

Restoring native fish migrations

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The Nature Conservancy



WATER CENTER
UNIVERSITY OF MICHIGAN



Great Lakes barriers

Pressures to keep

- Hydropower, irrigation, recreation
- Transportation
- Invasive species
- Contaminated sediments



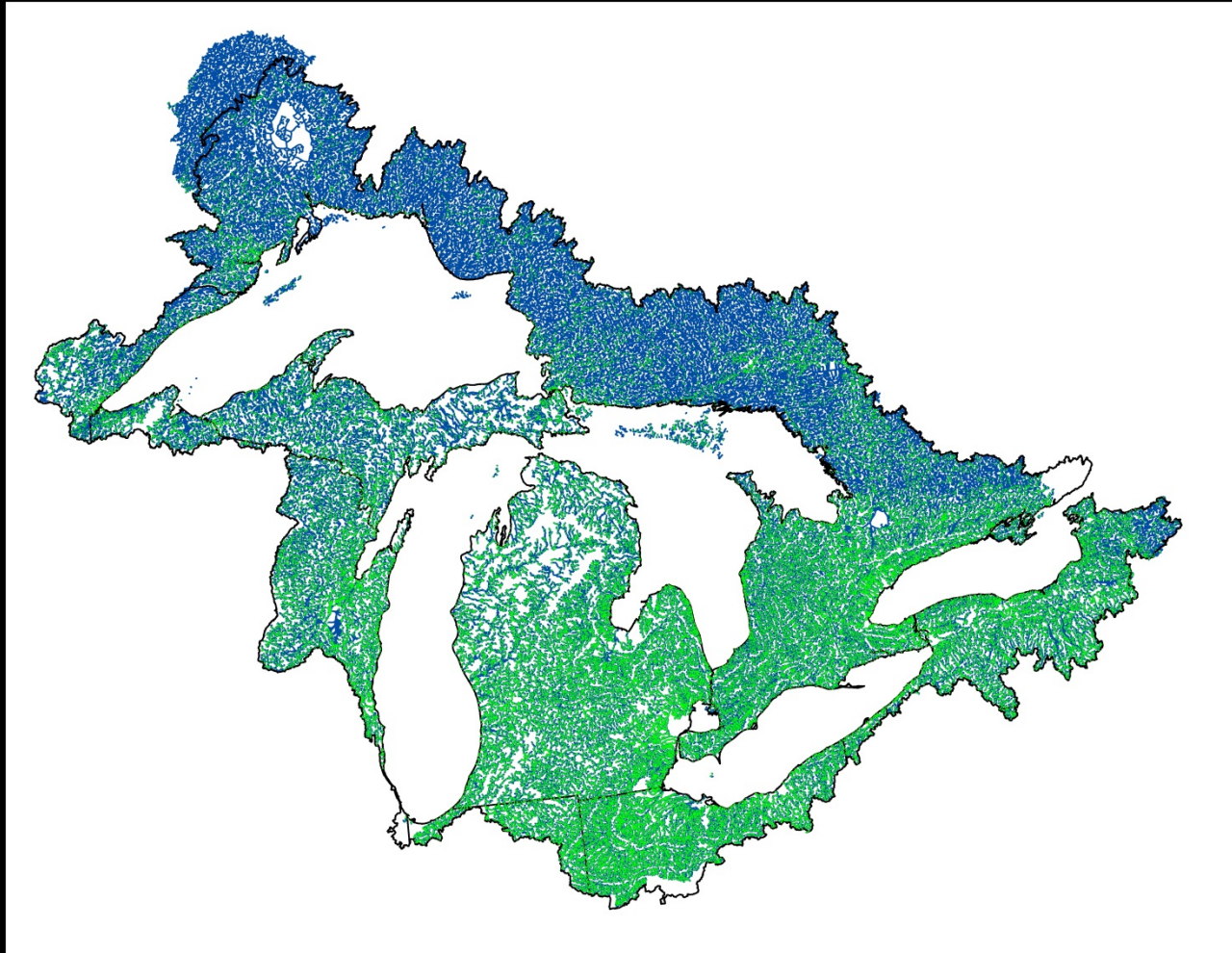
Pressures to remove

- Restore fish migrations
- Human safety
- Cost of upkeep

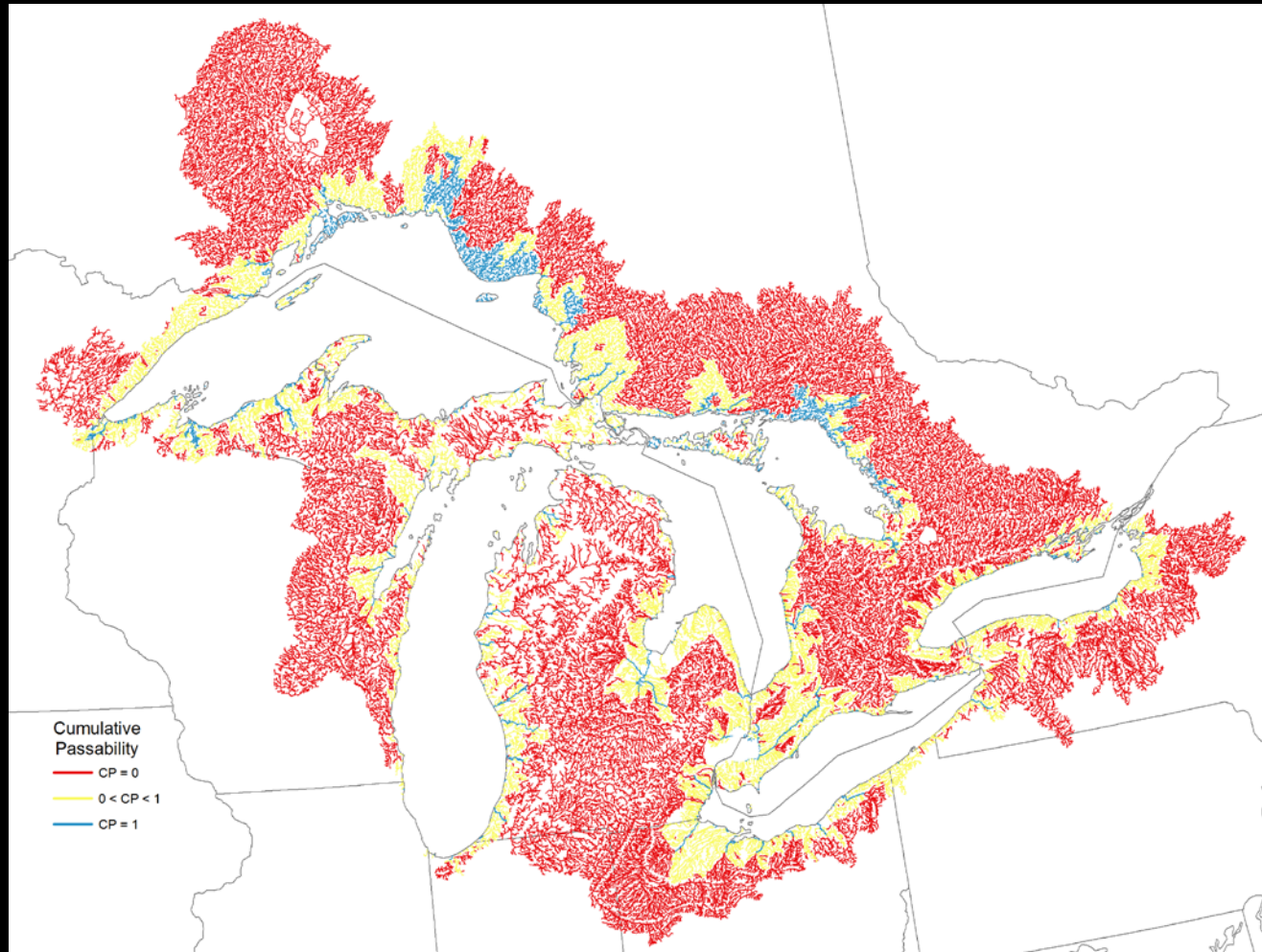


James Snitgen , Duck Creak Dams, WI

Dams and road crossings



Barrier impact



Online decision support tool

1. visualize barriers
2. user-submitted edits
3. optimization of barrier removal

greatlakesconnectivity.org

Explore

Visualize

Scenarios

Inspect

Results

Compare	Scenario Name	Total Cost	Habitat (km)	Date
<input type="checkbox"/>	UNCOPIED / DEFAULT	90.00	0.0	2014-01-01
<input type="checkbox"/>	test1	\$8,927,594.15	143,679.5	2015-01-21
<input checked="" type="checkbox"/>	county_all	\$987,882.13	144,212.1	2015-01-28
<input checked="" type="checkbox"/>	county_all_2	90.00	143,667.2	2015-01-28
<input checked="" type="checkbox"/>	county_all_2	\$1,990,509.92	144,274.2	2015-01-28
<input checked="" type="checkbox"/>	county_all_3	\$5,369,523.59	144,261.7	2015-01-28

Habitat Change (%)	Habitat Change (km)	ROI (Return on Invest)	Actual Habitat (km)
0.0			
0.1			
0.2			
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1.0			

Barrier ID	Nation	Basin	State	Cost	Is Dam	Guild 1	Guild 7	Guild 4	Up Hab
590766	USA	Lake Michigan	Michigan	112969.9399	<input checked="" type="checkbox"/>	0.099239453	0.078126376	0.007512716	1.54717886
519133	USA	Lake Michigan	Michigan	144261.7	<input checked="" type="checkbox"/>	0.070745187	2435.800462	0.70745187	2435.800462
519037	USA	Lake Michigan	Michigan	3800453774	<input checked="" type="checkbox"/>	0.680453774	4431.911709	0.680453774	4431.911709
525593	USA	Lake Michigan	Michigan	680229942	<input checked="" type="checkbox"/>	0.680229942	2156.562322	0.680229942	2156.562322
518479	USA	Lake Michigan	Michigan	6458833663	<input checked="" type="checkbox"/>	0.6458833663	0.050597867	0.6458833663	0.050597867
526857	USA	Lake Michigan	Michigan	688470216	<input checked="" type="checkbox"/>	0.688470216	3399.724572	0.688470216	3399.724572
526856	USA	Lake Michigan	Michigan	710370462	<input checked="" type="checkbox"/>	0.710370462	3098.046255	0.710370462	3098.046255
526855	USA	Lake Michigan	Michigan	39099.24006	<input checked="" type="checkbox"/>	0.662635684	0.648359038	0.384859104	619.6556113
519039	USA	Lake Michigan	Michigan	00000	<input checked="" type="checkbox"/>	0.949928511	0.939499385	0.772407575	256.8133055

Fishwerks FWS UW Limnology UW Optimization Enter Wild West Help

Find barriers of interest Features matched: 1676

View barriers Base map: Hybrid Satellite Click mode: Info Select All-Barriers opacity: 100%

Removal cost per barrier Filter
 Passability rating Filter
 Upstream habitat Filter
 County Filter
 Watershed Remove
 Deactivate selection tool Clear selection

State / Province Filter
 Great Lake basin Filter
 Nation Filter
 Barrier type Filter
 first barrier to sea lamprey Filter
 Barrier ID Filter

Optimize barrier removals

Transform name	Operation	Configure	Add	Clear	Delete
Keep these barriers	Ignore				
Already removed barriers	Remove				
Candidate barriers	Optimize				

Reset scenario Add transform Evaluate

View scenario results Compare existing scenarios

Quick summary

Habitat change (%) Habitat change (km) ROI (Return on invest) Basin-wide habitat

Change in habitat (km)

Strong Moderate Weak Invasive

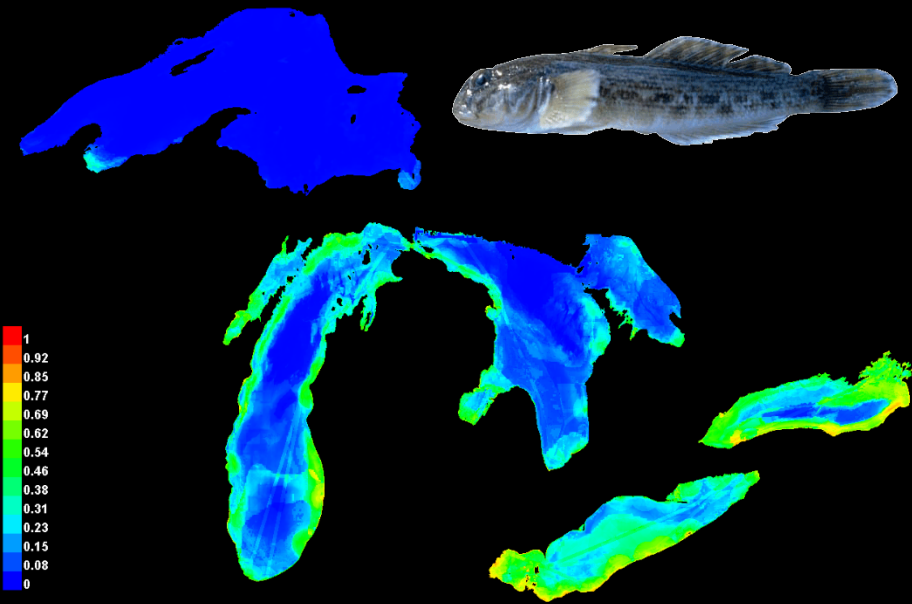
default	0	\$0.00	143,667.2 km
OttawaNF	\$997,295.99	144,137.3 km	

Removed barriers Scenario - show remove

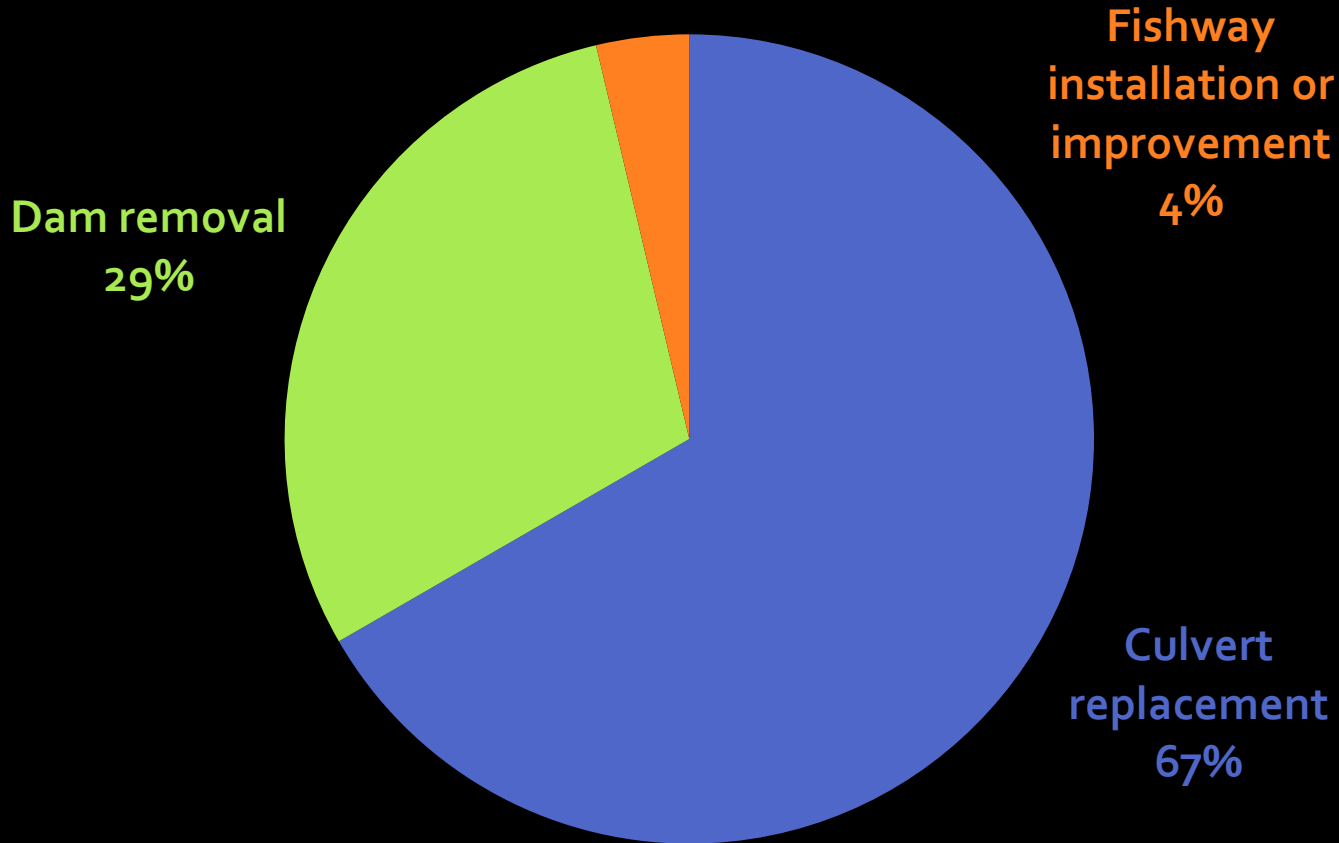
barriers \$ habitat length

Improvements

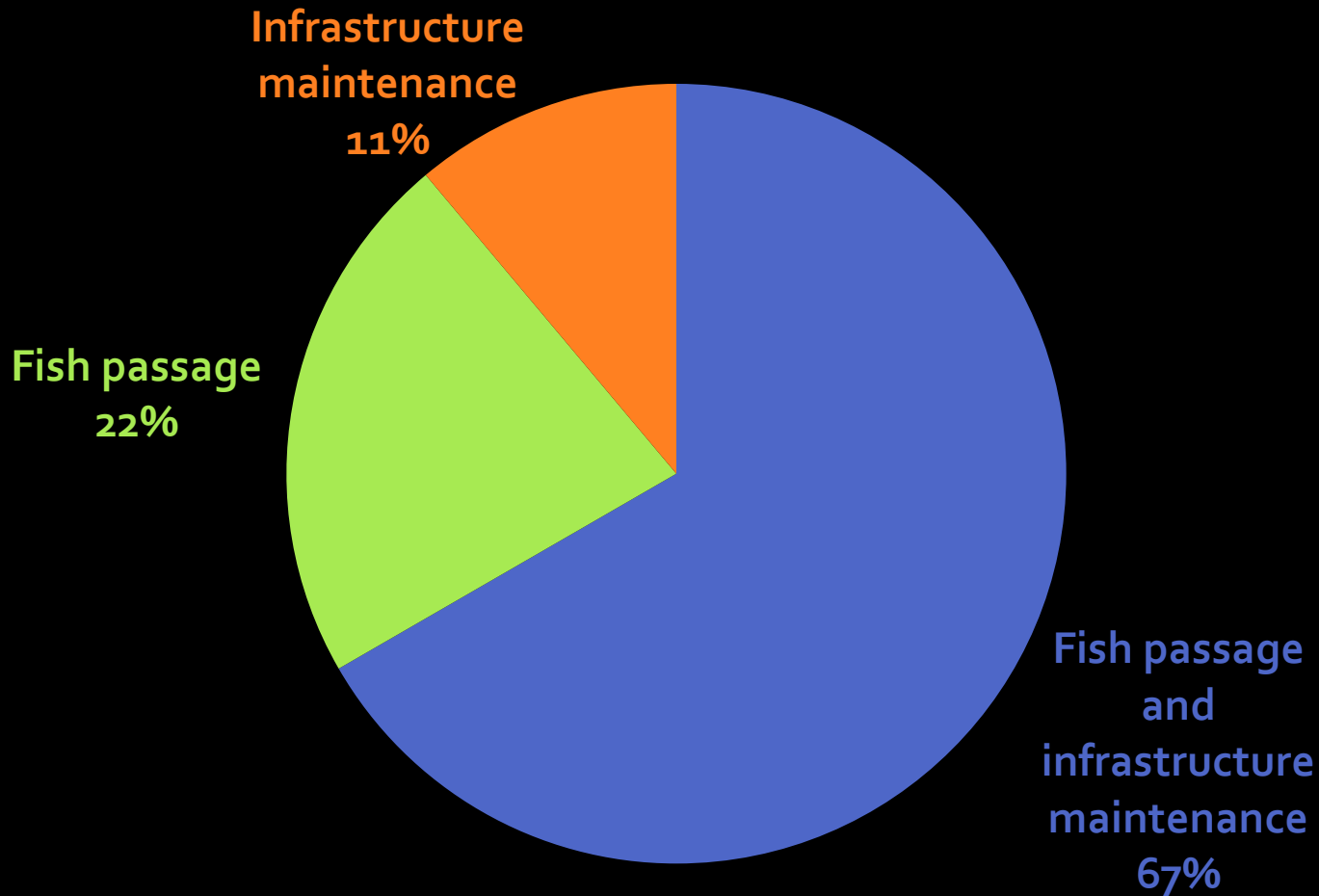
1. barrier database
2. native species ranges
3. stressor map
4. round goby invasion potential



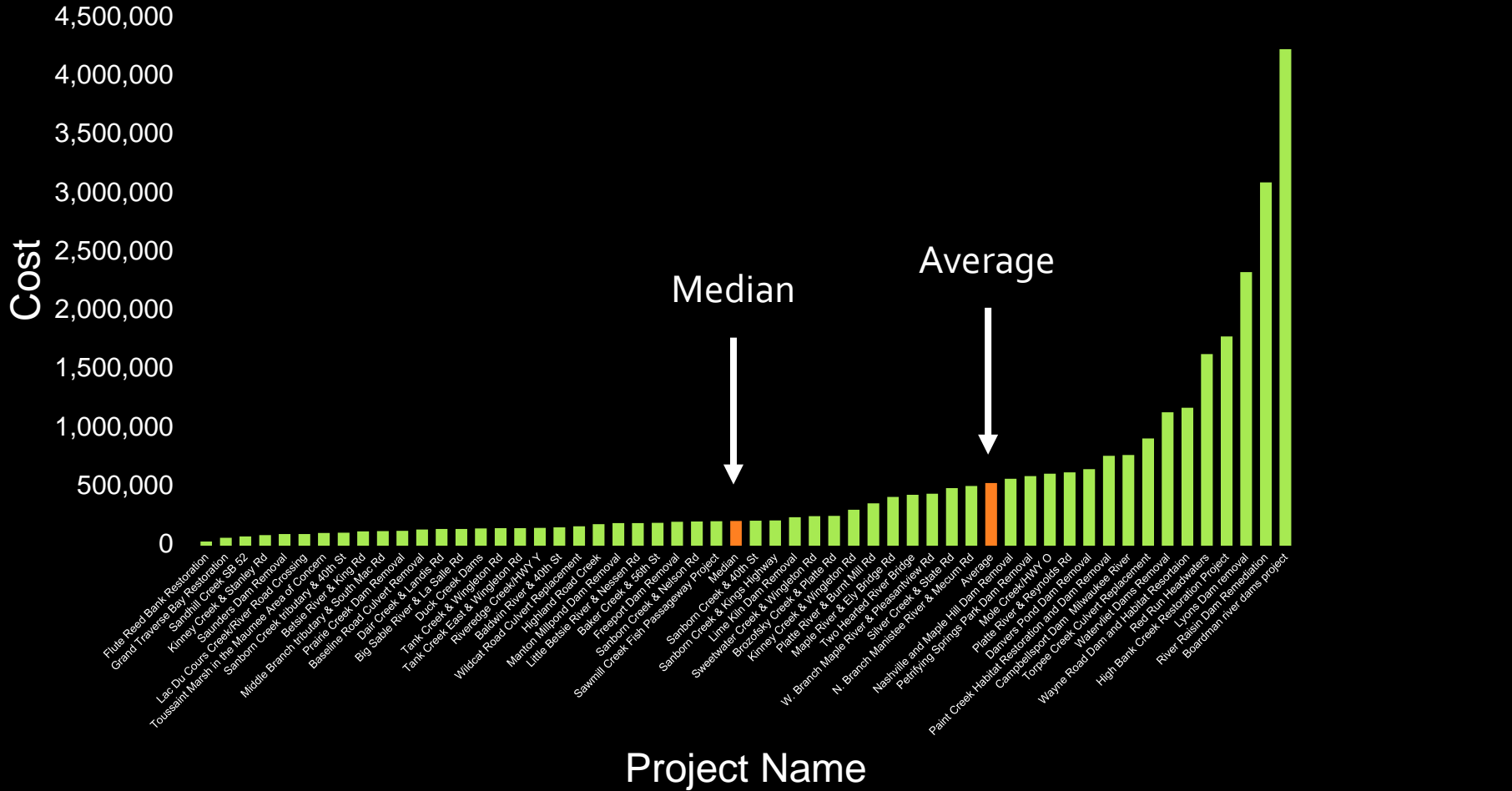
Barrier removal dataset - what?



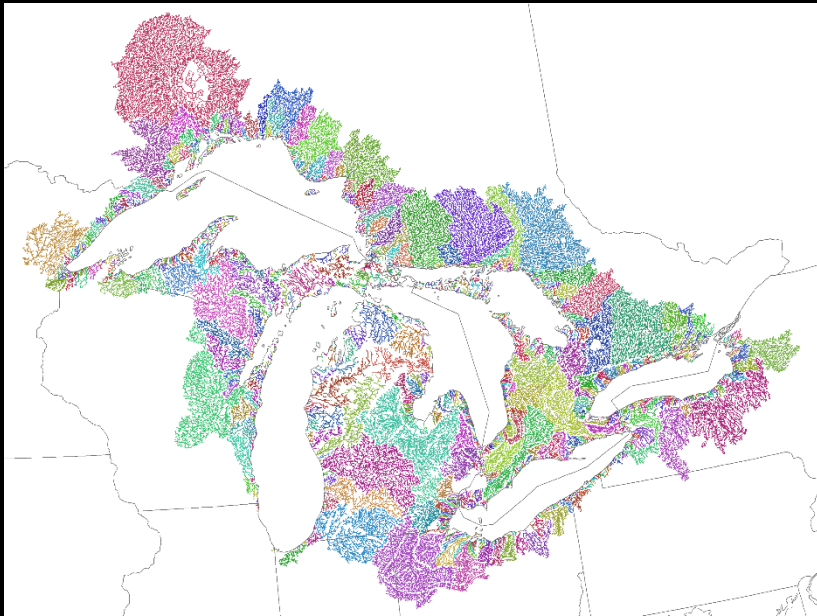
Barrier removal dataset - why?



Barrier removal database - \$\$\$?



Native species distributions



- 2881 tributaries
- 61 species
- average 3.5 species per tributary
- median 0 (0-50)

Most widely distributed



Catostomus commersonii
White sucker (29%)



Oncorhynchus mykiss
Steelhead (19%)



Rhinichthys cataractae
Longnose dace (17%)

Rules of thumb

not proportional to no. barriers

prioritize barriers with lots of
upstream habitat

overall, so much habitat is
inaccessible to fish - many
opportunities!



Thanks

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Watershed stressors - Lucinda Johnson

GLEAM Team