SWIFT TOWERS AS OPEN RESEARCH LAB: THE EXPERIENCE OF A NETWORK OF NESTING SITES IN NW ITALY

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31.05.2024

Swift towers in NW Italy

We are studying since 2018 some structures used by Common swifts *Apus apus*

We mapped them in NW Italy (some of them are mapped in a poster!)

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Studied sites

Three structures:
- Jerago con Orago (VA): 105 cells
- Azzate (VA): 200 cells
- Cuggiono (MI): 299 cells

One public building
Two private buildings

Materials and methods

Monitor weekly during the breeding season (three colonies)

Cork coaster as nesting attractants (two colonies)

5 IoT tracking devices on breeding individuals (one colony)

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Materials and methods

We test the effect on reproductive phenology and population parameters of meteorological data in General Linear Models (Gaussian)

Attractant and (re-)colonization: Generalized Linear Models with binomial error distribution (dependent variable: 0 non-used; 1 used)

Tracking system is based on SigFox IoT network. Daily travel distances and movement metrics calculated in R

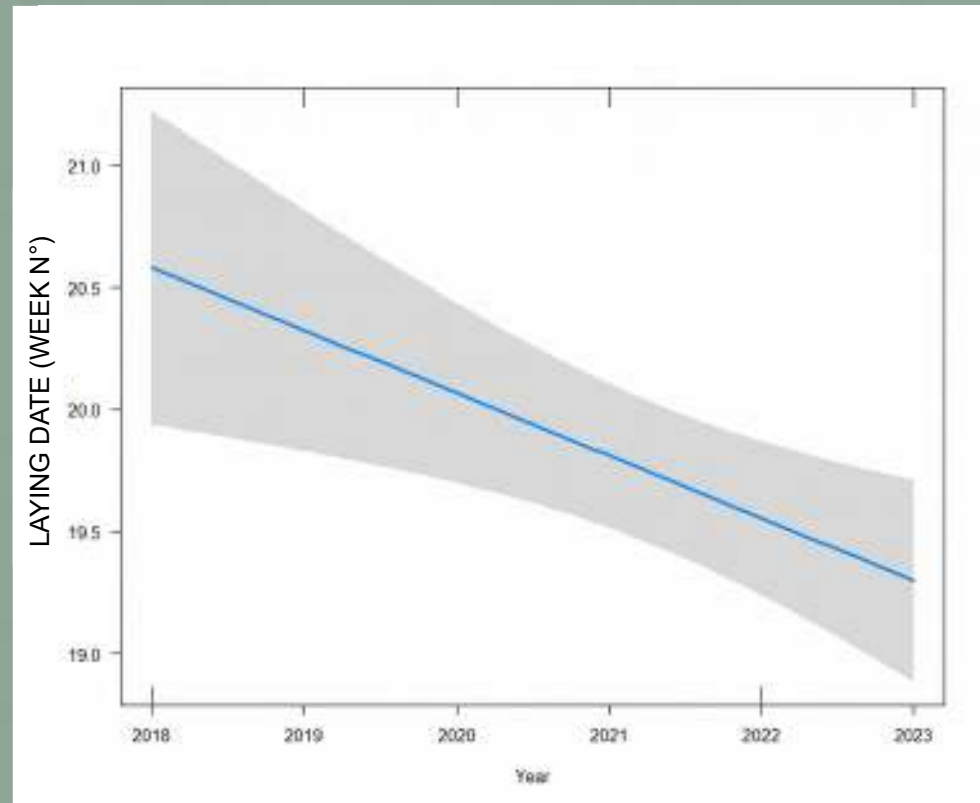# Results 1/3 – phenology

EARLIER DEPOSITION

Impressive trend of earlier deposition dates (1 week in 6 years)!

This is likely to be a direct effect of spring warming, in line with several publications

NOTE: the frequency of data collection (weekly) do not allow to observe finer advancement in laying date (i.e. below 1 week). It is noteworthy that we found in any case such a strong effect!

Results 1/3 – phenology

TEMPERATURE AND RAIN EFFECTS

- The medium temperature of April and May influenced eggs laying: the warmer the years, the earlier swifts lay their eggs. It is not a spurious result because the medium temperature throughout the years does not increase.
- The more often it rains, the later swifts lay their eggs.

However, accordingly to our models, temperature is the factor that most influences egg deposition.

LAYING DATE (WEEK N°)

MEAN TEMPERATURE (C°)

LAYING DATE (WEEK N°)

RAINY DAYS IN APRIL (N)
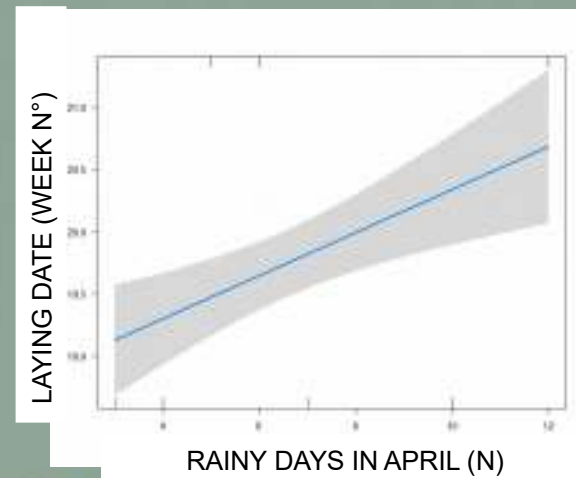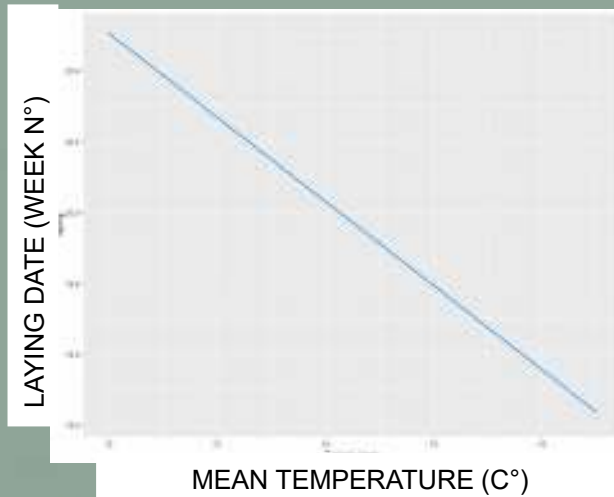
Results 2/3 – cork coaster

OLD NESTS vs CORK COASTER and EMPTY CELLS

Cavities with old natural nest are preferred over empty ones, but also over those with unused coasters.

Factor	Estimate	SE	z	p
Intercept	2.53	0.74	3.43	<0.001
Empty cavities VS old nests	-6.18	1.02	-6.03	<0.001
Coark coasters VS old nests	-5.00	0.85	-5.89	<0.001
Cuggiono VS Azzate	-1.41	0.8	-1.75	0.081
Cork coaster * Locality	2.70	1.14	2.38	0.017
Old nest * Locality	2.03	0.97	2.10	0.036

Results 2/3 – cork coaster

CORK COASTER vs EMPTY CELLS

Since the two colonies have a different histories (in Cuggiono the colony was almost extinct due to bad maintenance), we verified only in this colony whether the positioning of cork coasters could accelerate recolonization.

| Factor	Estimate	SE	z	p
Intercept	-0.56	0.17	-3.27	0.002
Coark coasters VS Empty cavities	0.63	0.24	2.65	0.008

We found that in this colony, cells with cork coasters had a significantly higher probability of being occupied than empty cells.

Therefore, in 'swift walls/towers' with many empty cells, the use of cork coasters is an effective accelerator of colonization.

Results 2/3 – cork coaster

PROBABILITY OF CELL OCCUPANCY
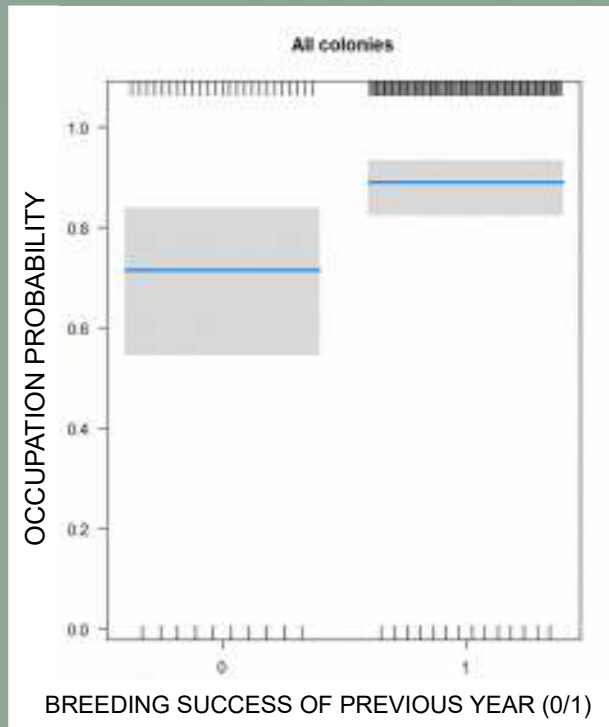
The cells where successful reproduction occurred (in the previous year) are significantly more occupied than those where reproduction was unsuccessful
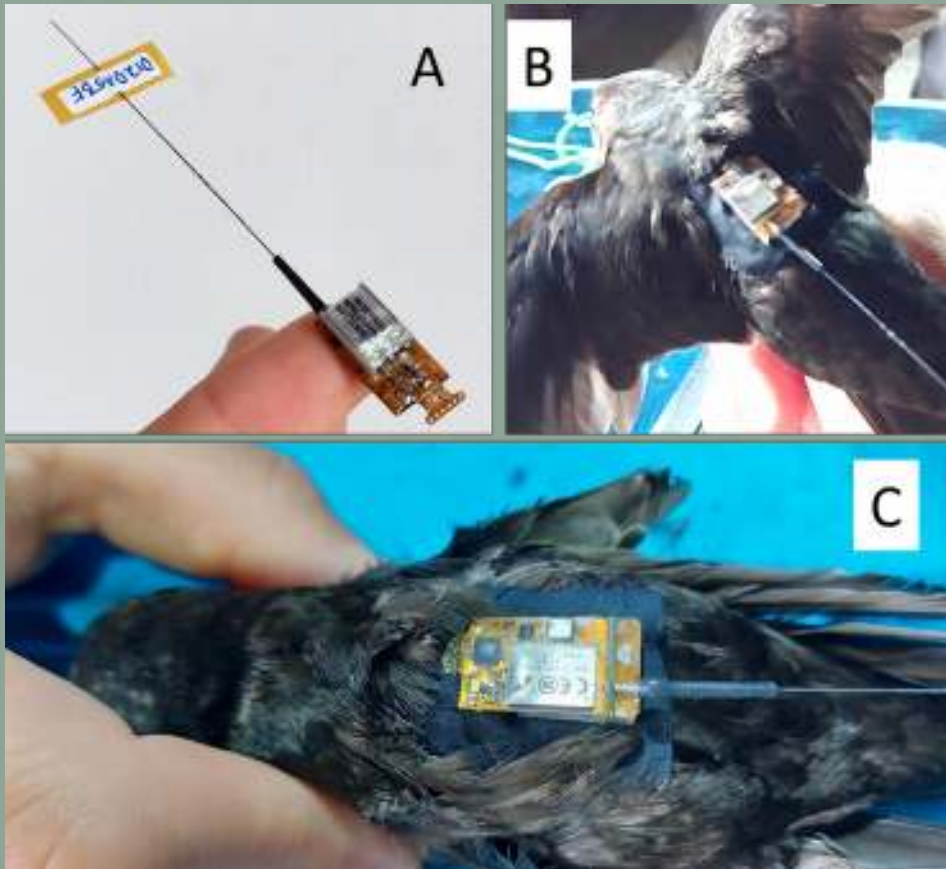
(considering only the cells where nesting occurred in the previous year)

Strong effect $p<0.001$ (binomial GLM)

DEVICES AND MIGRATION

- Quality of the data is acceptable
- Inaccuracy in the locations and their frequency (12h) still prevent the possibility of using these for a detailed study of the foraging ecology
- Devices were deployed without a harness and were well tolerated by the birds, suggesting this may be a common way to deploy swifts in the future
- **Birds were back in 2024 safe and without the devices, so they successfully lost them as predicted**

DEVICES AND MIGRATION

- All of the five devices successfully transmitted data (92 valid locations: 62 were accompanied by the estimation of the location error)
- On average, the devices collected 19 locations each (min 6, max 45), with an overall average error of 7.44 km (max: 15.6 km; min: 3.4 km; sd: 3.55 km)
- 4 devices collected information on movements likely related to foraging, close to the colony
- 1 individual left the colony and started post-nuptial migration (tracked July 1 - July 16)
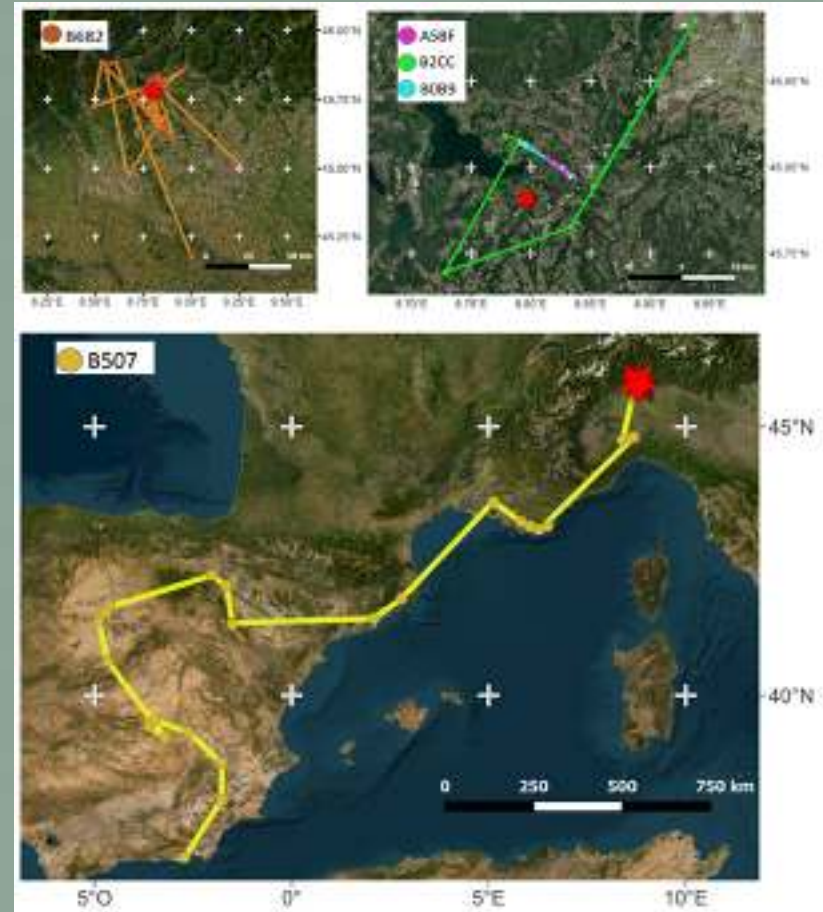
Conclusion

- Swifts' breeding phenology is quickly responding to global change, most likely due to spring warming

- Cork coasters may be an effective tool to accelerate re-colonization of (near to) deserted swift walls/towers

- In old, well established colonies, the effect of cork coasters in favouring occupation is positive but negligible

- Remote tracking of swifts is now reliable, with further technical improvement of IoT devices may soon will gather data of higher quality

- Swift walls/towers are a valid open laboratory for training and involving new volunteers

Thanks for your attention

Thanks to our associations, the institutions and all the volunteers and collaborators:

Emilio Aliverti, Roberto Ambrosini, Franco Aresi, Davide Biganzoli, Rebecca Carente, Samuele Cassani, Elena Castoldi, Costante Cavallaro, Gisella Cirigliano, Alessandra Costanzo, Antonella Cresci, Francesca De Maria, Vincenzo Di Michele, Antonio Ferrari, Giorgio Ginelli, Andrea Miglierina, Eleonora Montani, Ismaele Nabil, Zaccaria Nabil, Ennio Pisoni, Federica e Giuseppe Teti, Bruna e Walter Tres

31.05.2024