Covariate Information

Tables of Covariate Coverage by Data Type

**Table S1** The continuous covariates (i.e. not the categorical land cover type data) were centered around the mean and divided by the standard deviation of the data (using ‘scale’ function in R). The centered covariate data was used for model fitting.

|  |  |  |
| --- | --- | --- |
| Covariate | Center | Scale |
| Elevation (m) | 519.4111 | 467.8513 |
| Human Influence Index (HII) | 20.21134 | 14.7006 |
| Perimeter Complexity | 12.16122 | 9.381704 |
| Area (km2) | 8.590938 | 35.79214 |
| Canopy | 8.975515 | 20.46046 |

**Table S2** Minimum, mean, and maximum values for continuous covariates, with both center/scaled and untransformed data summaries are given below. ‘WDFW sites’ are sites that were surveyed by the WDFW, ‘eBird sites’ are sites that were only surveyed by eBird observers, ‘In Model Sites’ are sites that were included in the occupancy model, and ‘All Sites’ are all the sites that meet the minimum site criteria for Common Loons.

|  |  |  |  |
| --- | --- | --- | --- |
| **Human Influence Index** | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | 5 | 15.1698113 | 50 |
| eBird Sites | 0 | 20.5809129 | 60 |
| In Model Sites | 0 | 20.2113402 | 60 |
| All Sites | 0 | 20.0516351 | 60 |
| Human Influence Index – Center = 20.21134, Scale = 14.7006 | | | |
| Data Type Sites | Minimum | Mean | Maximum |
| WDFW Sites | -1.0347431 | -0.3429472 | 2.02635722 |
| eBird Sites | -1.3748653 | 0.02513998 | 2.70660173 |
| In Model Sites | -1.3748653 | -6.47E-17 | 2.70660173 |
| All Sites | -1.3748653 | -0.0108639 | 2.70660173 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Elevation (m)** | | | |
| Data Type Sites | Minimum | Mean | Maximum |
| WDFW Sites | 12 | 682.90566 | 1381 |
| eBird Sites | -11 | 507.426003 | 1510 |
| In Model Sites | -11 | 519.411082 | 1510 |
| All Sites | -11 | 515.395869 | 1525 |
| Elevation (m) – Center = 519.4111, Scaled = 467.8513 | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | -1.0845563 | 0.34945841 | 1.84158703 |
| eBird Sites | -1.1337172 | -0.0256173 | 2.11731566 |
| In Model Sites | -1.1337172 | 1.03E-16 | 2.11731566 |
| All Sites | -1.1337172 | -0.0085822 | 2.14937713 |
| **Canopy (% tree canopy cover)** | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | 0 | 9.73584906 | 81 |
| eBird Sites | 0 | 8.9197787 | 85 |
| In Model Sites | 0 | 8.97551546 | 85 |
| All Sites | 0 | 8.45611015 | 255 |
| Canopy (% tree canopy cover) - Center = 8.975515, Scale = 20.46046 | | | |
| Data Type Sites | Minimum | Mean | Maximum |
| WDFW Sites | -0.4386762 | 0.03716112 | 3.52017938 |
| eBird Sites | -0.4386762 | -0.0027241 | 3.71567842 |
| In Model Sites | -0.4386762 | -2.54E-17 | 3.71567842 |
| All Sites | -0.4386762 | -0.0253858 | 12.0243876 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Area (km2)** | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | 0.05 | 3.33013077 | 46.8169631 |
| eBird Sites | 0.041 | 8.97658544 | 288.633064 |
| In Model Sites | 0.041 | 8.59093841 | 288.633064 |
| All Sites | 0.0400402 | 3.03051834 | 288.633064 |
| Area (km2) – Center = 8.590938, Scale = 35.79214 | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | -0.2386261 | -0.1469822 | 1.06800067 |
| eBird Sites | -0.2388776 | 0.01077463 | 7.82412451 |
| In Model Sites | -0.2388776 | 1.90E-18 | 7.82412451 |
| All Sites | -0.2389044 | -0.1553531 | 7.82412451 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Perimeter Complexity** | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | 6.06915046 | 10.4509587 | 24.1629173 |
| eBird Sites | 5.28336027 | 12.2865872 | 125.680398 |
| In Model Sites | 5.28336027 | 12.1612157 | 125.680398 |
| All Sites | 5.26773905 | 10.4860075 | 125.680398 |
| Perimeter Complexity - Center = 12.16122, Scale = 9.381704 | | | |
| Data Type | Minimum | Mean | Maximum |
| WDFW Sites | -0.6493559 | -0.182297 | 1.27926668 |
| eBird Sites | -0.7331136 | 0.01336341 | 12.1000598 |
| In Model Sites | -0.7331136 | 7.46E-17 | 12.1000598 |
| All Sites | -0.7347787 | -0.1785612 | 12.1000598 |

**Table S3** Categorical National Land Cover Dataset (NLCD) covariate counts by data type. ‘WDFW sites’ are sites that were surveyed by the WDFW, ‘eBird sites’ are sites that were only surveyed by eBird observers, ‘In Model Sites’ are sites that were included in the occupancy model, and ‘All Sites’ are all the sites that meet the minimum site criteria for Common Loons.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | WDFW Sites | eBird Sites | In Model Sites | All Sites |
| Forest | 5 | 46 | 51 | 99 |
| Developed | 1 | 36 | 37 | 103 |
| Other | 1 | 65 | 66 | 227 |
| Open Water | 46 | 576 | 622 | 1895 |

**Table S4** Proportion data coverage by covariate. Proportions were calculated as the range of the covariate values of WDFW survey sites divided by the range of covariate values for sites only surveyed by eBird. The proportion is reported below for centered and scaled covariates (as used in model fitting) and data that was not transformed.

|  |  |  |
| --- | --- | --- |
| Covariate | Proportion Centered and Scaled | Proportion Not Transformed |
| HII | 0.75 | 0.91666667 |
| Elevation (m) | 0.90006575 | 0.91584484 |
| Canopy | 0.95294118 | 0.95294118 |
| Area (km2) | 0.16205215 | 0.16235252 |
| Perimeter Complexity | 0.15028415 | 0.23084301 |

Figures of Covariate Coverage by Data Type

For Figures S1 through Figure S11, the data types in the figures are defined as:

‘All Sites’ – all sites that meet the minimum criteria for a Common Loon, both sites that were included in the model and sites that were not included in the model.

‘eBird Sites’ – sites that were observed by eBird observers, but not visited by WDFW observers.

‘WDFW Sites’ – sites that were visited by WDFW observers only.

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**Figure S1** Distribution of Human Influence Index (not centered or scaled) by data type.



**Figure S2** Distribution of centered and scaled Human Influence Index by data type.



**Figure S3** Distribution of elevation in meters (not centered or scaled) by data type.



**Figure S4** Distribution of centered and scaled elevation (m) by data type.



**Figure S5** Distribution of percent tree canopy cover (not centered or scaled) by data type.

**Figure S6** Distribution of centered and scale percent tree canopy cover by data type.

**Figure S7** Distribution of area (km2) (not centered or scaled) by data type.



**Figure S8** Distribution of centered and scale area (km2) by data type.



**Figure S9** Distribution of perimeter complexity (not centered or scaled) by data type.



**Figure S10** Distribution of centered and scaled perimeter complexity by data type.

**Figure S11** National Land Cover Dataset (NLCD) counts by category of land cover type and data type. (a) is the count by NLCD category of ‘Forest’ type counts by data type, (b) is the NLCD category of ‘Developed and Cultivated’ type counts by data type, (c) is the NLCD ‘Other’ category count by data type, and (d) is the NLCD ‘Open Water’ category by data type. The data types are defined as follows: ‘All’ are the sites that meet the minimum criteria for a Common Loon site, ‘eBird’ are the sites that were surveyed by eBird observers only, ‘Model’ are the sites that were included in the occupancy model, and ‘WDFW’ are the sites that were surveyed by WDFW observers.