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## What goes up must come down – The discovery of a new island population of *Podarcis pityusensis* (BOSCÁ, 1883) in the North of Ibiza by use of an aerial drone.

MARTEN VAN DEN BERG & MIKE ZAWADZKI

### Abstract

Unmanned aerial vehicles (colloquially known as drones) equipped with a high-definition camera have a wide range of applications in biological research. In this article we report on our experiences using a drone to explore the surface of hard to access small islands in the North of Ibiza (Balearic Islands, Spain) for possible occurrences of lizard populations. On one of these small and unnamed islets that we call “Escull a Punta de Llevant” we detected a hitherto unknown population of *Podarcis pityusensis*.

**Keywords:** Drone, UAV, *Podarcis pityusensis*, *Euphorbia margalidiana*, Ibiza, Escull a Punta de Llevant.

## Introduction

Drones, also known as unmanned aerial vehicles (UAVs), have a wide range of applications in various fields, including biological research. Drones can be equipped with cameras, sensors, and other scientific instruments, which allows scientists to collect data from even remote and hard-to-reach areas (ANDERSON & GASTON 2013). In biological research, drones can be used to study biodiversity, monitor wildlife populations, track animal migrations, collect environmental data, and collect samples, among other applications.

With the help of aerial images taken by drones data could be collected to estimate the size and distribution of populations of the grey seal *Halichoerus grypus* (SEYMOUR et al. 2017).

In another example drones were equipped with LiDAR (light detection and ranging) sensors to create 3D maps of forest canopies to study tropical forests. The data collected by the drones allowed the researchers to estimate the amount of carbon stored in the forest, which is important for understanding the global carbon cycle and the impacts of deforestation (MITCHARD et al. 2014).

A small rotary-winged UAV mounted with a small video camera had been successful in surveying the nest contents of four raptor species in an accurate and safe manner when the proper flight technique was employed (JUNDA et al. 2015).

Even in entomology, drones can be used to study insect populations. The study of MADDEN et al. (2022) confirms that drones are an efficient and accurate way to collect canopy arthropods. It was concluded that if this new technique is integrated into the field of entomology, canopy studies can be done much more often, for less money, and more safely than they have been done using other techniques.

Drones have also proven to be very useful in herpetology. For example, in detecting cryptic behaviors without influencing the animal being observed, in the case of crocodylian nesting in Malaysia, where UAVs were used instead of expensive helicopter surveys (EVANS et al. 2015),

and the monitoring of freshwater turtle populations in Bulgaria (BISERKOV & LUKANOV 2017).

## Preparations

During the preliminary stages of our preparations for our fieldwork studies on the Ibiza wall lizard *Podarcis pityusensis* in 2016 we had been asked to kindly support the Servei de Protecció d'Espècies to collect data on the condition of *Euphorbia margalidiana* as well as the number of nesting sites of Audouins gull (*Ichthyaeetus audouinii*) on the Illa Murada during our conventional field research (see VAN DEN BERG et al. 2016).

We already had been in the possession of a drone when we became aware of the paper “The coming revolution: the use of drones in plant conservation” (SÁNCHEZ-BOU & LÓPEZ-PUJOL 2014). Thus, when we applied for the necessary permits (CEP permits and access permits to the national parks) for our fieldwork studies in 2017, we offered to monitor the coverage of *Euphorbia margalidiana* on Illa Murada with the use of a drone, to show that this could provide a cheap and time-saving way of monitoring. This was gratefully accepted by the Servei de Protecció d'Espècies.

A second application for our drone would focus on surveying several little-explored small islands in the northern half of Ibiza, regarding the potential of these islands to accommodate a *Podarcis pityusensis* lizard population, and for possible observations of these *Podarcis pityusensis* lizards.

## Material and method

We already were in the possession of a DJI Phantom 4 drone, a ready to fly quadcopter equipped with GPS, and obstacle avoidance technology. Thanks to the 4K ultra-HD camera with 3-axis gimbal, the system is ideally suited for aerial photography and video. The average possible flight time is approximately 30 minutes, with a maximum speed of 72 km/h. We use the drone in combination with DJI goggles because flying with only the phone- or tablet screen in full sunlight limits your visibility, which also limits the safety of the flight. With goggles this problem is eliminated, and it is also much easier to get close-up footage in a save manner.

To ensure that we approach the islands safely and accurately, we always chose a spot with an unobstructed view of the island to be investigated, preferably also higher up. The usual altitude limits that are used for drone flights have never been achieved in this case. We flew as low as possible in the direction of the island to be investigated, considering the security conditions and possible privacy issues. Video recordings of the entire flight were saved to flash memory and reviewed later.

## Results

Regarding monitoring *Euphorbia marginaliana* on Murada island with the drone as performed in 2017 compared to the same monitoring during our field research in 2016, we can conclude that the use of a drone has several advantages.

1. The drone footage can provide a more complete and detailed picture of the situation than what can be achieved on foot.
2. There will be less disturbance on the study area compared to conventional field research.
3. The time savings are extreme.

We believe that in this kind of monitoring a drone could perfectly replace the boots on the ground. By using a programmable flight route, standardization can be achieved, as a result of which the footage can be interpreted more easily, and as expected, also automatically.



Image 1. Illa Murada in front of Port de Sant Miquel, with thriving *Euphorbia marginaliana*.



Image 2. Situation around Punta de Llevant, in the North of Ibiza.

The sighting and evaluation of the video footage made by the drone during the flights to one of the small islands in the North of Ibiza had a surprise in store for us. In the first instance our aim had been to investigate whether there was a vegetation present on the small islets. If this was the case, we tried to assess whether this island may host a small lizard population.

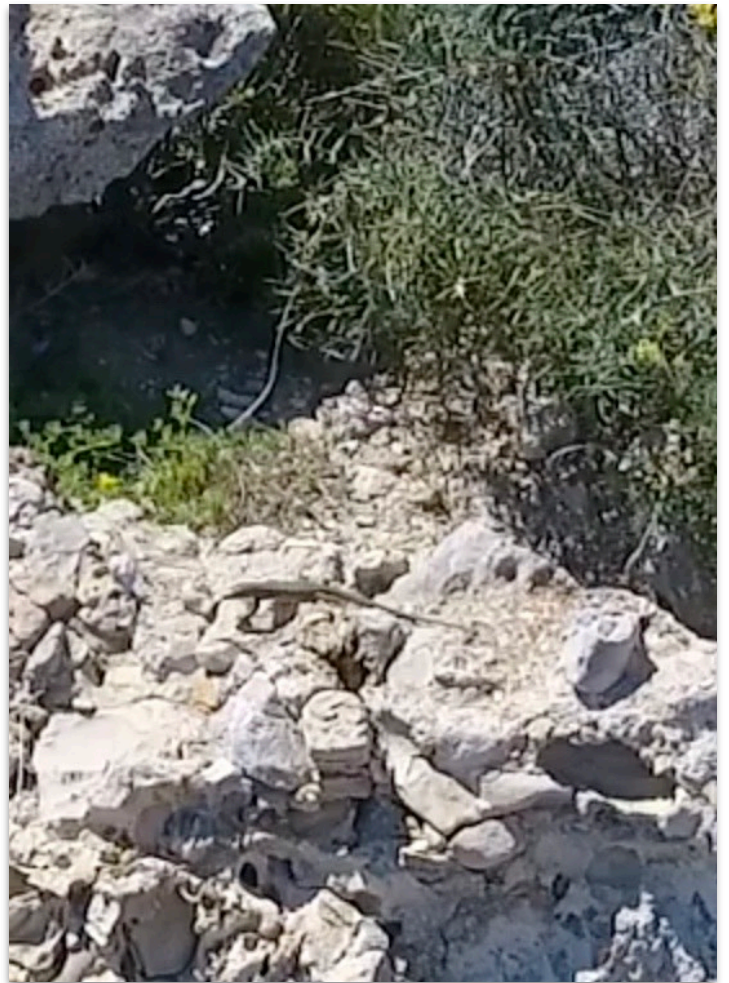
One of the chosen islands was a small unnamed islet, situated north of the Illa Sa Mesquida, that we name Escull a Punta de Llevant. It is only of recent separation. Here we could observe two lizards on the material collected during two flights. In the first case, it was a lizard with a green back, probably a male specimen, just distinguishable on an enlargement of the still image. If it had not ran away, we probably would have missed this lizard. In the second case, the lizard was observed during flight and followed. It turned out to be a brown colored female specimen of *Podarcis pityusensis*.



**Image 3.** The second lizard spotted on Escull a Punta de Llevant.



**Image 4.** Enlargement of image 3.



**Image 5.** Enlargement of a few frames later.

## Discussion

With an estimated surface of 450 m<sup>2</sup> Escull a Punta de Llevant is just a little bigger than Illa Dau Gran (VAN DEN BERG & ZAWADZKI 2010), and would rank third on the list of smallest islands with a population of *Podarcis pityusensis* lizards. Due to the recent separation to mainland Ibiza it is to be expected that the *Podarcis pityusensis* lizards on Escull a Punta de Llevant will show close similarities to the *Podarcis pityusensis* lizards on Ibiza. This will be similar to most of the other northern populations of *Podarcis pityusensis* lizards, in particular Illa d'en Calders, Illa des Canaret, Illa Sa Mesquida and Illa Punta Galera de Portinatx.

The discovery of this new island population of *Podarcis pityusensis* lizards has shown that with the use of an aerial drone it is possible to demonstrate the presence of lizards in locations that are difficult to access. Moreover it shows once again that even on very small islands the existence of a *Podarcis pityusensis* lizard population is possible.

The disadvantage of disturbing the lizards by using an aerial drone does not outweigh the disturbance caused by the personal presence of researchers, especially in cases where accessibility can be a problem. In this case, we have shown that an aerial drone can be an asset for research in herpetology.

## Supporting material

The relevant part of the second lizard video footage on Escull a Punta de Llevant is shown at: <https://vimeo.com/822469419>

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