

Short note

Not only an aquatic threat: A Caspian whipsnake Dolichophis caspius (Gmelin, 1789) entangled in discarded fishing net onshore on Lesvos Island, Greece

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Abstract. The use of fishing nets has a widespread impact on marine, saline-brackish, and freshwater environments, as well as the species occurring in them. While the nets are intended to capture fish and other target species, they often result in high mortality rates of many other fauna species through bycatch and entanglement. Fishing nets that are lost, destroyed, or reach the end of their lifespan are often referred to as "ghost nets", posing a major threat to fauna as hundreds of species become fatally entangled. Here, we report for the first time an incident of a terrestrial snake, a Caspian whipsnake (*Dolichophis caspius*), which we found entangled onshore in a ghost net on Lesvos Island, Greece. The snake was released into its natural habitat after being carefully disentangled. This incident highlights the need for proper disposal of fishing nets to prevent future entanglements and mortality of non-target species.

Key words: net trapping; ghost nets; terrestrial reptiles; discarded fishing gear; Aegean Sea.

Various types of fishing nets are used worldwide on both a commercial and amateur level to catch fish and other fauna species in marine (Eyo & Akpati, 1995; Narayanakumar et al., 2009; Gerami & Dastbaz, 2013; Dammanagoda, 2018), saline-brackish (Welcomme, 1972; Crespi, 2002; Mehanna et al., 2020), and freshwater environments (Eyo & Akpati, 1995; Minakawa et al., 2008; Gurumayum & Choudhury, 2009; Raju et al., 2016; Jawad, 2021).

Unfortunately, in addition to the target species, many other fauna species are also frequently trapped as bycatch in these nets during their use, resulting in a high mortality rate. This phenomenon has been recorded

both in the sea (Piatt & Nettleship, 1987; Tasker et al., 2000; Dagys & Žydelis, 2002; Lewison et al., 2004; Moore & Jennings, 2008; Gilman et al., 2010; Casale, 2011) and wetlands (Alexander, 2010; Amarasinghe et al., 2015; Naria et al., 2019; Kelkar & Dey, 2020; Sindha et al., 2020; Vyas et al., 2020; Vyas & Patel, 2020).

Many fishing nets are lost, and others, when they are destroyed or reach the end of their lifespan, are abandoned in the sea or wetlands and are referred to as "ghost nets" (Macfadyen et al., 2009; Kim et al., 2014; Edyvane & Penny, 2017), which can wash ashore (Claereboudt, 2004; Wilcox et al., 2013; Bergmann et al., 2017) or be improperly disposed of onshore

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or in garbage dumps (Peirce & Van Daele, 2006; pers. obs.). Ghost nets are a major fauna threat worldwide as hundreds of species become fatally entangled (Macfadyen et al., 2009; Gilardi et al., 2010; Good et al., 2010; Vyas et al., 2020; Blettler & Mitchell, 2021; Patel et al., 2022). Similar entanglement incidents in discarded fishing nets have also been recorded onshore, but to the best of our knowledge, they are much less frequent (Bergmann et al., 2017; Vyas & Patel, 2020; Blettler & Mitchell, 2021). Here, we present one such incident of terrestrial snake trapping in a fishing net for the first time.

In the summer of 2020, we undertook small-scale herpetological surveys in several

areas on the island of Lesvos, North Aegean, Greece. On June 29, 2020, at 17:27 hours, during our field expedition in an olive grove located in a small settlement of Fteli (39° 02' 25.8" N; 26° 27' 34.6" E; 5 m a.s.l), a coastal hamlet situated at the mouth of the Gulf of Gera (Fig. 1), we detected an enwrapped Caspian whipsnake *Dolichophis caspius* (Gmelin, 1789) (Squamata: Colubridae) within a trammel net made by synthetic fabric (Fig. 2). The day was sunny with an average temperature of 27°C. The snake had likely become trapped while trying to hide or during foraging, and it probably became more entangled as it tried to disentangle itself.

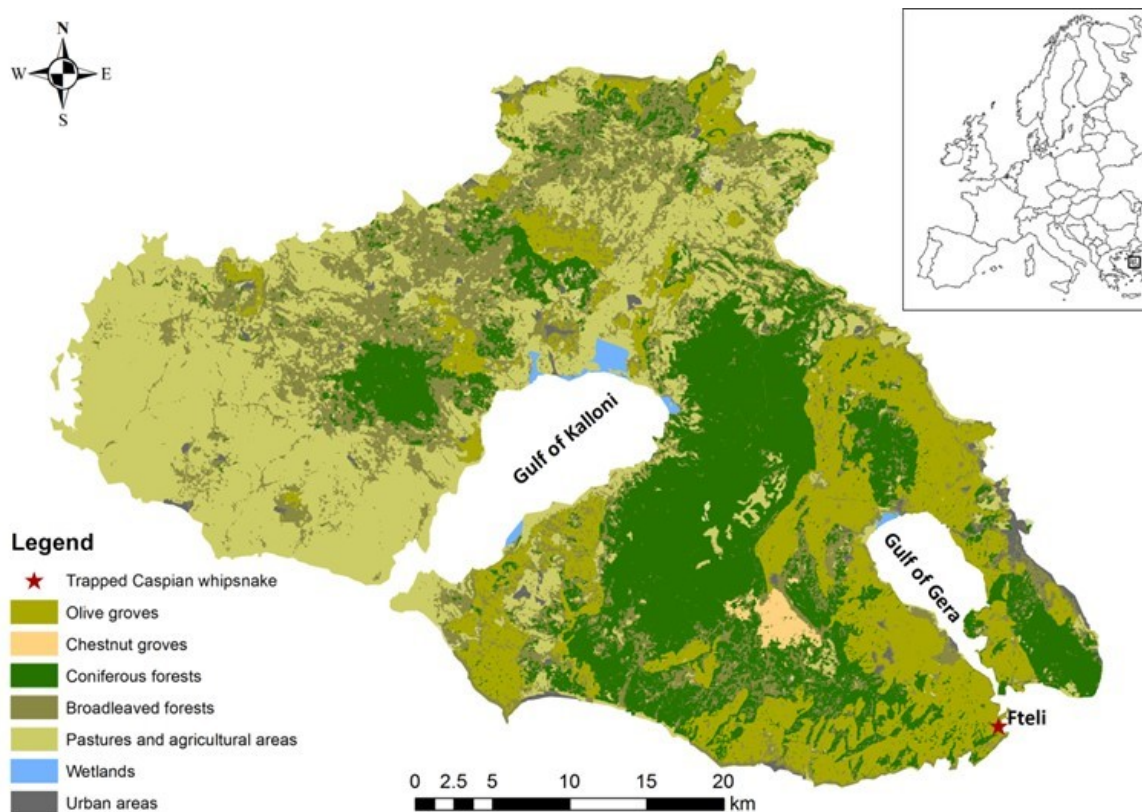


Fig. 1. Distribution map concerning the main land cover types of Lesvos Island and the locality of the trapped Caspian whipsnake.

The snake's position inside the net, which was folded over, seemed to have impeded its ability to free itself, making it even more entangled in its efforts to escape (Fig. 2). The only way we managed to free the snake from the very bad entanglement was by carefully cutting the net with scissors and avoiding injuring the reptile. The Caspian whipsnake

was lively and vigorous, so we released it into its natural habitat, a century-old olive grove with dry-stone walls surrounded by maquis vegetation dominated by lentisks (*Pistacia lentiscus*) and kermes oaks (*Quercus coccifera*). Then, to avoid future animal entanglements, we collected the nets, sealed them securely in a bag, and took them with us.



Fig. 2. Photographic documentation from the island of Lesvos, Greece, of a Caspian whipsnake ensnared within an abandoned fishing net.

The Caspian whipsnake is a large-bodied terrestrial colubrid snake that lives on the ground but can climb on trees (Dudás & Frank, 2021), and swim in freshwater (Oskyrko & Jablonski, 2020). It is a diurnal species (Pulev et al., 2019; Cattaneo et al., 2020), but nocturnal activity has been observed during warmer months (Dyugmedzhiev, 2021). This species can be found in a wide variety of habitats up to an elevation of 1,600 m, and seems to prefer plains and hills covered by agricultural environments, meadows, phrygana, shrublands, riparian zones, and residential or semi-natural areas with woody vegetation (Valakos et al., 2008; Mollov, 2011; Pulev et al., 2019; Cattaneo et al., 2020; Christopoulos et al., 2021; Teffo et al., 2023). Its presence is associated with several habitat features, such as rocks, stones, dry-stonewalls, ruins, rubble, burrows, and shrubs, which it uses for shelter (Teffo et al., 2021; pers. obs.). The Caspian whipsnake's range includes much of

mainland and insular Greece, including Lesvos, where it is widely distributed throughout the island and it is one of the most common snake species (Pafilis & Maragou, 2020; Zevgolis et al., 2023; pers. obs.).

Given the aforementioned event, we postulate that parallel occurrences of comparable nature could occur in the coastal fishing regions, not just within Greece but also in other fishing countries. In the Mediterranean basin, a significant fishing zone, 189 instances of marine fauna ensnarement in abandoned fishing nets have been documented between 2004 and 2021, while in Greece has been reported 41 such instances from 2016 to 2020 (Perroca et al., 2022). However, to the extent of our knowledge, this is the first reported case of a terrestrial serpent caught in discarded fishing nets. On the other hand, the fortuitous trapping of reptiles by sundry human-thrown materials (Miranda et al., 2013; Blettler & Mitchell, 2021; Zdunek & Kolenda, 2022), or their

unintended capture as bycatch in traps meant for other fauna species (Crane et al., 2016; Christopoulos et al., 2021), and within artificial structures (Woinarski et al., 2000; Doody et al., 2003; Manning, 2007; García-Cardenete et al., 2014), have been well-documented in many cases. In particular, trapping by farming and gardening materials and equipment has also been witnessed (Stuart et al., 2001; Brown & Sleeman, 2002; Kapfer & Paloski, 2011; Šmíd, 2012; Christopoulos & Pafilis, 2021; Zevgolis & Christopoulos, 2023).

Fishing nets pose a major threat to marine (Gilman et al., 2010; Casale, 2011; Jensen et al., 2013; Wilcox et al., 2015; Patel et al., 2022) and terrestrial semi-aquatic reptile species (Alexandar, 2010; Amarasinghe et al., 2015; Naria et al., 2019; Sindha et al., 2020; Vyas et al., 2020; Vyas & Patel, 2020), when they come into contact with them into the water. It seems also that rigorous terrestrial species can also be affected, when fishing nets are dumped uncontrollably onshore. According to Walde et al. (2007), the effects of garbage and litter on reptiles are poorly understood mainly because of the rarity of observations that primarily come from chance encounters. For the same reason, the effects of discarded fishing nets on terrestrial fauna, and therefore on reptiles, are almost unknown.

Our case, along with other quite similar isolated instances (Bergmann et al., 2017; Vyas & Patel, 2020; Blettler & Mitchell, 2021), sheds light on an unknown problem, since, as far as we know, the effects of the derelict and discarded nets onshore on wildlife has not been assessed.

Thus, we encourage the publication of cases of unintentional entanglement and trapping of terrestrial animals in fishing nets, to the dissemination of information in order to allow for a comprehensive overview of the extent of the problem on a global scale. Through such data, the scientific community will be able to assess the systemic risks and pressures associated with the issue.

To prevent further incidents, uncontrolled net depositing should be avoided and disposal methods should be established to ensure they do not come into contact with wildlife. As an ideal option, it would be the creation of specific net-disposal sites in areas that are used on a large scale, such as coastal and lakeside settlements. In both cases, it is essential to educate people about the effects that discarded nets have on wildlife. If

a trapped animal is found in a net or any other item, it should be carefully removed, and the nets should be deposited in a safe place. If someone is not capable of doing so, it would be safer to contact with relevant and expert people from the area, such as wildlife conservation groups or vets who are trained to handle such incidents.

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