



# Shads in the world – State of the Allis shad and conservation issues

**Miran Aprahamian**

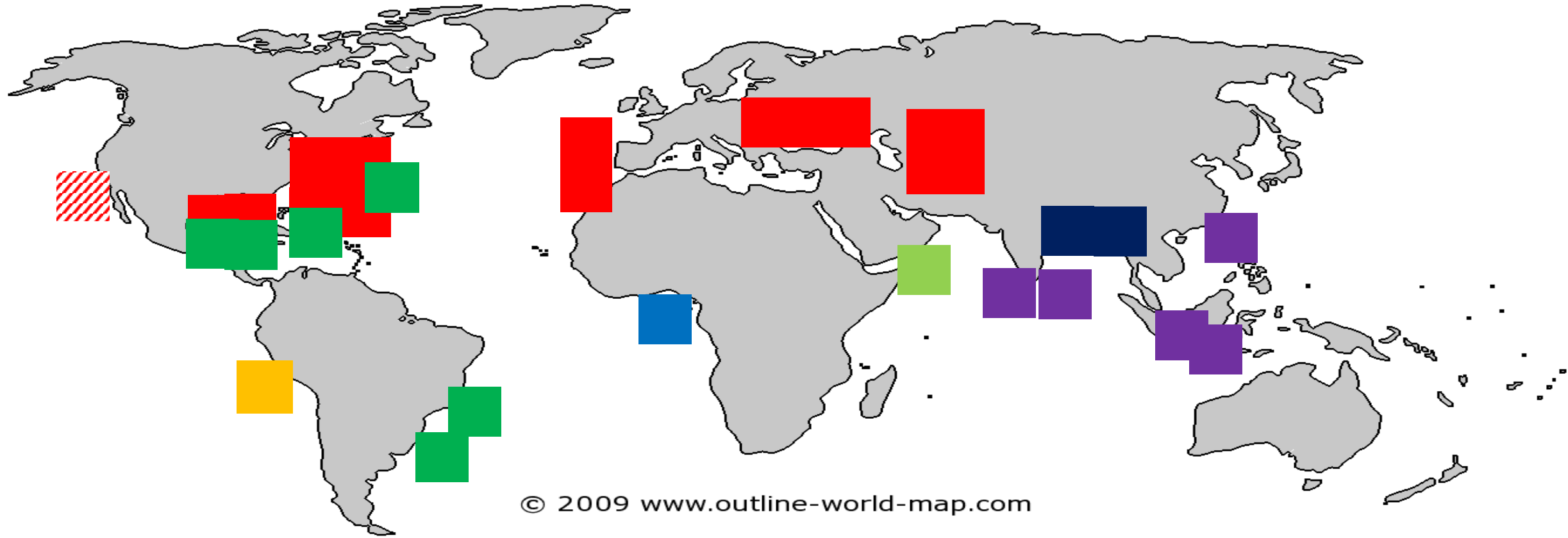


# The shads - Alosinae

- *Alosa*
  - 14 (16) species
- *Brevoortia*
  - 6 species
- *Ethmalosa*
  - 1 species
- *Ethmidium*
  - 1 species
- *Gudusia*
  - 2 species
- *Hilsa*
  - 1 species
- *Tenualosa*
  - 5 species



# Distribution



© 2009 www.outline-world-map.com

- Alosa
- Brevoortia
- Ethmalosa
- Ethmidium
- Hilsa
- Gadusia
- Tenualosa

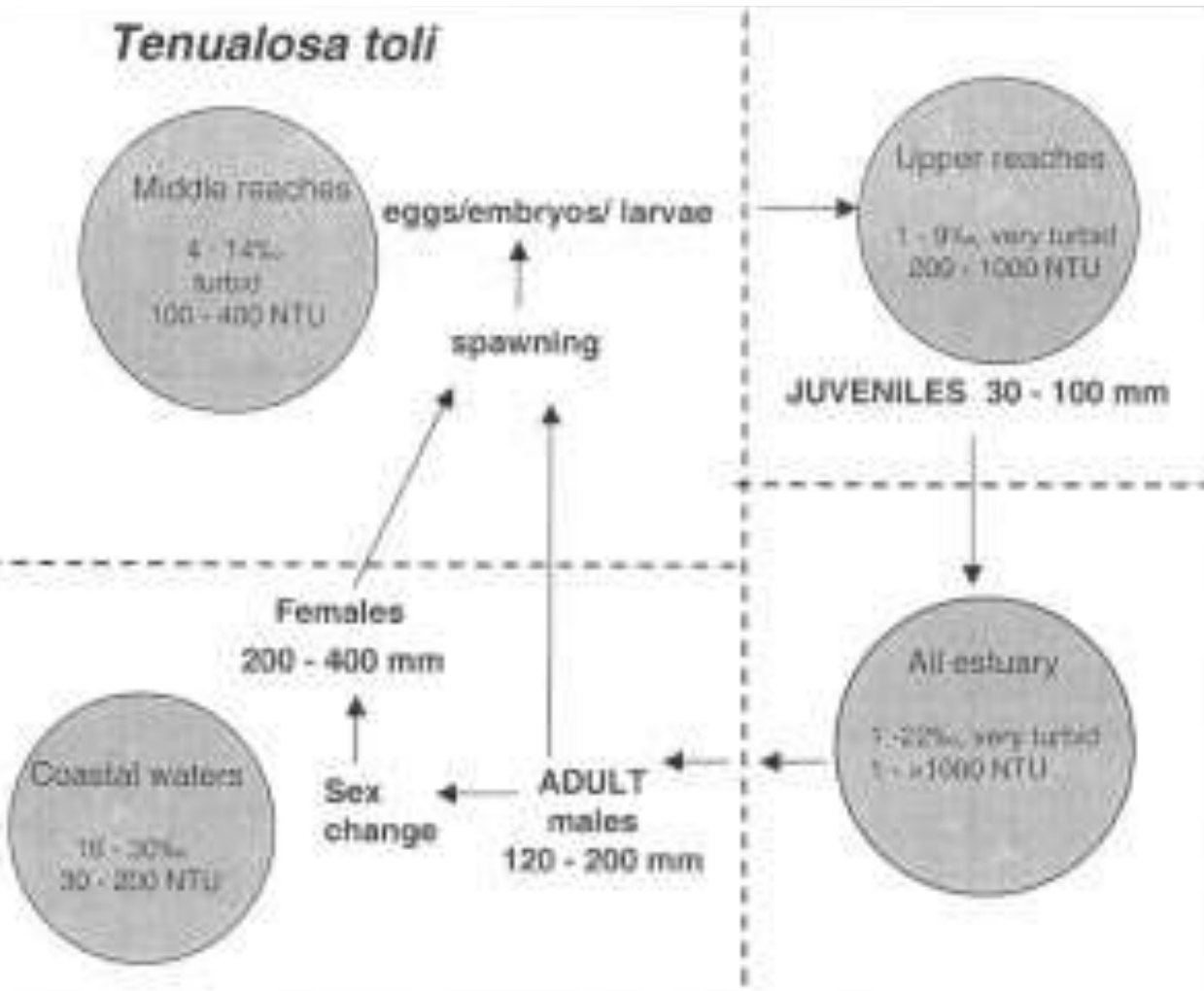


# Life History

- Anadromous (14 Species)
- Marine (8 species)
- Amphidromous (6 species)
- Freshwater riverine (2 species)
- Landlocked (>2 species)
- Gonochoristic (i.e. either male or female)
- Protandrous hermaphrodites (where females are derived from sex changed males).
  - *Tenualoa toli*
  - *Tenualosa macrura*



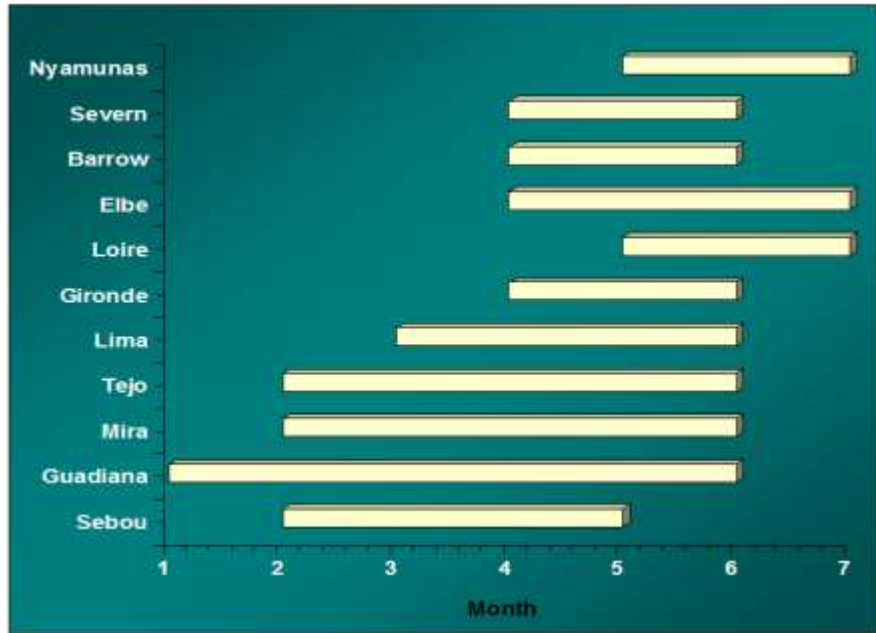
## Protandrous hermaphrodite - *T.toli*



Male *T. toli* spawn toward the end of their first year in the middle reaches of large, low-salinity, turbid estuaries in Sarawak and spawn as females in their second year.

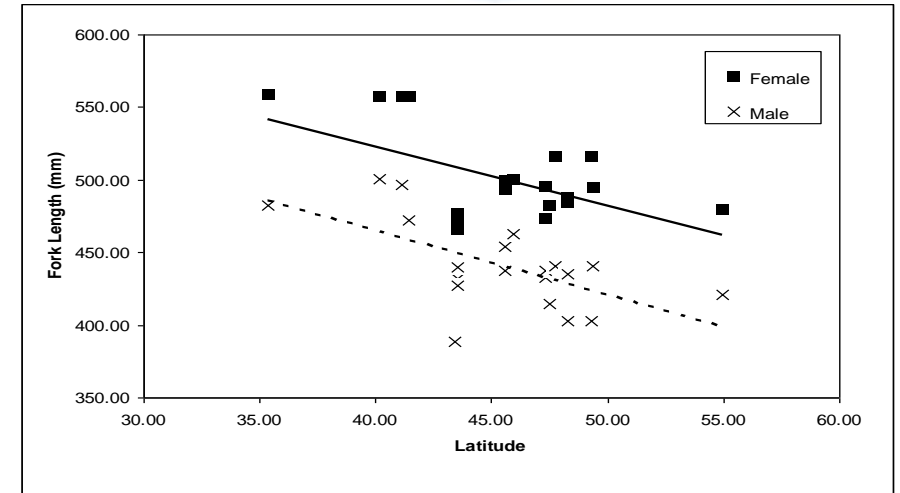


# Latitudinal variation

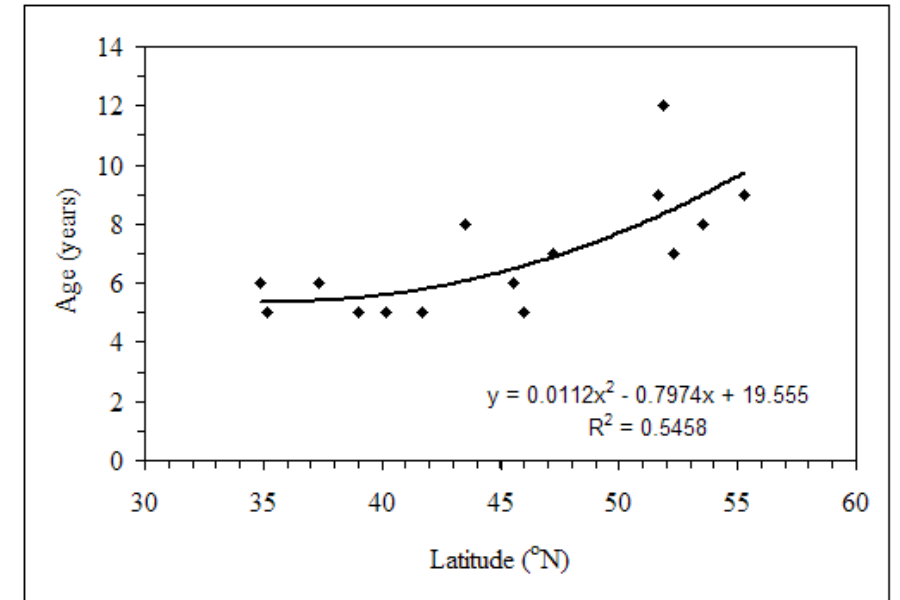


Run timing - *A. fallax*

Length at maturity – *A. alosa*



Longevity – *A. fallax*

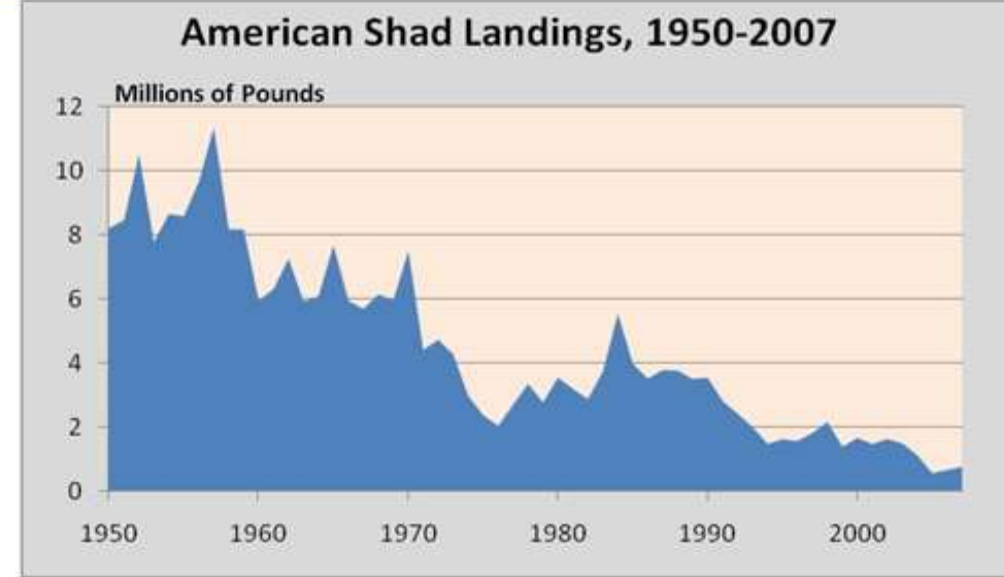


# Fisheries

A large school of silver fish, likely shad, swimming in dark water. The fish are densely packed and move in a coordinated pattern, creating a shimmering effect as they catch the light. The background is dark, making the silvery scales of the fish stand out prominently.

- Edibility
- High abundance
- Predictable

# Fisheries



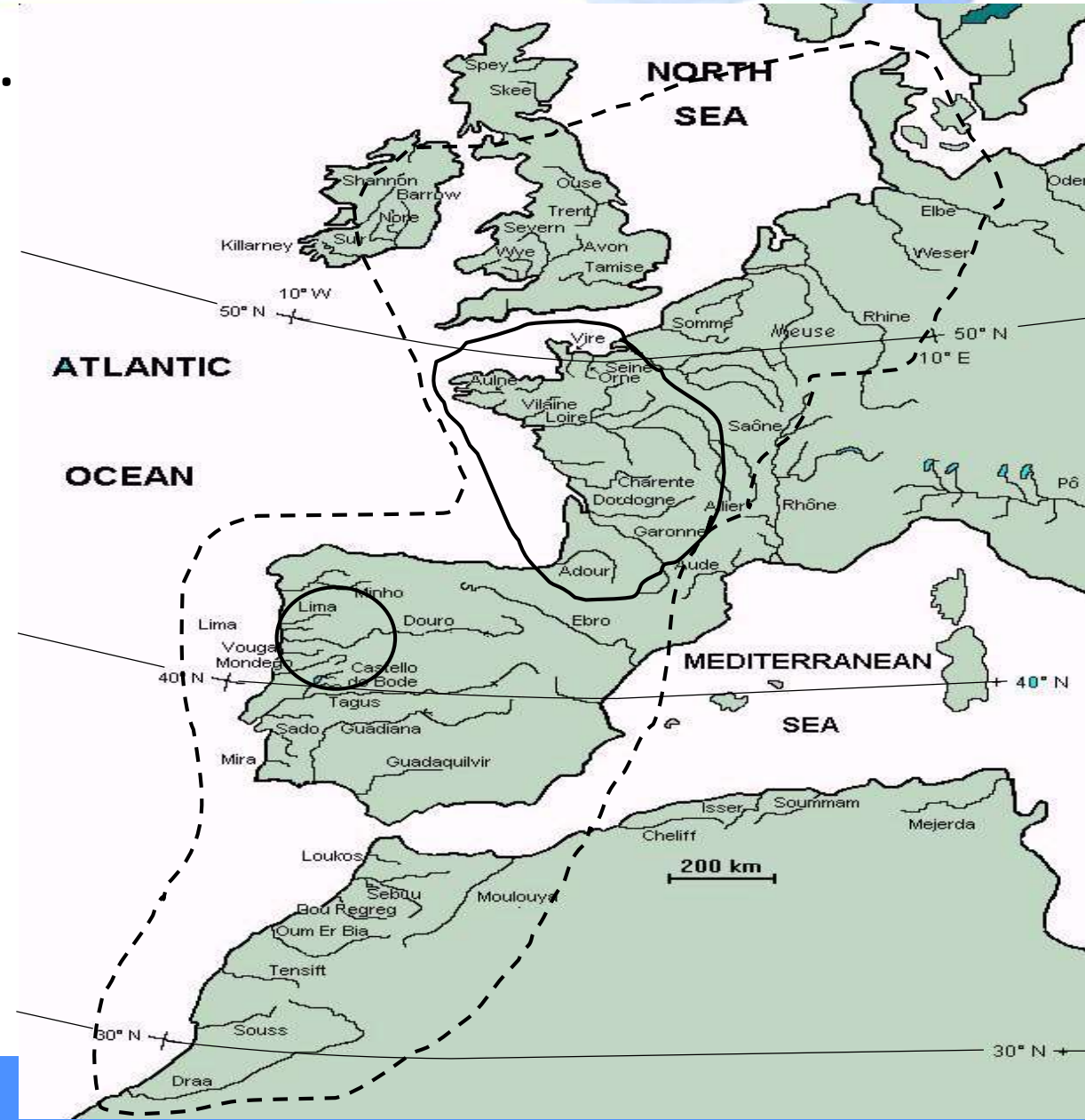




# Cultural Importance



## Distribution of *Alosa alosa*, past and present. (Baglinière *et al.*, 2003)

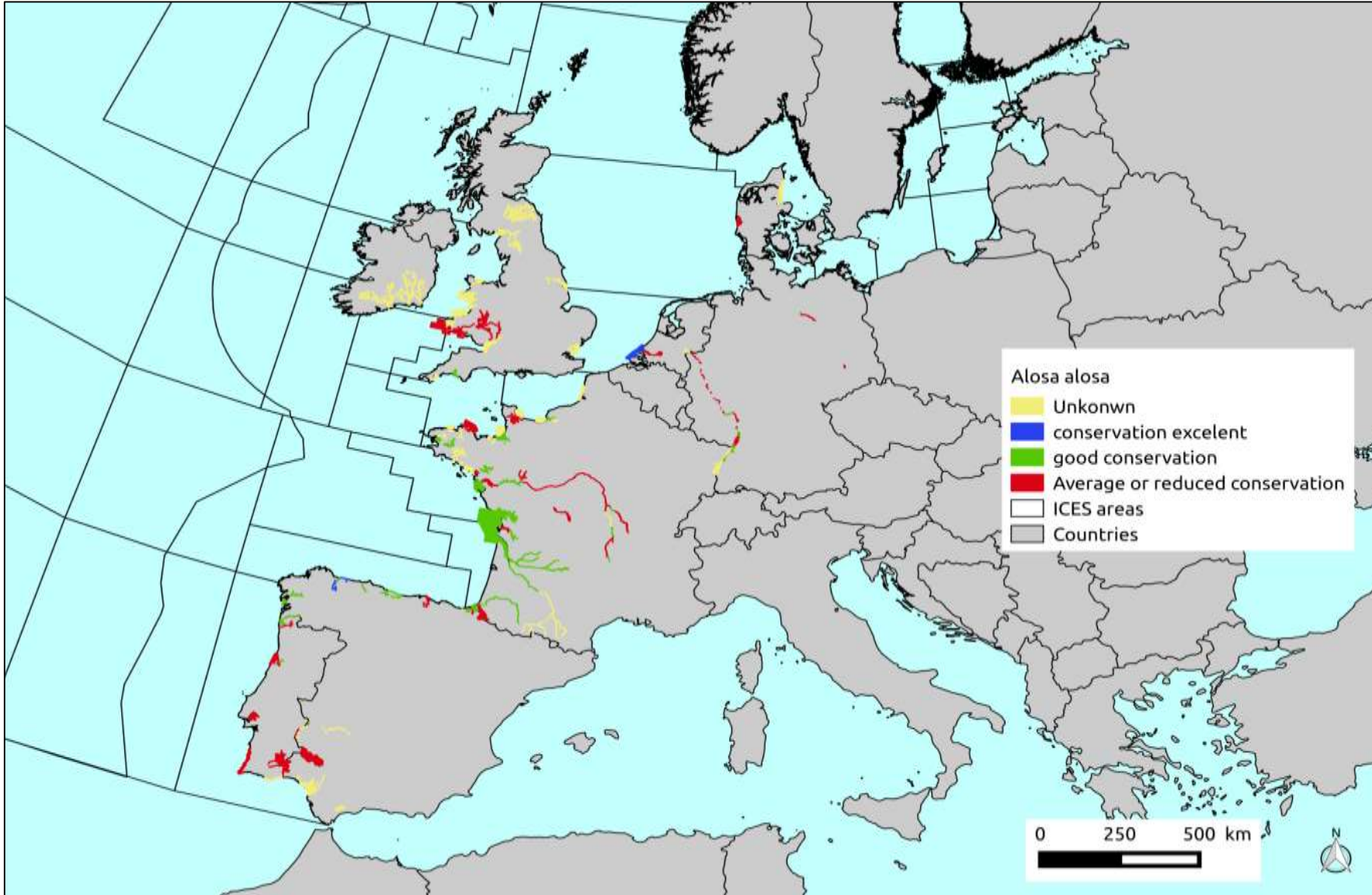




## Conservation status

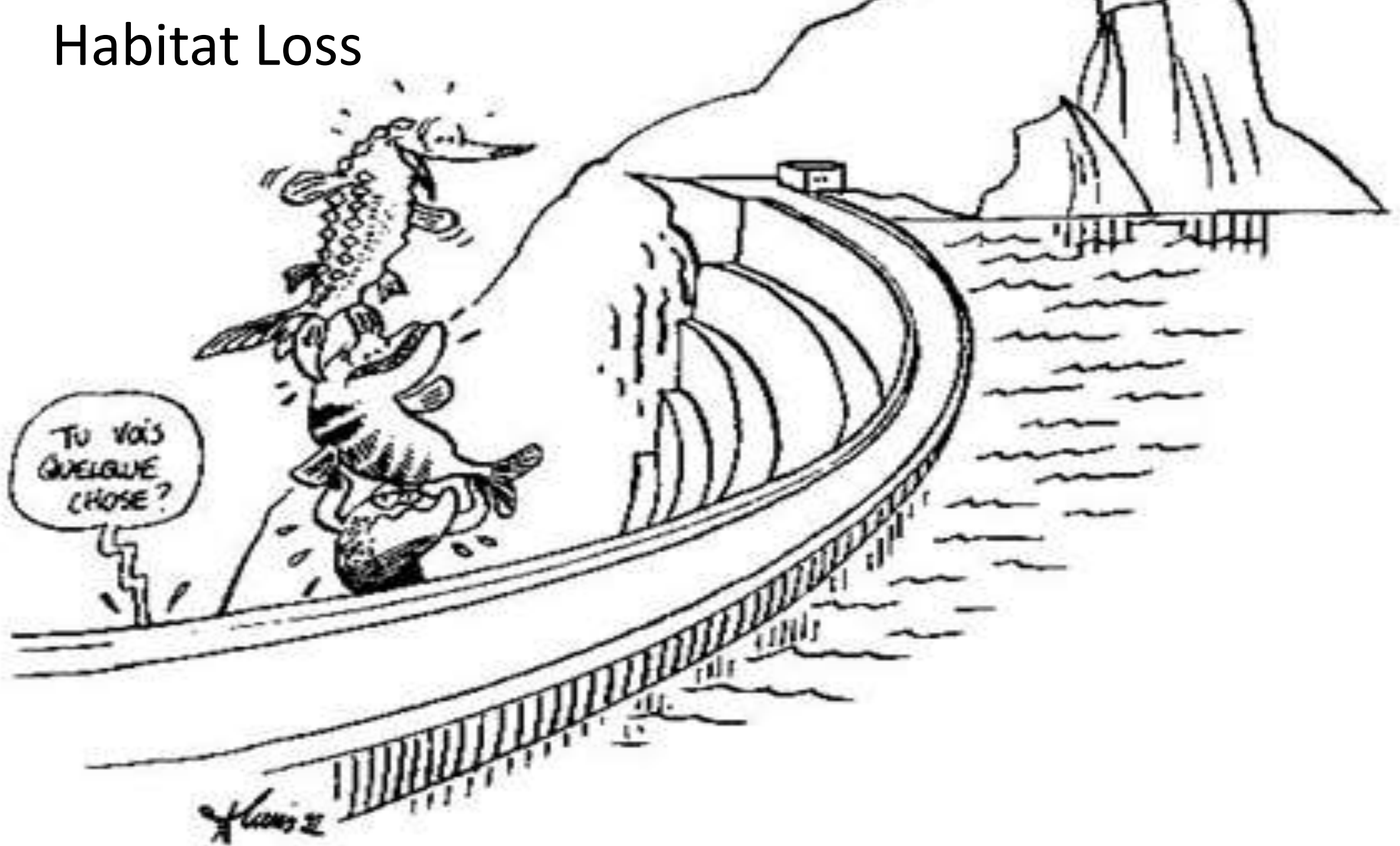
Conservation status	Criteria	Countries
Extinct	There is no reasonable doubt that the last individual has died.	Belgium, Luxembourg, Sweden
Critically endangered	Species is facing an extremely high risk of extinction in the wild in the immediate future.	Denmark, Great Britain, Ireland, Spain (Mediterranean Sea)
Endangered	Species is not critically endangered but is facing an extreme risk of extinction in the wild in the near future.	Germany, The Netherlands, Portugal, Spain (Atlantic Ocean)
Vulnerable	Species is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.	France

From Baglinière *et al.* 2003, updated conservation data in Ireland classifies allis shad as *Data Deficient* (King *et al.* ,2011)



# Conservation status

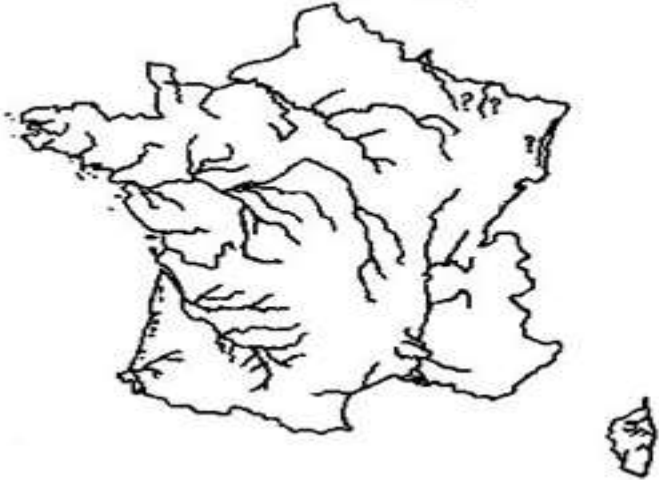
# Habitat Loss



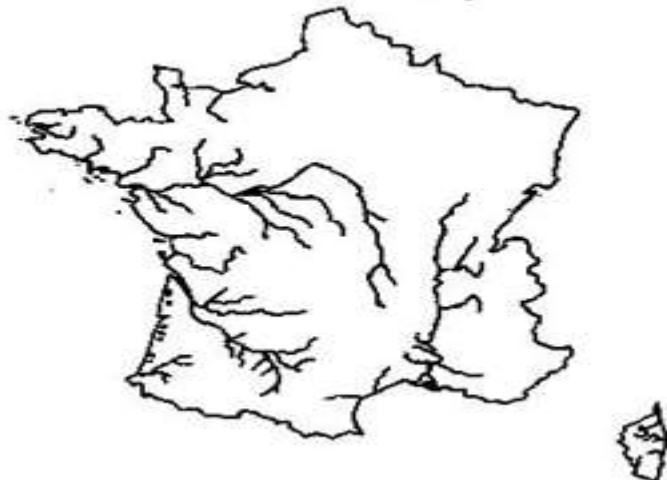


# Impact of Barriers on *Alosa* distribution in France

18th Century



19th Century



20th Century



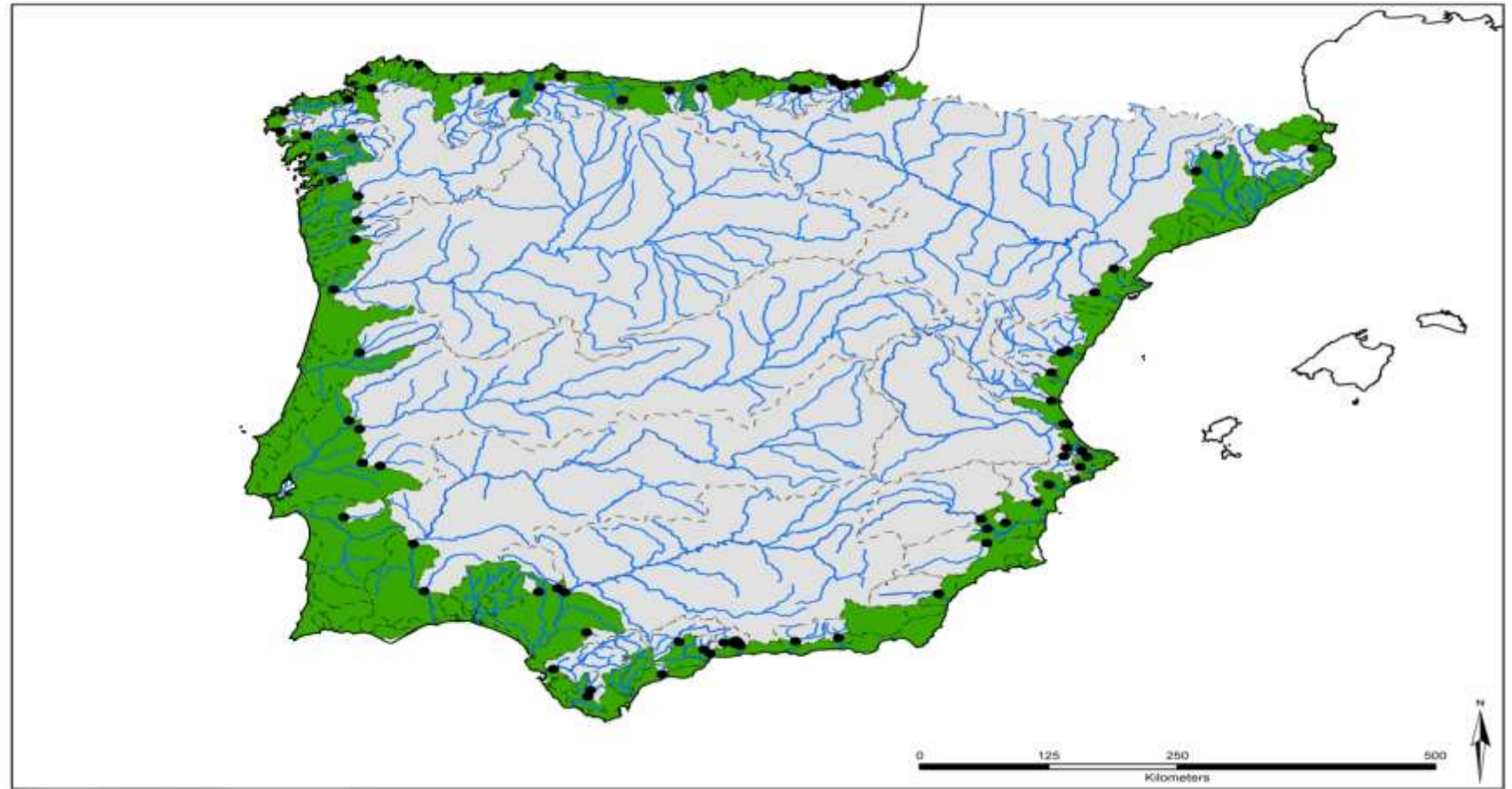


# Impact of Barriers on *Alosa* distribution in Spain & Portugal

**Dots:** first obstacle in the main course of the rivers;

**Green:** available habitat for diadromous fish;

**Grey:** inaccessible habitat for diadromous fish





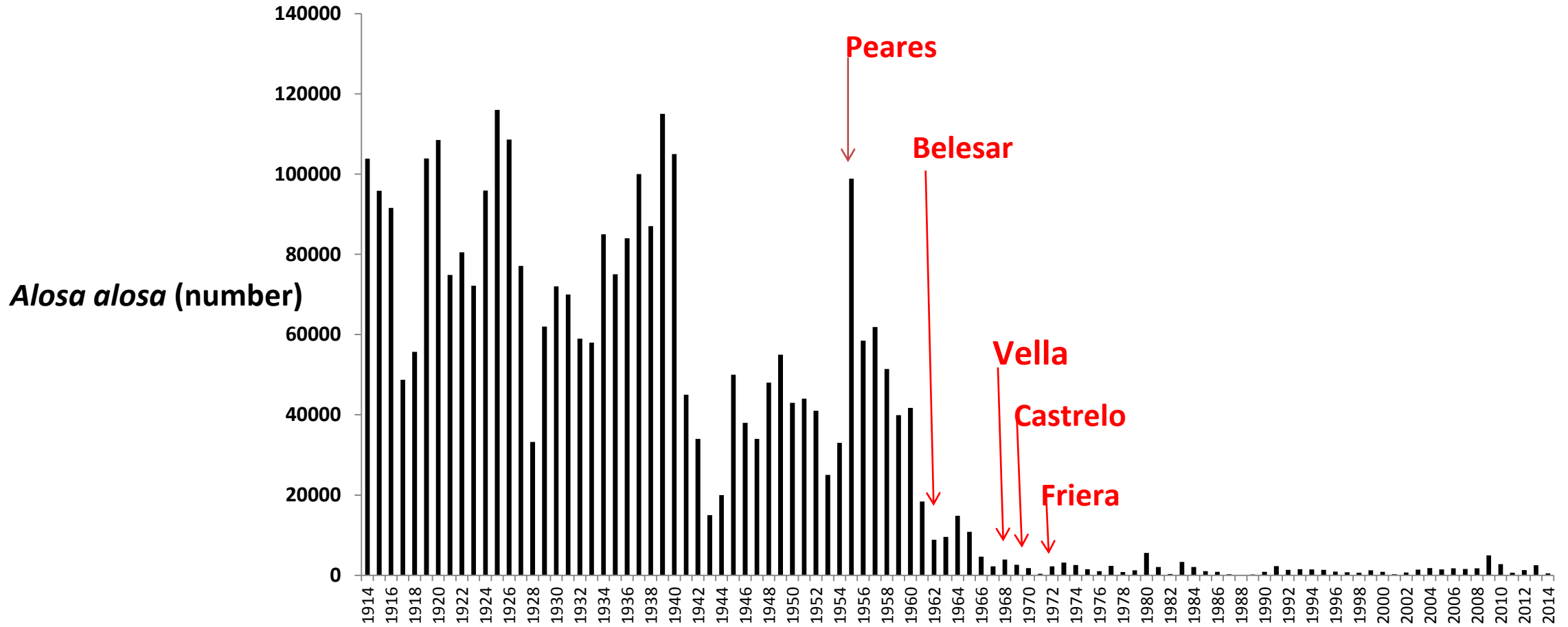
## Habitat Loss -

River	Pristine length (km)	Accessible length (km)	Percent loss
Severn (GB)	303	50	83.5%
Rhine (DE)	1320	986	25.3%
Minho (PT)	340	80	76.5%
Duoro (PT)	1180	21	98.2%
Vouga (PT)	148	32	78.4%
Mondego (PT)	258	45	82.6%
Tagus (PT)	2280	1270	44.3%
Sebou (MA)	490	40	91.8%





## River Minho catch (1914-2014) in relation to reservoir construction



(Mota and Antunes ,2011)

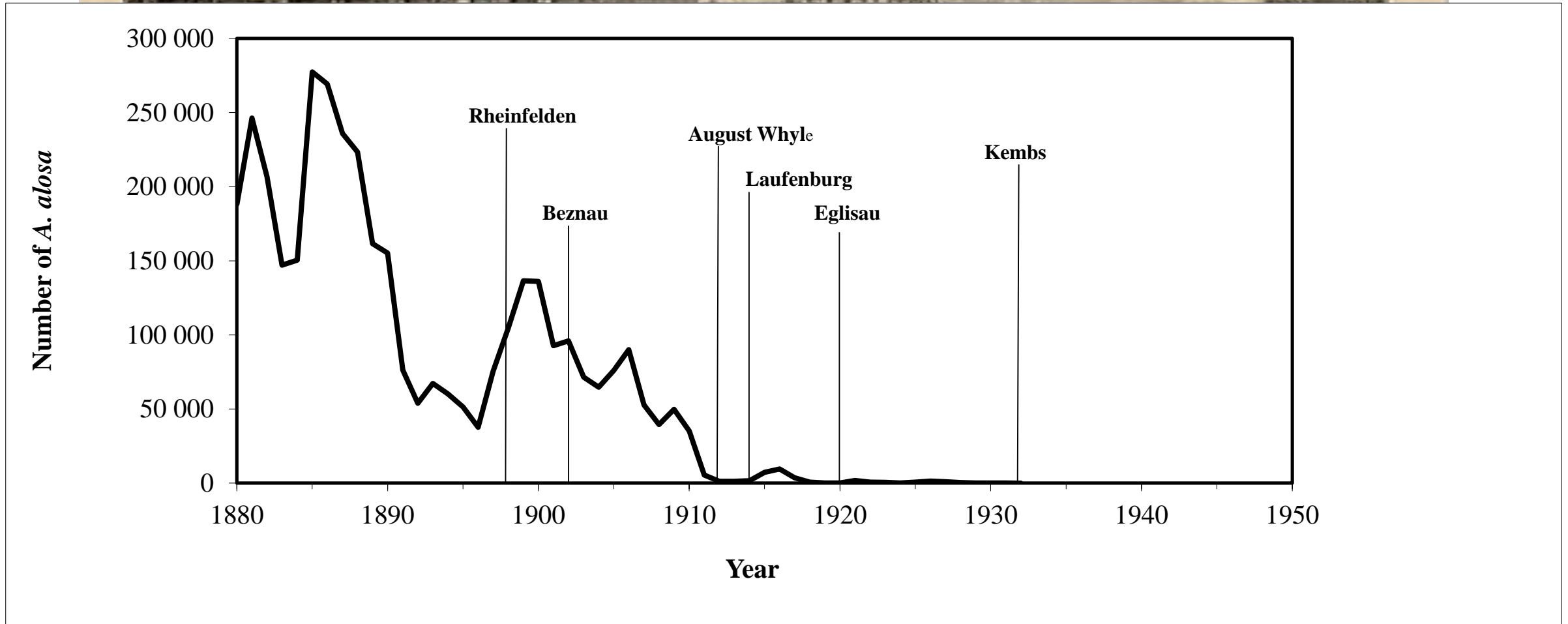
## Impact of Barriers – River Rhine (Germany)



Maifischmarkt in Düsseldorf.  
Aus dem Buch von Dr. Edinger.



### Impact of Barriers – River Rhine (Germany)

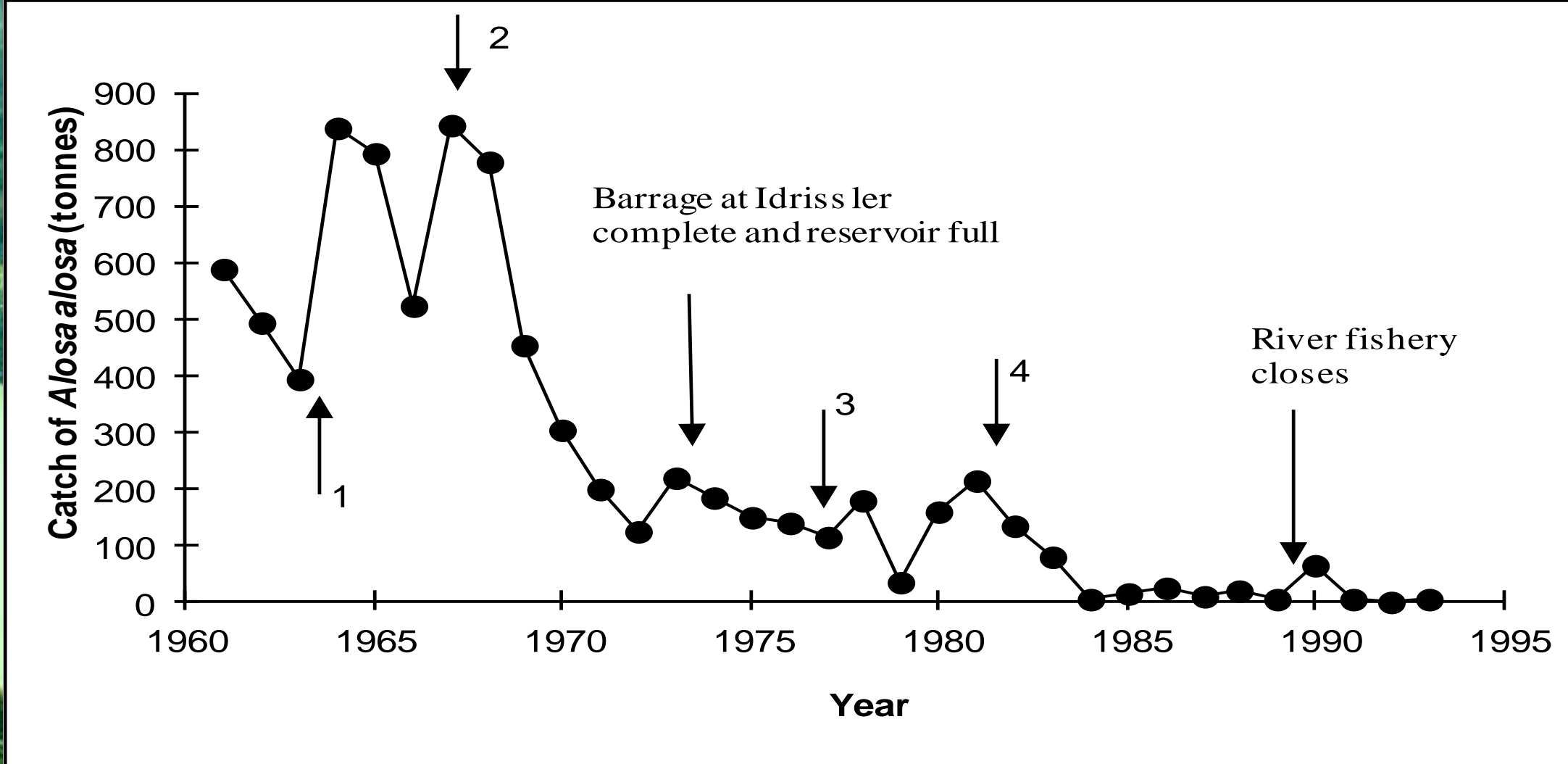


## Impact of Water Pollution & Barrages – Oued Sebou (Morocco)



**Barrage at Idriss ler on the Oued Inaouen a tributary of the Sebou (Source: <http://www.water.gov.ma/>).**

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Barrage at Idriss ler on the Oued Inaouen a tributary of the Sebou (Source: <http://www.water.gov.ma/>).

# Fishing

- Mainly in the estuaries and the middle sections of river; a little in the sea along the coasts
- Mainly by commercial fisheries - seasonal activity during upstream migration
- Different techniques: most used: stop net and drift net



**Estuary of Lima**



**Middle section of Loire**

# Fishing

- Other techniques – seine netting
- Recent development of Angling



**Lower section of Garonne**



**Angling**

## *Alosa alosa* Exploitation (Minho River)

“Botirão”



“Cabaceira”



Trammel net

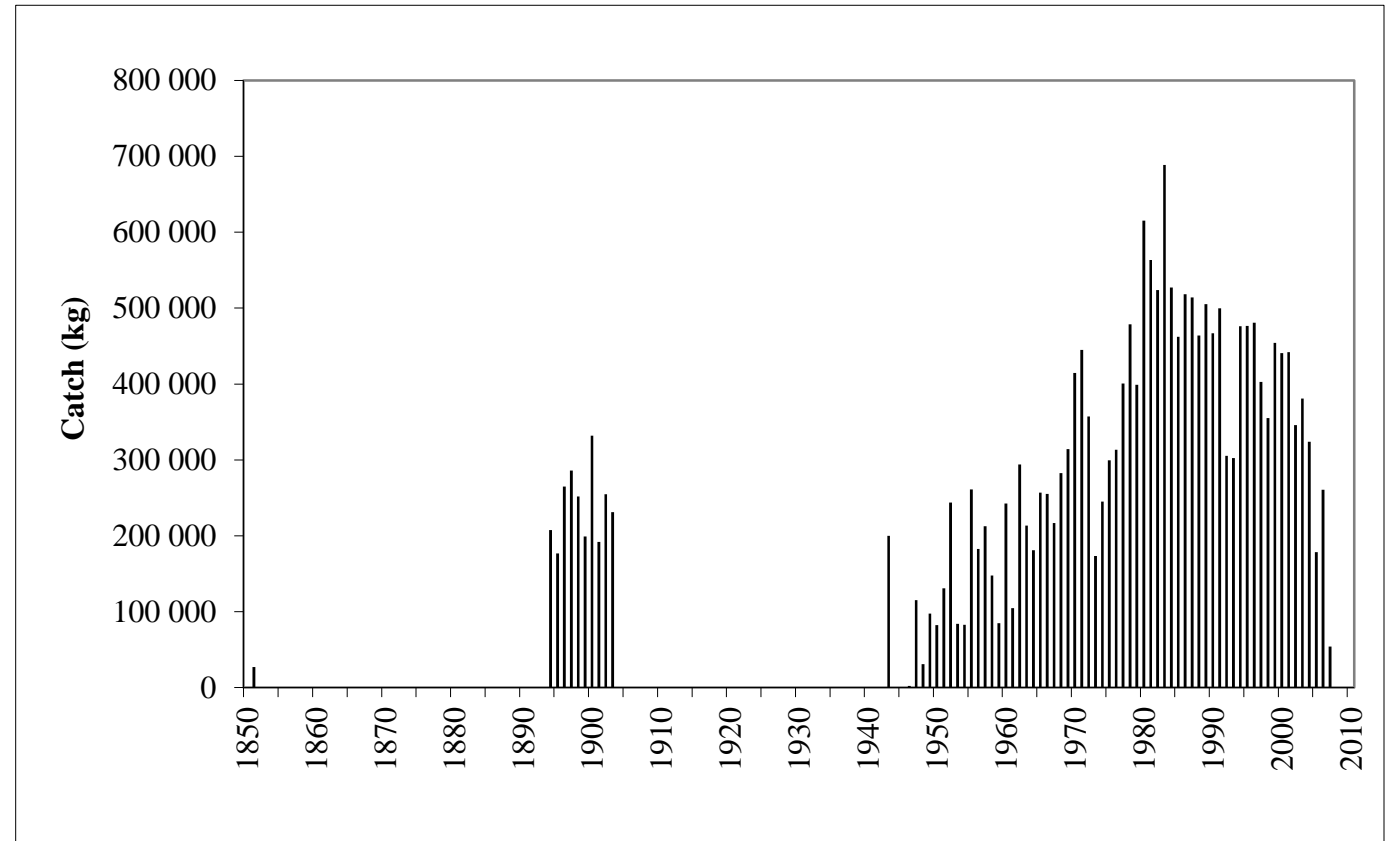


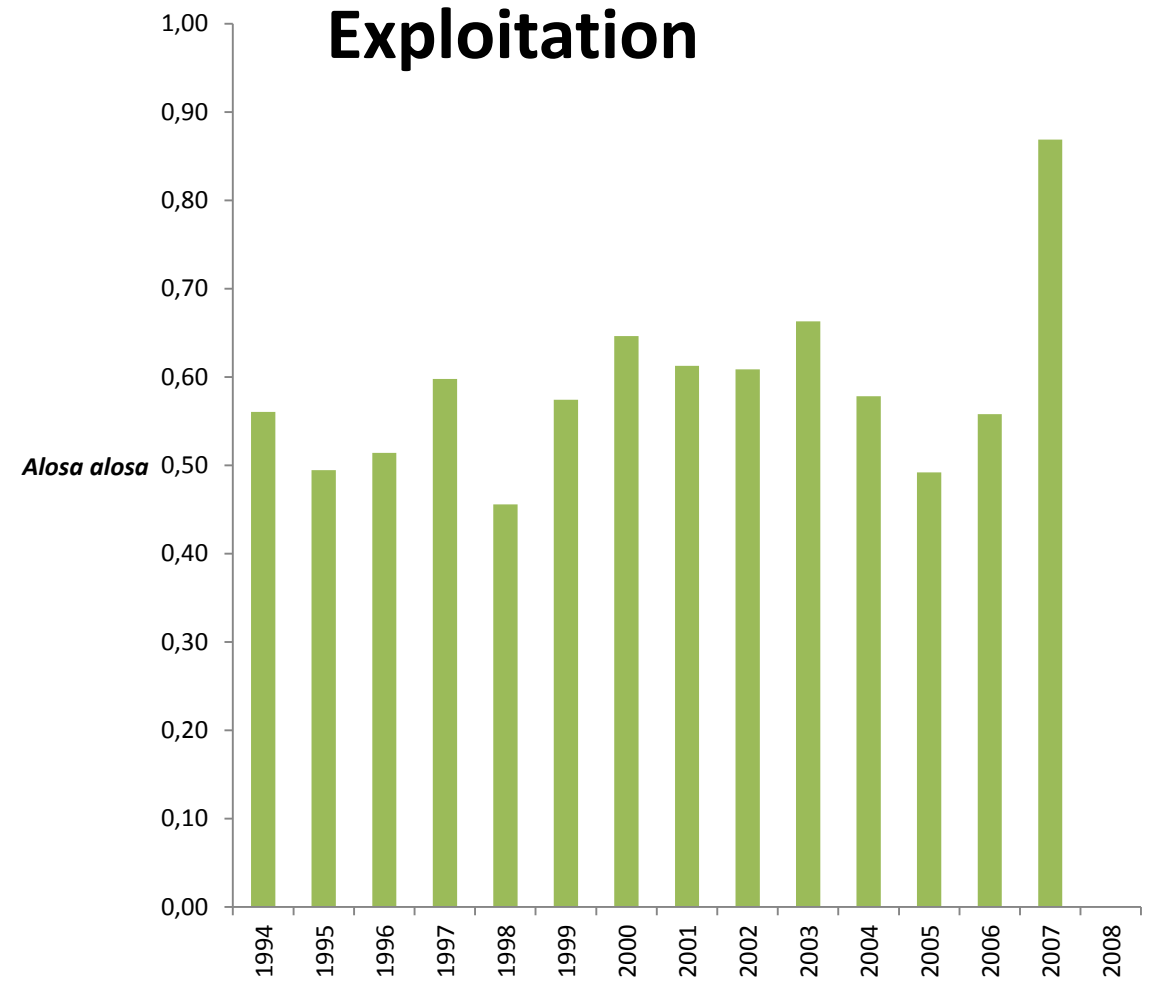
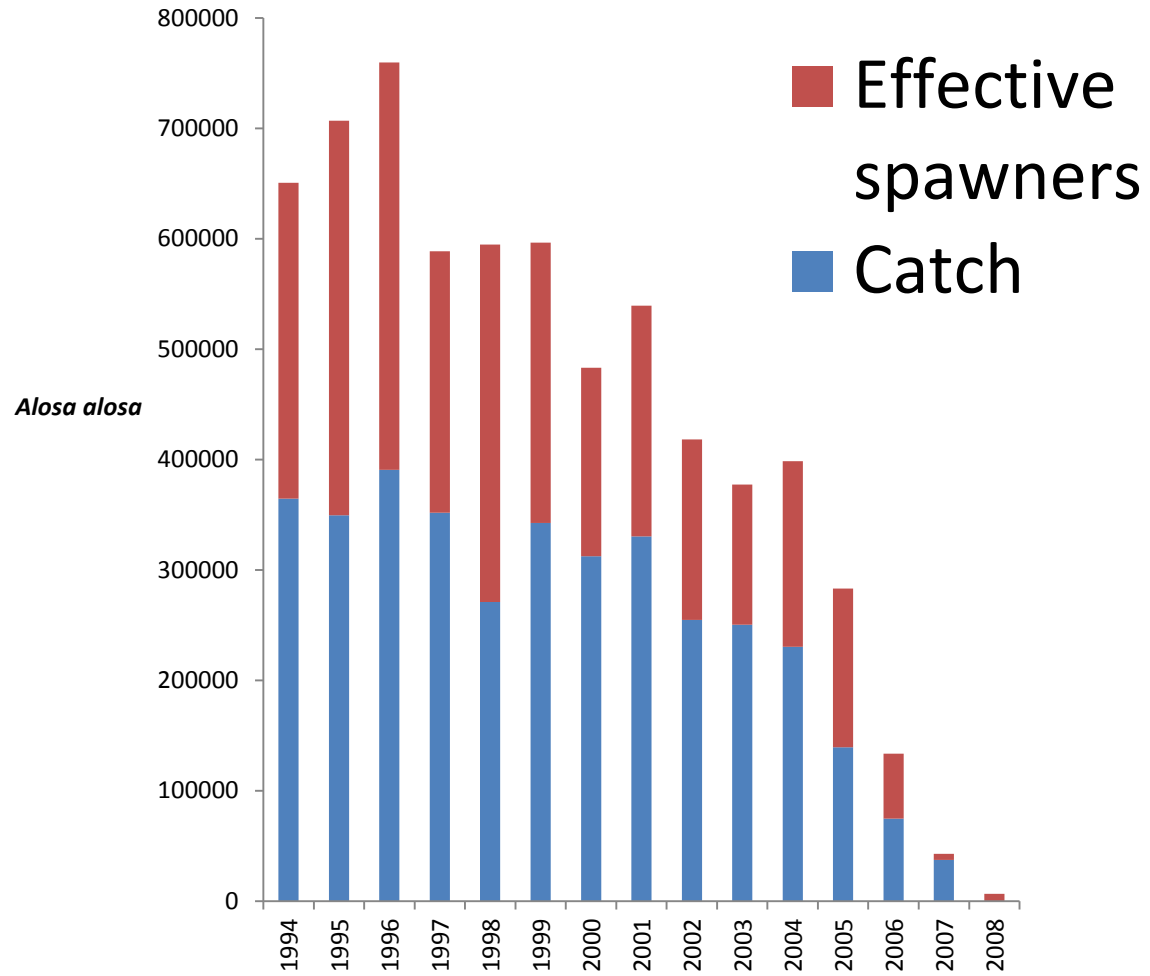


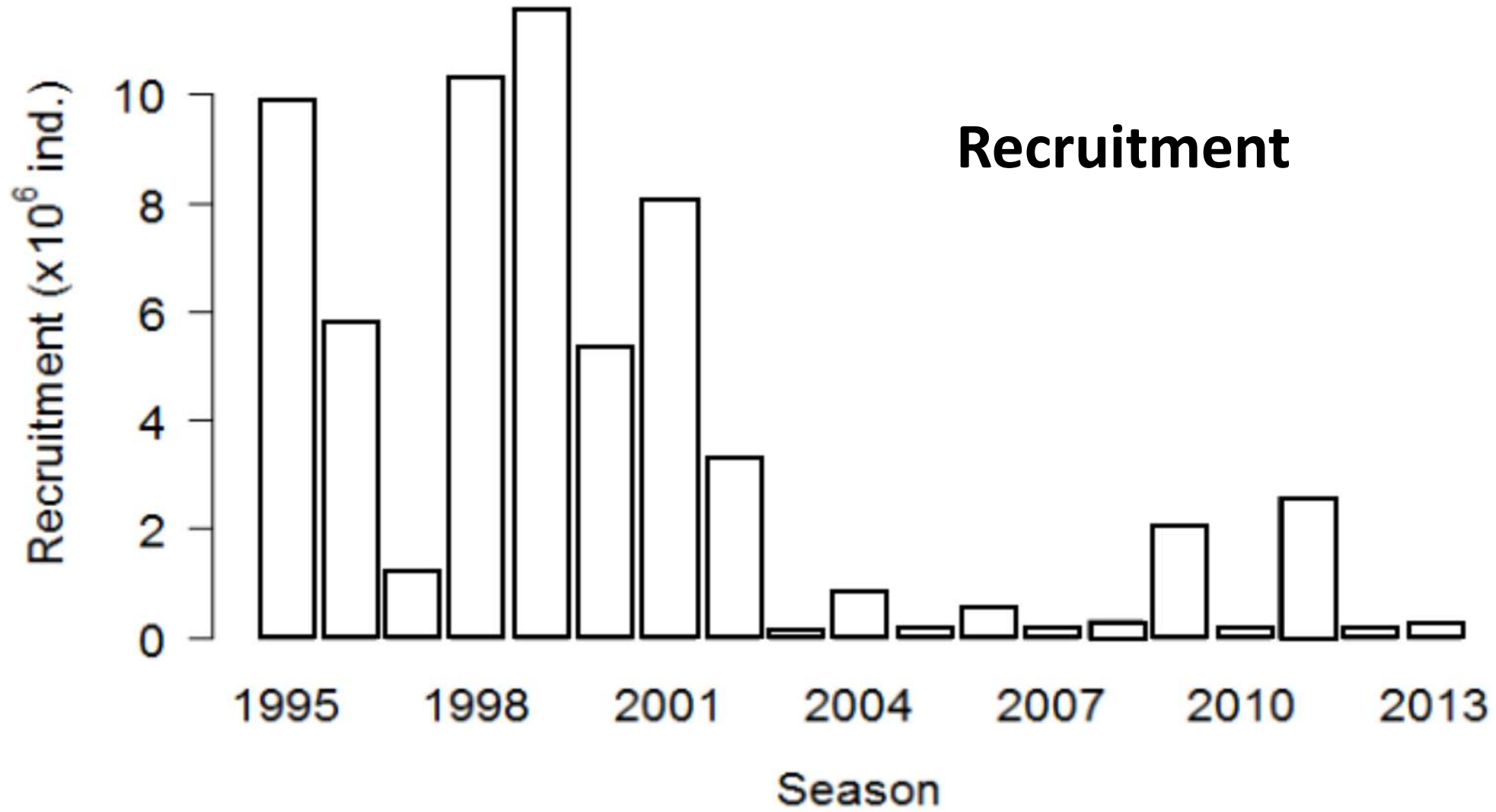


## Catch of *Alosa alosa* - Gironde-Garonne-Dordogne system (FR)

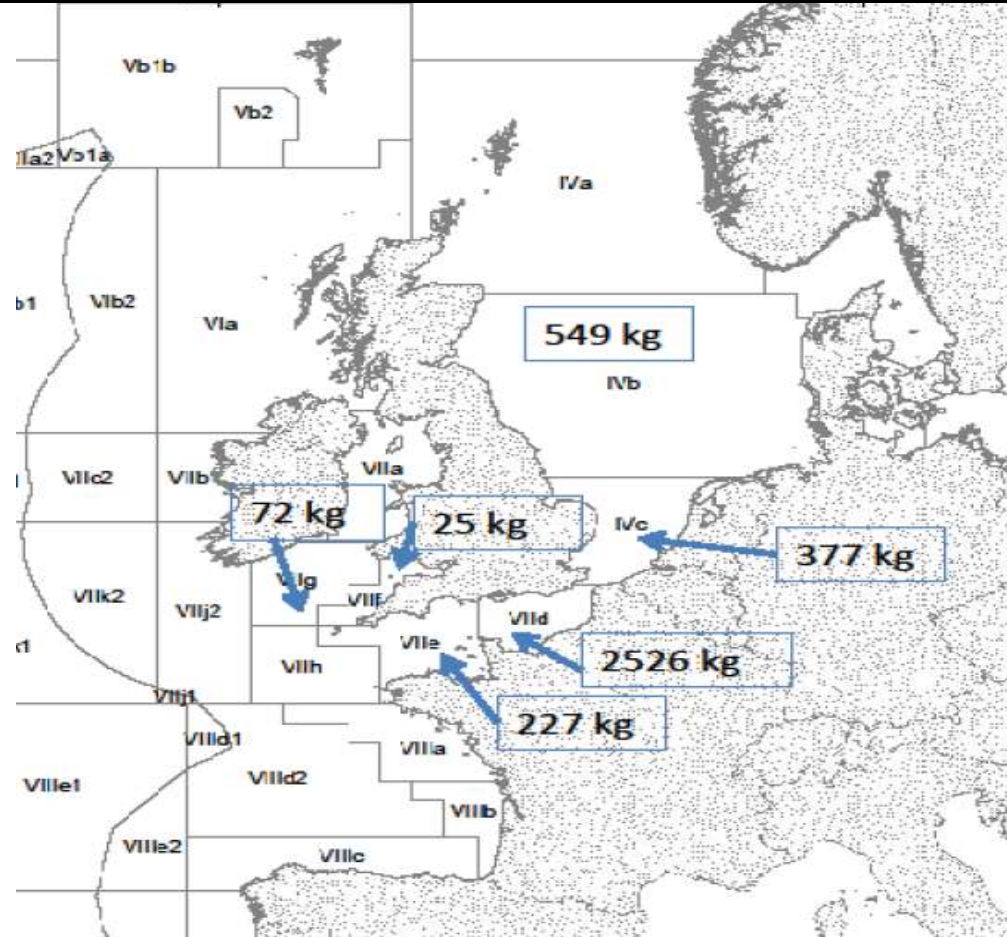
- Total catches up to 700 tonnes
- Catch from the Gironde-Garonne-Dordogne system contribute ~90% of total *Alosa alosa* landings
- Commercial value: turnover of 1.3 millions € in 1997 in France
- Declining catch - fishery closed 2008



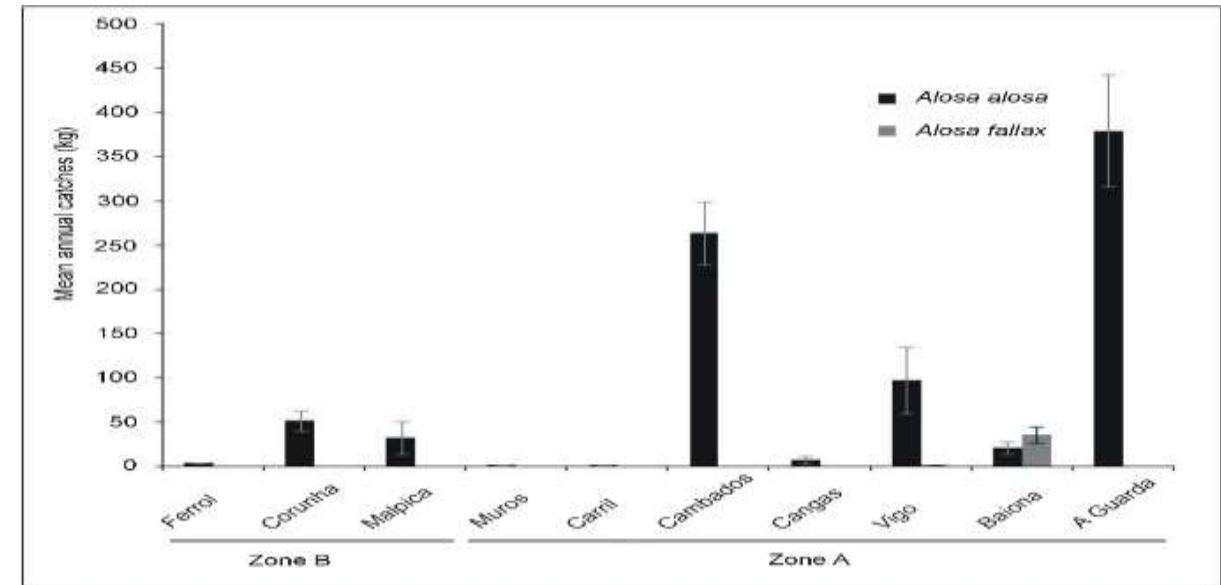
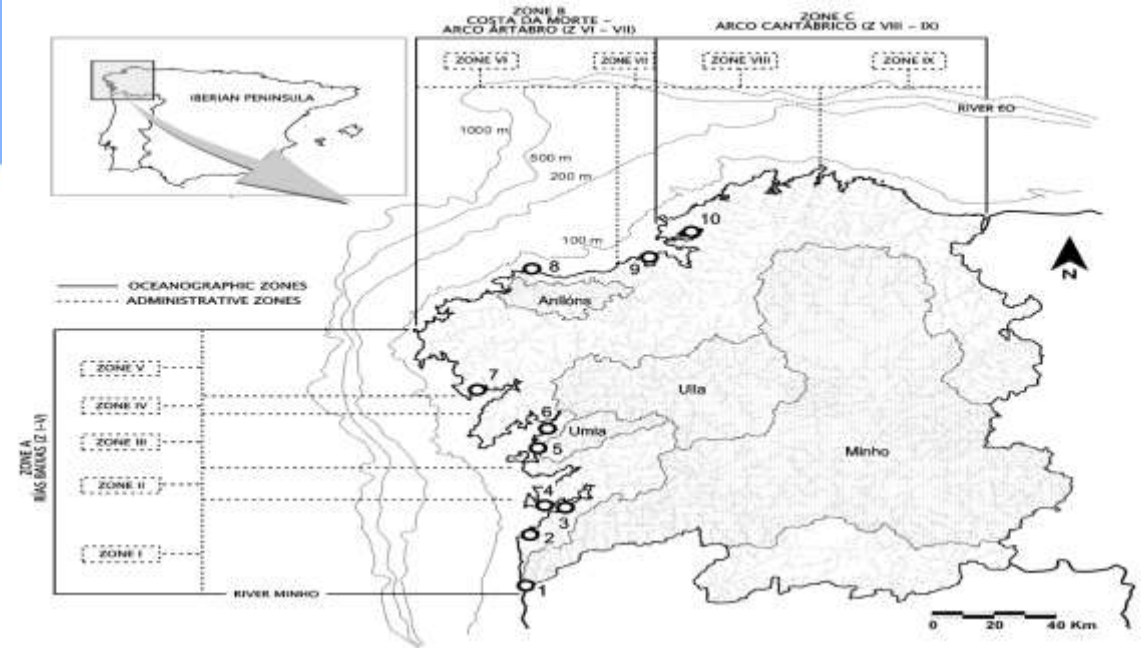




# Bycatch - marine



Mean weight (kg) of *Alosa* spp. declared as bycatch by Sweden, the Netherlands and the United Kingdom between 2009-2012 by ICES subdivision (ICES 2014).



Nachón *et al.* (in press).

# Bycatch

## Glass eel and shrimp fisheries - Gironde (FR)

The glass eel fishery  
took less than 1% of  
both *Alosa* species.



The impact of the shrimp fishery was only evaluated for *A. fallax* of which between 11-26% was estimated to be killed in the fishery.

Taverny (1991)



## Entrainment



## Blayais nuclear power plant Gironde (FR)

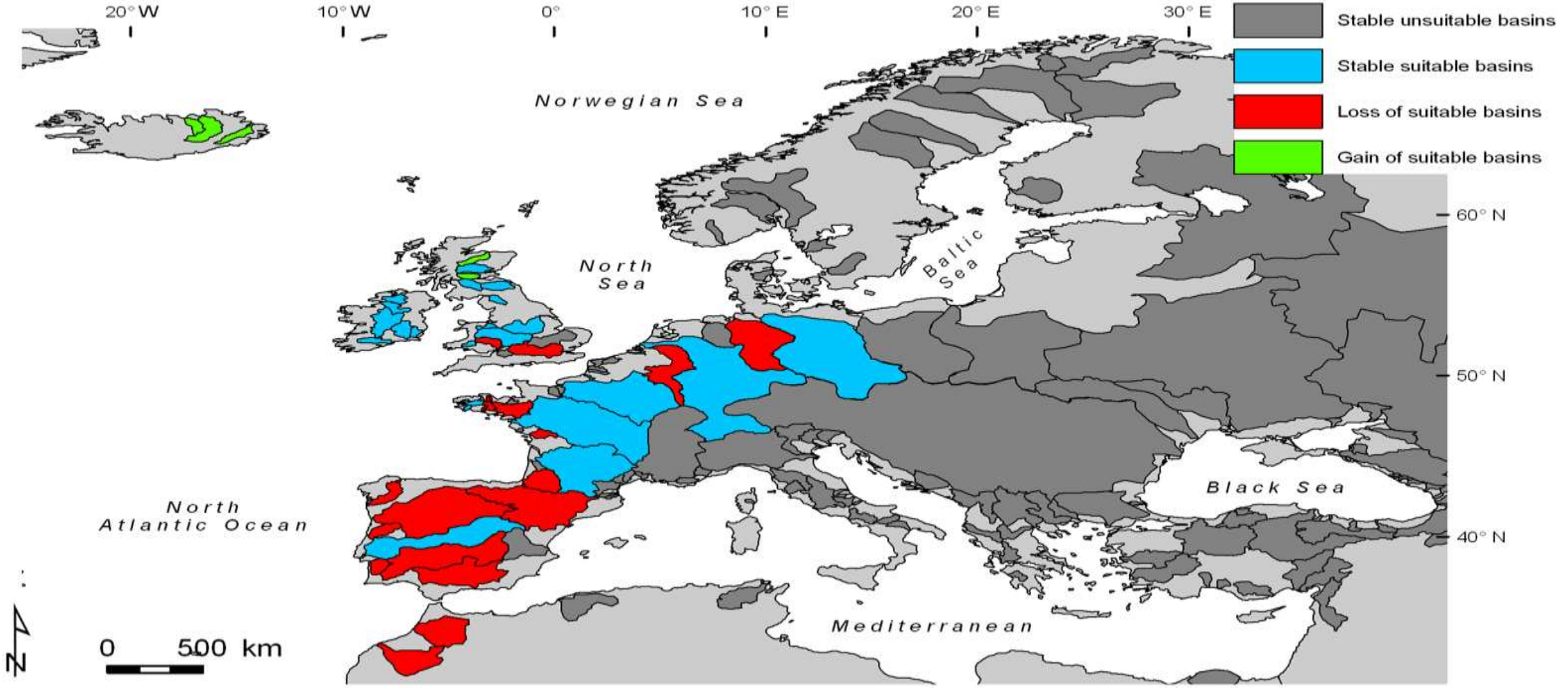
The power station was estimated to take between:

1. 2.5-5.8% of the *A. fallax* 0+ population and
2. 9.6-11% of the *A. alosa* 0+ population.

Taverny (1991)



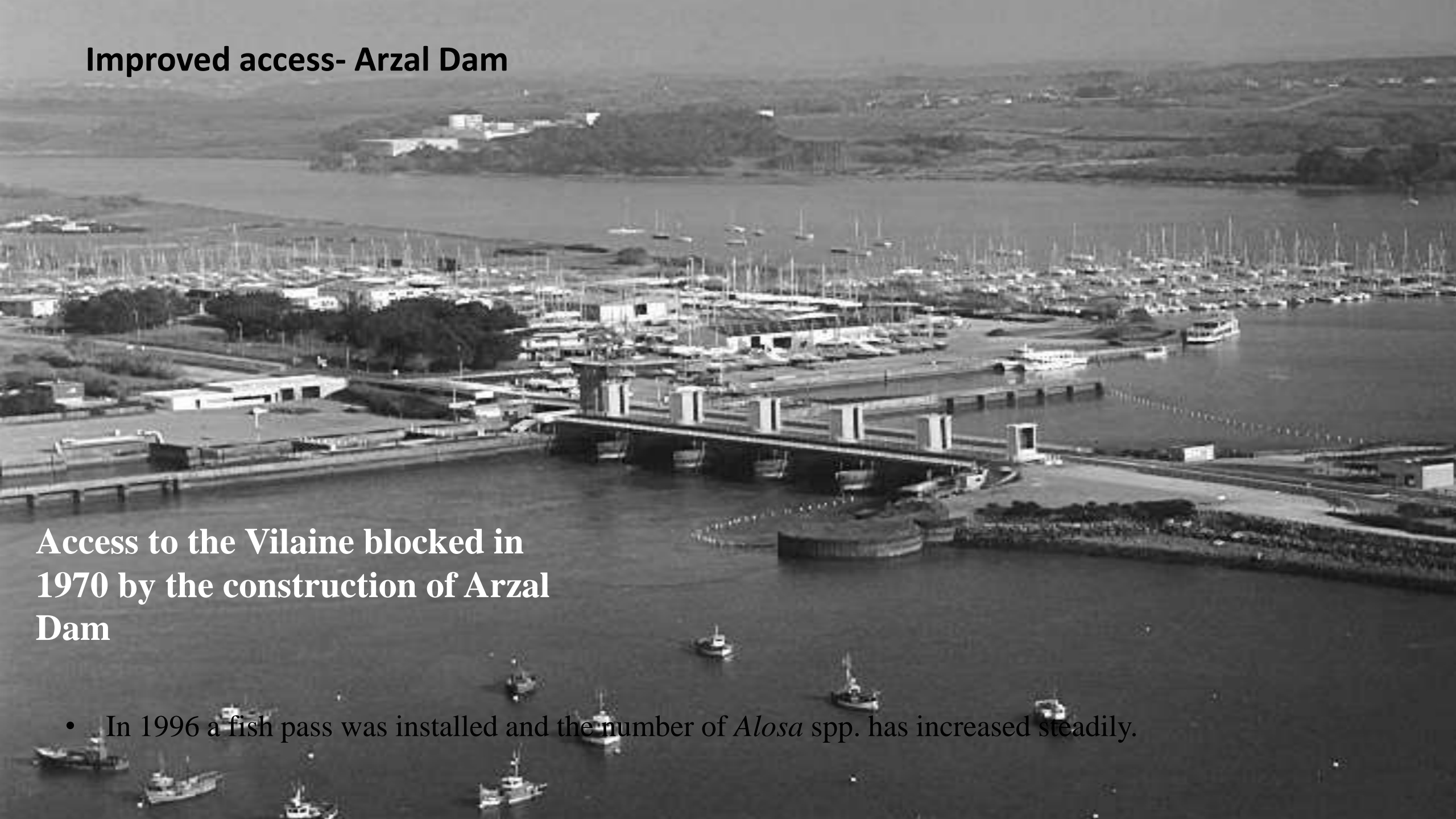
# Climate change impact for Allis shad



## Improved access- Arzal Dam

Access to the Vilaine blocked in 1970 by the construction of Arzal Dam

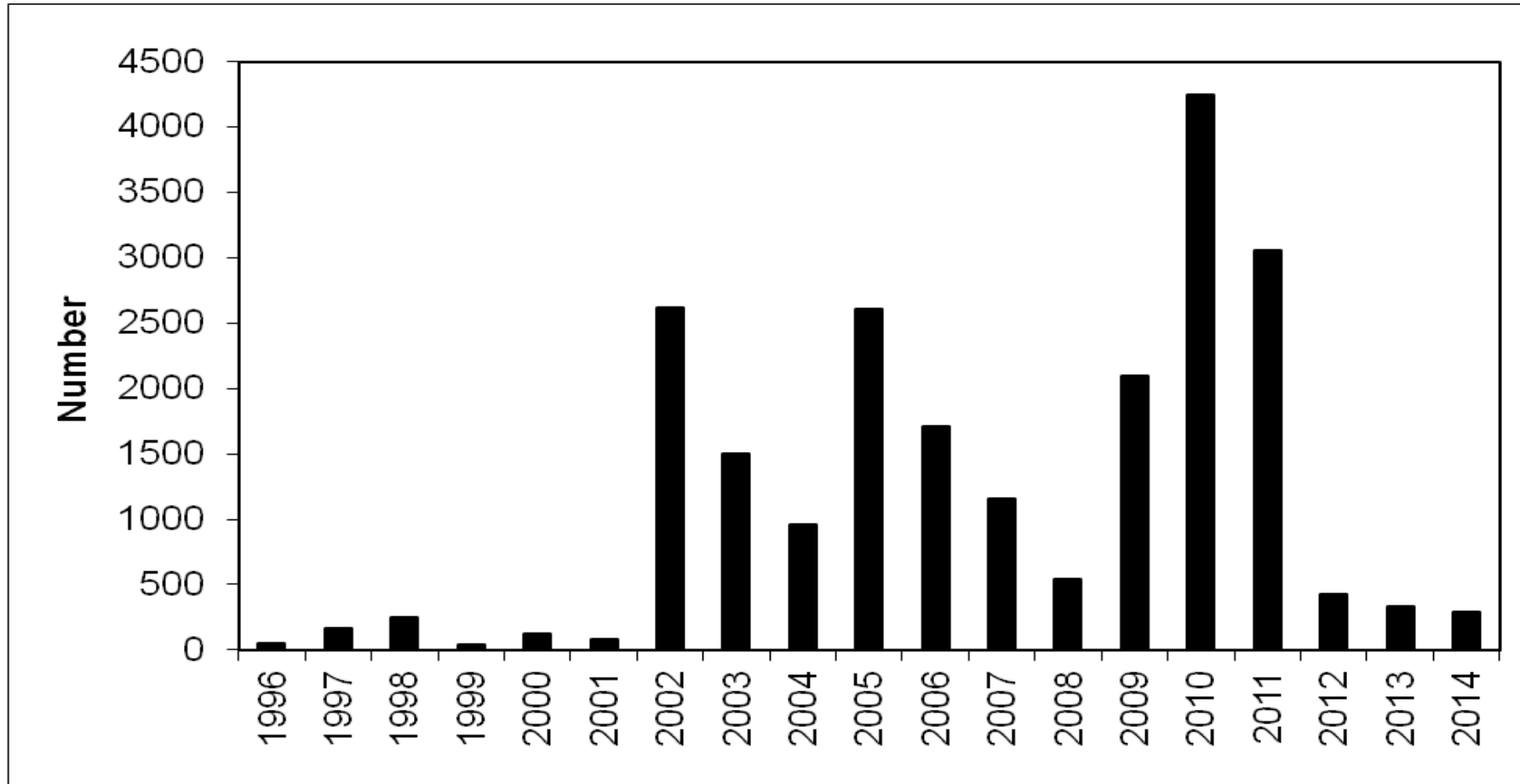
- In 1996 a fish pass was installed and the number of *Alosa* spp. has increased steadily.







## Improved access- Arzal Dam



- Decline in numbers after 2011 - reflect exploitation levels >80%

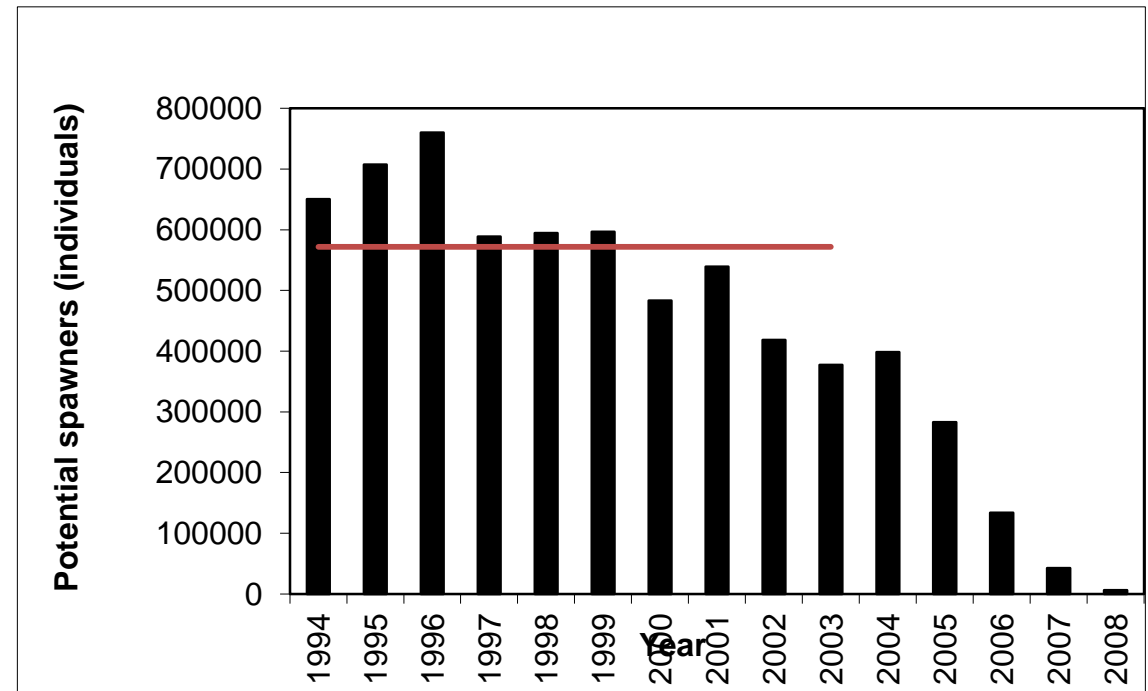
## Stock Protection - sanctuary areas

Vilaine (France) -  
fishing prohibited in  
front of fish way on the  
Arzal dam during  
March to May to reduce  
the level of exploitation.





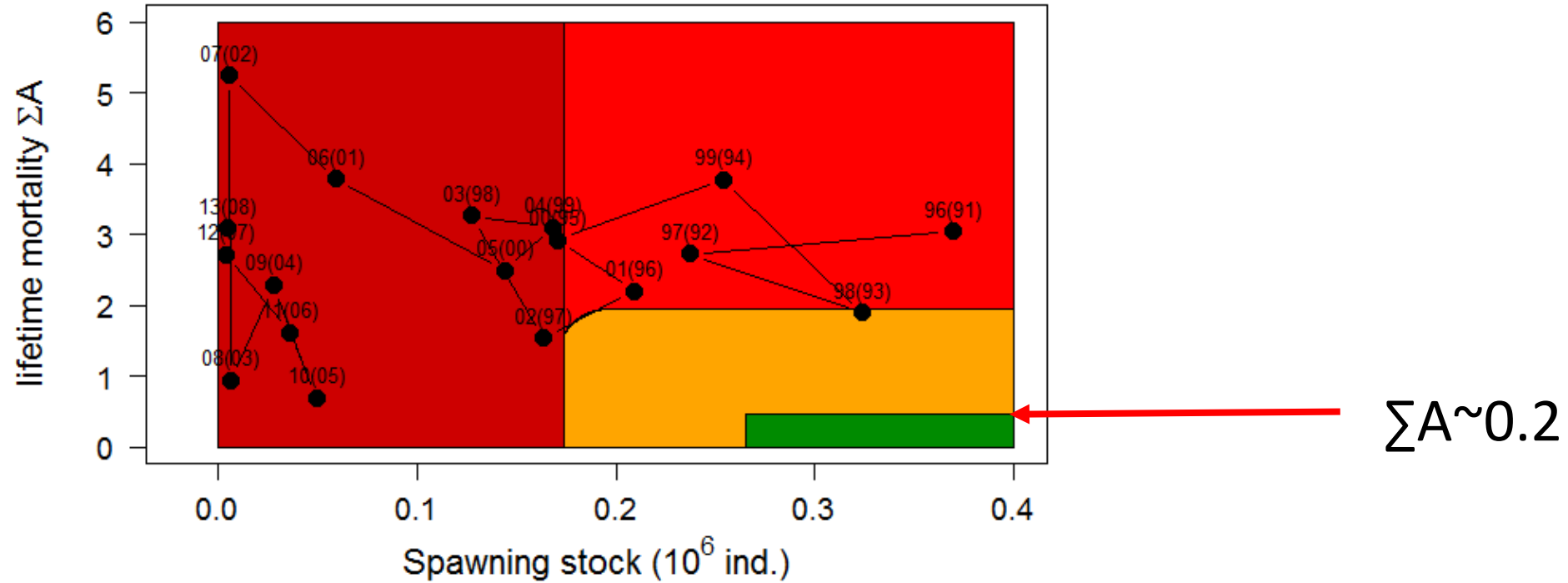
## Setting Fishing controls - catchment productivity



- Wetted area 370 km<sup>2</sup>
- Mean potential spawners 570,000
- 1,540 spawners km<sup>-2</sup>

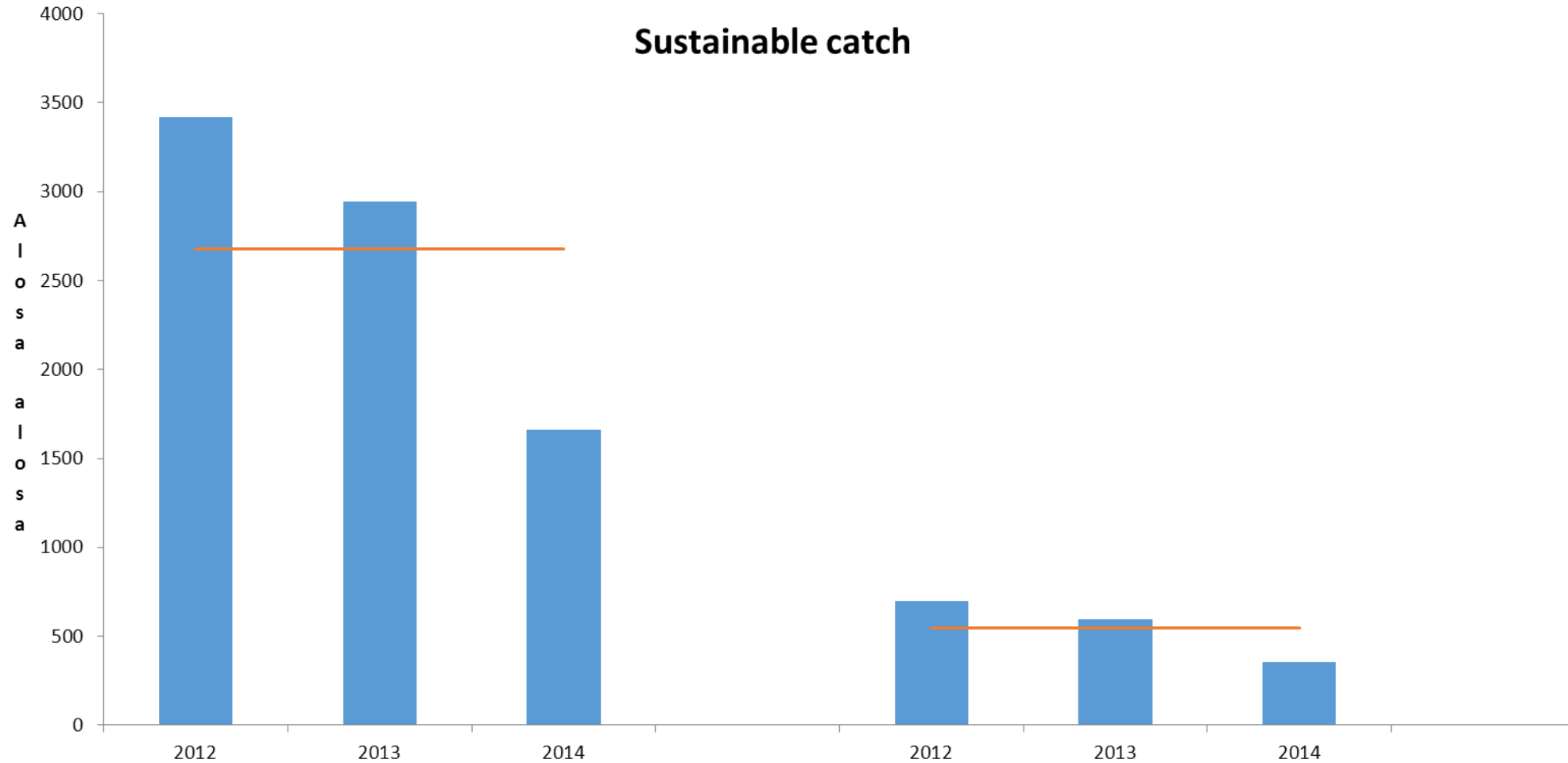


# Setting Fishing controls – sustainable exploitation





# Setting Fishing controls – sustainable exploitation

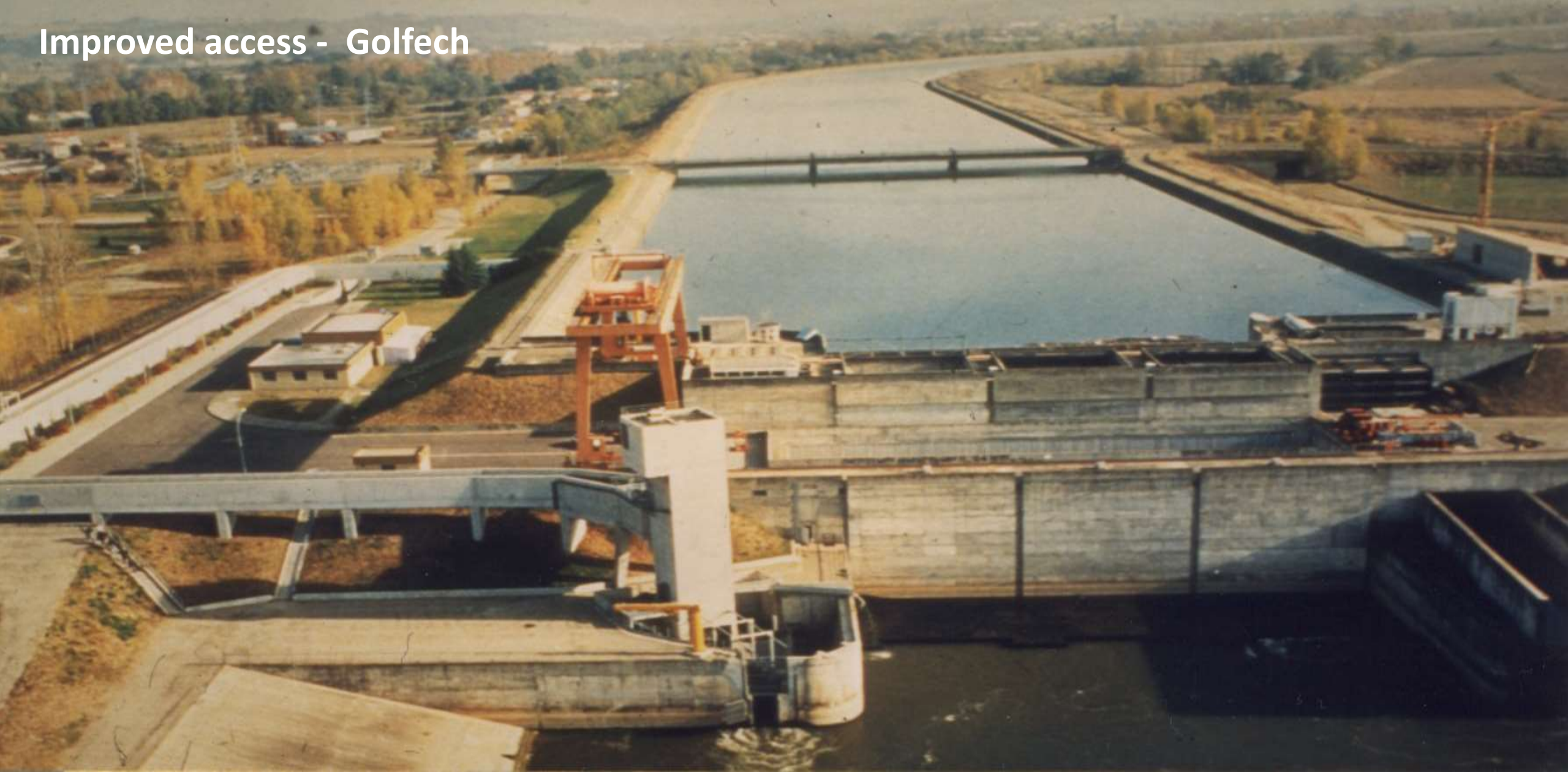


## Restoring access - fishways



**Fishway in Açude-Ponte Coimbra dam, River Mondego, Portugal.**

## Improved access - Golfech





# Other actions

- **Sanctuary areas**

- On the River Garonne at Agen (France) a sanctuary for *Alosa alosa* was created by Ministry decree on May 15th 1981. The site measures 4.78 km<sup>2</sup> and is one of the main spawning areas on the river.

- **Effort restrictions**

- Mondego (PT) - 10 day closed fishing season at the end of April – start of May.

- **Stocking**

- Two LIFE projects with the objective to recover the populations of allis shad in the Rhine (2008-2010) and in the Rhine and Gironde (2011-2015), in the first project, some 4.8 million larvae were released, and in the second ~1.5-2 million larvae per year are being released.





# What needs to be done

- Develop methodologies and collect data to calculate management targets and limits with coordination between conservation and fisheries objectives.
- Assess the possibility of using these species in metrics of habitat continuity or quality and for assessing Good Ecological Status.
- Improve our understanding of:
  - Population dynamics
  - Habitat / ecological requirements - marine, estuarine & fresh water
  - Marine phase
  - Fish pass requirements

## Improve Political & Public awareness



**World Fish Migration Day activities in the fishway of Açude-Ponte Coimbra dam, River Mondego, Portugal. (Photos: Catarina Mateus).**

