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FIRST EVIDENCE OF SCOPOLI'S SHEARWATERS *Calonectris diomedea* USING ARTIFICIAL STRUCTURES FOR NESTING IN CROATIA

Prvi nalaz korištenja umjetnih struktura za gniježđenje kod kaukala Calonectris diomedea u Hrvatskoj

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ABSTRACT

This short note documents the first observations of Scopoli's Shearwaters *Calonectris diomedea* successfully breeding in association with artificial structures in Croatia, on the island of Bratin in the Lastovo archipelago, during 2022 - 2026. Large water tanks placed on wooden pallets created burrows resembling a natural nesting situation of a big boulder on a gentle slope. Future conservation efforts for shearwaters in Croatia can consider the creation of artificial, or even semi-natural, burrows on suitable islands which have otherwise limited natural nesting space available in order to supplement nesting opportunities. Ideally, introduced invasive mammalian predators (e.g. rats) are permanently removed from such sites.

The Scopoli's Shearwater *Calonectris diomedea* is a medium-sized, burrow-nesting Procellariiform seabird breeding on rocky islands and cliffs in the Mediterranean Sea. They nest predominantly during the summer months, with egg-laying in the beginning of June, hatching in mid-July and fledging during autumn. While the species is listed as Least Concern by the IUCN, it is considered to be globally declining, owing primarily to the species being bycaught in fishing gear and the predation of eggs and chicks by invasive mammalian species (e.g. *Rattus* spp.) introduced to their breeding colonies (BirdLife International 2026).

In Croatia, the species was first mentioned in 1880 (Kolombatović 1880) and its breeding range is restricted to the Lastovo and Vis archipelagos, situated in

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the Middle Adriatic Sea. It is considered Near Threatened on a national level (Tutiš *et al*. 2013) and the estimated national population of 700 – 1200 breeding pairs is divided more or less equally between the two archipelagos (Mikulić *et al*. 2012, Engelen & Ječmenica 2025).

One of the largest colonies around Lastovo is found on the island of Bratin (latitude: 42.74833000, longitude: 16.80083000) with at least 68 breeding pairs (Engelen *et al*. 2023). The island is of karstic origin and its 17.5 hectares are largely covered with well-developed macchia containing Phoenician Juniper *Juniperus phoenicea*, Lentisk *Pistacia lentiscus* and Aleppo Pine *Pinus halepensis*. Scopoli's Shearwaters are mostly found along the island's coast in crevices, vertical depressions, former Mediterranean Shag *Gulosis aristotelis desmarestii* nests, small caves and cliffs or more inland below large boulders or at the roots of large (fallen) trees. Other bird species using these habitats include Pallid Swift *Apus pallidus*, Mediterranean Shag and Eleonora's Falcon *Falco eleonorae* (Engelen & Ječmenica 2025). Furthermore, introduced black rats *Rattus rattus* are present on the island, as is a population of semi-feral goats.

Systematic monitoring of the Scopoli's Shearwater breeding population and reproductive output has been carried out on Bratin since 2019 through LIFE Artina & LIFE TETIDE (Engelen *et al.* 2023). During the census carried out in September 2022, a burrow was observed under a water tank in a metal casing placed on a wooden pallet (Fig. 1). The soil below was further excavated by Scopoli's Shearwaters and turned into a burrow. The entrance had a lot of bird faeces in front of it and, upon inspection, a near-fledging chick was found under the structure. Each following year, 2023-2025, a new chick successfully fledged. In 2025, a second water tank, placed a few meters down from the first one, also had a pair of Scopoli's Shearwaters under it which successfully raised another chick. In 2026, both nests were again successful.

The water tanks were installed by a local from Lastovo at least ten years ago (before 2016), below some Aleppo Pines on the north side of the island, to provide water for the semi-feral goat population. The structure of a 1000 litres water tank on a pallet resembles one of the most common natural nesting burrows for the species, namely below a larger boulder on a gentle slope (Ramos *et al.* 1997). It is known that several species of burrow-nesting seabirds, including shearwaters breeding in the Mediterranean, easily adapt to using artificial nesting structures, such as nest boxes (Ramos *et al.* 1997, Bolton *et al.* 2004, Libois *et al.* 2012, Bourgeois *et al*. 2015, Austad *et al.* 2020). These are, however, the first observations of such behaviour in Croatia.

The fact that breeding occurred below these artificial structures could indicate a lack of available suitable nesting places, or strong intraspecific competition for nest cavities (Ramos *et al.* 1997). Therefore, the use of artificially created burrows could be useful on islands, providing a natural population of Scopoli's Shearwaters exists, but which are otherwise limited by the availability of suitable nesting

sites. Deliberately created nesting cavities could even be achieved by rearranging naturally available materials present on the islands themselves (e.g. rocks, boulders, logs, etc.). Burrow occupancy could be further optimized by selecting the right burrow and habitat characteristics such as nest entrance orientation, height and width, burrow depth and shelter, and elevation (Ramos *et al*. 1997, Bourgeois *et al*. 2015, Karris *et al*. 2024). Additional benefits of such burrows could include improved breeding success and adult survival (as a result of nest stability, protection from predators and adverse weather conditions, reduction in egg damage), as well as making it easier to monitor the nests and study the breeding biology (Bourgeois *et al.* 2015, Austad *et al*. 2020). Any structure should be placed and designed to have a suitable temperature, taken that higher nest temperatures are affecting nestling physiology and growth (Casagrande & Dell'Omo 2025).



Figure 1: A water tank on a wooden pallet creating a nesting burrow for Scopoli's Shearwater *Calonectris diomedea* below it - Bratin island, Lastovo archipelago, 2022.

Slika 1: *Spremnik za vodu na paleti koji ispod sebe stvara rupu za gniježđenje kaukala Calonectris diomedea, otok Bratin, lastovski arhipelag, 2022.*

On islands with Yelkouan Shearwater *Puffinus yelkouan* present it could possibly also benefit this smaller, endangered shearwater species, either directly by providing more burrows, or indirectly by reducing interspecific competition with Scopoli's Shearwater (Austad *et al*. 2020).

Lastly, places where adding artificial nesting structures would be considered, should ideally be without introduced predators present, or where their populations can be permanently removed or controlled on an annual basis. A specific example is the much larger island of Kopište (73.9 ha), in the same archipelago. It has at least 32 pairs of Scopoli's Shearwater along its coast line (Engelen *et al*. 2023), but an unsuitable interior consisting of gentle slopes, mostly covered with Aleppo Pine forest, but with few boulder outcrops present. While Black rats are currently present on the island, reincursions following a successful rat eradication effort are highly unlikely due to the island's remote location.

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SAŽETAK

U ovoj kratkoj bilješci dokumentirano je prvo zapažanje uspješnog gniježđenja kaukala *Calonectris diomeda* povezano s umjetnim strukturama u Hrvatskoj, na otoku Bratinu, u Lastovskom otočju, u razdoblju od 2022. do 2026. godine. Velike spremnici za vodu postavljeni na palete stvorili su ispod sebe rupe koje nalikuju prirodnim mjestima za gniježđenje, poput onih ispod velikih stijena na blagim padinama. Prilikom budućih napora za zaštitu cjevonosnica, kako bi se osigurali dodatni uvjeti za njihovo gniježđenje, može se razmotriti stvaranje umjetnih ili poluprirodnih, rupa na pogodnim otocima s inače ograničenim prirodnim prostorom za gniježđenje. U idealnom slučaju, na takvim bi lokacijama bili trajno uklonjeni invazivni predatori iz skupine sisavaca (npr. štakori).