Assessing the Efficiency of Selective Fish Passage

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Itinerary

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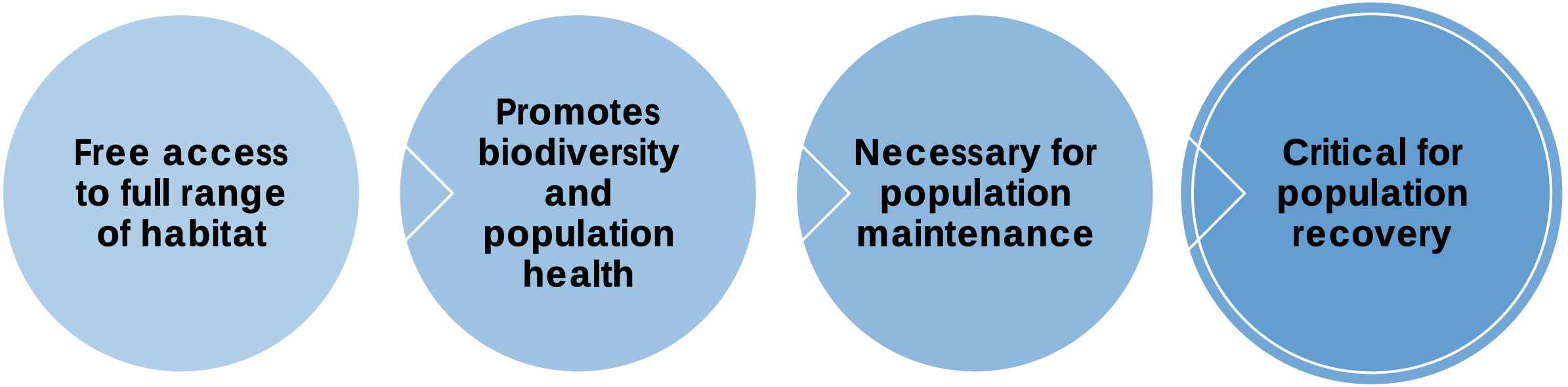
- Background
- The Big Problem
- How Selective Fish Passage (SFP) works
- How I have assessed the efficiency of SFP
- How efficient is Passive Sorting SFP?
- Causes of inefficiency

Background - Connectivity



Background - Fragmentation

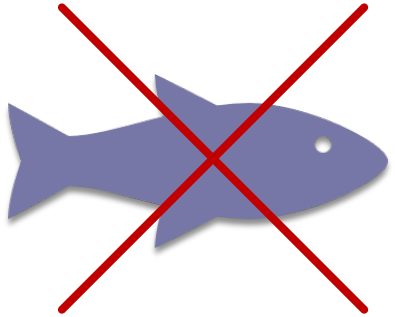
- Restricts access to some or all habitat
- Potentially reduces biodiversity
- Can lead to population decline or crash
- May be used to manage undesirable species

Trade-offs

Connectivity	Fragmentation
Increase native populations	Decrease native populations
Can benefit invasive species	Helps manage undesirable species

It’s All About Balance

Connectivity maintains biodiversity



Fragmentation manages undesirable species

Why not both?

Selective Fish Passage

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- Current methods are effective, but also expensive
- Passive Sorting may present an alternative to trap-and-sort

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- 3 Fishway sites
  - Big Carp River on Lake Superior
  - Big Creek on Lake Erie
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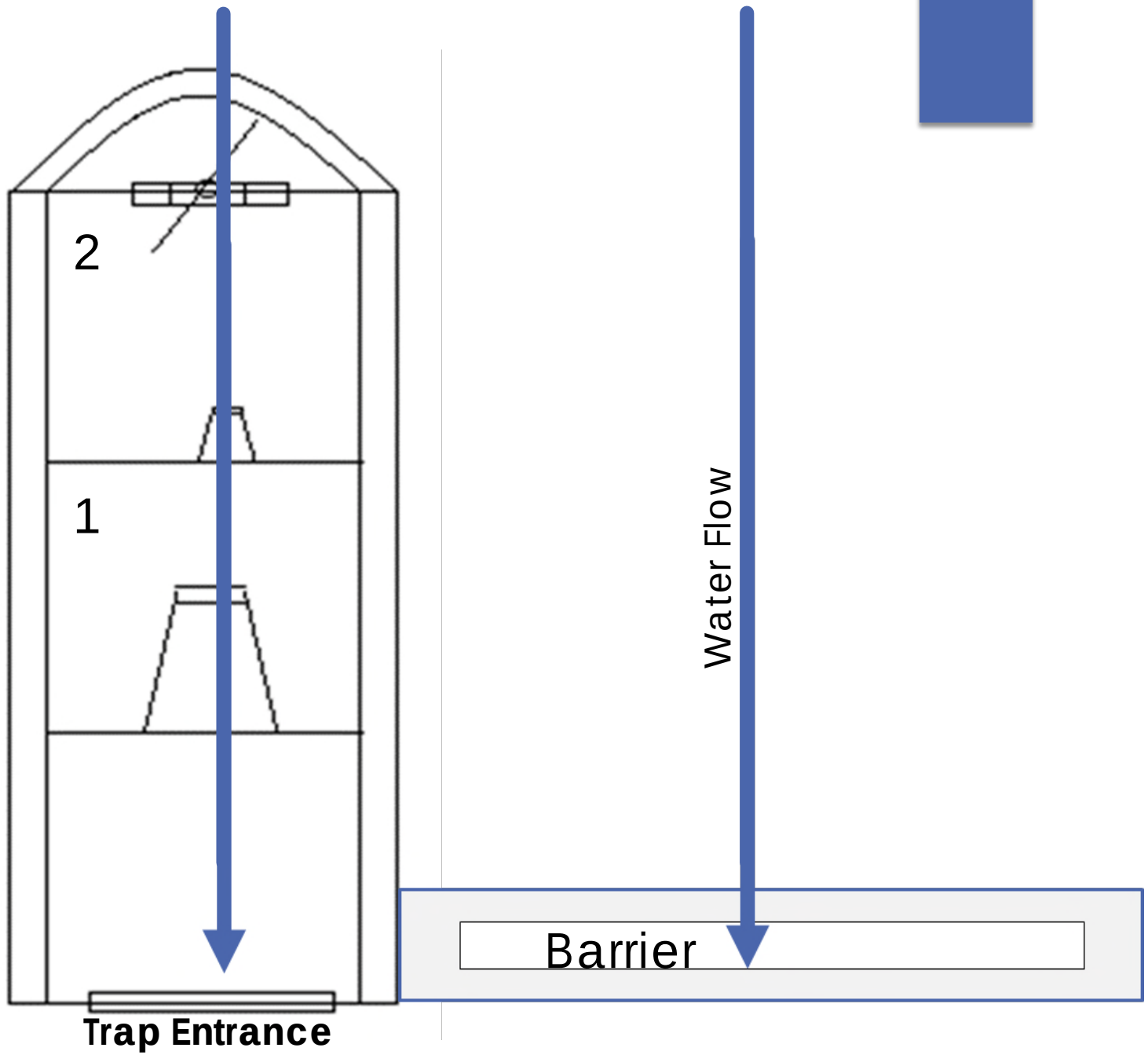
How Does SFP Work?

- Currently trap-and-sort operation
- Size-based Passive Sorting is an alternative



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- Need a baseline measurement
- Necessary to quantify management options
- Critical for tracking any improvement

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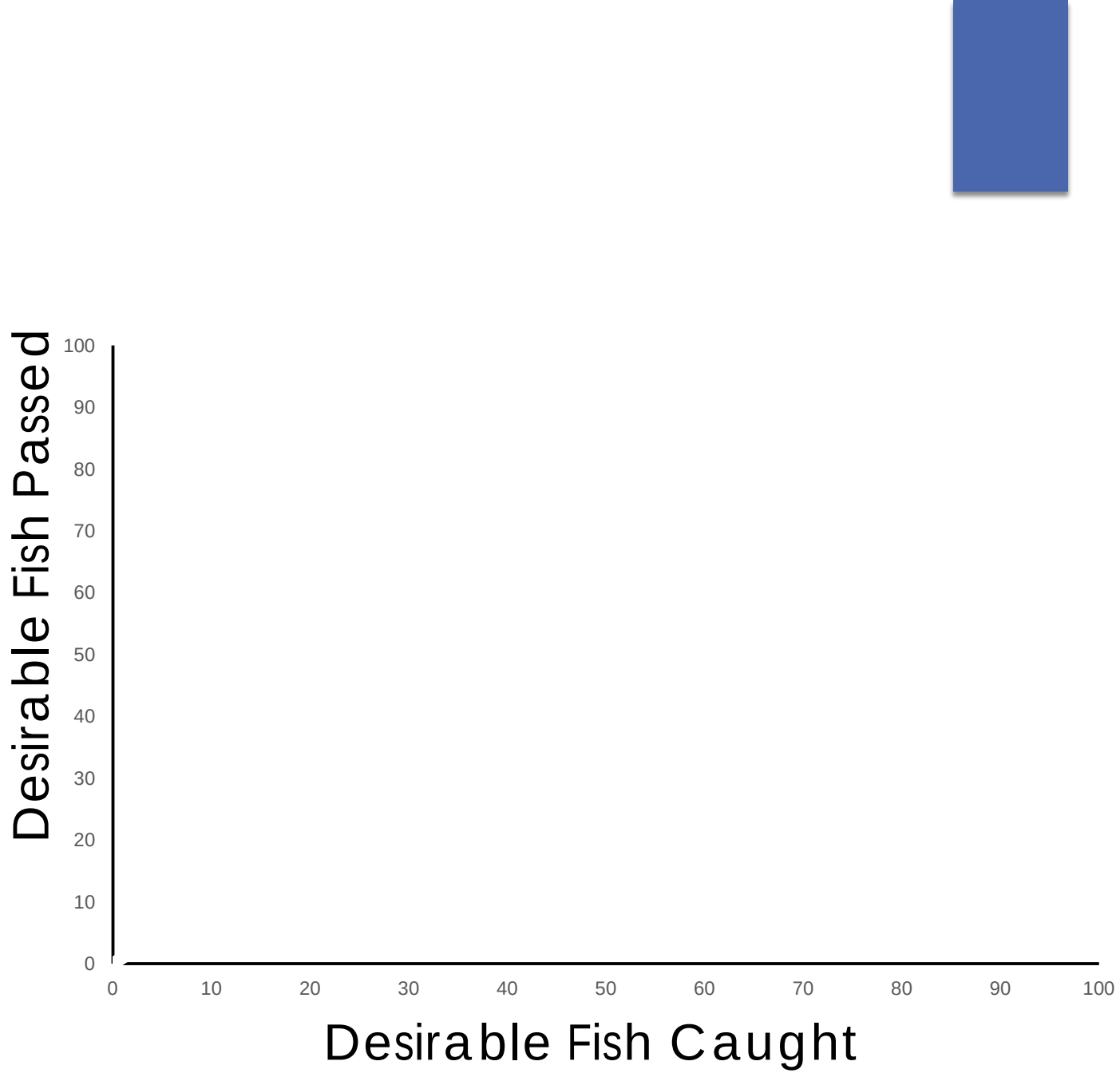
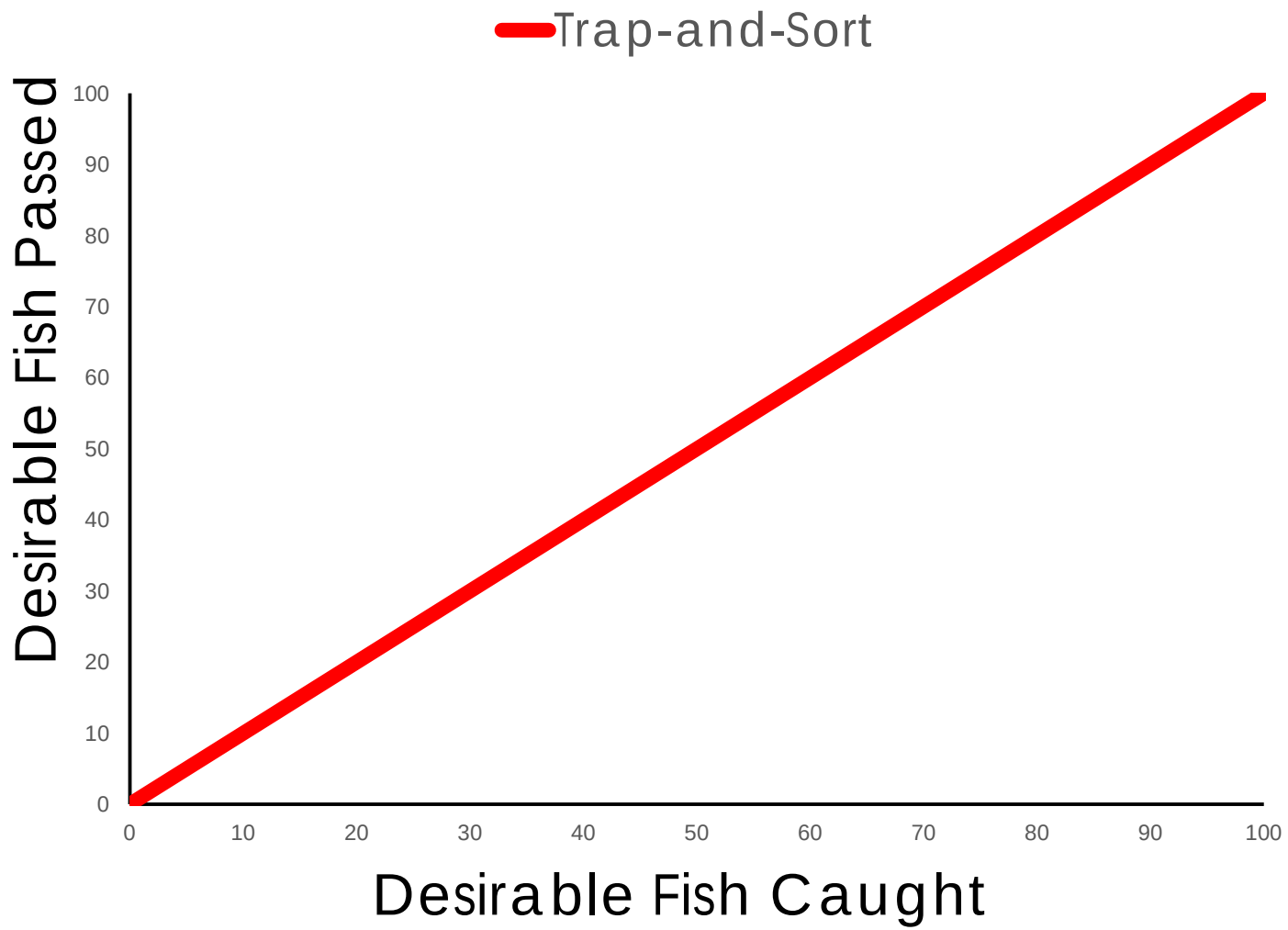
- Analyzed Data from the DFO from 1995-2015
- I used linear regression to represent efficiency

Predictions



Predictions



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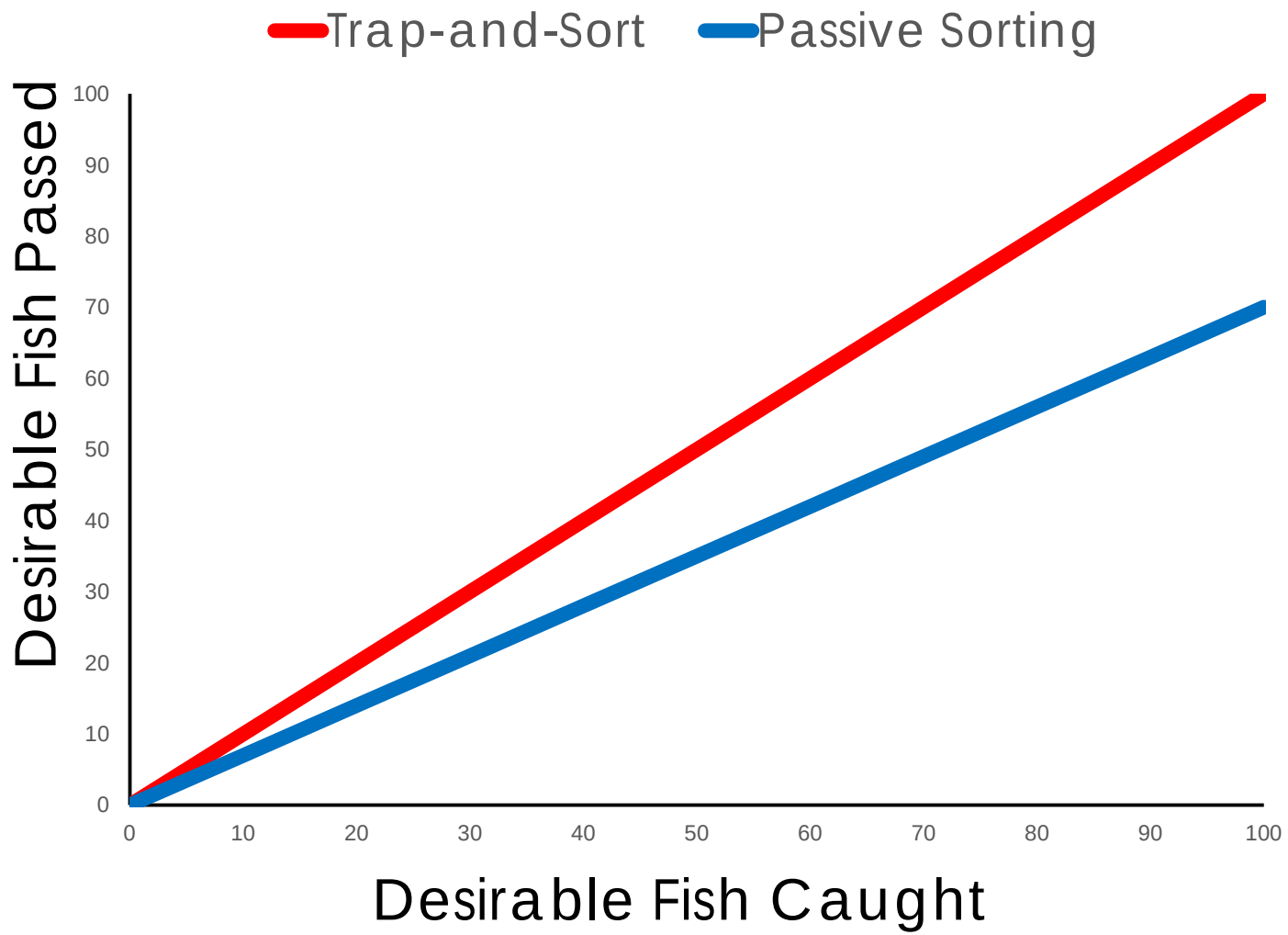
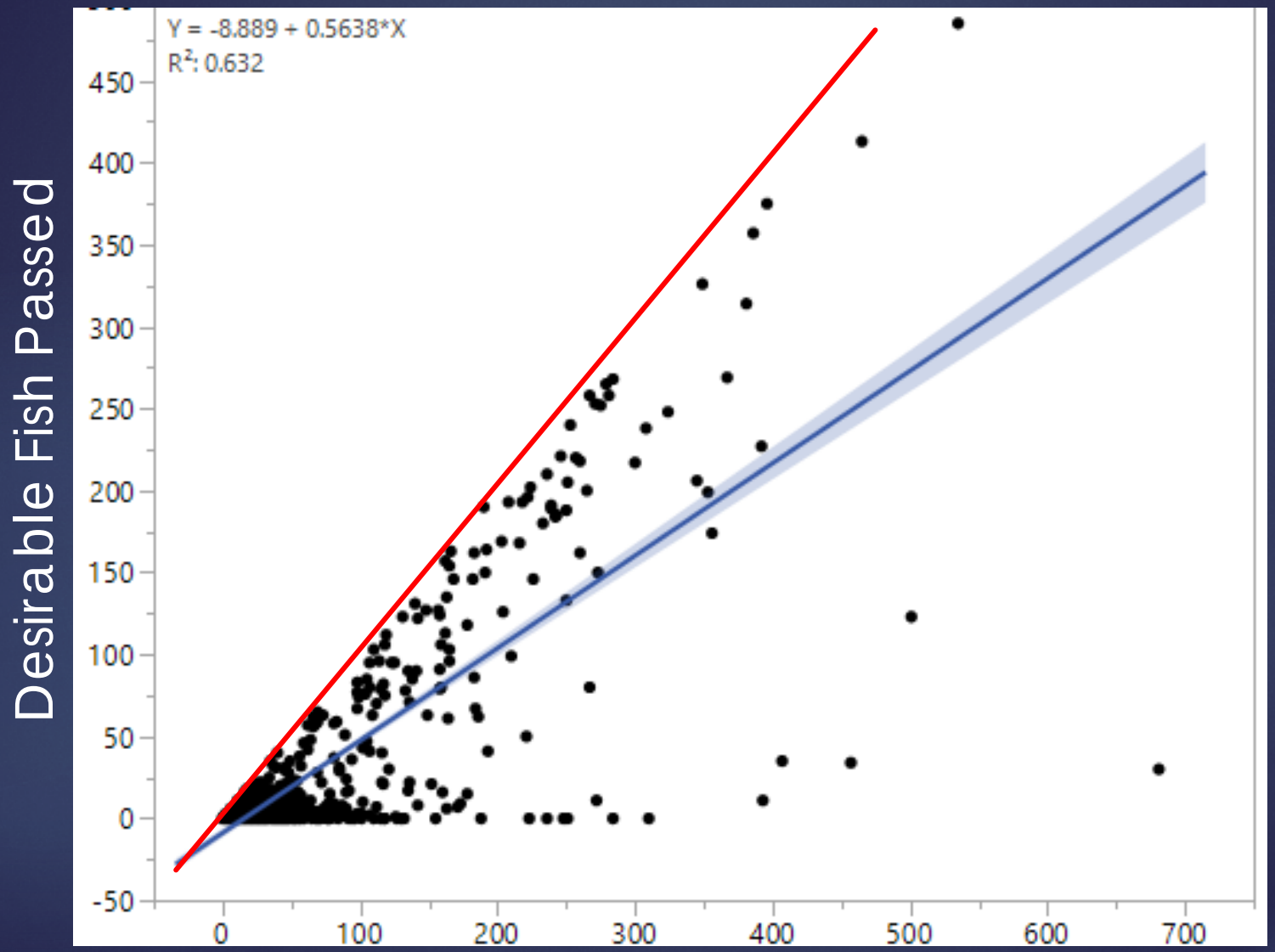
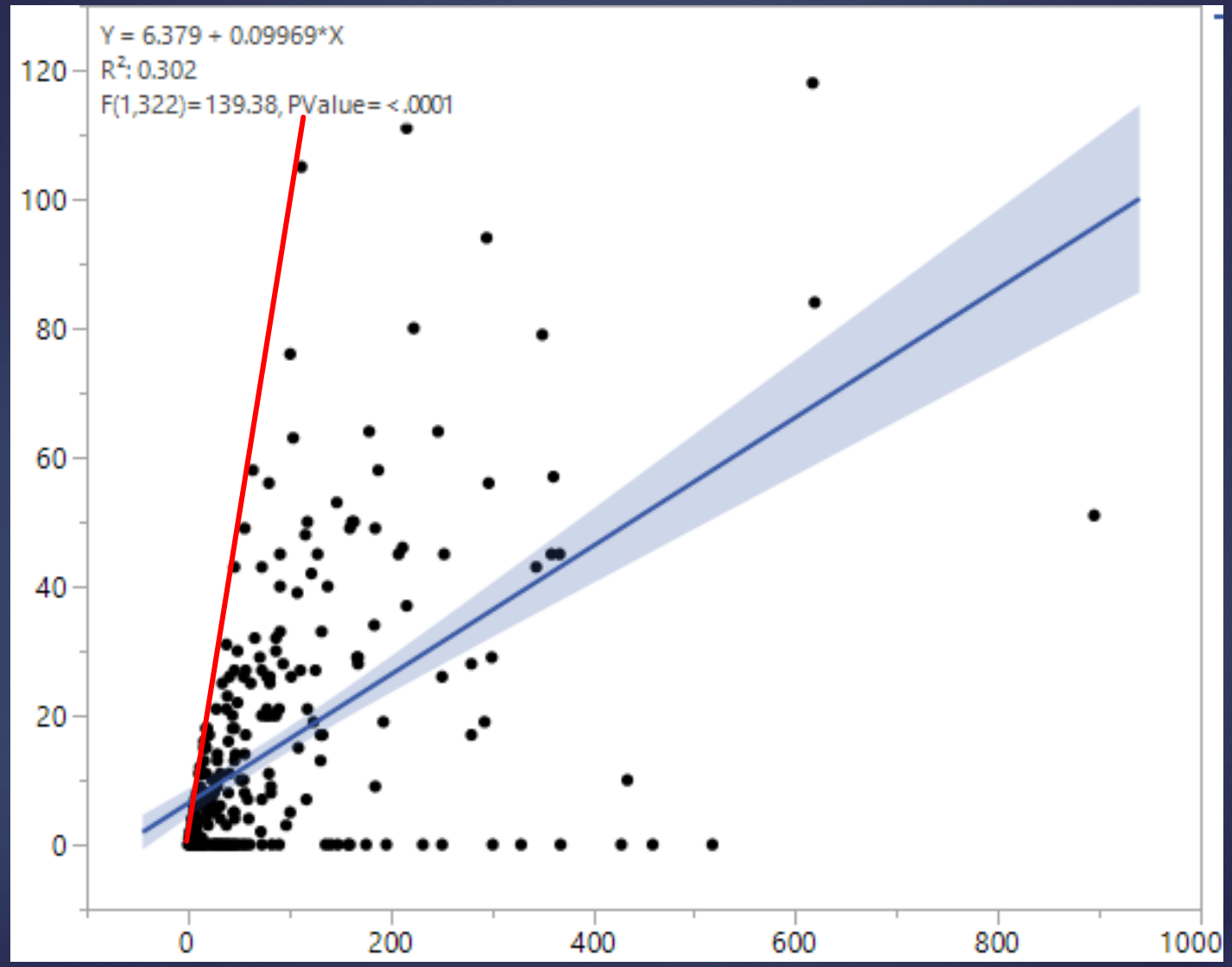


What do we find?

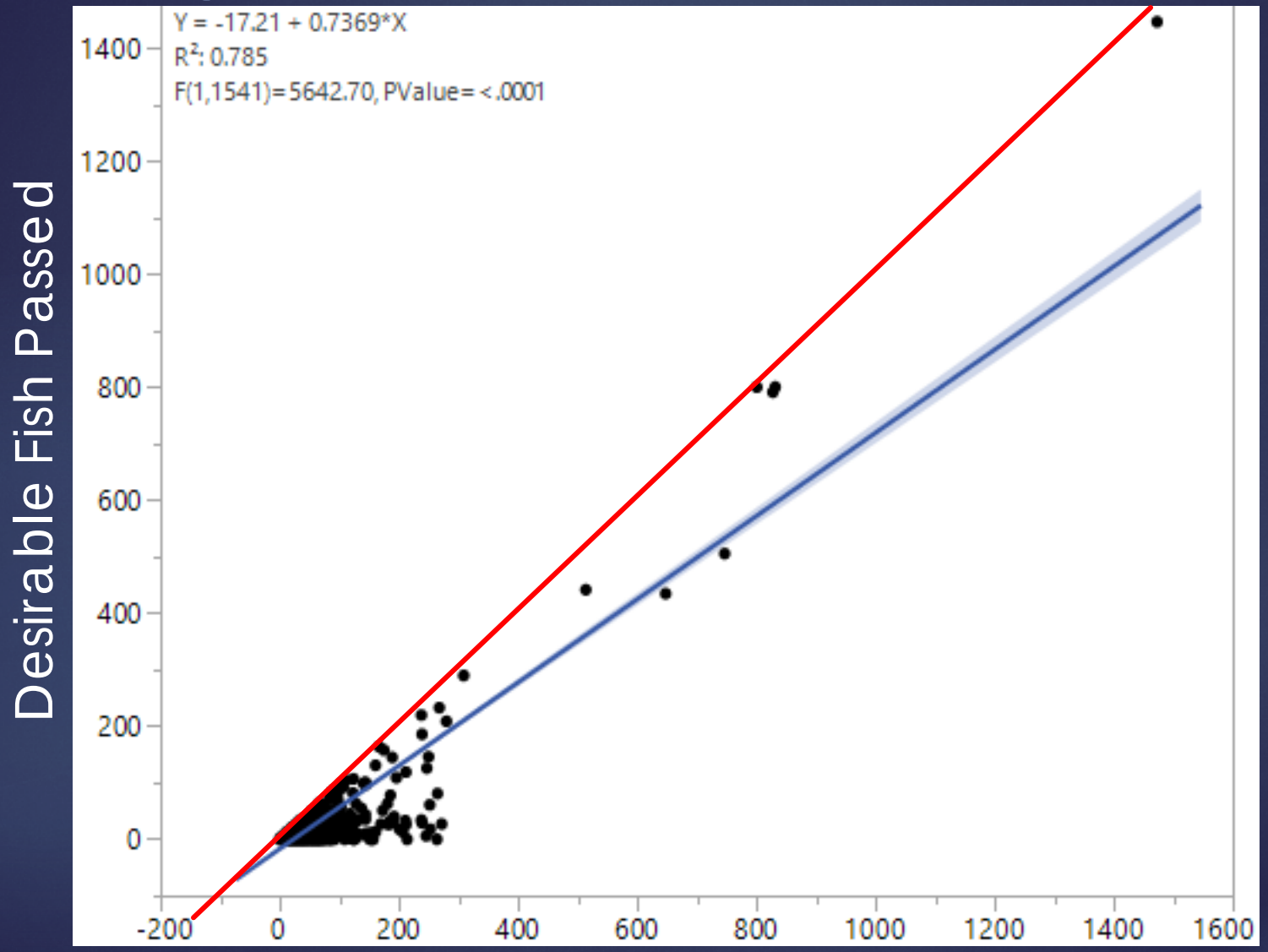
Big Carp River



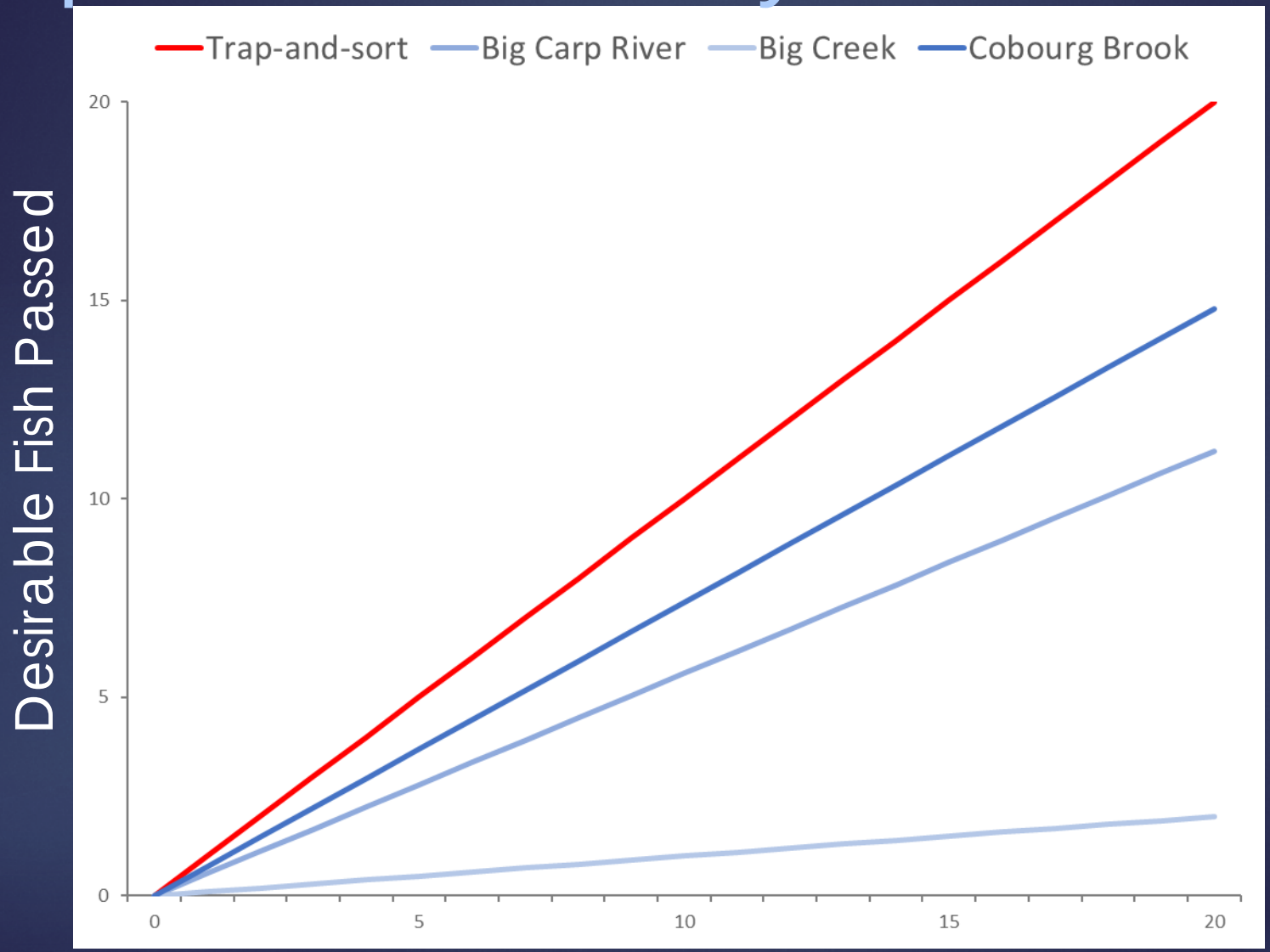
Big Creek


Y = 6.379 + 0.09969*X
R²: 0.302
F(1,322)=139.38, PValue=<.0001
120
100
80
60
40
20
0
0
200
400
600
800
1000
Desirable Fish Passed
Desirable Fish Caught

Cobourg Brook



Compared Efficiency



Efficiency of Passive Sorting

Fishway	Efficiency
Big Carp River (Lake Superior)	56%
Big Creek (Lake Erie)	10%
Cobourg Brook (Lake Ontario)	74%
Average	46.6%

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- Efficiency can be lost 2 ways
- Sea Lamprey stay in Lower Chamber
- Desirable fish move into Upper Chamber

Where was efficiency lost?

Fishway	Unpassed Desirable fish in Lower Chamber	Unpassed Desirable fish in Upper Chamber
Big Carp River	0.03%	99.97%
Big Creek	10.3%	89.7%
Cobourg Brook	0.02%	99.98%

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  - Passive sorting efficiency needs improvement
  - Most inefficiency is desirable fish in upper chamber
  - Efficiency is highly variable

Next steps

- Look to improve efficiency
- Improve trap flow consistency
- Chapter 2- Introducing light

Acknowledgements

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