



# **The Role of Marine Science in Supporting the Implementation of the Canadian Aquatic Invasive Species Regulations**

**Thomas W. Therriault**

Fisheries and Oceans Canada, Pacific Biological Station,  
Nanaimo, British Columbia, Canada, V9T 6N7



# Background

- Despite the threat invasive species pose to native biodiversity Canada does NOT have a general *Biosecurity Act* (e.g., New Zealand)
- Although it has always been illegal to introduce fish under the *Fisheries Act* General Regulations there was a desire to develop and implement AIS Regulations in the *Fisheries Act* due to the increased risk of new invaders (e.g., Asian carps in Great Lakes)



# Aquatic Invasive Species (AIS) Regulation in the Canadian *Fisheries Act*

- Published in Canadian *Gazette* June 17, 2015
- <http://gazette.gc.ca/rp-pr/p2/2015/2015-06-17/html/sor-dors121-eng.php>
- Designed to be enabling so do not come with dedicated funding



# AIS Regs: Prohibited Species

- The regulation prohibits import, transport, possession and release of specific species listed in Part 2
- Prohibited list of species includes name of species, which prohibitions apply, and in which geographic area
- List indicates if prohibition applies to live organisms, or both live and dead, or have a requirement for evisceration





# AIS Regs: Prohibited Species

- Risk assessments to be used to inform decision making regarding which species and geographic boundaries to consider for listing
- Thus, the intent is to invoke prohibitions only when certain risk tolerance thresholds are exceeded
- DFO Science informed the listing of species/areas in the AIS Regulations and can inform any potential amendments





# Prohibited Species List

## ➤ Asian carp (four species):

- prohibited from import, possession, transport and release in Canada unless dead and eviscerated

## ➤ Invasive fish under the *Ontario Fishery Regulations*:

- prohibited from live possession, transport and release in Ontario

## ➤ Prohibited species under the *Manitoba Fishery Regulations*:

- prohibited from live possession, transport and release in Manitoba

## ➤ Zebra and Quagga Mussels:

- prohibited from import across Canada; possession, transport and release, live or dead, in British Columbia, Alberta, Saskatchewan, and Manitoba



# Prohibited Species List: Potential Gaps

- Initial list of Prohibited Species will be expanded over time (through regulatory amendment) according to risk and capacity to administer and enforce prohibitions
- British Columbia's lists were excluded from initial listing process, specifically:
  - Pacific Fisheries Regulation Schedule VIII
  - Controlled Alien Species Regulation in the British Columbia Wildlife Act





# AIS Regs: Control Species

- The regulation also includes a list of 14 species (Part 3) that are NOT prohibited but for which control activities may be undertaken where they are not indigenous and may cause harm
- List includes tunicates, green crab, and species such as smallmouth bass and walleye which are native to some parts of Canada but are considered invasive elsewhere





# AIS Regs: Control Species

- Species listed are the ones for which DFO has completed risk assessments and the outcome was moderate to high risk
- Currently, this list only includes species that have already invaded at least one location in Canada
- Thus, the intent is to provide a regulatory framework to undertake control measures if desired



# Control Species List

- **Marine Species**
  - **Club Tunicate**
  - **Vase Tunicate**
  - **Golden Star Tunicate**
  - **Violet Tunicate**
  - **Carpet Tunicate**
  - **European Green Crab**
  - **Chinese Mitten Crab**
- **Freshwater Species**
  - **Bloody Red Shrimp**
  - **Smallmouth Bass**
  - **Largemouth Bass**
  - **Northern Pike**
  - **Pumpkinseed**
  - **Yellow Perch**
  - **Walleye**





# AIS Regs: General Prohibition

- The regulation also contains a general prohibition against the introduction of species where they are not indigenous unless authorized under federal or provincial law
- **NOTE:** It was already illegal to introduce fish to fish-bearing waters under the *Fisheries Act* General Regulations





# NEW Control & Eradication

- The regulation allows prescribed Ministers to authorize the deposit of deleterious substances to control or eradicate AIS:
  - Conditions such as not compromising public safety and taking into account impact and alternative measures have to be followed
  - Only approved drug and pest control products can be used



# NEW Control & Eradication

- Control and eradication activities may be *authorized* for species listed in the regulation (Parts 2 or 3 of the Schedule), as well as any aquatic species where it is not indigenous and may cause harm
- Additional research will be required to inform control measures for freshwater and marine AIS
- Additional products will need to be approved for use in aquatic systems



# NEW Compliance & Enforcement

- P/T ministers will play a role in administering and enforcing the regulatory provisions in areas where they manage the fishery
- Regulatory provisions can be enforced by Federal Fishery Officers and provincial Enforcement Officers designated under the *Fisheries Act*
- Enforcement will focus on high risk species, geographic areas, and activities



# NEW Compliance & Enforcement

Fishery Officers & Fishery Guardians may:

- Notify people that species are non-indigenous
- Take certain actions to control listed species (e.g., treat or destroy species or carriers, prohibit access to areas where species are found)

Fishery Officers may also:

- Enforce the prohibitions on listed species
- Direct people to cease activities that may lead to the introduction of any aquatic species where it is not indigenous





# Risk Assessments to Inform Regulations

- As noted, detailed-level risk assessments were the general basis for listing species in the AIS Regulations.
- Generally these are quite time-consuming and not clear if detailed-level risk assessments would be required to inform listing species in AIS Regulations – maybe screening-level risk assessments are suitable?



# Screening-Level RA Tools (SLRA)

- SLRA tools can be applied quickly with available data (which may be limited)
- Score-based tools can prioritize AIS based on rank score
- SLRAs provide a risk-based approach that could be used to add species to the AIS Regulations



# Screening Level RA Tool (CMIST)

- We developed the Canadian Marine Invasive Screening Tool (CMIST)
- 17 questions are generalized to the invasion process and resulting impacts, therefore this tool could be applied to other taxa and at different spatial scales
- Guidance document ensures standardized application
- Explicitly captures assessor uncertainty in the final risk score *via* a Monte Carlo procedure



# CMIST Likelihood of Invasion Qs

**Table 1** Questions of CMIST and description of potential scores

Question	Score		
	1 (Low)	2 (Moderate)	3 (High)
<i>Present status</i>			
1 Is the species established in the assessment area?	No	Observed but not reported as established	Yes
<i>Rate of introduction</i>			
2 How frequently and in what numbers is the species expected to arrive into the assessment area?	Infrequently in low numbers of individuals	Frequently in low numbers or infrequently in high numbers	Frequently in high numbers
<i>Survival</i>			
3 How much of the assessment area offers suitable habitat for the species?	Negligible proportion of the assessment area	Moderate proportion of the assessment area	Most of the assessment area
4 How much of the assessment area offers suitable environmental conditions for the species to survive?	Negligible proportion of the assessment area	Moderate proportion of the assessment area	Most of the assessment area
<i>Establishment</i>			
5 Are the species' reproductive requirements available in the assessment area?	Almost never	Sometimes	Almost always
6 To what extent could natural control agents slow the species' population growth in the assessment area?	Likely to severely restrict population growth	Could slow population growth	Unlikely to affect population growth
<i>Spread</i>			
7 What is the range of the species' potential natural dispersal in the assessment area?	Very limited range	Moderate range	Wide range
8 What is the range of the species' potential dispersal in the assessment area from anthropogenic mechanisms?	Very limited range	Moderate range	Wide range



# CMIST Impact of Invasion Qs

**Table 1** Questions of CMIST and description of potential scores

Question	Score		
	1 (Low)	2 (Moderate)	3 (High)
<b>Impact</b>			
9 What level of impact could the species have on population growth of other species in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
10 What level of impact could the species have on communities in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
11 What level of impact could the species have on habitat in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
12 What level of impact could the species have on ecosystem function in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
13 What level of impact could the species' associated diseases, parasites, or travellers have on other species in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
14 What level of genetic impact could the species have on other species in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
15 What level of impact could the species have on at-risk or depleted species in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
16 What level of impact could the species have on aquaculture and commercially fished species in the assessment area?	Low or no impact	High impact in few areas or moderate impact in many areas	High impact in many areas
17 Is the species known or generally considered to be invasive anywhere in the world?	No	No, but has traits related to invasiveness	Yes





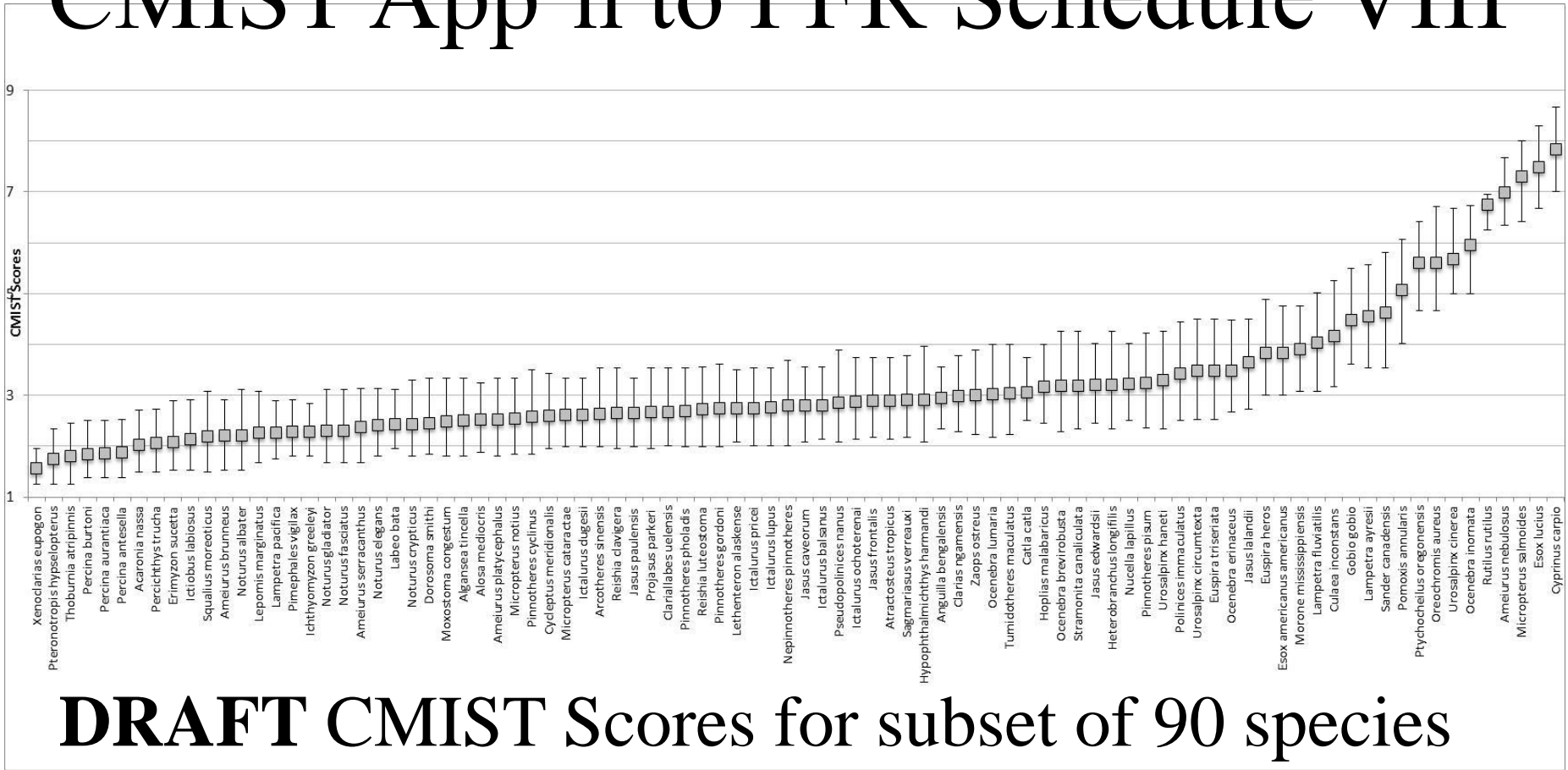
# Pacific Region CMIST Application

- Currently applying CMIST to British Columbia Pacific Fisheries Regulations Schedule VIII
- BC PFR includes primarily FW fish (1161 sp.) and marine invertebrates (375 sp.)
- Screening is using combination of climate and CMIST: temperate species will be assessed with CMIST while tropical ones will not





# CMIST App'n to PFR Schedule VIII

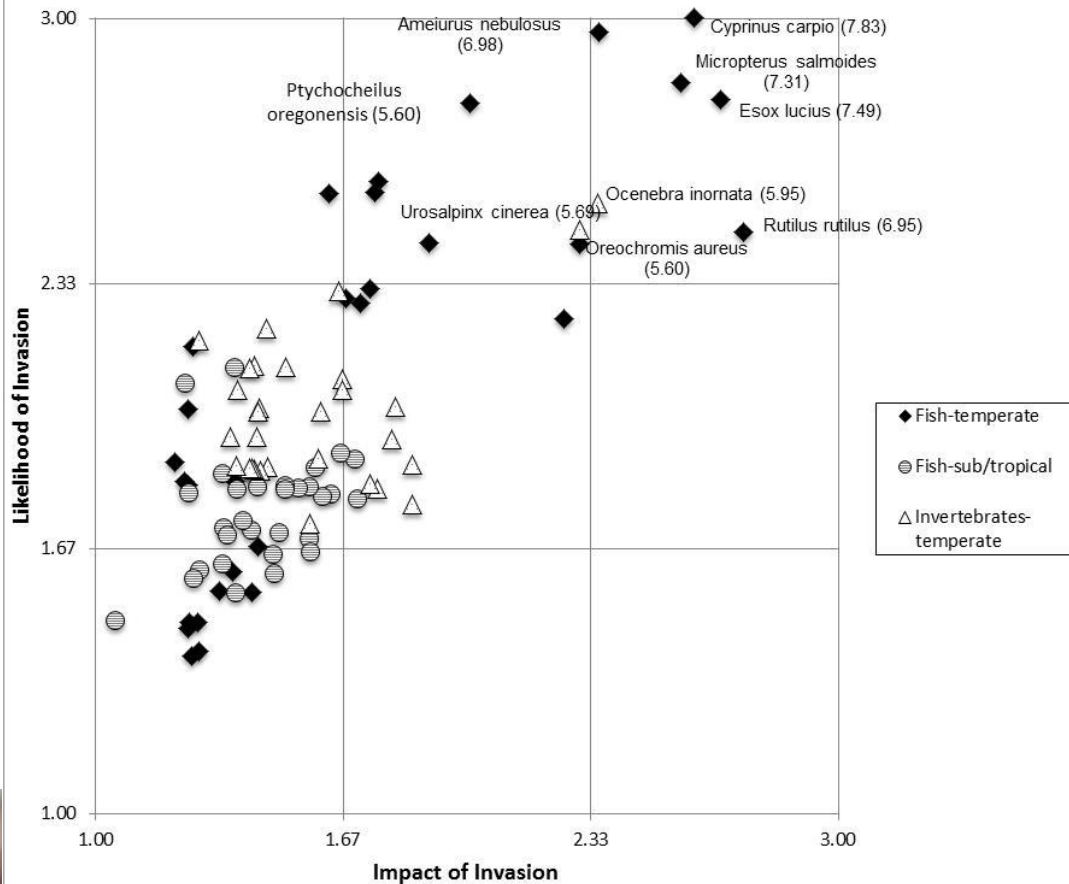


## DRAFT CMIST Scores for subset of 90 species





# CMIST App'n to PFR Schedule VIII



Higher risk species are in the upper right and lower risk species are in the lower left



# AIS Regulation Amendments

- Application of CMIST to PFR Schedule VIII species (or others) will identify higher risk species that could be considered in future changes to prohibited/control species in the AIS Regulations
- Ecological risk is only one consideration. Also,
  - Socio-economic risk assessment
  - Cost-Benefit Analysis



# Summary

- Non-native species continue to be re-distributed globally at alarming rates – implications for Canada’s marine and freshwater ecosystems
- Prevention should be the primary objective but we can’t prevent all introductions
- Agencies don’t have the resources to deal with all introductions so these need to be prioritized in a risk-based way
- DFO can’t do this alone and needs to work with Provincial/Federal counterparts, First Nations, industry, and stakeholders to deliver



# Summary

- SLRA outputs can be used to inform AIS Regulatory amendments, EDRR plans, AIS monitoring programs, and the identification of research gaps
- PFR Schedule VIII assessments will be peer-reviewed via a DFO CSAS process consistent with other science advice within the Department
- Additional species not covered by PFR Schedule VIII should be assessed for risk of invasiveness (e.g., snakeheads)
- DFO Science plays a critical role informing management decision making and policy development



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# Questions?



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