

Newfoundland and Labrador Bird Colony Buffer Analysis

Product Objective

ECCC recommends an increased buffer, beyond 5 km, around bird colonies to mitigate impacts from Offshore Wind Energy Development (OWED) in Newfoundland and Labrador (NL). Although siting decisions are the most effective strategy to avoid and minimize impacts of development on breeding birds (Gulka et al., 2024 *preprint*), extending the buffer around colonies would reduce the risk of collision and displacement for species during critical life stages. The buffer recommendations presented here should be considered as “minimum buffers”; Proponents should contact ECCC during the planning stages of any project for advice on appropriate colony- or species-specific setbacks based on best available data and subject-matter expert information.

Colonial birds show high site fidelity to colonies during breeding, nesting, and chick-rearing, and make repeated foraging and transit movements between nest sites and foraging areas. These repeated movements may cause individuals to be more at risk of displacement or collision within their natural foraging range around colonies. ECCC-CWS provides the following examples of how extending the buffer distance around colonies may reduce the impacts of offshore wind energy developments to foraging birds.

Methods

The results presented here relate to the proposed OWED licencing areas identified by the NL Regional Assessment Committee in the draft Final Report. The data shown below is taken from the [theoretical foraging range](#) work previously provided by ECCC-CWS and [modeled foraging distribution](#) work conducted by Ronconi et al., (2022). Bird abundance values were extracted from the summed, all-species density layer or individual species layers. The same assumptions and limitations apply to the examples below, and it should be noted that the number of birds may not reflect the true abundance of individuals foraging around colonies at a given time. The values below are for illustrative purposes. Also of note, the summed, all-species product does not contain any estimates of Leach’s Storm-petrel abundance, as the species’ theoretical foraging range from that work overlapped most of the focus area at high densities. Certain long-range foraging species (e.g., Leach’s Storm-petrel) require additional context and mitigations. The risk for mitigating impacts to foraging birds will need to be managed by the regulator and developer, through consultation with ECCC.

ECCC-CWS calculated the impact of extending the exclusion buffer in terms of number of birds and the corresponding reduction of proposed licencing areas. Currently, the NL

Committee for the Regional Assessment on OWED has recommended a 10 km coastal buffer with the addition of a 5 km buffer around known breeding bird colonies (Figure 1). In all scenarios, the 10 km coastal buffer recommended by the NL RA Committee was included and maintained as described in the Draft Final Report. Therefore, the scenario with the 0 km bird colony buffer only includes the 10 km coastal buffer around coastal colonies and provides the baseline conditions for comparison. To demonstrate the importance of colony buffers in addition to the coastal buffer, applied buffers ranged from 0 – 60 km, increased at intervals of 5 km. Any overlapping colony buffer boundaries were dissolved and merged before extracting bird abundance estimates.

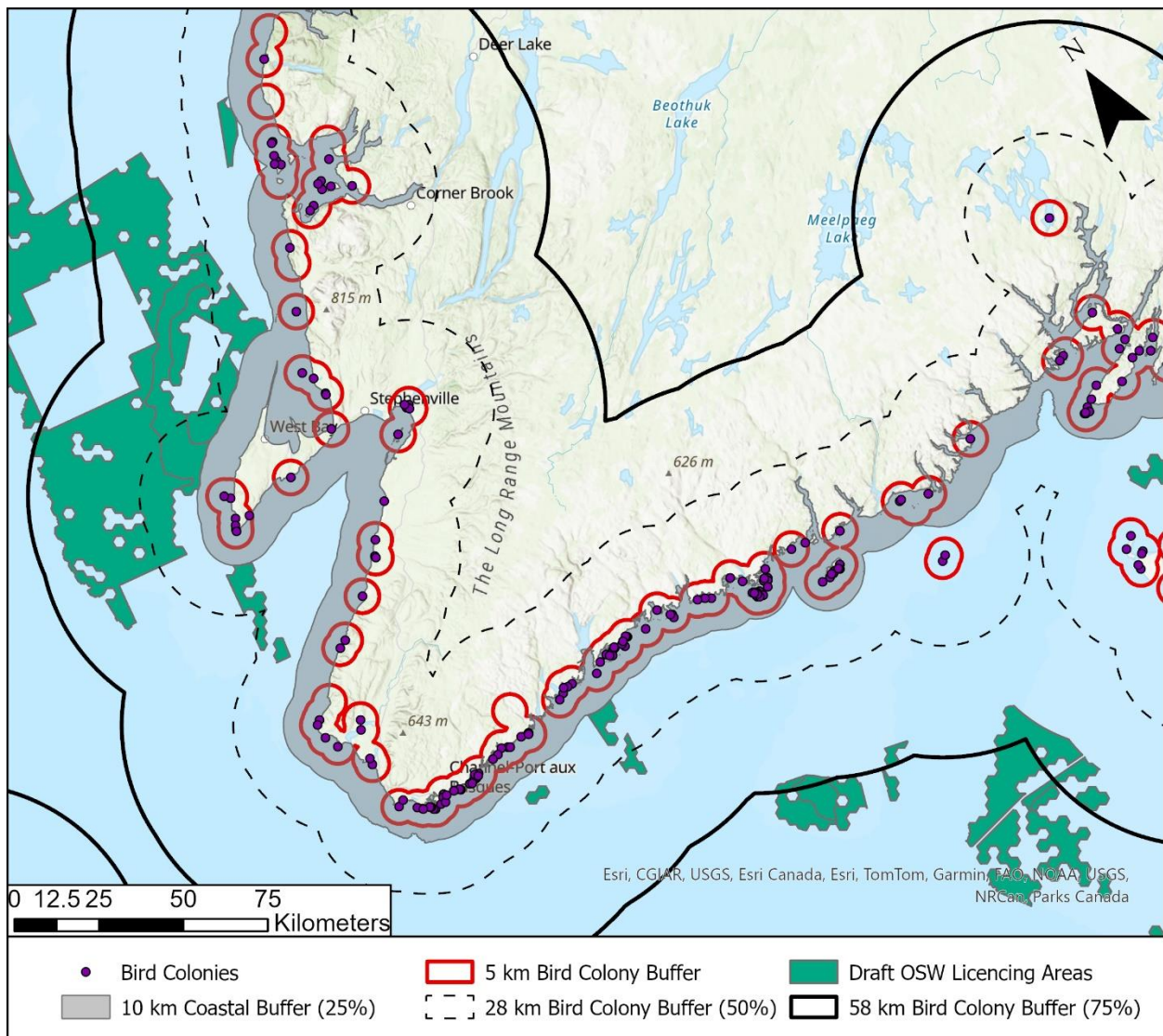


Figure 1. Colony locations with 5 km colony buffer, separate 10 km coastal buffer, and offshore wind energy development licencing areas as currently defined within the NL Draft Final Report. The dashed black line represents a 28 km buffer, and the solid black line

represents a 58 km buffer around each bird colony that have each been merged into a single buffer.

Interpretation

Colonial birds that forage offshore within the focus area have a collective mean maximum foraging range of 164 km (Figure 2) from the colony (range 10.7 – 1346 km; ECCC-CWS 2024). Within the focus area, an estimated 95,917 birds may be foraging in offshore waters throughout the breeding season.

ECCC first calculated the number of theoretical foraging birds found within the 10 km coastal buffer plus each of the sequential bird colony buffer sizes outside of the coastal buffer. The 10 km coastal buffer alone theoretically accounts for 23,603 birds, while the addition of 5 km colony buffer reduces exposure for 25,072 birds (Table 1). Therefore, the currently recommended 5 km colony buffer only limits the potential overlap with OWED for an additional 1500 foraging birds. However, expanding the buffer to 10-15 km around all colonies captures the highest density (Table 1) and the largest increase in total foraging birds found within the buffers (Figure 3). Of note, the combined buffer area does not increase linearly with increasing colony buffer size due to the overlap of some colonies with the coastal buffer, as well as the overlap between individual colony buffers as the size increases.

The 10 km coastal buffer alone, with no additional bird colony buffer, avoids potential exposure to OWED for ~25% (23,603) of breeding colonial birds. Applying a colony buffer of 164 km (the average maximum foraging range) would avoid exposing 99.5% of breeding colonial birds to OWED. To reduce exposure to 75% of these birds, a 58 km colony buffer would be required, while a 28 km buffer would reduce exposure for 50% of birds.

For individual species, the results from both ECCC-CWS (2024) and Ronconi et al., (2022) indicate that an extended buffer of 28 km greatly reduces exposure for species with short to intermediate foraging ranges (Figure 5; Figure 6). A buffer of this size may be particularly important for reducing exposure for terns, Black Guillemots, Common Eiders, and cormorants. Further, a buffer of 58 km reduces exposure for species with longer foraging ranges including Great Black-backed Gulls, Black-legged Kittiwakes, Thick-billed Murres, and possibly Northern Gannets. While large proportions of long-distance foraging birds may not be captured by a buffer less than 164 km, any extended buffer will reduce exposure for birds foraging or using offshore waters within that area.

Implementing larger minimum buffers around bird colonies will help avoid and minimize impacts from future offshore wind energy development in Newfoundland and Labrador. ECCC recommends increasing the proposed minimum buffer from 5km

to better mitigate impacts to foraging colonial birds during their breeding seasons. For project-level environmental assessments, proponents should consult with ECCC for additional guidance. For Leach's storm-petrel, and any other far-ranging species including Manx Shearwater, proponents should consult with ECCC for additional guidance.

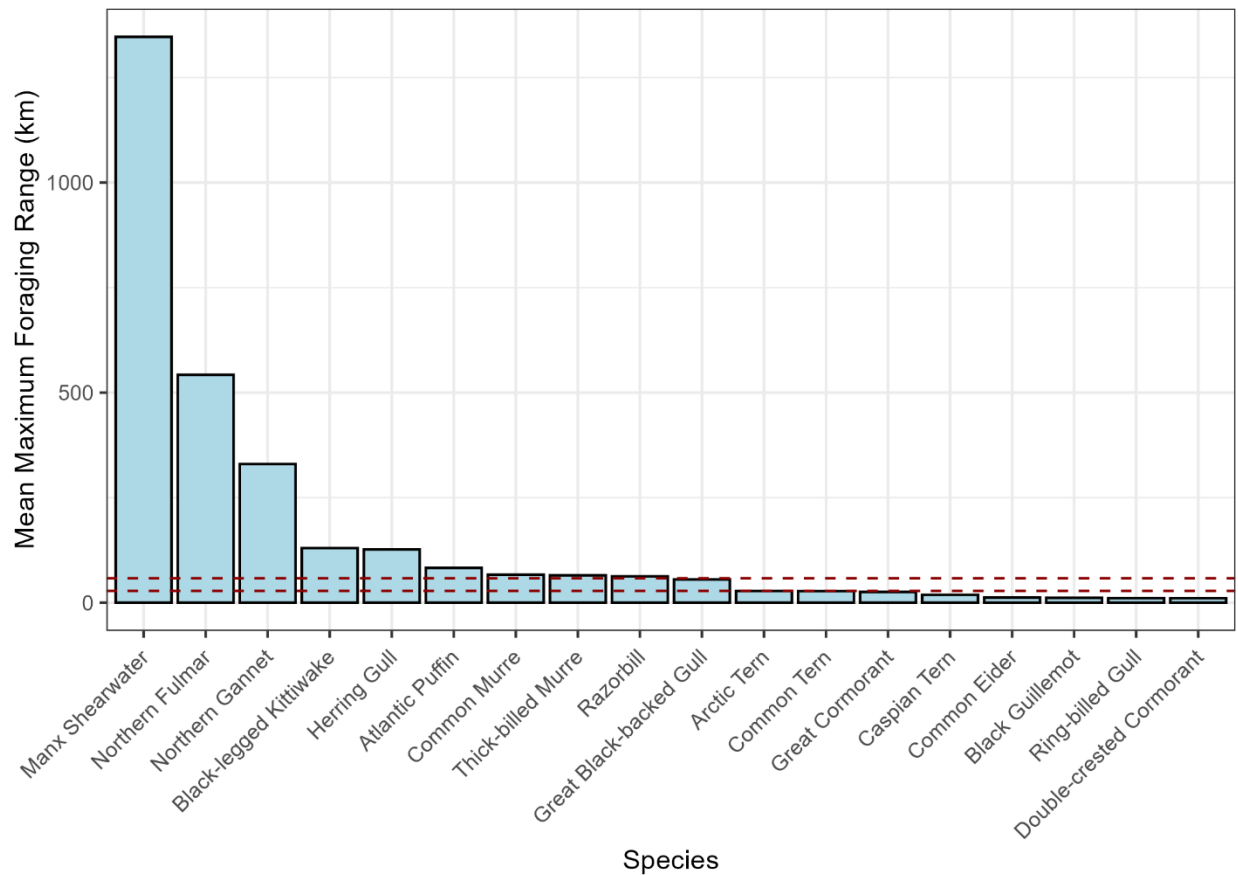


Figure 2. Mean maximum foraging ranges collected through a literature survey (ECCC-CWS, 2024) for species found to either nest in colonies or with foraging ranges that overlap with the Newfoundland and Labrador focus area. The red dashed lines represent 28 km (50% percentile) and 58 km (75% percentile) colony buffers.

Table 1. Total birds found within the 10 km coastal buffer plus the additional colony buffer sizes. Combined buffer area is the summed area of both the 10 km coastal buffer and a given colony buffer. Density is calculated by dividing the total birds by the combined buffer area.

Coastal Buffer (km)	Additional Colony Buffer (km)	Birds with Reduced Exposure	Combined Buffer Area (km ²)	Density (birds/km ²)
10	0	23,603	12,509	1.89
10	5	25,072	12,879	1.95
10	10	28,097	14,026	2.00
10	15	34,902	17,629	1.98
10	20	40,324	20,948	1.92
10	25	44,688	23,861	1.87
10	30	49,014	26,653	1.84
10	35	53,697	29,417	1.83
10	40	57,945	32,044	1.81
10	45	61,551	34,462	1.79
10	50	65,456	37,006	1.77
10	55	69,445	39,491	1.76
10	60	73,359	41,959	1.75

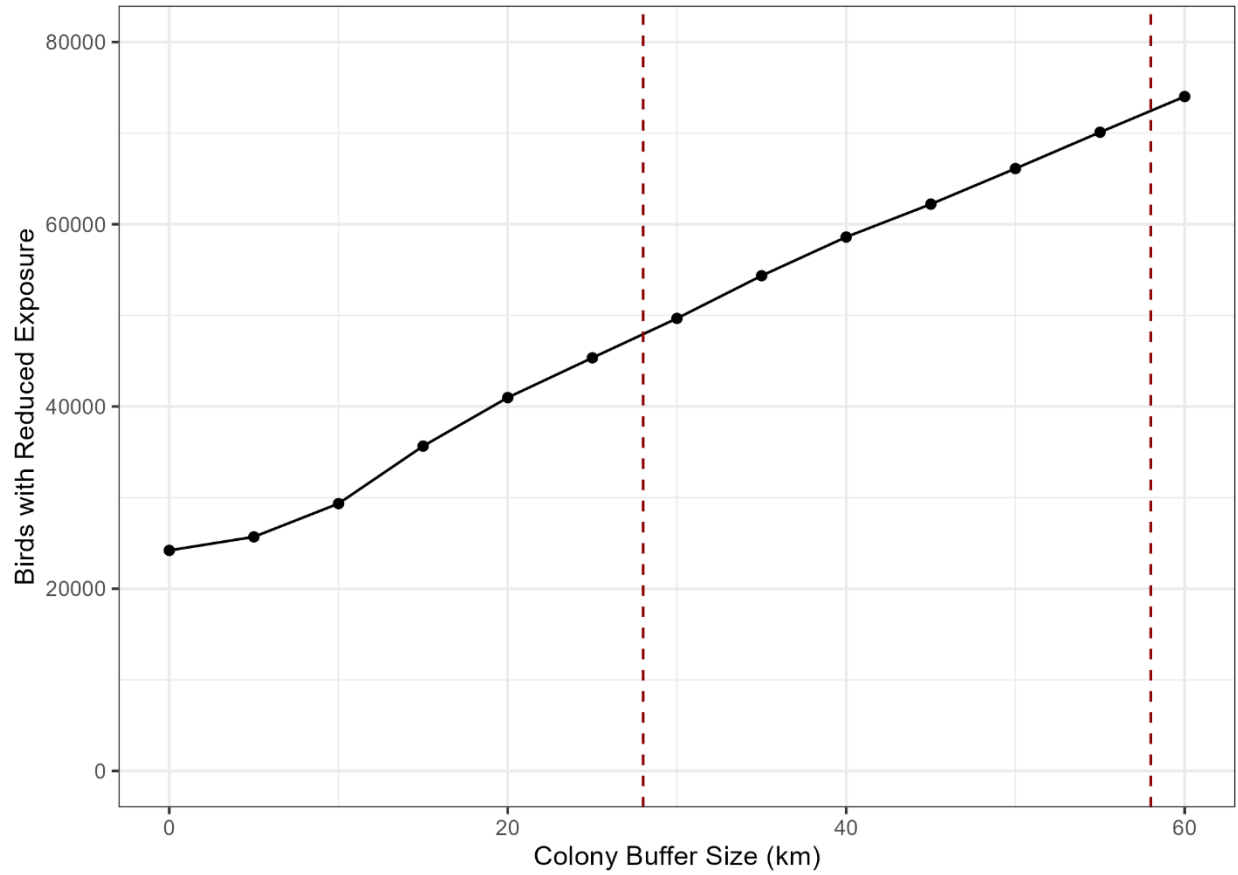


Figure 3. Total foraging birds that would experience reduced exposure to offshore wind energy development within a baseline 10 km coastal buffer (at x-axis = 0), with additional colony buffers at 5 km increments. The red dashed lines represent 28 km (50%) and 58 km (75%) colony buffers.

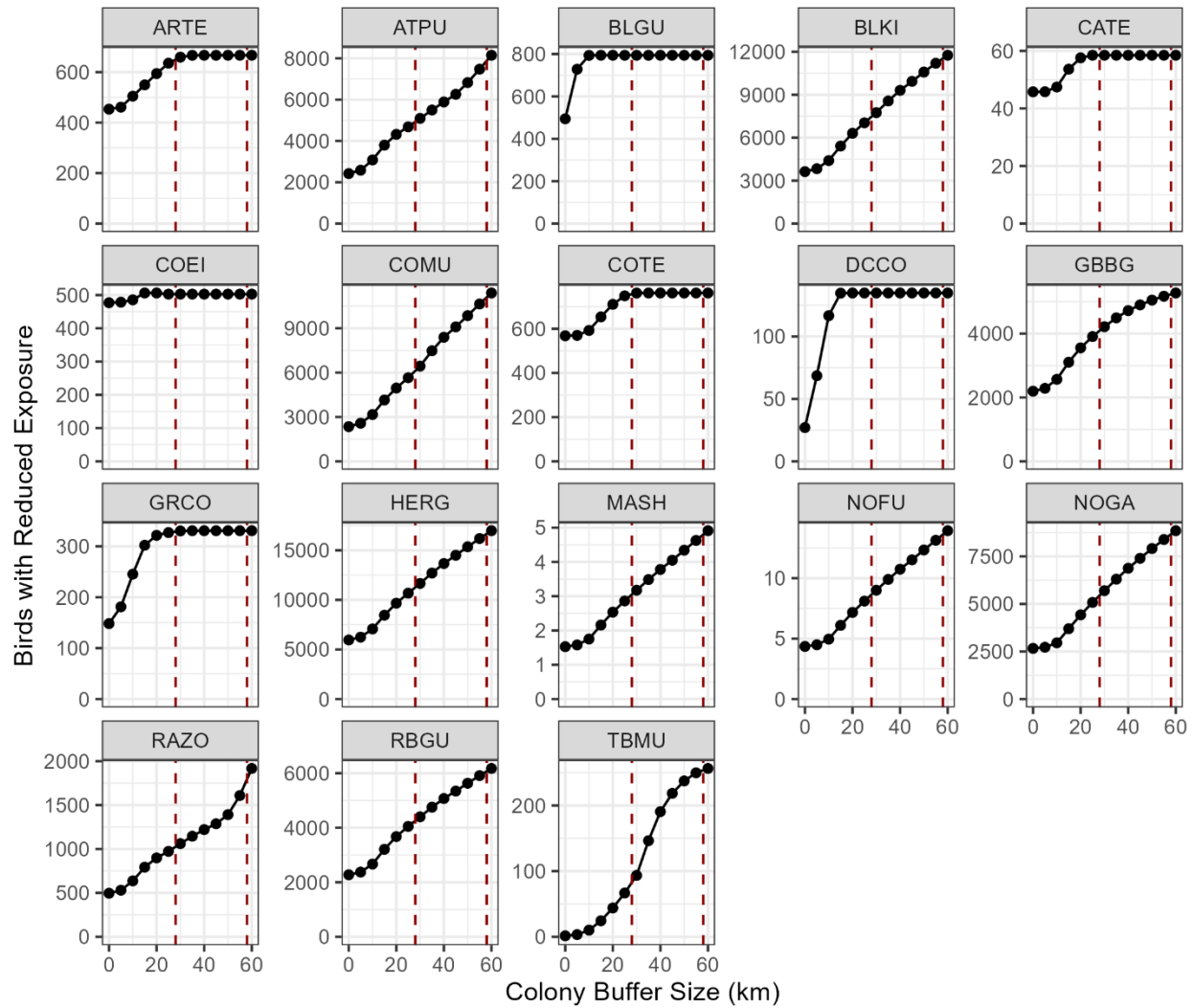


Figure 4. Total foraging birds that would experience reduced exposure to offshore wind energy development within a baseline 10 km coastal buffer (at x-axis = 0), with additional colony buffers at 5 km increments. Species data was extracted from theoretical foraging distribution work conducted by ECCC-CWS. The red dashed lines represent 28 km (50%) and 58 km (75%) colony buffers.

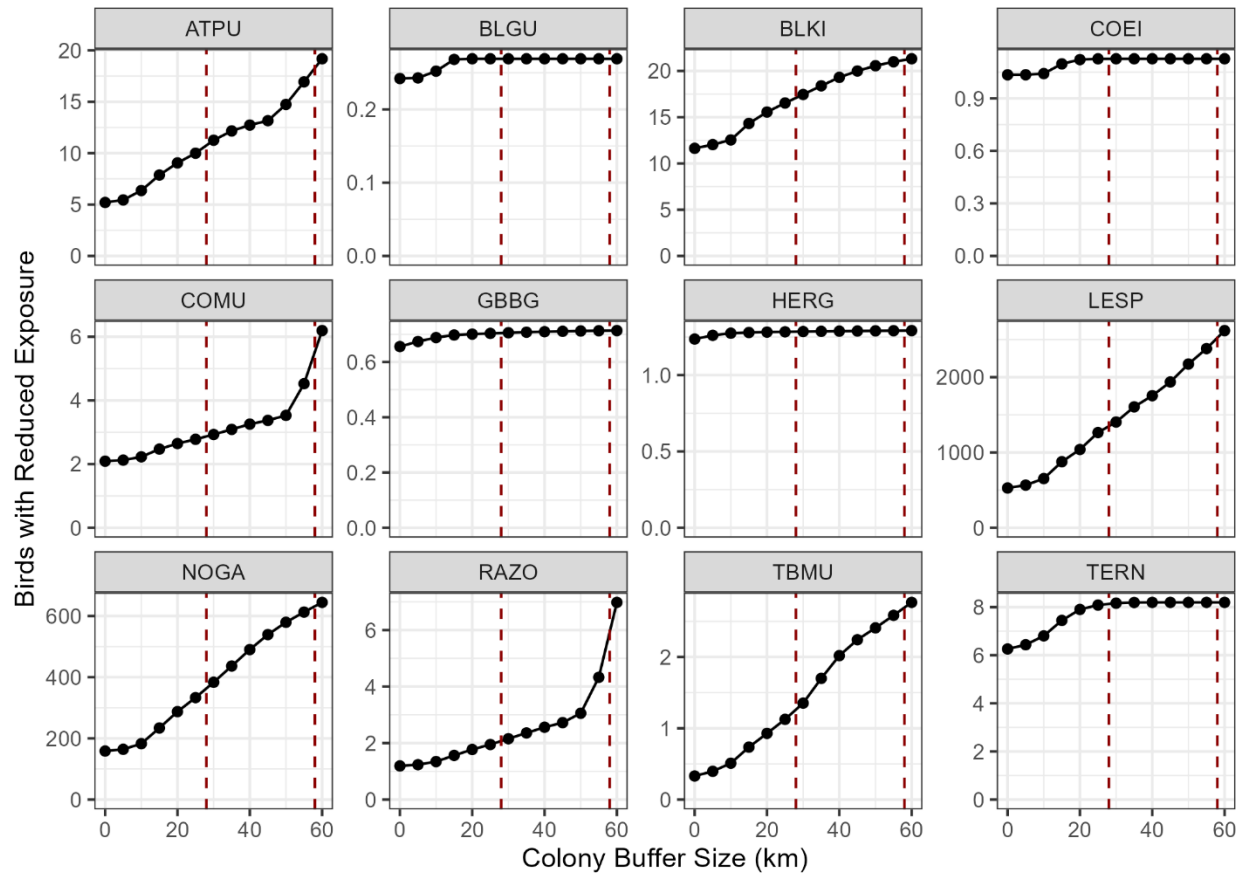


Figure 5. Total foraging birds that would experience reduced exposure to offshore wind energy development within a baseline 10 km coastal buffer (at x-axis = 0), with additional colony buffers at 5 km increments. Species data was extracted from modeled foraging distribution work conducted by Ronconi et al., 2022. The red dashed lines represent 28 km (50%) and 58 km (75%) colony buffers.

References

- Gulka, J., Knapp, S., Soccorsi, A., Avery-Gomm, S., Knaga, P., Williams, K. A. (2024). Strategies for Mitigating Impacts to Aerofauna from Offshore Wind Energy Development: Available Evidence and Data Gaps. <https://doi.org/10.1101/2024.08.20.608845>
- Environment and Climate Change Canada, Canadian Wildlife Service (ECCC-CWS). 2024. Colonial Bird Theoretical Foraging Radii. Submitted to the Newfoundland Committee for Offshore Wind Energy Development in Atlantic Canada.
- Ronconi, R.A., Lieske, D.J., McFarlane Tranquilla, L.A., Abbott, S., Allard, K.A., Allen, B., Black, A.L., Bolduc, F., Davoren, G.K., Diamond, A.W. and Fifield, D.A. (2022). Predicting seabird foraging habitat for conservation planning in Atlantic Canada: Integrating telemetry and survey data across thousands of colonies. *Frontiers in Marine Science*, 9, p.816794.

Appendix 1

Table A1. The number of birds, by species, with reduced exposure to offshore wind energy development within a 25%, 50%, 75% or 99.5% quantile buffer. Species abundances were extracted from the theoretical foraging range work by ECCC-CWS (2024).

Species	Buffer			
	0 km (25%)	28 km (50%)	58 km (75%)	164 km (99.5%)
ARTE	453	652	667	667
ATPU	2421	4918	7879	12198
BLGU	494	794	794	794
BLKI	3629	7460	11542	14561
CATE	46	58	58	58
COEI	477	503	503	503
COMU	2347	6106	11093	13663
COTE	568	759	762	762
DCCO	27	135	135	135
GBBG	2196	4096	5236	5495
GRCO	148	329	331	331
HERG	5958	11264	16665	22640
MASH	2	3	5	8
NOFU	4	9	14	22
NOGA	2664	5453	8667	12682
RAZO	496	1024	1782	3604
RBGU	2275	4260	6070	7749
TBMU	2	82	254	259

Appendix 2

The extended buffer sizes were also overlaid with the proposed OWED licencing areas provided in the NL Committee's draft Final Report. This exercise calculates the licencing areas that would be removed if a given colony buffer size were implemented, and the approximate proportion of the total OWED licencing areas. There are no licencing areas found within either the coastal buffer or colony buffers below 10 km. Extending the bird colony buffer to 20-25 km calculates the largest increase in overlap with current OWED licencing areas, which represents 5.5 to 9.7% of the total proposed OWED areas (Table S1).

Table S1. Total area of overlap between draft offshore wind energy development licencing areas and extended colony buffers. The overlap area is also represented as a proportion of the total licencing areas defined in the draft Final Report.

Coastal Buffer (km)	Colony Buffer (km)	Licencing Area Overlap (km ²)	Proportion of Total Licencing Areas
10	0	0	0
10	5	0	0
10	10	38	0.002
10	15	400	0.024
10	20	941	0.055
10	25	1653	0.097
10	30	2157	0.127
10	35	2674	0.157
10	40	3419	0.201
10	45	4189	0.246
10	50	4880	0.287
10	55	5430	0.319
10	60	5852	0.344