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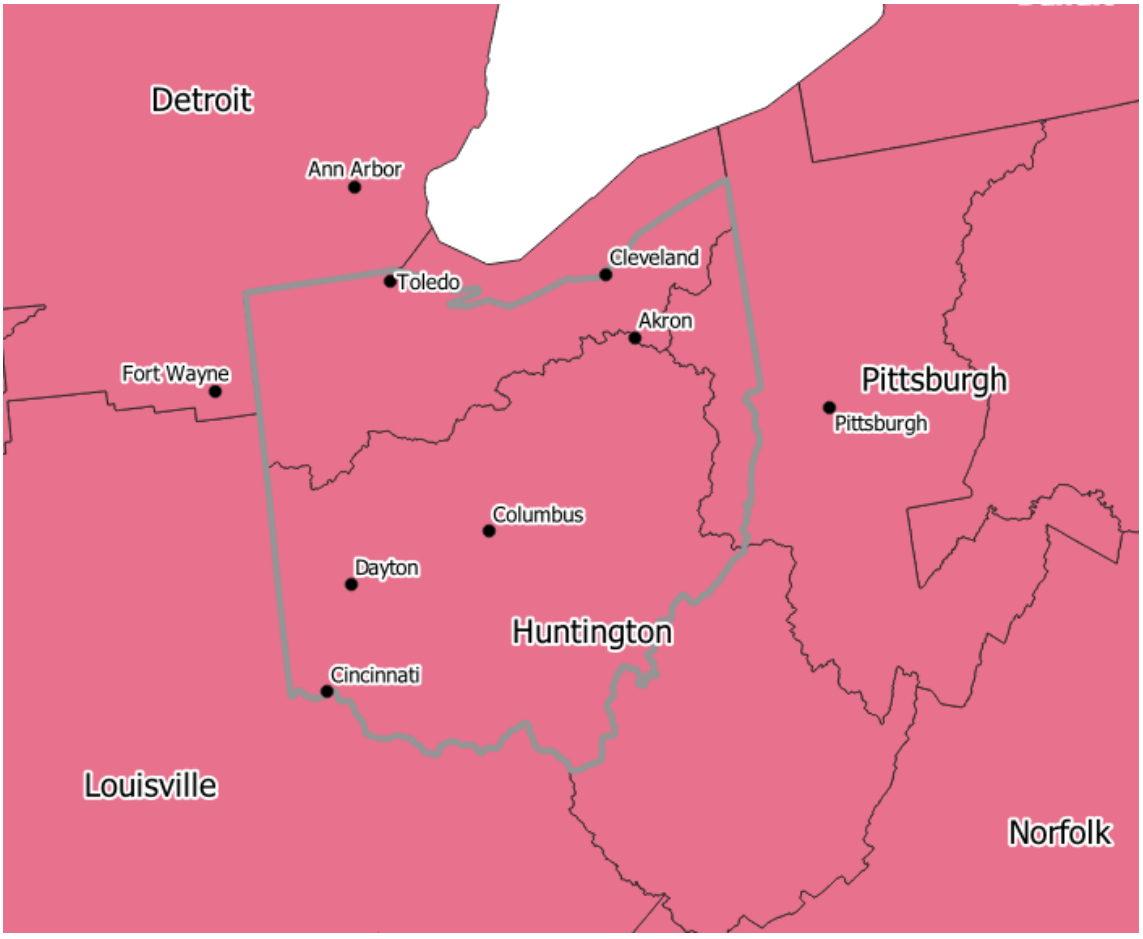
Ohio Report 1

Purpose

This report attempts to elucidate where environmental impacts, mainly to stream and wetland resources, have occurred over the last 5 years in the state of Ohio. This report also will attempt to determine where in Ohio most mitigation activitiy has occurred over the same time period, and what the demand and supply of mitigation credits there currently looks like.

Figure 1. USACE districts with the state of Ohio outlined in grey.



Methods

I acquired all stream and wetland impact data from the US Army Corp of Engineers' (USACE) ORM2 datasets from 2015 to 2020[1]. These data were obtained via FOIA request from the USACE ORM database. I then separated those impacts into various Cowardin classes through the addition of another categorical variable (ephemeral, intermittent, or perennial). I analyzed the different Cowardin classes and number of linear feet using the R statistical software platform ([v3.6.2], dplyr/ggplot packages). This

[1] This is using datasets from 2015-2020. I did not filter out any dates within those datasets. An alternative method could be to take everything I have (2008-2020), filter dates from 2015 to 2020, and get results that way. That would give me slightly different results thanks to the quirks of ORM2.

dataset was combined with an available geospatial dataset of Hydrological Unit Codes for the state of Ohio. The number of linear feet for each Cowardin class was mapped to HUCs. This was visualized in the QGIS platform. The ten HUCs for each variable containing the most impacts on each variable in mitigation requiring permits were selected and used to create Figure 1 and Table 1.

Additionally, I acquired all credit withdrawals, releases, and initial credit releases for 65 mitigation banks from 2015-2020. These banks had service areas within the boundaries of the State of Ohio and included banks from the Pittsburgh, Louisville, Buffalo, and Huntington USACE districts. I filtered the data for ephemeral, intermittent and perennial credits and palustrine credits. This dataset was subsequently also combined with the dataset of Hydrological Unit Codes and visualized in QGIS. These data were used to create Figures 3 and 4 and Tables 2 and 3. Table 3 contains credit releases and initial credit releases for all of banks with service areas intersecting the selected HUCs.

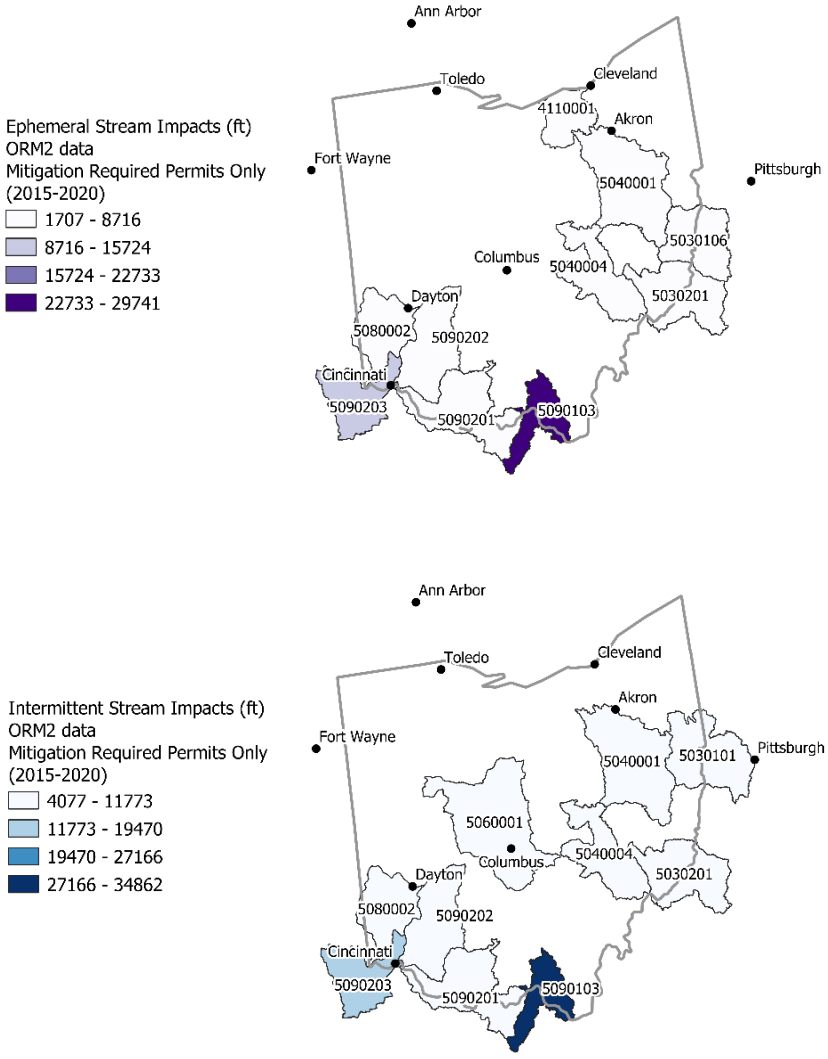
Results

Table 1 details the top ten HUCs for each category – intermittent, ephemeral, and perennial stream impacts (mitigation required permits only) and the percent of impacts requiring mitigation. Twenty HUCs were included, with some HUCs containing a large number of stream impacts for more than one category. Figure 2 visualizes quantiles of stream impacts across the geographic locations of HUCs.

Table 1. Impacts on stream and wetland resources by HUC8 in Ohio from October 2014 to September 2020. Mitigation required included. Table A1 contains both mitigation required permits and non-mitigation required permits for these HUCs.

HUC8	Mitigation Required Ephemeral	Mitigation Required Intermittent	Mitigation Required Perennial	Mitigation Required Palustrine	Mitigation Required All Riverine
5090103	29741	34862	15276.5		79879.5
5090203	15662	13720	6368	36.14068	35988
5040001	7358.6	5018		50.79669	13649.6
5040004	6764	5111			14825
5030201	5380.6	11642.1	5433.2		22455.9
5080002	3828	7825			11774
4110001	3760.17			78.488	
5090201	2946	7887			12425
5090202	1815	4856			
5030106	1707		3923		14411.42
5060001		9868	3534	52.8133	14377
5030101		4077	12980	38.26709	17698
4100011			4452		
4100001			3947	37.91403	
5030202			3916		
4100009			3590		
5030103				105.5444	
4110002				68.7883	
4110003				41.8194	
4100003				39.0669	

Figure 2. Impacts on stream resources by HUC8 in Ohio from October 2014 to September 2020. Top ten HUC8s are included for each variable. Linear feet of streams is clustered by equal intervals.



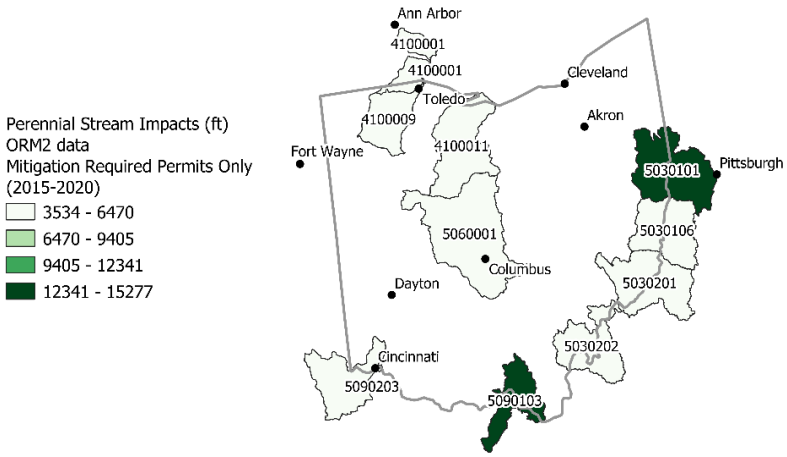


Table 2 contains the sum of permits, credits, linear feet, and acres of bank withdrawals for each HUC. Some banks contained HUC8s for each permit or had HUC10s, which were converted to HUC8s [257 permits]. Others had no HUCs whatsoever [225 permits]. Therefore, for the permits with no HUCs, I matched these permit numbers to ORM2 entries that contained coordinates [46 permits]. The 179 remaining permits could be impacting anywhere within Ohio and the surrounding states; however, of those 179, only 39 are stream permits (8% of all permits) and are listed within this table.

Table 2. Withdrawal of bank credits by HUC8 in Ohio from October 2014 to September 2020. Limited to HUCs of interest, based on Table 1.

	Palustrine				Riverine			
HUC	Permits	Credits	Acres	Linear Feet	Permits	Credits	Acres	Linear Feet
4100001	3	12.4	12.3	0	0	0	0	0
4100003	1	0.5	0.5	0	0	0	0	0
4100009	18	30.4	30.1	0	0	0	0	0
4100011	11	25.4	26.4	0	0	0	0	0
4110001	88	63	80.038	0	0	0	0	0
4110002	51	41.345	52.129	0	0	0	0	0
4110003	4	2.4	2.42	0	0	0	0	0
5030101	3	1	0.56	0	3	311.2	0	328
5030106	5	0.82	0.33	0	2	1322.86	0	0
5030201	7	1.831	0	0	10	11168.65	0	221
5040001	3	7.9	8.51	0	0	0	0	0
5040004	0	0	0	0	1	187.24	0	265
5060001	11	4.9	5.74	0	0	0	0	0
5080002	1	0.5	0.84	0	0	0	0	0
5090103	1	0.5	0.5	0	2	295	0	732
5090201	2	0.6	0.548	0	1	1	0	8
5090203	15	8.9	9.402	0	8	9591	0	11745
NA	166	151.9574	200.808	0	39	111383.8	4.4	126497.6

Figure 3. Withdrawn wetland credits for each HUC and HUCs with no wetland withdrawals in RIBITS.

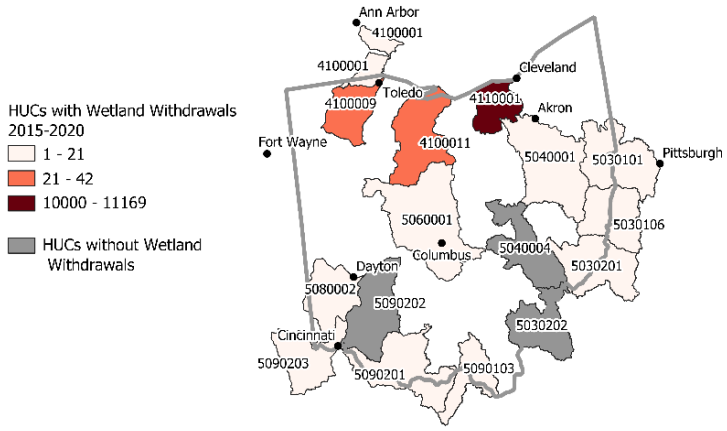


Figure 4. Withdrawn stream credits for each HUC and HUCs with no stream withdrawals in RIBITS.

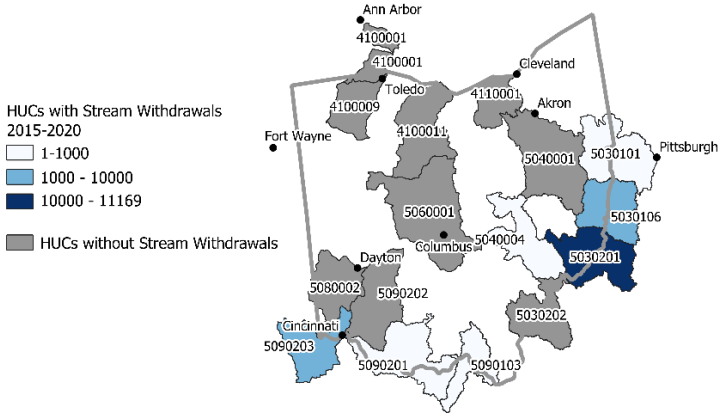


Table 3. Initial and Released Stream Credits within banks. Wetland credits listed in Appendix 1.

Credit Classification	Bank	Initial Credits	Released Credits	Estimated Remaining Credits
Stream	Tuscarawas Mitigation BankLedger	51198	13830	37368
Stream	Oxbow Mitigation BankLedger	27255.69	11331.4	15924.29
Perennial	Upper Ohio Mitigation BankLedger	20813.3	9810	11003.3
Perennial	Robinson Fork Mitigation Bank - Phase 1Ledger	94773.93	85296.52	9477.41
Stream	Sandy Creek Mitigation BankLedger	11597	2793.86	8803.14
Stream	EIP-KSWMBI-Big Sandy Mitigation Bank (LRL-2012-606)Ledger	26184	17674	8510
Stream	Cline Run Mitigation BankLedger	22340	14799.01	7540.99
Stream	Bearwallow Run Mitigation BankLedger	12151.27	6706.451	5444.819
Stream	Foster Run Mitigation BankLedger	15489	10619.98	4869.02
WV Stream Credits	KincheloeLedger	15122.86	10829.05	4293.814
Stream	Crow Run Mitigation BankLedger	7852.94	4379.5	3473.44
Stream	EIP-KSWMBI-Little Sandy Stream Mitigation Bank (LRL-2012-607)Ledger	9375	6329	3046
WV Stream Credits	Hackers Creek Mitigation BankLedger	4731	2233.464	2497.536
Stream	Great Miami Mitigation BankLedger	2320	700	1620
Perennial	Enlow Fork Mitigation BankLedger	4150.2	3927.19	223.01
Stream	Hayes Run Mitigation BankLedger	7121.67	6943.626	178.044
Riparian Corridor	Great Miami Mitigation BankLedger	2.8	2.1	0.7
Stream	KYTC - Beaver Creek (LRL-2008-291)Ledger	13042	13042	0
Stream	KYTC - Dix River Mitigation/Lincoln County (LRL-2006-904)Ledger	15332.8	15332.8	0
Stream	KYTC - Town Branch Mitigation (LRL-2008-684)Ledger	11295	11295	0
Stream	Northern Kentucky Mitigation Bank (LRL-2005-1898)Ledger	2621	2621	0
WV Stream Credits	Brushy Fork Mitigation BankLedger	2855.01	5780.11	-2925.1

Appendix

Table A1. Impacts on stream resources by HUC8 in Ohio from October 2014 to September 2020 – both mitigation required and non-mitigation required permits included.

HUC	Ephemeral	Intermittent	Perennial
5030106	38040.96	52279.3	83318.86
5030201	37798.12	45901.37	46762.6
5090103	29841	35365	16688.5
5090203	24259.01	22349.54	19977.26
5040001	12744.52	15210.86	18720.61
5060001	8140.5	18696	24543
5040004	7256	NA	NA
5080002	6294	12261	25386
5030101	5778.64	13714.33	56606.33
5090202	4992.5	11728	NA
5090201	NA	8469	NA
4110002	NA	NA	20055.1
5030202	NA	NA	16656.8

Table A2. Withdrawal of all Palustrine Bank credits by HUC8 in Ohio from October 2014 to September 2020.

Credit Classification	Bank	Initial Credits	Released Credits	Estimated Remaining Credits
Emergent	Big Darby-HellbranchLedger.csv	18.8	18.9	-0.1
Emergent	Chippewa NorthLedger.csv	52.5	26.9	25.6
Emergent	Great Miami Mitigation BankLedger.csv	2.4	1.8	0.6
Emergent	Little Scioto Phase IILedger.csv	66.8	105.5	-38.7
Forested	Big Darby-HellbranchLedger.csv	44.2	44.1	0.1
Forested	Cranberry Bog Wetland Mitigation BankLedger.csv	31.8	8.8	23
Forested	Great Miami Mitigation BankLedger.csv	24.2	17.6	6.6
Forested	Little Scioto (Ohio Wetlands Foundation Portion)Ledger.csv	21.6	21.6	0
Forested	Little Scioto Phase IILedger.csv	68.2	15.5	52.7
Forested	Little Scioto Phase ILedger.csv	13.5	40.5	-27
Forested	Meadow River Mitigation BankLedger.csv	24.74	24.74	0
Forested	Enlow Fork Mitigation BankLedger.csv	2.62	2.18	0.44
Non-Forested	Cranberry Bog Wetland Mitigation BankLedger.csv	4.2	0.9	3.3
Non-Forested	Little Scioto (Ohio Wetlands Foundation Portion)Ledger.csv	70	70	0
Uplands	Great Miami Mitigation BankLedger.csv	5.6	4.2	1.4
Uplands	Little Scioto Phase ILedger.csv	8.3	8.3	0

Wetlands	Sandy RidgeLedger.csv	87.5	87.5	0
Wetlands	Bearwallow Run Mitigation BankLedger.csv	4.99	2.5406	2.4494
Wetlands	Big IslandLedger.csv	143.536	143.536	0
Wetlands	Cline Run Mitigation BankLedger.csv	2.18	1.059	1.121
Wetlands	Crow Run Mitigation BankLedger.csv	0.08	0.08	0
Wetlands	Foster Run Mitigation BankLedger.csv	2.93	1.66	1.27
Wetlands	Great Miami Mitigation BankLedger.csv	3.9	2.9	1
Wetlands	Hayes Run Mitigation BankLedger.csv	0.97	0.73	0.24
Wetlands	Little Scioto Phase IILedger.csv	4.5	4.5	0
Wetlands	Little Scioto Phase ILedger.csv	307.2	238.9	68.3
Wetlands	Oxbow Mitigation BankLedger.csv	3.68	0.78	2.9
Wetlands	Panzner Wetland Wildlife ReserveLedger.csv	95.6	90.8	4.8
Wetlands	Red Stone Farm Mitigation BankLedger.csv	92.5	74.9	17.6
Wetlands	Shannon Valley Mitigation BankLedger.csv	41.8	30.6	11.2
Wetlands	Slate RunLedger.csv	91.9	91.9	0
Wetlands	Sugar Creek- Brewster Site In-lieu Fee Mitigation InitiativeLedger.csv	46.8	46.8	0
Wetlands	KYTC - Bath Co. Site/Ova Arnett (LRL-2007-343)Ledger.csv	55.9	55.9	0
Wetlands	KYTC - Dix River Mitigation/Lincoln County (LRL-2006-904)Ledger.csv	50.36	56.16	-5.8
Wetlands	KYTC - South Shore Wetland Mitigation Site (LRL-2011-606)Ledger.csv	28.2	28.2	0
Wetlands	Northern Kentucky Mitigation Bank (LRL-2005-1898)Ledger.csv	35.4	35.4	0
Wetlands	Brushy Fork Mitigation BankLedger.csv	9.53	10.33	-0.8
Wetlands	Hackers Creek Mitigation BankLedger.csv	2.11	2.371	-0.261
Wetlands	KincheloeLedger.csv	4.68	3.117	1.563
Wetlands	Robinson Fork Mitigation Bank - Phase 1Ledger.csv	37.35	33.64	3.71
Wetlands	Buffalo Fork Mitigation BankLedger.csv	NA	14.99	NA