

Assessing the impact of dam implementation on otters: the cases of Alqueva (SE Portugal) and Sabor (NE Portugal) dams



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Support:



EDIA, S.A, FEDER, PEDIZA (1999/2003)

Environmental Impact Assessment in Europe

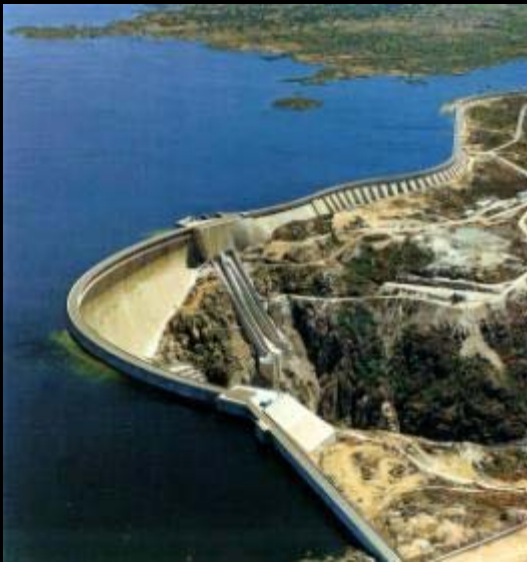
The EU Directive on Environmental Impact Assessment (EIA) was introduced in 1985 and was amended in 1997.

The EIA procedure ensures that environmental consequences of projects are identified and assessed before authorisation is given for the start of the construction.

European Member States have transposed the Directive

Monitoring programs

Mostly due to the growing concerns over the impact of large infrastructures on biodiversity, the European Union directives have implemented under the EIA frameworks monitoring programs.



Data available is however still relatively scarce when dealing with carnivore mammals (including otters)

Eurasian Otters (*Lutra lutra*)



Using the example of Eurasian otters and large dams, we contribute to this framework by addressing two case studies:

- 1) a monitoring program (Alqueva Dam built in 2001)
- 2) a pre-implementation evaluation (Sabor Dam - to be build on a short term)

ALQUEVA DAM

SE Portugal - Alentejo Rio Guadiana

- Largest artificial lake in Europe
- 96m wall
- 83km along 6 counties
- 25 000ha flooding area
- 110 000ha irrigation area



ALQUEVA DAM

Mediterranean
woodland



Rivers and streams



Riparian Vegetation



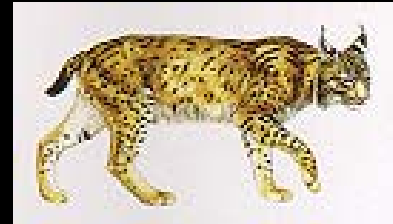
Oakland forest



**One of the most important areas for flora and fauna
in Portugal and of the Mediterranean basin**



THE ALQUEVA PROJECT



Alqueva dam EIA required a monitoring protocol for threatened species (Portuguese Red Book of Vertebrates) whose distribution ranges would overlap with the impact area of the Alqueva dam.



The Otter Monitoring

**aimed at understanding the
impacts in the local population status**

1999-2003





The Otter Monitoring

monitoring protocol for otters

Alqueva dam impacts were intended to be monitored in 3 periods:

1 – reference situation (before deforestation and flooding)

2 - after deforestation

3 - after flooding



Delay in wall construction

Delay in deforestation

Delay flooding (low precipitation)



combined deforestation/flooding phase.



The Otter Monitoring

monitoring protocol for otters

Because of these delays, it was not possible to monitor the post flooding phase within the 5 years timeframe of the monitoring program

Alqueva dam impacts were monitored:

1 - before deforestation and flooding (1999-2000)

2 - during deforestation (2001-2002)

3 - after deforestation/**early flooding** (2002-2003)





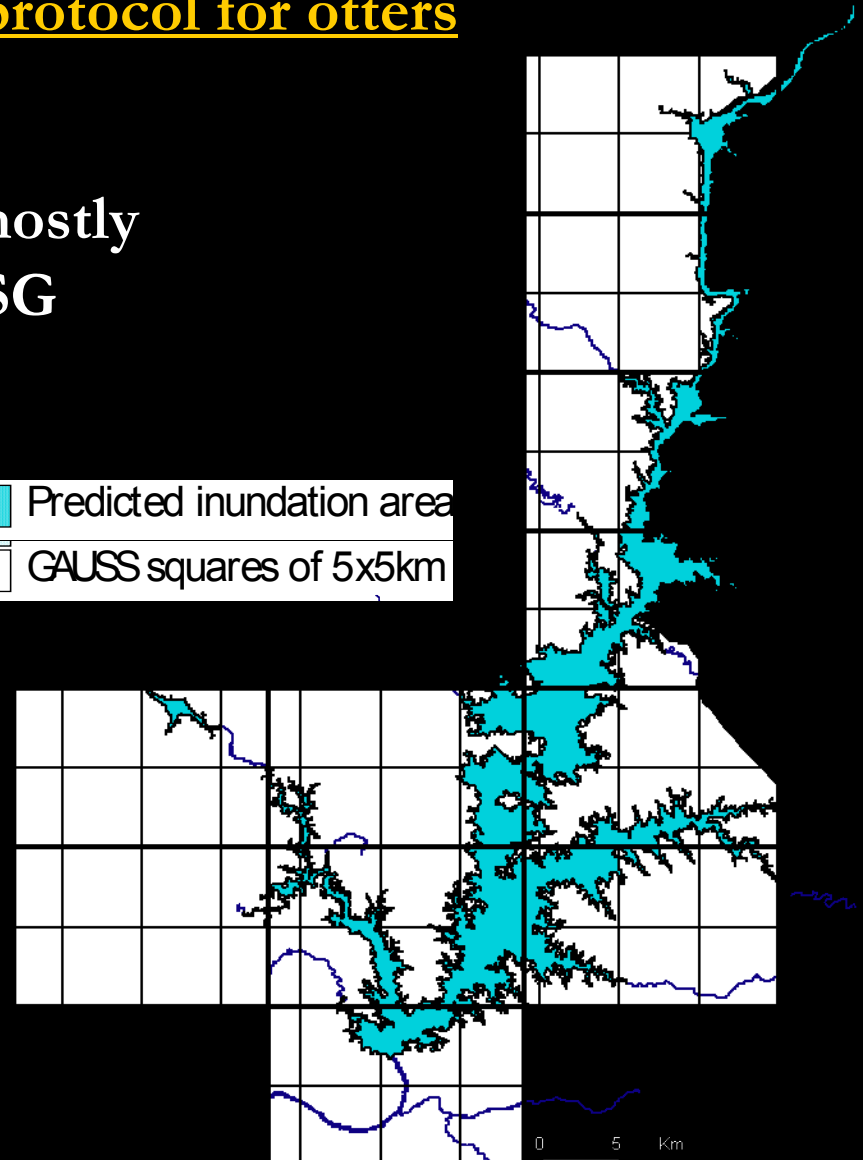
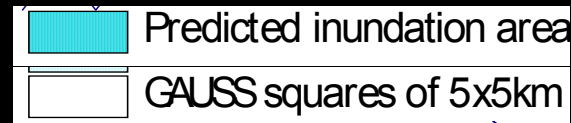
The Otter Monitoring

monitoring protocol for otters

Otter monitoring was conducted mostly through sign surveys following OSG guidelines (600m transects)



in a grid-based system
(1x1 km and 5x5km squares)
that covered:
1) the area to be flooded
2) surroundings





The Otter Monitoring

monitoring protocol for otters

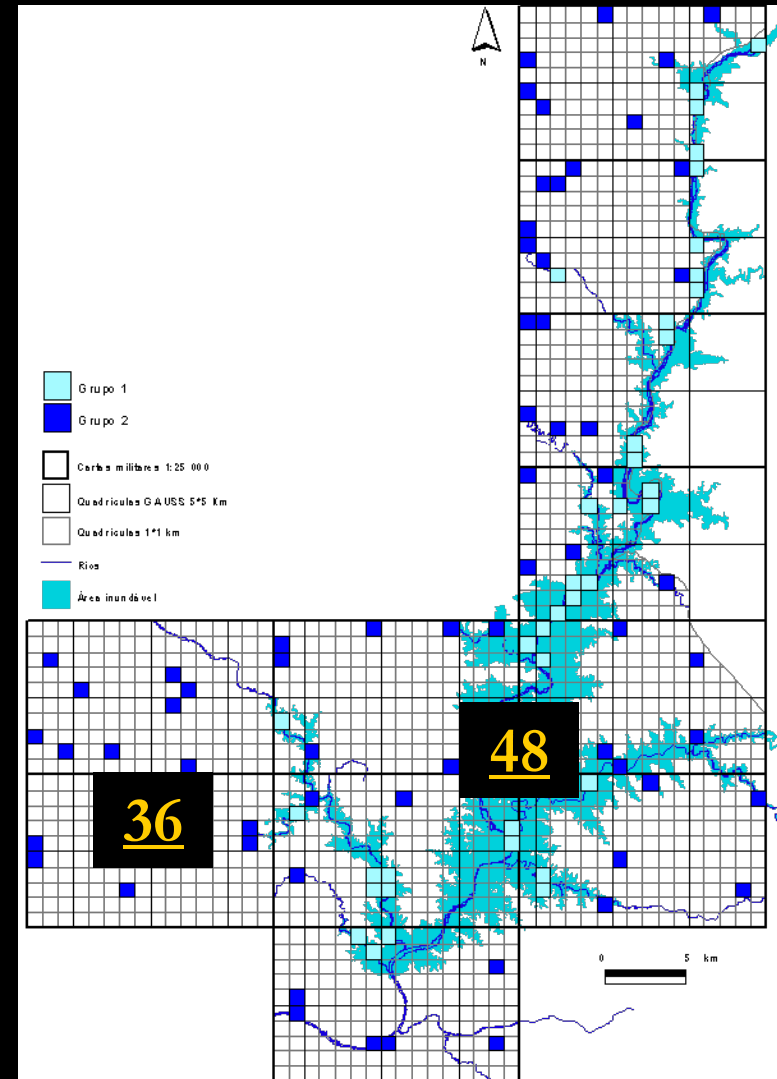
84 squares of 1x1 km
were randomly selected

(20% of the squares with freshwater)

due to the high availability of these
habitats in the study area.



From these 1x1 km grid, we
extrapolated to 5x5 km grid.

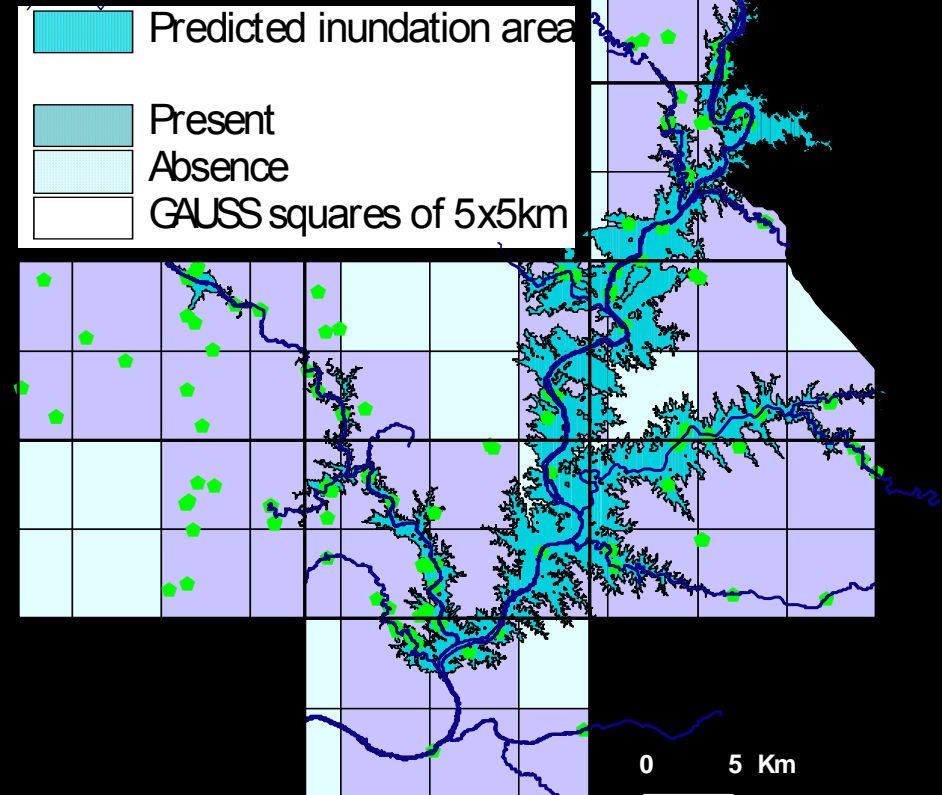




RESULTS (5x5km)

OTTER SITUATION BEFORE DEFORESTATION (reference situation)

- ✓ 86,8 % positive squares
- ✓ Generalized distribution
- ✓ Presence in all major aquatic habitats
- ✓ 47,3% positive squares in soon to be flooded area







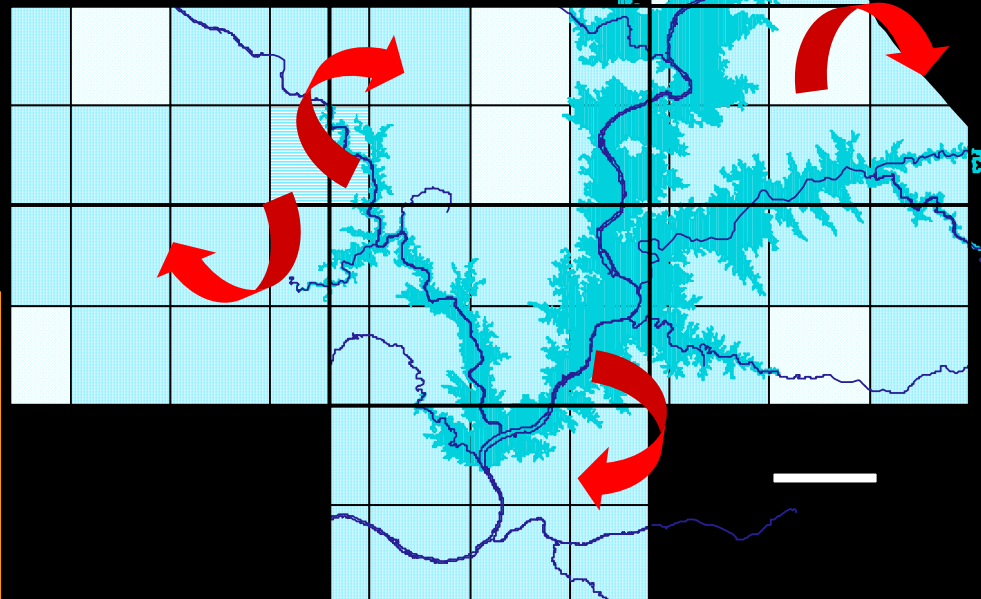
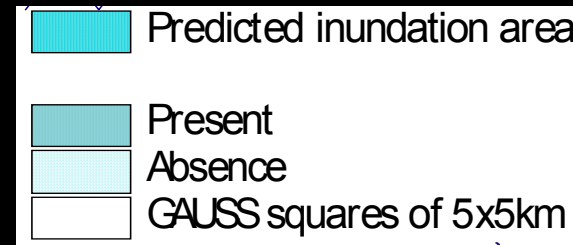
RESULTS (5x5km)

OTTER SITUATION DURING DEFORESTATION

- ✓ 88,2% of presences (+ 1,4%)
- ✓ continuous distribution
- ✓ changes from presence to absence squares and vice-versa



- ✓ Disturbance probably resulted in population instability and search for new refuges

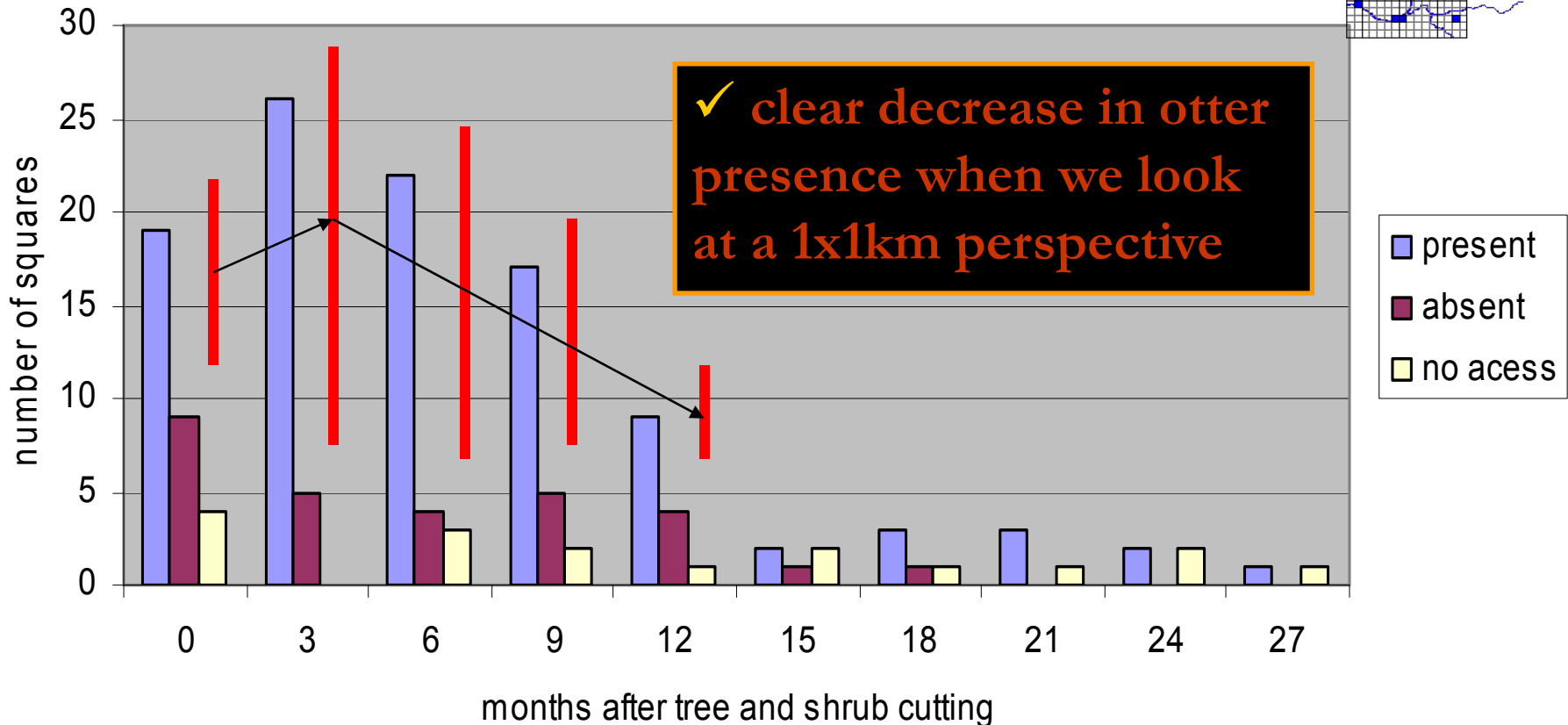
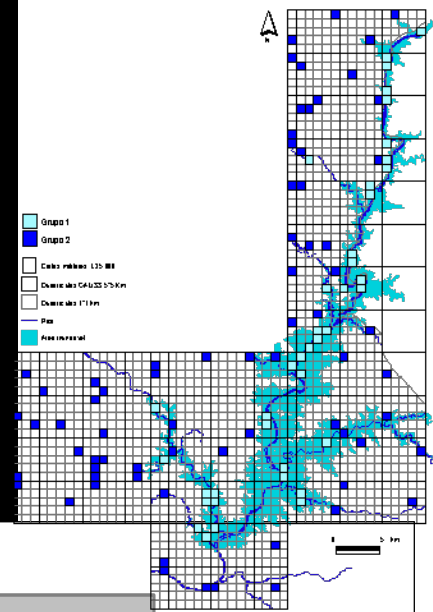


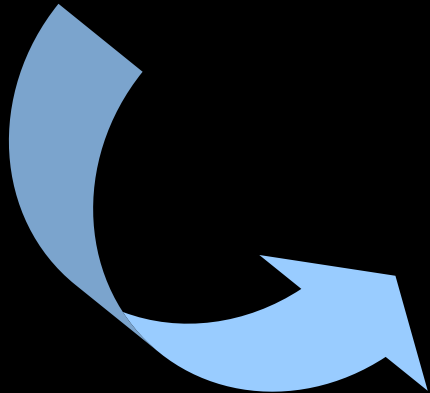
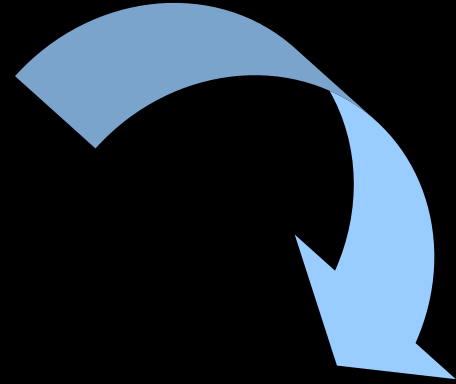


RESULTS (1x1km)

OTTER SITUATION DURING DEFORESTATION

Ratio presence/absence of otter decreases



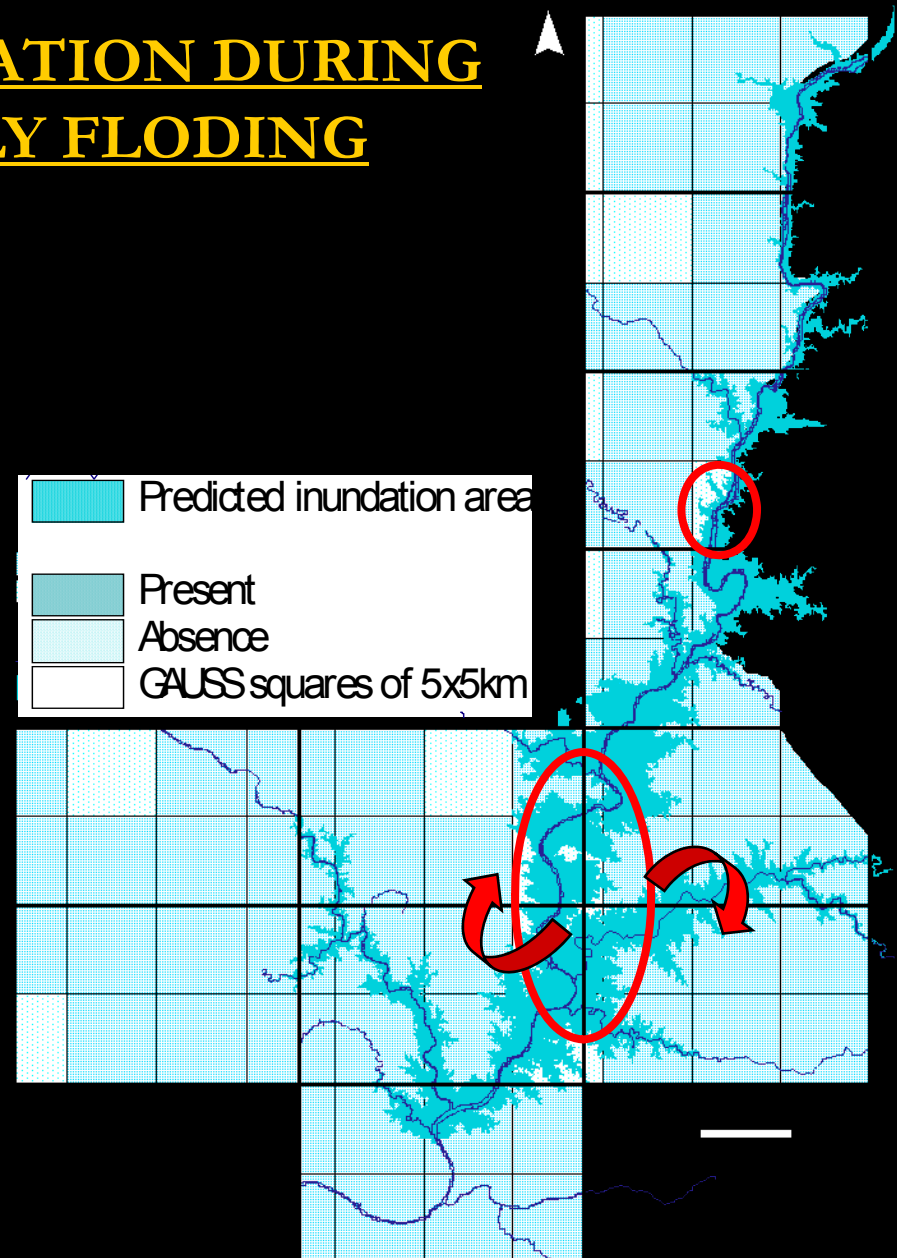




RESULTS (5x5km)

OTTER SITUATION DURING EARLY FLOODING

- ✓ 79,4% of presence (- 7,4%)
- ✓ continuous distribution
- ✓ - 4 squares in flooding area;
- ✓ + 2 squares outside flooding area

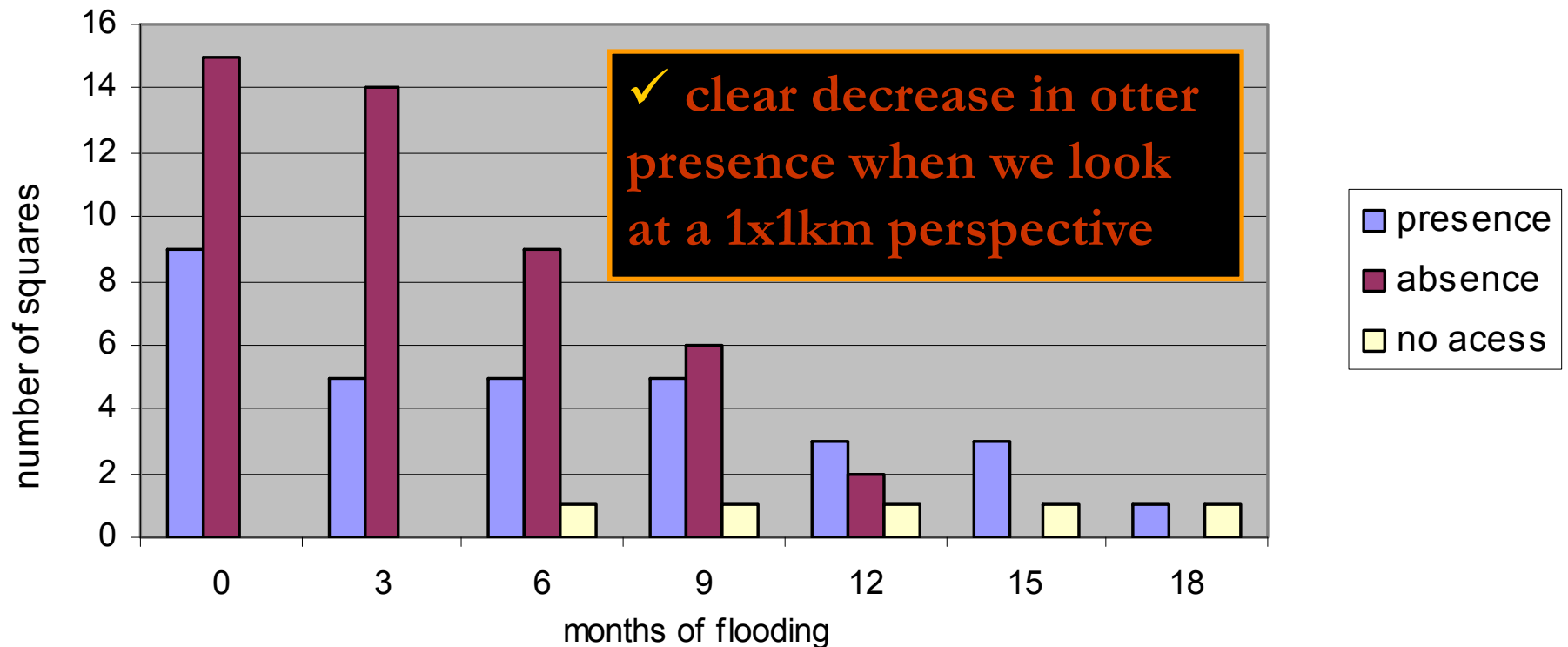
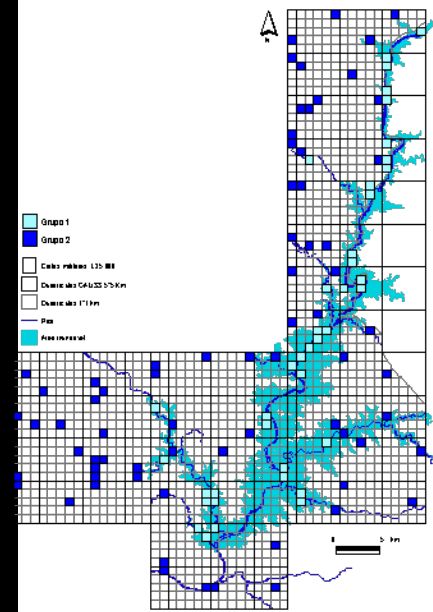




RESULTS (1x1km)

OTTER SITUATION DURING EARLY FLOODING

After flooding: n° absences greater then presences





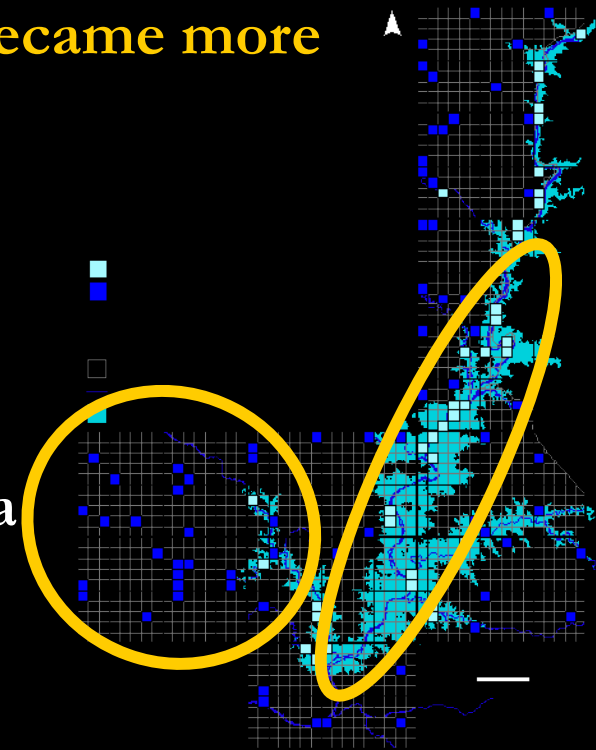
Monitoring Conclusions



At the end of the study, after the increase in distribution range at early flooding, **the otter range decreased and became more fragmented then in pre-dam situation.**

This decrease is a result:

- negative grid squares in the main rivers
- negative squares located outside flooding area



In the overall, otter situation after dam implementation revealed itself worse than before



Learned lessons regarding future EIA processes



Scale:

- Smaller scale is more adequate than larger one (1x1km vs 5x5km)
this means more time and money for EIA
- Monitoring should cover not only the area to be flooded but also the surrounding area (better understanding of the otter population adaptation) – **almost never happens in EIA**

Survey methodology:

- Adequate (600m area, presence/absence)

Monitoring protocol:

- 1st time in Portugal that a EIA on a dam had previous and post monitoring. However, **didn't adapt to real time period.**



Learned lessons regarding future EIA processes



Monitoring protocol:

Because of delays, it was not possible to monitor the complete post flooding phase within the 5 years timeframe of the monitoring program.

Monitoring protocols should have the capability to adjust to changes in reality like delays in the construction of the dam and shouldn't be limited mainly by budgets but by real time events and necessities





Recommendations for minimizing Alqueva dam building impact



Measures related to deforestation (to be applied during the Project implementation):

- time (season) and direction of the deforestation (tree and shrub cutting) – best escape routes for otters (and other carnivores)

Applied only in the beginning (first 6 months)





Measures related to habitat (to be applied after the Project implementation):



Trees:

- *Salix* sp.
- *Ulmus minor*

Shrubs:

- *Nerium oleander*
(authoctonus and rapidly construct refuge structure)

Trees:

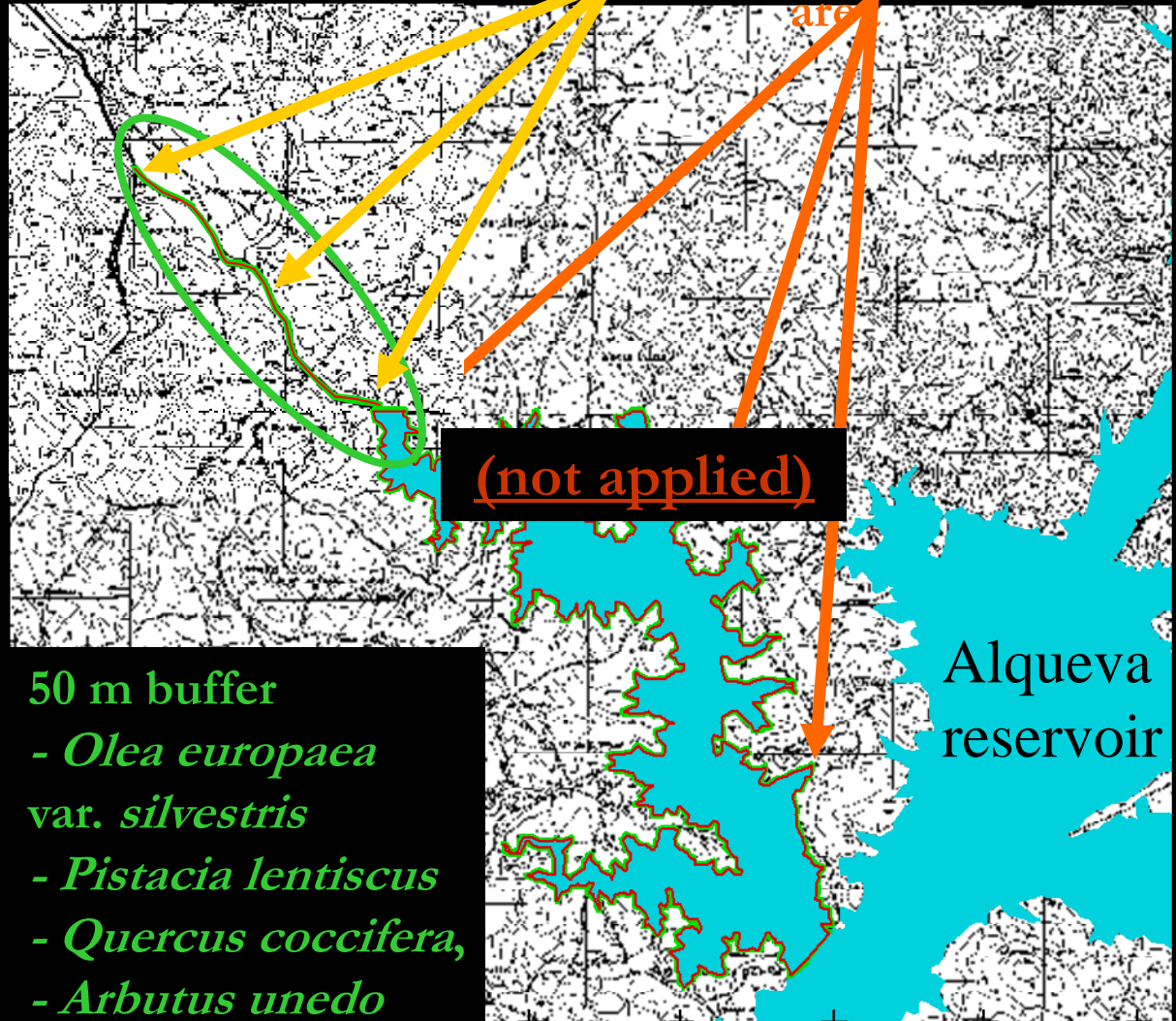
- *Salix* sp.

Shrubs:

- *Securinega tintorea*
(endures water level variation)

e.g. Alcarrache Stream

Flooded
are



50 m buffer

- *Olea europaea*
var. *silvestris*
- *Pistacia lentiscus*
- *Quercus coccifera*,
- *Arbutus unedo*

Alqueva
reservoir



Recommendations for minimizing Alqueva dam building impact



Measures related to prey improvement (to be applied after the Project implementation):

Enhance otter prey vulnerability by:

- Promoting inlets of small depth to increase capture rate of fish.
- Promoting the sustainability of autochthonous species



(not applied)



Recommendations for minimizing Alqueva dam building impact



Measures related to Water management

- Controlling the pumping out of water from pools in surrounding water lines in the dry season
- Maintaining the ecological flow down stream from the dam (Rio Guadiana)



(not applied)

BALANCE



Lots of money spent in
studying, complying to EU
Directive and EIA regarding
the need to assess impacts

but.....

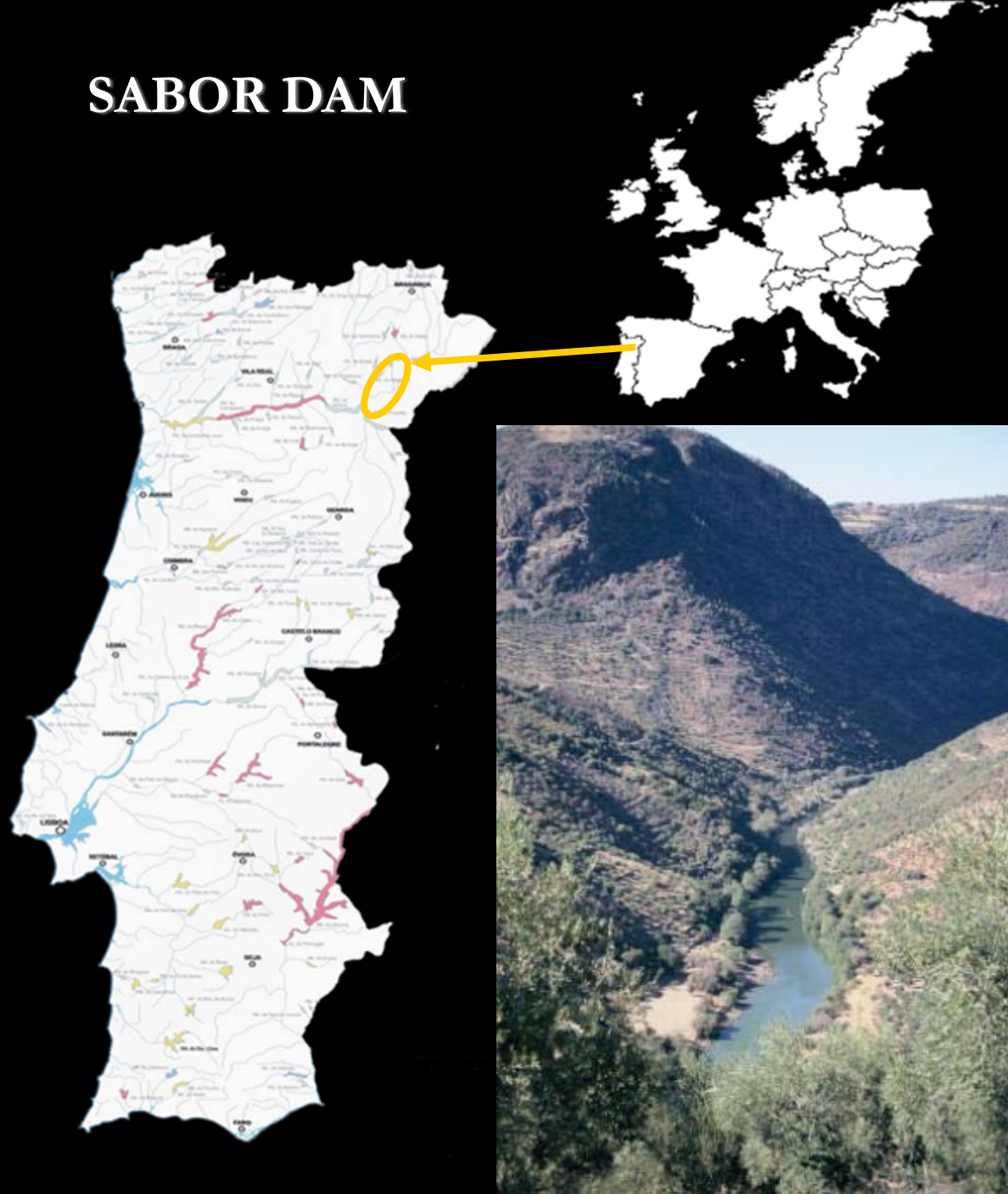
none applied in real
conservation of otter and
mitigation of Alqueva Dam
impacts



Sabor River, north-eastern Portugal

- to be built at short term
- > 100m wall
- 3 660ha flooding area

SABOR DAM





SABOR DAM



Sabor dam will be located
in a Natura 2000 site,



and this motivated several
studies devoted to
protected and most
impacted species.

**Special Protection Area
(Natura 2000)**



SABOR DAM



The otter was one of the species under analysis and impacts in such an important area were expected to be severe.



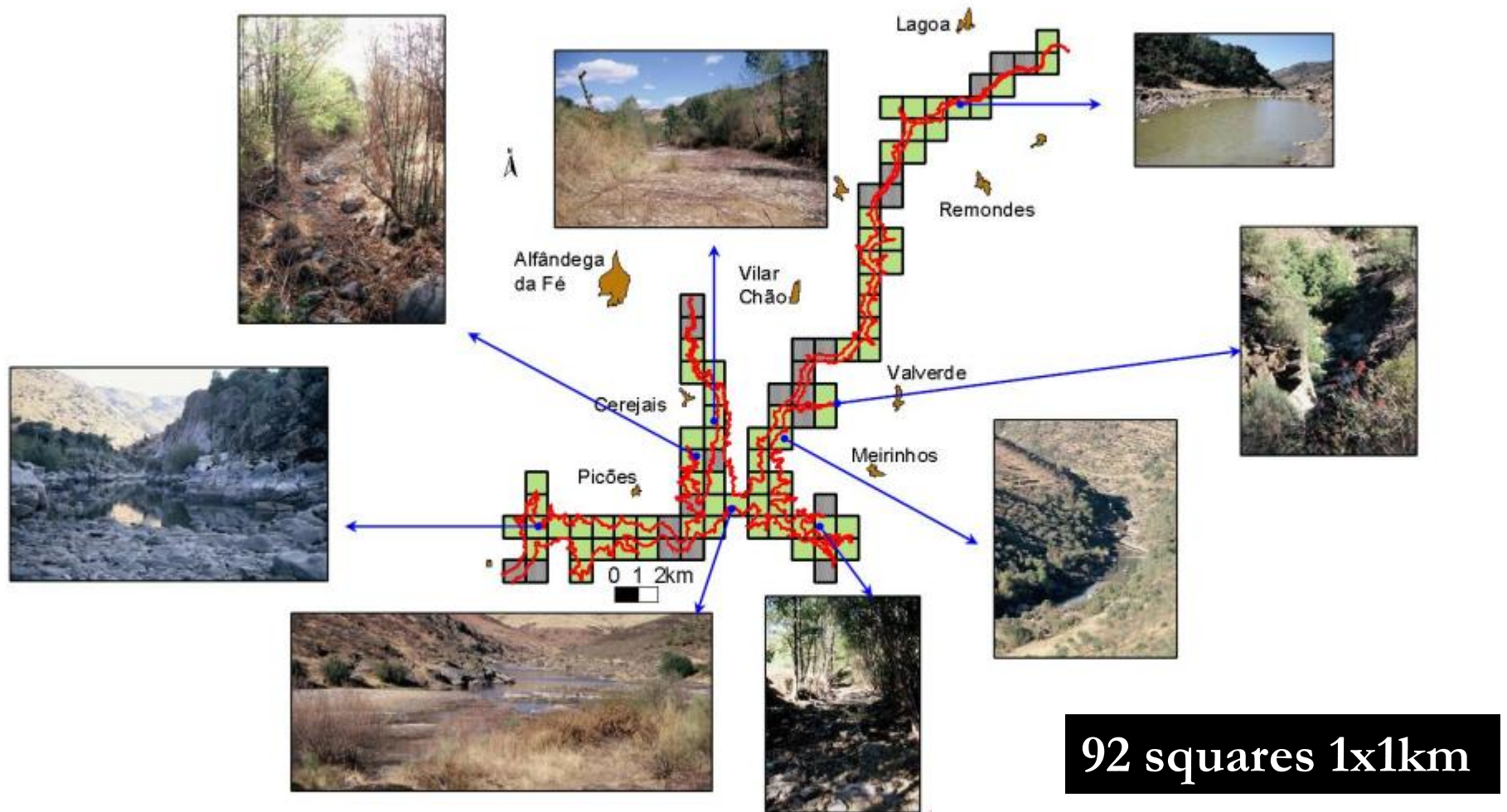
Along with the otter, another aquatic species was also studied:

Galemys pyrenaicus – Pyrenean Desman

(Vulnerable) - Native: France; Portugal; Spain



Methodology



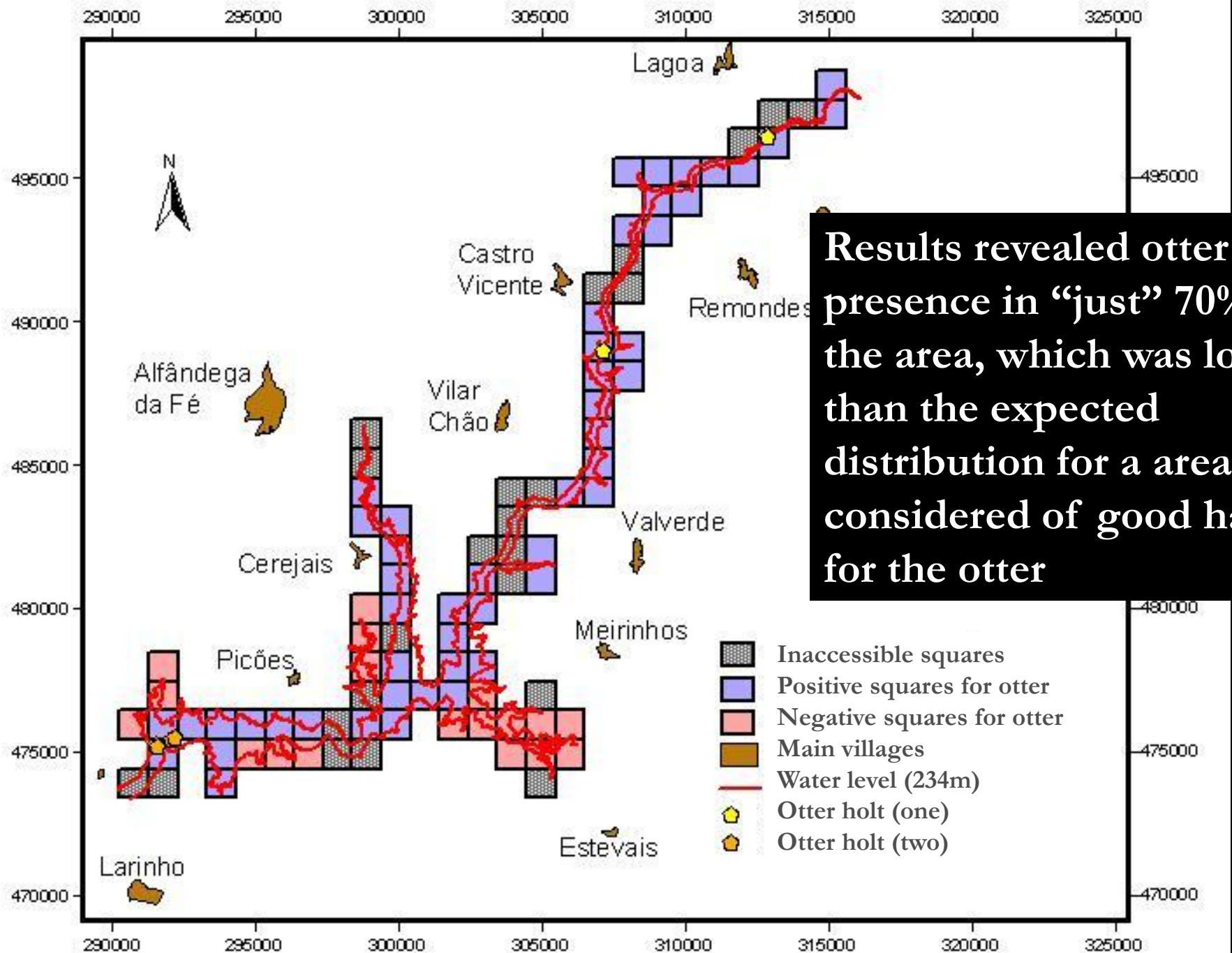
Field work September and October 2008 through sign surveys in a grid-based system that covered only the area to be flooded.

Methodology



A transect of 600m (or more if otter absent) was surveyed per 1x1km grid cell to determine otter presence/absence.





Results revealed otter presence in “just” 70% of the area, which was lower than the expected distribution for a area considered of good habitat for the otter

Portugal was facing a **drought and sampling period occurred at the end of the dry season**, and so many of squares classified as “otter absent” have been so due to the complete dryness of existing water lines and consequent absence of water and prey



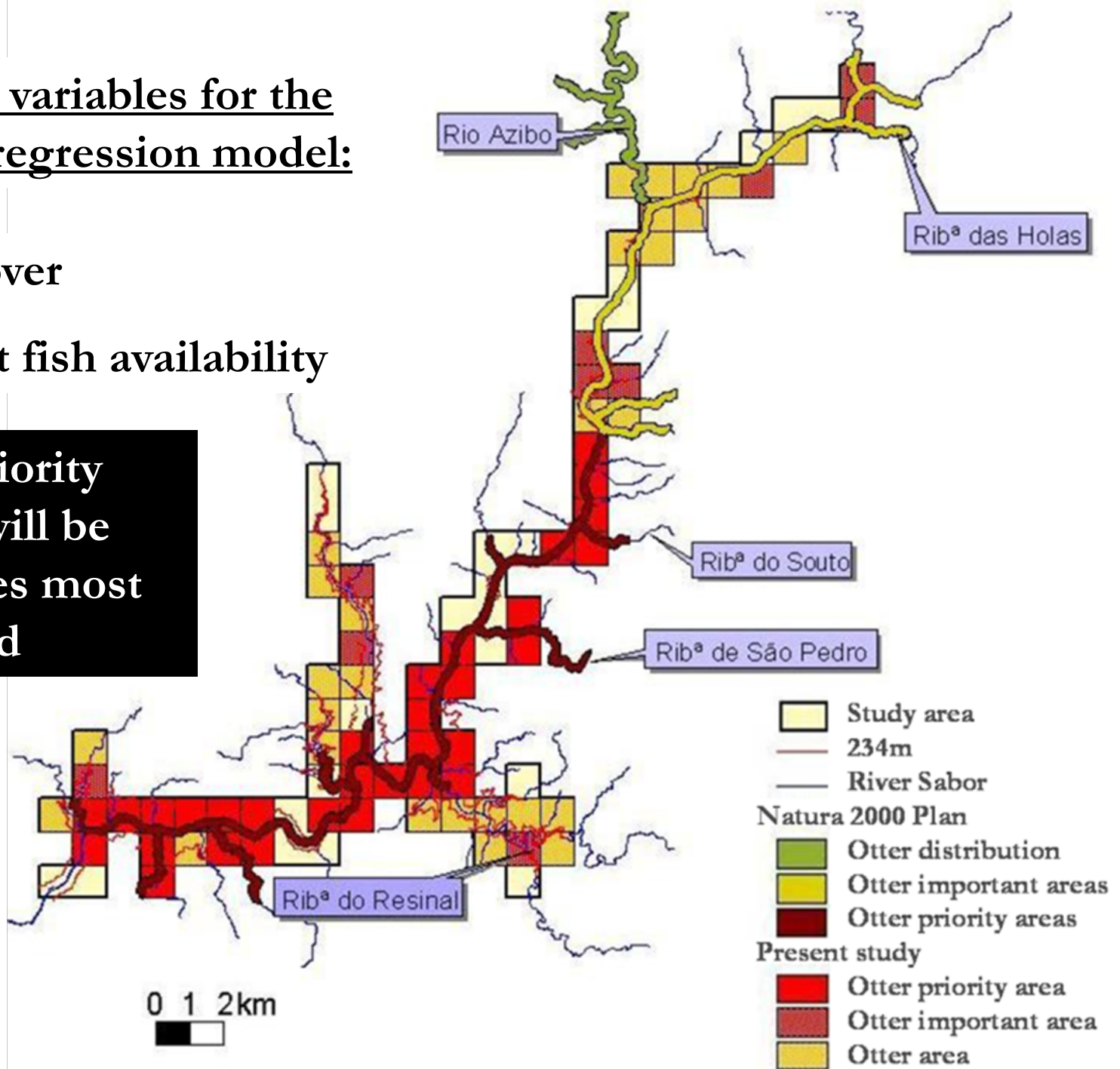


Selected variables for the
logistic regression model:

Undercover

Constant fish availability

The priority
areas will be
the ones most
affected





SABOR DAM



Identification of impacts:

The same as the ones that occurred in the Alqueva Dam, related to deforestation and flooding.

Recommendations for minimizing dam building impact:

Same as the ones presented for the Alqueva Dam

Will they be implemented this time? We will see.....

preparatory works are already beginning in 2009.....



Learned lessons regarding future EIA processes



Scale:

Adequate for understanding impact (1x1km)

Survey methodology:

Adequate (200-600m transect, presence/absence)

Season:

time of the sampling, an imposition of the Environment Impact Assessment timetable, may have constrained the real impact.

Less otter presence; no desman presence; may lead to underestimation to importance of study area and less preoccupation with impact minimization



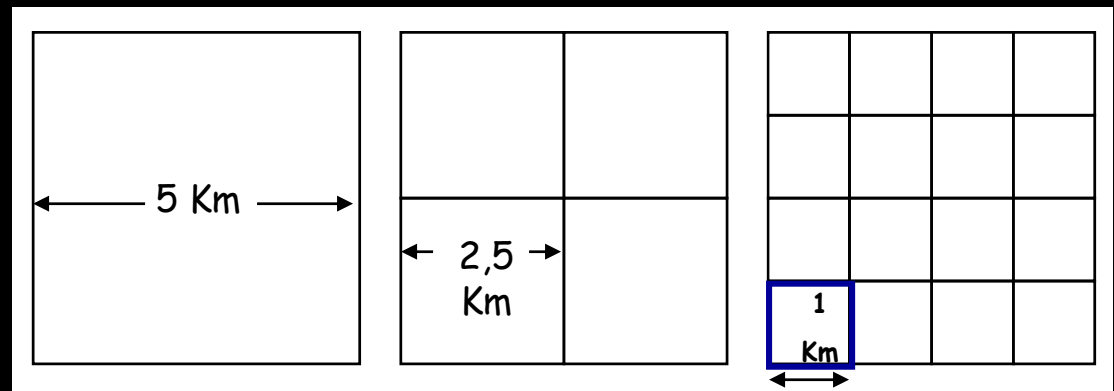
GENERAL CONCLUSIONS FROM BOTH WORKS REGARDING EIAs



Several constrains were identified and need to be corrected in future Environmental Impact Assessments and Monitoring Programs implemented in Portugal.

1) The scale of sampling, being sensitive to the nature of the study and the ecology of the target species Sampling at large scales, the finer habitat selection characteristics are “dissolved”

Problem: most EIA deal with several target (and even groups) species: e.g. mammals, birds, fish.....





GENERAL CONCLUSIONS FROM BOTH WORKS REGARDING EIAs

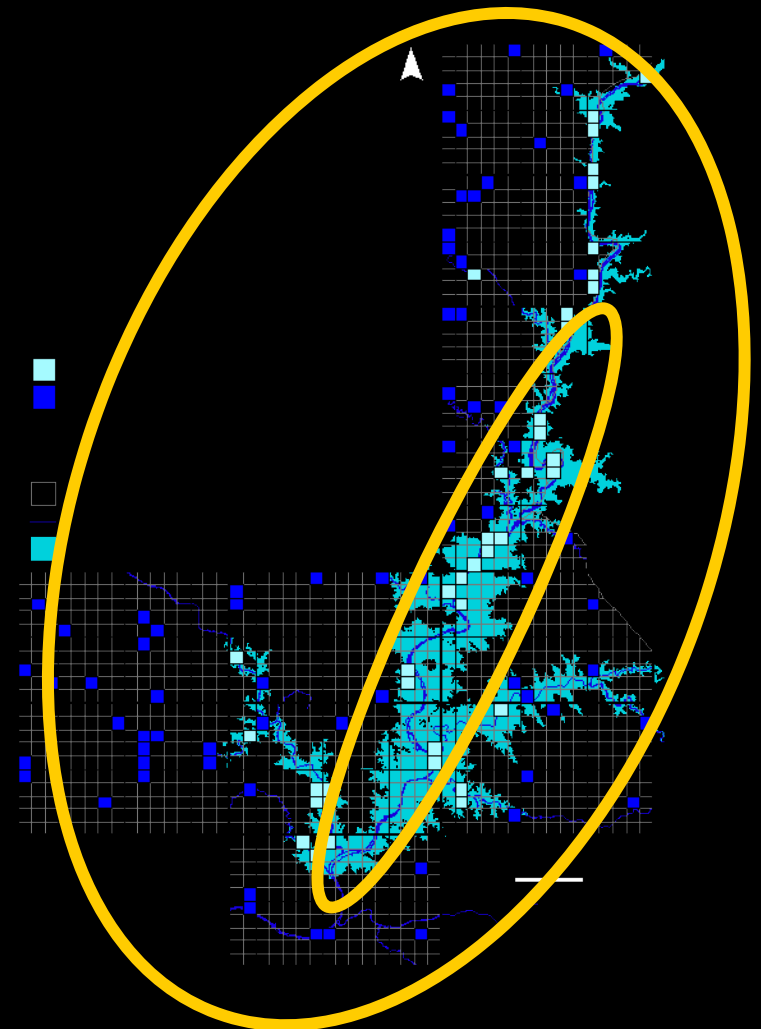


2) DAMS:

Monitoring covered should not
only the area to be flooded

but also the surrounding area
allowing for a better
understanding of the otter
population adaptation

(problem? Time and money)





GENERAL CONCLUSIONS FROM BOTH WORKS REGARDING EIAs



3) Legislation regarding implementation of minimization programs should be **efficient** - there should be a final balance to decide if monitoring program was adequate and, if not, legally adjust it

4) Companies responsible for implementations of large infrastructures should be **subjected to effective evaluation** for incompliance with proposed minimization and compensation measures



AND OTTER?



5) Member States (and European Commission?) uses the implementation of species studies as a minimization measure, but in reality, not true.

6) Importance of otter in Portugal is almost none regarding EIA

- Reflex of downgrading species status

CAREFUL: we are losing capability to protect habitats “using” otter!!!!!!!!!!!!!!



Thank you for your attention!