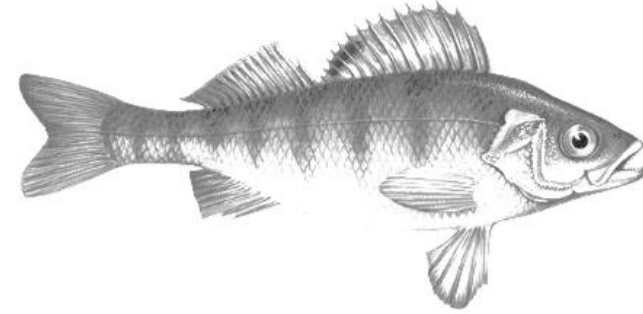


FELCHEN

Coregonus lavaretus



BARSCH

Perca fluviatilis

Entwicklung der im Genfersee fischereilich genutzten Fischpopulationen

Chloé Goulon, Jean Guillard, Orlane Anneville

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



@ChloeGoulon

Tagung – Was ist mit unseren Seen los?
13. November 2019, Olten



INRA
SCIENCE & IMPACT



**UNIVERSITÉ
SAVOIE
MONT BLANC**

Ökosystemleistungen und Bedrohungen

ÖKOSYSTEMLEISTUNGEN



Lynch et al., 2016

BEDROHUNGEN

HABITATSVERLUST

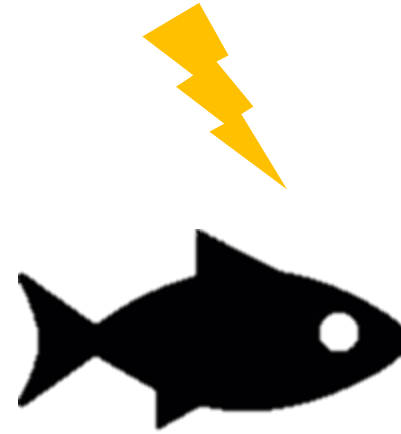
KLIMAWANDEL

INVASIVE ARTEN

VERSCHMUTZUNG

ULTRA-OLIGOTROPHIERUNG

ÜBERNUTZUNG



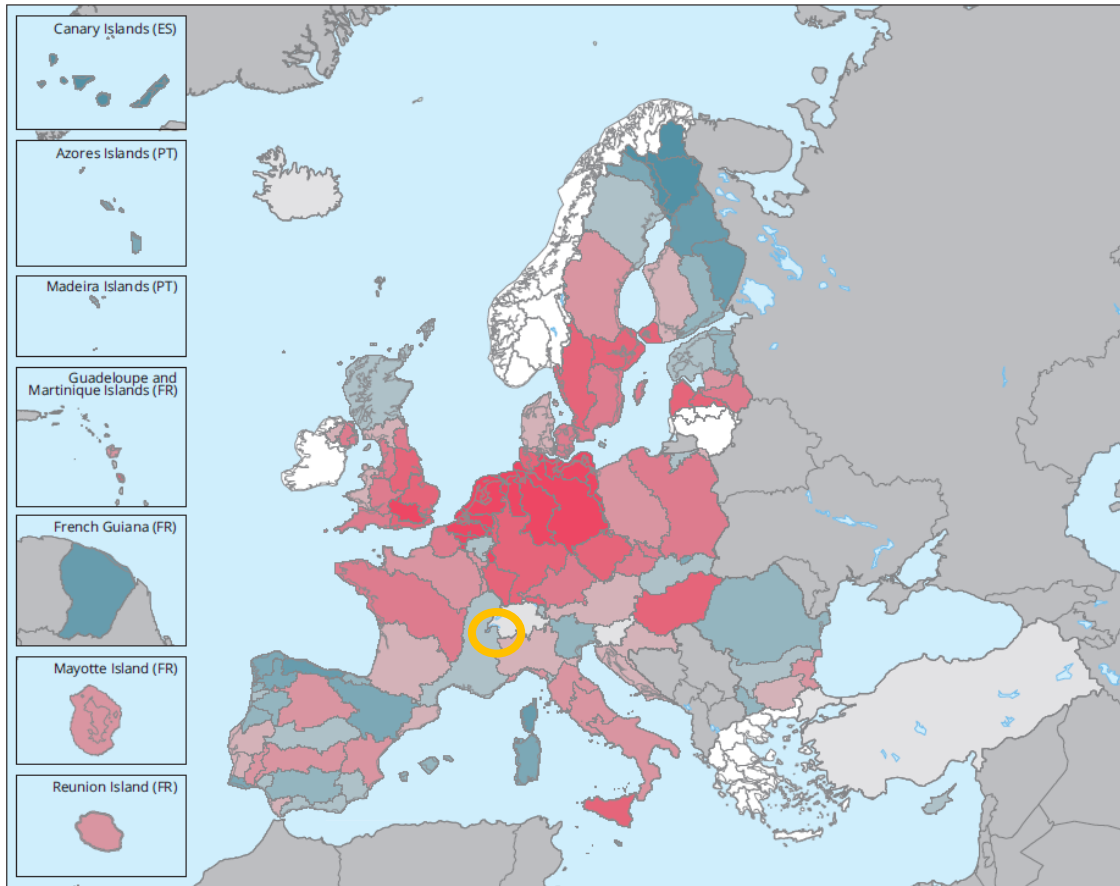
Gesellschaft



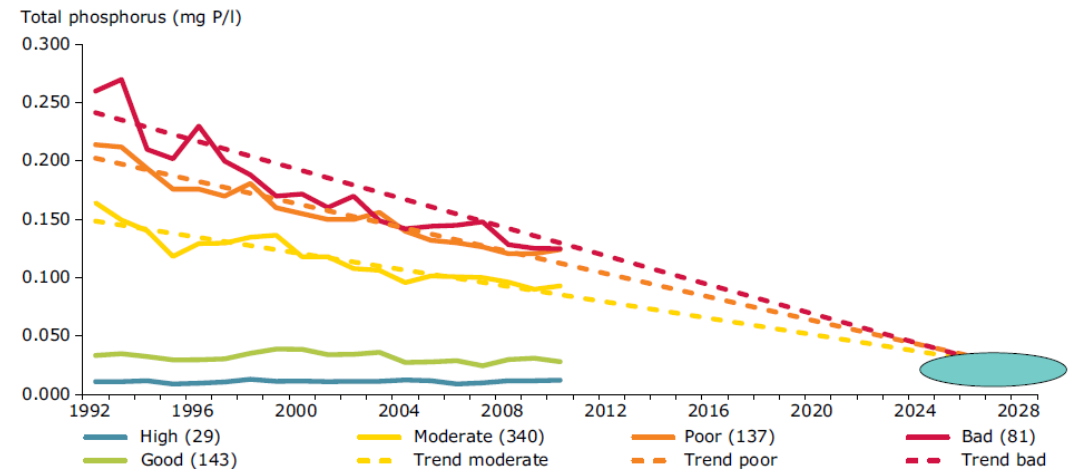
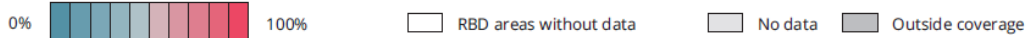
Ind.

Eutrophierungsproblem

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



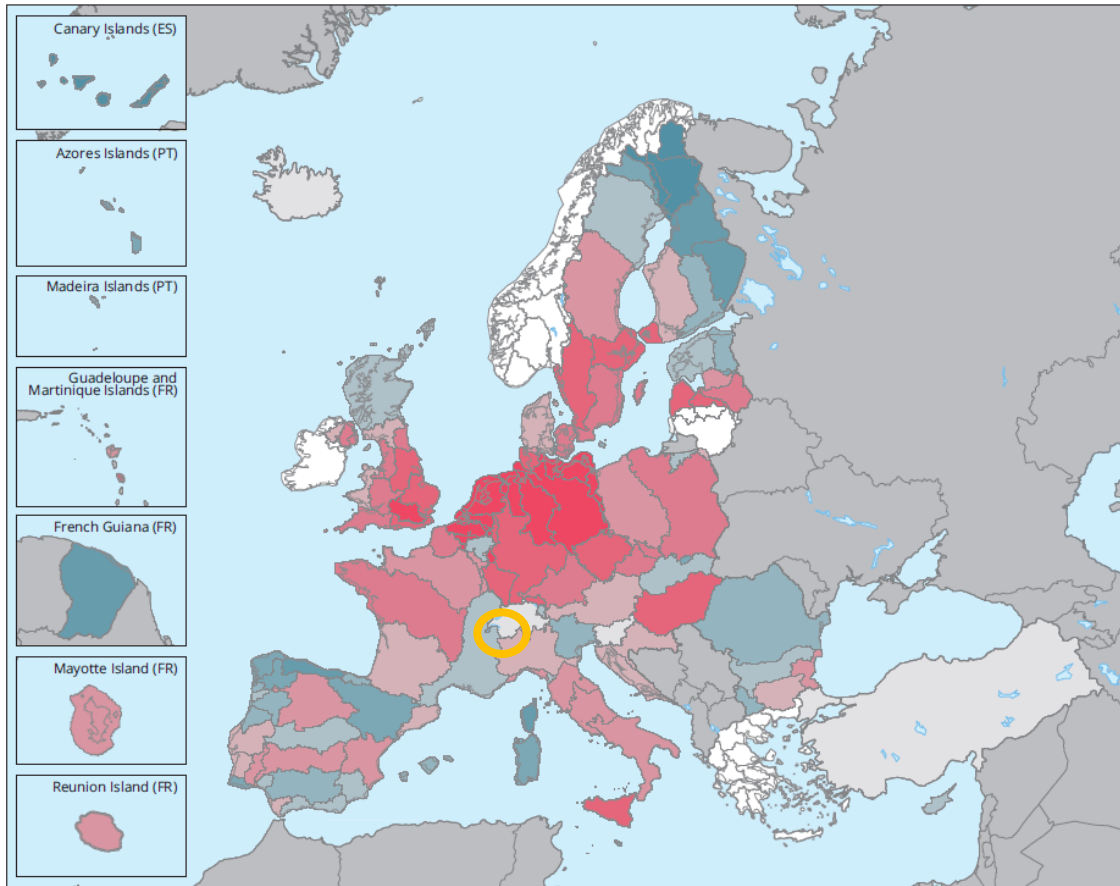
Percentage of number water bodies not in good ecological status or potential per river basin district (RBD) in second RBMPs



EEA Report No 9/2012

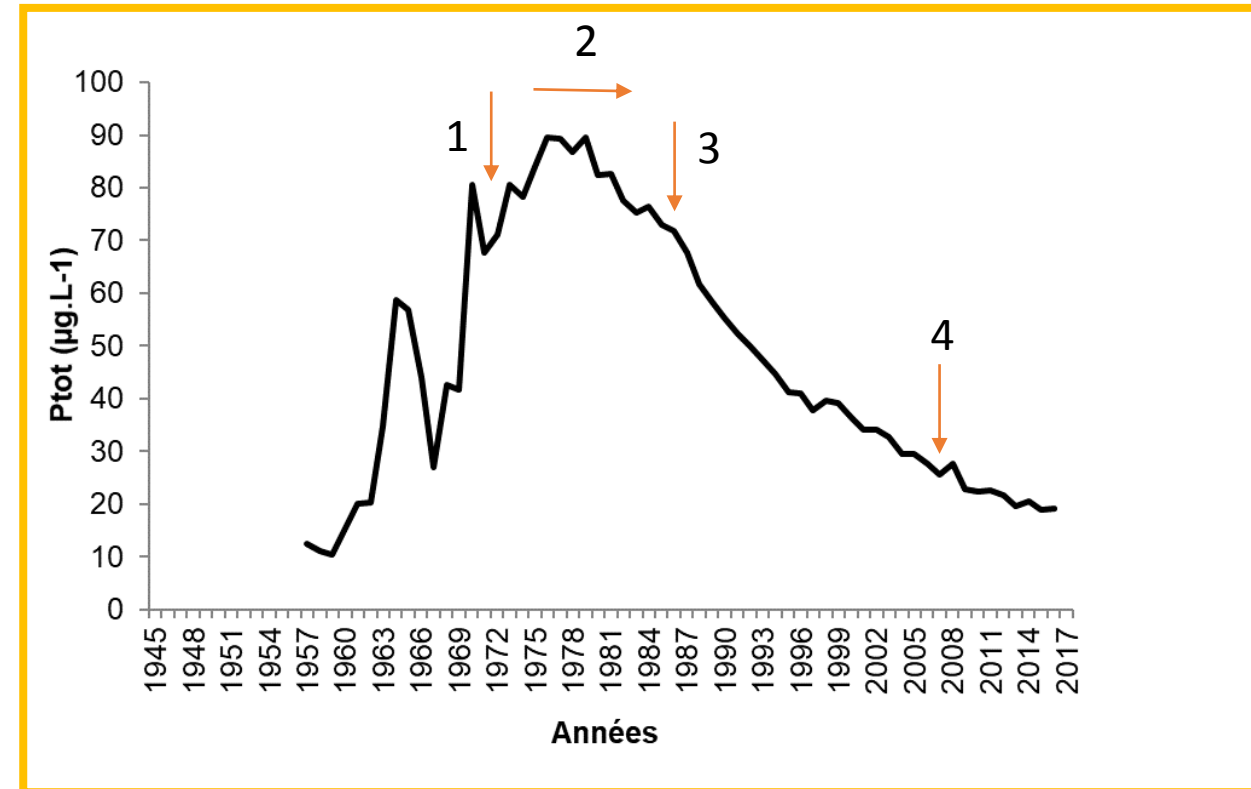
Eutrophierungsproblem

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

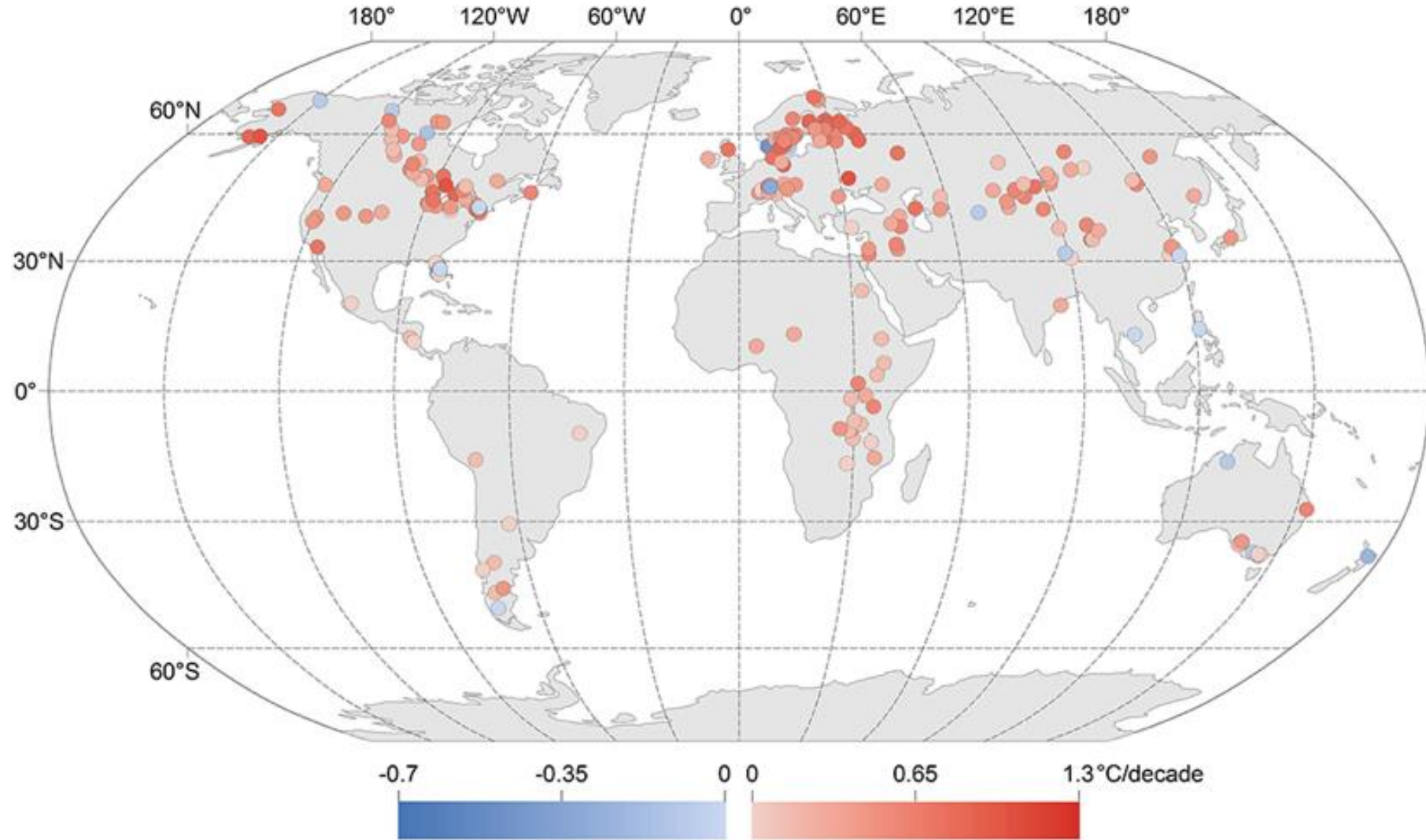


Percentage of number water bodies not in good ecological status or potential per river basin district (RBD) in second RBMPs

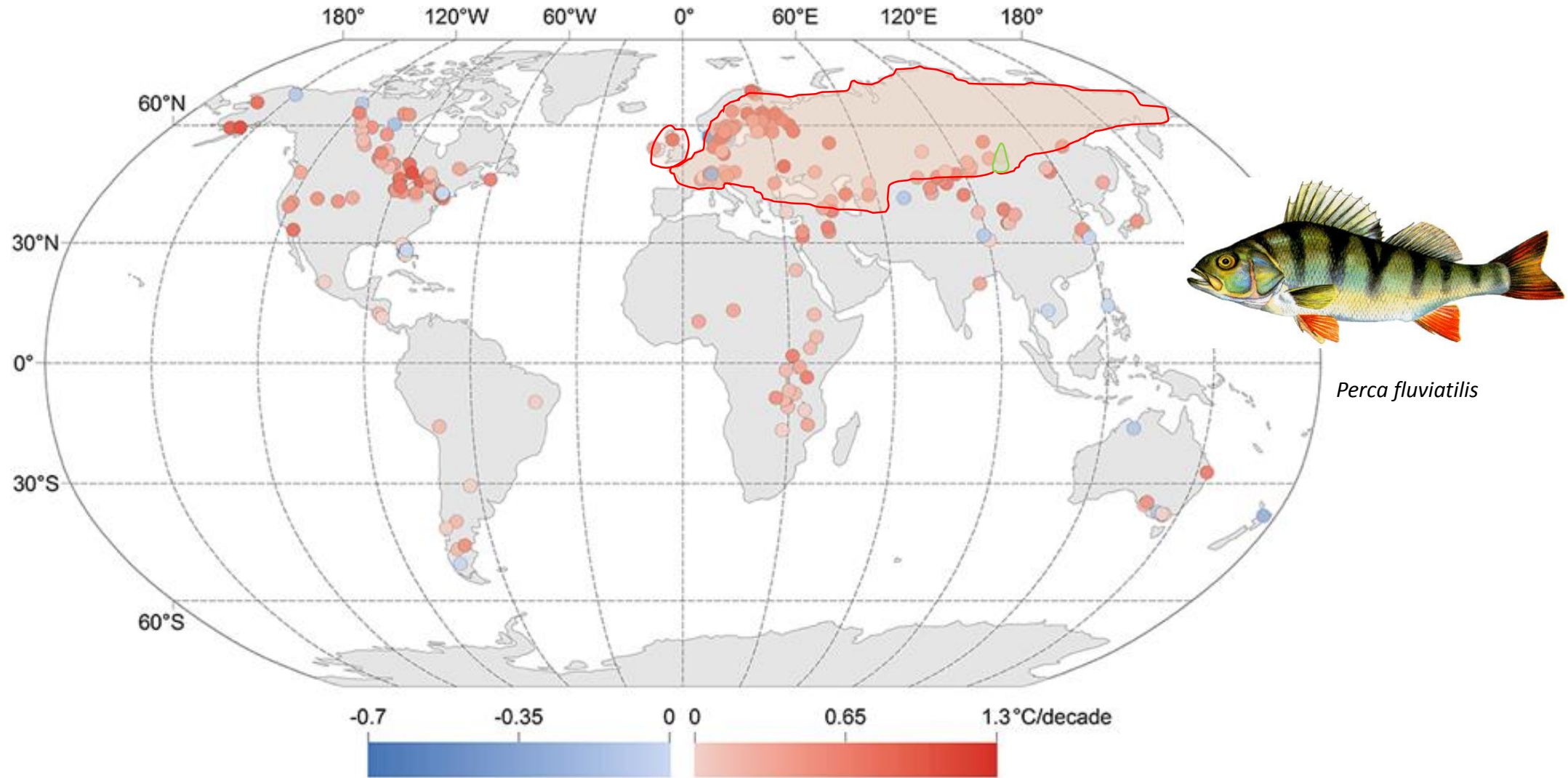
0% 100% RBD areas without data No data Outside coverage



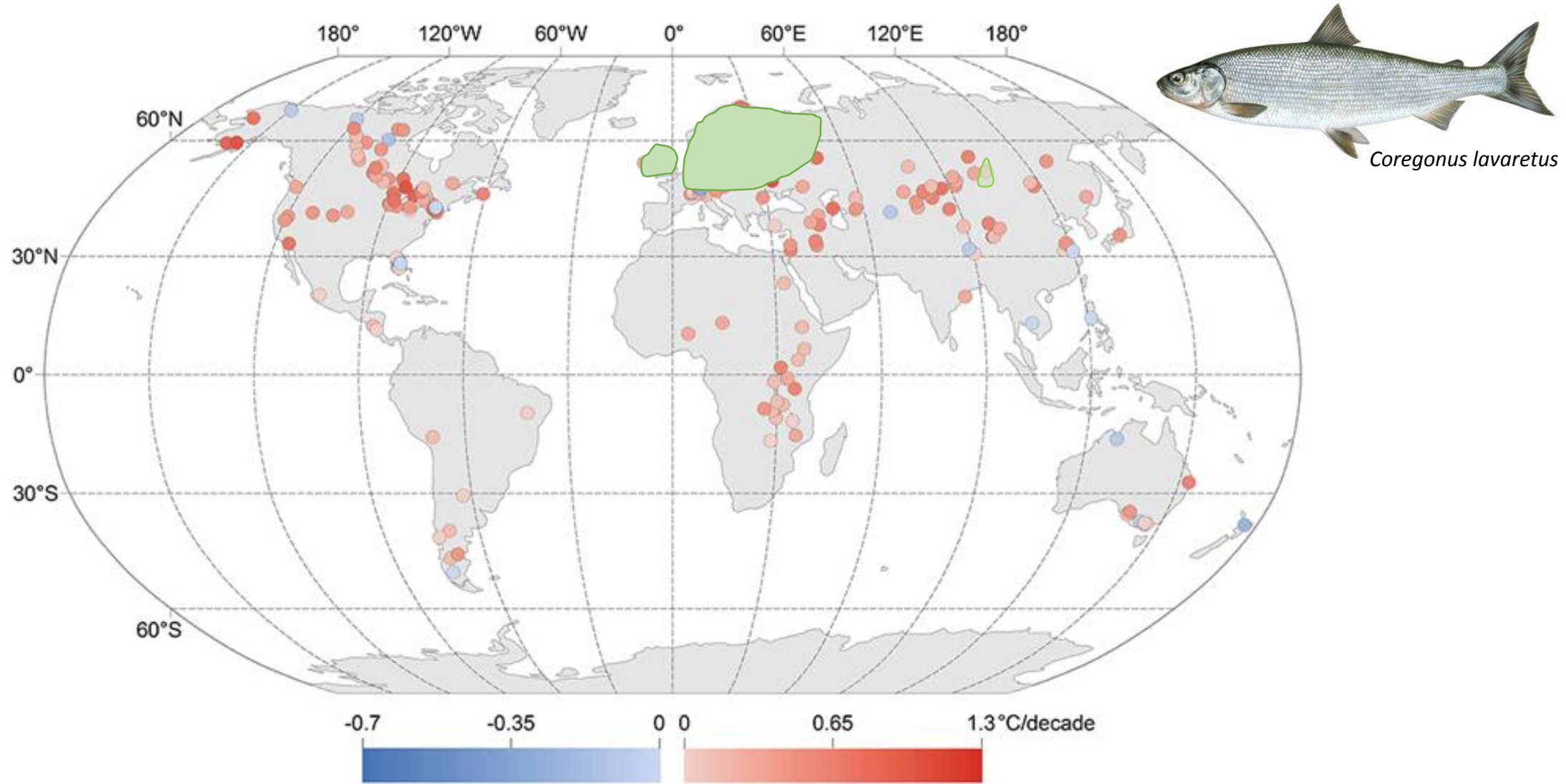
Die Seen erwärmen sich



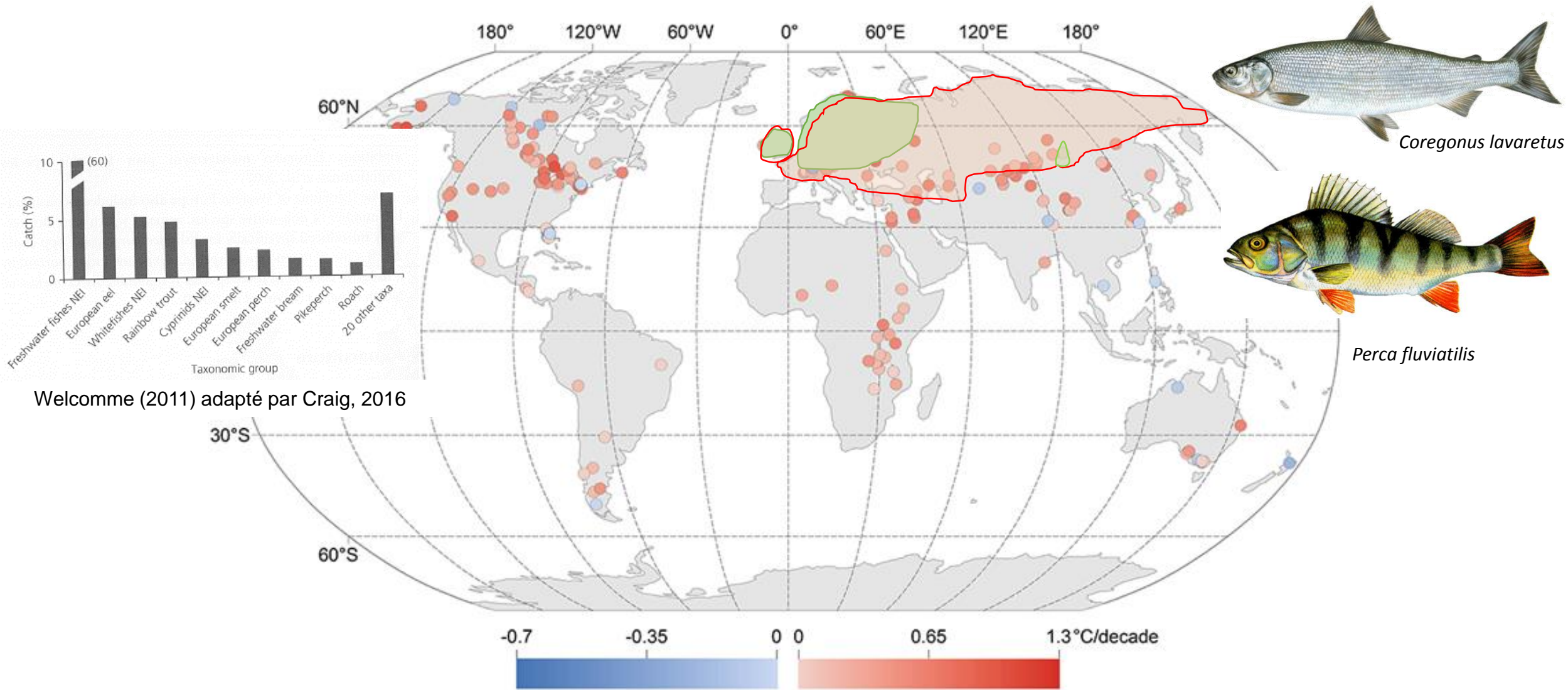
Die Seen erwärmen sich



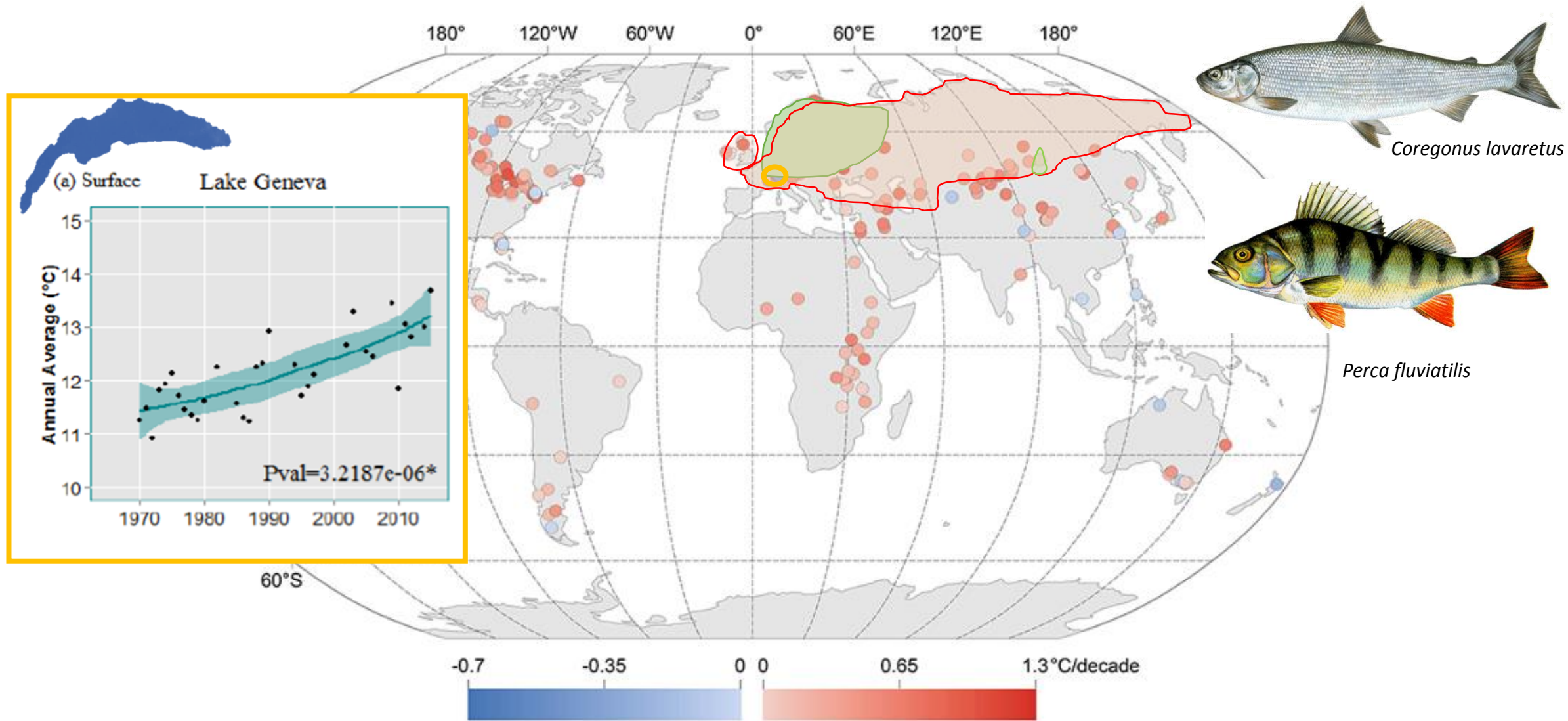
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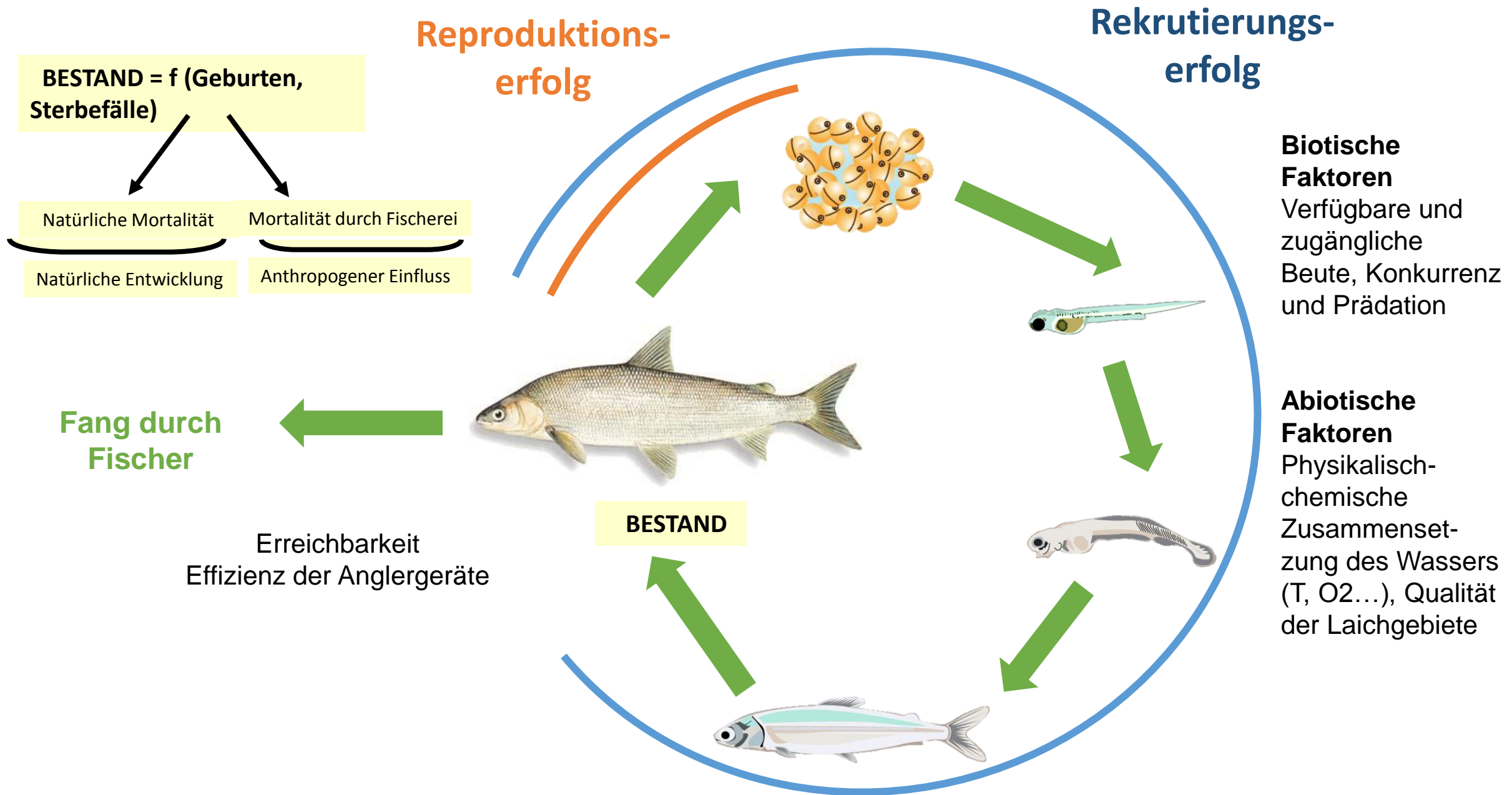


Die Seen erwärmen sich

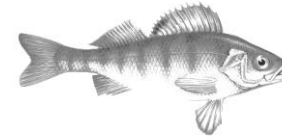


Die Seen erwärmen sich

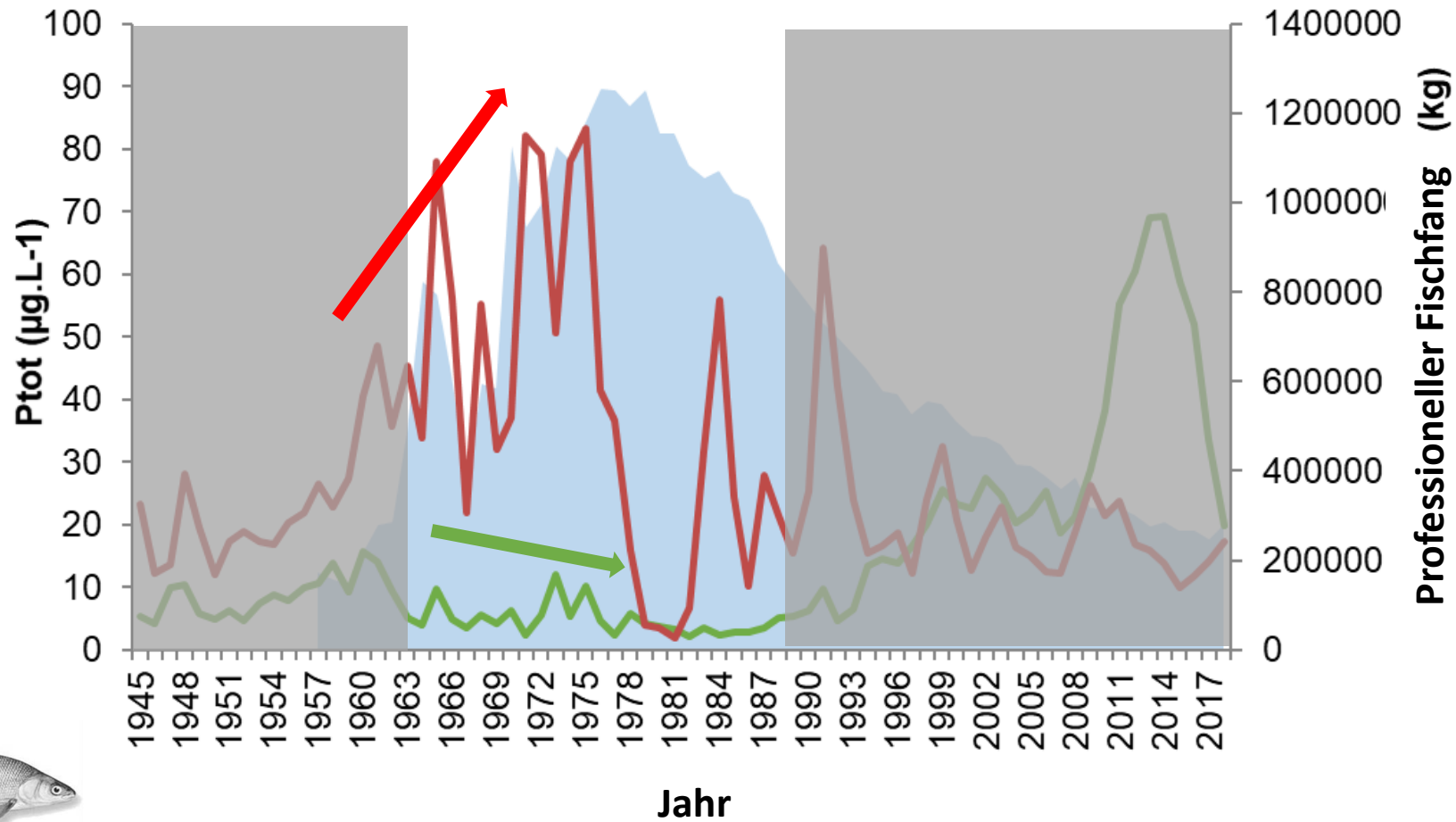




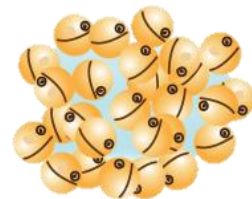
Ein eutropher See



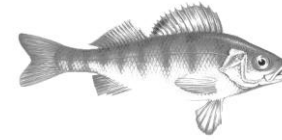
ERFOLGREICHE REKRUTIERUNG
NAHRUNGSÜBERFLUSS



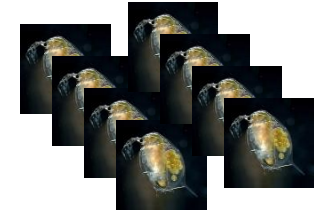
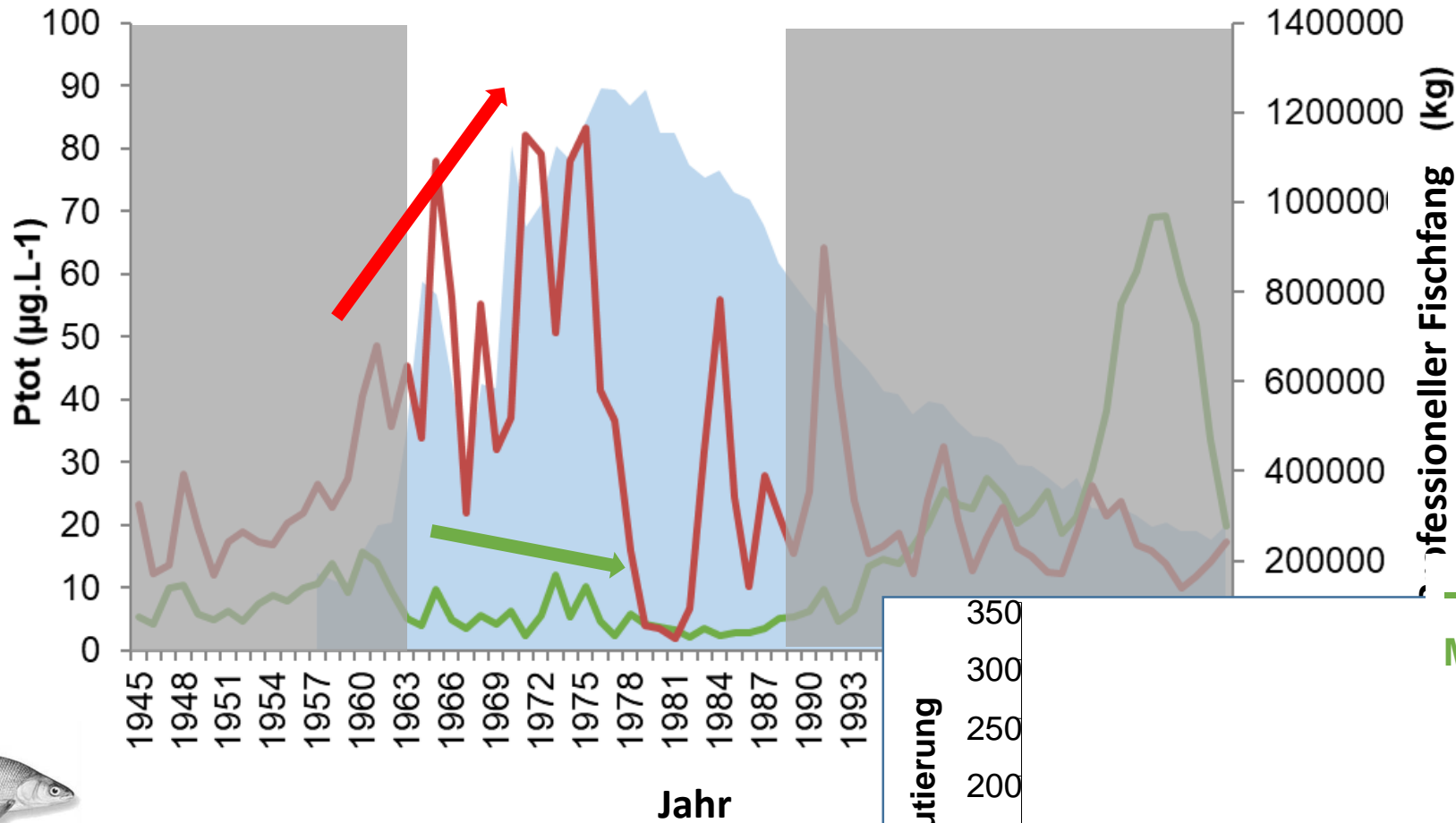
SCHWACHER REKRUTIERUNGSERFOLG
REPRODUKTION : LAICHGEBIETE IN
SCHLECHTEM ZUSTAND



Ein eutropher See



ERFOLGREICHE REKRUTIERUNG
NAHRUNGSÜBERFLUSS

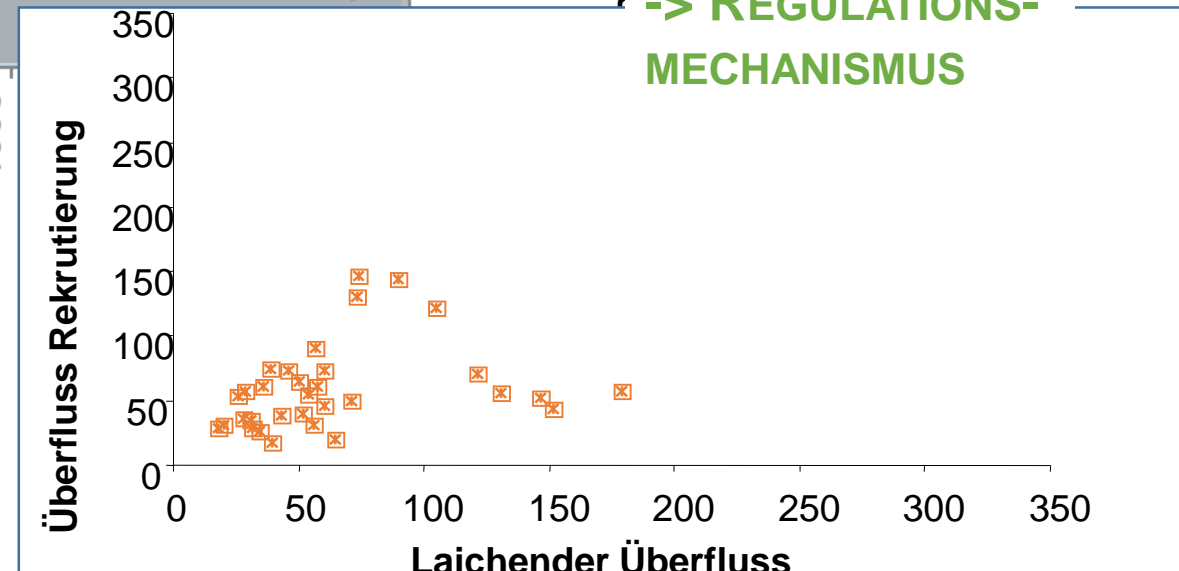


CARANHAC & GERDEAUX 1998
-> Dichteabhängigkeit

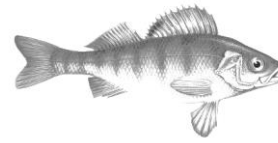
-> **REGULATIONSMECHANISMUS**



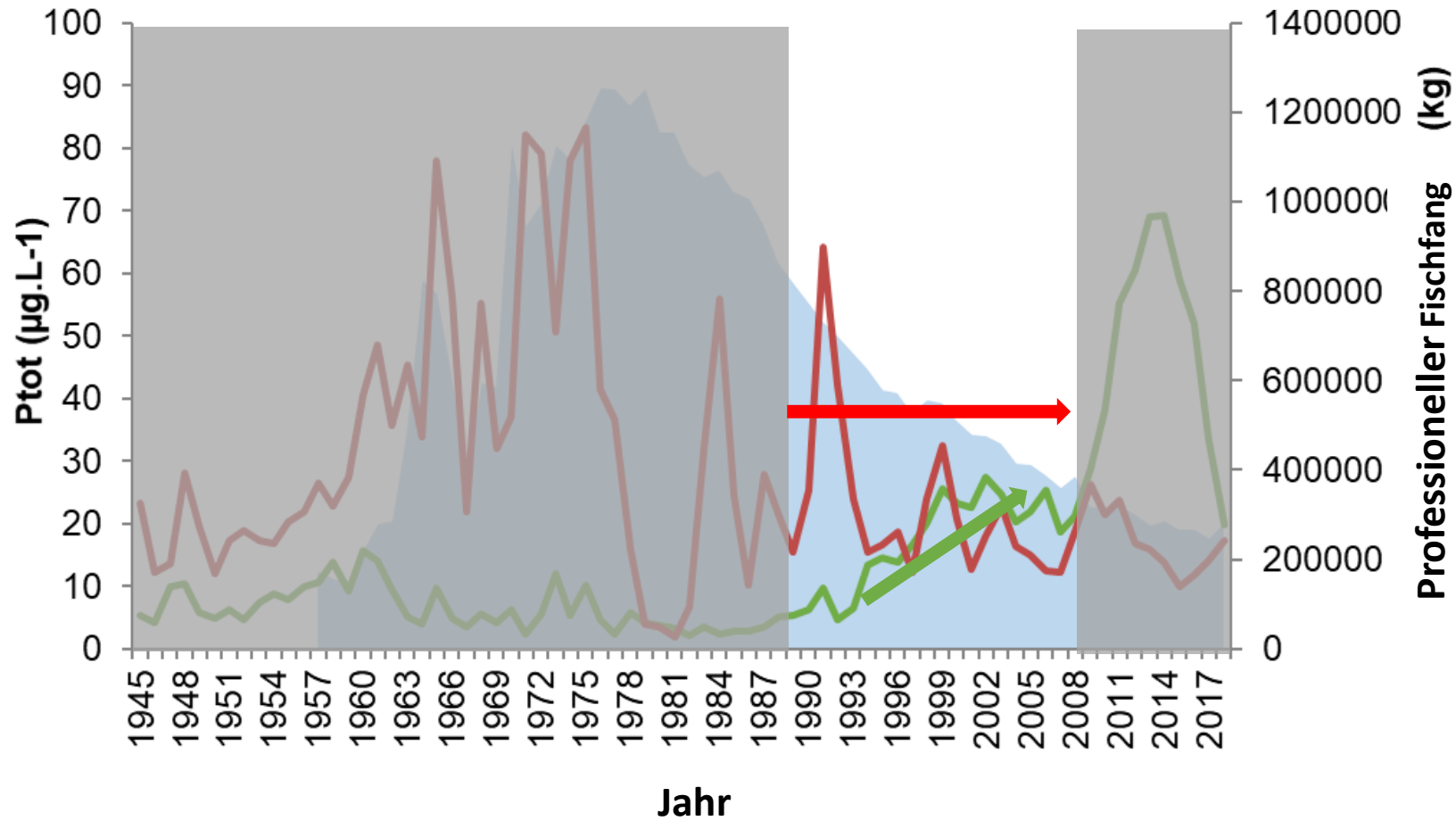
SCHWACHER REKRUTIERUNGSERFOLG
REPRODUKTION : LAICHGEBIETE IN SCHLECHTEM ZUSTAND



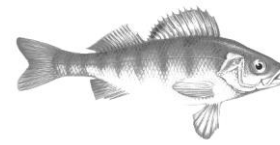
Ein meso-eutropher See



GERINGERER REKRUTIERUNGSERFOLG
WACHSTUMSABNAHME,
PARASITEN, KANIBALISMUS



Ein meso-eutropher See



GERINGERER REKRUTIERUNGSERFOLG
WACHSTUMSABNAHME,
PARASITEN, KANIBALISMUS

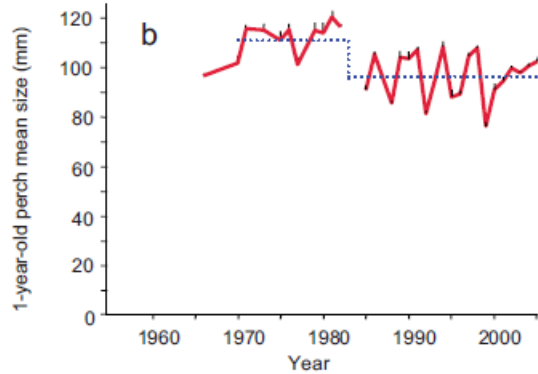


Fig. 4. (a) Trends in perch yield (t) (fine unbroken line) and zooplankton biovolume ($\text{ml m}^{-2} \text{year}^{-1}$) (bold unbroken line); and (b) mean size (with standard error) of one-year-old perch in Lake Geneva (unbroken lines). Mean levels and changes detected by the DCPC procedure are indicated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

Dubois et al., 2008

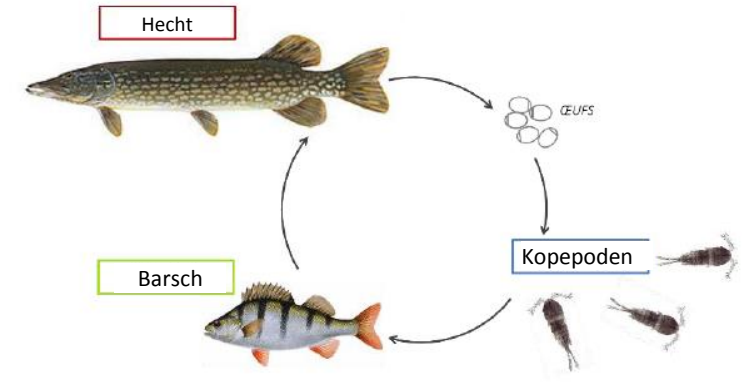
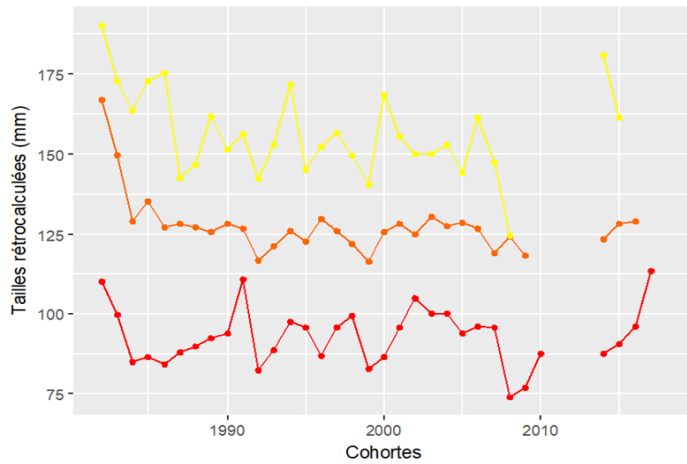
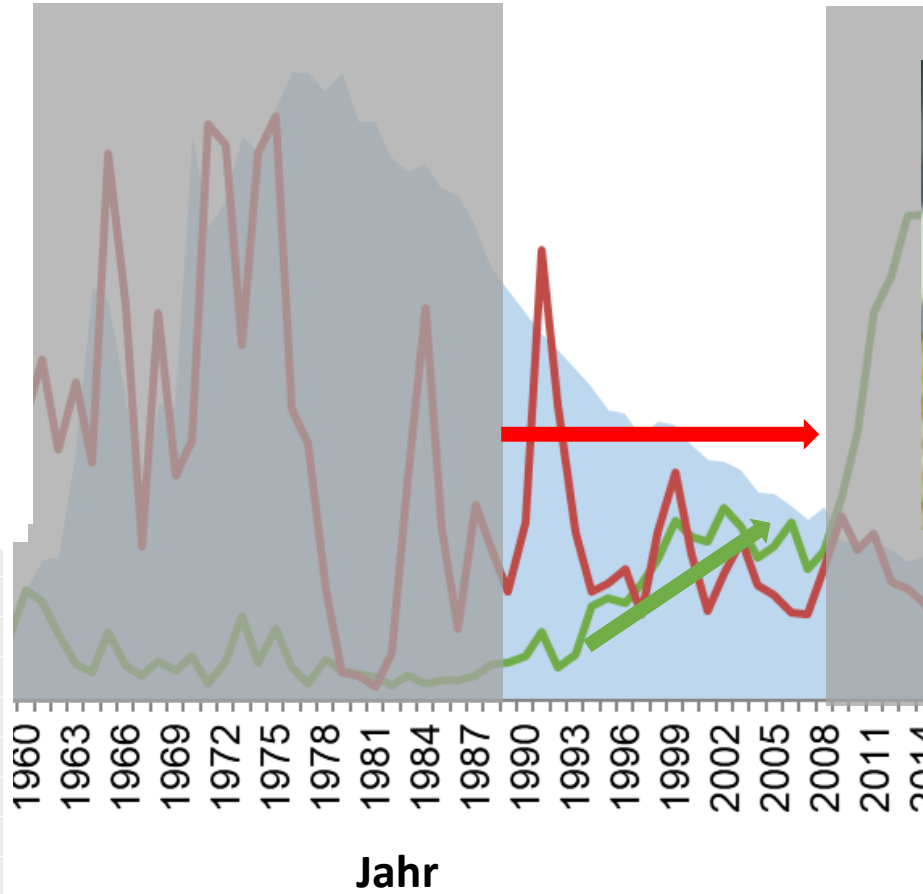
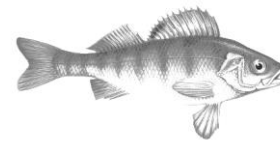
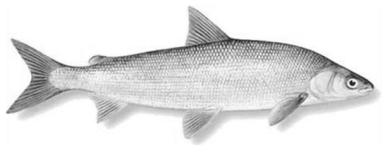
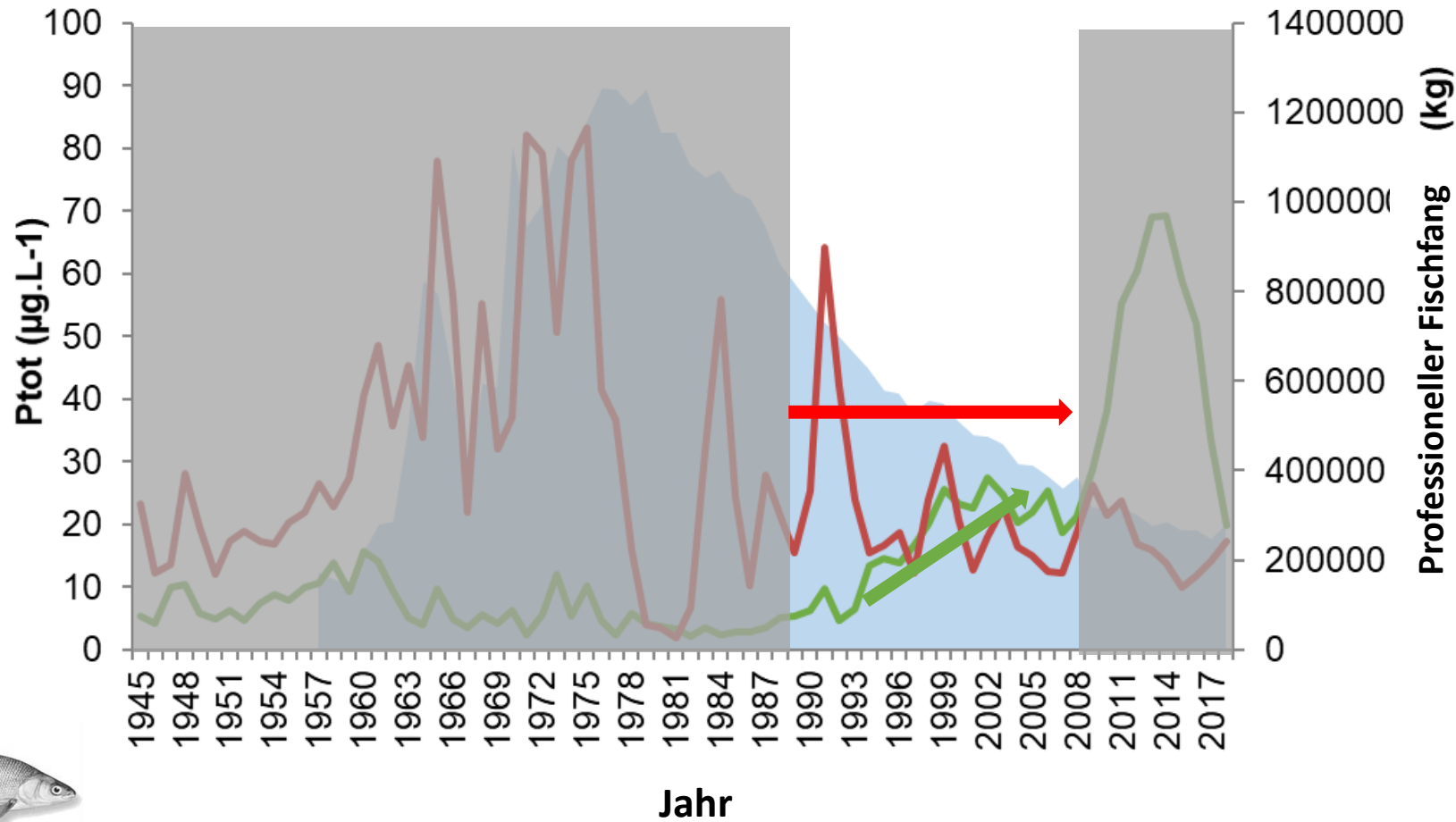


Abbildung 3 Vereinfachter Lebenszyklus von *Triaenophorus nodulosus*

Ein meso-eutropher See



GERINGERERER REKRUTIERUNGSERFOLG
WACHSTUMSABNAHME,
PARASITEN, KANIBALISMUS



BESSERE REKRUTIERUNG

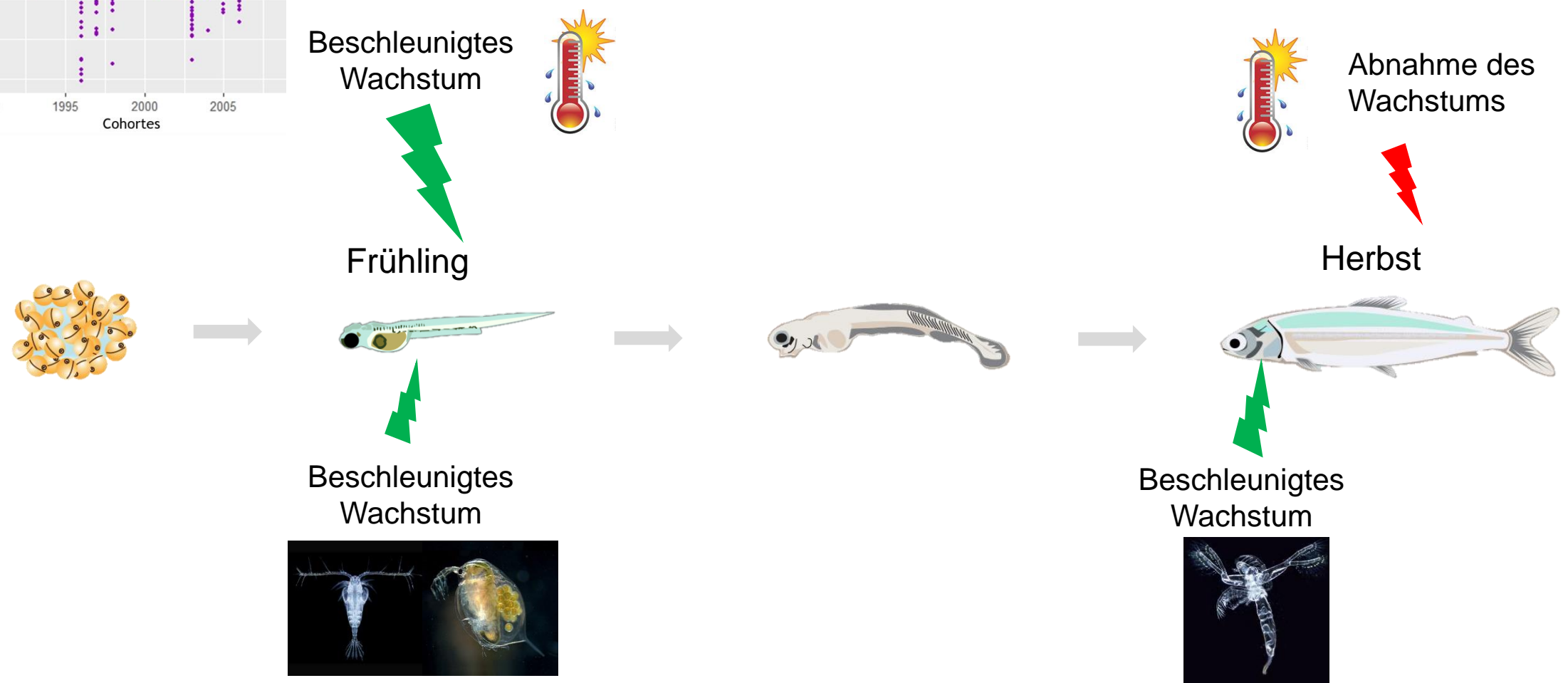
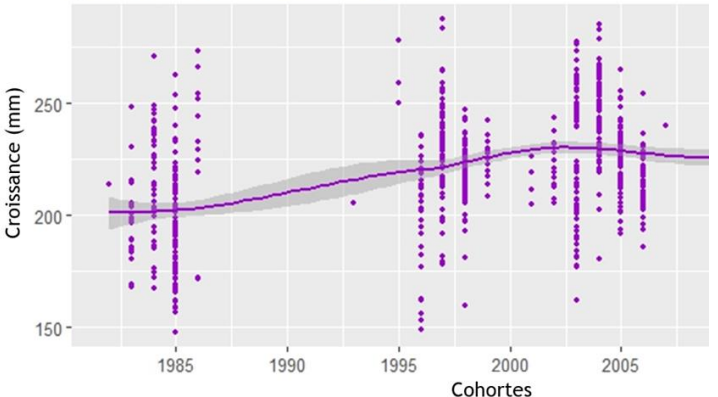
VERBESSERUNG DER QUALITÄT DER LAICHGEBIETE

TEMPERATURANSTIEG + ÜBEREINSTIMMUNG MIT ZOOPLANKTON:

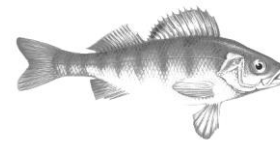
↑ WACHSTUMSRATE DER LARVEN

Günstige biotische und abiotische Faktoren

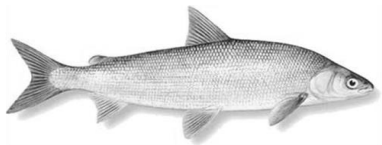
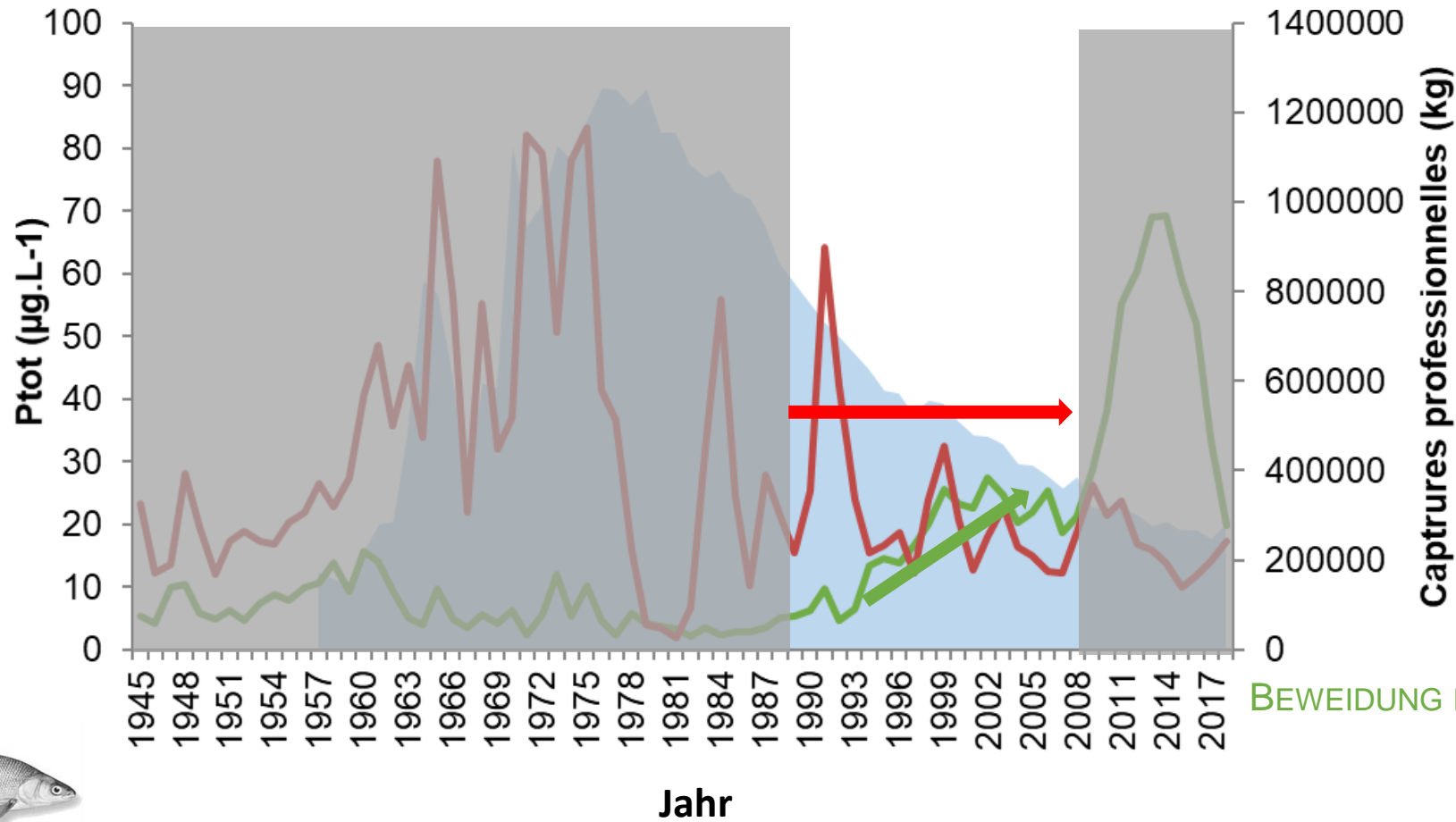
(p-value < 2.2e-16; tau= 0.25)



Ein meso-eutropher See



GERINGERER REKRUTIERUNGSERFOLG
WACHSTUMSABNAHME,
PARASITEN, KANIBALISMUS



BEWEIDUNG DER SEEN ALS UNTERSTÜTZUNG

BESSERE REKRUTIERUNG

VERBESSERUNG DER LAICHGEBIETSQUALITÄT

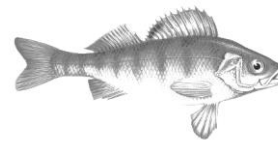
TEMPERATURANSTIEG + ÜBEREINSTIMMUNG MIT ZOOPLANKTON:

↑ WACHSTUMSRATE DER LARVEN

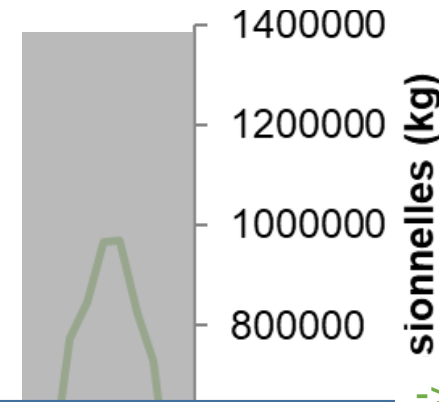
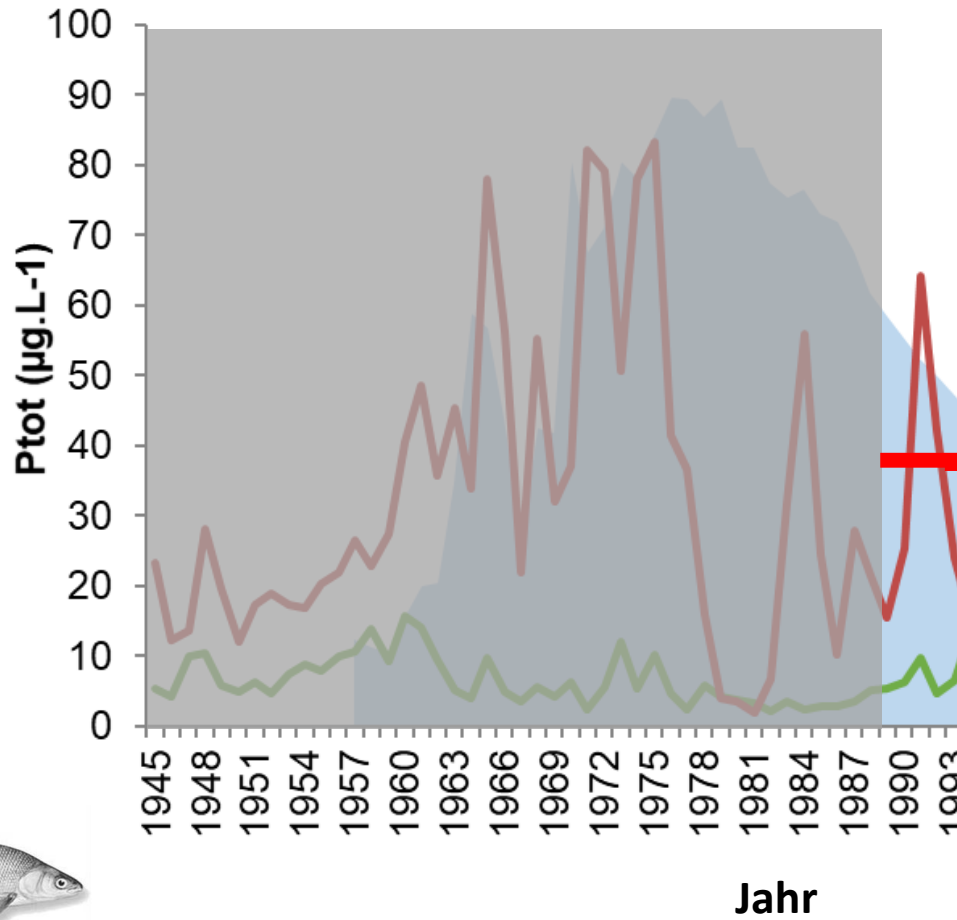
Gerdeaux, 2004 ; Anneville et al., 2009



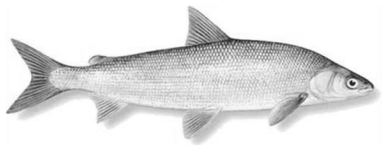
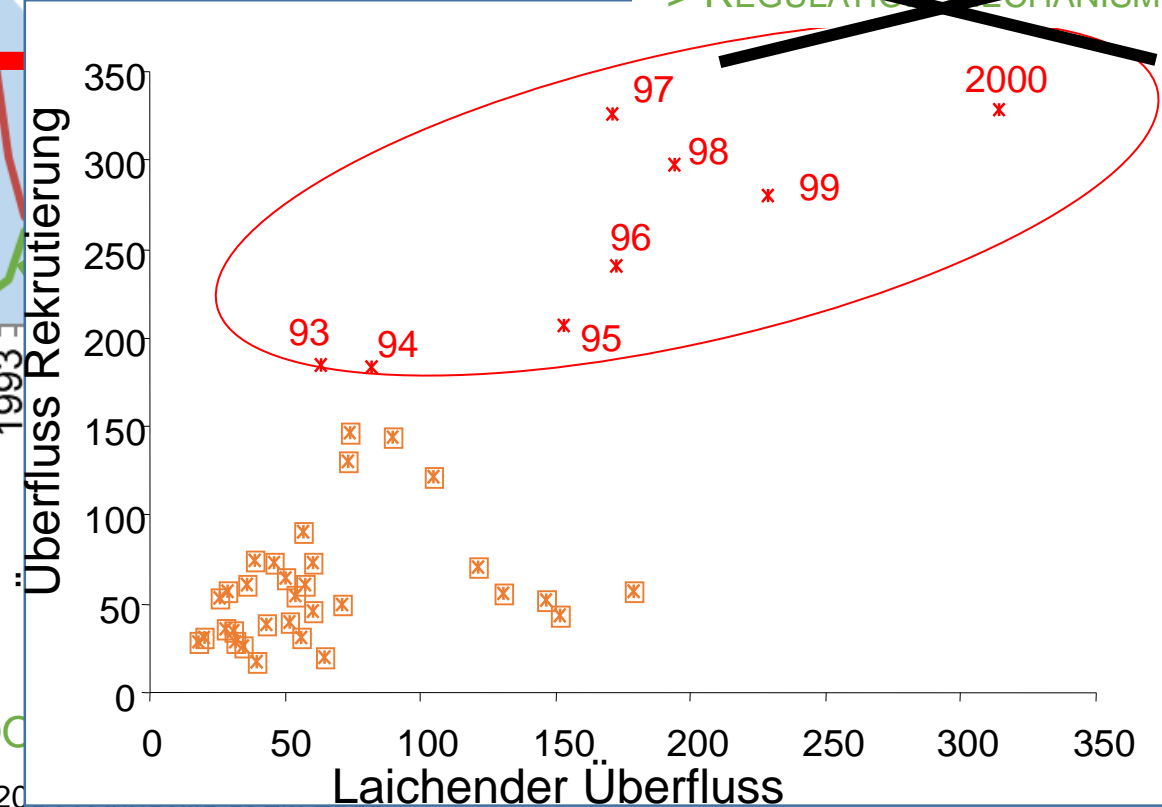
Ein meso-eutropher See



GERINGERERER REKRUTIERUNGSERFOLG
WACHSTUMSABNAHME,
PARASITEN, KANIBALISMUS

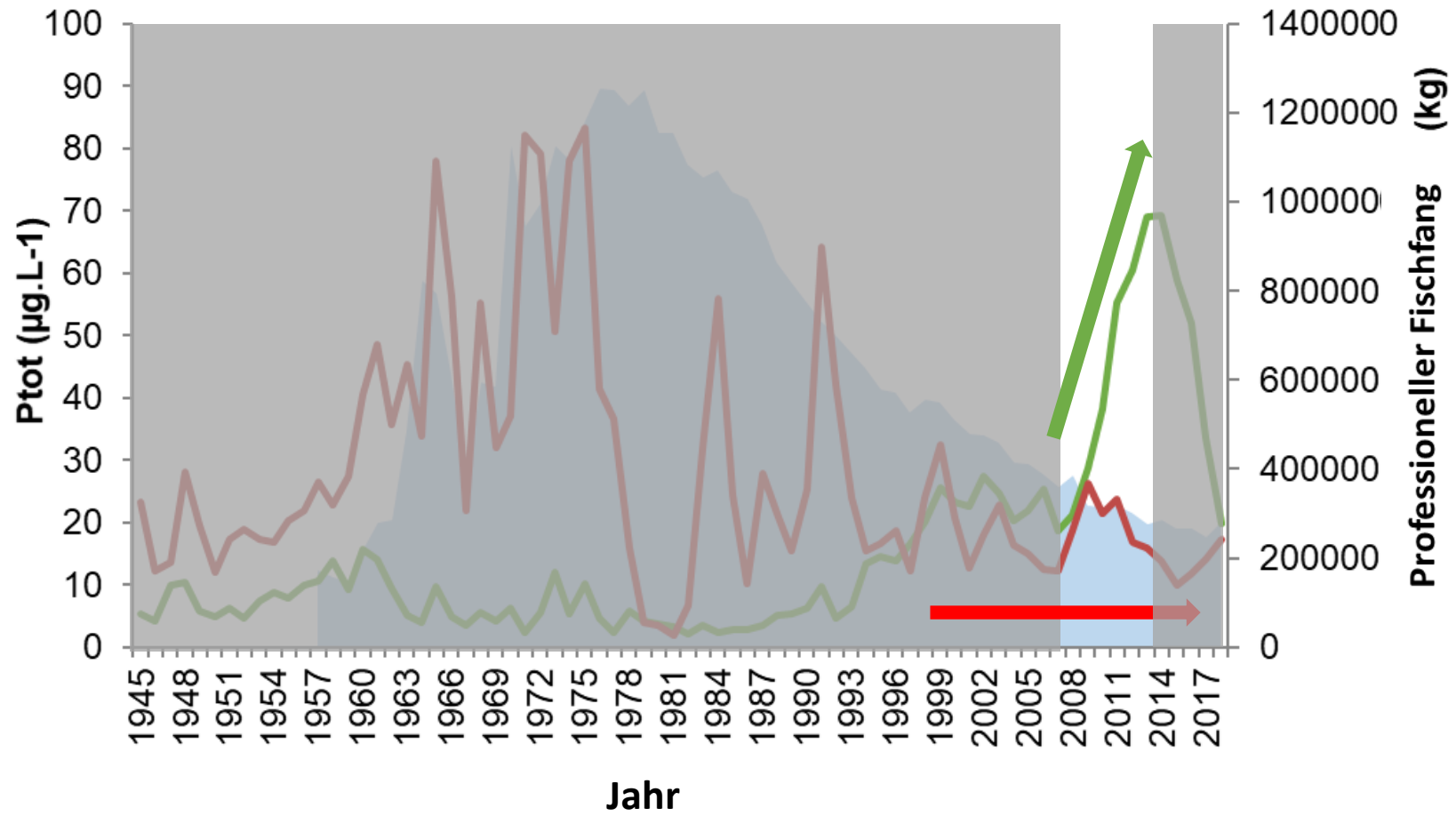


-> ~~REGULATIONSMECHANISMEN~~

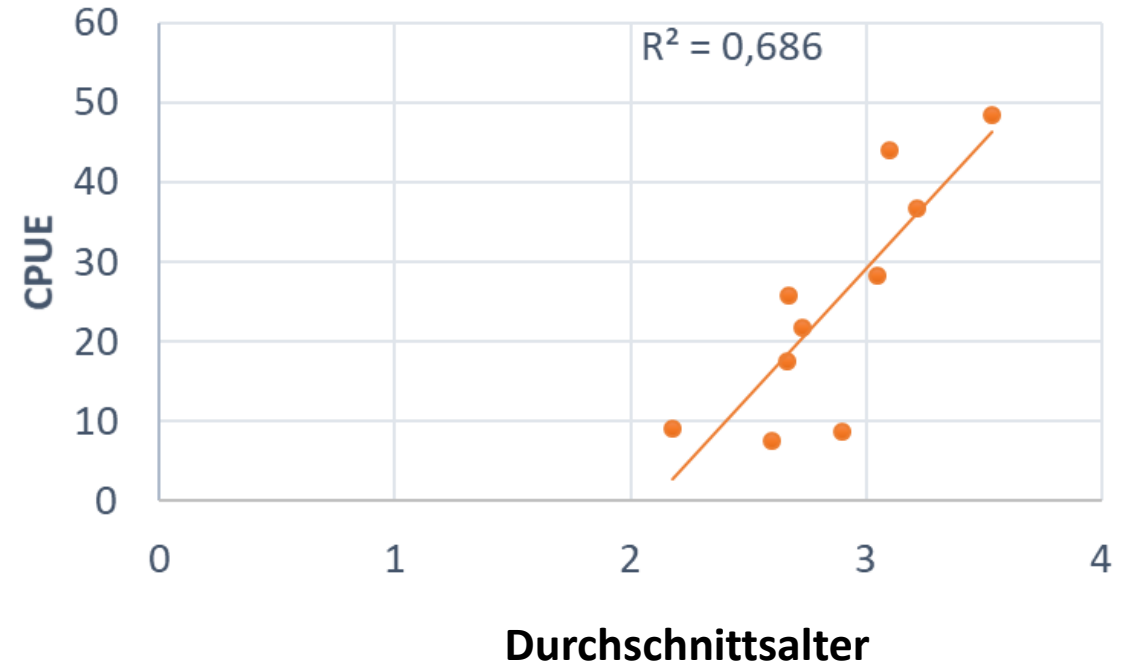
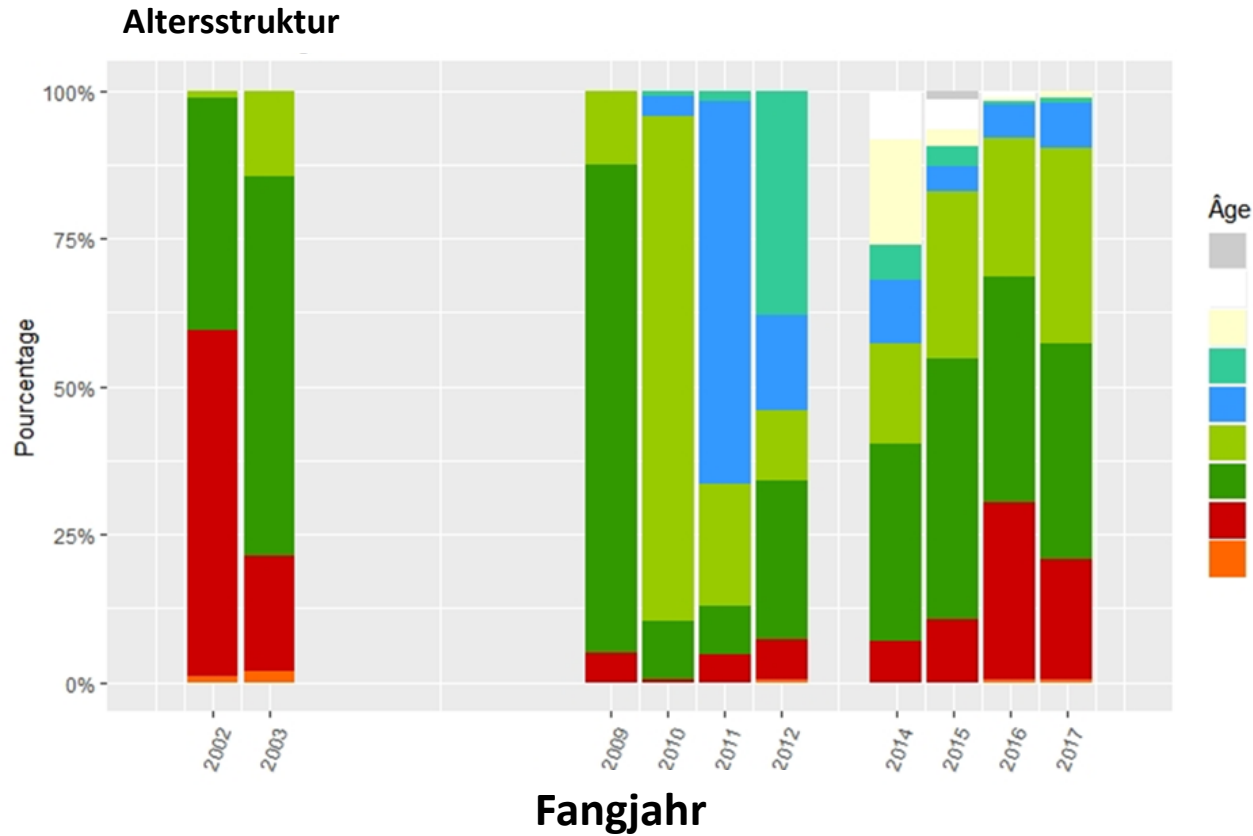


BESSERE REKRUTIERUNG
VERBESSERUNG DER LAICHGEBIETSQUALITÄT
TEMPERATURANSTIEG + ÜBEREINSTIMMUNG MIT ZOC
↑ WACHSTUMSRATE DER LARVEN

Ein mesotropher See

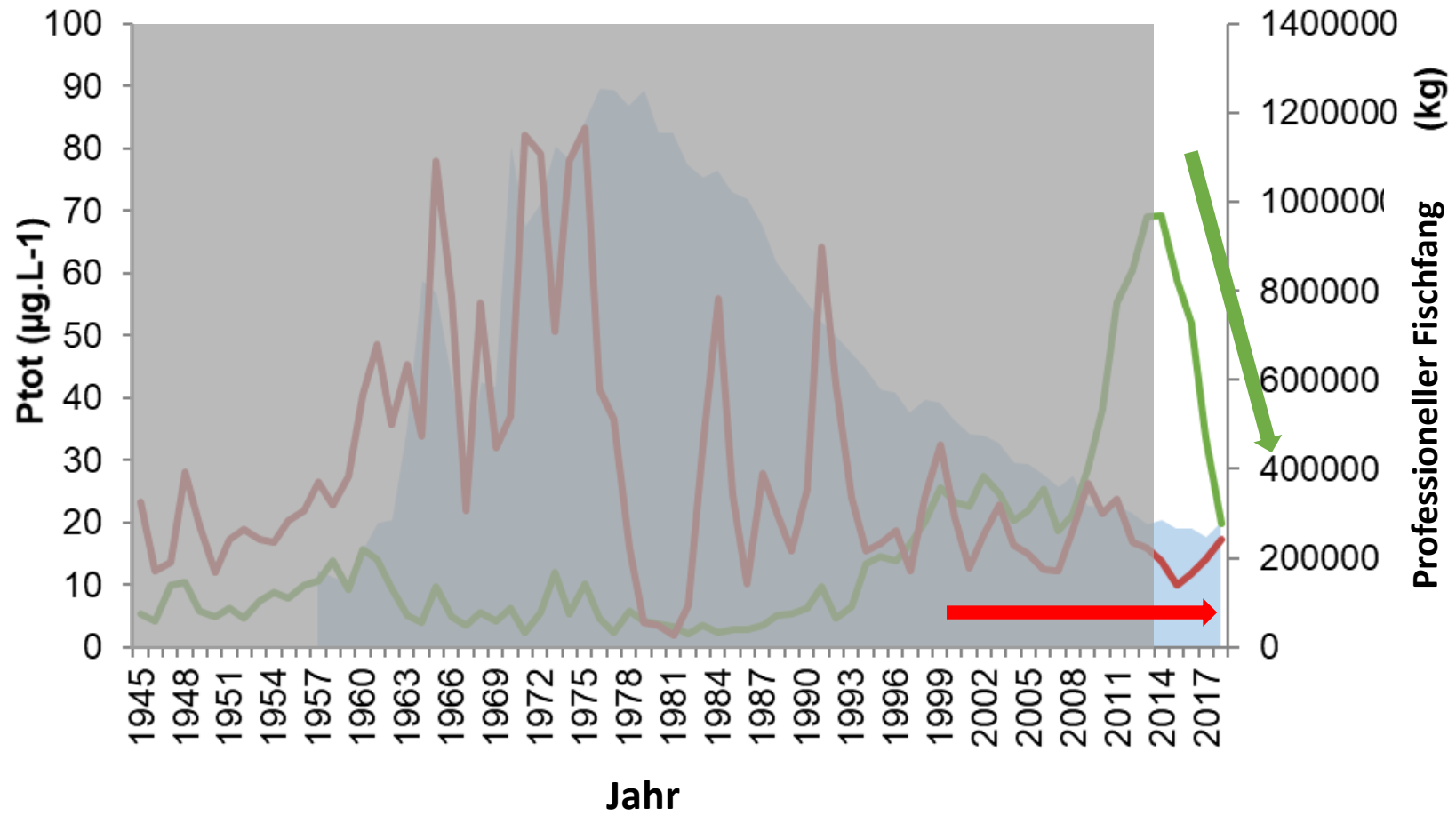


Eine starke Altersgruppe



Starke Gruppe: 2006
(Anneville et al., 2017)

Ein mesotropher See



Nahrungskonkurrenz

Beutetierte: Kopepoden, Cladoceren (Folgemassnahmen CIPEL)



Commission internationale
pour la protection des eaux du Léman

ACCUEIL

LA CIPEL

LE LÉMAN

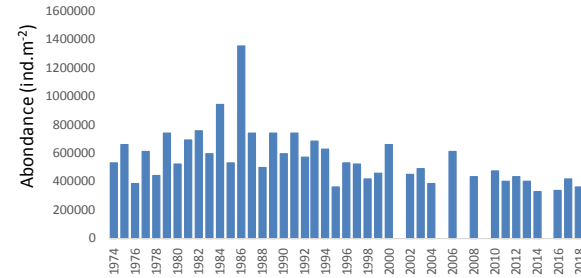
THEMES



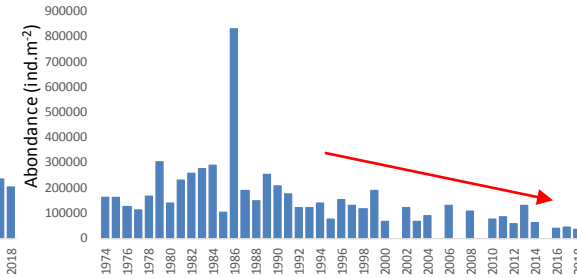
MENU

RAPPORT SCIENTIFIQUE 2019

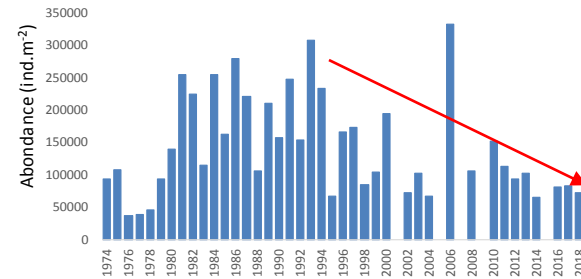
Microcrustacés



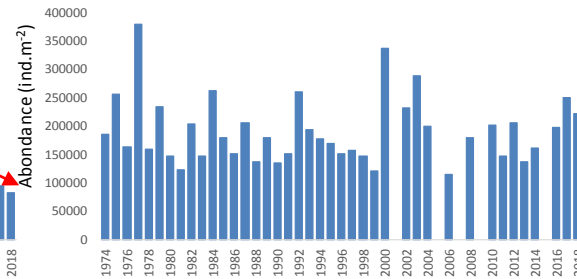
Cladocères herbivores



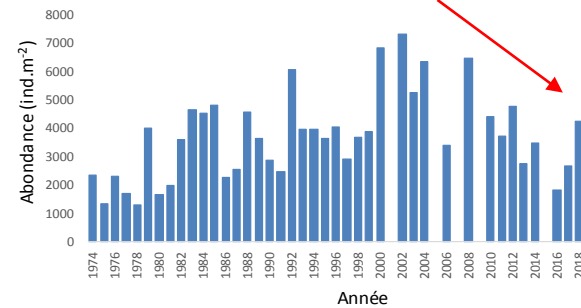
Cyclopoïdes



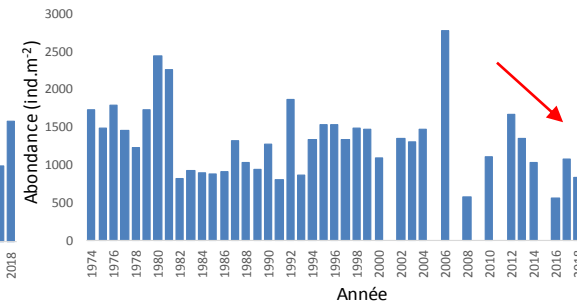
Calanoïdes



Leptodora kindti

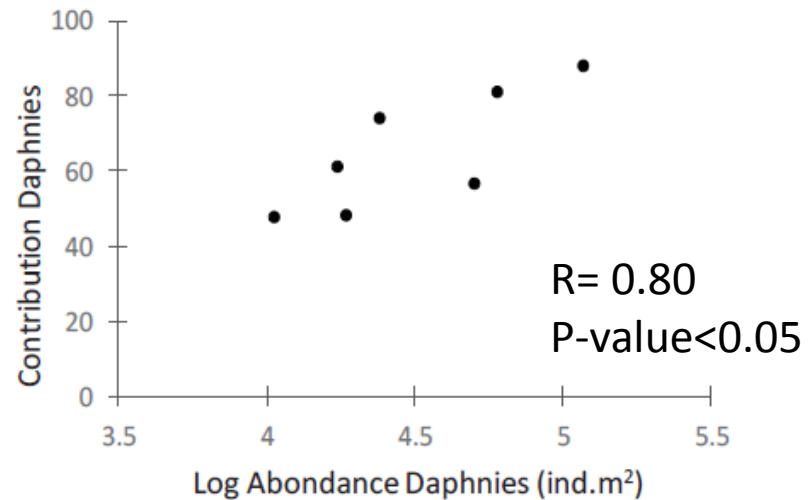
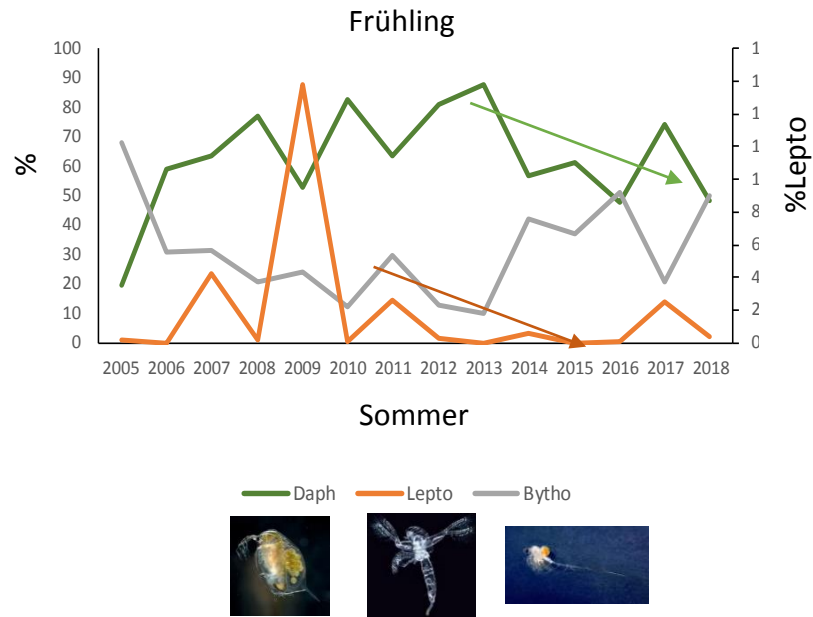
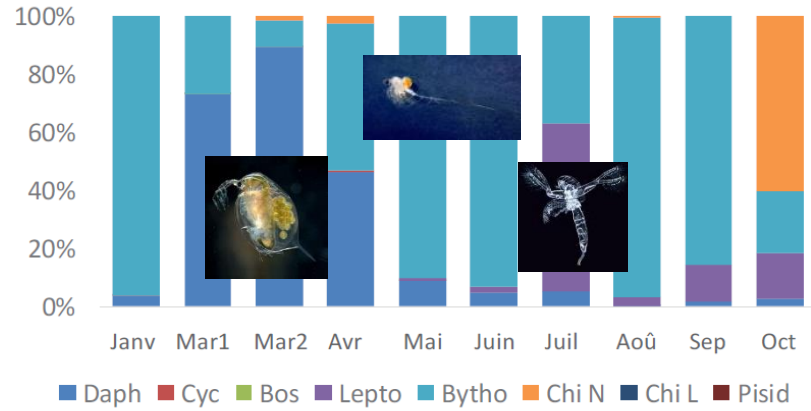


Bythotrephes longimanus



Nahrungskonkurrenz

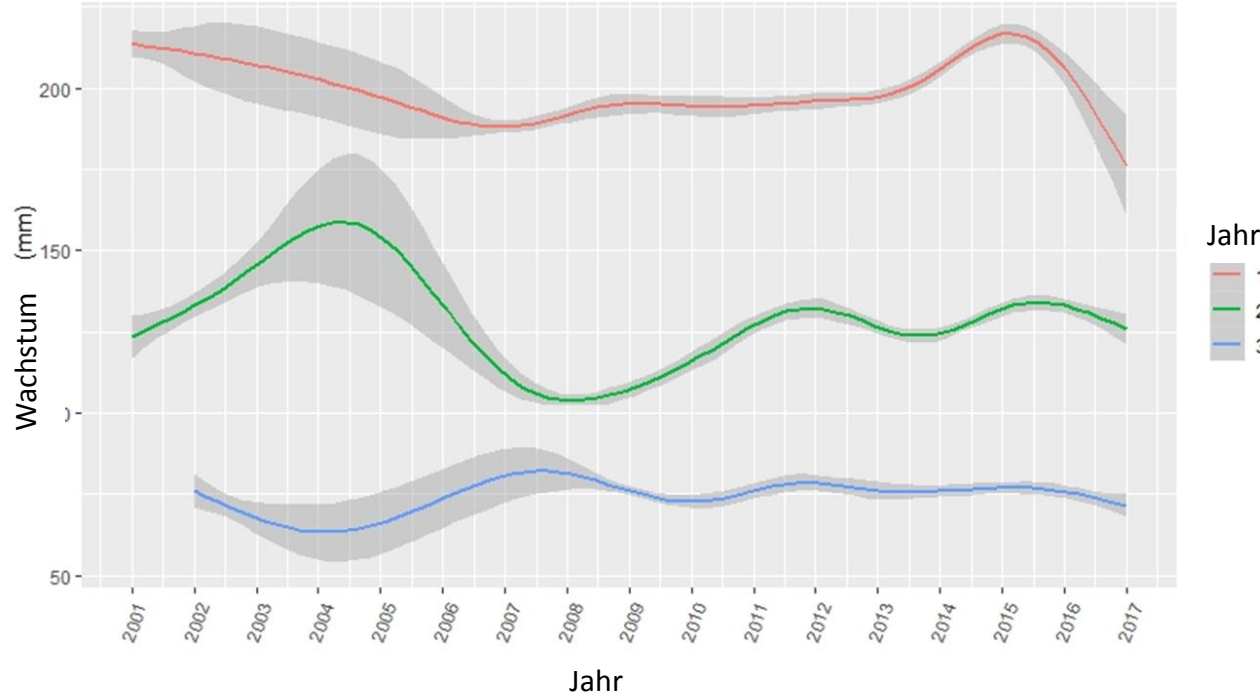
Indikator 1 : Ernährungsweise



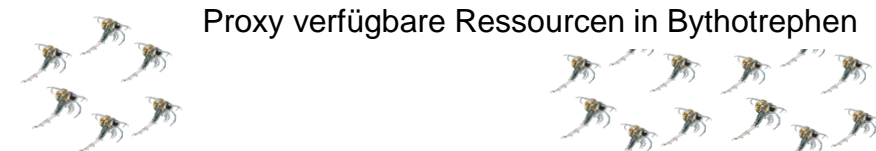
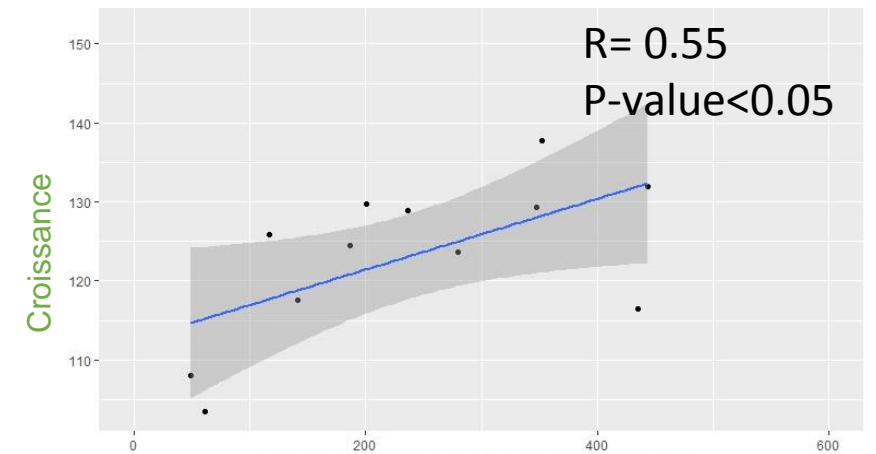
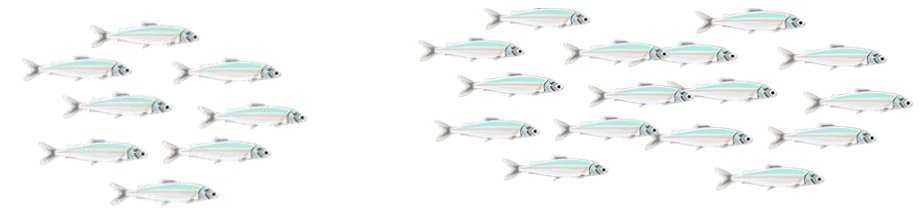
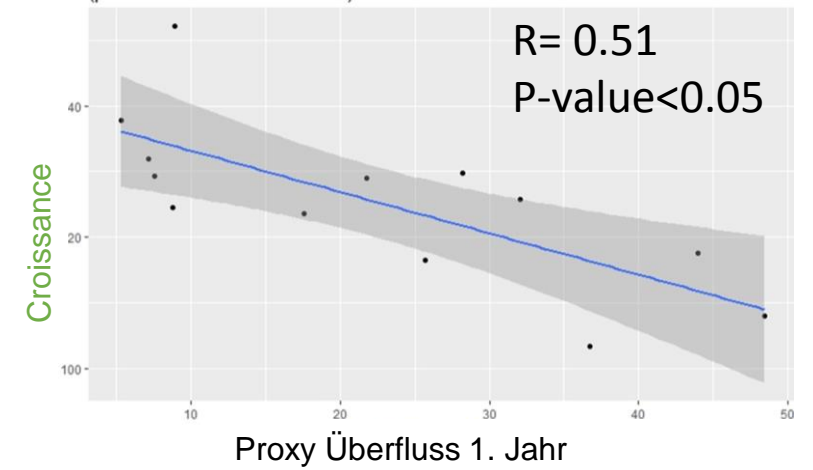
Veränderung der Ernährung
im Zusammenhang mit der
Beuteverfügbarkeit.

Nahrungskonkurrenz

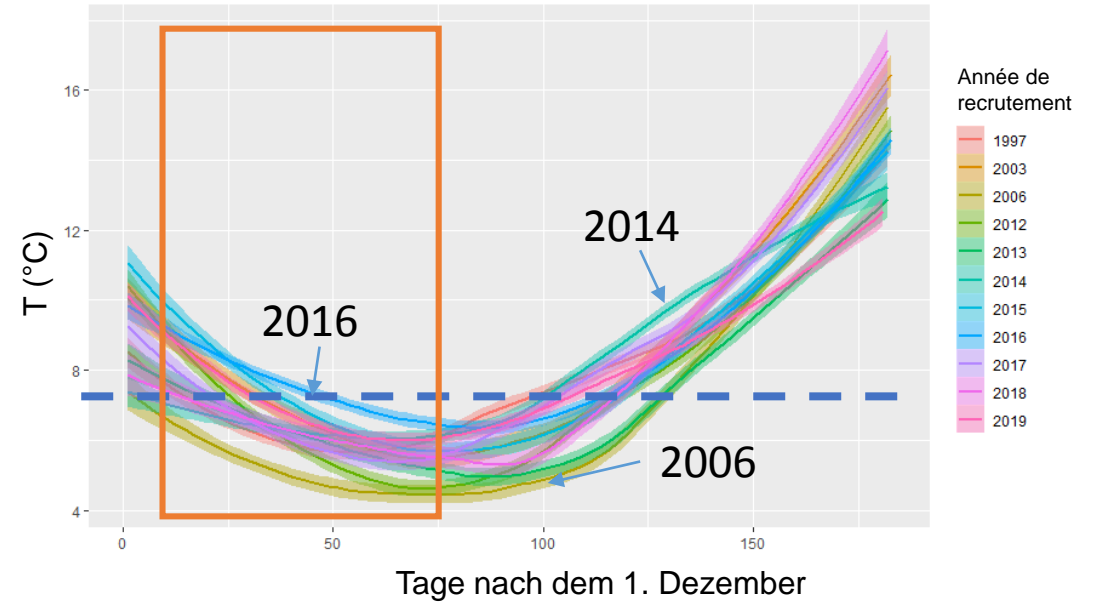
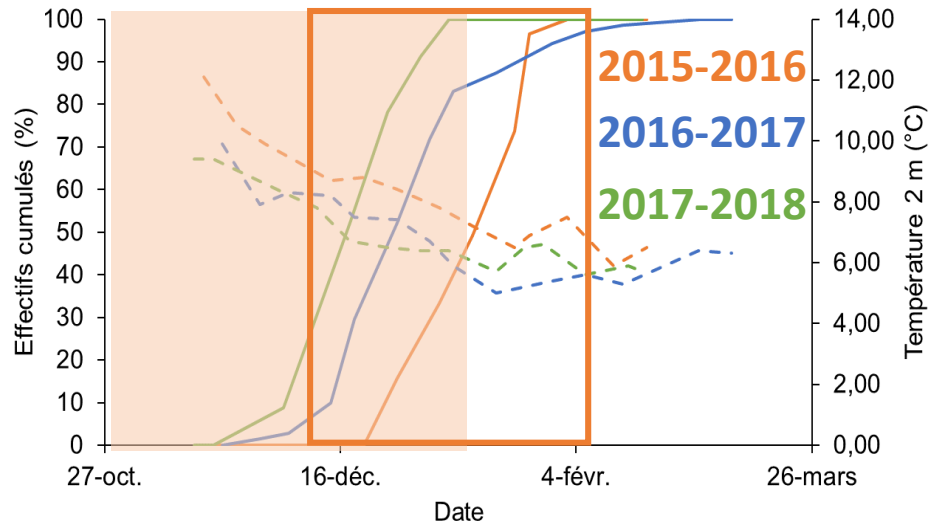
Vergleich der ersten drei Jahre des Lebens des Korregons



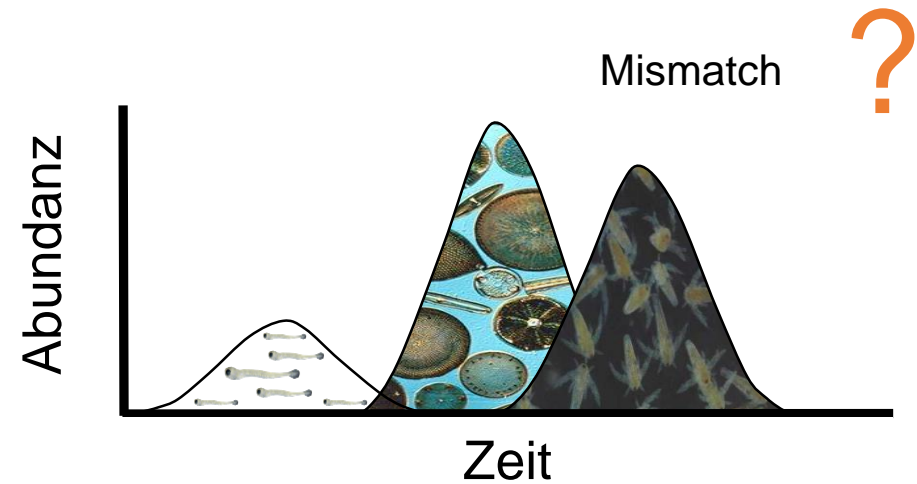
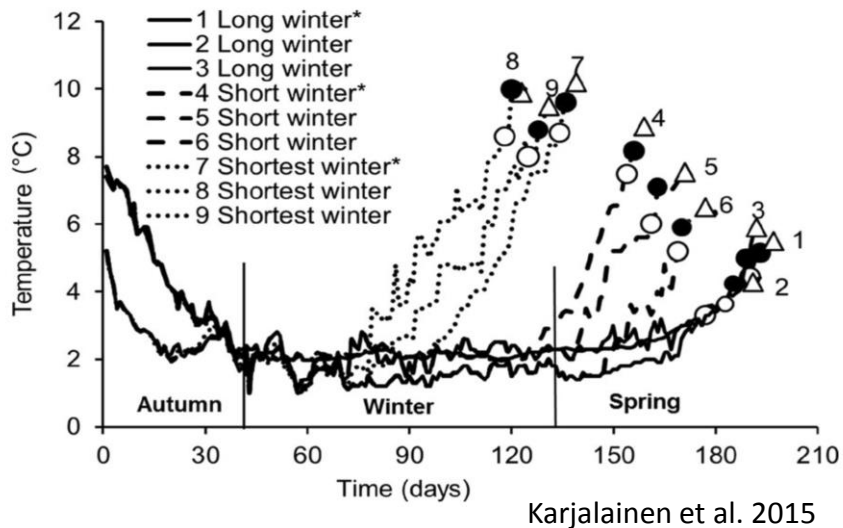
Indikator 2 : Wachstum



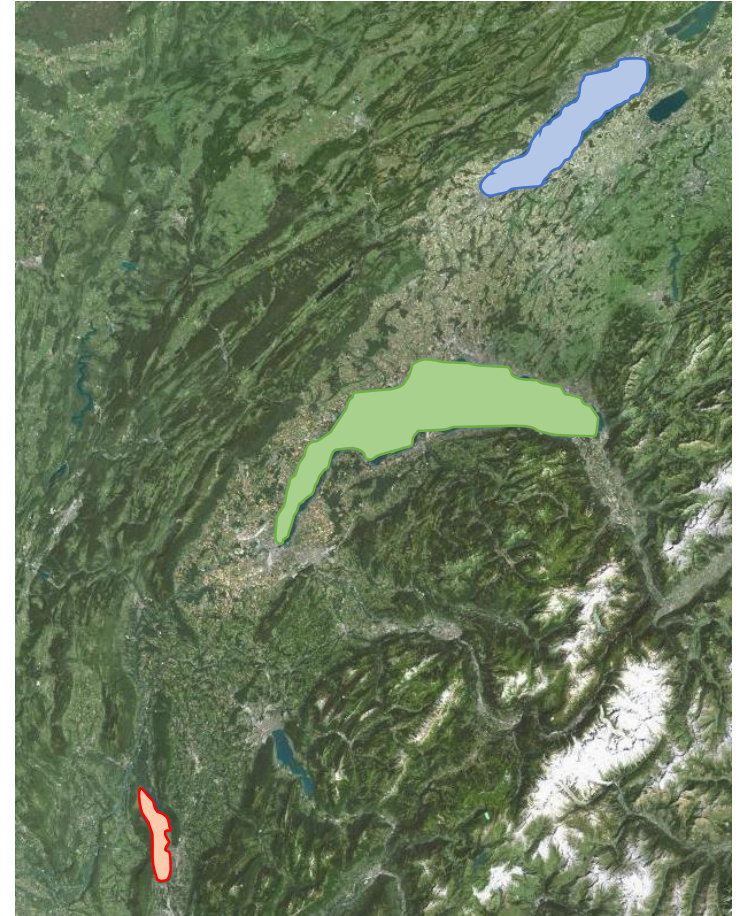
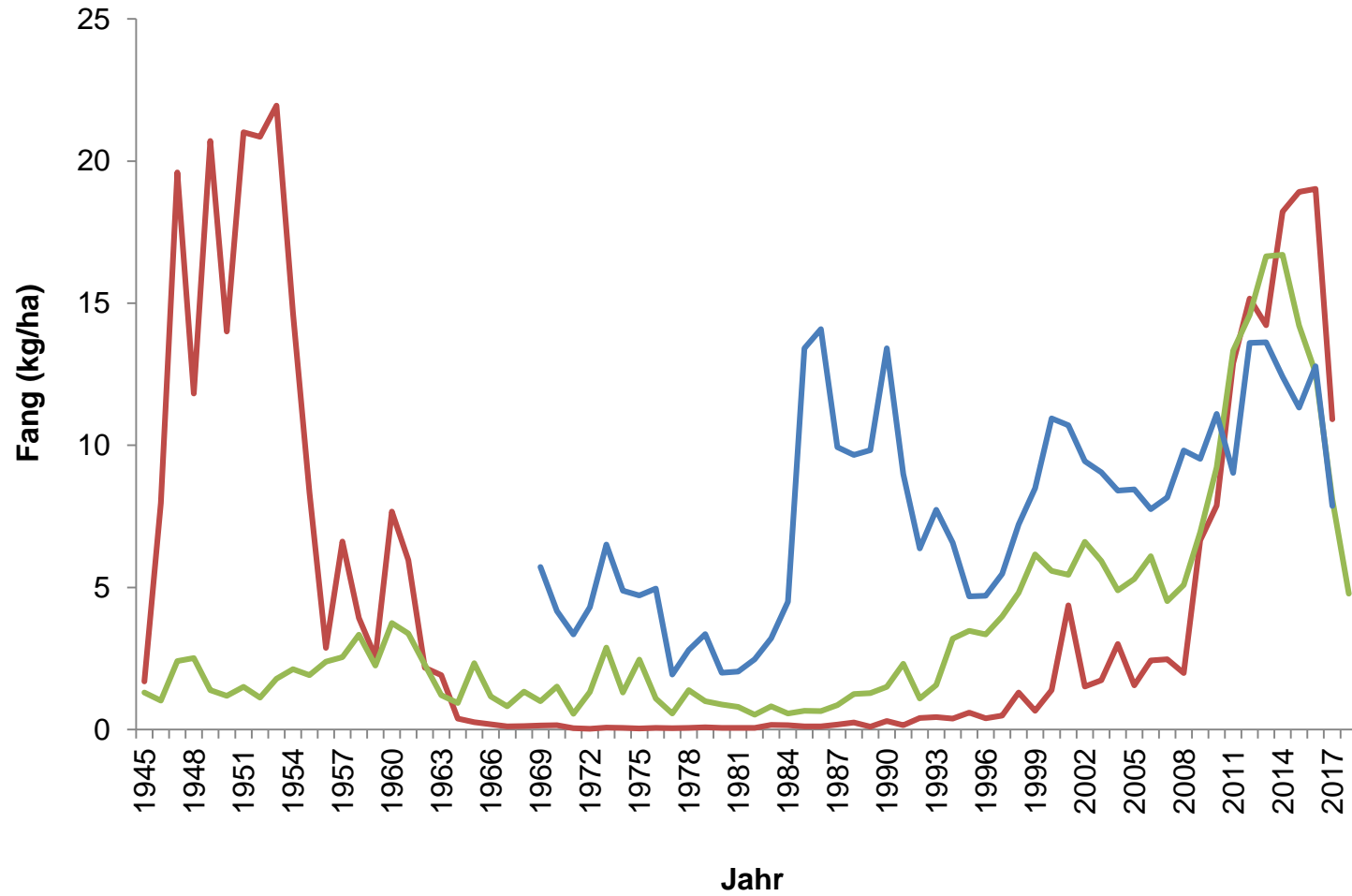
Temperatur



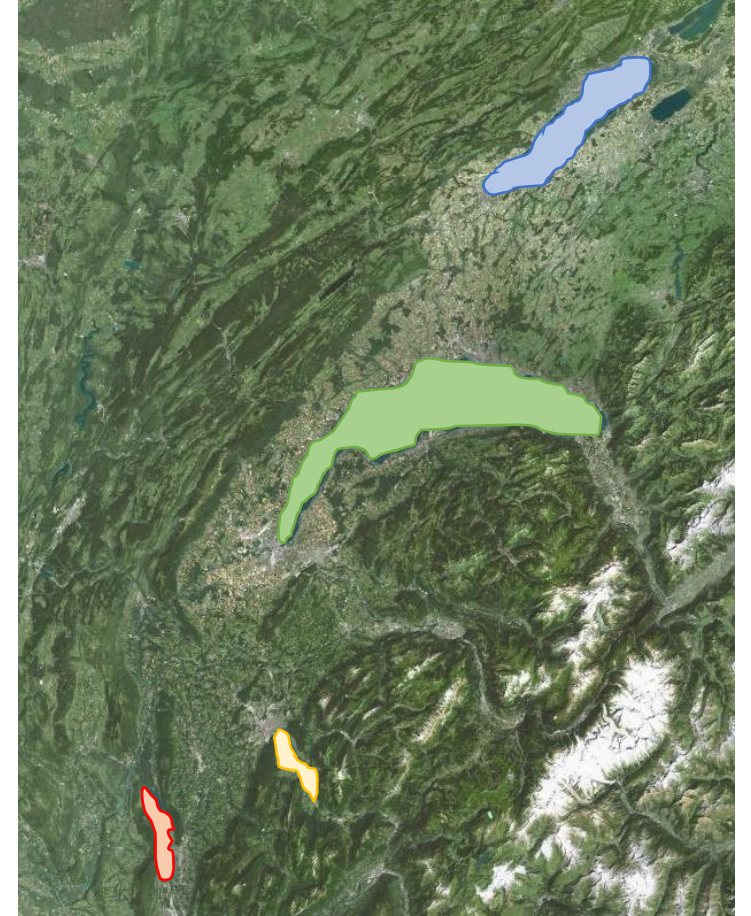
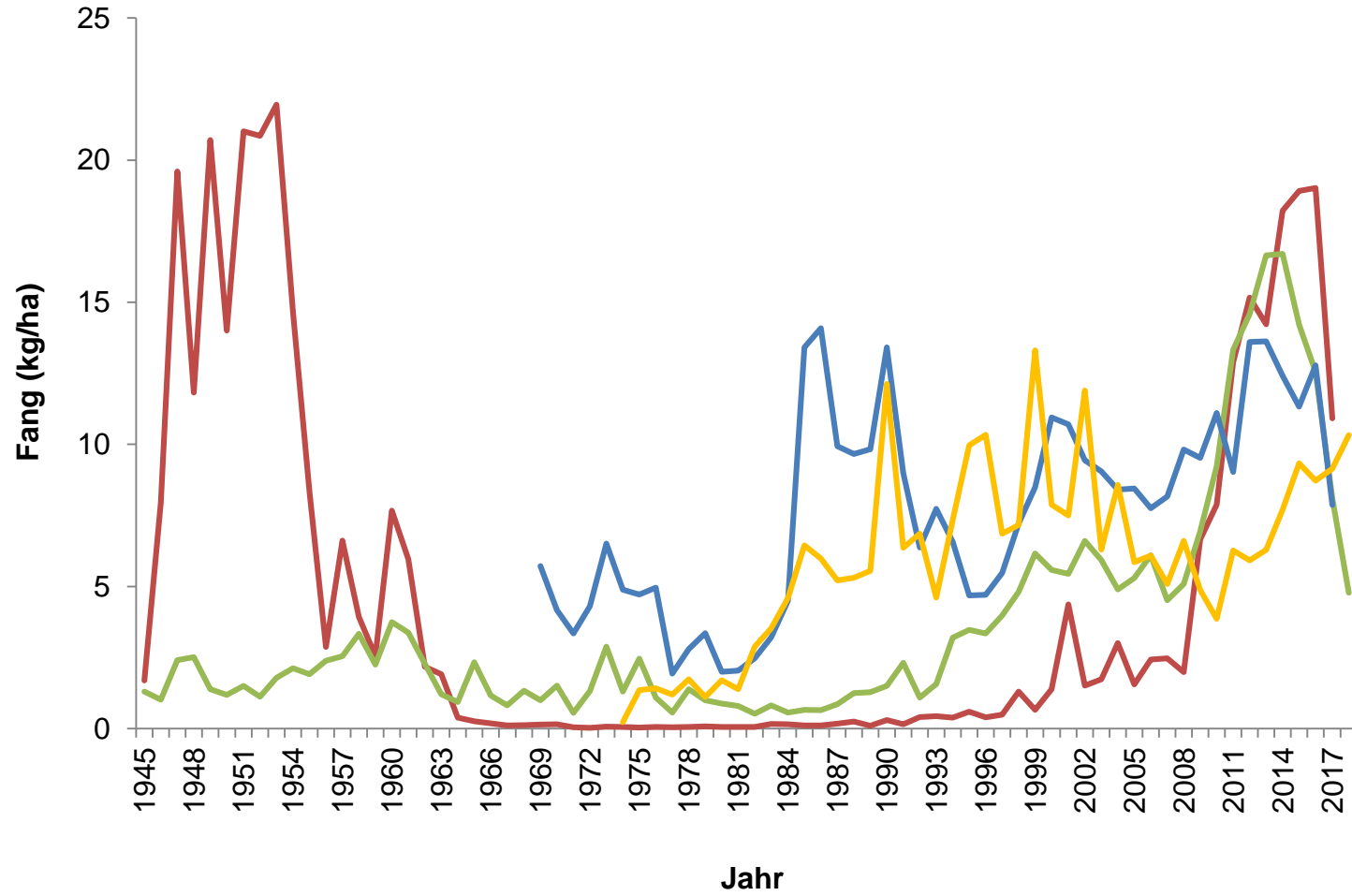
Wärmere Winter sind verantwortlich für früheren Schlupf



Ähnliche Dynamiken in anderen Seen



Ähnliche Dynamiken in anderen Seen



Fazit

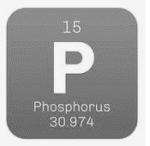
Reproduktions-
erfolg

Rekrutierungs-
erfolg

Fang

BESTAND

Erreichbarkeit der Fische
Effizienz der Anglergeräte



Verfügbare und
zugängliche
Beute



Prädation

