A Wetland Water Quality and Biodiversity Profile of Goose Pond Fish and Wildlife Area

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Introduction

85% of wetlands in Indiana alone have been lost to agriculture and urbanization.

Lentic

vs

Lotic

Fig. 1. Lentic Wetland Ecosystem at Goose Pond Fish and Wildlife Area. Lentic is defined as still, independent water systems **with no** defined channel or floodplain.

Fig. 2. Lotic Wetland Ecosystem at Goose Pond Fish and Wildlife Area. Lotic is defined as moving water systems **with** a defined channel or floodplain.

Materials and Methods

Water Quality Index (WQI)

- Rates overall health of a system and status of water quality.
- Measured pH, turbidity, temperature, nitrates, phosphate, dissolved oxygen, biochemical oxygen demand, and total dissolved solids.

Fig. 3. *In situ* data sampling using Multipara-meter Water Quality Meter.

Fig. 4. Turbidity Meter.

Fig. 5. Separate Nitrate and Phosphate Meters.

Shannon Biodiversity Index (H)

- Gives a quantitative measurement of biodiversity.
- The higher the value of H, the more biodiverse the ecosystem.
- Sampled and measured Macroinvertebrates – living organisms lacking a backbone, such as crayfish, that are able to be seen without a microscope. Macros are great bioindicator species for the health of a system.

Fig. 6. D-Net used to sample Macro-invertebrates.

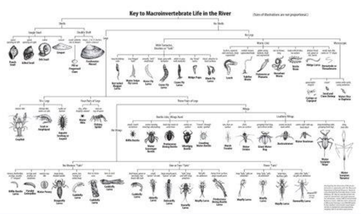

Fig. 7. Macro-invertebrate Key used for identification.

Results

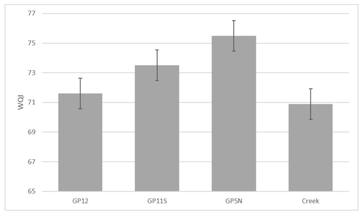

Fig. 8. Mean Water Quality Index (WQI) scores per wetland unit.

Table 1.
One-way ANOVA for water quality in response to wetland unit. Results revealed no statistically significant difference in water quality between locations at the $p < .05$ level [$F(3, 28) = 1.34$, $p = .280$]

	SS	*df*	*MS*	*F*	*p*	ω^2
Between groups	102.5	3	34.2	1.34	.280	.031

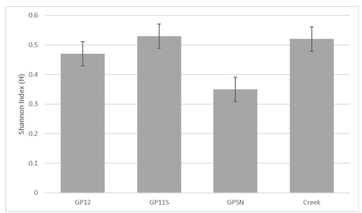

Fig. 9. Shannon's Index of Diversity (H) scores per wetland unit.

Table 2.
One-way ANOVA for Shannon's Index of Diversity (H) in response to wetland unit. Results revealed no statistically significant difference in biodiversity between locations at the $p < .05$ level [$F(3, 28) = .233$, $p = .872$]

	SS	df	*MS*	*F*	*p*	ω^2
Between groups	.169	3	.056	.233	.872	-.077

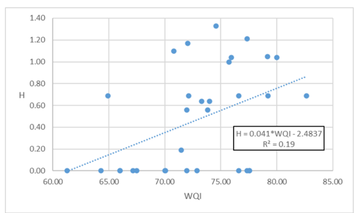

Fig. 10. Correlation between WQI and H.

Table 3.
Regression analysis summary of WQI as a predictor for H. The regression model (H = 0.041*WQI - 2.4837) was significant [R2 = 0.19, $F(1, 30) = 7.17$, $p = .012$]. Specifically, 19% of the variance in H can be explained by WQI.

	B	*SE*	*t*	*p*	*95% CI*	
					LL	*UL*
WQI	.041	.015	2.68	.012	.010	.071

Note: $R^2 = .19$, Adjusted $R^2 = .17$

Conclusions

1. There is no significant difference in Water Quality Index and Shannon Biodiversity Index scores between wetland units at GPFWA.
2. WQI is a significant predictor of H.

Future Work

- Gather a much larger data set over a longer period of time to account for variables that the linear regression model does not explain
- Investigate if specific water quality parameters are predictors for biodiversity
- Include fecal coliforms in water quality index

Literature cited

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