Article S4. Optimized MaxEnt models from 1% and 5% selection criterion

1% selection criterion

Our optimized models included 1) *Linear* and *quadratic* features for models in Rideau region from NHIC-only dataset with RM set to 1.0; 2) *Linear*, *Quadratic*, and *Product* features for models in Rideau region from NHIC+eDNA dataset with RM set to 4.0); 3) *Linear*, *Quadratic*, *Product*, and *Threshold* features for models in Southern Ontario from NHIC-only dataset with RM set to 3.0; and 4) *Linear*, *Quadratic*, *Product*, and *Threshold* features for models in Southern Ontario from NHIC+eDNA dataset with RM set to 4.0.

The environmental variables ranked by their contribution to the models are as follows. For the Rideau region, NHIC-only and NHIC+eDNA models had five 8 and 13 variables, respectively. The top three contributing variables (Mean annual temperature, Total shoreline, and Waterbody proportion) were shared between the two models (Table S4). For the Southern Ontario region, NHIC-only and NHIC+eDNA models had five 10 and 11 variables, respectively. Variable compositions of the two models were almost identical, except for the NHIC+eDNA model had an extra variable (Farmland proportion) but only with a contribution of 1.8% (Table S5). Post hoc PCA of variables in models from the two modelling regions showed lower correlations among variables in models built from NHIC+eDNA dataset than those in models built from NHIC-only dataset (Fig. S8).

Generally, ROR was positively related to Annual mean temperature; negatively related to Mean elevation; and exhibited a bell-shaped response curve for Waterbody proportion and Total shoreline. Additionally, NHIC+eDNA model indicated a positive

relationship between ROR and Temperature diurnal range but negative with Temperature diurnal range. For the Southern Ontario region, the ROR was positively related to Annual mean temperature and Mean temperature warmest quarter; negatively related to Mean elevation; and again, showed optimal range of Waterbody proportion. Thresholding behaviour (i.e., ROR rapidly dropped to zero below or above a threshold value) was evident for Annual mean temperature, Mean temperature warmest quarter, and Precipitation warmest quarter, similar to what we found in models selected under 3% criterion. From these curves we determined that the following environmental conditions were not favourable for the persistence of musk turtles (i.e., zero ROR): Annual mean temperature < 4 ˚C, Mean temperature warmest quarter < 17 ˚C, Mean elevation > 400 m, and Precipitation warmest quarter > 275 mm.

5% selection criterion

Our optimized models included 1) *Linear* and *Quadratic* features for models in Rideau region from both datasets with RM set to 1.0; and 2) *Linear*, *Quadratic*, *Product*, and *Threshold* features for models in Southern Ontario region with elevated regularization to correct for model overfitting (RM = 3.0 and 2.5 from NHIC-only and NHIC+eDNA datasets, respectively).

The environmental variables ranked by their contribution to the models are as follows. For the Rideau region, both NHIC-only and NHIC+eDNA model had 4 variables. The top three contributing variables (Mean annual temperature, Total shoreline, and Waterbody proportion) were shared between the two models (Table S6). For the Southern Ontario region, both NHIC-only and NHIC+eDNA models had 7 variables. Variable compositions of the two models were similar but the ranking shifted

for certain variables (Table S7). Post hoc PCA of variables in models from the two modelling regions showed very similar patterns for the two datasets (Fig. S9).

Generally, ROR was positively related to Annual mean temperature; negatively related to Mean elevation; and exhibited a bell-shaped response curve for Waterbody proportion, Total shoreline, and Forest proportion 5km. Thresholding behaviour was only evident for Annual mean temperature and Mean elevation. From these curves we determined that the following environmental conditions were not favourable for the persistence of musk turtles (i.e., zero ROR): Annual mean temperature < 4 ˚C and Mean elevation > 400 m.