Overlooked for 29 years: natural history and conservation of *Globia sparganii* (Esper, 1790) (Noctuidae) at Lagoa de Óbidos, West-Central Portugal

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Abstract

A population of *Globia sparganii* (Esper, 1790) (Lepidoptera: Noctuidae) was discovered at Lagoa de Óbidos during targeted surveys of other wetland moths following the early 2026 severe flooding. Together with the retrospective identification of a specimen collected in 2024 at the same site, this discovery marks the first confirmation of the species in Portugal since 1997. Observations of immature stages, adult behaviour, and reproductive activity revealed a strong local association with *Sparganium erectum* L. Adults exhibited limited attraction to light traps, whereas direct searches with flashlights revealed the species to be highly localised, despite the wider regional distribution of *S. erectum*. Classified as Endangered in the Portuguese Red List of Invertebrates, this moth faces conservation threats in Lagoa de Óbidos associated with habitat degradation and local environmental pressures.
Keywords: Lepidoptera, Noctuidae, wetland conservation, Lagoa de Óbidos.

Resumo

Uma população de *Globia sparganii* (Esper, 1790) (Lepidoptera: Noctuidae) foi encontrada na Lagoa de Óbidos durante prospecções direcionadas a lepidópteros palustres após as cheias severas do início de 2026. A par da retrospectiva identificação de um espécime recolhido em 2024 no mesmo local, esta descoberta representa a primeira confirmação da espécie em Portugal desde 1997. Observações dos estádios imaturos, comportamento dos adultos e atividade reprodutiva revelaram uma forte associação local com *Sparganium erectum* L. Os adultos demonstraram baixa responsividade a armadilhas luminosas, mas pesquisas diretas com lanternas indicaram que a ocorrência da espécie é altamente localizada, apesar da ampla distribuição regional da planta hospedeira identificada. Classificada como Em Perigo (EN) na Lista Vermelha dos Invertebrados de Portugal, a *G. sparganii* enfrenta críticas ameaças à sua conservação na Lagoa de Óbidos, relacionadas com a degradação do habitat e crescentes pressões ambientais locais.
Palavras-chave: Lepidoptera, Noctuidae, conservação de zonas húmidas, Lagoa de Óbidos.

Introduction

Globia sparganii (Esper, 1790) remains widely distributed and classified as Least Concern (LC) across Europe according to the recent European Red List of Moths (Phelan et al., 2026), while its Iberian populations are prone to geographic isolation at the southwestern limit of its range. As highlighted by Farino et al. (2024), both *Globia* species belong to a highly localised group of marsh lepidoptera whose sparse Ibero-Balearic records may carry significant biogeographical and conservation weight. In Portugal, *G. sparganii* is classified as Endangered (EN) (Boieiro et al., 2023).



Figure 1 - Mating pair of *Globia sparganii* on *Sparganium erectum* L. leaves near Pequena Poça do Vau, during the night of 21–22.vi.2026 at 12:06 AM.

Following a succession of severe floods in early 2026, a core population of *Globia sparganii* was found at Lagoa de Óbidos (Poças do Vau) under a very similar threatened context to that identified for *Globia algae* (Esper, 1789), a congeneric species recently documented for the national fauna (Lemos, 2026). *G. sparganii* was previously known in the country from a single published record from Lagoa de Santo André in 1997 (Corley, 2004). Following the June 2026 discovery, a specimen collected on a spiderweb, at Lagoa de Óbidos in 2024, was retrospectively identified as *G. sparganii*.

Despite being documented as oligophagous in Central and Northern Europe, with immature stages known to feed on various aquatic host-plants, the observations of the newly discovered core population suggest a more restricted host-plant association.

This report documents the newly discovered population of *G. sparganii* and the retrospective identification of a 2024 occurrence, at Lagoa de Óbidos, recently designated as a Ramsar site, and presents new data on its natural history and conservation in a landscape under increasing pressures.

Material and methods

Systematic field visits targeting adult and larval stages of *Globia sparganii* were carried out from June 2026, following the initial detection of the species on 21 June, and extended until October to monitor habitat condition and host-plant phenology. Fieldwork was centred at Poças do Vau (Lagoa de Óbidos), with additional surveys conducted across the central western region of Portugal to search for further populations. Two complementary survey methodologies were implemented.

Direct observation: Diurnal monitoring was conducted by close visual inspection of the vegetation to locate endophytic larvae, pupal chambers and resting adults. Nocturnal and crepuscular surveys used high-powered white-light torches (Fig. 2) to locate individuals, alongside long-wavelength emitters (deep red light — 660 nm) during behavioural close range observations to minimise disturbance.



Figure 2 - Customised equipment used for nocturnal direct observation surveys in 2026. Convoy S16 high-power flashlights (SFT70 white light and deep red light LEDs). Both devices feature adjustable output levels.

Attended light trapping: A custom factory-made LepiLED light trap was initially deployed at the southernmost periphery of the Pequena Poça do Vau (Fig. 3 - B), with limited results.

During nocturnal surveys, an effort was made to rotate rapidly between survey sites while retaining survey coverage until the end of the flying season at Lagoa de Óbidos. Photographic comparisons were used to identify individuals across consecutive survey dates. An effort was made to minimise damage to plants when searching for larvae, by not pulling them or detaching structures. Selected adults and two pupae were retained for identification and collection, and comparisons of behavioural observations, including long-term oviposition observations, and eggs from two females were kept as an ex-situ reserve

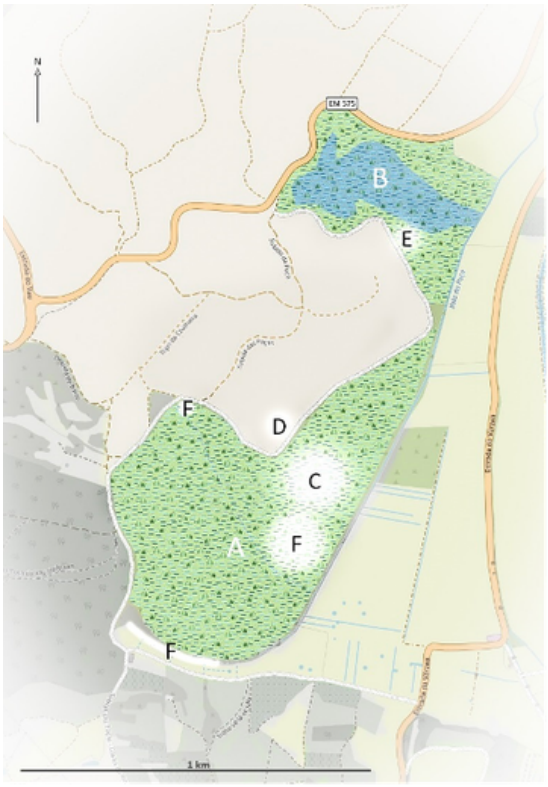

Figure 3 - Spatial view of the floodplain depressions of Poças do Vau, Lagoa de Óbidos. The area represented with a green background and a dashed, herbaceous pattern corresponds to the extensive zone that typically floods during winter, where the darker blue zone represents more or less permanent flooding. A: Area roughly corresponding to the central sector of Grande Poça do Vau. B: Pequena Poça do Vau. C: A more restricted area dominated by *Schoenoplectus lacustris* (L.) Palla and *Typha angustifolia* L. D: Small pond dominated by *Schoenoplectus lacustris*, with scarce *Sparganium erectum*, and the recently extirpated *Typha* sp. E: Area south of Pequena Poça do Vau featuring 2 small nuclei of *Sparganium erectum*. F: Marginal or central areas permanently dominated by *Typha angustifolia*. Base map source: OpenTopoMap (Data from © OpenStreetMap and NASA SRTM); adapted by the author.

Geographical coverage (municipalities and sites):

Surveys were supported by the author's database regarding host-plant locations, especially in the Caldas da Rainha Typhonic Valley. The fieldwork focused on the drainage basin of Lagoa de Óbidos, in the municipality of Óbidos (Poças do Vau, Rio Real and Rio Arnóia margins, Bom Sucesso, Amoreira, Pó, and Olho Marinho), Bombarral, and Caldas da Rainha (Nadadouro, banks and floodplains/tributaries of the Rio Tornada, Águas Santas, and Campo), as well as Alcobaça and Nazaré (S. Martinho do Porto, Vale do Paraíso, and the agricultural plains of the Rio Alcoa).

To investigate the regional occurrence of *G. sparganii*, all known host-plant stands within the surveyed area were revisited from June to August, targeting adults and searching for larval or pupal chamber traces.

Entomological collection

Wild-collected specimens of *Globia sparganii* are kept in the author's private collection.

Óbidos (Poças do Vau); Male 29.vi.2024; Male 21.vi.2026; Two pairs 26.vi.2026 (nearly empty females pinned); Coll. Lemos.

Results and discussion

I - The rediscovery of *Globia sparganii*

Circumstances of previous non-detection:



Figure 4 - *Globia sparganii* is a "reflective" light-colored moth characterised by a distinct behaviour and more conspicuous flight pattern above the herbaceous canopy than other local endophytic wetland macromoths. Morphologically larger than *Globia algae* and *Lenisa geminipuncta* (Haworth, 1809), from a distance its perching posture resembles a few common wet meadow species that rest prominently within the riparian vegetation along the shores of Lagoa de Óbidos; 22.vi.2026; 12:16 AM.

Globia sparganii was detected on the night of 21.vi.2026 during attended light trapping and direct searching near a large lagoon locally known as Pequena Poça do Vau (Fig. 3 – E), next to an unpaved path, where two isolated stands of *Sparganium erectum* L. occur close to the trapping point. This area of Lagoa de Óbidos had been intensively monitored; nevertheless, fixed light traps operated from May to July repeatedly detected *G. algae* for two years without a single record of *G. sparganii*. These surveys were primarily intended to detect *G. algae* dispersing into an area without *Schoenoplectus lacustris* (L.) Palla. Nearby willows support abundant aphid honeydew, providing a feeding resource for many Lepidoptera.

Moth activity around the trapping area was generally high in previous years. Several medium-sized wet meadow or reedbed species, particularly *Mythimna* spp. and *Thysanoplusia orichalcea* (Fabricius, 1775), commonly fly above riparian vegetation (higher than *G. algae*) or settle around the outer perimeter of faint illumination, often conspicuously perched on the vegetation for short periods. Under such conditions, routine examination of every moth with a hand-held white torch is impractical.

In 2026, common species usually conspicuous during these observations were noticeably scarcer. Against this reduced background activity, a moth flying out of a *S. erectum* stand crossed the beam of the hand-held white torch and was captured after directed high-output illumination disturbed its flight. Its identification as *G. sparganii* prompted an immediate directed search, revealing numerous adults concentrated within and immediately around the two nearby *S. erectum* stands.

This species showed little apparent affinity for the light trap. Some individuals negatively reacted to strong direct white light, but most remained within or immediately around the *S. erectum* stands, and mating behaviour continued even with the LED UV equipment placed close by. The occupied stands lay just near the poorly illuminated outer limit of the trapping area. The weak apparent "attraction" of adults to light and the high background moth activity may together

explain how a locally confined but numerous population remained undetected despite substantial previous survey effort. However, attended light trapping was subsequently discontinued there during behavioural observations, which were conducted using only deep red light.

Sparganium erectum stands had also been inspected regionally for endophytic moths since 2014, including precisely those stands near the small pond in April 2024 and 2025. *Orthotelia sparganella* (Thunberg, 1788) was the only endophytic moth detected during those earlier inspections. In retrospect, searches conducted in April 2026 may have been too early to detect the conspicuous larval and pupal evidence subsequently found in late June, while abundant traces of *O. sparganella* complicate recognition of evidence from other early-instar endophytic species. Searches were consequently repeated at several regional *S. erectum* stands, specifically targeting the same characteristic larval and pupal evidence found at the occupied site (Fig. 5), which remains visible on the plants for several months. But no comparable evidence of *G. sparganii* was found in other locations.

Adult behaviour, reproduction and immature stages:

Activity of adult males and previously mated females began at dusk. Individuals were concentrated within and around *Sparganium erectum*, frequently changing position through short flights, remaining very conspicuous on the upper parts of the plants (Figs. 4; 6; 7). Some temporarily left the stands out of sight and returned within moments or later. In several observations, individuals flew towards the eucalyptus plantation on the opposite side of the road and later returned, raising the possibility of attraction to aphid colonies on young shoots uphill.



Figure 5 - High levels of *Globia sparganii* occupancy on *Sparganium erectum*, with some unsuccessful pupae due to parasitoids and pathogens visible. Leaf bases at the plant core were slightly deflected to expose the remains. The infestation appears to impact only flowering, without compromising patch persistence. 27.vi.2026

Photographic comparisons allowed some individuals to be recognised on a successive survey dates (example in Fig. 6), indicating that at least some adults remained associated with the site for several days.

Mating pairs were observed on *Sparganium erectum*, generally in intermediate or elevated positions (Fig. 1), after females had moved towards the upper parts of the plants and begun calling. It was not confirmed whether they were females that had emerged earlier that night. Mating was always recorded between approximately 11:30 PM and 2:00 AM (reaching the latter hour only once), while conspicuous male activity declined at around 1:30 AM.

Both sexes were observed from the initial detection on 21.vi.2026 until 29.vi.2026, and males were particularly numerous, consistent with the high level of larval infestation within such a restricted space.

Despite the lack of species-specific monitoring before June, the inconspicuous larval traces in late April, combined with the empirically observed relationship between the high number of active, newly emerged adults and the infestation level relative to the number of plant shoots available, suggests that this core population experienced a relatively short flight period that effectively concluded well before that of *G. algae*. The last recorded *G. sparganii* was a worn male that had been photographed at the site four days previously (Fig. 6).



Figure 6 - A *Globia sparganii* worn male detected over a five-day period around the *Sparganium erectum* patch. Left picture on 25.vi.2026 and right on 29.vi.2026.

In captivity, one female exhibited several oviposition bouts per night, with the eggs laid on the edge of a toilet paper sheet, and activity increased towards dawn and was interrupted by periods of inactivity. When provided with nutrition, she continued laying eggs intermittently for more than a week. In the wild, some females subsequently disappeared from observation while still carrying eggs, suggesting some dispersal capacity, although predation provides an alternative explanation.

Eggs are deposited along the margins of *S. erectum* leaf blades, rolling the leaves with the ovipositor apparatus in a manner similar to *Rhizedra lutosa* (Hübner, [1803]) (Fig. 7). Egg adhesion was examined in four clusters in the wild and in captivity, all adhering only weakly and readily detached from the “glue” when the rolled leaves were handled after drying. This could have ecological significance if eggs remain unprotected among litter or decaying vegetation (Fig. 8), potentially exposing them to predation and directly to local substrate and hydrological conditions. Alternatively, the weak adhesion could conceivably represent an aberrant trait of the population concerned.



Figure 7 - *Globia sparganii* oviposition on the leaf blades of *Sparganium erectum*; 27.vi.2026.



Figure 8 - Structural composition of the litter layer beneath *Sparganium erectum* patches hosting *Globia sparganii*, displaying multi-year accumulation inclusive of dead biomass from previous seasons. The orientation of the leaves is mainly a consequence of winter and springtime inundation; 31.vii.2026.

Careful inspection from accessible paths revealed high prevalence of larval traces and pupal chambers distributed individually per shoot. The numbers of empty larval galleries and occupied pupal chambers was roughly equivalent, suggesting each larva damages an average of 1–2 shoots during this stage. Many pupal chambers contained empty puparia or dead pupae and larvae affected by parasitoids or disease (Fig. 5). Evidence of occupancy was found in approximately 70–80% of mature shoots (peripheral count, 1m inward from edge), without evidence of regression of the *S. erectum* patches.

By the time of this discovery, the site had already been without standing water for approximately one month with the occupied plants flowering and fruiting on dry soil. The aerial parts of the plants senesced through summer. Decaying leaves remain upright through the summer (Fig. 9) and may persist on the substrate into the following dry season; this is evidenced by the presence of older semi-rotten material from the previous year on the substrate in July (Fig. 8). Because the eggs sink in water, such accumulation could provide a plausible safe substrate for deposited eggs, although it does not explain their premature weak adhesion to the leaves. Even during flooding, this site does not experience significant currents, which are further impeded by the surrounding dense rush vegetation. Litter and plant material are therefore not normally swept far away or uprooted during winter.



Figure 9 - Monitored progression of the *Sparganium erectum* patch occupied by *Globia sparganii* following a high-precipitation winter and spring, subsequent aestival drought, and successive heatwaves atypical for the region. Plants exhibited typical annual senescence, with basal structures remaining intact in partially damp soil. Upper photo: 31.vii.2026; lower photo: 20.ix.2026.

Predation:

The bat *Myotis escalerai* Cabrera, 1904 and, particularly, nightjar species were directly observed preying on moths above the *S. erectum* stands. On arrival at the site around dusk, two to four nightjars were regularly present, either actively flying over the *Sparganium erectum* stand occupied by *Globia sparganii* or perched along the adjacent roadside, which borders the occupied stand. During these observations, the *S. erectum* stand lay directly against the moonlit background from the nightjars' line of sight. The presence of the observer appeared to discourage their approach during subsequent surveys.

Two male *G. sparganii* were found in a *Larinioides* sp. web at this location.

Rallids that could potentially prey on larvae and pupae were virtually absent from the immediate occupied area.

Ecological context:

The known occurrence area of *Globia sparganii* comprises two stands of *S. erectum*, covering approximately 280 m² (220 m² + 60 m²; Fig. 10), and lies within the Lagoa de Óbidos drainage basin, west of the Rio Real in the floodplain system of the Poças do Vau. The occupied area (Fig. 3 – E) lies beside an unpaved road that overlies a former catenal transition between sandstone-derived soils, formerly supporting heath-gorse vegetation and cork oak (currently eucalyptus plantations), and marshy vegetation on sediments from former lagoon mudflats formed when the brackish waters of Lagoa de Óbidos extended farther upstream. The flooded area still retains some salinity, with waters ranging from slightly brackish to hypersaline, reflecting its former inclusion within the coastal lagoon and subsequent hydrographic regression. The substrate is somewhat similar to that of the corresponding marginal areas of Grande Poça do Vau, where on the opposite road verge *Sparganium erectum* also occurs (Fig. 3 – D), this although in less saline water and affected by stunted growth and inverted phenology that currently may not be suited to the larval stage. Hillside water flow is seasonally variable along the verge from the opposite side of the large road.



Figure 10 - Spatial configuration of two neighboring *Sparganium erectum* patches near Pequena Poça do Vau colonised by *Globia sparganii*, taken by daylight near the end of the adult flying season; 27.vi.2026.

G. sparganii occupies seasonally inundated area that drains considerably faster than the deeper depressions of the Poças do Vau (colonised by other tall helophytes), and it is not a marginal detached depression like the pond of Fig. 3 – D. In February 2026, the "Fig. 3 – E" location was temporarily but deeply affected by severe flooding with the adjacent road submerged; however, by the *G. sparganii* flying period it was already dry.

The vegetation variation at the site is identical to that found in the vast area of Poças do Vau, which is predominantly composed of saline wet grasslands (pastures) and rush beds featuring *Bolboschoenus maritimus* (L.) Palla and *Juncus maritimus* Lam., together with a widespread invasion by *Spartina patens* (Aiton) Muhl. and expanding stands of *Phragmites australis* (Cav.) Trin. ex Steud. The dominance or presence of other helophytes is more localised, with *S. erectum* being the rarest of the potential known European host-plants for *G. sparganii* (Fig. 3).

Regional ecology and distribution of *Sparganium erectum*:

In the central western region of Portugal, the distribution of *S. erectum* is regionally fragmented, mirroring its habitat, but still locally abundant in a variety of semi-natural and transformed landscapes, including open or forested lagoon margins, riverbanks and runoff channels, river valleys and tributaries, irrigation and orchard ditches, and semi-open fields associated with remnants of hydromorphic podzolic soils and riparian galleries. Although less conspicuous than *Typha* species, it is regionally more widely distributed and abundant than those, even though it lacks their high wind-dispersal capacity. This distribution pattern and the associated plants identified might demonstrate that *S. erectum* populations persist in their historical locations (Fig. 11), despite most of the sites being degraded. However, this plant is particularly rare on slightly saline substrates of former large coastal lagoon systems, such as the drainage basins of the Óbidos Lagoon, São Martinho do Porto and the downstream floodplains of the Alcoa River, with a tendency to become restricted to the surrounding deep or heavily managed drainage ditches.

Sparganium erectum is characteristically associated with shallow-water and marginal wetland habitats, which are the most affected by human activities, and generally occupies shallower positions than *S. lacustris* and *Typha angustifolia* L. Several stands of *S. erectum* persisted in the Poças do Vau area in the 1990s, particularly around Pequena Poça do Vau,



Figure 11 - Example of a relict *Sparganium erectum* patch in permanently damp soil within the context of a marginal zone adjacent to abandoned small-scale farming, upstream of a tributary of Lagoa de Óbidos in the Municipality of Caldas da Rainha; 9.viii.2026.



Figure 12 - Male *Globia sparganii* trapped in a *Larinioides* sp. spiderweb over a small stand of verdant *Sparganium erectum*; 29.vi.2024.

peripherally in all directions (Fig. 3 – B). Parts of the wider floodplain have since been, and continue to be, affected by smallholder agriculture and pastoral abandonment, with the floodplains being subject to ditch excavation and other earthworks, as well as chemical constraints associated with agricultural and forestry use. The currently occupied *S. erectum* stands and the localised *G. sparganii* population are therefore remnants of similar wetland conditions that were more extensive until relatively recently.

Within the Poças do Vau, *S. erectum* is facing regression across the extensive still seasonally flooded surfaces, while being more frequent along tributaries and in upstream palustrine areas, especially on sandy soils. These landscapes are increasingly affected either by intensive agriculture where pesticides are used, or by abandonment without grazing (which replaces the lower riparian vegetation), which, however, does not seem to prevent a widespread (almost omnipresent) occurrence of *Nonagria typhae* (Thunberg, 1784).

Small livestock animals still move along the road and partially affect the *S. erectum* stands beside the passage, mainly through light grazing, browsing and trampling, with apparently limited overall effects. The nearby expansion of *S. patens* and *P. australis* represents the most evident long-term habitat pressure, while additional potential threats include repeated road-widening works immediately beside the occupied area and forestry harvesting adjacent to the site (Fig. 14).

Earlier occurrence and host-plant phenology:

An earlier occurrence of *G. sparganii* was documented on 29.vi.2024 in a *Sparganium* stand that was then more developed in the small pond supporting the high-density *G. algae* core population (Fig. 3 – D). The specimen, a medium-sized yellowish moth found trapped in *Larinioides* sp. spiderweb (Araneae: Araneidae), was collected at the time but provisionally considered to be an oversized *Plusia festucae* (Linnaeus, 1758), and stored in a refrigerator (Fig. 12). Following

the discovery of *G. sparganii* in 2026, the preserved specimen was re-examined and identified as *G. sparganii*. The circumstances closely match those documented twice in the newly discovered population in 2026, where male *G. sparganii* were found trapped in *Larinioides* sp. webs above *Sparganium* stands. The collection date coincides with that of the last confirmed adult observation in 2026.



Figure 13 - Poor regeneration and/or inverted phenology of the five main helophytes in the previously highest density *G. algae* site at Lagoa de Óbidos, where *Globia sparganii* also occurred in 2024. *Bolboschoenus maritimus* apparently better adapted to continue fruiting and thriving under this regime. From left to right: *Schoenoplectus lacustris*, *Sparganium erectum*, *Iris pseudacorus* L., *Typha latifolia* L. (as only standing litter from the previous season) and *B. maritimus*; end of summer, 20.ix.2026.

This confirmed earlier record demonstrates that *G. sparganii* occurred at this site while the local *Sparganium* was exhibiting a small stand (despite the inverted phenology already). The *Sparganium* stand at this location had been well developed six years earlier. In recent years, however, it exhibited delayed resprout that became more pronounced during the last two years. In 2025, the plants were still active, emerging during summer after water levels receded despite occasional livestock pressure (Lemos, 2026, Fig. 7). Following the February 2026 flooding, the stand declined markedly in extent, with only small shoots found in late August/September (Fig. 13). This phenological condition would appear poorly suited to normal local larval development, although the late-emerging plants could still have attracted adults and received eggs during recent years.

Host-plant association results:

The concentration of adults strongly attracted to *S. erectum* while resting, flying and mating, alongside oviposition on its leaves and the subsequent abundance of larval and pupal evidence, supports a strong regional association of *G. sparganii* with this plant, from which its specific epithet is derived. The international literature (Henwood & Sterling, 2020) mentions a diversity of helophyte hosts, such as *Typha* spp., *Sparganium erectum*, and also *Schoenoplectus lacustris*, *S. tabernaemontani* (C.C.Gmel.) Palla, *Iris pseudacorus* L.; however, this contrasts with the observations of the present study in western Portugal.

From May to July in both 2024 and 2025, large *Typha* stands at the Poças do Vau (Fig. 3) and associated ditches were repeatedly visited during monitoring of *G. algae* and other wetland moths, and the negative observations of *G. sparganii* from *Typha* are supported by substantial survey effort in 2026.

The observed activity patterns and biotic interactions of helophyte-associated endophytic moths within Poças do Vau, and further afield, provide additional context for these observations, with abundant *Typha* spp. occurring under diverse hydrological regimes, including at Grande Poça do Vau where it is embedded or interspersed with *S. lacustris* (Fig. 3 – C). The currently occupied *S. erectum* stands (Fig. 3 – E) are only approximately 500 m from Grande Poça do Vau. This distance is covered by *G. algae*, and *G. sparganii* was itself recorded in 2024 (Fig. 12) in the former *Sparganium* stand at the small peripheral high-density *G. algae* pond (Fig. 3 – D), only approximately 100 m from Grande Poça do Vau.

Contrasting with *G. sparganii* swarming adults around *S. erectum* at site "E" (Fig. 3), this moth was not detected within Grande Poça do Vau or in association with any more peripheral *Typha* stands, nor with scattered *Iris pseudacorus* or *S. lacustris* stands in surrounding areas. Furthermore, the endophytic macromoths found in *Typha* stands (larvae and adults) were repeatedly *Nonagria typhae* and *Sesamia nonagrioides* (Lefebvre, 1827), reinforcing previous regional observations in which *Typha* was not found to be regionally used as an oviposition host by *G. algae* (Lemos, 2026).

Subsequent regional surveys detected only *Orthotelia sparganella* among the endophytic moths associated with *S. erectum*, while *G. sparganii* remained undetected outside the known occupied site. The continued absence of *G. sparganii* detections at numerous surveyed locations of its locally associated host remains unexplained.

Whether *G. sparganii* larvae hatching from eggs laid on *S. erectum* may subsequently move to alternative host-plants mentioned in the European literature remains unknown, as such plants do not coexist at the known occupied site.

One possibility requiring experimental investigation is that adult host affinity and selection are influenced not only by host-plant identity or presence but also by plant and habitat condition. Furthermore, the high level of larval infestation observed in the occupied *S. erectum* stands could modify chemical cues, for example through plant damage or larval activity, including herbivore-induced plant volatiles (HIPVs), potentially influencing adult aggregation or oviposition (Zakir et al., 2013; El-Sayed et al., 2016; Hussain et al., 2020).

Syntopy with *G. algae*:

At the wetland-system scale, the occurrences of *G. sparganii* and *G. algae* at Poças do Vau partially overlap. This co-occurrence is not restricted to Lagoa de Óbidos. *G. algae* has also been recorded at Lagoa de Santo André, the locality of the previously published Portuguese record of *G. sparganii* from 1997, while Bergmann (1954) likewise reported that the two species may occasionally coexist.

The distribution of their respective host-plants might, however, suggest some differentiation of the two *Globia* species in relation to water depth. This should not be interpreted simply as *G. sparganii* being a shallow-water species and *G. algae* a deeper-water species. The largest known concentration of *G. algae* occurred until 2025 in a peripheral pond (Fig. 3 – D) where *S. erectum* also occurred within the same helophyte community. Neither *G. algae* nor *Nonagria typhae* is

particularly abundant in deeper-water areas of Grande Poça do Vau. This may partly reflect differences in offspring survival, as more *N. typhae* females are observed ovipositing at these sites when water levels recede, than the number of larvae subsequently found the following year.

N. typhae may not be comparable to *Globia* species, because it is found widely dispersed across the region in various wet or damp habitats, regardless of habitat type or the local availability of its host-plants (*Typha* spp.). It appears to establish itself in small numbers (even as isolated larval individuals) within very scattered sites with very few plants each, suggesting a high dispersal and colonization capacity within a metapopulation framework.

This pattern is difficult to compare with that of *Globia algae* because of the limited number of locations supporting its host-plant. The regional pattern nevertheless differs markedly between the two *Globia* species in relation to the availability of their principal regional host-plants: *S. erectum* persists in diverse and numerous natural or transformed habitats, despite *G. sparganii* having so far been detected only locally within the Poças do Vau wetland system. In contrast, the regional stands of the principal host-plants of *G. algae* are themselves increasingly rare, fragmented and undergoing a more severe decline (however, several scattered, well-preserved stands without apparent pressures, such as cutting, seem to support the species).

II - Conservation implications

The restricted known occurrence of *Globia sparganii* at Lagoa de Óbidos raises particular conservation concerns, especially given its Endangered status in Portugal. Although *Sparganium erectum* remains relatively widespread in western Portugal, the moth has so far been detected at Poças do Vau, suggesting that the presence of its locally confirmed host-plant is not sufficient to explain its distribution. The preservation of suitable hydrological conditions, vegetation structure and host-plant phenology, as well as other as yet unidentified factors, may therefore be important to the persistence of the species itself.

The regional conservation context differs from that documented for *G. algae*, particularly regarding host-plant availability, as the local main host-plant of *G. algae* is increasingly rare and fragmented (Lemos, 2026). Both species nevertheless occur in wetland habitats affected by vegetation changes, altered land use and direct human disturbance.

At Poças do Vau, the immediate threat is particularly evident. Track-widening works in October 2026 directly affected both *S. erectum* stands occupied by *G. sparganii*, through soil deposition and the accumulation of cut eucalyptus branches (Fig. 14). These disturbances add to the longer-term pressures associated with the expansion of *Spartina patens* and *Phragmites australis*, forestry operations and changes in wetland management. Preventing further damage to the occupied stands, maintaining the surrounding habitat conditions and monitoring the population should therefore be immediate priorities.

Continued surveys of other regional and national *S. erectum* stands are also necessary to establish whether the species occurs elsewhere and to assess its conservation needs more reliably.



Figure 14 - Habitat disturbance associated with track-widening works at Poças do Vau (Óbidos, Portugal) during the first week of October 2026. The works extended along the track surrounding Poças do Vau and other areas subject to forestry operations, and caused substantial disturbance to both stands of *Sparganium erectum* occupied by *Globia sparganii*. a) Deposition of soil onto the northernmost nucleus. b) Southern nucleus, with large eucalyptus branches deposited directly over *S. erectum*. c) Clearance of vegetation along the opposite verge adjacent to the eucalyptus plantation. d) View of the southern nucleus. e, f) Views from a lower position than shown in Fig. 8 published in Lemos (2026), documenting an area previously undergoing land preparation now occupied by a new plantation extending to the edge of the widened Poças do Vau track; the works also resulted in the destruction of several willows (*Salix* spp.) and rush-dominated vegetation along the opposite verge, bordering the Poça do Vau wetland. Freguesia do Vau (Óbidos); 12.x.2026.

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