Decision Tools in Support of Fish Passage

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Key Points

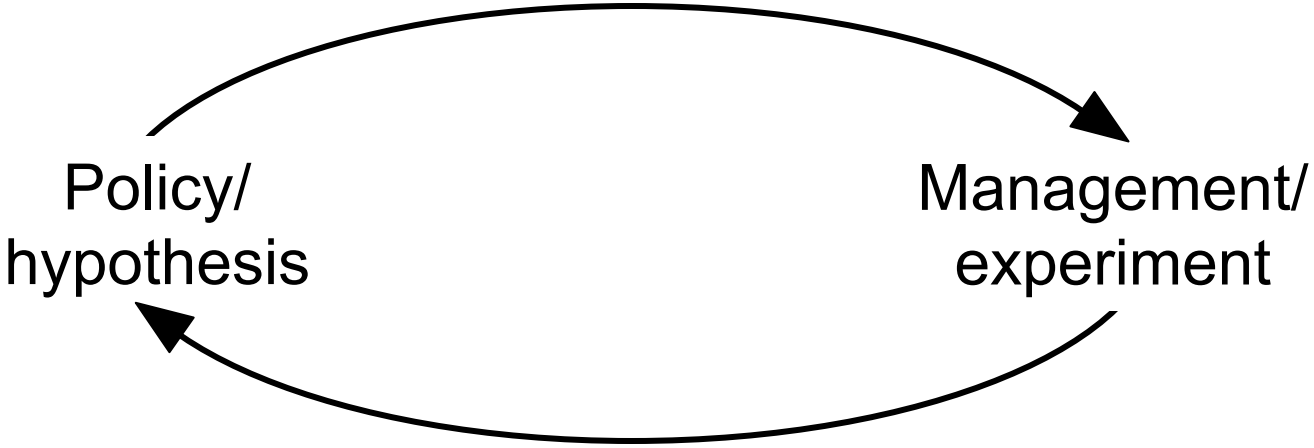
- Managers are facing greater socio-ecological complexity
- Fish passage decisions need to be made
- Structured decision making can help ensure passage decisions are sound

A Changing Management Landscape

Past/Present	Present/Future
single species systems	multi-species ecosystems
command-control - receptive users	participatory management - diverse, sophisticated users
opaque process	open and transparent
uncertainty endured	uncertainty embraced
“muddling through?”	adaptive management

Structured Decision Making

Process:



People:

Decision/policy makers, stakeholders, scientists and engineers

Tools:

Decision/real-options analyses, utility functions, Bayesian belief networks, value of information, simulations, databases/software

Linkov et al. 2006. Env Int 32:1072

Sea Lamprey Control in the Great Lakes

Sea Lamprey Barriers

Permanent

Seasonal

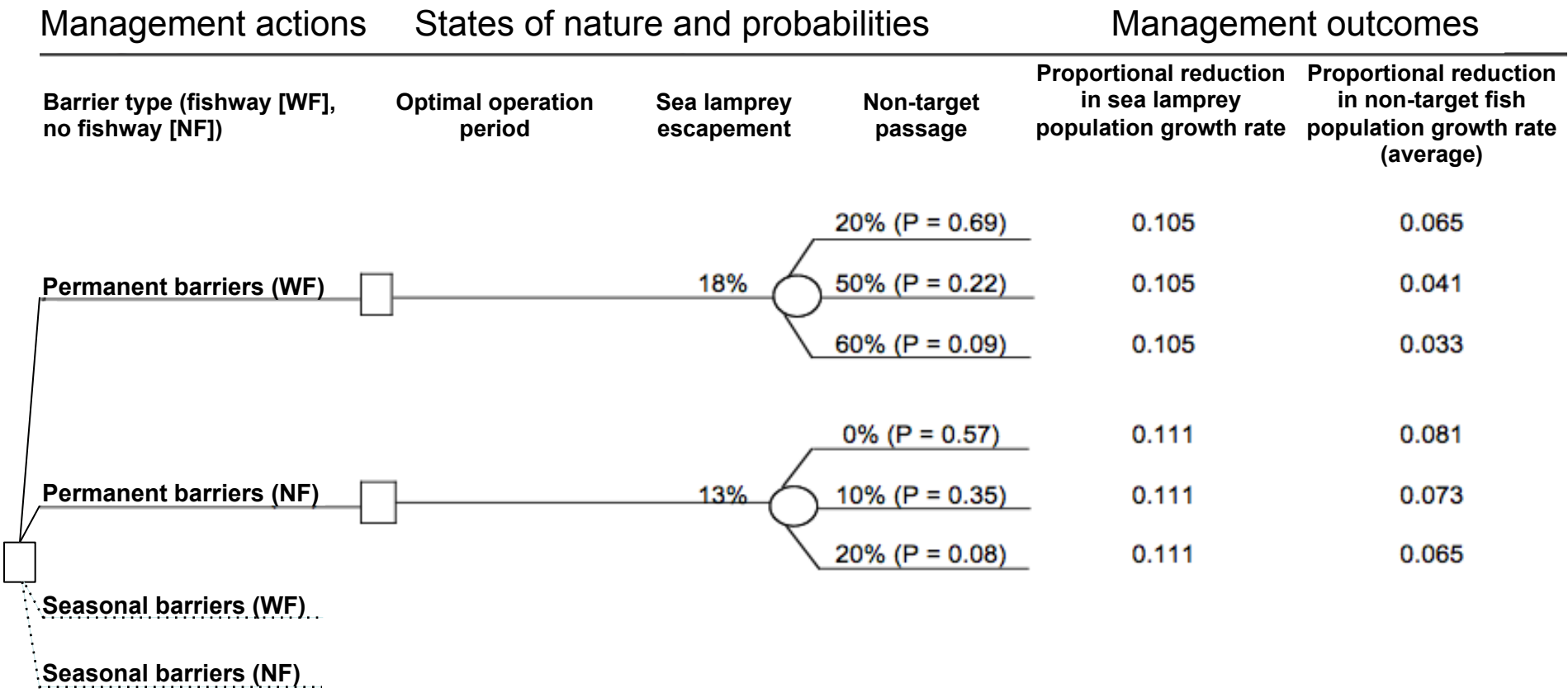
Case 1: Barrier/Fishway Options

Decision Analysis

1) Specify management objectives
2) Specify management options
3) Identify uncertainties
4) Assign probabilities to uncertainties
5) Conduct simulations linking 1-4
6) Create a decision tree
7) Rank the management options
8) Conduct sensitivity analyses

Peterman + Peters. 1998. BC Ministry of Forests, Land Management Handbook 42

Decision Tree



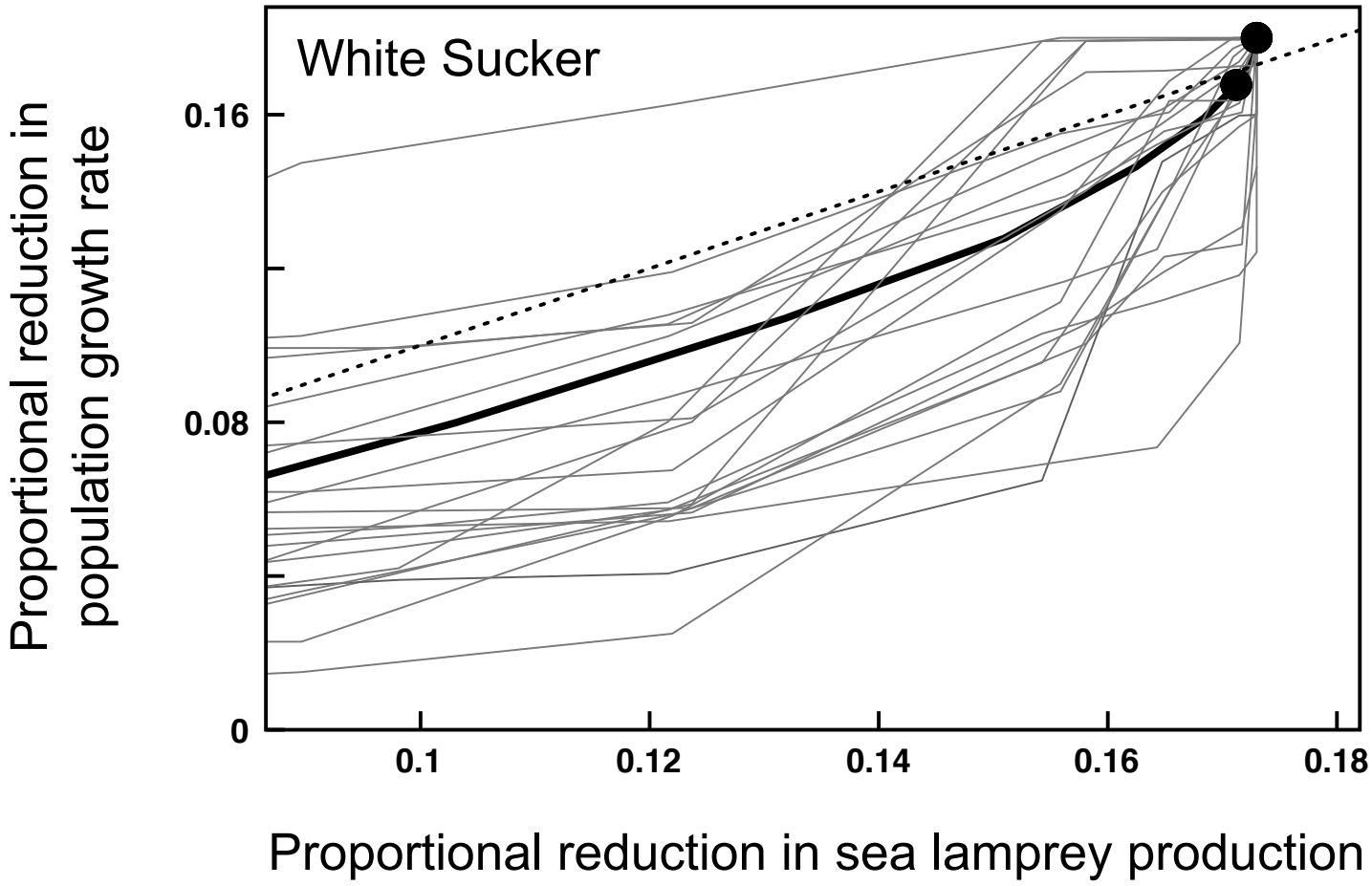
McLaughlin et al. 2008. GLFC Report

Ranking Blocking/Passage Options

Management option	Decision coefficients			
	1.0:0	0.8:0.2	0.5:0.5	0.2:0.8
PB(NF)	1	3	4	4
PB(WF)	3	2	1	2
SB(NF)	2	1	2	3
SB(WF)	4	4	3	1

McLaughlin et al. 2008. GLFC Report

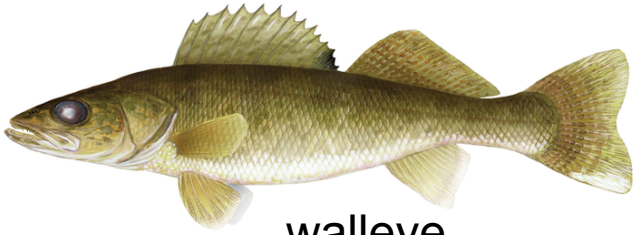
Uncertainty With Seasonal Barriers



Velez et al. 2011. Biol Cons 144:1068

Case 2: Dam Removal

Dam Removal: Black Sturgeon River



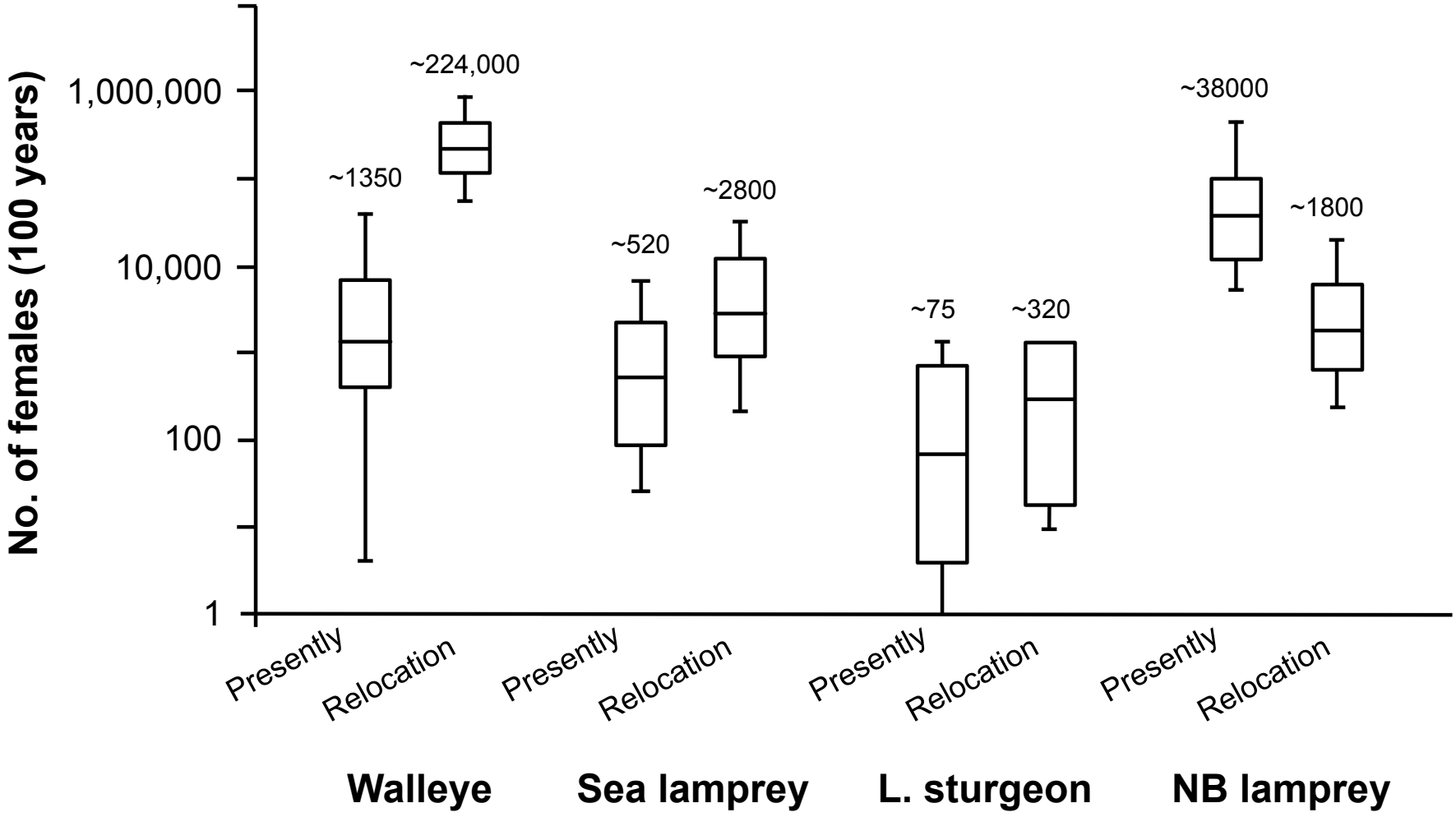
walleye

sea lamprey

lake sturgeon

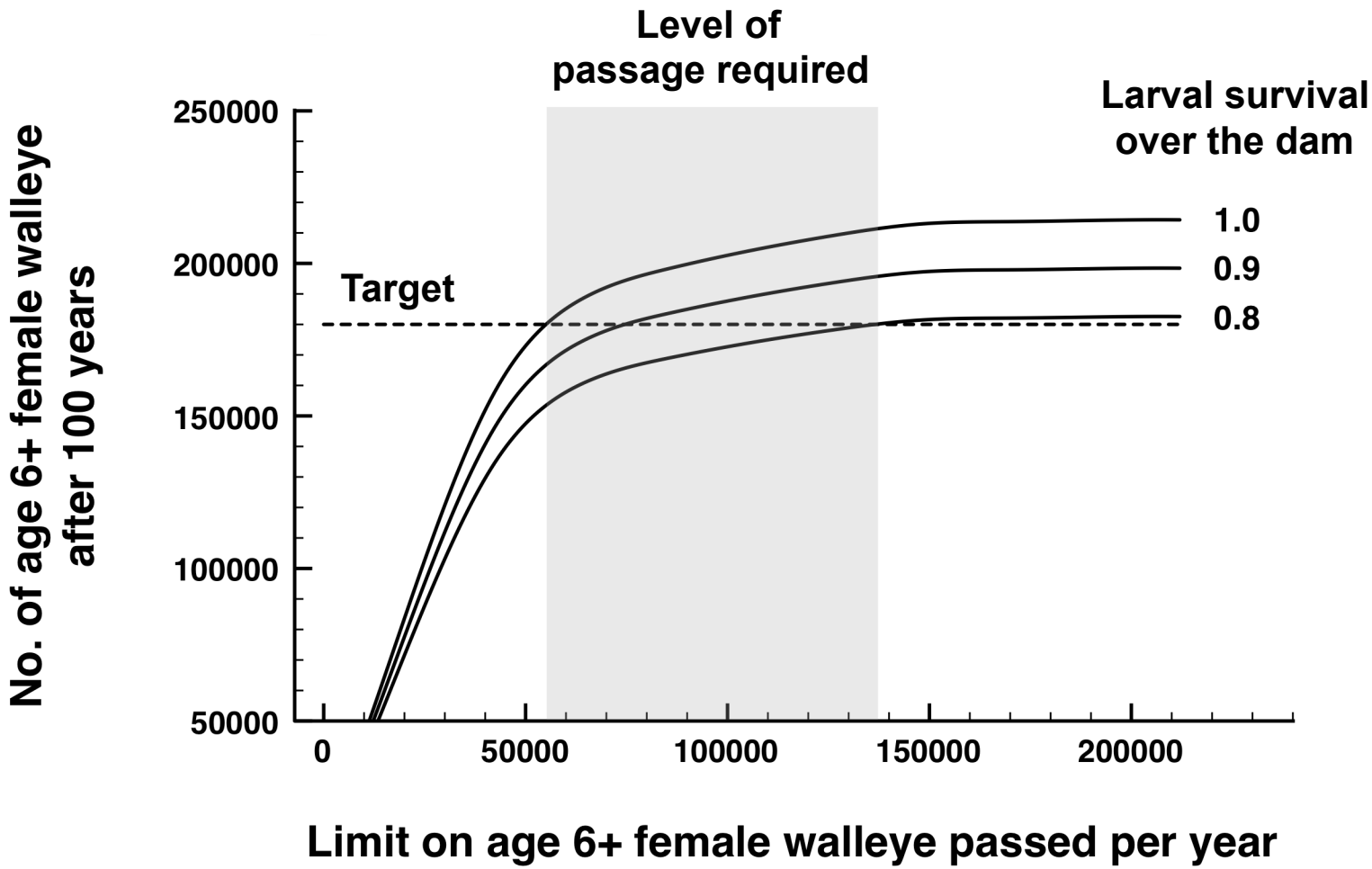
northern brook lamprey

Trade-offs: Abundances



Smyth et al. 2013. CJFAS in revision

Uncertainty: Fish Passage



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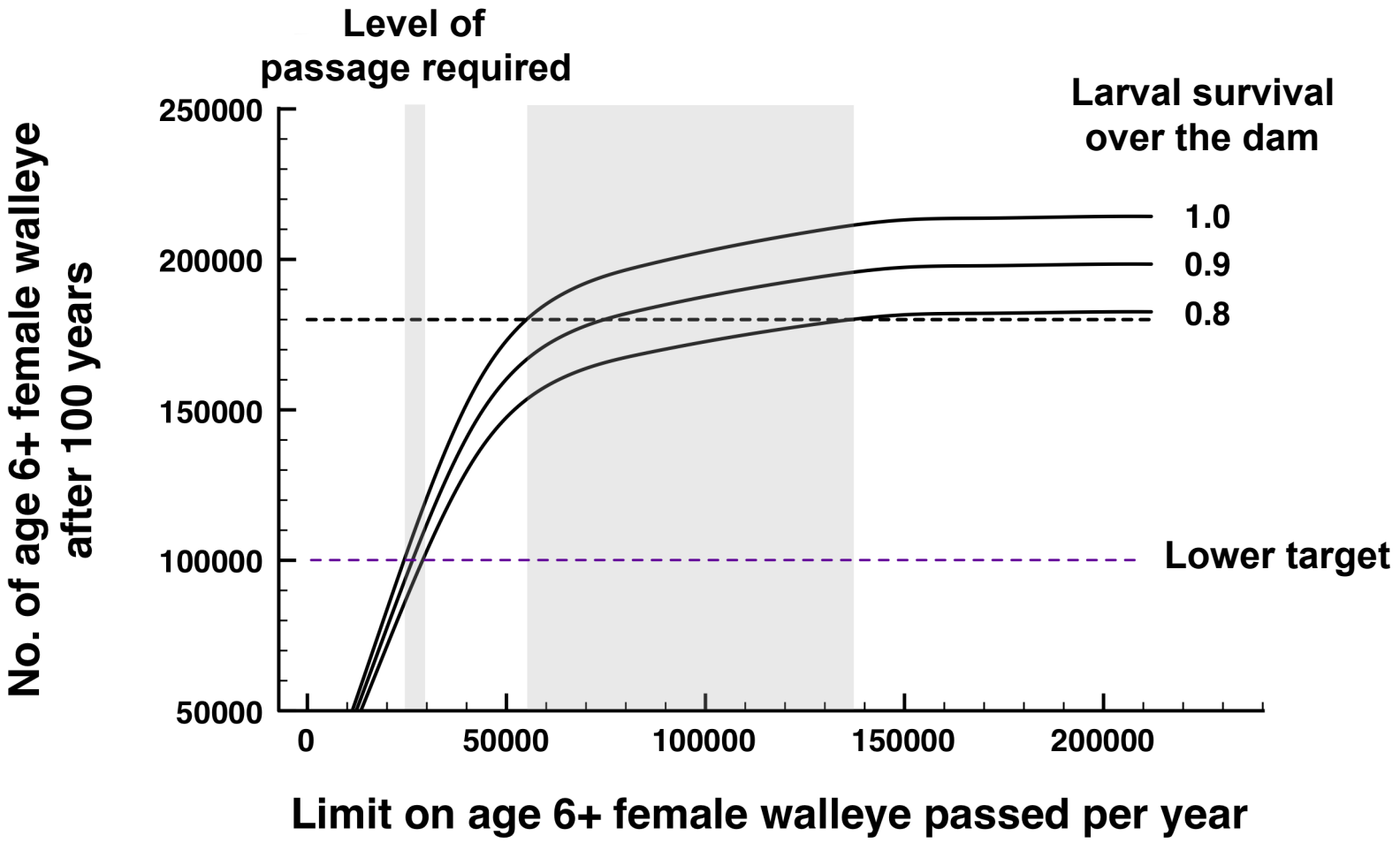
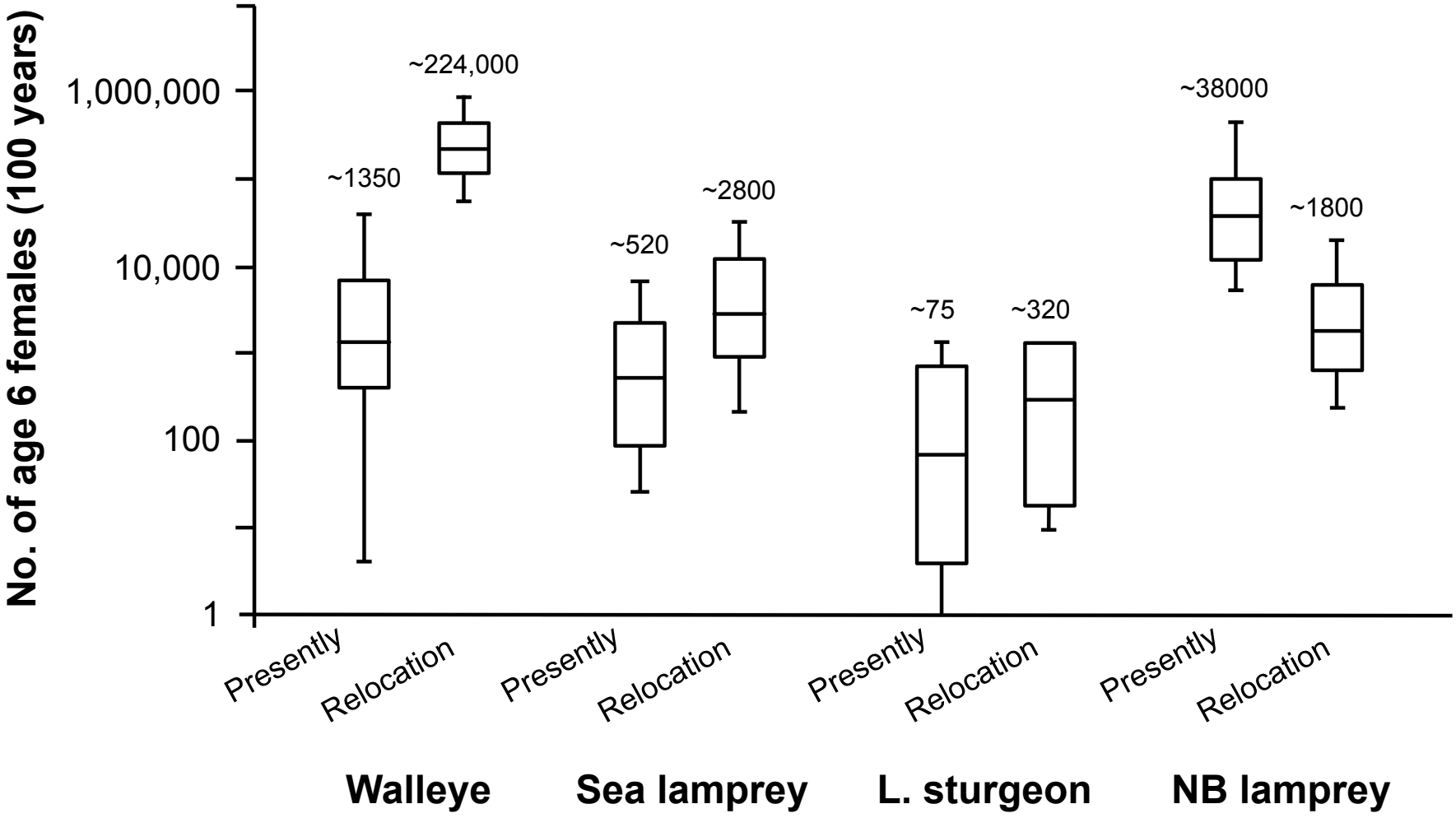
Uncertainty: Fish Passage



Smyth et al. 2013. CJFAS in revision

Uncertainty: Spawning Habitat Limiting? Yes.



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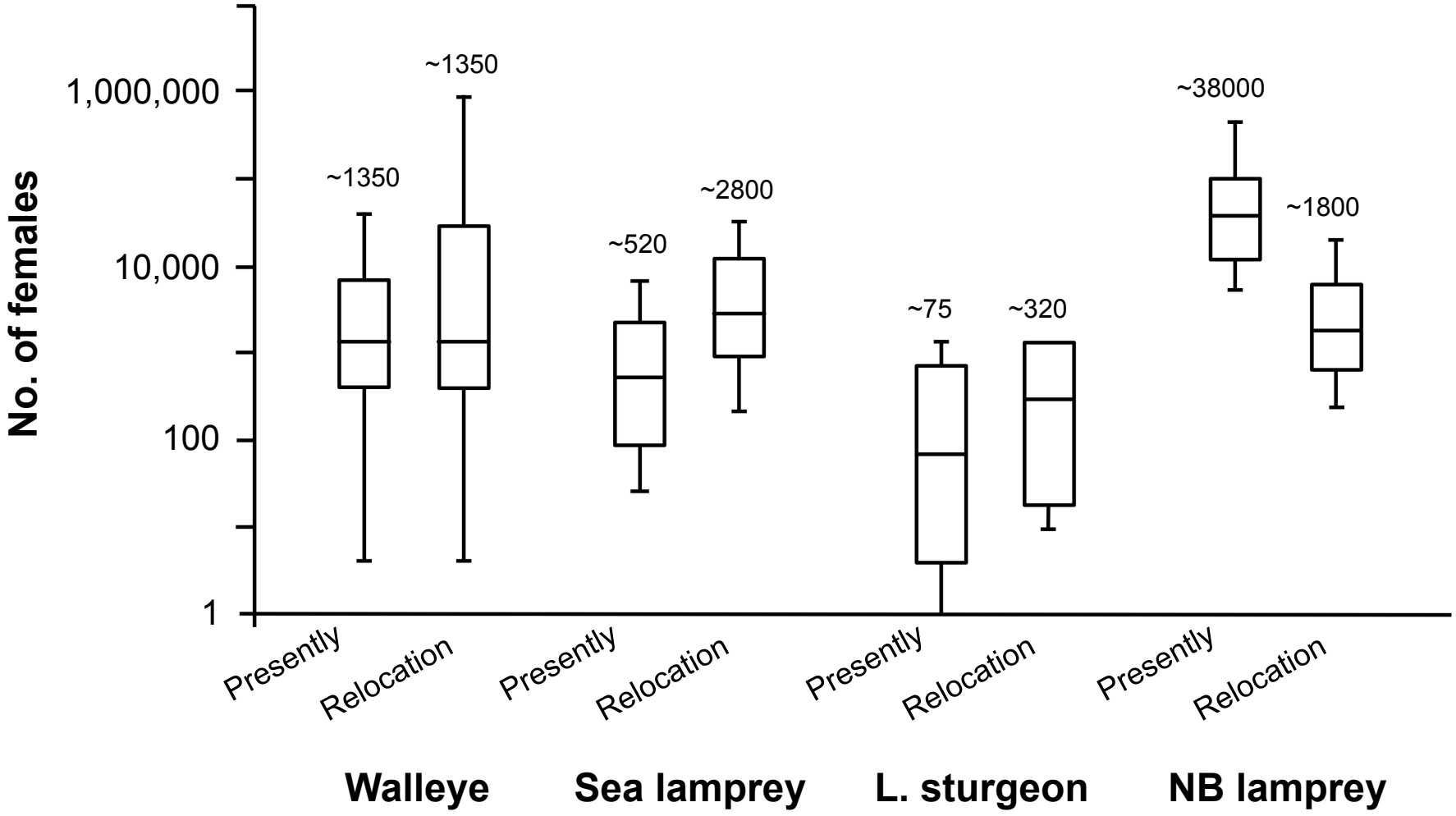

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Acknowledgements

Eric Smyth, ECOFISH Research, Vancouver, ON
Bill Harford, University of Miami, FL
Mike Jones,, Michigan State University, East Lansing, MI
Marten Koops, Fisheries and Oceans Canada, Burlington, ON
Tom Pratt, Fisheries and Oceans Canada, Sault Ste Marie ON
Luis Antonio Velez-Espino, Fisheries and Oceans Canada, Nanaimo, BC

Great Lakes Fishery Commission
Fisheries and Oceans Canada, Sea Lamprey Control
US Fish and Wildlife Service
Michigan Department of Natural Resources
Ohio Department of Natural Resources
Ontario Ministry of Natural Resources, Upper Great Lakes Management Unit
Wisconsin Department of Natural Resources