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Supplement C: Detailed Results from Partial Least Squared Regression Relating Environmental Variables to Walleye and Yellow Perch Young-of-Year Production in Six Lakes of Northern Minnesota

Supplemental Table S.C.1. Partial least-squares regression results for age-0 Walleye CPUE in Lake Kabetogama, Minnesota (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.02	0.93	0.99	1.05
Cumulative percentage of variance explained (response)	NA	37.0	51.5	54.0
Cumulative percentage of variance explained (predictors)	NA	29.8	43.4	60.5
Component loadings				
Adult Walleye CPUE	NA	–0.15	–	–
Age-1+ Walleye CPUE	NA	–0.33	–	–
Estimated Walleye biomass	NA	–0.33	–	–
Annual minimum WL	NA	0.25	–	–
Annual WL rise	NA	–0.22	–	–
Mean annual WL	NA	0.26	–	–
Annual SD in WL	NA	–0.23	–	–
WL from the previous summer	NA	0.04	–	–
Overwinter decline in WL	NA	–0.24	–	–
Early spring increase in WL	NA	–0.01	–	–
Mean WL in early spring	NA	0.26	–	–
SD of WL in early spring	NA	0.00	–	–
CV in WL in early spring	NA	0.00	–	–
WL at ice-out	NA	0.28	–	–
Annual degree-days (0°C)	NA	–0.31	–	–
Annual degree-days (5°C)	NA	–0.32	–	–
Annual degree-days (10°C)	NA	–0.33	–	–
Annual degree-days (15°C)	NA	–0.32	–	–
Early spring degree-days (0°C)	NA	–0.10	–	–
Early spring degree-days (5°C)	NA	–0.11	–	–
Early spring degree-days (10°C)	NA	–0.13	–	–
Early spring degree-days (15°C)	NA	–0.14	–	–
SD in maximum temperature in early spring	NA	–0.16	–	–
CV in maximum temperature in early spring	NA	–0.07	–	–
Time between ice-out and sampling	NA	0.01	–	–

Supplemental Table S.C.2. Partial least-squares regression results for age-0 Walleye CPUE in Lake of the Woods (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.03	1.22	1.28	1.59
Cumulative percentage of variance explained (response)	NA	37.7	48.7	60.3
Cumulative percentage of variance explained (predictors)	NA	16.6	31.0	40.4
Component loadings				
Adult Walleye CPUE	NA	–	–	–
Age-1+ Walleye CPUE	NA	–	–	–
Estimated Walleye biomass	NA	–	–	–
Annual minimum WL	NA	–	–	–
Annual WL rise	NA	–	–	–
Mean annual WL	NA	–	–	–
Annual SD in WL	NA	–	–	–
WL from the previous summer	NA	–	–	–
Overwinter decline in WL	NA	–	–	–
Early spring increase in WL	NA	–	–	–
Mean WL in early spring	NA	–	–	–
SD of WL in early spring	NA	–	–	–
CV in WL in early spring	NA	–	–	–
WL at ice-out	NA	–	–	–
Annual degree-days (0°C)	NA	–	–	–
Annual degree-days (5°C)	NA	–	–	–
Annual degree-days (10°C)	NA	–	–	–
Annual degree-days (15°C)	NA	–	–	–
Early spring degree-days (0°C)	NA	–	–	–
Early spring degree-days (5°C)	NA	–	–	–
Early spring degree-days (10°C)	NA	–	–	–
Early spring degree-days (15°C)	NA	–	–	–
SD in maximum temperature in early spring	NA	–	–	–
CV in maximum temperature in early spring	NA	–	–	–
Time between ice-out and sampling	NA	–	–	–

Supplemental Table S.C.3. Partial least-squares regression results for age-0 Walleye CPUE in Leech Lake (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.03	1.14	1.40	1.30
Cumulative percentage of variance explained (response)	NA	27.8	52.7	67.0
Cumulative percentage of variance explained (predictors)	NA	25.6	37.4	50.1
Component loadings				
Adult Walleye CPUE	NA	–	–	–
Age-1+ Walleye CPUE	NA	–	–	–
Estimated Walleye biomass	NA	–	–	–
Annual minimum WL	NA	–	–	–
Annual WL rise	NA	–	–	–
Mean annual WL	NA	–	–	–
Annual SD in WL	NA	–	–	–
WL from the previous summer	NA	–	–	–
Overwinter decline in WL	NA	–	–	–
Early spring increase in WL	NA	–	–	–
Mean WL in early spring	NA	–	–	–
SD of WL in early spring	NA	–	–	–
CV in WL in early spring	NA	–	–	–
WL at ice-out	NA	–	–	–
Annual degree-days (0°C)	NA	–	–	–
Annual degree-days (5°C)	NA	–	–	–
Annual degree-days (10°C)	NA	–	–	–
Annual degree-days (15°C)	NA	–	–	–
Early spring degree-days (0°C)	NA	–	–	–
Early spring degree-days (5°C)	NA	–	–	–
Early spring degree-days (10°C)	NA	–	–	–
Early spring degree-days (15°C)	NA	–	–	–
SD in maximum temperature in early spring	NA	–	–	–
CV in maximum temperature in early spring	NA	–	–	–
Time between ice-out and sampling	NA	–	–	–

Supplemental Table S.C.4. Partial least-squares regression results for age-0 Walleye CPUE in Rainy Lake (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.02	0.93	0.94	0.93
Cumulative percentage of variance explained (response)	NA	50.3	66.8	70.8
Cumulative percentage of variance explained (predictors)	NA	25.2	38.4	56.9
Component loadings				
Adult Walleye CPUE	NA	0.03	–	–
Age-1+ Walleye CPUE	NA	0.11	–	–
Estimated Walleye biomass	NA	0.08	–	–
Annual minimum WL	NA	0.08	–	–
Annual WL rise	NA	0.10	–	–
Mean annual WL	NA	0.20	–	–
Annual SD in WL	NA	0.02	–	–
WL from the previous summer	NA	–0.01	–	–
Overwinter decline in WL	NA	–0.18	–	–
Early spring increase in WL	NA	0.22	–	–
Mean WL in early spring	NA	0.24	–	–
SD of WL in early spring	NA	0.22	–	–
CV in WL in early spring	NA	0.22	–	–
WL at ice-out	NA	0.23	–	–
Annual degree-days (0°C)	NA	–0.32	–	–
Annual degree-days (5°C)	NA	–0.35	–	–
Annual degree-days (10°C)	NA	–0.35	–	–
Annual degree-days (15°C)	NA	–0.33	–	–
Early spring degree-days (0°C)	NA	–0.26	–	–
Early spring degree-days (5°C)	NA	–0.26	–	–
Early spring degree-days (10°C)	NA	–0.28	–	–
Early spring degree-days (15°C)	NA	–0.28	–	–
SD in maximum temperature in early spring	NA	–0.18	–	–
CV in maximum temperature in early spring	NA	0.05	–	–
Time between ice-out and sampling	NA	0.02	–	–

Supplemental Table S.C.5. Partial least-squares regression results for age-0 Walleye CPUE in Lake Vermilion (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.04	0.75	0.56	0.52
Cumulative percentage of variance explained (response)	NA	76.2	92.6	94.6
Cumulative percentage of variance explained (predictors)	NA	20.2	35.7	62.5
Component loadings				
Adult Walleye CPUE	NA	–0.06	0.23	–
Age-1+ Walleye CPUE	NA	–0.25	0.32	–
Estimated Walleye biomass	NA	–0.20	0.37	–
Annual minimum WL	NA	0.25	–0.18	–
Annual WL rise	NA	0.10	–0.10	–
Mean annual WL	NA	0.25	–0.07	–
Annual SD in WL	NA	0.09	–0.03	–
WL from the previous summer	NA	–0.07	–0.35	–
Overwinter decline in WL	NA	–0.28	–0.06	–
Early spring increase in WL	NA	0.11	–0.34	–
Mean WL in early spring	NA	0.28	–0.19	–
SD of WL in early spring	NA	0.08	–0.37	–
CV in WL in early spring	NA	0.08	–0.37	–
WL at ice-out	NA	0.23	–0.13	–
Annual degree-days (0°C)	NA	–0.30	0.10	–
Annual degree-days (5°C)	NA	–0.33	0.10	–
Annual degree-days (10°C)	NA	–0.37	0.08	–
Annual degree-days (15°C)	NA	–0.41	0.06	–
Early spring degree-days (0°C)	NA	–0.04	0.23	–
Early spring degree-days (5°C)	NA	0.07	0.20	–
Early spring degree-days (10°C)	NA	0.04	0.20	–
Early spring degree-days (15°C)	NA	0.04	0.19	–
SD in maximum temperature in early spring	NA	–0.20	–0.04	–
CV in maximum temperature in early spring	NA	–0.31	–0.13	–
Time between ice-out and sampling	NA	–0.16	–0.14	–

Supplemental Table S.C.6. Partial least-squares regression results for age-0 Walleye CPUE in Lake Winnibigoshish (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.05	0.97	1.02	1.14
Cumulative percentage of variance explained (response)	NA	63.6	78.4	88.0
Cumulative percentage of variance explained (predictors)	NA	31.4	58.0	70.2
Component loadings				
Adult Walleye CPUE	NA	–0.21	–	–
Age-1+ Walleye CPUE	NA	–0.29	–	–
Estimated Walleye biomass	NA	–0.20	–	–
Annual minimum WL	NA	–0.13	–	–
Annual WL rise	NA	0.16	–	–
Mean annual WL	NA	0.25	–	–
Annual SD in WL	NA	0.21	–	–
WL from the previous summer	NA	0.25	–	–
Overwinter decline in WL	NA	0.12	–	–
Early spring increase in WL	NA	0.08	–	–
Mean WL in early spring	NA	0.02	–	–
SD of WL in early spring	NA	0.05	–	–
CV in WL in early spring	NA	0.05	–	–
WL at ice-out	NA	–0.01	–	–
Annual degree-days (0°C)	NA	–0.37	–	–
Annual degree-days (5°C)	NA	–0.38	–	–
Annual degree-days (10°C)	NA	–0.38	–	–
Annual degree-days (15°C)	NA	–0.36	–	–
Early spring degree-days (0°C)	NA	–0.31	–	–
Early spring degree-days (5°C)	NA	–0.22	–	–
Early spring degree-days (10°C)	NA	–0.13	–	–
Early spring degree-days (15°C)	NA	0.15	–	–
SD in maximum temperature in early spring	NA	0.22	–	–
CV in maximum temperature in early spring	NA	0.13	–	–
Time between ice-out and sampling	NA	0.00	–	–

Supplemental Table S.C.7. Partial least-squares regression results for age-0 Yellow Perch CPUE in Lake Kabetogama (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.02	0.93	1.03	1.04
Cumulative percentage of variance explained (response)	NA	42.3	53.8	61.7
Cumulative percentage of variance explained (predictors)	NA	29.2	41.5	55.0
Component loadings				
Adult Walleye CPUE	NA	0.16	–	–
Age-1+ Walleye CPUE	NA	0.18	–	–
Annual minimum WL	NA	0.29	–	–
Annual WL rise	NA	–0.25	–	–
Mean annual WL	NA	0.28	–	–
Annual SD in WL	NA	–0.27	–	–
WL from the previous summer	NA	0.04	–	–
Overwinter decline in WL	NA	–0.24	–	–
Early spring increase in WL	NA	0.06	–	–
Mean WL in early spring	NA	0.26	–	–
SD of WL in early spring	NA	0.07	–	–
CV in WL in early spring	NA	0.07	–	–
WL at ice-out	NA	0.26	–	–
Annual degree-days (0°C)	NA	–0.27	–	–
Annual degree-days (5°C)	NA	–0.29	–	–
Annual degree-days (10°C)	NA	–0.29	–	–
Annual degree-days (15°C)	NA	–0.28	–	–
Early spring degree-days (0°C)	NA	–0.19	–	–
Early spring degree-days (5°C)	NA	–0.19	–	–
Early spring degree-days (10°C)	NA	–0.20	–	–
Early spring degree-days (15°C)	NA	–0.18	–	–
SD in maximum temperature in early spring	NA	–0.10	–	–
CV in maximum temperature in early spring	NA	0.03	–	–
Time between ice-out and sampling	NA	0.09	–	–

Supplemental Table S.C.8. Partial least-squares regression results for age-0 Yellow Perch CPUE in Lake of the Woods (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.03	1.01	1.23	1.29
Cumulative percentage of variance explained (response)	NA	39.6	47.8	58.5
Cumulative percentage of variance explained (predictors)	NA	26.7	48.9	60.0
Component loadings				
Adult Walleye CPUE	NA	0.23	–	–
Age-1+ Walleye CPUE	NA	0.15	–	–
Annual minimum WL	NA	–0.16	–	–
Annual WL rise	NA	–0.20	–	–
Mean annual WL	NA	–0.29	–	–
Annual SD in WL	NA	–0.18	–	–
WL from the previous summer	NA	0.13	–	–
Overwinter decline in WL	NA	0.22	–	–
Early spring increase in WL	NA	–0.21	–	–
Mean WL in early spring	NA	–0.22	–	–
SD of WL in early spring	NA	–0.22	–	–
CV in WL in early spring	NA	–0.22	–	–
WL at ice-out	NA	–0.21	–	–
Annual degree-days (0°C)	NA	0.29	–	–
Annual degree-days (5°C)	NA	0.34	–	–
Annual degree-days (10°C)	NA	0.36	–	–
Annual degree-days (15°C)	NA	0.35	–	–
Early spring degree-days (0°C)	NA	0.15	–	–
Early spring degree-days (5°C)	NA	0.17	–	–
Early spring degree-days (10°C)	NA	0.15	–	–
Early spring degree-days (15°C)	NA	0.09	–	–
SD in maximum temperature in early spring	NA	0.06	–	–
CV in maximum temperature in early spring	NA	–0.08	–	–
Time between ice-out and sampling	NA	–0.05	–	–

Supplemental Table S.C.9. Partial least-squares regression results for age-0 Yellow Perch CPUE in Leech Lake (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.03	1.09	1.03	1.01
Cumulative percentage of variance explained (response)	NA	47.7	75.1	80.8
Cumulative percentage of variance explained (predictors)	NA	17.8	26.7	42.2
Component loadings				
Adult Walleye CPUE	NA	–	–	–
Age-1+ Walleye CPUE	NA	–	–	–
Annual minimum WL	NA	–	–	–
Annual WL rise	NA	–	–	–
Mean annual WL	NA	–	–	–
Annual SD in WL	NA	–	–	–
WL from the previous summer	NA	–	–	–
Overwinter decline in WL	NA	–	–	–
Early spring increase in WL	NA	–	–	–
Mean WL in early spring	NA	–	–	–
SD of WL in early spring	NA	–	–	–
CV in WL in early spring	NA	–	–	–
WL at ice-out	NA	–	–	–
Annual degree-days (0°C)	NA	–	–	–
Annual degree-days (5°C)	NA	–	–	–
Annual degree-days (10°C)	NA	–	–	–
Annual degree-days (15°C)	NA	–	–	–
Early spring degree-days (0°C)	NA	–	–	–
Early spring degree-days (5°C)	NA	–	–	–
Early spring degree-days (10°C)	NA	–	–	–
Early spring degree-days (15°C)	NA	–	–	–
SD in maximum temperature in early spring	NA	–	–	–
CV in maximum temperature in early spring	NA	–	–	–
Time between ice-out and sampling	NA	–	–	–

Supplemental Table S.C.10. Partial least-squares regression results for age-0 Yellow Perch CPUE in Rainy Lake (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.022	1.05	1.04	1.07
Cumulative percentage of variance explained (response)	NA	34.0	46.1	50.6
Cumulative percentage of variance explained (predictors)	NA	20.6	38.8	56.4
Component loadings				
Adult Walleye CPUE	NA	–	–	–
Age-1+ Walleye CPUE	NA	–	–	–
Annual minimum WL	NA	–	–	–
Annual WL rise	NA	–	–	–
Mean annual WL	NA	–	–	–
Annual SD in WL	NA	–	–	–
WL from the previous summer	NA	–	–	–
Overwinter decline in WL	NA	–	–	–
Early spring increase in WL	NA	–	–	–
Mean WL in early spring	NA	–	–	–
SD of WL in early spring	NA	–	–	–
CV in WL in early spring	NA	–	–	–
WL at ice-out	NA	–	–	–
Annual degree-days (0°C)	NA	–	–	–
Annual degree-days (5°C)	NA	–	–	–
Annual degree-days (10°C)	NA	–	–	–
Annual degree-days (15°C)	NA	–	–	–
Early spring degree-days (0°C)	NA	–	–	–
Early spring degree-days (5°C)	NA	–	–	–
Early spring degree-days (10°C)	NA	–	–	–
Early spring degree-days (15°C)	NA	–	–	–
SD in maximum temperature in early spring	NA	–	–	–
CV in maximum temperature in early spring	NA	–	–	–
Time between ice-out and sampling	NA	–	–	–

Supplemental Table S.C.11. Partial least-squares regression results for age-0 Yellow Perch CPUE in Lake Vermilion (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.035	0.92	0.77	0.88
Cumulative percentage of variance explained (response)	NA	60.8	76.0	88.1
Cumulative percentage of variance explained (predictors)	NA	20.5	44.0	50.3
Component loadings				
Adult Walleye CPUE	NA	0.15	–0.11	–
Age-1+ Walleye CPUE	NA	0.05	–0.12	–
Annual minimum WL	NA	0.25	–0.07	–
Annual WL rise	NA	–0.40	0.22	–
Mean annual WL	NA	–0.24	0.21	–
Annual SD in WL	NA	–0.40	0.19	–
WL from the previous summer	NA	0.03	–0.33	–
Overwinter decline in WL	NA	0.26	–0.21	–
Early spring increase in WL	NA	–0.18	0.07	–
Mean WL in early spring	NA	–0.29	0	–
SD of WL in early spring	NA	–0.17	0.07	–
CV in WL in early spring	NA	–0.17	0.07	–
WL at ice-out	NA	–0.32	0	–
Annual degree-days (0°C)	NA	–0.35	0.16	–
Annual degree-days (5°C)	NA	–0.32	0.16	–
Annual degree-days (10°C)	NA	–0.30	0.13	–
Annual degree-days (15°C)	NA	–0.25	0.08	–
Early spring degree-days (0°C)	NA	–0.19	0.39	–
Early spring degree-days (5°C)	NA	–0.07	0.44	–
Early spring degree-days (10°C)	NA	0	0.42	–
Early spring degree-days (15°C)	NA	0.1	0.36	–
SD in maximum temperature in early spring	NA	–0.11	–0.12	–
CV in maximum temperature in early spring	NA	–0.21	–0.28	–
Time between ice-out and sampling	NA	0.12	–0.26	–

Supplemental Table S.C.12. Partial least-squares regression results for age-0 Yellow Perch CPUE in Lake Winnibigoshish (WL = water level elevation; CV = coefficient of variation; NA = not applicable). Component loadings are equivalent to the correlation between the component and the individual variable. Loadings for components that did not improve the root mean square error (RMSE) or did not improve the percentage of variance explained in the response variables by over 5% are not shown.

Variable	No components	Component 1	Component 2	Component 3
Cross-validation (RMSE, adjusted)	1.05	1.24	1.44	1.39
Cumulative percentage of variance explained (response)	NA	54.5	70.5	89.9
Cumulative percentage of variance explained (predictors)	NA	24.5	51.6	69.6
Component loadings				
Adult Walleye CPUE	NA	–	–	–
Age-1+ Walleye CPUE	NA	–	–	–
Annual minimum WL	NA	–	–	–
Annual WL rise	NA	–	–	–
Mean annual WL	NA	–	–	–
Annual SD in WL	NA	–	–	–
WL from the previous summer	NA	–	–	–
Overwinter decline in WL	NA	–	–	–
Early spring increase in WL	NA	–	–	–
Mean WL in early spring	NA	–	–	–
SD of WL in early spring	NA	–	–	–
CV in WL in early spring	NA	–	–	–
WL at ice-out	NA	–	–	–
Annual degree-days (0°C)	NA	–	–	–
Annual degree-days (5°C)	NA	–	–	–
Annual degree-days (10°C)	NA	–	–	–
Annual degree-days (15°C)	NA	–	–	–
Early spring degree-days (0°C)	NA	–	–	–
Early spring degree-days (5°C)	NA	–	–	–
Early spring degree-days (10°C)	NA	–	–	–
Early spring degree-days (15°C)	NA	–	–	–
SD in maximum temperature in early spring	NA	–	–	–
CV in maximum temperature in early spring	NA	–	–	–
Time between ice-out and sampling	NA	–	–	–