OneSTOP

Mounting barriers to online data threaten systemic monitoring of invasive species

Why researcher access to social media, search-engine and e-commerce data is collapsing at the exact moment invasion science needs it most – and six concrete fixes.

POLICY BRIEF

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1. Introduction

Invasive alien species (IAS), non-native organisms that threaten local environments, are among the leading drivers of biodiversity loss and cost the EU economy billions of euros every year. Preventing new introductions and responding rapidly to detections depend on timely evidence – not only where species occur, but how people encounter, discuss, trade and react to them. *Conservation culturomics* (the study of human-nature relationships through digital data) and *iEcology* (mining online data to answer ecological questions) turn this into low-cost, continental-scale evidence, complementing field and citizen-science monitoring (Novoa et al., 2025; Pocock et al., 2024). Conservation culturomics and iEcology monitoring includes the systemic, continuous, platform-wide tracking of species occurrence, engagement, trade and sentiment signals – a real-time "barometer" for policy and management.

Online IAS monitoring activities directly support the EU biosecurity policy, particularly the enforcement of the IAS Regulation (EU 1143/2014). Yet, just as EU-funded projects such as OneSTOP build automated pipelines to exploit this potential, the platforms that generate the data are closing off access – a global trend known as the "APIcalypse" (Bruns, 2019). This brief draws on OneSTOP's systematic evaluation of 14 platforms and two policy-relevant case studies (Reynaert et al., 2026; Henke et al., 2026) to show which platforms work, why access is deteriorating, and what regulators, platforms and funders can concretely do about it.

Funded by the European Union

2. Evidence and Analysis

2.1 Two-thirds of platforms tested are unusable for monitoring

Between January and December 2025, OneSTOP applied for researcher access to 14 major platforms to track the 88 species on the EU Union List of Invasive Alien Species. Only six platforms ultimately yielded usable data (Wikipedia, YouTube, Flickr, Facebook/Meta, eBay and, via slow manual downloads only, Google Trends); four platforms rejected applications outright, and three lacked the geolocation needed for occurrence-level monitoring (Reynaert et al., 2026). Table 1 summarises access outcomes together with how well each platform's data actually reflects real invasions and how easily its output can be automatically validated.

The role of machine vision in validation

Machine vision acts as a crucial filter for processing large volumes of social media data, such as Flickr images and YouTube videos (Table 1), helping to remove inaccurate results. Automated workflows can be set up to gather geolocated media using targeted keyword lists, filter for unique sightings by time and place, and then confirm species identity using machine vision tools. Services like the Pl@ntNet API are particularly helpful here, as they offer accessible, low-cost species validation with free tiers for research projects. This flexible approach allows researchers to efficiently gather high-quality data on invasive species.

Table 1. Researcher access outcomes and monitoring value of the platforms evaluated for automated IAS data mining, 2025 (adapted from Reynaert et al., 2026). *Correlation assessed against confirmed occurrences (GBIF/EASIN) across 112 documented early invasion events, 2016–2025 for all platforms except Google Trends, where comparison with USDA PLANTS dataset was performed.

Platform	Access outcome	Correlation with real occurrences*	Automated validation potential	Verdict
Wikipedia	Open, free, unlimited (>90 views/day threshold)	High – best of all platforms tested	Low (pre-aggregated)	Best overall signal; ready to use now
Facebook / Meta	Vetted-research social media archive enclave; from Mar. 2026: $1,000 + ~$400/month	Medium	Medium	Usable, but costly and coarse (country-level only)
YouTube	Free quota (raised to 200k requests/day)	Low	High, once paired with machine vision validation layer	High potential; needs AI filtering for false positives
Flickr	Free tier; high-resolution images paywalled since 2025	Low	High, once paired with machine vision validation layer	Best coordinate-level source, paired with machine vision
eBay	Free, 5,000 calls/day	Not evaluated (no historical trend data)	Medium	Useful live snapshot, not time-series
Google Trends	No stable API; ~4,000 manual queries needed for one study	Medium – taxon specific	Low	Usable only at small, non-scalable scope
X (Twitter)	Rejected – "not solely for... systemic risks" (DSA Art. 34); reading access now paywalled	Untested	–	Blocked
Google Ads / Search API	Rejected – "keyword-only tools not allowed" / insufficient data-protection proof	Untested	–	Blocked
TikTok	Rejected – applicant "government institute not considered an academic institution"	Untested	–	Blocked

2.2 A regulatory answer already exists – but isn't reliably applied

These rejections are not isolated administrative friction; they are the local expression of a broader shift in which platforms have reasserted control over data access under commercial and legal pressure (Bruns, 2019). Meta retired CrowdTangle in 2024, X ended free reading access in 2023, and Flickr paywalled high-resolution API access in 2025 (Leppämäki et al., 2025) – disrupting over 100 research projects in 2023 alone. The Digital Services Act (DSA) already created a vetted-researcher access pathway, and the European Commission's €120 million non-compliance decision against X was issued partly for denying that access (European Commission, 2025). Yet, in a formal refusal to OneSTOP, X rejected data access for Invasive Alien Species (IAS) monitoring by arguing:

"Based on our review of your application, it does not appear that your proposed use of X data is solely for performing research that contributes to the detection, identification and understanding of systemic risks in the EU as described by Art. 34 of the Digital Services Act."

While some critics view this as a legislative scope gap—noting that environmental monitoring is not explicitly enumerated in the text—X's stance represents a strict misapplication of the regulation. By tying biosecurity risks directly to the promotion of illegal e-commerce trade (Article 34(1)(a)) and public health threats (Article 34(1)(c)) via zoonotic vectors and environmental disturbance, invasive species monitoring sits squarely within the intended scope of the law. X's rejection reveals that the Article 40(4) access mechanism is not being reliably applied to biosecurity frameworks, requiring clearer enforcement guidelines for platforms.

These barriers also fall unevenly: high fees and shifting eligibility rules disproportionately exclude researchers with less administrative and financial support, further skewing which invasions become visible in biodiversity-rich, data-poor regions. OneSTOP's own experience illustrates the mechanism – Facebook access now costs a one-time $1,000 registration plus roughly $400/month, a cost few institutions outside well-funded consortia can absorb for a single platform.

2.3 Privacy protection can be calibrated, not just switched off

Data protection is a necessary constraint, but current implementations often suppress useful signals without a matching privacy gain. Facebook's secure research enclave permits export of only normalised, country-level post counts; Wikipedia only releases daily pageviews once they exceed 90 views per page and country. Both are sensible safeguards – but both also strip out the earliest, lowest-volume signal that matters most for early warning (Ahmed et al., 2022; Reynaert et al., 2026). Data Transfer Agreements (DTAs) could offer a graduated middle tier between fully open and fully suppressed data, allowing coordinate-level access for defined public-interest research inside secure environments (Desai, Ritchie & Welpton, 2016). Figure 1 illustrates this graduated model against the platforms evaluated in this brief.

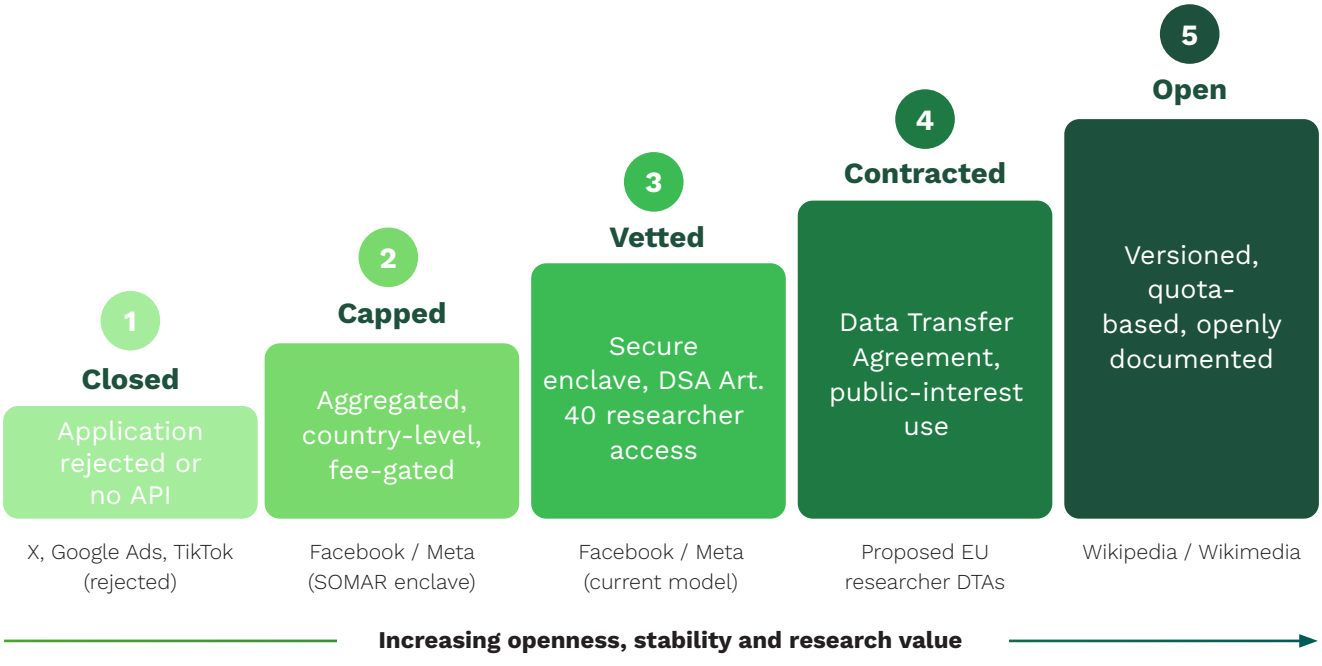

Figure 1. A graduated ("five-star" style) model of data access, from closed to fully open, benchmarked against platforms tested in OneSTOP (see also Table 1).

Why access to online data matters for IAS monitoring

Weekly Google search-volume data (2016–2025) for 88 Union List species (full list up until early 2025) reveal anomalous spikes in public attention that can be linked to specific topics concerning the respective species, such as reported health impacts or approaching/newly documented invasions. Here, in addition to the covered topics, relevant information on media outlets and stakeholder groups involved are specifically useful for targeted awareness campaigns. For instance, giant hogweed shows frequent short-term peaks in public attention linked to its advancing invasion or its harmful impact on human health, while a comparably regulated species such as the muskrat generated almost no anomalous online signal (Henke et al., 2026).

Repeated e-commerce surveys (2021 and 2024, six EU Member States) tracked species listed for prohibited online trade. Tree-of-heaven and coypu were still listed for sale in both survey years despite the EU trade ban – a clear enforcement gap – while giant hogweed disappeared from listings between surveys, a possible sign of improving compliance (see table below).

Table 2. E-commerce trade patterns for IAS of Union concern, 2021 vs. 2024 surveys (Henke et al., 2026).

Trade pattern	Example species	Policy signal
Exit	Giant hogweed *(Heracleum mantegazzianum)*	Possible sign of improving compliance / successful enforcement
Persistent	Tree-of-heaven *(Ailanthus altissima)*; Coypu *(Myocastor coypus)*	Enforcement gap – priority for compliance action
Entry	Asian knotweed *(Reynoutria japonica)*	New species need monitoring the moment they are proposed for listing

2.4 A working governance model already exists

Wikipedia/Wikimedia shows that stability and privacy protection are not mutually exclusive: two decades of open, quota-based governance produced the strongest correlation with real-world IAS occurrences and exhibited the greatest accuracy in predicting early invasion windows out of any platform tested (Reynaert et al., 2026). This shows that the growing barriers to online data are a governance choice, not a technical necessity – and manual workarounds cannot substitute for it at scale (one Google Trends study needed ~4,000 manual queries; Alam & Hulme, 2026).

3. Policy Implications and Recommendations

The evidence above points to six concrete, feasible actions for regulators, platforms and funders:

Make research data access a legal entitlement, not a favour.

Clarify – through guidance, the delegated act, enforcement practice or amendment – that environmental and biosecurity risks fall within the systemic-risk scope of the DSA (Art. 34/40) alongside public health and electoral integrity, and mandate free or marginal-cost tiers for vetted researchers. The €120M non-compliance decision against X (European Commission, 2025), issued partly for denying researcher access, already treats access as a regulatory obligation – the DSA text should say so unambiguously.

Calibrate privacy protection to preserve utility.

Replace blanket country-level suppression with transparent, minimum-count aggregation thresholds (similar to Meta's and Wikipedia's existing internal rules), paired with tiered access: open trend data by default, sensitive or coordinate-level data only within secure research environments and specific contexts, following widespread data management practices (Desai, Ritchie & Welpton, 2016).

Recognise and reward governed, long-term platforms.

Use Wikipedia/Wikimedia as the EU reference governance model, and give funders and the DSA's transparency mechanism ways to reward platforms adopting similar continuity and fair-cost commitments (e.g., "trusted research infrastructure" status, sustained funding or reduced compliance burden).

Invest in shared infrastructure and data-science capacity.

Fund secure, shared analysis environments and cross-institutional data-science training, prioritising biodiversity-rich, data-poor regions, so culturomics and iEcology capacity isn't limited to the few institutions able to absorb platform fees and administrative overhead.

Frame data provisioning as a shared benefit for the planet and people.

Position platform data access as a direct contribution to early detection of species harming ecosystems, agriculture and health – not a compliance cost – and require this framing in DSA transparency reports and platform sustainability disclosures to build lasting buy-in beyond ad hoc negotiations.

Strengthen EASIN and the European Media Monitor as complementary EU-native alternatives.

These EU-hosted services play distinct roles in systemic IAS monitoring: EASIN offers a RESTful API for IAS occurrence data, while EMM screens news in over 70 languages daily but without the possibility to query structured results programmatically. Targeted investment — better documentation, advanced filtering and standardised data formats (e.g., Darwin Core mapping) for EASIN, and development of a keyword-searchable API for EMM comparable to those offered by similar research tools (e.g., Media Cloud) — would allow monitoring efforts to rely less on commercial platforms vulnerable to sudden access restrictions.

A ready-made European alternative: EASIN + European Media Monitor

EASIN and the European Media Monitor (EMM) are free, EU-hosted services that could serve different but complementary functions in systemic IAS monitoring. EASIN offers a RESTful API providing access to IAS occurrence data collated from various sources (e.g., GBIF, literature, member state reporting), while EMM independently screens news in over 70 languages daily, offering an early-warning capability that occurrence databases alone cannot provide. Both services could reduce dependence on commercial platforms, but each requires targeted investment to reach its full potential.

For EASIN, this means clearer documentation of output fields, advanced filtering options (i.e., time range) and standardised data formats (e.g., Darwin Core). For EMM, this means moving beyond its current model — pre-defined topic and country RSS feeds, with limited customisation via the MyNews interface — toward a modern API that allows structured, keyword-based querying, similar to open research tools such as GDELT or Media Cloud. Without this, users cannot programmatically retrieve articles matching search terms, limiting EMM's usefulness for automated or targeted monitoring pipelines.

In combination with the concepts and reusable software components developed in OneSTOP, these improvements could make EASIN and the EMM the default infrastructure for systemic IAS monitoring across all EU Member States.

4. Sustainability and Legacy

OneSTOP—produced two directly reusable, open-source (CC BY) outputs, openly archived and citable on Zenodo: a repeatable culturomics workflow for anomaly detection and e-commerce compliance surveys (Henke et al., 2026), and an iEcology software package integrating Facebook, Flickr, YouTube, Wikipedia and iNaturalist pipelines (Reynaert et al., 2026). Both are species- and region-agnostic and can be applied to any future update of the Union List, or adapted to other biosecurity domains such as illegal wildlife trade. Validating these workflows for integration within EASIN and the European Media Monitor offers the most direct route to institutional continuity beyond OneSTOP.

5. Project Objectives and Methodology

Objectives

The overarching objective of OneSTOP is to pioneer an innovative, integrated approach to biosecurity for terrestrial IAS, strengthening the interconnections between human, animal, plant, and environmental health. The project aims to achieve transformative results that minimise the introduction, establishment, spread, and impact of IAS. By linking cutting-edge detection with robust risk modelling and active stakeholder engagement, OneSTOP seeks to inform harmonised policies, facilitate rapid management actions, and support the EU Biodiversity Strategy's target of reducing the number of Red List species threatened by IAS by 50%.

Methodology

OneSTOP's methodology is rooted in the "One Biosecurity" concept and operates across four interconnected pillars:

Detection

The project transitions from reactive to proactive monitoring by prototyping four rapid-detection technologies: **Air-DNA** (analysing bioaerosols for genetic traces of IAS), **iEcology** (mining digital platforms and internet searches for early warnings), **computer vision** (deploying vehicle-mounted cameras and automated insect traps), and **sentinel gardens** (engaging citizen scientists to monitor private properties).

Prioritisation

Detection data feeds into an automated, data-driven prioritisation system. The project utilises dynamic species distribution models (SDMs) and horizon scanning to forecast potential invasion risks and ecological impacts under future climate and land-use scenarios, guiding effective resource allocation.

Dissemination

To eliminate reporting bottlenecks, OneSTOP establishes open, automated data workflows that seamlessly publish detection records to global databases like GBIF and the European Alien Species Information Network (EASIN). A customisable **OneSTOP Alert** early warning system will rapidly notify relevant decision-makers of new incursions.

Socio-political Action

Recognising that biological invasions are driven by human activities, the project deploys a network of five **Living Labs** across Europe to test solutions and co-create management strategies with local stakeholders. Furthermore, the project applies **Culturomics**—the analysis of (digital) social discourse—to understand public behaviour, perceptions, and interest, and design socially acceptable, integrated governance policies.

Further Reading

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OneBiosecurity Systems and Technology for People, Places and Pathways

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DURATION

January 2025 – June 2028 (42 months)

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Funded by
the European Union

This project receives funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101180559. This policy brief reflects only the authors' view; the European Commission/REA is not responsible for any use that may be made of the information it contains.