



4th Training Seminar

"Management and conservation of the species *Larus audouinii* & *Puffinus yelkouan*"

The Yelkouan Shearwater *Puffinus yelkouan*. Biology ecology, threats and distribution in Greece and Italy



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Με τη συγχρηματοδότηση
της Ευρωπαϊκής Ένωσης







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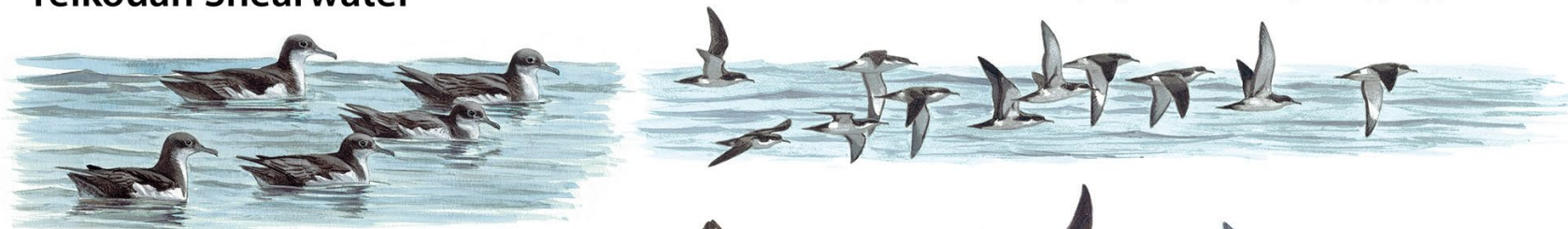
Pelagic seabird; spends most time at sea
 Gregarious; Flocks few birds to thousands;
 Quick wingbeats, often seen in flocks; close to the surface
 Forages in flocks, regularly travel thousands of nm
 Endemic of Med islands, winters in Mediterranean and Black Sea



medium-sized seabird with highly contrasted belly and back,
fine beak and marked angle with the head

Yelkouan Shearwater

passage tends to occur in compact flocks, 'pulsing' past low over sea



rump-side notch may be
clean white, like Manx,
or washed brownish like
Balearic

often washed
brownish

narrow 'wedge' of white
due to all-dark lateral
undertail coverts

at times, no
projection of toes
visible, possibly
due to feet being
carried in forward
position?

projecting toes can create
impression of remarkably
attenuated rear end

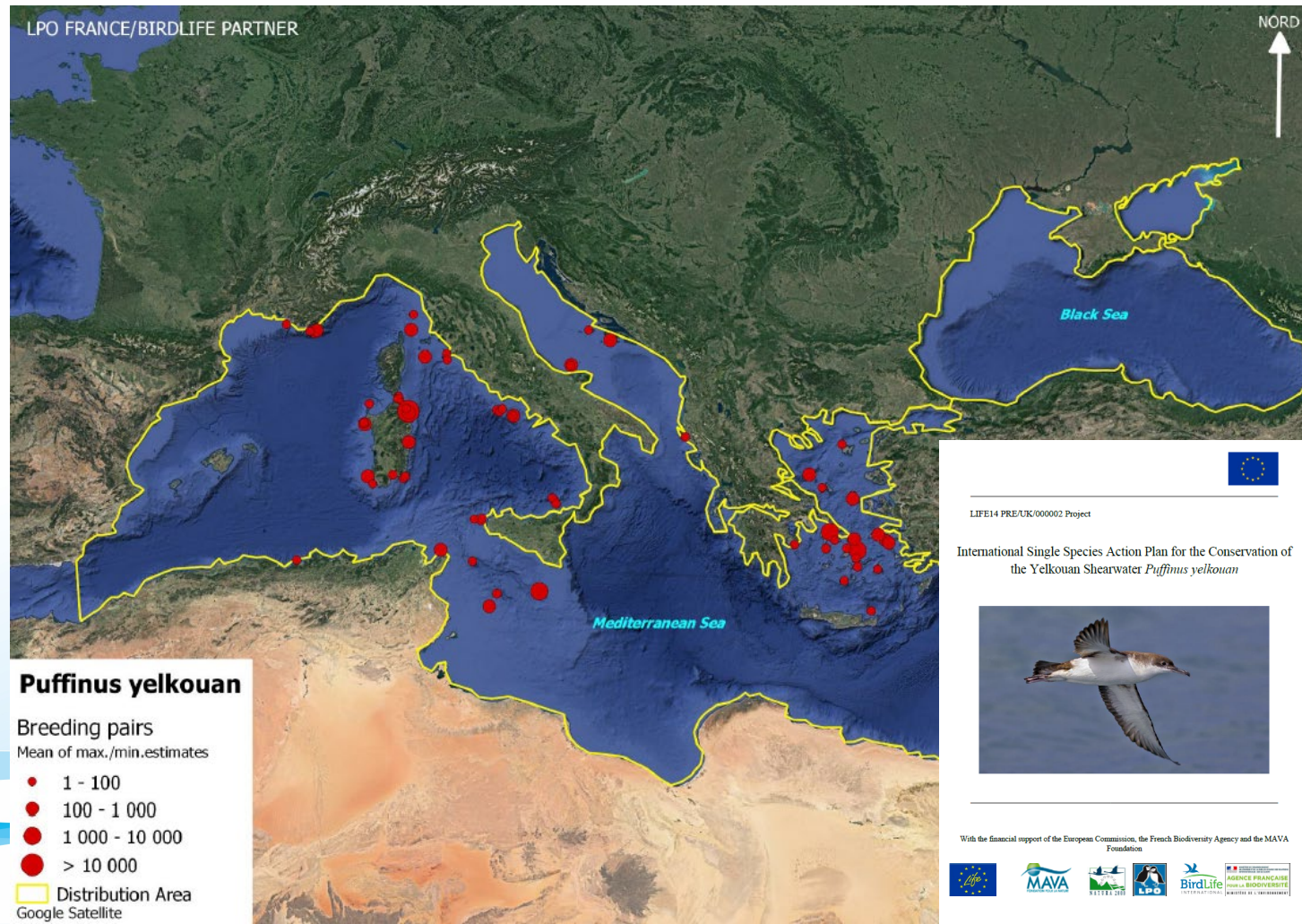
worn birds may
develop pale
patch

typically, toes
project clearly
beyond tail

usually looks blackish above,
a shade darker than Balearic;
'blackness' depends on the light
conditions

worn, faded plumage
is more brownish





Species Action Plan
(Gaudart et al. 2018)

















Breeding phenology

	March			April			May				June			July				August					
Greece					I	I	I	I	I	I	I	I	H	H	C	C	C	C	C	C	C	F	F
Rest Med		I	I	I	I	I	I	H	H	C	C	C	C	C	C	C	F	F					

- Monogamous
- Birds attend breeding colonies on land only during the breeding season
- Adults reach colony sites approx. between Nov-Dec in IT, Jan-Feb in GR
- Pair meets and mate in nesting burrow
- Asynchronous, with large phenological differences between populations
- Lay one egg per season
- In Italy egg-laying starts around mid-March, in Greece mid – April
- Both adults incubate their egg alternating for c. 50 days
- Chick fledges after 2 months – IT end July, GR end August



Nocturnal behaviour



Like all pelagic species, they return to the colony only at night,
after moonset

They create **rafts** on the sea surface at sunset and await till
dark to enter colony

Adaptation to avoid terrestrial and avian predators

Locate mate with calls

Pair bonds and then partner leaves to feed









Breeding colonies



Needs uninhabited islets to breed and/or cliffs of larger islands.

Mostly in inaccessible cliffs, or in deep burrows under large boulders.

Sometimes (IT, MT) there may be communal nesting in large caves





Breeding colonies

Suitable habitat



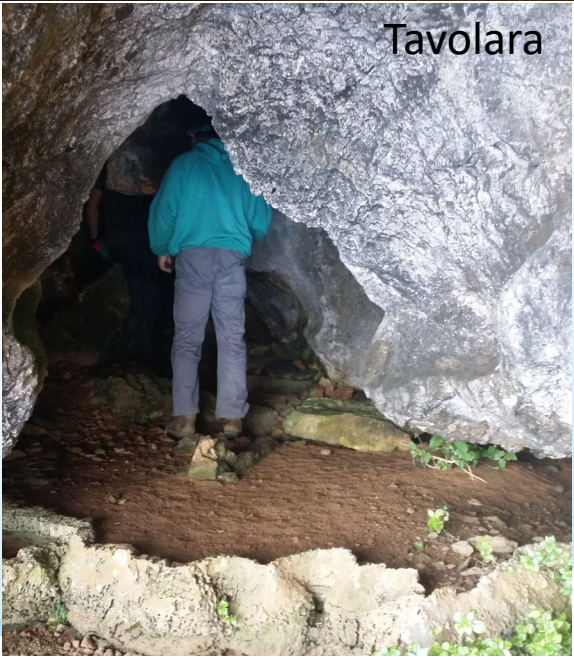
Pianosa



Breeding colonies

Suitable habitat

Tremiti



Με τη συγχρηματοδότηση της Ευρωπαϊκής Ένωσης



Breeding colonies



Breeding colonies

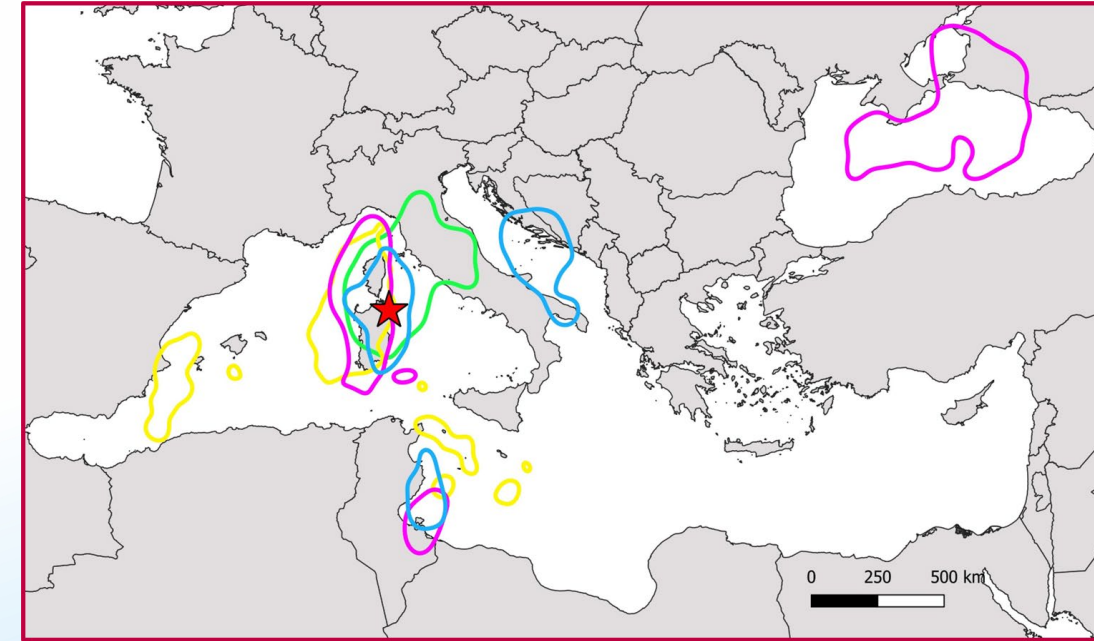
Mykonos colony



Makares colony



Italy - breeding + wintering distribution



Strongholds: Tavolara archipelago (9.9-13.4k) , Lampedusa is. (1k)

c. 45% of population winters in Aegean/Black Sea



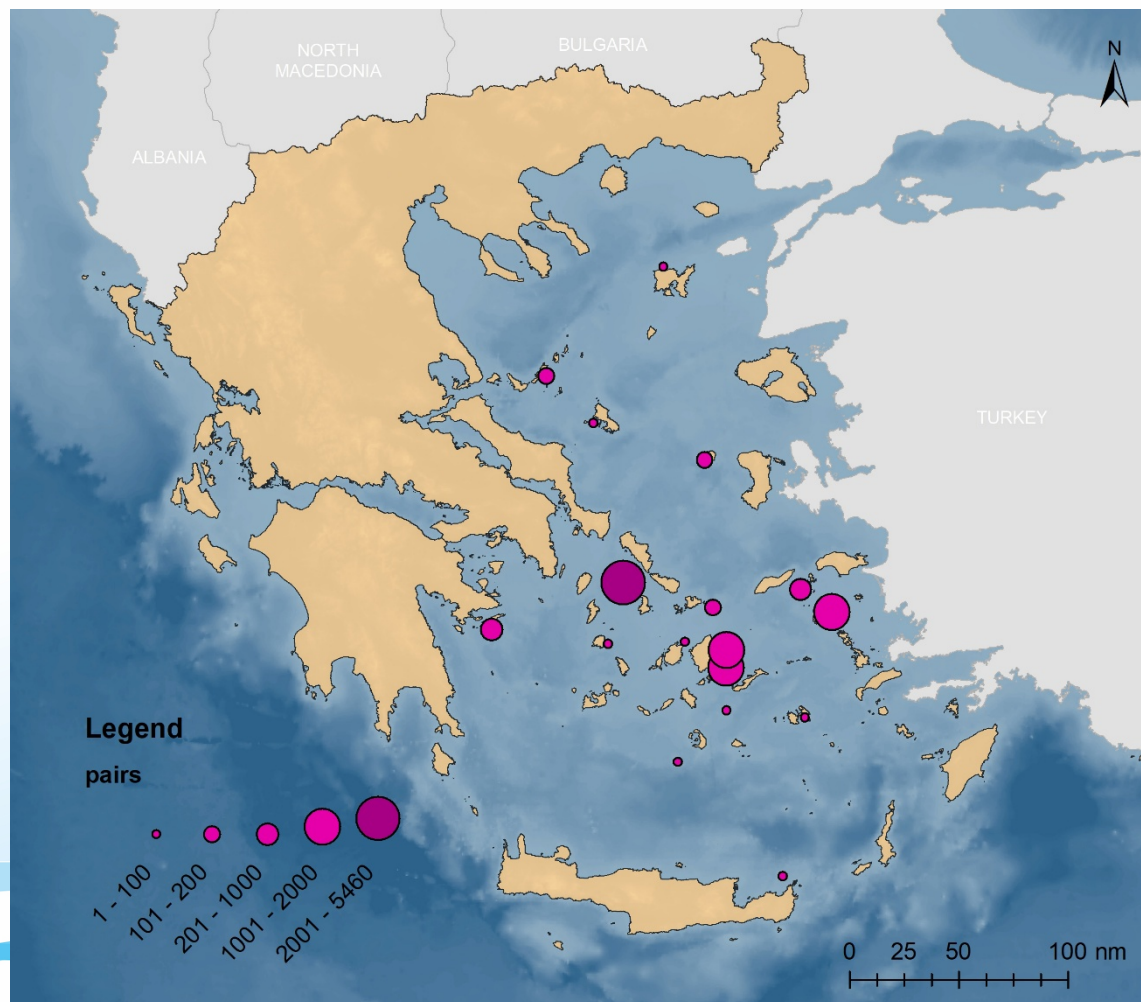
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Unknown % of population overwintering in Aegean.

Probably most overwinter in Black Sea

Greece - breeding + wintering distribution

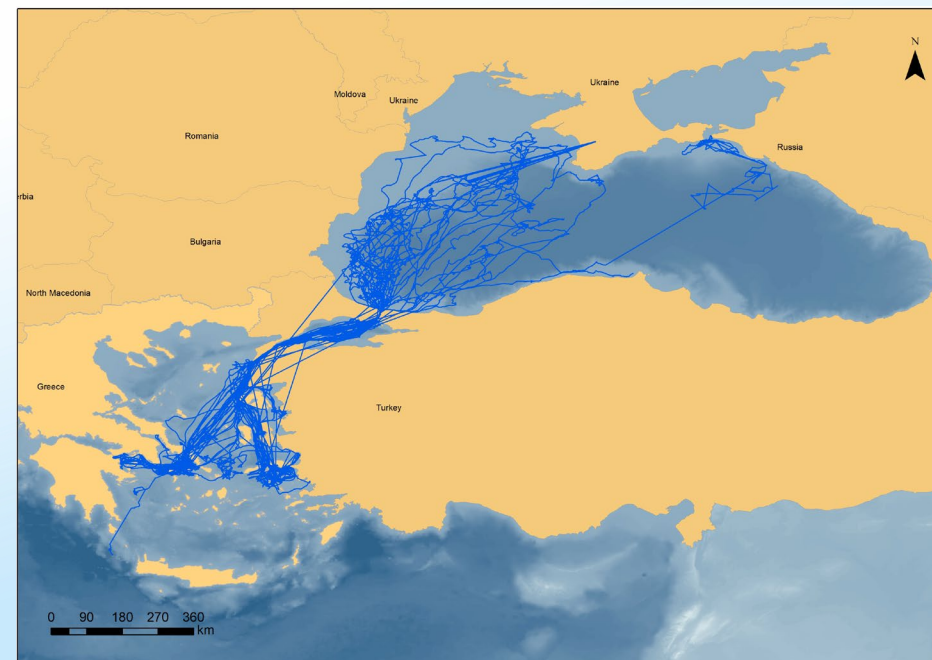
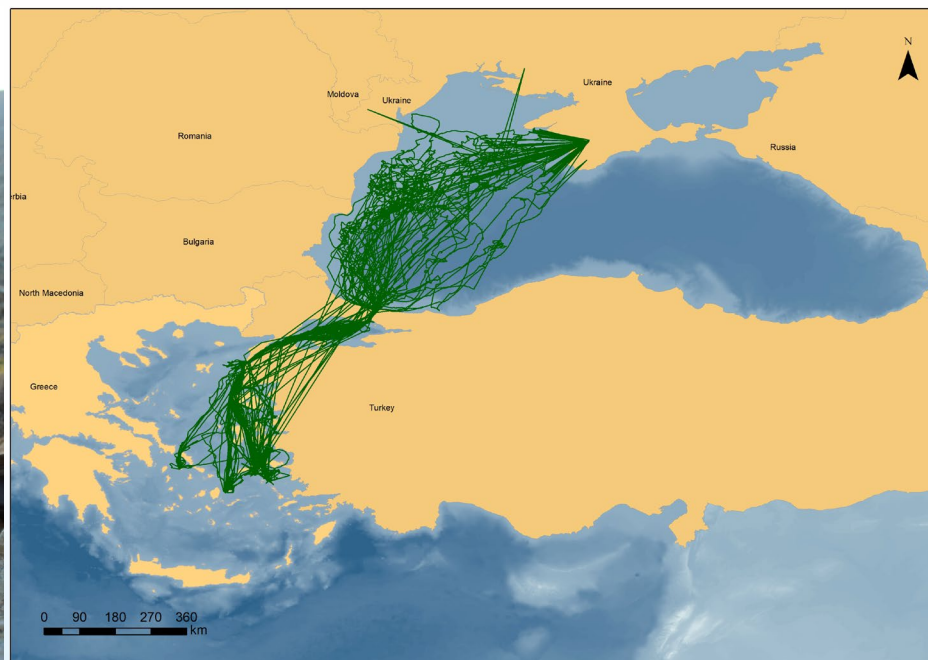


Region_name	min	max
Gyros	3000	7500
Psara	950	1750
Naxos	1000	1260
Arkioi	810	1170
Fournoi	800	1000
Piperi	1000	1000
Leipsoi	630	850
Sikinos	300	500
Gioura	300	500
Psara	150	250
Mykonos	100	250
Peristera	50	250

Greece - breeding distribution

Yelkouan Shearwaters (incubation & chick-rearing stage)

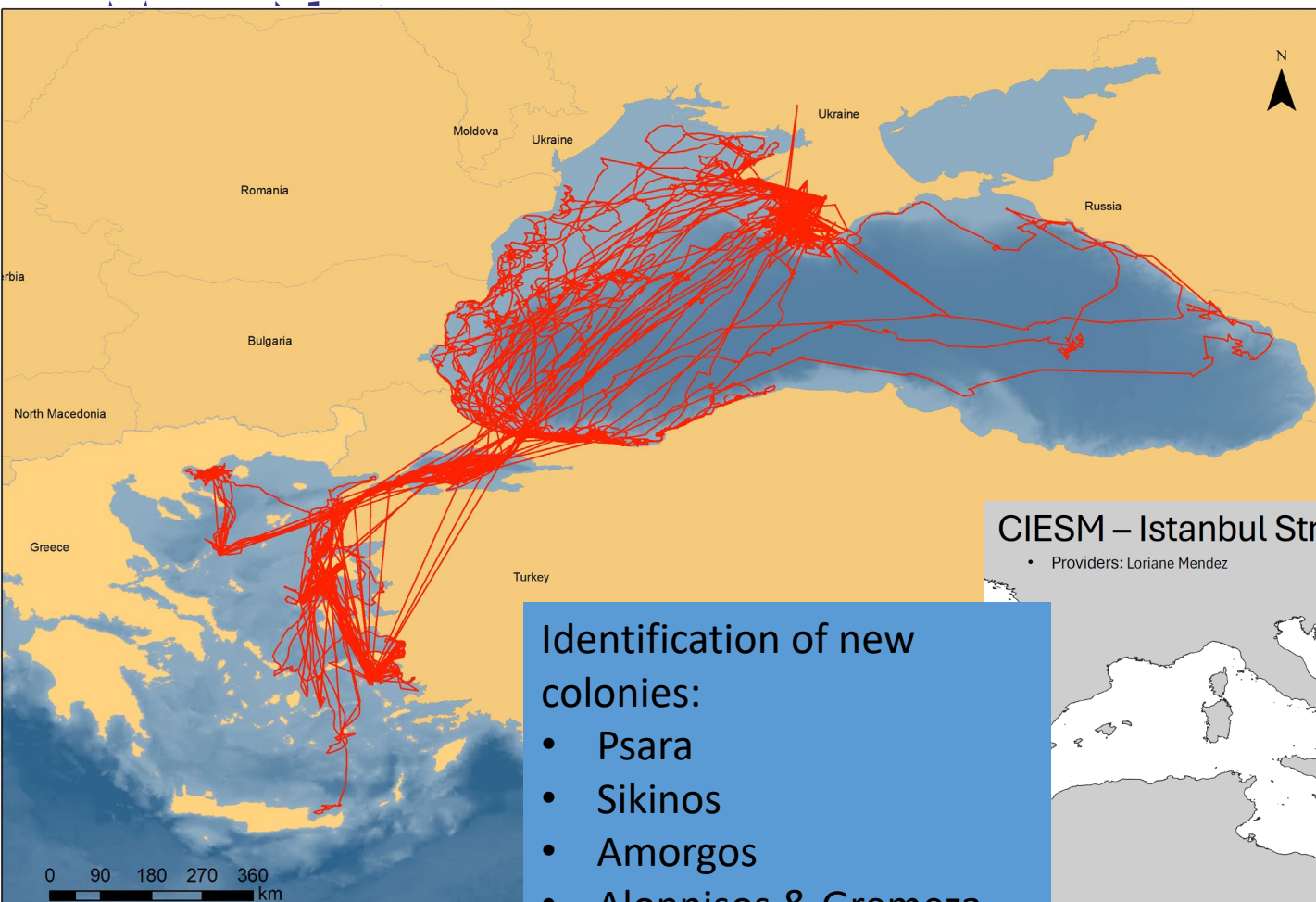
 (Agrilousa, Alatzonisi, Gyaros / Makares) >1500km to Black Sea





Greece - breeding distribution

Yelkouan Shearwaters (pre-laying exodus tagging)
Agrilousa, nesting adults / at-sea Kalloni Gulf

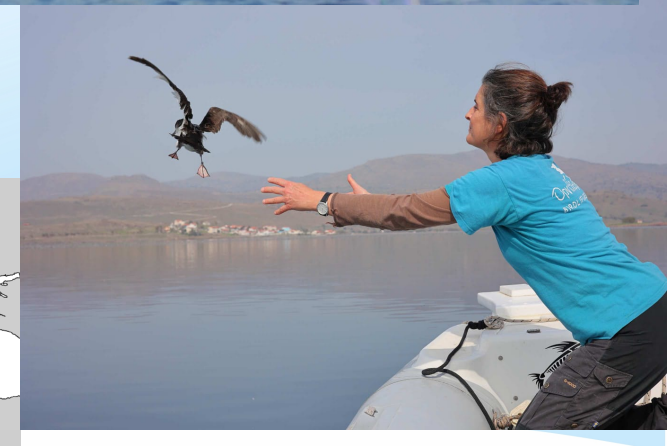
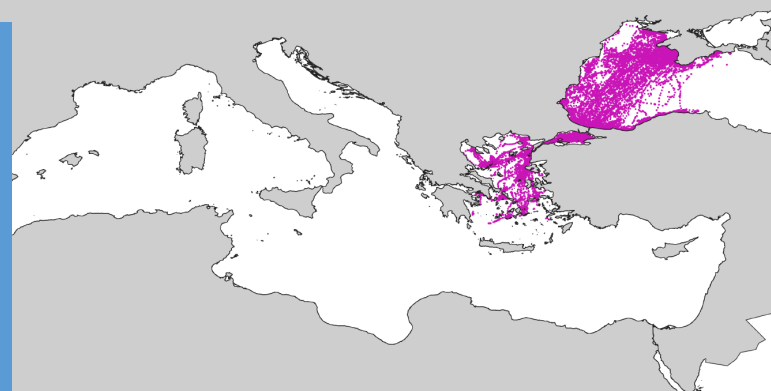


CIESM – Istanbul Strait – GPS data

• Providers: Loriane Mendez

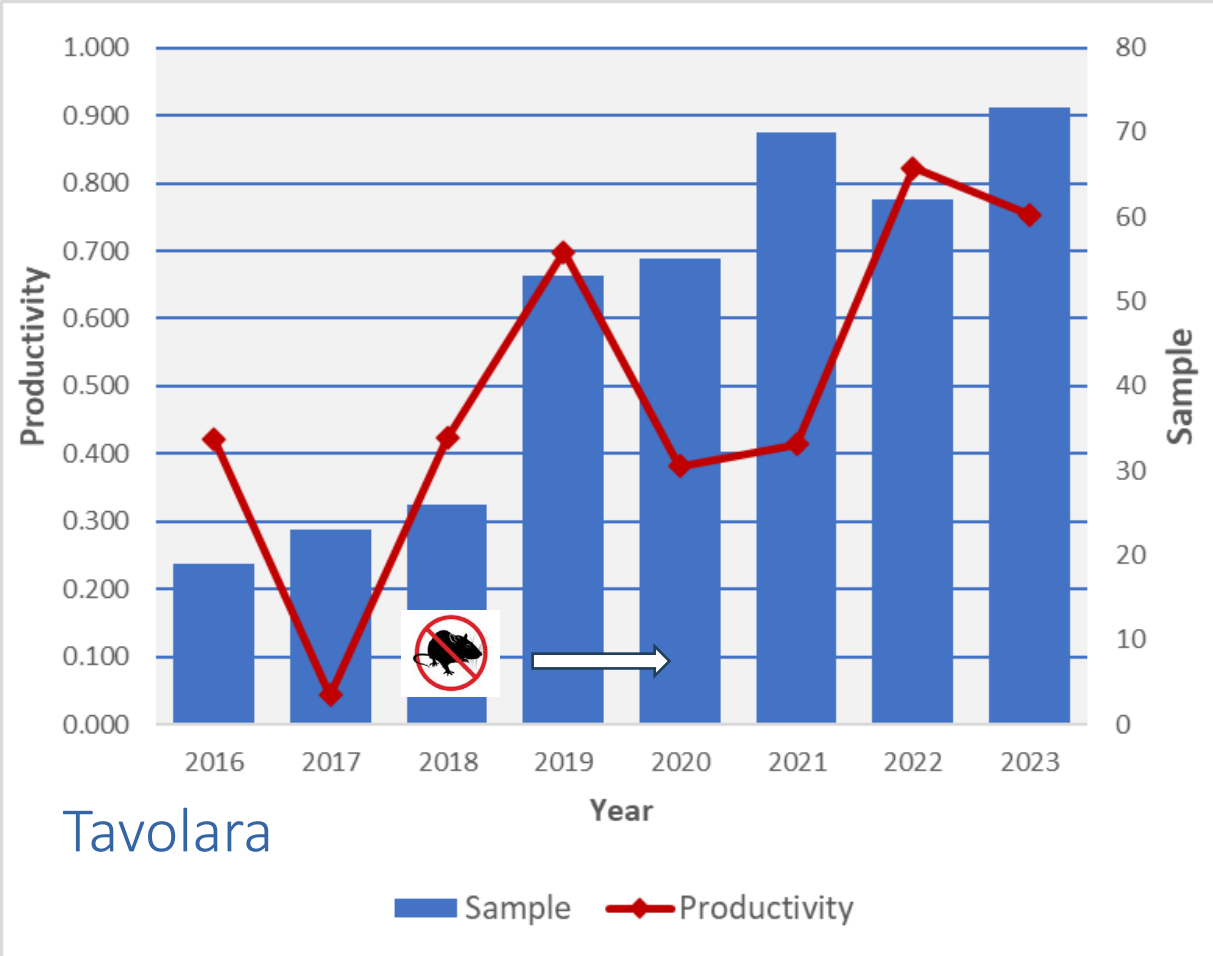
Identification of new colonies:

- Psara
- Sikinos
- Amorgos
- Alonnisos & Gremeza





NON BREEDING SEASON: Longitudinal variation of birds moving to the Black Sea after breeding



Italy – breeding parameters

IT: breeding success low where black rat is present. In rat free islands breeding success improved after eradication, although sometimes unexpectedly low



Greece - Breeding parameters

Agreloussa colony, Arkioi

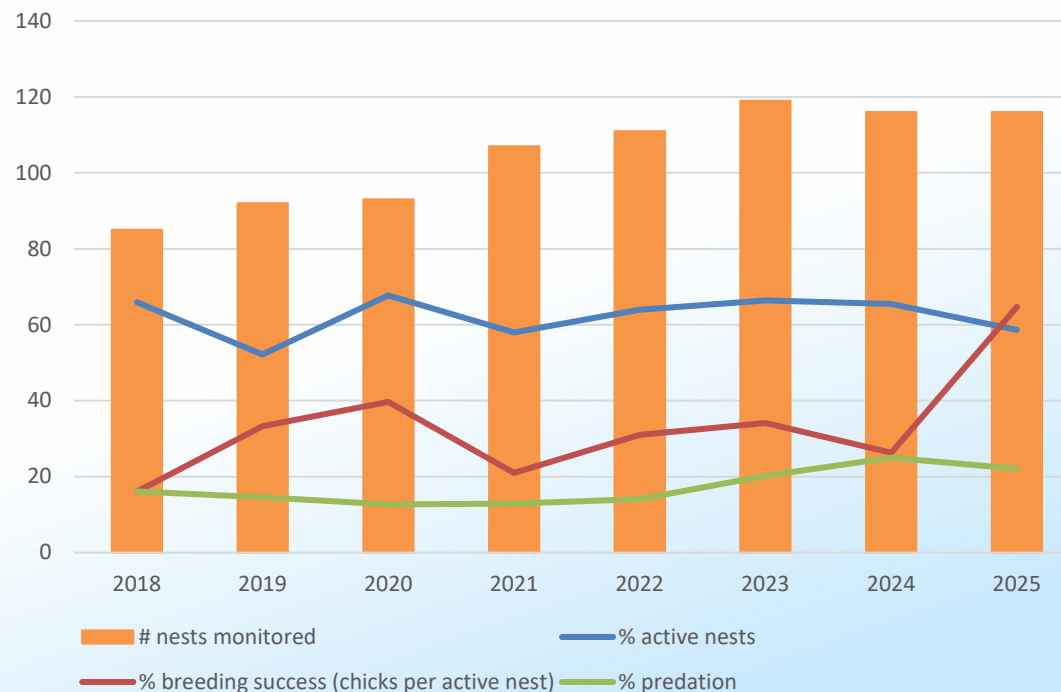
Year	Monitored Nests	Active Nests	Chicks Fledged	%	Phase
2022	45	42	18	42.9	Before eradication
2023	56	50	32	64.0	Year start eradication
2024	66	62	48	77.4	After eradication
2025	73	64	49	76.6	After eradication

Breeding success has increased in Agreloussa colony by 79% following eradication



Greece - Breeding parameters

Gyaros colony



Mean % occupied nests → 62%

Breeding success (fledglings per nest) → 5-30%

Nests with predation signs → 20%



Foraging behaviour

Time-depth-recorders

YS dive predominantly during the day but show peaks in foraging activity at dawn and dusk

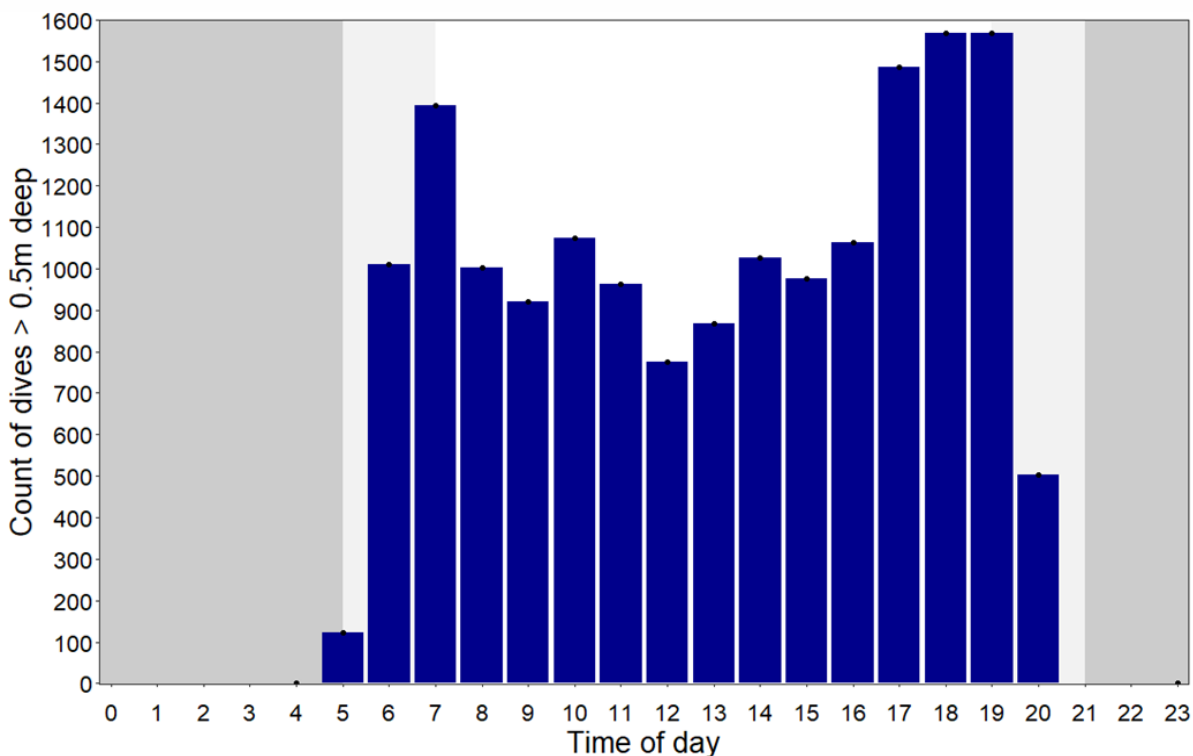
Majority of dives short and shallow (<5m) and only 7.5% of dives deeper than 20m.

Max recorded depth was 51.6m.

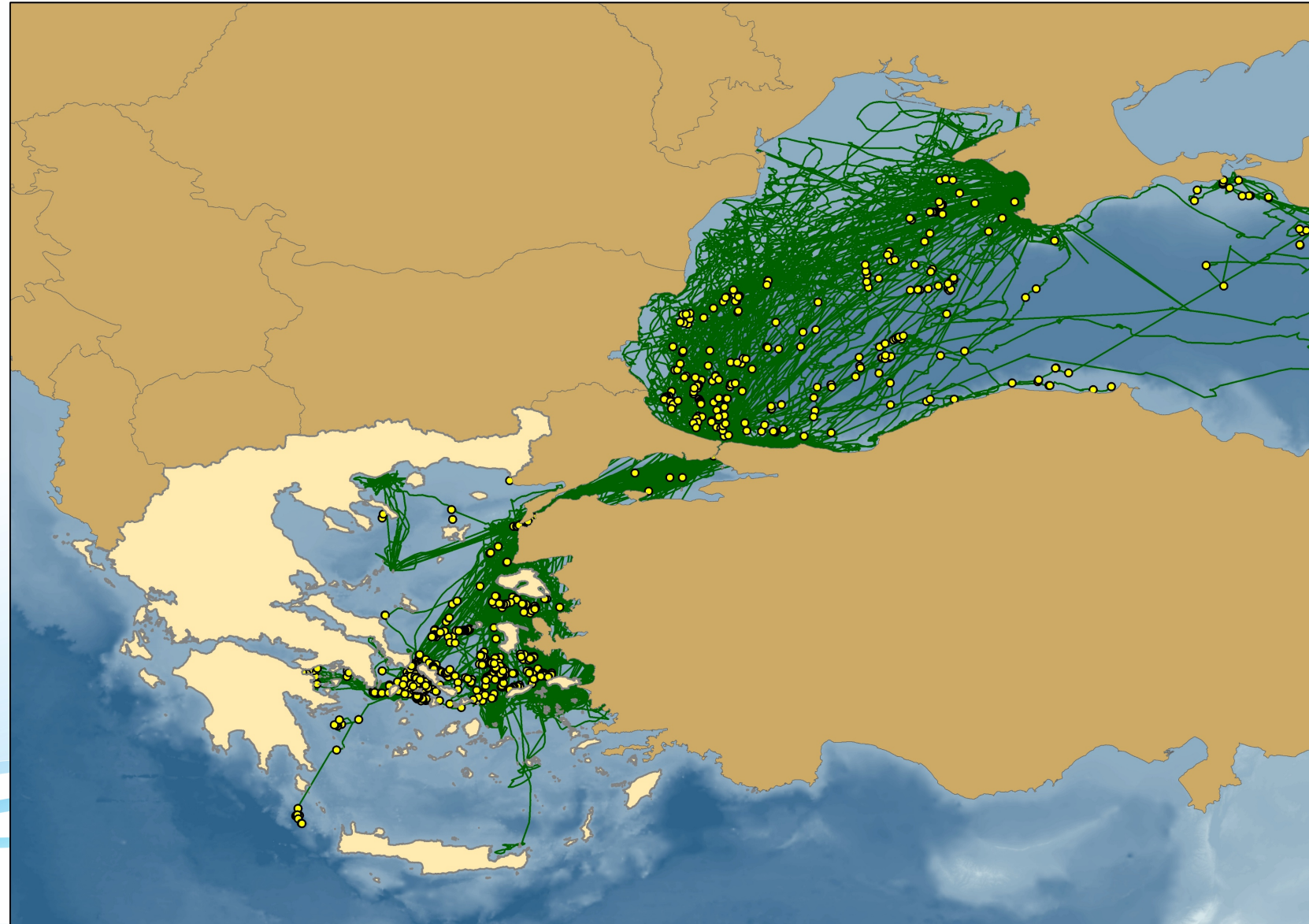
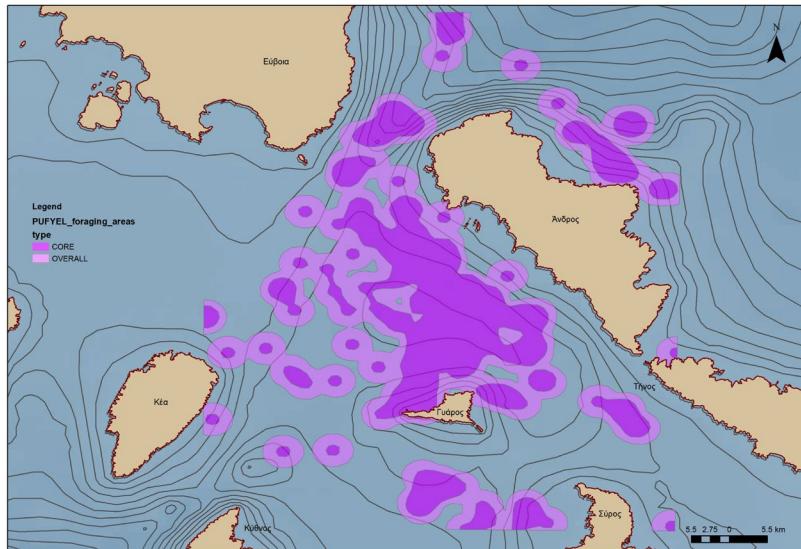
Dives were deeper, and bottom time longer in shallow coastal waters (<50m depth)

This has important implications when promoting night setting with fishermen because deviations from nocturnal hours might increase bycatch risk

Austad et al. 2024 – LIFE PanPuffinus

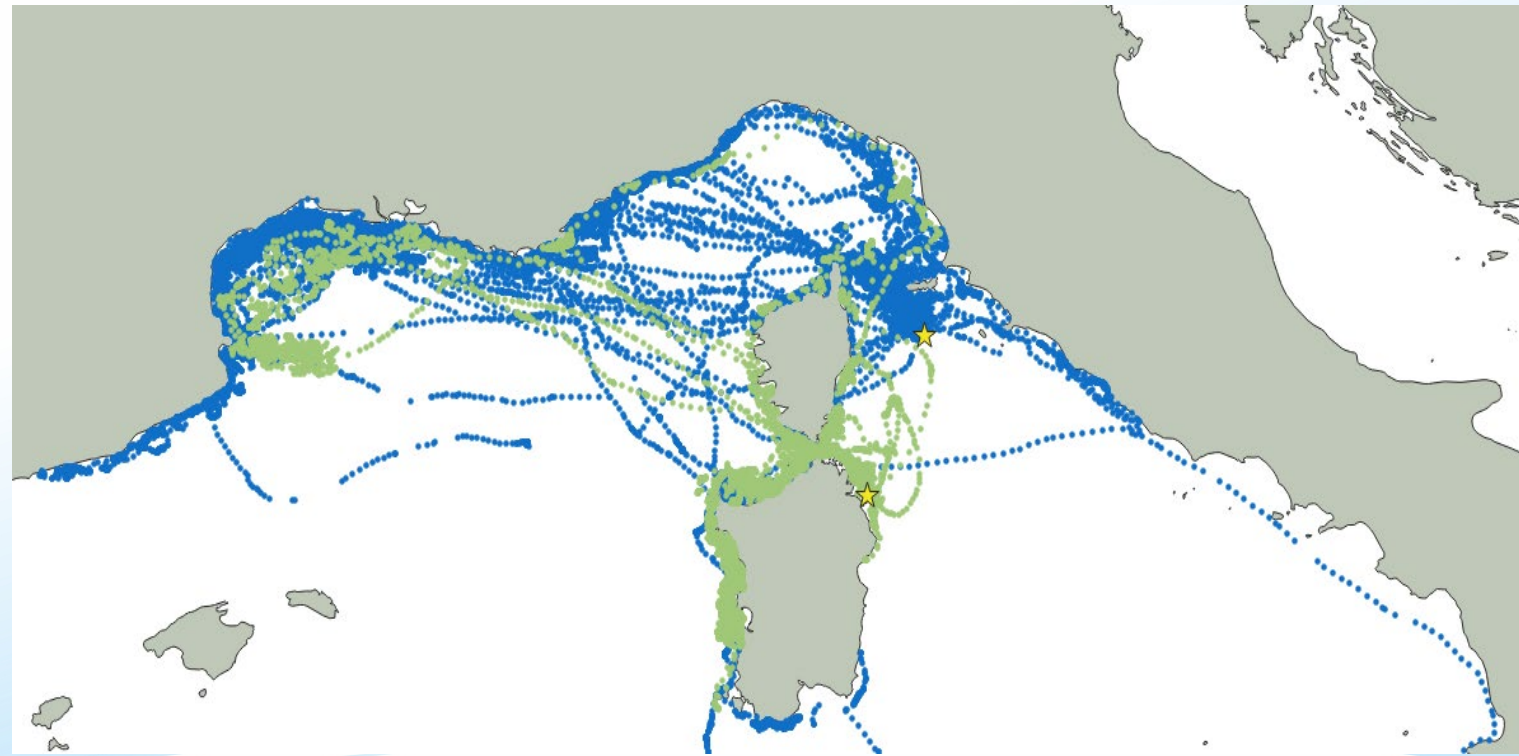
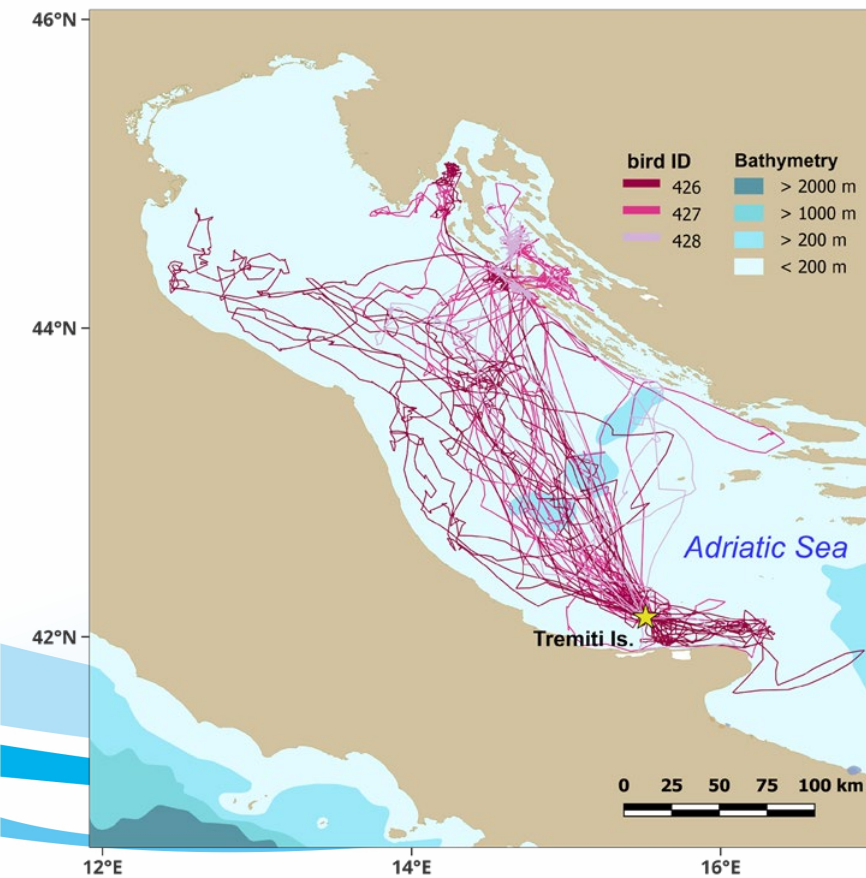


Foraging behaviour

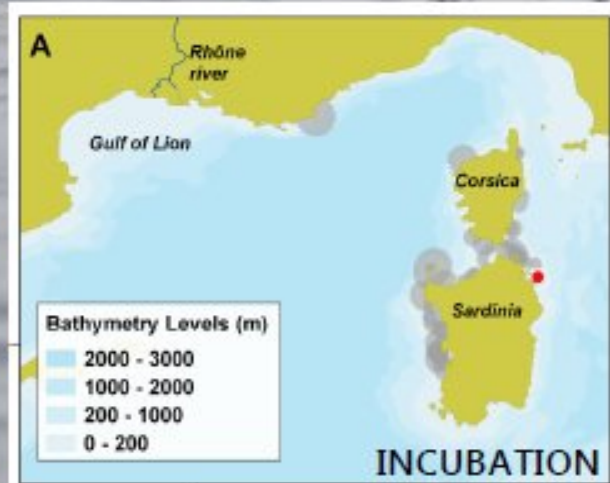


Diet & feeding range

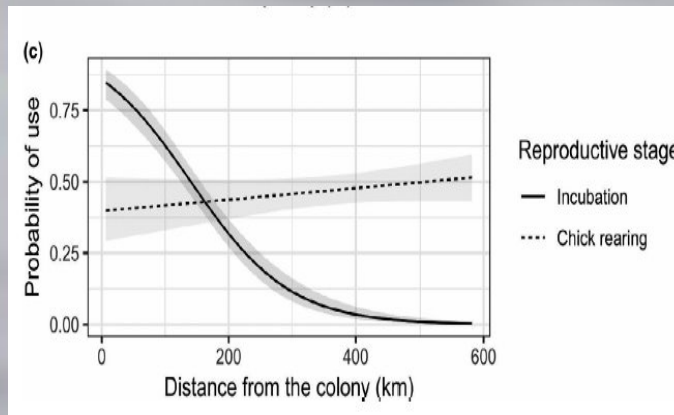
Long foraging trips to exploit productive coastal areas, up to several hundred km



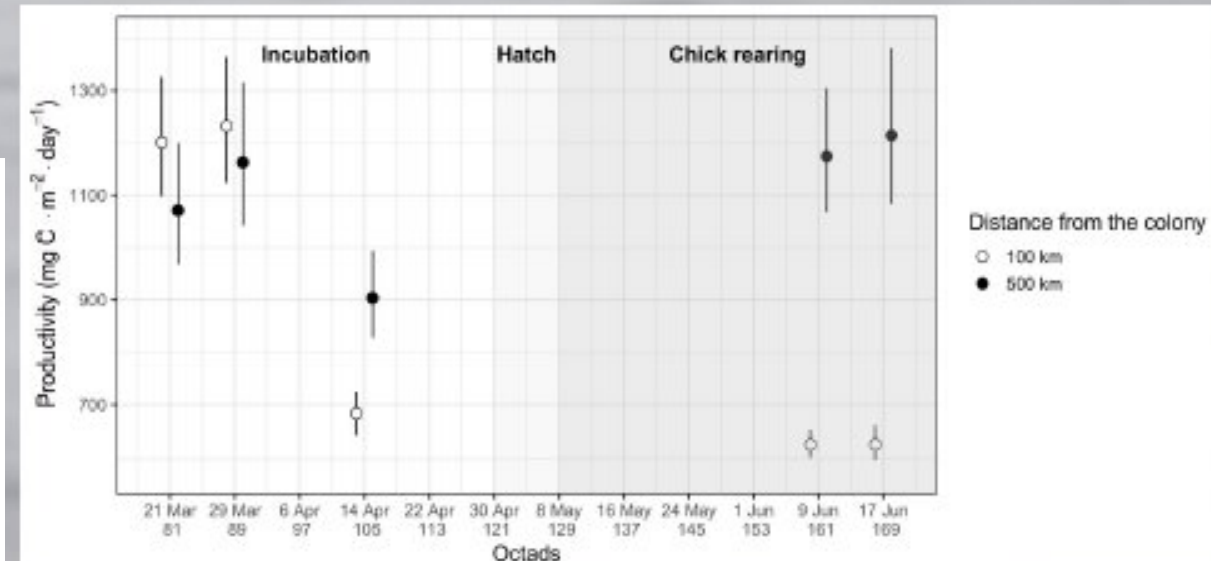
Diet & feeding range (Tavolara)



- productivity around the colony **decreases** along the season, when food requirements **increase**



- feeding trips head towards **predictable** (albeit distant) feeding spots





Threats



- Predation *R. rattus*, *F. peregrinus*, Cat, Boar!
- Bycatch in fishing gear - reduces breeding populations causing nest desertion/unnatural fast turnover of breeding pairs
- Climate change - Depletion of fish stocks
- Offshore Wind – displacement of foraging grounds & collision & barrier effect
- Pollution (through reduced incubation and hatching success, but also through direct mortality of adults, eggs and chicks)
- Degradation of nesting habitat on islets (Stock-grazing, Military exercises)
- Light pollution
- Avian Influenza
- (Blooms of Toxic algae)



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Predation from introduced species - Rats

The most important threat for seabirds on land – on breeding colonies

- Rats predate eggs and chicks and reduce breeding success
- Predate other endemic species of flora and fauna
- Degrade islet habitats and reduce vegetation cover
- Introduce disease which might affect islet populations

Shearwaters particularly vulnerable to predation due to

- long nesting seasons
- max one offspring per year
- slow maturity to reach breeding age
- strong tendency to return to natal colony
- few if any mechanisms to repel mammal predators



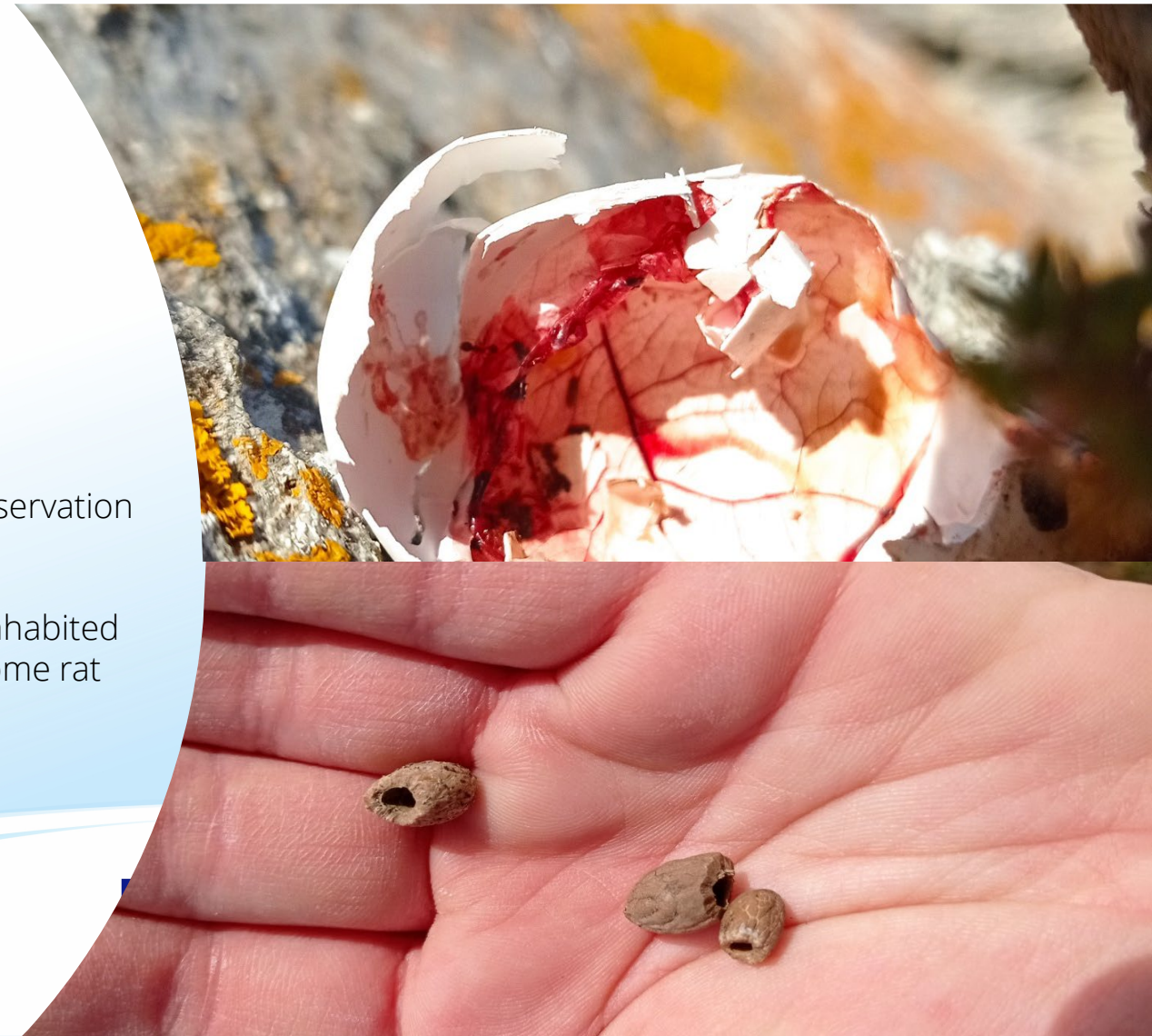
Predation from introduced species - Rats



Rat eradication from
important colonies

One of the most effective conservation
actions

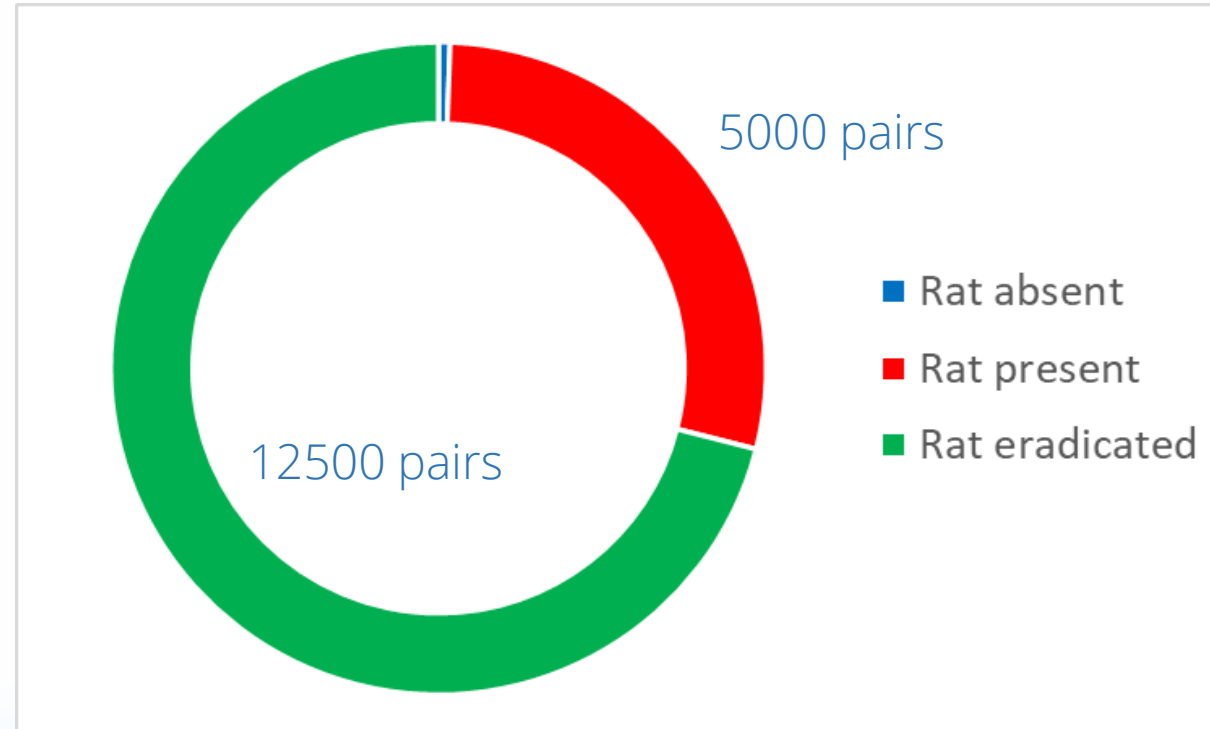
Since 2005 more than 52 uninhabited
islets in the Aegean have become rat
free (>1,300 ha)



Predation from introduced species - Rats



P. yelkouan after eradications (IT)



Rat eradication usually followed by increase of occupied nests, but breeding success can remain low
 Adult survival low in some colonies: still high adult mortality outside breeding areas/season?

Predation from introduced species Feral pigs



- Feral pigs illegally introduced in 2021 (from Syros)
- 2022 first realized were predating on PY – feathers in scats
- Ruined nests, predated on adults and fledglings, eroded soil and overturned rocks, ...
- Placed cameras to record predation





Predation from introduced species *Feral pigs*



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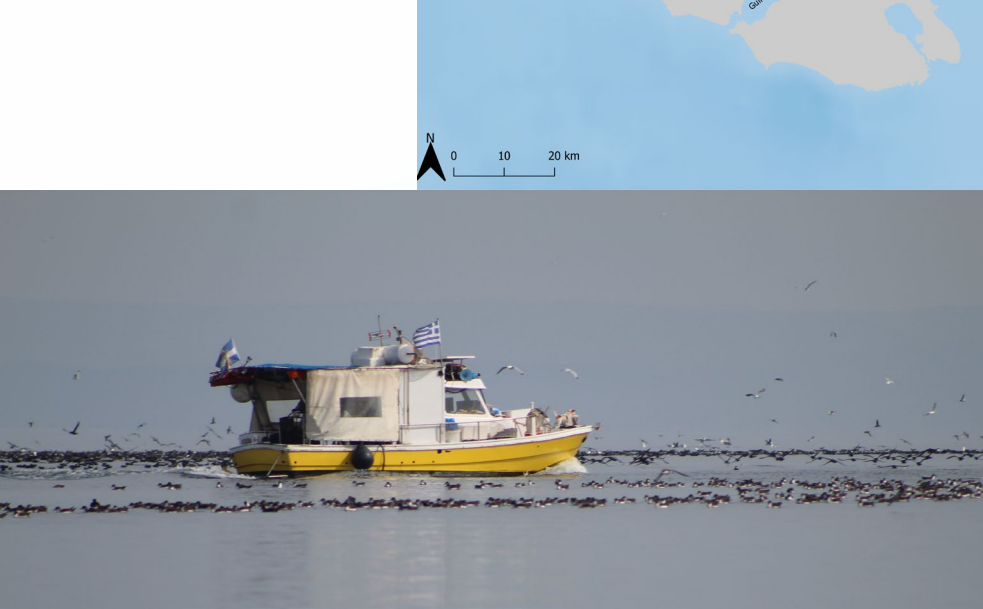


Predation from introduced species *Feral pigs*



Threats - Bycatch in fishing gear Trammel nets

- Kalloni Gulf, Lesvos island
- Yelkouan shearwater important foraging ground from Feb – April
- Feeding frenzies on anchovies (Hapsi)
- Questionnaires exhibited **high bycatch** - unknown before



Threats - Bycatch in fishing gear Trammel nets

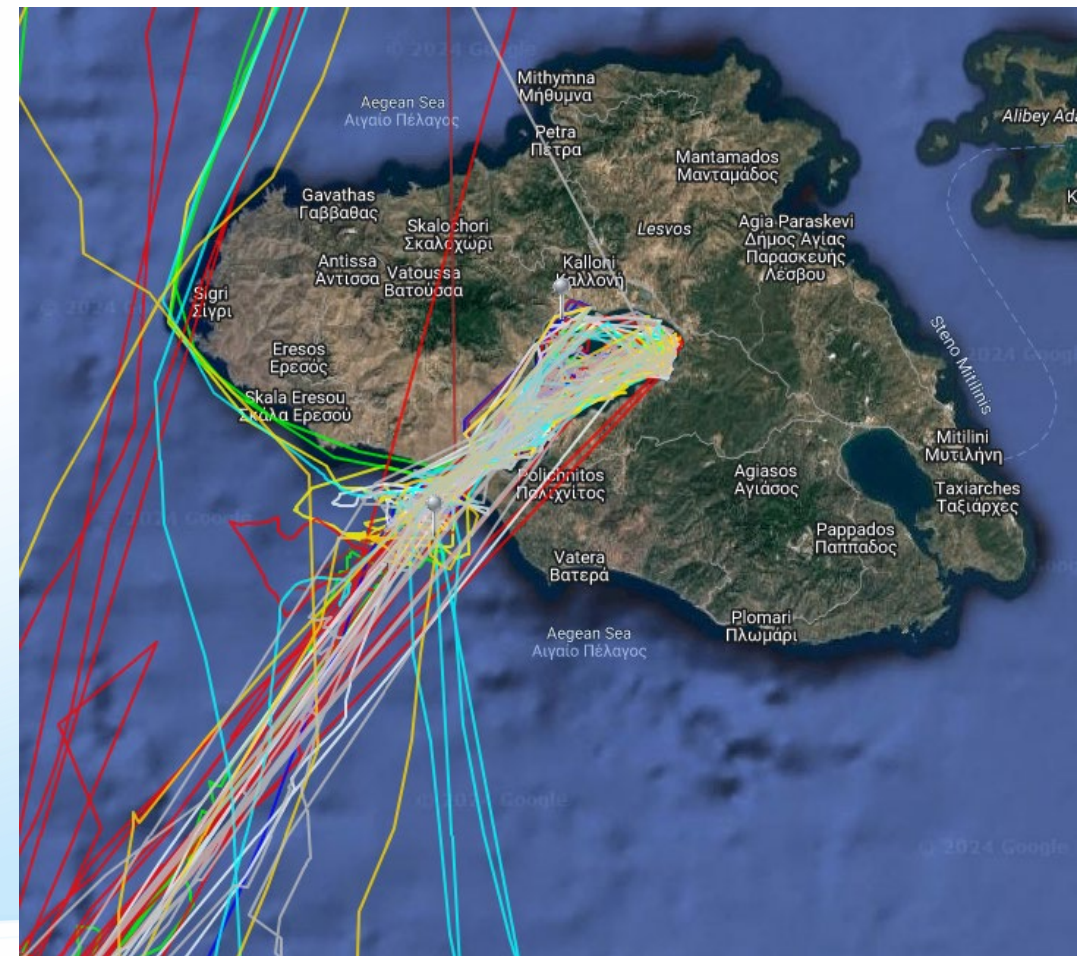
- Gear responsible - trammel nets targeting cuttlefish in shallow waters
- Unsure when bycatch occurred till systematic observations and tagging



PY tagging & observation

helped to identify:

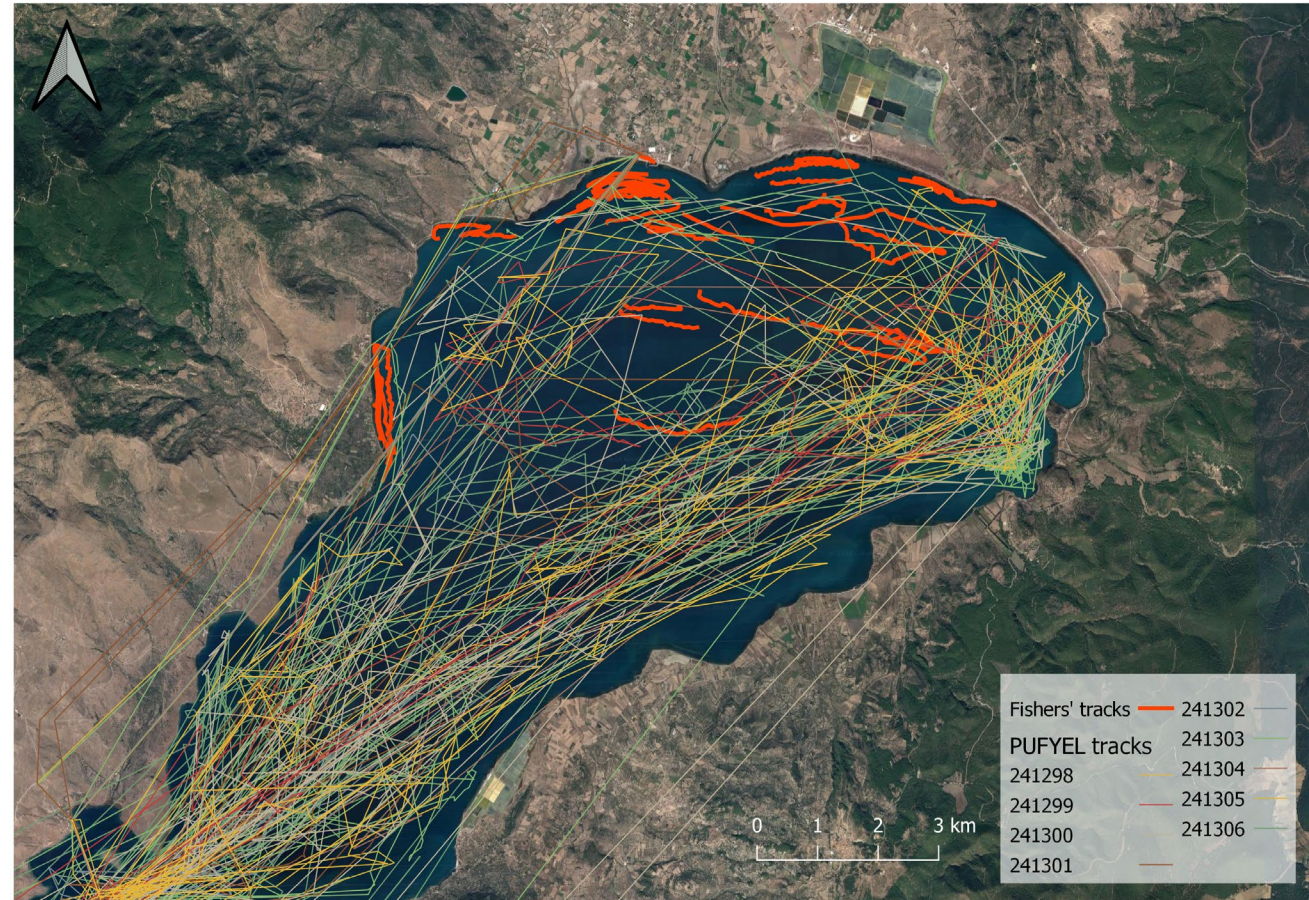
- foraging between Feb – May, then leave area
- PY enter to forage **during day only** (30,000 max) & leave gulf at night
- bycatch occurs when nets left to soak during day
- PY move closer to northern part in April and May





Threats - Bycatch in fishing gear Trammel nets

- Localised coexistence within the Gulf
- PY follow the larger anchovy schools
- More detailed GPS tracks of PY needed to see depth of foraging



Mitigation Measures

Avoiding setting and casting
gears around sunset/sunrise
(best: at night)

Fast sinking of baits

Scary Bird during setting

Threats - Bycatch in fishing gear Demersal longlines



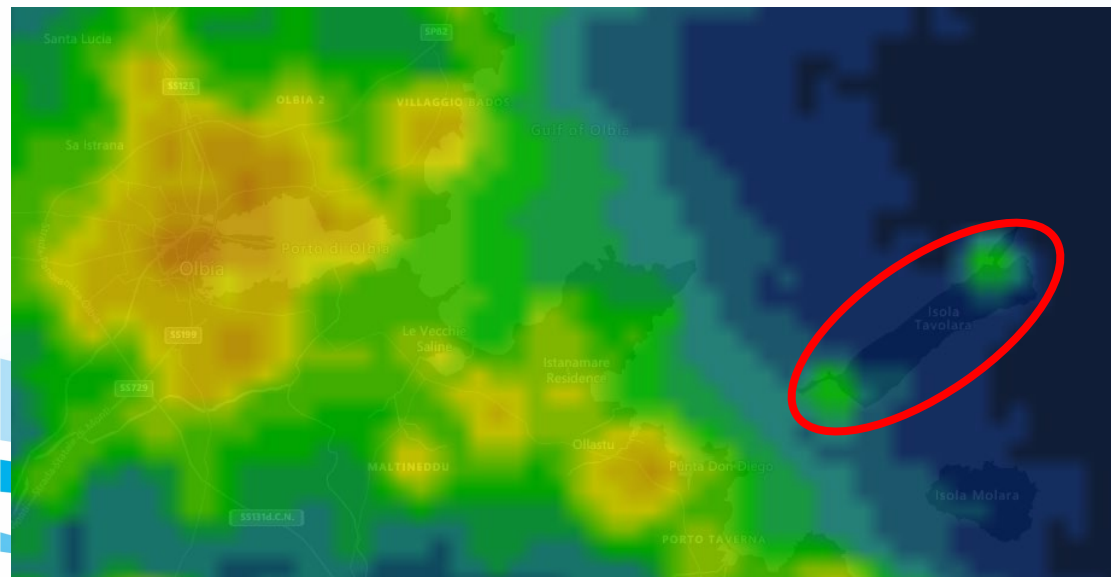
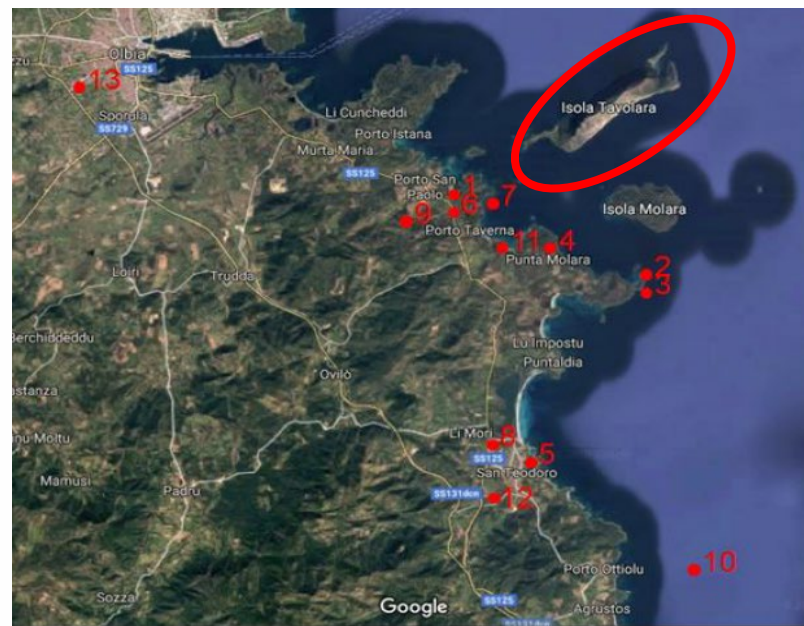
Threats – light pollution



Light pollution from nearby cities / beaches: at Tavolara summer fallout of fledged juvs in July

2018: (after rat eradication) 13 birds

Previous years: 1-5 birds



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Prolonged light pollution may cause colony abandonment
Gyaros colony and Attica / Evoia



Thank you!

