

Rethinking Black Bass management – populations, habitats and people

May 2nd, 2025

Watersheds Canada

David Philipp – Fisheries Conservation Foundation
Steven Cooke – Carleton University, Ottawa
Julie Claussen – Fisheries Conservation Foundation
Cory Suski – University of Illinois, Illinois
Justin Lombardo – University of Illinois, Illinois
Aaron Zolderdo – Queens University Biological Station
Luc LaRochelle – Carleton University, Ottawa
Dwayne Struthers – Charleston Lake Association
Hansen Downer – Big Rideau Lake Association
Sam Woods – University of Toronto, Toronto
Reace Murphy – Carleton University, Ottawa
Liam O’Grady – Carleton University, Ottawa





Dr. David Philipp



Dr. Steven Cooke



Dr. Cory Suski

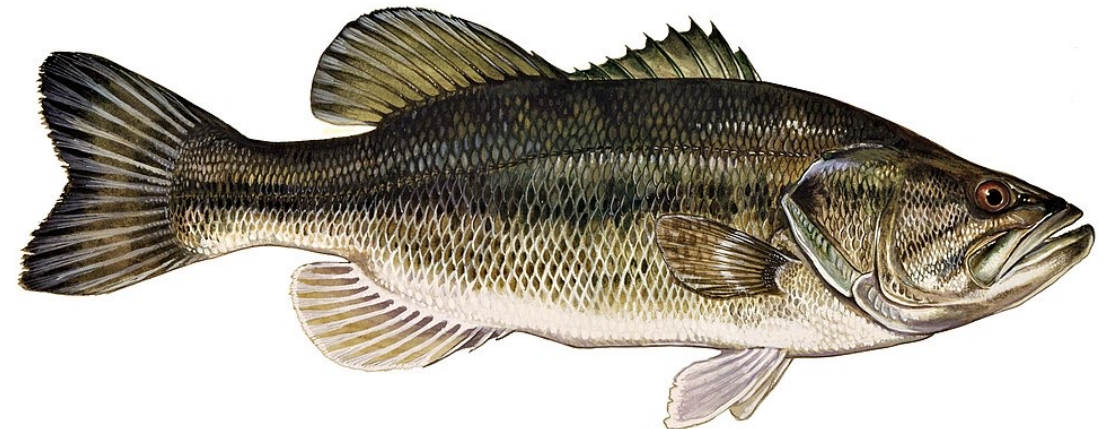




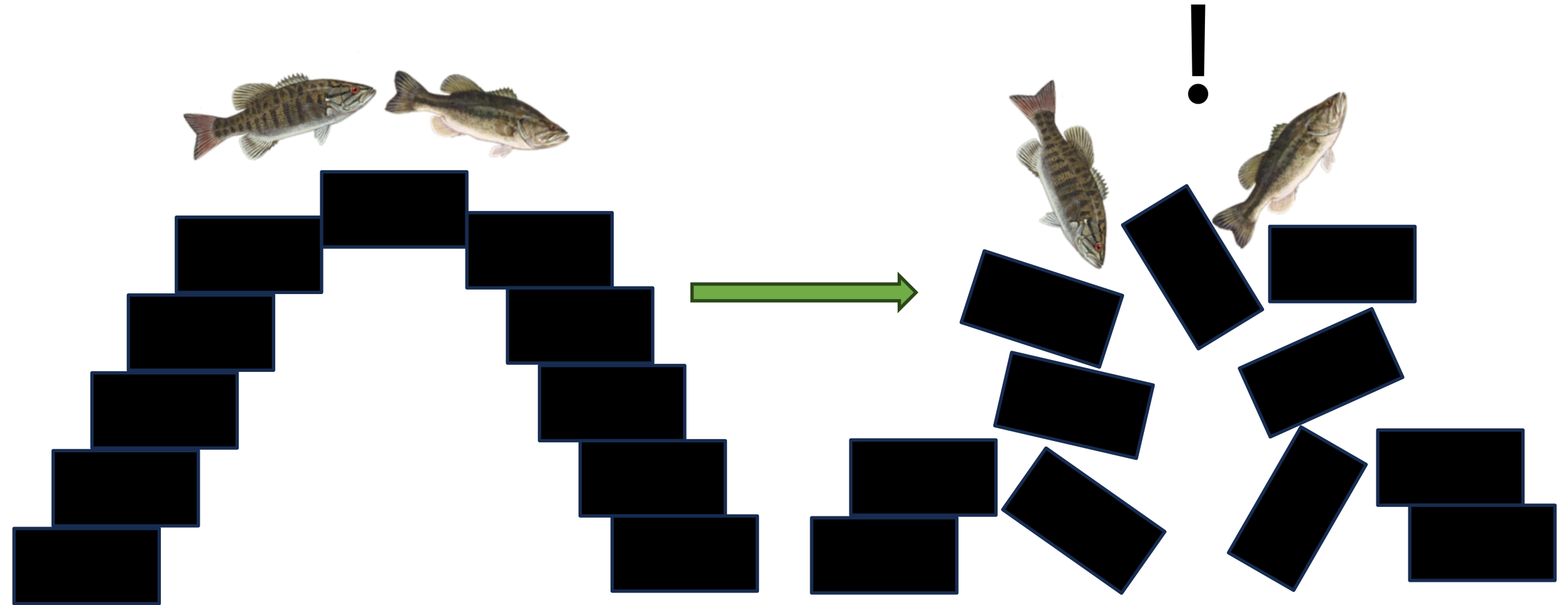
**Black Bass
Spawning
Sanctuaries**



**Small areas of good
spawning habitat closed to
ALL fishing during an
extended reproductive
period**

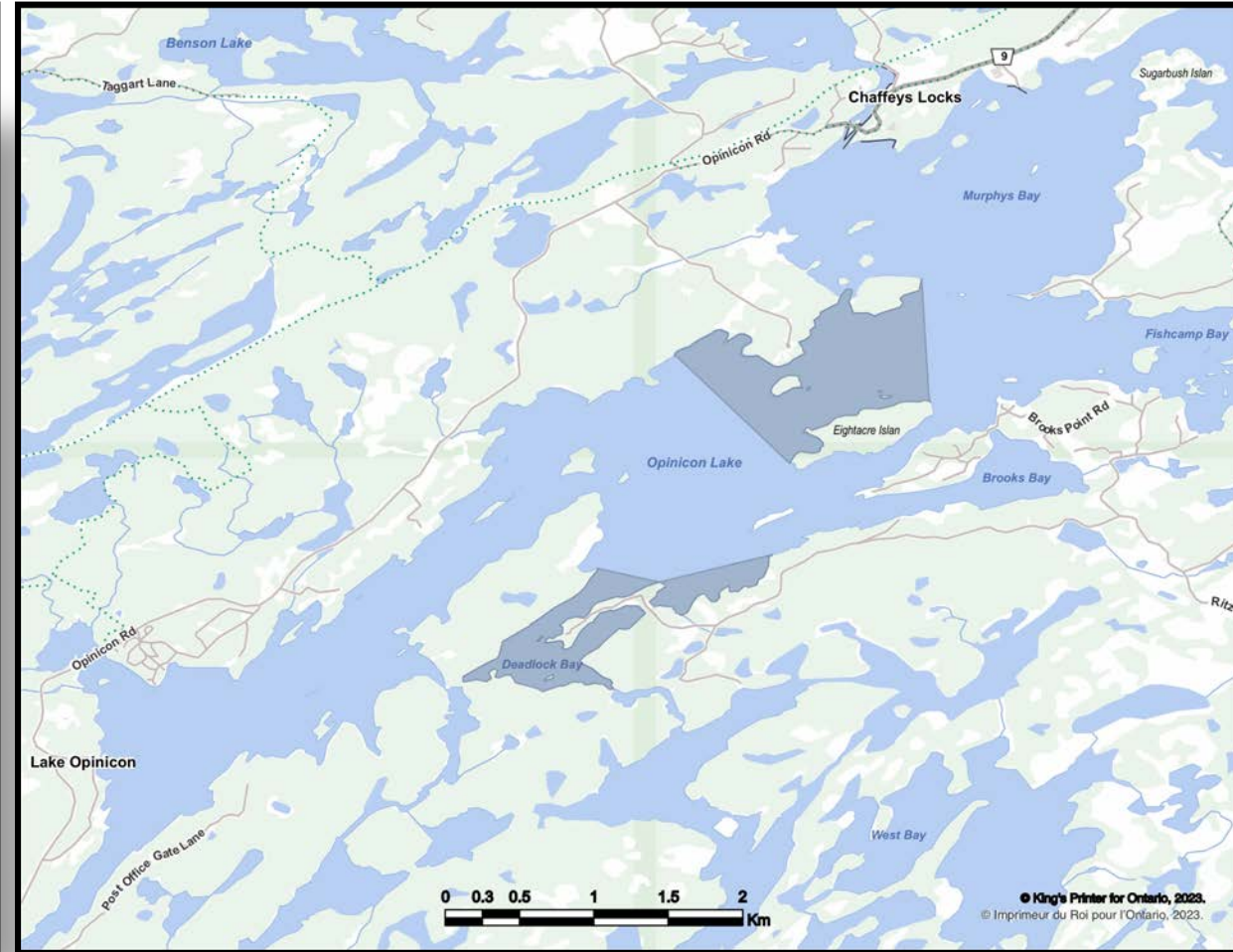


Why Black Bass Spawning Sanctuaries?





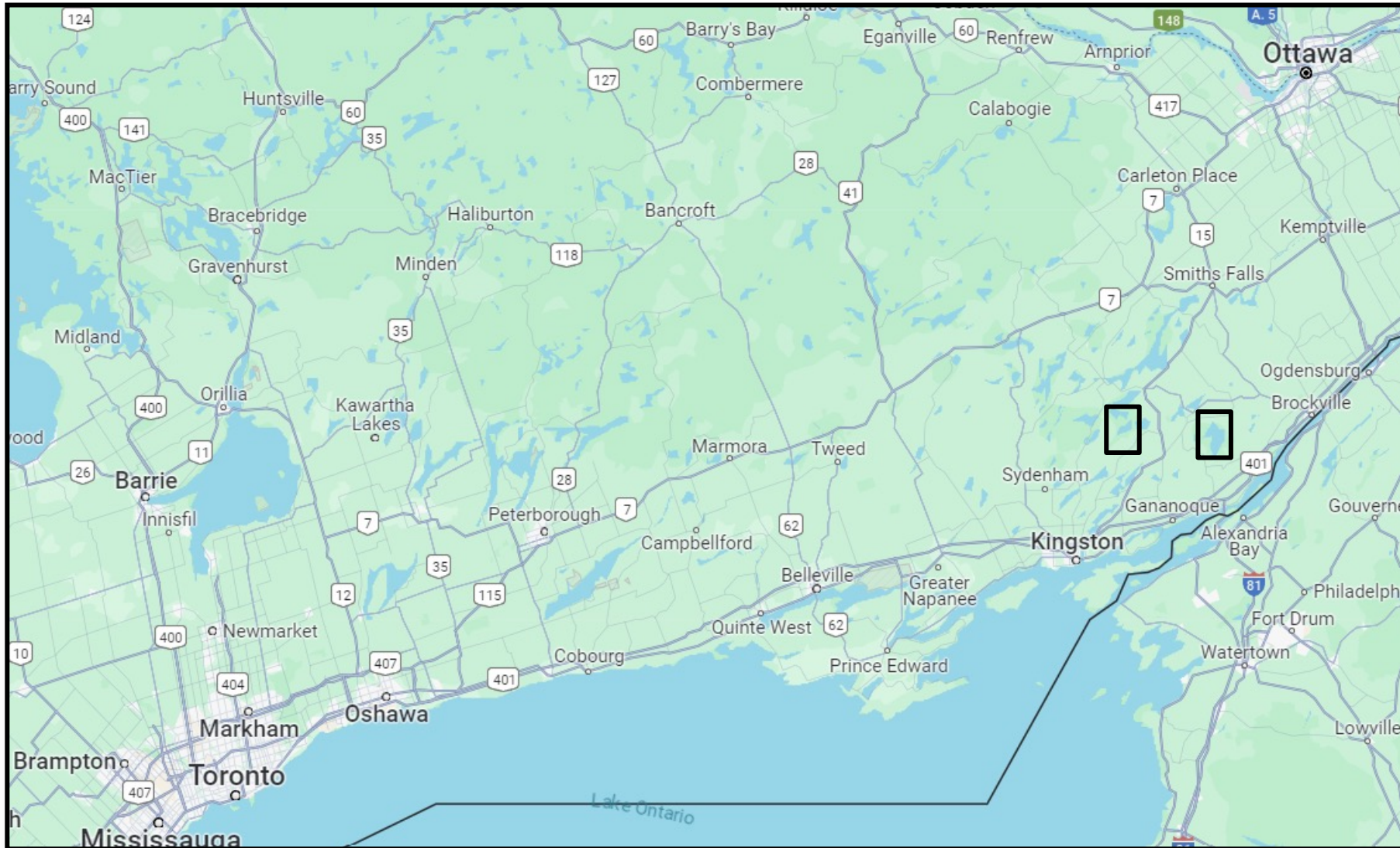
Charleston Lake

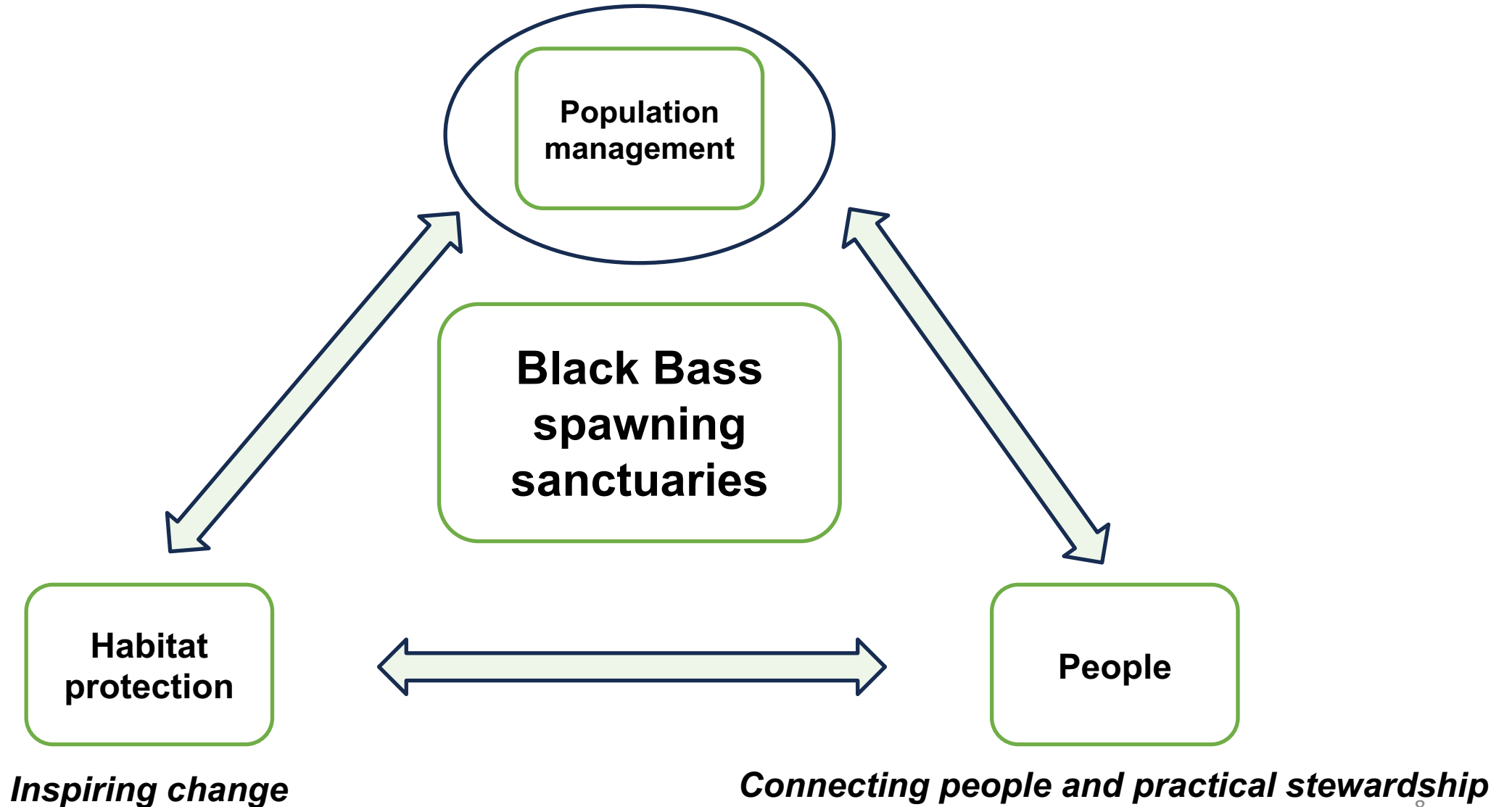


Opinicon Lake



Black Bass spawning sanctuaries







“...fishing of aquatic animals (mainly fish) that do not constitute the individual's primary resource to meet basic nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets.” (FAO 2012)



- Recreational fisheries are important for many reasons!

“...similar extrapolations of Canadian recreational capture rates would suggest that 47.10 billion fish are landed on a global basis annually” (Cooke & Cowx 2004)

- More pressure on freshwater fisheries
- More impactful than commercial?



Canada's Recreational Fisheries: The Invisible Collapse?

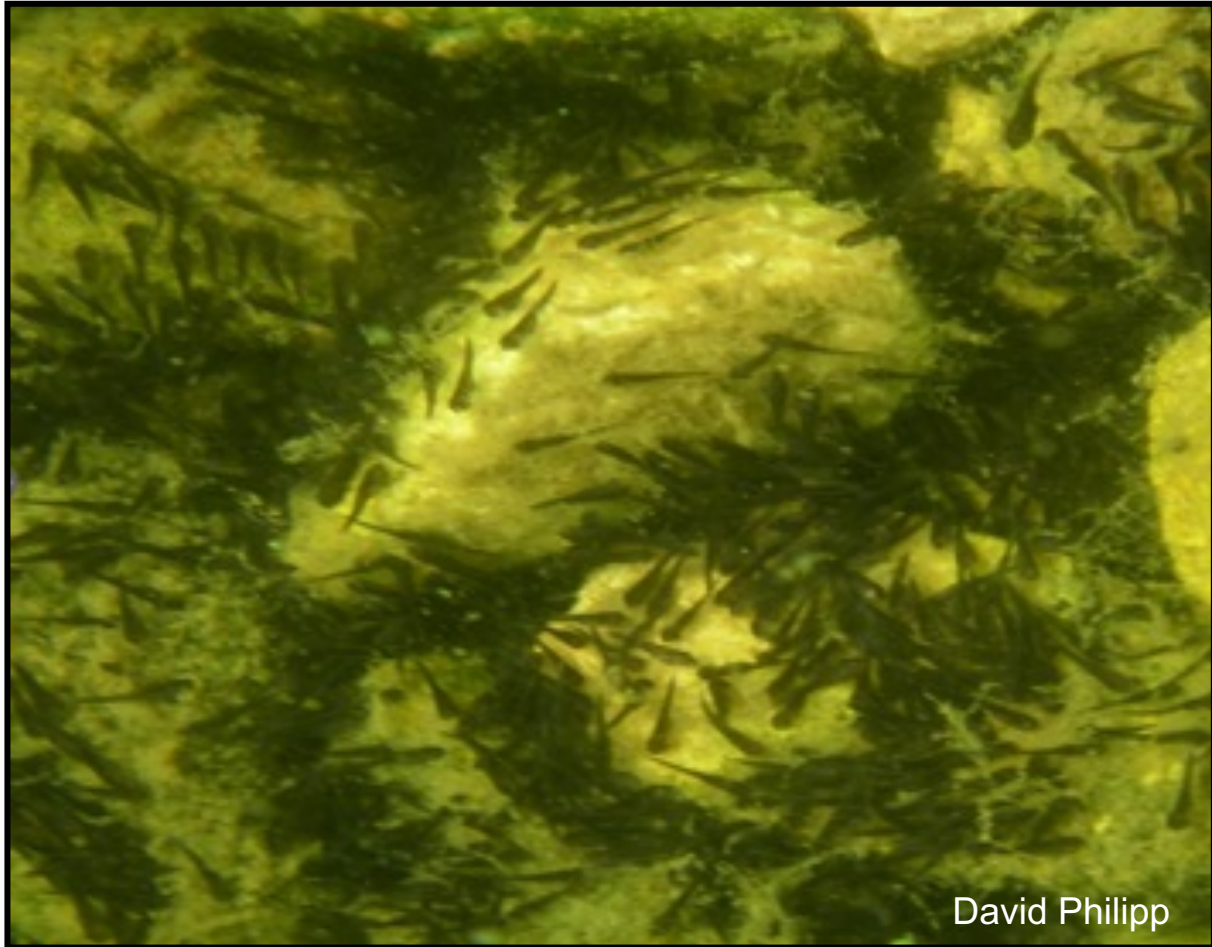
(Post et al. 2002)

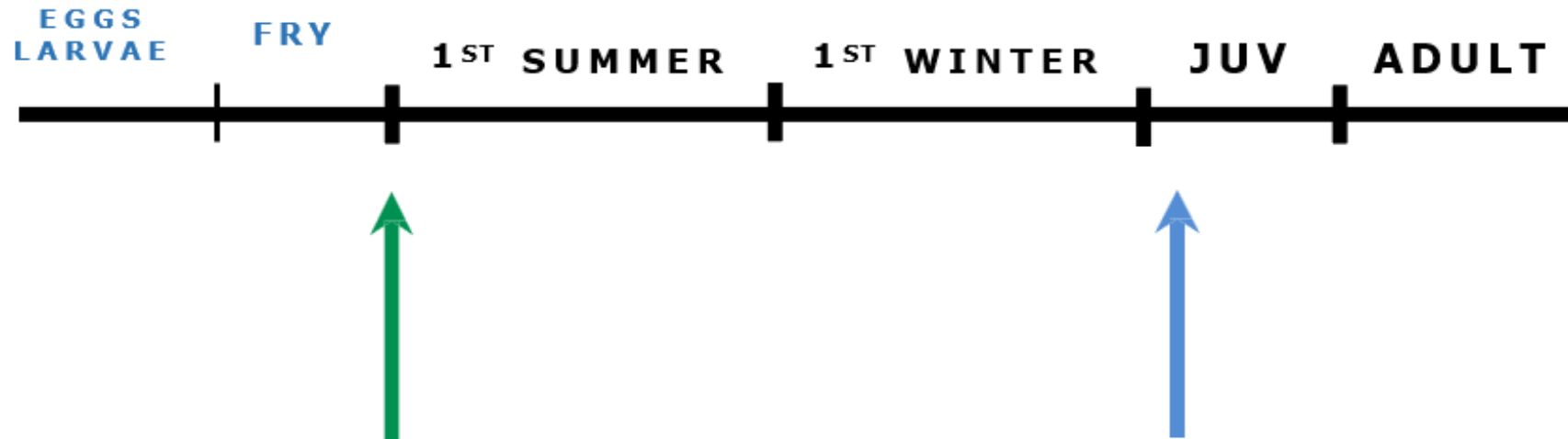
- **Technology**
- **Large spatial/temporal scales**
- **“Shifting baselines” (Pauly 1995)**
- **Inability to detect changes**

Catch-and-release:

- **Popular in North America**
- **Only works if impact is low: mortality/sublethal**
- **Populations?**







**Reproductive Success =
INDEPENDENT FRY**

1. Nesting Success

**Recruitment =
1+ JUVENILES**

2. Population Success
- Many fish species



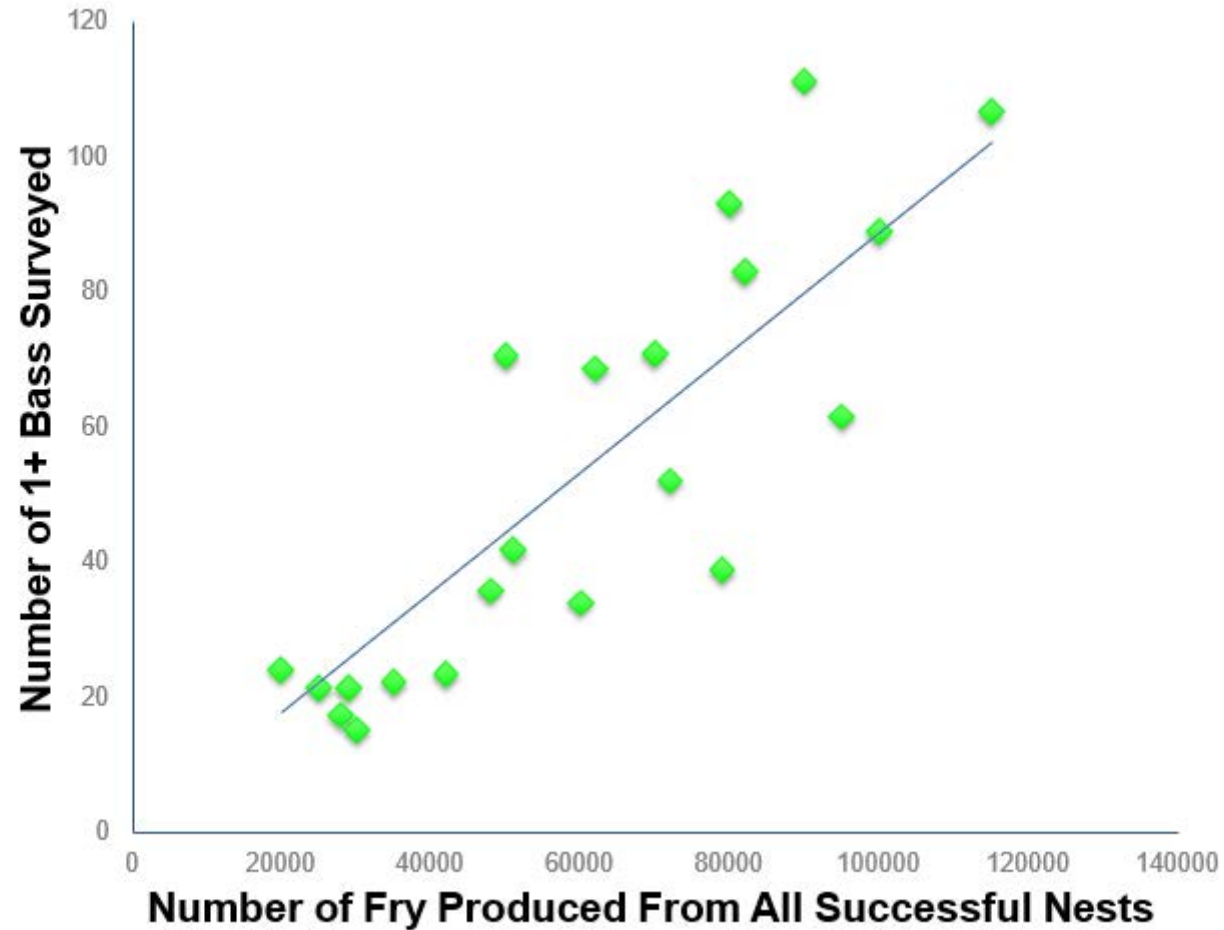
North American Journal of Fisheries Management

Article |  Full Access

The Impact of Catch-and-Release Angling on the Reproductive Success of Smallmouth Bass and Largemouth Bass

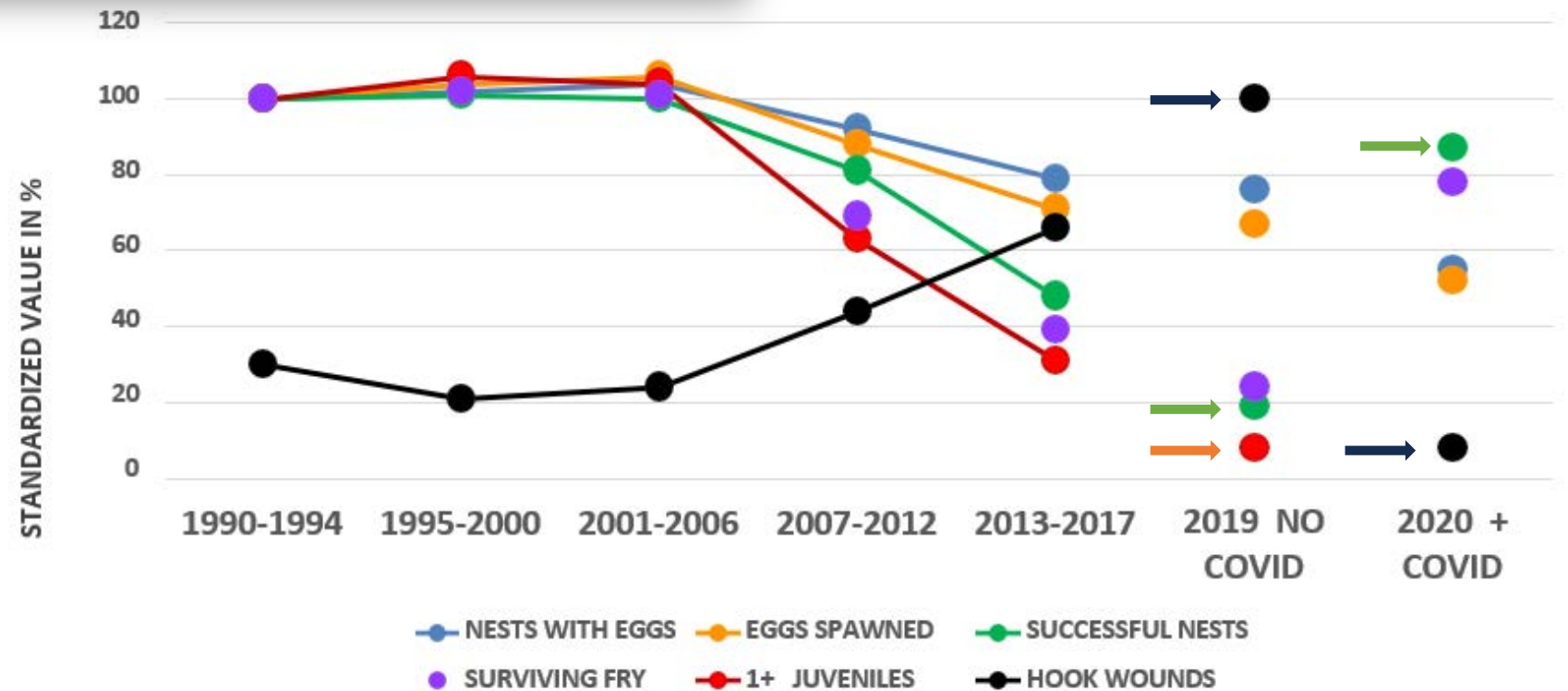
David P. Philipp, C. Anna Toline, Mark F. Kubacki, David B. F. Philipp, Frank J. S. Phelan

- 1. There is some amount of angling for nesting bass***
- 2. Time to return to nest greatly increases brood predation***
- 3. Increase in angling increases abandonment of nests***



COVID-19 reduced recreational fishing effort during the black bass spawning season, resulting in increases in black bass reproductive success and annual recruitment

David P. Philipp^a, Aaron Zolderdo^{b,c}, Michael J. Lawrence^d, Julie E. Claussen^a, Liane Nowell^e, Peter Holder^c, Steven J. Cooke^{a,c}



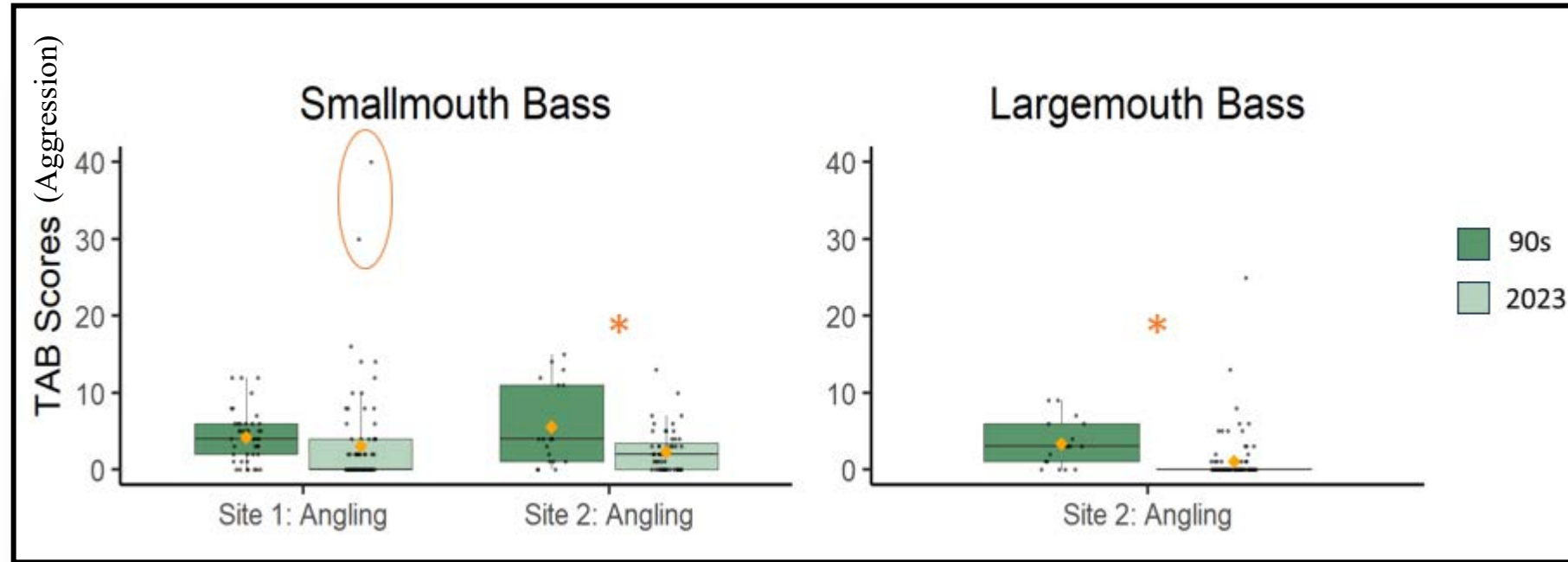


Annual recruitment is correlated with reproductive success in a smallmouth bass population

David P. Philipp^{a,b}, Julie E. Claussen^{a,b}, James Ludden^c, Jana H. Svec^d, Aaron D. Shultz^b, Steven J. Cooke^e, Mark S. Ridgway^f, Allan H. Bell^f, Madison A.C. Philipp^{b,g}, Cory D. Suski^h, Matthew M.C. Philipp^b, Frank J.S. Phelanⁱ, and Jeffrey A. Stein^{b,a,b}

Nesting success → Recruitment?





Lombardo et al. unpublished data

- Evolution favours more aggressive, larger males
- The timing of maturation can change due to social environment
- Smaller, less aggressive males succeed

Fisheries-Induced Evolution in Largemouth Bass: Linking Vulnerability to Angling, Parental Care, and Fitness

DAVID P. PHILIPP*

Illinois Natural History Survey, 1816 South Oak Street, Champaign, Illinois 61820, USA

and

Department of Natural Resources and Environmental Science, University of Illinois

1102 South Goodwin Avenue, Urbana, Illinois 61801, USA

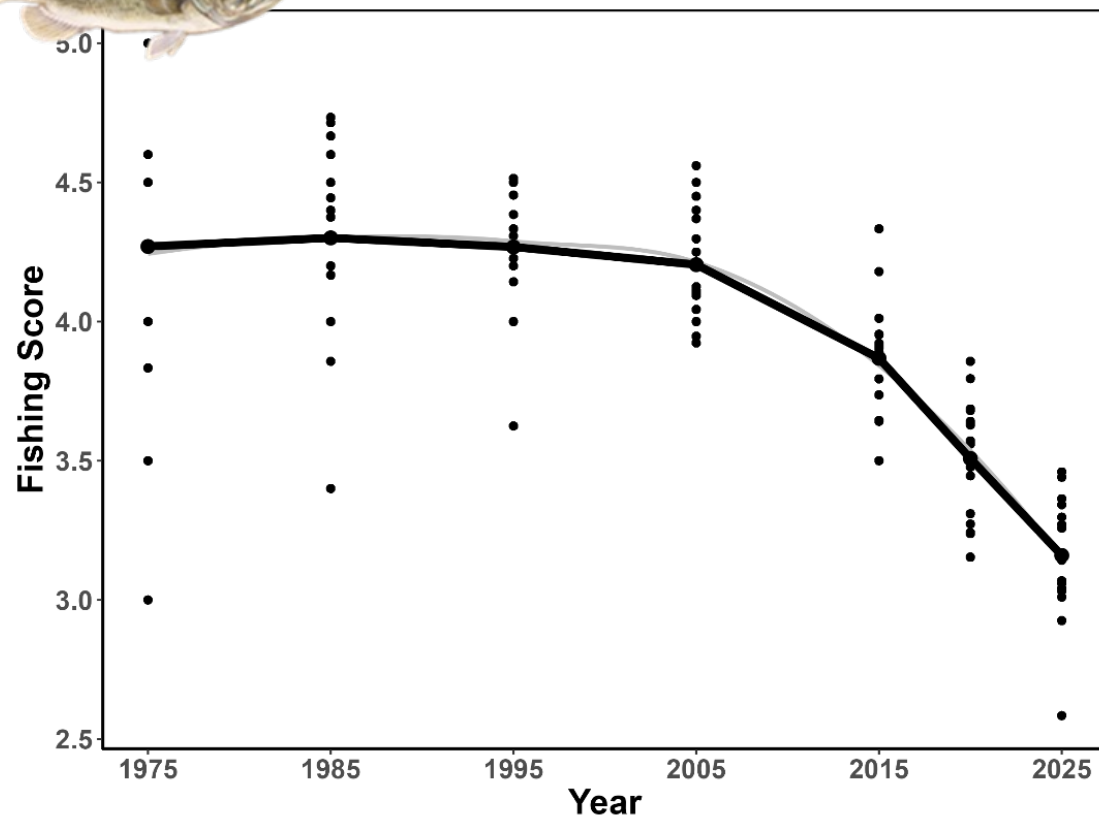
and

Local angler knowledge reveals declines in fishing quality for Black Bass in lakes of eastern Ontario

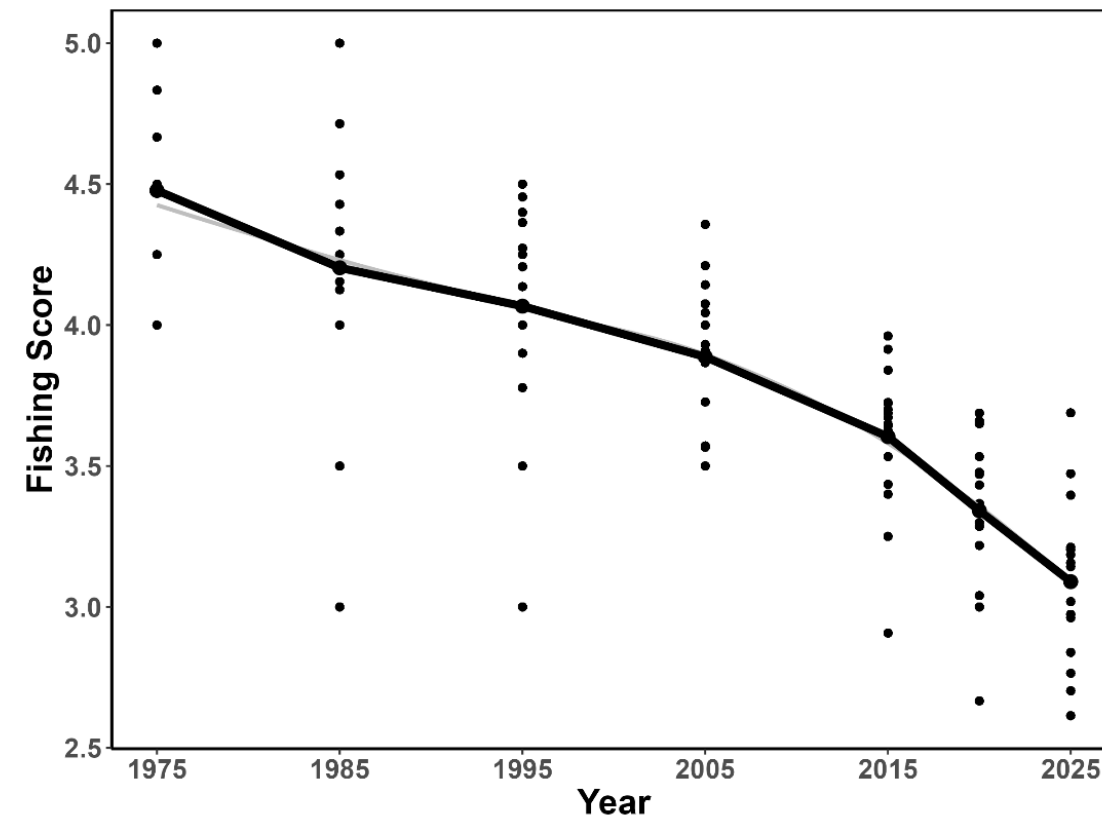
Joel Zhang^{1*}, David P. Philipp^{2,3}, Julie E. Claussen^{2,3}, Cory D. Suski⁴, Vivian M. Nguyen¹, Nathan Young⁵, Luc LaRochelle¹, Justin W. Lombardo⁴, Steven J. Cooke¹



Numbers



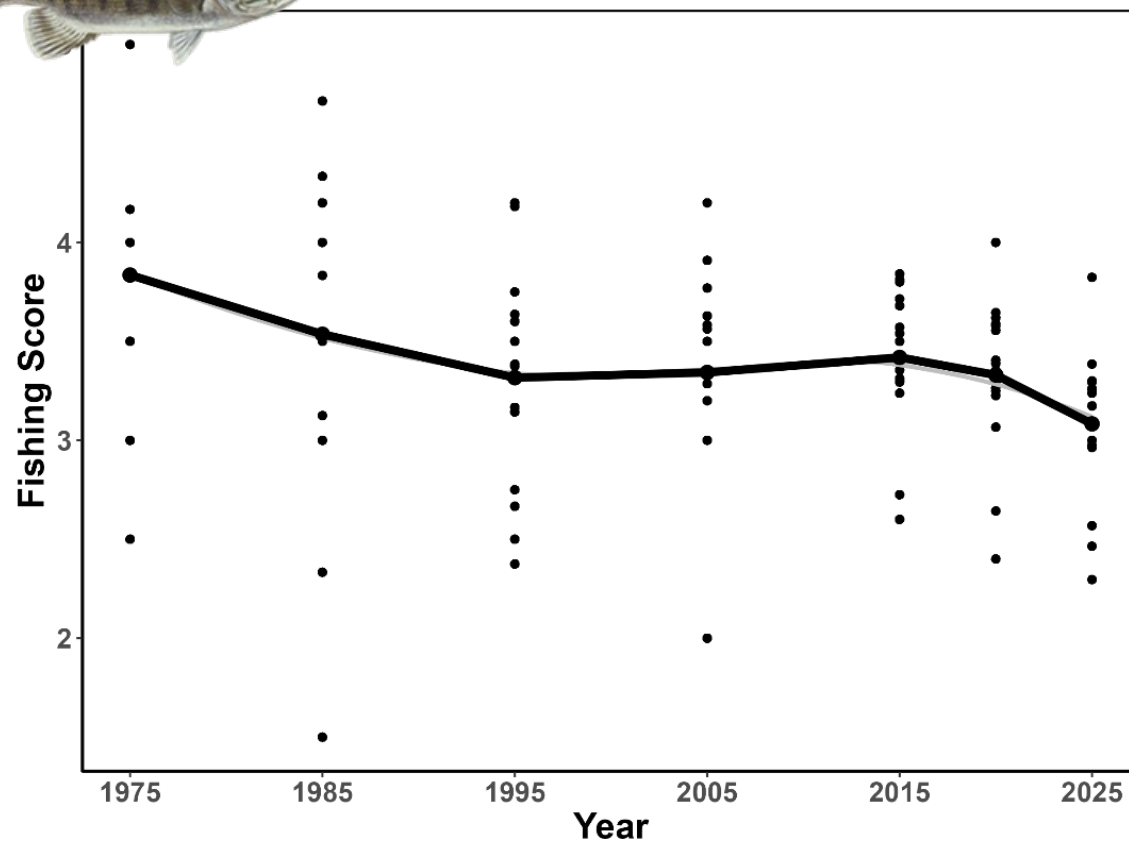
Sizes



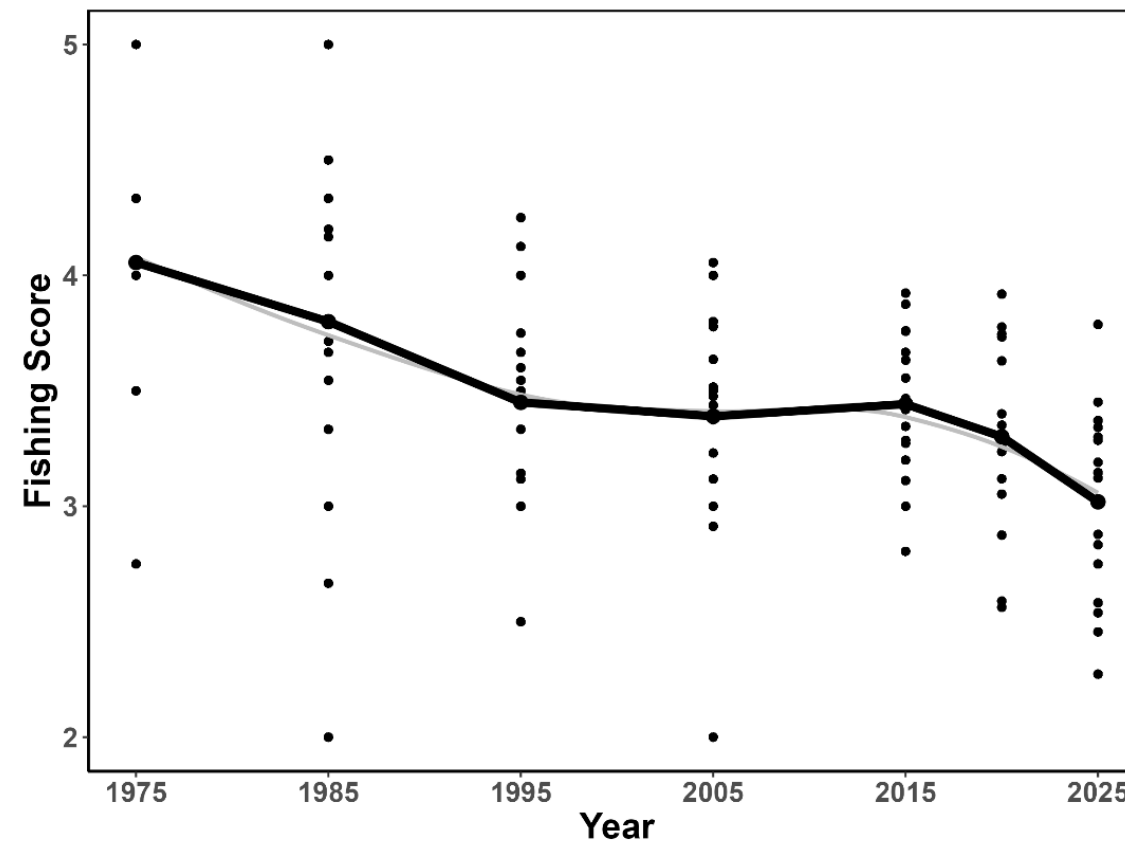
Local angler knowledge reveals declines in fishing quality for Black Bass in lakes of eastern Ontario

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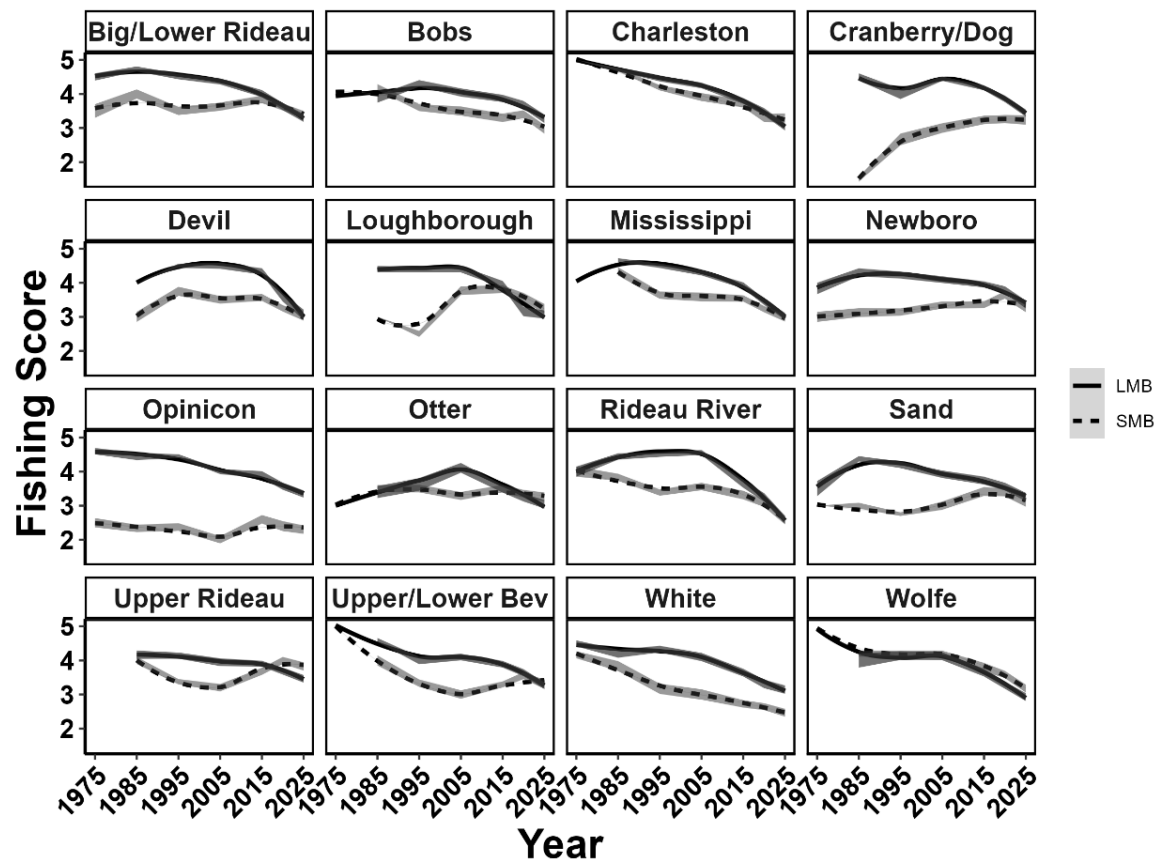
Numbers



Sizes

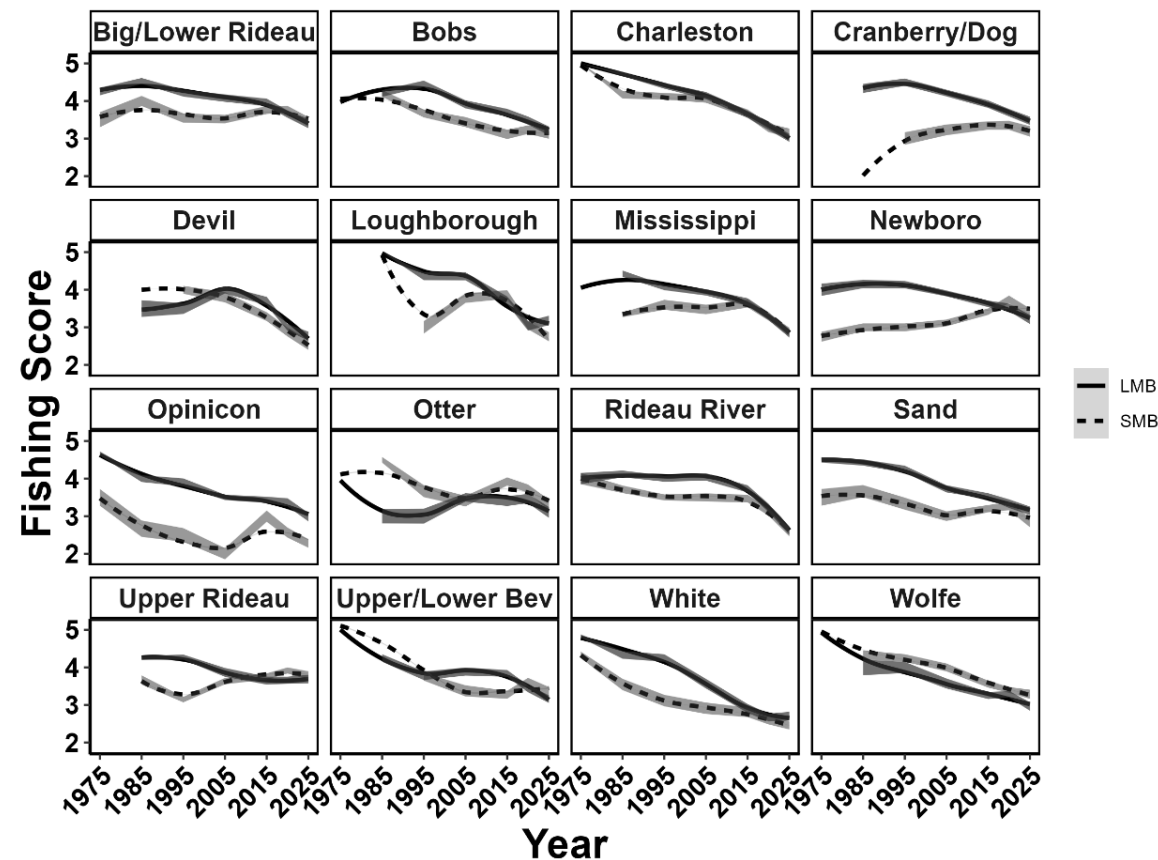


Numbers

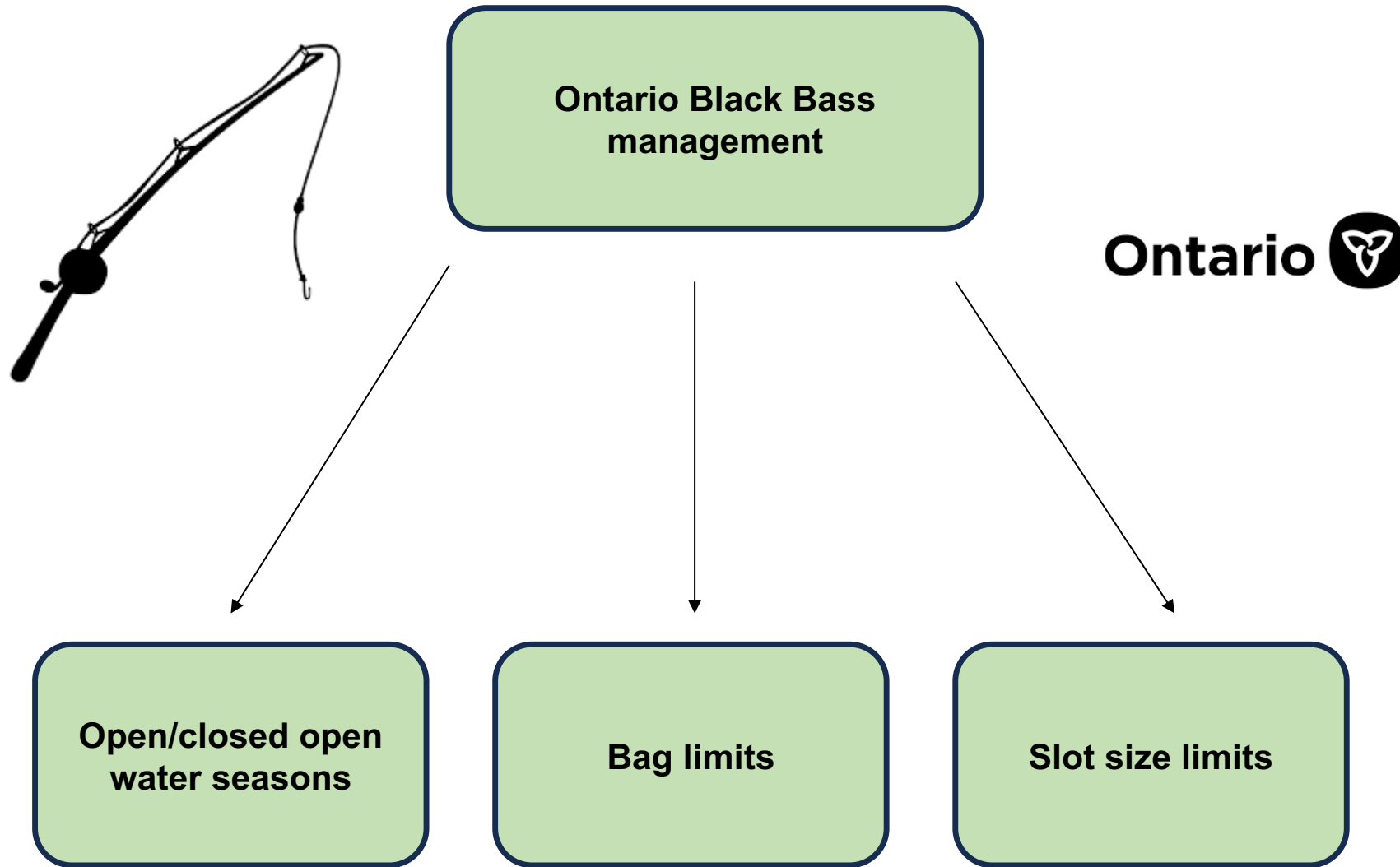


Decreases in recruitment?

Sizes



Fisheries-induced evolution?



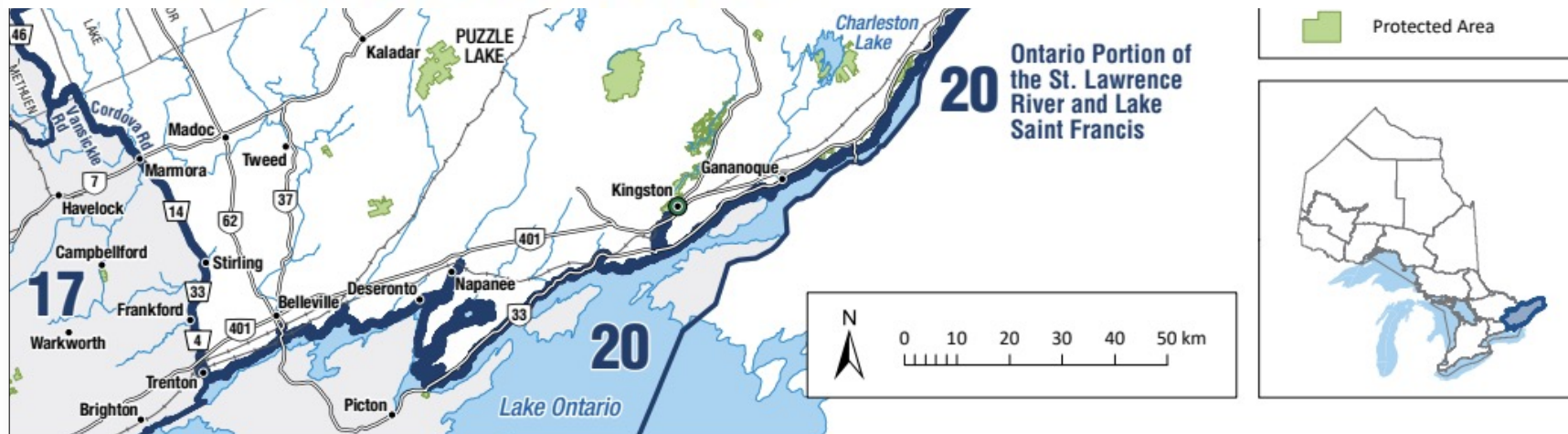


Largemouth and Smallmouth Bass combined

Season: third Saturday in June to

December 15

Limits: S-6 and C-2





Problems with current closed seasons in Eastern Ontario:

1. Nest abandonment

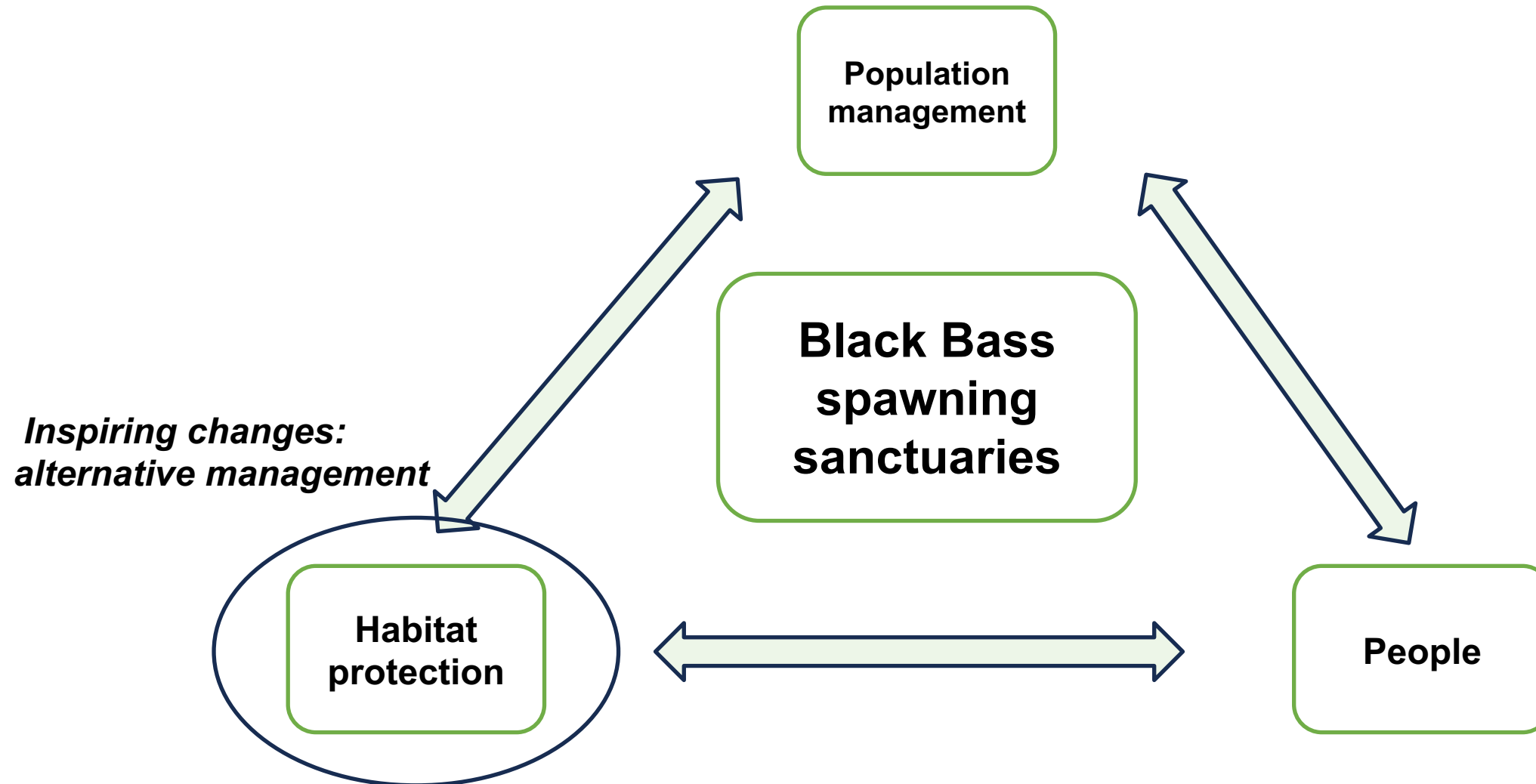
- Catch and release angling can have impacts on fitness
- Angled bass are more likely to abandon due to brood predation

2. Difficult to enforce regulations

- Compliance is fundamentally low
- Overlap with other open seasons

3. Fundamental ecology

- Spawn dates and length vary by year
- Low rates of re-nesting





Good habitat is the foundation for healthy fish populations and aquatic communities/ecosystems



REVIEW

Principles for ensuring healthy and productive freshwater ecosystems that support sustainable fisheries

Nicolas W.R. Lapointe, Steven J. Cooke, Jack G. Imhof, Daniel Boisclair, John M. Casselman, R. Allen Curry, Otto E. Langer, Robert L. McLaughlin, Charles K. Minns, John R. Post, Michael Power, Joseph B. Rasmussen, John D. Reynolds, John S. Richardson, and William M. Tonn

Habitat: the set of biotic and abiotic conditions in which an organism regularly inhabits

- Quantity vs. Quality
- Structural vs. Functional
- Food, refuge, water quality, life stage, **reproduction**





A note on protection vs. restoration...

The effectiveness of spawning habitat creation or enhancement for substrate-spawning temperate fish: a systematic review



Jessica J. Taylor^{1,2,3*†} , Trina Rytwinski^{1,2,3†}, Joseph R. Bennett^{1,3}, Karen E. Smokorowski⁴, Nicolas W. R. Lapointe⁵, Richard Janusz⁶, Keith Clarke⁷, Bill Tonn⁸, Jessica C. Walsh⁹ and Steven J. Cooke^{1,2,3}

Freshwater fish sanctuaries provide benefits for riparian wildlife

Michael R. Dusevic¹  | Brooke S. Etherington¹ | William M. Twardek¹ | Tara Lepine¹  | Aaron J. Zolderdo¹ | Austin J. Gallagher² | Kathryn Peiman¹  | Steven J. Cooke¹

On the troubling use of plastic ‘habitat’ structures for fish in freshwater ecosystems – or – when restoration is just littering

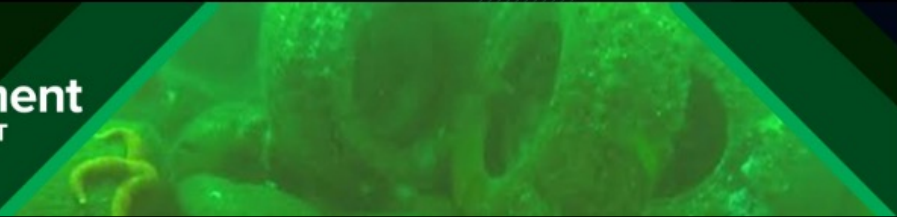
S.J. Cooke^{abc*}, M.L. Piczak^a, J.C. Vermaire^{abc}, and A.E. Kirkwood^d

ENVIRONMENT

Sixty years later: More than 100,000 tires from failed reef plan are coming out of Puget Sound

A plan to create artificial reefs in Puget Sound using automotive tires was created by Washington's Department of Natural Resources.

environment
NORTHWEST



TCD

Group shares eerie photos of disastrous man-made reef off coast of Florida: '500,000 tires left sitting at the bottom of the ocean'

Brett Aresco

Thu, November 16, 2023 at 5:30 AM EST · 3 min read



1.2k





“a clearly defined geographical space, recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature, with associated ecosystem services and cultural values” (IUCN)

Systematic review

Effectiveness of terrestrial protected areas in reducing habitat loss and population declines



Jonas Geldmann^{a,*}, Megan Barnes^{b,c}, Lauren Coad^d, Ian D. Craigie^e, Marc Hockings^b, Neil D. Burgess^{a,f}

^a Center for Macroecology, Evolution and Climate, Department of Biology, University of Copenhagen, Denmark

^b School of Geography, Planning and Environmental Management, University of Queensland, Australia

^c Environmental Decisions Group, Australia

^d Environmental Change Institute, School of Geography, University of Oxford, Oxford OX1 3QY, United Kingdom

^e ARC Centre of Excellence for Coral Reef Studies, James Cook University, Australia

^f UNEP, World Conservation Monitoring Centre, Cambridge, United Kingdom

Success depends on....

- **Size**
- **Habitat quality**
- **Scale**
- **Age**
- **Organism characteristics**
- **Connectivity**
- **Ecological objectives**
- **Management objectives**
- **Cultural objectives**
- **Co-management**

ECOLOGICAL
APPLICATIONS
ECOLOGICAL SOCIETY OF AMERICA

Invited Feature | Full Access

THE IMPACT OF MARINE RESERVES: DO RESERVES WORK AND DOES RESERVE SIZE MATTER?

Benjamin S. Halpern

First published: 01 February 2003 | [https://doi.org/10.1890/1051-0761\(2003\)013\[0117:TIOMRD\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2003)013[0117:TIOMRD]2.0.CO;2) | Citations: 931

For reprints of this Special Issue, see footnote 1, p. S3

...it's complicated



Conservation of aquatic resources through the use of freshwater protected areas: opportunities and challenges

Cory D. Suski · Steven J. Cooke

The role of protected areas for freshwater biodiversity conservation: challenges and opportunities in a rapidly changing world

Virgilio Hermoso ✉ Robin Abell, Simon Linke, Philip Boon

First published: 26 June 2016 | <https://doi-org.proxy.library.carleton.ca/10.1002/aqc.2681> | Citations: 129

Protected areas and freshwater biodiversity: a novel systematic review distils eight lessons for effective conservation

Michael Acreman^{1,2} | Kathy A. Hughes³ | Angela H. Arthington⁴ | David Tickner³ | Manuel-Angel Dueñas¹

Freshwater specific challenges...

- “Paper MPAs”
- Definition differences
- No monitoring
- No comparative data
- Size vs. opportunity trade-offs
- Disconnects between groups
- Ecological misunderstanding
- Catchment size
- Density of people
- Imbedded in terrestrial PAs
- **Lack of evidence**

Evidence → management



No fishing - April 15 to the Friday before the first Saturday in July (2024 and 2025)

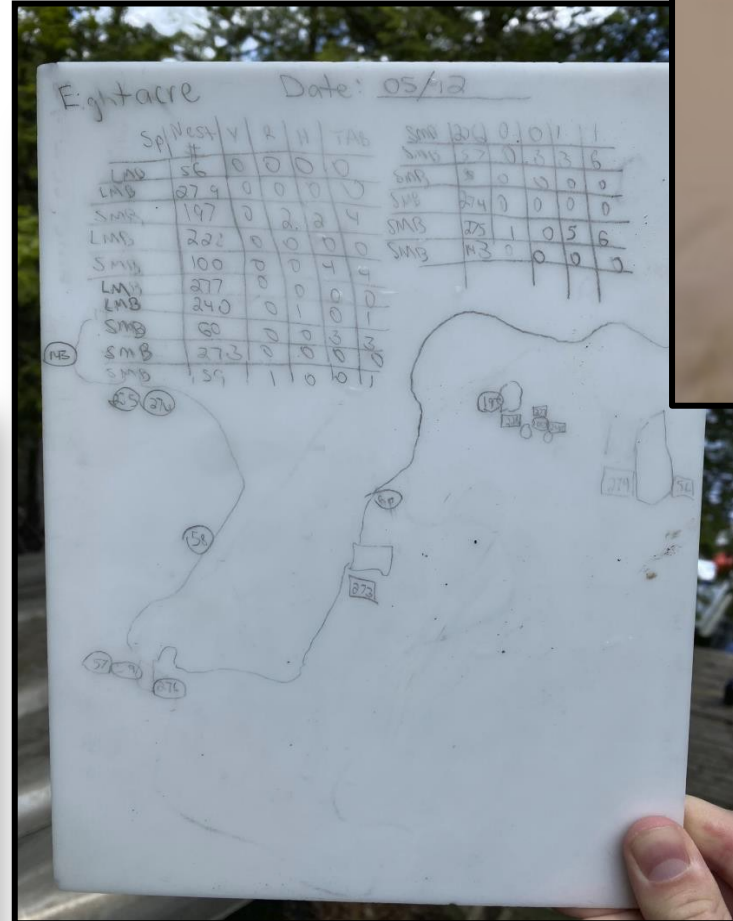
- Charleston Lake - Within 100m of:
 - Sheep Island (44°33'21"N., 76°00'45" W.),
 - Democrat Island (44°32'34" N., 76°00'55"W.),
 - Fisher Island (44°33'00" N., 76°01'05"W.),
 - Hogback Island (44°32'43"N., 76°00'28" W.),
 - Prospect Island (44°32'32"N., 76°00'22" W.),
 - Tar Island (44°32'57"N., 76°00'41"W.),
 - Victoria Island (44°32'53"N., 76°01'07"W.), and
 - Rockhouse Island (44°33'16"N., 76°01'07"W.)
- Charleston Lake - Sally's Hole (including Brown's Island) (44°33'42" N., 75°58'52"W.)
- Opinicon Lake (Eightacre Island) - From the tip of the unnamed point (44°33'54"N., 76°19'51" W.) south of Queen's University Biological Research Station to the southwest tip of Eightacre Island (44°33'30" N., 76°19'27"W.) to the northeast tip of Eightacre Island (44°33'44"N., 76°18'56"W.) to the eastern tip of Cow Island (44°34'11" N., 76°18'57"W.)
- Opinicon Lake - Deadlock Bay (44°32'45" N., 76°20'23" W.) and Opinicon Property Owners' Community Bay (44°33'05" N., 76°19'44" W.)

- Ecologically significant reproductive areas → good habitat

- Sanctuaries: protect ecologically significant areas

- Long-term data

Before-After-Control-Impact (BACI)....



CONTROLLED PILOT STUDY

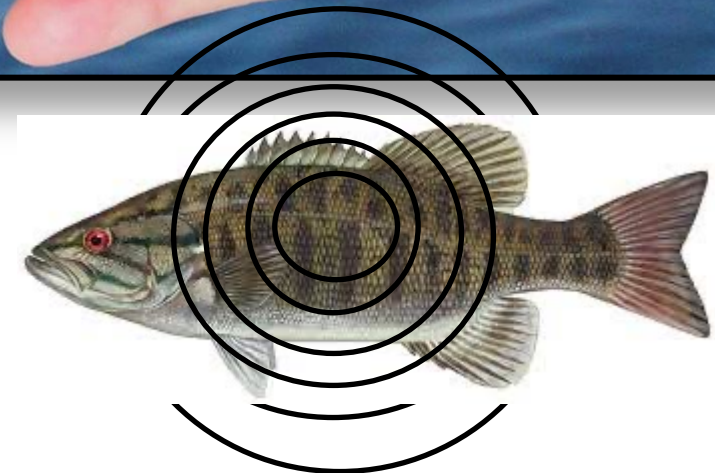
TWO STUDY LAKES:
OPINICON LAKE
CHARLESTON LAKE

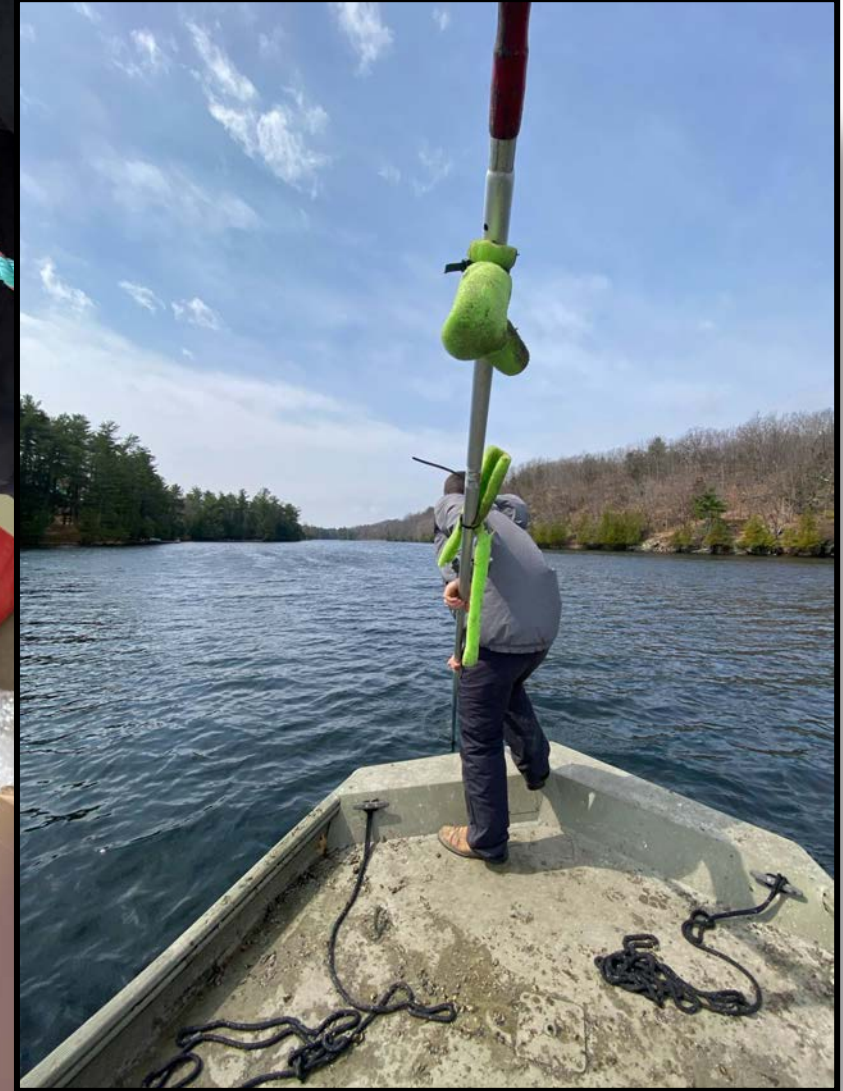
BACI DESIGN:

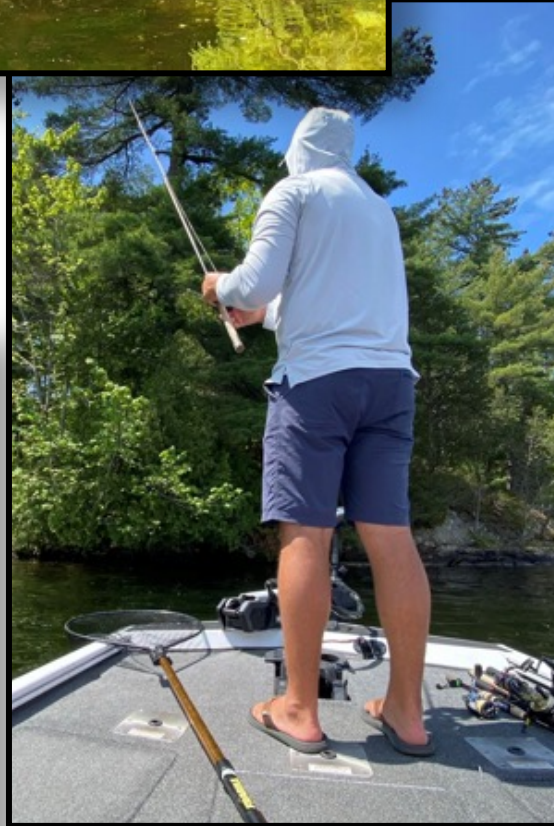
BEFORE = 2022-2023

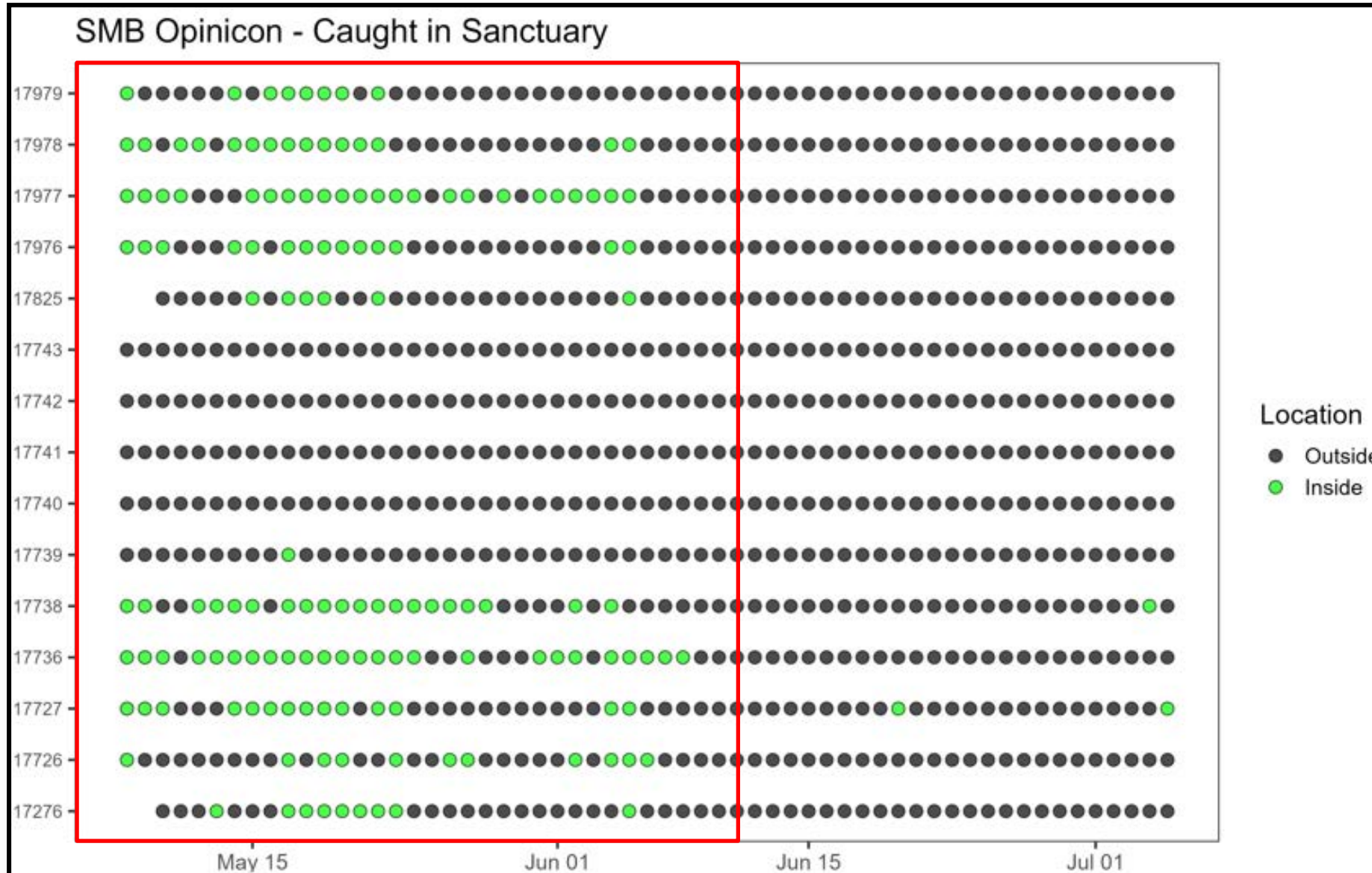
AFTER = 2024-2026

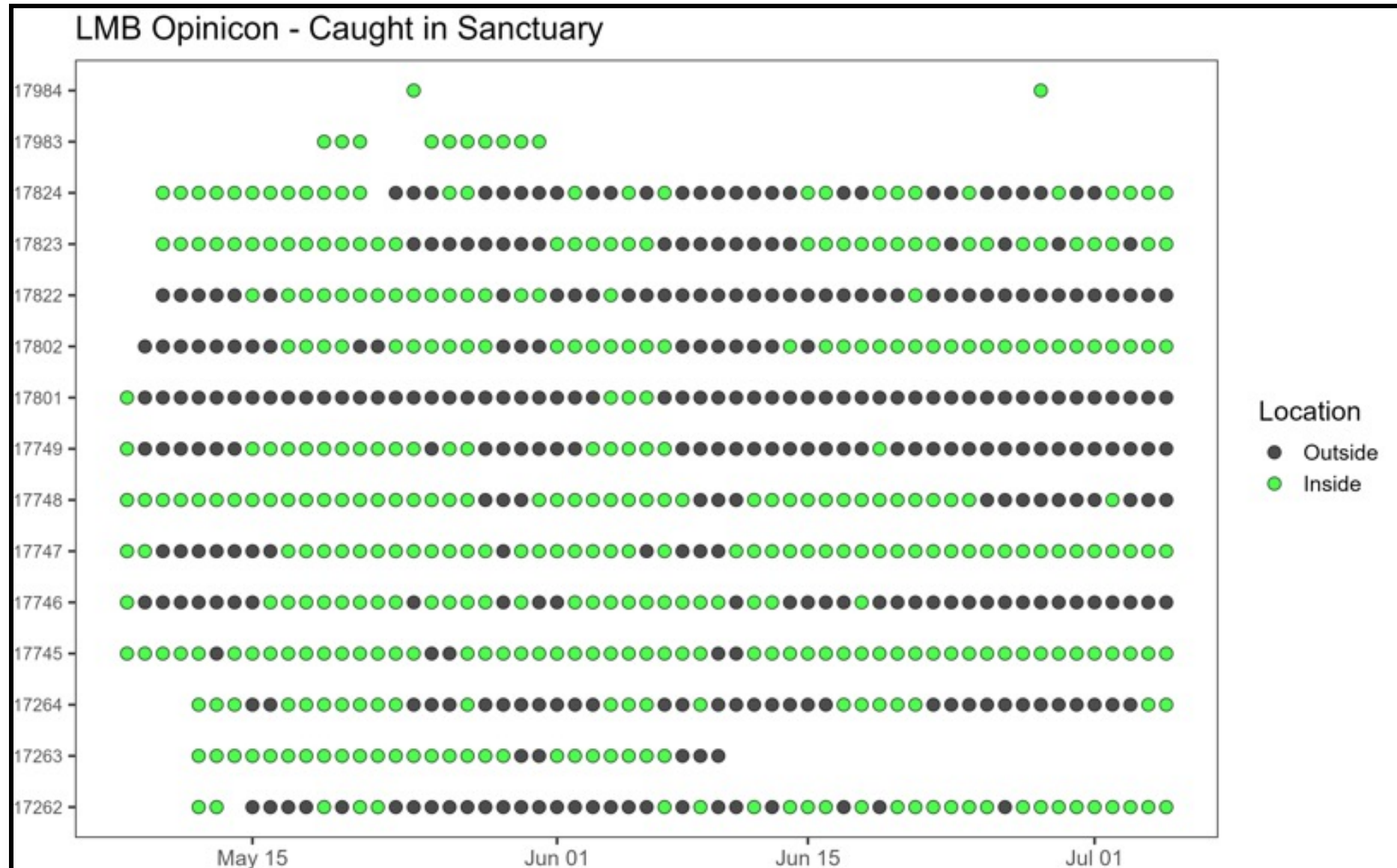


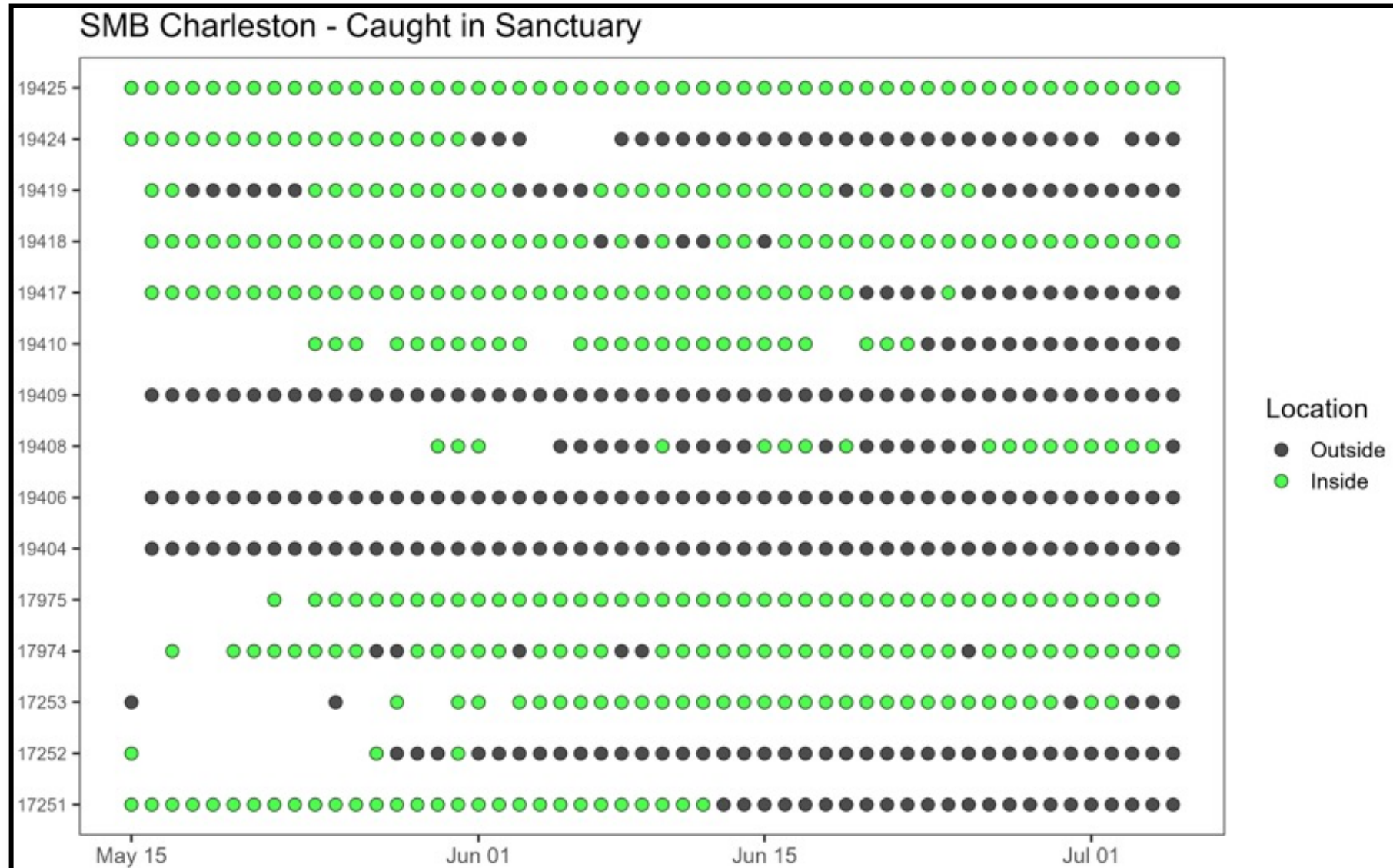


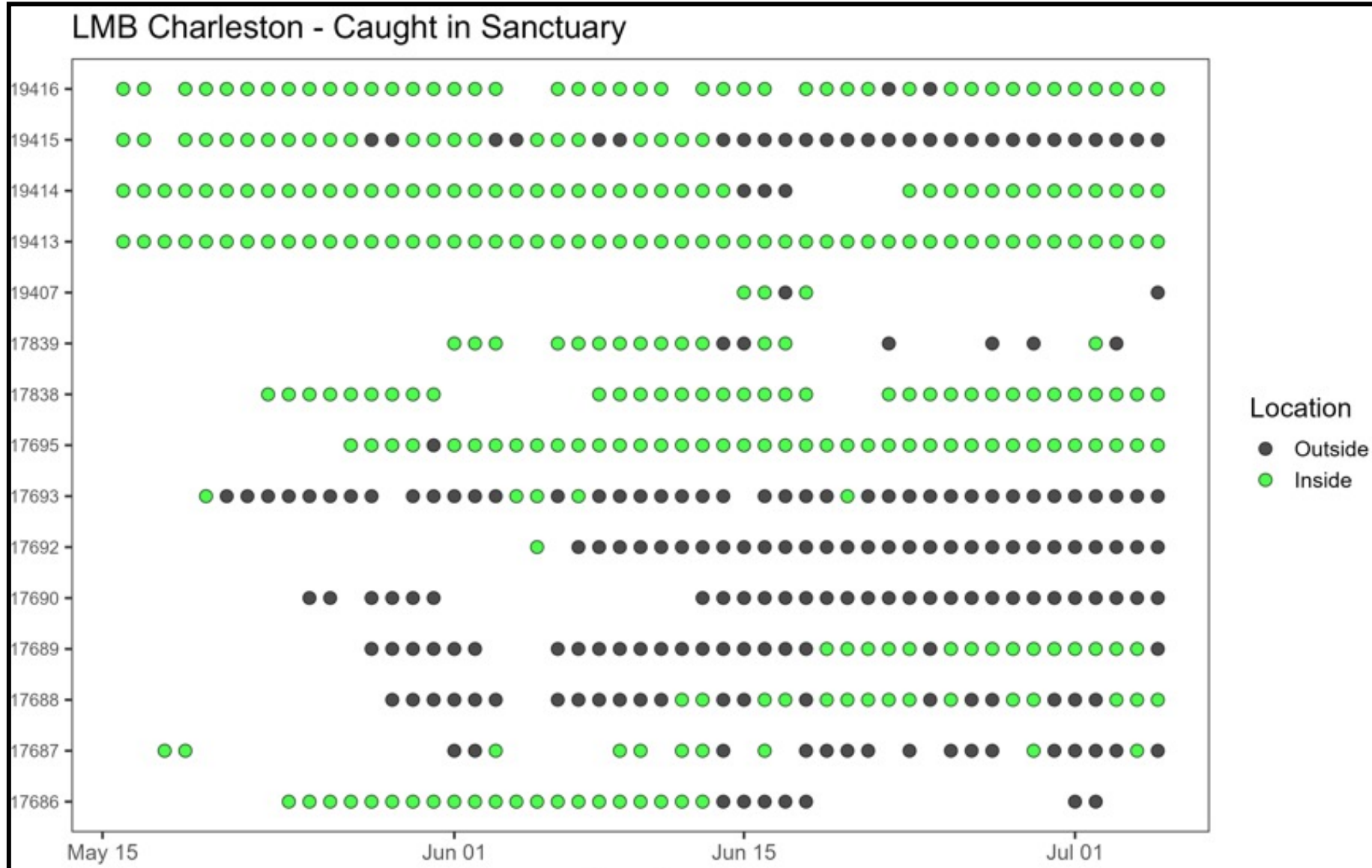








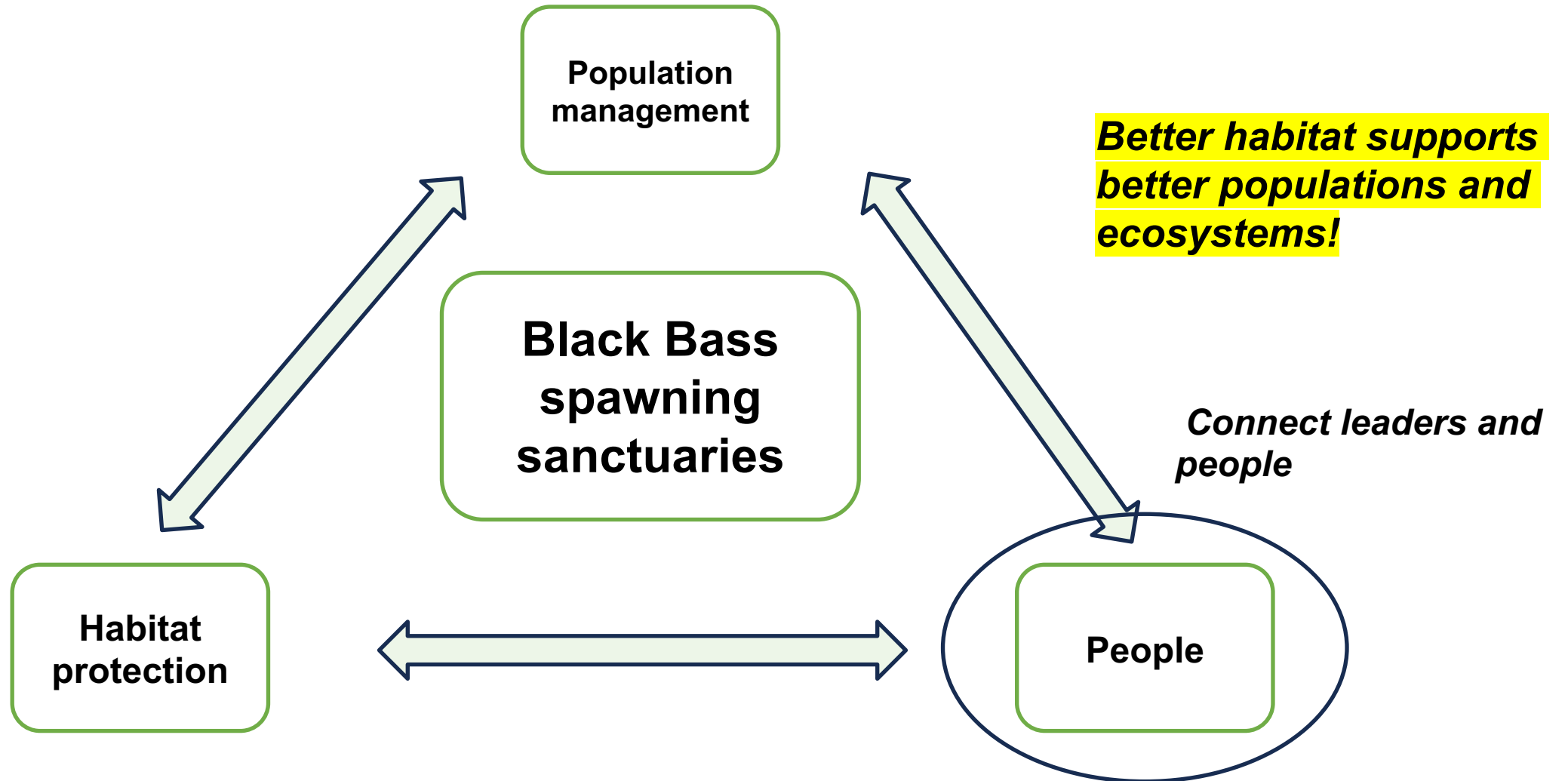




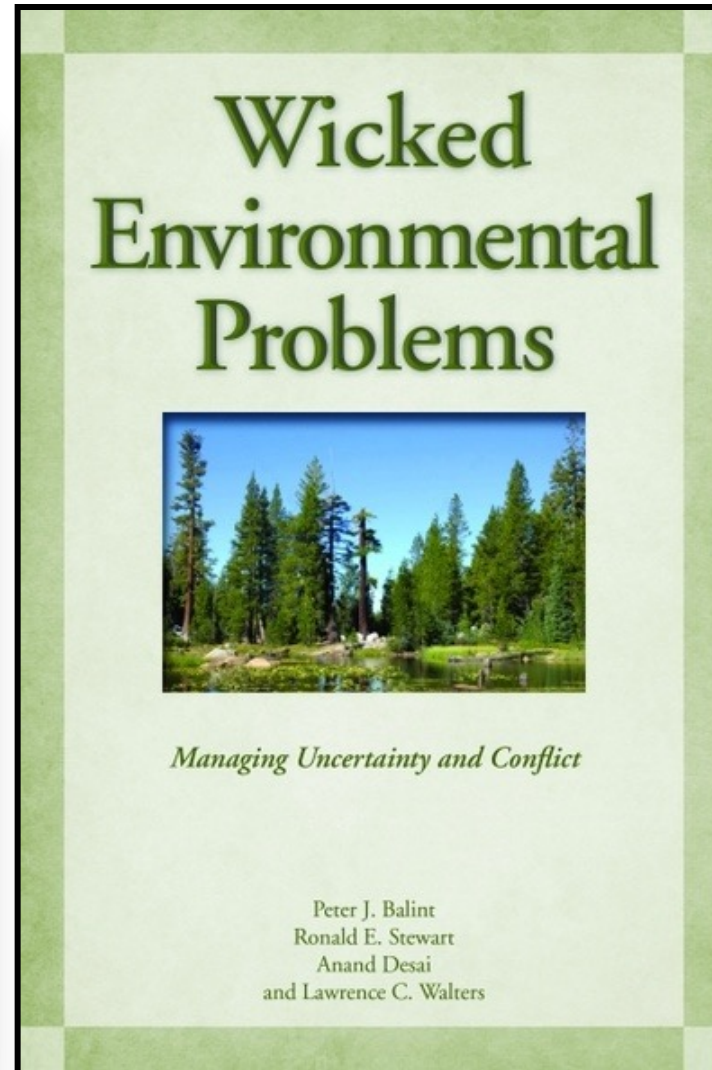
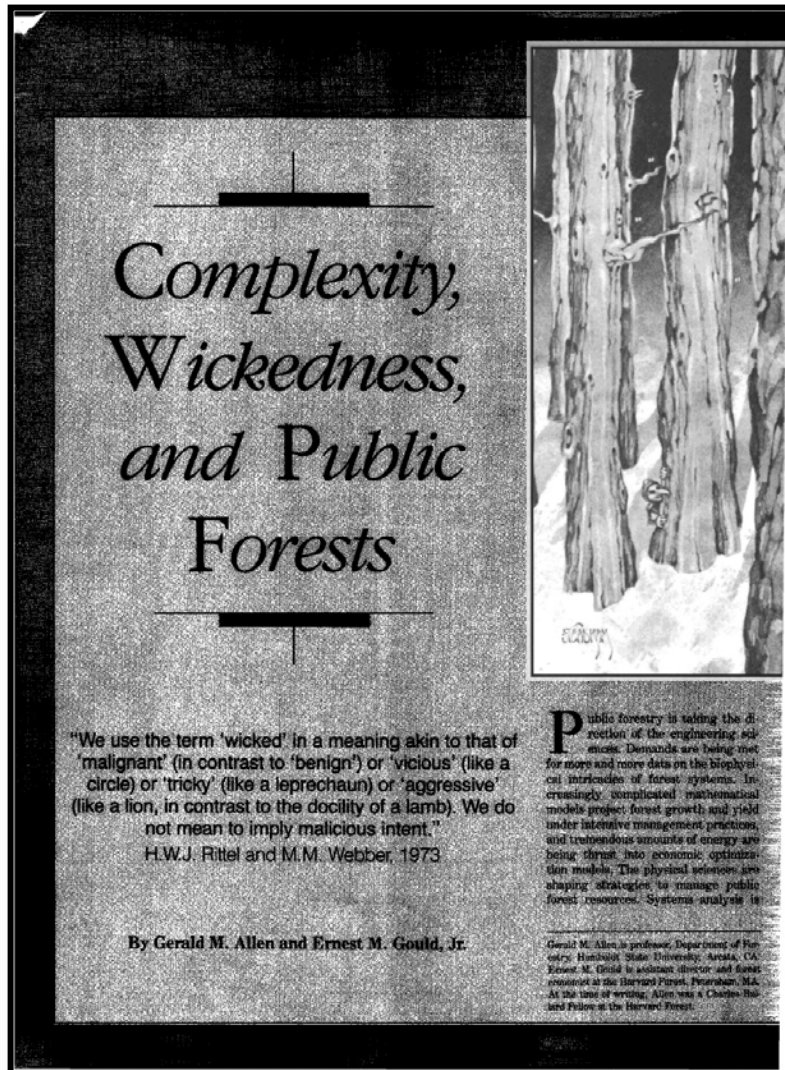


Bowfin (*Amia calva*)





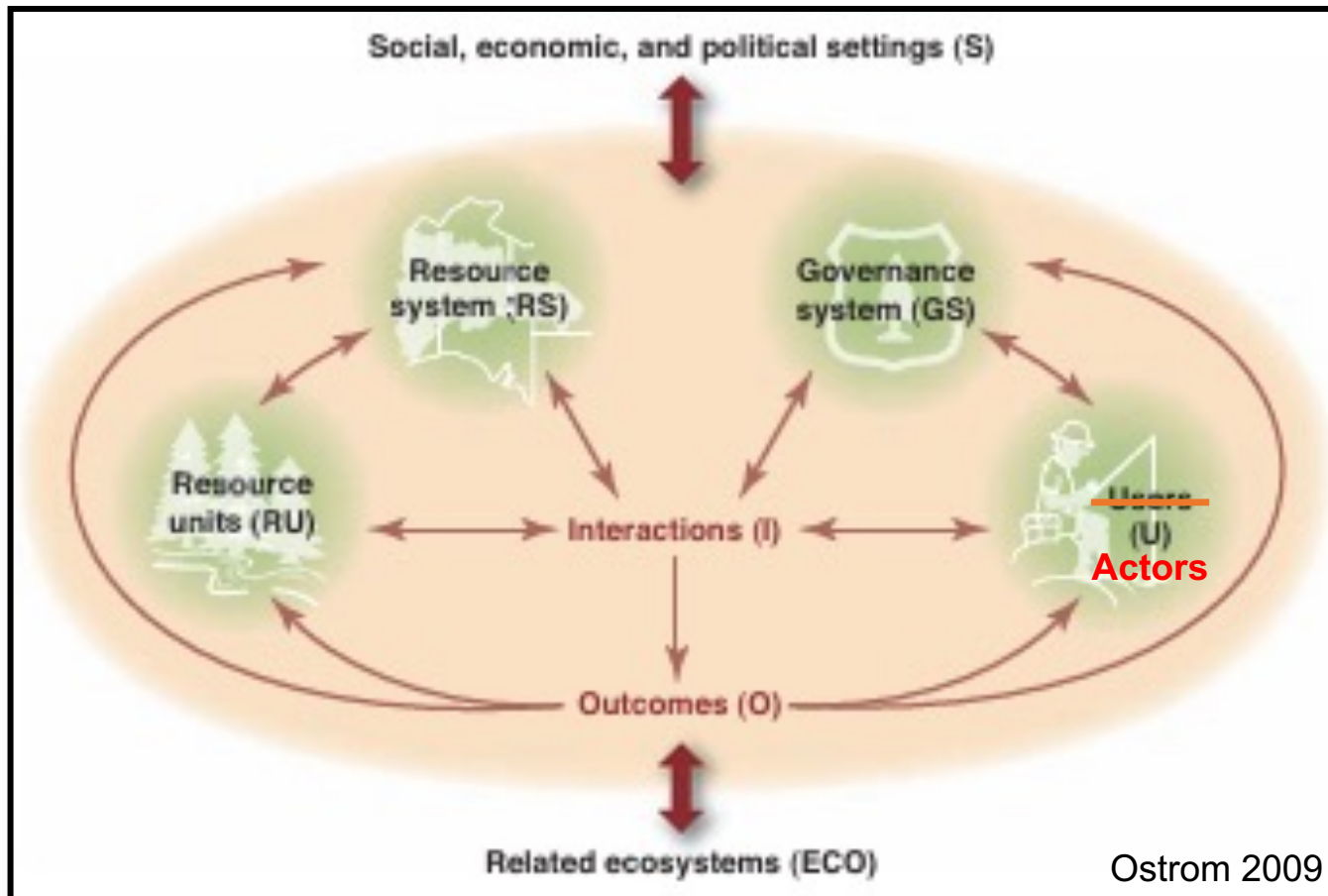
Wicked problems – not as simple as stopping the fishing or protecting habitat...



According to Rittel & Webber (1973), a wicked problem...

1. Has no definitive formulation
2. Has no stopping rule
3. Has no true or false solutions
4. Allows for no ultimate test of solutions
5. Cannot be solved with trial and error
6. Has no discrete set of potential solutions/permmissible operations
7. Is essentially unique
8. Has causal connection(s) to other wicked problems
9. Has discrepancies that can be explained in numerous ways
10. Has real consequences if hypotheses are refuted

“Natural, undisturbed systems are likely to be continually in a transient state; they will be equally so under the influence of man” – Holling 1973



“Nature conservation is fundamentally about managing people” (Arias et al. 2015)



Illustrating the critical role of human dimensions research for understanding and managing recreational fisheries within a social-ecological system framework

L. M. Hunt✉ S. G. Sutton, R. Arlinghaus

First published: 17 January 2013 | <https://doi.org/10.1111/j.1365-2400.2012.00870.x> | Citations: 171

Towards resilient recreational fisheries on a global scale through improved understanding of fish and fisher behaviour

R. Arlinghaus✉ S. J. Cooke, W. Potts

First published: 18 February 2013 | <https://doi.org/10.1111/fme.12027> | Citations: 101

Resilient recreational fisheries or prone to collapse? A decade of research on the science and management of recreational fisheries

J. R. Post✉

“...the effective and responsible effort to provide a maximum sustained yield from a fish population ... might paradoxically increase the chance for extinctions” – Holling 1973





How can we better support our fisheries through anglers? Local ecological knowledge.

Ann. Rev. Ecol. Syst. 1978, 9:349-64
Copyright © 1978 by Annual Reviews Inc. All rights reserved

TRADITIONAL MARINE CONSERVATION METHODS IN OCEANIA AND THEIR DEMISE

♦4145

R. E. Johannes

Hawaii Institute of Marine Biology, P.O. Box 1346, Kaneohe, HI 96744

Islanders perceive their limits more easily than do continental peoples.

Kenneth Brower (14)

- Lots of definitions

- Increases in usage for
commercial/artisanal fisheries

How has the quality of bonefishing changed over the past 40 years? Using local ecological knowledge to quantitatively inform population declines in the South Florida flats fishery

J. S. Rehage • R. O. Santos • E. K. N. Kroloff •
J. T. Heinen • Q. Lai • B. D. Black • R. E. Boucek •
A. J. Adams

Angler and guide perceptions provide insights into the status and threats of the Atlantic tarpon (*Megalops atlanticus*) fishery

Lucas P. Griffin^{a, *}, Grace A. Casselberry^a, Ezra M. Markowitz^a, Jacob W. Brownscombe^b, Aaron J. Adams^{c, d}, Bill Horn^c, Steven J. Cooke^c, Andy J. Danylchuk^a

^a Department of Environmental Conservation, University of Massachusetts Amherst, 160 Holdsworth Way, Amherst, MA 01003, USA

^b Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, Burlington, ON L7S 1A1, Canada

^c Bonefish & Atlantic tarpon Trust, 2937 SW 27th Ave, Ste. 203, Miami, FL 33133, USA

^d Florida Atlantic University, Harbor Branch Oceanographic Institute, 5600 US 1 North, Fort Pierce, FL 34946, USA

* Fish Ecology and Conservation Physiology Laboratory, Department of Biology, Carleton University, 1125 Colonel By Dr., Ottawa, ON K1S 5B6, Canada



Millenium Ecosystem Assessment

Fishers' Ecological Knowledge and Stock Assessment in Newfoundland*

BARBARA NEIS

Fisheries assessment: what can be learned from interviewing resource users?

Authors [Barbara Neis](#), [David C. Schneider](#), [Lawrence Felt](#), [Richard L. Haedrich](#), [Johanne Fischer](#), and [Jeffrey A. Hutchings](#) | [AUTHORS INFO & AFFILIATIONS](#)

Mapping Cod: Fisheries Science, Fish Harvesters' Ecological Knowledge and Cod Migrations in the Northern Gulf of St. Lawrence

Grant Murray • Barbara Neis • Craig T. Palmer • David C. Schneider

WHY NOT TRY?



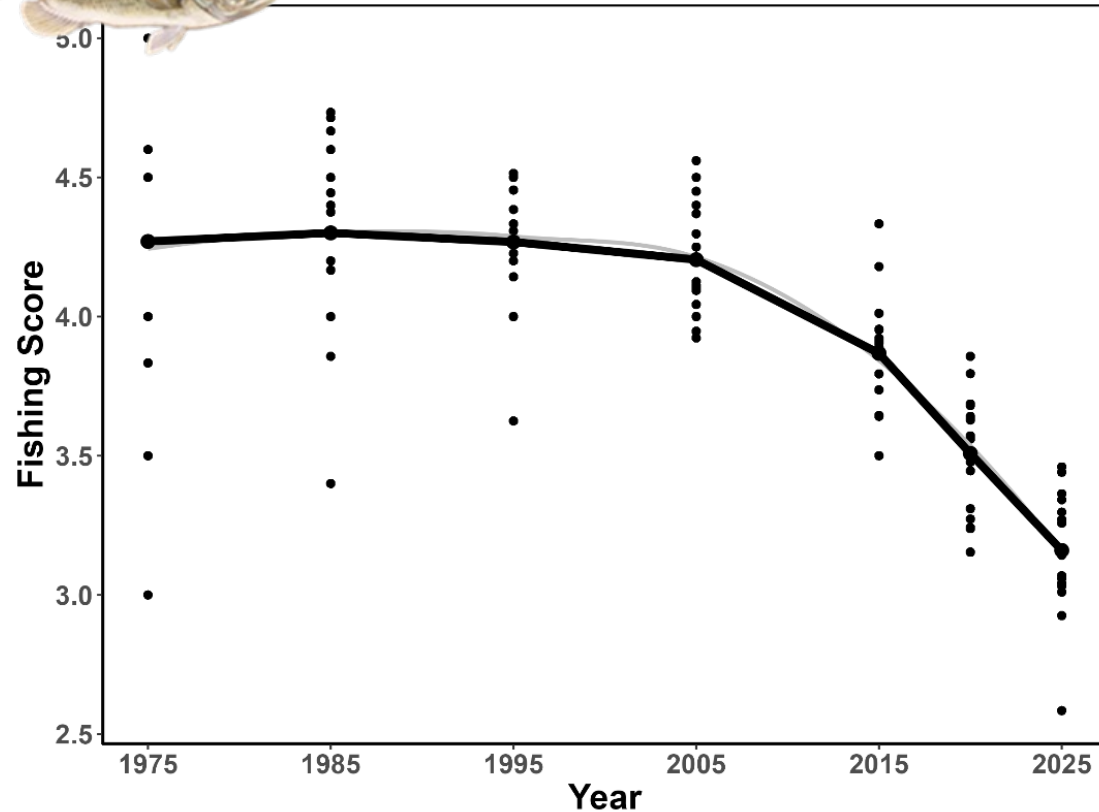
Avoiding “too little, too late” (Oro & Martínez-Abraín 2023)

Local angler knowledge reveals declines in fishing quality for Black Bass in lakes of eastern Ontario

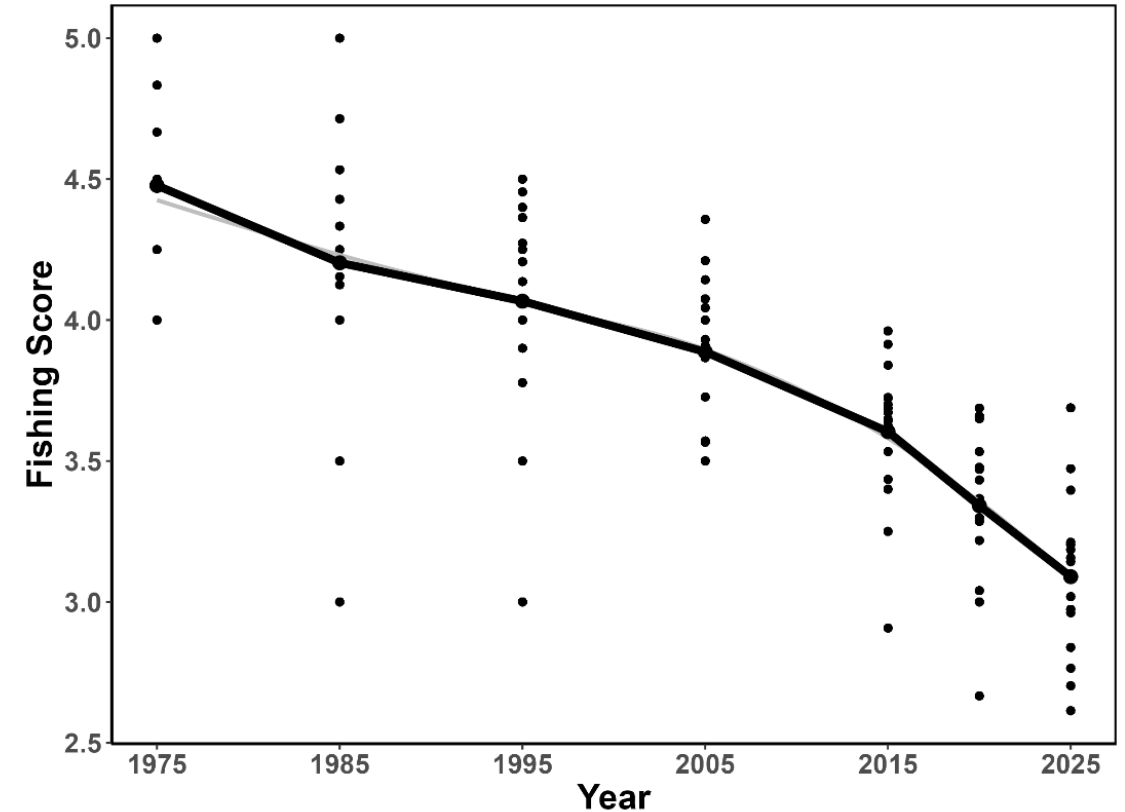
Joel Zhang^{1*}, David P. Philipp^{2,3}, Julie E. Claussen^{2,3}, Cory D. Suski⁴, Vivian M. Nguyen¹, Nathan Young⁵, Luc LaRochelle¹, Justin W. Lombardo⁴, Steven J. Cooke¹



Numbers



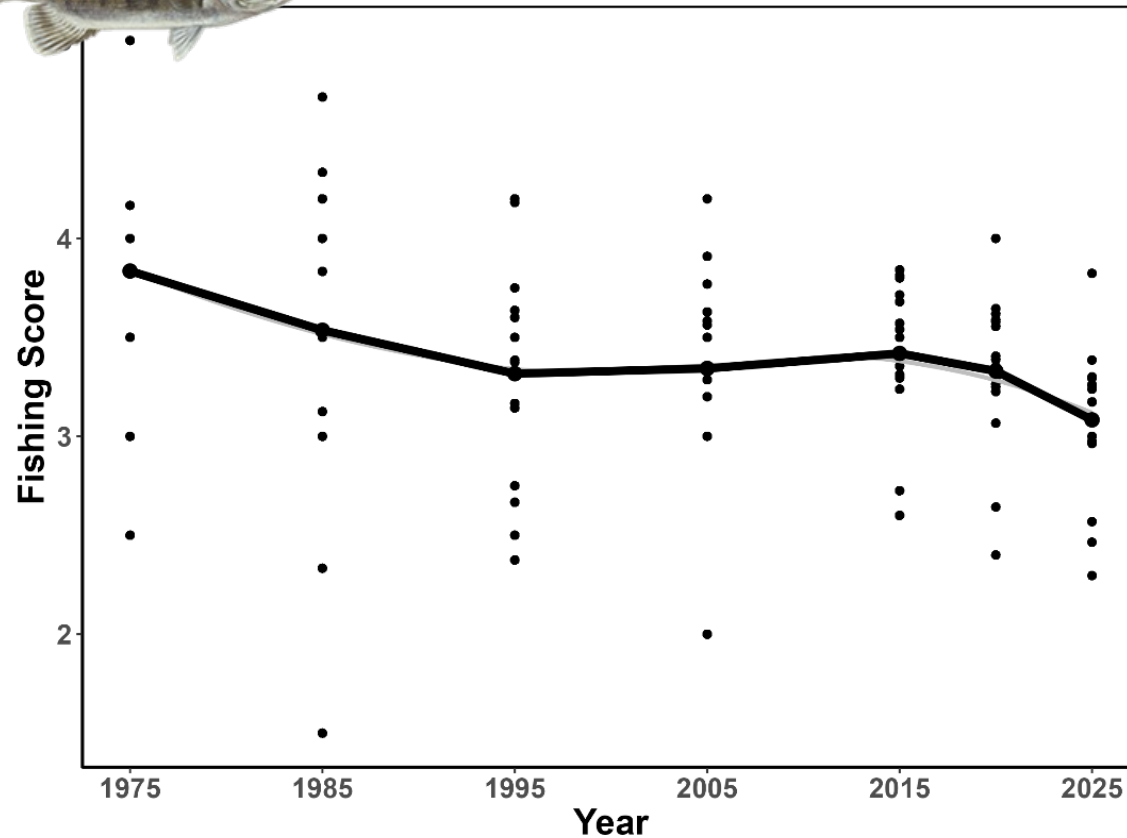
Sizes



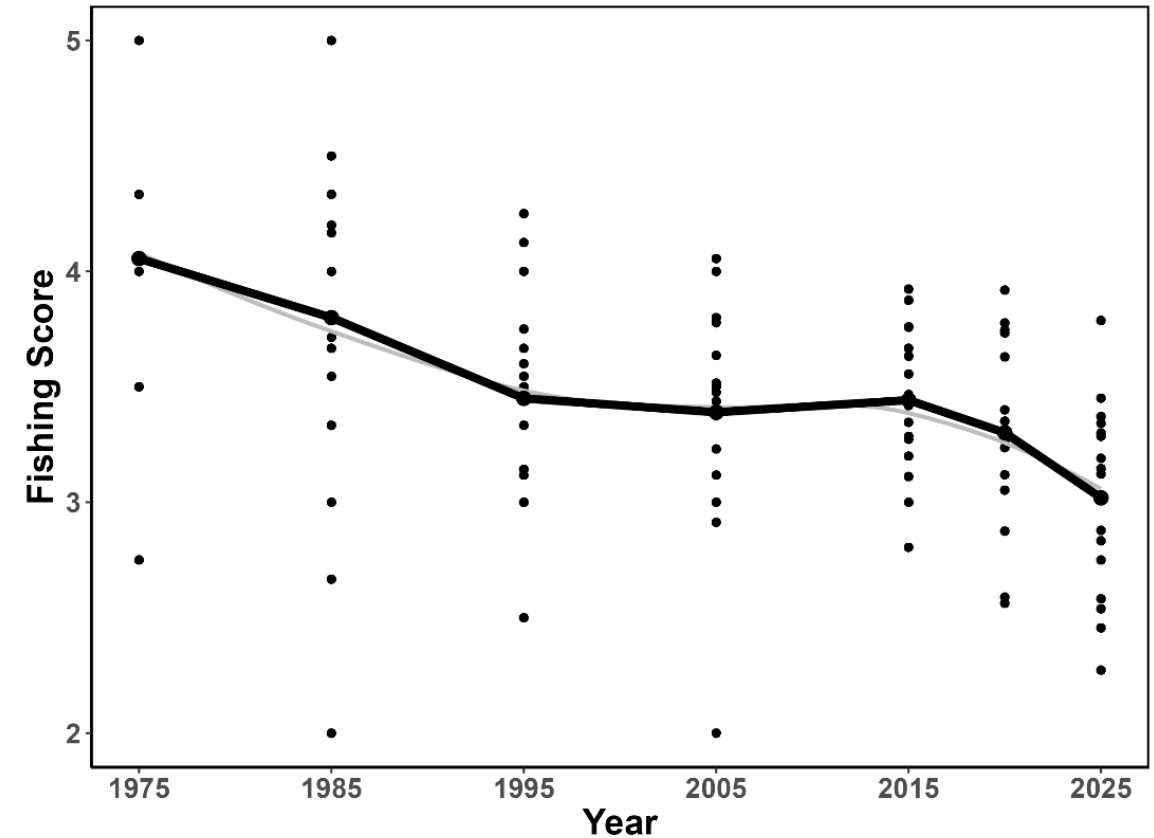
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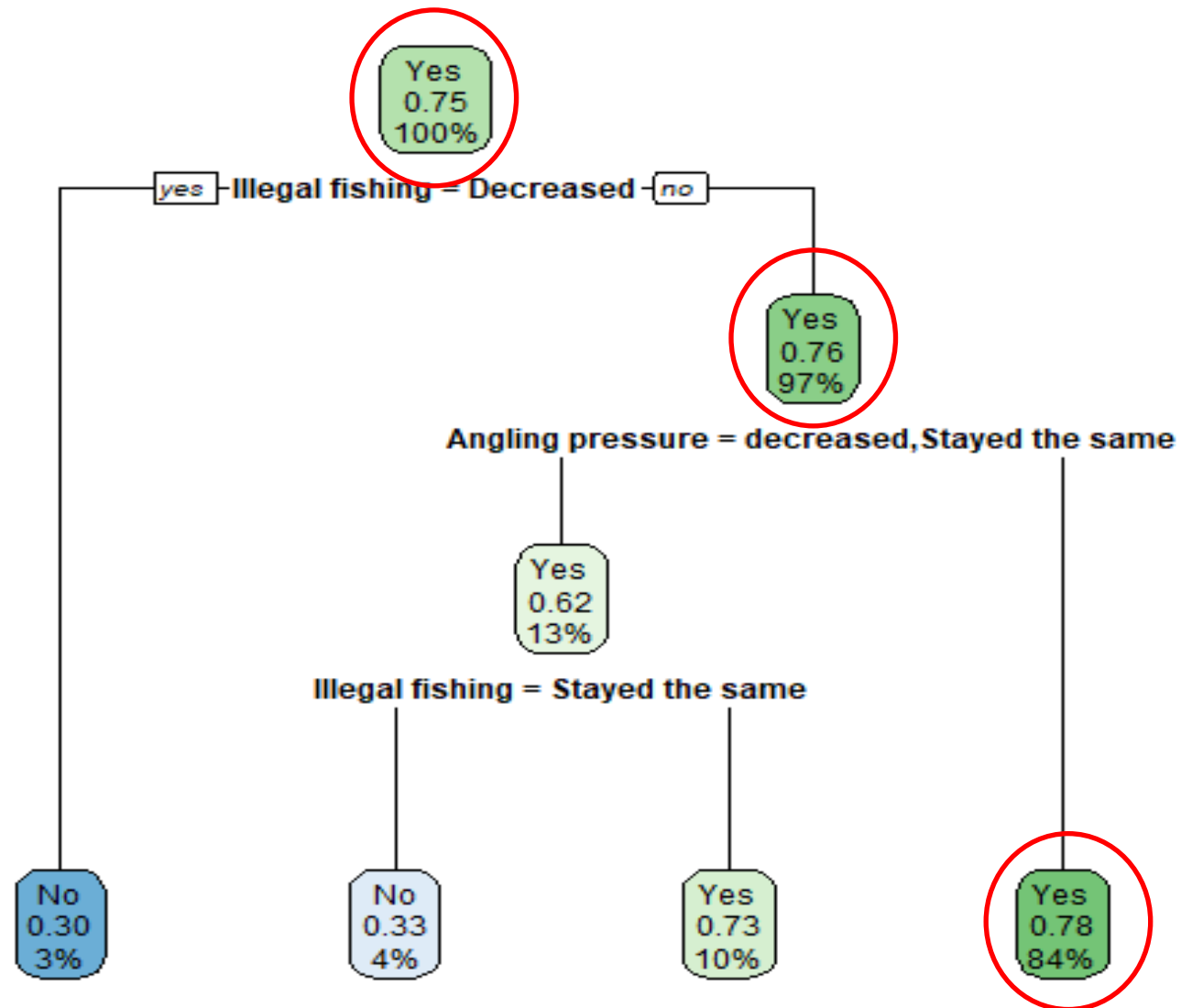
Joel Zhang^{1*}, David P. Philipp^{2,3}, Julie E. Claussen^{2,3}, Cory D. Suski⁴, Vivian M. Nguyen¹, Nathan Young⁵, Luc LaRochelle¹, Justin W. Lombardo⁴, Steven J. Cooke¹

Numbers



Sizes





Ontario


Environmental Registry of Ontario

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Temporary Fish Sanctuaries – Opinicon Lake and Charleston Lake

ERO number	019-6728
Notice type	Regulation
Act	Fish and Wildlife Conservation Act, 1997
Posted by	Ministry of Natural Resources and Forestry
Notice stage	Proposal
Proposal posted	May 4, 2023
Comment period	May 4, 2023 - June 19, 2023 (46 days) Closed
Last updated	May 4, 2023

This consultation was open from:

May 4, 2023
to June 19, 2023

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Proposal summary

In co-operation with academia (Fisheries Conservation Foundation, Universities of Carleton, Illinois, Manitoba, and Queen's), the ministry is proposing to create temporary fish sanctuaries on Opinicon Lake and Charleston Lake for the 2024 and 2025 fishing season to support long-term bass nesting and population recruitment research.



Zhang et al. 2024





9 codes for “Feeling new regulations are unnecessary due to underestimation of illegal behaviour by anglers.”

“Anglers don’t target bass before the season starts so minimal are caught while they are spawning,”

“This past spring I did not catch a single bass off of my dock while they were spawning and I probably caught over a dozen pike and 50-100 bluegill and pumpkinseed. This is evident that you can fish in these zones without catching any bass,”

10 codes for “Misinformation or misunderstanding of study purpose or general ecology”

“I have noticed that all bass finish spawning well before the opening date between the 1st to 2nd week of June. July 10 is incredibly far off and is not even close to the date that the bass stop guarding fry,”

“I have also sat in a presentation of this proposal and my understanding is that the majority of studies for this were completed on Lake Opinicon and not Charleston. These two bodies do not seem comparable, at least to my eye.”



Zhang et al. 2024





82 % of 105 comments were in support of the new sanctuary regulations

21 codes for seeing anglers “illegally fishing for nesting bass”

“As a resident of Charleston Lake I witness on a regular basis lots of fishing before the opening of Bass season. People say we are after Crappie not Bass. This is legal however the number of Bass caught and released at this time, although maybe accidental, can be devastating to the recruitment of newly hatched young.”

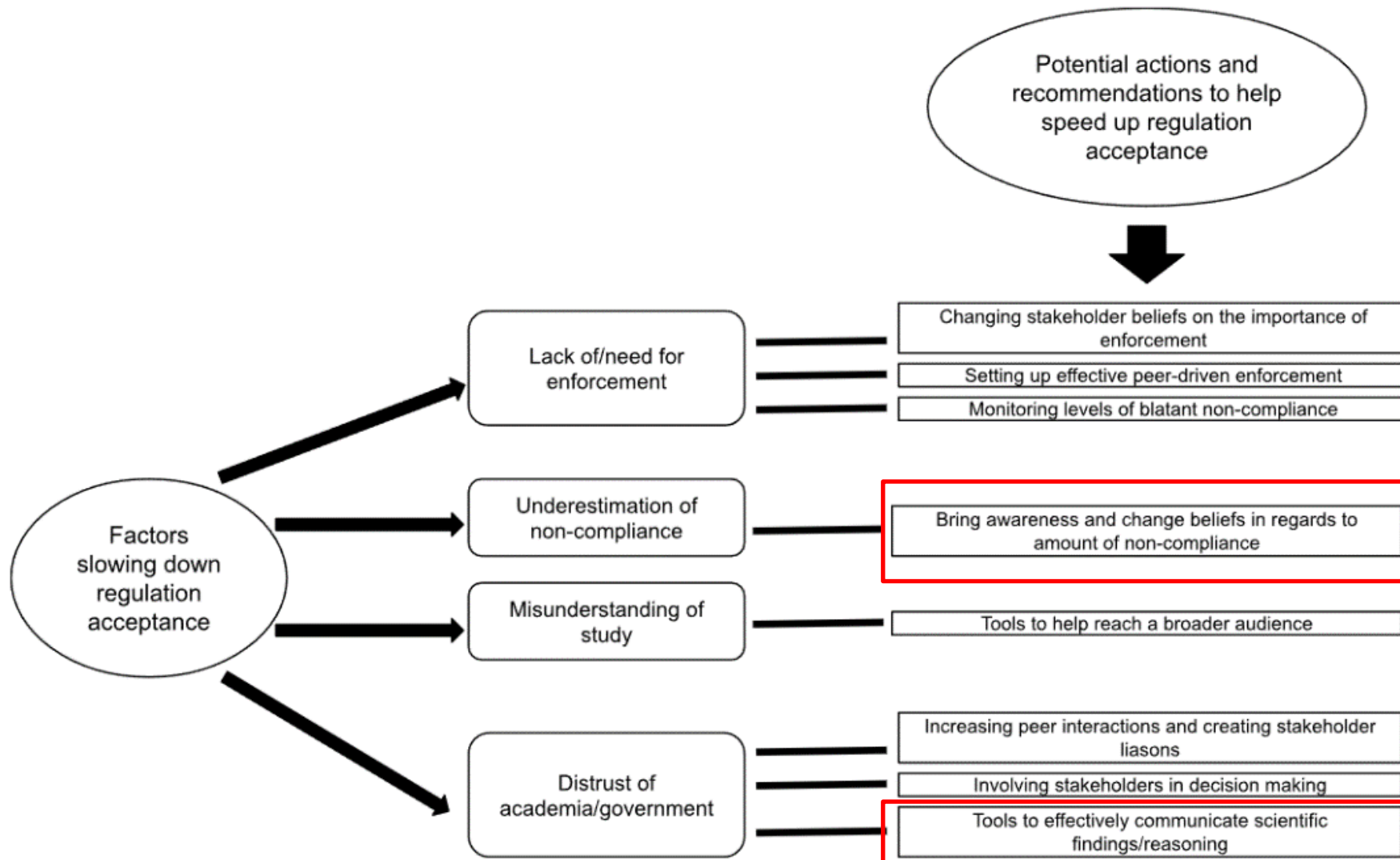
15 codes from those making “local ecological observations”

“My memory may not be scientific, but I remember my fishing for bass in Opinicon in the late 1970's was excellent, both for numbers and size. The high fishing pressure today due to the number of anglers using modern boats and equipment to fish for nesting bass cannot be sustainable.”



Zhang et al. 2024

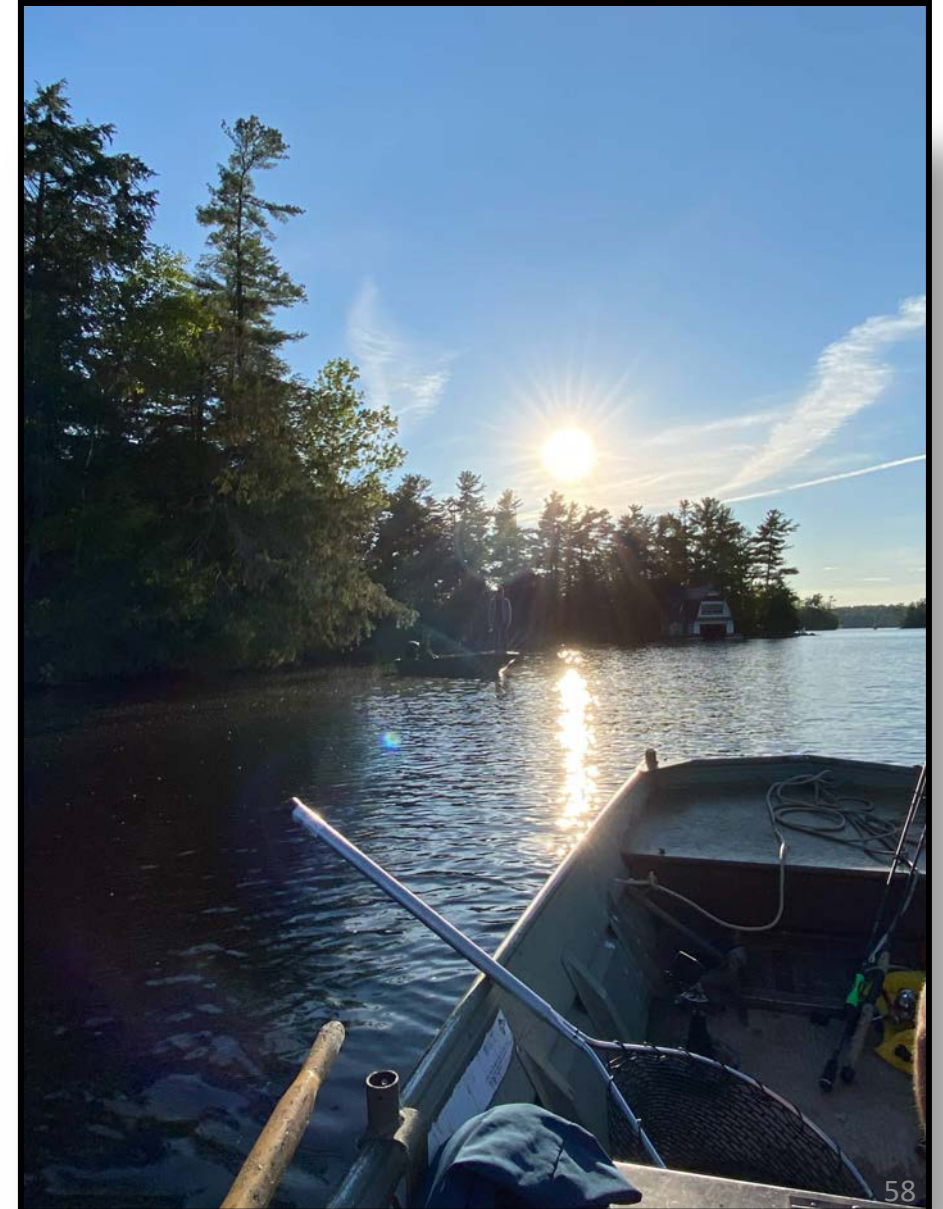
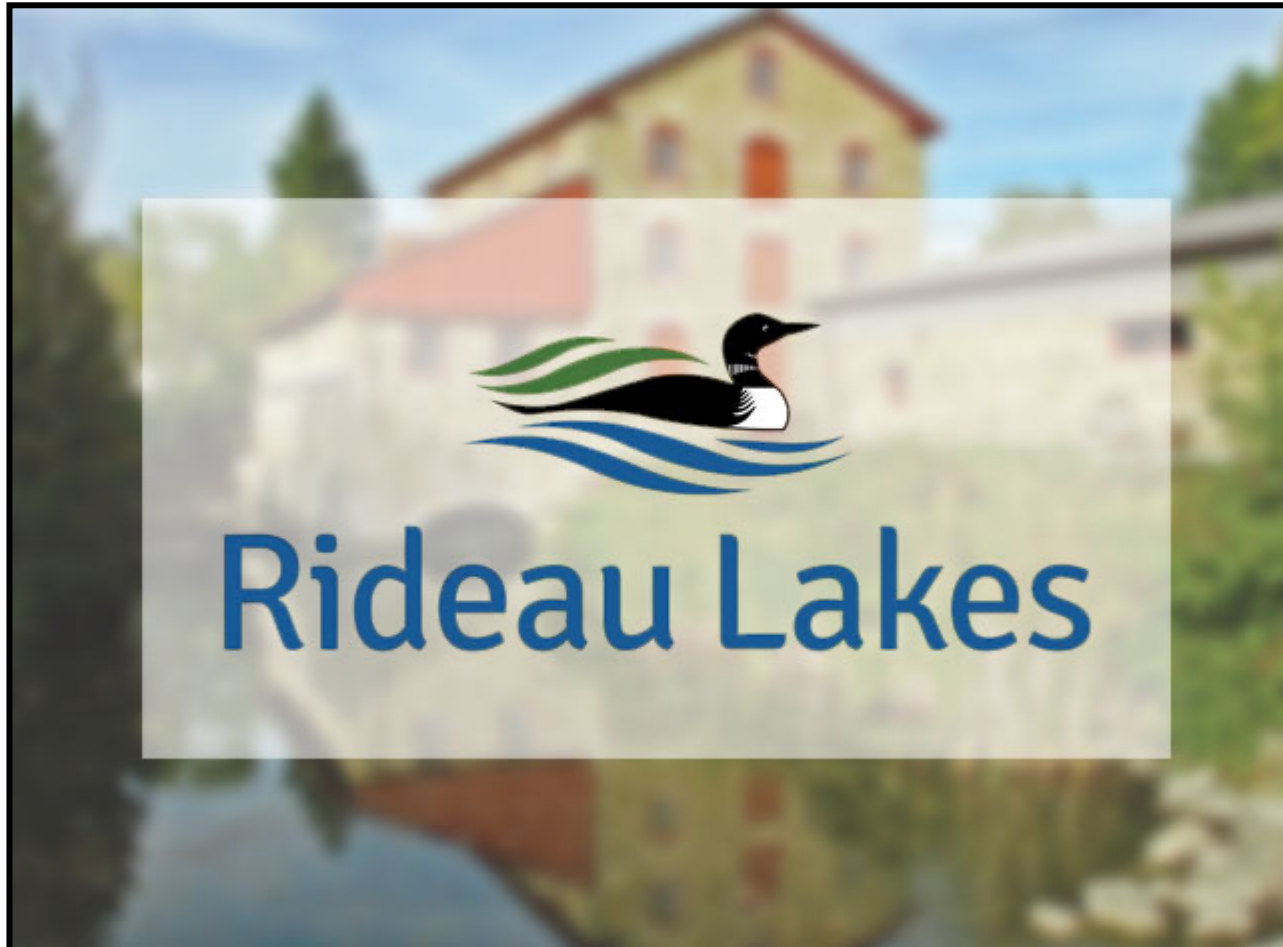




Zhang et al. 2024



A bottom-up approach...



1. Bass are highly managed but not highly monitored

4. Inspiring change through collaboration and new management strategies

2. Important to create systems that absorb changes

On Improved Care of Black Bass During Live-Release Competitive Angling Events — Cooke et al. 2020

Charleston Lake

Please enjoy this beautiful lake and respect all of its resources

10 km/h

Within 30m of shore

Manage your wake

Obey all MNRF regulations

Keep distance from wildlife

Take away your garbage

Cataraqui Conservation



3. People care and we need to facilitate collaboration





Reach out!

joelzhang@cmail.carleton.ca

(905)-431-2225

<https://www.fecpl.ca/people/joel-zhang/>

stevencooke@cunet.carleton.ca

philipp@illinois.edu

