

Short Communication

The potential role of the yellow-legged gull, *Larus michahellis* as a seed disperser of an invasive plant species in the Tuscan Archipelago

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Abstract - Gulls have a significant role as seed dispersers in coastal habitats and as drivers of plant movements within and between islands. We report the observed interaction between the yellow-legged gull (*Larus michahellis*) and species of cacti of the genus *Opuntia* in Capraia Island, in the Tuscan Archipelago.

Key words: seed dispersers, invasive alien species, *Opuntia* spp., *Larus michahellis*.

Riassunto - Il ruolo potenziale del gabbiano reale zampegiale *Larus michahellis* come dispersore di semi di una specie vegetale invasiva nell'Arcipelago Toscano.

I gabbiani svolgono un ruolo significativo nei processi di dispersione dei semi negli ecosistemi costieri e favoriscono il movimento delle piante all'interno e tra le isole. In questo contributo riportiamo l'interazione osservata tra il gabbiano reale zampegiale (*Larus michahellis*) e specie di cactus del genere *Opuntia* sull'isola di Capraia, nell'Arcipelago Toscano.

Parole chiave: dispersione dei semi, specie aliene invasive, *Opuntia* spp., *Larus michahellis*.

Capraia Island is the third-largest island of the Tuscan Archipelago, and it is part of the Arcipelago Toscano National Park. As in most Mediterranean islands, Capraia has experienced, over the last few decades, important socio-economic transformations that have also affected its vegetation and increased the risk of invasions by alien plant and animal species (Foggi *et al.*, 2011).

One of the most concerning invasive plant genera, *Opuntia* spp. Haw., has been reported as present on the is-

land in 1839 (Moris & De Notaris, 1839). *O. stricta* is currently the most widespread alien plant on Capraia, covering over 70 hectares, approximately 3.6% of the island's surface. It occurs at higher densities near human settlements, although it is also found outside the settlements, including in areas already within the National Park (Misuri *et al.*, 2024). In addition to *O. stricta*, two other species of the genus *Opuntia* have been introduced to Capraia: *O. ficus-indica* (L.) Mill. and *O. monacantha* (Willd.) Haw. (Lazzaro *et al.*, 2014). However, their abundance is considerably more limited compared to *O. stricta*, which dominates the landscape in both disturbed and natural settings (Fig. 1).

Due to their tolerance of salinity and water scarcity, many species of *Opuntia* are particularly adapted to dry areas in many parts of the world (Vilà & Gimeno, 2003). Understanding the germination and longevity of *O. stricta* seeds, dispersal mechanisms, and the interaction with local fauna is crucial for assessing its potential to invade new areas (Nogales *et al.*, 2001) and planning effective eradication campaigns.

According to previous studies (Padrón *et al.*, 2011), animal species belonging to different taxa, such as elephants in South Africa, baboons in the Arabian Peninsula, and lizards in the Canary Islands, have been identified as dispersers of *Opuntia* spp. seeds.

Gulls have a significant role as seed dispersers in coastal habitats and drivers of plant movements within and between islands (Calvino-Cancela, 2011; Padrón *et al.*, 2011). They transport seeds in the plant material they use to build their nests, as well as in the regurgitated pellets and droppings after consuming fruits (Calvino-Cancela, 2011). Gulls play a significant role in dispersing *Opuntia* spp. seeds in the Mediterranean basin (Padrón *et al.*, 2011).

In early March, the authors found, in the proximity of the dock and near the castle, pellets regurgitated by the yellow-legged gull *Larus michahellis* containing mainly *Opuntia* spp. seeds (Fig. 2). The authors also observed distinctive beak marks in several *O. stricta* fruits, and fruit remnants were frequently found in the areas typically inhabited by gulls near the harbour and in the cliffs near the village.

On the 14th of March, an adult yellow-legged gull was seen taking flight with an *Opuntia* fruit in its beak. The observation took place at dusk near the viewpoint in proximity to the heliport.

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Fig. 1 – The fruiting season of *Opuntia stricta* in Capraia starts around September and ends in March. / La stagione di fruttificazione di *Opuntia stricta* a Capraia inizia intorno a settembre e termina a marzo.

The role of the yellow-legged gull in *Opuntia* spp. seed dispersal had already been observed in Benidorm Island, Alicante, Spain (Padrón *et al.*, 2011) during research, carried out in the Balearic Islands, in Cap de Creus (Catalonia) and Benidorm and Canary Islands, that highlighted the active role of vertebrates in dispersing *O. stricta*, *O. maxima* and *O. dillenii* seeds within and among islands. In particular, the raven, *Corvus corax*, and the Western Canaria Lizard *Gallotia galloti* were the most important dispersers in the Canary Islands, while the main vectors in the Balearic Islands were *C. corax* and a few small mammals. On Benidorm Island, the yellow-legged gull, *L. michahellis*, has been iden-

tified as the most efficient vector for seed dispersal, primarily through their pellets. By testing and comparing the germination success of dispersed seeds, researchers found that seeds passing through the digestive tract, such as those dispersed by rabbits, had lower germinability than those expelled in pellets (Padrón *et al.*, 2011). According to Vilà & Gimeno (2003), *Opuntia* spp. show greater seed germination rates in introduced areas compared to their native habitats, where vegetative propagation is more frequent.

Another recent study highlights how the daily movements of yellow-legged gulls have contributed to the dispersal of olive seeds within and among the Balearic Islands (Ando *et al.*, 2024). Both studies underscore that the yellow-legged gull can be considered a significant vector for the long-distance dispersal of large fleshy fruits in island ecosystems where large specialised frugivores are absent.

According to Misuri *et al.* (2024) and local inhabitants (pers. comm), *C. corax* is also known to consume *Opuntia* spp. fruits in Capraia Island.

Since the yellow-legged gull can retain seeds up to 9.5 hours before regurgitating them (Nogales *et al.*, 2001), it is of extreme importance to investigate the role of gulls as seed dispersers, especially when planning invasive plant species eradication strategies and programs.

CONTRIBUTIONS

This author statement is developed using the CRediT (Contributor Roles Taxonomy). SL, MS conceptualization, writing – original draft preparation, writing – review and editing.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.



Fig. 2 – Pellets of yellow-legged gull containing *Opuntia* spp. seeds. / Borre di gabbiano reale contenenti semi di *Opuntia* spp..

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