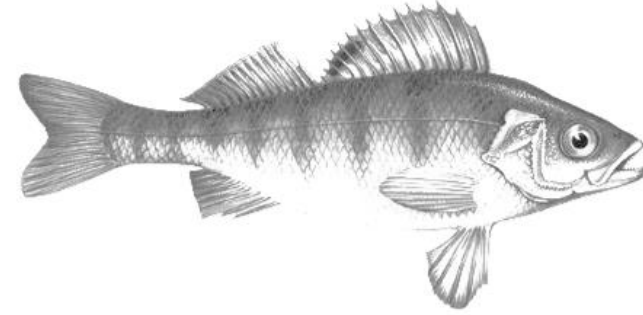


LE COREGONE (FERA)
Coregonus lavaretus



LA PERCHE
Perca fluviatilis

Evolution des populations de poissons exploitées par la pêche dans le Léman

Chloé Goulon, Jean Guillard, Orlane Anneville

UMR CARRTEL, INRA/USMB, Thonon-les-Bains

 @ChloeGoulon

Colloque - Qu'en est-il de nos lacs ?
13 novembre 2019, Olten

CARRTEL
CENTRE ALPIN DE RECHERCHE
SUR LES RÉSEAUX TROPHIQUES
ET ÉCOSYSTÈMES LIMNIQUES



INRA
SCIENCE & IMPACT



UNIVERSITÉ
SAVOIE
MONT BLANC

Service écosystémiques et menaces

SERVICES ECOSYSTEMIQUES



Lynch et al., 2016

MENACES

PERTES D'HABITATS

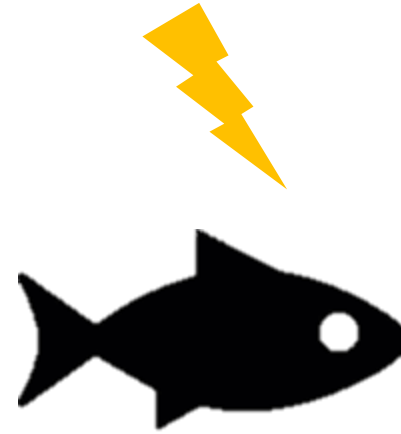
CHANGEMENT CLIMATIQUE

ESPECES INVASIVES

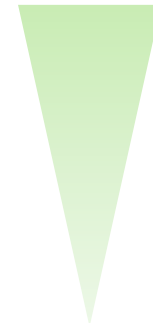
POLLUTIONS

ULTRA-OLIGOTROPHISATION

SUREXPLOITATION



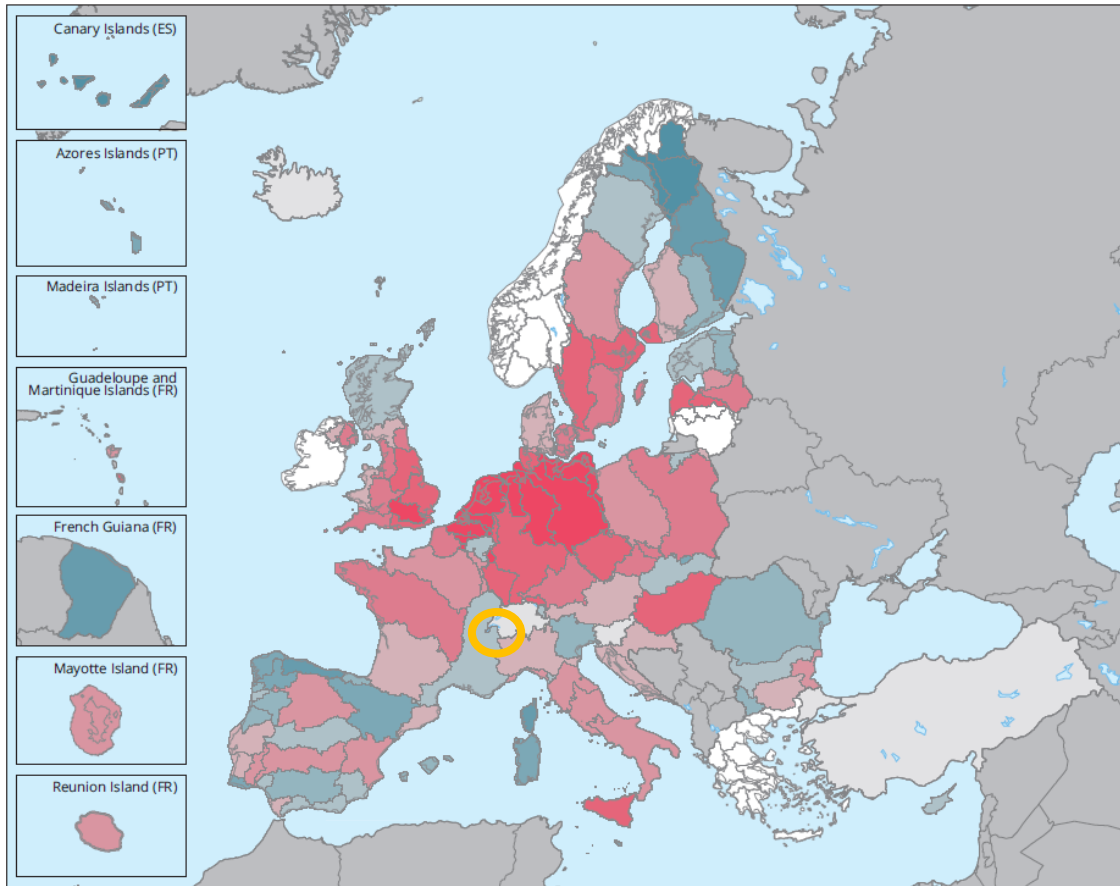
Communauté



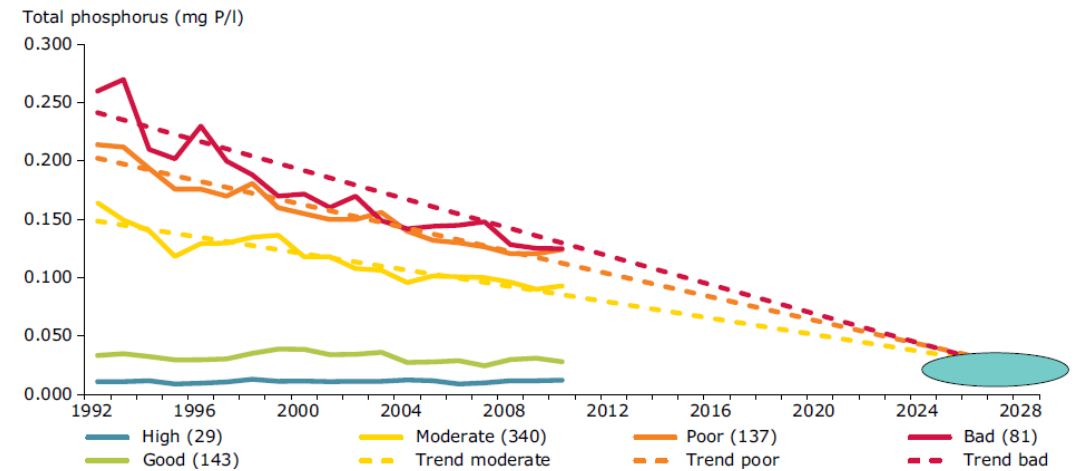
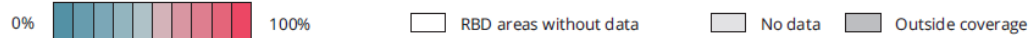
Ind.

Problèmes d'eutrophisation

Map 2.1 Percentage of water bodies in Europe's RBDs that are not in good ecological status/potential: second RBMPs



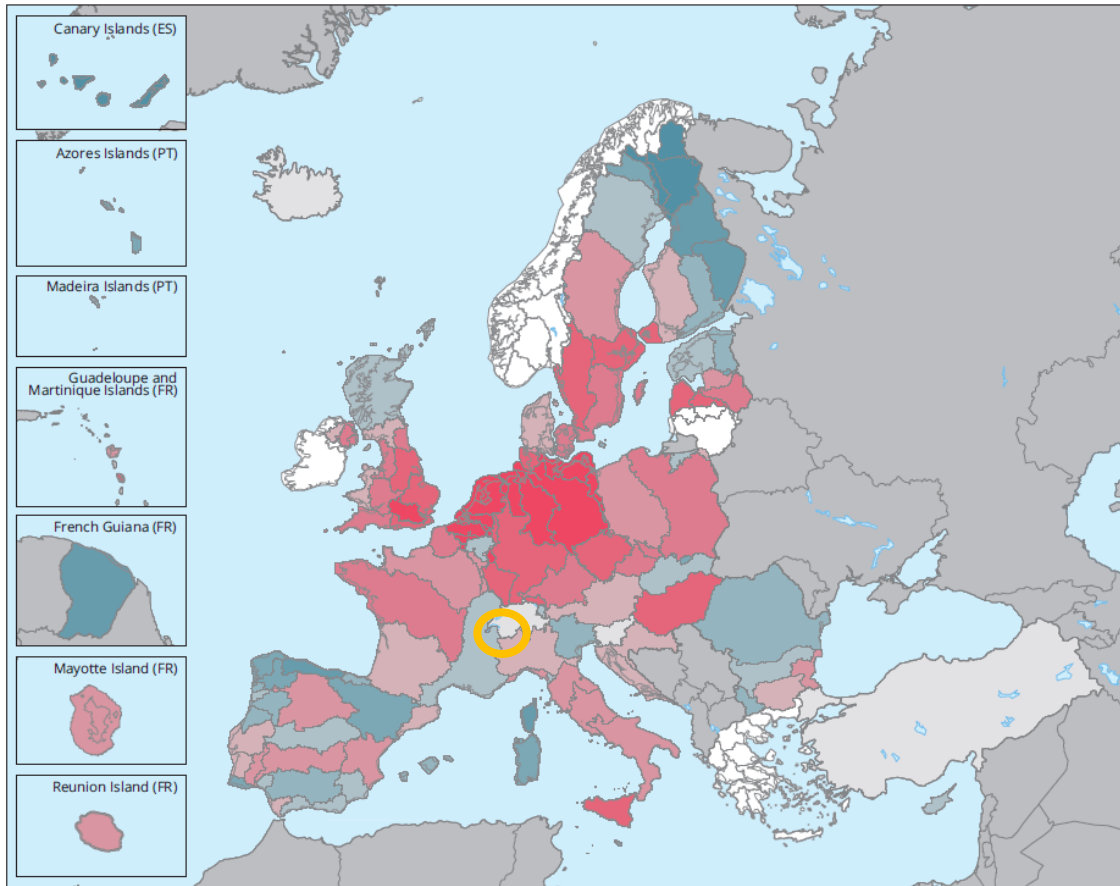
Percentage of number water bodies not in good ecological status or potential per river basin district (RBD) in second RBMPs



EEA Report No 9/2012

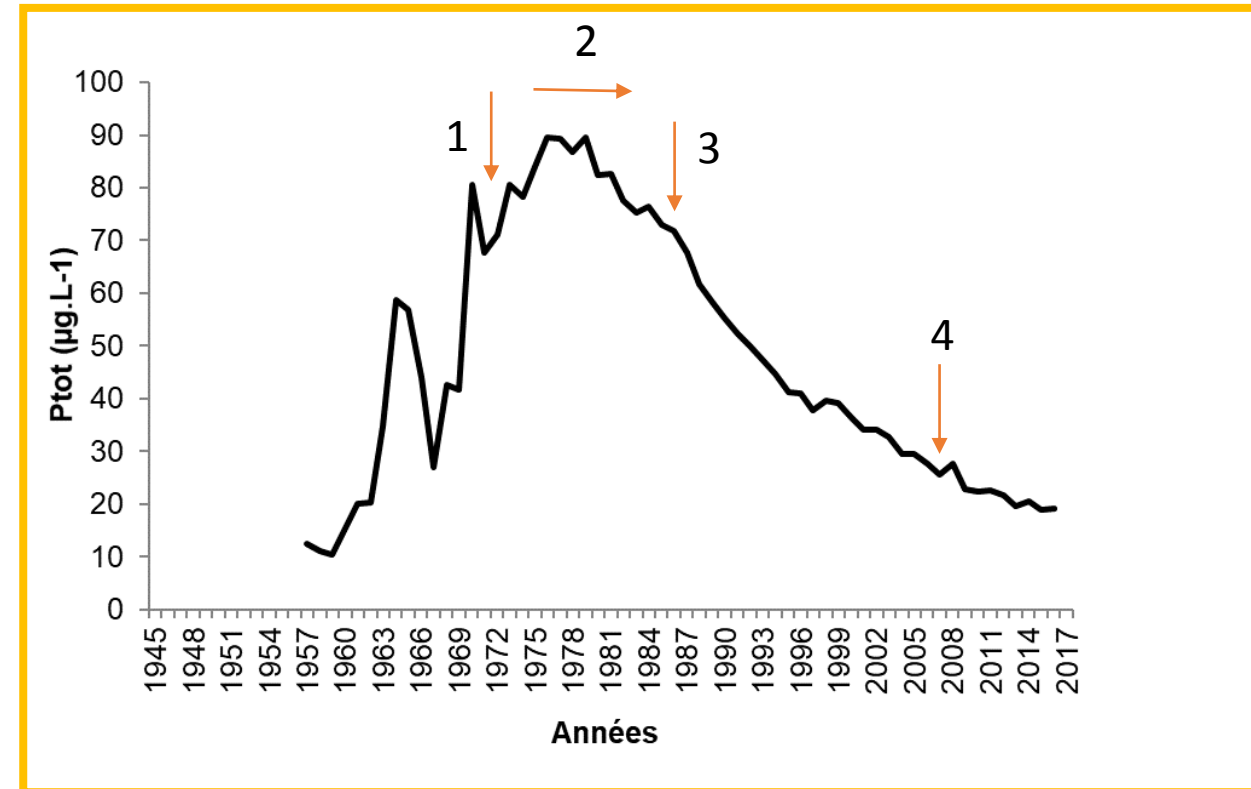
Problèmes d'eutrophisation

Map 2.1 Percentage of water bodies in Europe's RBDs that are not in good ecological status/potential: second RBMPs

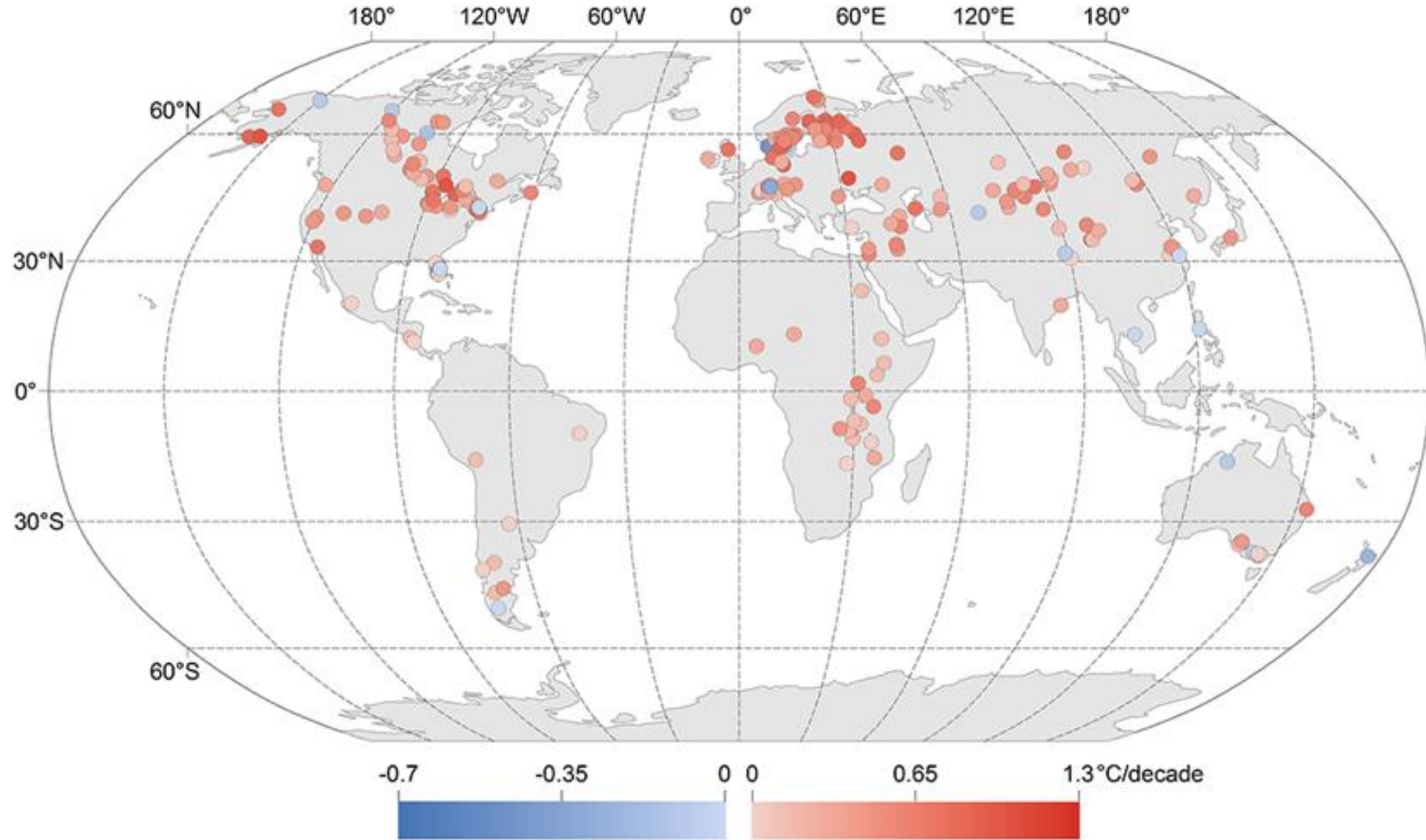


Percentage of number water bodies not in good ecological status or potential per river basin district (RBD) in second RBMPs

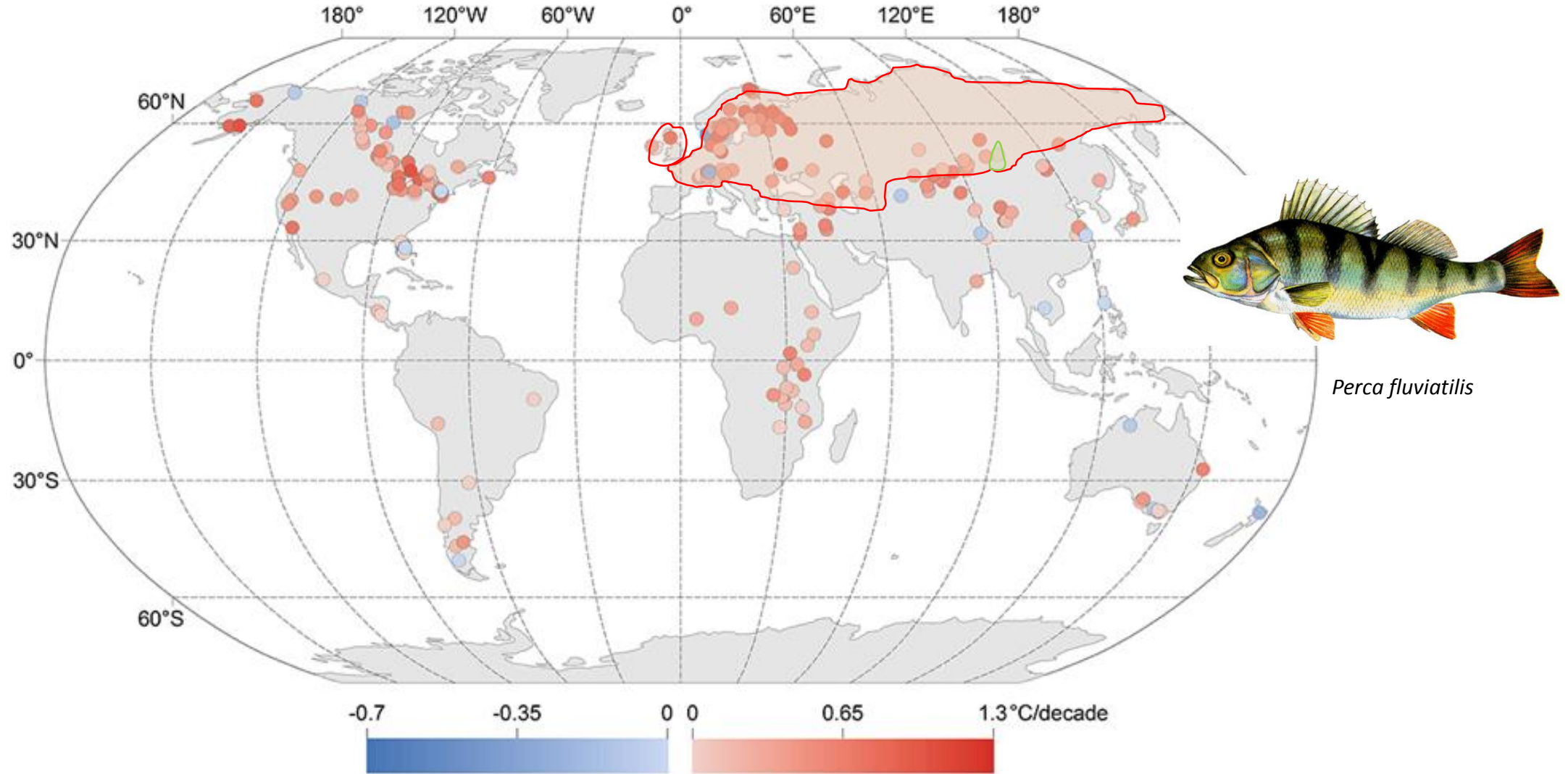
0% 100%



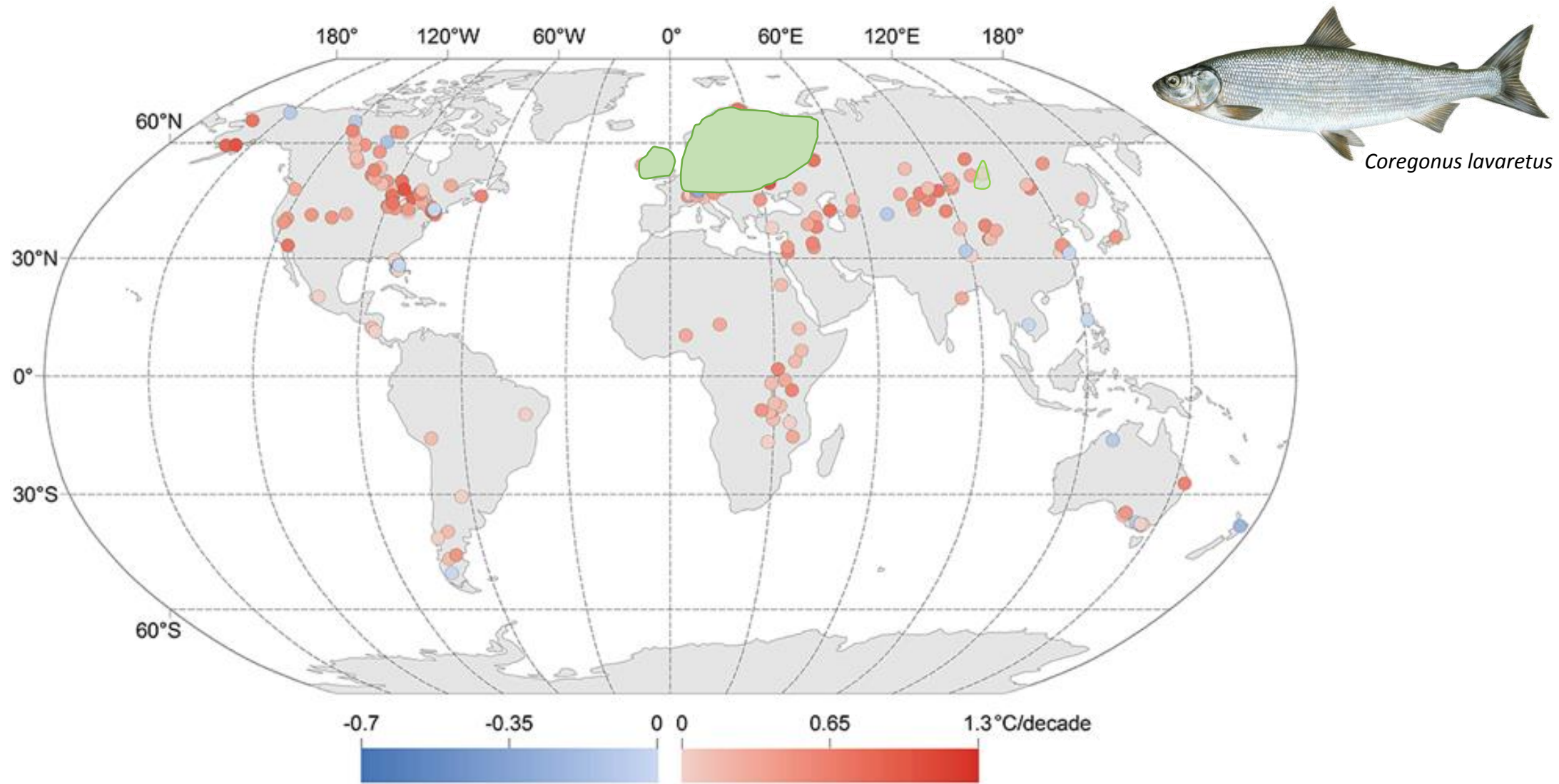
Les lacs se réchauffent



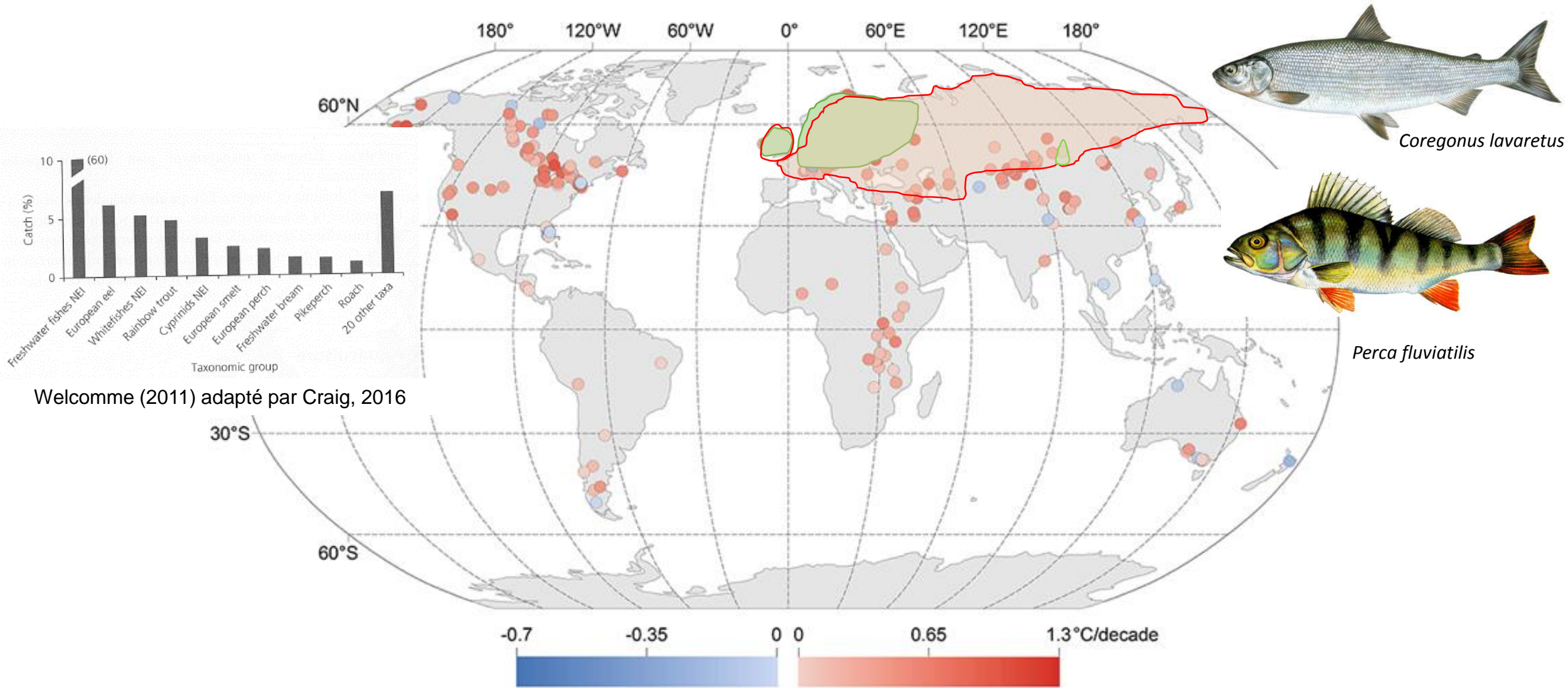
Les lacs se réchauffent



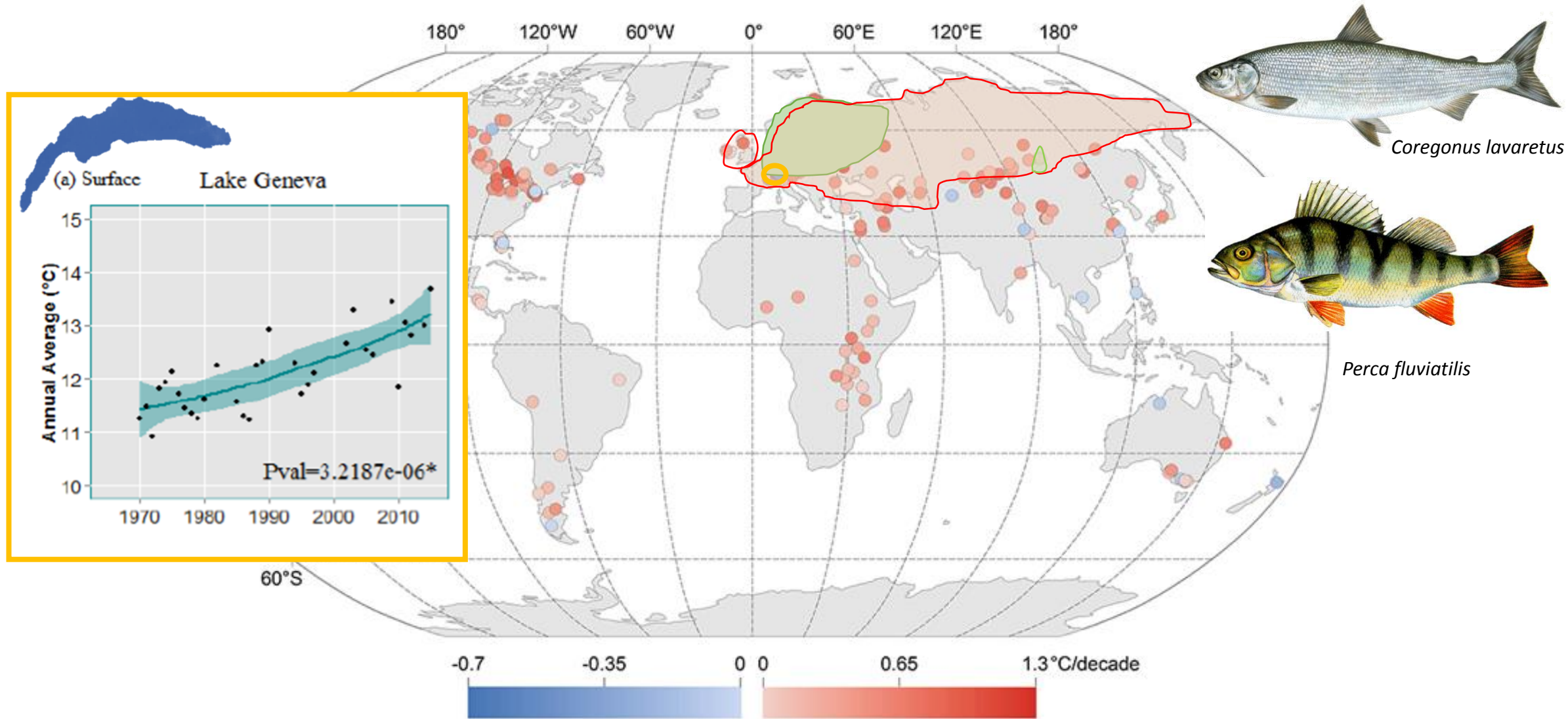
Les lacs se réchauffent

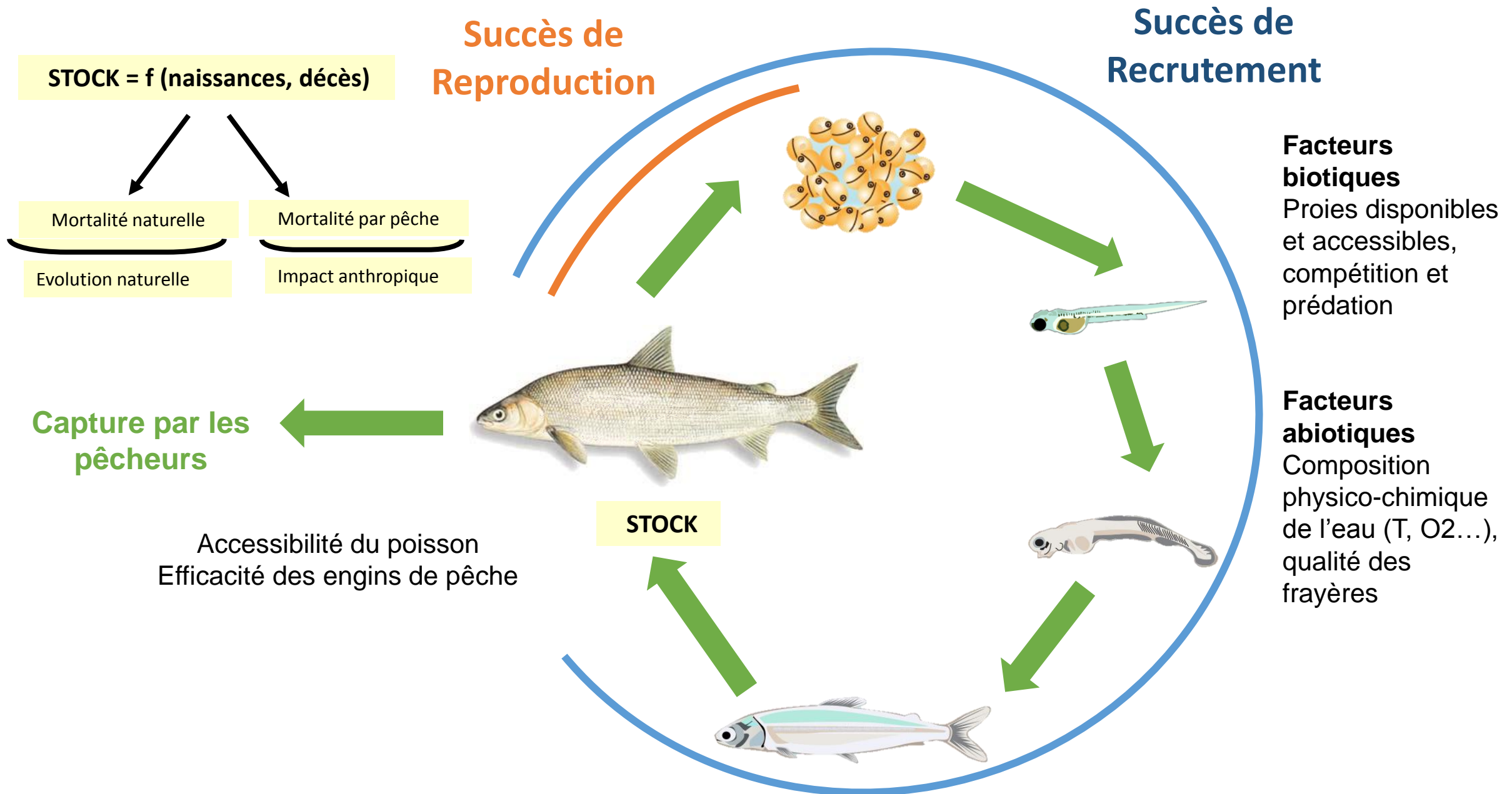


Les lacs se réchauffent



Les lacs se réchauffent

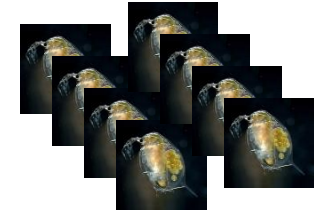
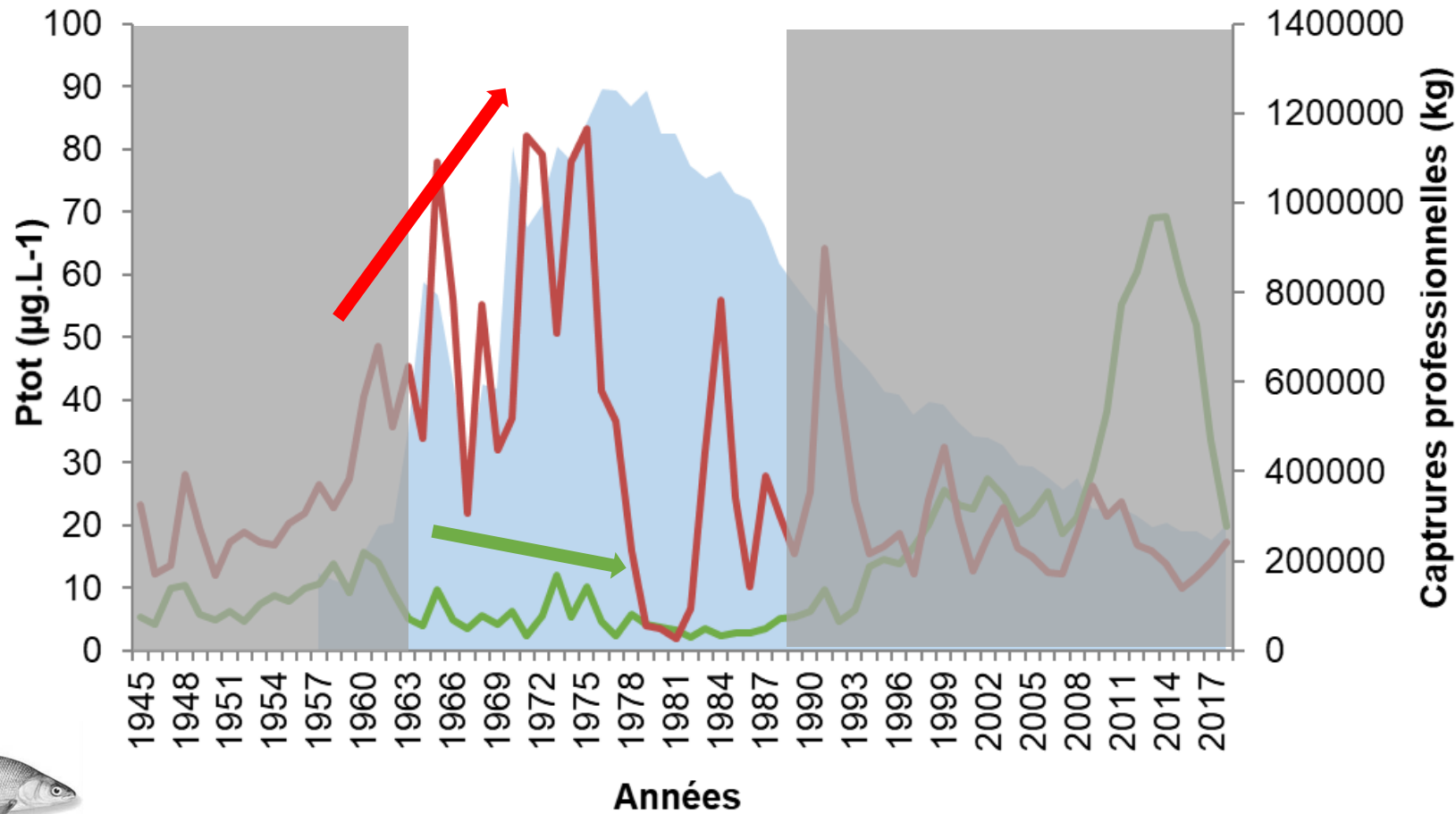




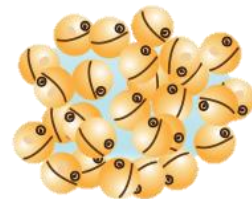
Un lac eutrophe



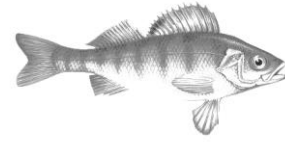
BON SUCCÈS DE RECRUTEMENT
NOURRITURE EN ABONDANCE



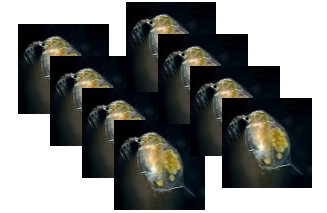
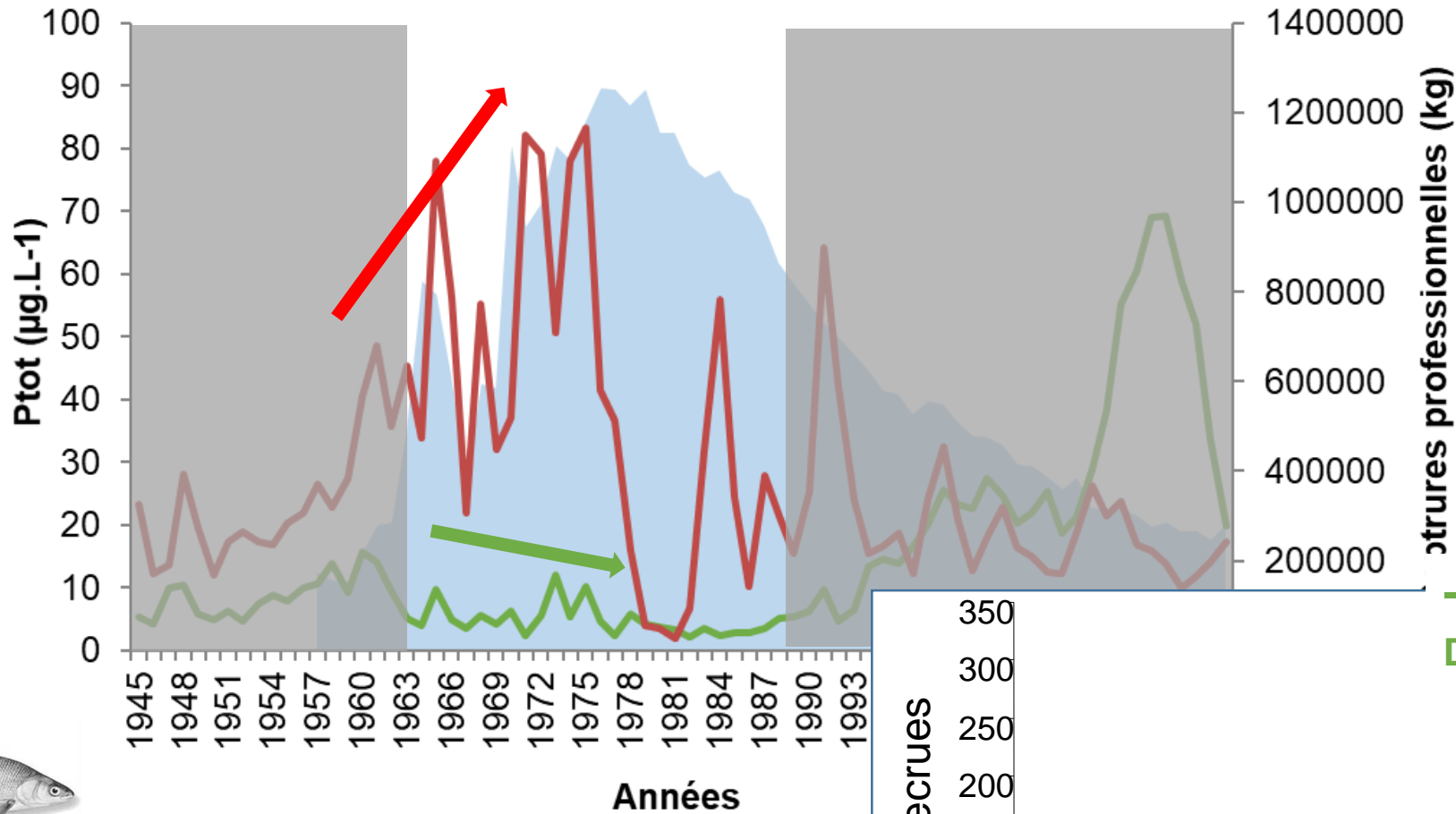
FAIBLE SUCCÈS DE RECRUTEMENT
REPRODUCTION : FRAYÈRES DE
MAUVAISES QUALITÉ



Un lac eutrophe



BON SUCCÈS DE RECRUTEMENT
NOURRITURE EN ABONDANCE

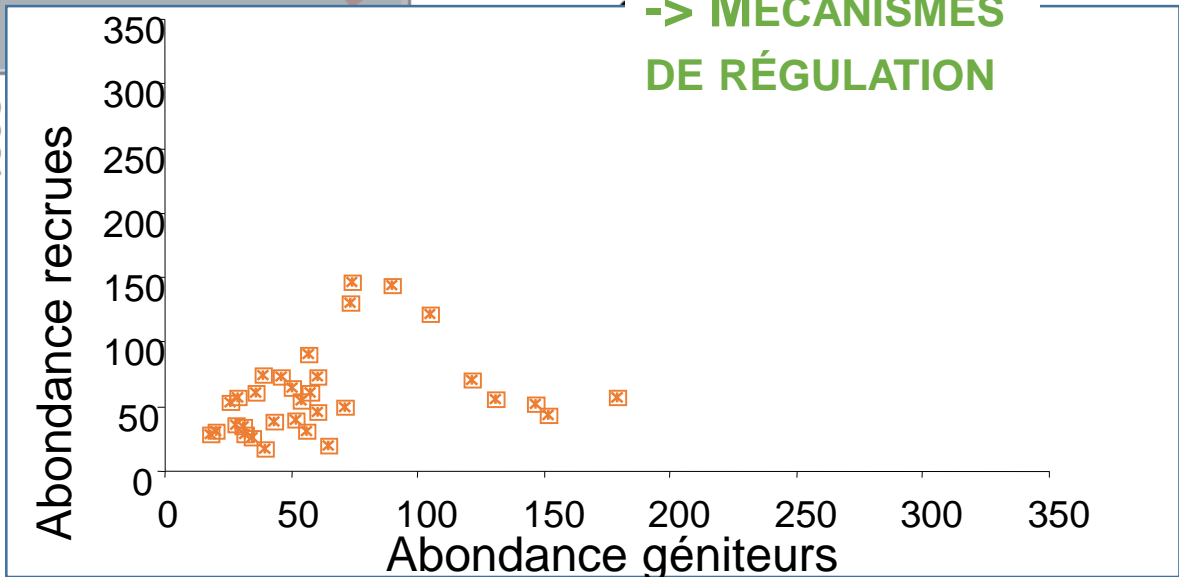
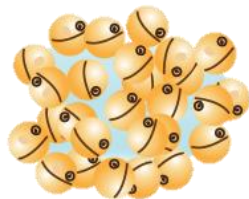


CARANHAC & GERDEAUX 1998
-> Relation de densité-dépendance

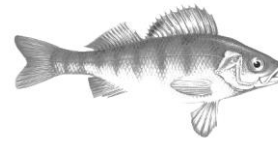
-> **MÉCANISMES DE RÉGULATION**



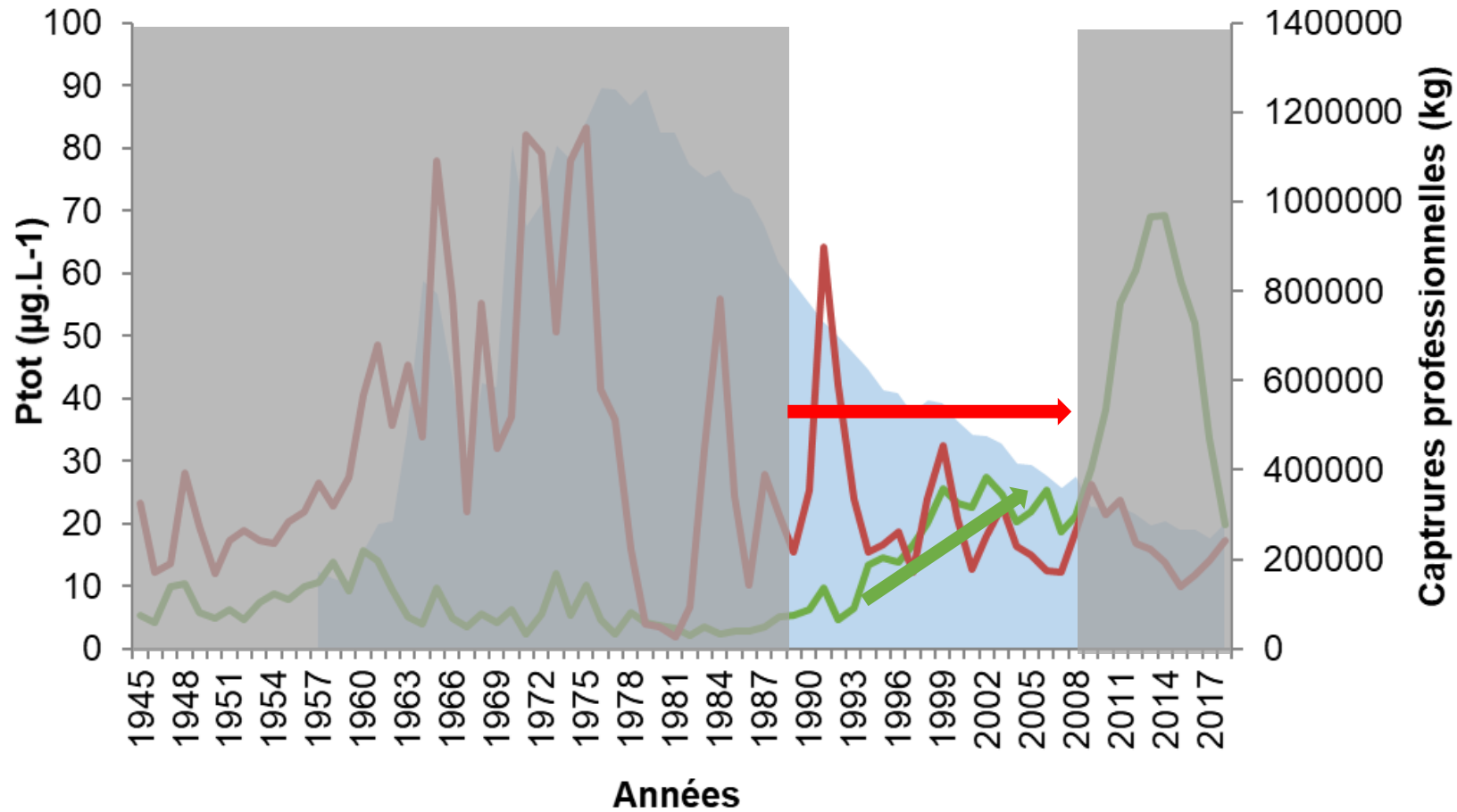
FAIBLE SUCCÈS DE RECRUTEMENT
REPRODUCTION : FRAYÈRES DE MAUVAISES QUALITÉ



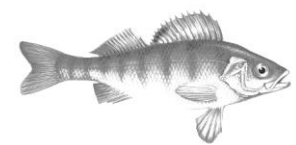
Un lac méso-eutrophe



PLUS FAIBLE SUCCÈS DE RECRUTEMENT
BAISSE DE LA CROISSANCE,
PARASITISME, CANNIBALISME



Un lac méso-eutrophe



PLUS FAIBLE SUCCÈS DE RECRUTEMENT
BAISSE DE LA CROISSANCE,
PARASITISME, CANNIBALISME

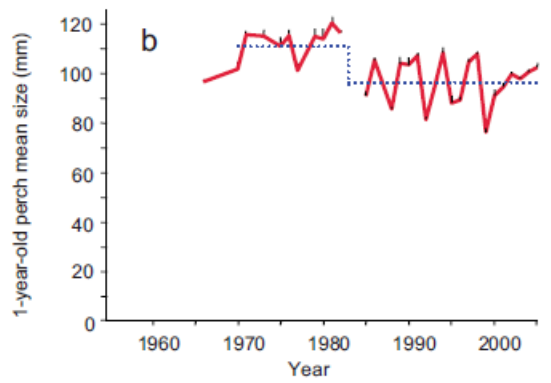


Fig. 4. (a) Trends in perch yield (t) (fine unbroken line) and zooplankton biovolume ($\text{ml m}^{-2} \text{year}^{-1}$) (bold unbroken line); and (b) mean size (with standard error) of one-year-old perch in Lake Geneva (unbroken lines). Mean levels and changes detected by the DCPC procedure are indicated by dotted lines. Dubois et al., 2008

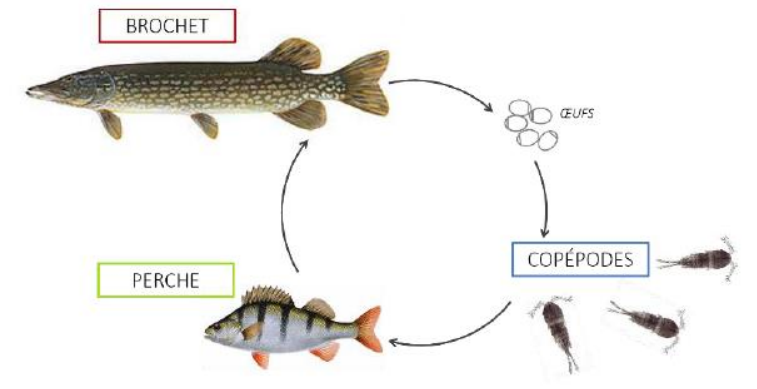
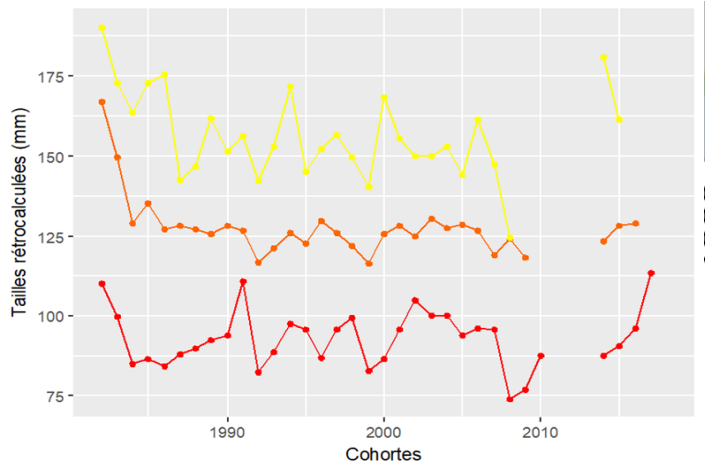
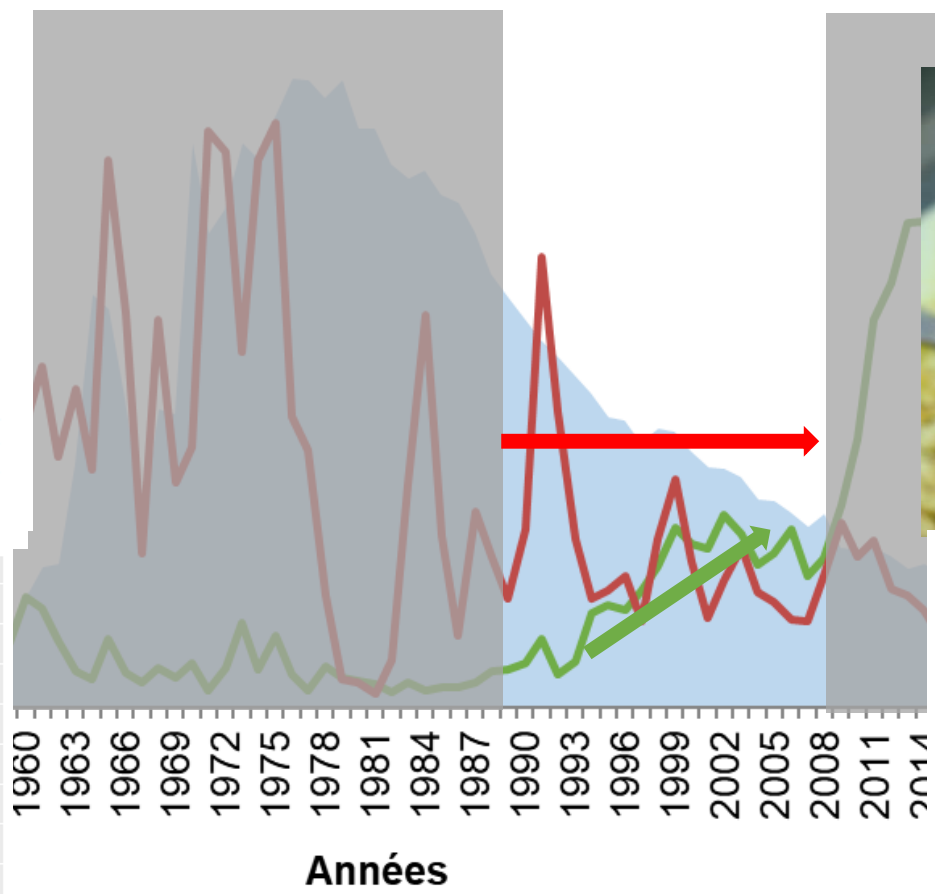
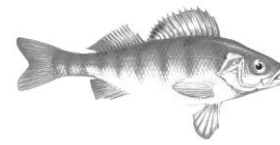
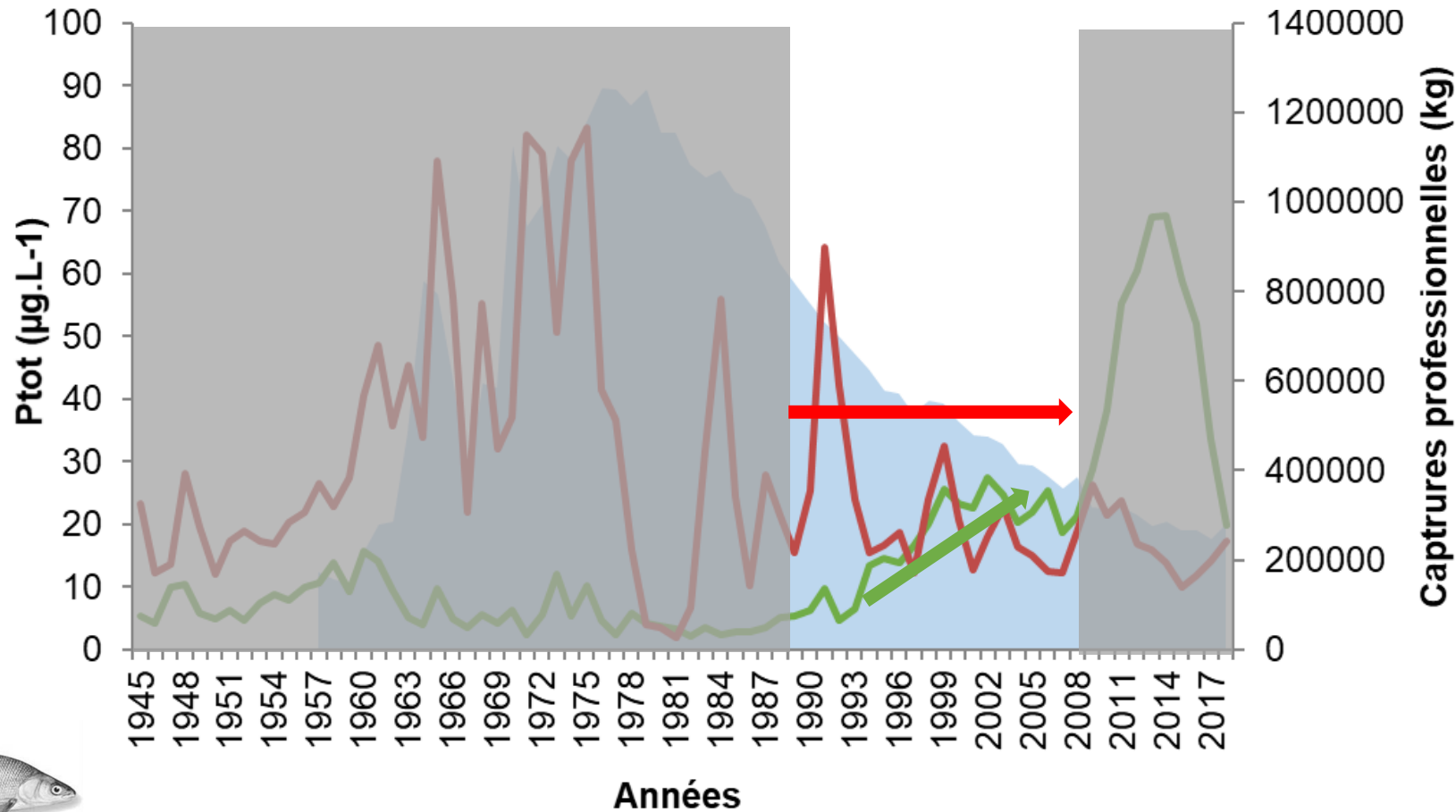


Figure 3 Cycle de vie simplifié de *Triaenophorus nodulosus*

Un lac méso-eutrophe



PLUS FAIBLE SUCCÈS DE RECRUTEMENT
BAISSE DE LA CROISSANCE,
PARASITISME, CANNIBALISME



MEILLEUR RECRUTEMENT

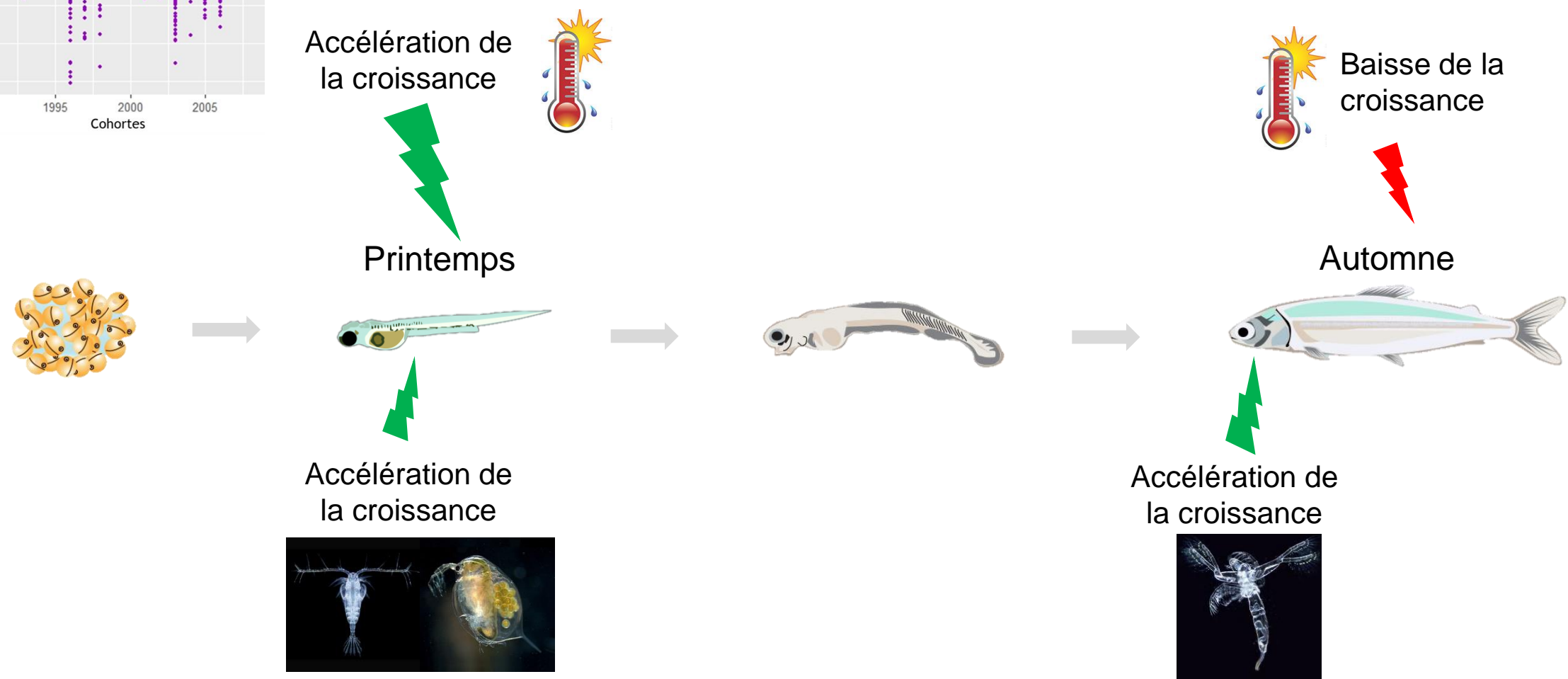
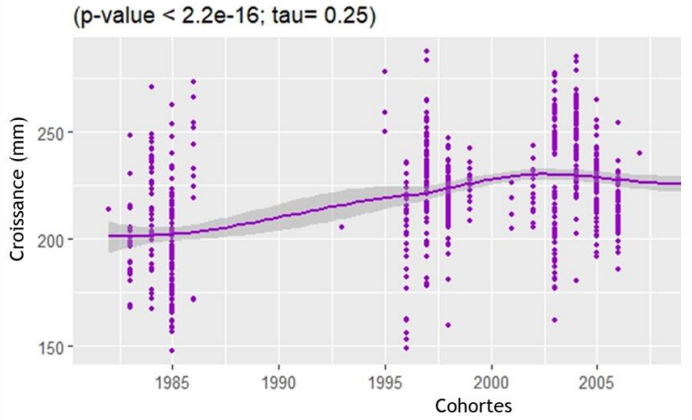
AMÉLIORATION DE LA QUALITÉ DES FRAYÈRES

HAUSSE DES TEMPÉRATURES +MATCH AVEC ZOOPLANCTON :

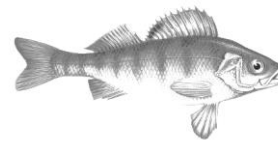
↑ VITESSE DE CROISSANCE DES LARVES

Gerdeaux, 2004 ; Anneville et al., 2009

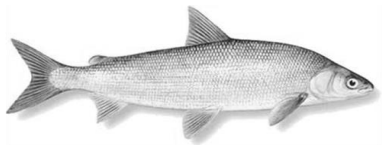
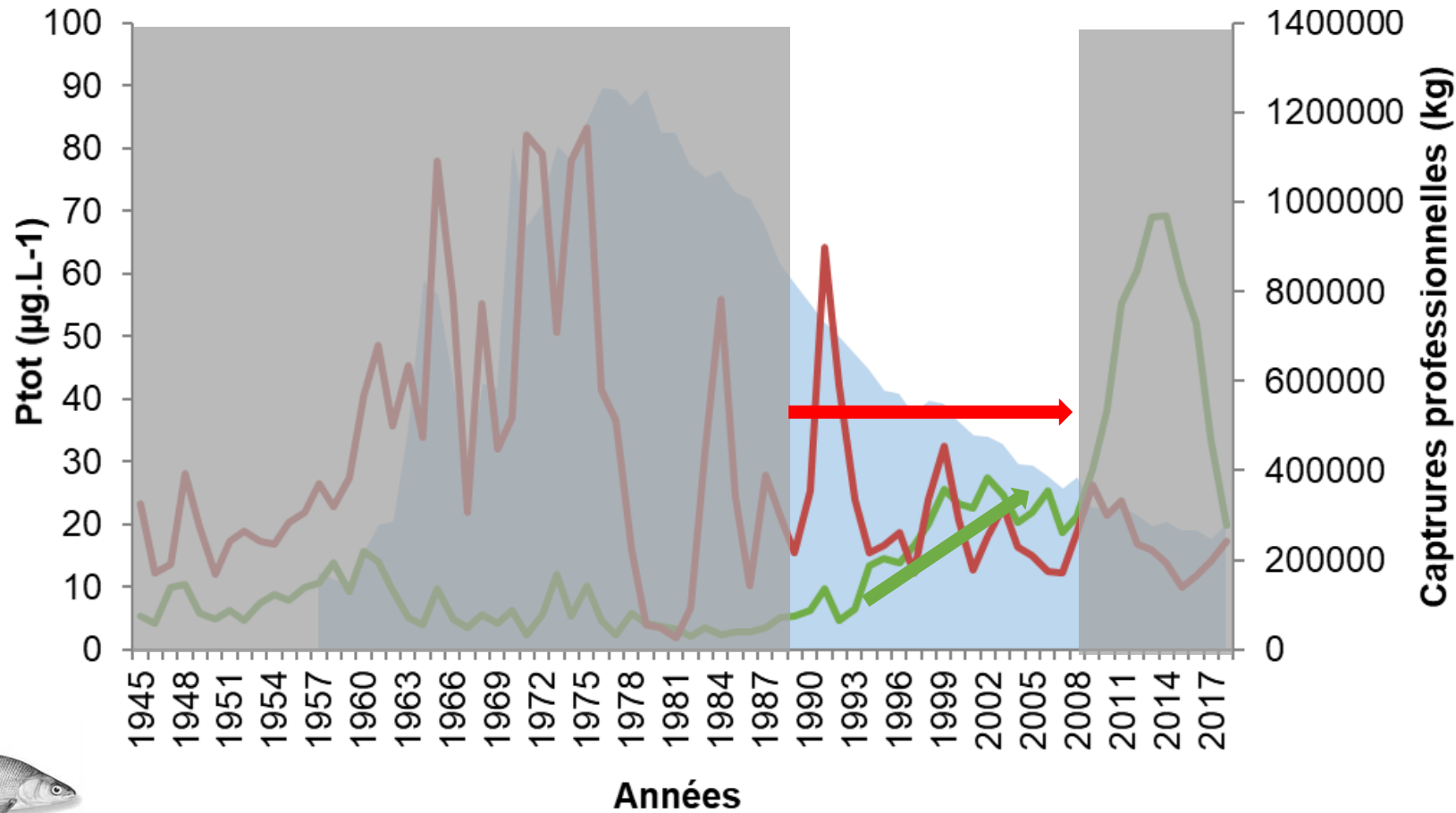
Facteurs biotiques et abiotiques favorables



Un lac méso-eutrophe



PLUS FAIBLE SUCCÈS DE RECRUTEMENT
BAISSE DE LA CROISSANCE,
PARASITISME, CANNIBALISME



MEILLEUR RECRUTEMENT

AMÉLIORATION DE LA QUALITÉ DES FRAYÈRES

HAUSSE DES TEMPÉRATURES +MATCH AVEC ZOOPLANCTON :

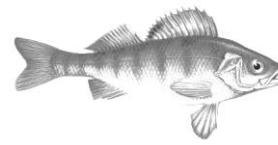
↑ VITESSE DE CROISSANCE DES LARVES

Gerdeaux, 2004 ; Anneville et al., 2009

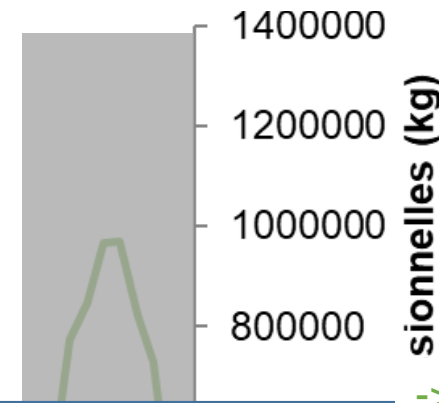
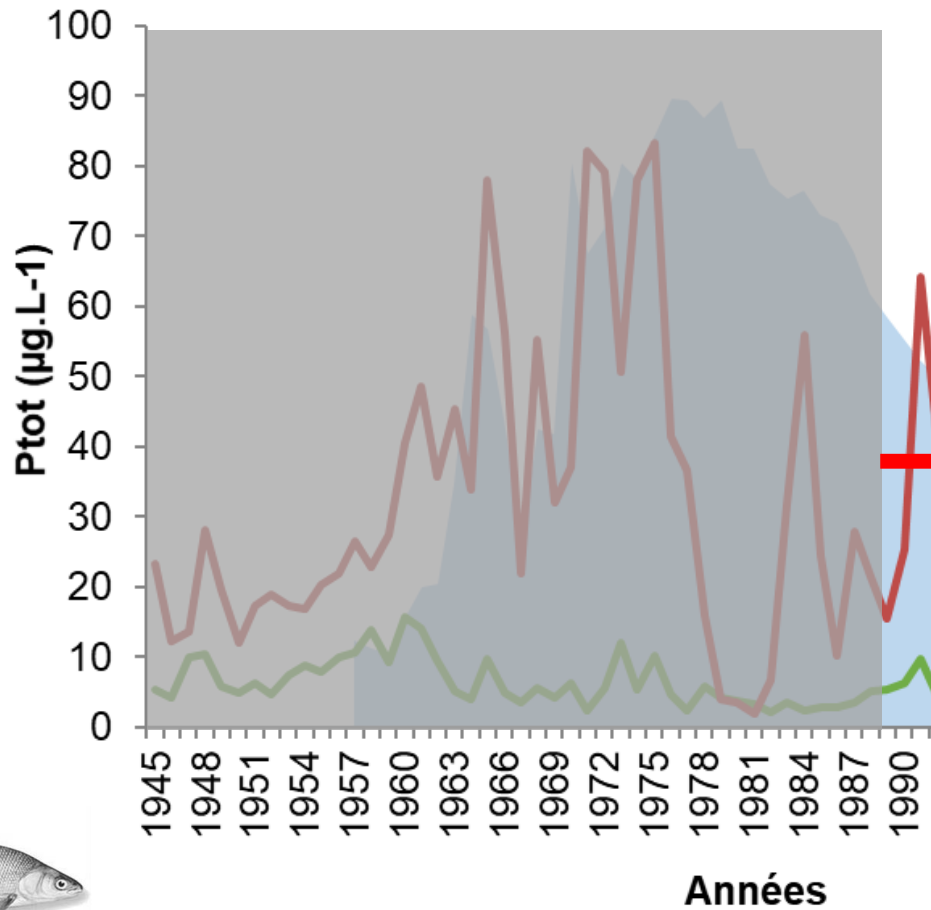
PACAGE LACUSTRE EN SOUTIEN



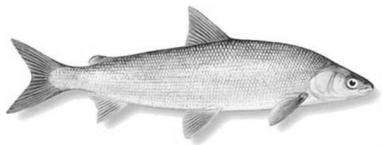
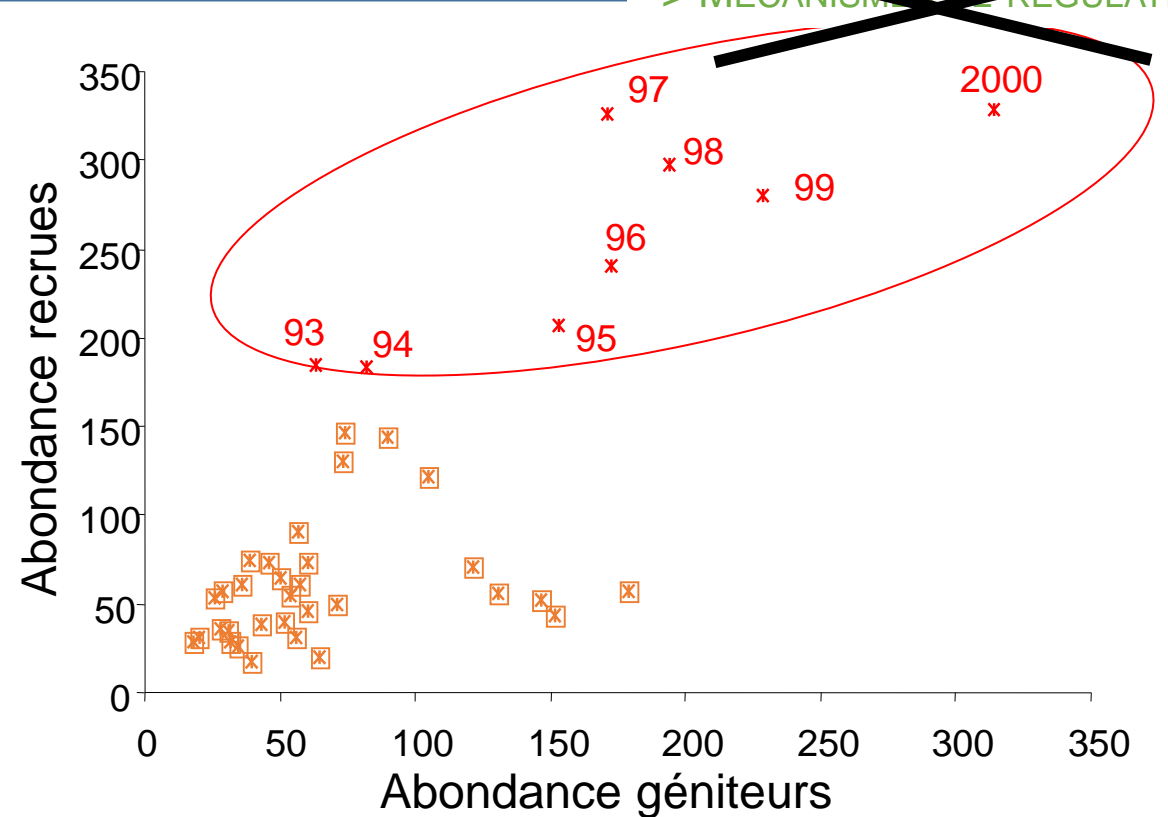
Un lac méso-eutrophe



PLUS FAIBLE SUCCÈS DE RECRUTEMENT
BAISSE DE LA CROISSANCE,
PARASITISME, CANNIBALISME



~~-> MÉCANISMES DE RÉGULATION~~



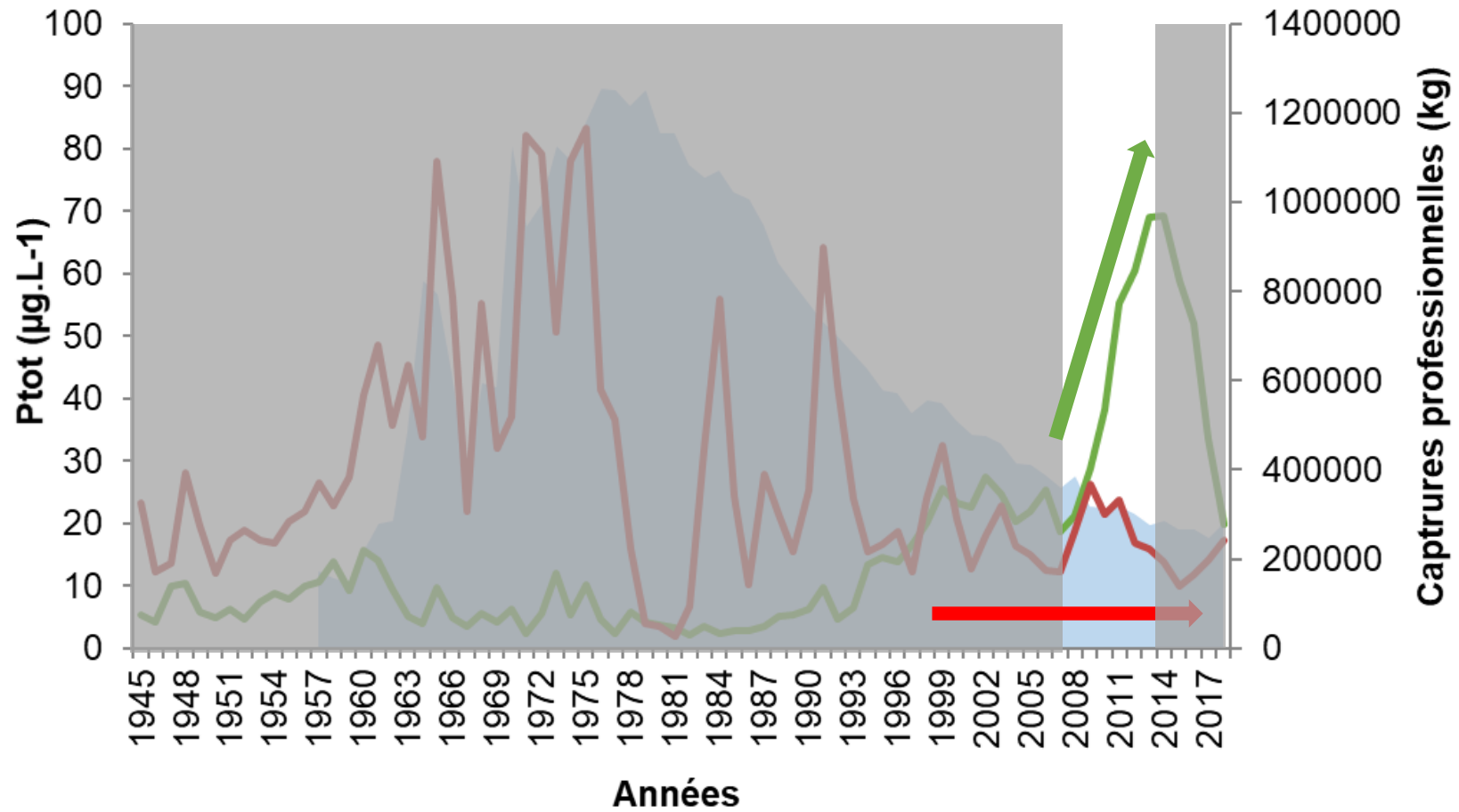
MEILLEUR RECRUTEMENT

AMÉLIORATION DE LA QUALITÉ DES FRAYÈRES

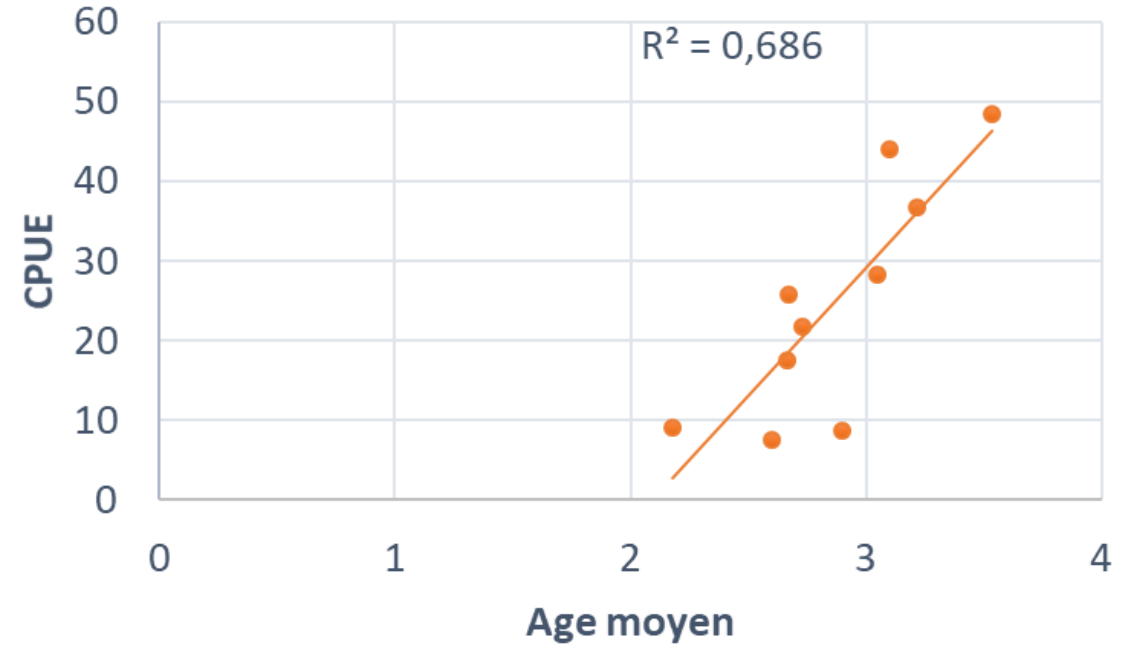
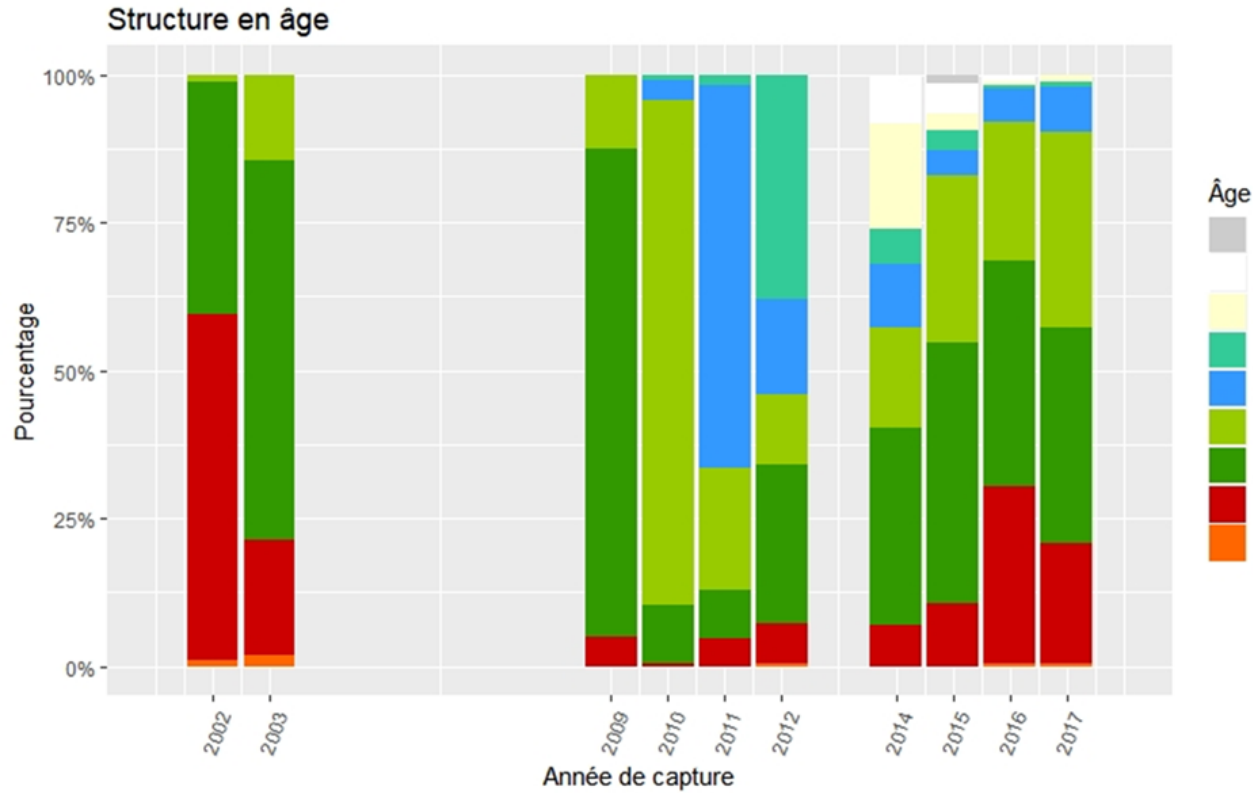
HAUSSE DES TEMPÉRATURES +MATCH AVEC ZOOPLANKTON

↑ VITESSE DE CROISSANCE DES LARVES Gerdeaux, 2004

Un lac mésotrophe

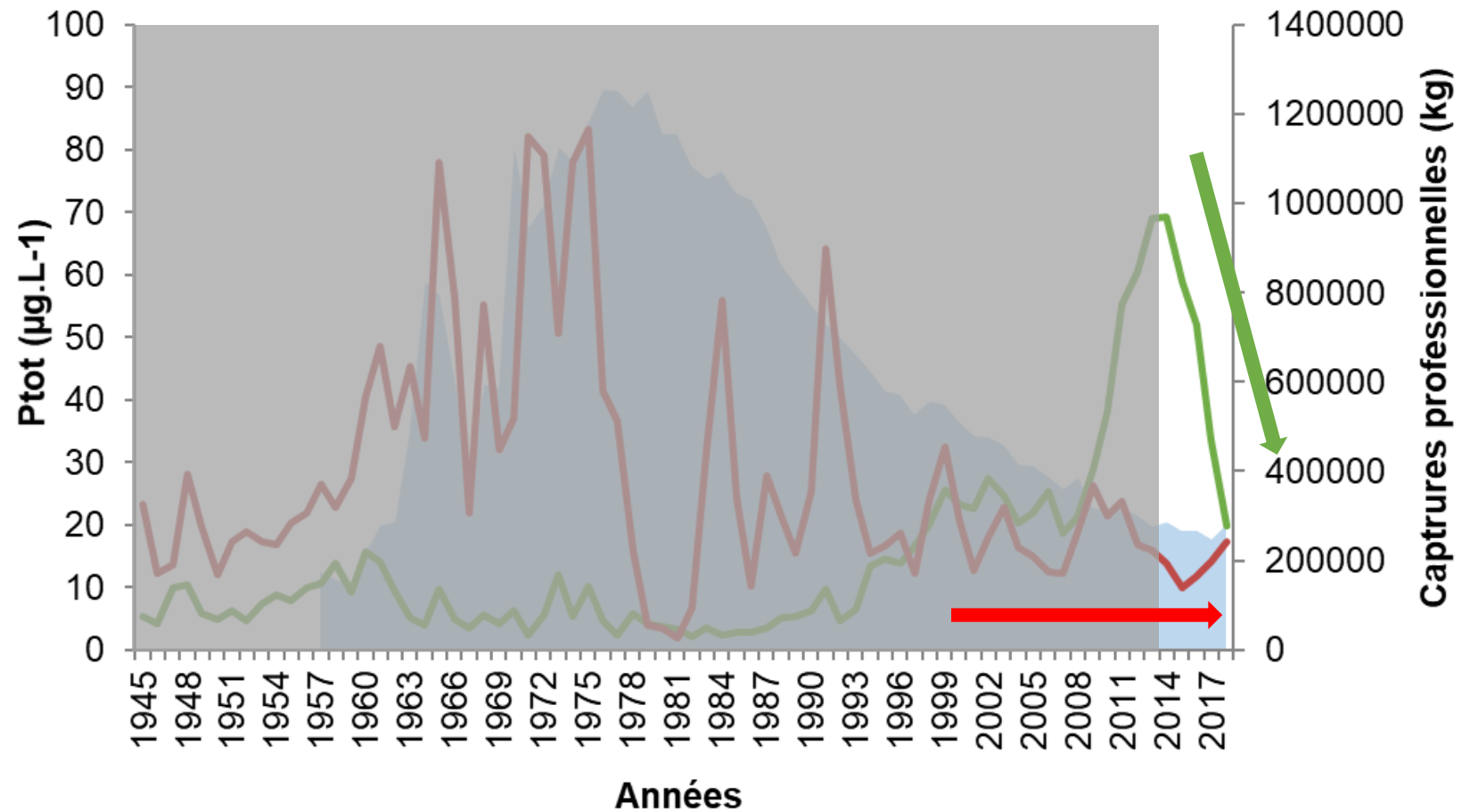


Une classe d'âge forte



Forte cohorte : 2006
(Anneville et al., 2017)

Un lac mésotrophe



Compétition pour la nourriture

Proies: copépodes, cladocères (suivis CIPEL)



Commission internationale
pour la protection des eaux du Léman

ACCUEIL

LA CIPEL

LE LÉMAN

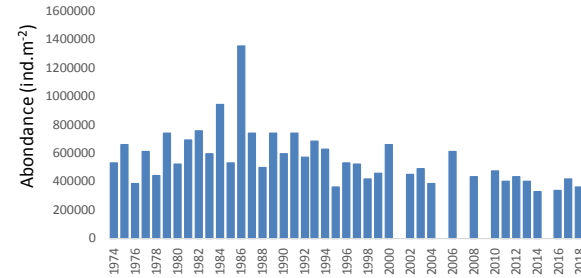
THEMES



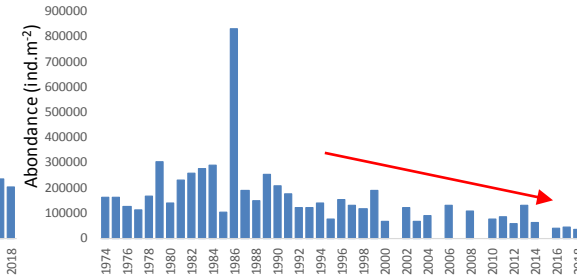
MENU

RAPPORT SCIENTIFIQUE 2019

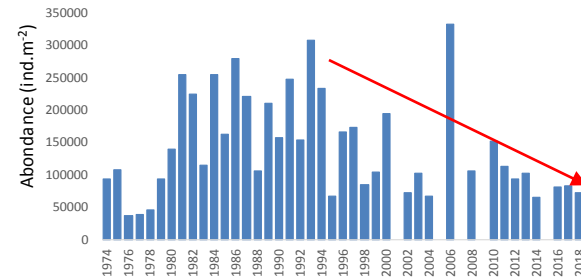
Microcrustacés



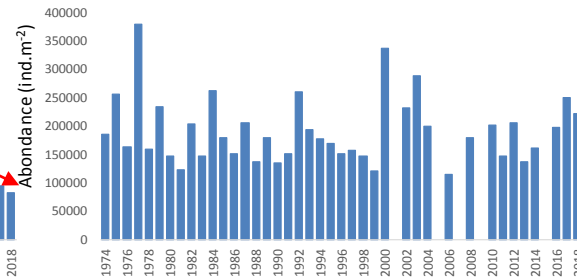
Cladocères herbivores



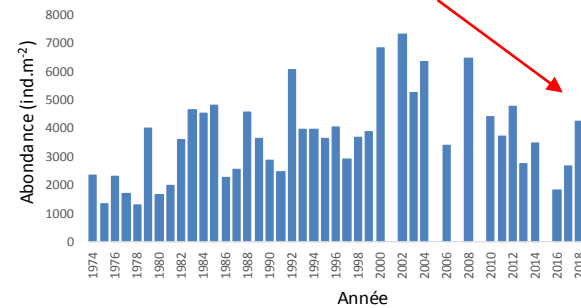
Cyclopoïdes



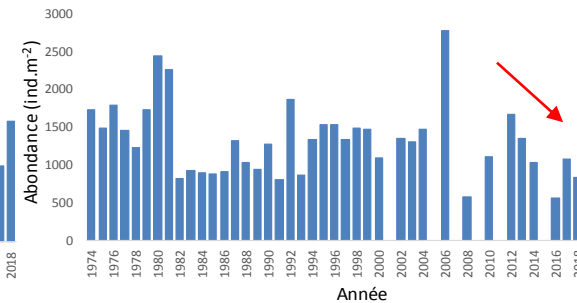
Calanoïdes



Leptodora kindti



Bythotrephes longimanus

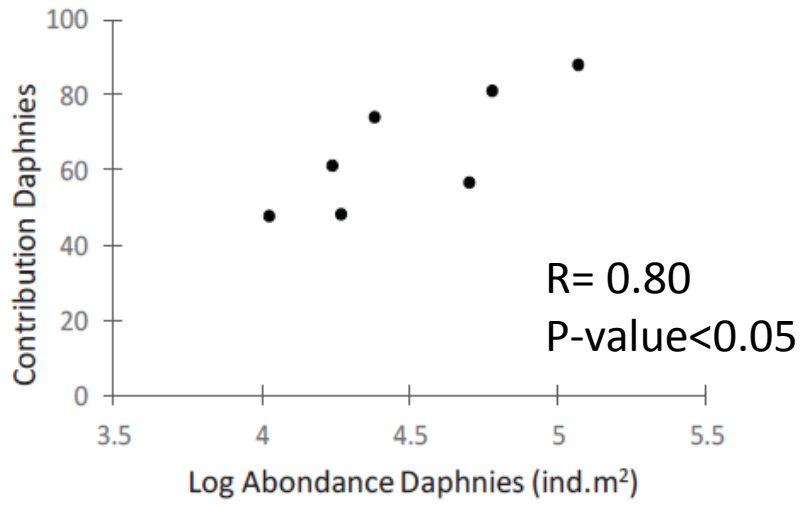
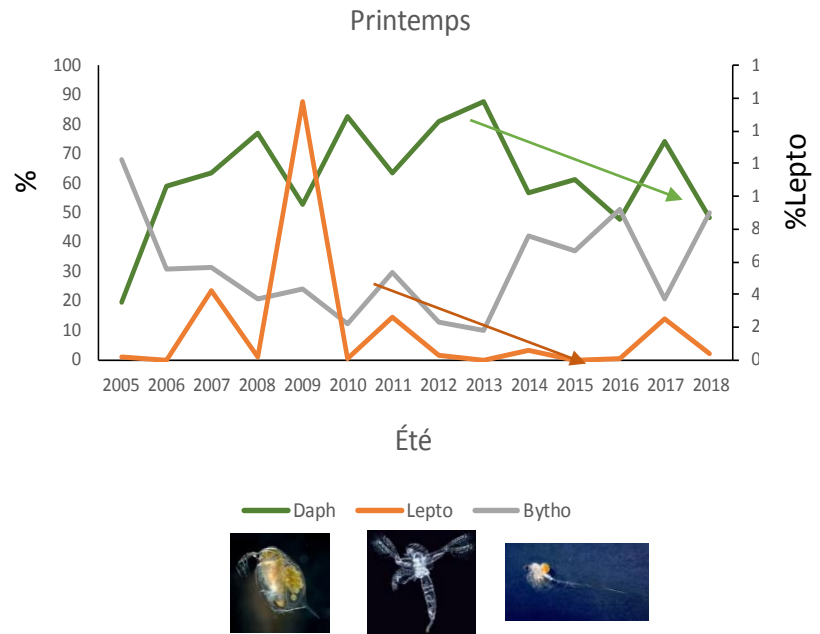
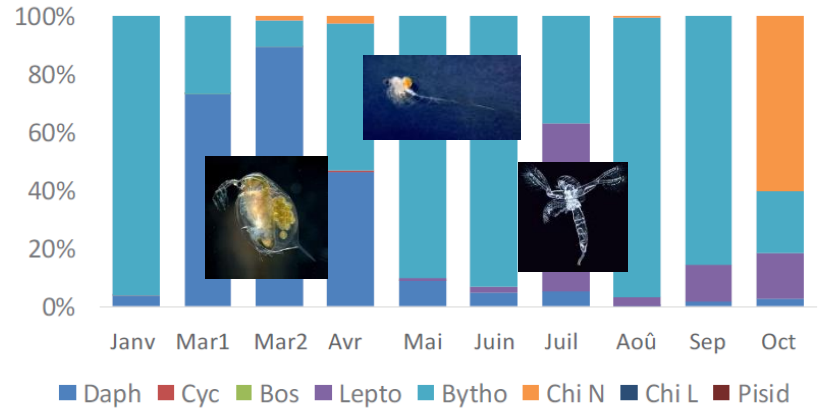


Année

Année

Compétition pour la nourriture

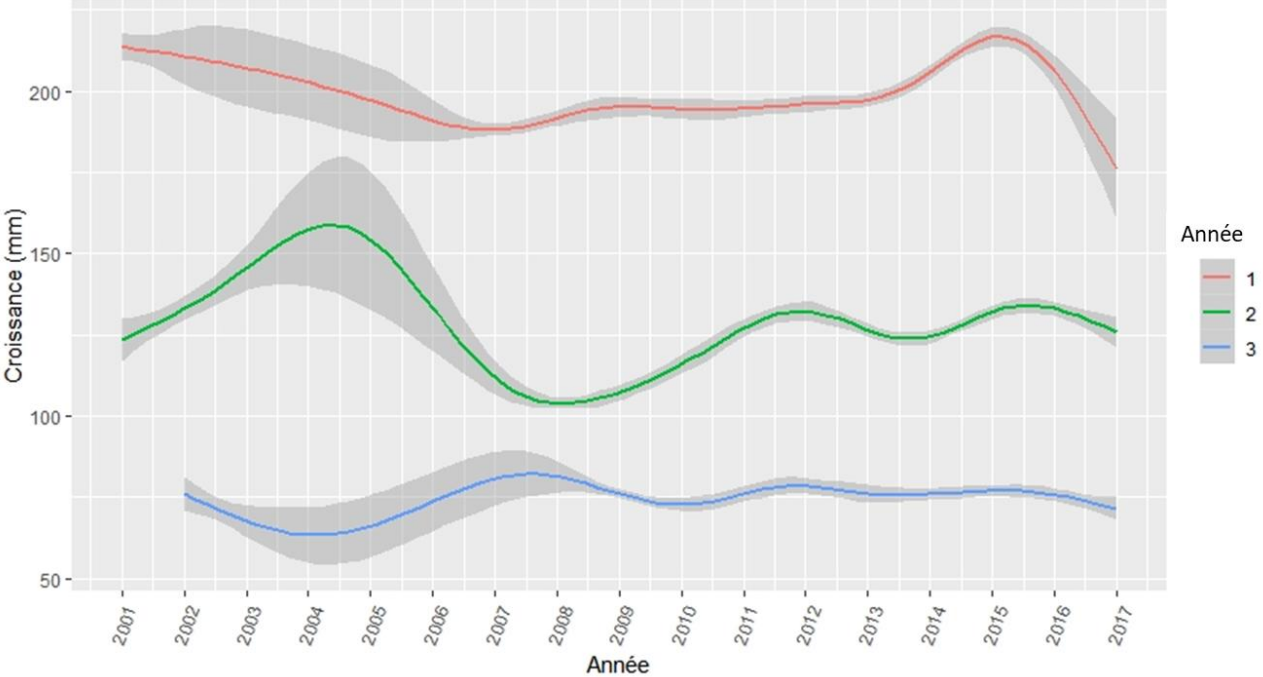
Indicateur 1 : régime alimentaire



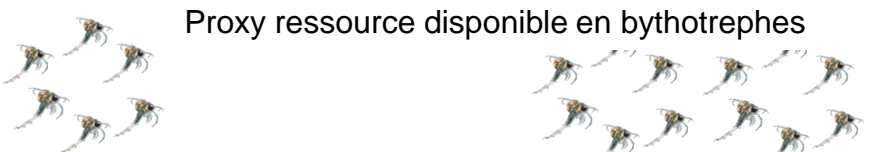
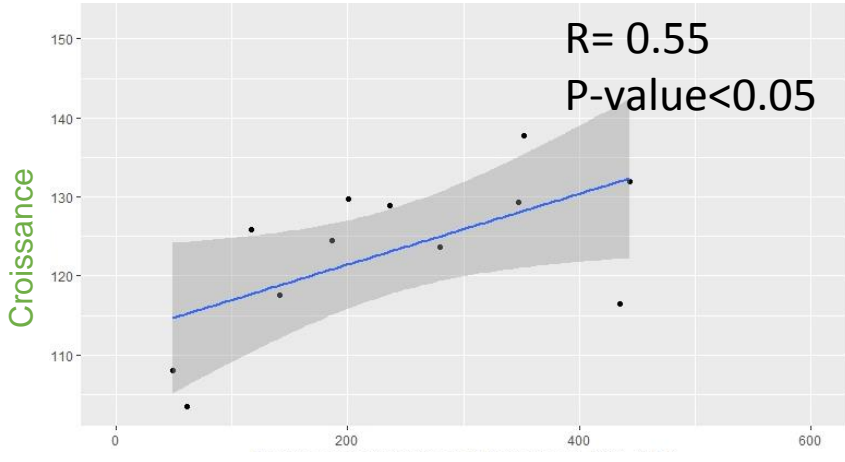
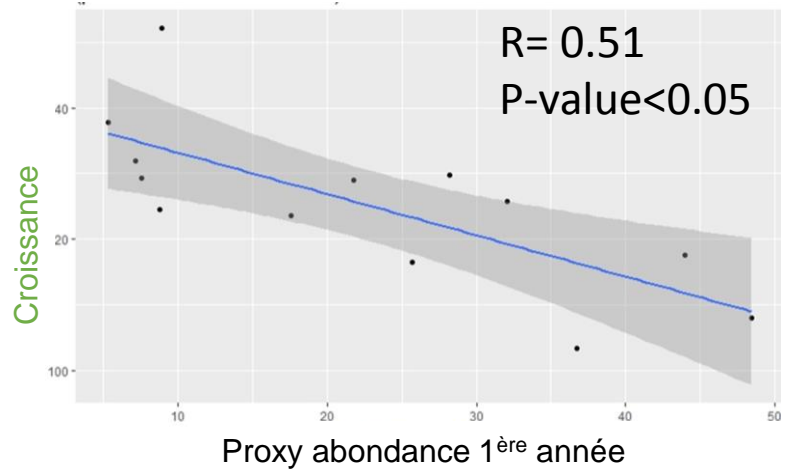
Modification de l'alimentation en lien avec l'évolution de l'abondance des proies.

Compétition pour la nourriture

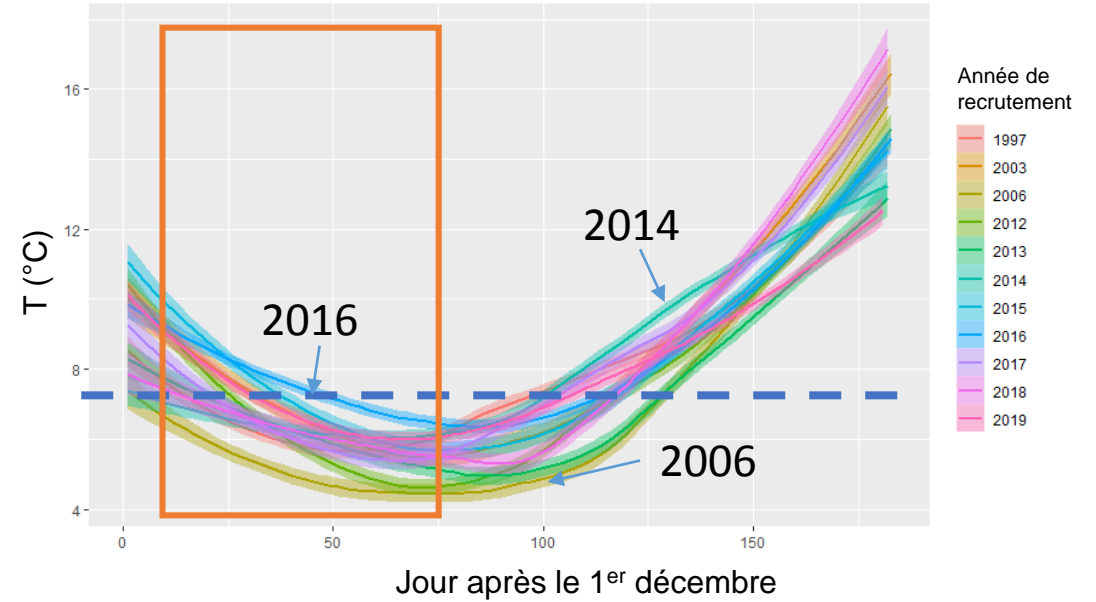
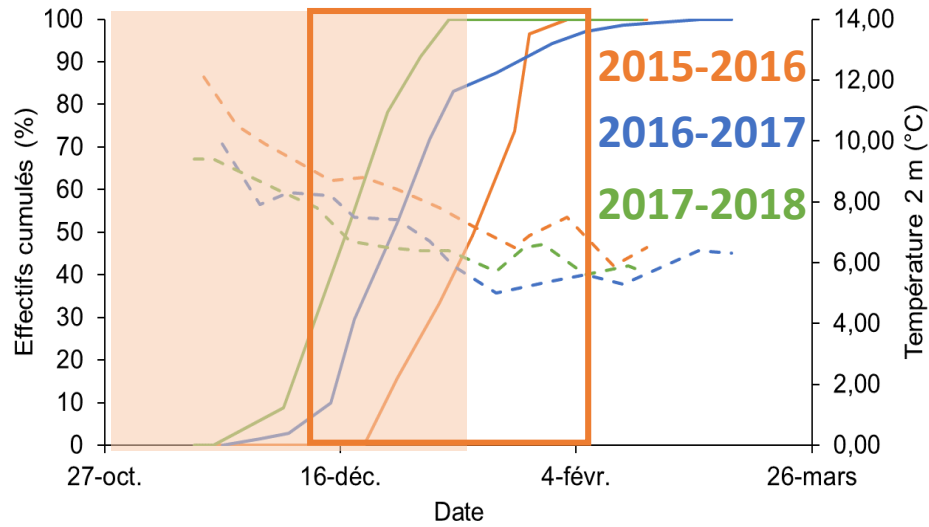
Comparaison de l'évolution de la croissance des trois premières années de vie du corégone



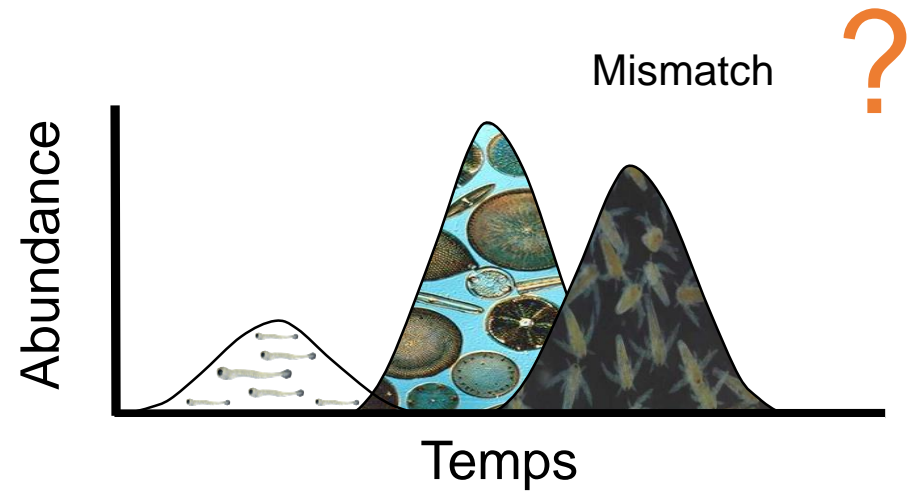
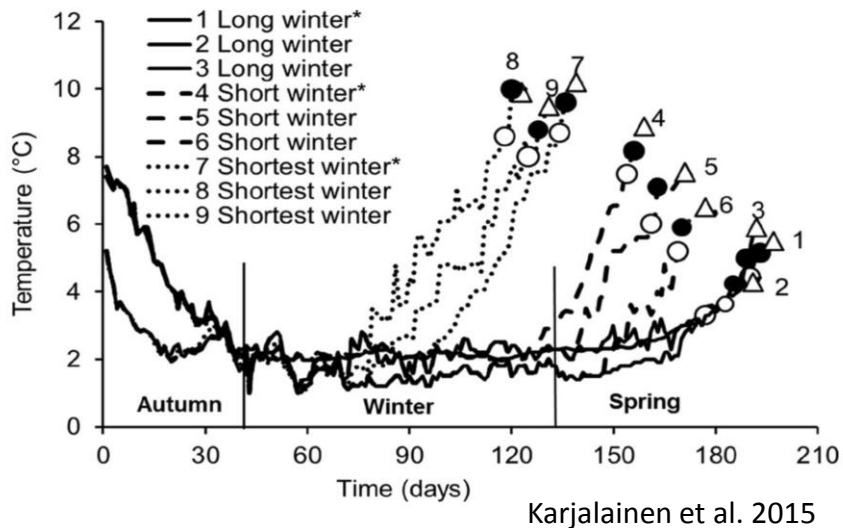
Indicateur 2 : croissance



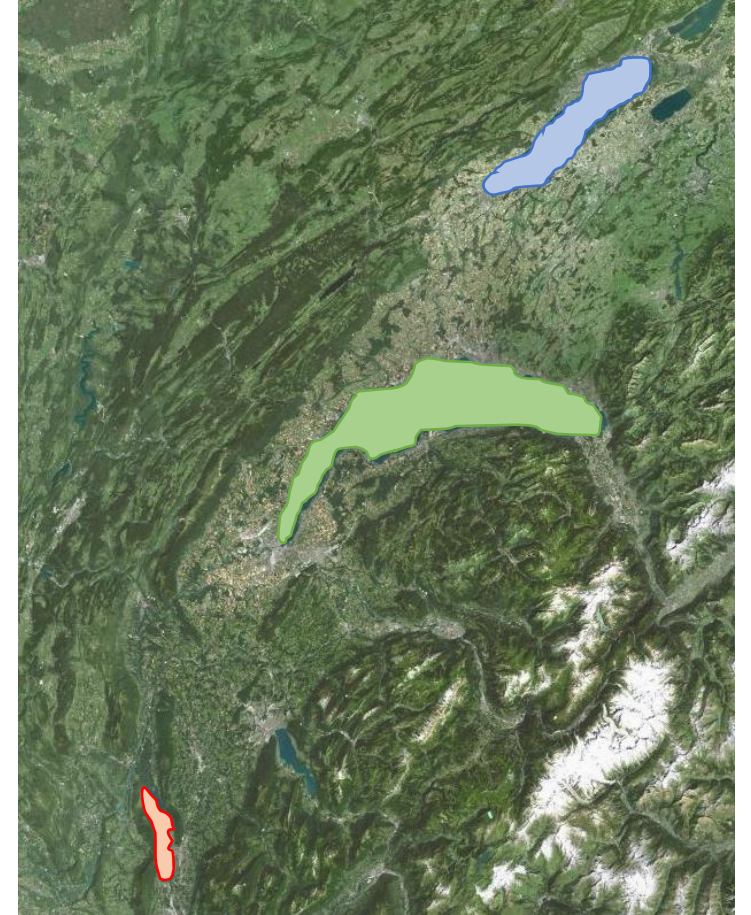
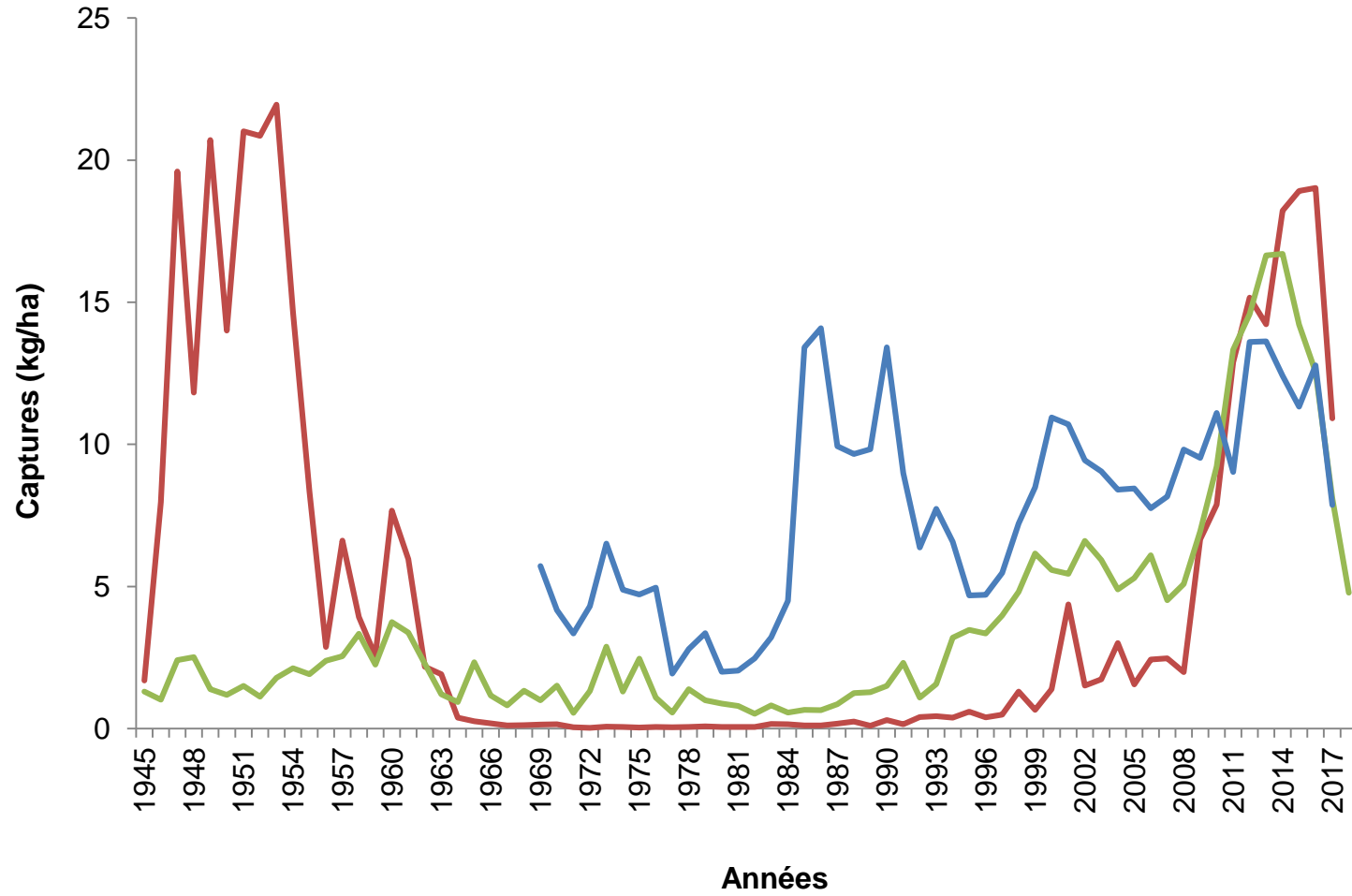
Température



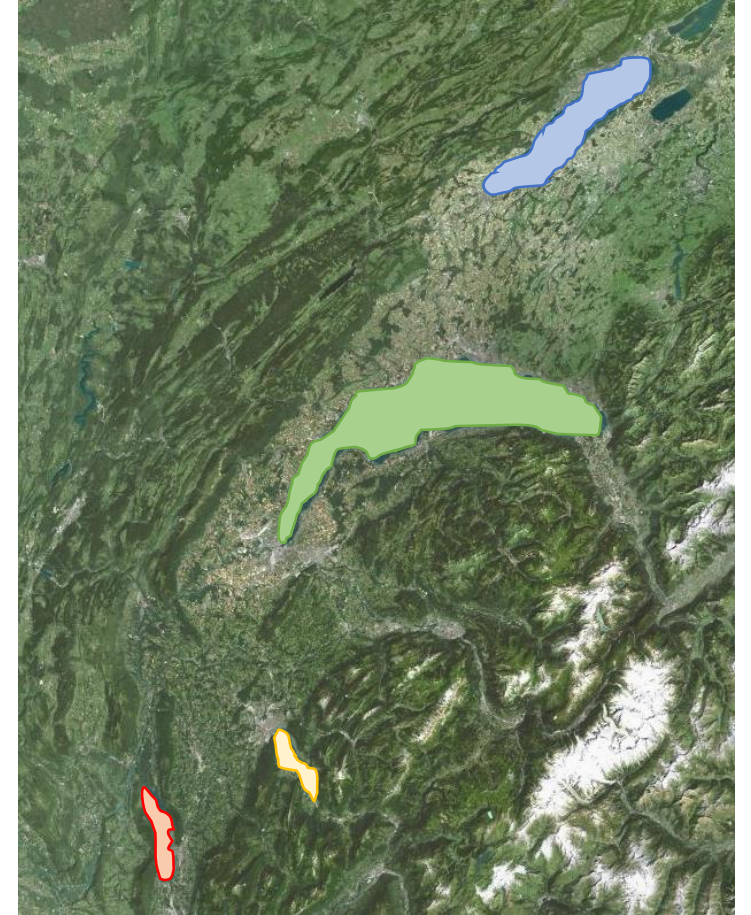
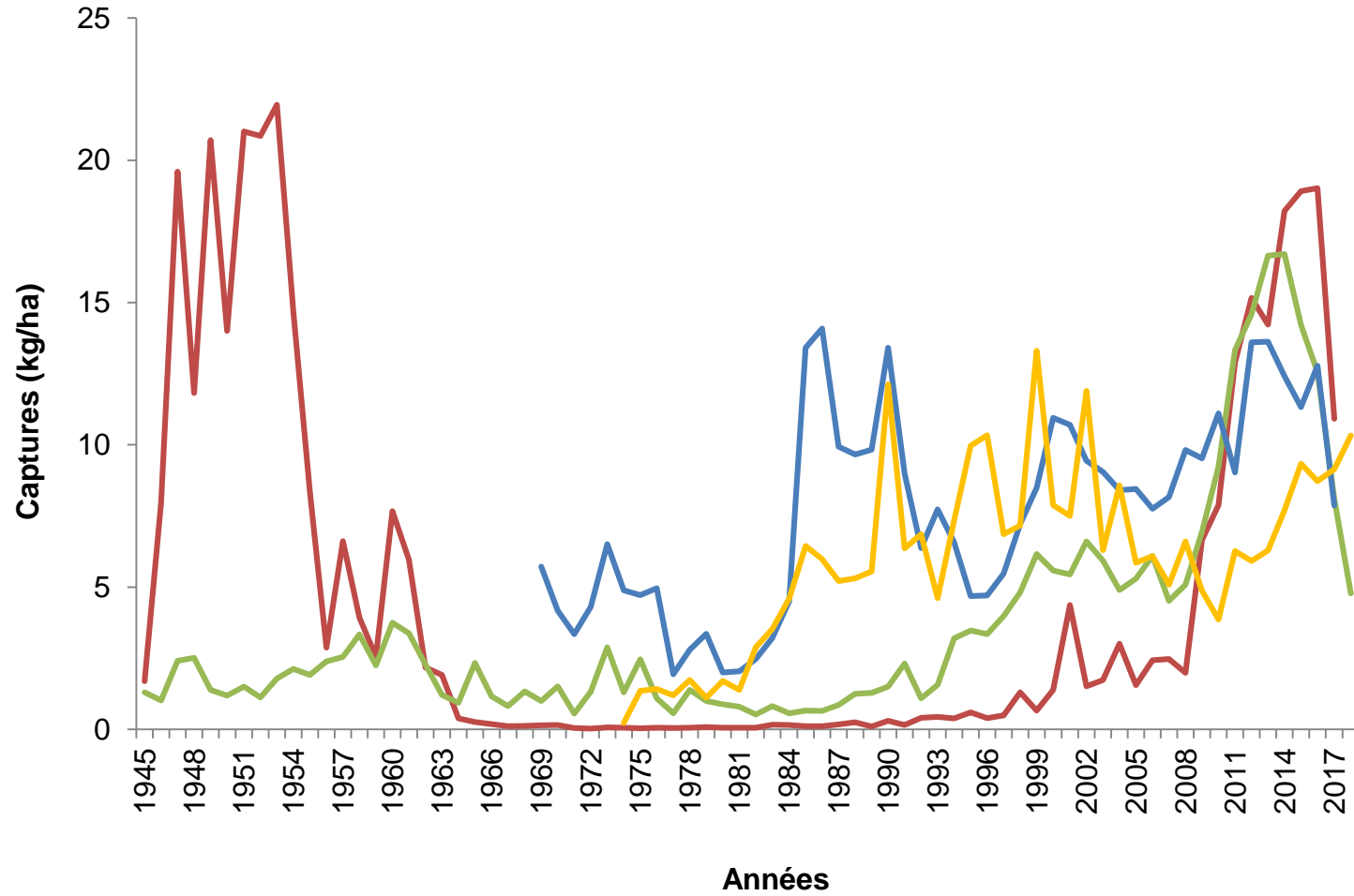
Des hivers plus chauds, responsables d'une éclosion précoce



Dynamiques similaires sur d'autres lacs



Dynamiques similaires sur d'autres lacs



Conclusion

Succès de
Reproduction

Succès de
Recrutement

Capture par les
pêcheurs

Accessibilité du poisson
Efficacité des engins de pêche

STOCK

15
P
Phosphorus
30.974



Proies
disponibles et
accessibles



Prédation

