

Short communication

First confirmed breeding of an invasive alien species in the lagoon of Venice (Italy): the Sacred Ibis *Threskiornis aethiopicus*

Francesco Scarton^{1*}, Alvise Luchetta², Emiliano Molin³, Alessandro Sartori⁴, Roberto G. Valle⁵

Abstract - After more than a decade of regular occurrence, the first confirmed breeding of the Sacred Ibis *Threskiornis aethiopicus* in the lagoon of Venice (Italy) was observed in 2020, in three sites. The ibises nested in colonies with of one or more species of Ardeidae and Phalacrocoracidae. The colonies were on islets < 2 ha in size, covered with thick vegetation. Nests were placed on the top of bushes or trees, at a height of 1.5-5 m. The colony sites seemed not occupied by adults until the end of February - half of March; laying took place from early May, with hatchings occurring from the end of that month until July. Overall, 22-24 pairs nested in 2020. Birds were observed feeding at saltmarshes, freshwater wetlands and arable fields; a public garbage collection site was also used regularly. Given the high number of suitable nesting and feeding sites, a rapid growth of the Sacred Ibis population is expected in the next years.

Key words: Colonial waterbirds, invasive species, Ardeidae.

Riassunto - Prima nidificazione accertata di una specie aliena ed invasiva, l'ibis sacro *Threskiornis aethiopicus*, nella laguna di Venezia.

Dopo circa un decennio di regolare presenza, la prima nidificazione di ibis sacro *Threskiornis aethiopicus* è stata accertata nel 2020, in tre siti. Gli ibis sacri hanno nidificato in colonie con una o più specie di Ardeidae e Phalacrocoracidae. Le colonie erano situate su isole di meno di 2 ha e coperte da fitta vegetazione arborea ed arbustiva. I nidi erano posti sulla sommità della vegetazione, ad un'altezza di 1,5-5 m. I siti di nidificazione non erano apparentemente utilizzati dagli adulti fino alla fine di febbraio - metà marzo; la deposizione ha avuto luogo dai primi di maggio, con schiuse dalla fine di quel mese fino a luglio. Complessivamente 22-24 coppie hanno nidificato nel 2020. Gli uccelli sono stati visti alimentarsi in isolotti e fondali emersi lagunari, in piccole zone umide d'acqua dolce e presso un sito di stoccaggio temporaneo di rifiuti urbani. Data l'ampia disponibilità di siti idonei per la nidificazione e la

ricerca di cibo, si ritiene probabile un futuro rapido incremento della popolazione di ibis sacro nel bacino lagunare.

Parole chiave: uccelli coloniali, specie invasive, Ardeidi.

INTRODUCTION

The settlement in the Venice lagoon, the largest coastal wetland around the Mediterranean, of waterbird species that had never previously nested there has been frequently observed since the mid-nineties of the last century (Scarton, 2017). Among these species there were the Sandwich Tern (*Thalasseus sandvicensis*) since 1995, the Pigmy Cormorant (*Microcarbo pygmaeus*) since 1997, the Cattle Ibis (*Bubulcus ibis*) since 2000, the Greater Flamingo (*Phoenicopterus roseus*) since 2008, the Gull-billed Tern (*Gelochelidon nilotica*) since 2008 and the Ferruginous Duck (*Aythya nyroca*) since 2011 (Bon *et al.*, 2014; Scarton *et al.*, 2018). In some cases these were just occasional nesting events, but more often the new breeders settled permanently in the following years. All these species were native to Europe and began to reproduce in the lagoon because of natural phenomena of population expansion, with the occupation of a new breeding area previously used only during the wintering and/or migration seasons.

From the late nineties onwards a non-native and invasive species such as the Sacred Ibis (*Threskiornis aethiopicus*) has been observed more and more frequently in the lagoon of Venice; its sightings became regular since 2010, with a marked increase in the following years (Scarton & Valle, 2020). Details about the occurrence and subsequent spreading of this invasive species in Europe may be found in Yésou *et al.* (2017) and Bauer (2020). In Italy, the Sacred Ibis nested for the first time in 1989; 980-1,000 couples were recently estimated, mostly in Piedmont, Lombardy and Emilia-Romagna (Cocchi *et al.*, 2020).

In the Venice lagoon nesting of the Sacred Ibis was presumed in 2017-2019 at several sites (Sartori *et al.*, 2020; Scarton & Valle, 2020); the reproduction of 2-3 pairs in 2018 was reported (Panzarin in Cocchi *et al.*, 2020), but without giving any detail about this nesting event. Nesting of Sacred Ibis, despite suspected at several sites, was not observed in 2019 in the whole Veneto region, during a detailed surveys of the heronries (Scarton *et al.*, 2020).

¹ SELC Soc. Coop, via dell'Elettricità 3/d, 30175 Venezia, Italia.

² Via E. Dandolo 20, 30173 Venezia, Italia.

³ Via Usodimare 10/a, 30126 Venezia, Italia.

⁴ World Biodiversity Association onlus, Viale Lungadige Porta Vittoria, 9, 37129 Verona, Italia.

⁵ Rialto, San Polo 571, 30125 Venezia, Italia.

* Corresponding author: scarton@selc.it

© 2021 Francesco Scarton, Alvise Luchetta, Emiliano Molin, Alessandro Sartori, Roberto G. Valle

Received for publication: 10 October 2020

Accepted for publication: 11 March 2021

Online publication: 16 April 2021

It is certainly possible the reason of the lack of confirmed records for the lagoon of Venice lays in the difficulty of accessing the multi-specific colonies, always located in small, heavily vegetated islands, in which the pairs of Sacred Ibis were assumed to have nested.

In 2020 we could confirm the nesting of the Sacred Ibis at three sites, and details of these findings and preliminary observations on the breeding biology are presented hereafter.

STUDY AREA AND METHODS

The lagoon of Venice (NE Italy) covers ca. 55,000 ha and hosts significant populations of breeding waterbirds at national and international levels (Scarton *et al.*, 2018). Apart from the town of Venice and a few other large islands, there are about thirty islets mostly abandoned since decades or centuries and covered with thick vegetation; three of these islands host colonies of Ardeidae and Phalacrocoracidae (Scarton *et al.*, 2020). Visits to the three breeding sites described below were carried out between February and August 2020, every 2-3 weeks; due to COVID-19 restrictions, visits in March-April were much reduced than originally planned. Observations were made at short distance from a boat or a levee, in the two largest colonies where it was not considered appropriate to enter to avoid disturbance, but also landing and visiting

the smallest colony. We took aerial images of two colonies with the use of a small off-the shelf drone; in doing drone flights we followed the recommendations reported by Valle & Scarton (2018) and Weston *et al.* (2020) to reduce disturbance to the birds.

The three colony sites were:

1. Buel del Lovo (45°29'32"N, 12°22'34"E). A small island of 0.7 ha, abandoned for decades and located in the northern lagoon 2 km SW of Burano. It hosts ruins of old artefacts and is densely covered by a chaotic thicket of Blackberry (*Rubus* spp.), Tree of heaven (*Ailanthus altissima*), Black Locust (*Robinia pseudoacacia*), Oleaster (*Elaeagnus angustifolia*) (Fig. 1). In this island a colony of Ardeidae and Phalacrocoracidae occurs since 2009; at least 200-220 pairs of six species nested in 2020. In this colony the Sacred Ibises, both adults and immatures, were regularly observed over the last years during the breeding season (Sartori *et al.*, 2020).
2. San Giorgio in Alga (45°25'29"N, 12°17'32"E). Less than two hectares in size and about 1.5 km SW of Venice, this island was abandoned almost a century ago; there are remains of artefacts, and a wall surrounds the whole island. It is largely covered by Elder (*Sambucus nigra*), with Black Locust, Tamarisk (*Tamarix gallica*) and Field Elm (*Ulmus minor*). The occurrence of heron colonies was never reported for this island until



Fig. 1 - Two of the islands used by the Sacred Ibis to nest: above, Buel del Lovo (17 June 2020. Photo: F. Scarton); below, Ca' Pasqua (drone survey, 14 May 2020. Photo: R. Valle). / Due delle isole utilizzate dall'ibis sacro per nidificare: sopra, Buel del Lovo (17 giugno 2020. Foto: F. Scarton); sotto, Ca' Pasqua (immagine da drone, 14 maggio 2020. Foto: R. Valle).

2019, but due to its morphology and quite secluded location we cannot excluded this possibility. In 2020 the Little Egret (*Egretta garzetta*) was as also nesting in the colony, with 16 chicks and 26 adults.

3. Ca' Pasqua (45°11'01"N, 12°14'44"E). Less than one hectare in size, this islet is placed at the confluence of the Brenta and Bacchiglione rivers, very close to the lagoon; a heronry occurs there since 2000. The Sacred Ibises, both adults and immatures, were regularly observed in the colony during the breeding seasons over the last years, but nesting was never ascertained (Scarton & Valle, 2020). The islet is entirely covered with dense shrubby vegetation with Elder, Bramble, Elm (*Alnus glutinosa*) and Black-Locust. In spring 2020, five species of herons and the Pygmy Cormorant were nesting, with 60-70 pairs overall.

RESULTS

The findings for each colony are summarized as follows:

- Buel del Lovo. At the end of February 2020, no Sacred Ibises were observed; the 8th May four birds were seen, and 10-12 birds on the 23th May, when adults



Fig. 2 - Above: a young Sacred Ibis fed by an adult (28 August 2020. Photo: C. Loschi), with Cattle Egret and Little Egret. Below: two chicks around the nest (S. Giorgio in Alga, 14 July 2020. Photo: A. Luchetta). / Sopra: un giovane ibis sacro imbeccato da un adulto (28 agosto 2020. Foto: C. Loschi), con airone guardabuoi e garzetta. Sotto: due pulcini nei pressi del nido (S. Giorgio in Alga, 14 luglio 2020. Foto: A. Luchetta).

were observed landing at the edge of the island and walking into the colony. On 11th June there were at least 20 birds, with an adult brooding; ten to twelve nesting pairs were estimated. On the 5th July, a juvenile was begging for food from an adult in a small pond located in the mainland, about 3 km from the colony (Fig. 2). The 24th July, several four-week old juveniles were observed in the colony; in the pond above mentioned there were at the end of August 95 Sacred Ibises of which 16 were born in 2020, according to their plumage.

- San Giorgio in Alga. On the 18th April there were 13 Sacred Ibises, with four adults exhibiting reproductive behaviour; Sacred Ibises were also occurring in May and June, while on the 20th June nests with adults were seen from a drone flight. On the 14th July at least 16 chicks of Sacred Ibis of different ages were observed; ten nests were found, made on the shrubby vegetation, at about 1.5 m from the ground (Fig. 2). Birds coming from the colony were regularly observed feeding in large tidal flats located about 3 km from the colony but also in a public garbage collection site, located in the outskirts of Venice, 1.3 km far from the colony.
- Ca' Pasqua. In February and at the beginning of March no Sacred Ibises were observed; on the 8th May 21 birds were present, including two birds engaged in the construction of two nests, as it appeared from drone imagery. On the 14th May two eggs in one nest and one brooding adult in the second were located with drone observations (Fig. 1). On 6th June one nest contained at least two chicks, of the apparent age of 10-15 days; adults and chicks were also observed on the 22th June, while on the 26th August there were 17 birds, adults and immatures. Birds coming from the colony were regularly observed feeding in saltmarshes and tidal flats close by.

CONCLUSIONS

Nesting of the Sacred Ibis took place in the lagoon of Venice after several years in which adults and immatures were observed visiting and going back and forth colonies of herons and cormorants; the occurrence of prospecting, non-breeding birds is a common characteristic of the early stage of colonisation of new nesting sites elsewhere in Italy (Cucco *et al.*, 2021). It must be thus remarked that the observations of adult birds into a colony do not necessarily mean the Sacred Ibises are actually nesting there, and this must be considered in evaluating the sightings reported by field surveyors.

In our study area the breeding birds settled in colonies with one or more other nesting colonial species and always located on small islets, covered with thick vegetation; nests were placed both on the top of trees and bushes. These observations agree with those made in France, where colonies settled very often in islands, with nesting on the ground observed somewhere (Yesou *et al.*, 2006 and 2017; Maillard *et al.*, 2020). Our data suggest that the colony sites were not used by Sacred Ibises until the end of February – half of March; later, laying took place from early May onwards, with hatchings occurring

from the end of that month until July. This laying period is delayed compared to that observed in France, where the species begins to lay in late March-early April (Yesou *et al.*, 2006; 2017); Castiglioni *et al.* (2015) observed the same laying period in N-W Italy, but notably with a second period in August-September. The delayed peak laying period observed in the lagoon of Venice seems coherent for first-time breeding individuals, as it has been observed for some colonial birds (Schreiber & Burger, 2001).

Adults and immatures of Sacred Ibis were observed in the lagoon of Venice feeding both in saltmarsh habitats, particularly at tidal flats exposed during the low tides; in saltmarsh islets, along their edge or into intertidal creeks; in the mainland, where birds used to feed mainly at ditches, arable fields, and small freshwater wetlands. We do not have detailed data about the food items that were consumed by the Sacred Ibises; recently Novarini & Stival (2017) observed in our study area the predation on Green Toad (*Bufo viridis*), not reported elsewhere so far. Both previous observations made by Semenzato *et al.* (2020) and ours indicate the Sacred Ibis can also feed regularly on urban waste; the trophic behaviour, with the extensive use of the nearby waste deposit for food, observed for the birds nesting in San Giorgio in Alga, highlights the great adaptive capacity of this species which has probably facilitated its expansion. More recently, in February 2021 about hundred Sacred Ibises were observed feeding in the same garbage collection site (Bernstein, com. pers.).

The nesting of the Sacred Ibis in the Venice lagoon follows a long period of occurrence, about twenty years from the very first sighting and ten years from its regular presence. Its settlement in this large wetland was easily predictable, given the ecology of the species, the occurrence of suitable colony and feeding sites, and the highly expansive dynamics the Sacred Ibis has shown over the last years in north-Italian regions (Cucco *et al.*, 2021). Moreover, in 2020 nesting of Sacred Ibis was confirmed for the first time in the Po Delta (Sartori *et al.*, 2021), 30 km south of the lagoon and where so far it was only considered probable (Sartori *et al.*, 2020). Given these recent findings, a rapid increase of the nesting population of Sacred Ibis in the Venice lagoon and in the whole Veneto region over the next forthcoming years is also very likely, with effects on habitats and native species that are difficult to predict.

Acknowledgments

Claudia Loschi provided a nice picture and Roberta Castiglioni gave useful information on plumages of juveniles and immatures; A.G. Bernstein reported unpublished observation. The comments of a referee greatly improved the manuscript.

REFERENCES

Bauer H.G., 2020 – African Sacred Ibis *Threskiornis aethiopicus*. In: European Breeding Bird Atlas 2: Distribution, Abundance and Change. Keller V., Herrando S., Vorisek P., Franch M., Kipson M., Milanese P., Martí D., Anton M., Klvanová A., Kalyakin M. V., Bauer H.-G. & Foppen R. P. B. (eds). *European Bird Census Council & Lynx Edicions*, Barcelona.

- Bon M., Scarton F., Stival E., Sattin L. & Sgorlon G., 2014 – Nuovo Atlante degli uccelli nidificanti e svernanti in provincia di Venezia. *Associazione Faunisti Veneti, Museo di Storia Naturale di Venezia*.
- Castiglioni R., Azzola C. & Vergallo S. 2015 – Ecologia e riproduzione di ibis sacro (*Threskiornis aethiopicus*) in provincia di Bergamo. *Atti XVIII Convegno italiano di Ornitologia*, Caramanico Terme: 45.
- Cocchi R., Volponi S. & Baccetti N., 2020 – Piano di gestione nazionale dell'ibis sacro *Threskiornis aethiopicus* (Latham, 1790). *ISPRA*. <https://www.minambiente.it/sites/default/files/archivio/allegati/biodiversita/piano_gestione_ibis_sacro_2020_def.pdf> (Last access: 11 March 2021).
- Cucco M., Alessandria G., Bissacco M., Carpegna F., Fasola M., Gagliardi A., Gola L., Volponi S. & Pellegrino I., 2021 – The spreading of the invasive sacred ibis in Italy. *Scientific Reports*, 11: 86. <<https://doi.org/10.1038/s41598-020-79137-w>>
- Maillard J. F., Gutiérrez-Expósito C. & Yesou P., 2020 – African Sacred Ibis (*Threskiornis aethiopicus* Latham, 1790). In: Invasive birds: Global trends and impacts. Downs C. T. & Hart L. A. (eds.). *CAB International Wallingford*, UK: 248-251.
- Novarini N. & Stival E., 2017 – Wading birds predation on *Bufo viridis* (Laurenti, 1768) in the Ca' Vallesina wetland (Ca' Noghera, Venice, Italy). *Bollettino del Museo di Storia Naturale di Venezia*, 67: 71-75 71.
- Sartori A., Bedin L. & Verza E., 2020 – Probabili nidificazioni di ibis sacro, *Threskiornis aethiopicus*, in Veneto (Aves, Threskiornithidae). *Lavori Società Veneziana di Scienze Naturali*, 45: 137-138.
- Sartori A., Verza E. & Valle R. G., 2021 – *Platalea leucorodia*: nidificazione nella parte veneta del Delta del Po - Rovigo. *Lavori Società Veneziana di Scienze Naturali*, 46: 17-20.
- Scarton F., 2017 – Long-term trend of the waterbird community breeding in a heavily man-modified coastal lagoon: the case of the Important Bird Area "Lagoon of Venice". *Journal of Coastal Conservation*, 21: 35-45.
- Scarton F. & Valle R. G., 2020 – L'ibis sacro *Threskiornis aethiopicus* in laguna di Venezia: una sintesi decennale (2010-2019) sulla presenza di una specie invasiva. *Bollettino del Museo Storia Naturale di Venezia*, 71: 113-121.
- Scarton F., Verza E., Guzzon C., Utmar P., Sgorlon G. & Valle R. G., 2018 – Laro-limicoli (Charadriiformes) nidificanti nel litorale nord adriatico (Veneto e Friuli-Venezia Giulia) nel periodo 2008-2014: consistenza, trend e problematiche di conservazione. *RIO. Research in Ornithology*, 88 (2): 33-41. <<https://doi.org/10.4081/rio.2018.418>>
- Scarton F., Sighele M., Stival E., Verza E., Cassol M., Fioretto M., Guzzon C., Maistri R., Mezzavilla F., Pedrini P., Piras G., Utmar P. & Volcan G., 2020 – Risultati del censimento delle specie coloniali (Threskiornithidae - Ardeidae - Phalacrocoracidae) nidificanti nel Triveneto (Veneto, province di Trento e Bolzano, Friuli-Venezia Giulia). Anno 2019. <www.birdingveneto.eu/garzaie/index.html> (Last access: 7th February 2021).
- Schreiber E. A & Burger J. (ed.), 2001 – Biology of marine birds. *CRC press*.
- Semenzato M., Novarini N. & Sartori A., 2020 — I vertebrati terrestri di Venezia. *Lavori Società Veneziana di Scienze Naturali*, 45 (suppl.): 63-88.
- Valle R. & Scarton F., 2018 – Uso dei droni nel censimento degli uccelli acquatici nidificanti nel Nord Adriatico. *Bollettino del Museo di Storia Naturale di Venezia*, 69: 69-75.
- Weston M. A., O'Brien C., Kostoglou K. N. & Symonds M. R., 2020 – Escape responses of terrestrial and aquatic birds to drones: towards a code of practice to minimize disturbance. *Journal of Applied Ecology*, 57: 777-785.
- Yesou P., Cabelguen J. & Potiron J. L., 2006 – Quelques aspects de la reproduction de l'ibis sacré *Threskiornis aethiopicus* dans l'estuaire de la Loire. *Alauda*, 74: 421-427.
- Yesou P., Clergeau P., Bastian S., Reeber S. & Maillard J. F., 2017 – The Sacred Ibis in Europe: ecology and management. *British Birds*, 110: 197-212.