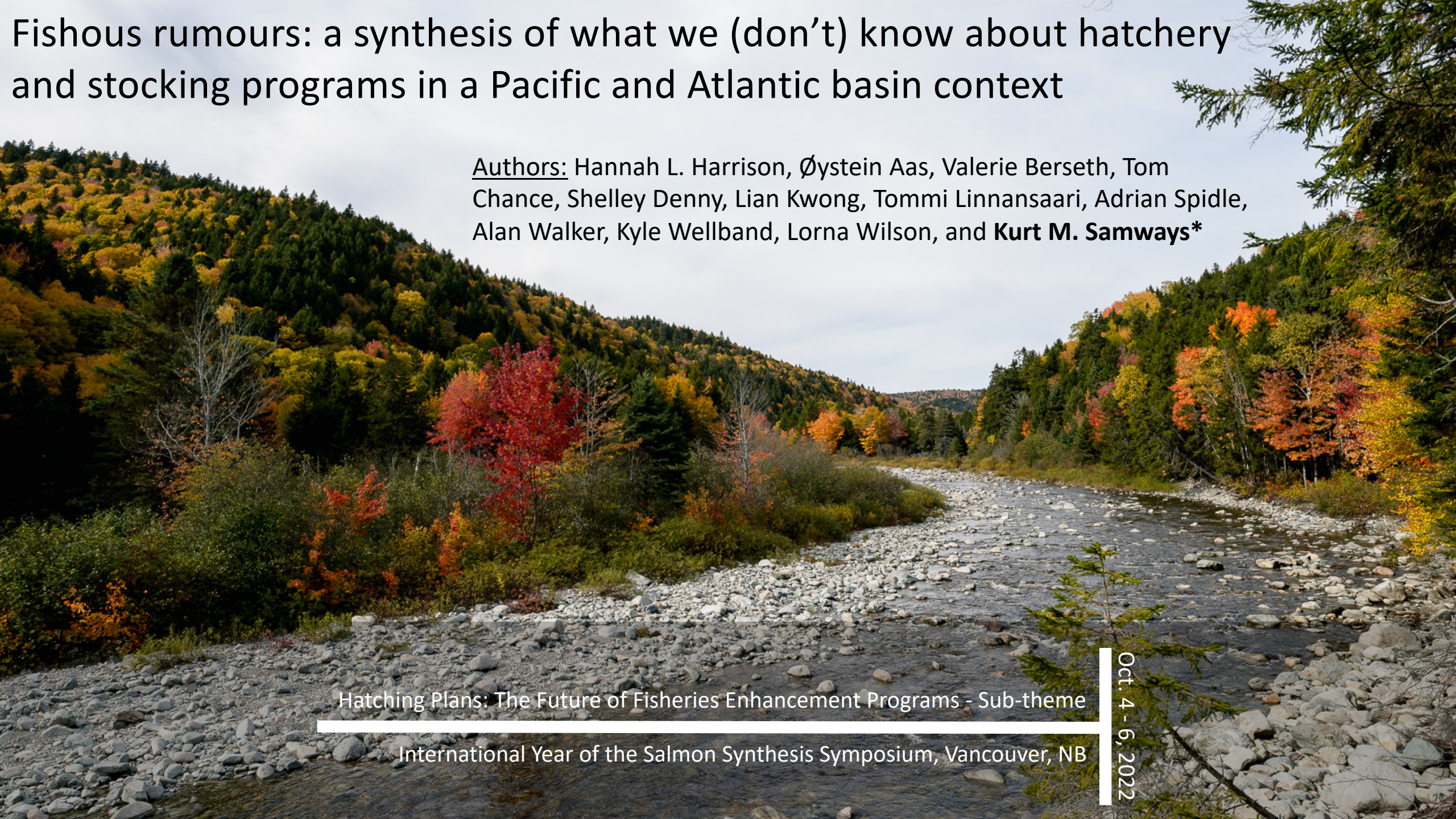
Fishous rumours: a synthesis of what we (don’t) know about hatchery and stocking programs in a Pacific and Atlantic basin context

Authors: Hannah L. Harrison, Øystein Aas, Valerie Berseth, Tom Chance, Shelley Denny, Lian Kwong, Tommi Linnansaari, Adrian Spidle, Alan Walker, Kyle Wellband, Lorna Wilson, and **Kurt M. Samways***



Hatching Plans: The Future of Fisheries Enhancement Programs - Sub-theme

International Year of the Salmon Synthesis Symposium, Vancouver, NB

Oct. 4 - 6, 2022

The Team

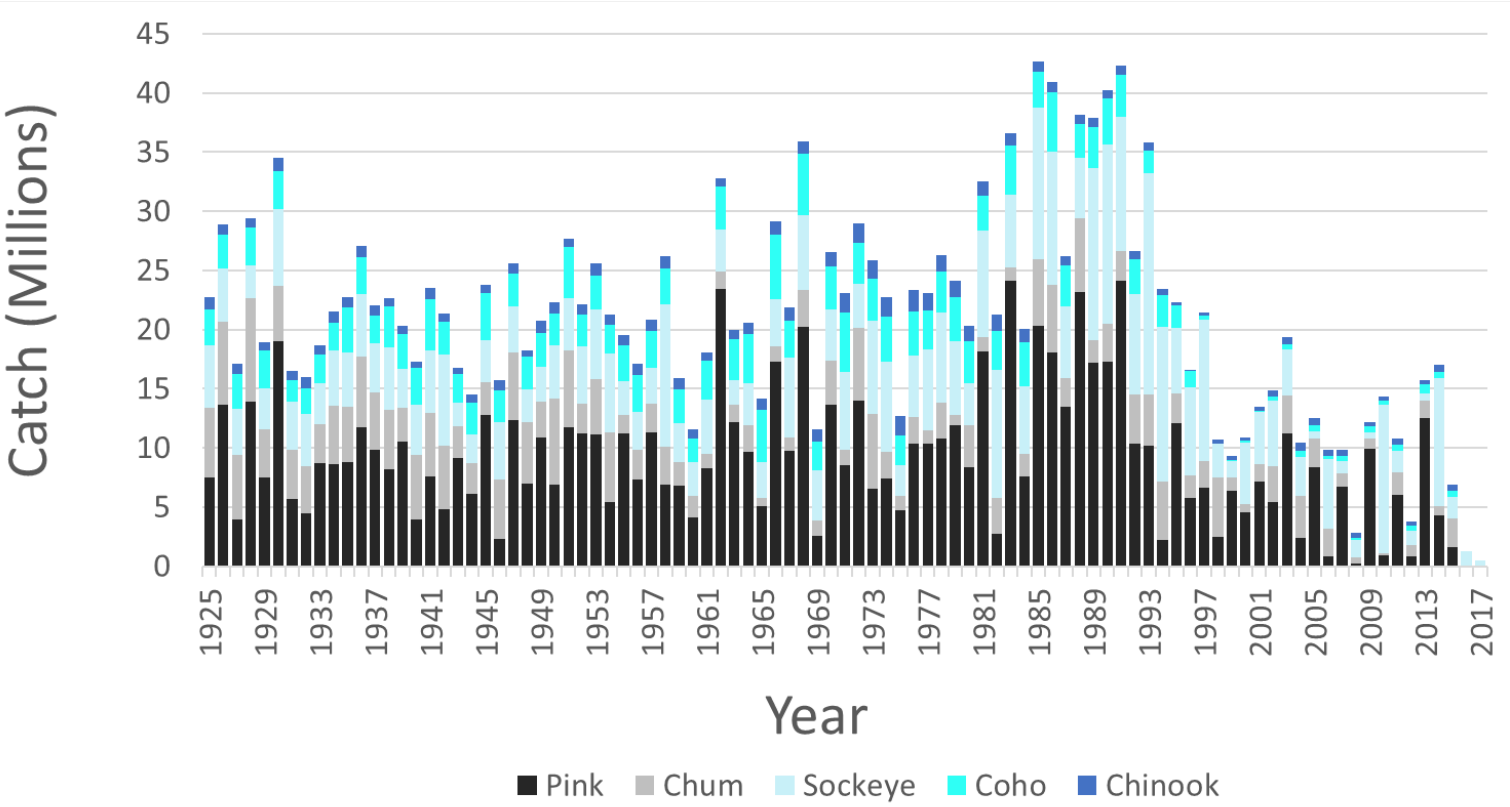
Co-Leads	Hannah L. Harrison	-	Dalhousie University
	Kurt M. Samways	-	University of New Brunswick
	Øystein Aas	-	Norwegian University of Life Science
	Valerie Berseth	-	Carleton University
	Tom Chance	-	Lummi Nation, Bellingham, WA
	Shelley Denny	-	Unama'ki Institute of Natural Resources; Dalhousie University
	Lian Kwong	-	DFO (PAC) - Salmon Enhancement Program
	Tommi Linnansaari	-	University of New Brunswick
	Adrian Spidle	-	Northwest Indian Fisheries Commission, Olympia, WA
	Alan Walker	-	Centre for Environment Fisheries and Aquaculture Science, England, UK
	Kyle Wellband	-	DFO (PAC) - Science
	Lorna Wilson	-	Alaska Department of Fish and Game

Captive Rearing

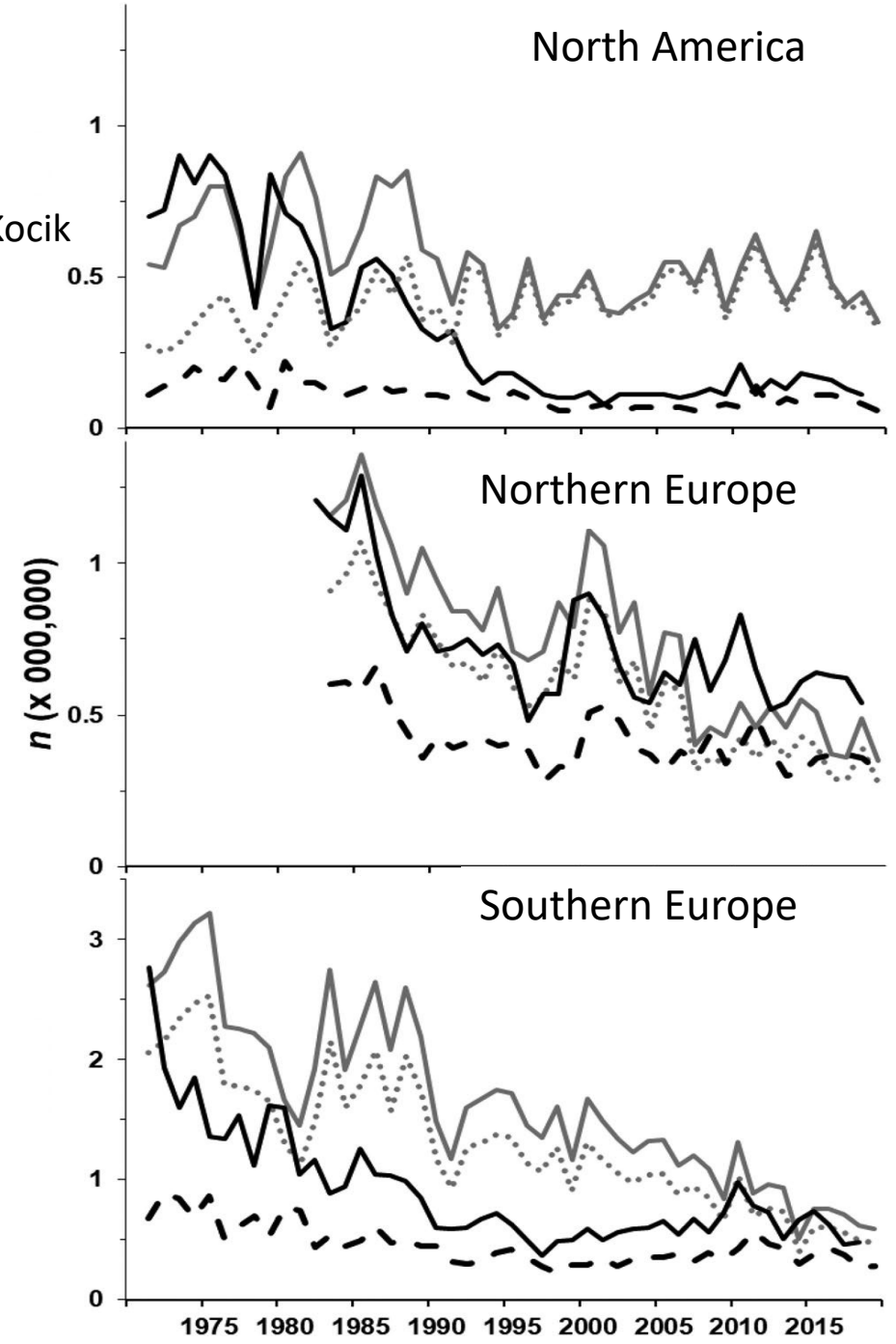
(*e.g.*, hatcheries, marine rearing, sea ranching)

Population Declines

Estimated prefishery Atlantic salmon abundance 1971–2019. - (adapted from Kocik and Brown 2002; Friedland et al. 2014; ICES 2015, 2020).



Average commercial catch of Canadian Pink, Chum, Sockeye, Coho and Chinook Salmon 1925-2019 - DFO 2020



Factors Contributing to Population Declines

communications biology

ARTICLE

https://doi.org/10.1038/s42003-021-01734-w OPEN

Climate change threatens Chinook salmon throughout their life cycle

Lisa G. Crozier[1✉], Brian J. Burke[1], Brandon E. Chasco[1], Daniel L. Widener[2] & Richard W. Zabel[1]

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Impact of parasites on salmon recruitment in the Northeast Atlantic Ocean

Martin Krkošek[1], Crawford W. Revie[2], Patrick G. Gargan[3], Ove T. Skilbrei[4], Bengt Finstad[5] and Christopher D. Todd[6]

Article

Land use, fishing, climate change, and the decline of Thompson River, British Columbia, coho salmon

Authors: Michael J Bradford and James R Irvine | AUTHORS INFO & AFFILIATIONS

Publication: Canadian Journal of Fisheries and Aquatic Sciences • January 2000 • https://doi.org/10.1139/f99-283

NRC Research Press

329

ARTICLE

Influence of dams on population persistence in Atlantic salmon (*Salmo salar*)

Elizabeth R. Lawrence, Anna Kuparinen, and Jeffrey A. Hutchings

ARTICLE

https://doi.org/10.1038/s41467-019-10972-w OPEN

Genomic signatures and correlates of widespread population declines in salmon

S.J. Lehnert[1], T. Kess[1], P. Bentzen[2], M.P. Kent[3], S. Lien[3], J. Gilbey[4], M. Clément[5,6], N.W. Jeffery[7], R.S. Waples[8] & I.R. Bradbury[1,2]

Routledge Taylor & Francis Group

REVIEWS IN FISHERIES SCIENCE & AQUACULTURE

https://doi.org/10.1080/23308249.2021.1937044

REVIEW

The Decline and Impending Collapse of the Atlantic Salmon (*Salmo salar*) Population in the North Atlantic Ocean: A Review of Possible Causes

Michael Dadswell[a], Aaron Spares[a], Jeffrey Reader[a], Montana McLean[a], Tom McDermott[b], Kurt Samways[c] and Jessie Lilly[d]

ELSEVIER

Aquaculture 183 (2000) 363–386

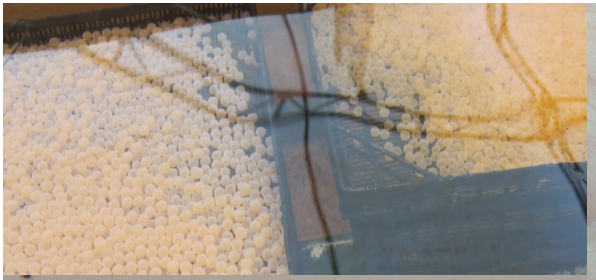
Aquaculture

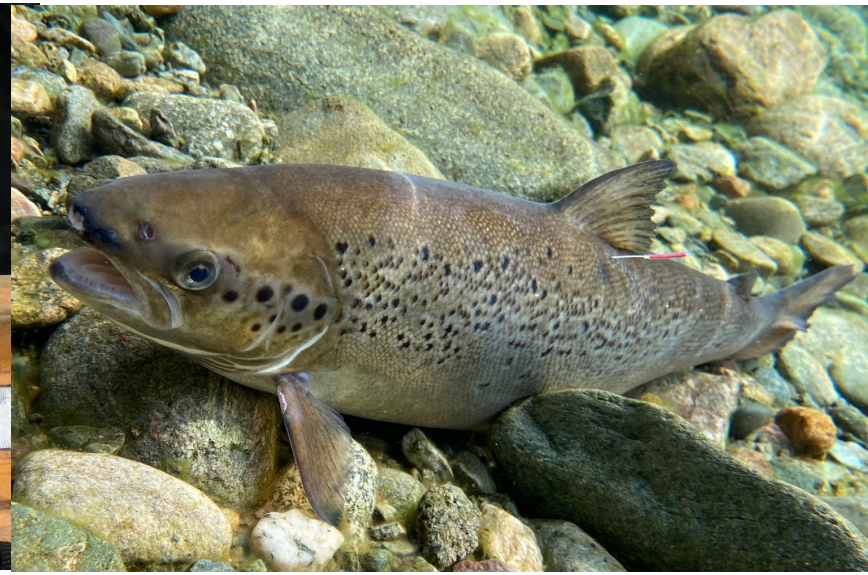
www.elsevier.nl/locate/aqua-online

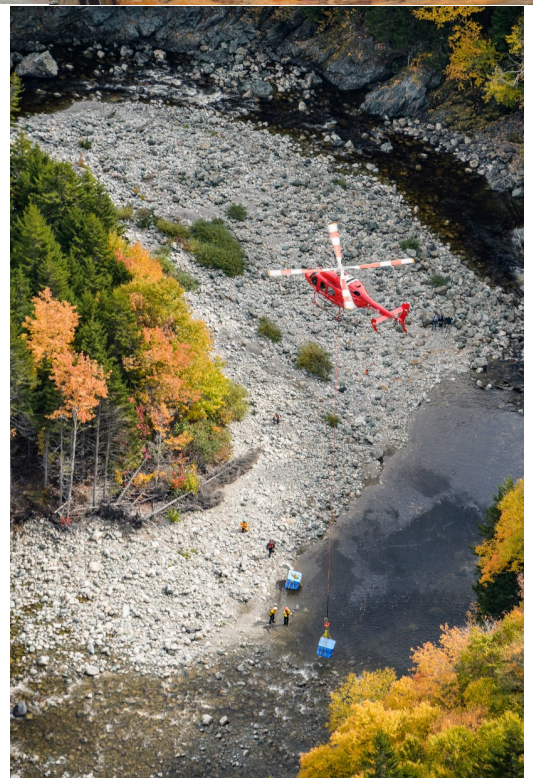
On the decline of Pacific salmon and speculative links to salmon farming in British Columbia

Donald J. Noakes *, Richard J. Beamish, Michael L. Kent

Programs captively rear and release salmon at all life-stages, scales, contexts and methods

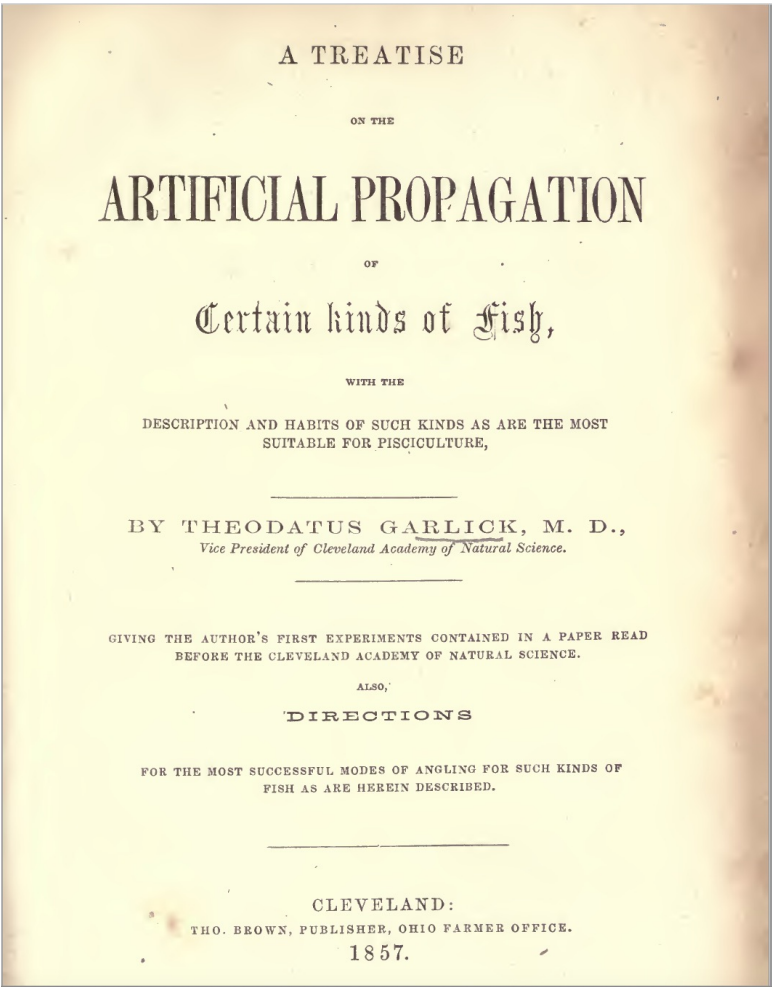






Is the problem the tool itself or the current hatchery practices?

Many practices have gone relatively unchanged for over a century



A TREATISE

ON THE

ARTIFICIAL PROPAGATION

OF

Certain kinds of Fish,

WITH THE

DESCRIPTION AND HABITS OF SUCH KINDS AS ARE THE MOST SUITABLE FOR PISCICULTURE,

BY THEODATUS GARLICK, M. D.,

Vice President of Cleveland Academy of Natural Science.

GIVING THE AUTHOR'S FIRST EXPERIMENTS CONTAINED IN A PAPER READ BEFORE THE CLEVELAND ACADEMY OF NATURAL SCIENCE.

ALSO,

DIRECTIONS

FOR THE MOST SUCCESSFUL MODES OF ANGLING FOR SUCH KINDS OF FISH AS ARE HEREIN DESCRIBED.

CLEVELAND:

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1857.

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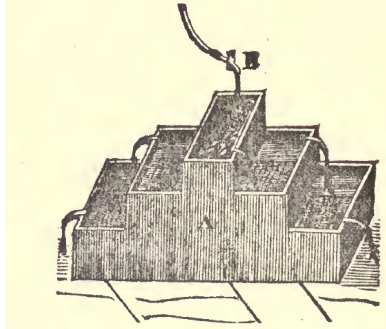
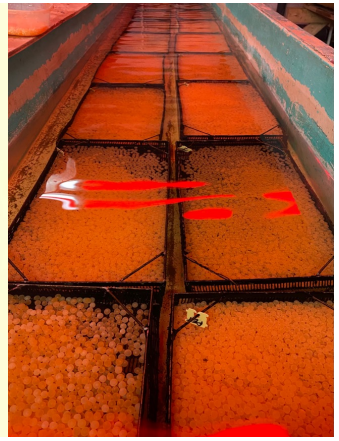


M. Costa's Hatching Apparatus.



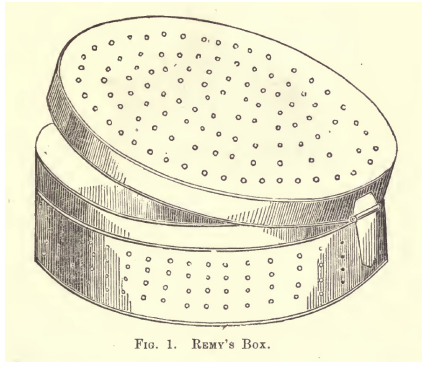
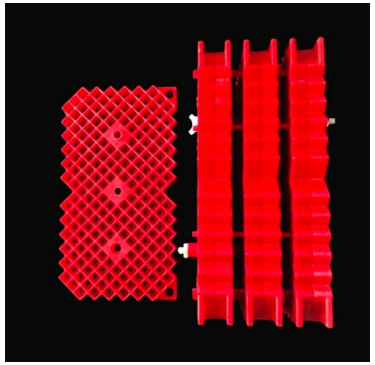
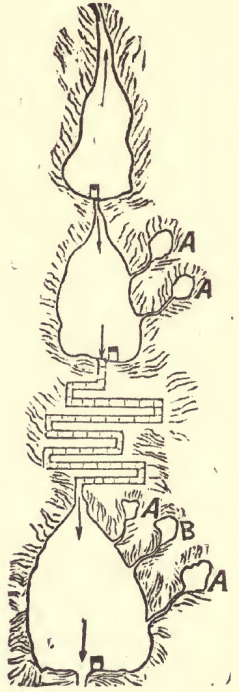


Fig. 1. Remy's Box.



THE CONSTRUCTION OF PONDS.



We have learned a lot about captive rearing and supplementation

- New knowledge about the good, the bad and the ugly is accumulating
- Knowledge is not always translated into practice or policy

Natural science literature synthesis to include aspects of:

- Biological
- Ecological
- Genetic

Photo Credit: Alanah Bartlet

Human dimensions need to be part of this discussion

- Syntheses don't consider human dimensions research on salmon supplementation
- Knowledge systems from traditions outside of academia (*e.g.*, Indigenous knowledge), not considered

Social science literature synthesis to include aspects of:

- Economic values
- Non-monetary social values
- Food security
- Recreational value
- Understanding conflicts
- Indigenous ways of knowing and experiences

What role could captive rearing play in conserving future wild salmon populations?

- **Objective** look at the state of knowledge
- Focus on last 10 year (2012-2021, inclusive)
- Address gaps between natural and social sciences
- Peer-reviewed literature on ecological, biological, and social understandings of captive rearing programs
- Focus on non-commercial salmon in the Pacific and Atlantic basins
- Interdisciplinary synthesis framed in the context of climate change and the Anthropocene
- Bring balance back to the discussion

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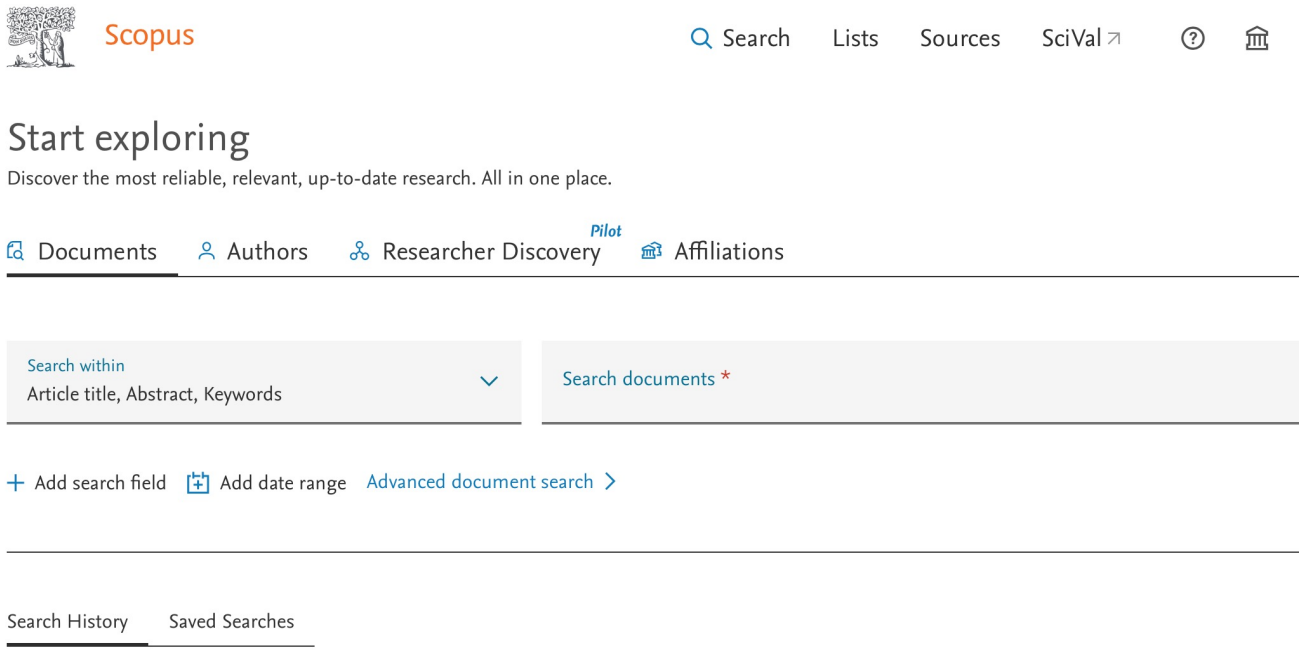
https://www.linkedin.com/pulse/dont-throw-baby-out-bath-water-david-hodson/

Mechanics of the Synthesis

- Search engines
  - Web of Science
  - Scopus
  - Aquatic Sciences and Fisheries Abstracts
  - Google Scholar*
- Covidence
  - Literature review management software
  - Dalhousie University Library
- Grey literature conundrum
  - How do we access perspectives/information outside peer-reviewed literature?
- Use this to highlight what knowledge is NOT represented in the peer-review lit



- Search Strings:

(Pacific salmon OR Atlantic salmon) AND (stocking OR hatcheries OR cultivation OR supplementation OR sea ranching OR mitigation OR enhancement) AND (value* OR belief*OR identit*)

Where we are at and where we are going?

Where are we at?

- We have assembled a very strong team
- We have developed our framework
- We have formalized the search process
- Teams are starting to conduct their searches and evaluating the papers

Where are we are going?

- Complete the interdisciplinary/inter-knowledge synthesis
- Perspectives on the role hatcheries may play in conserving wild populations and supporting fisheries
- Key decision-making points/guidance offered to practitioners/managers/policy makers
- Recommendations on public participation and practitioner knowledge in creation of knowledge
- Balancing risks (including risk of doing nothing)
    - policy paradox of doing nothing vs doing something that is critiqued
    - making decisions without perfect knowledge