EVALUATION OF THE IMPACT OF WATER MANAGEMENT OF THE EBRO RIVER IN FLIX ON THE REPRODUCTIVE SUCCES OF BIRDS IN THE RESERVA NATURAL DE SEBES

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Introduction

The Reserva Natural de Sebes i Meandre de Flix is a protected natural area in the final stretch of the Ebro River in Catalonia. The Grup de Natura Freixe (GNF) is responsible for managing this wildlife reserve and implementing various conservation projects to protect species and their habitats.

The reserve is located very close to a dam, which has raised concerns regarding hydrological management practices and their potential impact on native bird species. A decontamination barrier constructed in 2012 in front of the Reserve also needs to be considered.

To assess these impacts, the GNF proposed a collaboration with the UAB to study the effects of the hydrological management on the breeding succes of two bird species that nidify near water: the Great Reed Warbler and the Reed Warbler.

Figure 1. Reserva Natural de Sebes map

Objectives

REPRODUCTIVE PERIOD: 1999 → 2022

1. Evaluate **CAPTURE TRENDS** and **REPRODUCTIVE SUCCESS**
2. Asses the influence of **WATER LEVEL VARIABILITY** and **LOCAL RAINFALL**
3. Determine the potential impact of **Hydrological management** and **Protective barrier**

Great Reed Warbler [1]
(Acrocephalus arundinaceus)

(European) Reed Warbler [1]
(Acrocephalus scirpaceus)

Development

To achieve the study's objectives we used the data from:

RINGING DATABASE → collected by the collaborating entity since 1999

WATER LEVEL RECORDS
- EMBASSAMENT piezometer: at the dam, collected by SAIH since 1999
- CIGONYES piezometer: at the Reserve, collected by GNF since 2011

PRECIPITATION RECORDS of the geographical region, provided by SAIH (Hidrographic Confederation of the Ebro river)

Data selection:

BREADING SEASON MAY - AUGUST

BIRD SPECIES
- **GREAT REED WARBLER**
- **REED WARBLER**
- **CETTI'S WARBLER** *(Cettia cetti)*
- **COMMON NIGHTINGALE** *(Luscinia megarhynchos)*

Classification:

Juveniles | Reproductive adults

EURING 4, 6

EURING 3

EURING 4, 5, 6

Water levels: analyzed on a daily and weekly basis. **Standard deviations** providing insight into the fluctuations in dam water levels with boxplot graphics

Results

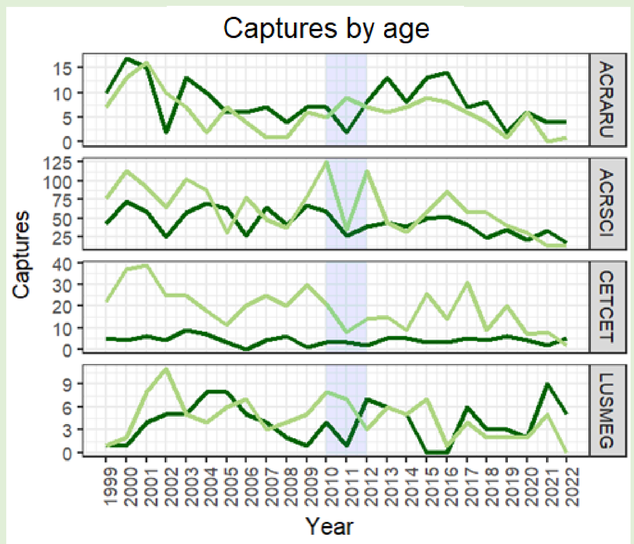

Figure 2. Anual captures by age of the 4 species during the breading season.

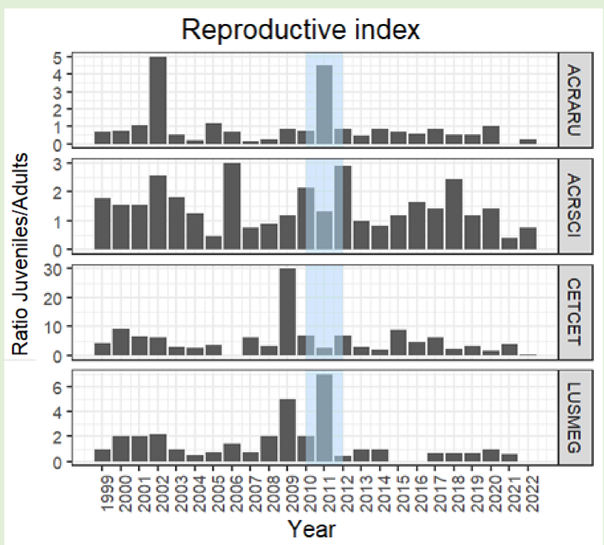

Figure 3. Yearly reproductive index (Juveniles / Reproductive adults ratio). Blue zone represents the building of the barrier.

TOTAL & **JUVENILE** captures decline
Great Reed Warbler, Reed Warbler and Cetti's Warbler statistically significant (p-value< 0.01) with linear models.

ADULT captures decline, only significant in Reed Warbler.

Lots of variability. Difficult to see trends. Some extreme values in species with low N.
Statistically significant decline in Common Nightingale reproductive index with linear regression model.

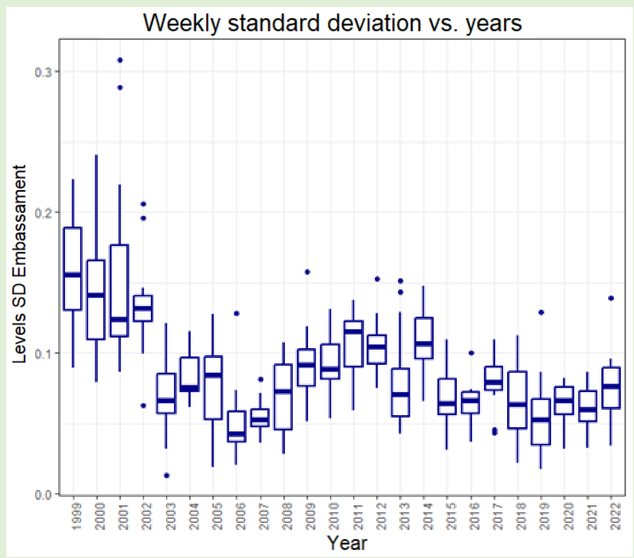

Figure 4. Weekly standard deviation in EMBASSAMENT from 1999-2022.

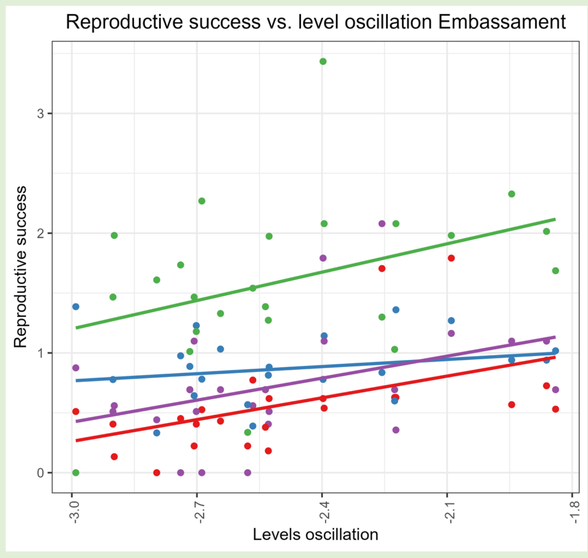

Figure 5. Linear regression model between reproductive success (reproductive index) and water levels oscillation in Embassament (weekly SD).

More variability and oscillation of water levels during the firsts years of study.

Linear models explain a positive correlation between water levels oscillation and reproductive success, significant on Great Reed Warbler and Cetti's Warbler. ($R^2 = 0.23$, $F = 6.58$, p-value<0.01)
In Cigonyes we have too low number of observations to fit a model but in graphics relating reproductive exit with Cigonyes oscillation we see opposed tendencies (clear negative tendency in Cetti's Warbler). Therefore, further investigations are needed to clear the real effect of oscillations.
In our study, precipitation had no significant effect on the reproductive success.

Conclusions

Negative population trends in Great Reed Warbler, Reed Warbler and Cetti's Warbler, specially juvenile captures significantly decreasing every year.
Negative tendency in the reproductive success of Common Nightingale.
Positive and significant relation between water level oscillations and the reproducitve success in Great Reed Warbler and Cetti's Warbler is probably related to a confounding bias, creating a casual relation.
Further studies targeting water rebound, following nests or selecting critical periods are needed.

References

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GRUP DE NATURA FREIXE
Natura, territori i persones