

INTEGRATED MANAGEMENT APPROACH OF AQUATIC INVASIVE SPECIES FOR THE PROVINCE OF QUÉBEC, CANADA

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Direction de l'expertise sur la faune aquatique

International Conference on Aquatic Invasive Species

Fort Lauderdale, Florida

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@OMorissette

WILDLIFE & FISHERIES MANAGEMENT IN QUÉBEC

Québec is responsible for freshwater + migratory fish since 1922 (*marine fish under Fed. since 1983*)

The *Ministère des Forêts, de la Faune et des Parcs* (i.e, Forest, Wildlife and Parks)

**Development
&
Conservation**



INTEGRATED MANAGEMENT APPROACH

Asian Carps



Environmental DNA
(eDNA) surveys



Some examples...

Baitfish regulations



Outreach activities



AQUATIC INVASIVE SPECIES IN QUEBEC

Challenges:

Vast superficies (1,7 million km²)

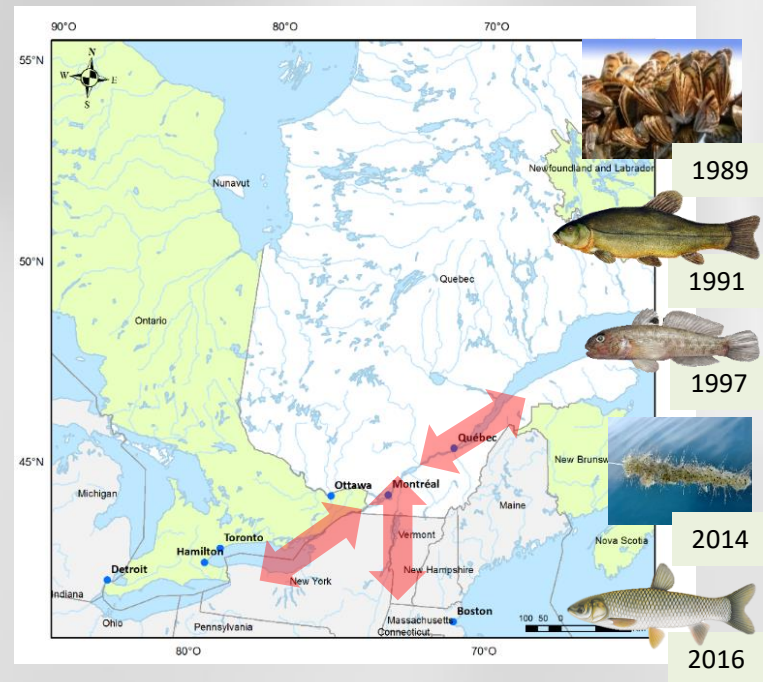
Population of 8,12 million

The St.Lawrence river is the downstream portion of the Great Lakes / St.Lawrence system

Recently:

General increase of AIS species number and abundance

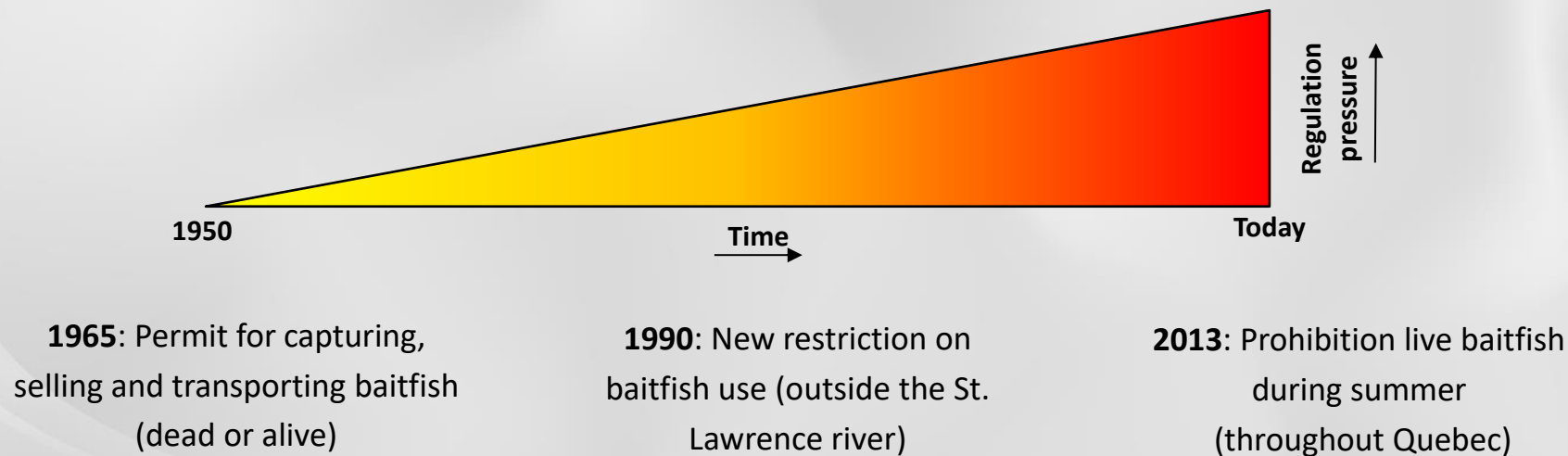
Arrival of the grass carp in the St.Lawrence



The province of Québec is increasing its efforts dedicated toward the AIS, via the MFFP.

HISTORY OF BAITFISH REGULATIONS IN QUÉBEC

Control on baitfish

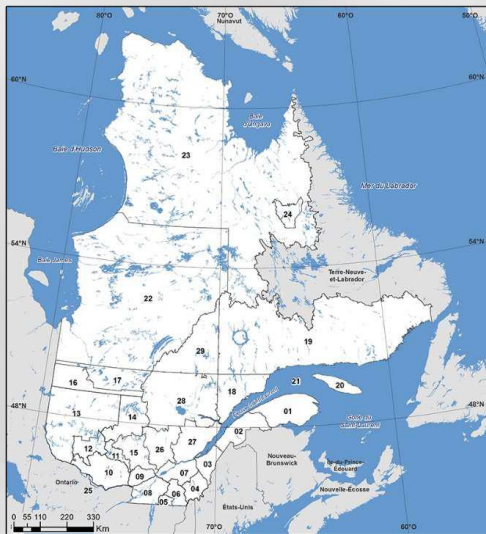


Risks associated with baitfish remained.

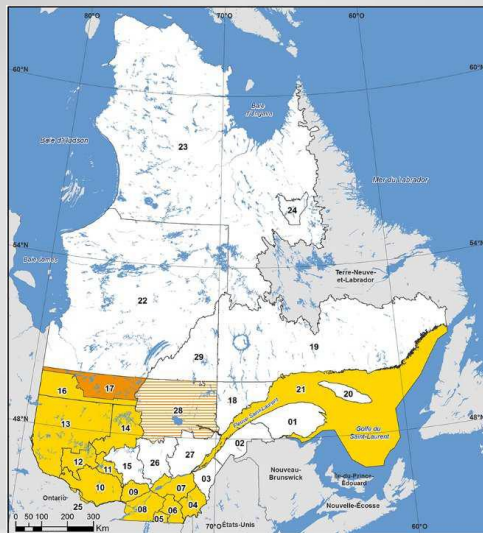
BAITFISH REGULATION UPDATE

“Since April 1st 2017, use of live baitfish is prohibited throughout the year and dead baitfish are allowed only in winter, in some areas (in yellow).”

Summer



Winter



SOCIAL ACCEPTANCE AND SUPPORT FOR THE INDUSTRY

The *Ministère des Forêts, de la Faune et des Parcs* is providing support to the winter sport fishing and baitfish industry to adapt to this new reality (prevention of AIS spread and new baitfish regulations).

Included in the ministry's Salmon and recreational fishing strategy, \$1 Million specifically dedicated for supporting / promoting winter sport fishing activities

Support baitfish industry



Support winter fishery

- Alternative techniques
- Research projects



Communications & outreach

- Baitfish as a key AIS vectors
- Promotion of winter ice-fishing



PREVENTION AND OUTREACH

The MFFP is involved in numerous initiatives promoting:

- Public awareness
- Scientific knowledge
- Better practices (boat cleaning)
- Proposing new regulations / implementation
- Enforcement of regulations (Wildlife protection officers)



Fédération québécoise
des chasseurs et pêcheurs



EARLY DETECTION

Early detection and monitoring :

Commercial fishermen AIS surveillance network

Annual ichthyological surveys in the St. Lawrence river

RSI (freshwater portion)

RIPE (estuarine portion)

Other governmental ichthyological surveys / population assessments



Improving early detection capabilities through eDNA

(Since 2015, 40 stations that year)

379 stations sampled between May and September
2017

St. Lawrence river and its majors tributaries.



eDNA DEVELOPMENTS

- Implementing an annual survey (since 2015)
- Increasing laboratory capabilities
- Developing new primers
- Improving spatial resolution and expanding coverage



Interpretation and limitations of eDNA results from a highly-energetic fluvial systems

Julien April, Guillaume Côté, Yves Paradis & Louis Bernatchez

Detectability of eDNA signals of two species within water masses flowing side-by-side with little mixing

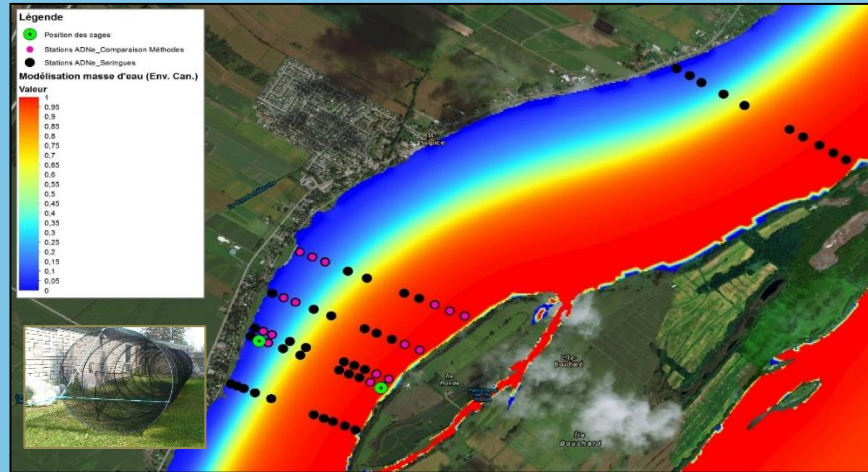
Ongoing project



UNIVERSITÉ
LAVAL

Forêts, Faune
et Parcs

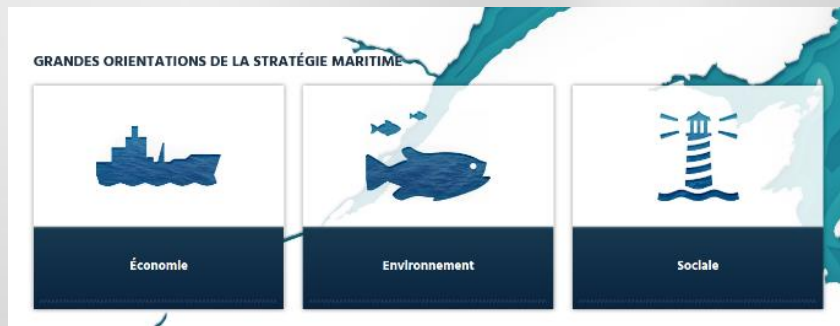
Québec



STATUS OF ASIAN CARPS IN QUEBEC



STRATÉGIE
MARITIME



“Protection of biodiversity and increase of the capacity to react and intervene in face of AIS, notably Asian Carps”.

Initiation of the **Québec Asian Carp Program** in 2016

Financial support of 1.7 M\$ covering 3 years (2016-2018) is listed as a element of the Quebec's maritime strategy

But in the meantime...

ASIAN CARPS IN QUEBEC - SITUATION



Photos : Huguette Massé

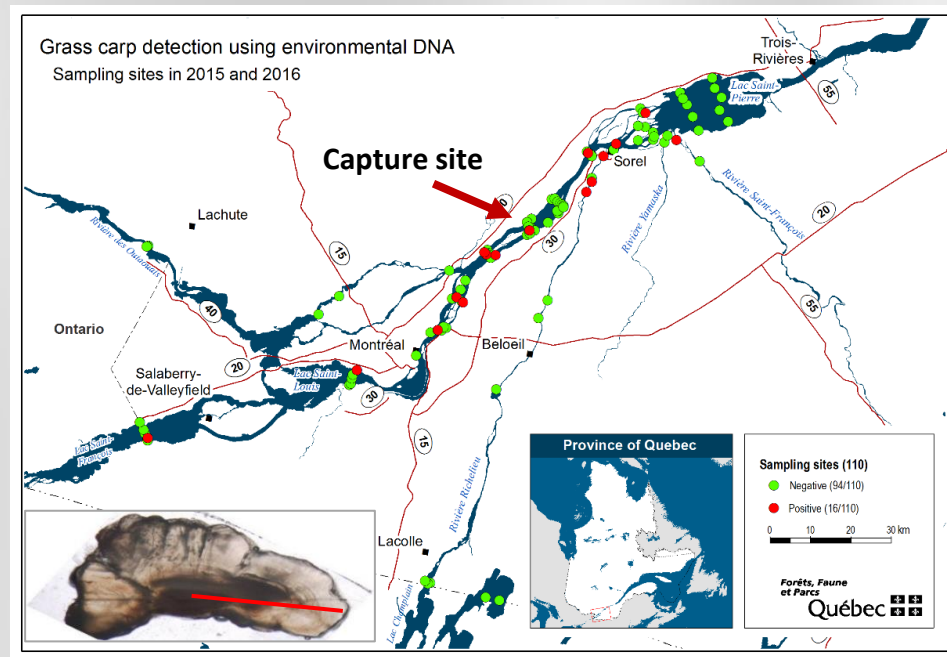
Grass carp, diploid female

1.26 m, 29 kg

~9 years old (3 kg/yr)

1,3 M of eggs potentially viable

One of the highest growth rate in N.America



Grass Carp is considered as **present** in the St.
Lawrence river

QUEBEC'S ASIAN CARPS PROGRAM

Main objectives;

- Creation of a *concerted provincial action plan*
- Optimize *early detection and population surveys* focusing on Asian Carps
- Identify and analyze *options available to control/restrict* invasion of inland waters
- Evaluate the *options available to mitigate* impacts
- Develops and adapt the *Quebec expertise* on Asian Carps to deal with the St.Lawrence reality (LRS unhindered) and increase collaborations with experts and collaborators in US & Canada

The Quebec central team...



Guillaume
Côté, M.Sc.

eDNA program



Annick
Drouin, Ph.D.

Capturability and
coordination



Frédéric
Lecomte, Ph.D.

Ichthyologist &
scientific expert



Olivier Morissette,
Ph.D. candidate

AIS coordination
& dispersal



Rémy Pouliot,
Ph.D.

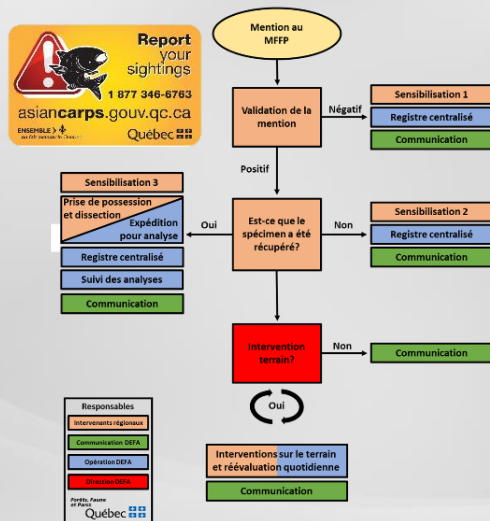
Habitat assessment
& dispersal

QUEBEC'S ASIAN CARPS PROGRAM

Results obtained in 2016-2017

Protocol of Asian Carps reports

Plan de suivi des mentions de carpes asiatiques par
le ministère des Forêts, de la Faune et des Parcs 2017-2018



>40 reports, all
misidentifications...

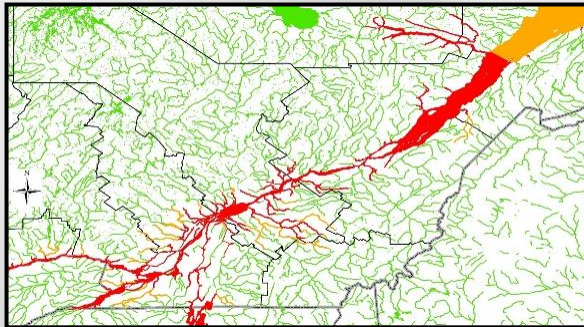


Capacity of rapid
response



QUEBEC'S ASIAN CARPS PROGRAM

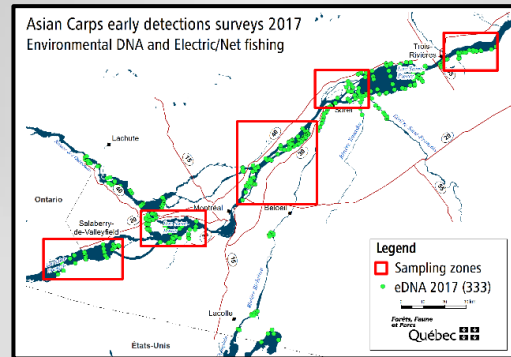
**Risk assessment and dispersion
(see our poster!)**



**Develop capacity to capture the beasts
(In Quebec & US)**



**Expansion of eDNA sampling and
reducing the processing time**



**Enforcement and seizure of
live grass carps**



Photos : Huguette Massé

ASIAN CARPS – FUTURE DIRECTIONS

Governmental concerted plan

Protection, control & confining



Habitats assessment



Otolith microchemistry



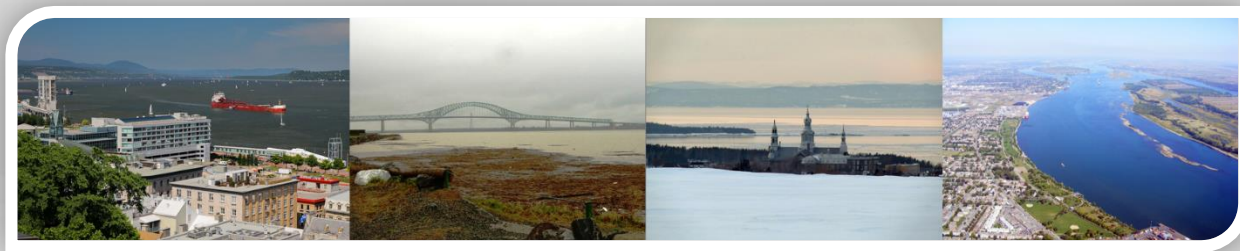
Development of scientific expertise & collaborations with regional entities

CONCLUSION – TOWARD NEW CHALLENGES

Management of AIS in Quebec is an important issue vs. sheer size

We believe all efforts dedicated to achieve the main goals of the Quebec's Asian Carp Program will benefit other actions aimed at various AIS threatening the aquatic ecosystems in Québec.

St. Lawrence River is a large and complex landscape (unhindered, tidal estuarine habitats, numerous tributaries and fluvial lakes), with few comparisons available. A dedicated and adapted AIS management approach is mandatory.



ACKNOWLEDGMENTS

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Co-authors:

- Catherine Brisson-Bonenfant
- Rémy Pouliot
- Annick Drouin
- Guillaume Côté
- Frédéric Lecomte

Collaborators:

- Yvon Boilard
- Martin Arvisais
- Véronik de la Chenelière
- Yves Paradis
- Julien April



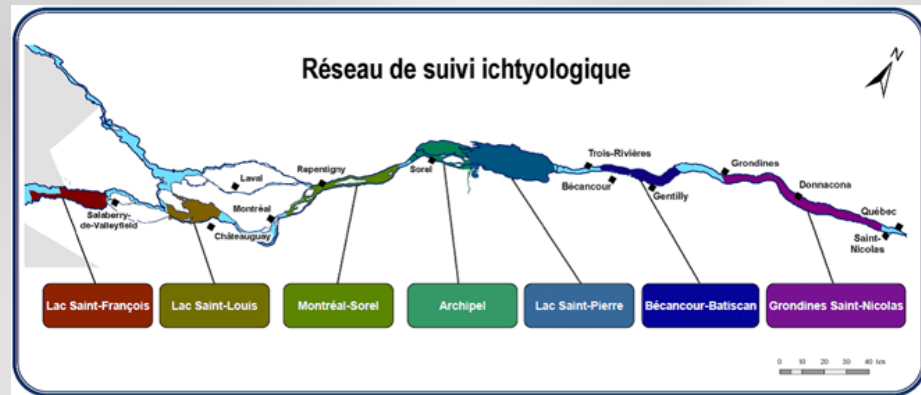
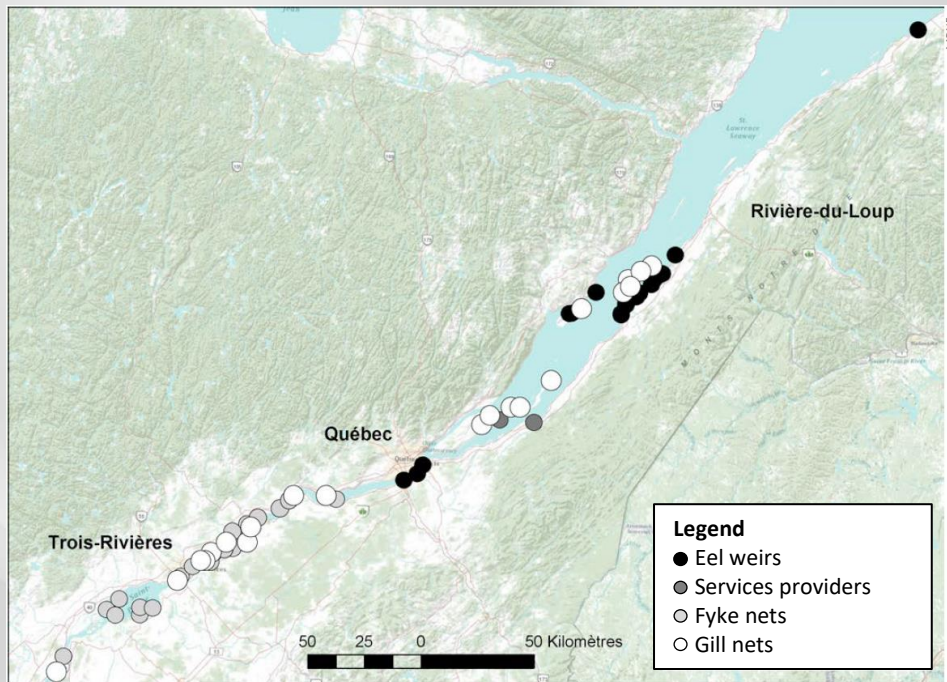
Fisheries and Oceans Canada Pêches et Océans Canada



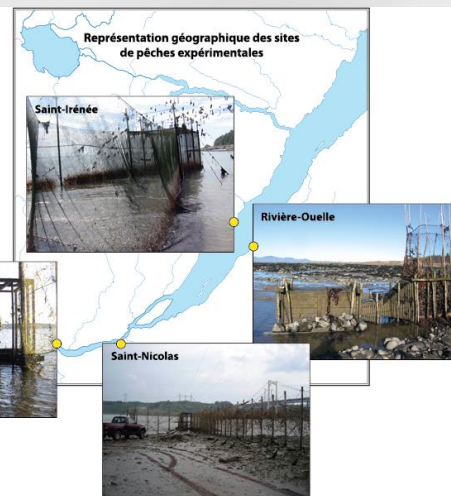
THANKS YOU!



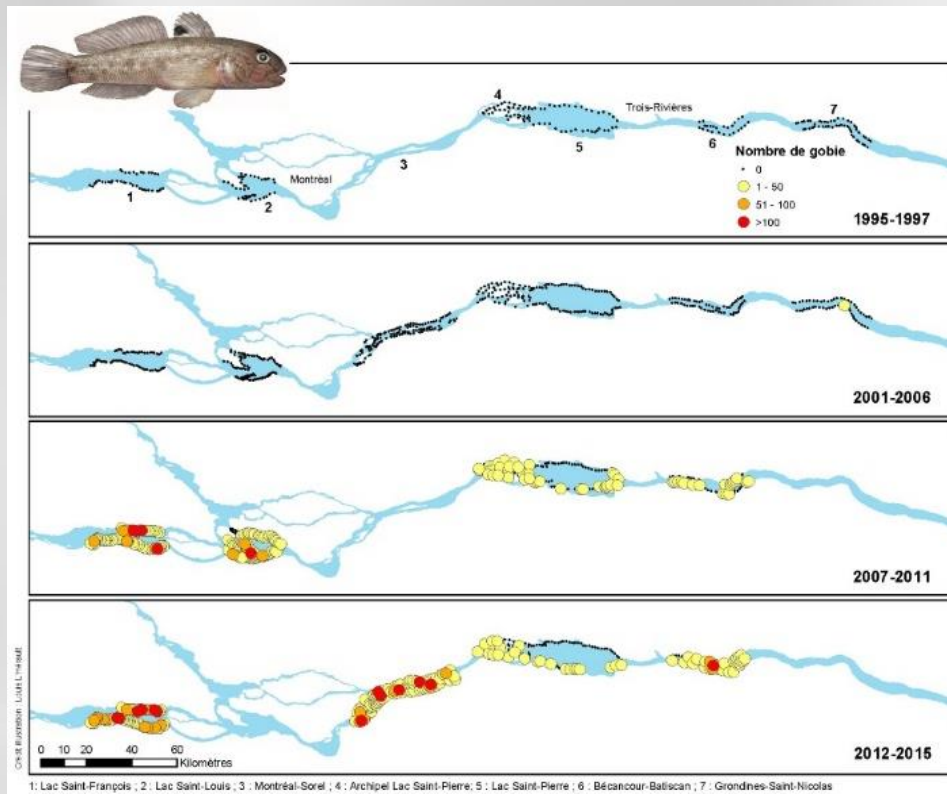
EARLY DETECTION



RIPE



AIS INCREASING DENSITY – ROUND GOBY

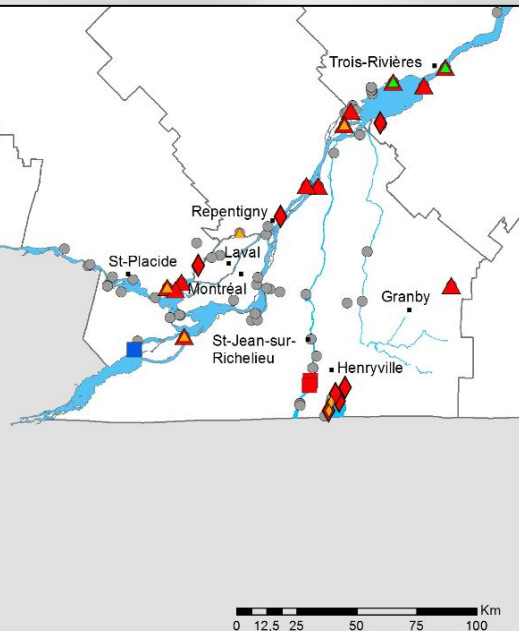


BAITFISH AS AIS VECTOR

Presence of Rudd at baitfish sellers

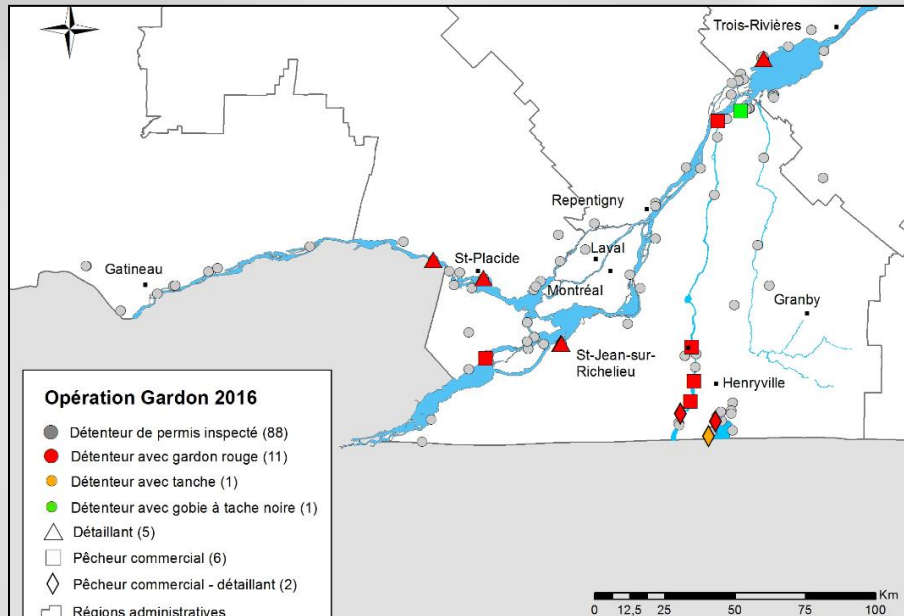
Opération Gardon 2015

- Inspection (88)
- Inspection avec gardon rouge (20)
- Inspection avec tanche (6)
- Inspection avec méné à grosse tête (rose) (2)
- Inspection avec roule-caillou (1)
- △ Détaillant (13)
- Pêcheur commercial (2)
- ◇ Pêcheur commercial - détaillant (8)
- Régions administratives

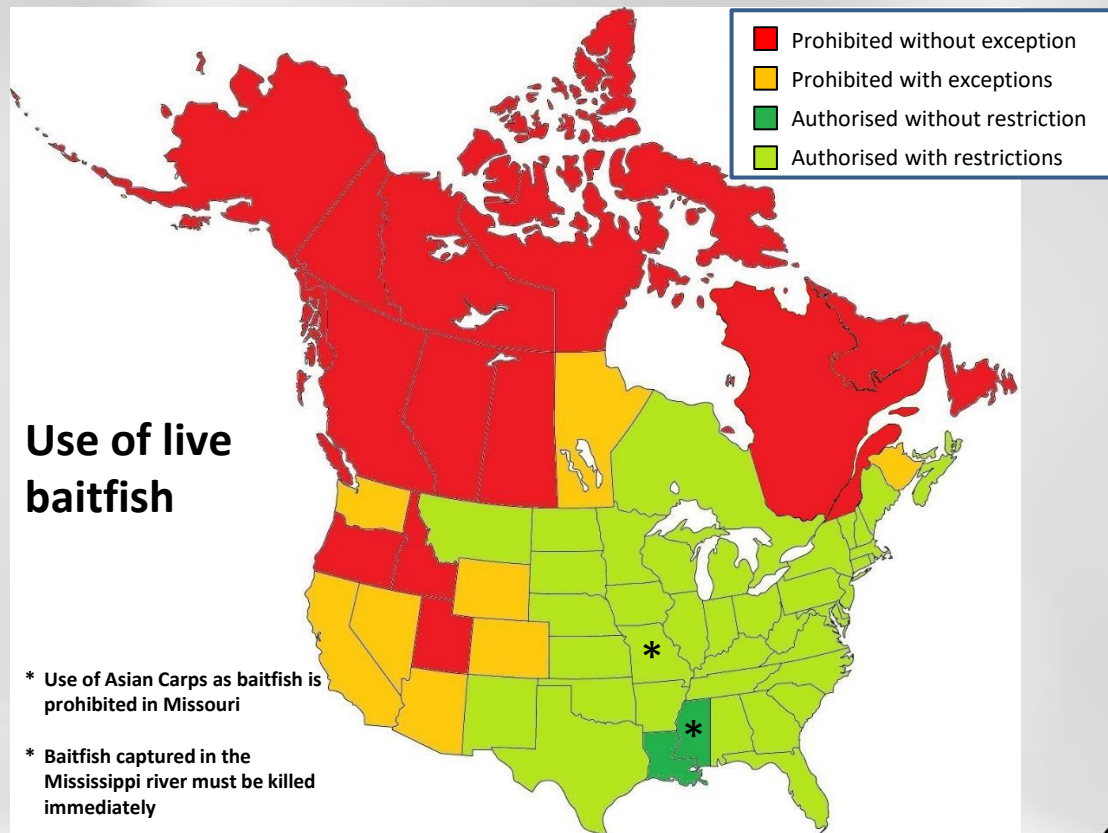


Opération Gardon 2016

- Détenteur de permis inspecté (88)
- Détenteur avec gardon rouge (11)
- Détenteur avec tanche (1)
- Détenteur avec gobie à tache noire (1)
- △ Détaillant (5)
- Pêcheur commercial (6)
- ◇ Pêcheur commercial - détaillant (2)
- Régions administratives



Baitfish regulations in other regions



FINANCING OF CLEANING STATIONS

Recreational boating being a important vector of transport and colonisation of AIS, boat cleaning remains a great prevention tool.

- Guide of better practices for boat cleaning
- 100 K\$ for financing of new cleaning stations (11 projects)



- Pressure (>2600 psi) cleaning
- More than 30 m away from water
- Good filtration, drainage or evaporation of waste water
- Site with null or slight slope
- Visual presentation of better practices or presence of employee
- Hot water (>60 C) cleaning
- Sensitization or information material available