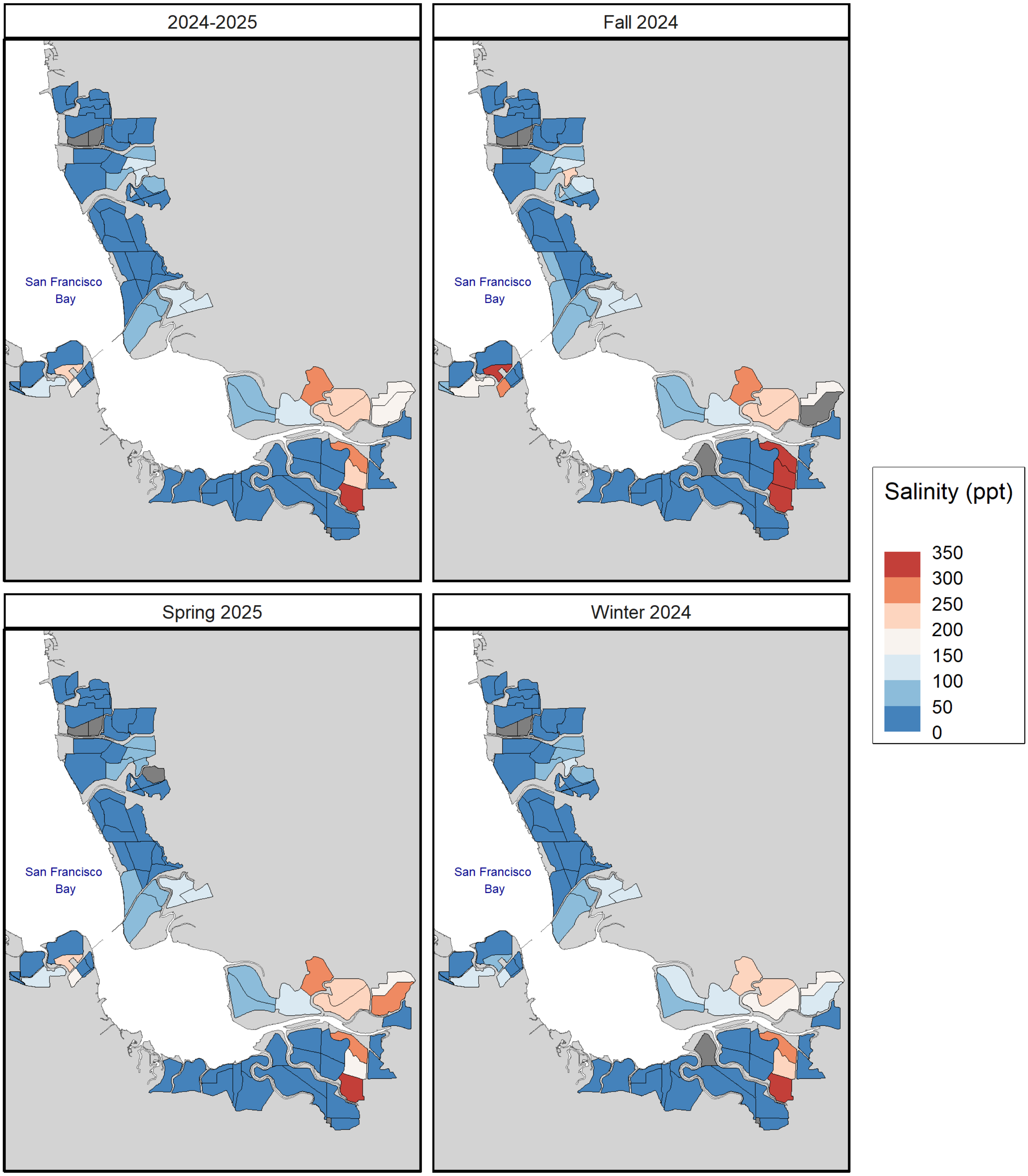

Figure 63. Salinity (ppt) between September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic during that survey period.

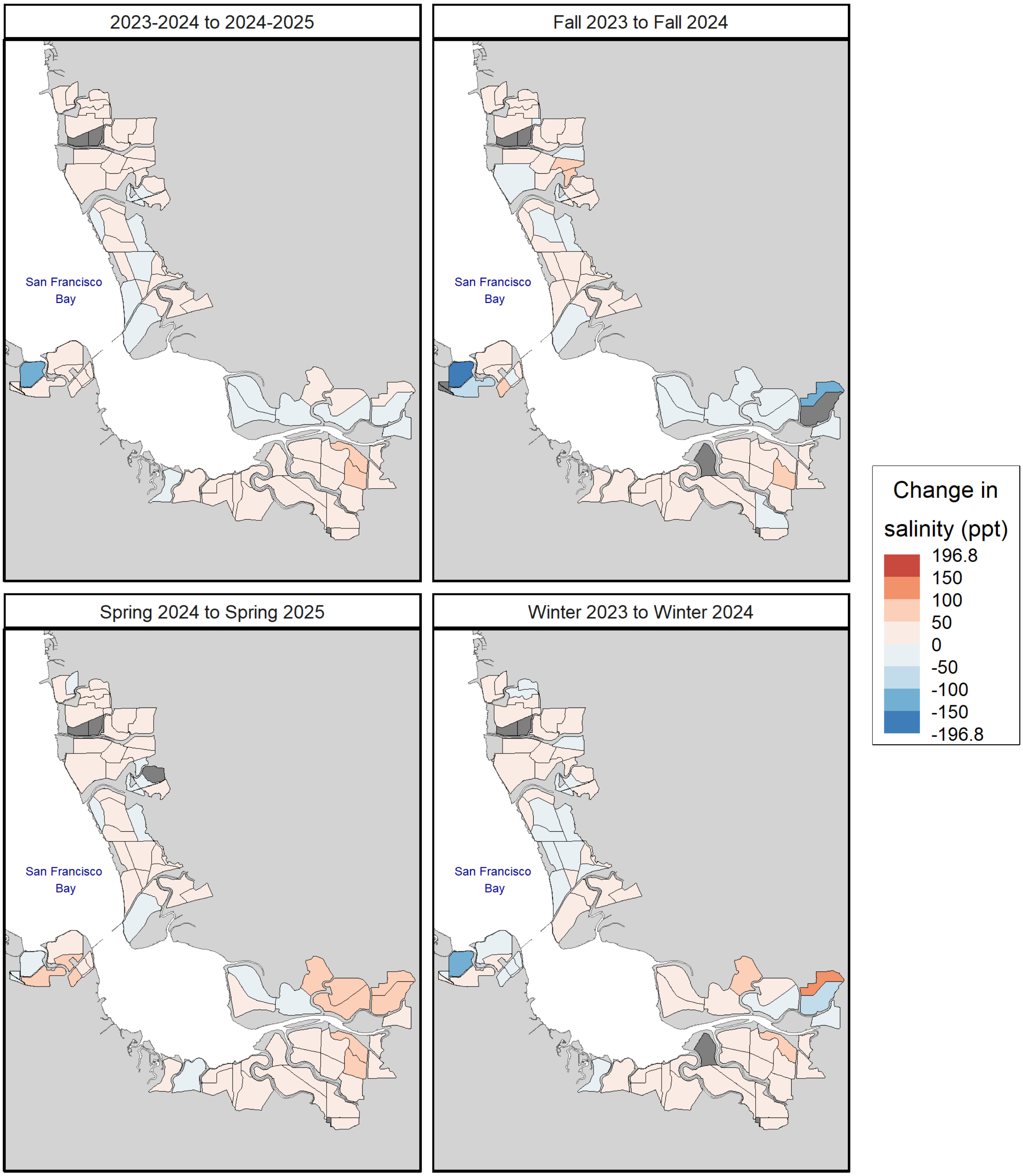

Figure 64. Change in salinity (ppt) between September 2023–May 2024 and September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic in one or both periods.

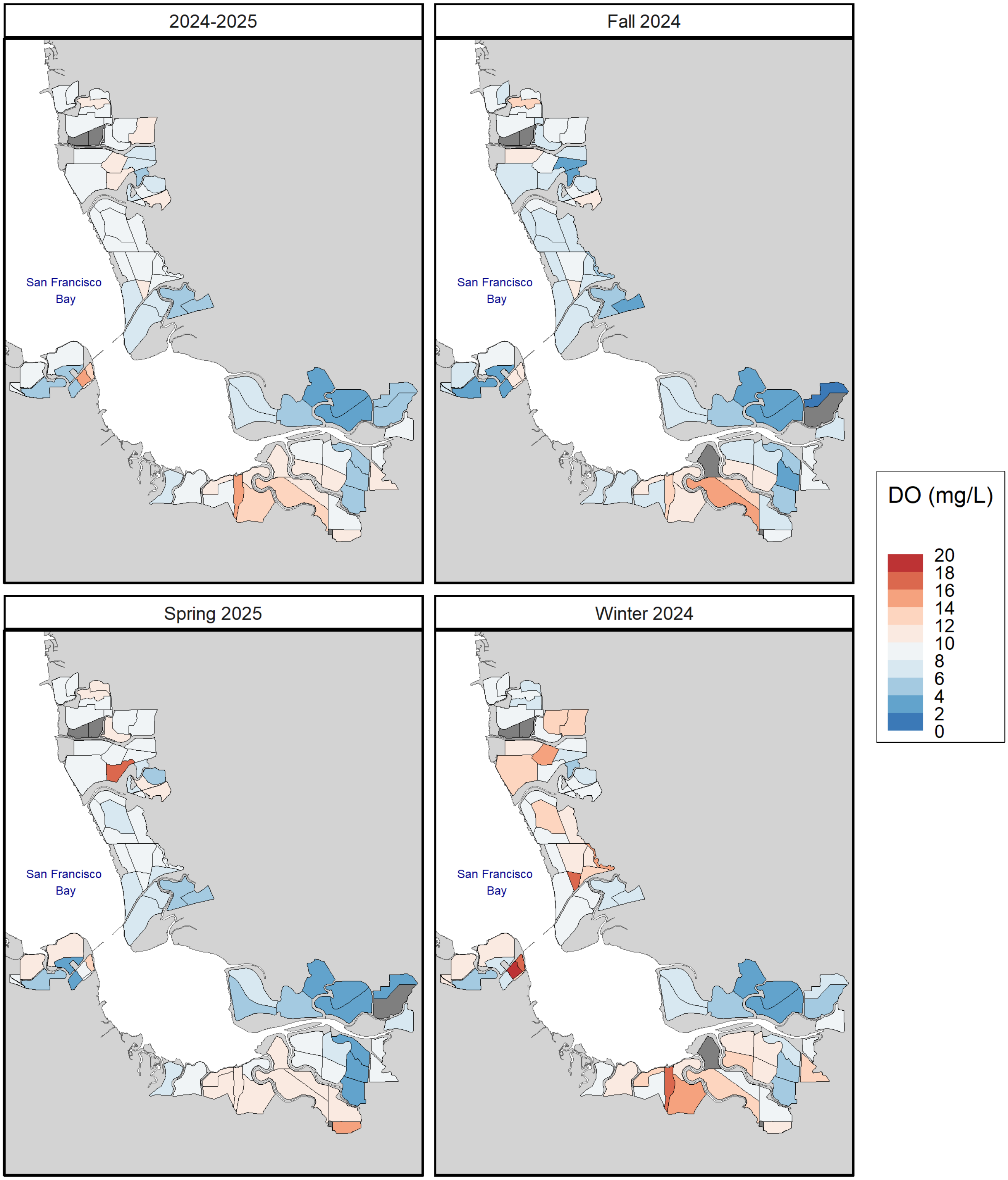

Figure 65. Dissolved oxygen (mg/L) between September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic during that survey period.

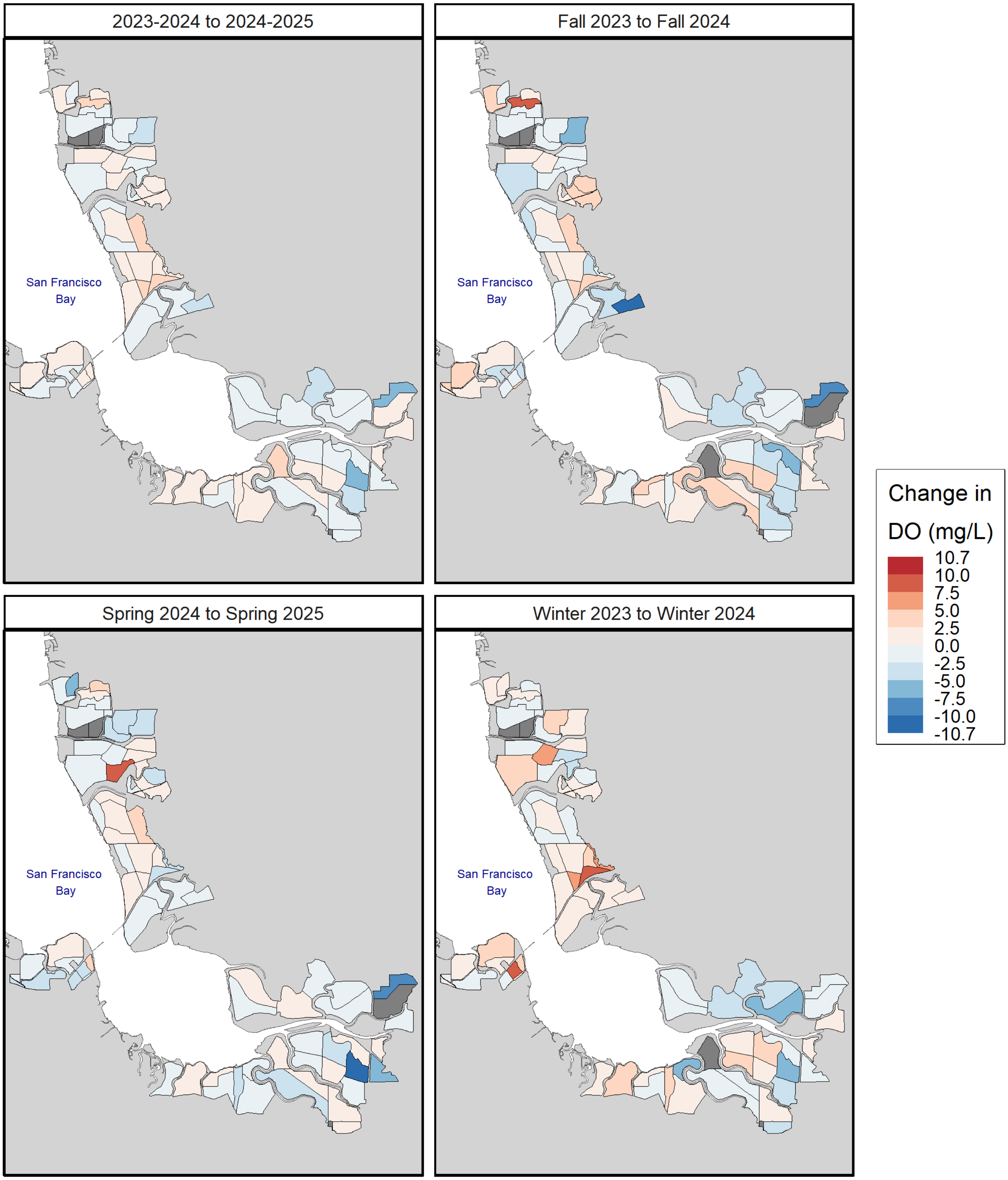

Figure 66. Change in dissolved oxygen (mg/L) between September 2023–May 2024 and September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic in one or both periods.

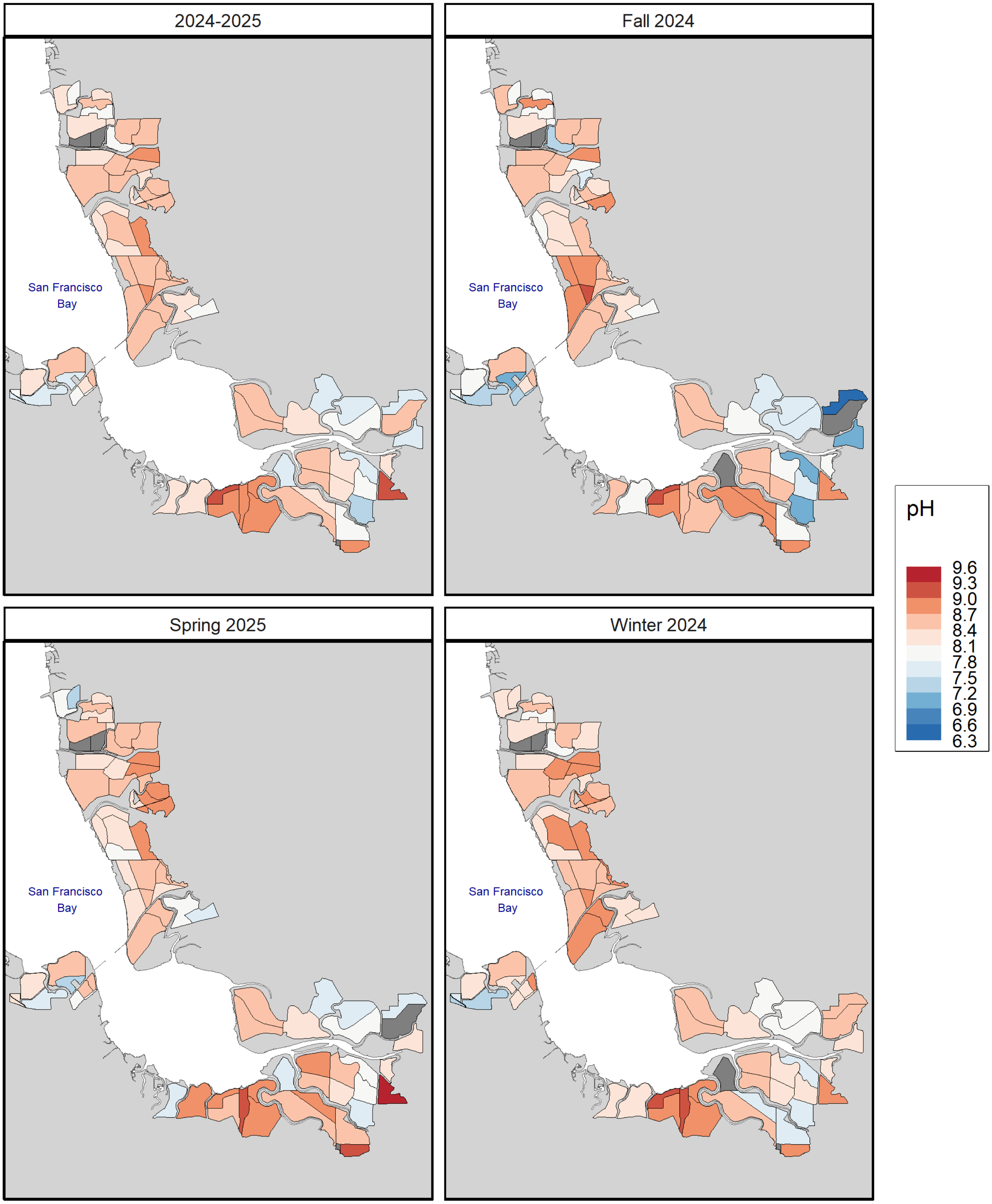

Figure 67. pH between September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic during that survey period.

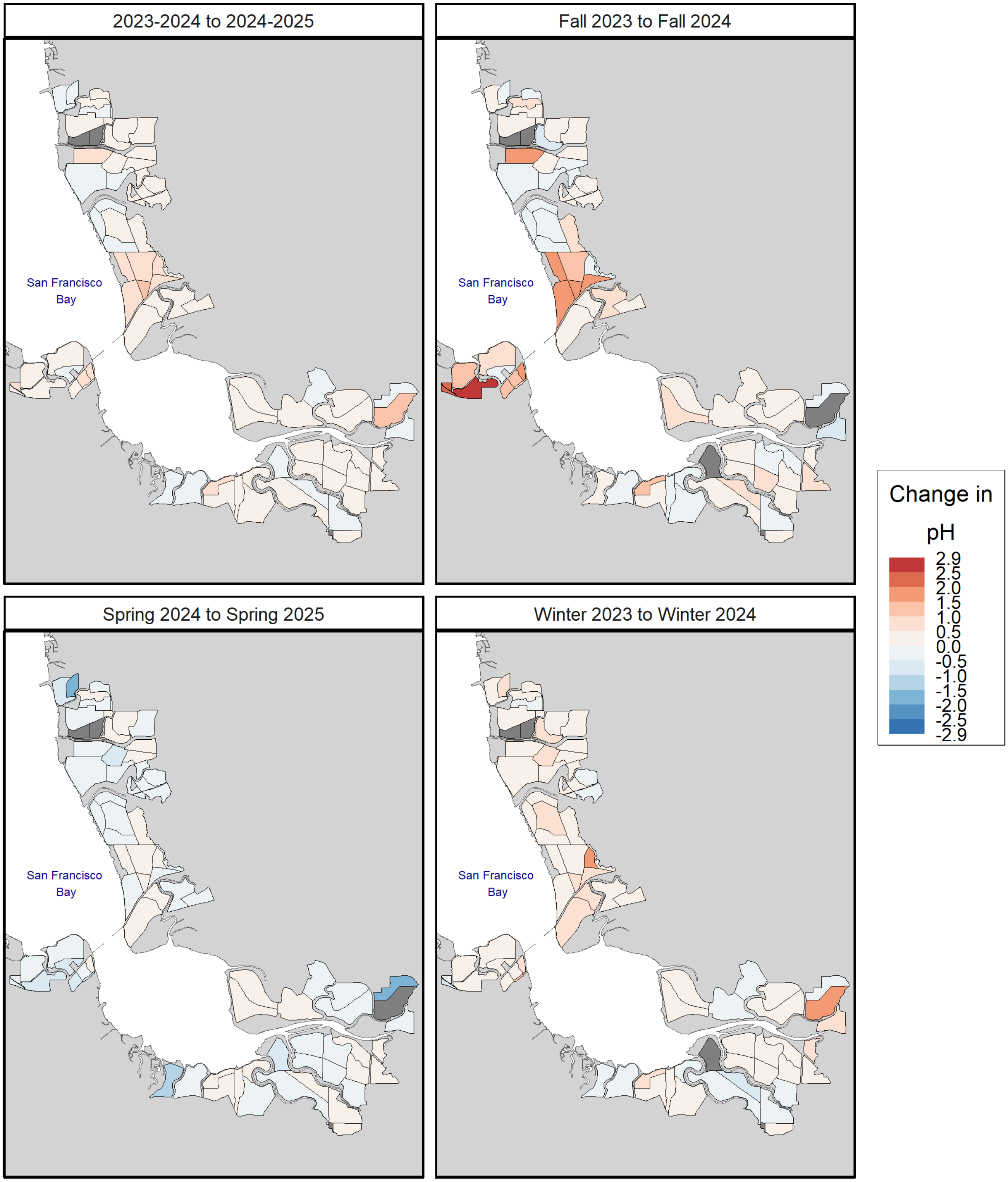

Figure 68. Change in pH between September 2023–May 2024 and September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic in one or both periods.

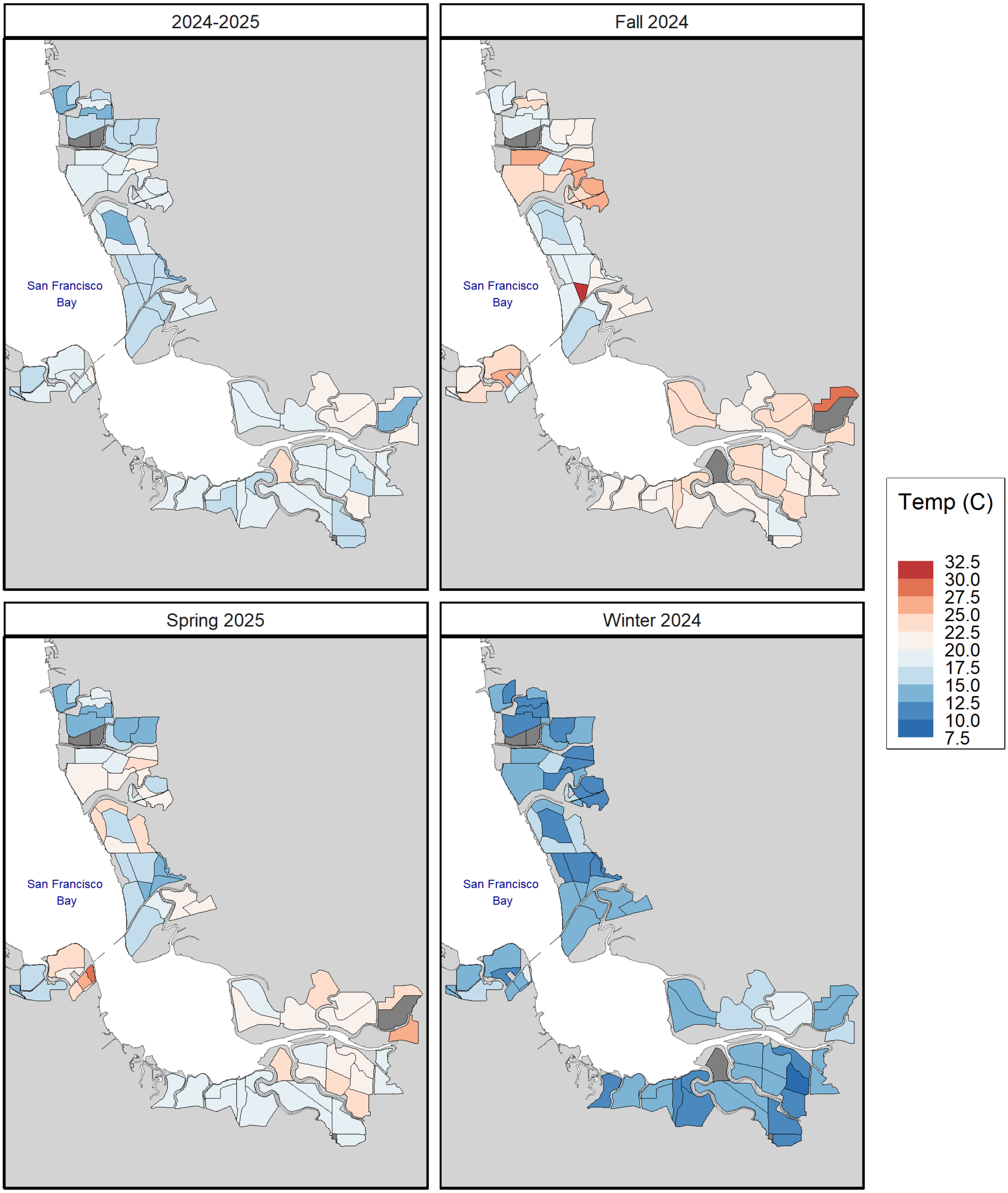

Figure 69. Temperature (C) between September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic during that survey period.

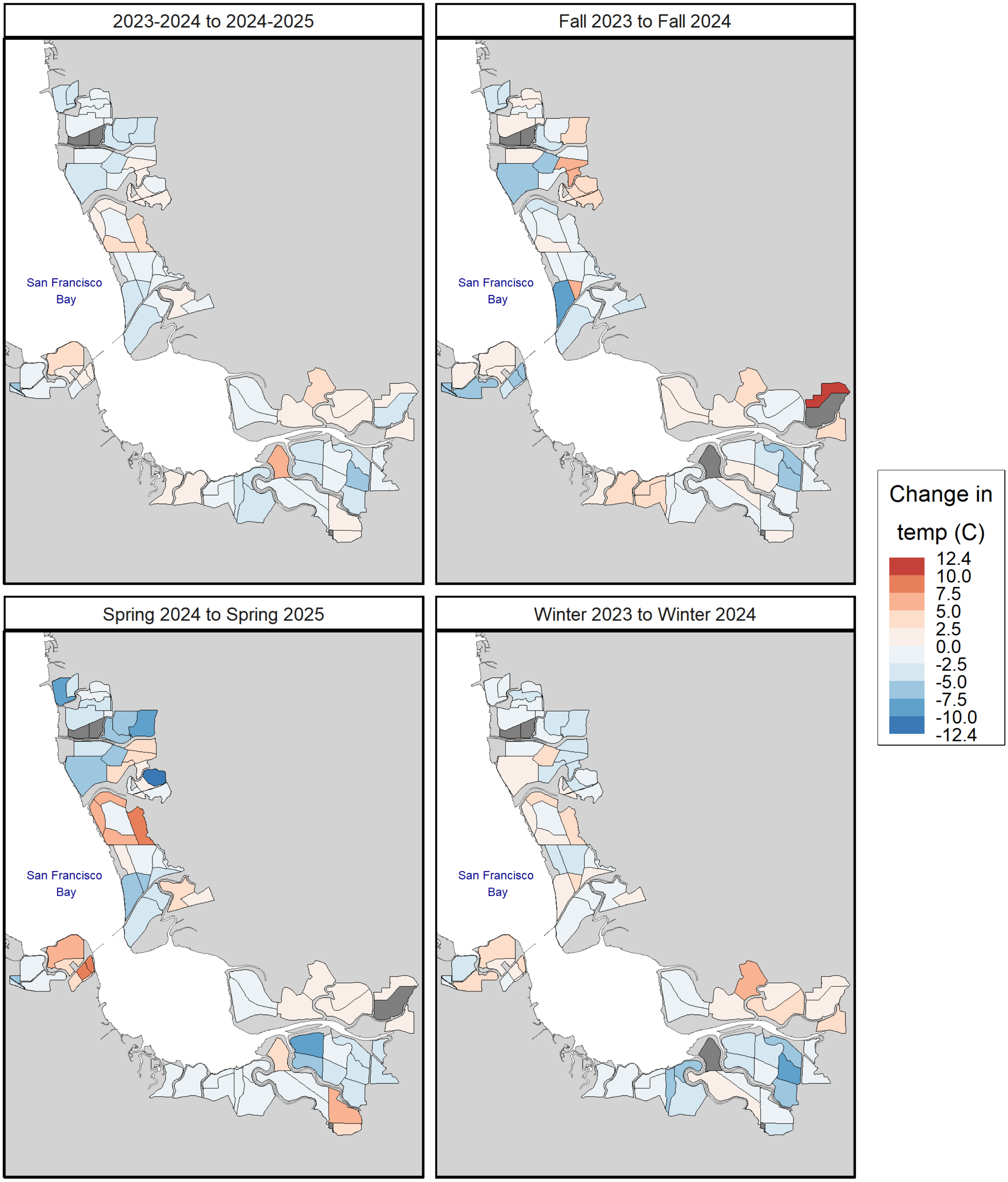

Figure 70. Change in temperature (C) between September 2023–May 2024 and September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic in one or both periods.

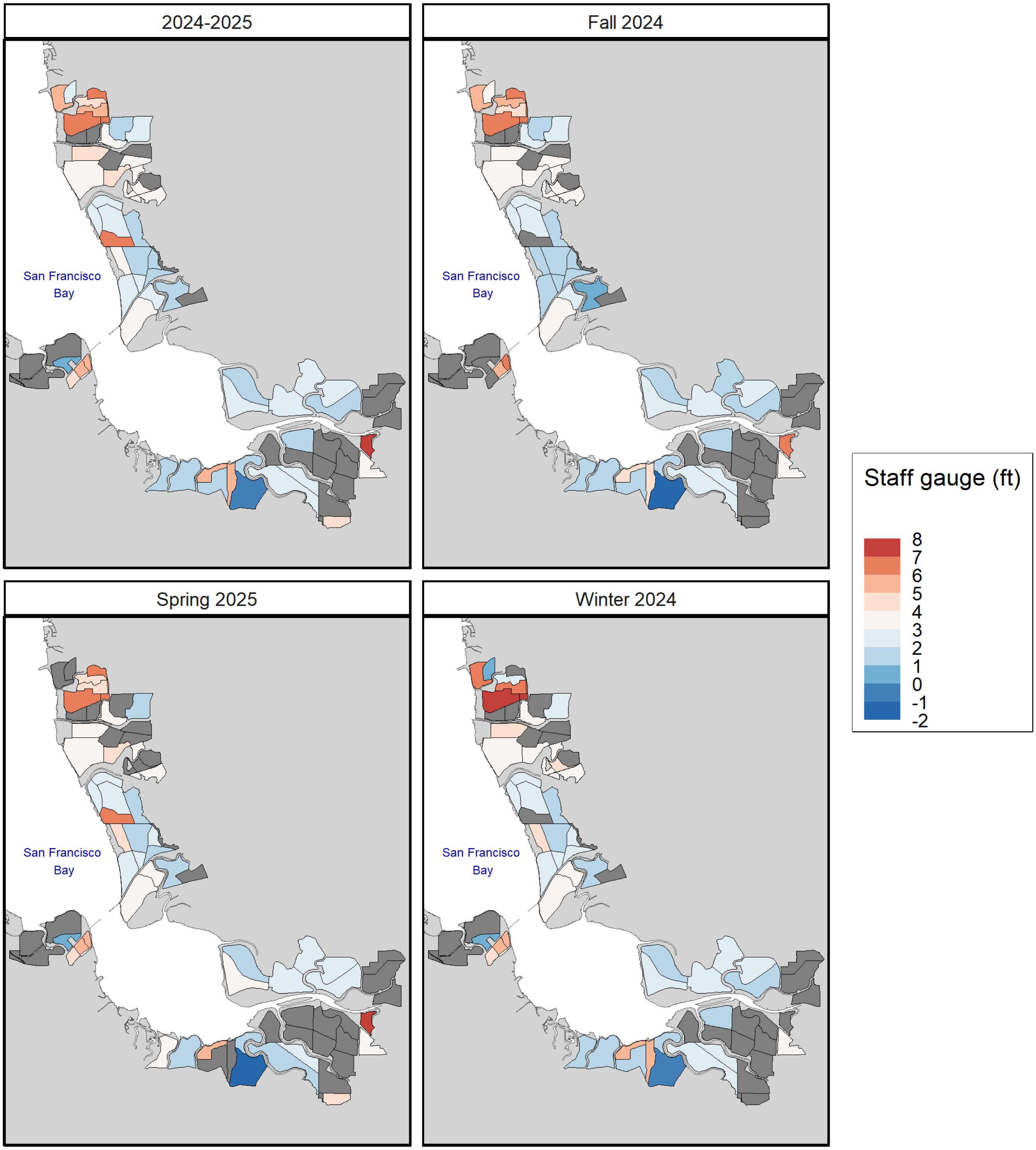

Figure 71. Staff gauge reading (ft) between September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic during that survey period.

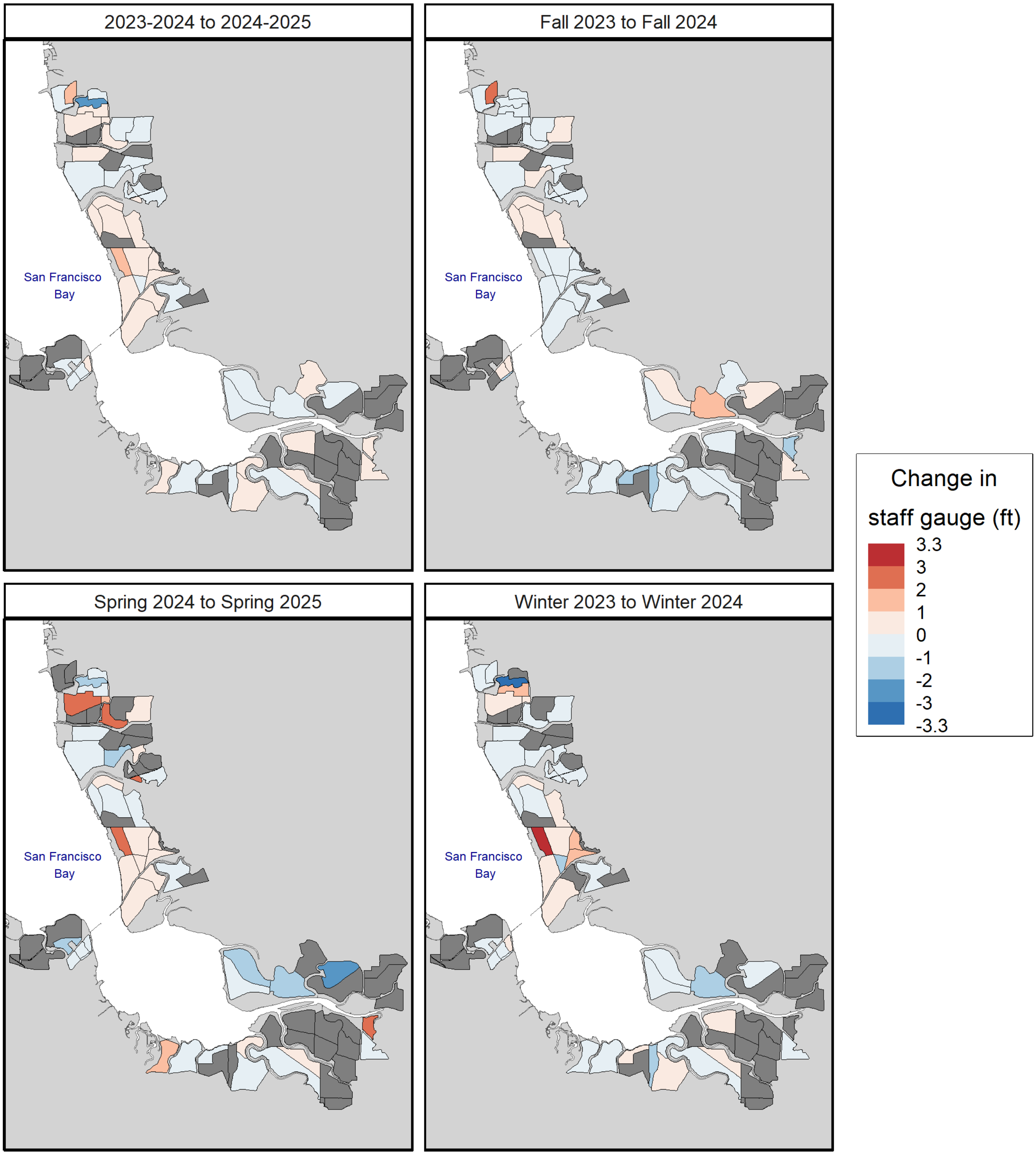

Figure 72. Change in staff gauge reading (ft) between September 2023–May 2024 and September 2024–May 2025, averaged across survey rounds by season, in pond habitats of South San Francisco Bay, California. Dark grey ponds were not measured for this pond characteristic in one or both periods.

Discussion

Management Triggers

Restoration efforts have been underway for over twenty years, and analyses of long-term population trends have shown some species and guilds are declining within South San Francisco Bay. Of the 9 targets set by the AMP or USFWS, 7 were below their multi-year trigger thresholds based on abundances in the past three years (including phalaropes; Table 2, Van Schmidt & Parsons 2025b). Of the larger set of 13 taxa we assessed (counting small shorebirds in both fall and spring), 5 taxa had their average abundances across those three years higher than their 2005–2007 SBSPRP baseline values.

While this indicates many guilds have experienced long-term benefits of the restoration and enhancement activities for waterbird populations within South San Francisco Bay, other guilds show signs of decline. Management triggers are currently passed for 7 species/guilds: Bonaparte's Gulls, dabbling ducks, fisheaters, gulls, herons and egrets, phalaropes, and small shorebirds. Two species/guilds that specialize in saline habitats have declined below trigger values: phalaropes and Bonaparte's Gulls (Table 2; Burns et al. 2023, Van Schmidt 2023). Despite increasing within the South Bay overall, Eared Grebe counts are approaching zero within the SBSPRP footprint, with increases largely due to population growth in the salt production ponds. This suggests that for Eared Grebes, the carrying capacity of the remaining salt production ponds alone may be sufficient to maintain historic population levels in South San Francisco Bay. Studies have also found that breeding waterbirds have declined within South San Francisco Bay (Hartman et al. 2021). Even for species that have increased, several have declined again in recent years, passing trigger thresholds. This may simply be cyclical population dynamics resulting from annual weather or density-dependent regulation (Coates et al. 2021), but results from the change model suggest management changes to ponds may be contributing to some of these declines.

New Trend and Trigger Analyses

We ran trend and trigger analyses of fisheaters, gulls, herons and egrets, and terns for the first time this year. Terns had increased slightly since the baseline period and showed very stable populations in recent years. However, though no formal management triggers have been set for this species, fisheaters, herons and egrets, and gulls were all below baseline abundances in all three of the recent years.

The reason for the decline in fisheaters and herons and egrets is not readily apparent, but one hypothesis would be that it was driven by a decrease in fish abundance; however, terns also primarily eat fish and did not appear affected. Scott et al. (2024) used colonial waterbird nest colony monitoring data to assess trends in heron and egret breeding populations across the entire broader San Francisco Bay Region and at subregional scales. They found no region-wide trends in Great Blue Herons or Great Egrets, but a decline in Snowy Egrets. Within just South San Francisco Bay, they found Snowy Egret breeding colonies had declined from 2000–2010 but showed signs of partial recovery from 2010–2020, while both Great Blue Herons and Great Egrets had increased since 2000. The trend within the SBSPRP and salt pond complexes therefore appears to be anomalous and divergent from regional trends.

Spring abundance of gulls is strongly driven by California Gull breeding abundance. Historically, the California Gull was listed by CDFW as a "Species of Special Concern" because its native nesting habitat in Mono Lake was threatened by unsustainable water withdrawals, but it was removed from the list in 2006 due to a court order to protect those water levels and the swiftly growing breeding population in San Francisco Bay. The species does not natively breed in San Francisco Bay, but colonized it in the 1980s after displacement from Mono Lake due to falling lake levels there. Reducing the abundance of California Gull breeding in South San Francisco Bay to protect other sensitive species has been a major management goal of the past two decades due to the nest predation threat this species poses to sensitive waterbird species like Western Snowy Plover, Black-necked Stilt, American Avocet, and terns (Herring et al. 2011, Riensche et al. 2012, Ackerman et al. 2013, 2014a, 2014b). As the local California Gull population grew dramatically over the decades, site managers carried out nest hazing in ponds where these other sensitive waterbird species are nesting and hazing at landfills that provide food subsidies, both in an effort to reduce the threat of predation and overall abundance (Riensche et al. 2012, Ackerman et al. 2013). Therefore, this observed decline is not necessarily indicative of a management problem, but could indicate successful management of a problematic species.

However, California Gulls main nesting habitats in Mono Lake are experiencing continuing degradation which has led to ongoing declines since the 1990s and record low breeding success there in recent years. California Gull abundance at Mono Lake has declined each year since 2020, productivity been <1 chick/year since 2015 (Burnett et al. 2025). Given these ongoing declines and habitat degradation in their native range and that the local breeding population of California Gulls in South San Francisco Bay (~44,000) represents over 60% of the total California breeding population, special attention may be warranted towards how to balance the needs of this and other species.

Drivers of Observed Changes

For a decline to be significant under NEPA/CEQA requirements, it must be due to restoration and management activities, which has yet to be determined. At a landscape scale, habitat changes driven by SBSPRP management have been linked to changes in breeding waterbird abundance for four species: American Avocets (*Recurvirostra americana*), Black-necked Stilts (*Himantopus mexicanus*), Forster's Terns (*Sterna forsteri*), and Caspian Terns (*Hydroprogne caspia*; Schacter et al. 2023). This study found increases in habitat use in managed ponds compared to salt ponds, but not for tidally restored wetlands. De La Cruz et al. (2018) also assessed the relationship between pond characteristics and waterbird trends within the SBSPRP for migratory and wintering species/guilds. Their study had two goals, (1) assessing trends in waterbird populations and (2) identifying habitat characteristics at the pond-scale and within ponds ("grid-scale") that predicted waterbird abundance. Scullen et al. (2013) similarly modeled how water quality parameters related to shorebird abundance, but only within the Cargill-managed ponds. Both of these studies identified covariates of abundance for species that could inform management actions intended to reverse the declines here and have been highlighted above in the *Results* section for each guild.

While our report provides estimates of the relative degree to which habitat changes versus weather could have driven these declines, importantly, the current study cannot definitively answer this question. R^2 values were generally low (<0.2), indicating that most of the variation in abundance remains unexplained. Ecological models of wide-ranging species like birds often have low R^2, but can achieve higher rates with proper model specification (c.f., Dettmers et al. 1999, Brand et al. 2006). It is unsurprising that our study showed low R^2 because there are significant challenges to modeling population trends of waterbirds in particular and over the long time periods of this study, including potential time lags, cross-scale interactions, incomplete habitat quality and/or abundance data for tidally restored wetlands, and potentially confounding relationships between drivers of waterbird abundance vs. change-in-abundance. Our guild abundance measures also summarize over multiple species, which may each exhibit varying responses to environmental conditions.

A conclusive determination of whether SBSPRP management actions have caused the observed declines therefore requires continuing to develop the model until a sufficient proportion of the variance in change in counts is attributable to either weather or site conditions. Setting a target R^2 is difficult because very stochastic processes may naturally have low R^2, with some sources of variability potentially impossible to address within the model. Because waterbirds are exceptionally wide-ranging, it is very likely some variability in counts is explainable only by conditions on breeding or wintering grounds. Even if pond conditions remain the same there may be natural spatial and temporal variation in when and which ponds they utilize on any given day of surveys. Based on these considerations, we recommend a general rule of thumb would be to continue model development until alternate functional forms, model-averaging, and quadratic and interaction terms, and model cross-validation have been implemented at a minimum.

The highest priority for model development should be the guilds that have crossed their AMP or USFWS trigger thresholds. Initial steps should be attempting to fit quadratic or non-linear forms, interaction terms, and alternative specifications of change. In addition, now that several variants of models have been produced, the covariates included in the top model have shifted from year to year for many species. Many model sets had a fairly even distribution of AIC scores, with multiple competitive top models with only small differences in AIC between them (Appendix 5). This creates this instability in what variables are represented in the top model each year but could be remedied by model-averaging across the parameter estimates across the full set of models. More advanced options include developing species-specific models or an explicit time-series model (i.e., a population model).

For the time being, we recommend the current report should be interpreted as preliminary findings on the potential scale and relative importance of habitat and climatic effects. While not a conclusive documentation of drivers of waterbird declines, those significant results we have found and their resulting site-level predictions can be used as a warning system to identify habitat changes that may be detrimental to each waterbird guild.

Habitat Changes

One of the biggest changes in management within the SBSPRP has been the reduction of hypersaline ponds as part of the Initial Stewardship Plan. As early as summer 2004, actions were taken to reduce salinity in hypersaline ponds to transition them away from salt production, and most ponds had transitioned by fall 2005 (SBSPRP 2007). Ponds A12–A15, E5, E6, and E6C were initially retained as high salinity ponds, though management at some has changed since then.

Our results clearly demonstrate that reductions in salinities directly corresponded to statistically significant increases in abundances of most assessed guilds. Of the twelve target species/guilds assessed, eight showed a statistically significant increase in abundance in relation to decreases in salinities (or vice versa). Surprisingly, this included phalaropes, a specialist in saline habitats. The only exceptions were Eared Grebes, Bonaparte’s Gull, and gulls overall (heavily influenced by California Gulls), all of which could be considered saline specialist species (spring abundances of gulls as a guild being heavily influenced by the breeding activity of California Gulls). The increase in abundance after the ponds were transitioned from salt production for most of these species is a major success of the project. Though eventually these increased abundances are likely to decline as more ponds are converted to tidal marsh, this habitat enhancement should help a larger proportion of waterbird abundances persist in the reduced habitat. However, the declines in Bonaparte’s Gulls and Eared Grebes (within the SBSPRP ponds) does provide evidence that SBSPRP management actions have contributed to the decline of these saline-specialist species within South San Francisco Bay.

As expected, abundances of multiple taxa were affected by changes in water depth. Falling water elevations increased abundances of small shorebirds, medium shorebirds, phalaropes, and gulls (guilds which all use shallow water to forage) and increasing water elevations increased abundance of Eared Grebes (which dive to forage). Nevertheless, changes in water elevation proved to be a key management factor driving changes in abundance, in agreement with De La Cruz et al. (2018) who also found water depth was central to guild abundance patterns. Because we lacked bathymetry data for all ponds (it is not available for Cargill-managed ponds) and there were many missing staff gauge values, we could not include true water depth as a variable in our model. We therefore used observed change in water elevation (i.e., change in staff gauge value) as a proxy for water depth. Nevertheless, our model’s statistical power is likely reduced because of this limitation, which may explain why some guilds did not show significant effects. Recent efforts to update and standardize staff gauges across the SBSPRP footprint should improve our ability to estimate changes in water level, but unless bathymetry data can be obtained for all ponds, it will remain not possible to include a true water depth covariate in a region-wide model.

Higher levels of dissolved oxygen had significant positive effects on dabbling ducks, Ruddy Ducks, and fisheaters, and did not have negative effects in any top models. Changes in dissolved oxygen can have cascading and complex effects on prey relative abundance and trophic webs (for an extreme example, see Takekawa et al. 2015). Earlier reports (Van Schmidt & Parsons 2024, 2025a) found more divergent effects on guilds, including a negative relationship with dissolved oxygen that was previously found for phalaropes (Van Schmidt & Parsons 2024) but was not in the top model of the revised approach used in this study. Nevertheless, it warrants further examination as an alternative hypothesis for their decline. Ruddy Ducks and fisheaters also saw a strong negative influence of pH, which may have affected their prey.

The remaining covariates tested generally had weak effects in models. We found little support for the influence of static pond characteristics on our change model, but De La Cruz et al. (2018) found these could be key drivers of abundance and habitat selection. Our model assessed drivers of changes in abundance, not habitat suitability overall; it is unsurprising that pond characteristics that were static did not cause changes. These features may still drive overall suitability of ponds, however, so we recommend that inferences about the value of pond area, islands, and other static characteristics be based on De La Cruz et al. (2018).

Tidal Marsh Restoration

The separation of tidally restored ponds from SBSPRP-managed wildlife ponds in the trend analysis showed that for most taxa, tidal ponds have had low or declining abundances; the exceptions are dabbling ducks and medium shorebirds. Surprisingly, despite an early increase in abundance of small shorebirds within these ponds from roughly 2010-2014, we found new evidence of strong declines of small shorebirds within tidally breached ponds, the only effect of breaches in our dataset. In contrast, De La Cruz et al. (2018) found higher abundance of small shorebirds in breached ponds. There are three potential explanations for this finding.

One explanation is that the evolution of habitats within breached ponds in the near decade since data collection in the earlier study has rendered them less suitable. Such a hypothesis is plausible because it is anticipated that, in the years following breaching to restore tidal action, mudflats will generally evolve into vegetated tidal marsh that is unsuitable foraging habitat for small shorebirds (Athearn et al. 2009). De La Cruz et al. (2018) analyzed data from 2002–2015, with the 4 oldest breached ponds in the final year of data collection only 9 years old, and the remaining 7 ponds are only 3–5 years old. In nearby Tomales Bay, studies up to eight years after tidal marsh restoration found benefits to shorebirds, but even these leveled out by the end of the study (Kelly & Condeso 2017), and more recent analyses have suggested the benefits of tidal restoration for shorebirds were short term (Warnock et al., 2021). Thus, given that we now have data for some restored ponds nearly twenty years post breach, it is possible we are detecting the new signals of the eventual decline of habitat suitability for small shorebirds.

An alternative explanation is that tidal marsh restoration has reduced our ability to detect small shorebirds. The increasing vegetation cover and height may be reducing field surveyor's ability to sight small shorebirds within the remaining mudflats. This effect presumably explains at least a part of the declines observed in most taxa in the long-term trends analyses. In addition, because our surveys are conducted at or near high tide, they may underestimate small shorebird use of tidally restored ponds, which is likely higher during low tide when mudflats are exposed. Additional low tide surveys have begun in 2024–2025 which could help better model impacts. Given the finding that change in small shorebird abundance has switched from positive to negative in breached ponds over time, these surveys should be continued.

Additional field data and focused modeling efforts are needed to draw accurate conclusions about how breaching ponds to restore tidal action is affecting waterbird species long term. The confidence intervals on the negative effect of tidal breaches on small shorebird population changes were very wide (Fig. 54). Our analysis of tidal breach impacts is not robust due to data limitations, with only nine breached ponds in the model (A6S, A6N, A17, A19, A20, A21, E8X, E9, and R4). Of these, A20 and A21 have not been surveyed since 2013. Post breach accessibility limitations have prevented water quality sampling at two more breached ponds (E8AE and E8AW) and have also largely prevented two other breached ponds from being surveyed (E10X and A6N). Ponds are sometimes drawn down before breaching, which could also temporarily increase small shorebird use the year before breaching, complicating inference in our year to year analysis model. There may be more complex changes as the hydrology and vegetation of the ponds changes as they are drawn down, breached, and gradually flooded, which our current binary breached vs. not breached variable did not capture. Because of these limitations and sampling biases, our current analysis is better suited to assessing changes in managed ponds than in tidally restored wetlands.

Weather

After a “historically strong” El Niño in the previous year (2023–2024), this year’s weather was more typical, and total bird abundances from most guilds were also firmly middle-of-the-road in comparison to past years. Our findings confirmed that annual weather plays a divergent role in driving observed trends in abundance. Three species/guilds were estimated to have experienced weather conditions that lowered their abundance (diving ducks, fisheaters, and gulls), while three were estimated to have conditions that increased their abundance (dabbling ducks, medium shorebirds, and Bonaparte’s Gulls).

During the California drought from 2013–2015, drying wetlands in the Central Valley correlated to decreases in both Central Valley and San Francisco Bay populations of yellowlegs (*Tringa* spp.) and dowitchers (*Limnodromus* spp.), but evidence of a shift in distribution from the Central Valley to the San Francisco Bay in Dunlin (*Calidris alpine*; Barbaree et al. 2020). Conversely, precipitation effects could be the result of birds moving inland to escape winter storms; Warnock and Takekawa (1995) documented shifts in Dunlin from coastal wetlands to inland wetlands in rainy years.

Our results for weather have been fairly unstable over the past three years. This may be driven in part by the fact that this is an annual term that is sensitive to sudden very low- or high-abundance years, and the complexities of using multiple competing terms (i.e., TMN vs. TMX or the alternative lag effects of PPT0, PPT1, and PPT3). Calculating model-averaged coefficients may improve stability of parameter estimates.

Additional Considerations for Future Study

As noted, more advanced analyses are needed to tease apart complex temporal and spatial patterns operating at different scales within this dynamic system. Recent trends point towards declines across multiple taxa, which are reversing previous gains. Most wildlife populations exhibit cyclical population trends, so this is not necessarily yet cause for alarm; monitoring nadir-to-nadir over longer time periods (i.e., are the low points getting lower) can reliably identify whether the taxa are truly declining (Coates et al. 2021). The strong synchrony among different taxa could point to a shared common factor independent of local habitat, such as weather. Warnock et al. (2021) found strong effects of both restoration actions (positive effect) and annual weather (negative effect) on shorebird abundance, with lags of up to four years. Time-lagged impacts are commonly observed in population biology because influences on adult condition can take years to trickle down through fecundity to juvenile recruitment and eventual overall population size (Metzger 2009). Comparison of trends within the SBSPRP and nearby ponds to those elsewhere in California could elucidate whether this decline is in line with broader factors, or an issue with habitats within the SBSPRP area (Coates et al. 2021). The lack of inverse trends in the abundance of birds at SBSPRP sites and Cargill-managed sites likewise indicates that changes in numbers may be driven by factors operating on larger geographic scales (e.g., the scale of the Pacific Flyway; Murphy et al. 2007).

We suggest targeting any new research efforts first on those taxa that have been identified as crossing AMP and USFWS triggers (SBSPRP 2007). Bonaparte's Gulls and phalaropes were the first to cross these thresholds and may warrant special attention as saline specialist species. Initial review and data re-analysis studies on phalaropes have shed light on the timing and severity of their decline and helped more firmly established current population trends (LaBarbera et al. 2023, Burns and Van Schmidt 2023). It may be fruitful to do comparable review analyses on the current state of Bonaparte's Gull populations outside of the San Francisco Bay and available data sources for comparing populations in and outside of the SBSPRP area. Furthermore, new surveys across the Pacific Flyway (Carle et al. 2021) will soon make it possible to compare trends in our local targeted phalarope counts (Burns et al. 2023) to those at other staging sites. In combination with eBird data, this could provide the resolution needed to develop a model to test whether phalarope populations in South San Francisco Bay are tracking wider trends, or uniquely declining (i.e., following the methods of Coates et al. 2021). Once such a workflow is developed, it could then be incorporated into a monitoring system for the other taxa.

Ultimately, monitoring of declines is only useful if the drivers of the declines can be diagnosed and management can be altered to reverse those declines. While monitoring is crucial, better habitat information is also needed to understand how to manage ponds. Water level and quality parameters likely affected prey availability of foraging birds and contributed, at least in part, to observed guild distribution patterns (see Velasquez 1992, Warnock et al. 2002, Takekawa et al. 2006). The current report, Scullen et al. (2013), and De La Cruz (2018) all found that pond conditions had positive, negative, and no effects on guild abundances, depending on the guild, parameter, and timeframe. These data could be used to parameterize scenarios of alternative pond management strategies or the impacts of climate change (i.e., warming temperatures and subsequently lower dissolve oxygen concentrations) to assess these potential impacts on waterbirds and more directly inform management. Such an effort would provide a strong link between the bird monitoring work and habitat goals and directly aid the SBSPRP in applying an adaptive management approach to restoration and management.

Additional field data and focused modeling efforts are needed to draw accurate conclusions about how breaching ponds to restore tidal action is affecting waterbird species long-term. Our analysis of tidal breach impacts is likely not robust due to data limitations, with only five breached ponds in the model (A17, A19, A20, A21, and E8X). Of these, A20 and A21 have not been surveyed since 2013. Post-breach accessibility limitations have prevented water quality sampling at two more breached ponds (E8AE and E8AW) two more breached ponds (E10X and A6N) from being surveyed at all. Because of these limitations and sampling biases, our current analysis is better suited to assessing changes in managed ponds than in tidally restored wetlands. Additional low tide surveys have begun in 2024-2025 which could help better model impacts and given the surprising finding that breached ponds have had worse change in small shorebird abundance over time, should be continued.

Given that invertebrate sampling for the SBSPRP was first conducted two decades ago (Brand et al. 2014), additional field sampling of prey items could now better test the connection between how changing water quality parameters may alter the quality of ponds as foraging habitat. This would be especially fruitful at ponds that are currently used by Bonaparte's Gulls and phalaropes, and ponds that these taxa have disappeared from, to try and understand drivers of change. Pilot sampling was carried out successfully at six phalarope ponds this summer. Invertebrate sampling of phalarope ponds vs. non-ponds across a gradient of dissolved oxygen concentrations could assess the hypothesis that shifting dissolved oxygen concentrations are driving the decline in those species.

Management Recommendations

We acknowledge the work of the South Bay Salt Pond Restoration's Pond Management Working Group in recommending and implementing changes at the pond systems since the initiation of the project. In order for the South Bay to retain its current bird numbers, we make the following recommendations for the South Bay Salt Pond Restoration Project's Project Management Team, Don Edwards San Francisco Bay National Wildlife Refuge, and Eden Landing Ecological Reserve to consider while managing ponds within the restoration project area:

1. Carefully examine where the mapped changes in habitats correspond to changes in waterbird abundance, especially for ponds identified as low or high outliers in this report and those that have been identified as experiencing significant negative or positive impacts for pond condition changes by the change model. Managers could compare these to known changes in their management practices or other challenges to the ponds to identify potential detrimental or beneficial impacts of these actions.

2. Maintain the pond systems to have a variety of water quality parameter levels, thereby supporting guilds with different habitat requirements. Special consideration should be given to species of local concern within the SBSPRP management area, such as phalaropes and Bonaparte's gull. Consider managing ponds to support use by these species, or alter project targets for this guild to address declines at SBSPRP sites. Continue to maintain some flooded units during the winter months for diving duck populations (especially more pond dependent species, like Ruddy Duck).

3. Provide islands or undisturbed levees for shorebird roosting habitat, and nesting habitat for other species. This is especially important during high tides.

4. Continue monitoring waterbird use of Cargill-managed and SBSPRP ponds as the project proceeds with its restoration activities. Models cannot work without data, and because of the complexities of the system (e.g., large-scale, long-term cyclical population dynamics, multiple changes happening at once), data at a sub-annual resolution is needed to adequately monitor to meet the goals of the Adaptive Management Plan (Tarjan et al. 2019).

5. Focus new field studies on understanding the local habitat needs of guilds that have passed their management triggers, particularly those habitat characteristics that can be altered by alternative management strategies—with the aim of identifying management solutions that co-benefit both species given the limited acreage of ponds that can be maintained.

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Appendices

Appendix 1. Table describing how species were assigned to foraging guilds. Rails, geese, and flamingos were not analyzed at as a focal foraging guild and are not listed.

Appendix 2. Tables (two per year/season) of guild-specific and total pond and complex waterbird abundance and richness, and year-to-year change and percent change in abundance, for the study period overall and for each of the three seasons. We recommended using these data to better understand the change in density maps.

Appendix 3. Bar graphs (one per complex) of guild-specific waterbird abundance by survey round.

Appendix 4. Tables (one per guild, plus total waterbird sightings) of the percent of bird sightings that were counted on each pond engaging in different behaviors: foraging, roosting on the pond surface, roosting on islands, roosting on levees, or roosting on manmade structures (e.g., blinds, fence posts).

Appendix 5. AICc tables (one per guild) summarizing the model selection results for the regression models relating inter-annual changes in seasonal waterbird abundance to changes in habitats and weather. The final two tables contain the "base" AICc tables for fitting site characteristics for Bonaparte's Gulls and phalaropes (see Van Schmidt and Parsons 2023 for details).

Appendix 6. Table of the mean water quality measures per season and the change in those measures since last year.

Appendix 7. Line graphs (one per set of ponds) of the mean water quality measures during each survey at all ponds acrossing the reporting year: salinity (Figs. A7.1-A7.4), water temperature (Figs. A7.5-A7.8) dissolved oxygen (Figs. A7.9-A7.12), pH (Figs. A7.13-A7.16), and staff gauge reading (Figs. A7.17-A7.20).

Appendix 8. Table of the status of staff gauges within each pond.

Appendix 1

This appendix describes how species were assigned to foraging guilds. Rails, geese, and flamingos were not analyzed at as a focal foraging guild and are not listed.

Species assignments to foraging guilds. Guilds included dabblers, divers, Eared Grebes, fisheaters, gulls, herons, medium shorebirds, phalaropes, small shorebirds, and terns.

Common Name	Species Code	Scientific Name	Guild
American Coot	AMCO	*Fulica americana*	DABBLER
American Green-winged Teal	AGWT	*Anas crecca*	DABBLER
American Wigeon	AMWI	*Anas americana*	DABBLER
Blue-winged Teal	BWTE	*Anas discors*	DABBLER
Cinnamon Teal	CITE	*Anas cyanoptera*	DABBLER
Common Moorhen	COMO	*Gallinula chloropus*	DABBLER
Domestic Mallard	DOMA	*Anas spp*	DABBLER
Eurasian Wigeon	EUWI	*Anas penelope*	DABBLER
Gadwall	GADW	*Anas strepera*	DABBLER
Green-winged Teal	GWTE	*Anas crecca*	DABBLER
Long-tailed Duck	LTDU	*Clangula hyemalis*	DABBLER
Mallard	MALL	*Anas platyrhynchos*	DABBLER
Northern Pintail	NOPI	*Anas acuta*	DABBLER
Northern Shoveler	NSHO	*Anas clypeata*	DABBLER
Unidentified dabbling duck	DABB	*dabbling duck spp.*	DABBLER
Barrow's Goldeneye	BAGO	*Bucephala islandica*	DIVER
Bufflehead	BUFF	*Bucephala albeola*	DIVER
Canvasback	CANV	*Aythya valisineria*	DIVER
Common Goldeneye	COGO	*Bucephala clangula*	DIVER
Greater Scaup	GRSC	*Aythya marila*	DIVER
Lesser Scaup	LESC	*Aythya affinis*	DIVER
Redhead	REDH	*Aythya americana*	DIVER
Ring-necked Duck	RNDU	*Aythya collaris*	DIVER
Ruddy Duck	RUDU	*Oxyura jamaicensis*	DIVER
Surf Scoter	SUSC	*Melanitta perspicillata*	DIVER
Tufted Duck	TUDU	*Aythya fuligula*	DIVER
Unidentified diving duck	DIVE	*diving duck spp.*	DIVER
Unidentified scaup	SCAU	*Aythya* spp.	DIVER
White-winged scoter	WWSC	*Melanitta fusca*	DIVER
Eared Grebe	EAGR	*Podiceps nigricollis*	EAREDGR
American White Pelican	AWPE	*Pelecanus erythrorhynchos*	FISHEAT
Belted Kingfisher	BEKI	*Ceryle alcyon*	FISHEAT
Black Skimmer	BLSK	*Rhynchops niger*	FISHEAT
Brown Booby	BRBO	*Sula leucogaster*	FISHEAT
Brown Pelican	BRPE	*Pelecanus occidentalis*	FISHEAT
Clark's Grebe	CLGR	*Aechmophorus clarkii*	FISHEAT
Common Loon	COLO	*Gavia immer*	FISHEAT
Common Merganser	COME	*Mergus merganser*	FISHEAT
Double-crested Cormorant	DCCO	*Phalacrocorax auritus*	FISHEAT

Common Name	Species Code	Scientific Name	Guild
Hooded Merganser	HOME	*Lophodytes cucullatus*	FISHEAT
Horned Grebe	HOGR	*Podiceps auritus*	FISHEAT
Long-tailed Jaeger	LTJA	*Stercorarius longicaudus*	FISHEAT
Pacific Loon	PALO	*Gavia pacifica*	FISHEAT
Pelagic Cormorant	PECO	*Phalacrocorax pelagicus*	FISHEAT
Pied-billed Grebe	PBGR	*Podilymbus podiceps*	FISHEAT
Red-breasted Merganser	RBME	*Mergus serrator*	FISHEAT
Red-necked Grebe	RNGR	*Podiceps grisegena*	FISHEAT
Red-throated Loon	RTLO	*Gavia stellata*	FISHEAT
Unidentified Cormorant	CORM	*Phalacrocorax spp.*	FISHEAT
Unidentified grebe	GREBE	N/A	FISHEAT
Western Grebe	WEGR	*Aechmophorus occidentalis*	FISHEAT
Western Grebe or Clark's Grebe	WEGR/CLGR	*Aechmophorus spp.*	FISHEAT
Bonaparte's Gull	BOGU	*Larus philadelphia*	GULL
California Gull	CAGU	*Larus californicus*	GULL
California Gull or Ring-billed Gull	CAGU/RBGU	*Larus* spp.	GULL
Franklin's Gull	FRGU	*Larus pipixcan*	GULL
Glaucous Gull	GLGU	*Larus hyperboreus*	GULL
Glaucous-winged Gull	GWGU	*Larus glaucescens*	GULL
Herring Gull	HERG	*Larus argentatus*	GULL
Mew Gull	MEGU	*Larus canus*	GULL
Ring-billed Gull	RBGU	*Larus delawarensis*	GULL
Sabine's Gull	SAGU	*Xena sabini*	GULL
Slaty-backed Gull	SBGU	*Larus schistisagus*	GULL
Thayer's Gull	THGU	*Larus thayeri*	GULL
Unidentified gull	GULL	*Larus* spp.	GULL
Western Gull	WEGU	*Larus occidentalis*	GULL
American Bittern	AMBI	*Botarus lentiginosus*	HERON
Black-crowned Night-Heron	BCNH	*Nycticorax nycticorax*	HERON
Cattle Egret	CAEG	*Bubulcus ibis*	HERON
Great Blue Heron	GBHE	*Ardea herodias*	HERON
Great Egret	GREG	*Ardea alba*	HERON
Green Heron	GRHE	*Butorides virescens*	HERON
Little Blue Heron	LBHE	*Egretta caerulea*	HERON
Snowy Egret	SNEG	*Egretta thula*	HERON
White-faced Ibis	WFIB	*Plegadis chihi*	HERON
American Avocet	AMAV	*Recurvirostra americana*	MEDSHORE
Black Oystercatcher	BLOY	*Haematopus bachmani*	MEDSHORE
Black Turnstone	BLTU	*Arenaria melanocephala*	MEDSHORE
Black-bellied Plover	BBPL	*Pluvialis squatarola*	MEDSHORE
Black-necked Stilt	BNST	*Himantopus mexicanus*	MEDSHORE
Common Snipe	COSN	*Gallinago gallinago*	MEDSHORE
Golden Plover	GOPL	*Pluvialis* spp.	MEDSHORE
Greater Yellowlegs	GRYE	*Tringa melanoleuca*	MEDSHORE
Killdeer	KILL	*Charadrius vociferus*	MEDSHORE

Common Name	**Species Code**	**Scientific Name**	**Guild**
Lesser Yellowlegs	LEYE	*Tringa flavipes*	MEDSHORE
Long-billed Curlew	LBCU	*Numenius americanus*	MEDSHORE
Marbled Godwit	MAGO	*Limosa fedoa*	MEDSHORE
Pacific Golden-Plover	PAGP	*Pluvialis fulva*	MEDSHORE
Red Knot	REKN	*Calidris canutus*	MEDSHORE
Ruddy Turnstone	RUTU	*Arenaria interpres*	MEDSHORE
Ruff	RUFF	*Philomachus pugnax*	MEDSHORE
Spotted Redshank	SPRE	*Tringa erythropus*	MEDSHORE
Stilt Sandpiper	STSA	*Calidris himantopus*	MEDSHORE
Surfbird	SURF	*Aphriza virgata*	MEDSHORE
Unidentifed yellowlegs	YELL	*Tringa spp.*	MEDSHORE
Unidentified medium shorebird	SHOR	med shorebird spp.	MEDSHORE
Wandering Tattler	WATA	*Tringa incana*	MEDSHORE
Whimbrel	WHIM	*Numenius phaeopus*	MEDSHORE
Willet	WILL	*Catoptrophorus semipalmatus*	MEDSHORE
Red Phalarope	REPH	*Phalaropus fulicaria*	PHAL
Red-necked Phalarope	RNPH	*Phalaropus lobatus*	PHAL
Unidentified phalarope	PHAL	*Phalaropus spp.*	PHAL
Wilson's Phalarope	WIPH	*Phalaropus tricolor*	PHAL
Baird's Sandpiper	BASA	*Calidris bairdii*	SMSHORE
Dunlin	DUNL	*Calidris alpina*	SMSHORE
Least Sandpiper	LESA	*Calidris minutilla*	SMSHORE
Long-billed Dowitcher	LBDO	*Limnodromus scolopaceus*	SMSHORE
Pectoral Sandpiper	PESA	*Calidris melanotos*	SMSHORE
Sanderling	SAND	*Calidris alba*	SMSHORE
Semipalmated Plover	SEPL	*Charadrius semipalmatus*	SMSHORE
Semipalmated Sandpiper	SESA	*Calidris pusilla*	SMSHORE
Short-billed Dowitcher	SBDO	*Limnodromus griseus*	SMSHORE
Snowy Plover	SNPL	*Charadrius alexandrinus*	SMSHORE
Spotted Sandpiper	SPSA	*Actitis macularia*	SMSHORE
Unidentified Dowitcher	DOWI	*Limnodromus* spp.	SMSHORE
Unidentified peeps	PEEP	*Calidris* spp.	SMSHORE
Western Sandpiper	WESA	*Calidris mauri*	SMSHORE
Western Sandpiper or Dunlin	WESA/DUNL	*Calidris* spp.	SMSHORE
Western Sandpiper or Least Sandpiper	WESA/LESA	*Calidris* spp.	SMSHORE
Arctic Tern	ARTE	*Sterna paradiaea*	TERN
Black Tern	BLTE	*Chlidonias niger*	TERN
Caspian Tern	CATE	*Sterna caspia*	TERN
Common Tern	COTE	*Sterna hirundo*	TERN
Elegant Tern	ELTE	*Sterna elegans*	TERN
Forster's Tern	FOTE	*Sterna forsteri*	TERN
Least Tern	LETE	*Sterna antillarum browni*	TERN
Unidentified tern	TERN	*Sterna* spp.	TERN

Appendix 2

This appendix presents tables (two per year/season) of guild-specific and total pond and complex waterbird abundance and richness, and year-to-year change and percent change in abundance, for the study period overall and for each of the three seasons. We recommended using these data to better understand the change in density maps.

Table A2.1. Waterbird species richness and total sightings in the survey year (September 2024 - May 2025) in South San Francisco Bay, California. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	1274	13241	8745	52	522	541	9	58	0	34	41	59	15837	42
A10	123	5725	3385	85	432	869	191	54	0	23	0	7	7323	37
A11	59	7028	1572	523	303	204	0	27	0	157	1	212	8515	40
A12	0	0	0	0	0	4522	0	0	0	11	250	0	4785	13
A13	31	46	0	7	1	390	0	0	0	309	672	0	1458	19
A14	6691	8912	3604	259	1055	64	0	46	1	72	29	43	17174	42
A15	0	0	0	0	0	888	0	0	0	22	381	0	1295	12
A16	29524	4508	4099	43	1238	910	0	113	0	1809	2081	224	40500	54
A17	7513	129	90	0	35	2096	0	13	0	2460	7079	2	19356	38
A19	3637	78	23	0	0	269	0	11	0	1116	102	0	5262	17
A22	25	0	0	0	0	1182	0	2	0	277	8989	0	10484	23
A23	2	0	0	0	0	4974	0	0	0	2118	3088	0	10186	14
A2E	2814	7116	6768	38	247	1816	9	61	0	9	0	159	12260	26
A2W	314	13430	6203	97	698	286	14	83	0	318	858	562	16649	45
A3N	10	9	8	0	7	42	0	10	0	800	661	8	1549	24
A3W	1700	35034	28182	94	763	175	5	122	0	100	81	166	38235	41
A5	11113	7543	3625	33	1343	819	0	98	0	153	1695	101	22906	47
A6S	953	50	50	0	1	0	0	8	0	179	979	0	2175	23
A7	9866	3465	1433	16	570	1793	0	34	0	147	797	101	16795	41
A8	2203	6197	4965	18	428	890	0	43	0	72	126	28	10016	47
A8S	1204	1573	805	9	237	584	3	40	0	23	323	29	4033	45
A8W	209	57	52	2	211	217	1	56	0	35	169	117	1081	41
A9	5973	5121	5081	2	210	192	0	159	0	21898	16353	66	49977	45
AB1	4704	1529	1314	5	72	17	0	43	0	2655	1070	50	10157	32
AB2	4456	2999	2794	1	396	870	1	67	0	4869	1283	203	15146	41
Alviso	94398	123790	82798	1284	8769	24610	233	1148	1	39666	47108	2137	343154	69
N1A	264	1174	223	0	340	602	2	59	0	52	90	111	2692	36

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
N2A	26	8093	1872	60	564	2131	0	143	0	125	22	39	11210	37
N3A	8712	4451	1311	1	1276	4265	2	49	0	1040	873	131	20809	39
N4	55	291	228	13	89	346	0	17	0	4947	277	28	6091	31
N4AA	4435	3134	2360	111	551	187	3	275	0	358	1037	282	10388	44
N4AB	340	6060	4592	25	918	1826	0	127	0	1	1	62	9366	34
N4B	488	1138	414	1	0	1	0	30	0	696	800	5	3162	24
N5	60	72	44	0	150	80	0	23	0	2	90	33	517	24
N6	135	1247	244	3	71	1978	2	37	0	1249	258	3	4990	32
N7	206	1858	1584	84	58	2184	0	14	0	12	83	29	4544	32
N8	102	1029	451	32	94	322	0	29	0	766	238	47	2659	30
N9	662	3046	2050	1	65	1824	0	29	1	1050	2367	3	9051	33
Coyote Hills	15485	31593	15373	331	4176	15746	9	832	1	10298	6136	773	85479	59
N1	7799	397	271	748	3	1882	1067	2	5	2395	2520	19	15776	29
N2	4544	514	4	120	1	272	215	4	63	366	3781	7	9698	25
N3	7018	1031	13	226	129	430	266	38	0	2126	8302	34	19342	34
NPP1	1054	5	1	881	0	426	135	0	10	7993	48039	0	58409	32
Dumbarton	20415	1947	289	1975	133	3010	1683	44	78	12880	62642	60	103225	45
CP3C	1697	323	290	0	23	839	0	41	0	3032	28829	30	34829	41
E1	55	903	365	14	269	77	0	53	0	36	364	138	1910	39
E10	558	4248	3914	0	21	6	0	37	0	149	242	8	5280	33
E11	2504	93	79	0	68	26	0	106	0	10109	1173	79	14169	32
E12	1849	158	112	1	44	54	0	20	8	7029	10027	53	19243	44
E13	1522	186	142	0	14	2	0	22	146	3629	12967	13	18501	33
E14	1439	40	0	1	3	3	0	70	0	1178	16666	9	19411	29
E1C	205	62	0	0	0	0	0	1	0	1426	3053	0	4747	15
E2	570	3680	1983	32	396	88	0	94	161	3887	7092	54	16054	46
E2C	6	1	0	0	1	1	0	5	0	419	1951	2	2386	22
E4	1353	75	57	8	10	25	0	43	344	6213	4480	4	12555	35
E4C	609	132	36	0	0	37	0	0	8	12425	35346	0	48567	26
E5	1775	531	153	37	0	367	175	0	2	1303	441	1	4458	23
E5C	155	146	1	0	0	1	0	1	63	2407	4491	0	7264	22
E6	813	90	43	21	2	322	1	11	3	1396	7405	31	10102	35
E6A	2539	7470	7237	37	93	257	1	91	141	1257	15250	15	27158	46
E6B	598	255	238	5	6	6	3	21	197	4363	48391	3	53845	37
E6C	1786	247	12	5	0	351	261	1	0	1838	279	1	4508	23

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
E7	131	479	96	18	514	442	345	95	475	355	3046	528	6084	38
E8	1695	677	615	0	10	1	0	20	25	8020	11800	4	22252	35
E8AE	40	0	0	0	1	1	0	10	0	43	1003	5	1103	17
E8AW	2	0	0	0	0	0	0	6	0	301	250	53	612	11
E8XN	56	979	840	0	16	0	0	2	0	1	0	12	1066	11
E8XS	126	1	0	0	0	0	0	9	0	2	127	0	265	10
E9	3213	192	4	0	26	4	0	50	0	1881	3103	1	8483	36
Eden Landing	25296	20968	16217	179	1517	2910	786	809	1573	72699	217776	1044	344852	71
M1	5302	404	251	2013	3	2355	0	0	1705	12097	15432	4	39321	28
M2	6061	165	74	741	11	2357	15	1	70	4469	15772	3	29659	33
M3	650	237	17	3386	13	1527	0	1	179	2082	14774	0	22859	26
M4	2868	340	0	10880	0	3446	0	1	0	499	947	1	19000	19
M5	196	7	0	1667	0	2276	0	0	1	2277	8492	0	14918	13
M6	91	0	0	292	0	470	0	2	0	36	6372	0	7269	17
Mowry	15168	1153	342	18979	27	12431	15	5	1955	21460	61789	8	133026	43
R1	117	1086	726	15	91	114	0	143	0	418	53956	32	55981	43
R2	24	17	0	0	0	4	0	1	0	29	12536	0	12618	13
R3	2	154	0	0	0	0	0	3	0	886	1345	0	2398	20
R4	1168	922	0	4	8	812	0	52	0	3308	6119	16	12417	40
R5	647	1	0	0	2	8	0	12	0	362	434	3	1479	25
R5S	270	3	0	0	1	1	0	9	0	1349	649	1	2284	25
RSF2U1	3454	496	136	0	25	759	0	82	1	16198	4473	270	25763	36
RSF2U2	5514	610	426	0	194	329	0	42	0	3967	1366	639	12664	40
RSF2U3	140	91	0	1	0	39	0	0	1	123	438	0	837	16
RSF2U4	122	1535	1394	0	21	0	0	16	0	0	32	13	1740	21
Ravenswood	11458	4915	2682	20	342	2066	0	360	2	26640	81348	974	128181	59
Study Area	182220	184366	117701	22768	14964	60773	2726	3198	3610	183643	476799	4996	1137917	85

Table A2.2. Change in waterbird species richness and total sightings in the survey year (September 2024 - May 2025 compared to September 2023 - May 2024) in South San Francisco Bay, California. Percent change from the previous year is listed in parentheses; New indicates sites that were new colonizations (zero abundance in the previous period). Sites that were unoccupied by a guild in both periods are listed as Unused. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	-613 (-32%)	+2510 (+23%)	+3342 (+62%)	+17 (+49%)	+156 (+43%)	+296 (+121%)	+2 (+29%)	-21 (-27%)	Unused	+30 (+750%)	+40 (+4000%)	-30 (-34%)	+2386 (+18%)	+6 (+17%)
A10	-364 (-75%)	+1797 (+46%)	+963 (+40%)	+34 (+67%)	+95 (+28%)	+817 (+1571%)	+191 (New)	+22 (+69%)	Unused	+8 (+53%)	-30 (-100%)	-63 (-90%)	+2319 (+46%)	-8 (-18%)
A11	-35 (-37%)	+3679 (+110%)	+1276 (+431%)	+516 (+7371%)	+79 (+35%)	+147 (+258%)	Unused	+13 (+93%)	Unused	+105 (+202%)	-51 (-98%)	-56 (-21%)	+4392 (+107%)	-2 (-5%)
A12	-1 (-100%)	Unused	Unused	Unused	Unused	+565 (+14%)	Unused	Unused	Unused	+9 (+450%)	+250 (New)	-2 (-100%)	+823 (+21%)	+3 (+30%)
A13	-3 (-9%)	-204 (-82%)	Unused	+4 (+133%)	-4 (-80%)	-648 (-62%)	Unused	Unused	-1 (-100%)	+192 (+164%)	-3039 (-82%)	Unused	-3707 (-72%)	-2 (-10%)
A14	-8850 (-57%)	+5149 (+137%)	+1351 (+60%)	-87 (-25%)	+225 (+27%)	-424 (-87%)	Unused	+9 (+24%)	+1 (New)	-242 (-77%)	+11 (+61%)	-767 (-95%)	-4984 (-22%)	+0 (+0%)
A15	-2 (-100%)	Unused	Unused	Unused	Unused	+123 (+16%)	Unused	Unused	Unused	-30 (-58%)	-3634 (-91%)	-3 (-100%)	-3555 (-73%)	-4 (-25%)
A16	+14896 (+102%)	+2812 (+166%)	+2900 (+242%)	+4 (+10%)	+341 (+38%)	-198 (-18%)	-1 (-100%)	-186 (-62%)	Unused	+922 (+104%)	+1629 (+360%)	-363 (-62%)	+19806 (+96%)	+2 (+4%)
A17	+4580 (+156%)	-306 (-70%)	+6 (+7%)	Unused	+30 (+600%)	+1171 (+127%)	Unused	-7 (-35%)	Unused	+1786 (+265%)	+7015 (+10961%)	-3 (-60%)	+14255 (+279%)	+4 (+12%)
A19	-307 (-8%)	-14 (-15%)	-35 (-60%)	Unused	Unused	-2739 (-91%)	Unused	+5 (+83%)	Unused	+337 (+43%)	+90 (+750%)	Unused	-2630 (-33%)	-5 (-23%)
A22	-91 (-78%)	-26 (-100%)	-1 (-100%)	Unused	Unused	-158 (-12%)	Unused	+0 (+0%)	Unused	-987 (-78%)	+7094 (+374%)	-6 (-100%)	+5818 (+125%)	-3 (-12%)
A23	+2 (New)	Unused	Unused	Unused	Unused	+2491 (+100%)	Unused	Unused	Unused	+353 (+20%)	+2888 (+1444%)	Unused	+5724 (+128%)	-2 (-12%)
A2E	+2612 (+1293%)	-264 (-4%)	-176 (-3%)	-41 (-52%)	+195 (+375%)	-1476 (-45%)	-125 (-93%)	+8 (+15%)	Unused	-8 (-47%)	-38 (-100%)	+125 (+368%)	+1106 (+10%)	-10 (-28%)
A2W	+169 (+117%)	+5050 (+60%)	+2738 (+79%)	+64 (+194%)	+45 (+7%)	+13 (+5%)	+14 (New)	-1 (-1%)	Unused	+284 (+835%)	+751 (+702%)	+497 (+765%)	+6848 (+70%)	+7 (+18%)
A3N	-139 (-93%)	-471 (-98%)	-392 (-98%)	Unused	-8 (-53%)	+37 (+740%)	Unused	-53 (-84%)	Unused	-829 (-51%)	+160 (+32%)	-22 (-73%)	-1333 (-46%)	-1 (-4%)
A3W	-7239 (-81%)	+19936 (+132%)	+14467 (+105%)	-81 (-46%)	+151 (+25%)	-131 (-43%)	-116 (-96%)	+19 (+18%)	Unused	+88 (+733%)	+3 (+4%)	+63 (+61%)	+12797 (+50%)	+0 (+0%)
A5	+8749 (+370%)	+550 (+8%)	+1516 (+72%)	-131 (-80%)	+170 (+14%)	-1469 (-64%)	-696 (-100%)	+34 (+53%)	-900 (-100%)	+88 (+135%)	+1428 (+535%)	+72 (+248%)	+8574 (+60%)	-6 (-11%)
A6S	+362 (+61%)	+7 (+16%)	+7 (+16%)	Unused	+1 (New)	-1 (-100%)	Unused	-16 (-67%)	Unused	+138 (+337%)	+958 (+4562%)	Unused	+1448 (+199%)	+8 (+53%)
A7	+2513 (+34%)	+583 (+20%)	+864 (+152%)	-11 (-41%)	-36 (-6%)	-1142 (-39%)	-169 (-100%)	+3 (+10%)	-377 (-100%)	+52 (+55%)	+463 (+139%)	+87 (+621%)	+2131 (+15%)	-6 (-13%)
A8	+1527 (+226%)	+4177 (+207%)	+3820 (+334%)	-528 (-97%)	-115 (-21%)	-442 (-33%)	Unused	-10 (-19%)	Unused	-36 (-33%)	-28 (-18%)	-28 (-50%)	+4505 (+82%)	+3 (+7%)

Pond/complex	DABBLER	DIVER	RUDU	EAREGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A8S	+793 (+193%)	+19 (+1%)	-143 (-15%)	-329 (-97%)	-21 (-8%)	-654 (-53%)	-3 (-50%)	-14 (-26%)	Unused	-92 (-80%)	+232 (+255%)	-37 (-56%)	-127 (-3%)	-1 (-2%)
A8W	-580 (-74%)	-91 (-61%)	-76 (-59%)	-56 (-97%)	+52 (+33%)	-290 (-57%)	-98 (-99%)	+42 (+300%)	Unused	-5 (-12%)	+166 (+5533%)	-37 (-24%)	-796 (-42%)	+8 (+24%)
A9	-2478 (-29%)	+2061 (+67%)	+2134 (+72%)	-2 (-50%)	-110 (-34%)	+11 (+6%)	-26 (-100%)	+131 (+468%)	-678 (-100%)	+15023 (+219%)	+12626 (+339%)	+0 (+0%)	+26587 (+114%)	+3 (+7%)
AB1	+2231 (+90%)	-2877 (-65%)	-3009 (-70%)	+5 (New)	-21 (-23%)	-62 (-78%)	Unused	-15 (-26%)	Unused	-2223 (-46%)	+427 (+66%)	-13 (-21%)	-2539 (-20%)	-2 (-6%)
AB2	-3165 (-42%)	+1665 (+125%)	+1653 (+145%)	-5 (-83%)	+208 (+111%)	-1734 (-67%)	+1 (New)	-14 (-17%)	Unused	+3571 (+275%)	+54 (+4%)	+190 (+1462%)	+767 (+5%)	-2 (-5%)
Alviso	+14567 (+18%)	+45742 (+59%)	+33205 (+67%)	-627 (-33%)	+1433 (+20%)	-5897 (-19%)	-1026 (-81%)	-51 (-4%)	-1955 (-100%)	+18534 (+88%)	+29465 (+167%)	-396 (-16%)	+100615 (+41%)	-9 (-12%)
N1A	-345 (-57%)	-281 (-19%)	-99 (-31%)	Unused	-92 (-21%)	+411 (+215%)	+2 (New)	-36 (-38%)	Unused	-863 (-94%)	-198 (-69%)	-25 (-18%)	-1448 (-35%)	-8 (-18%)
N2A	-899 (-97%)	+1455 (+22%)	-1850 (-50%)	+11 (+22%)	-15 (-3%)	+412 (+24%)	Unused	+120 (+522%)	Unused	-356 (-74%)	-36 (-62%)	+8 (+26%)	+697 (+7%)	+2 (+6%)
N3A	+6563 (+305%)	+2137 (+92%)	+57 (+5%)	+0 (+0%)	-299 (-19%)	+479 (+13%)	-133 (-99%)	-142 (-74%)	-1 (-100%)	+111 (+12%)	-2830 (-76%)	+67 (+105%)	+6081 (+41%)	-2 (-5%)
N4	+55 (New)	+84 (+41%)	+73 (+47%)	+13 (New)	+24 (+37%)	+17 (+5%)	Unused	-9 (-35%)	Unused	+1580 (+47%)	-32 (-10%)	+8 (+40%)	+1759 (+41%)	+6 (+24%)
N4AA	+3224 (+266%)	+763 (+32%)	+936 (+66%)	+107 (+2675%)	-2 (-0%)	-14 (-7%)	-47 (-94%)	+195 (+244%)	Unused	+109 (+44%)	-1333 (-56%)	-230 (-45%)	+2822 (+37%)	+3 (+7%)
N4AB	-4925 (-94%)	+3331 (+122%)	+2924 (+175%)	-21 (-46%)	-1760 (-66%)	-147 (-7%)	-47 (-100%)	-51 (-29%)	Unused	-49 (-98%)	-59 (-98%)	-3 (-5%)	-3701 (-28%)	-6 (-15%)
N4B	-64 (-12%)	+728 (+178%)	+272 (+192%)	+0 (+0%)	-1 (-100%)	-1 (-50%)	Unused	-10 (-25%)	Unused	-228 (-25%)	-460 (-37%)	+4 (+400%)	-31 (-1%)	-3 (-11%)
N5	-38 (-39%)	-77 (-52%)	-90 (-67%)	Unused	-28 (-16%)	+0 (+0%)	Unused	-9 (-28%)	Unused	-116 (-98%)	+20 (+29%)	-3 (-8%)	-253 (-33%)	+0 (+0%)
N6	+119 (+744%)	+933 (+297%)	+177 (+264%)	+3 (New)	-47 (-40%)	+375 (+23%)	+2 (New)	+22 (+147%)	Unused	+1237 (+10308%)	-645 (-71%)	-6 (-67%)	+1999 (+67%)	+7 (+28%)
N7	+113 (+122%)	+767 (+70%)	+1142 (+258%)	+71 (+546%)	-112 (-66%)	-273 (-11%)	Unused	-18 (-56%)	Unused	-63 (-84%)	-589 (-88%)	-124 (-81%)	-234 (-5%)	+3 (+10%)
N8	+74 (+264%)	+672 (+188%)	+263 (+140%)	+32 (New)	+19 (+25%)	-15 (-4%)	Unused	+0 (+0%)	Unused	+755 (+6864%)	-482 (-67%)	+46 (+4600%)	+721 (+37%)	+3 (+11%)
N9	+504 (+319%)	+2011 (+194%)	+1441 (+237%)	+1 (New)	-612 (-90%)	-761 (-29%)	-2 (-100%)	+3 (+12%)	+1 (New)	+836 (+391%)	+474 (+25%)	-2 (-40%)	+2448 (+37%)	+0 (+0%)
Coyote Hills	+4381 (+39%)	+12523 (+66%)	+5246 (+52%)	+217 (+190%)	-2925 (-41%)	+483 (+3%)	-225 (-96%)	+65 (+8%)	+0 (+0%)	+2953 (+40%)	-6170 (-50%)	-260 (-25%)	+10860 (+15%)	+1 (+2%)
N1	+2472 (+46%)	-909 (-70%)	+152 (+128%)	+410 (+121%)	-5 (-62%)	-548 (-23%)	-1029 (-49%)	+0 (+0%)	-16 (-76%)	+1626 (+211%)	+1749 (+227%)	+8 (+73%)	+4775 (+43%)	+0 (+0%)
N2	+4507 (+12181%)	+478 (+1328%)	+2 (+100%)	+104 (+650%)	-3 (-75%)	+251 (+1195%)	+215 (New)	-6 (-60%)	+63 (New)	+337 (+1162%)	+3751 (+12503%)	+6 (+600%)	+9478 (+4308%)	+6 (+32%)
N3	+6989 (+24100%)	+964 (+1439%)	+11 (+550%)	+219 (+3129%)	+87 (+207%)	+357 (+489%)	+266 (New)	+11 (+41%)	Unused	+622 (+41%)	+7418 (+839%)	+14 (+70%)	+16682 (+627%)	+5 (+17%)
NPP1	-2578 (-71%)	-218 (-98%)	-41 (-98%)	+161 (+22%)	-2 (-100%)	-146 (-26%)	-123 (-48%)	-4 (-100%)	+8 (+400%)	+6193 (+344%)	+40238 (+516%)	Unused	+43617 (+295%)	+4 (+14%)

Pond/complex	DABBLER	DIVER	RUDU	EAREGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
Dumbarton	+11390 (+126%)	+315 (+19%)	+124 (+75%)	+894 (+83%)	+77 (+138%)	-86 (-3%)	-671 (-29%)	+1 (+2%)	+55 (+239%)	+8778 (+214%)	+53156 (+560%)	+28 (+88%)	+74552 (+260%)	+3 (+7%)
CP3C	-1325 (-44%)	-833 (-72%)	-712 (-71%)	-1 (-100%)	-14 (-38%)	+20 (+2%)	-26 (-100%)	-1 (-2%)	Unused	+1243 (+69%)	+21407 (+288%)	-80 (-73%)	+20327 (+140%)	+2 (+5%)
E1	+19 (+53%)	-2266 (-72%)	-1169 (-76%)	+14 (New)	-50 (-16%)	-79 (-51%)	Unused	+27 (+104%)	Unused	-523 (-94%)	+167 (+85%)	+35 (+34%)	-2661 (-58%)	+5 (+15%)
E10	-570 (-51%)	+871 (+26%)	+1264 (+48%)	Unused	-130 (-86%)	-54 (-90%)	-49 (-100%)	-91 (-71%)	Unused	-1323 (-90%)	-391 (-62%)	-58 (-88%)	-1735 (-25%)	-6 (-15%)
E11	+2320 (+1261%)	-337 (-78%)	+49 (+163%)	Unused	+30 (+79%)	+21 (+420%)	Unused	+90 (+562%)	Unused	+8967 (+785%)	+950 (+426%)	+73 (+1217%)	+12117 (+590%)	+6 (+23%)
E12	-1488 (-45%)	-645 (-80%)	-98 (-47%)	-2 (-67%)	-56 (-56%)	-107 (-66%)	-1 (-100%)	-108 (-84%)	-402 (-98%)	+4087 (+139%)	+3648 (+57%)	-162 (-75%)	+4763 (+33%)	-1 (-2%)
E13	+633 (+71%)	-227 (-55%)	-204 (-59%)	-2 (-100%)	+10 (+250%)	-73 (-97%)	Unused	+3 (+16%)	-975 (-87%)	+2135 (+143%)	-2032 (-14%)	+11 (+550%)	-517 (-3%)	-7 (-18%)
E14	+1396 (+3247%)	+40 (New)	Unused	+1 (New)	+3 (New)	+2 (+200%)	Unused	+54 (+338%)	-3 (-100%)	+1046 (+792%)	-1185 (-7%)	+8 (+800%)	+1356 (+8%)	+7 (+32%)
E1C	-73 (-26%)	-64 (-51%)	-2 (-100%)	Unused	Unused	Unused	Unused	-6 (-86%)	Unused	+640 (+81%)	+1357 (+80%)	Unused	+1854 (+64%)	-7 (-32%)
E2	-730 (-56%)	+222 (+6%)	-687 (-26%)	+31 (+3100%)	+175 (+79%)	-1 (-1%)	-11 (-100%)	-128 (-58%)	+118 (+274%)	+3001 (+339%)	-402 (-5%)	-71 (-57%)	+2200 (+16%)	-5 (-10%)
E2C	-635 (-99%)	-3 (-75%)	-1 (-100%)	Unused	+1 (New)	-5 (-83%)	Unused	-13 (-72%)	Unused	-140 (-25%)	-2234 (-53%)	+0 (+0%)	-3030 (-56%)	-5 (-19%)
E4	-58 (-4%)	-197 (-72%)	+42 (+280%)	+8 (New)	-7 (-41%)	-24 (-49%)	Unused	-48 (-53%)	+344 (New)	+4238 (+215%)	+3067 (+217%)	-2 (-33%)	+7317 (+140%)	+3 (+9%)
E4C	+357 (+142%)	-226 (-63%)	-27 (-43%)	Unused	-1 (-100%)	-107 (-74%)	Unused	-3 (-100%)	+8 (New)	+10279 (+479%)	+23276 (+193%)	Unused	+33586 (+224%)	+1 (+4%)
E5	-289 (-14%)	+449 (+548%)	+108 (+240%)	+34 (+1133%)	Unused	+140 (+62%)	+175 (New)	-1 (-100%)	-1045 (-100%)	-93 (-7%)	+287 (+186%)	-27 (-96%)	-547 (-11%)	+0 (+0%)
E5C	-1154 (-88%)	+49 (+51%)	+1 (New)	Unused	Unused	-2 (-67%)	Unused	-8 (-89%)	+62 (+6200%)	+1635 (+212%)	-407 (-8%)	-7 (-100%)	+166 (+2%)	-3 (-12%)
E6	+356 (+78%)	-190 (-68%)	-138 (-76%)	+14 (+200%)	+2 (New)	+232 (+258%)	+1 (New)	+11 (New)	-339 (-99%)	+1110 (+388%)	+5655 (+323%)	+31 (New)	+6864 (+212%)	+9 (+35%)
E6A	-405 (-14%)	+2789 (+60%)	+3002 (+71%)	+29 (+362%)	+30 (+48%)	+49 (+24%)	+1 (New)	+35 (+62%)	+141 (New)	+300 (+31%)	+8580 (+129%)	-21 (-58%)	+11494 (+73%)	-1 (-2%)
E6B	-91 (-13%)	-1721 (-87%)	-1629 (-87%)	+5 (New)	+5 (+500%)	-27 (-82%)	+3 (New)	+13 (+162%)	+197 (New)	+3098 (+245%)	+37132 (+330%)	-1 (-25%)	+38609 (+253%)	+5 (+16%)
E6C	+211 (+13%)	+160 (+184%)	-15 (-56%)	+3 (+150%)	Unused	+305 (+663%)	+217 (+493%)	-1 (-50%)	Unused	+508 (+38%)	-708 (-72%)	-6 (-86%)	+471 (+12%)	-1 (-4%)
E7	-3916 (-97%)	-81 (-14%)	+82 (+586%)	+18 (New)	+433 (+535%)	+424 (+2356%)	+338 (+4829%)	+35 (+58%)	+432 (+1005%)	-446 (-56%)	+2804 (+1159%)	-91 (-15%)	-387 (-6%)	+4 (+12%)
E8	+229 (+16%)	+308 (+83%)	+432 (+236%)	Unused	+10 (New)	-1 (-50%)	Unused	+1 (+5%)	+1 (+4%)	+4917 (+158%)	+9920 (+528%)	+2 (+100%)	+15365 (+223%)	+0 (+0%)
E8AE	-8 (-17%)	-30 (-100%)	Unused	Unused	+0 (+0%)	+0 (+0%)	Unused	+1 (+11%)	Unused	-387 (-90%)	+90 (+10%)	+5 (New)	-329 (-23%)	-2 (-11%)
E8AW	-378 (-99%)	-16 (-100%)	Unused	Unused	-2 (-100%)	-4 (-100%)	Unused	-7 (-54%)	Unused	-919 (-75%)	+243 (+3471%)	+51 (+2550%)	-1032 (-63%)	-7 (-39%)

Pond/complex	DABBLER	DIVER	RUDU	EAREGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
E8XN	+36 (+180%)	+320 (+49%)	+506 (+151%)	Unused	+9 (+129%)	Unused	Unused	-11 (-85%)	Unused	+0 (+0%)	Unused	+7 (+140%)	+361 (+51%)	-5 (-31%)
E8XS	+78 (+162%)	-1 (-50%)	Unused	Unused	Unused	Unused	Unused	+4 (+80%)	Unused	+1 (+100%)	+77 (+154%)	Unused	+159 (+150%)	+1 (+11%)
E9	+135 (+4%)	+35 (+22%)	-7 (-64%)	Unused	+8 (+44%)	-1 (-20%)	Unused	-9 (-15%)	Unused	-256 (-12%)	-883 (-22%)	+1 (New)	-958 (-10%)	+2 (+6%)
Eden Landing	-5350 (-17%)	-1594 (-7%)	+797 (+5%)	+152 (+563%)	+456 (+43%)	+708 (+32%)	+648 (+470%)	-161 (-17%)	-1461 (-48%)	+43118 (+146%)	+110418 (+103%)	-302 (-22%)	+145813 (+73%)	-1 (-1%)
M1	+1813 (+52%)	-261 (-39%)	-390 (-61%)	-2872 (-59%)	-3 (-50%)	+437 (+23%)	Unused	-1 (-100%)	+1705 (New)	+9195 (+317%)	+2285 (+17%)	+4 (New)	+12254 (+45%)	+0 (+0%)
M2	-10059 (-62%)	-671 (-80%)	-189 (-72%)	-3805 (-84%)	+9 (+450%)	+267 (+13%)	+15 (New)	+0 (+0%)	-5 (-7%)	+1653 (+59%)	+2874 (+22%)	-3 (-50%)	-9751 (-25%)	+5 (+18%)
M3	-2948 (-82%)	-228 (-49%)	-34 (-67%)	-5133 (-60%)	+13 (New)	-374 (-20%)	Unused	+0 (+0%)	+179 (New)	-68 (-3%)	+3811 (+35%)	Unused	-4752 (-17%)	-1 (-4%)
M4	+1223 (+74%)	-30 (-8%)	-3 (-100%)	+6091 (+127%)	Unused	+1026 (+42%)	Unused	-2 (-67%)	Unused	+434 (+668%)	+351 (+59%)	+1 (New)	+9100 (+92%)	-1 (-5%)
M5	-86 (-30%)	-91 (-93%)	Unused	+285 (+21%)	Unused	+469 (+26%)	Unused	Unused	+1 (New)	+2159 (+1830%)	+1760 (+26%)	Unused	+4495 (+43%)	-6 (-32%)
M6	+86 (+1720%)	-882 (-100%)	Unused	+242 (+484%)	Unused	+105 (+29%)	Unused	+2 (New)	Unused	+18 (+100%)	+215 (+3%)	Unused	-215 (-3%)	-3 (-15%)
Mowry	-9971 (-40%)	-2163 (-65%)	-616 (-64%)	-5192 (-21%)	+19 (+238%)	+1930 (+18%)	+15 (New)	-1 (-17%)	+1880 (+2507%)	+13391 (+166%)	+11296 (+22%)	+2 (+33%)	+11131 (+9%)	+0 (+0%)
R1	-275 (-70%)	+191 (+21%)	+134 (+23%)	+13 (+650%)	-131 (-59%)	+86 (+307%)	Unused	-3 (-2%)	Unused	-1171 (-74%)	+2795 (+5%)	-22 (-41%)	+1462 (+3%)	+3 (+8%)
R2	+11 (+85%)	-158 (-90%)	Unused	Unused	Unused	-120 (-97%)	-1 (-100%)	+0 (+0%)	-12 (-100%)	-253 (-90%)	-7148 (-36%)	-7 (-100%)	-7682 (-38%)	-10 (-43%)
R3	-614 (-100%)	-180 (-54%)	Unused	-2 (-100%)	-2 (-100%)	Unused	Unused	-6 (-67%)	Unused	+554 (+167%)	+1180 (+715%)	-13 (-100%)	+839 (+54%)	-4 (-17%)
R4	+1155 (+8885%)	+922 (New)	Unused	+4 (New)	+7 (+700%)	+783 (+2700%)	Unused	+46 (+767%)	Unused	+2858 (+635%)	-47 (-1%)	-46 (-74%)	+5665 (+84%)	+20 (+100%)
R5	+600 (+1277%)	+0 (+0%)	Unused	Unused	+2 (New)	+8 (New)	Unused	+8 (+200%)	Unused	+273 (+307%)	+4 (+1%)	+3 (New)	+782 (+112%)	+7 (+39%)
R5S	+225 (+500%)	-5 (-62%)	Unused	Unused	+1 (New)	+1 (New)	Unused	+6 (+200%)	Unused	+1272 (+1652%)	+509 (+364%)	+1 (New)	+1997 (+696%)	+11 (+79%)
RSF2U1	+2184 (+172%)	-146 (-23%)	+23 (+20%)	-2 (-100%)	-27 (-52%)	+323 (+74%)	Unused	-2 (-2%)	+1 (New)	+4400 (+37%)	+1767 (+65%)	-29 (-10%)	+8465 (+49%)	-5 (-12%)
RSF2U2	+4117 (+295%)	+265 (+77%)	+182 (+75%)	Unused	+44 (+29%)	-58 (-15%)	Unused	+11 (+35%)	Unused	-2738 (-41%)	-262 (-16%)	+353 (+123%)	+1717 (+16%)	+0 (+0%)
RSF2U3	+108 (+338%)	-39 (-30%)	Unused	+1 (New)	-1 (-100%)	-34 (-47%)	Unused	Unused	+1 (New)	+13 (+12%)	-1178 (-73%)	Unused	-1134 (-58%)	-5 (-24%)
RSF2U4	+90 (+281%)	-68 (-4%)	-98 (-7%)	Unused	-4 (-16%)	Unused	Unused	+10 (+167%)	Unused	-24 (-100%)	+0 (+0%)	+11 (+550%)	+9 (+1%)	+1 (+5%)
Ravenswood	+7601 (+197%)	+782 (+19%)	+241 (+10%)	+14 (+233%)	-111 (-25%)	+989 (+92%)	-1 (-100%)	+70 (+24%)	-10 (-83%)	+5184 (+24%)	-2380 (-3%)	+251 (+35%)	+12120 (+10%)	+5 (+9%)
Study Area	+22618 (+14%)	+55605 (+43%)	+38997 (+50%)	-4542 (-17%)	-1051 (-7%)	-1873 (-3%)	-1260 (-32%)	-77 (-2%)	-1491 (-29%)	+91958 (+100%)	+195785 (+70%)	-677 (-12%)	+355091 (+45%)	-2 (-2%)

Table A2.3. Waterbird species richness and total sightings in fall (September 2024 - November 2024) in South San Francisco Bay, California. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	225	2686	2287	11	353	17	5	30	0	17	37	23	3399	31
A10	50	432	423	0	198	13	0	13	0	8	0	4	718	20
A11	18	681	265	0	182	65	0	9	0	15	0	205	1175	23
A12	0	0	0	0	0	2547	0	0	0	0	0	0	2547	3
A13	0	0	0	0	0	35	0	0	0	0	156	0	191	5
A14	2231	1554	1068	4	923	25	0	24	1	59	27	26	4874	31
A15	0	0	0	0	0	709	0	0	0	0	127	0	836	3
A16	4547	784	749	18	963	697	0	56	0	954	1295	52	9366	44
A17	4165	13	13	0	21	563	0	6	0	1220	62	0	6050	25
A19	2374	2	2	0	0	149	0	9	0	971	86	0	3591	13
A22	0	0	0	0	0	0	0	0	0	0	8	0	8	2
A23	0	0	0	0	0	45	0	0	0	0	0	0	45	2
A2E	2	231	221	13	154	21	9	37	0	2	0	108	568	17
A2W	36	2651	2320	5	605	96	0	25	0	34	291	367	4110	33
A3N	2	4	4	0	0	30	0	5	0	42	58	0	141	14
A3W	1289	12131	12107	31	592	111	5	100	0	33	3	46	14336	33
A5	2877	3005	893	3	1125	120	0	49	0	83	822	80	8164	41
A6S	374	0	0	0	0	0	0	5	0	9	380	0	771	13
A7	4731	2295	612	2	415	13	0	9	0	34	361	101	7961	33
A8	1817	2123	1583	0	304	41	0	31	0	65	120	16	4517	35
A8S	214	247	223	0	107	68	3	7	0	9	306	5	963	28
A8W	69	5	5	0	179	45	1	45	0	27	155	107	632	32
A9	276	10	10	0	140	100	0	92	0	11509	4730	29	16886	25
AB1	1219	24	23	0	19	1	0	11	0	14	0	0	1288	15
AB2	2388	747	746	1	328	18	1	30	0	3047	1098	192	7849	33
Alviso	28904	29625	23554	88	6608	5529	24	593	1	18152	10122	1361	100986	60
N1A	68	21	4	0	209	88	2	27	0	40	15	62	530	22
N2A	9	298	64	10	365	344	0	132	0	73	1	32	1264	27
N3A	1783	2224	1	0	1053	336	2	43	0	675	303	91	6510	30
N4	18	27	17	13	48	2	0	4	0	1523	97	6	1738	20
N4AA	909	975	672	109	500	161	3	253	0	24	582	188	3701	38
N4AB	320	1907	1072	10	787	270	0	115	0	1	0	31	3441	27
N4B	190	0	0	1	0	1	0	23	0	514	655	5	1389	17
N5	2	0	0	0	65	5	0	6	0	0	76	28	182	12
N6	89	4	0	0	52	78	2	32	0	1241	192	2	1690	14
N7	2	332	127	27	25	56	0	9	0	4	31	21	507	17
N8	25	5	1	13	49	82	0	27	0	757	228	45	1231	21
N9	168	11	8	0	51	79	0	13	1	606	889	2	1820	25
Coyote Hills	3583	5804	1966	183	3204	1502	9	684	1	5458	3069	513	24003	53
N1	4718	1	0	8	0	652	18	1	3	1507	2193	0	9083	21
N2	2551	4	4	12	0	53	0	4	0	210	3498	0	6332	16
N3	4889	723	3	30	111	109	9	17	0	1536	5301	0	12716	24
NPP1	19	0	0	0	0	212	0	0	0	1766	13843	0	15840	18
Dumbarton	12177	728	7	50	111	1026	27	22	3	5019	24835	0	43971	35

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
CP3C	503	0	0	0	3	635	0	6	0	1225	14647	0	17019	22
E1	49	0	0	0	175	67	0	19	0	1	14	87	412	19
E10	15	54	0	0	4	0	0	27	0	7	196	1	304	15
E11	90	0	0	0	1	0	0	8	0	5364	1152	0	6615	14
E12	234	1	1	0	38	35	0	11	8	4894	7955	4	13180	37
E13	52	11	0	0	0	0	0	9	146	1006	7129	0	8353	24
E14	192	3	0	0	0	0	0	40	0	71	449	0	755	15
E1C	2	0	0	0	0	0	0	1	0	666	1823	0	2492	12
E2	90	288	21	14	257	80	0	36	161	1515	4256	24	6721	38
E2C	6	1	0	0	0	0	0	5	0	233	608	0	853	16
E4	366	0	0	7	8	16	0	9	342	3006	4048	1	7803	27
E4C	367	0	0	0	0	36	0	0	0	3815	25007	0	29225	15
E5	144	0	0	4	0	187	0	0	2	1246	389	0	1972	12
E5C	16	0	0	0	0	1	0	1	0	1585	1676	0	3279	16
E6	288	1	1	4	1	221	0	7	3	1327	3086	2	4940	18
E6A	206	224	218	10	28	128	1	53	141	306	2133	1	3230	34
E6B	350	2	2	0	0	0	0	5	197	4123	28656	1	33334	21
E6C	7	0	0	0	0	0	0	0	0	172	18	0	197	4
E7	90	29	0	4	487	94	1	70	475	108	2885	292	4534	29
E8	134	0	0	0	0	0	0	7	25	5787	9657	1	15611	20
E8AE	0	0	0	0	1	0	0	8	0	5	0	1	15	6
E8AW	0	0	0	0	0	0	0	4	0	10	0	53	67	4
E8XN	7	9	9	0	9	0	0	1	0	0	0	1	27	7
E8XS	0	0	0	0	0	0	0	6	0	1	0	0	7	3
E9	108	0	0	0	4	3	0	26	0	195	6	0	342	12
Eden Landing	3316	623	252	43	1016	1503	2	359	1500	36668	115790	469	161287	59
M1	5254	45	45	1177	2	3	0	0	58	4775	11954	0	23268	18
M2	4918	63	60	240	11	10	0	0	0	3429	9972	0	18643	21
M3	540	1	1	763	13	369	0	1	179	899	9530	0	12295	19
M4	2269	0	0	368	0	537	0	1	0	177	243	1	3596	12
M5	16	0	0	0	0	37	0	0	0	85	1203	0	1341	6
M6	0	0	0	0	0	0	0	2	0	3	1805	0	1810	7
Mowry	12997	109	106	2548	26	956	0	4	237	9368	34707	1	60953	31
R1	25	111	108	0	63	56	0	94	0	347	38059	10	38765	30
R2	0	0	0	0	0	0	0	0	0	0	1066	0	1066	3
R3	0	0	0	0	0	0	0	0	0	12	161	0	173	4
R4	0	0	0	0	6	18	0	42	0	1449	4217	2	5734	19
R5	16	0	0	0	0	0	0	0	0	20	5	0	41	7
R5S	3	0	0	0	0	0	0	1	0	3	0	0	7	3
RSF2U1	2451	22	17	0	18	471	0	52	1	12849	1975	35	17874	32
RSF2U2	3903	321	302	0	102	130	0	20	0	2772	127	27	7402	29
RSF2U3	0	0	0	0	0	0	0	0	0	52	231	0	283	4
RSF2U4	57	222	203	0	8	0	0	9	0	0	32	1	329	16
Ravenswood	6455	676	630	0	197	675	0	218	1	17504	45873	75	71674	44
Study Area	67432	37565	26515	2912	11162	11191	62	1880	1743	92169	234396	2419	462874	75

Table A2.4. Change in waterbird species richness and total sightings in fall (September 2024 - November 2024 compared to September 2023 - November 2023) in South San Francisco Bay, California. Percent change from the previous year is listed in parentheses; New indicates sites that were new colonizations (zero abundance in the previous period). Sites that were unoccupied by a guild in both periods are listed as Unused. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	+70 (+45%)	-1107 (-29%)	+28 (+1%)	-1 (-8%)	+144 (+69%)	-173 (-91%)	-2 (-29%)	-21 (-41%)	Unused	+14 (+467%)	+36 (+3600%)	-21 (-48%)	-1059 (-24%)	+1 (+3%)
A10	-23 (-32%)	-435 (-50%)	+293 (+225%)	Unused	-6 (-3%)	+2 (+18%)	Unused	-3 (-19%)	Unused	-5 (-38%)	-15 (-100%)	-58 (-94%)	-543 (-43%)	-8 (-29%)
A11	+12 (+200%)	-1947 (-74%)	+110 (+71%)	Unused	+40 (+28%)	+36 (+124%)	Unused	+3 (+50%)	Unused	+7 (+88%)	-40 (-100%)	-58 (-22%)	-1947 (-62%)	-3 (-12%)
A12	Unused	Unused	Unused	Unused	Unused	-555 (-18%)	Unused	Unused	Unused	Unused	Unused	-2 (-100%)	-557 (-18%)	-2 (-40%)
A13	Unused	Unused	Unused	Unused	-5 (-100%)	-421 (-92%)	Unused	Unused	-1 (-100%)	Unused	-383 (-71%)	Unused	-810 (-81%)	+0 (+0%)
A14	-1631 (-42%)	+519 (+50%)	+270 (+34%)	+2 (+100%)	+534 (+137%)	-381 (-94%)	Unused	+12 (+100%)	+1 (New)	-68 (-54%)	+10 (+59%)	-703 (-96%)	-1705 (-26%)	-2 (-6%)
A15	Unused	Unused	Unused	Unused	Unused	+521 (+277%)	Unused	Unused	Unused	Unused	-430 (-77%)	-3 (-100%)	+88 (+12%)	-3 (-50%)
A16	+1358 (+43%)	+408 (+109%)	+419 (+127%)	+1 (+6%)	+262 (+37%)	+37 (+6%)	-1 (-100%)	-165 (-75%)	Unused	+490 (+106%)	+857 (+196%)	+30 (+136%)	+3276 (+54%)	+0 (+0%)
A17	+3389 (+437%)	+4 (+44%)	+5 (+62%)	Unused	+21 (New)	+560 (+18667%)	Unused	-7 (-54%)	Unused	+1078 (+759%)	+61 (+6100%)	Unused	+5105 (+540%)	+10 (+67%)
A19	+168 (+8%)	+1 (+100%)	+2 (New)	Unused	Unused	-137 (-48%)	Unused	+5 (+125%)	Unused	+604 (+165%)	+80 (+1333%)	Unused	+721 (+25%)	+4 (+44%)
A22	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	-1 (-11%)	Unused	-1 (-11%)	+1 (+100%)
A23	Unused	Unused	Unused	Unused	Unused	-190 (-81%)	Unused	Unused	Unused	Unused	Unused	Unused	-190 (-81%)	-3 (-60%)
A2E	-28 (-93%)	-1183 (-84%)	-1178 (-84%)	-3 (-19%)	+143 (+1300%)	-9 (-30%)	+9 (New)	+11 (+42%)	Unused	-10 (-83%)	-20 (-100%)	+106 (+5300%)	-993 (-64%)	-7 (-29%)
A2W	-12 (-25%)	-658 (-20%)	+894 (+63%)	-15 (-75%)	+418 (+224%)	-96 (-50%)	Unused	-7 (-22%)	Unused	+11 (+48%)	+283 (+3538%)	+360 (+5143%)	+284 (+7%)	+1 (+3%)
A3N	+2 (New)	+4 (New)	+4 (New)	Unused	Unused	+27 (+900%)	Unused	+3 (+150%)	Unused	-1028 (-96%)	-277 (-83%)	-1 (-100%)	-1270 (-90%)	+3 (+27%)
A3W	+862 (+202%)	+6991 (+136%)	+6978 (+136%)	+19 (+158%)	+538 (+996%)	+44 (+66%)	+5 (New)	+72 (+257%)	Unused	+27 (+450%)	-54 (-95%)	+44 (+2200%)	+8535 (+147%)	+7 (+27%)
A5	+1894 (+193%)	+910 (+43%)	+167 (+23%)	-10 (-77%)	+696 (+162%)	+67 (+126%)	Unused	+33 (+206%)	Unused	+34 (+69%)	+645 (+364%)	+61 (+321%)	+4330 (+113%)	-2 (-5%)
A6S	+226 (+153%)	-1 (-100%)	-1 (-100%)	Unused	Unused	-1 (-100%)	Unused	-15 (-75%)	Unused	+9 (New)	+380 (New)	Unused	+601 (+354%)	+4 (+44%)
A7	-488 (-9%)	+177 (+8%)	+324 (+112%)	-7 (-78%)	+113 (+37%)	-19 (-59%)	Unused	-1 (-10%)	Unused	-49 (-59%)	+113 (+46%)	+91 (+910%)	-71 (-1%)	-4 (-11%)
A8	+1321 (+266%)	+1581 (+292%)	+1347 (+571%)	-2 (-100%)	-130 (-30%)	-279 (-87%)	Unused	+6 (+24%)	Unused	-8 (-11%)	+20 (+20%)	-32 (-67%)	+2477 (+121%)	-4 (-10%)
A8S	+12 (+6%)	+41 (+20%)	+86 (+63%)	-8 (-100%)	-14 (-12%)	+37 (+119%)	+3 (New)	-15 (-68%)	Unused	-57 (-86%)	+292 (+2086%)	-58 (-92%)	+230 (+31%)	+1 (+4%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A8W	-133 (-66%)	+0 (+0%)	+0 (+0%)	Unused	+85 (+90%)	+25 (+125%)	-1 (-50%)	+40 (+800%)	Unused	-1 (-4%)	+152 (+5067%)	-42 (-28%)	+126 (+25%)	+9 (+39%)
A9	-103 (-27%)	-43 (-81%)	-8 (-44%)	-4 (-100%)	+52 (+59%)	+86 (+614%)	Unused	+79 (+608%)	-678 (-100%)	+8600 (+296%)	+3091 (+189%)	+27 (+1350%)	+11107 (+192%)	-1 (-4%)
AB1	+939 (+335%)	-1704 (-99%)	-1696 (-99%)	Unused	-46 (-71%)	-6 (-86%)	Unused	+0 (+0%)	Unused	-11 (-44%)	-10 (-100%)	-1 (-100%)	-839 (-39%)	-5 (-25%)
AB2	-791 (-25%)	+311 (+71%)	+311 (+71%)	-2 (-67%)	+194 (+145%)	-231 (-93%)	+1 (New)	-21 (-41%)	Unused	+2659 (+685%)	+1062 (+2950%)	+192 (New)	+3372 (+75%)	+3 (+10%)
Alviso	+7044 (+32%)	+3869 (+15%)	+8355 (+55%)	-30 (-25%)	+3039 (+85%)	-1056 (-16%)	+14 (+140%)	+9 (+2%)	-678 (-100%)	+12296 (+210%)	+5852 (+137%)	-68 (-5%)	+30267 (+43%)	-6 (-9%)
N1A	-245 (-78%)	+14 (+200%)	+4 (New)	Unused	+28 (+15%)	+45 (+105%)	+2 (New)	-14 (-34%)	Unused	-271 (-87%)	-65 (-81%)	-48 (-44%)	-556 (-51%)	-2 (-8%)
N2A	-907 (-99%)	+104 (+54%)	+29 (+83%)	+6 (+150%)	+58 (+19%)	+92 (+37%)	Unused	+120 (+1000%)	Unused	-271 (-79%)	-57 (-98%)	+5 (+19%)	-850 (-40%)	-1 (-4%)
N3A	+1733 (+3466%)	+2048 (+1164%)	+1 (New)	Unused	-229 (-18%)	-185 (-36%)	-130 (-98%)	-132 (-75%)	Unused	+255 (+61%)	-949 (-76%)	+71 (+355%)	+2612 (+67%)	+8 (+36%)
N4	+18 (New)	+27 (New)	+17 (New)	+13 (New)	+13 (+37%)	+0 (+0%)	Unused	+2 (+100%)	Unused	+555 (+57%)	-155 (-62%)	+3 (+100%)	+476 (+38%)	+5 (+33%)
N4AA	+737 (+428%)	+975 (New)	+672 (New)	+109 (New)	+21 (+4%)	+6 (+4%)	-44 (-94%)	+216 (+584%)	Unused	-69 (-74%)	-496 (-46%)	+104 (+124%)	+1603 (+76%)	+11 (+41%)
N4AB	-772 (-71%)	+1812 (+1907%)	+1072 (New)	+10 (New)	-1621 (-67%)	+0 (+0%)	-47 (-100%)	-33 (-22%)	Unused	-42 (-98%)	-59 (-100%)	-8 (-21%)	-713 (-17%)	+2 (+8%)
N4B	+158 (+494%)	-1 (-100%)	Unused	+1 (New)	-1 (-100%)	+1 (New)	Unused	-7 (-23%)	Unused	-33 (-6%)	-260 (-28%)	+5 (New)	-137 (-9%)	-1 (-6%)
N5	+2 (New)	-4 (-100%)	Unused	Unused	+24 (+59%)	+3 (+150%)	Unused	+3 (+100%)	Unused	-113 (-100%)	+29 (+62%)	+27 (+2700%)	-29 (-14%)	+3 (+33%)
N6	+89 (New)	+4 (New)	Unused	Unused	+47 (+940%)	+78 (New)	+2 (New)	+22 (+220%)	Unused	+1238 (+41267%)	-544 (-74%)	-1 (-33%)	+933 (+123%)	+1 (+8%)
N7	-11 (-85%)	+332 (New)	+127 (New)	+27 (New)	-90 (-78%)	-175 (-76%)	Unused	+2 (+29%)	Unused	-70 (-95%)	-564 (-95%)	-130 (-86%)	-679 (-57%)	+1 (+6%)
N8	+25 (New)	+5 (New)	+1 (New)	+13 (New)	+35 (+250%)	+73 (+811%)	Unused	+14 (+108%)	Unused	+755 (+37750%)	+36 (+19%)	+44 (+4400%)	+1000 (+433%)	+8 (+62%)
N9	+168 (New)	+11 (New)	+8 (New)	Unused	-552 (-92%)	-43 (-35%)	Unused	+4 (+44%)	+1 (New)	+564 (+1343%)	-417 (-32%)	+2 (New)	-262 (-13%)	+7 (+39%)
Coyote Hills	+995 (+38%)	+5327 (+1117%)	+1931 (+5517%)	+179 (+4475%)	-2267 (-41%)	-105 (-7%)	-217 (-96%)	+197 (+40%)	+1 (New)	+2498 (+84%)	-3501 (-53%)	+74 (+17%)	+3398 (+16%)	+9 (+20%)
N1	+3511 (+291%)	-23 (-96%)	-5 (-100%)	-28 (-78%)	-3 (-100%)	-534 (-45%)	-885 (-98%)	+0 (+0%)	-2 (-40%)	+1047 (+228%)	+1695 (+340%)	Unused	+5663 (+166%)	-1 (-5%)
N2	+2550 (+255000%)	-6 (-60%)	+2 (+100%)	-4 (-25%)	Unused	+53 (New)	Unused	-1 (-20%)	Unused	+200 (+2000%)	+3481 (+20476%)	Unused	+6273 (+10632%)	+7 (+78%)
N3	+4864 (+19456%)	+711 (+5925%)	+1 (+50%)	+23 (+329%)	+87 (+362%)	+43 (+65%)	+9 (New)	+1 (+6%)	Unused	+166 (+12%)	+5004 (+1685%)	Unused	+10899 (+600%)	+6 (+33%)
NPP1	-737 (-97%)	-106 (-100%)	Unused	-10 (-100%)	-1 (-100%)	+24 (+13%)	-173 (-100%)	-2 (-100%)	-2 (-100%)	+1364 (+339%)	+11353 (+456%)	Unused	+11883 (+300%)	-4 (-18%)
Dumbarton	+10188 (+512%)	+576 (+379%)	-2 (-22%)	-19 (-28%)	+83 (+296%)	-414 (-29%)	-1049 (-97%)	-2 (-8%)	-4 (-57%)	+2777 (+124%)	+21533 (+652%)	Unused	+34718 (+375%)	+5 (+17%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
CP3C	+498 (+9960%)	Unused	Unused	Unused	-10 (-77%)	+262 (+70%)	-26 (-100%)	-4 (-40%)	Unused	+958 (+359%)	+13156 (+882%)	-16 (-100%)	+14844 (+682%)	+0 (+0%)
E1	+48 (+4800%)	-8 (-100%)	-5 (-100%)	Unused	-71 (-29%)	-71 (-51%)	Unused	+6 (+46%)	Unused	-56 (-98%)	+14 (New)	+48 (+123%)	-90 (-18%)	+2 (+12%)
E10	-9 (-38%)	+10 (+23%)	-4 (-100%)	Unused	-131 (-97%)	-52 (-100%)	-49 (-100%)	-86 (-76%)	Unused	-293 (-98%)	+78 (+66%)	-11 (-92%)	-494 (-62%)	-7 (-32%)
E11	+78 (+650%)	-3 (-100%)	Unused	Unused	+1 (New)	Unused	Unused	+2 (+33%)	Unused	+4652 (+653%)	+964 (+513%)	-2 (-100%)	+5692 (+617%)	-1 (-7%)
E12	-30 (-11%)	-5 (-83%)	+1 (New)	-1 (-100%)	-42 (-52%)	-94 (-73%)	Unused	-70 (-86%)	-402 (-98%)	+3372 (+222%)	+4838 (+155%)	-62 (-94%)	+7504 (+132%)	+5 (+16%)
E13	-78 (-60%)	+3 (+38%)	Unused	-2 (-100%)	-1 (-100%)	-71 (-100%)	Unused	+5 (+125%)	-975 (-87%)	+961 (+2136%)	+1661 (+30%)	Unused	+1503 (+22%)	+0 (+0%)
E14	+192 (New)	+3 (New)	Unused	Unused	Unused	Unused	Unused	+34 (+567%)	-3 (-100%)	-44 (-38%)	-9225 (-95%)	Unused	-9043 (-92%)	-1 (-6%)
E1C	-98 (-98%)	Unused	Unused	Unused	Unused	Unused	Unused	+0 (+0%)	Unused	+51 (+8%)	+704 (+63%)	Unused	+657 (+36%)	-1 (-8%)
E2	+36 (+67%)	+286 (+14300%)	+19 (+950%)	+14 (New)	+160 (+165%)	+17 (+27%)	Unused	-114 (-76%)	+118 (+274%)	+1239 (+449%)	-1416 (-25%)	-21 (-47%)	+319 (+5%)	+10 (+36%)
E2C	-31 (-84%)	+1 (New)	Unused	Unused	Unused	-1 (-100%)	Unused	-3 (-38%)	Unused	+65 (+39%)	-722 (-54%)	-1 (-100%)	-692 (-45%)	-3 (-16%)
E4	+234 (+177%)	Unused	Unused	+7 (New)	-7 (-47%)	-29 (-64%)	Unused	-46 (-84%)	+342 (New)	+2377 (+378%)	+3098 (+326%)	+1 (New)	+5977 (+327%)	+6 (+29%)
E4C	+355 (+2958%)	Unused	Unused	Unused	Unused	-104 (-74%)	Unused	Unused	Unused	+2947 (+340%)	+22009 (+734%)	Unused	+25207 (+627%)	+1 (+7%)
E5	-944 (-87%)	Unused	Unused	+4 (New)	Unused	-40 (-18%)	Unused	Unused	-1045 (-100%)	+16 (+1%)	+288 (+285%)	-28 (-100%)	-1749 (-47%)	-3 (-20%)
E5C	-222 (-93%)	Unused	Unused	Unused	Unused	-1 (-50%)	Unused	+1 (New)	-1 (-100%)	+1046 (+194%)	+1023 (+157%)	-7 (-100%)	+1839 (+128%)	-1 (-6%)
E6	+193 (+203%)	-1 (-50%)	+1 (New)	+2 (+100%)	+1 (New)	+169 (+325%)	Unused	+7 (New)	-323 (-99%)	+1312 (+8747%)	+3040 (+6609%)	+2 (New)	+4381 (+784%)	+8 (+80%)
E6A	-413 (-67%)	-471 (-68%)	-324 (-60%)	+7 (+233%)	-7 (-20%)	+40 (+45%)	+1 (New)	+39 (+279%)	+141 (New)	+31 (+11%)	+1283 (+151%)	+1 (New)	+651 (+25%)	+3 (+10%)
E6B	+76 (+28%)	-273 (-99%)	-207 (-99%)	Unused	Unused	-2 (-100%)	Unused	+4 (+400%)	+197 (New)	+3139 (+319%)	+25650 (+853%)	+1 (New)	+28792 (+634%)	+4 (+24%)
E6C	-161 (-96%)	Unused	Unused	Unused	Unused	Unused	Unused	-1 (-100%)	Unused	+172 (New)	-217 (-92%)	Unused	-207 (-51%)	-2 (-33%)
E7	+50 (+125%)	+25 (+625%)	-4 (-100%)	+4 (New)	+428 (+725%)	+86 (+1075%)	-4 (-80%)	+31 (+79%)	+432 (+1005%)	-67 (-38%)	+2744 (+1946%)	-79 (-21%)	+3654 (+415%)	+6 (+26%)
E8	-111 (-45%)	-92 (-100%)	-2 (-100%)	Unused	Unused	-2 (-100%)	Unused	+5 (+250%)	+1 (+4%)	+3532 (+157%)	+8516 (+746%)	+1 (New)	+11828 (+313%)	-4 (-17%)
E8AE	-2 (-100%)	Unused	Unused	Unused	+1 (New)	Unused	Unused	+5 (+167%)	Unused	-334 (-99%)	-77 (-100%)	+1 (New)	-406 (-96%)	-3 (-33%)
E8AW	-268 (-100%)	Unused	Unused	Unused	-2 (-100%)	-3 (-100%)	Unused	-6 (-60%)	Unused	-1189 (-99%)	-7 (-100%)	+52 (+5200%)	-1423 (-96%)	-8 (-67%)
E8XN	+6 (+600%)	+9 (New)	+9 (New)	Unused	+8 (+800%)	Unused	Unused	-5 (-83%)	Unused	Unused	Unused	+1 (New)	+19 (+238%)	+4 (+133%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
E8XS	Unused	Unused	Unused	Unused	Unused	Unused	Unused	+3 (+100%)	Unused	+0 (+0%)	Unused	Unused	+3 (+75%)	-1 (-25%)
E9	+106 (+5300%)	Unused	Unused	Unused	+3 (+300%)	+1 (+50%)	Unused	-15 (-37%)	Unused	-1434 (-88%)	-171 (-97%)	Unused	-1510 (-82%)	-2 (-14%)
Eden Landing	-495 (-13%)	-516 (-45%)	-516 (-67%)	+35 (+438%)	+331 (+48%)	+105 (+8%)	-78 (-98%)	-208 (-37%)	-1518 (-50%)	+22453 (+158%)	+77231 (+200%)	-119 (-20%)	+97256 (+152%)	+6 (+11%)
M1	+3794 (+260%)	+27 (+150%)	+27 (+150%)	-1075 (-48%)	-1 (-33%)	-305 (-99%)	Unused	Unused	+58 (New)	+2711 (+131%)	+2040 (+21%)	Unused	+7249 (+45%)	+1 (+6%)
M2	-3684 (-43%)	-7 (-10%)	+24 (+67%)	-871 (-78%)	+9 (+450%)	-135 (-93%)	Unused	-1 (-100%)	-75 (-100%)	+2869 (+512%)	-332 (-3%)	-1 (-100%)	-2228 (-11%)	+2 (+11%)
M3	-967 (-64%)	+1 (New)	+1 (New)	-2402 (-76%)	+13 (New)	+289 (+361%)	Unused	+1 (New)	+179 (New)	+450 (+100%)	+7230 (+314%)	Unused	+4794 (+64%)	+1 (+6%)
M4	+2269 (New)	Unused	Unused	-263 (-42%)	Unused	+329 (+158%)	Unused	-2 (-67%)	Unused	+146 (+471%)	-146 (-38%)	+1 (New)	+2334 (+185%)	+2 (+20%)
M5	+16 (New)	Unused	Unused	Unused	Unused	-395 (-91%)	Unused	Unused	Unused	+85 (New)	-2617 (-69%)	Unused	-2912 (-68%)	+0 (+0%)
M6	Unused	Unused	Unused	Unused	Unused	-118 (-100%)	Unused	+2 (New)	Unused	-1 (-25%)	-3317 (-65%)	Unused	-3434 (-65%)	-2 (-22%)
Mowry	+1428 (+12%)	+21 (+24%)	+52 (+96%)	-4611 (-64%)	+21 (+420%)	-335 (-26%)	Unused	+0 (+0%)	+162 (+216%)	+6260 (+201%)	+2858 (+9%)	+0 (+0%)	+5803 (+11%)	-1 (-3%)
R1	+19 (+317%)	+83 (+296%)	+91 (+535%)	Unused	-140 (-69%)	+53 (+1767%)	Unused	-27 (-22%)	Unused	-204 (-37%)	+16204 (+74%)	+6 (+150%)	+15994 (+70%)	+0 (+0%)
R2	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	-1216 (-53%)	Unused	-1216 (-53%)	-1 (-25%)
R3	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	-27 (-69%)	+150 (+1364%)	Unused	+123 (+246%)	+0 (+0%)
R4	Unused	Unused	Unused	Unused	+6 (New)	+18 (New)	Unused	+42 (New)	Unused	+1414 (+4040%)	+3748 (+799%)	+2 (New)	+5230 (+1038%)	+13 (+217%)
R5	+16 (New)	Unused	Unused	Unused	Unused	Unused	Unused	Unused	Unused	+18 (+900%)	+5 (New)	Unused	+39 (+1950%)	+6 (+600%)
R5S	+3 (New)	Unused	Unused	Unused	Unused	Unused	Unused	+1 (New)	Unused	-9 (-75%)	Unused	Unused	-5 (-42%)	+2 (+200%)
RSF2U1	+2214 (+934%)	+22 (New)	+17 (New)	-2 (-100%)	-31 (-63%)	+449 (+2041%)	Unused	+4 (+8%)	+1 (New)	+8765 (+215%)	+1355 (+219%)	+21 (+150%)	+12798 (+252%)	+8 (+33%)
RSF2U2	+3304 (+552%)	+321 (New)	+302 (New)	Unused	-46 (-31%)	+76 (+141%)	Unused	-2 (-9%)	Unused	+449 (+19%)	+91 (+253%)	+19 (+238%)	+4212 (+132%)	+1 (+4%)
RSF2U3	-1 (-100%)	Unused	Unused	Unused	-1 (-100%)	Unused	Unused	Unused	Unused	+50 (+2500%)	+173 (+298%)	Unused	+220 (+349%)	-1 (-20%)
RSF2U4	+32 (+128%)	+208 (+1486%)	+189 (+1350%)	Unused	-15 (-65%)	Unused	Unused	+6 (+200%)	Unused	-23 (-100%)	+0 (+0%)	+1 (New)	+209 (+174%)	+4 (+33%)
Ravenswood	+5587 (+644%)	+634 (+1510%)	+599 (+1932%)	-2 (-100%)	-227 (-54%)	+596 (+754%)	Unused	+24 (+12%)	+1 (New)	+10433 (+148%)	+20510 (+81%)	+49 (+188%)	+37604 (+110%)	+0 (+0%)
Study Area	+24747 (+58%)	+9911 (+36%)	+10419 (+65%)	-4448 (-60%)	+980 (+10%)	-1209 (-10%)	-1330 (-96%)	+20 (+1%)	-2036 (-54%)	+56717 (+160%)	+124483 (+113%)	-64 (-3%)	+209046 (+82%)	-3 (-4%)

Table A2.5. Waterbird species richness and total sightings in winter (December 2024 - February 2025) in South San Francisco Bay, California. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	402	9539	5755	18	96	512	4	15	0	6	4	5	10607	32
A10	56	2947	2433	63	186	837	191	24	0	10	0	2	4125	29
A11	41	1681	620	499	60	127	0	13	0	139	1	0	2561	31
A12	0	0	0	0	0	1773	0	0	0	0	248	0	2021	10
A13	0	1	0	0	0	132	0	0	0	4	111	0	248	12
A14	3868	5260	1482	63	98	36	0	13	0	9	1	0	9350	32
A15	0	0	0	0	0	179	0	0	0	1	28	0	208	8
A16	21943	3430	3155	19	178	123	0	34	0	378	667	0	26779	44
A17	2116	87	56	0	10	975	0	6	0	1170	7017	0	11381	30
A19	802	55	0	0	0	64	0	2	0	20	0	0	947	9
A22	19	0	0	0	0	1051	0	2	0	215	1653	0	2947	21
A23	2	0	0	0	0	4927	0	0	0	2118	3087	0	10138	14
A2E	116	5093	4900	24	89	668	0	17	0	5	0	40	6052	19
A2W	176	9520	3642	87	52	136	14	48	0	176	161	4	10363	42
A3N	4	4	3	0	2	12	0	4	0	758	603	0	1389	17
A3W	261	20368	15414	56	137	36	0	16	0	66	78	16	21034	32
A5	8000	4083	2648	29	131	255	0	35	0	69	873	11	13489	40
A6S	431	46	46	0	1	0	0	2	0	151	599	0	1230	15
A7	4503	1022	747	13	92	504	0	18	0	113	436	0	6701	32
A8	242	3157	2532	18	92	106	0	6	0	3	2	3	3637	34
A8S	702	1179	489	9	113	124	0	31	0	14	15	23	2210	34
A8W	99	33	28	1	24	10	0	8	0	6	14	5	200	24
A9	2661	1993	1961	0	59	50	0	44	0	9357	4068	13	18245	38
AB1	2062	1076	863	2	35	11	0	26	0	230	5	9	3456	22
AB2	963	1990	1888	0	59	297	0	30	0	1327	178	11	4855	29
Alviso	49469	72564	48662	901	1514	12945	209	394	0	16345	19849	142	174173	61
N1A	181	640	0	0	59	219	0	14	0	9	75	1	1198	24
N2A	15	7309	1503	50	97	863	0	4	0	51	4	0	8397	28
N3A	6917	533	3	1	91	1132	0	4	0	320	510	28	9542	29
N4	27	149	102	0	32	29	0	4	0	3209	118	0	3590	24
N4AA	3415	1960	1601	2	24	11	0	13	0	325	432	32	6228	31
N4AB	20	3903	3414	10	65	250	0	7	0	0	1	6	4267	25
N4B	243	876	251	0	0	0	0	7	0	171	35	0	1332	15
N5	23	27	11	0	71	8	0	10	0	2	14	1	163	20
N6	41	938	159	3	17	345	0	5	0	8	61	1	1425	27
N7	186	1380	1363	56	24	628	0	3	0	8	7	6	2304	23
N8	27	660	327	19	45	52	0	1	0	7	7	2	820	19
N9	454	2222	1420	1	12	649	0	8	0	364	568	0	4278	23
Coyote Hills	11549	20597	10154	142	537	4186	0	80	0	4474	1832	77	43544	49
N1	2969	333	208	147	3	904	883	1	0	535	278	0	5175	21
N2	947	335	0	13	1	211	210	0	0	104	66	0	1697	15
N3	1767	243	4	133	14	321	257	7	0	374	2152	0	5015	24
NPP1	603	5	1	231	0	203	135	0	0	2762	21567	0	25371	20
Dumbarton	6286	916	213	524	18	1639	1485	8	0	3775	24063	0	37258	33

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
CP3C	825	323	290	0	20	108	0	28	0	1690	11334	24	14367	38
E1	3	526	129	2	46	7	0	17	0	8	232	6	847	25
E10	292	2496	2227	0	16	6	0	9	0	82	43	3	2955	25
E11	2103	18	5	0	2	3	0	5	0	4092	16	3	6247	23
E12	1407	103	72	1	0	13	0	8	0	2044	2067	27	5670	25
E13	829	33	0	0	0	2	0	3	0	2117	5820	2	8806	25
E14	1229	37	0	1	3	3	0	28	0	1097	10694	3	13097	28
E1C	108	62	0	0	0	0	0	0	0	586	407	0	1163	13
E2	136	2449	1391	18	65	3	0	42	0	1778	2666	6	7163	37
E2C	0	0	0	0	1	1	0	0	0	147	3	0	152	7
E4	694	75	57	1	0	1	0	10	0	2936	198	0	3915	22
E4C	141	132	36	0	0	1	0	0	0	6605	7871	0	14759	22
E5	1412	489	121	33	0	180	175	0	0	48	50	0	2213	15
E5C	137	145	0	0	0	0	0	0	0	54	95	0	431	11
E6	167	84	37	17	1	60	1	1	0	15	2968	0	3319	24
E6A	1973	7158	6934	26	55	7	0	33	0	431	8004	4	17691	35
E6B	212	253	236	5	6	6	3	12	0	10	14860	1	15365	25
E6C	1449	186	0	5	0	261	261	0	0	116	166	0	2183	11
E7	26	25	6	14	19	3	0	8	0	184	135	96	510	21
E8	1456	667	611	0	10	1	0	13	0	2180	769	2	5098	25
E8AE	39	0	0	0	0	0	0	2	0	35	0	0	76	9
E8AW	2	0	0	0	0	0	0	2	0	283	2	0	289	7
E8XN	42	593	471	0	7	0	0	0	0	1	0	0	643	8
E8XS	105	0	0	0	0	0	0	2	0	1	42	0	150	7
E9	1847	131	2	0	20	1	0	12	0	1370	2983	0	6369	29
Eden Landing	16634	15985	12625	123	271	667	440	235	0	27910	71425	177	133478	61
M1	21	158	8	525	1	486	0	0	0	4996	1599	2	7788	22
M2	1138	80	7	314	0	492	15	1	0	875	4465	0	7365	20
M3	108	208	16	2257	0	194	0	0	0	964	4836	0	8575	20
M4	394	309	0	6373	0	1448	0	0	0	313	657	0	9496	16
M5	154	7	0	293	0	1404	0	0	0	2071	7224	0	11155	12
M6	17	0	0	62	0	280	0	0	0	31	4563	0	4955	13
Mowry	1832	762	31	9824	1	4304	15	1	0	9250	23344	2	49334	31
R1	56	921	589	13	19	52	0	43	0	63	15296	4	16467	30
R2	24	17	0	0	0	4	0	0	0	29	9323	0	9401	12
R3	2	45	0	0	0	0	0	1	0	683	303	0	1036	14
R4	791	459	0	4	2	149	0	5	0	900	135	7	2454	25
R5	331	0	0	0	1	0	0	6	0	214	218	0	770	17
R5S	199	0	0	0	0	1	0	5	0	972	449	0	1626	19
RSF2U1	810	437	85	0	2	24	0	6	0	1886	1034	18	4219	28
RSF2U2	958	207	43	0	9	56	0	8	0	1138	1239	9	3626	30
RSF2U3	140	78	0	1	0	16	0	0	0	60	187	0	484	12
RSF2U4	43	1138	1016	0	4	0	0	3	0	0	0	0	1188	10
Ravenswood	3354	3302	1733	18	37	302	0	77	0	5945	28184	38	41271	49
Study Area	89124	114126	73418	11532	2378	24043	2149	795	0	67699	168697	436	479058	71

Table A2.6. Change in waterbird species richness and total sightings in winter (December 2024 - February 2025 compared to December 2023 - February 2024) in South San Francisco Bay, California. Percent change from the previous year is listed in parentheses; New indicates sites that were new colonizations (zero abundance in the previous period). Sites that were unoccupied by a guild in both periods are listed as Unused. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	-1294 (-76%)	+3283 (+52%)	+3031 (+111%)	-1 (-5%)	-25 (-21%)	+459 (+866%)	+4 (New)	-5 (-25%)	Unused	+5 (+500%)	+4 (New)	-4 (-44%)	+2421 (+30%)	+7 (+28%)
A10	-332 (-86%)	+27 (+1%)	+219 (+10%)	+12 (+24%)	+96 (+107%)	+828 (+9200%)	+191 (New)	+12 (+100%)	Unused	+8 (+400%)	-15 (-100%)	+2 (New)	+637 (+18%)	-4 (-12%)
A11	-5 (-11%)	+1082 (+181%)	+496 (+400%)	+492 (+7029%)	+12 (+25%)	+116 (+1055%)	Unused	+9 (+225%)	Unused	+135 (+3375%)	-11 (-92%)	Unused	+1824 (+247%)	+0 (+0%)
A12	-1 (-100%)	Unused	Unused	Unused	Unused	+1005 (+131%)	Unused	Unused	Unused	Unused	+248 (New)	Unused	+1252 (+163%)	+3 (+43%)
A13	-3 (-100%)	-191 (-99%)	Unused	Unused	Unused	-386 (-75%)	Unused	Unused	Unused	-80 (-95%)	-992 (-90%)	Unused	-1658 (-87%)	-2 (-14%)
A14	-4435 (-53%)	+3405 (+184%)	+620 (+72%)	-105 (-62%)	-229 (-70%)	-21 (-37%)	Unused	-9 (-41%)	Unused	-178 (-95%)	+0 (+0%)	-1 (-100%)	-1572 (-14%)	-4 (-11%)
A15	Unused	Unused	Unused	Unused	Unused	-366 (-67%)	Unused	Unused	Unused	+0 (+0%)	-256 (-90%)	Unused	-628 (-75%)	-3 (-27%)
A16	+13373 (+156%)	+2415 (+238%)	+2456 (+351%)	+2 (+12%)	+87 (+96%)	-246 (-67%)	Unused	+12 (+55%)	Unused	+206 (+120%)	+659 (+8238%)	-6 (-100%)	+16481 (+160%)	+1 (+2%)
A17	+424 (+25%)	-325 (-79%)	-6 (-10%)	Unused	+8 (+400%)	+575 (+144%)	Unused	+1 (+20%)	Unused	+802 (+218%)	+6958 (+11793%)	Unused	+8443 (+287%)	+1 (+3%)
A19	-316 (-28%)	+7 (+15%)	-41 (-100%)	Unused	Unused	-1508 (-96%)	Unused	+0 (+0%)	Unused	-376 (-95%)	-6 (-100%)	Unused	-2205 (-70%)	-11 (-55%)
A22	-61 (-76%)	-23 (-100%)	Unused	Unused	Unused	-281 (-21%)	Unused	+0 (+0%)	Unused	-968 (-82%)	+690 (+72%)	Unused	-653 (-18%)	+1 (+5%)
A23	+2 (New)	Unused	Unused	Unused	Unused	+2696 (+121%)	Unused	Unused	Unused	+359 (+20%)	+2887 (+1444%)	Unused	+5934 (+141%)	+0 (+0%)
A2E	+47 (+68%)	-384 (-7%)	-160 (-3%)	+4 (+20%)	+65 (+271%)	-355 (-35%)	-134 (-100%)	+5 (+42%)	Unused	+5 (New)	-18 (-100%)	+12 (+43%)	-621 (-9%)	-7 (-27%)
A2W	+103 (+141%)	+4657 (+96%)	+1775 (+95%)	+78 (+867%)	-56 (-52%)	+62 (+84%)	+14 (New)	+15 (+45%)	Unused	+169 (+2414%)	+62 (+63%)	-17 (-81%)	+5049 (+95%)	+13 (+45%)
A3N	-71 (-95%)	-267 (-99%)	-192 (-98%)	Unused	-10 (-83%)	+10 (+500%)	Unused	+1 (+33%)	Unused	+757 (+75700%)	+497 (+469%)	Unused	+919 (+196%)	+4 (+31%)
A3W	-7648 (-97%)	+11587 (+132%)	+7763 (+101%)	-73 (-57%)	-327 (-70%)	-135 (-79%)	-121 (-100%)	-26 (-62%)	Unused	+61 (+1220%)	+57 (+271%)	+7 (+78%)	+3503 (+20%)	-3 (-9%)
A5	+6892 (+622%)	+1685 (+70%)	+1555 (+142%)	-52 (-64%)	-102 (-44%)	-1150 (-82%)	-432 (-100%)	+16 (+84%)	Unused	+64 (+1280%)	+783 (+870%)	+6 (+120%)	+8137 (+152%)	+5 (+14%)
A6S	+64 (+17%)	+20 (+77%)	+20 (+77%)	Unused	+1 (New)	Unused	Unused	-1 (-33%)	Unused	+134 (+788%)	+599 (New)	Unused	+817 (+198%)	+5 (+50%)
A7	+2960 (+192%)	+302 (+42%)	+491 (+192%)	-5 (-28%)	-24 (-21%)	-578 (-53%)	Unused	+5 (+38%)	Unused	+107 (+1783%)	+353 (+425%)	Unused	+3116 (+87%)	+2 (+7%)
A8	+159 (+192%)	+2580 (+447%)	+2015 (+390%)	-457 (-96%)	+17 (+23%)	-62 (-37%)	Unused	-8 (-57%)	Unused	-25 (-89%)	-52 (-96%)	+1 (+50%)	+2152 (+145%)	+4 (+13%)
A8S	+625 (+812%)	+213 (+22%)	-42 (-8%)	-273 (-97%)	+21 (+23%)	-331 (-73%)	-3 (-100%)	+18 (+138%)	Unused	-20 (-59%)	-62 (-81%)	+23 (New)	+214 (+11%)	-4 (-11%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A8W	-389 (-80%)	+17 (+106%)	+17 (+155%)	+0 (+0%)	-8 (-25%)	-211 (-95%)	-97 (-100%)	+6 (+300%)	Unused	+6 (New)	+14 (New)	+3 (+150%)	-562 (-74%)	+7 (+41%)
A9	-1135 (-30%)	-179 (-8%)	-133 (-6%)	Unused	-173 (-75%)	-7 (-12%)	Unused	+35 (+389%)	Unused	+6370 (+213%)	+2187 (+116%)	+9 (+225%)	+7107 (+64%)	+7 (+23%)
AB1	+1572 (+321%)	-1009 (-48%)	-1148 (-57%)	+2 (New)	+32 (+1067%)	-1 (-8%)	Unused	-17 (-40%)	Unused	-3633 (-94%)	-143 (-97%)	+8 (+800%)	-3189 (-48%)	-5 (-19%)
AB2	-3259 (-77%)	+1145 (+136%)	+1235 (+189%)	-3 (-100%)	+25 (+74%)	+177 (+148%)	Unused	+4 (+15%)	Unused	+656 (+98%)	-108 (-38%)	+3 (+38%)	-1360 (-22%)	-6 (-17%)
Alviso	+7272 (+17%)	+30047 (+71%)	+19971 (+70%)	-379 (-30%)	-590 (-28%)	+290 (+2%)	-578 (-73%)	+73 (+23%)	Unused	+4564 (+39%)	+14335 (+260%)	+46 (+48%)	+55558 (+47%)	-5 (-8%)
N1A	-107 (-37%)	-493 (-44%)	-36 (-100%)	Unused	-161 (-73%)	+173 (+376%)	Unused	-23 (-62%)	Unused	-427 (-98%)	+45 (+150%)	+1 (New)	-1006 (-46%)	-10 (-29%)
N2A	+8 (+114%)	+1229 (+20%)	-1836 (-55%)	+16 (+47%)	-86 (-47%)	+409 (+90%)	Unused	+1 (+33%)	Unused	-86 (-63%)	+4 (New)	Unused	+1490 (+22%)	+4 (+17%)
N3A	+4857 (+236%)	-296 (-36%)	-121 (-98%)	+1 (New)	-46 (-34%)	+220 (+24%)	Unused	-1 (-20%)	Unused	+132 (+70%)	-49 (-9%)	+20 (+250%)	+4838 (+103%)	+0 (+0%)
N4	+27 (New)	-53 (-26%)	-48 (-32%)	Unused	+14 (+78%)	+22 (+314%)	Unused	-7 (-64%)	Unused	+832 (+35%)	+68 (+136%)	-11 (-100%)	+910 (+34%)	+5 (+26%)
N4AA	+2616 (+327%)	+929 (+90%)	+1516 (+1784%)	+0 (+0%)	-43 (-64%)	-32 (-74%)	-3 (-100%)	+0 (+0%)	Unused	+199 (+158%)	-121 (-22%)	-385 (-92%)	+3173 (+104%)	+1 (+3%)
N4AB	-4146 (-100%)	+1791 (+85%)	+2223 (+187%)	-4 (-29%)	-98 (-60%)	-363 (-59%)	Unused	-2 (-22%)	Unused	-2 (-100%)	+0 (+0%)	+3 (+100%)	-2820 (-40%)	-4 (-14%)
N4B	-269 (-53%)	+687 (+363%)	+231 (+1155%)	-1 (-100%)	Unused	Unused	Unused	-2 (-22%)	Unused	-185 (-52%)	-310 (-90%)	-1 (-100%)	-81 (-6%)	-4 (-21%)
N5	-69 (-75%)	-37 (-58%)	-44 (-80%)	Unused	-41 (-37%)	+6 (+300%)	Unused	-11 (-52%)	Unused	-3 (-60%)	-9 (-39%)	-23 (-96%)	-180 (-52%)	+3 (+18%)
N6	+30 (+273%)	+820 (+695%)	+144 (+960%)	+3 (New)	-43 (-72%)	+172 (+99%)	Unused	+0 (+0%)	Unused	+7 (+700%)	-106 (-63%)	-2 (-67%)	+887 (+165%)	+8 (+42%)
N7	+113 (+155%)	+1327 (+2504%)	+1363 (New)	+55 (+5500%)	-1 (-4%)	+626 (+31300%)	Unused	-16 (-84%)	Unused	+8 (New)	-70 (-91%)	+6 (New)	+2043 (+783%)	+8 (+53%)
N8	+3 (+12%)	+572 (+650%)	+316 (+2873%)	+19 (New)	-16 (-26%)	+21 (+68%)	Unused	-11 (-92%)	Unused	+0 (+0%)	-328 (-98%)	+2 (New)	+254 (+45%)	+0 (+0%)
N9	+299 (+193%)	+1778 (+400%)	+1185 (+504%)	+1 (New)	-60 (-83%)	+278 (+75%)	-2 (-100%)	-9 (-53%)	Unused	+211 (+138%)	+131 (+30%)	-5 (-100%)	+2624 (+159%)	-2 (-8%)
Coyote Hills	+3362 (+41%)	+8254 (+67%)	+4893 (+93%)	+90 (+173%)	-581 (-52%)	+1532 (+58%)	-5 (-100%)	-81 (-50%)	Unused	+686 (+18%)	-745 (-29%)	-395 (-84%)	+12132 (+39%)	-2 (-4%)
N1	+545 (+22%)	-397 (-54%)	+154 (+285%)	+52 (+55%)	-2 (-40%)	+204 (+29%)	+183 (+26%)	+1 (New)	Unused	+250 (+88%)	+25 (+10%)	-2 (-100%)	+674 (+15%)	+0 (+0%)
N2	+946 (+94600%)	+309 (+1188%)	Unused	+13 (New)	-2 (-67%)	+190 (+905%)	+210 (New)	-2 (-100%)	Unused	+95 (+1056%)	+56 (+560%)	Unused	+1593 (+1532%)	+3 (+25%)
N3	+1767 (New)	+188 (+342%)	+4 (New)	+133 (New)	+1 (+8%)	+315 (+5250%)	+257 (New)	+1 (+17%)	Unused	+251 (+204%)	+1574 (+272%)	-11 (-100%)	+4223 (+533%)	+10 (+71%)
NPP1	-1241 (-67%)	-61 (-92%)	+1 (New)	+95 (+70%)	-1 (-100%)	-127 (-38%)	+53 (+65%)	-1 (-100%)	Unused	+1558 (+129%)	+16715 (+344%)	Unused	+16910 (+200%)	-3 (-13%)
Dumbarton	+2017 (+47%)	+39 (+4%)	+159 (+294%)	+293 (+127%)	-4 (-18%)	+582 (+55%)	+703 (+90%)	-1 (-11%)	Unused	+2154 (+133%)	+18370 (+323%)	-13 (-100%)	+23400 (+169%)	+1 (+3%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
CP3C	+461 (+127%)	-573 (-64%)	-478 (-62%)	-1 (-100%)	+4 (+25%)	-262 (-71%)	Unused	+19 (+211%)	Unused	+701 (+71%)	+9825 (+651%)	-61 (-72%)	+10046 (+232%)	+8 (+27%)
E1	-15 (-83%)	-1871 (-78%)	-1057 (-89%)	+2 (New)	+7 (+18%)	-6 (-46%)	Unused	+12 (+240%)	Unused	-469 (-98%)	+153 (+194%)	-3 (-33%)	-2196 (-72%)	-2 (-7%)
E10	-85 (-23%)	-573 (-19%)	-327 (-13%)	Unused	+5 (+45%)	+1 (+20%)	Unused	-4 (-31%)	Unused	-9 (-10%)	+42 (+4200%)	-17 (-85%)	-632 (-18%)	+2 (+9%)
E11	+1952 (+1293%)	-409 (-96%)	-25 (-83%)	Unused	-36 (-95%)	+3 (New)	Unused	-1 (-17%)	Unused	+4048 (+9200%)	+16 (New)	+1 (+50%)	+5572 (+825%)	+8 (+53%)
E12	-1211 (-46%)	-370 (-78%)	+35 (+95%)	+0 (+0%)	-14 (-100%)	-14 (-52%)	Unused	-28 (-78%)	Unused	+919 (+82%)	+424 (+26%)	-72 (-73%)	-366 (-6%)	-12 (-32%)
E13	+172 (+26%)	+2 (+6%)	-11 (-100%)	Unused	Unused	-2 (-50%)	Unused	-2 (-40%)	Unused	+847 (+67%)	+997 (+21%)	+1 (+100%)	+2015 (+30%)	-1 (-4%)
E14	+1186 (+2758%)	+37 (New)	Unused	+1 (New)	+3 (New)	+2 (+200%)	Unused	+19 (+211%)	Unused	+1086 (+9873%)	+7112 (+199%)	+2 (+200%)	+9443 (+258%)	+13 (+87%)
E1C	+41 (+61%)	-64 (-51%)	-2 (-100%)	Unused	Unused	Unused	Unused	-2 (-100%)	Unused	+456 (+351%)	+353 (+654%)	Unused	+784 (+207%)	-1 (-7%)
E2	-285 (-68%)	+263 (+12%)	-304 (-18%)	+17 (+1700%)	-26 (-29%)	-19 (-86%)	-11 (-100%)	+19 (+83%)	Unused	+1547 (+670%)	+2215 (+491%)	+2 (+50%)	+3727 (+108%)	-4 (-10%)
E2C	-321 (-100%)	-3 (-100%)	Unused	Unused	+1 (New)	-1 (-50%)	Unused	-5 (-100%)	Unused	-19 (-11%)	-103 (-97%)	-1 (-100%)	-452 (-75%)	-8 (-53%)
E4	-179 (-21%)	+34 (+83%)	+57 (New)	+1 (New)	-2 (-100%)	-3 (-75%)	Unused	-15 (-60%)	Unused	+1593 (+119%)	-265 (-57%)	-6 (-100%)	+1154 (+42%)	-1 (-4%)
E4C	+24 (+21%)	-177 (-57%)	-11 (-23%)	Unused	Unused	-3 (-75%)	Unused	-1 (-100%)	Unused	+5546 (+524%)	+2810 (+56%)	Unused	+8203 (+125%)	+6 (+38%)
E5	+767 (+119%)	+435 (+806%)	+77 (+175%)	+30 (+1000%)	Unused	+180 (New)	+175 (New)	Unused	Unused	-94 (-66%)	+30 (+150%)	Unused	+1348 (+156%)	+3 (+25%)
E5C	+126 (+1145%)	+57 (+65%)	Unused	Unused	Unused	Unused	Unused	-1 (-100%)	Unused	+32 (+145%)	+72 (+313%)	Unused	+284 (+193%)	+1 (+10%)
E6	+31 (+23%)	-165 (-66%)	-119 (-76%)	+12 (+240%)	+1 (New)	+39 (+186%)	+1 (New)	+1 (New)	Unused	-44 (-75%)	+1672 (+129%)	Unused	+1551 (+88%)	+4 (+20%)
E6A	+226 (+13%)	+3230 (+82%)	+3287 (+90%)	+21 (+420%)	+32 (+139%)	-9 (-56%)	Unused	+19 (+136%)	Unused	+42 (+11%)	+3845 (+92%)	+2 (+100%)	+7405 (+72%)	-1 (-3%)
E6B	-147 (-41%)	-1448 (-85%)	-1422 (-86%)	+5 (New)	+5 (+500%)	-25 (-81%)	+3 (New)	+6 (+100%)	Unused	-245 (-96%)	+10405 (+234%)	-2 (-67%)	+8554 (+126%)	-3 (-11%)
E6C	+760 (+110%)	+106 (+132%)	-23 (-100%)	+5 (New)	Unused	+217 (+493%)	+217 (+493%)	-1 (-100%)	Unused	+115 (+11500%)	+160 (+2667%)	Unused	+1362 (+166%)	+2 (+22%)
E7	-155 (-86%)	-403 (-94%)	+6 (New)	+14 (New)	+7 (+58%)	-7 (-70%)	-2 (-100%)	+3 (+60%)	Unused	+179 (+3580%)	+94 (+229%)	-14 (-13%)	-282 (-36%)	+1 (+5%)
E8	+504 (+53%)	+430 (+181%)	+459 (+302%)	Unused	+10 (New)	+1 (New)	Unused	+11 (+550%)	Unused	+1425 (+189%)	+185 (+32%)	+2 (New)	+2568 (+102%)	+3 (+14%)
E8AE	+4 (+11%)	Unused	Unused	Unused	Unused	-1 (-100%)	Unused	-1 (-33%)	Unused	-56 (-62%)	-480 (-100%)	Unused	-534 (-88%)	-2 (-18%)
E8AW	-106 (-98%)	-15 (-100%)	Unused	Unused	Unused	-1 (-100%)	Unused	+0 (+0%)	Unused	+263 (+1315%)	+2 (New)	Unused	+143 (+98%)	-2 (-22%)
E8XN	+25 (+147%)	+117 (+25%)	+313 (+198%)	Unused	+1 (+17%)	Unused	Unused	-6 (-100%)	Unused	+1 (New)	Unused	-1 (-100%)	+137 (+27%)	-6 (-43%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
E8XS	+78 (+289%)	-2 (-100%)	Unused	Unused	Unused	Unused	Unused	+0 (+0%)	Unused	+1 (New)	+42 (New)	Unused	+119 (+384%)	+2 (+40%)
E9	-956 (-34%)	+34 (+35%)	+2 (New)	Unused	+11 (+122%)	-2 (-67%)	Unused	+2 (+20%)	Unused	+1350 (+6750%)	+2983 (New)	Unused	+3427 (+116%)	+11 (+61%)
Eden Landing	+2897 (+21%)	-1328 (-8%)	+457 (+4%)	+107 (+669%)	+9 (+3%)	+88 (+15%)	+383 (+672%)	+44 (+23%)	Unused	+19215 (+221%)	+42589 (+148%)	-167 (-49%)	+63380 (+90%)	+2 (+3%)
M1	-1920 (-99%)	-103 (-39%)	-233 (-97%)	-794 (-60%)	-1 (-50%)	+191 (+65%)	Unused	-1 (-100%)	Unused	+4184 (+515%)	-1042 (-39%)	+2 (New)	+475 (+6%)	-1 (-4%)
M2	-6261 (-85%)	-485 (-86%)	-218 (-97%)	-1797 (-85%)	Unused	-51 (-9%)	+15 (New)	+1 (New)	Unused	-68 (-7%)	+3946 (+760%)	-1 (-100%)	-4723 (-39%)	-3 (-13%)
M3	-1900 (-95%)	-238 (-53%)	-35 (-69%)	-1326 (-37%)	Unused	+49 (+34%)	Unused	-1 (-100%)	Unused	-654 (-40%)	-2784 (-37%)	Unused	-6850 (-44%)	-4 (-17%)
M4	-1202 (-75%)	-33 (-10%)	-3 (-100%)	+3008 (+89%)	Unused	+503 (+53%)	Unused	Unused	Unused	+280 (+848%)	+450 (+217%)	Unused	+2998 (+46%)	+2 (+14%)
M5	-89 (-37%)	-31 (-82%)	Unused	-117 (-29%)	Unused	+712 (+103%)	Unused	Unused	Unused	+1984 (+2280%)	+4314 (+148%)	Unused	+6775 (+155%)	-2 (-14%)
M6	+12 (+240%)	-827 (-100%)	Unused	+61 (+6100%)	Unused	+231 (+471%)	Unused	Unused	Unused	+19 (+158%)	+3688 (+421%)	Unused	+3186 (+180%)	-2 (-13%)
Mowry	-11360 (-86%)	-1717 (-69%)	-489 (-94%)	-965 (-9%)	-1 (-50%)	+1635 (+61%)	+15 (New)	-1 (-50%)	Unused	+5745 (+164%)	+8572 (+58%)	+1 (+100%)	+1861 (+4%)	-3 (-9%)
R1	-74 (-57%)	+510 (+124%)	+366 (+164%)	+12 (+1200%)	+16 (+533%)	+33 (+174%)	Unused	+30 (+231%)	Unused	-856 (-93%)	-2177 (-12%)	-20 (-83%)	-2536 (-13%)	-3 (-9%)
R2	+11 (+85%)	-158 (-90%)	Unused	Unused	Unused	+0 (+0%)	Unused	Unused	Unused	-130 (-82%)	+5748 (+161%)	-7 (-100%)	+5466 (+139%)	-3 (-20%)
R3	+2 (New)	+40 (+800%)	Unused	Unused	Unused	Unused	Unused	-6 (-86%)	Unused	+633 (+1266%)	+216 (+248%)	Unused	+819 (+377%)	+3 (+27%)
R4	+791 (New)	+459 (New)	Unused	+4 (New)	+1 (+100%)	+149 (New)	Unused	+2 (+67%)	Unused	+493 (+121%)	-2487 (-95%)	-54 (-89%)	-663 (-21%)	+14 (+127%)
R5	+323 (+4038%)	-1 (-100%)	Unused	Unused	+1 (New)	Unused	Unused	+5 (+500%)	Unused	+153 (+251%)	-212 (-49%)	Unused	+168 (+28%)	+3 (+21%)
R5S	+191 (+2388%)	-8 (-100%)	Unused	Unused	Unused	+1 (New)	Unused	+4 (+400%)	Unused	+955 (+5618%)	+449 (New)	Unused	+1584 (+3771%)	+13 (+217%)
RSF2U1	+96 (+13%)	+37 (+9%)	+56 (+193%)	Unused	+1 (+100%)	-12 (-33%)	Unused	-25 (-81%)	Unused	-3639 (-66%)	+238 (+30%)	+4 (+29%)	-3302 (-44%)	-6 (-18%)
RSF2U2	+713 (+291%)	+138 (+200%)	+43 (New)	Unused	+9 (New)	+30 (+115%)	Unused	+2 (+33%)	Unused	-1702 (-60%)	+507 (+69%)	+8 (+800%)	-295 (-8%)	+5 (+20%)
RSF2U3	+140 (New)	+8 (+11%)	Unused	+1 (New)	Unused	+10 (+167%)	Unused	Unused	Unused	+7 (+13%)	-113 (-38%)	Unused	+54 (+13%)	+0 (+0%)
RSF2U4	+40 (+1333%)	+150 (+15%)	+134 (+15%)	Unused	+4 (New)	Unused	Unused	+1 (+50%)	Unused	Unused	Unused	Unused	+192 (+19%)	+2 (+25%)
Ravenswood	+2233 (+199%)	+1175 (+55%)	+599 (+53%)	+17 (+1700%)	+32 (+640%)	+211 (+232%)	Unused	+13 (+20%)	Unused	-4086 (-41%)	+2169 (+8%)	-69 (-64%)	+1487 (+4%)	+4 (+9%)
Study Area	+6421 (+8%)	+36470 (+47%)	+25590 (+54%)	-837 (-7%)	-1135 (-32%)	+4338 (+22%)	+518 (+32%)	+47 (+6%)	Unused	+28278 (+72%)	+85290 (+102%)	-597 (-58%)	+157818 (+49%)	-4 (-5%)

Table A2.7. Waterbird species richness and total sightings in spring (March 2025 - May 2025) in South San Francisco Bay, California. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	647	1016	703	23	73	12	0	13	0	11	0	31	1831	23
A10	17	2346	529	22	48	19	0	17	0	5	0	1	2480	23
A11	0	4666	687	24	61	12	0	5	0	3	0	7	4779	18
A12	0	0	0	0	0	202	0	0	0	11	2	0	217	7
A13	31	45	0	7	1	223	0	0	0	305	405	0	1019	16
A14	592	2098	1054	192	34	3	0	9	0	4	1	17	2950	19
A15	0	0	0	0	0	0	0	0	0	21	226	0	251	7
A16	3034	294	195	6	97	90	0	23	0	477	119	172	4355	41
A17	1232	29	21	0	4	558	0	1	0	70	0	2	1925	20
A19	461	21	21	0	0	56	0	0	0	125	16	0	724	11
A22	6	0	0	0	0	131	0	0	0	62	7328	0	7529	10
A23	0	0	0	0	0	2	0	0	0	0	1	0	3	2
A2E	2696	1792	1647	1	4	1127	0	7	0	2	0	11	5640	14
A2W	102	1259	241	5	41	54	0	10	0	108	406	191	2176	29
A3N	4	1	1	0	5	0	0	1	0	0	0	8	19	6
A3W	150	2535	661	7	34	28	0	6	0	1	0	104	2865	20
A5	236	455	84	1	87	444	0	14	0	1	0	10	1253	23
A6S	148	4	4	0	0	0	0	1	0	19	0	0	174	13
A7	632	148	74	1	63	1276	0	7	0	0	0	0	2133	16
A8	144	917	850	0	32	743	0	6	0	4	4	9	1862	22
A8S	288	147	93	0	17	392	0	2	0	0	2	1	860	17
A8W	41	19	19	1	8	162	0	3	0	2	0	5	249	17
A9	3036	3118	3110	2	11	42	0	23	0	1032	7555	24	14846	36
AB1	1423	429	428	3	18	5	0	6	0	2411	1065	41	5413	21
AB2	1105	262	160	0	9	555	0	7	0	495	7	0	2442	21
Alviso	16025	21601	10582	295	647	6136	0	161	0	5169	17137	634	67995	52
N1A	15	513	219	0	72	295	0	18	0	3	0	48	964	19
N2A	2	486	305	0	102	924	0	7	0	1	17	7	1549	18
N3A	12	1694	1307	0	132	2797	0	2	0	45	60	12	4757	18
N4	10	115	109	0	9	315	0	9	0	215	62	22	763	19
N4AA	111	199	87	0	27	15	0	9	0	9	23	62	459	21
N4AB	0	250	106	5	66	1306	0	5	0	0	0	25	1658	13
N4B	55	262	163	0	0	0	0	0	0	11	110	0	441	11
N5	35	45	33	0	14	67	0	7	0	0	0	4	172	12
N6	5	305	85	0	2	1555	0	0	0	0	5	0	1875	11
N7	18	146	94	1	9	1500	0	2	0	0	45	2	1733	16
N8	50	364	123	0	0	188	0	1	0	2	3	0	608	9
N9	40	813	622	0	2	1096	0	8	0	80	910	1	2953	20
Coyote Hills	353	5192	3253	6	435	10058	0	68	0	366	1235	183	17932	38
N1	112	63	63	593	0	326	166	0	2	353	49	19	1518	18
N2	1046	175	0	95	0	8	5	0	63	52	217	7	1669	15
N3	362	65	6	63	4	0	0	14	0	216	849	34	1611	25
NPP1	432	0	0	650	0	11	0	0	10	3465	12629	0	17198	22
Dumbarton	1952	303	69	1401	4	345	171	14	75	4086	13744	60	21996	36

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
CP3C	369	0	0	0	0	96	0	7	0	117	2848	6	3443	18
E1	3	377	236	12	48	3	0	17	0	27	118	45	651	21
E10	251	1698	1687	0	1	0	0	1	0	60	3	4	2021	18
E11	311	75	74	0	65	23	0	93	0	653	5	76	1307	21
E12	208	54	39	0	6	6	0	1	0	91	5	22	393	21
E13	641	142	142	0	14	0	0	10	0	506	18	11	1342	18
E14	18	0	0	0	0	0	0	2	0	10	5523	6	5559	13
E1C	95	0	0	0	0	0	0	0	0	174	823	0	1092	8
E2	344	943	571	0	74	5	0	16	0	594	170	24	2170	24
E2C	0	0	0	0	0	0	0	0	0	39	1340	2	1381	9
E4	293	0	0	0	2	8	0	24	2	271	234	3	837	18
E4C	101	0	0	0	0	0	0	0	8	2005	2468	0	4583	15
E5	219	42	32	0	0	0	0	0	0	9	2	1	273	8
E5C	2	1	1	0	0	0	0	0	63	768	2720	0	3554	14
E6	358	5	5	0	0	41	0	3	0	54	1351	29	1843	19
E6A	360	88	85	1	10	122	0	5	0	520	5113	10	6237	29
E6B	36	0	0	0	0	0	0	4	0	230	4875	1	5146	15
E6C	330	61	12	0	0	90	0	1	0	1550	95	1	2128	19
E7	15	425	90	0	8	345	344	17	0	63	26	140	1040	20
E8	105	10	4	0	0	0	0	0	0	53	1374	1	1543	11
E8AE	1	0	0	0	0	1	0	0	0	3	1003	4	1012	6
E8AW	0	0	0	0	0	0	0	0	0	8	248	0	256	3
E8XN	7	377	360	0	0	0	0	1	0	0	0	11	396	6
E8XS	21	1	0	0	0	0	0	1	0	0	85	0	108	6
E9	1258	61	2	0	2	0	0	12	0	316	114	1	1772	23
Eden Landing	5346	4360	3340	13	230	740	344	215	73	8121	30561	398	50087	50
M1	27	201	198	311	0	1866	0	0	1647	2326	1879	2	8265	20
M2	5	22	7	187	0	1855	0	0	70	165	1335	3	3651	14
M3	2	28	0	366	0	964	0	0	0	219	408	0	1989	11
M4	205	31	0	4139	0	1461	0	0	0	9	47	0	5908	11
M5	26	0	0	1374	0	835	0	0	1	121	65	0	2422	9
M6	74	0	0	230	0	190	0	0	0	2	4	0	504	7
Mowry	339	282	205	6607	0	7171	0	0	1718	2842	3738	5	22739	27
R1	36	54	29	2	9	6	0	6	0	8	601	18	749	24
R2	0	0	0	0	0	0	0	1	0	0	2147	0	2151	6
R3	0	109	0	0	0	0	0	2	0	191	881	0	1189	18
R4	377	463	0	0	0	645	0	5	0	959	1767	7	4229	31
R5	300	1	0	0	1	8	0	6	0	128	211	3	668	20
R5S	68	3	0	0	1	0	0	3	0	374	200	1	651	20
RSF2U1	193	37	34	0	5	264	0	24	0	1463	1464	217	3670	18
RSF2U2	653	82	81	0	83	143	0	14	0	57	0	603	1636	18
RSF2U3	0	13	0	0	0	23	0	0	1	11	20	0	70	11
RSF2U4	22	175	175	0	9	0	0	4	0	0	0	12	223	10
Ravenswood	1649	937	319	2	108	1089	0	65	1	3191	7291	861	15236	47
Study Area	25664	32675	17768	8324	1424	25539	515	523	1867	23775	73706	2141	195985	67

Table A2.8. Change in waterbird species richness and total sightings in spring (March 2025 - May 2025 compared to March 2024 - May 2024) in South San Francisco Bay, California. Percent change from the previous year is listed in parentheses; New indicates sites that were new colonizations (zero abundance in the previous period). Sites that were unoccupied by a guild in both periods are listed as Unused. RUDU counts are also included in counts of the DIVER guild and BOGU in counts of the GULL guild.

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A1	+611 (+1697%)	+334 (+49%)	+283 (+67%)	+19 (+475%)	+37 (+103%)	+10 (+500%)	Unused	+5 (+62%)	Unused	+11 (New)	Unused	-5 (-14%)	+1024 (+127%)	+4 (+21%)
A10	-9 (-35%)	+2205 (+1564%)	+451 (+578%)	+22 (New)	+5 (+12%)	-13 (-41%)	Unused	+13 (+325%)	Unused	+5 (New)	Unused	-7 (-88%)	+2225 (+873%)	+6 (+35%)
A11	-42 (-100%)	+4544 (+3725%)	+670 (+3941%)	+24 (New)	+27 (+79%)	-5 (-29%)	Unused	+1 (+25%)	Unused	-37 (-92%)	Unused	+2 (+40%)	+4515 (+1710%)	+1 (+6%)
A12	Unused	Unused	Unused	Unused	Unused	+115 (+132%)	Unused	Unused	Unused	+9 (+450%)	+2 (New)	Unused	+128 (+144%)	+4 (+133%)
A13	+0 (+0%)	-13 (-22%)	Unused	+4 (+133%)	+1 (New)	+159 (+248%)	Unused	Unused	Unused	+272 (+824%)	-1664 (-80%)	Unused	-1239 (-55%)	+1 (+7%)
A14	-2784 (-82%)	+1225 (+140%)	+461 (+78%)	+16 (+9%)	-80 (-70%)	-22 (-88%)	Unused	+6 (+200%)	Unused	+4 (New)	+1 (New)	-63 (-79%)	-1707 (-37%)	-6 (-24%)
A15	-2 (-100%)	Unused	Unused	Unused	Unused	-32 (-100%)	Unused	Unused	Unused	-30 (-59%)	-2948 (-93%)	Unused	-3015 (-92%)	-7 (-50%)
A16	+165 (+6%)	-11 (-4%)	+25 (+15%)	+1 (+20%)	-8 (-8%)	+11 (+14%)	Unused	-33 (-59%)	Unused	+226 (+90%)	+113 (+1883%)	-387 (-69%)	+49 (+1%)	+6 (+17%)
A17	+767 (+165%)	+15 (+107%)	+7 (+50%)	Unused	+1 (+33%)	+36 (+7%)	Unused	-1 (-50%)	Unused	-94 (-57%)	-4 (-100%)	-3 (-60%)	+707 (+58%)	+1 (+5%)
A19	-159 (-26%)	-22 (-51%)	+4 (+24%)	Unused	Unused	-1094 (-95%)	Unused	Unused	Unused	+109 (+681%)	+16 (New)	Unused	-1146 (-61%)	+1 (+10%)
A22	-30 (-83%)	-3 (-100%)	-1 (-100%)	Unused	Unused	+123 (+1538%)	Unused	Unused	Unused	-19 (-23%)	+6405 (+694%)	-6 (-100%)	+6472 (+612%)	-7 (-41%)
A23	Unused	Unused	Unused	Unused	Unused	-15 (-88%)	Unused	Unused	Unused	-6 (-100%)	+1 (New)	Unused	-20 (-87%)	+0 (+0%)
A2E	+2593 (+2517%)	+1303 (+266%)	+1162 (+240%)	-42 (-98%)	-13 (-76%)	-1112 (-50%)	Unused	-8 (-53%)	Unused	-3 (-60%)	Unused	+7 (+175%)	+2720 (+93%)	+1 (+8%)
A2W	+78 (+325%)	+1051 (+505%)	+69 (+40%)	+1 (+25%)	-317 (-89%)	+47 (+671%)	Unused	-9 (-47%)	Unused	+104 (+2600%)	+406 (New)	+154 (+416%)	+1515 (+229%)	+8 (+38%)
A3N	-70 (-95%)	-208 (-100%)	-204 (-100%)	Unused	+2 (+67%)	Unused	Unused	-57 (-98%)	Unused	-558 (-100%)	-60 (-100%)	-21 (-72%)	-982 (-98%)	-9 (-60%)
A3W	-453 (-75%)	+1358 (+115%)	-274 (-29%)	-27 (-79%)	-60 (-64%)	-40 (-59%)	Unused	-27 (-82%)	Unused	+0 (+0%)	Unused	+12 (+13%)	+759 (+36%)	-2 (-9%)
A5	-37 (-14%)	-2045 (-82%)	-206 (-71%)	-69 (-99%)	-424 (-83%)	-386 (-47%)	-264 (-100%)	-15 (-52%)	-900 (-100%)	-10 (-91%)	Unused	+5 (+100%)	-3893 (-76%)	-6 (-21%)
A6S	+72 (+95%)	-12 (-75%)	-12 (-75%)	Unused	Unused	Unused	Unused	+0 (+0%)	Unused	-5 (-21%)	-21 (-100%)	Unused	+30 (+21%)	+3 (+30%)
A7	+41 (+7%)	+104 (+236%)	+49 (+196%)	+1 (New)	-125 (-66%)	-545 (-30%)	-169 (-100%)	-1 (-12%)	-377 (-100%)	-6 (-100%)	-3 (-100%)	-4 (-100%)	-914 (-30%)	-9 (-36%)
A8	+47 (+48%)	+16 (+2%)	+458 (+117%)	-69 (-100%)	-2 (-6%)	-101 (-12%)	Unused	-8 (-57%)	Unused	-3 (-43%)	+4 (New)	+3 (+50%)	-124 (-6%)	-1 (-4%)
A8S	+156 (+118%)	-235 (-62%)	-187 (-67%)	-48 (-100%)	-28 (-62%)	-360 (-48%)	-3 (-100%)	-17 (-89%)	Unused	-15 (-100%)	+2 (New)	-2 (-67%)	-571 (-40%)	-15 (-47%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
A8W	-58 (-59%)	-108 (-85%)	-93 (-83%)	-56 (-98%)	-25 (-76%)	-104 (-39%)	Unused	-4 (-57%)	Unused	-10 (-83%)	Unused	+2 (+67%)	-360 (-59%)	-3 (-15%)
A9	-1240 (-29%)	+2283 (+273%)	+2275 (+272%)	+2 (New)	+11 (New)	-68 (-62%)	-26 (-100%)	+17 (+283%)	Unused	+53 (+5%)	+7348 (+3550%)	-36 (-60%)	+8373 (+129%)	+16 (+80%)
AB1	-280 (-16%)	-164 (-28%)	-165 (-28%)	+3 (New)	-7 (-28%)	-55 (-92%)	Unused	+2 (+50%)	Unused	+1421 (+144%)	+580 (+120%)	-20 (-33%)	+1489 (+38%)	+2 (+11%)
AB2	+885 (+402%)	+209 (+394%)	+107 (+202%)	Unused	-11 (-55%)	-1680 (-75%)	Unused	+3 (+75%)	Unused	+256 (+107%)	-900 (-99%)	-5 (-100%)	-1245 (-34%)	-2 (-9%)
Alviso	+251 (+2%)	+11826 (+121%)	+4879 (+86%)	-218 (-42%)	-1016 (-61%)	-5131 (-46%)	-462 (-100%)	-133 (-45%)	-1277 (-100%)	+1674 (+48%)	+9278 (+118%)	-374 (-37%)	+14790 (+28%)	-4 (-7%)
N1A	+7 (+88%)	+198 (+63%)	-67 (-23%)	Unused	+41 (+132%)	+193 (+189%)	Unused	+1 (+6%)	Unused	-165 (-98%)	-178 (-100%)	+22 (+85%)	+114 (+13%)	-7 (-27%)
N2A	+0 (+0%)	+122 (+34%)	-43 (-12%)	-11 (-100%)	+13 (+15%)	-89 (-9%)	Unused	-1 (-12%)	Unused	+1 (New)	+17 (New)	+3 (+75%)	+57 (+4%)	+1 (+6%)
N3A	-27 (-69%)	+385 (+29%)	+177 (+16%)	-1 (-100%)	-24 (-15%)	+444 (+19%)	-3 (-100%)	-9 (-82%)	-1 (-100%)	-276 (-86%)	-1832 (-97%)	-24 (-67%)	-1369 (-22%)	-12 (-40%)
N4	+10 (New)	+110 (+2200%)	+104 (+2080%)	Unused	-3 (-25%)	-5 (-2%)	Unused	-4 (-31%)	Unused	+193 (+877%)	+55 (+786%)	+16 (+267%)	+373 (+96%)	+2 (+12%)
N4AA	-129 (-54%)	-1141 (-85%)	-1252 (-94%)	-2 (-100%)	+20 (+286%)	+12 (+400%)	Unused	-21 (-70%)	Unused	-21 (-70%)	-716 (-97%)	+51 (+464%)	-1954 (-81%)	-4 (-16%)
N4AB	-7 (-100%)	-272 (-52%)	-371 (-78%)	-27 (-84%)	-41 (-38%)	+216 (+20%)	Unused	-16 (-76%)	Unused	-5 (-100%)	Unused	+2 (+9%)	-168 (-9%)	-8 (-38%)
N4B	+47 (+588%)	+42 (+19%)	+41 (+34%)	Unused	Unused	-2 (-100%)	Unused	-1 (-100%)	Unused	-10 (-48%)	+110 (New)	Unused	+187 (+74%)	+2 (+22%)
N5	+29 (+483%)	-36 (-44%)	-46 (-58%)	Unused	-11 (-44%)	-9 (-12%)	Unused	-1 (-12%)	Unused	Unused	Unused	-7 (-64%)	-44 (-20%)	-1 (-8%)
N6	+0 (+0%)	+109 (+56%)	+33 (+63%)	Unused	-51 (-96%)	+125 (+9%)	Unused	Unused	Unused	-8 (-100%)	+5 (New)	-3 (-100%)	+179 (+11%)	+0 (+0%)
N7	+11 (+157%)	-892 (-86%)	-348 (-79%)	-11 (-92%)	-21 (-70%)	-724 (-33%)	Unused	-4 (-67%)	Unused	-1 (-100%)	+45 (New)	+0 (+0%)	-1598 (-48%)	+0 (+0%)
N8	+46 (+1150%)	+95 (+35%)	-54 (-31%)	Unused	Unused	-109 (-37%)	Unused	-3 (-75%)	Unused	+0 (+0%)	-190 (-98%)	Unused	-533 (-47%)	-1 (-10%)
N9	+37 (+1233%)	+222 (+38%)	+248 (+66%)	Unused	+0 (+0%)	-996 (-48%)	Unused	+8 (New)	Unused	+61 (+321%)	+760 (+507%)	+1 (New)	+86 (+3%)	+6 (+43%)
Coyote Hills	+24 (+7%)	-1058 (-17%)	-1578 (-33%)	-52 (-90%)	-77 (-15%)	-944 (-9%)	-3 (-100%)	-51 (-43%)	-1 (-100%)	-231 (-39%)	-1924 (-61%)	+61 (+50%)	-4670 (-21%)	-10 (-21%)
N1	-1584 (-93%)	-489 (-89%)	+3 (+5%)	+386 (+186%)	Unused	-218 (-40%)	-327 (-66%)	-1 (-100%)	-14 (-88%)	+329 (+1371%)	+29 (+145%)	+10 (+111%)	-1562 (-51%)	+2 (+12%)
N2	+1011 (+2889%)	+175 (New)	Unused	+95 (New)	-1 (-100%)	+8 (New)	+5 (New)	-3 (-100%)	+63 (New)	+42 (+420%)	+214 (+7133%)	+6 (+600%)	+1612 (+2828%)	+6 (+67%)
N3	+358 (+8950%)	+65 (New)	+6 (New)	+63 (New)	-1 (-20%)	-1 (-100%)	Unused	+9 (+180%)	Unused	+205 (+1864%)	+840 (+9333%)	+25 (+278%)	+1560 (+3059%)	+13 (+108%)
NPP1	-600 (-58%)	-51 (-100%)	-42 (-100%)	+76 (+13%)	Unused	-43 (-80%)	-3 (-100%)	-1 (-100%)	+10 (New)	+3271 (+1686%)	+12170 (+2651%)	Unused	+14824 (+624%)	+4 (+22%)
Dumbarton	-815 (-29%)	-300 (-50%)	-33 (-32%)	+620 (+79%)	-2 (-33%)	-254 (-42%)	-325 (-66%)	+4 (+40%)	+59 (+369%)	+3847 (+1610%)	+13253 (+2699%)	+41 (+216%)	+16434 (+295%)	+8 (+29%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
CP3C	-2284 (-86%)	-260 (-100%)	-234 (-100%)	Unused	-8 (-100%)	+20 (+26%)	Unused	-16 (-70%)	Unused	-416 (-78%)	-1574 (-36%)	-3 (-33%)	-4563 (-57%)	-12 (-40%)
E1	-14 (-82%)	-387 (-51%)	-107 (-31%)	+12 (New)	+14 (+41%)	-2 (-40%)	Unused	+9 (+112%)	Unused	+2 (+8%)	+0 (+0%)	-10 (-18%)	-375 (-37%)	-2 (-9%)
E10	-476 (-65%)	+1434 (+543%)	+1595 (+1734%)	Unused	-4 (-80%)	-3 (-100%)	Unused	-1 (-50%)	Unused	-1021 (-94%)	-511 (-99%)	-30 (-88%)	-609 (-23%)	-8 (-31%)
E11	+290 (+1381%)	+75 (New)	+74 (New)	Unused	+65 (New)	+18 (+360%)	Unused	+89 (+2225%)	Unused	+267 (+69%)	-30 (-86%)	+74 (+3700%)	+853 (+188%)	+10 (+91%)
E12	-247 (-54%)	-270 (-83%)	-134 (-77%)	-1 (-100%)	+0 (+0%)	+1 (+20%)	-1 (-100%)	-10 (-91%)	Unused	-204 (-69%)	-1614 (-100%)	-28 (-56%)	-2375 (-86%)	-9 (-30%)
E13	+539 (+528%)	-232 (-62%)	-193 (-58%)	Unused	+11 (+367%)	Unused	Unused	+0 (+0%)	Unused	+327 (+183%)	-4690 (-100%)	+10 (+1000%)	-4035 (-75%)	-9 (-33%)
E14	+18 (New)	Unused	Unused	Unused	Unused	Unused	Unused	+1 (+100%)	Unused	+4 (+67%)	+928 (+20%)	+6 (New)	+956 (+21%)	+2 (+18%)
E1C	-16 (-14%)	Unused	Unused	Unused	Unused	Unused	Unused	-4 (-100%)	Unused	+133 (+324%)	+300 (+57%)	Unused	+413 (+61%)	-5 (-38%)
E2	-481 (-58%)	-327 (-26%)	-402 (-41%)	Unused	+41 (+124%)	+1 (+25%)	Unused	-33 (-67%)	Unused	+215 (+57%)	-1201 (-88%)	-52 (-68%)	-1846 (-46%)	-2 (-8%)
E2C	-283 (-100%)	-1 (-100%)	-1 (-100%)	Unused	Unused	-3 (-100%)	Unused	-5 (-100%)	Unused	-186 (-83%)	-1409 (-51%)	+2 (New)	-1886 (-58%)	-10 (-53%)
E4	-113 (-28%)	-231 (-100%)	-15 (-100%)	Unused	+2 (New)	+8 (New)	Unused	+13 (+118%)	+2 (New)	+268 (+8933%)	+234 (New)	+3 (New)	+186 (+29%)	+9 (+100%)
E4C	-22 (-18%)	-49 (-100%)	-16 (-100%)	Unused	-1 (-100%)	Unused	Unused	-2 (-100%)	+8 (New)	+1786 (+816%)	-1543 (-38%)	Unused	+176 (+4%)	-4 (-21%)
E5	-112 (-34%)	+14 (+50%)	+31 (+3100%)	Unused	Unused	Unused	Unused	-1 (-100%)	Unused	-15 (-62%)	-31 (-94%)	+1 (New)	-146 (-35%)	-1 (-11%)
E5C	-1058 (-100%)	-8 (-89%)	+1 (New)	Unused	Unused	-1 (-100%)	Unused	-8 (-100%)	+63 (New)	+557 (+264%)	-1502 (-36%)	Unused	-1957 (-36%)	-1 (-7%)
E6	+132 (+58%)	-24 (-83%)	-20 (-80%)	Unused	Unused	+24 (+141%)	Unused	+3 (New)	-16 (-100%)	-158 (-75%)	+943 (+231%)	+29 (New)	+932 (+102%)	+1 (+6%)
E6A	-218 (-38%)	+30 (+52%)	+39 (+85%)	+1 (New)	+5 (+100%)	+18 (+17%)	Unused	-23 (-82%)	Unused	+227 (+77%)	+3452 (+208%)	-24 (-71%)	+3438 (+123%)	+2 (+7%)
E6B	-20 (-36%)	Unused	Unused	Unused	Unused	Unused	Unused	+3 (+300%)	Unused	+204 (+785%)	+1077 (+28%)	+0 (+0%)	+1263 (+33%)	+2 (+15%)
E6C	-388 (-54%)	+54 (+771%)	+8 (+200%)	-2 (-100%)	Unused	+88 (+4400%)	Unused	+1 (New)	Unused	+221 (+17%)	-651 (-87%)	-6 (-86%)	-684 (-24%)	+1 (+6%)
E7	-3811 (-100%)	+297 (+232%)	+80 (+800%)	Unused	-2 (-20%)	+345 (New)	+344 (New)	+1 (+6%)	Unused	-558 (-90%)	-34 (-57%)	+2 (+1%)	-3759 (-78%)	+1 (+5%)
E8	-164 (-61%)	-30 (-75%)	-25 (-86%)	Unused	Unused	Unused	Unused	-15 (-100%)	Unused	-40 (-43%)	+1219 (+786%)	-1 (-50%)	+969 (+169%)	-6 (-35%)
E8AE	-10 (-91%)	-30 (-100%)	Unused	Unused	-1 (-100%)	+1 (New)	Unused	-3 (-100%)	Unused	+3 (New)	+647 (+182%)	+4 (New)	+611 (+152%)	-3 (-33%)
E8AW	-4 (-100%)	-1 (-100%)	Unused	Unused	Unused	Unused	Unused	-1 (-100%)	Unused	+7 (+700%)	+248 (New)	-1 (-100%)	+248 (+3100%)	-2 (-40%)
E8XN	+5 (+250%)	+194 (+106%)	+184 (+105%)	Unused	Unused	Unused	Unused	+0 (+0%)	Unused	-1 (-100%)	Unused	+7 (+175%)	+205 (+107%)	-2 (-25%)

Pond/complex	DABBLER	DIVER	RUDU	EAREDGR	FISHEAT	GULL	BOGU	HERON	PHAL	MEDSHORE	SMSHORE	TERN	TOTAL	Richness
E8XS	+0 (+0%)	+1 (New)	Unused	Unused	Unused	Unused	Unused	+1 (New)	Unused	Unused	+35 (+70%)	Unused	+37 (+52%)	+3 (+100%)
E9	+985 (+361%)	+1 (+2%)	-9 (-82%)	Unused	-6 (-75%)	Unused	Unused	+4 (+50%)	Unused	-172 (-35%)	-3695 (-97%)	+1 (New)	-2875 (-62%)	-2 (-8%)
Eden Landing	-7752 (-59%)	+250 (+6%)	+856 (+34%)	+10 (+333%)	+116 (+102%)	+515 (+229%)	+343 (+34300%)	+3 (+1%)	+57 (+356%)	+1450 (+22%)	-9402 (-24%)	-16 (-4%)	-14823 (-23%)	+0 (+0%)
M1	-61 (-69%)	-185 (-48%)	-184 (-48%)	-1003 (-76%)	-1 (-100%)	+551 (+42%)	Unused	Unused	+1647 (New)	+2300 (+8846%)	+1287 (+217%)	+2 (New)	+4530 (+121%)	+6 (+43%)
M2	-114 (-96%)	-179 (-89%)	+5 (+250%)	-1137 (-86%)	Unused	+453 (+32%)	Unused	Unused	+70 (New)	-1148 (-87%)	-740 (-36%)	-1 (-25%)	-2800 (-43%)	-1 (-7%)
M3	-81 (-98%)	+9 (+47%)	Unused	-1405 (-79%)	Unused	-712 (-42%)	Unused	Unused	Unused	+136 (+164%)	-635 (-61%)	Unused	-2696 (-58%)	-5 (-31%)
M4	+156 (+318%)	+3 (+11%)	Unused	+3346 (+422%)	Unused	+194 (+15%)	Unused	Unused	Unused	+8 (+800%)	+47 (New)	Unused	+3768 (+176%)	+2 (+22%)
M5	-13 (-33%)	-60 (-100%)	Unused	+402 (+41%)	Unused	+152 (+22%)	Unused	Unused	+1 (New)	+90 (+290%)	+63 (+3150%)	Unused	+632 (+35%)	-1 (-10%)
M6	+74 (New)	-55 (-100%)	Unused	+181 (+369%)	Unused	-8 (-4%)	Unused	Unused	Unused	+0 (+0%)	-156 (-98%)	Unused	+33 (+7%)	+0 (+0%)
Mowry	-39 (-10%)	-467 (-62%)	-179 (-47%)	+384 (+6%)	-1 (-100%)	+630 (+10%)	Unused	Unused	+1718 (New)	+1386 (+95%)	-134 (-3%)	+1 (+25%)	+3467 (+18%)	+4 (+17%)
R1	-220 (-86%)	-402 (-88%)	-323 (-92%)	+1 (+100%)	-7 (-44%)	+0 (+0%)	Unused	-6 (-50%)	Unused	-111 (-93%)	-11232 (-95%)	-8 (-31%)	-11996 (-94%)	-5 (-17%)
R2	Unused	Unused	Unused	Unused	Unused	-120 (-100%)	-1 (-100%)	+0 (+0%)	-12 (-100%)	-123 (-100%)	-11680 (-84%)	Unused	-11932 (-85%)	-9 (-60%)
R3	-616 (-100%)	-220 (-67%)	Unused	-2 (-100%)	-2 (-100%)	Unused	Unused	+0 (+0%)	Unused	-52 (-21%)	+814 (+1215%)	-13 (-100%)	-103 (-8%)	-3 (-14%)
R4	+364 (+2800%)	+463 (New)	Unused	Unused	Unused	+616 (+2124%)	Unused	+2 (+67%)	Unused	+951 (+11888%)	-1308 (-43%)	+6 (+600%)	+1098 (+35%)	+17 (+121%)
R5	+261 (+669%)	+1 (New)	Unused	Unused	+1 (New)	+8 (New)	Unused	+3 (+100%)	Unused	+102 (+392%)	+211 (New)	+3 (New)	+575 (+618%)	+8 (+67%)
R5S	+31 (+84%)	+3 (New)	Unused	Unused	+1 (New)	Unused	Unused	+1 (+50%)	Unused	+326 (+679%)	+60 (+43%)	+1 (New)	+418 (+179%)	+8 (+67%)
RSF2U1	-126 (-39%)	-205 (-85%)	-50 (-60%)	Unused	+3 (+150%)	-114 (-30%)	Unused	+19 (+380%)	Unused	-726 (-33%)	+174 (+13%)	-54 (-20%)	-1031 (-22%)	-8 (-31%)
RSF2U2	+100 (+18%)	-194 (-70%)	-163 (-67%)	Unused	+81 (+4050%)	-164 (-53%)	Unused	+11 (+367%)	Unused	-1485 (-96%)	-860 (-100%)	+326 (+118%)	-2200 (-57%)	-9 (-33%)
RSF2U3	-31 (-100%)	-47 (-78%)	Unused	Unused	Unused	-44 (-66%)	Unused	Unused	+1 (New)	-44 (-80%)	-1238 (-98%)	Unused	-1408 (-95%)	-6 (-35%)
RSF2U4	+18 (+450%)	-426 (-71%)	-421 (-71%)	Unused	+7 (+350%)	Unused	Unused	+3 (+300%)	Unused	-1 (-100%)	Unused	+10 (+500%)	-392 (-64%)	+0 (+0%)
Ravenswood	-219 (-12%)	-1027 (-52%)	-957 (-75%)	-1 (-33%)	+84 (+350%)	+182 (+20%)	-1 (-100%)	+33 (+103%)	-11 (-92%)	-1163 (-27%)	-25059 (-77%)	+271 (+46%)	-26971 (-64%)	+2 (+4%)
Study Area	-8550 (-25%)	+9224 (+39%)	+2988 (+20%)	+743 (+10%)	-896 (-39%)	-5002 (-16%)	-448 (-47%)	-144 (-22%)	+545 (+41%)	+6963 (+41%)	-13988 (-16%)	-16 (-1%)	-11773 (-6%)	+3 (+5%)

Appendix 3

This appendix presents bars graphs (one per complex) of guild-specific waterbird abundance by survey round.

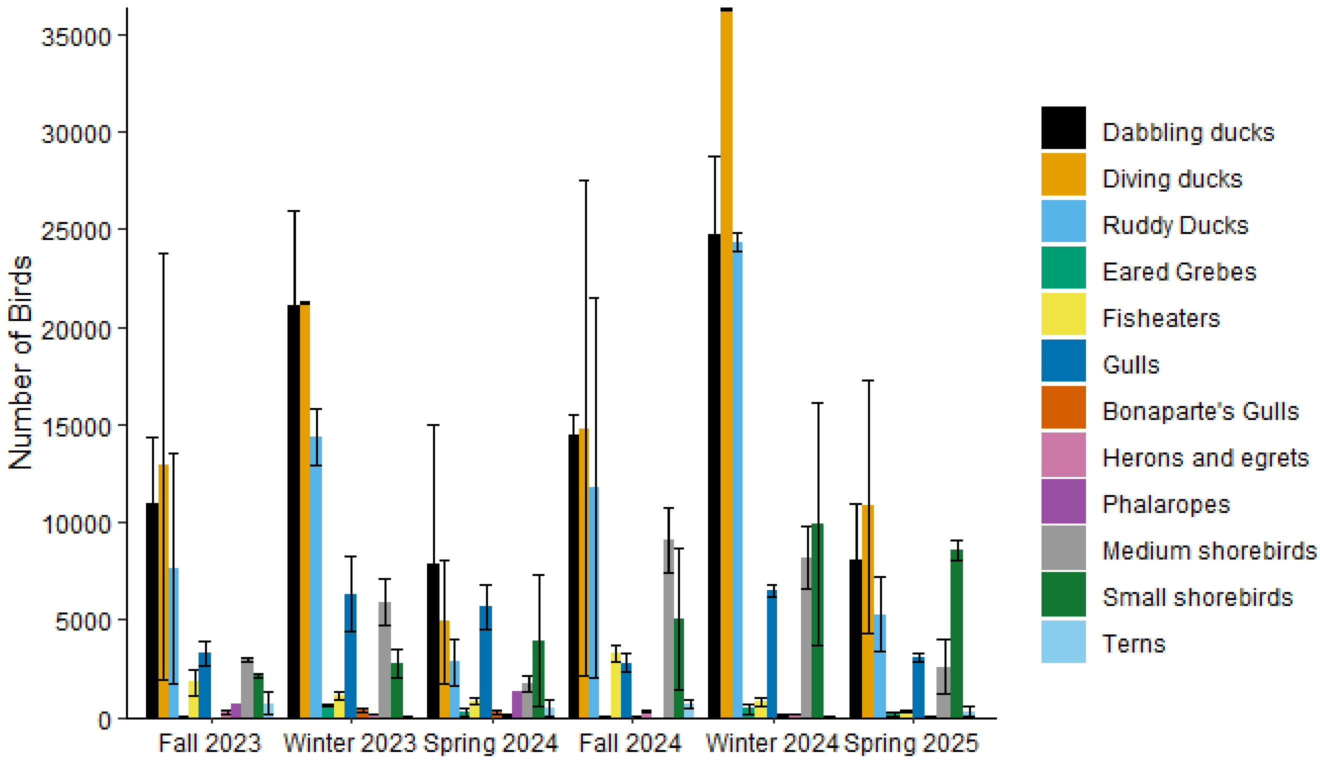

Figure A3.1. Avian abundance (mean number of bird sightings +/- 1 SE) by guild and by season at the Alviso complex, South San Francisco Bay, California; September 2024–May 2025. Scales on vertical axis are unique for each complex (Figure A3.1–Figure A3.6).

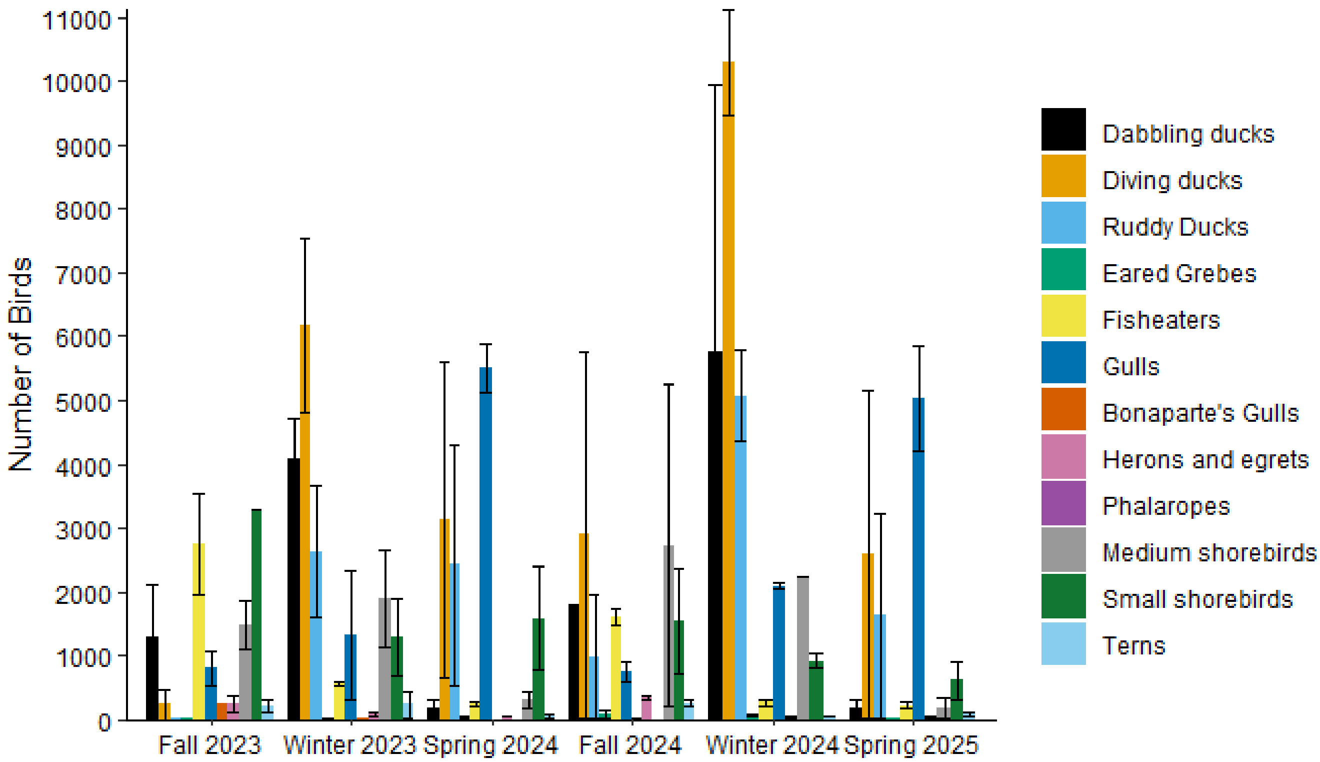

Figure A3.2. Avian abundance (mean number of bird sightings +/- 1 SE) by guild and by season at the Coyote Hills complex, South San Francisco Bay, California; September 2024–May 2025. Scales on vertical axis are unique for each complex (Figure A3.1–Figure A3.6).

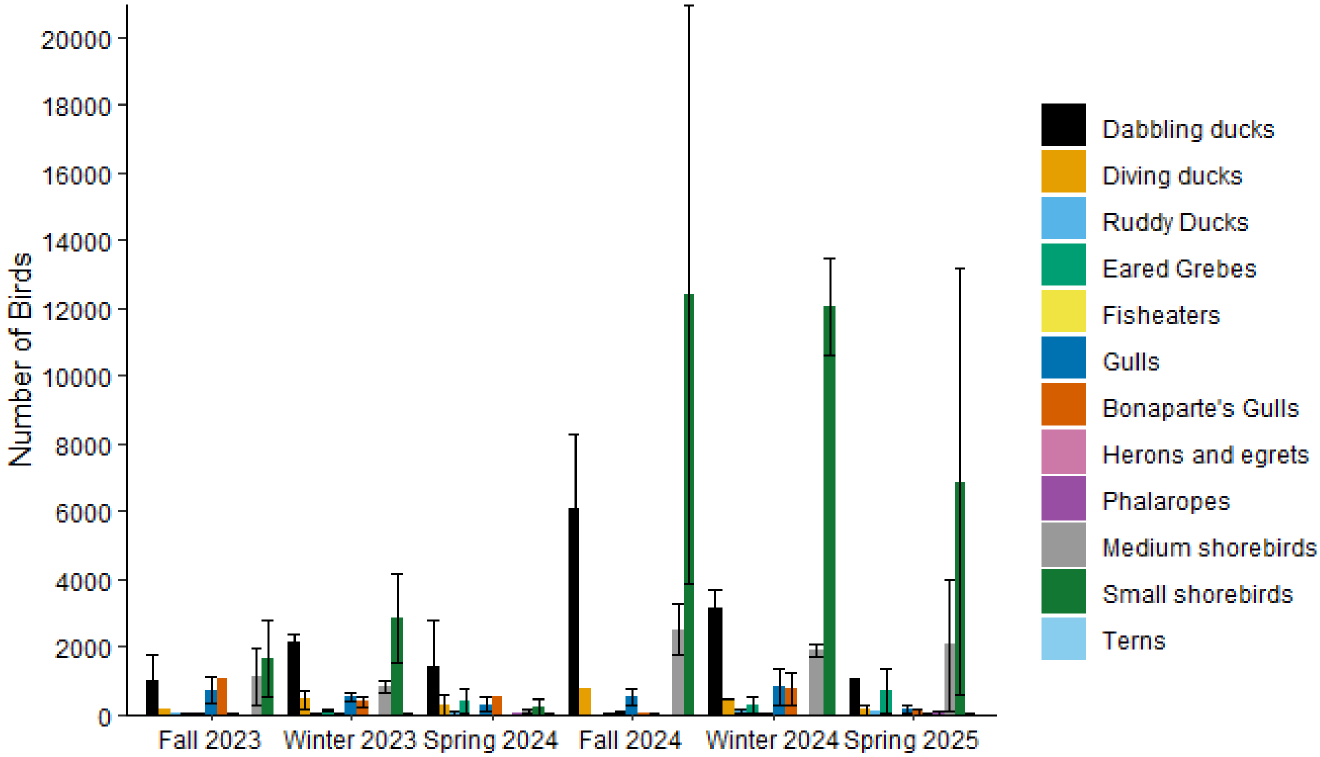

Figure A3.3. Avian abundance (mean number of bird sightings +/- 1 SE) by guild and by season at the Dumbarton complex, South San Francisco Bay, California; September 2024–May 2025. Scales on vertical axis are unique for each complex (Figure A3.1–Figure A3.6).

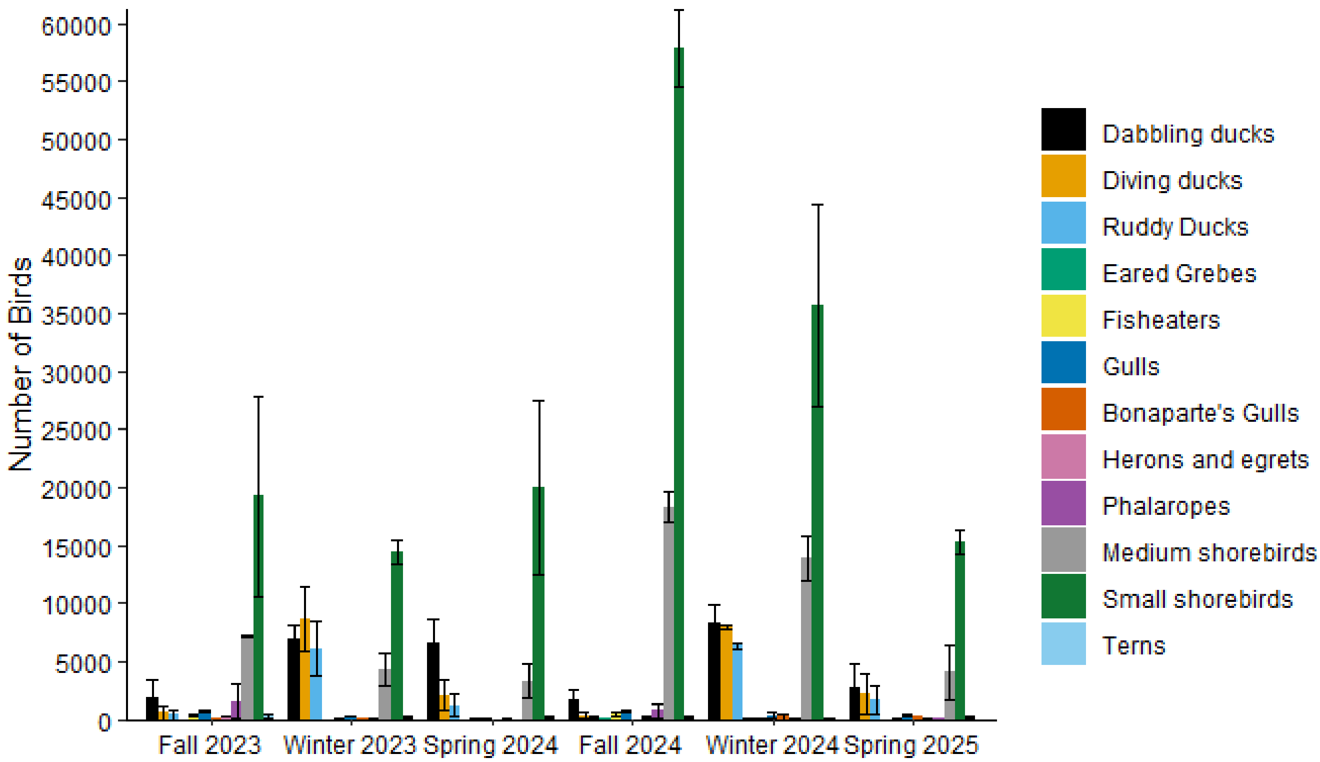

Figure A3.4. Avian abundance (mean number of bird sightings +/- 1 SE) by guild and by season at the Eden Landing complex, South San Francisco Bay, California; September 2024–May 2025. Scales on vertical axis are unique for each complex (Figure A3.1–Figure A3.6).

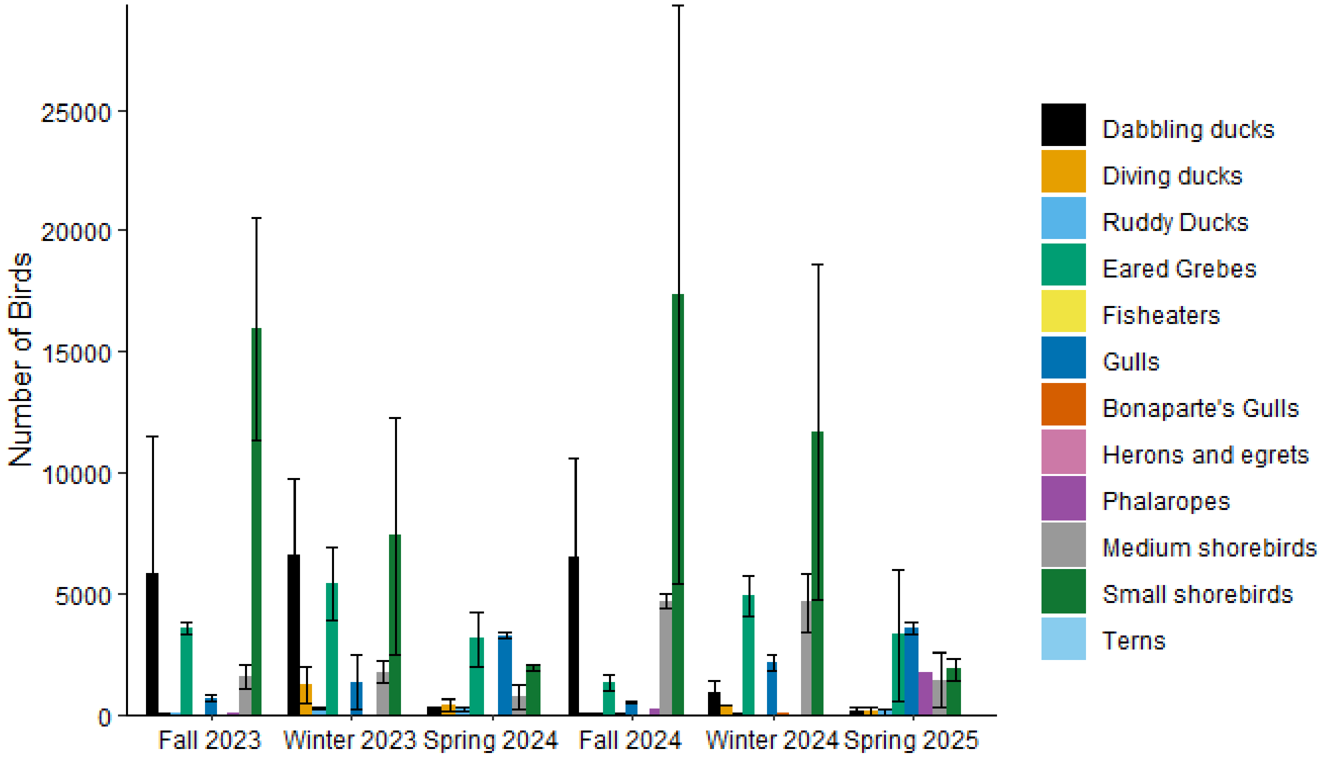

Figure A3.5. Avian abundance (mean number of bird sightings +/- 1 SE) by guild and by season at the Mowry complex, South San Francisco Bay, California; September 2024–May 2025. Scales on vertical axis are unique for each complex (Figure A3.1–Figure A3.6).

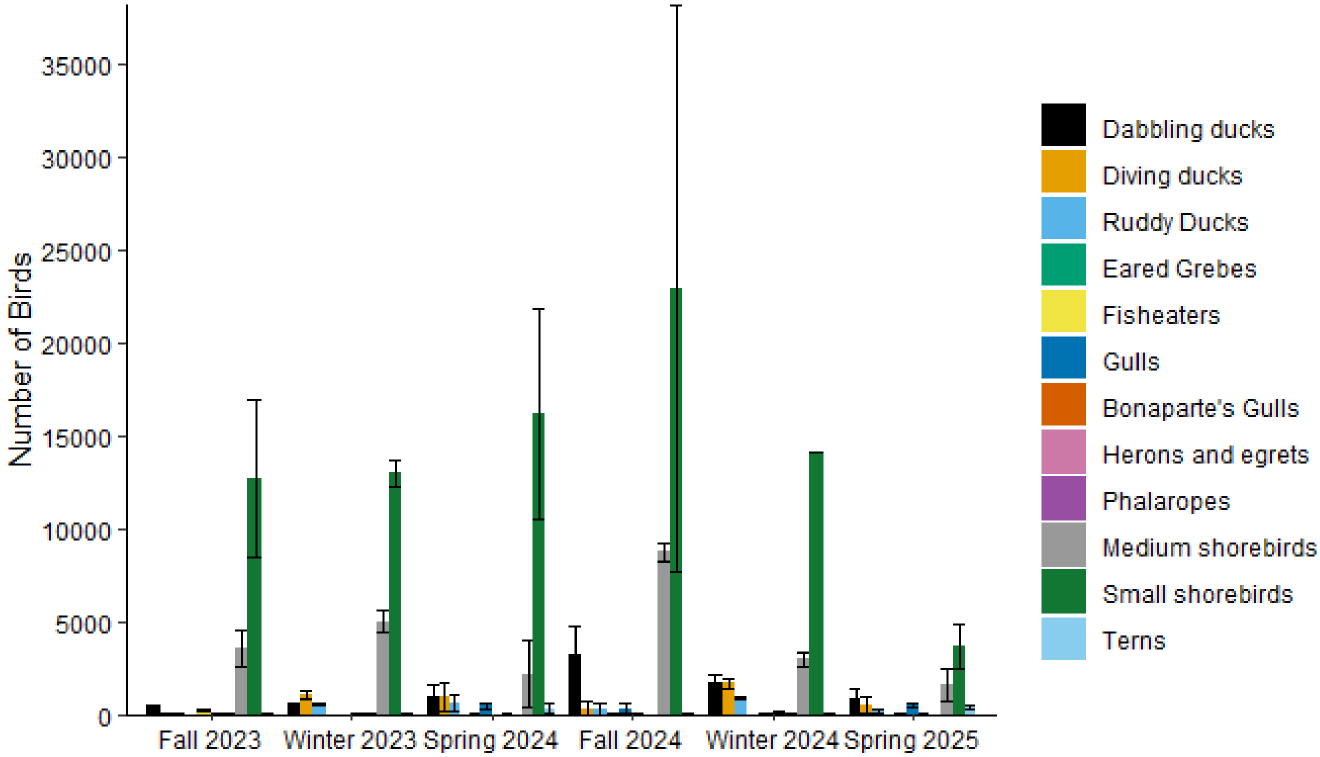

Figure A3.6. Avian abundance (mean number of bird sightings +/- 1 SE) by guild and by season at the Ravenswood complex, South San Francisco Bay, California; September 2024–May 2025. Scales on vertical axis are unique for each complex (Figure A3.1–Figure A3.6).

Appendix 4

This appendix presents tables (one per guild and total waterbird sightings) of the percent of bird sightings that were counted on each pond engaging in different behaviors: foraging, roosting on the pond surface, roosting on islands, roosting on levees, or roosting on manmade structures (e.g., blinds, fence posts).

Table A4.1. Percentage of total birds foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	12.2	86.7	0.0	0.1	1.0	15837
Alviso	A10	20.1	76.8	0.0	3.0	0.0	7323
Alviso	A11	9.9	84.9	0.1	5.1	0.0	8515
Alviso	A12	0.2	99.8	0.1	0.0	0.0	4785
Alviso	A13	59.5	37.5	0.0	3.0	0.0	1458
Alviso	A14	23.1	72.2	0.0	4.7	0.0	17174
Alviso	A15	1.9	94.3	0.0	3.8	0.0	1295
Alviso	A16	28.2	64.4	7.2	0.1	0.1	40500
Alviso	A17	68.5	31.5	0.0	0.0	0.0	19356
Alviso	A19	71.3	28.7	0.0	0.0	0.0	5262
Alviso	A22	46.4	53.5	0.0	0.1	0.0	10484
Alviso	A23	29.0	70.8	0.0	0.2	0.0	10186
Alviso	A2E	11.5	73.1	0.0	14.6	0.7	12260
Alviso	A2W	9.8	82.6	0.0	0.8	6.8	16649
Alviso	A3N	6.3	90.8	0.0	0.6	2.4	1549
Alviso	A3W	6.9	91.2	0.0	0.2	1.7	38235
Alviso	A5	14.8	69.2	0.0	16.0	0.0	22906
Alviso	A6S	66.4	33.6	0.0	0.0	0.0	2175
Alviso	A7	19.2	51.9	0.1	28.8	0.0	16795
Alviso	A8	12.8	73.9	0.6	12.1	0.6	10016
Alviso	A8S	34.2	51.4	0.0	14.4	0.0	4033
Alviso	A8W	31.0	21.6	0.5	46.4	0.6	1081
Alviso	A9	21.8	77.8	0.0	0.3	0.0	49977
Alviso	AB1	24.6	74.5	0.4	0.3	0.3	10157
Alviso	AB2	25.3	62.1	5.0	6.1	1.5	15146
Coyote Hills	N1A	26.0	39.8	0.0	33.7	0.4	2692
Coyote Hills	N2A	5.7	71.1	5.5	17.6	0.0	11210
Coyote Hills	N3A	34.8	40.6	0.0	24.4	0.3	20809
Coyote Hills	N4	4.5	5.5	79.2	9.9	0.9	6091
Coyote Hills	N4AA	44.9	50.7	0.1	1.5	2.9	10388
Coyote Hills	N4AB	15.0	60.0	0.0	24.8	0.2	9366
Coyote Hills	N4B	57.7	39.7	0.0	0.3	2.3	3162
Coyote Hills	N5	34.6	36.2	0.0	20.7	8.5	517
Coyote Hills	N6	27.5	37.7	0.0	34.8	0.0	4990
Coyote Hills	N7	5.8	45.3	0.1	48.3	0.6	4544
Coyote Hills	N8	21.2	65.3	0.0	12.7	0.8	2659
Coyote Hills	N9	31.0	48.6	0.0	20.4	0.0	9051

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Dumbarton	N1	65.6	22.2	3.4	6.1	2.7	15776
Dumbarton	N2	39.6	21.1	1.0	38.4	0.0	9698
Dumbarton	N3	33.4	19.7	12.3	33.2	1.4	19342
Dumbarton	NPP1	13.8	86.2	0.0	0.0	0.0	58409
Eden Landing	CP3C	48.7	51.2	0.1	0.0	0.1	34829
Eden Landing	E1	36.5	35.0	17.1	8.7	2.7	1910
Eden Landing	E10	15.4	83.7	0.5	0.0	0.4	5280
Eden Landing	E11	57.6	42.1	0.0	0.0	0.2	14169
Eden Landing	E12	27.8	42.7	11.1	15.3	3.1	19243
Eden Landing	E13	26.6	57.1	13.8	1.1	1.3	18501
Eden Landing	E14	32.9	67.0	0.0	0.0	0.0	19411
Eden Landing	E1C	71.6	27.7	0.7	0.0	0.0	4747
Eden Landing	E2	12.3	25.4	61.7	0.2	0.3	16054
Eden Landing	E2C	69.3	30.6	0.0	0.0	0.1	2386
Eden Landing	E4	31.1	68.3	0.4	0.0	0.2	12555
Eden Landing	E4C	18.1	78.6	0.0	0.0	3.3	48567
Eden Landing	E5	55.9	40.7	0.0	0.0	3.4	4458
Eden Landing	E5C	80.6	19.4	0.0	0.0	0.0	7264
Eden Landing	E6	24.0	74.4	0.0	0.0	1.5	10102
Eden Landing	E6A	53.0	46.5	0.4	0.1	0.1	27158
Eden Landing	E6B	35.5	64.2	0.1	0.2	0.0	53845
Eden Landing	E6C	55.9	44.0	0.0	0.0	0.0	4508
Eden Landing	E7	22.0	45.6	0.0	0.1	32.3	6084
Eden Landing	E8	12.8	86.9	0.0	0.0	0.2	22252
Eden Landing	E8AE	94.0	6.0	0.0	0.0	0.0	1103
Eden Landing	E8AW	41.7	58.3	0.0	0.0	0.0	612
Eden Landing	E8XN	3.3	96.5	0.0	0.1	0.1	1066
Eden Landing	E8XS	57.4	42.3	0.0	0.0	0.4	265
Eden Landing	E9	63.8	36.0	0.0	0.1	0.1	8483
Mowry	M1	18.5	49.8	0.0	31.7	0.0	39321
Mowry	M2	6.0	4.0	11.8	78.1	0.0	29659
Mowry	M3	18.5	6.6	64.5	10.5	0.0	22859
Mowry	M4	42.7	41.5	0.0	15.7	0.0	19000
Mowry	M5	42.6	45.6	0.8	10.9	0.1	14918
Mowry	M6	7.2	88.4	0.0	4.3	0.0	7269
Ravenswood	R1	45.2	54.8	0.0	0.0	0.0	55981
Ravenswood	R2	19.1	80.9	0.0	0.0	0.0	12618
Ravenswood	R3	25.7	74.2	0.0	0.1	0.0	2398
Ravenswood	R4	41.1	40.7	17.9	0.3	0.0	12417
Ravenswood	R5	41.6	58.4	0.0	0.0	0.0	1479
Ravenswood	R5S	40.2	59.8	0.0	0.0	0.0	2284
Ravenswood	RSF2U1	8.9	64.5	21.3	5.0	0.3	25763
Ravenswood	RSF2U2	14.5	20.5	27.2	37.7	0.1	12664
Ravenswood	RSF2U3	59.7	38.0	2.3	0.0	0.0	837
Ravenswood	RSF2U4	44.7	55.1	0.0	0.2	0.0	1740

Table A4.2. Percentage of dabbling ducks foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	23.4	76.3	0.0	0.0	0.3	1274
Alviso	A10	30.9	66.7	0.0	2.4	0.0	123
Alviso	A11	5.1	94.9	0.0	0.0	0.0	59
Alviso	A13	71.0	29.0	0.0	0.0	0.0	31
Alviso	A14	23.0	76.8	0.0	0.3	0.0	6691
Alviso	A16	34.4	62.8	2.8	0.0	0.0	29524
Alviso	A17	56.2	43.8	0.0	0.0	0.0	7513
Alviso	A19	81.9	18.1	0.0	0.0	0.0	3637
Alviso	A22	76.0	24.0	0.0	0.0	0.0	25
Alviso	A23	0.0	100.0	0.0	0.0	0.0	2
Alviso	A2E	16.5	83.3	0.0	0.2	0.0	2814
Alviso	A2W	15.0	78.3	0.0	2.9	3.8	314
Alviso	A3N	0.0	80.0	0.0	20.0	0.0	10
Alviso	A3W	47.2	49.0	0.0	3.4	0.5	1700
Alviso	A5	10.0	82.2	0.0	7.7	0.0	11113
Alviso	A6S	48.4	51.6	0.0	0.0	0.0	953
Alviso	A7	29.9	53.9	0.0	16.2	0.0	9866
Alviso	A8	22.4	66.5	1.5	9.7	0.0	2203
Alviso	A8S	50.7	44.5	0.0	4.8	0.0	1204
Alviso	A8W	18.2	51.7	2.4	26.8	1.0	209
Alviso	A9	41.2	58.8	0.0	0.0	0.0	5973
Alviso	AB1	31.1	68.8	0.0	0.0	0.0	4704
Alviso	AB2	52.6	40.1	4.8	2.4	0.0	4456
Coyote Hills	N1A	62.5	29.9	0.0	7.6	0.0	264
Coyote Hills	N2A	26.9	73.1	0.0	0.0	0.0	26
Coyote Hills	N3A	37.4	62.2	0.0	0.4	0.0	8712
Coyote Hills	N4	80.0	20.0	0.0	0.0	0.0	55
Coyote Hills	N4AA	57.5	42.0	0.0	0.2	0.4	4435
Coyote Hills	N4AB	49.7	47.6	0.0	2.6	0.0	340
Coyote Hills	N4B	64.5	26.8	0.0	0.0	8.6	488
Coyote Hills	N5	41.7	58.3	0.0	0.0	0.0	60
Coyote Hills	N6	89.6	10.4	0.0	0.0	0.0	135
Coyote Hills	N7	17.0	83.0	0.0	0.0	0.0	206
Coyote Hills	N8	68.6	31.4	0.0	0.0	0.0	102
Coyote Hills	N9	28.4	71.5	0.0	0.2	0.0	662
Dumbarton	N1	77.3	10.0	1.2	11.5	0.0	7799
Dumbarton	N2	47.3	39.4	0.5	12.9	0.0	4544
Dumbarton	N3	55.2	44.1	0.6	0.1	0.0	7018

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Dumbarton	NPP1	88.0	10.8	1.1	0.0	0.0	1054
Eden Landing	CP3C	51.2	48.8	0.0	0.0	0.0	1697
Eden Landing	E1	5.5	94.5	0.0	0.0	0.0	55
Eden Landing	E10	35.1	63.4	1.4	0.0	0.0	558
Eden Landing	E11	64.8	34.7	0.0	0.0	0.4	2504
Eden Landing	E12	61.0	32.4	1.1	5.5	0.0	1849
Eden Landing	E13	45.5	51.3	0.0	3.2	0.0	1522
Eden Landing	E14	81.6	18.4	0.0	0.0	0.0	1439
Eden Landing	E1C	8.8	91.2	0.0	0.0	0.0	205
Eden Landing	E2	42.8	41.2	16.0	0.0	0.0	570
Eden Landing	E2C	100.0	0.0	0.0	0.0	0.0	6
Eden Landing	E4	49.7	50.3	0.0	0.0	0.0	1353
Eden Landing	E4C	15.3	84.7	0.0	0.0	0.0	609
Eden Landing	E5	83.4	13.5	0.0	0.0	3.2	1775
Eden Landing	E5C	73.5	26.5	0.0	0.0	0.0	155
Eden Landing	E6	60.4	39.6	0.0	0.0	0.0	813
Eden Landing	E6A	24.1	75.1	0.0	0.7	0.0	2539
Eden Landing	E6B	54.8	45.2	0.0	0.0	0.0	598
Eden Landing	E6C	82.1	17.8	0.0	0.1	0.0	1786
Eden Landing	E7	67.9	32.1	0.0	0.0	0.0	131
Eden Landing	E8	31.9	68.1	0.0	0.0	0.0	1695
Eden Landing	E8AE	57.5	42.5	0.0	0.0	0.0	40
Eden Landing	E8AW	0.0	100.0	0.0	0.0	0.0	2
Eden Landing	E8XN	16.1	83.9	0.0	0.0	0.0	56
Eden Landing	E8XS	12.7	87.3	0.0	0.0	0.0	126
Eden Landing	E9	69.0	31.0	0.0	0.0	0.0	3213
Mowry	M1	51.1	32.5	0.0	16.4	0.0	5302
Mowry	M2	21.5	9.4	13.1	56.0	0.0	6061
Mowry	M3	51.5	36.8	0.9	10.8	0.0	650
Mowry	M4	92.8	7.0	0.0	0.2	0.0	2868
Mowry	M5	94.4	4.6	1.0	0.0	0.0	196
Mowry	M6	16.5	83.5	0.0	0.0	0.0	91
Ravenswood	R1	6.8	93.2	0.0	0.0	0.0	117
Ravenswood	R2	0.0	100.0	0.0	0.0	0.0	24
Ravenswood	R3	0.0	100.0	0.0	0.0	0.0	2
Ravenswood	R4	32.6	51.8	12.5	3.1	0.0	1168
Ravenswood	R5	51.5	48.5	0.0	0.0	0.0	647
Ravenswood	R5S	14.4	85.6	0.0	0.0	0.0	270
Ravenswood	RSF2U1	32.1	54.1	4.7	9.1	0.0	3454
Ravenswood	RSF2U2	29.8	35.3	8.4	26.5	0.0	5514
Ravenswood	RSF2U3	86.4	13.6	0.0	0.0	0.0	140
Ravenswood	RSF2U4	34.4	65.6	0.0	0.0	0.0	122

Table A4.3. Percentage of diving ducks foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	8.4	91.6	0.0	0.0	0.0	4496
Alviso	A10	5.7	94.3	0.0	0.0	0.0	2340
Alviso	A11	0.9	99.1	0.0	0.0	0.0	5456
Alviso	A13	52.2	47.8	0.0	0.0	0.0	46
Alviso	A14	31.4	68.5	0.0	0.0	0.0	5308
Alviso	A16	35.0	64.3	0.5	0.0	0.2	409
Alviso	A17	33.3	66.7	0.0	0.0	0.0	39
Alviso	A19	0.0	100.0	0.0	0.0	0.0	55
Alviso	A2E	56.6	43.4	0.0	0.0	0.0	348
Alviso	A2W	12.2	87.8	0.0	0.0	0.0	7227
Alviso	A3N	0.0	100.0	0.0	0.0	0.0	1
Alviso	A3W	8.0	92.0	0.0	0.0	0.0	6852
Alviso	A5	26.6	73.4	0.0	0.1	0.0	3918
Alviso	A7	5.2	94.7	0.0	0.1	0.0	2032
Alviso	A8	27.5	72.3	0.1	0.1	0.0	1232
Alviso	A8S	21.5	78.3	0.0	0.3	0.0	768
Alviso	A8W	40.0	20.0	0.0	40.0	0.0	5
Alviso	A9	82.5	17.5	0.0	0.0	0.0	40
Alviso	AB1	20.9	79.1	0.0	0.0	0.0	215
Alviso	AB2	10.2	89.8	0.0	0.0	0.0	205
Coyote Hills	N1A	23.6	76.4	0.0	0.0	0.0	951
Coyote Hills	N2A	3.6	96.4	0.0	0.0	0.0	6221
Coyote Hills	N3A	75.8	24.2	0.0	0.0	0.0	3140
Coyote Hills	N4	68.3	31.7	0.0	0.0	0.0	63
Coyote Hills	N4AA	63.7	36.3	0.0	0.0	0.0	774
Coyote Hills	N4AB	48.7	51.3	0.0	0.0	0.0	1468
Coyote Hills	N4B	14.0	86.0	0.0	0.0	0.0	724
Coyote Hills	N5	60.7	39.3	0.0	0.0	0.0	28
Coyote Hills	N6	36.1	63.9	0.0	0.0	0.0	1003
Coyote Hills	N7	6.2	93.8	0.0	0.0	0.0	274
Coyote Hills	N8	13.0	87.0	0.0	0.0	0.0	578
Coyote Hills	N9	36.9	63.1	0.0	0.0	0.0	996
Dumbarton	N1	78.6	20.6	0.0	0.0	0.8	126
Dumbarton	N2	84.3	15.7	0.0	0.0	0.0	510
Dumbarton	N3	97.2	2.8	0.0	0.0	0.0	1018
Dumbarton	NPP1	100.0	0.0	0.0	0.0	0.0	4

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Eden Landing	CP3C	45.5	54.5	0.0	0.0	0.0	33
Eden Landing	E1	48.1	51.9	0.0	0.0	0.0	538
Eden Landing	E10	79.6	20.4	0.0	0.0	0.0	334
Eden Landing	E11	85.7	14.3	0.0	0.0	0.0	14
Eden Landing	E12	60.9	39.1	0.0	0.0	0.0	46
Eden Landing	E13	79.5	20.5	0.0	0.0	0.0	44
Eden Landing	E14	62.5	37.5	0.0	0.0	0.0	40
Eden Landing	E1C	100.0	0.0	0.0	0.0	0.0	62
Eden Landing	E2	41.8	58.2	0.0	0.0	0.0	1697
Eden Landing	E2C	100.0	0.0	0.0	0.0	0.0	1
Eden Landing	E4	83.3	16.7	0.0	0.0	0.0	18
Eden Landing	E4C	100.0	0.0	0.0	0.0	0.0	96
Eden Landing	E5	96.0	4.0	0.0	0.0	0.0	378
Eden Landing	E5C	100.0	0.0	0.0	0.0	0.0	145
Eden Landing	E6	87.2	12.8	0.0	0.0	0.0	47
Eden Landing	E6A	21.0	79.0	0.0	0.0	0.0	233
Eden Landing	E6B	100.0	0.0	0.0	0.0	0.0	17
Eden Landing	E6C	30.6	69.4	0.0	0.0	0.0	235
Eden Landing	E7	18.5	81.5	0.0	0.0	0.0	383
Eden Landing	E8	59.7	40.3	0.0	0.0	0.0	62
Eden Landing	E8XN	0.0	100.0	0.0	0.0	0.0	139
Eden Landing	E8XS	0.0	100.0	0.0	0.0	0.0	1
Eden Landing	E9	13.8	86.2	0.0	0.0	0.0	188
Mowry	M1	84.3	15.7	0.0	0.0	0.0	153
Mowry	M2	67.0	31.9	1.1	0.0	0.0	91
Mowry	M3	67.3	32.7	0.0	0.0	0.0	220
Mowry	M4	30.6	69.4	0.0	0.0	0.0	340
Mowry	M5	100.0	0.0	0.0	0.0	0.0	7
Ravenswood	R1	25.0	75.0	0.0	0.0	0.0	360
Ravenswood	R2	0.0	100.0	0.0	0.0	0.0	17
Ravenswood	R3	5.2	94.8	0.0	0.0	0.0	154
Ravenswood	R4	27.5	71.8	0.2	0.4	0.0	922
Ravenswood	R5	100.0	0.0	0.0	0.0	0.0	1
Ravenswood	R5S	66.7	33.3	0.0	0.0	0.0	3
Ravenswood	RSF2U1	23.6	73.9	2.5	0.0	0.0	360
Ravenswood	RSF2U2	28.8	70.7	0.5	0.0	0.0	184
Ravenswood	RSF2U3	81.3	18.7	0.0	0.0	0.0	91
Ravenswood	RSF2U4	36.9	63.1	0.0	0.0	0.0	141

Table A4.4. Percentage of Ruddy Ducks foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	9.0	91.0	0	0	0	8745
Alviso	A10	12.6	87.4	0	0	0	3385
Alviso	A11	1.1	98.9	0	0	0	1572
Alviso	A14	6.1	93.9	0	0	0	3604
Alviso	A16	9.2	90.8	0	0	0	4099
Alviso	A17	16.7	83.3	0	0	0	90
Alviso	A19	0.0	100.0	0	0	0	23
Alviso	A2E	6.1	93.9	0	0	0	6768
Alviso	A2W	2.3	97.7	0	0	0	6203
Alviso	A3N	0.0	100.0	0	0	0	8
Alviso	A3W	2.6	97.4	0	0	0	28182
Alviso	A5	2.8	97.2	0	0	0	3625
Alviso	A6S	0.0	100.0	0	0	0	50
Alviso	A7	1.5	98.5	0	0	0	1433
Alviso	A8	2.0	98.0	0	0	0	4965
Alviso	A8S	8.6	91.4	0	0	0	805
Alviso	A8W	13.5	86.5	0	0	0	52
Alviso	A9	1.0	99.0	0	0	0	5081
Alviso	AB1	5.5	94.5	0	0	0	1314
Alviso	AB2	2.2	97.8	0	0	0	2794
Coyote Hills	N1A	5.8	94.2	0	0	0	223
Coyote Hills	N2A	3.4	96.6	0	0	0	1872
Coyote Hills	N3A	6.5	93.5	0	0	0	1311
Coyote Hills	N4	3.1	96.9	0	0	0	228
Coyote Hills	N4AA	1.1	98.9	0	0	0	2360
Coyote Hills	N4AB	4.5	95.5	0	0	0	4592
Coyote Hills	N4B	7.7	92.3	0	0	0	414
Coyote Hills	N5	11.4	88.6	0	0	0	44
Coyote Hills	N6	8.2	91.8	0	0	0	244
Coyote Hills	N7	0.5	99.5	0	0	0	1584
Coyote Hills	N8	2.9	97.1	0	0	0	451
Coyote Hills	N9	4.2	95.8	0	0	0	2050
Dumbarton	N1	2.6	97.4	0	0	0	271
Dumbarton	N2	0.0	100.0	0	0	0	4
Dumbarton	N3	0.0	100.0	0	0	0	13
Dumbarton	NPP1	0.0	100.0	0	0	0	1

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Eden Landing	CP3C	9.0	91.0	0	0	0	290
Eden Landing	E1	29.0	71.0	0	0	0	365
Eden Landing	E10	0.4	99.6	0	0	0	3914
Eden Landing	E11	0.0	100.0	0	0	0	79
Eden Landing	E12	0.0	100.0	0	0	0	112
Eden Landing	E13	0.0	100.0	0	0	0	142
Eden Landing	E2	3.0	97.0	0	0	0	1983
Eden Landing	E4	3.5	96.5	0	0	0	57
Eden Landing	E4C	0.0	100.0	0	0	0	36
Eden Landing	E5	8.5	91.5	0	0	0	153
Eden Landing	E5C	100.0	0.0	0	0	0	1
Eden Landing	E6	0.0	100.0	0	0	0	43
Eden Landing	E6A	0.4	99.6	0	0	0	7237
Eden Landing	E6B	18.5	81.5	0	0	0	238
Eden Landing	E6C	0.0	100.0	0	0	0	12
Eden Landing	E7	11.5	88.5	0	0	0	96
Eden Landing	E8	29.8	70.2	0	0	0	615
Eden Landing	E8XN	0.0	100.0	0	0	0	840
Eden Landing	E9	50.0	50.0	0	0	0	4
Mowry	M1	1.6	98.4	0	0	0	251
Mowry	M2	5.4	94.6	0	0	0	74
Mowry	M3	5.9	94.1	0	0	0	17
Ravenswood	R1	10.6	89.4	0	0	0	726
Ravenswood	RSF2U1	5.9	94.1	0	0	0	136
Ravenswood	RSF2U2	0.0	100.0	0	0	0	426
Ravenswood	RSF2U4	43.8	56.2	0	0	0	1394

Table A4.5. Percentage of Eared Grebes foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	48.1	51.9	0	0	0	52
Alviso	A10	89.4	10.6	0	0	0	85
Alviso	A11	87.4	12.6	0	0	0	523
Alviso	A13	100.0	0.0	0	0	0	7
Alviso	A14	93.8	6.2	0	0	0	259
Alviso	A16	79.1	20.9	0	0	0	43
Alviso	A2E	100.0	0.0	0	0	0	38
Alviso	A2W	52.6	47.4	0	0	0	97
Alviso	A3W	54.3	45.7	0	0	0	94
Alviso	A5	42.4	57.6	0	0	0	33
Alviso	A7	62.5	37.5	0	0	0	16
Alviso	A8	33.3	66.7	0	0	0	18
Alviso	A8S	100.0	0.0	0	0	0	9
Alviso	A8W	50.0	50.0	0	0	0	2
Alviso	A9	0.0	100.0	0	0	0	2
Alviso	AB1	40.0	60.0	0	0	0	5
Alviso	AB2	100.0	0.0	0	0	0	1
Coyote Hills	N2A	90.0	10.0	0	0	0	60
Coyote Hills	N3A	0.0	100.0	0	0	0	1
Coyote Hills	N4	7.7	92.3	0	0	0	13
Coyote Hills	N4AA	90.1	9.9	0	0	0	111
Coyote Hills	N4AB	52.0	48.0	0	0	0	25
Coyote Hills	N4B	0.0	100.0	0	0	0	1
Coyote Hills	N6	100.0	0.0	0	0	0	3
Coyote Hills	N7	76.2	23.8	0	0	0	84
Coyote Hills	N8	78.1	21.9	0	0	0	32
Coyote Hills	N9	100.0	0.0	0	0	0	1
Dumbarton	N1	98.9	1.1	0	0	0	748
Dumbarton	N2	60.8	39.2	0	0	0	120
Dumbarton	N3	73.0	27.0	0	0	0	226

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Dumbarton	NPP1	96.0	4.0	0	0	0	881
Eden Landing	E1	100.0	0.0	0	0	0	14
Eden Landing	E12	100.0	0.0	0	0	0	1
Eden Landing	E14	100.0	0.0	0	0	0	1
Eden Landing	E2	96.9	3.1	0	0	0	32
Eden Landing	E4	100.0	0.0	0	0	0	8
Eden Landing	E5	56.8	43.2	0	0	0	37
Eden Landing	E6	100.0	0.0	0	0	0	21
Eden Landing	E6A	62.2	37.8	0	0	0	37
Eden Landing	E6B	100.0	0.0	0	0	0	5
Eden Landing	E6C	100.0	0.0	0	0	0	5
Eden Landing	E7	55.6	44.4	0	0	0	18
Mowry	M1	32.0	68.0	0	0	0	2013
Mowry	M2	51.0	49.0	0	0	0	741
Mowry	M3	85.4	14.6	0	0	0	3386
Mowry	M4	34.9	65.1	0	0	0	10880
Mowry	M5	29.3	70.7	0	0	0	1667
Mowry	M6	6.8	93.2	0	0	0	292
Ravenswood	R1	86.7	13.3	0	0	0	15
Ravenswood	R4	75.0	25.0	0	0	0	4
Ravenswood	RSF2U3	0.0	100.0	0	0	0	1

Table A4.6. Percentage of fisheaters foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	58.8	24.1	0.0	0.0	17.0	522
Alviso	A10	16.7	43.5	0.0	39.8	0.0	432
Alviso	A11	38.0	31.7	0.0	30.4	0.0	303
Alviso	A13	100.0	0.0	0.0	0.0	0.0	1
Alviso	A14	21.2	12.5	0.0	66.3	0.0	1055
Alviso	A16	15.3	6.6	76.7	0.1	1.3	1238
Alviso	A17	22.9	77.1	0.0	0.0	0.0	35
Alviso	A2E	61.5	12.6	0.0	20.2	5.7	247
Alviso	A2W	14.8	10.5	0.1	0.6	74.1	698
Alviso	A3N	85.7	14.3	0.0	0.0	0.0	7
Alviso	A3W	29.9	19.9	0.0	0.0	50.2	763
Alviso	A5	23.6	12.6	0.0	63.7	0.1	1343
Alviso	A6S	0.0	100.0	0.0	0.0	0.0	1
Alviso	A7	17.0	4.0	0.0	78.8	0.2	570
Alviso	A8	32.0	11.2	3.7	38.8	14.3	428
Alviso	A8S	69.2	19.4	0.0	11.4	0.0	237
Alviso	A8W	31.8	7.6	0.0	60.7	0.0	211
Alviso	A9	17.6	16.2	0.0	64.8	1.4	210
Alviso	AB1	50.0	13.9	0.0	20.8	15.3	72
Alviso	AB2	10.6	3.5	65.9	17.2	2.8	396
Coyote Hills	N1A	36.5	5.0	0.0	57.4	1.2	340
Coyote Hills	N2A	20.7	7.3	0.0	72.0	0.0	564
Coyote Hills	N3A	37.3	1.4	0.0	60.1	1.2	1276
Coyote Hills	N4	56.2	12.4	0.0	0.0	31.5	89
Coyote Hills	N4AA	80.4	5.3	0.0	10.0	4.4	551
Coyote Hills	N4AB	24.2	12.2	0.0	63.4	0.2	918
Coyote Hills	N5	24.0	58.7	0.0	6.7	10.7	150
Coyote Hills	N6	69.0	9.9	0.0	21.1	0.0	71
Coyote Hills	N7	50.0	37.9	5.2	5.2	1.7	58
Coyote Hills	N8	60.6	12.8	0.0	24.5	2.1	94

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Coyote Hills	N9	30.8	0.0	0.0	69.2	0.0	65
Dumbarton	N1	0.0	0.0	0.0	0.0	100.0	3
Dumbarton	N2	100.0	0.0	0.0	0.0	0.0	1
Dumbarton	N3	10.1	0.8	0.0	0.0	89.1	129
Eden Landing	CP3C	47.8	17.4	0.0	0.0	34.8	23
Eden Landing	E1	23.8	5.9	43.9	13.0	13.4	269
Eden Landing	E10	61.9	4.8	19.0	0.0	14.3	21
Eden Landing	E11	98.5	1.5	0.0	0.0	0.0	68
Eden Landing	E12	0.0	6.8	77.3	15.9	0.0	44
Eden Landing	E13	92.9	0.0	0.0	7.1	0.0	14
Eden Landing	E14	33.3	66.7	0.0	0.0	0.0	3
Eden Landing	E2	42.4	16.7	30.3	6.3	4.3	396
Eden Landing	E2C	100.0	0.0	0.0	0.0	0.0	1
Eden Landing	E4	100.0	0.0	0.0	0.0	0.0	10
Eden Landing	E6	50.0	50.0	0.0	0.0	0.0	2
Eden Landing	E6A	57.0	24.7	0.0	0.0	18.3	93
Eden Landing	E6B	33.3	66.7	0.0	0.0	0.0	6
Eden Landing	E7	7.4	10.5	0.0	0.0	82.1	514
Eden Landing	E8	70.0	30.0	0.0	0.0	0.0	10
Eden Landing	E8AE	100.0	0.0	0.0	0.0	0.0	1
Eden Landing	E8XN	81.2	18.8	0.0	0.0	0.0	16
Eden Landing	E9	80.8	15.4	0.0	0.0	3.8	26
Mowry	M1	0.0	0.0	0.0	100.0	0.0	3
Mowry	M2	27.3	0.0	0.0	63.6	9.1	11
Mowry	M3	100.0	0.0	0.0	0.0	0.0	13
Ravenswood	R1	40.7	53.8	5.5	0.0	0.0	91
Ravenswood	R4	37.5	62.5	0.0	0.0	0.0	8
Ravenswood	R5	50.0	50.0	0.0	0.0	0.0	2
Ravenswood	R5S	100.0	0.0	0.0	0.0	0.0	1
Ravenswood	RSF2U1	28.0	0.0	8.0	40.0	24.0	25
Ravenswood	RSF2U2	6.7	0.0	60.8	26.3	6.2	194
Ravenswood	RSF2U4	85.7	14.3	0.0	0.0	0.0	21

Table A4.7. Percentage of gulls foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	1.3	91.0	0.0	0.2	7.5	532
Alviso	A10	74.2	23.3	0.0	2.5	0.0	678
Alviso	A11	60.8	16.7	2.9	19.6	0.0	204
Alviso	A12	0.0	100.0	0.0	0.0	0.0	4522
Alviso	A13	32.8	56.4	0.0	10.8	0.0	390
Alviso	A14	3.1	29.7	0.0	67.2	0.0	64
Alviso	A15	0.0	94.5	0.0	5.5	0.0	888
Alviso	A16	24.6	48.0	26.9	0.3	0.1	910
Alviso	A17	4.5	95.5	0.0	0.0	0.0	2096
Alviso	A19	10.0	90.0	0.0	0.0	0.0	269
Alviso	A22	0.2	99.8	0.0	0.0	0.0	1182
Alviso	A23	0.1	99.7	0.0	0.2	0.0	4974
Alviso	A2E	0.3	2.9	0.0	95.7	1.1	1807
Alviso	A2W	1.1	29.8	0.0	0.4	68.8	272
Alviso	A3N	0.0	16.7	0.0	2.4	81.0	42
Alviso	A3W	0.6	11.8	0.0	0.0	87.6	170
Alviso	A5	2.9	9.4	0.0	87.7	0.0	819
Alviso	A7	0.1	0.7	0.4	98.7	0.1	1793
Alviso	A8	2.2	7.3	0.0	90.4	0.0	890
Alviso	A8S	0.3	19.4	0.0	80.2	0.0	581
Alviso	A8W	5.6	11.1	0.0	82.4	0.9	216
Alviso	A9	2.6	97.4	0.0	0.0	0.0	192
Alviso	AB1	5.9	17.6	5.9	0.0	70.6	17
Alviso	AB2	8.2	2.4	4.0	83.7	1.7	869
Coyote Hills	N1A	0.8	6.2	0.0	92.8	0.2	600
Coyote Hills	N2A	0.1	4.3	28.9	66.6	0.0	2131
Coyote Hills	N3A	0.3	0.9	0.0	98.9	0.0	4263
Coyote Hills	N4	0.0	2.0	0.0	98.0	0.0	346
Coyote Hills	N4AA	7.1	45.1	0.0	44.0	3.8	184
Coyote Hills	N4AB	0.1	10.2	0.0	89.6	0.1	1826
Coyote Hills	N4B	0.0	100.0	0.0	0.0	0.0	1
Coyote Hills	N5	2.5	3.8	0.0	92.5	1.2	80
Coyote Hills	N6	12.1	1.0	0.0	86.9	0.0	1976
Coyote Hills	N7	0.1	0.1	0.0	99.7	0.0	2184
Coyote Hills	N8	2.8	9.3	0.0	87.9	0.0	322
Coyote Hills	N9	0.2	2.0	0.0	97.8	0.0	1824

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Dumbarton	N1	79.5	17.1	2.9	0.1	0.4	815
Dumbarton	N2	0.0	1.8	0.0	98.2	0.0	57
Dumbarton	N3	1.2	0.0	0.6	9.1	89.0	164
Dumbarton	NPP1	44.0	56.0	0.0	0.0	0.0	291
Eden Landing	CP3C	0.0	100.0	0.0	0.0	0.0	839
Eden Landing	E1	5.2	76.6	13.0	2.6	2.6	77
Eden Landing	E10	16.7	0.0	16.7	0.0	66.7	6
Eden Landing	E11	7.7	88.5	0.0	0.0	3.8	26
Eden Landing	E12	1.9	33.3	44.4	20.4	0.0	54
Eden Landing	E13	50.0	50.0	0.0	0.0	0.0	2
Eden Landing	E14	0.0	100.0	0.0	0.0	0.0	3
Eden Landing	E2	3.4	8.0	87.5	0.0	1.1	88
Eden Landing	E2C	0.0	100.0	0.0	0.0	0.0	1
Eden Landing	E4	24.0	72.0	0.0	0.0	4.0	25
Eden Landing	E4C	45.9	54.1	0.0	0.0	0.0	37
Eden Landing	E5	45.3	53.6	0.0	0.0	1.0	192
Eden Landing	E5C	0.0	100.0	0.0	0.0	0.0	1
Eden Landing	E6	6.2	80.7	0.0	0.0	13.1	321
Eden Landing	E6A	48.4	49.2	0.0	0.4	2.0	256
Eden Landing	E6B	33.3	66.7	0.0	0.0	0.0	3
Eden Landing	E6C	100.0	0.0	0.0	0.0	0.0	90
Eden Landing	E7	4.1	64.9	0.0	0.0	30.9	97
Eden Landing	E8	0.0	100.0	0.0	0.0	0.0	1
Eden Landing	E8AE	0.0	100.0	0.0	0.0	0.0	1
Eden Landing	E9	0.0	75.0	0.0	0.0	25.0	4
Mowry	M1	0.0	0.9	0.0	99.1	0.0	2355
Mowry	M2	0.4	2.3	10.5	86.8	0.0	2342
Mowry	M3	12.1	2.8	29.6	55.5	0.0	1527
Mowry	M4	18.7	1.3	0.0	79.9	0.0	3446
Mowry	M5	28.6	0.2	0.0	71.2	0.0	2276
Mowry	M6	27.9	6.2	0.6	65.3	0.0	470
Ravenswood	R1	9.6	85.1	5.3	0.0	0.0	114
Ravenswood	R2	25.0	75.0	0.0	0.0	0.0	4
Ravenswood	R4	2.2	38.3	59.5	0.0	0.0	812
Ravenswood	R5	37.5	62.5	0.0	0.0	0.0	8
Ravenswood	R5S	0.0	100.0	0.0	0.0	0.0	1
Ravenswood	RSF2U1	0.5	0.1	94.6	3.8	0.9	759
Ravenswood	RSF2U2	0.6	1.2	79.3	18.8	0.0	329
Ravenswood	RSF2U3	59.0	38.5	2.6	0.0	0.0	39

Table A4.8. Percentage of Bonaparte's Gulls foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	33.3	22.2	0	0.0	44.4	9
Alviso	A10	96.3	3.7	0	0.0	0.0	191
Alviso	A2E	66.7	33.3	0	0.0	0.0	9
Alviso	A2W	21.4	78.6	0	0.0	0.0	14
Alviso	A3W	40.0	20.0	0	0.0	40.0	5
Alviso	A8S	66.7	33.3	0	0.0	0.0	3
Alviso	A8W	100.0	0.0	0	0.0	0.0	1
Alviso	AB2	100.0	0.0	0	0.0	0.0	1
Coyote Hills	N1A	0.0	100.0	0	0.0	0.0	2
Coyote Hills	N3A	100.0	0.0	0	0.0	0.0	2
Coyote Hills	N4AA	0.0	33.3	0	0.0	66.7	3
Coyote Hills	N6	100.0	0.0	0	0.0	0.0	2
Dumbarton	N1	95.5	3.8	0	0.1	0.6	1067
Dumbarton	N2	100.0	0.0	0	0.0	0.0	215
Dumbarton	N3	99.6	0.0	0	0.0	0.4	266
Dumbarton	NPP1	100.0	0.0	0	0.0	0.0	135
Eden Landing	E5	95.4	0.0	0	0.0	4.6	175
Eden Landing	E6	100.0	0.0	0	0.0	0.0	1
Eden Landing	E6A	100.0	0.0	0	0.0	0.0	1
Eden Landing	E6B	100.0	0.0	0	0.0	0.0	3
Eden Landing	E6C	100.0	0.0	0	0.0	0.0	261
Eden Landing	E7	0.0	56.2	0	0.0	43.8	345
Mowry	M2	53.3	46.7	0	0.0	0.0	15

Table A4.9. Percentage of herons and egrets foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	69.0	12.1	0.0	6.9	12.1	58
Alviso	A10	51.9	24.1	0.0	24.1	0.0	54
Alviso	A11	66.7	14.8	0.0	18.5	0.0	27
Alviso	A14	67.4	4.3	0.0	26.1	2.2	46
Alviso	A16	59.3	19.5	11.5	4.4	5.3	113
Alviso	A17	15.4	61.5	0.0	23.1	0.0	13
Alviso	A19	81.8	9.1	0.0	9.1	0.0	11
Alviso	A22	0.0	50.0	0.0	50.0	0.0	2
Alviso	A2E	57.4	23.0	0.0	16.4	3.3	61
Alviso	A2W	27.7	21.7	0.0	37.3	13.3	83
Alviso	A3N	40.0	50.0	0.0	0.0	10.0	10
Alviso	A3W	62.3	25.4	0.0	1.6	10.7	122
Alviso	A5	65.3	17.3	0.0	16.3	1.0	98
Alviso	A6S	75.0	25.0	0.0	0.0	0.0	8
Alviso	A7	41.2	26.5	2.9	20.6	8.8	34
Alviso	A8	69.8	14.0	2.3	14.0	0.0	43
Alviso	A8S	60.0	2.5	0.0	37.5	0.0	40
Alviso	A8W	21.4	55.4	0.0	21.4	1.8	56
Alviso	A9	91.8	3.8	1.3	1.3	1.9	159
Alviso	AB1	74.4	4.7	11.6	7.0	2.3	43
Alviso	AB2	52.2	13.4	11.9	14.9	7.5	67
Coyote Hills	N1A	61.0	0.0	0.0	32.2	6.8	59
Coyote Hills	N2A	97.2	1.4	0.0	1.4	0.0	143
Coyote Hills	N3A	77.6	2.0	4.1	10.2	6.1	49
Coyote Hills	N4	47.1	29.4	0.0	23.5	0.0	17
Coyote Hills	N4AA	95.6	1.1	1.5	0.4	1.5	275
Coyote Hills	N4AB	23.6	5.5	1.6	69.3	0.0	127
Coyote Hills	N4B	80.0	13.3	0.0	3.3	3.3	30
Coyote Hills	N5	69.6	4.3	0.0	17.4	8.7	23
Coyote Hills	N6	97.3	0.0	0.0	2.7	0.0	37
Coyote Hills	N7	64.3	21.4	0.0	7.1	7.1	14
Coyote Hills	N8	82.8	0.0	0.0	17.2	0.0	29
Coyote Hills	N9	20.7	48.3	0.0	31.0	0.0	29
Dumbarton	N1	0.0	100.0	0.0	0.0	0.0	2
Dumbarton	N2	75.0	0.0	0.0	25.0	0.0	4
Dumbarton	N3	31.6	15.8	2.6	39.5	10.5	38
Eden Landing	CP3C	75.6	14.6	0.0	7.3	2.4	41
Eden Landing	E1	43.4	5.7	11.3	28.3	11.3	53
Eden Landing	E10	75.7	13.5	2.7	2.7	5.4	37

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Eden Landing	E11	93.4	1.9	2.8	0.0	1.9	106
Eden Landing	E12	55.0	0.0	0.0	15.0	30.0	20
Eden Landing	E13	90.9	4.5	0.0	4.5	0.0	22
Eden Landing	E14	94.3	2.9	0.0	2.9	0.0	70
Eden Landing	E1C	0.0	0.0	0.0	100.0	0.0	1
Eden Landing	E2	39.4	25.5	7.4	14.9	12.8	94
Eden Landing	E2C	40.0	0.0	0.0	0.0	60.0	5
Eden Landing	E4	69.8	7.0	4.7	4.7	14.0	43
Eden Landing	E5C	0.0	0.0	0.0	0.0	100.0	1
Eden Landing	E6	81.8	0.0	0.0	0.0	18.2	11
Eden Landing	E6A	67.0	29.7	0.0	1.1	2.2	91
Eden Landing	E6B	81.0	14.3	0.0	4.8	0.0	21
Eden Landing	E6C	100.0	0.0	0.0	0.0	0.0	1
Eden Landing	E7	34.7	35.8	1.1	4.2	24.2	95
Eden Landing	E8	50.0	45.0	0.0	5.0	0.0	20
Eden Landing	E8AE	60.0	40.0	0.0	0.0	0.0	10
Eden Landing	E8AW	83.3	16.7	0.0	0.0	0.0	6
Eden Landing	E8XN	50.0	0.0	0.0	0.0	50.0	2
Eden Landing	E8XS	88.9	0.0	0.0	0.0	11.1	9
Eden Landing	E9	66.0	14.0	0.0	20.0	0.0	50
Mowry	M2	0.0	0.0	0.0	100.0	0.0	1
Mowry	M3	0.0	100.0	0.0	0.0	0.0	1
Mowry	M4	0.0	0.0	0.0	100.0	0.0	1
Mowry	M6	0.0	0.0	0.0	100.0	0.0	2
Ravenswood	R1	81.1	13.3	0.0	0.7	4.9	143
Ravenswood	R2	0.0	0.0	0.0	100.0	0.0	1
Ravenswood	R3	33.3	33.3	0.0	33.3	0.0	3
Ravenswood	R4	75.0	21.2	0.0	1.9	1.9	52
Ravenswood	R5	83.3	16.7	0.0	0.0	0.0	12
Ravenswood	R5S	77.8	22.2	0.0	0.0	0.0	9
Ravenswood	RSF2U1	30.5	12.2	54.9	2.4	0.0	82
Ravenswood	RSF2U2	66.7	0.0	31.0	2.4	0.0	42
Ravenswood	RSF2U4	68.8	12.5	0.0	18.8	0.0	16

Table A4.10. Percentage of phalaropes foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A14	0.0	100.0	0	0	0	1
Coyote Hills	N9	100.0	0.0	0	0	0	1
Dumbarton	N1	60.0	40.0	0	0	0	5
Dumbarton	N2	100.0	0.0	0	0	0	63
Dumbarton	NPP1	100.0	0.0	0	0	0	10
Eden Landing	E12	50.0	50.0	0	0	0	8
Eden Landing	E13	97.3	2.7	0	0	0	146
Eden Landing	E2	100.0	0.0	0	0	0	161
Eden Landing	E4	98.3	1.7	0	0	0	344
Eden Landing	E4C	100.0	0.0	0	0	0	8
Eden Landing	E5	0.0	100.0	0	0	0	2
Eden Landing	E5C	100.0	0.0	0	0	0	63
Eden Landing	E6	100.0	0.0	0	0	0	3
Eden Landing	E6A	19.9	80.1	0	0	0	141
Eden Landing	E6B	95.9	4.1	0	0	0	197
Eden Landing	E7	73.9	26.1	0	0	0	475
Eden Landing	E8	100.0	0.0	0	0	0	25
Mowry	M1	98.1	1.9	0	0	0	1705
Mowry	M2	0.0	100.0	0	0	0	70
Mowry	M3	100.0	0.0	0	0	0	179
Mowry	M5	0.0	100.0	0	0	0	1
Ravenswood	RSF2U1	0.0	100.0	0	0	0	1
Ravenswood	RSF2U3	100.0	0.0	0	0	0	1

Table A4.11. Percentage of medium shorebirds foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	26.5	64.7	0.0	0.0	8.8	34
Alviso	A10	39.1	0.0	0.0	60.9	0.0	23
Alviso	A11	6.4	4.5	0.6	88.5	0.0	157
Alviso	A12	0.0	81.8	18.2	0.0	0.0	11
Alviso	A13	85.8	14.2	0.0	0.0	0.0	309
Alviso	A14	29.2	56.9	0.0	13.9	0.0	72
Alviso	A15	4.5	95.5	0.0	0.0	0.0	22
Alviso	A16	4.5	61.4	34.2	0.0	0.0	1809
Alviso	A17	74.6	25.4	0.0	0.0	0.0	2460
Alviso	A19	53.4	46.6	0.0	0.0	0.0	1116
Alviso	A22	62.8	37.2	0.0	0.0	0.0	277
Alviso	A23	0.7	99.3	0.0	0.0	0.0	2118
Alviso	A2E	77.8	0.0	0.0	11.1	11.1	9
Alviso	A2W	13.2	82.1	0.0	0.0	4.7	318
Alviso	A3N	0.0	99.5	0.0	0.5	0.0	800
Alviso	A3W	82.0	18.0	0.0	0.0	0.0	100
Alviso	A5	38.6	18.3	0.0	43.1	0.0	153
Alviso	A6S	12.3	87.7	0.0	0.0	0.0	179
Alviso	A7	10.9	10.2	6.1	72.8	0.0	147
Alviso	A8	26.4	52.8	8.3	12.5	0.0	72
Alviso	A8S	60.9	13.0	0.0	26.1	0.0	23
Alviso	A8W	57.1	14.3	0.0	28.6	0.0	35
Alviso	A9	20.9	79.1	0.0	0.0	0.0	21898
Alviso	AB1	21.0	78.7	0.3	0.0	0.0	2655
Alviso	AB2	16.2	80.6	3.0	0.2	0.0	4869
Coyote Hills	N1A	15.4	0.0	0.0	84.6	0.0	52
Coyote Hills	N2A	0.8	0.0	0.0	99.2	0.0	125
Coyote Hills	N3A	39.1	60.8	0.0	0.1	0.0	1040
Coyote Hills	N4	0.1	0.0	95.5	4.3	0.0	4947
Coyote Hills	N4AA	12.8	86.3	0.8	0.0	0.0	358
Coyote Hills	N4AB	0.0	0.0	100.0	0.0	0.0	1
Coyote Hills	N4B	91.1	8.2	0.0	0.7	0.0	696
Coyote Hills	N5	100.0	0.0	0.0	0.0	0.0	2
Coyote Hills	N6	21.8	78.2	0.0	0.0	0.0	1249
Coyote Hills	N7	83.3	0.0	0.0	16.7	0.0	12
Coyote Hills	N8	8.7	90.6	0.0	0.7	0.0	766
Coyote Hills	N9	11.6	88.1	0.0	0.3	0.0	1050
Dumbarton	N1	25.1	47.7	9.4	0.4	17.3	2395
Dumbarton	N2	29.8	23.5	4.9	41.8	0.0	366

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Dumbarton	N3	9.8	19.6	9.5	61.1	0.0	2126
Dumbarton	NPP1	7.9	92.1	0.0	0.0	0.0	7993
Eden Landing	CP3C	46.0	53.4	0.4	0.0	0.3	3032
Eden Landing	E1	2.8	0.0	30.6	66.7	0.0	36
Eden Landing	E10	36.2	53.7	8.1	0.0	2.0	149
Eden Landing	E11	59.9	40.1	0.0	0.0	0.0	10109
Eden Landing	E12	25.8	50.3	5.6	10.3	8.0	7029
Eden Landing	E13	22.7	66.3	0.7	3.5	6.9	3629
Eden Landing	E14	53.1	46.9	0.0	0.0	0.0	1178
Eden Landing	E1C	63.3	36.7	0.0	0.0	0.0	1426
Eden Landing	E2	3.4	15.7	80.8	0.0	0.0	3887
Eden Landing	E2C	27.4	72.6	0.0	0.0	0.0	419
Eden Landing	E4	22.0	77.1	0.8	0.0	0.1	6213
Eden Landing	E4C	10.4	76.8	0.0	0.0	12.8	12425
Eden Landing	E5	13.8	80.0	0.0	0.0	6.1	1303
Eden Landing	E5C	65.8	34.2	0.0	0.0	0.0	2407
Eden Landing	E6	9.5	84.6	0.0	0.0	5.9	1396
Eden Landing	E6A	43.8	56.2	0.0	0.1	0.0	1257
Eden Landing	E6B	7.2	92.8	0.0	0.0	0.0	4363
Eden Landing	E6C	23.1	76.8	0.0	0.0	0.1	1838
Eden Landing	E7	12.7	19.2	0.0	0.0	68.2	355
Eden Landing	E8	0.6	98.9	0.0	0.0	0.6	8020
Eden Landing	E8AE	7.0	93.0	0.0	0.0	0.0	43
Eden Landing	E8AW	0.0	100.0	0.0	0.0	0.0	301
Eden Landing	E8XN	0.0	0.0	0.0	100.0	0.0	1
Eden Landing	E8XS	50.0	50.0	0.0	0.0	0.0	2
Eden Landing	E9	17.5	82.3	0.0	0.0	0.2	1881
Mowry	M1	8.3	78.4	0.0	13.3	0.0	12097
Mowry	M2	0.2	0.1	29.1	70.6	0.1	4469
Mowry	M3	9.6	1.2	89.2	0.0	0.0	2082
Mowry	M4	53.3	39.5	0.0	7.2	0.0	499
Mowry	M5	90.6	4.4	4.8	0.1	0.0	2277
Mowry	M6	91.7	8.3	0.0	0.0	0.0	36
Ravenswood	R1	8.9	91.1	0.0	0.0	0.0	418
Ravenswood	R2	34.5	65.5	0.0	0.0	0.0	29
Ravenswood	R3	14.6	85.4	0.0	0.0	0.0	886
Ravenswood	R4	11.7	44.3	44.0	0.0	0.0	3308
Ravenswood	R5	10.8	89.2	0.0	0.0	0.0	362
Ravenswood	R5S	28.6	71.4	0.0	0.0	0.0	1349
Ravenswood	RSF2U1	3.1	67.7	24.2	5.0	0.0	16198
Ravenswood	RSF2U2	1.5	1.3	49.7	47.5	0.0	3967
Ravenswood	RSF2U3	34.1	51.2	14.6	0.0	0.0	123

Table A4.12. Percentage of small shorebirds foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	75.6	24.4	0.0	0.0	0.0	41
Alviso	A11	0.0	0.0	100.0	0.0	0.0	1
Alviso	A12	3.2	96.8	0.0	0.0	0.0	250
Alviso	A13	62.5	37.5	0.0	0.0	0.0	672
Alviso	A14	6.9	75.9	0.0	13.8	3.4	29
Alviso	A15	6.3	93.7	0.0	0.0	0.0	381
Alviso	A16	6.8	86.7	6.4	0.0	0.0	2081
Alviso	A17	99.7	0.3	0.0	0.0	0.0	7079
Alviso	A19	100.0	0.0	0.0	0.0	0.0	102
Alviso	A22	52.0	48.0	0.0	0.0	0.0	8989
Alviso	A23	95.2	4.8	0.0	0.0	0.0	3088
Alviso	A2W	16.7	71.4	0.0	9.3	2.6	858
Alviso	A3N	12.3	87.7	0.0	0.0	0.0	661
Alviso	A3W	71.6	28.4	0.0	0.0	0.0	81
Alviso	A5	32.2	0.4	0.0	67.4	0.0	1695
Alviso	A6S	97.7	2.3	0.0	0.0	0.0	979
Alviso	A7	0.8	0.0	0.0	99.2	0.0	797
Alviso	A8	92.1	5.6	0.0	2.4	0.0	126
Alviso	A8S	89.8	9.9	0.0	0.3	0.0	323
Alviso	A8W	95.9	0.0	0.0	4.1	0.0	169
Alviso	A9	21.9	78.1	0.0	0.0	0.0	16353
Alviso	AB1	25.3	74.7	0.0	0.0	0.0	1070
Alviso	AB2	35.4	56.7	7.6	0.0	0.4	1283
Coyote Hills	N1A	78.9	0.0	0.0	21.1	0.0	90
Coyote Hills	N2A	81.8	0.0	0.0	18.2	0.0	22
Coyote Hills	N3A	60.1	39.9	0.0	0.0	0.0	873
Coyote Hills	N4	41.5	17.0	35.0	6.5	0.0	277
Coyote Hills	N4AA	67.0	33.0	0.0	0.0	0.0	1037
Coyote Hills	N4AB	100.0	0.0	0.0	0.0	0.0	1
Coyote Hills	N4B	89.4	7.0	0.0	0.0	3.6	800
Coyote Hills	N5	68.9	11.1	0.0	20.0	0.0	90
Coyote Hills	N6	100.0	0.0	0.0	0.0	0.0	258
Coyote Hills	N7	100.0	0.0	0.0	0.0	0.0	83
Coyote Hills	N8	90.8	8.0	0.0	1.3	0.0	238
Coyote Hills	N9	84.8	15.2	0.0	0.0	0.0	2367
Dumbarton	N1	47.8	43.5	6.7	2.0	0.0	2520
Dumbarton	N2	21.0	0.7	1.3	77.0	0.0	3781
Dumbarton	N3	10.9	2.2	25.7	61.1	0.0	8302
Dumbarton	NPP1	11.2	88.8	0.0	0.0	0.0	48039

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Eden Landing	CP3C	50.6	49.4	0.0	0.0	0.0	28829
Eden Landing	E1	33.8	0.0	41.5	24.7	0.0	364
Eden Landing	E10	97.9	2.1	0.0	0.0	0.0	242
Eden Landing	E11	20.5	79.3	0.0	0.0	0.3	1173
Eden Landing	E12	23.5	39.2	16.4	20.9	0.0	10027
Eden Landing	E13	24.6	55.7	19.5	0.2	0.0	12967
Eden Landing	E14	27.0	73.0	0.0	0.0	0.0	16666
Eden Landing	E1C	79.2	19.8	1.1	0.0	0.0	3053
Eden Landing	E2	5.7	3.1	91.2	0.0	0.0	7092
Eden Landing	E2C	78.2	21.8	0.0	0.0	0.0	1951
Eden Landing	E4	32.4	67.3	0.0	0.0	0.3	4480
Eden Landing	E4C	20.6	79.3	0.0	0.0	0.0	35346
Eden Landing	E5	41.0	58.0	0.0	0.0	0.9	441
Eden Landing	E5C	87.9	12.1	0.0	0.0	0.0	4491
Eden Landing	E6	22.9	77.1	0.0	0.0	0.0	7405
Eden Landing	E6A	84.2	15.1	0.7	0.0	0.0	15250
Eden Landing	E6B	37.6	62.1	0.1	0.2	0.0	48391
Eden Landing	E6C	71.3	28.7	0.0	0.0	0.0	279
Eden Landing	E7	22.3	57.2	0.0	0.0	20.6	3046
Eden Landing	E8	17.0	83.0	0.0	0.0	0.0	11800
Eden Landing	E8AE	100.0	0.0	0.0	0.0	0.0	1003
Eden Landing	E8AW	100.0	0.0	0.0	0.0	0.0	250
Eden Landing	E8XS	100.0	0.0	0.0	0.0	0.0	127
Eden Landing	E9	89.8	10.2	0.0	0.0	0.0	3103
Mowry	M1	7.2	43.2	0.0	49.6	0.0	15432
Mowry	M2	0.1	0.1	7.4	92.4	0.0	15772
Mowry	M3	1.8	4.1	84.1	9.9	0.0	14774
Mowry	M4	68.2	13.1	0.0	18.7	0.0	947
Mowry	M5	34.9	64.8	0.0	0.0	0.2	8492
Mowry	M6	5.1	94.9	0.0	0.0	0.0	6372
Ravenswood	R1	46.1	53.9	0.0	0.0	0.0	53956
Ravenswood	R2	19.1	80.9	0.0	0.0	0.0	12536
Ravenswood	R3	35.5	64.5	0.0	0.0	0.0	1345
Ravenswood	R4	65.5	32.4	2.1	0.0	0.0	6119
Ravenswood	R5	50.7	49.3	0.0	0.0	0.0	434
Ravenswood	R5S	74.3	25.7	0.0	0.0	0.0	649
Ravenswood	RSF2U1	12.2	75.6	9.7	2.5	0.0	4473
Ravenswood	RSF2U2	0.7	0.5	3.4	95.4	0.0	1366
Ravenswood	RSF2U3	54.6	45.4	0.0	0.0	0.0	438
Ravenswood	RSF2U4	100.0	0.0	0.0	0.0	0.0	32

Table A4.13. Percentage of terns foraging, roosting, and using islands, levees, or manmade structures in each pond, South San Francisco Bay, California; September 2024 - May 2025. N is the total number of bird sightings during the study period. Only ponds with one or more sightings are shown. Pond CP3C is in the Eden Landing area but owned by Cargill.

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Alviso	A1	76.3	0.0	0.0	0.0	23.7	59
Alviso	A10	85.7	14.3	0.0	0.0	0.0	7
Alviso	A11	23.6	0.0	0.0	76.4	0.0	212
Alviso	A14	62.8	2.3	0.0	30.2	4.7	43
Alviso	A16	3.6	41.1	52.7	0.0	2.7	224
Alviso	A17	100.0	0.0	0.0	0.0	0.0	2
Alviso	A2E	61.0	10.1	0.0	0.0	28.9	159
Alviso	A2W	34.2	0.0	0.0	0.0	65.8	562
Alviso	A3N	75.0	0.0	0.0	0.0	25.0	8
Alviso	A3W	36.1	0.0	0.0	0.0	63.9	166
Alviso	A5	97.0	0.0	0.0	1.0	2.0	101
Alviso	A7	0.0	0.0	0.0	99.0	1.0	101
Alviso	A8	89.3	0.0	0.0	3.6	7.1	28
Alviso	A8S	100.0	0.0	0.0	0.0	0.0	29
Alviso	A8W	11.1	0.0	0.0	88.0	0.9	117
Alviso	A9	37.9	37.9	0.0	0.0	24.2	66
Alviso	AB1	30.0	2.0	50.0	0.0	18.0	50
Alviso	AB2	5.9	0.0	0.0	0.0	94.1	203
Coyote Hills	N1A	49.5	0.0	0.0	48.6	1.8	111
Coyote Hills	N2A	51.3	0.0	0.0	48.7	0.0	39
Coyote Hills	N3A	37.4	0.0	0.0	35.9	26.7	131
Coyote Hills	N4	10.7	0.0	0.0	0.0	89.3	28
Coyote Hills	N4AA	11.3	0.0	0.0	0.7	87.9	282
Coyote Hills	N4AB	72.6	0.0	0.0	8.1	19.4	62
Coyote Hills	N4B	100.0	0.0	0.0	0.0	0.0	5
Coyote Hills	N5	24.2	0.0	0.0	0.0	75.8	33
Coyote Hills	N6	100.0	0.0	0.0	0.0	0.0	3
Coyote Hills	N7	13.8	0.0	0.0	0.0	86.2	29
Coyote Hills	N8	19.1	0.0	0.0	42.6	38.3	47
Coyote Hills	N9	66.7	0.0	0.0	0.0	33.3	3
Dumbarton	N1	5.3	0.0	94.7	0.0	0.0	19
Dumbarton	N2	14.3	0.0	71.4	14.3	0.0	7
Dumbarton	N3	97.1	0.0	0.0	0.0	2.9	34
Eden Landing	CP3C	93.3	0.0	0.0	0.0	6.7	30
Eden Landing	E1	72.5	0.0	21.7	0.0	5.8	138
Eden Landing	E10	12.5	0.0	0.0	0.0	87.5	8
Eden Landing	E11	79.7	2.5	0.0	0.0	17.7	79
Eden Landing	E12	24.5	0.0	20.8	5.7	49.1	53
Eden Landing	E13	46.2	15.4	38.5	0.0	0.0	13

Complex	Pond	% Foraging	% Roosting	% Island	% Levee	% Manmade	N
Eden Landing	E14	22.2	55.6	0.0	0.0	22.2	9
Eden Landing	E2	50.0	0.0	9.3	0.0	40.7	54
Eden Landing	E2C	100.0	0.0	0.0	0.0	0.0	2
Eden Landing	E4	75.0	25.0	0.0	0.0	0.0	4
Eden Landing	E5	0.0	0.0	0.0	0.0	100.0	1
Eden Landing	E6	25.8	0.0	0.0	0.0	74.2	31
Eden Landing	E6A	46.7	26.7	0.0	0.0	26.7	15
Eden Landing	E6B	66.7	0.0	0.0	0.0	33.3	3
Eden Landing	E6C	100.0	0.0	0.0	0.0	0.0	1
Eden Landing	E7	1.1	9.5	0.0	0.0	89.4	528
Eden Landing	E8	50.0	25.0	0.0	0.0	25.0	4
Eden Landing	E8AE	20.0	80.0	0.0	0.0	0.0	5
Eden Landing	E8AW	0.0	100.0	0.0	0.0	0.0	53
Eden Landing	E8XN	100.0	0.0	0.0	0.0	0.0	12
Eden Landing	E9	0.0	0.0	0.0	0.0	100.0	1
Mowry	M1	0.0	0.0	0.0	0.0	100.0	4
Mowry	M2	0.0	0.0	0.0	0.0	100.0	3
Mowry	M4	0.0	100.0	0.0	0.0	0.0	1
Ravenswood	R1	40.6	34.4	25.0	0.0	0.0	32
Ravenswood	R4	43.8	12.5	43.8	0.0	0.0	16
Ravenswood	R5	33.3	66.7	0.0	0.0	0.0	3
Ravenswood	R5S	100.0	0.0	0.0	0.0	0.0	1
Ravenswood	RSF2U1	2.2	0.0	69.6	7.8	20.4	270
Ravenswood	RSF2U2	3.6	5.2	88.7	2.3	0.2	639
Ravenswood	RSF2U4	100.0	0.0	0.0	0.0	0.0	13

Appendix 5

This appendix presents AICc tables (one per species/guild) summarizing the model selection results for the regression models relating inter-annual changes in seasonal waterbird abundance to changes in habitats and weather. The final two tables contain the "base" AICc tables for fitting site characteristics for Bonaparte's Gulls and phalaropes (see Van Schmidt and Parsons 2023 for details).

Table A5.1. Model selection table for interannual change in abundance of dabbling ducks during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC	10	0.00	5739.31	-2859.57	0.03
Abun_PC ~ Islands_num + OpenHunting_pct + PPT1 + Salinity + Salinity_AC	8	0.05	5739.36	-2861.62	0.03
Abun_PC ~ Islands_num + OpenHunting_pct + Salinity + Salinity_AC	7	1.17	5740.48	-2863.20	0.02
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + Salinity + Salinity_AC	9	1.36	5740.67	-2861.26	0.02
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + TMX	11	1.76	5741.07	-2859.43	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + Gated + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC	11	1.78	5741.09	-2859.44	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + TMN	11	1.84	5741.14	-2859.47	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + PPT1 + Salinity + Salinity_AC + TMX	9	1.86	5741.17	-2861.52	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + WaterElev_m_AC	11	1.88	5741.19	-2859.49	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + PPT1 + Salinity + Salinity_AC + TMN	9	1.89	5741.20	-2861.53	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + Gated + PPT1 + Salinity + Salinity_AC	9	1.94	5741.25	-2861.56	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + PPT1 + Salinity + Salinity_AC + WaterElev_m_AC	9	1.95	5741.26	-2861.56	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + Temp_C + Temp_C_AC	12	1.98	5741.29	-2858.52	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + Breached + LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC	11	2.00	5741.31	-2859.55	0.01

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ Islands_num + OpenHunting_pct + Breached + PPT1 + Salinity + Salinity_AC	9	2.01	5741.32	-2861.59	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT1 + Salinity + Salinity_AC	12	2.31	5741.62	-2858.69	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + PPT1 + Salinity + Salinity_AC + Temp_C + Temp_C_AC	10	2.79	5742.10	-2860.96	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + Salinity + Salinity_AC + WaterElev_m_AC	8	2.98	5742.29	-2863.09	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + Gated + Salinity + Salinity_AC	8	3.08	5742.39	-2863.14	0.01
Abun_PC ~ Islands_num + OpenHunting_pct + Salinity + Salinity_AC + TMX	8	3.11	5742.41	-2863.15	0.01

Table A5.2. Model selection table for interannual change in abundance of diving ducks during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT0 + Salinity + Salinity_AC	9	0.00	5468.33	-2725.10	0.03
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	10	0.62	5468.95	-2724.39	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT1 + Salinity + Salinity_AC + TMN + TMX	11	1.26	5469.59	-2723.70	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + pH + pH_AC + PPT0 + Salinity + Salinity_AC	11	1.27	5469.60	-2723.70	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Breached + PPT0 + Salinity + Salinity_AC	10	1.54	5469.88	-2724.86	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Salinity + Salinity_AC	8	1.71	5470.04	-2726.97	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT1 + Salinity + Salinity_AC + TMN + TMX + WaterElev_m_AC	12	1.80	5470.13	-2722.95	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Gated + PPT0 + Salinity + Salinity_AC	10	1.80	5470.13	-2724.99	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT0 + Salinity + Salinity_AC + TMX	10	1.84	5470.17	-2725.00	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Salinity + Salinity_AC + WaterElev_m_AC	9	1.87	5470.20	-2726.03	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT0 + Salinity + Salinity_AC + TMN	10	2.02	5470.35	-2725.10	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + pH + pH_AC + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	12	2.03	5470.36	-2723.07	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Breached + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	11	2.10	5470.43	-2724.12	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT1 + Salinity + Salinity_AC	9	2.10	5470.43	-2726.15	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Salinity + Salinity_AC + TMN + TMX	10	2.21	5470.54	-2725.19	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Salinity + Salinity_AC + TMX	9	2.30	5470.63	-2726.25	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Gated + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	11	2.39	5470.73	-2724.27	0.01

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Salinity + Salinity_AC + TMN + TMX + WaterElev_m_AC	11	2.40	5470.73	-2724.27	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT0 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	11	2.44	5470.78	-2724.29	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + PPT1 + Salinity + Salinity_AC + WaterElev_m_AC	10	2.46	5470.79	-2725.31	0.01

Table A5.3. Model selection table for interannual change in abundance of Ruddy Ducks during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC	12	0.00	5048.33	-2512.02	0.05
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT0 + Salinity + Salinity_AC	13	0.46	5048.78	-2511.23	0.04
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + TMN	13	0.55	5048.87	-2511.28	0.04
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT3 + Salinity + Salinity_AC	13	1.20	5049.53	-2511.60	0.03
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT0 + Salinity + Salinity_AC + TMN	14	1.47	5049.80	-2510.71	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT1 + Salinity + Salinity_AC	13	1.56	5049.89	-2511.78	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Gated + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC	13	1.68	5050.01	-2511.84	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT0 + Salinity + Salinity_AC + TMX	14	1.83	5050.15	-2510.89	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + WaterElev_m_AC	13	1.98	5050.31	-2511.99	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Breached + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC	13	2.01	5050.34	-2512.01	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + TMX	13	2.04	5050.36	-2512.02	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Gated + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT0 + Salinity + Salinity_AC	14	2.16	5050.48	-2511.05	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT3 + Salinity + Salinity_AC + TMN	14	2.28	5050.60	-2511.11	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + TMN + TMX	14	2.34	5050.66	-2511.14	0.02

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Gated + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + TMN	14	2.34	5050.66	-2511.14	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT1 + Salinity + Salinity_AC + TMN	14	2.36	5050.69	-2511.16	0.02
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	14	2.48	5050.81	-2511.22	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Breached + LDO_mgL + LDO_mgL_AC + pH + pH_AC + PPT0 + Salinity + Salinity_AC	14	2.49	5050.81	-2511.22	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + TMN + WaterElev_m_AC	14	2.53	5050.85	-2511.24	0.01
Abun_PC ~ BayDist_km + Islands_num + Area_km2 + Breached + LDO_mgL + LDO_mgL_AC + pH + pH_AC + Salinity + Salinity_AC + TMN	14	2.58	5050.90	-2511.26	0.01

Table A5.4. Model selection table for interannual change in abundance of Eared Grebes during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ Islands_num + Area_km2 + WaterElev_m_AC	6	0.00	4188.43	-2088.18	0.02
Abun_PC ~ Islands_num + Area_km2 + PPT1 + WaterElev_m_AC	7	0.64	4189.07	-2087.48	0.02
Abun_PC ~ Islands_num + Area_km2 + pH + pH_AC + WaterElev_m_AC	8	1.01	4189.44	-2086.65	0.01
Abun_PC ~ Islands_num + Area_km2 + Breached + WaterElev_m_AC	7	1.04	4189.47	-2087.68	0.01
Abun_PC ~ Islands_num + Area_km2 + TMN + WaterElev_m_AC	7	1.13	4189.57	-2087.73	0.01
Abun_PC ~ Islands_num + Area_km2 + TMX + WaterElev_m_AC	7	1.19	4189.62	-2087.76	0.01
Abun_PC ~ Islands_num + Area_km2 + PPT1 + TMN + WaterElev_m_AC	8	1.21	4189.65	-2086.76	0.01
Abun_PC ~ Islands_num + Area_km2 + PPT3 + WaterElev_m_AC	7	1.53	4189.96	-2087.93	0.01
Abun_PC ~ Islands_num + Area_km2 + Breached + PPT1 + WaterElev_m_AC	8	1.60	4190.04	-2086.95	0.01
Abun_PC ~ Islands_num + Area_km2 + Breached + pH + pH_AC + WaterElev_m_AC	9	1.72	4190.15	-2085.99	0.01
Abun_PC ~ Islands_num + Area_km2 + Gated + WaterElev_m_AC	7	1.82	4190.25	-2088.07	0.01
Abun_PC ~ Islands_num + Area_km2 + pH + pH_AC + PPT1 + WaterElev_m_AC	9	1.84	4190.27	-2086.05	0.01
Abun_PC ~ Islands_num + Area_km2 + PPT1 + TMX + WaterElev_m_AC	8	1.92	4190.36	-2087.11	0.01
Abun_PC ~ Islands_num + Area_km2 + PPT0 + WaterElev_m_AC	7	1.98	4190.42	-2088.16	0.01
Abun_PC ~ Islands_num + Area_km2 + PPT3 + TMN + WaterElev_m_AC	8	2.03	4190.46	-2087.16	0.01
Abun_PC ~ Islands_num + Area_km2 + Breached + TMX + WaterElev_m_AC	8	2.09	4190.52	-2087.19	0.01
Abun_PC ~ Islands_num + Area_km2 + Breached + PPT1 + TMN + WaterElev_m_AC	9	2.16	4190.59	-2086.21	0.01
Abun_PC ~ Islands_num + Area_km2 + Breached + TMN + WaterElev_m_AC	8	2.16	4190.60	-2087.23	0.01
Abun_PC ~ Islands_num + Area_km2 + pH + pH_AC + TMN + WaterElev_m_AC	9	2.24	4190.67	-2086.25	0.01
Abun_PC ~ Islands_num + Area_km2 + pH + pH_AC + PPT3 + WaterElev_m_AC	9	2.32	4190.76	-2086.29	0.01

Table A5.6. Model selection table for interannual change in abundance of Bonaparte's Gulls during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ Temp_C + Temp_C_AC + TMN	6	0.00	1993.84	-990.81	0.04
Abun_PC ~ Temp_C + Temp_C_AC	5	0.58	1994.43	-992.14	0.03
Abun_PC ~ Temp_C + Temp_C_AC + TMX	6	1.33	1995.18	-991.48	0.02
Abun_PC ~ PPT3 + Temp_C + Temp_C_AC + TMN	7	1.34	1995.18	-990.45	0.02
Abun_PC ~ Salinity + Salinity_AC + Temp_C + Temp_C_AC + TMN	8	1.73	1995.57	-989.60	0.02
Abun_PC ~ Temp_C + Temp_C_AC + TMN + TMX	7	1.89	1995.73	-990.72	0.02
Abun_PC ~ BreachOrGate + Temp_C + Temp_C_AC + TMN	7	1.91	1995.75	-990.73	0.02
Abun_PC ~ Temp_C + Temp_C_AC + TMN + WaterElev_m_AC	7	1.93	1995.78	-990.75	0.02
Abun_PC ~ PPT1 + Temp_C + Temp_C_AC + TMN	7	1.96	1995.80	-990.76	0.02
Abun_PC ~ PPT0 + Temp_C + Temp_C_AC + TMN	7	2.03	1995.87	-990.79	0.02
Abun_PC ~ Salinity + Salinity_AC + Temp_C + Temp_C_AC	7	2.09	1995.93	-990.82	0.01
Abun_PC ~ Temp_C + Temp_C_AC + WaterElev_m_AC	6	2.42	1996.26	-992.03	0.01
Abun_PC ~ BreachOrGate + Temp_C + Temp_C_AC	6	2.56	1996.40	-992.09	0.01
Abun_PC ~ PPT3 + Temp_C + Temp_C_AC	6	2.61	1996.46	-992.12	0.01
Abun_PC ~ PPT0 + Temp_C + Temp_C_AC	6	2.63	1996.47	-992.13	0.01
Abun_PC ~ PPT1 + Temp_C + Temp_C_AC	6	2.64	1996.48	-992.13	0.01
Abun_PC ~ pH + pH_AC + Temp_C + Temp_C_AC + TMN	8	2.70	1996.54	-990.09	0.01
Abun_PC ~ PPT0 + Temp_C + Temp_C_AC + TMX	7	2.80	1996.64	-991.18	0.01
Abun_PC ~ pH + pH_AC + Temp_C + Temp_C_AC	7	3.06	1996.90	-991.31	0.01
Abun_PC ~ Salinity + Salinity_AC + Temp_C + Temp_C_AC + TMX	8	3.22	1997.06	-990.35	0.01

Table A5.5. Model selection table for interannual change in abundance of phalaropes during summer in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ PPT1 + Salinity + Salinity_AC + WaterElev_m_AC	7	0.00	1233.32	-609.41	0.02
Abun_PC ~ LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + WaterElev_m_AC	9	0.13	1233.46	-607.33	0.02
Abun_PC ~ PPT1 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	8	0.46	1233.78	-608.57	0.01
Abun_PC ~ PPT1 + Salinity + Salinity_AC	6	0.75	1234.07	-610.85	0.01
Abun_PC ~ PPT1 + Temp_C + Temp_C_AC + WaterElev_m_AC	7	0.78	1234.10	-609.80	0.01
Abun_PC ~ Salinity + Salinity_AC + WaterElev_m_AC	6	0.79	1234.11	-610.87	0.01
Abun_PC ~ PPT1 + WaterElev_m_AC	5	0.81	1234.13	-611.93	0.01
Abun_PC ~ LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC	8	0.84	1234.17	-608.76	0.01
Abun_PC ~ LDO_mgL + LDO_mgL_AC + Salinity + Salinity_AC + WaterElev_m_AC	8	0.94	1234.26	-608.81	0.01
Abun_PC ~ PPT1 + Salinity + Salinity_AC + TMX	7	0.94	1234.26	-609.88	0.01
Abun_PC ~ PPT1 + TMX + WaterElev_m_AC	6	1.01	1234.33	-610.98	0.01
Abun_PC ~ PPT1 + Salinity + Salinity_AC + Temp_C + Temp_C_AC + WaterElev_m_AC	9	1.10	1234.42	-607.81	0.01
Abun_PC ~ LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	10	1.17	1234.49	-606.75	0.01
Abun_PC ~ Salinity + Salinity_AC	5	1.33	1234.65	-612.19	0.01
Abun_PC ~ PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	7	1.34	1234.66	-610.08	0.01
Abun_PC ~ PPT1 + TMX	5	1.35	1234.67	-612.21	0.01
Abun_PC ~ PPT1	4	1.39	1234.71	-613.27	0.01
Abun_PC ~ LDO_mgL + LDO_mgL_AC + Salinity + Salinity_AC	7	1.49	1234.81	-610.16	0.01
Abun_PC ~ LDO_mgL + LDO_mgL_AC + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	9	1.63	1234.95	-608.07	0.01
Abun_PC ~ LDO_mgL + LDO_mgL_AC + PPT1 + Salinity + Salinity_AC + TMX	9	1.64	1234.96	-608.08	0.01

Table A5.8. Model selection table for interannual change in abundance of medium shorebirds during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown. Site characteristics were not subject to model selection (see text for details), but were instead obtained from De La Cruz et al. (2018).

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ CreekDist_km + Islands_num + Salinity + Salinity_AC + TMX + WaterElev_m_AC	9	0.00	6258.77	-3120.32	0.04
Abun_PC ~ CreekDist_km + Islands_num + Salinity + Salinity_AC + WaterElev_m_AC	8	0.64	6259.41	-3121.65	0.03
Abun_PC ~ CreekDist_km + Islands_num + PPT1 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	10	0.88	6259.65	-3119.74	0.03
Abun_PC ~ CreekDist_km + Islands_num + PPT0 + Salinity + Salinity_AC + TMN + WaterElev_m_AC	10	1.08	6259.85	-3119.84	0.02
Abun_PC ~ CreekDist_km + Islands_num + PPT0 + Salinity + Salinity_AC + WaterElev_m_AC	9	1.08	6259.86	-3120.86	0.02
Abun_PC ~ CreekDist_km + Islands_num + Salinity + Salinity_AC + TMN + WaterElev_m_AC	9	1.45	6260.22	-3121.04	0.02
Abun_PC ~ CreekDist_km + Islands_num + PPT0 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	10	1.66	6260.43	-3120.13	0.02
Abun_PC ~ CreekDist_km + Islands_num + PPT1 + Salinity + Salinity_AC + WaterElev_m_AC	9	1.67	6260.44	-3121.16	0.02
Abun_PC ~ CreekDist_km + Islands_num + Salinity + Salinity_AC + TMN + TMX + WaterElev_m_AC	10	1.87	6260.65	-3120.24	0.02
Abun_PC ~ CreekDist_km + Islands_num + Gated + Salinity + Salinity_AC + TMX + WaterElev_m_AC	10	1.95	6260.72	-3120.28	0.02
Abun_PC ~ CreekDist_km + Islands_num + PPT3 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	10	1.97	6260.74	-3120.29	0.02
Abun_PC ~ CreekDist_km + Islands_num + Breached + Salinity + Salinity_AC + TMX + WaterElev_m_AC	10	1.99	6260.76	-3120.30	0.02
Abun_PC ~ CreekDist_km + Islands_num + LDO_mgL + LDO_mgL_AC + Salinity + Salinity_AC + TMX + WaterElev_m_AC	11	2.21	6260.98	-3119.39	0.01
Abun_PC ~ CreekDist_km + Islands_num + PPT3 + Salinity + Salinity_AC + WaterElev_m_AC	9	2.44	6261.21	-3121.54	0.01
Abun_PC ~ CreekDist_km + Islands_num + Breached + Salinity + Salinity_AC + WaterElev_m_AC	9	2.54	6261.32	-3121.59	0.01
Abun_PC ~ CreekDist_km + Islands_num + Gated + Salinity + Salinity_AC + WaterElev_m_AC	9	2.62	6261.39	-3121.63	0.01
Abun_PC ~ CreekDist_km + Islands_num + PPT1 + Salinity + Salinity_AC + TMN + WaterElev_m_AC	10	2.73	6261.51	-3120.67	0.01

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ CreekDist_km + Islands_num + Gated + PPT1 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	11	2.84	6261.61	-3119.71	0.01
Abun_PC ~ CreekDist_km + Islands_num + Breached + PPT1 + Salinity + Salinity_AC + TMX + WaterElev_m_AC	11	2.86	6261.63	-3119.72	0.01
Abun_PC ~ CreekDist_km + Islands_num + PPT1 + Salinity + Salinity_AC + TMN + TMX + WaterElev_m_AC	11	2.87	6261.64	-3119.72	0.01

Table A5.9. Model selection table for base model of pond characteristics related to change in abundance of Bonaparte's Gulls during winter in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown.

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ 1	3	0.00	1999.11	-996.52	0.11
Abun_PC ~ Islands_num	4	1.84	2000.95	-996.43	0.04
Abun_PC ~ BayDist_km	4	1.92	2001.03	-996.46	0.04
Abun_PC ~ OpenPublic_pct	4	1.98	2001.09	-996.49	0.04
Abun_PC ~ OpenHunting_pct	4	1.99	2001.09	-996.50	0.04
Abun_PC ~ LandfillDist_km	4	2.01	2001.12	-996.51	0.04
Abun_PC ~ Area_km2	4	2.02	2001.13	-996.52	0.04
Abun_PC ~ CreekDist_km	4	2.04	2001.15	-996.52	0.04
Abun_PC ~ BayDist_km + Islands_num	5	3.80	2002.91	-996.38	0.02
Abun_PC ~ Islands_num + OpenPublic_pct	5	3.86	2002.97	-996.41	0.02
Abun_PC ~ Islands_num + OpenHunting_pct	5	3.86	2002.97	-996.41	0.02
Abun_PC ~ OpenHunting_pct + OpenPublic_pct	5	3.88	2002.99	-996.42	0.02
Abun_PC ~ Islands_num + LandfillDist_km	5	3.88	2002.99	-996.42	0.02
Abun_PC ~ CreekDist_km + Islands_num	5	3.88	2002.99	-996.42	0.02
Abun_PC ~ BayDist_km + LandfillDist_km	5	3.89	2003.00	-996.42	0.02
Abun_PC ~ Area_km2 + Islands_num	5	3.89	2003.00	-996.43	0.02
Abun_PC ~ BayDist_km + OpenHunting_pct	5	3.91	2003.02	-996.44	0.02
Abun_PC ~ LandfillDist_km + OpenPublic_pct	5	3.94	2003.05	-996.45	0.02
Abun_PC ~ BayDist_km + OpenPublic_pct	5	3.94	2003.05	-996.45	0.02
Abun_PC ~ Area_km2 + BayDist_km	5	3.97	2003.07	-996.46	0.02

Table A5.10. Model selection table for base model of pond characteristics related to change in abundance of phalaropes during summer in current and former salt ponds in South San Francisco Bay, California, water year 2003-2025. Model selection was carried out based on corrected Akaike Information Criterion (AICc); only the top 20 models are shown.

Formula	K	dAICc	AICc	-2LL	w
Abun_PC ~ 1	3	0.00	1235.46	-614.68	0.09
Abun_PC ~ CreekDist_km	4	0.78	1236.24	-614.03	0.06
Abun_PC ~ OpenPublic_pct	4	1.68	1237.14	-614.48	0.04
Abun_PC ~ BayDist_km	4	1.98	1237.44	-614.63	0.03
Abun_PC ~ LandfillDist_km	4	1.99	1237.46	-614.64	0.03
Abun_PC ~ OpenHunting_pct	4	2.03	1237.49	-614.66	0.03
Abun_PC ~ Area_km2	4	2.07	1237.53	-614.68	0.03
Abun_PC ~ Islands_num	4	2.07	1237.53	-614.68	0.03
Abun_PC ~ CreekDist_km + OpenPublic_pct	5	2.59	1238.05	-613.89	0.02
Abun_PC ~ Area_km2 + CreekDist_km	5	2.64	1238.10	-613.92	0.02
Abun_PC ~ CreekDist_km + Islands_num	5	2.83	1238.30	-614.02	0.02
Abun_PC ~ CreekDist_km + OpenHunting_pct	5	2.84	1238.30	-614.02	0.02
Abun_PC ~ CreekDist_km + LandfillDist_km	5	2.86	1238.32	-614.03	0.02
Abun_PC ~ BayDist_km + CreekDist_km	5	2.86	1238.33	-614.03	0.02
Abun_PC ~ BayDist_km + OpenPublic_pct	5	3.43	1238.89	-614.31	0.02
Abun_PC ~ OpenHunting_pct + OpenPublic_pct	5	3.76	1239.22	-614.48	0.01
Abun_PC ~ Area_km2 + OpenPublic_pct	5	3.76	1239.22	-614.48	0.01
Abun_PC ~ LandfillDist_km + OpenPublic_pct	5	3.76	1239.23	-614.48	0.01
Abun_PC ~ Islands_num + OpenPublic_pct	5	3.77	1239.23	-614.48	0.01
Abun_PC ~ BayDist_km + LandfillDist_km	5	3.87	1239.33	-614.53	0.01

Appendix 6

This appendix presents a table of the mean water quality measures per season, and the change in those measures since last year (Table A6.1).

Table A6.1. Annual and seasonal water quality and depth measures (mean across surveys), and change in those measures compared to the same time period last year, in current and former salt ponds in South San Francisco Bay, California, September 2024 – May 2025.

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
A1	Year	24.35	7.75	8.24	18.01	1.92	-5.84	0.09	-0.21	0.57	0.06
A1	Fall	28.35	7.41	8.45	22.32	1.45	1.50	0.84	0.31	2.04	-0.35
A1	Winter	22.10	8.28	8.35	12.27	1.60	-23.97	0.47	-0.21	-0.21	-0.55
A1	Spring	22.60	7.37	7.60	19.43	3.50	4.95	-1.22	-1.06	-0.13	1.90
A10	Year	29.47	11.36	8.54	18.57		7.88	2.31	0.22	-2.59	
A10	Fall	33.95	10.78	8.53	22.59		7.85	4.13	0.48	1.06	
A10	Winter	29.91	13.42	8.54	12.68		8.11	2.87	0.19	-2.73	
A10	Spring	24.55	9.89	8.55	20.46		7.67	-0.06	-0.02	-6.10	
A11	Year	32.08	10.27	8.35	19.97		11.02	1.38	0.15	-1.11	
A11	Fall	34.42	11.04	8.49	23.39		9.65	2.58	0.60	1.21	
A11	Winter	32.76	10.72	8.22	13.90		10.46	0.88	0.03	-1.85	
A11	Spring	29.07	9.05	8.35	22.63		12.96	0.69	-0.18	-2.67	
A12	Year	310.28	4.07	7.47	20.55		22.53	-2.89	0.12	-2.72	
A12	Fall	329.67	4.20	7.08	24.93		6.84	-3.17	0.42	-0.28	
A12	Winter	303.50	4.10	7.60	12.03		20.50	-4.27	-0.03	-5.19	
A12	Spring	307.38	3.90	7.73	24.68		49.95	-1.24	-0.04	-2.70	
A13	Year	235.50	4.10	7.96	17.20		53.37	-6.76	0.16	-5.58	
A13	Fall	303.83	3.43	7.56	20.96		61.33	-3.55	0.24	-5.24	
A13	Winter	202.67	5.39	8.21	9.35		32.62	-6.41	0.10	-7.91	
A13	Spring	200.00	3.14	8.10	21.29		66.17	-10.64	0.12	-3.58	
A14	Year	34.34	8.91	8.26	17.90		13.22	-1.72	0.01	-2.36	
A14	Fall	34.30	7.14	8.00	18.94		7.93	-3.86	-0.08	-3.47	
A14	Winter	31.28	11.85	8.33	12.82		8.61	2.79	0.14	-2.52	
A14	Spring	37.45	7.74	8.44	21.95		23.14	-4.08	-0.03	-1.08	
A15	Year	290.71	4.72	7.57	18.26		56.32	-2.27	0.12	-4.61	
A15	Fall	321.67	4.38	7.13	21.74		23.67	-5.99	-0.10	-5.13	
A15	Winter	279.83	6.26	7.76	10.77		61.29	-1.58	0.08	-5.43	
A15	Spring	270.62	3.34	7.82	22.26		84.00	0.59	0.39	-3.26	
A16	Year	15.05	10.54	9.03	17.74	3.63	2.44	-2.23	0.39	-2.35	0.13

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
A16	Fall	19.12	9.83	8.85	20.50	3.55	0.96	0.24	0.83	-2.30	0.55
A16	Winter	16.76	12.14	8.89	12.86	3.60	3.23	-0.73	0.31	-2.14	-0.15
A16	Spring	9.27	9.65	9.36	19.87	3.75	3.13	-6.21	0.05	-2.61	0.00
A17	Year	11.41	8.71	8.12	17.90	7.07	2.34	1.50	0.26	-2.12	0.13
A17	Fall	14.10	8.59	8.00	20.86	6.70	1.16	2.02	0.01	-1.25	-1.20
A17	Winter	9.48	9.10	8.17	13.48		0.34	1.38	0.66	-1.24	
A17	Spring	10.67	8.38	8.18	19.36	7.80	5.52	1.03	0.12	-3.86	2.10
A19	Year	6.98	8.06	7.79	20.98		-1.65	0.90	-0.07	1.67	
A19	Fall	10.28	7.23	7.10	22.79		-1.76	1.87	-0.63	2.87	
A19	Winter	3.06	9.09	8.30	16.51		-3.82	1.00	0.69	4.75	
A19	Spring	8.25	7.65	8.18	26.30		4.68	-2.20	-0.18	0.66	
A22	Year	157.29	4.30	7.72	20.69		20.03	-5.49	-0.48	2.38	
A22	Fall	169.00	0.10	6.53	28.72		-134.50	-9.39	-0.39	10.02	
A22	Winter	154.53	6.88	8.41	14.70		112.26	-1.63	-0.04	2.45	
A22	Spring	154.20	3.36	7.52	24.64		88.20	-7.99	-1.70	0.66	
A23	Year	176.40	5.72	8.54	14.19		-29.10	0.28	1.32	-3.31	
A23	Fall										
A23	Winter	126.10	5.72	8.54	14.19		-96.40	-1.20	1.65	1.88	
A23	Spring	277.00					88.50				
A2E	Year	29.88	8.38	8.78	17.41	1.90	6.78	-0.12	0.25	-0.27	
A2E	Fall	37.78	6.17	8.86	20.63	2.00	6.11	0.41	0.46	2.81	
A2E	Winter	28.35	8.57	8.84	13.77	1.80	7.46	0.00	0.29	-1.63	
A2E	Spring	23.51	10.39	8.65	17.82		6.78	-0.76	0.01	-2.02	
A2W	Year	22.13	9.45	8.39	18.13	1.48	0.90	1.01	-0.19	0.35	-0.24
A2W	Fall	27.33	7.07	8.03	22.27	1.45	0.70	-0.48	-0.31	4.30	-0.35
A2W	Winter	23.33	11.78	8.37	12.65	1.60	2.72	2.81	-0.22	-1.05	-0.30
A2W	Spring	15.73	9.49	8.77	19.46	1.45	-0.73	0.69	-0.03	-2.22	0.00
A3N	Year	40.13	10.41	8.82	17.50	1.76	5.86	0.58	0.12	-3.64	0.02
A3N	Fall	47.27	10.12	8.65	22.67	1.85	7.75	4.64	-0.01	-1.39	-0.10
A3N	Winter	39.44	11.23	8.91	11.16	1.65	2.42	-5.87	-0.02	-5.95	-0.25
A3N	Spring	33.68	9.88	8.91	18.66	1.80	6.04	-0.68	0.29	-1.56	0.35
A3W	Year	22.16	12.06	8.86	17.78	-0.77	3.23	1.11	0.02	-2.80	0.05
A3W	Fall	25.16	10.57	8.68	21.75	-1.05	1.41	1.97	-0.01	-2.27	-0.20
A3W	Winter	22.83	14.09	9.00	12.12	-0.15	1.37	1.08	0.32	-3.01	0.55
A3W	Spring	18.50	11.50	8.89	19.47	-1.10	5.66	-0.78	-0.18	-0.39	-0.25

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
A5	Year	14.82	12.54	8.70	18.23	2.10	3.80	-0.17	0.04	-0.63	-0.07
A5	Fall	20.18	14.98	8.78	21.69	2.20	2.56	4.56	0.49	-0.28	-0.40
A5	Winter	12.85	12.32	8.65	14.69	2.05	2.95	-1.52	-0.21	0.72	-0.05
A5	Spring	11.43	10.53	8.61	18.30	2.00	5.89	-3.35	-0.23	-2.35	0.00
A6S	Year	12.92	11.98	7.76	24.63		1.25	2.55	-0.42	6.90	
A6S	Fall										
A6S	Winter										
A6S	Spring	12.92	11.98	7.76	24.63		5.75	1.30	-0.65	2.83	
A7	Year	14.01	11.00	8.36	17.92	2.26	1.94	0.54	-0.08	-0.55	0.08
A7	Fall	19.44	12.40	8.77	21.18	2.25	1.49	2.37	0.67	0.90	-0.15
A7	Winter	13.84	9.96	7.71	13.63	2.20	4.25	-1.03	-0.99	-1.11	0.10
A7	Spring	8.75	11.70	8.85	18.94	2.40	0.06	1.34	0.34	-1.44	0.25
A8	Year	9.47	8.57	7.99	17.24		1.13	-0.14	-0.10	1.57	
A8	Fall	14.18	7.52	7.85	19.68		-2.18	-2.63	-0.36	-0.23	
A8	Winter	6.82	8.10	7.64	12.46		0.20	0.34	-0.34	-0.29	
A8	Spring	7.40	10.10	8.49	19.60		5.36	1.88	0.40	5.26	
A8S	Year	13.65	11.23	8.97	16.80	4.70	4.27	-1.45	0.39	0.72	
A8S	Fall	19.50	9.12	8.78	21.14		4.68	-0.93	0.50	1.41	
A8S	Winter	15.33	10.43	8.88	11.23		6.00	-4.05	0.27	-2.80	
A8S	Spring	6.12	14.14	9.25	18.04	4.70	2.12	0.64	0.41	3.57	
A8W	Year										
A8W	Fall										
A8W	Winter										
A8W	Spring										
A9	Year	27.52	9.64	8.63	18.22	1.37	2.42	-1.00	0.11	-4.71	0.17
A9	Fall	38.12	7.92	8.62	23.50	1.35	1.54	-1.26	0.49	-1.65	-0.15
A9	Winter	25.81	11.20	8.46	12.53	1.40	3.96	0.48	0.03	-3.38	0.55
A9	Spring	18.64	9.81	8.82	18.64		1.76	-2.22	-0.16	-9.08	
AB1	Year	20.15	11.78	9.03	17.51	5.32	2.27	2.13	0.68	-0.20	-0.46
AB1	Fall	26.59	10.87	9.05	20.77	4.95	2.15	2.81	1.12	3.05	-1.30
AB1	Winter	19.73	13.45	9.07	14.13	5.65	2.97	1.88	0.56	-1.85	0.20
AB1	Spring	14.13	11.02	8.97	17.61	5.40	1.68	1.70	0.37	-1.83	-0.25
AB2	Year	20.15	14.33	8.88	17.70	5.18	1.91	0.13	0.07	-3.32	-0.64
AB2	Fall	25.04	13.11	8.61	22.51	4.70	1.51	-0.01	-0.10	-2.05	-1.40
AB2	Winter	20.20	17.96	9.01	11.93	5.65	2.29	3.71	0.28	-6.74	-1.15

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
AB2	Spring	15.20	11.92	9.03	18.65		1.91	-3.32	0.04	-1.18	
N1A	Year	30.95	9.10	8.22	18.28	2.42	1.01	-0.35	-0.01	1.30	0.24
N1A	Fall	32.57	9.60	8.15	16.73	2.55	0.97	-0.44	-0.12	-4.64	0.50
N1A	Winter	30.72	8.84	8.35	14.93	2.30	1.60	-0.95	0.28	3.06	0.05
N1A	Spring	29.56	8.88	8.17	23.19	2.40	0.47	0.36	-0.16	5.48	0.15
N2A	Year	29.96	8.37	8.19	18.91	2.31	-0.34	-2.15	-0.21	1.64	0.13
N2A	Fall	35.36	7.33	8.09	18.59	2.53	3.52	-3.88	-0.37	-0.81	0.43
N2A	Winter	31.32	8.98	8.32	15.33	2.20	1.10	-1.35	0.16	0.44	0.00
N2A	Spring	23.21	8.81	8.16	22.81	2.20	-5.64	-1.21	-0.43	5.30	0.00
N3A	Year	36.68	8.91	8.45	15.00	2.42	4.62	0.99	0.11	-1.67	0.14
N3A	Fall	35.53	6.56	8.25	16.26	2.65	-0.37	0.07	-0.12	-2.22	0.65
N3A	Winter	31.02	12.35	8.91	12.45	2.35	-0.10	2.44	0.55	-2.37	0.00
N3A	Spring	43.49	7.82	8.19	16.30	2.25	14.33	0.47	-0.11	-0.42	-0.10
N4	Year	49.04	7.85	8.51	15.78	2.18	-1.59	0.55	0.53	-4.24	0.16
N4	Fall	50.91	6.52	8.73	18.50	1.70	0.29	-1.29	1.52	-7.73	-0.30
N4	Winter	45.57	9.85	8.57	13.25	2.40	-5.19	2.05	0.24	0.17	0.40
N4	Spring	50.66	7.19	8.23	15.59	2.20	0.16	0.90	-0.18	-5.16	0.15
N4AA	Year	31.07	9.39	8.74	19.28	1.78	-17.91	2.80	0.44	3.02	0.32
N4AA	Fall	36.51	7.96	8.53	18.16	1.80	-48.55	3.97	0.59	-2.25	0.35
N4AA	Winter	31.61	10.59	8.97	15.03	2.00	-0.58	-0.20	0.46	2.65	0.80
N4AA	Spring	25.09	9.64	8.71	24.65	1.55	-4.61	4.65	0.25	8.67	-0.05
N4AB	Year	36.42	8.10	8.21	19.13	7.00	3.42	-0.05	-0.21	2.83	
N4AB	Fall	36.99	7.96	8.30	19.44		0.47	-0.41	-0.30	1.90	
N4AB	Winter	30.93	8.13	8.25	15.74		-2.58	-1.85	0.01	0.39	
N4AB	Spring	41.35	8.20	8.06	22.21	7.00	12.39	2.09	-0.35	6.22	
N4B	Year	40.60	9.51	8.66	14.98		4.92	0.46	0.05	-1.79	
N4B	Fall	44.07	4.83	8.33	18.81		2.09	-2.46	-0.17	-3.16	
N4B	Winter	35.61	15.30	8.94	11.50		3.74	7.17	0.40	-1.29	
N4B	Spring	42.14	8.39	8.70	14.63		8.96	-3.35	-0.08	-0.93	
N5	Year	49.10	8.56	8.57	15.51	3.63	0.79	0.18	0.65	-1.46	1.83
N5	Fall	52.60	7.96	8.84	19.11	1.50	1.74	0.15	1.59	-1.93	-0.25
N5	Winter	44.88	9.61	8.59	11.24	4.80	-4.98	0.73	0.27	-2.88	3.30
N5	Spring	49.83	8.12	8.28	16.17	4.60	5.62	-0.32	0.09	0.42	2.60
N6	Year	43.49	11.93	8.81	17.08	2.04	2.70	4.93	1.01	-3.22	-0.44
N6	Fall	48.35	10.33	9.20	31.54	1.40	9.08	3.68	1.84	6.20	-0.50

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
N6	Winter	38.04	16.01	8.85	14.09	2.20	5.23	6.89	0.86	2.84	-1.15
N6	Spring	46.50	8.65	8.58	12.84	2.20	0.20	2.37	0.45	-6.93	0.30
N7	Year	43.77	9.41	8.69	15.12	1.46	-0.71	1.41	0.74	-2.33	0.12
N7	Fall	47.50	8.64	8.86	18.87	1.05	1.53	0.97	1.40	-2.37	-0.20
N7	Winter	39.33	10.58	8.60	11.23	1.80	-11.23	2.35	0.04	-2.59	0.70
N7	Spring	44.49	9.01	8.62	15.27	1.70	4.54	0.80	0.48	-0.21	0.15
N8	Year	41.58	8.86	8.62	15.93	1.96	6.97	0.50	0.65	-1.17	0.30
N8	Fall	44.83	7.38	8.64	21.21	1.30	1.55	-3.92	-0.41	-0.70	-0.15
N8	Winter	37.41	10.75	8.68	11.73	2.70	14.39	3.18	1.98	-1.82	1.20
N8	Spring	42.52	8.45	8.55	14.86	2.25	4.99	2.23	0.39	-0.97	0.30
N9	Year	40.70	8.69	8.54	15.40	1.88	2.65	3.05	0.72	-1.46	0.58
N9	Fall	42.10	7.83	8.67	20.88	1.20	2.34	4.06	1.55	-1.91	-0.20
N9	Winter	36.44	12.12	8.64	12.67	2.10	-0.82	8.34	0.66	1.05	1.25
N9	Spring	43.57	6.11	8.32	12.66	2.00	6.45	-3.27	-0.05	-3.50	0.35
N1	Year	106.95	5.63	8.18	18.70	1.40	5.37	-1.54	0.16	0.21	-0.18
N1	Fall	114.79	4.41	8.32	21.40	0.90	6.91	-4.92	0.56	-2.08	-0.45
N1	Winter	105.12	6.70	8.30	13.31	1.70	5.67	0.73	0.30	-0.18	-0.05
N1	Spring	100.93	5.77	7.93	21.39	1.60	3.51	-0.44	-0.36	2.89	-0.05
N2	Year	79.86	7.28	8.68	16.37	2.96	3.31	-0.35	0.49	-2.16	0.04
N2	Fall	87.10	6.53	8.52	17.51	2.80	3.62	-0.91	0.44	-1.67	-0.05
N2	Winter	70.71	8.72	8.89	13.43	3.02	1.24	1.57	0.82	-0.52	
N2	Spring	81.78	6.59	8.63	18.17	3.05	5.08	-1.70	0.20	-4.29	0.05
N3	Year	69.00	7.47	8.67	16.46	3.58	0.00	-0.86	0.38	-2.72	0.07
N3	Fall	73.00	6.92	8.64	17.45	3.35	-1.35	-1.99	0.42	-3.03	-0.12
N3	Winter	64.86	8.41	8.79	14.63	3.75	1.47	0.87	0.56	-1.05	0.35
N3	Spring	69.13	7.09	8.59	17.28	3.65	-0.13	-1.46	0.18	-4.10	0.05
NPP1	Year	131.88	4.85	7.97	19.04		13.76	-3.47	0.14	-0.27	
NPP1	Fall	134.75	3.85	7.94	21.55		7.63	-10.50	0.29	-2.73	
NPP1	Winter	122.62	6.25	8.15	14.01		9.13	0.54	0.30	0.77	
NPP1	Spring	138.25	4.46	7.80	21.56		24.50	-0.44	-0.18	1.15	
CP3C	Year	36.14	10.54	8.68	19.32	3.73	8.23	1.42	0.08	0.28	-0.03
CP3C	Fall	48.08	11.33	8.80	25.01	3.75	6.97	3.47	0.32	2.89	0.00
CP3C	Winter	31.97	8.71	8.49	11.27	3.95	5.51	0.21	-0.06	-1.66	-0.25
CP3C	Spring	28.37	11.60	8.74	21.67	3.50	12.21	0.58	-0.03	-0.42	-0.05
E1	Year	36.10	9.77	8.38	19.49	4.02	10.52	0.42	0.75	-0.93	0.22

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
E1	Fall	41.65	10.88	8.47	25.15	4.00	7.97	1.36	1.86	0.58	0.35
E1	Winter	35.00	10.07	8.35	13.78	4.40	12.72	-0.10	0.44	-0.82	0.00
E1	Spring	31.63	8.36	8.32	19.56	3.30	10.86	0.00	-0.05	-2.52	-0.05
E10	Year	31.76	9.04	8.28	14.95	6.00	2.27	0.33	-0.10	-3.63	-0.03
E10	Fall	40.42	9.75	8.51	18.50	5.90	2.24	3.42	0.34	-2.64	-0.20
E10	Winter	27.99	9.21	8.35	12.66	6.10	3.35	0.03	0.27	-0.39	-0.50
E10	Spring	26.88	8.17	7.98	13.70		1.24	-2.45	-0.92	-7.84	
E11	Year	25.59	8.47	7.82	15.06	2.50	0.46	-2.11	-0.40	-2.80	1.68
E11	Fall	36.52	7.90	7.82	18.77	3.35	5.06	-0.96	-0.38	-3.14	2.65
E11	Winter	26.03	9.11	8.30	11.20	0.80	3.10	2.32	0.71	-1.17	-0.25
E11	Spring	14.23	8.40	7.33	15.22		-6.75	-5.81	-1.55	-4.08	
E12	Year	28.97	8.52	8.12	17.43	6.53	0.49	0.54	0.08	-0.30	-0.59
E12	Fall	40.14	8.87	7.98	22.13	6.40	2.80	1.39	-0.01	0.82	-0.30
E12	Winter	23.29	6.64	8.14	12.55		-1.82	-2.30	0.36	-1.46	
E12	Spring	23.49	10.06	8.22	17.60	6.80	0.49	2.54	-0.12	-0.27	-0.05
E13	Year	30.17	10.91	8.65	17.70	4.10	2.86	3.07	0.46	-0.88	-2.00
E13	Fall	37.60	12.59	8.79	23.68	5.70	0.90	8.52	0.83	1.54	-0.55
E13	Winter	22.11	8.98	8.54	11.81	2.95	-2.18	0.62	0.49	-3.32	-3.05
E13	Spring	30.79	11.17	8.63	17.62	4.80	9.86	0.09	0.08	-0.86	-1.25
E14	Year	27.68	8.71	8.07	14.22	5.30	4.66	-0.77	-0.05	-2.25	-0.89
E14	Fall	36.54	8.98	8.03	17.74	5.00	4.39	-0.73	0.06	-2.25	-0.10
E14	Winter	25.71	7.80	7.84	11.78	6.60	4.11	-0.33	-0.03	-0.17	-2.10
E14	Spring	20.78	9.36	8.35	13.15	4.80	5.47	-1.24	-0.18	-4.31	-0.05
E1C	Year	47.22	7.34	8.32	19.07	3.90	-20.61	-0.02	0.05	0.81	-0.25
E1C	Fall	83.58	6.53	8.20	23.37	3.80	-29.53	0.53	0.38	1.74	0.00
E1C	Winter	35.01	8.80	8.41	15.05	4.00	-8.10	1.71	0.07	1.10	-0.45
E1C	Spring	23.08	6.68	8.35	18.79		-24.18	-2.31	-0.31	-0.41	
E2	Year	41.30	9.82	8.52	18.86	3.60	5.70	-0.57	-0.10	-3.52	-0.07
E2	Fall	49.06	7.20	8.41	22.54	3.30	-0.49	-4.50	-0.41	-5.98	-0.20
E2	Winter	40.16	12.95	8.63	13.97	3.95	12.66	3.66	0.30	0.49	-0.10
E2	Spring	34.67	9.30	8.50	20.07	3.40	4.91	-0.87	-0.22	-5.06	-0.05
E2C	Year	25.59	9.56	8.46	19.36	3.55	-5.39	0.97	0.06	1.98	0.13
E2C	Fall	33.94	9.33	8.24	22.61	3.65	0.21	1.23	0.06	2.47	-0.05
E2C	Winter	20.82	9.64	8.42	14.87	3.85	-1.96	1.12	0.17	2.24	-0.50
E2C	Spring	22.01	9.70	8.74	20.60	3.15	-14.43	0.55	-0.03	1.23	2.15

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
E4	Year	58.67	11.11	8.57	18.93	4.18	10.44	1.57	-0.16	-0.85	-0.34
E4	Fall	62.00	7.15	8.34	24.00	3.10	11.29	-2.31	-0.33	-2.32	0.20
E4	Winter	61.30	8.86	8.67	10.60	3.95	7.52	-1.42	0.15	-3.05	-0.35
E4	Spring	52.73	17.33	8.70	22.21	4.95	12.51	8.46	-0.29	2.83	-1.65
E4C	Year	96.68	6.63	8.50	18.96		14.14	0.50	0.13	-1.17	
E4C	Fall	118.00	7.57	8.36	27.26		2.00	3.27	0.39	4.57	
E4C	Winter	75.37	6.01	8.50	12.19		22.96	-0.29	-0.01	-1.31	
E4C	Spring		5.99	8.77	15.90			-3.46	-0.13	-12.36	
E5	Year	103.31	6.97	8.58	20.08	3.50	29.86	-0.45	0.09	2.02	-0.60
E5	Fall	138.97	3.42	8.03	25.97	3.50	51.87	-0.84	0.00	6.44	-0.75
E5	Winter	80.27	7.48	8.75	11.73		5.08	-2.72	0.25	-3.22	
E5	Spring	90.68	10.00	8.96	22.53		32.62	2.19	0.01	2.82	
E5C	Year	39.89	9.98	8.66	19.58	4.00	-6.46	1.42	0.03	0.97	-0.27
E5C	Fall	52.75	9.95	8.50	24.96	3.85	2.87	2.70	0.12	3.98	-0.05
E5C	Winter	44.88	9.37	8.73	11.42	4.15	-3.30	1.41	0.03	-2.85	-0.30
E5C	Spring	22.04	10.62	8.77	22.36		-18.95	0.16	-0.07	1.77	
E6	Year	67.82	7.98	8.98	18.23		5.89	0.30	0.07	-0.13	
E6	Fall	85.34	7.11	9.00	21.70		-5.71	-1.17	0.05	-1.80	
E6	Winter	53.70	8.22	8.96	11.07		-0.19	1.08	0.14	-2.51	
E6	Spring	64.41	8.61	8.96	21.91		23.55	0.99	0.01	3.92	
E6A	Year	27.49	10.45	8.49	16.18	2.40	3.51	-3.10	0.06	-2.84	-0.08
E6A	Fall	38.64	8.43	8.56	22.04	2.55	1.93	-6.73	0.20	2.81	0.20
E6A	Winter	27.01	13.22	8.37	12.60	2.90	5.63	1.20	0.03	-2.91	-0.50
E6A	Spring	16.83	9.68	8.54	13.91	2.00	2.96	-3.79	-0.07	-8.42	0.30
E6B	Year	29.71	9.85	8.51	16.10	1.90	5.19	-0.24	0.20	-3.52	-0.22
E6B	Fall	41.50	8.47	8.53	21.96	1.90	6.73	-1.51	0.21	-1.13	-0.85
E6B	Winter	29.97	12.03	8.51	12.08		6.98	3.92	0.30	-2.96	
E6B	Spring	17.65	9.05	8.48	14.25		1.87	-3.12	0.08	-6.46	
E6C	Year	148.40	4.63	8.15	19.70	3.77	19.19	-1.59	0.02	1.87	-0.23
E6C	Fall	214.75	2.55	7.72	25.29	3.62	52.75	-2.01	0.00	7.48	-0.18
E6C	Winter	140.88	5.22	8.30	13.21	3.95	5.63	-3.80	0.17	-3.33	-0.60
E6C	Spring	89.58	6.12	8.44	20.60	3.70	-17.20	1.03	-0.09	1.44	0.15
E7	Year	48.38	10.81	8.60	18.65		12.10	2.07	0.08	-2.67	
E7	Fall	64.53	8.59	8.55	19.84		21.41	0.55	0.21	-5.56	
E7	Winter	43.85	14.01	8.87	16.58		13.47	6.55	0.63	3.38	

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
E7	Spring	36.77	9.84	8.39	19.53		1.44	-0.90	-0.58	-5.83	
E8	Year	31.46	9.37	8.02	15.86	3.35	5.69	-1.95	0.02	-3.98	0.29
E8	Fall	36.66	6.88	7.50	19.49	2.90	1.66	-2.16	-0.75	-3.58	-0.60
E8	Winter	29.08	9.36	7.86	12.81	3.50	3.12	-0.85	0.68	-2.40	-0.05
E8	Spring	28.66	11.86	8.69	15.29	3.50	12.31	-2.85	0.12	-5.95	2.30
E8AE	Year										
E8AE	Fall										
E8AE	Winter										
E8AE	Spring										
E8AW	Year										
E8AW	Fall										
E8AW	Winter										
E8AW	Spring										
E8XN	Year	24.37	9.16	8.18	15.66	6.02	0.99	-0.12	0.13	-1.76	0.19
E8XN	Fall	30.72	8.41	8.01	19.02	6.20	-0.76	-0.38	0.12	-0.98	-0.05
E8XN	Winter	22.67	9.55	8.18	12.70	6.15	-0.77	0.89	0.31	-0.36	-0.10
E8XN	Spring	19.73	9.52	8.35	15.25	5.70	4.50	-0.88	-0.03	-3.95	0.70
E8XS	Year	25.01	8.82	8.16	16.11	6.82	3.26	-0.42	0.16	-0.08	0.49
E8XS	Fall	30.43	7.59	7.98	19.78	6.70	-0.27	-0.37	0.16	1.67	-0.15
E8XS	Winter	24.87	9.25	8.14	12.80	7.70	3.11	-0.34	0.12	-0.01	0.05
E8XS	Spring	19.74	9.63	8.35	15.73	6.50	6.96	-0.53	0.20	-1.91	2.00
E9	Year	26.58	8.81	8.27	15.79	6.98	3.04	-1.03	0.12	-0.71	0.96
E9	Fall	32.36	8.28	8.13	19.09	6.80	1.06	-0.56	0.21	0.27	-0.20
E9	Winter	27.67	8.30	8.25	11.05	7.80	5.30	-0.89	0.28	-1.70	0.75
E9	Spring	20.26	9.59	8.41	14.86	6.75	3.30	-1.88	-0.14	-3.06	2.75
M1	Year	83.50	6.43	8.49	19.38	1.47	-4.01	-1.00	0.18	-0.50	-0.65
M1	Fall	81.77	6.91	8.52	24.02	1.55	-17.56	-0.51	0.45	1.37	0.05
M1	Winter	101.67	6.32	8.52	14.33	1.30	32.23	-2.46	0.07	-0.53	-0.70
M1	Spring	67.05	6.30	8.42	19.78	1.55	-26.72	0.20	0.01	-2.35	-1.25
M2	Year	82.87	6.64	8.60	19.38	2.87	-4.86	-0.76	0.30	-0.20	-0.55
M2	Fall	72.44	7.33	8.68	23.67	2.75	-29.43	0.05	0.66	1.09	-0.05
M2	Winter	81.83	7.70	8.68	14.25	2.55	12.75	-1.09	0.23	-0.54	-0.65
M2	Spring	94.33	5.24	8.45	20.23	3.30	2.08	-0.87	0.01	-1.14	-0.85
M3	Year	133.29	4.82	8.20	19.70	2.70	-19.75	-2.48	0.17	1.06	-0.22

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
M3	Fall	137.25	4.93	8.09	21.89	2.65	-39.63	-3.21	0.40	1.93	1.30
M3	Winter	121.25	5.55	8.32	15.01	2.70	6.37	-4.89	-0.07	0.43	-1.30
M3	Spring	141.38	4.02	8.20	22.20	2.75	-26.00	0.70	0.20	0.83	-1.20
M4	Year	208.56	3.23	7.91	21.14	1.90	-0.50	-2.26	0.20	1.77	
M4	Fall	210.00	3.11	7.77	23.59	1.65	-35.00	-1.21	0.44	-0.07	
M4	Winter	191.00	3.72	8.03	18.47	1.80	-17.17	-6.81	0.42	3.75	
M4	Spring	224.67	2.86	7.93	21.37	2.20	50.67	-1.28	-0.21	1.63	
M5	Year	236.94	3.01	7.77	21.01	2.57	10.94	-1.38	0.18	1.13	-0.73
M5	Fall	242.50	2.98	7.67	22.87	2.40	-35.83	-0.91	0.40	-0.37	0.70
M5	Winter	225.17	3.35	7.88	18.45	3.00	17.17	-4.49	0.37	1.92	-0.25
M5	Spring	243.17	2.70	7.78	21.70	2.30	51.50	-0.47	-0.17	1.84	-2.70
M6	Year	257.17	2.98	7.73	20.88	2.03	35.17	-2.81	-0.04	2.99	0.13
M6	Fall	271.83	2.65	7.53	21.97	1.55	-20.84	-2.90	0.34	2.52	-0.35
M6	Winter	237.33	3.57	7.94	17.24	2.30	50.50	-4.52	-0.15	5.68	
M6	Spring	262.33	2.72	7.72	23.42	2.25	75.83	-1.01	-0.33	0.75	
R1	Year	29.80	9.95	8.57	19.55		3.47	1.77	0.29	3.46	
R1	Fall	36.54	8.30	8.52	22.98		5.36	1.27	0.57	1.59	
R1	Winter	25.95	11.52	8.69	13.07		-0.52	2.73	0.35	3.43	
R1	Spring	26.91	10.03	8.50	22.60		5.56	1.31	-0.04	5.35	
R2	Year	203.82	4.46	7.64	19.49	0.95	32.67	-1.42	-0.17	2.48	-0.45
R2	Fall	310.25	3.42	7.08	25.13		28.92	-4.29	-0.14	1.13	
R2	Winter	86.56	7.22	8.34	11.66	1.00	2.45	1.04	0.19	1.45	-0.40
R2	Spring	214.67	2.75	7.50	21.68	0.90	66.67	-1.00	-0.54	4.87	-1.20
R3	Year	149.07	4.45	7.52	18.38		35.31	-2.00	0.42	-0.67	
R3	Fall	194.25	2.87	7.37	23.20		-69.75	1.91	2.89	-5.13	
R3	Winter	124.60	5.67	7.47	15.04		24.08	-0.07	0.30	3.47	
R3	Spring	128.38	4.82	7.72	16.90		83.12	-4.72	-0.66	-1.24	
R4	Year	26.24	9.61	8.20	17.29		-109.84	1.00	0.50	-2.07	
R4	Fall	32.80	7.94	8.07	21.83		-196.79	3.18	1.25	0.29	
R4	Winter	26.35	10.63	8.19	13.80		-132.21	0.44	0.30	-4.83	
R4	Spring	19.56	10.26	8.33	16.24		-0.53	-0.60	-0.05	-1.68	
R5	Year	39.03	8.46	8.05	15.99		1.52	0.74	0.67	-5.08	
R5	Fall	59.46	6.46	8.06	20.88			4.00	2.44	-5.61	
R5	Winter	31.33	10.05	7.71	12.59		-1.53	-0.55	-0.33	-4.34	
R5	Spring	26.31	8.87	8.38	14.49		-15.85	-1.22	-0.10	-5.31	

Pond	Season	Salinity (ppt)	DO (mg/L)	pH	Temp (C)	Staff gauge (ft)	ΔSalinity (ppt)	ΔDO (mg/L)	ΔpH	ΔTemp (C)	ΔStaff gauge (ft)
R5S	Year	47.83	8.50	7.76	15.89		13.01	0.29	0.50	-3.81	
R5S	Fall	85.00	6.12	7.62	19.54			2.39	2.38	-5.42	
R5S	Winter	31.90	11.20	7.49	12.71		5.36	1.45	-0.60	-1.68	
R5S	Spring	26.59	8.19	8.17	15.42		-16.50	-2.98	-0.27	-4.34	
RSF2U1	Year	26.28	13.59	8.61	22.14	5.85	1.75	1.20	0.83	1.92	0.52
RSF2U1	Fall	30.81	11.54	8.52	20.61	6.25	1.39	-3.16	1.68	-5.87	0.60
RSF2U1	Winter	20.24	17.43	8.79	18.34	5.60	-5.17	4.01	0.63	4.02	1.00
RSF2U1	Spring	23.25	13.86	8.61	29.01	5.70	4.49	4.81	0.27	9.13	-0.05
RSF2U2	Year	25.83	14.28	8.36	18.93	5.76	0.99	1.68	0.52	0.01	-0.12
RSF2U2	Fall	30.56	11.95	8.27	18.98	5.95	-0.06	-0.75	1.38	-7.01	0.10
RSF2U2	Winter	22.91	19.08	8.38	14.89	5.60	-2.43	8.08	0.34	1.83	-0.35
RSF2U2	Spring	22.19	9.36	8.49	26.89	5.70	3.61	-4.73	-0.11	9.18	-0.15
RSF2U3	Year	171.01	4.11	7.82	18.93	4.10	39.65	-1.83	0.36	-0.35	-0.07
RSF2U3	Fall	252.00	2.48	7.50	19.73		57.75	-1.54	1.26	-3.92	
RSF2U3	Winter	105.03	6.54	8.14	13.64	4.05	-14.19	-0.08	0.36	-0.07	0.00
RSF2U3	Spring	156.00	3.30	7.83	23.42	4.15	75.40	-3.89	-0.55	2.93	-0.90
RSF2U4	Year	26.52	10.50	7.88	17.41	3.40	2.58	1.87	0.47	-0.14	-0.65
RSF2U4	Fall	31.59	10.02	7.44	18.08	3.35	2.46	4.09	0.98	-3.74	-1.20
RSF2U4	Winter	22.73	12.12	8.27	13.29	3.75	-2.13	2.87	1.01	0.03	-0.65
RSF2U4	Spring	25.23	9.36	7.95	20.85	3.10	7.42	-1.37	-0.57	3.29	-0.10

Appendix 7

This appendix presents line graphs (one per set of ponds) of the mean water quality measures during each survey: salinity (Figs. A7.1-A7.4), water temperature (Figs. A7.5-A7.8) dissolved oxygen (Figs. A7.9-A7.12), pH (Figs. A7.13-A7.16), and staff gauge reading (Figs. A7.17-A7.20).

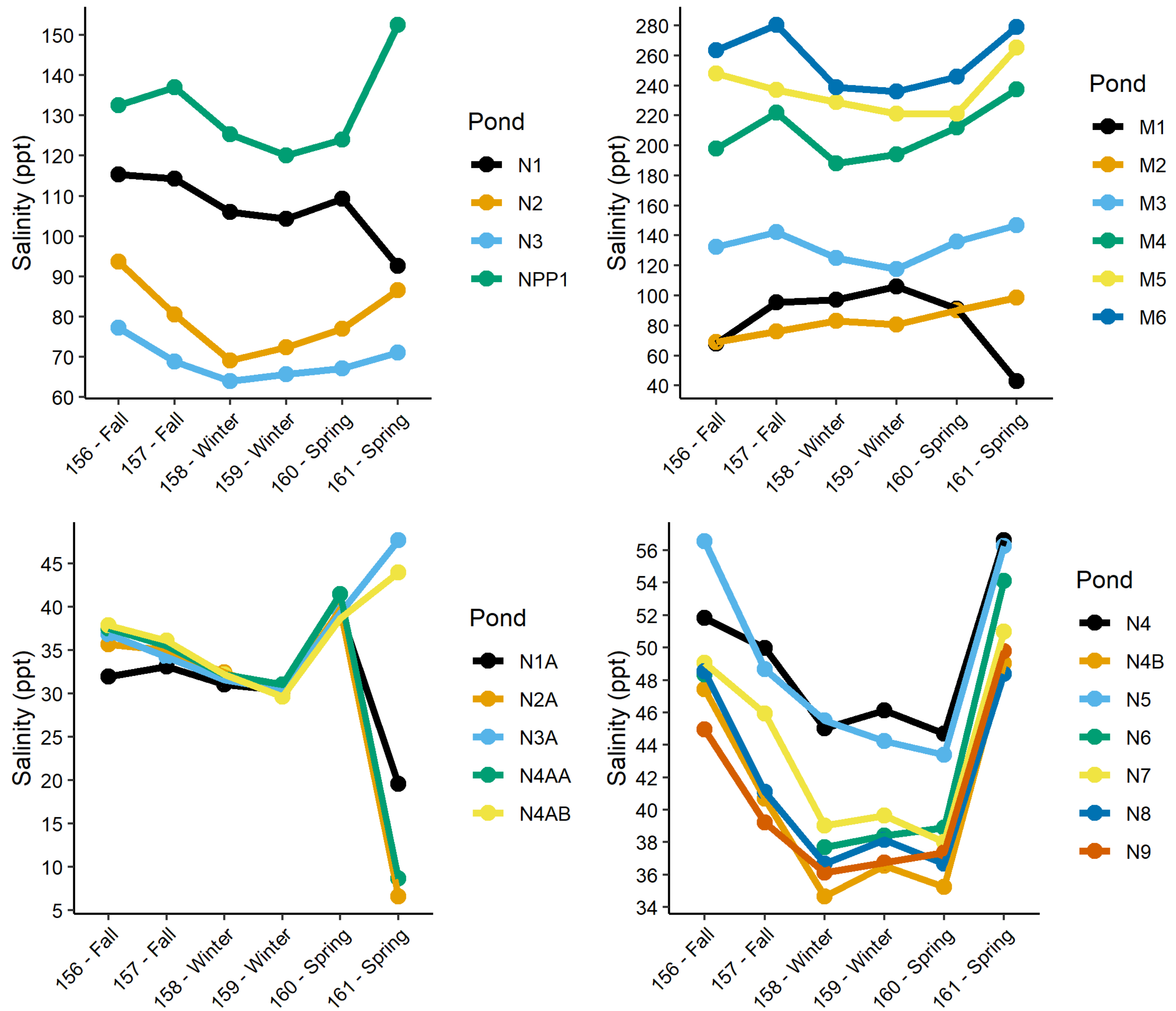

Figure A7.1. Average Salinity (ppt) at the Coyote Hills, Dumbarton, and Mowry pond complexes, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

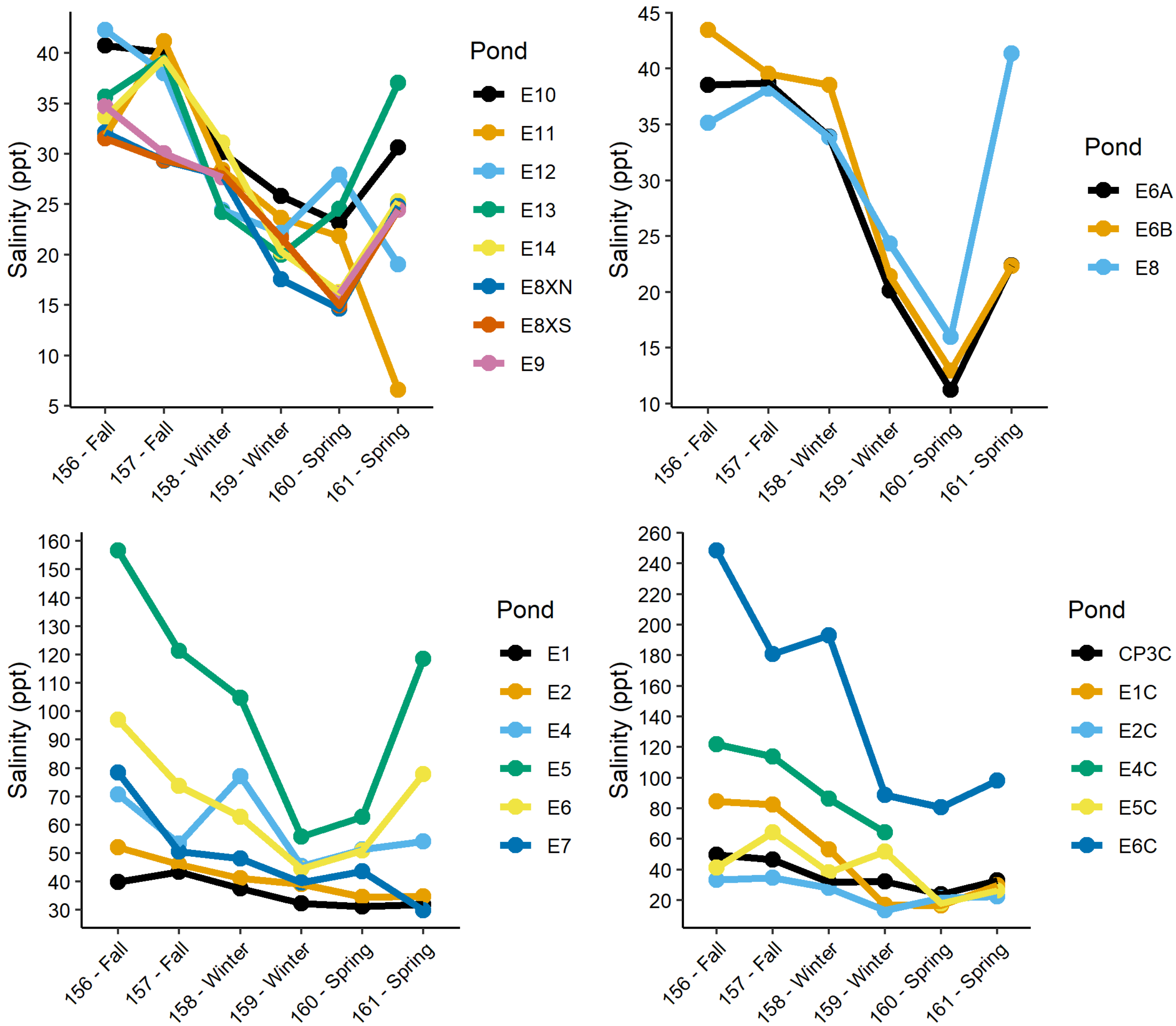

Figure A7.2. Average Salinity (ppt) at the Eden Landing pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

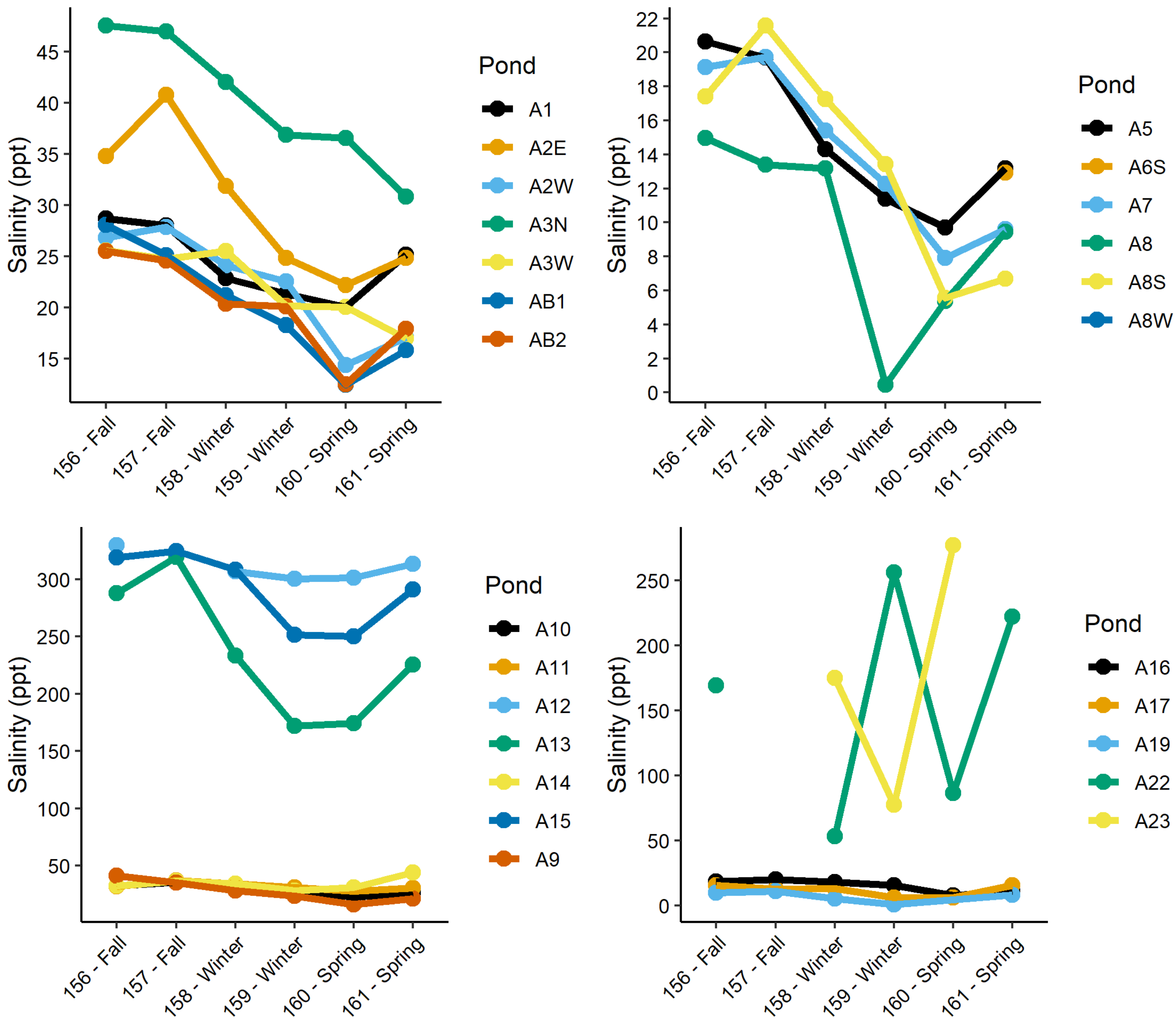

Figure A7.3. Average Salinity (ppt) at the Alviso pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

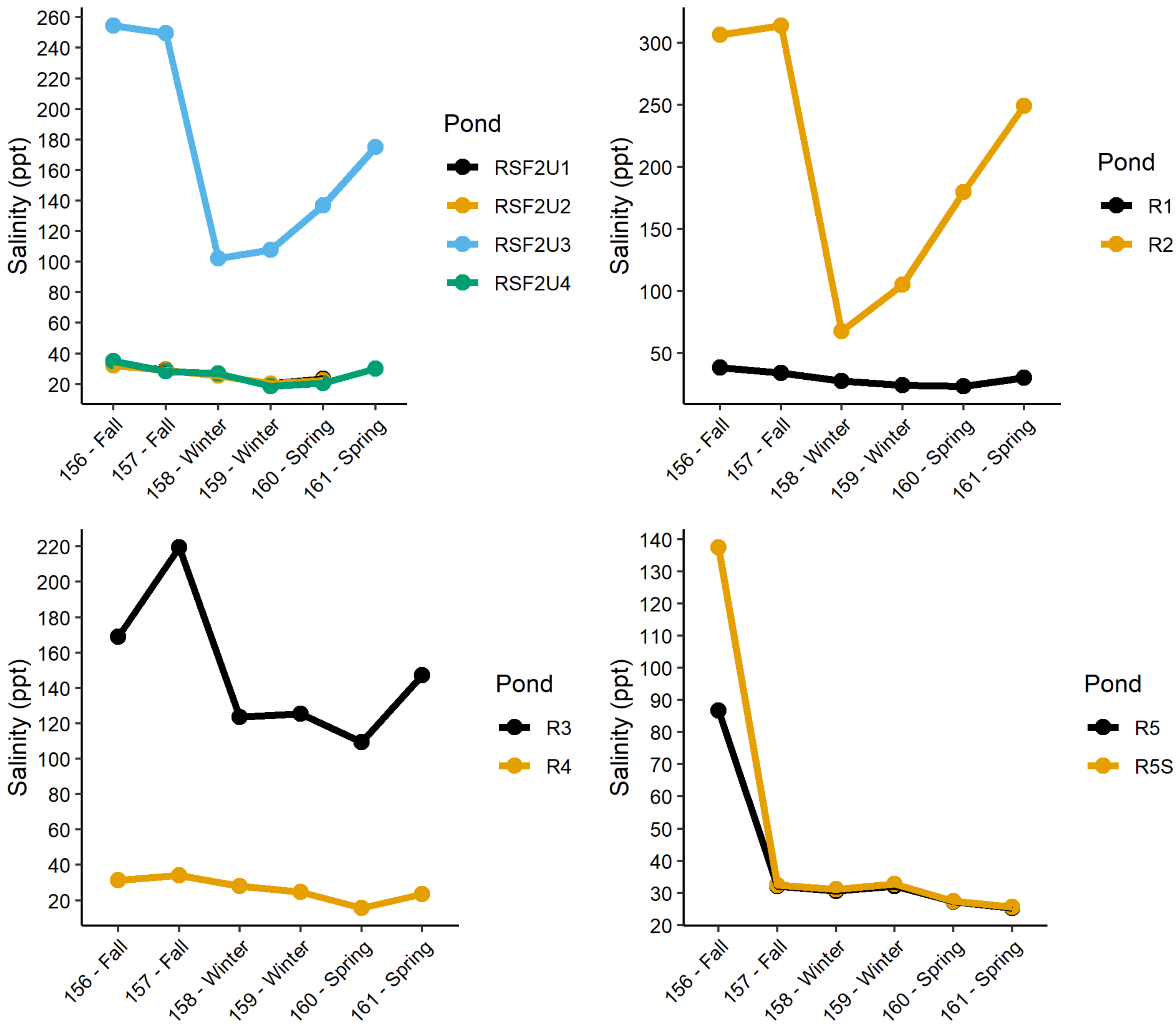

Figure A7.4. Average Salinity (ppt) at the Ravenswood pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

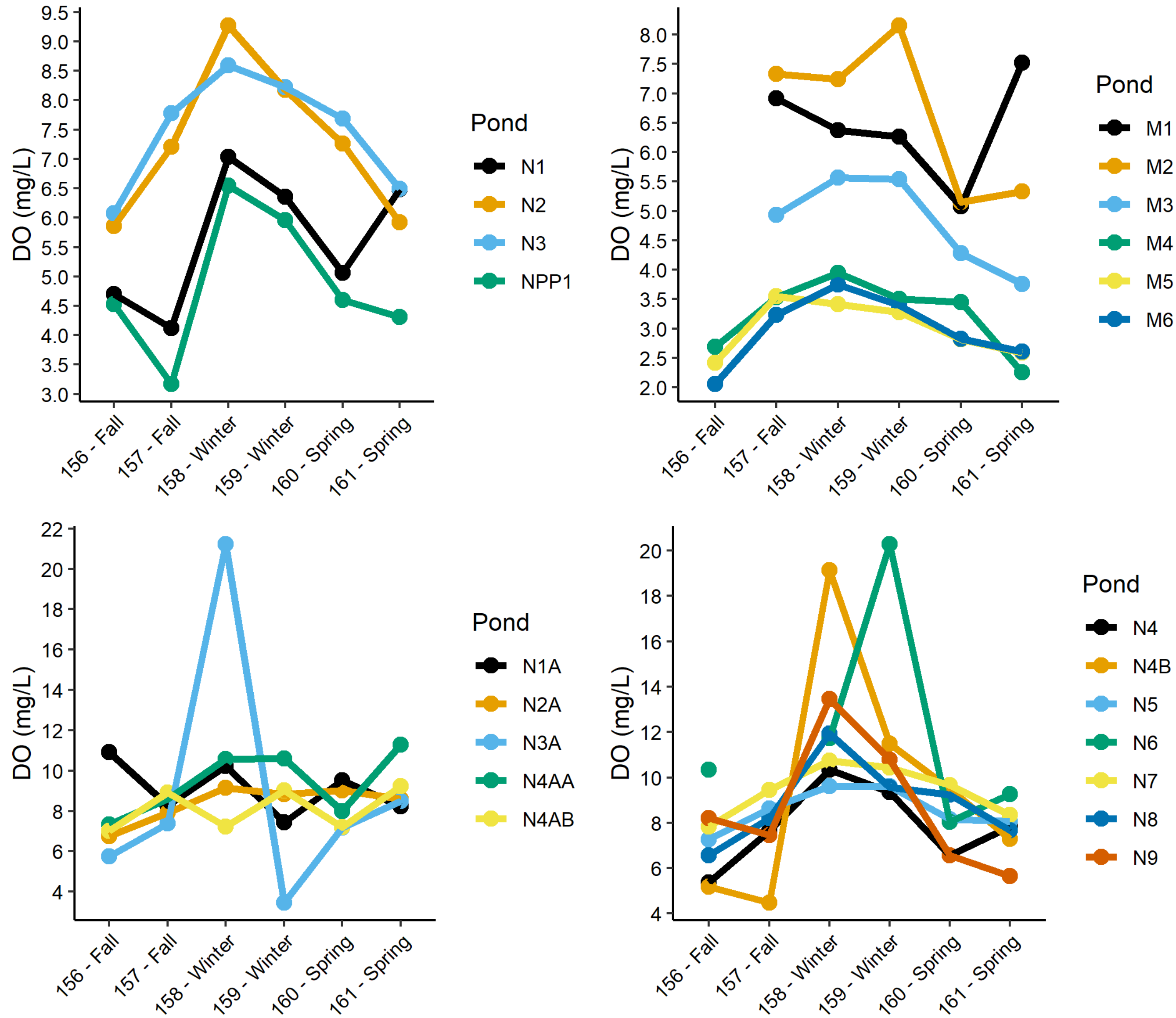

Figure A7.5. Average DO (mg/L) at the Coyote Hills, Dumbarton, and Mowry pond complexes, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

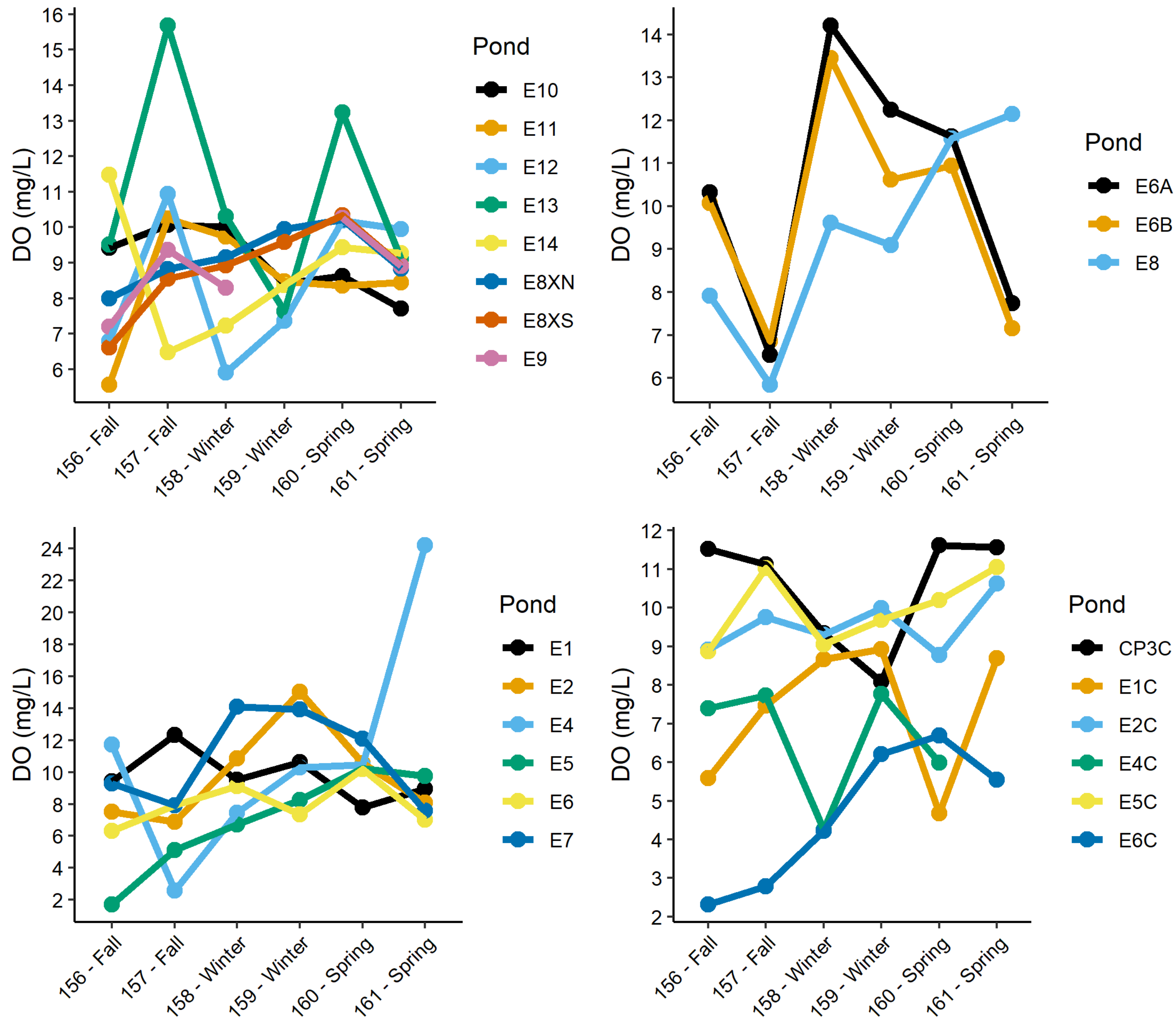

Figure A7.6. Average DO (mg/L) at the Eden Landing pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

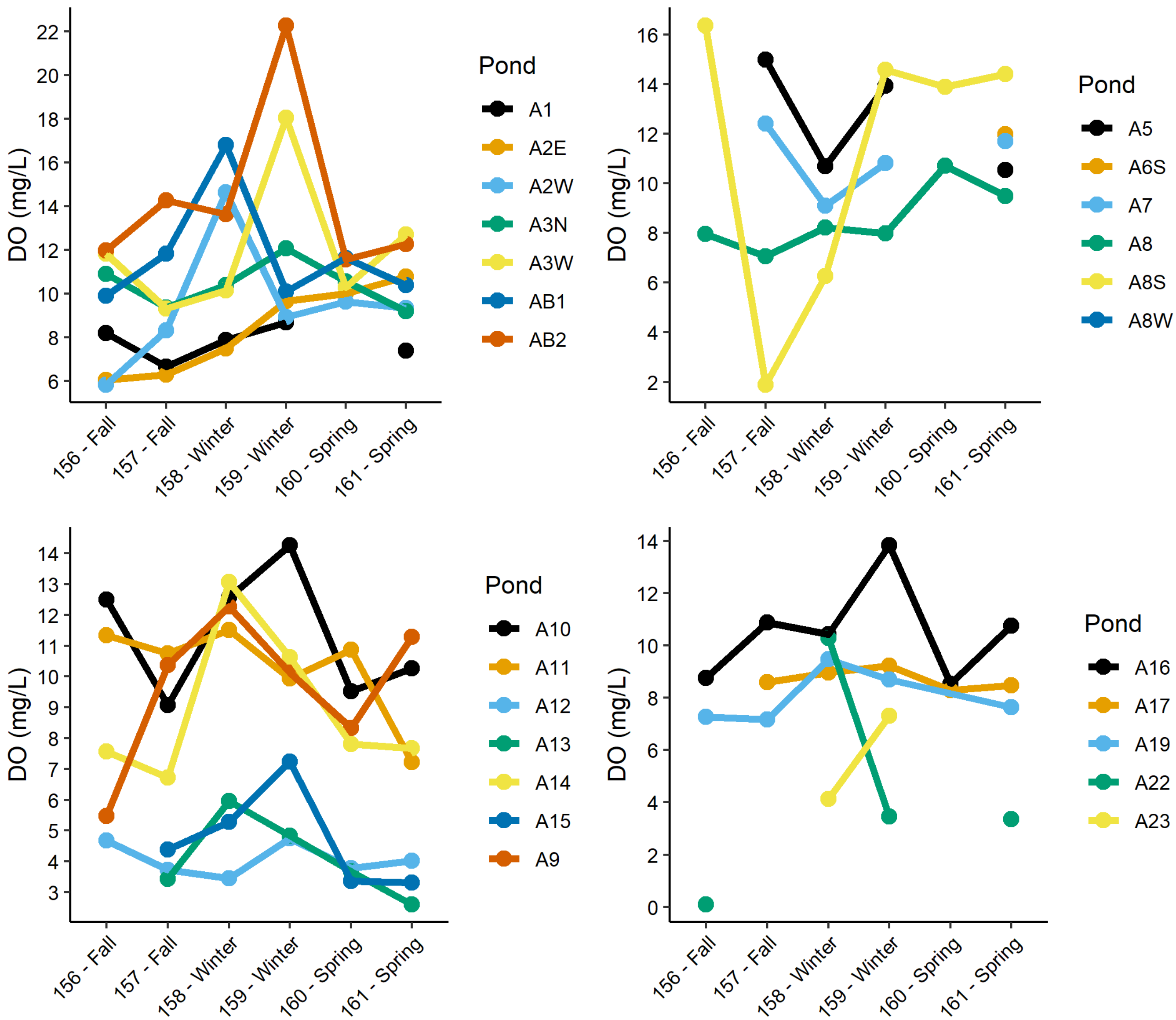

Figure A7.7. Average DO (mg/L) at the Alviso pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

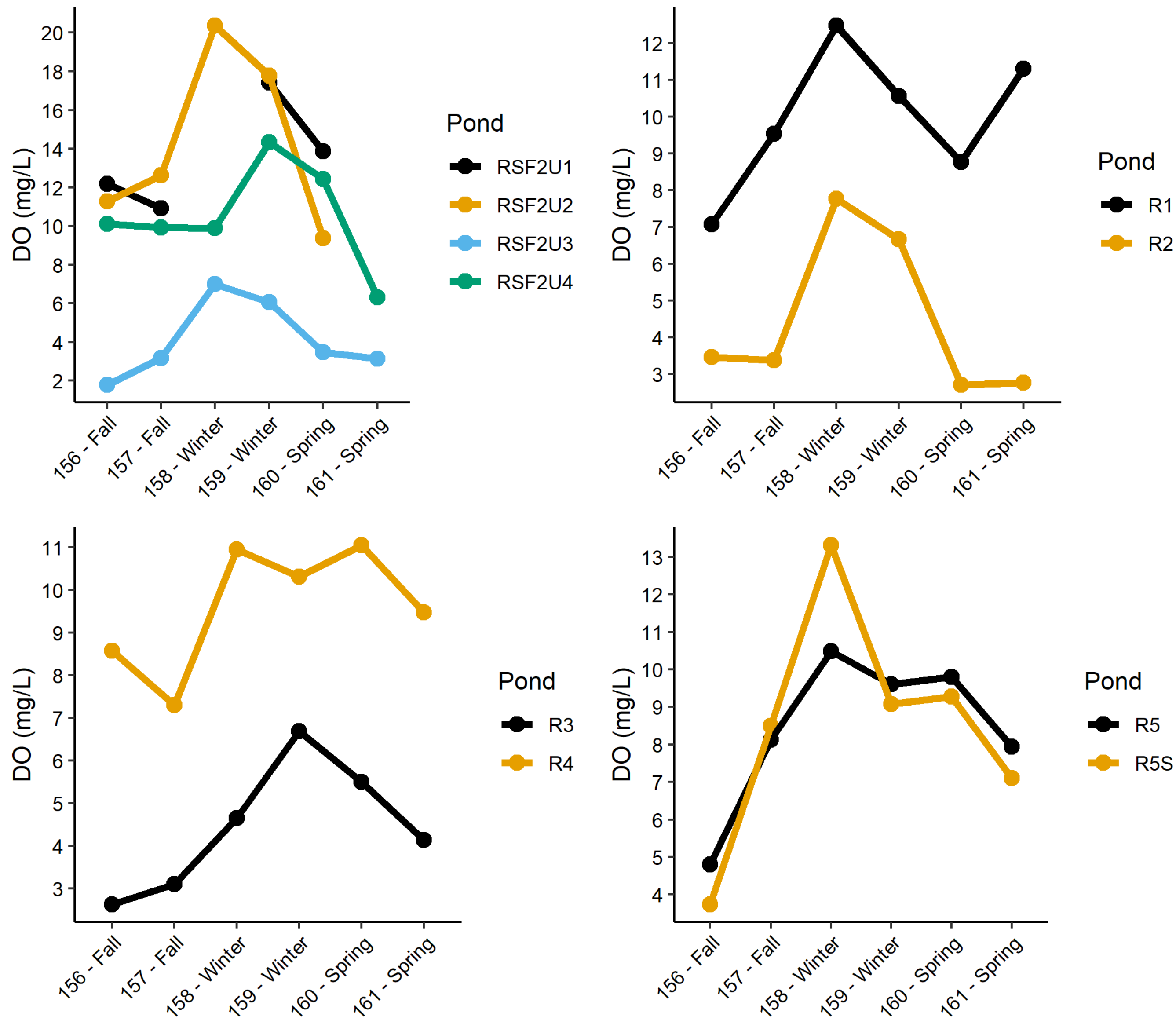

Figure A7.9. Average DO (mg/L) at the Ravenswood pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

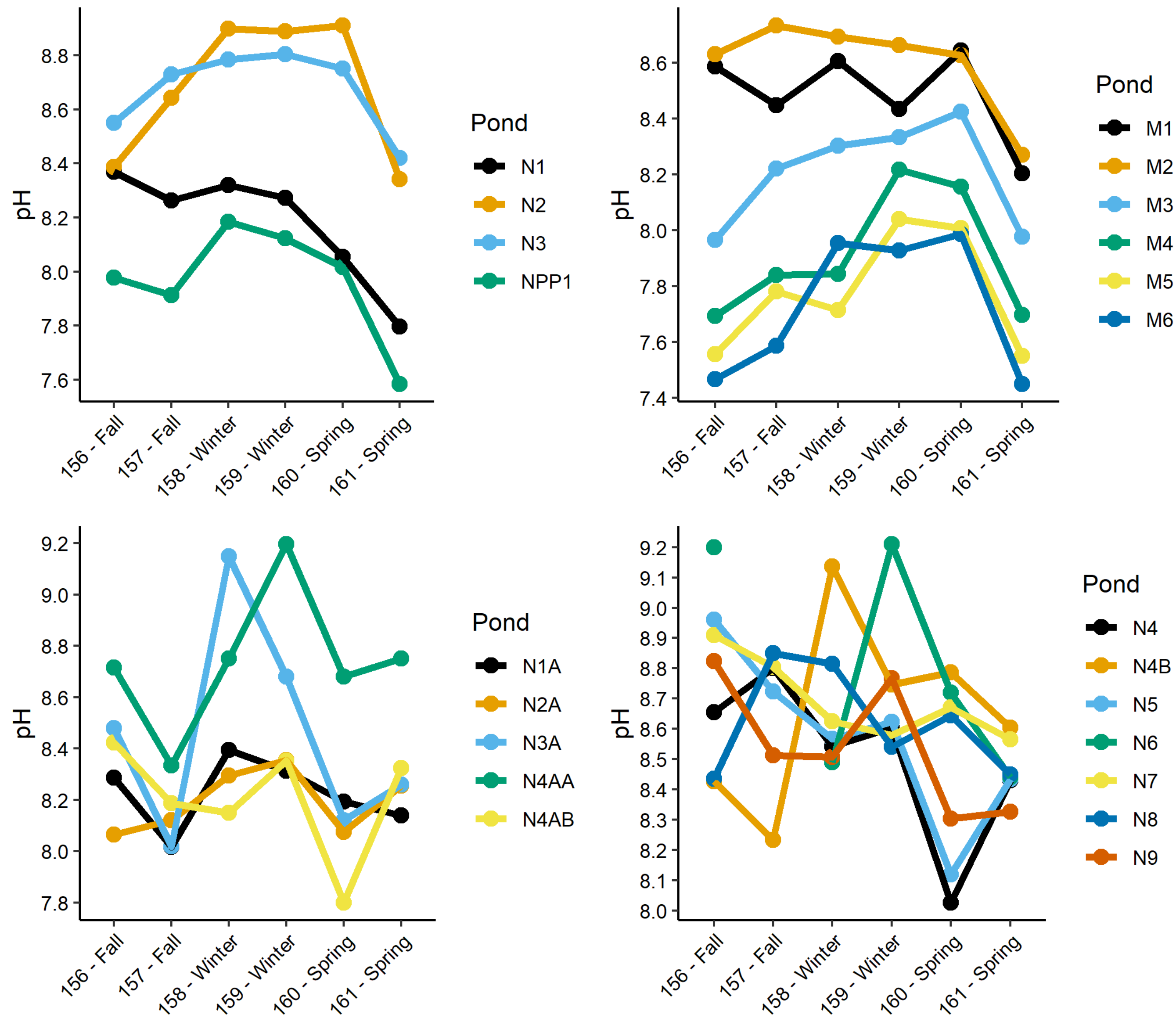

Figure A7.10. Average pH at the Coyote Hills, Dumbarton, and Mowry pond complexes, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

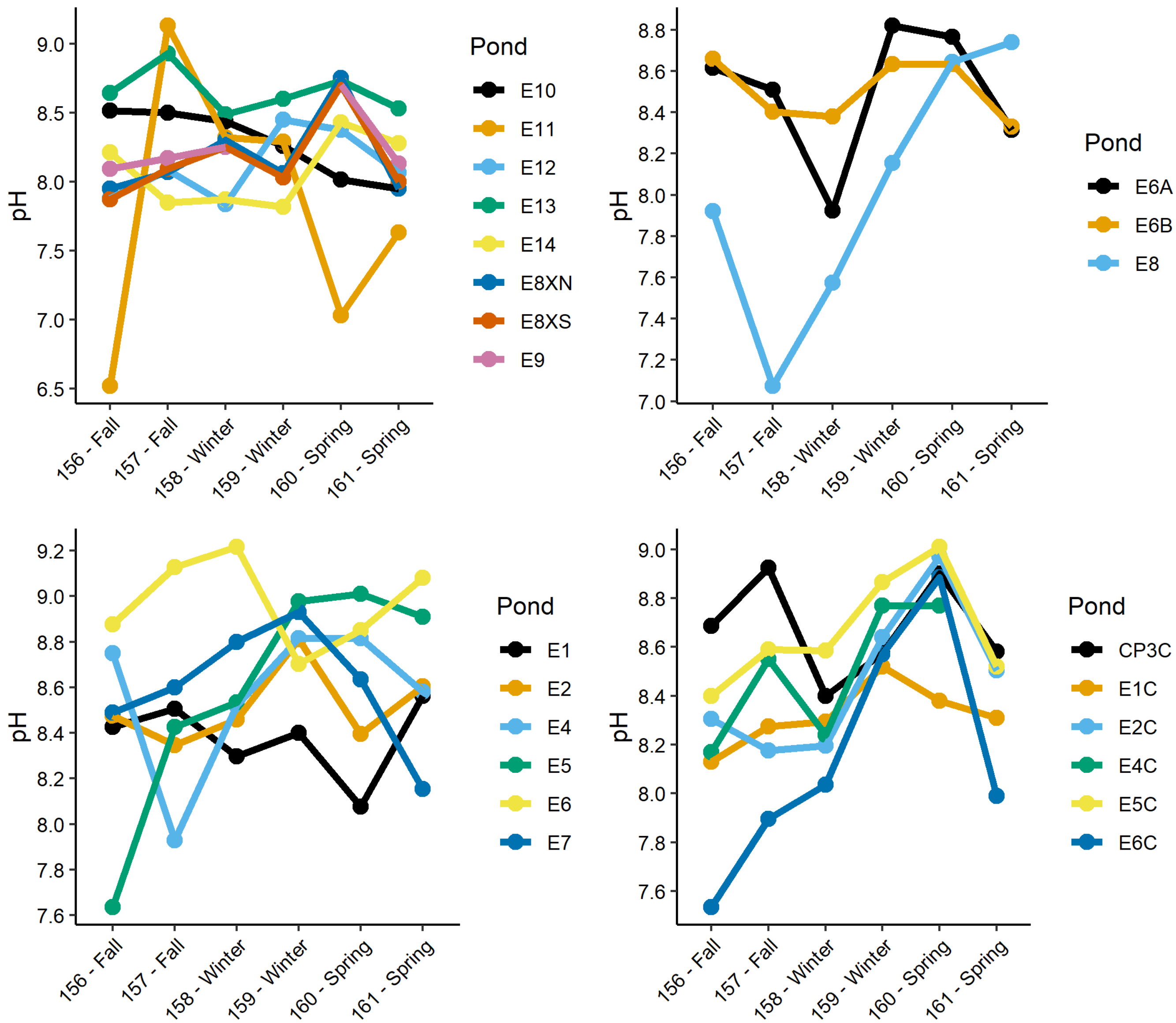

Figure A7.11. Average pH at the Eden Landing pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

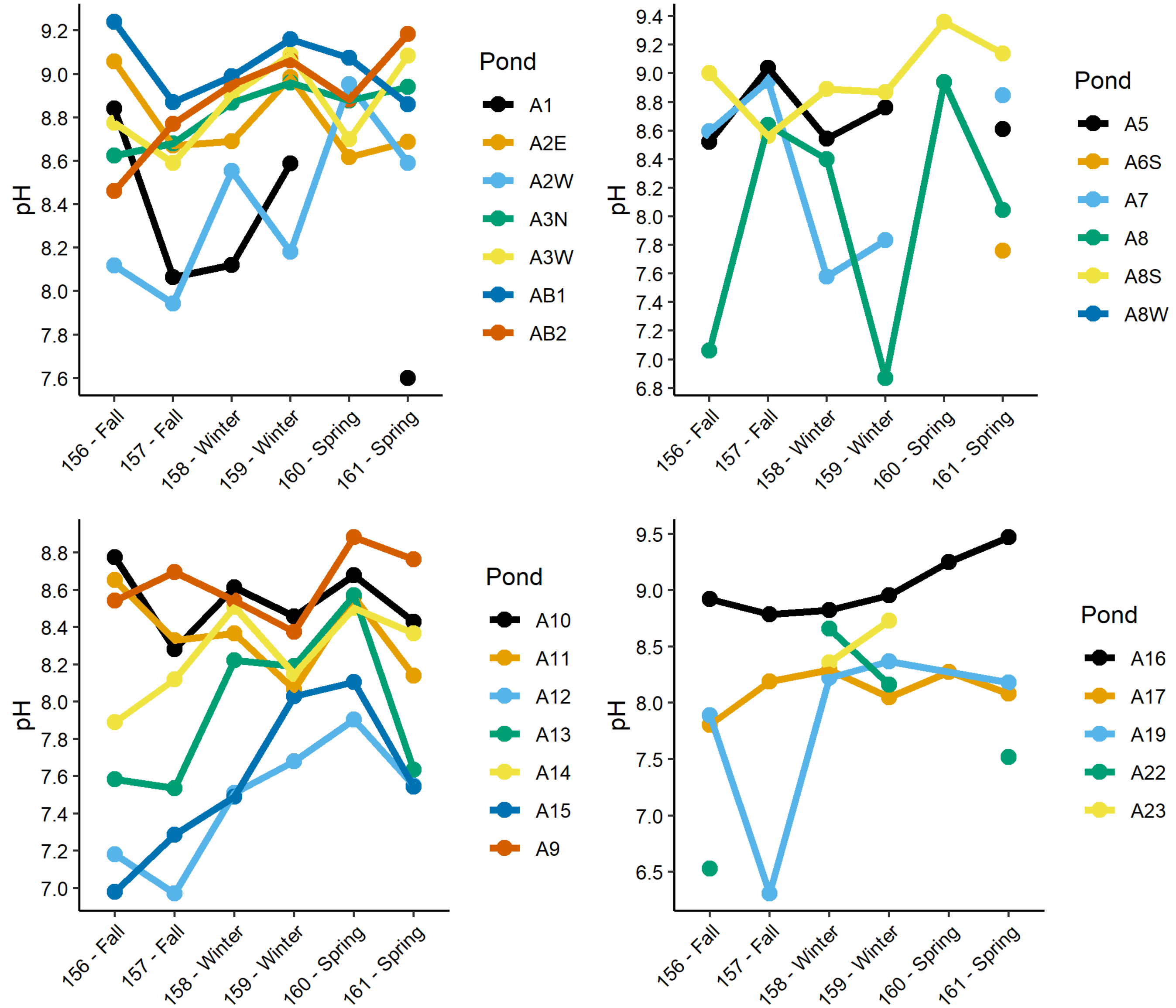

Figure A7.12. Average pH at the Alviso pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

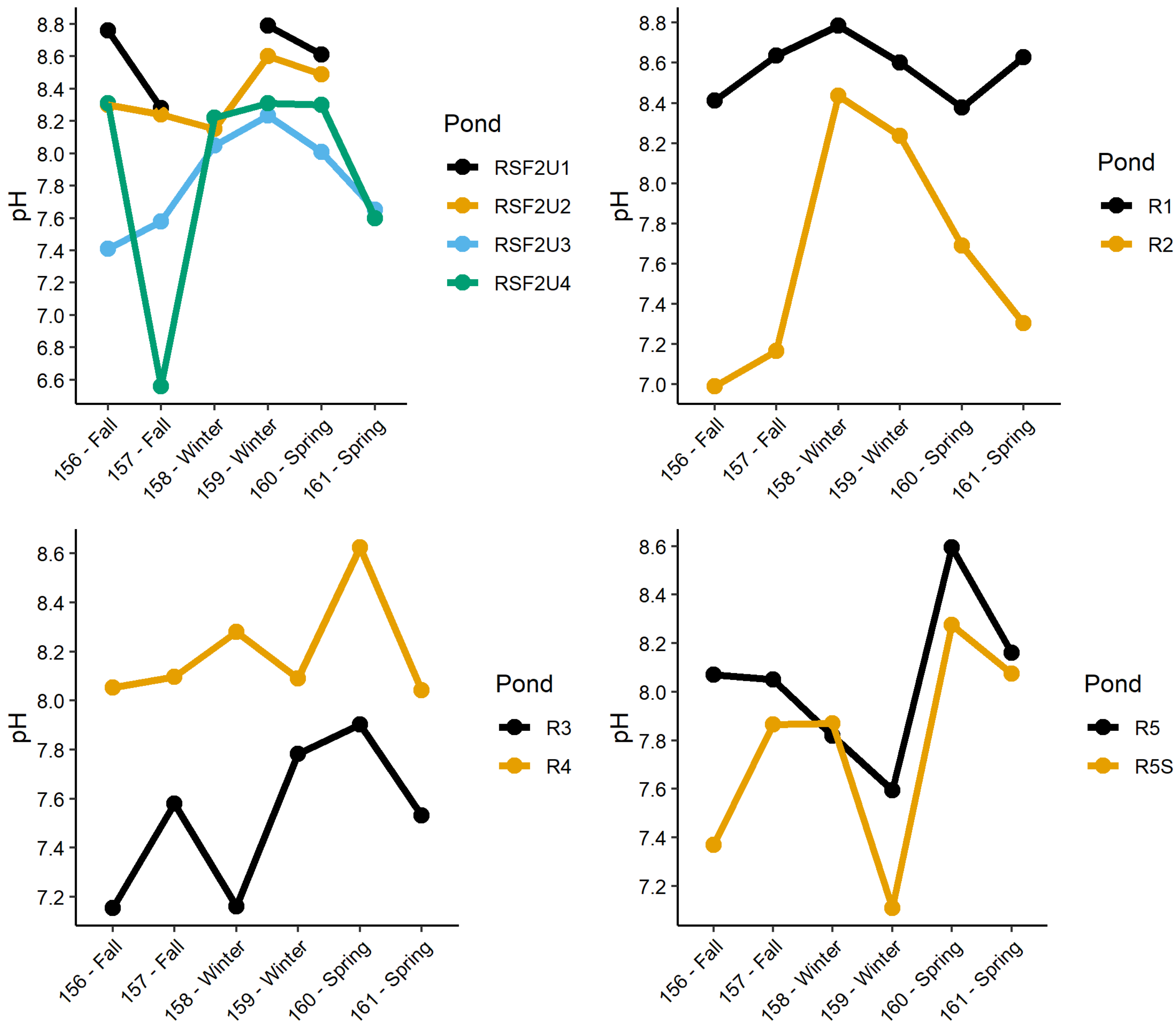

Figure A7.13. Average pH at the Ravenswood pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

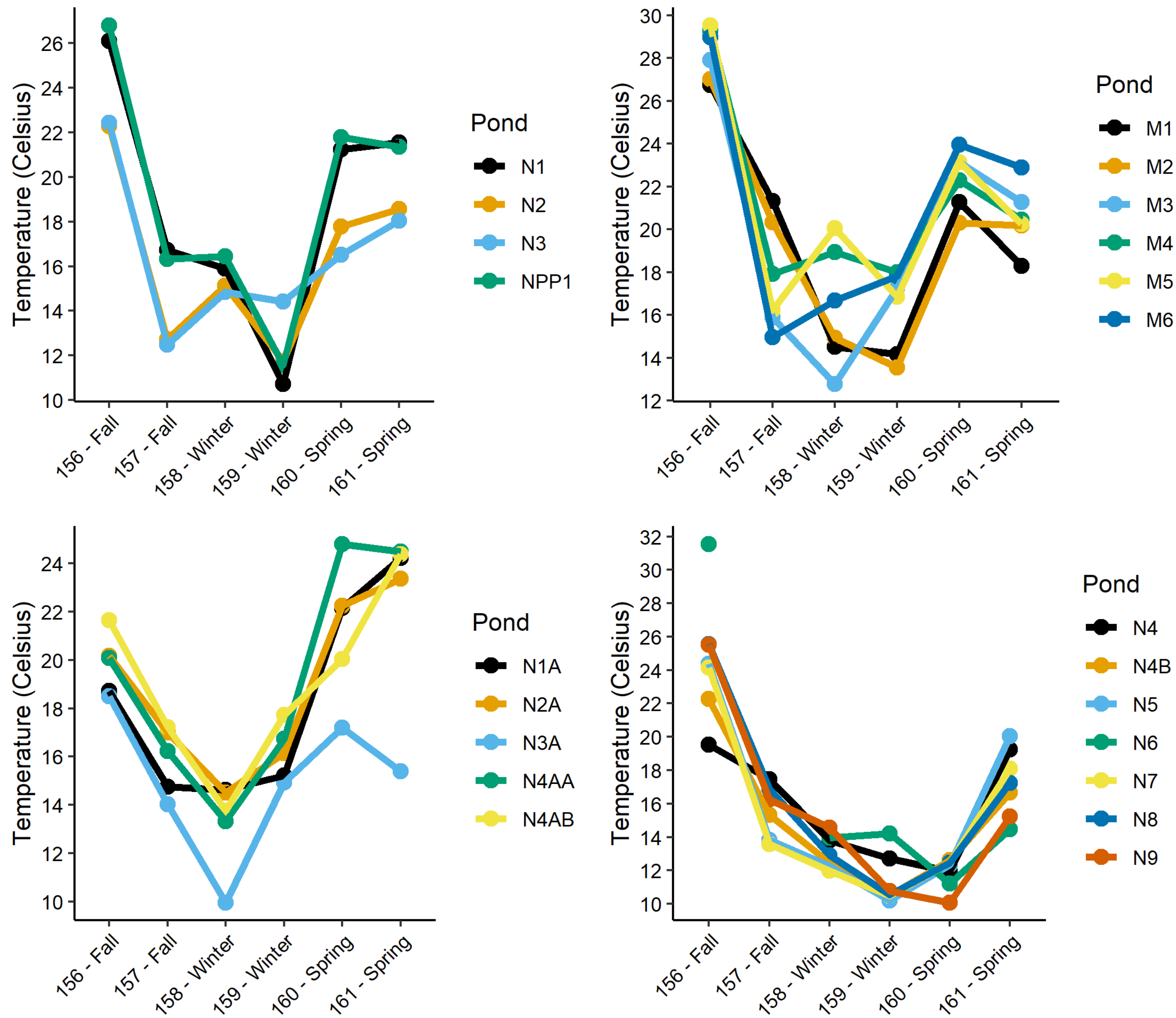

Figure A7.14. Average Temperature (Celsius) at the Coyote Hills, Dumbarton, and Mowry pond complexes, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

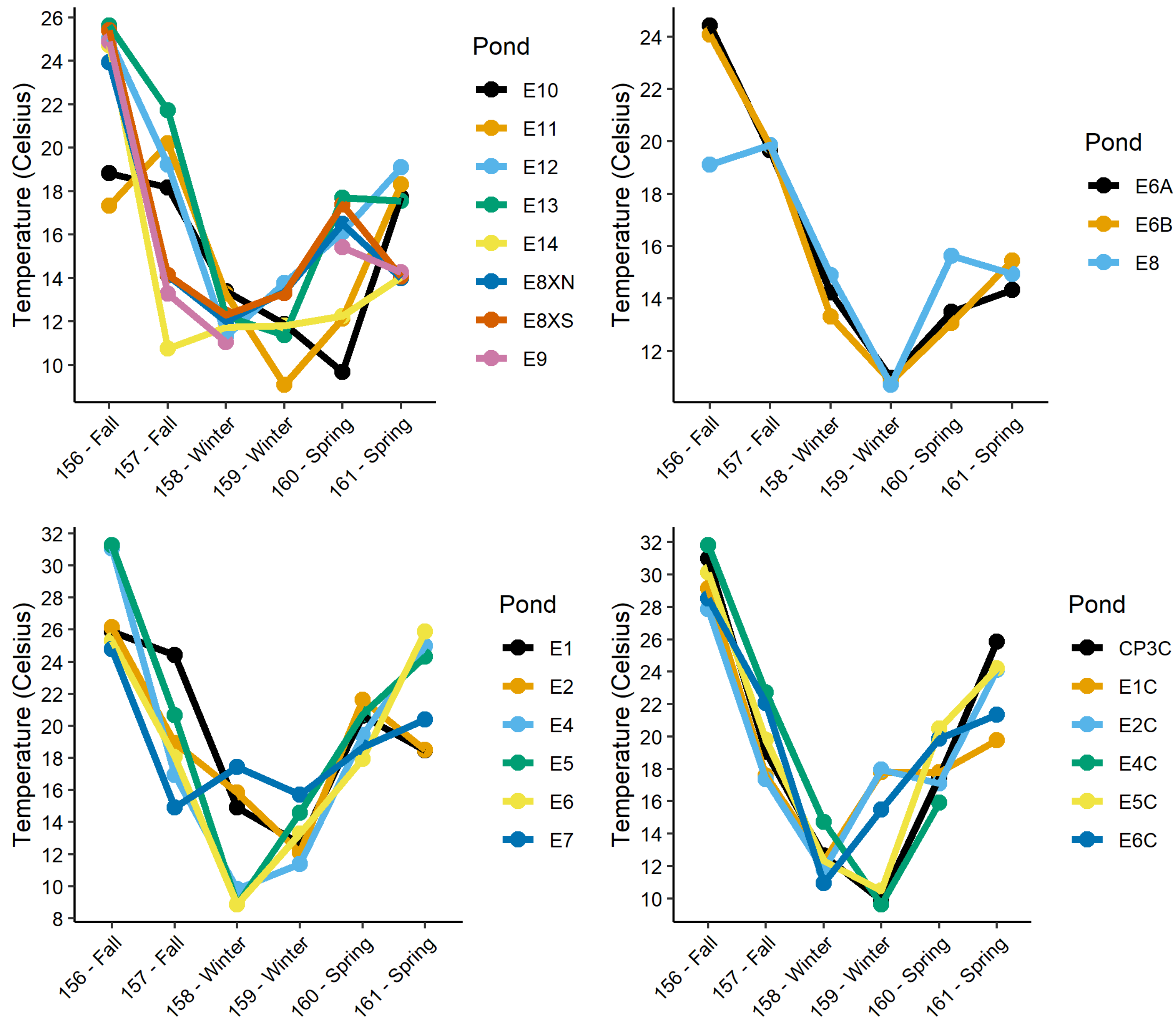

Figure A7.15. Average Temperature (Celsius) at the Eden Landing pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

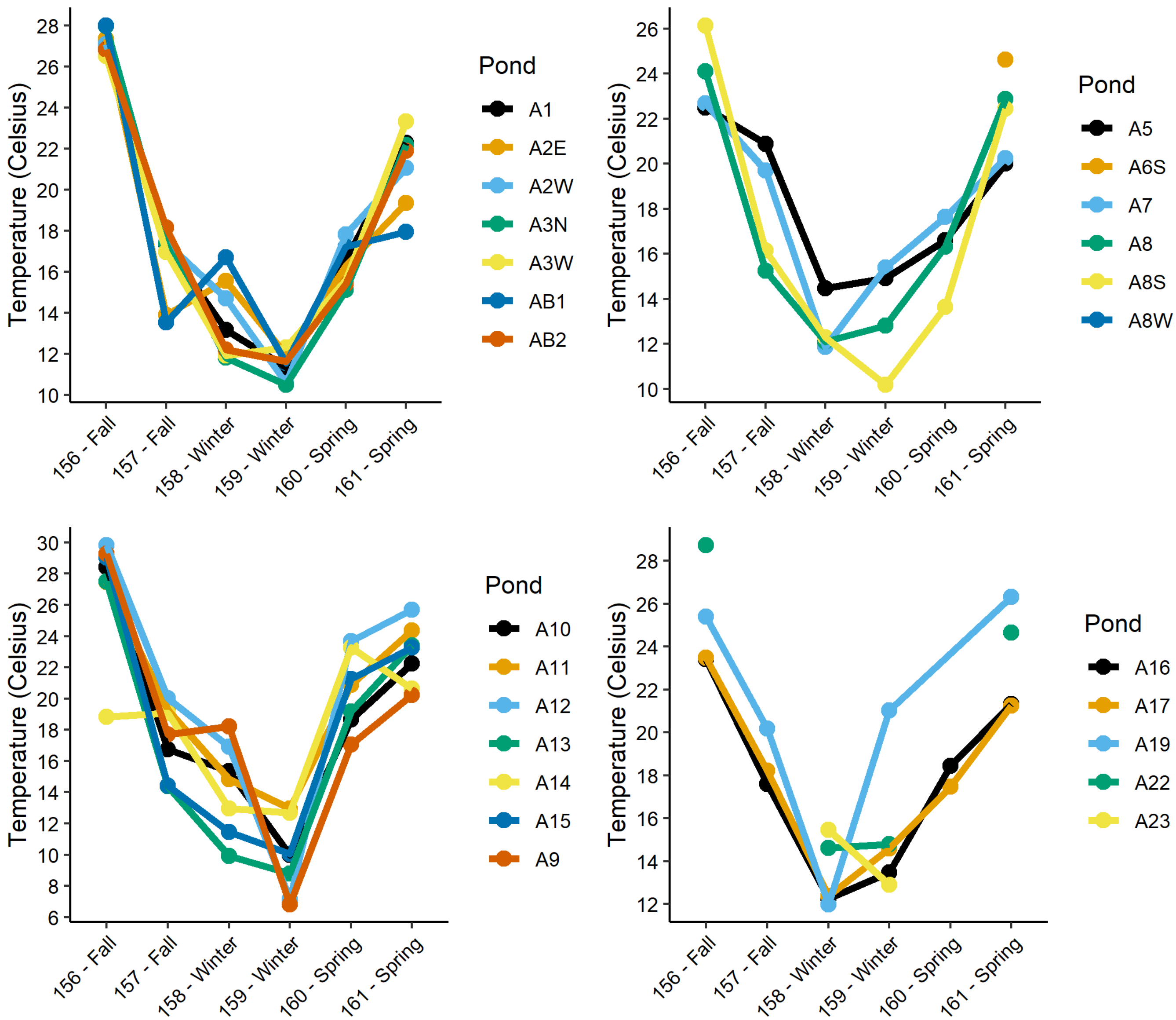

Figure A7.16. Average Temperature (Celsius) at the Alviso pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

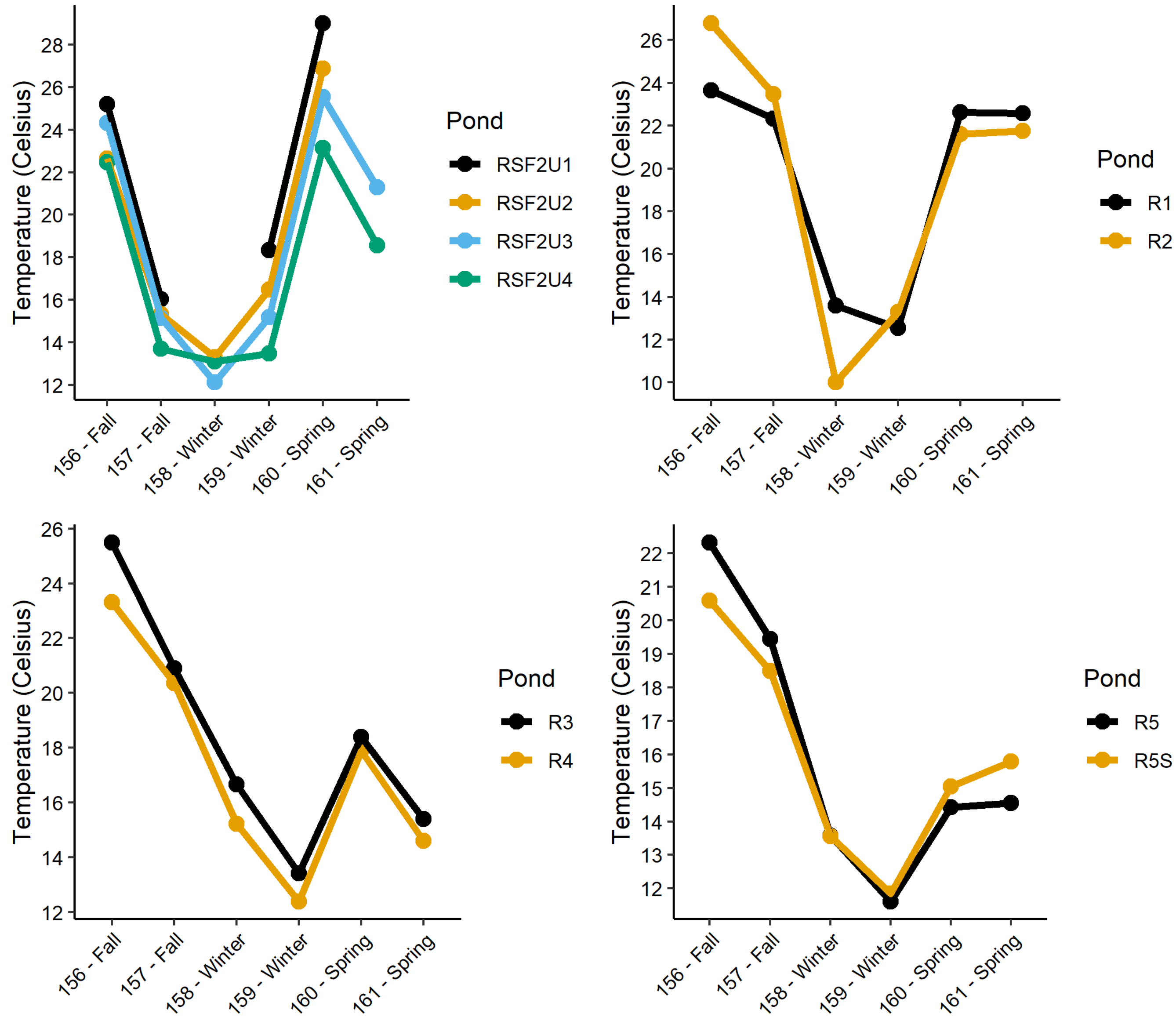

Figure A7.17. Average Temperature (Celsius) at the Ravenswood pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

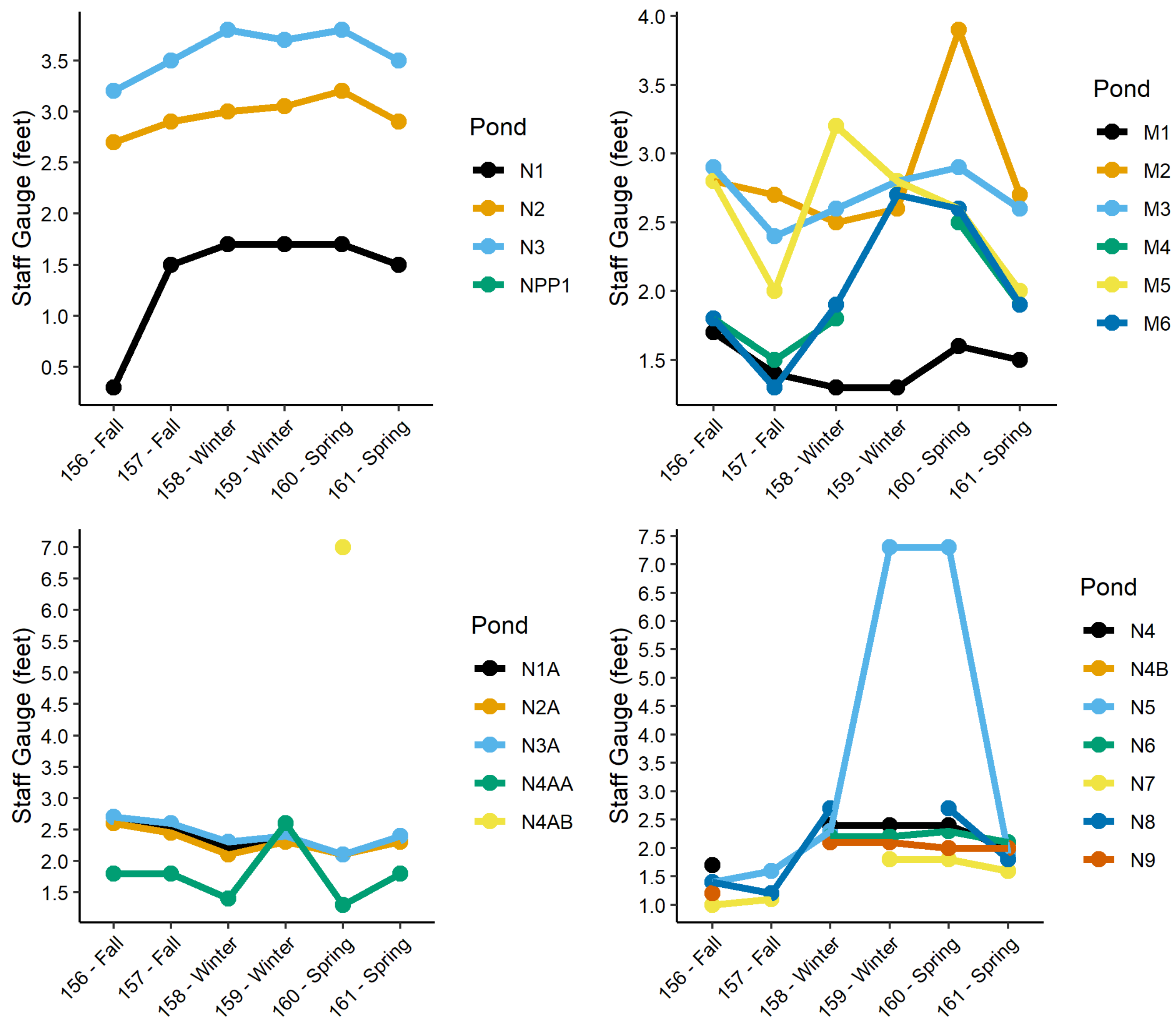

Figure A7.18. Average Staff Gauge (feet) at the Coyote Hills, Dumbarton, and Mowry pond complexes, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

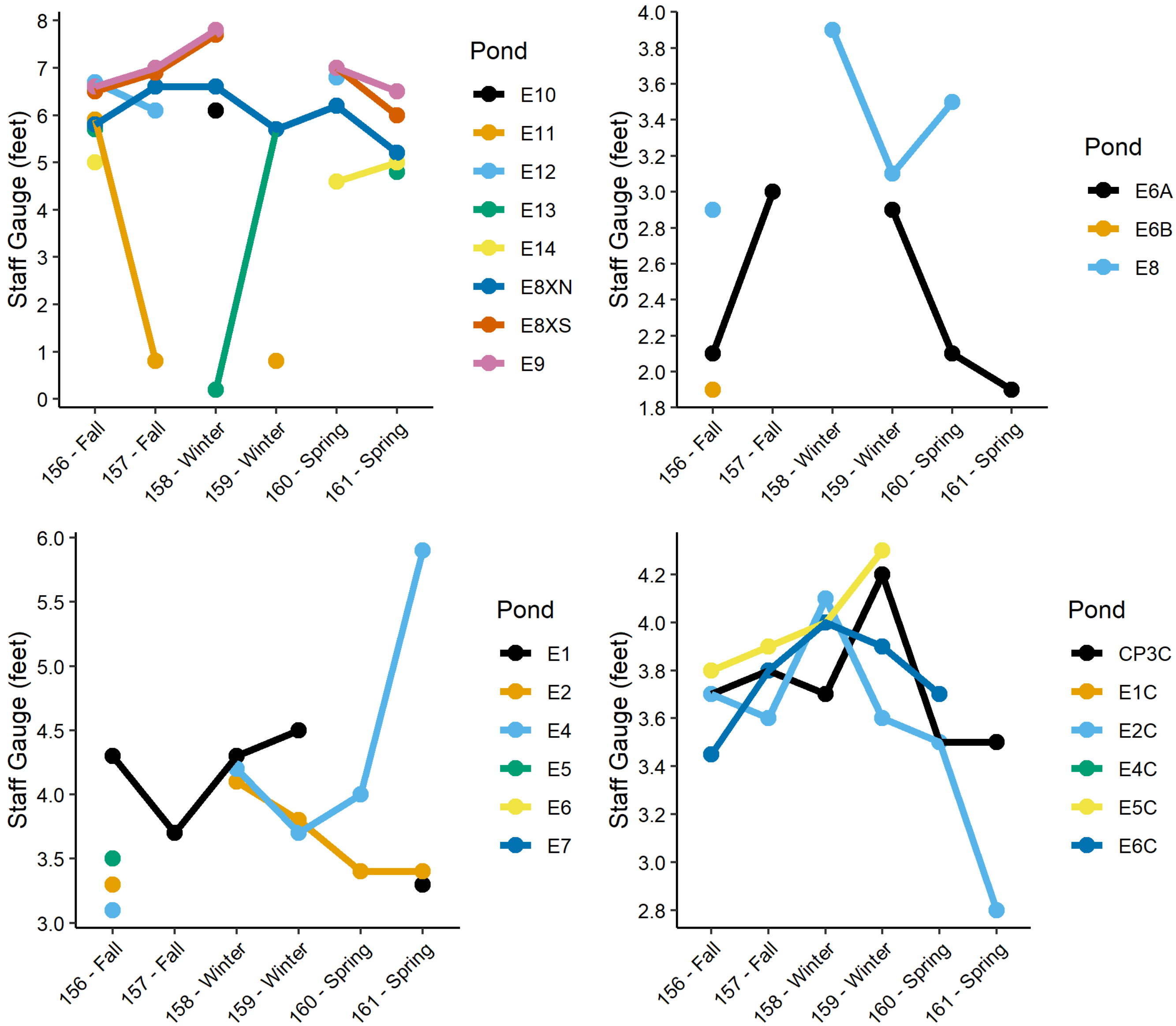

Figure A7.19. Average Staff Gauge (feet) at the Eden Landing pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

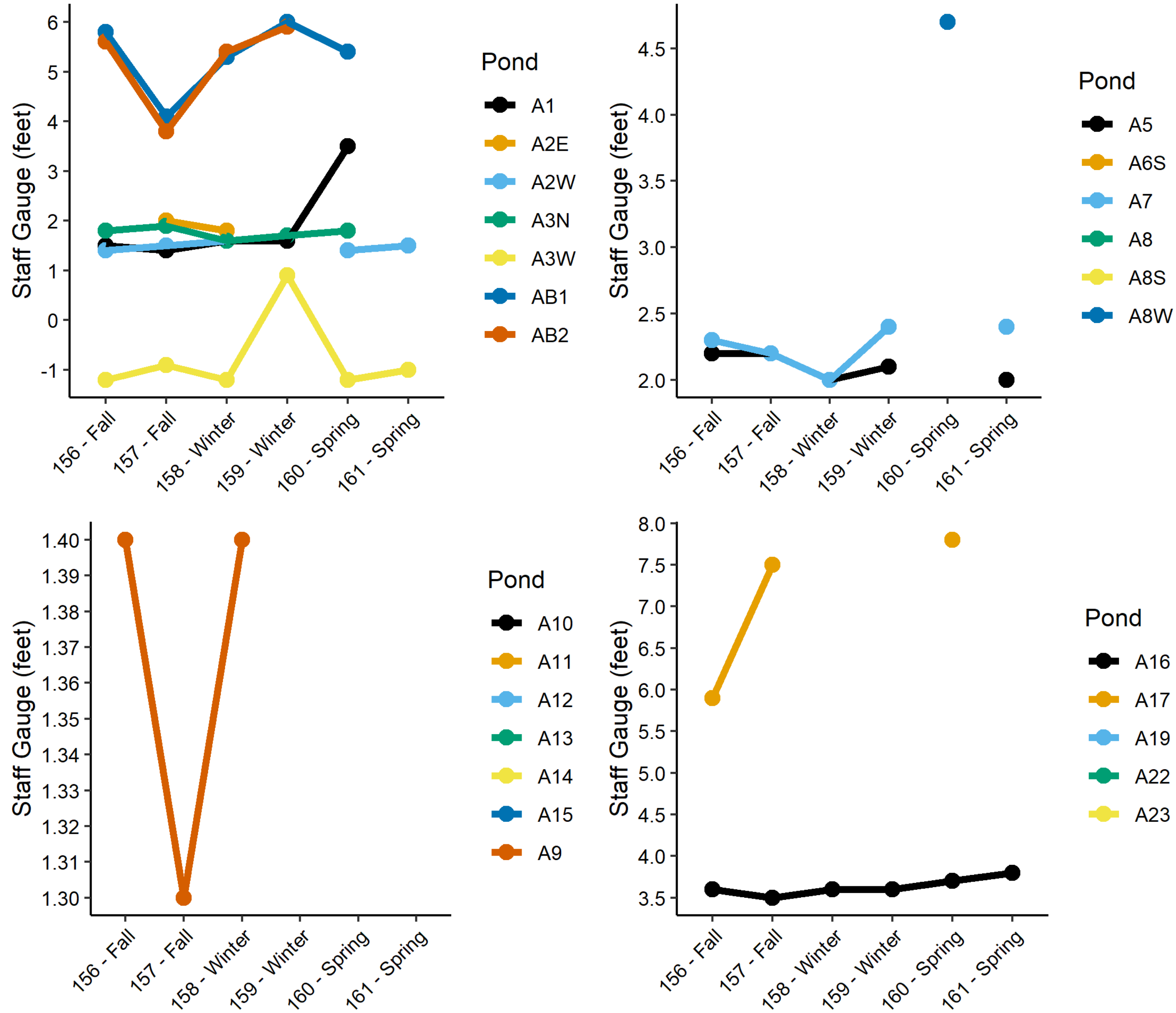

Figure A7.20. Average Staff Gauge (feet) at the Alviso pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

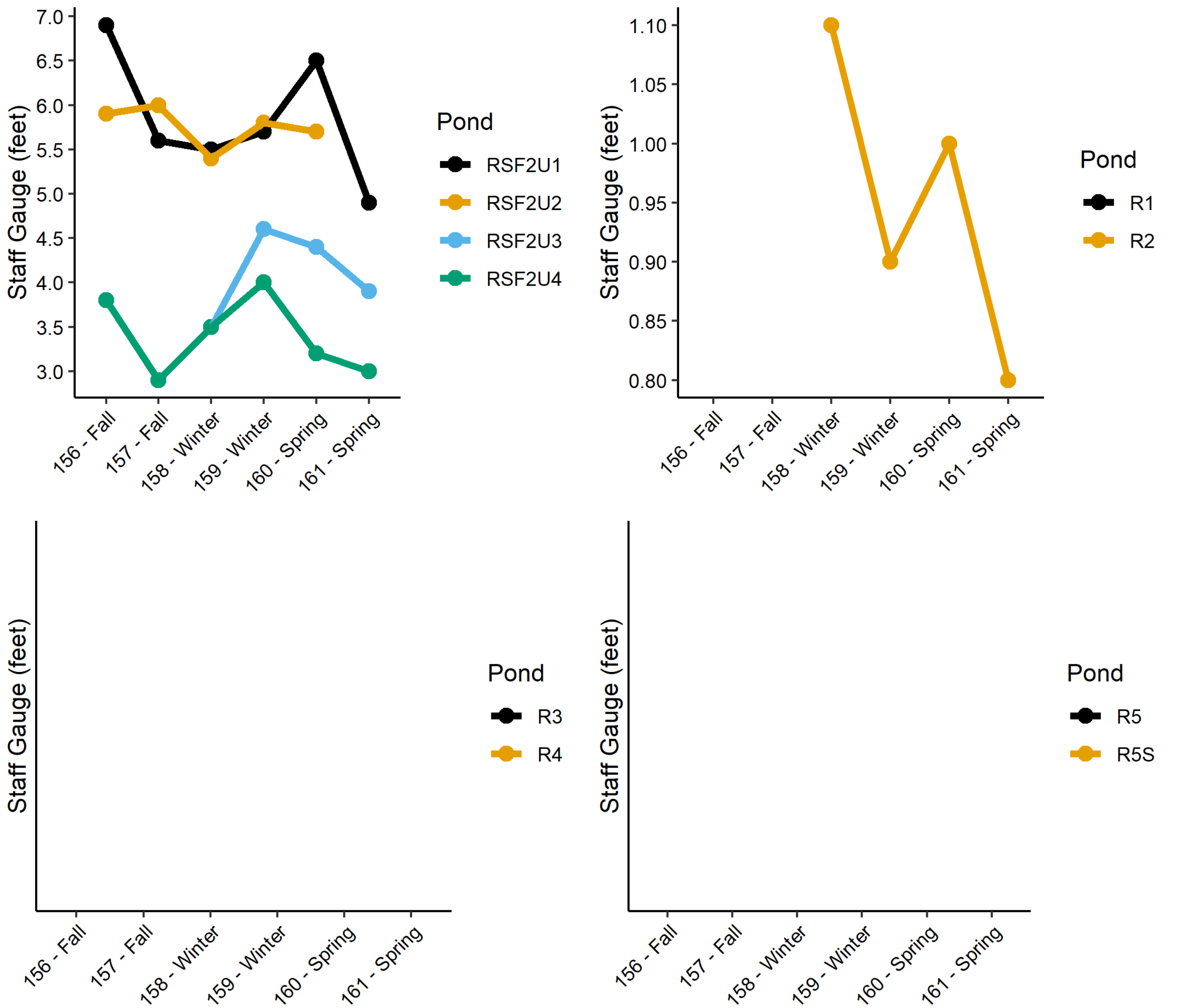

Figure A7.21. Average Staff Gauge (feet) at the Ravenswood pond complex, South San Francisco Bay, California; September 2024 – May 2025. Scale differs between graphs.

Appendix 8

This appendix presents the status of staff gauges within each pond.

Table A8.1. List of all ponds surveyed, their staff gauge location, and staff gauge status in 2025. Ponds marked with a '*' symbol are tidal.

Complex	Pond	Grid	Status	Notes
Alviso	A1	H1	GOOD	
	A10	A2	MISSING	Missing since 10/29/2014
	A11	E1	MISSING	Missing since 10/07/2019
	A12	C5	MISSING	Since at least Fall 2022 the corner is dug out by construction, inaccessible and likely gone
	A13	A2	GOOD	
	A14	A3	OK	Broken below 1.5
	A15	A2	MISSING	
	A16	E6	GOOD	
	A17	D1	GOOD	Tidal pond
	A19	NONE	MISSING	Missing since at least 2014. Tidal pond
	A22	NONE	MISSING	Missing since at least 2014
	A23	NONE	MISSING	Missing since at least 2014
	A2E	H7	MISSING	Missing since 10/03/2019
	A2W	A6	OK	Eroded below 1.7
	A3N	D1	GOOD	
	A3W	E9	GOOD	
	A5	B3	GOOD	
	A6S	NONE	MISSING	Missing since at least 2014. Tidal pond
	A7	A2	OK	Broken below 2.3
	A8	NONE	MISSING	Missing since at least 2014
	A8S	NONE	MISSING	Missing since at least 2014
	A8W	NONE	MISSING	Missing since at least 2014
	A9	D2	OK	Broken below 1.8
	AB1	A7	GOOD	
	AB2	J1	OK	algae growth under 5.5 ft makes it difficult to read- plastic needs cleaned (Restored as of Fall 2022
Coyote Hills	N1A	C1	GOOD	Old C8 was destroyed in storms, replaced with new C1 corner gauge
	N2A	C2	GOOD	
	N3A	C6	GOOD	
	N4	E5	GOOD	
	N4AA	I6	GOOD	
	N4AB	NONE	MISSING	
	N4B	NONE	MISSING	
	N5	A2	GOOD	
	N6	E2	GOOD	
	N7	A1	GOOD	
	N8	A2	GOOD	
	N9	A5	GOOD	
Dumbarton	N1	D8	GOOD	
	N2	C2	GOOD	
	N3	G1	GOOD	

Complex	Pond	Grid	Status	Notes
	NPP1	C11	MISSING	Missing since 10/10/2019
Eden Landing	E1	A1	GOOD	Replaced in 2019
	E10	F2	OK	difficult to read under 6.5 ft. - plastic may just need cleaning
	E11	E3	GOOD	
	E12	D6	OK	Top number is 8ft, algae makes most of it illegible
	E13	C2	OK	Two staff gauges, master is white plastic, cannot read numbers under 6ft due to algae growth
	E14	B1	GOOD	Can read up to 5ft, algae below
	E1C	E3	GOOD	
	E2	D1	GOOD	
	E2C	A2	OK	Broken below 5ft.
	E3C	B2	OK	Broken below 4ft
	E4	B6	GOOD	
	E4C	NONE	MISSING	Missing since at least 2014
	E5	C6	OK	algae growth below 4.2 ft
	E5C	C4	GOOD	
	E6	D8	MISSING	SG removed during construction 2021
	E6A	A3	OK	difficult to read under 4.5ft
	E6B	A6	OK	difficult to read under 2ft
	E6C	A4	GOOD	
	E7	B5	MISSING	Missing as of 12/2020; replacement pending -> still missing 11/2022
	E8	I6	OK	wooden numbers difficult to read unless up close
	E8AE	NONE	MISSING	Tidal pond
	E8AW	NONE	MISSING	Tidal pond
	E8XN	D3	OK	Can read up to 7ft, algae below
	E8XS	D3	OK	Can read up to 7ft, algae below, Tidal pond
	E9	A4	OK	Tidal pond, can read up to 7ft, algae below
Mowry	M1	H10	GOOD	
	M2	G10	OK	4ft is the highest number, but this is often covered in water
	M3	B6	OK	Top number unreadable
	M4	C13	MISSING	Missing as of 2023-11-09 survey
	M5	A3	GOOD	
	M6	B5	MISSING	Missing
Ravenswood	R1	F8	GOOD	Consistently dry
	R2	D4	GOOD	
	R3	A6	MISSING	Missing since at least 2021
	R4	F1	MISSING	Removed fall 2019 due to construction
	R5	A1	MISSING	Missing since 2020
	R5S	NONE	MISSING	Missing since at least 2014
	RSF2U1	D6	GOOD	
	RSF2U2	E3	GOOD	
	RSF2U3	E3	GOOD	
	RSF2U4	E6	GOOD	