

Does spring trapping yellow-legged Asian hornets work?

A four-year study in Brittany, France

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In 2021 beekeepers in Trégastel, a town on the north coast of France that has a high population of yellow-legged Asian hornets (*Vespa velutina*), embarked on a four-year study into the impact of spring trapping of foundress hornet queens. Spring trapping has been controversial in France, so they wanted to find out whether the loss of early season insects as bycatch is a price worth paying for potentially fewer primary and secondary yellow-legged hornet nests later in the year.¹



- 1 A commercial trap with QR code that was used in the study
- 2 A common sight: a hive attacked by six yellow-legged hornets simultaneously in Trégastel in August 2021

The Trégastel invasion

After the first yellow-legged Asian hornet was seen in south-west France in 2004, its population spread across the country while a national strategy to fight this invasive predator was formulated. In Brittany, the invasion was noticed in the spring of 2010 and soon intensified, particularly in coastal regions. By 2019 studies showed a nest density of five nests per km². Recently, in September 2024, a 77-year-old hiker died in Côtes-d'Armor after a yellow-legged hornet attack.

Trégastel, a town in Côtes-d'Armor (Brittany), has a population of 2,500 in a 7km² area. In 2021, 63 nests were removed (a density of 9 nests/km²). In 2022, the hornet invasion began impacting the lives of all residents for the first time, as 90 primary and secondary nests (a density of 12.9 nests/km²) were removed.

In July 2022, most of the apiaries in Côtes-d'Armor were invaded by the hornet. Five or six hornets would wait by hive entrances from sunrise to sunset and the stress of predation inhibited honey bee queens from laying eggs. The national hive mortality survey in France (ENHMA) showed that 30% of colonies were lost in the winter of 2022–3 in Côtes-d'Armor, 18% of which was attributed to yellow-legged hornet attacks.²

A high density of yellow-legged hornets disrupts even human community life, invading meat and fish stalls in markets, restaurant bins and endangering city gardeners trimming hedges and disturbing nests. Neither residents nor tourists are safe.

In August 2022, a serious attack on the public at a busy beach car park caused an evacuation and road closure. This prompted the Trégastel town council to follow the spring trapping recommendations proposed by GDSA22, a beekeeping health protection group in Côtes-d'Armor. Since 2020, this group has led a targeted campaign against the hornets based on spring trapping foundresses and analysing nest numbers.



The study begins

Although spring trapping foundresses has been very controversial in France for almost 20 years because of potential bycatch,¹ GDSA22 members (volunteers and civil servants, including police officers and gardeners) worked together to deploy spring traps in Trégastel for eight-week periods each year.

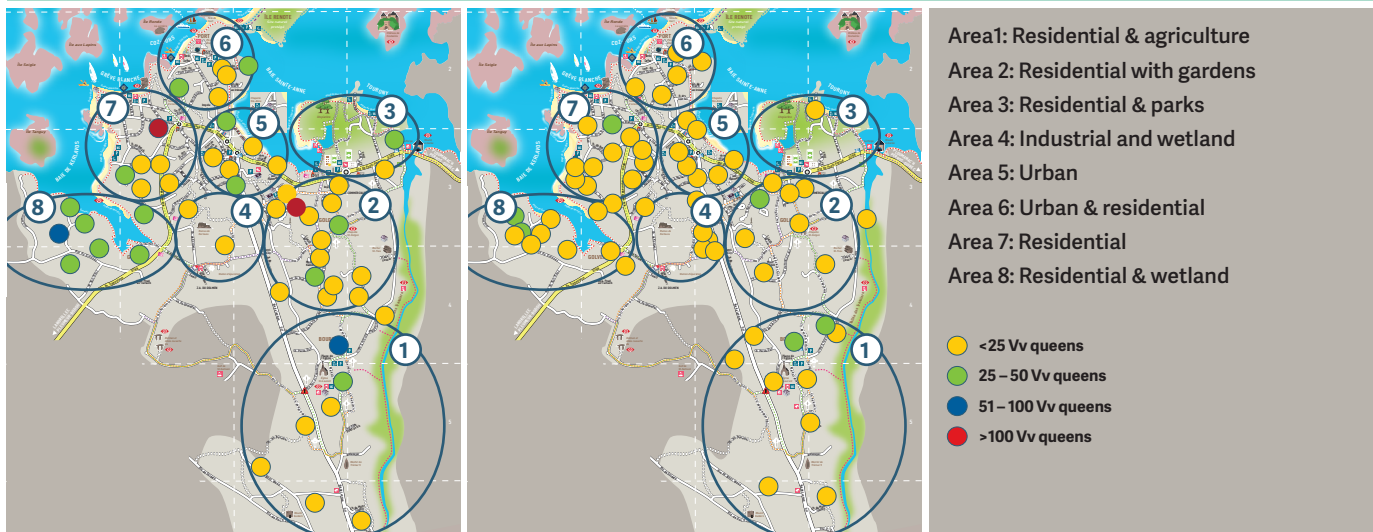
The first task involved raising awareness of the *Vespa velutina* threat by creating a precise map of nests removed from municipal properties in each month in 2021 and 2022. This information was shared online and at regular public meetings.

At the first meeting, which was attended by approximately 110 people (out of 1,372 households), discussions revolved around the yellow-legged hornet's lifecycle and the goal of environmentally responsible spring trapping of foundresses. The organisers explained that trapping and nest destruction was to be centralised by the town police with a dedicated telephone number, and financially supported by the municipality. Based on nest data from previous years, 53 volunteer trappers (2023) and 66 volunteer trappers (2024) were selected to give optimal coverage.

Traps were to be positioned close to flowers (camellia, apple trees) blooming in March/April. For budgetary reasons, only one type of affordable commercial trap plus bait was provided free of charge to each trapper for the whole campaign. Some traps were improved with floating twigs and 6mm holes made below the rim, to enable small insects to escape.

A trapper's commitment form with a catch-counting sheet and four bait refills were distributed along with instructions on how to distinguish the yellow-legged hornet from other types of insects. A QR code label linked to information about the trapping campaign and information on insect identification.

Distribution of spring queen-trapping in 2023 (left) and 2024 (right); in 2024 there were no captures of more than 50 queens in any trap



How did spring trapping work?

The campaign was deliberately limited to seven to eight weeks. To minimise bycatch, trapping began across the region when the first foundresses were caught in six satellite traps and ended when the first workers were found in the traps.

The recommendations for trapping were:

- place the bait inside the trap and renew it every two weeks, noting the catches (number and species)
- place the trap in a sunny spot, a shrub near flowers (camellia shrub, if possible) and sheltered from the wind
- follow the instructions to start and end trapping, and return the trap with its catch-collection sheet to the police.

Perhaps because of weather conditions, the emergence of the first foundresses in 2023 and 2024 differed – the trapping campaign began in 2023 on 14 March and in 2024 on 2 April.

In Trégastel, the alert and removal of nests has been centralised since 2022. Nest locations are reported via a dedicated telephone number and the municipal police organise nest removals by a single company within 24–48 hours. All costs are covered by the town council – a service which is not common in France, so generally property owners elsewhere are reluctant to report nests for financial reasons.

Spring trapping results

Despite the traps being distributed as evenly as possible, the most impacted

areas were residential and suburban where the largest numbers of nests had previously been discovered in 2021 and 2022 (areas 2, 7 and 8). In contrast, in agricultural and industrial areas, comparatively fewer foundresses were captured (area 4 and west of area 1).

In 2023, 1,146 foundresses were captured between mid-March and mid-May.

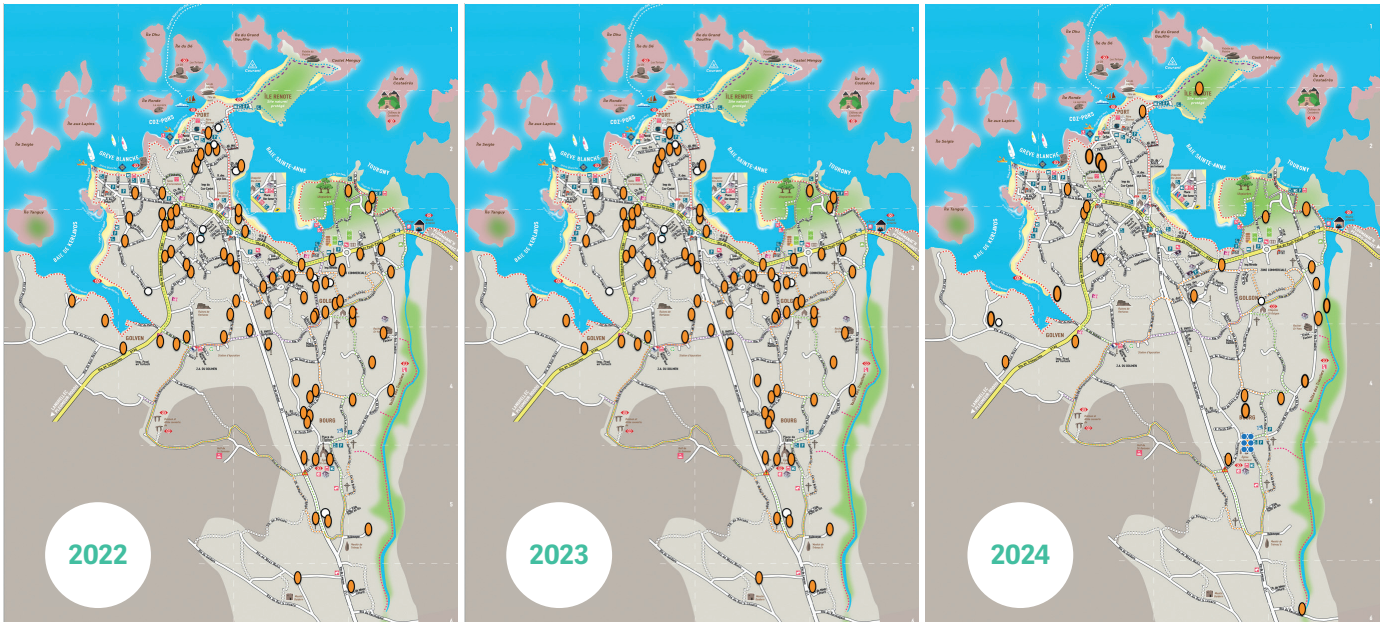
In 2024, the trapping campaign was delayed by poor weather, and only 598 foundresses were captured, despite more volunteer trappers.

The average number of foundresses found in each trap was 21.6 in 2023, but only 9.1 in 2024. In 2023, 18 trappers caught more than 25 queens, but in 2024 only six trappers captured more than 25 queens.

Comparative counts of trapping results in 2023 and 2024 and estimated catch weights (g), based on available published insect weight data (mg) ³									
2023	Hymenoptera					Diptera		Lepidoptera	
	Vespa velutina	Vespa crabro	Bombus terrestris	Various wasp	Bee	Mosquito & tiny dipteres	Various fly	Butterfly	
March 14 to 30	16	0	2	0	0	280	23	0	
April 1 to 15	130	8	5	70	0	160	140	0	
April 16 to 30	283	20	10	80	2	100	200	1	
May 1 to 15	717	32	2	200	4	28	430	2	
Total insect capture	1146	60	19	350	6	568	793	3	
Total weight calculations (g) Desired vs undesired	688	60	8	28	0	1	8	0	106
2024	Hymenoptera					Diptera		Lepidoptera	
	Vespa velutina	Vespa crabro	Bombus terrestris	Various wasp	Bee	Mosquito & tiny dipteres	Various fly	Butterfly	
March 14 to 30	0	0	0	0	0	0	0	0	
April 1 to 15	117	8	7	26	2	610	755	10	
April 16 to 30	222	60	11	57	2	812	1089	22	
May 1 to 20	259	86	22	56	6	642	1090	35	
Total insect capture	598	154	40	139	10	2064	2934	67	
Total weight calculations (g) Desired vs undesired	359	154	16	11	1	5	29	5	222
Published individual weight (mg)/insect type ^a	Hymenoptera					Diptera		Lepidoptera	
	Vespa velutina	Vespa crabro	Bombus terrestris	Various wasp	Bee	Mosquito & tiny dipteres	Various fly	Butterfly	
	600	1000	400	80	80	2.5	10	80	

Images courtesy: Rémi Brouard

Locations of active removed nests in 2022 (90), 2023 (53) and on 1 December 2024 (31). Primary nests in white, secondary nests in orange. The exact numbers are 90 in 2022 (9 primary + 81 secondary); 53 in 2023 (15 primary + 38 secondary) and 31 in 2024 (2 primary + 29 secondary).



The bycatch

After being trained in species recognition, the volunteer trappers were asked to count non-target insects (bycatch) including Hymenoptera, Diptera and Lepidoptera. Perhaps because of the late start of the 2024 trapping campaign, there was more bycatch in 2024 than in 2023.

If available and financially viable, a totally selective trap would have been preferable as early season insects are essential for the preservation of biodiversity and for pollination services. The total estimated weight of bycatch for the entire campaign was 200–300g per year.

According to a 2021 paper, a single secondary yellow-legged hornet nest can collect 11.32kg of insect biomass (159 species), including 38% bees, 30% flies and 19.7% wasps.³ If we compare the 300g of bycatch per year with the knowledge that the hornets captured around 900kg biomass in 2022 (based on the 81 large secondary nests destroyed in Trégastel), then the impact of spring trapping is put in perspective.

The impact of spring trapping on the European hornet

In 2024, the 15-day delay to the start of the campaign regrettably meant that more European hornets (*Vespa crabro*) were caught than in 2023. Since European hornets emerge later in spring than yellow-legged hornets, it is likely that the poor weather in 2024 caused a greater overlap in their emergence.⁴

Despite this excessive trapping of European hornet foundresses, a large

number of European hornet nests were recorded that summer. Some studies suggest that the simultaneous emergence of yellow-legged and European hornet foundresses might have increased nesting site competition between the species resulting in greater difficulty for the yellow-legged hornet to found nests because of the greater number of European hornet nests in the area in 2024.^{5,6}

Nest removal results

The alert system and the commitment of residents made it possible to centralise and map the exact locations of nests. It is a difficult task, and some nests may have gone unnoticed in marshy areas or unfrequented land.

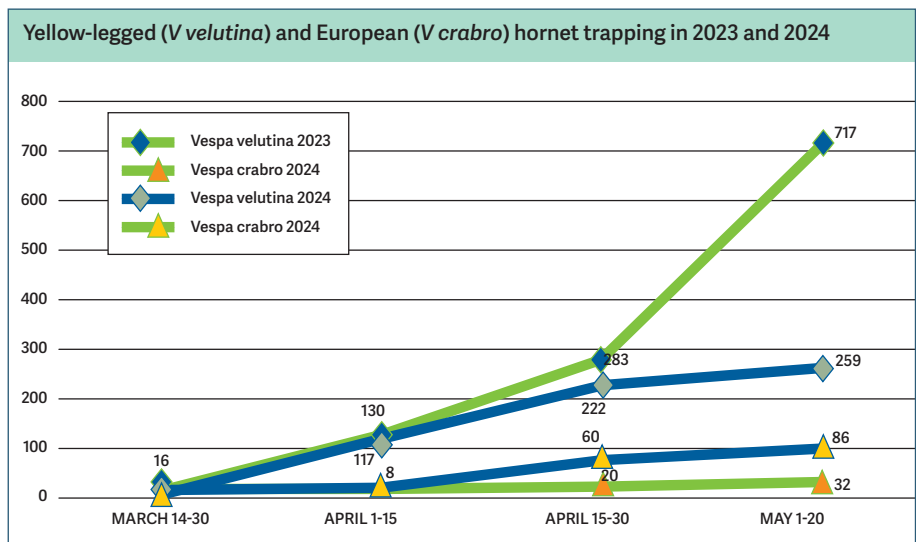
In 2022, with no spring trapping, 90 nests (nine primary and 81 secondary nests) were removed by the municipality.

Following the spring trapping campaigns of 2023 and 2024, the number of active secondary nests was reduced. In 2022, 81 secondary nests were found; in 2023, 38 secondary nests; and in 2024, only 29.

It is very tempting to link spring trapping to reduced nest building, but the decrease in secondary nests could be due to other factors. For example, a cold winter and Storm Ciaran in November 2023 might have impacted the number of surviving foundresses.

Primary nest finds

The campaign has raised the awareness of the general public, and more primary nests (+67%) were reported in 2023 than in 2022. In 2022 the first primary nests were discovered on 15 April, but in 2023 the date was three weeks later, on 10 June. In 2024, only two primary nests were discovered.



Secondary nests finds

Location

The 2024 secondary nests were located in similar areas to previous years: along wetlands (east of area 2 and area 8) and in areas for second homes where trapping has been weaker such as area 3 and along the coast (north of area 5 and area 2).

High levels of foundress capture (more than 25 per trap) frequently coincided with nearby primary or secondary nests spotted later in summer, enabling more focused trapping the following spring.

Delay in appearance

As with primary nests, the appearance of the first secondary nests was one month later in 2023 and 2024 than in 2022. The resulting later appearance of yellow-legged hornet workers significantly reduced the pressure on apiaries and hornet sightings drastically reduced that summer.

Size

From August 2023, we discovered almost exclusively 'presumed secondary' nests, the size of a basketball, at ground level in ferns, tree stumps, rabbit holes, small hedges and even concrete blocks on the ground. A few small primary nests, the size of tennis balls, were also discovered in late August.

Most nests found in 2024 were smaller than a basketball. Only three discovered in autumn 2024 had a diameter greater than 50cm. The building of secondary nests is linked to a colony needing more space and protection from predators. Did the late building of primary nests, a consequence of intensive queen trapping, disrupt the proliferation of yellow-legged hornet workers in early summer, and thus their decisions to build secondary nests? Could it explain the building of small secondary nests at the primary location and not higher in the trees?



A typical small 'secondary nest' (20cm) which developed at ground level in an old stump (Trégastel, August 2024)

How successful was spring trapping?

Spring trapping of foundress queens totalled 1,146 in 2023 and 598 in 2024.

The collateral trapping of other insects remained low in both years (less than 300g), far below the expected potential predation by the yellow-legged hornets over the same period of time.

After spring trapping, the number of secondary active nests decreased by 53% in 2023, and by 24% in 2024, reaching an overall decline in nest finds of 64% compared to 2022. The nests were found to be much smaller and closer to the ground after spring trapping campaigns.

In this seaside town, several successive spring trapping campaigns may have reduced the spread of the yellow-legged hornet to a more acceptable level for the population and beekeepers. Educating people, organising communal efforts freely supported by public services have improved the efficacy of the campaigns.

Constant vigilance in 2023 and 2024 has led to no reported yellow-legged hornet incidents in the municipality in the past two years. Involving the community by updating residents on the spring trapping progress via a monthly newsletter proved useful. Most importantly, the financial investment of the town services (traps and free removal of nests) proved cost-saving: 64% fewer nests were eliminated in the past two years and there was improved safety for both human and insect populations.

Regionally, as part of the GDSA22 campaign against the yellow-legged hornet, several surrounding villages have also begun spring trapping campaigns. Trébeurden, 8km away, recorded a similar drop in predation. Compared to the rest of Brittany, where nest numbers are still on the rise, nest numbers in the Côtes-d'Armor showed a significant drop in 2023 (from 8,000 to 6,000 nest removals).

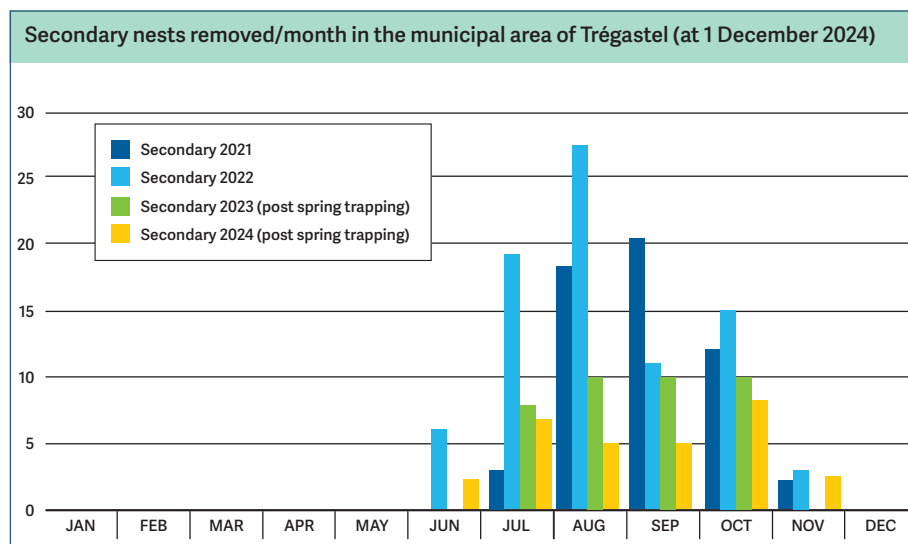
Moving forward, it will be vital to improve the selectivity of spring traps at an affordable price, and to combine better detection systems with environmentally friendly nest destruction methods. We also hope that a practical national plan will be implemented to contain the invasion of yellow-legged hornets.

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REFERENCES

- Thiery, Denis et al (2024). Twenty years of attempting to control the *Vespa velutina* invasion: will we win the battle? *Entomologia Generalis*, Vol. 44, Issue 3, 479–480
- ENHMA (2022–23), National hive mortality survey in France. www.tinyurl.com/BC2025-01-05
- Rosenberg, Y et al (2023). The global biomass and number of terrestrial arthropods. *Sci. Adv.* Volume 9, (issue 4049).
- Rome, Q et al (2021). Not just honeybees: predatory habits of *Vespa velutina* (Hymenoptera: Vespidae) in France. *Annales de la Société entomologique de France*. Volume 57 issue 1. <https://doi.org/10.1080/00379271.2020.1867005>
- Monceau, K et al (2015). Evaluation of Competition between a Native and an Invasive Hornet Species: Do Seasonal Phenologies Overlap? *Bull. Entomol.* Volume 105, pp 462–469.
- Lioy, S et al (2023). Climatic Niche Differentiation between the Invasive Hornet *Vespa velutina nigrithorax* and Two Native Hornets in Europe, *Vespa crabro* and *Vespa orientalis*. *Diversity*. Volume 15, (issue 495).