



EMERGING & LEGACY PESTICIDE CONTAMINATION IN THE WAISHKEY BAY, MICHIGAN



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INTRODUCTION

The Waishkey Bay is located on the Upper Saint Marys River at the outflow of Lake Superior, 20 miles west of Sault Ste. Marie, MI. The Bay Mills Indian Community, an Anishinaabe tribe, is located at the meeting of the Lake, River, and Bay. The tribe consists of an upwards of 2000 members with their constitution being enacted in 1936.

Tribal members rely heavily on the Bay for food, recreation, and economic use, so with the potential for legacy and emerging pesticide contaminants, this could have a huge impact on the whole community. The possible sources of these contaminants within the watershed could be run-off from the nearby golf course, municipal waste water, or residential run-off.

Some studies to document these chemicals have been done in the Great Lakes and the lower Saint Marys River surface waters, but there is little to no additional knowledge about contamination within the Bay. Exposures in the fish and wildlife populations, food chain bioaccumulation, and/or human exposures is also unknown.

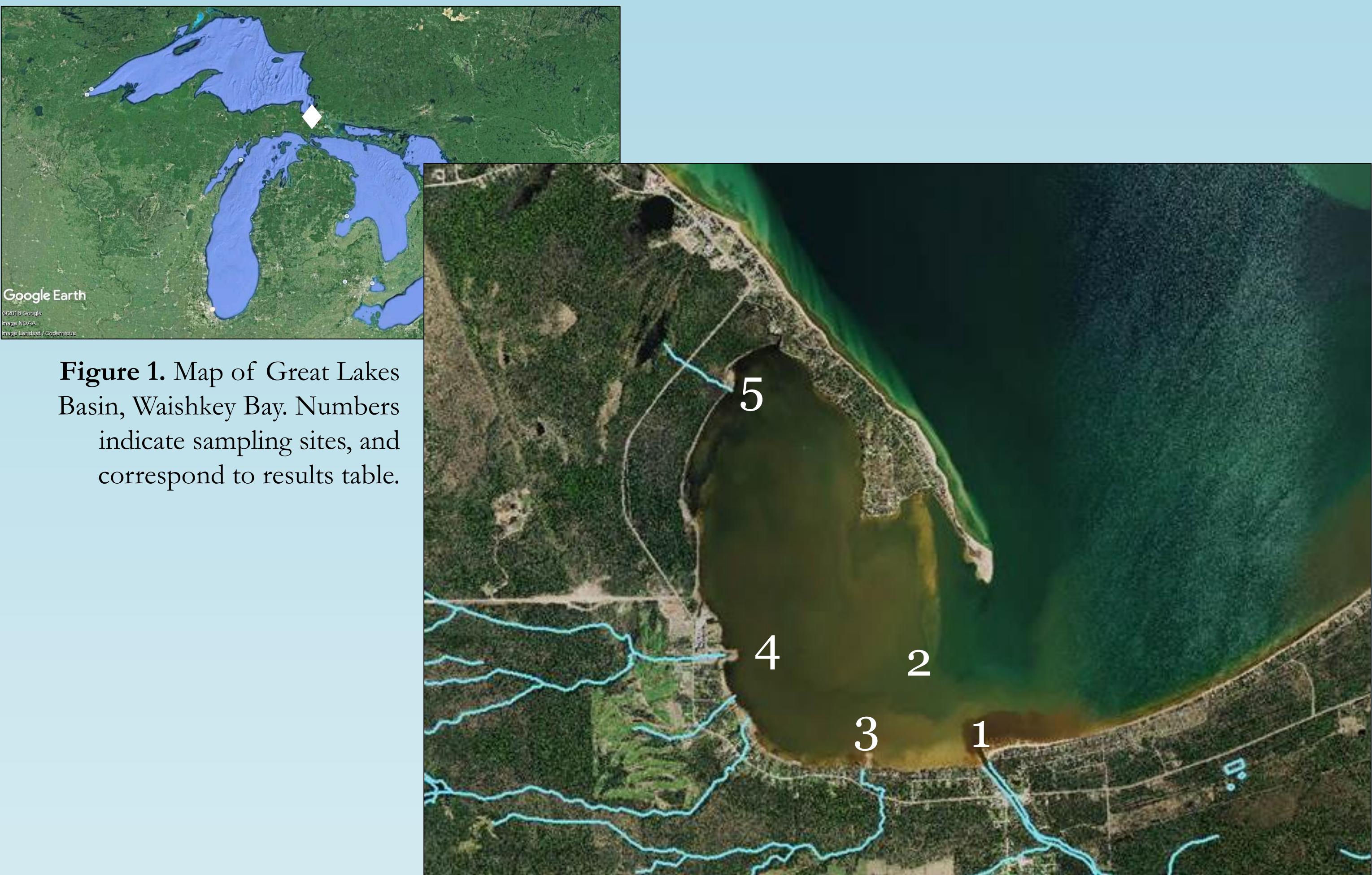
OBJECTIVES

- Gather baseline data of legacy and emergent pesticide contamination with the Waishkey Bay
 - Conduct broad chemical analysis on small sample number
 - Identify pesticides of interest for future analysis

METHODS

- Sediment samples collected late fall 2017
 - Ponar sampler
 - 19' Boston Whaler
 - 5 sampling sites
 - Waishkey River (WR: 1)
 - Open Bay (OB: 2)
 - Little Waishkey River (LW: 3)
 - Parish Creek (PC: 4)
 - Deep Creek (DC:5)
 - Collected into amber glass *Traceclean* bottles (#051317)
 - Qualitative analysis for 76 chemicals
 - Lake Superior State University
 - Hexane extraction
 - GCMS

STUDY LOCATION



Basin, Waishkey Bay. Numbers indicate sampling sites, and correspond to results table.

RESULTS

Sediment samples were analyzed for many chemicals but only 15 were detected.

Table 1. Sediment pesticide data from 5 sites within Waishkey Bay, Nov 2017

Target Analyte (ug/g)	Sample ID					Method
	1 WR	2 OB	3 LW	4 PC	5 DC	
m-Xylene	X	-	-	-	X	-
Chlorobenzene	X	X	-	X	X	-
p-Cresol	BD	BD	BD	BD	0.23	BD
2-methylnaphthalene	BD	0.03	0.03	BD	0.04	BD
1-methylnaphthalene	BD	0.02	BD	BD	0.03	BD
Vanillin	X	-	X	-	X	-
Azobenzene	0.02	BD	BD	BD	BD	BD
Diphenylamine	0.01	BD	BD	BD	BD	BD
Isopropyl Myristate	-	-	X	-	-	-
Fluorenone	-	X	-	-	X	-
Anthracene	0.06	0.10	0.11	BD	0.20	BD
9-Tricosene	X	-	-	-	-	-
Phytol	-	-	-	-	X	-
Flouranthene	X	-	-	-	-	-
Pyrene	BD	0.03	0.05	BD	BD	BD

X = Detected put not quantifiable due to no standard

BD = Below Detection Limit

Fifteen chemicals were found above detection in the sediment collected from at least one of the five locations. Qualitative analysis of 8 of the chemicals showed they were present, but the concentration was not detected. The other 7 chemicals were present enough to be able to determine their concentration.

DISCUSSION

This study found many chemicals to be present in Waishkey Bay sediment samples. The presence of these chemicals are concerning because they may have negative impacts on human health (for example P-cresol, anthracene, and pyrene).

- P-cresol is used for adhesives and sealant chemicals, with prolonged or excessive contact, this chemical can be toxic. The toxicity for the human database at this time is inadequate.
 - Anthracene used for production of dyes and smoke screens and is a possible carcinogen. The toxicity data on this chemical for humans is limited.
 - Pyrene used for indirect food additive, dyes and plastics, but there is little information available on diet-derived Pyrene in humans.

The information that is gained will help the future phases of this study. This includes rigorous qualitative analysis of sediment, investigation of the tissues in local aquatic wildlife, and an investigation of fresh water mussels. There will also be additional future investigations in the Waishkey Bay environmental media and biota concerning pesticides, plastics, and personal care products (PCPs).

Acknowledgements: We would like to thank the BMIC community as well as Bay Mills Biological Services for partnering in this project. This project is funded by USDA National Institute of Food and Agriculture (2018-00021)

