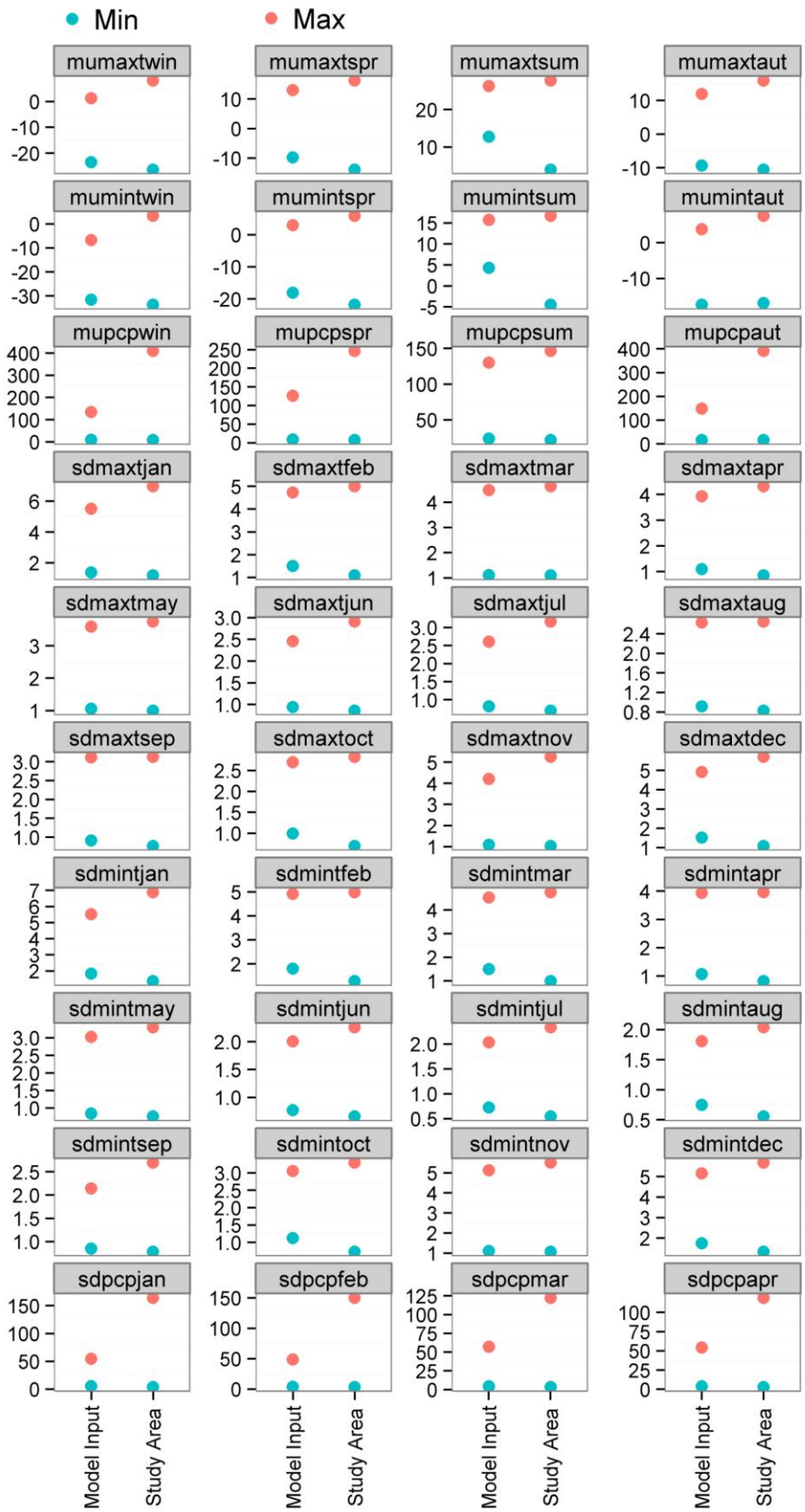
Appendix 1. Environmental variables used in Boosted Regression Trees of waterfowl abundance. The table describes each variable while the figures depict the range of each variable within the WBPHS segments (model input) and within the entire study area (study area).

Variable	Time Period	Resolution	Source	Calculation
Climatic				
mumaxt*x*: 30-year mean maximum temperature in season *x*[a] (n=4 seasons)	1981-2010	10 km	NRCAN[b]	Mean calculated for each cell across 30 years of monthly grids. Weighted mean calculated for each unit[c]. Seasonal mean calculated.
mumint*x*: 30-year mean minimum temperature in season *x*[a] (n=4 seasons)	"	"	"	"
mupcp*x*:30-year mean precipitation in season *x*[a] (n=4 seasons)	"	"	"	"
sdmaxt*x*:30-year standard deviation of maximum temperature in month *x* (n=12 months)	"	"	"	Standard deviation calculated for each cell across 30 years of monthly grids. Weighted mean calculated for each unit.
sdmint*x*:30-year standard deviation of minimum temperature in month *x* (n=12 months)	"	"	"	"
sdpcp*x*:30-year standard deviation of precipitation in month *x* (n=12 months)	"	"	"	"
Bioclimatic				
tmpseas:30-year mean temperature seasonality; monthly mean variance around the annual mean (n=1)	"	"	"	Mean calculated for each cell across 30 annual grids. Weighted mean calculated for each unit.
pcpseas:30-year mean precipitation seasonality; monthly mean variance around the annual mean (n=1)	"	"	"	"
temprange:30-year mean temperature annual range; difference between the maximum of the warmest month and the minimum of the coldest month (n=1)	"	"	"	"
wetmonth:30-year mean of precipitation in wettest month (n=1)	"	"	"	"
drymonth: 30-year mean of precipitation in driest month (n=1)	"	"	"	"
mugrow: 30-year mean of growing season length; number of days above 5°C (n=1)	"	"	"	"
sdgrow: 30-year standard deviation of growing season length (n=1)	"	"	"	"
gpp: 7-year average gross primary productivity, in $gC/m^2/yr$[e] (n=1)	2000-2006	1 km	Numerical Terradynamic Simulation Group[f]	Weighted mean calculated for each unit.

Variable	Time Period	Resolution	Source	Calculation
Landscape				
lcc.C.*i*: Proportion of area covered by land cover class *i*, described in Table A2 (n=12 cover classes).	Static (2005)	250 m	Centre for Remote Sensing[g]	$Ci \ / \ Ct$ Ci = Count of cells of land c class i within unit Ct = Total cell count in unit
sdi: Shannon Diversity Index for land cover classes (n=1)	"	"	"	$\sum_{i=1}^{m}(Pi * \ln(Pi)))$ m = number of land cover types Pi= proportion of area covered by land cover type
topo: Index of topographic ruggedness; calculated as coefficient of variation from a DEM (n=1)	Static (2000 and 1993-1996)	1 km	Integrated Remote Sensing Studio[i]	Weighted mean calculated for each unit.
Hydrological				
cmi: 30-year average climate moisture index; cm precipitation – cm potential evaporation per year[d] (n=1)	1961-1990	10 km	NRCAN	Weighted mean calculated for each unit.
hwlwetland/hwlwater: Proportion of area covered by open water or wetlands[i] (n=2 classes)	Static (2000 and 2009)	25 m	Ducks Unlimited Canada	Count of water or wetland cells within each unit, expressed as a proportion of total number of cells within unit.
streamlength: Total length of streams in m stream/km^2 area (n=1)	Static (created from data from 1994-2010)	1:10,000-1:50,000	National Hydrology Network[j]	Length of all streams, divided by unit area (to standardize).
wbdens: Density of water bodies in unit neighbourhood (n=1)	"	"	"	Number of water bodies intersected by unit, divided by unit area (to standardize).
muareawbods: Mean size of water bodies in unit neighbourhood (n=1)	"	"	"	Mean area of water bodies intersected by unit, divided by unit area (to standardize).
shorelength: Length of shoreline in km shoreline/km^2 area (n=1)	"	"	"	Total shoreline (perimeter of water bodies) contained within unit, divided by unit area (to standardize).
shorecx: Shoreline complexity (area-weighted shape index for water bodies in unit neighbourhood) (n=1)	"	"	"	Ratio of water body perimeter to area measured against a circle standard. Mean across water bodies weighted by area of water body within unit.

[a] Seasons as follows: *Winter*: Dec, Jan, Feb; *Spring*: Mar, Apr, May; *Summer*: Jun, Jul, Aug; *Autumn*: Sept, Oct, Nov.
[b] McKenney, D. W., M. F. Hutchinson, P. Papadopol, K. Lawrence, J. Pedlar, K. Campbell, E. Milewska, R. F. Hopkinson, D. Price, and T. Owen. 2011. Customized spatial climate models for North America. Bulletin of the American Meteorological Society 92:1611–1622.
[c] unit = segment buffer or grid cell (see *Methods: Environmental data*).
[d] Calculated from modified Penman-Monteith potential evapotranspiration. Hogg, E. H. 1994. Climate and the southern limit of the western Canadian boreal forest. Canadian Journal of Forest Research 24:1835–1845.
[e] from the MOD17A3 product. Zhao, M., F. A. Heinsch, R. R. Nemani, and S. W. Running. 2005. Improvements of the MODIS terrestrial gross and net primary production global data set. Remote Sensing of Environment 95:164–176. (http://www.ntsg.umt.edu/project/mod17)
[f] NTSG at the University of Montana. (http://www.ntsg.umt.edu/)
[g] Latifovic 2008. Landcover Map of Canada 2005. (http://www.nrcan.gc.ca/earth-sciences/geography-boundary/remote-sensing/optical/2208)
[h] Integrated Remote Sensing Studio (http://databasin.org/datasets/14d70746535e4be99aaf66595cc0b677)
[i] Jones, N. 2010. Hybrid Wetland Layer (Version 2.1) User Guide. Ducks Unlimited Canada.
j National Hydrology Network. 2007. Government of Canada. Available on Geobase. (http://www.geobase.ca/geobase/en/data/nhn/description.html)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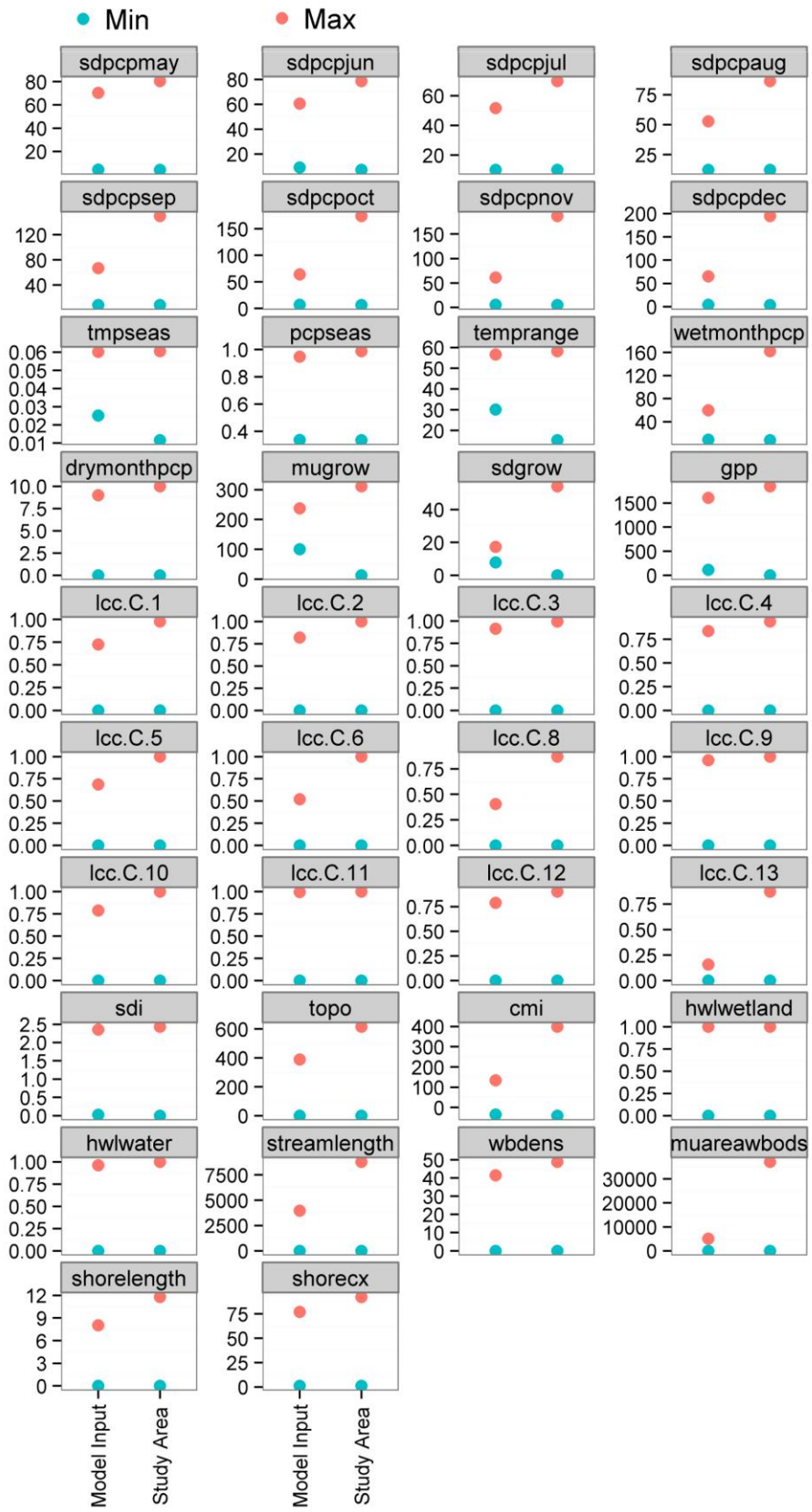
Study Area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