

Investigating Physiological Abnormalities Induced by Contaminated Aquatic Sites in Freshwater Fish Across Northeast Ohio



By: Kyle Stringer Advisor: Dr. R. Williams

Abstract

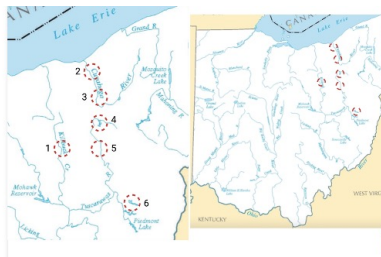
- Biomarkers have become an effective tool to monitor the viability of aquatic environments through assessment of biological responses
- This study aims to investigate the potential relationship between physiological abnormalities in 11 fish species from 6 aquatic bodies across northeastern Ohio
- Commonalities throughout this study include discoloration, hemorrhaging, scarring, and fin necrosis in fish collected from sites contaminated with bacterial infection, high chemical PAH concentrations, and solid waste pollution
- Sediment analysis of ΣPAH revealed a linear pattern between pollution and abnormalities in fish
- No adaptive responses to PAHs were recorded from sampling sites

Objective

- Effectively examine abnormalities related to varying contaminated water levels across northeast Ohio through biomarkers and analysis of physiological factors

Sampling Sites

- 1) Killbuck Creek
- 2) Cuyahoga River (Cleveland)
- 3) Cuyahoga River (Lock 29 Trailhead)
- 4) Silver Creek Lake
- 5) Sippo Lake
- 6) Tappan Lake



Site selection criteria: based on safety, species present, pollution exposure, and permits

Collection Process



Hoop Net System Electrofishing Gillnetting

Examinations

External Features

Internal Organs

USGS Guidelines



Results

- Tappan Lake (n=32), (Σ2974 ng/g), (26.5% of collection)
- Killbuck Creek (n=8-49), (Σ763.66 ng/g), (47.1% of collection)
- Interesting trends regarding monitoring/remediation efforts (Ohio DNR)

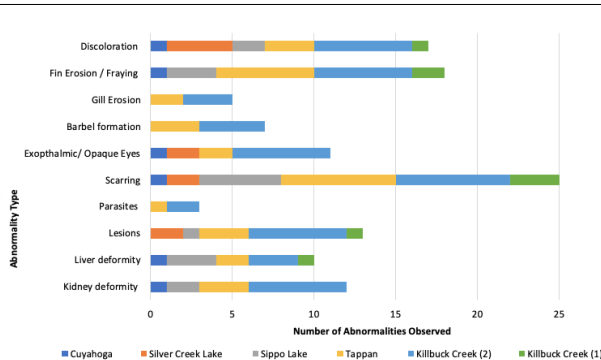
Site Location	ΣPAH Concentration (ng/g)	Total Number of Abnormalities Recorded
Cuyahoga River (Lock 29)	581.20	6
Killbuck Creek (Site 1)	716.90	8
Sippo Lake	731.10	16
Killbuck Creek (Site 2)	810.41	49
Silver Creek Lake	855.80	10
Tappan Lake	2974.0	32

Conclusions

- Sediment Analysis - Validation of ΣPAH site pollution
 - Surface vs Benthic-Feeders
- Linear Pattern: Anomalies vs ΣPAH
- Adaptational benefits to toxic environments – Natural Selection
- Signs of acclimation to heavily polluted environment – Fin necrosis, discoloration, scarring, (smaller body and larger organs)

Future Work

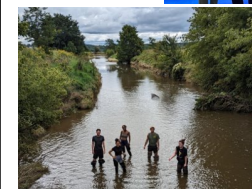
- Increase sample size (20-30 fish per site with n=3 per species)
- Variety of collection techniques at all sites (Kite fishing / Fyke nets)
- Alternative susceptible and benthic species (Rainbow Trout/ Brown Bullhead)
- Continue collaboration with DNR
- Implement conservation strategies



- 45 Fish Collected
- 11 Species
- 121 Abnormalities
 - Scarring (n=25)
 - Discoloration (n=18)
 - Fin Necrosis (n=17)
 - Atypical Organ Structure (n=22)
 - Body Size Deformity

- Benthic species are highly impacted
 - Yellow Bullhead

Williams
BCMB
Cohort
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References

