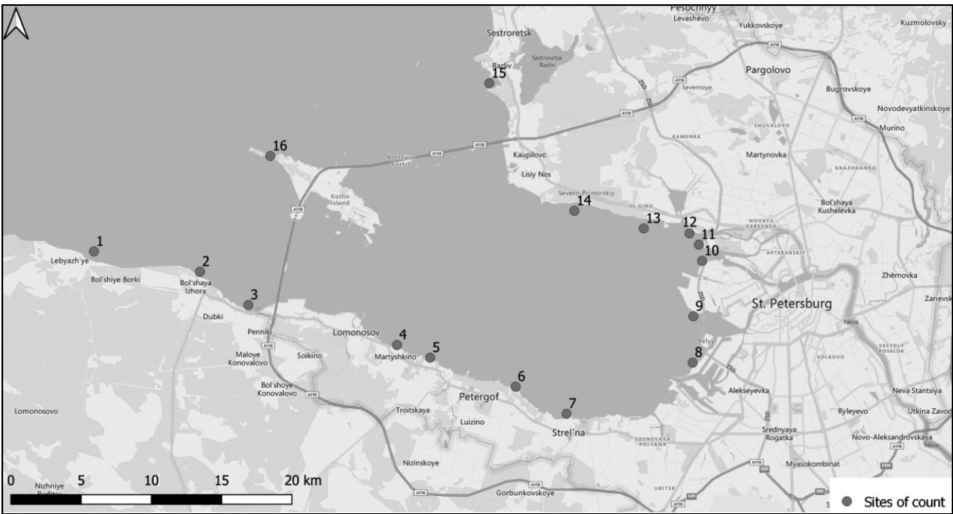


# Supporting Materials

## Shifts in site use by spring-staging swans *Cygnus* sp., from traditional to artificially reclaimed habitat in the Gulf of Finland



**Figure S1.** The geographical distributions of swan count sites covered by this survey during 2018 to 2021. See Table 2 for explanation of count site names and frequency of coverage in each year.

**Table S1.** Route length and area for each count site. Locations are indicated in Fig. S1.

| Count site                                   | Length of the count route (km) | Site area (km <sup>2</sup> ) |
|----------------------------------------------|--------------------------------|------------------------------|
| <i>Traditional</i>                           |                                |                              |
| 1. Chaika-Lebyazhye                          | 6.0                            | 3.38                         |
| 2. BolshayaIzhora                            | 3.0                            | 1.89                         |
| 5. Petergof                                  | 2.3                            | 1.00                         |
| 6. Southern coast of Neva Bay                | 3.8                            | 1.50                         |
| 7. Strelna                                   | 4.0                            | 2.60                         |
| 14. Northern coast of Neva Bay               | 5.3                            | 4.80                         |
| 15. Tarkhovka                                | 1.4                            | 2.30                         |
| 16. Western Kotlin                           | 4.5                            | 3.78                         |
| 16. Western Kotlin (for Mute Swan)           | 3.7                            | 2.47                         |
| <i>Reclaimed</i>                             |                                |                              |
| 3. Bronka                                    | 3.5                            | 1.89                         |
| 4. Martyshkino                               | 1.0                            | 0.21                         |
| 8. Kanonersky Island                         | 1.3                            | 1.23                         |
| 9. Sea Façade                                | 1.8                            | 1.50                         |
| 10. Dekabristov Island                       | 1.6                            | 1.47                         |
| 11. ZenitArena                               | 0.7                            | 0.67                         |
| 12. 300th Anniversary of St. Petersburg Park | 1.2                            | 0.77                         |
| 13. Lakhta-Olgino                            | 3.5                            | 2.11                         |

**Table S2.** The number of spring counts carried out annually at the survey sites in 2018–2022. Locations are indicated in Fig. S1.

| Count site                                   | Maximum number of individuals<br>per count day |      |      |      |      |
|----------------------------------------------|------------------------------------------------|------|------|------|------|
|                                              | 2018                                           | 2019 | 2020 | 2021 | 2022 |
| <i>Traditional</i>                           |                                                |      |      |      |      |
| 1. Chaika-Lebyazhye                          | 2                                              | 4    | 5    | 3    | 5    |
| 2. BolshayaIzhora                            | 0                                              | 0    | 3    | 3    | 1    |
| 5. Petergof                                  | 3                                              | 2    | 0    | 7    | 2    |
| 6. Southern coast of Neva Bay                | 0                                              | 1    | 5    | 8    | 5    |
| 7. Strelna                                   | 1                                              | 1    | 2    | 4    | 4    |
| 14. Northern coast of Neva Bay               | 3                                              | 4    | 9    | 8    | 5    |
| 15. Tarkhovka                                | 0                                              | 0    | 0    | 4    | 0    |
| 16. Western Kotlin                           | 4                                              | 0    | 1    | 3    | 2    |
| <i>Reclaimed</i>                             |                                                |      |      |      |      |
| 3. Bronka                                    | 2                                              | 0    | 2    | 4    | 2    |
| 4. Martyshkino                               | 1                                              | 0    | 1    | 1    | 0    |
| 8. Kanonersky Island                         | 0                                              | 0    | 2    | 3    | 3    |
| 9. Sea Façade                                | 0                                              | 3    | 3    | 5    | 5    |
| 10. Dekabristov Island                       | 0                                              | 0    | 0    | 2    | 0    |
| 11. Zenit Arena                              | 0                                              | 0    | 0    | 5    | 0    |
| 12. 300th Anniversary of St. Petersburg Park | 0                                              | 0    | 1    | 4    | 0    |
| 13. Lakhta-Olgino                            | 1                                              | 4    | 14   | 8    | 6    |

Table S3. Count dates for each site in each year.

| Count site                                   | 2018          | 2019          | 2020          | 2021          | 2022          |
|----------------------------------------------|---------------|---------------|---------------|---------------|---------------|
| <i>Traditional</i>                           |               |               |               |               |               |
| 1. Chaika-Lebyazhye                          | 15 Apr-06 May | 30 Mar-28 Apr | 22 Mar-04 May | 11 Apr-08 May | 16 Apr-23 Apr |
| 2. BolshayaIzhora                            | -             | -             | 28 Mar-02 May | 11 Apr-08 May | 16 Apr-16 Apr |
| 5. Petergof                                  | 24 Apr-11 May | 06 Apr-27 Apr | -             | 04 Apr-29 Apr | 16 Apr-21 Apr |
| 6. Southern coast of Neva Bay                | -             | 27 Apr-27 Apr | 15 Mar-02 May | 28 Mar-16 May | 07 Apr-22 May |
| 7. Strelna                                   | 29 Apr-29 Apr | 04 Apr-04 Apr | 2 May-16 May  | 4 Mar-11 May  | 17 Apr-22 May |
| 14. Northern coast of Neva Bay               | 13 Apr-05 May | 14 Apr-05 May | 14 Mar-14 May | 18 Mar-12 May | 16 Apr-15 May |
| 15. Tarkhovka                                | -             | -             | -             | 11 Mar-22 Apr | -             |
| 16. Western Kotlin                           | 22 Apr-10 May | -             | 21 April      | 3 Apr-22 May  | 25 Apr-30 Apr |
| <i>Reclaimed</i>                             |               |               |               |               |               |
| 3. Bronka                                    | 02 May-06 May | -             | 07 Apr-21 Apr | 03 Apr-22 Apr | 16 Apr-23 Apr |
| 4. Martyshkino                               | 24 April      | -             | 02 May        | 20 April      | -             |
| 8. Kanonersky Island                         | -             | -             | 07 Apr-12 Apr | 04 Apr-17 Apr | 18 Apr-18 May |
| 9. Sea Façade                                | -             | 11 Mar-30 Apr | 29 Mar-06 Apr | 03 Apr-03 May | 9 Apr-18 May  |
| 10. Dekabristov Island                       | -             | -             | -             | 25 Apr-03 May | -             |
| 11. Zenit Arena                              | -             | -             | -             | 19 Apr-12 May | -             |
| 12. 300th Anniversary of St. Petersburg Park | -             | -             | 29 Mar-29 Mar | 18 Apr-12 May | -             |
| 13. Lakhtra-Olgino                           | 13 April      | 14 Apr-5 May  | 9 Mar-9 May   | 03 Mar-12 May | 10 Apr-15 May |

**Table S4.** Whooper Swan density for each site, on the day when the maximum number was counted at the site, for each spring during the study period.

| Count site                                   | Density of individuals per count day<br>(birds/km <sup>2</sup> ) |      |      |      |      |
|----------------------------------------------|------------------------------------------------------------------|------|------|------|------|
|                                              | 2018                                                             | 2019 | 2020 | 2021 | 2022 |
| <i>Traditional</i>                           |                                                                  |      |      |      |      |
| 1. Chaika-Lebyazhye                          | 25                                                               | 86   | 2    | 2    | 1    |
| 2. Bolshaya Izhora                           | –                                                                | –    | 8    | 5    | 7    |
| 5. Petergof                                  | 0                                                                | 0    | –    | 3    | 0    |
| 6. Southern coast of Neva Bay                | –                                                                | 0    | 5    | 1    | 4    |
| 7. Strelna                                   | 0                                                                | 3    | 0    | 3    | 0    |
| 14. Northern coast of Neva Bay               | 3                                                                | 0    | 5    | 5    | 1    |
| 15. Tarkhovka                                | –                                                                | –    | –    | 0    | –    |
| 16. Western Kotlin                           | 2                                                                | –    | –    | 0    | 0    |
| <i>Reclaimed</i>                             |                                                                  |      |      |      |      |
| 3. Bronka                                    | 0                                                                | –    | 0    | 1    | 11   |
| 4. Martyshkino                               | 0                                                                | –    | 0    | 0    | –    |
| 8. Kanonersky Island                         | –                                                                | –    | 0    | 18   | 8    |
| 9. Sea Façade                                | –                                                                | 7    | 21   | 25   | 21   |
| 10. Dekabristov Island                       | –                                                                | –    | –    | 0    | –    |
| 11. Zenit Arena                              | –                                                                | –    | –    | 1    | –    |
| 12. 300th Anniversary of St. Petersburg Park | –                                                                | –    | 0    | 0    | –    |
| 13. Lakhta-Olgino                            | 0                                                                | 27   | 21   | 5    | 76   |

**Table S5.** Bewick’s Swan density for each site, on the day when the maximum number was counted at the site, for each spring during the study period.

| Count site                                   | Density of individuals per count day<br>(birds/km <sup>2</sup> ) |      |      |      |      |
|----------------------------------------------|------------------------------------------------------------------|------|------|------|------|
|                                              | 2018                                                             | 2019 | 2020 | 2021 | 2022 |
| <i>Traditional</i>                           |                                                                  |      |      |      |      |
| 1. Chaika-Lebyazhye                          | 5                                                                | 11   | 32   | 2    | 65   |
| 2. BolshayaIzhora                            | –                                                                | –    | 6    | 3    | 77   |
| 5. Petergof                                  | 5                                                                | 36   | –    | 4    | 3    |
| 6. Southern coast of Neva Bay                | –                                                                | 0    | 37   | 4    | 1    |
| 7. Strelna                                   | 0                                                                | 1    | 8    | 1    | 0    |
| 14. Northern coast of Neva Bay               | 21                                                               | 4    | 25   | 7    | 20   |
| 15. Tarkhovka                                | –                                                                | –    | –    | 0    | –    |
| 16. Western Kotlin                           | 2                                                                | –    | –    | 11   | 11   |
| <i>Reclaimed</i>                             |                                                                  |      |      |      |      |
| 3. Bronka                                    | 2                                                                | –    | 2    | 32   | 3    |
| 4. Martyshkino                               | 10                                                               | –    | 76   | 43   | –    |
| 8. Kanonersky Island                         | –                                                                | –    | 2    | 15   | 46   |
| 9. Sea Façade                                | –                                                                | 0    | 67   | 23   | 96   |
| 10. Dekabristov Island                       | –                                                                | –    | –    | 0    | –    |
| 11. Zenit Arena                              | –                                                                | –    | –    | 6    | –    |
| 12. 300th Anniversary of St. Petersburg Park | –                                                                | –    | 0    | 0    | –    |
| 13. Lakhta-Olgino                            | 0                                                                | 47   | 58   | 56   | 209  |

**Table S6.** Mute Swan density at each site, on the day when the maximum number was counted at the site, for each spring during the study period.

| Count site                                   | Density of individuals per count day<br>(birds/km <sup>2</sup> ) |      |      |      |      |
|----------------------------------------------|------------------------------------------------------------------|------|------|------|------|
|                                              | 2018                                                             | 2019 | 2020 | 2021 | 2022 |
| <i>Traditional</i>                           |                                                                  |      |      |      |      |
| 1. Chaika-Lebyazhye                          | 0                                                                | 0    | 1    | 0    | 0    |
| 2. BolshayaIzhora                            | –                                                                | –    | 0    | 0    | 1    |
| 5. Petergof                                  | 2                                                                | 0    | –    | 1    | 0    |
| 6. Southern coast of Neva Bay                | –                                                                | 1    | 2    | 4    | 1    |
| 7. Strelna                                   | 1                                                                | 0    | 1    | 0    | 1    |
| 14. Northern coast of Neva Bay               | 0                                                                | 0    | 1    | 1    | 0    |
| 15. Tarkhovka                                | –                                                                | –    | –    | 0    | –    |
| 16. Western Kotlin                           | 2                                                                | –    | 2    | 4    | –    |
| <i>Reclaimed</i>                             |                                                                  |      |      |      |      |
| 3. Bronka                                    | 1                                                                | –    | 0    | 0    | 0    |
| 4. Martyshkino                               | 0                                                                | –    | 0    | 0    | –    |
| 8. Kanonersky Island                         | –                                                                | –    | 0    | 0    | 0    |
| 9. Sea Façade                                | –                                                                | 0    | 0    | 0    | 0    |
| 10. Dekabristov Island                       | –                                                                | –    | –    | 0    | –    |
| 11. Zenit Arena                              | –                                                                | –    | –    | 0    | –    |
| 12. 300th Anniversary of St. Petersburg Park | –                                                                | –    | 0    | 0    | –    |
| 13. Lakhta-Olgino                            | 0                                                                | 1    | 4    | 0    | 0    |