

Wildlife Biology **WLB-00804**

Gutowsky, S. E., Studholme, K. R., Ronconi, R. A., Allard, K. A., Shlepr, K., Diamond, A. W., McIntyre, J., Craik, S. R. and Mallory, M. L. 2021. The influence of multiple industries on the behaviour of breeding gulls from four colonies across the eastern Gulf of Maine, Canada. - Wildlife Biology 2021: wlb.00804.

Appendix 1

Table A1. Significance of terms (ANOVA, type III sum of squares) for generalized linear mixed model predicting the relative amount of time herring gulls spent visiting particular habitat types. Bird identity was included as a random factor ($n = 39$ bird identities, 55 bird-years).

Term	Wald χ^2	df	<i>p</i>
Intercept	0.97	1	0.33
Habitat	1.93	1	0.16
Colony	20.34	3	<0.001*
Habitat:Colony	39.24	3	<0.001*

*significance at $\alpha = 0.05$.

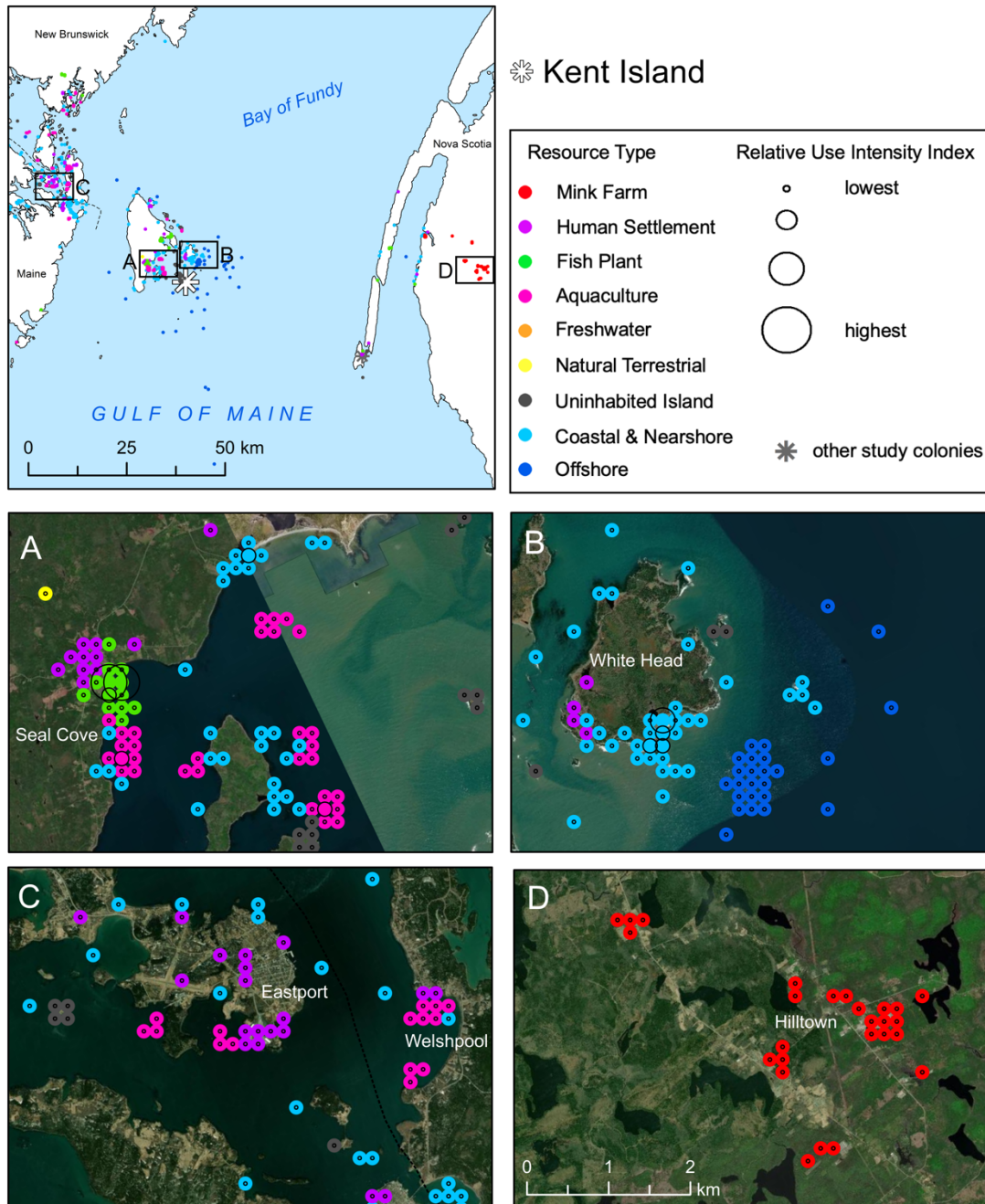


Figure A1. Spatial distribution and intensity of visitation to nine distinct resource types by breeding herring gulls tracked from Kent Island. Locations of visits made by birds from Kent are represented as points on a 250 x 250 m grid coloured by resource type. The accompanying four panes depict regions of most intense use. The size of open circles around each grid centroid show the relative Use Intensity Index for all birds from Kent, reflecting for each grid cell individual bird fidelity (repeated visitation), proportion of total time spent, and the proportion of birds from Kent which visited that cell (see Methods for details).

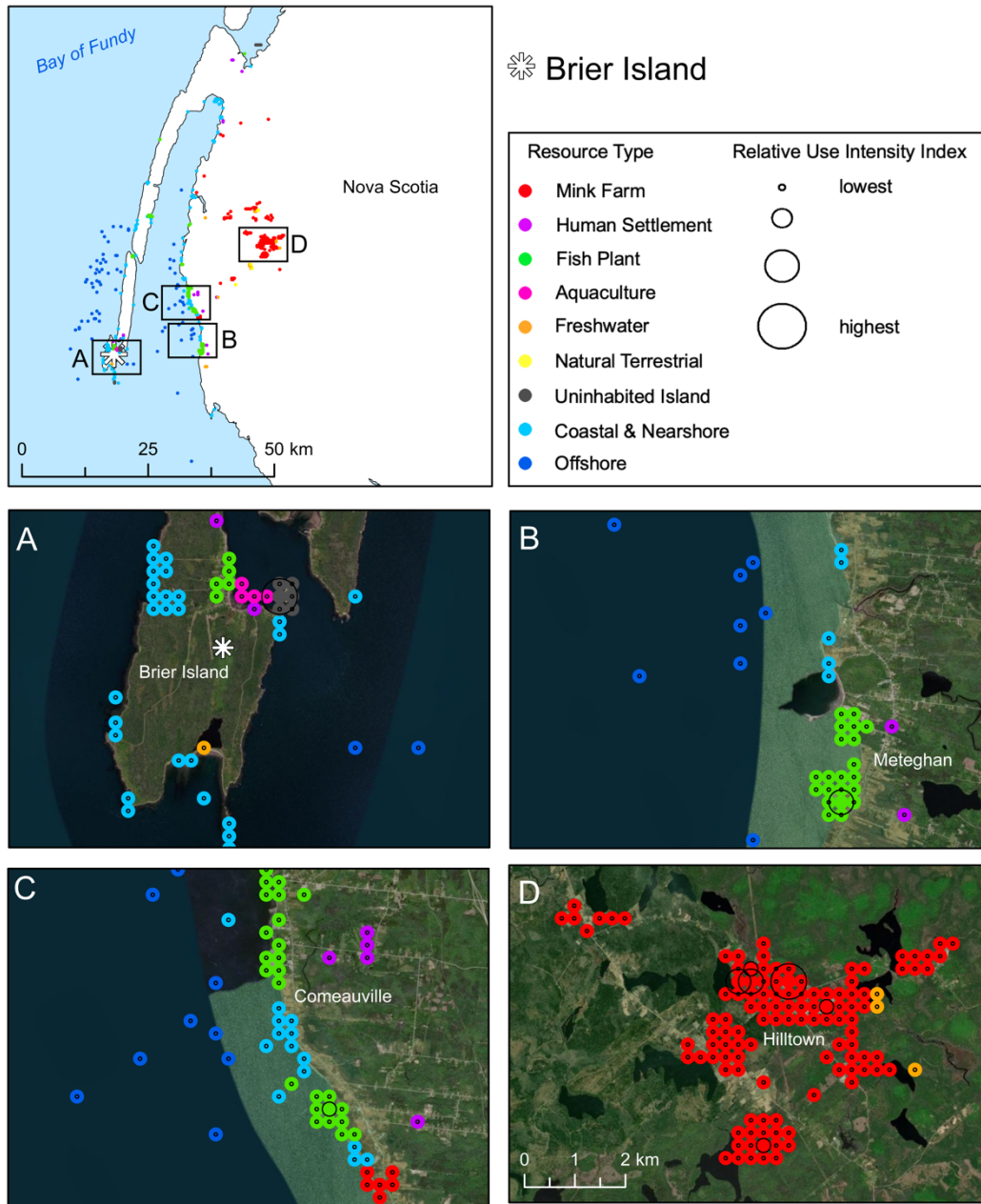


Figure A2. Spatial distribution and intensity of visitation to nine distinct resource types by breeding herring gulls tracked from Brier Island. Locations of visits made by birds from Brier are represented as points on a 250 x 250 m grid coloured by resource type. The accompanying four panes depict regions of most intense use. The size of open circles around each grid centroid show the relative Use Intensity Index for all birds from Brier, reflecting for each grid cell individual bird fidelity (repeated visitation), proportion of total time spent, and the proportion of birds from Brier which visited that cell (see Methods for details).

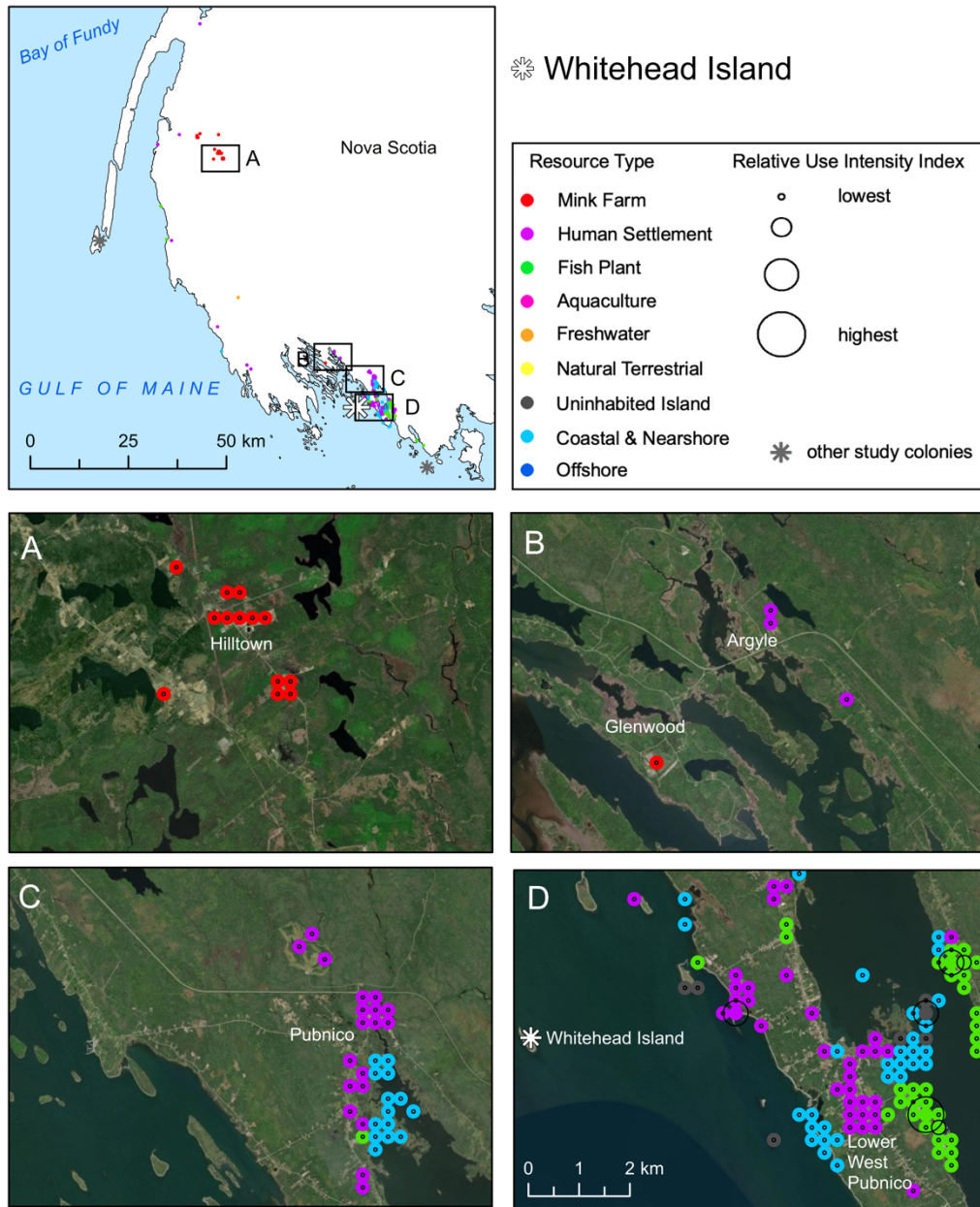


Figure A3. Spatial distribution and intensity of visitation to nine distinct resource types by breeding herring gulls tracked from Whitehead Island. Locations of visits made by birds from Whitehead are represented as points on a 250 x 250 m grid coloured by resource type. The accompanying four panes depict regions of most intense use. The size of open circles around each grid centroid show the relative Use Intensity Index for all birds from Whitehead, reflecting for each grid cell individual bird fidelity (repeated visitation), proportion of total time spent, and the proportion of birds from Whitehead which visited that cell (see Methods for details).

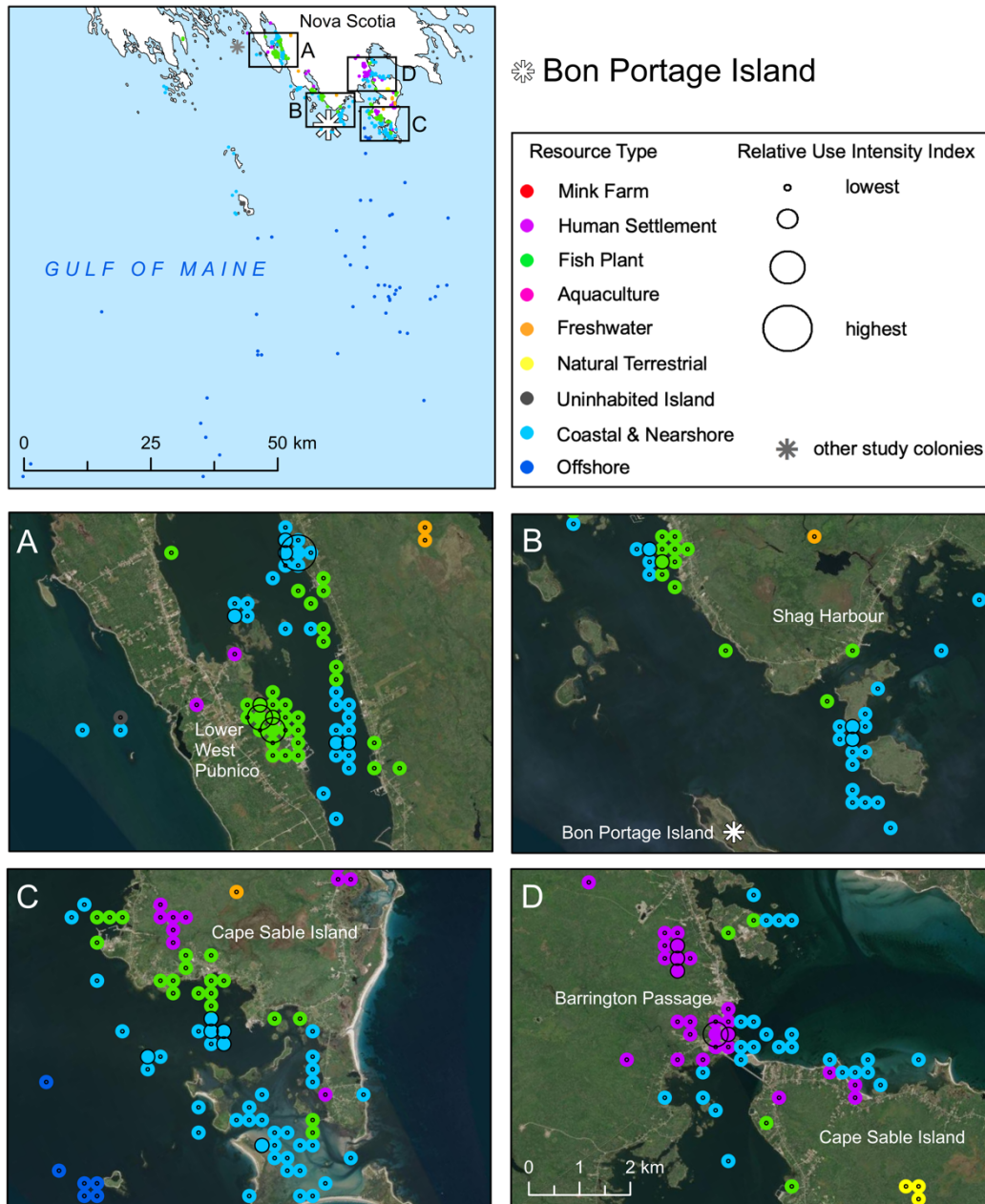


Figure A4. Spatial distribution and intensity of visitation to nine distinct resource types by breeding herring gulls tracked from Bon Portage Island. Locations of visits made by birds from Bon Portage are represented as points on a 250 x 250 m grid coloured by resource type. The accompanying four panes depict regions of most intense use. The size of open circles around each grid centroid show the relative Use Intensity Index for all birds from Bon Portage, reflecting for each grid cell individual bird fidelity (repeated visitation), proportion of total time spent, and the proportion of birds from Bon Portage which visited that cell (see Methods for details).

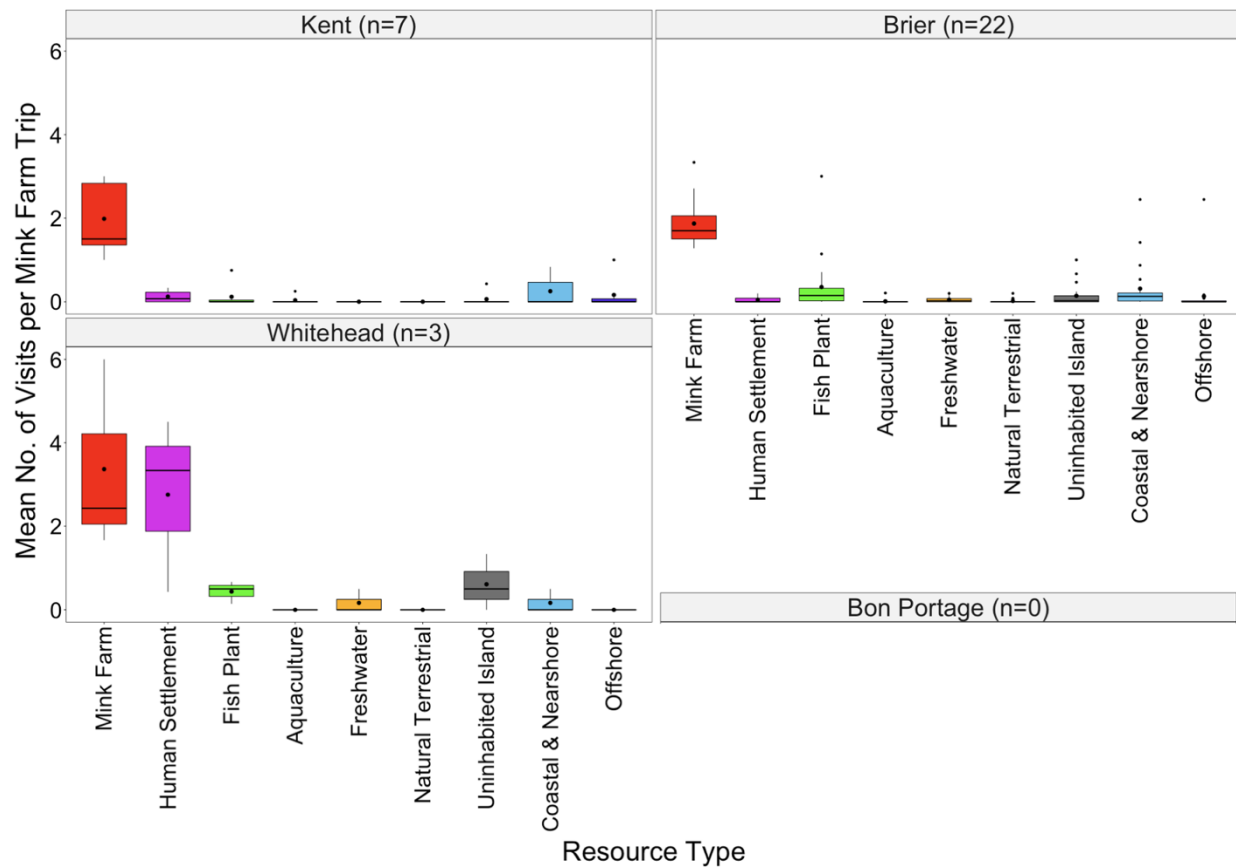


Figure A5. For breeding herring gulls which visited mink farms, the mean number of visits made to each resource type on the same trip. Sample sizes reflect the number of bird-years from each colony which visited a Mink Farm on at least one trip. Birds from Bon Portage Island did not visit mink farms and are not shown. Each data point is a bird-year mean value. Boxes show third quartile, median, and first quartile, with a dot inside each box showing the mean. Whiskers extend to the largest and smallest value no more than 1.5 times the interquartile range, with data beyond whiskers shown as outlying points.

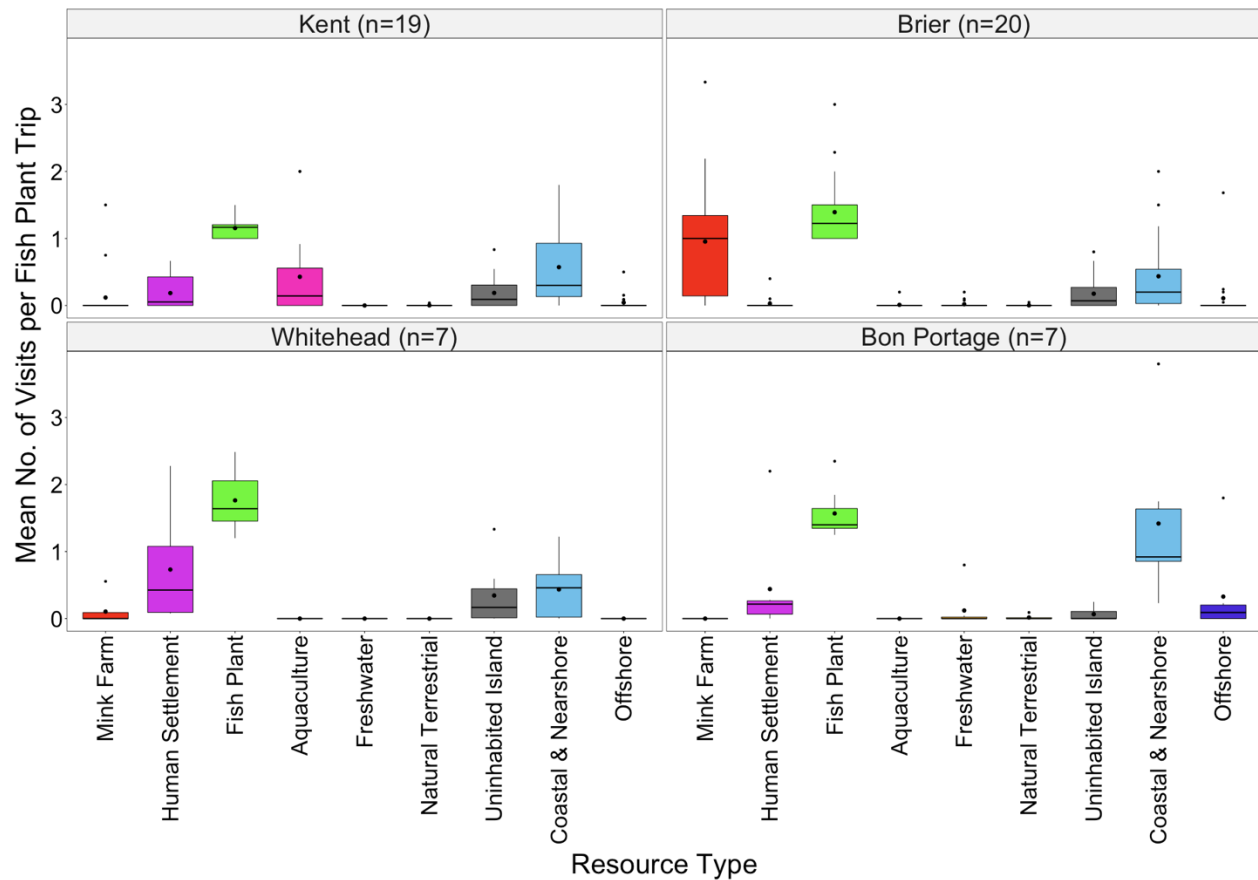


Figure A6. For breeding herring gulls which visited fish plants, the mean number of visits made to each resource type on the same trip. Sample sizes reflect the number of bird-years from each colony which visited a Fish Plant on at least one trip. Each data point is a bird-year mean value. Boxes show third quartile, median, and first quartile, with a dot inside each box showing the mean. Whiskers extend to the largest and smallest value no more than 1.5 times the interquartile range, with data beyond whiskers shown as outlying points.

Appendix 2

Individual Variation In Use of Resource Types

The proportion of time spent visiting each resource type showed clear differences between individuals, both between and within colonies (Figure A7). While colony-level differences are still apparent, the relative time spent visiting each resource type varied across individuals. For example, some individual birds from Kent Island visited coastal/nearshore, aquaculture, and fish plant resources in considerably higher proportions than others breeding at the same colony (Figure A7). Further, some individuals tracked in more than one breeding season exhibited high consistency in their use of specific resource types while others did not. For example, Kent Island birds 2 and 9 almost exclusively visited fish plant and coastal/nearshore resources in both years, respectively. In contrast, Kent Island birds 10 and 11 shifted their relative use of different resource types markedly between tracking years (Figure A7). Birds from Brier Island visited mink farms in highly different proportions across individuals (Figure A7). Similarly, birds from Whitehead Island all visited fish plant and human settlement resources, but with high variability in the proportion of overall time spent in each resource type (Figure A7). For gulls from Bon Portage Island, as well as the other three colonies, the variation across individuals in the use of offshore resources is striking; some individuals spent varying amounts of time offshore, while others did not make visitations to areas >1 km from the coast, particularly birds from Whitehead Island (Figure A7).

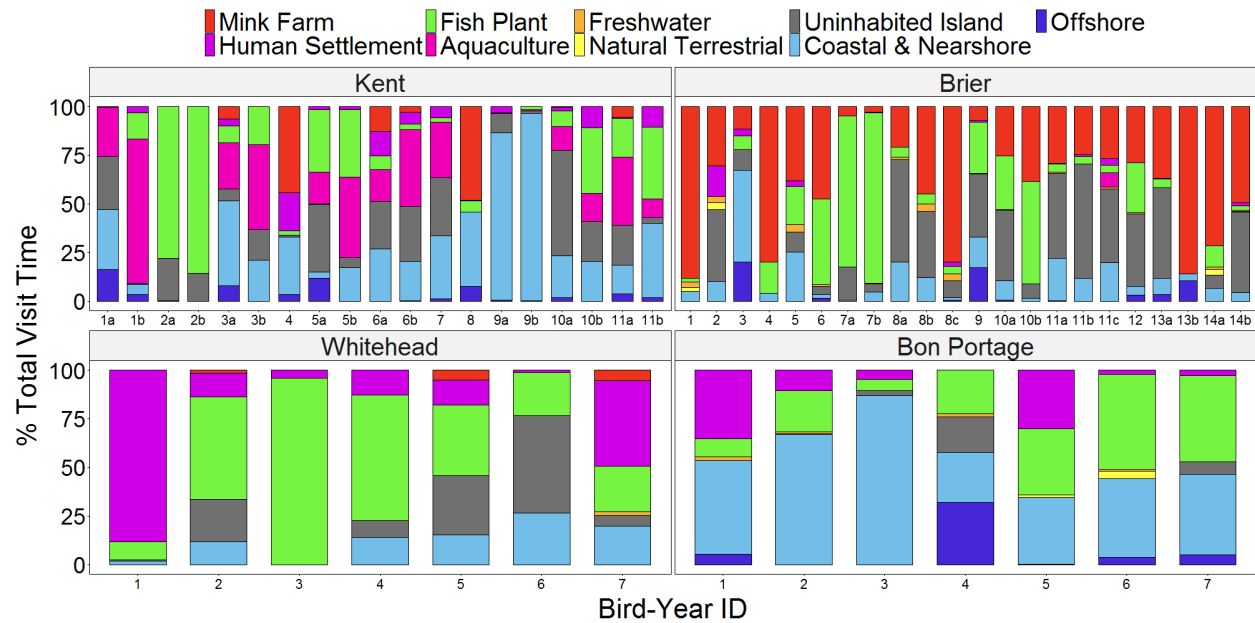


Figure A7. Individual variation in the proportion of time spent visiting each resource type by breeding herring gulls tracked from four colonies. Birds tracked in more than one breeding season are indicated by letters (e.g. Bird 5 from Kent Island was tracked in two different breeding season years, a and b).