appendix

Appendix

Table 1: Listing of the variables used in the regression models at Hika beach. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate	Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Sheboygan River Discharge									
	Diff			x					
Manitowoc River Discharge									
	Diff			x					
log Manitowoc River Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
log Sheboygan River Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
Cloud cover									
	Mean	x	x	x	x	x	x		
Lake level									
	Mean	x				x			
	Max	x				x			
	Min	x				x			
	Diff					x			
Surface current, perpendicular									
	Mean	x	x	x	x	x	x	x	x
Surface current, parallel									
	Mean	x	x	x	x	x	x	x	x
Subsurface current, perpendicular									
	Mean	x	x	x	x	x	x	x	x
Subsurface current, parallel									
	Mean	x	x	x	x	x	x	x	x
Wave height									
	Mean	x	x	x	x	x			
Wave height speed, perpendicular									
	Mean	x	x	x	x	x			
Wave height speed, parallel									
	Mean	x	x	x	x	x			
Wave speed, perpendicular									
	Mean	x	x	x	x	x			
Wave speed, parallel									
	Mean	x	x	x	x	x			
Wind speed, perpendicular									
	Mean	x	x	x	x	x			
Wind speed, parallel									
	Mean	x	x	x	x	x			
Air temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.		x	x	x	x	x	x	x
Water temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.		x	x	x	x	x	x	x
sqrt Rainfall over Manitowoc River									
	Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Hika									
	Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual								
Wind speed, perpendicular	Manual								
Wind speed, perpendicular	Manual								
People in water	Manual								
People on beach	Manual								
Air temperature	Manual								
Water temperature	Manual								
Wave height	Manual								
Algae near shore	Manual								
Algae on beach	Manual								
Julian date	Manual								

Table 2: Listing of the variables used in the regression models at Kreher beach. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate	Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Whittlesley Creek Discharge									
	Diff			x					
log Whittlesley Creek Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
Cloud cover									
	Mean	x	x	x	x	x			
Lake level									
	Mean	x	x	x	x	x			
	Diff					x			
Wind speed, perpendicular									
	Mean	x	x	x	x	x			
Wind speed, parallel									
	Mean	x	x	x	x	x			
Air temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.		x	x	x	x	x	x	x
sqrt Rainfall over Kreher									
	Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Maslowski									
	Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Whittlesley Creek									
	Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual								
Wind speed, perpendicular	Manual								
Wind speed, perpendicular	Manual								
Number of people in water	Manual								
Number of people on beach	Manual								
Number of geese present	Manual								
Number of gulls present	Manual								
Air temperature	Manual								
Water temperature	Manual								
Wave height	Manual								
Lakeshore current velocity	Manual								
Beach specific conductance	Manual								
Bay City Creek specific conductance	Manual								
Algae near shore	Manual								
Algae on beach	Manual								
Julian date	Manual								

Table 3: Listing of the variables used in the regression models at Maslowski beach. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate	Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Whittlesley Creek Discharge									
	Diff			x					
log Whittlesley Creek Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
Cloud cover									
	Mean	x	x	x	x	x			
Lake level									
	Mean	x	x	x	x	x			
	Diff					x			
Wind speed, perpendicular									
	Mean	x	x	x	x	x			
Wind speed, parallel									
	Mean	x	x	x	x	x			
Air temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.		x	x	x	x	x	x	x
sqrt Rainfall over Maslowski									
	Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Whittlesley Creek									
	Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual								
Wind speed, perpendicular	Manual								
Wind speed, perpendicular	Manual								
Number of people in water	Manual								
Number of people on beach	Manual								
Number of geese present	Manual								
Number of gulls present	Manual								
Air temperature	Manual								
Water temperature	Manual								
Wave height	Manual								
Lakeshore current velocity	Manual								
Beach specific conductance	Manual								
Fish Creek (north) specific conductance	Manual								
Fish Creek (south) specific conductance	Manual								
Whittlesley Creek specific conductance	Manual								
Fish Creek (south) water elevation	Manual								
Algae near shore	Manual								
Algae on beach	Manual								
Julian date	Manual								

Table 4: Listing of the variables used in the regression models at the Point beaches. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Manitowoc River Discharge								
Diff			x					
Sheboygan River Discharge								
Diff			x					
log Manitowoc River Discharge								
Mean	x	x	x	x	x	x	x	x
Min	x	x	x	x	x	x	x	x
Max					x			
log Sheboygan River Discharge								
Mean	x	x	x	x	x	x	x	x
Min	x	x	x	x	x	x	x	x
Max					x			
Cloud cover								
Mean	x	x	x	x	x	x		
Lake level								
Mean	x				x			
Max	x				x			
Min	x				x			
Diff					x			
Surface current, perpendicular								
Mean	x	x	x	x	x	x	x	x
Surface current, parallel								
Mean	x	x	x	x	x	x	x	x
Current at depth, perpendicular								
Mean	x	x	x	x	x	x	x	x
Current at depth, parallel								
Mean	x	x	x	x	x	x	x	x
Wind speed, perpendicular								
Mean	x	x	x	x	x			
Wind speed, parallel								
Mean	x	x	x	x	x			
Wave direction, perpendicular								
Mean	x	x	x	x	x			
Wave direction, parallel								
Mean	x	x	x	x	x			
Wave height								
Mean	x	x	x	x	x			
Wave height direction, perpendicular								
Mean	x	x	x	x	x			
Wave height direction, parallel								
Mean	x	x	x	x	x			
Air temperature								
Mean	x	x	x	x	x	x	x	x
St. Dev.		x	x	x	x	x	x	x
Water temperature								
Mean		x	x	x	x	x	x	x
St. Dev.		x	x	x	x	x	x	x
sqrt **Rainfall over Point beaches**								
Sum	x	x	x	x	x	x	x	x
sqrt **Rainfall over Twin Rivers**								
Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual							
Wind speed, perpendicular	Manual							
Wind speed, perpendicular	Manual							
Number of people in water	Manual							
Number of people on beach	Manual							
Air temperature	Manual							
Water temperature	Manual							
Wave height	Manual							
Lakeshore current velocity	Manual							
Algae near shore	Manual							
Algae on beach	Manual							
Julian date	Manual							

Table 5: Listing of the variables used in the regression models at Thompson beach. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate	Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Whittlesley Creek Discharge									
	Diff			x					
log Whittlesley Creek Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
Cloud cover									
	Mean	x	x	x	x	x			
Lake level									
	Mean	x	x	x	x	x			
	Diff					x			
Wind speed, perpendicular									
	Mean	x	x	x	x	x			
Wind speed, parallel									
	Mean	x	x	x	x	x			
Air temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.		x	x	x	x	x	x	x
sqrt Rainfall over Whittlesley Creek									
	Sum	x	x	x	x	x	x		
sqrt Rainfall over Thompson Creek									
	Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Maslowski									
	Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual								
Wind speed, perpendicular	Manual								
Wind speed, perpendicular	Manual								
Number of people in water	Manual								
Number of people on beach	Manual								
Beach specific conductance	Manual								
Thompson Creek specific conductance	Manual								
Air temperature	Manual								
Water temperature	Manual								
Wave height	Manual								
Lakeshore current velocity	Manual								
Algae near shore	Manual								
Algae on beach	Manual								
Julian date	Manual								

Table 6: Listing of the variables used in the regression models at Neshotah beach. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate	Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Manitowoc River Discharge									
	Diff			x					
Kewaunee River Discharge									
	Diff			x					
log Manitowoc River Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
log Kewaunee River Discharge									
	Mean	x	x	x	x	x	x	x	x
	Min	x	x	x	x	x	x	x	x
	Max					x			
Cloud cover									
	Mean	x	x	x	x	x	x		
Lake level									
	Mean	x				x			
	Max					x			
	Min					x			
	Diff					x			
Surface current, perpendicular									
	Mean	x	x	x	x	x	x	x	x
Surface current, parallel									
	Mean	x	x	x	x	x	x	x	x
Current at depth, perpendicular									
	Mean	x	x	x	x	x	x	x	x
Current at depth, parallel									
	Mean	x	x	x	x	x	x	x	x
Wind speed, perpendicular									
	Mean	x	x	x	x	x			
Wind speed, parallel									
	Mean	x	x	x	x	x			
Wave direction, perpendicular									
	Mean	x	x	x	x	x			
Wave direction, parallel									
	Mean	x	x	x	x	x			
Wave height									
	Mean	x	x	x	x	x			
Wave height direction, perpendicular									
	Mean	x	x	x	x	x			
Wave height direction, parallel									
	Mean	x	x	x	x	x			
Air temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.			x	x	x	x	x	x
Water temperature									
	Mean	x	x	x	x	x	x	x	x
	St. Dev.			x	x	x	x	x	x
sqrt Rainfall over Neshotah									
	Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Twin Rivers									
	Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual								
Wind speed, perpendicular	Manual								
Wind speed, perpendicular	Manual								
Number of people in water	Manual								
Number of people on beach	Manual								
Number of gulls present	Manual								
Air temperature	Manual								
Water temperature	Manual								
Wave height	Manual								
Lakeshore current velocity	Manual								
Algae near shore	Manual								
Algae on beach	Manual								
Julian date	Manual								

Table 7: Listing of the variables used in the regression models at Red Arrow beach. For each variable, the listing indicates which summary statistics were computed, and over what time scales.

Covariate Statistic	1h	2h	6h	12h	24h	48h	72h	120h
Manitowoc River Discharge								
Diff			x					
log Manitowoc River Discharge								
Mean	x	x	x	x	x	x	x	x
Min	x	x	x	x	x	x	x	x
Max					x			
Cloud cover								
Mean	x	x	x	x	x	x		
Lake level								
Mean	x				x			
Max	x				x			
Min	x				x			
Diff					x			
Surface current, perpendicular								
Mean	x	x	x	x	x	x	x	x
Surface current, parallel								
Mean	x	x	x	x	x	x	x	x
Current at depth, perpendicular								
Mean	x	x	x	x	x	x	x	x
Current at depth, parallel								
Mean	x	x	x	x	x	x	x	x
Wind speed, perpendicular								
Mean	x	x	x	x	x			
Wind speed, parallel								
Mean	x	x	x	x	x			
Wave direction, perpendicular								
Mean	x	x	x	x	x			
Wave direction, parallel								
Mean	x	x	x	x	x			
Wave height								
Mean	x	x	x	x	x			
Wave height direction, perpendicular								
Mean	x	x	x	x	x			
Wave height direction, parallel								
Mean	x	x	x	x	x			
Air temperature								
Mean	x	x	x	x	x	x	x	x
St. Dev.		x	x	x	x	x	x	x
Water temperature								
Mean	x	x	x	x	x	x	x	x
St. Dev.		x	x	x	x	x	x	x
sqrt Rainfall over Manitowoc River								
Sum	x	x	x	x	x	x	x	x
sqrt Rainfall over Red Arrow beach								
Sum	x	x	x	x	x	x	x	x
log Turbidity	Manual							
Wind speed, perpendicular	Manual							
Wind speed, perpendicular	Manual							
Number of people in water	Manual							
Number of people on beach	Manual							
Number of gulls present	Manual							
Air temperature	Manual							
Water temperature	Manual							
Wave height	Manual							
Lakeshore current velocity	Manual							
Algae near shore	Manual							
Algae on beach	Manual							
Julian date	Manual							