

Estimation of the colony size of *Larus michahellis* nesting on the island of Bergeggi (Liguria, SV) using the double-observer method

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Introduction



Previous studies:

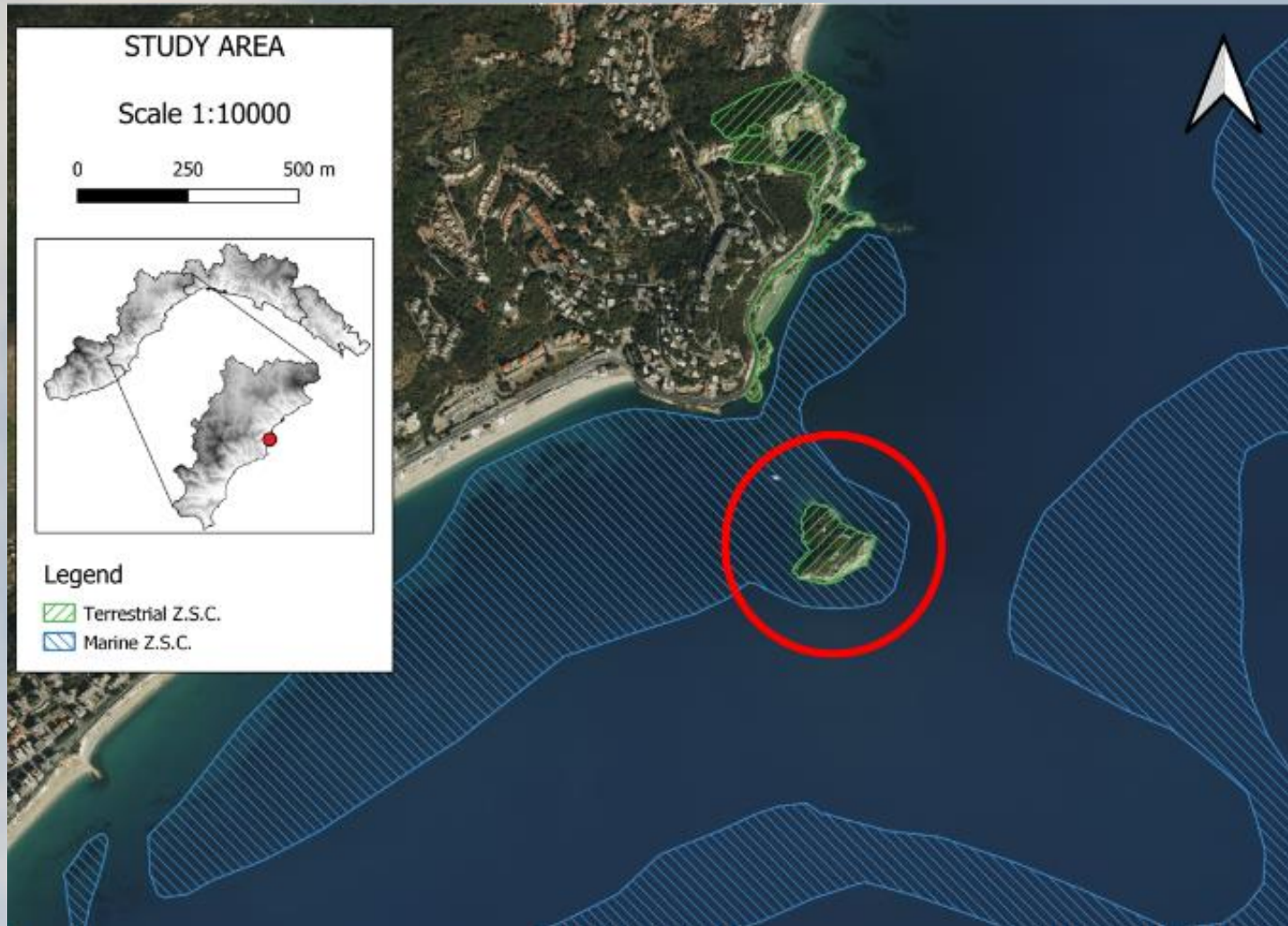
- **Borgo *et al.*, 1989**
- **Ghiglia, 2003**

Laridae

179. 06040 **Gabbiano eburneo** *Pagophila eburnea* (Phipps, 1774)
A A-1 (SV 1972) [68]
180. 06020 **Gabbiano tridattilo** *Rissa tridactyla* (Linnaeus, 1758)
A M reg, W
181. 05850 **Gabbiano roseo** *Chroicocephalus genei* Breme, 1840
A A-8 (GE 1989, 1992, 1995, 2006, 2007, 2009, 2 segn. 2010)
[22, 29, 34, 106, Bottero M. ined.]
182. 05820 **Gabbiano comune** *Chroicocephalus ridibundus* (Linnaeus, 1766)
A M reg, W
183. 05780 **Gabbianello** *Hydrocoloeus minutus* Pallas, 1776
A M reg
184. 05760 **Gabbiano sghignazzante** *Larus atricilla* Linnaeus, 1758
A A-1 (W IM 2004-05-06) [22, 41, 43]
185. 05750 **Gabbiano corallino** *Larus melanocephalus* Temminck, 1820
A M reg, W
186. 05880 **Gabbiano corso** *Larus audouinii* Payraudeau, 1826
A M irr [56]
- ²187. 05900 **Gavina** *Larus canus* Linnaeus, 1758
A M reg, W
188. 05910 **Zafferano** *Larus fuscus* Linnaeus, 1758
A M reg, W
189. 05920 **Gabbiano reale nordico** *Larus argentatus* Pontoppidan, 1763
A M irr, W irr
190. 05926 **Gabbiano reale** *Larus michahellis* Naumann, 1840
A M reg, W, E, SB
191. 05927 **Gabbiano reale pontico** *Larus cachinnans* Pallas, 1811
A A-4 (GE 2001, 2004, 2006, 2010) [26, 30, Bottero M. ined.]
- ³192. 05980 **Gabbiano d'Islanda** *Larus glaucoideus* Meyer, 1822
B A-1 (GE 1902) [38]
193. 05990 **Gabbiano glauco** *Larus hyperboreus* Gunnerus, 1767
A A-4 (SV 1987; GE 1853, 1877, 1912) [60, 71, 78, 85]
194. 06000 **Mugnaiaccio** *Larus marinus* Linnaeus, 1758
A A-7 (~ 1860; IM 1931; 2 ind. SV 1989; GE 1892, 2 ind. 1981, 1999, 2004)
[5, 22, 102]

Baghino L., Borgo E., Bottero M., Galli L. & Valfiorito R., 2012 - Checklist degli uccelli di Liguria. Rivista Italiana di Ornitologia, 81:15-42.

Study area

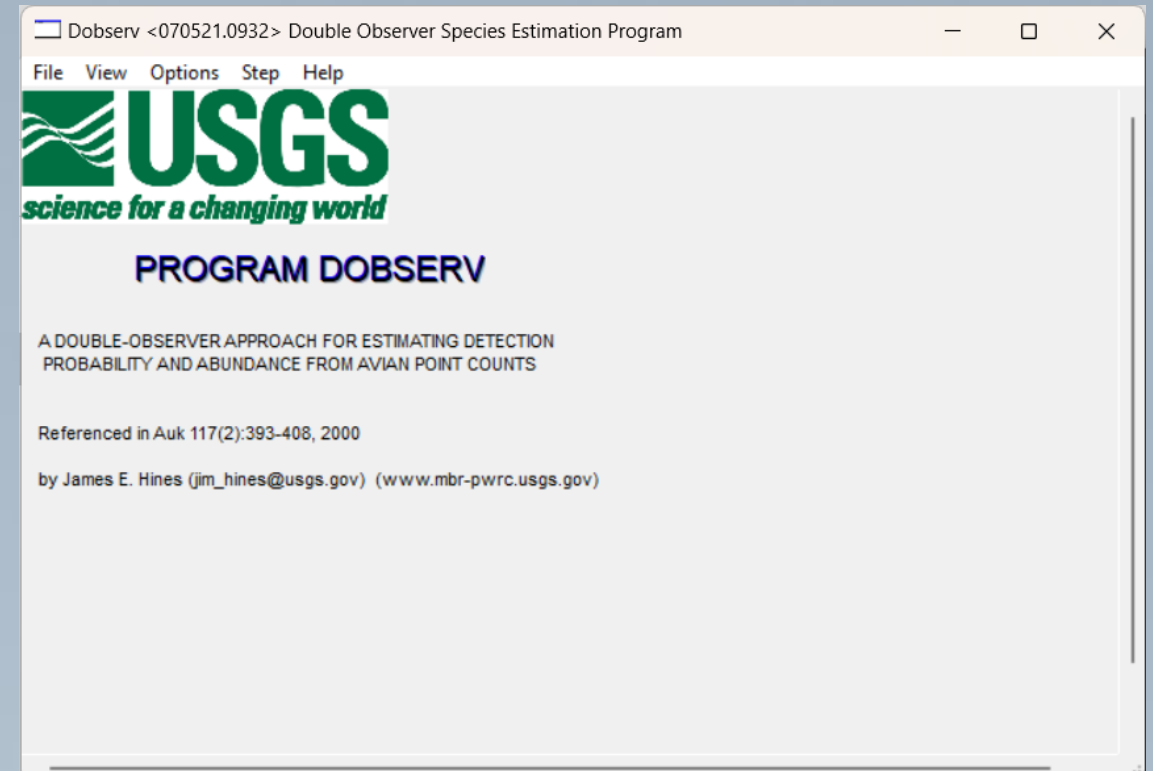


- 2.05 ha
- Perimeter: 650 m
- Mediterranean scrub vegetation
- Difficult access



Materials and methods

- Double-observer method
- Dependent approach
- DOBSERV (Nichols *et al.*, 2000)
- AIC -> P (.,.) -> the detection probability is the same for both observers
- Outputs processed using Excel and Rstudio



The screenshot shows the 'Dobserv <070521.0932> Double Observer Species Estimation Program' window. The 'Step' menu is selected. The input file is 'C:\Users\huawei\Desktop\dobserv\dataset\30062025\30062025.CSV'. The model is 'P(.,.)'. The output table is as follows:

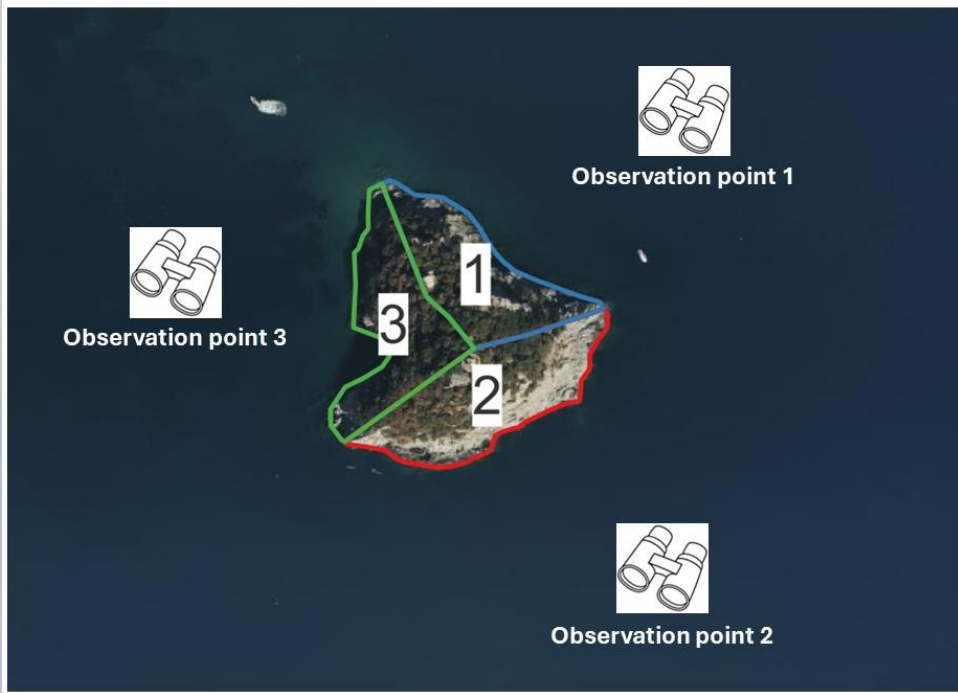
I	SPEC	X..	P	SE(P)	N	SE(N)	CHAO 95% CONF. INT. LOWER	UPPER
2	GBNR	97	0.9990	0.0012	97.10	0.34	97.00	99.24

Materials and methods (Survey details)

- **Breeding season: March to June (Brichetti & Fracasso, 2006)**
- **2 surveys per month**
- **The investigations were conducted at dawn and in favorable weather and sea conditions**
- **2024 and 2025**

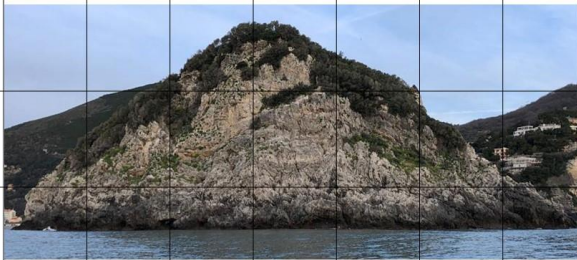


Materials and methods



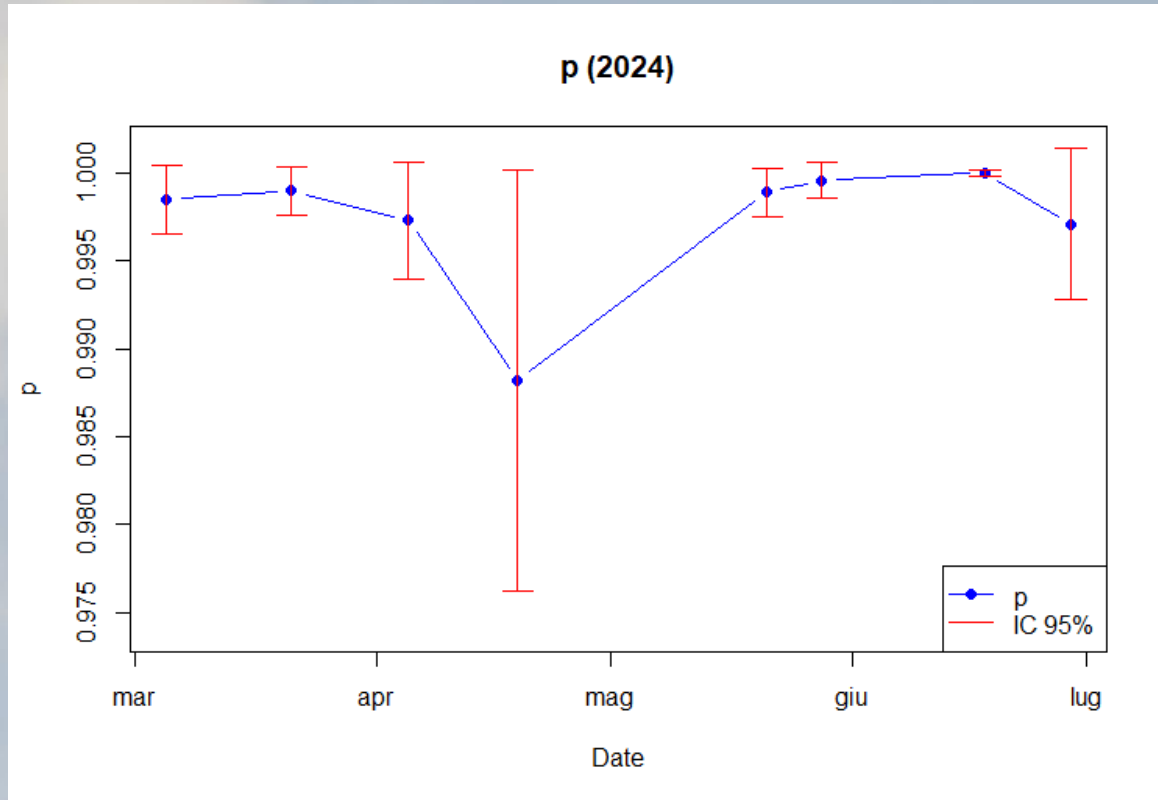
- Island split into 3 areas
- Fixed points on the boat
- Each area further divided

	1	2	3	4	5	6	7
A							
B							
C							
Observation point 1							

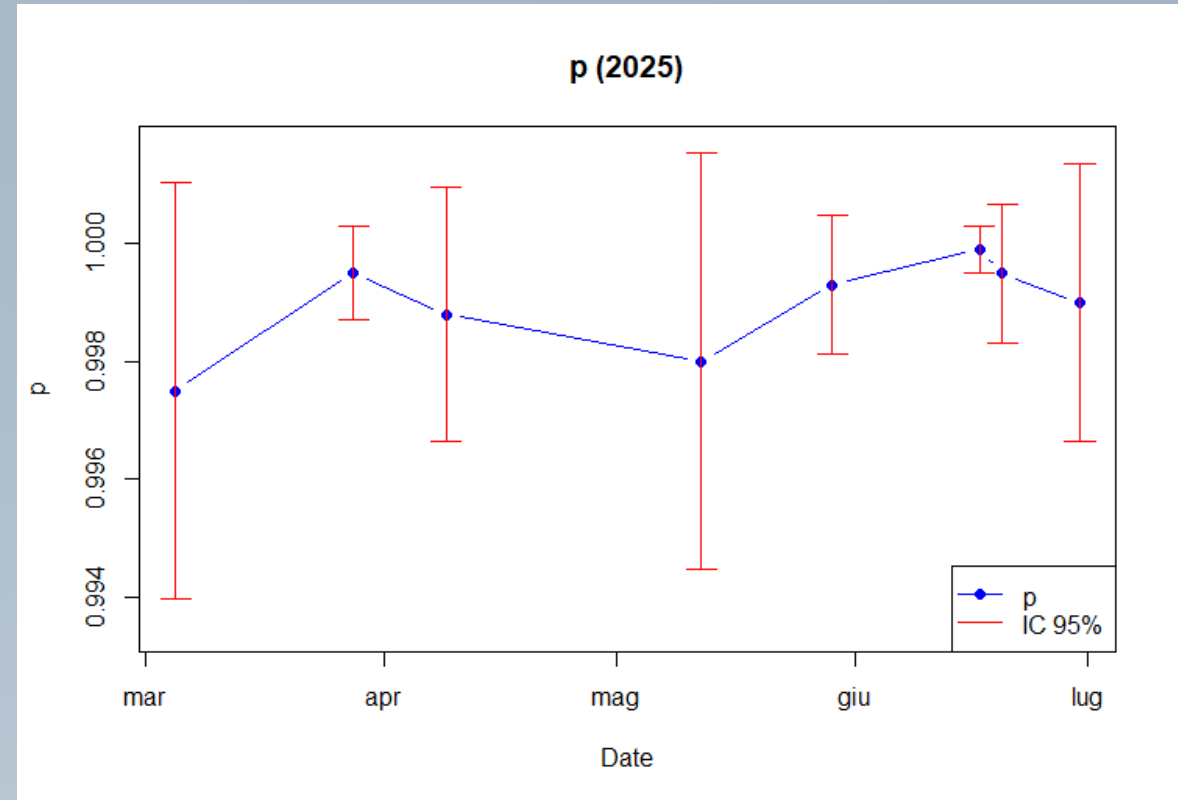
	1	2	3	4	5	6	7
A							
B							
C							
Observation point 2							

	1	2	3	4	5	6	7
A							
B							
C							
Observation point 3							

Results (Detection probability)



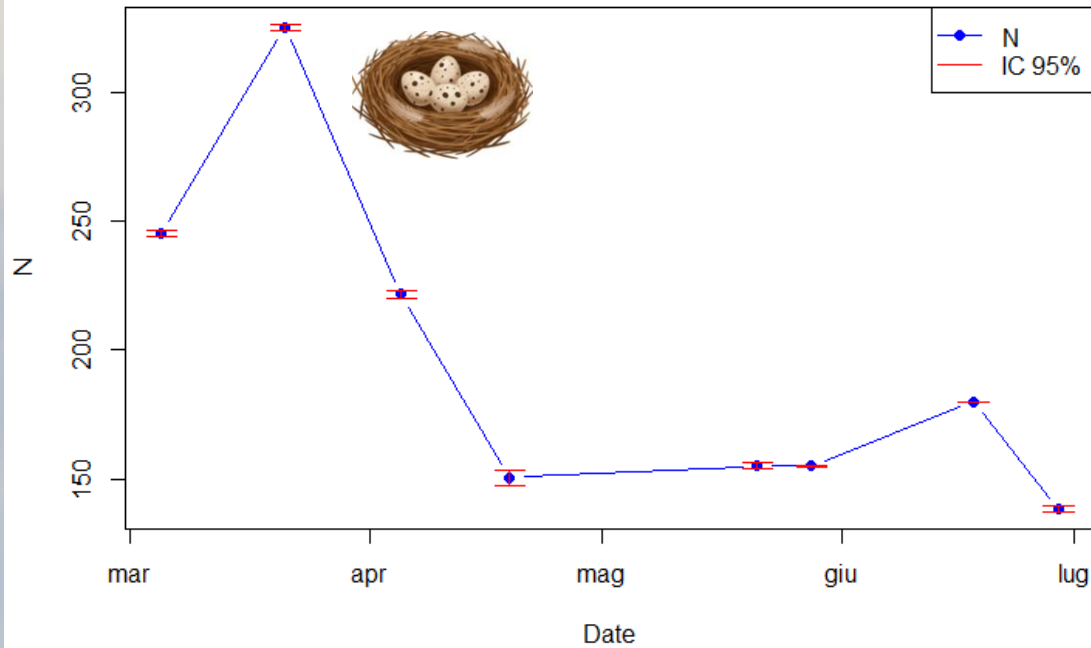
Mean p (2024) = 0.997325 ± 0.003196



Mean p (2025) = 0.998938 ± 0.000682

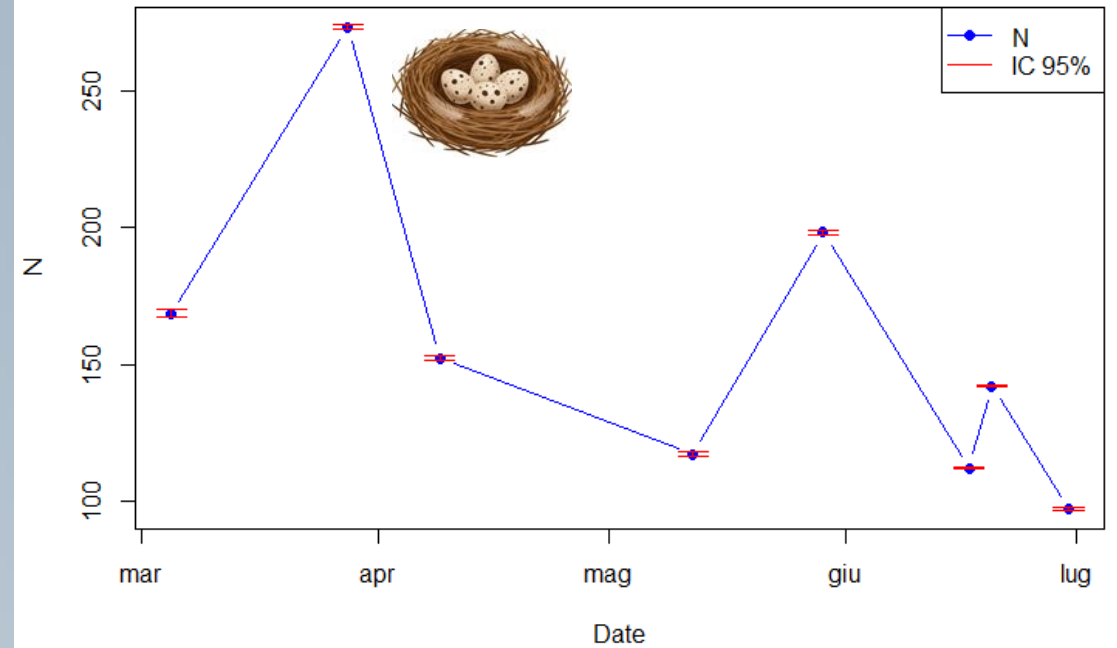
Results (N)

N (2024)



Mean N (2024) = 196.445 ± 53.627

N (2025)



Mean N (2025) = 157.535 ± 47.666

Discussion

- High detection probability throughout the investigation period → Animals that are easy to observe and unlikely to be confused with other species.
- The number of seagulls contacted decreases as the nesting period progresses in both 2024 and 2025.
- Probably due to the reduced detectability of birds during nesting (nest location, e.g., in bushes)
- High detection probability (p) + numerous replicates → wide confidence interval



Conclusion

- Easy to apply
- Replicable
- User-friendly DOBSERV program

- Possible confusion with wintering and migratory species at the start of the nesting season
- Counting only individuals perched
- Problems related to weather and sea conditions

Bibliography

- Baghino L., Borgo E., Bottero M., Galli L. & Valfiorito R., 2012 - *Check-list degli uccelli di Liguria. Rivista Italiana di Ornitologia*, 81:15-42.
- Borgo E., Ceccarini G. & Spanò S., 1989 – Il gabbiano reale *Larus cachinnans* sull'Isola di Bergeggi (Liguria Occidentale). *Boll. Mus. Ist. Biol. Univ. Genova*, 54-55:91-116.
- Ghiglia S., 2002 – Origine, fluttuazioni stagionali e biologia riproduttiva delle popolazioni di *Larinae* presenti lungo la costa orientale della Provincia di Savona. Tesi di Laurea. Università degli Studi di Genova.
- Nichols J.D., Hines J.E., Sauer J.R., Fallon F., Fallon J. & Heglund P.J., 2000 - A double-observer approach for estimating detection probability and abundance from avian point counts. *Auk*, 117:393–408.

Thank you for your attention



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