

Table S1. Cytochrome b sequences (sense strand) of species-specific common musk turtle (*Sternotherus odoratus*) primer and probe set compared to other co-occurring turtles in the area.

Mismatches between *S. odoratus* and other species are highlighted.

Species	Region	Sequence (5' – 3')	Mismatches
<u>Common musk turtle</u>		<u>CGGCTGACTCATTCGAAACC</u>	-
Blanding's turtle	Forward	CGG A TGACT T AT C CG T AAC A	5
Northern map turtle	Primer	CGG A TGACT T AT C CG T AA T A	6
Midland painted turtle	(1-20)	CGG A TGACTCAT C CG T AA T A	5
Common snapping turtle		CGG A TGACT A AT C CG C AAC A	5
<u>Common musk turtle</u>		<u>CCATGCCAACGGC</u>	-
Blanding's turtle	TaqMan	A CATGCCAACGGC	1
Northern map turtle	MGB	T CATGC T AACGGC	2
Midland painted turtle	Probe	A CATGC T AACGGC	2
Common snapping turtle	(22-34)	A C A C C GCCAACGGC	2
<u>Common musk turtle</u>		<u>ATGCACATTGGACGAGGAATC</u>	-
Blanding's turtle	Reverse	C T C CACATTGG C CG G GGACT T	6
Northern map turtle	Primer	C T T CA T ATTGGACGAGGAAT T	4
Midland painted turtle	(62-82)	C T T CA T ATTGGACGAGGAAT T	4
Common snapping turtle		C T C CA T AT C GG C CGAGGACT T	7

Table S2. Environmental layers for MaxEnt modelling.

Raw resolution, timespan of data collection, processing method, and biological and ecological implications for the focal species, Common musk turtle (*Sternotherus odoratus*) are show. Data sources: WorldClim2.0 (www.worldclim.org); National Oceanic and Atmospheric Administration (NOAA, www.noahrs.noaa.gov); Natural Resources Canada (NRC, www.nrcan.gc.ca);

Name	Source	Resolution	Timespan	Processing method	Note
Bioclimatic variables Solar radiation	WorldClim2.0	30 arcsec	1970-2000	Solar radiation summed from May to Sep. All resampled to 1 km	Regularly used in SDMs (Fick & Hijmans 2017)
Annual snow	NOAA snow cover	100 m	2014-2020	Days of snow/ice cover summed for each year, then resampled to 1 km	May correlate with overwintering duration
Mean elevation Elevation range Elevation STD	NRC Digital Elevation Model (DEM)	0.75 arcsecond	2013	Mean, range, and standard deviation of elevation calculated to each 1km grid cell	May affect dispersal of <i>S. odoratus</i> and habitat connectivity. e.g., higher, or rougher terrain might hinder its range expansion
Forest Farmland Shrub & grass Urban & barren Waterbody Wetland	NRC Landcover	30 m	2015	Area proportion of each respective landscape type calculated to each 1km grid cell	Various landscape types that might affect habitat suitability and connectivity, e.g., waterbodies and wetlands could be crucial for dispersal and summer foraging
Total shoreline Wetland shoreline	NRC National Hydro Network	Vector	2010	Vector lines rasterized to 20 m, then calculated total area and its proportion to each 1 km grid cell	Transition zones between aquatic and terrestrial environs also provide foraging and basking grounds
Moving average of landcover and shoreline layers	Landcover & shorelines	-	-	Moving average of surrounding cells within a 5 km radius, i.e., 25 cells in 5 km × 5 km area	Generalization of the neighboring situations of the corresponding landscapes

Table S4. MaxEnt parameter combination ranking under 1% backward selection criterion for the modelling scenarios.

The top 3 parameter combinations are shown for each scenario, with the best indicated by smallest AICc ($\Delta_{AICc} = 0$, bolded). Parameters are presented in the format of feature class combinations followed by regularization multiplier value, e.g., LQPT3.0 indicates that *Linear*, *Quadratic*, *Product*, and *Threshold* feature classes were used by MaxEnt algorithm, and the multiplier was set to 3.0. Number of variables, training AUC, testing AUC, and the difference between the two AUC values are also presented. Note the testing AUC values were averaged from 10-fold cross validation models, with standard deviation presented in brackets.

Scenario	Parameters	Variables	Training AUC	Testing AUC	AUC difference	Delta AICc
Rideau + NHIC-only	LQ1.0	8	0.941	0.940 (0.014)	0.002	0
	LQPT4.0	10	0.950	0.944 (0.013)	0.007	0.818
	LQPT3.5	9	0.951	0.944 (0.013)	0.007	2.667
Rideau + NHIC- eDNA	LQP4.5	13	0.934	0.931 (0.015)	0.003	0
	LQP3.5	16	0.935	0.931 (0.015)	0.004	5.526
	LQP2.0	14	0.936	0.932 (0.015)	0.005	7.547
S. Ontario + NHIC-only	LQPT3.0	10	0.970	0.966 (0.008)	0.004	0
	LQPT4.0	9	0.969	0.965 (0.008)	0.004	8.161
	LQPT4.5	10	0.969	0.966 (0.007)	0.003	13.609
S. Ontario + NHIC- eDNA	LQPT3.5	11	0.968	0.963 (0.007)	0.004	0
	LQPT4.5	12	0.967	0.963 (0.007)	0.004	13.640
	LQPT3.0	11	0.968	0.963 (0.007)	0.004	14.926

Table S5. Variable contributions to optimized MaxEnt models under 1% backward selection criterion for the modelling scenarios.

Simplified response curves are also shown (relative occurrence rate on y axis and environmental gradient on x axis). Abbreviations: Contr.: contribution to model in percentage; M.: month; Precp.: precipitation; Q.: quarter; T.: temperature.





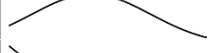
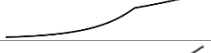

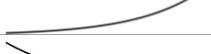
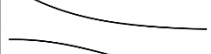
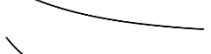


















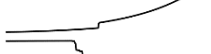



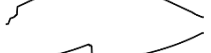



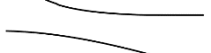
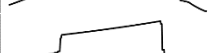



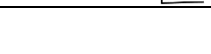
		Occurrence: NHIC-only		Occurrence: NHIC-eDNA			
	Variable	Contr.	Response curve	Variable	Contr.	Response curve	
Rideau	Annual mean T.	38.4		Annual mean T.	22.2		
	Total shoreline	27.1		Total shoreline	12.6		
	Waterbody%	13.8		Waterbody%	12.1		
	Mean elevation	12.5		Forest%	11.4		
	Precp. coldest Q.	2.8		Mean diurnal range	8.5		
	Farmland%	2.3		Mean elevation	7.2		
	Mean T. wettest Q.	1.7		Precp. wettest M.	6.6		
	Grassland% 5km	1.4		Min T. coldest M.	5.0		
					Farmland%	3.4	
					Precp. driest M.	3.2	
				Urban&Barren%	3.2		
				Mean T. wettest Q.	2.7		
				Forest % 5km	1.8		
Southern Ontario	Total shoreline	20.9		Total shoreline	20.4		
	Mean T. warmest Q.	18.8		Mean T. warmest Q.	20.1		
	Mean elevation	13.1		Mean elevation	12.6		
	Annual mean T.	12.7		Annual mean T.	12.2		
	Precp. warmest Q.	11.1		Precp. warmest Q.	10.9		
	Waterbody%	10.3		Waterbody%	9.9		
	Total shoreline 5km	6.0		Total shoreline 5km	5.8		
	Grass&Shrub% 5km	3.8		Grass&Shrub% 5km	3.3		
	Forest% 5km	1.9		Farmland%	1.8		
	Annual range T.	1.4		Forest% 5km	1.7		
				Annual range T.	1.4		

Table S6. MaxEnt parameter combination ranking under 5% backward selection criterion for the modelling scenarios.

The top 3 parameter combinations are shown for each scenario, with the best indicated by smallest AICc ($\Delta_{AICc} = 0$, bolded). Parameters are presented in the format of feature class combinations followed by regularization multiplier value, e.g., LQPT3.0 indicates that *Linear*, *Quadratic*, *Product*, and *Threshold* feature classes were used by MaxEnt algorithm, and the multiplier was set to 3.0. Number of variables, training AUC, testing AUC, and the difference between the two AUC values are also presented. Note the testing AUC values were averaged from 10-fold cross validation models, with standard deviation presented in brackets.

Scenario	Parameters	Variables	Training AUC	Testing AUC	AUC difference	Delta AICc
Rideau + NHIC-only	LQ1.0	4	0.933	0.932 (0.015)	0.001	0
	LQ1.5	5	0.932	0.931 (0.016)	0.001	2.659
	LQPT4.0	4	0.942	0.937 (0.014)	0.005	6.332
Rideau + NHIC- eDNA	LQ1.0	4	0.916	0.915 (0.019)	0.001	0
	LQP1.0	4	0.920	0.917(0.018)	0.003	5.790
	LQP2.5	6	0.918	0.916 (0.019)	0.003	13.006
S. Ontario + NHIC-only	LQPT3.0	7	0.967	0.963 (0.008)	0.004	0
	LQPT3.5	7	0.966	0.965 (0.008)	0.004	5.397
	LQPT4.5	7	0.966	0.962 (0.008)	0.004	10.563
S. Ontario + NHIC- eDNA	LQPT2.5	7	0.963	0.959 (0.009)	0.005	0
	LQPT3.5	7	0.962	0.958 (0.007)	0.005	0.862
	LQPT4.5	7	0.962	0.958 (0.007)	0.004	12.023

Table S7. Variable contributions to optimized MaxEnt models under 1% backward selection criterion for the modelling scenarios.

Simplified response curves are also shown (relative occurrence rate on y axis and environmental gradient on x axis). Abbreviations: Contr.: contribution to model in percentage; M.: month; Precp.: precipitation; Q.: quarter; T.: temperature.

		Occurrence: NHIC-only			Occurrence: NHIC-eDNA		
		Variable	Contr.	Response curve	Variable	Contr.	Response curve
Rideau	Annual mean T.		44.5		Annual mean T.	35.5	
	Total shoreline		32.8		Total shoreline	33.4	
	Waterbody%		16.7		Waterbody%	20.2	
	Forest % 5km		6.1		Mean elevation	10.8	
Southern Ontario	Annual mean T.		22.8		Total shoreline	25.1	
	Total shoreline		22.5		Mean T. warmest Q.	20.3	
	Mean elevation		15.4		Mean elevation	14.1	
	Mean T. warmest Q.		11.6		Annual mean T.	12.8	
	Waterbody%		10.7		Precp. warmest Q.	11.5	
	Precp. warmest Q.		9.9		Waterbody%	9.0	
	Total shoreline 5km		7.1		Waterbody% 5km	7.3	