



# The Wordfence 2023 State of WordPress Security Report

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## Introduction

In 2023, the threat landscape remained largely the same as in 2022.

# Executive Summary

## Vulnerabilities

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More than twice as many vulnerabilities in WordPress plugins and themes were responsibly disclosed in 2023 compared to 2022, but very few of these vulnerabilities were impactful. With multiple CNAs able to issue CVE IDs, the WordPress space finally has enough administrative capacity to handle hundreds of researchers disclosing vulnerabilities in tens of thousands of plugins and themes.

Unfortunately, this meant that quantity became a viable strategy for self-promotion for some parties, resulting in hundreds of low-quality vulnerabilities with little or no impact receiving CVE IDs. To counter this dynamic, Wordfence launched a [Bug Bounty Program](#) paying out the highest rates in the industry for the most impactful bugs in WordPress plugins and themes. While we still receive a number of low-quality vulnerability submissions, the rewards we offer significantly incentivize security researchers to spend more time on meaningful vulnerabilities.

## Threats to WordPress (Attacks)

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Over the course of 2023 we saw a significant reduction in credential stuffing attacks against WordPress, accompanied by a moderate increase in other types of attacks. As was the case in 2022, credential stuffing still accounted for the majority of attacks, followed by attempts to find existing backdoors and webshells. Unexpectedly, Cross-Site Scripting had a large increase in attack volume as techniques making use of it to take over sites became mainstream.

## Malware

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On the malware front, overall rates of infection remained consistent. In many cases, however, WordPress is no longer the weakest link in the Web Hosting chain, with many attacker tool sets targeting cPanel and other Web Host Management systems to maintain persistence. Countering this trend necessitates scanning the entire web hosting directory structure of an organization rather than only WordPress files.

## Recommendations

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While Multifactor Authentication remains important, protecting against vulnerabilities and remediating infections has come into focus in 2023 as attackers gain new avenues to compromise sites.

Defense against Cross-Site Scripting attacks has become increasingly important. Fortunately, these attacks are easily blocked by even the most basic of Web Application Firewalls, which should be considered an essential part of any organization's security posture.

Additionally, as attackers become more skilled at pivoting to infect entire hosting environments, detection and remediation across multiple sites becomes paramount. Using a quality malware scanner such as [Wordfence-CLI](#), defenders can rapidly scan entire hosting environments and remediate infections.

# Security Reports in Depth

## Vulnerability Report

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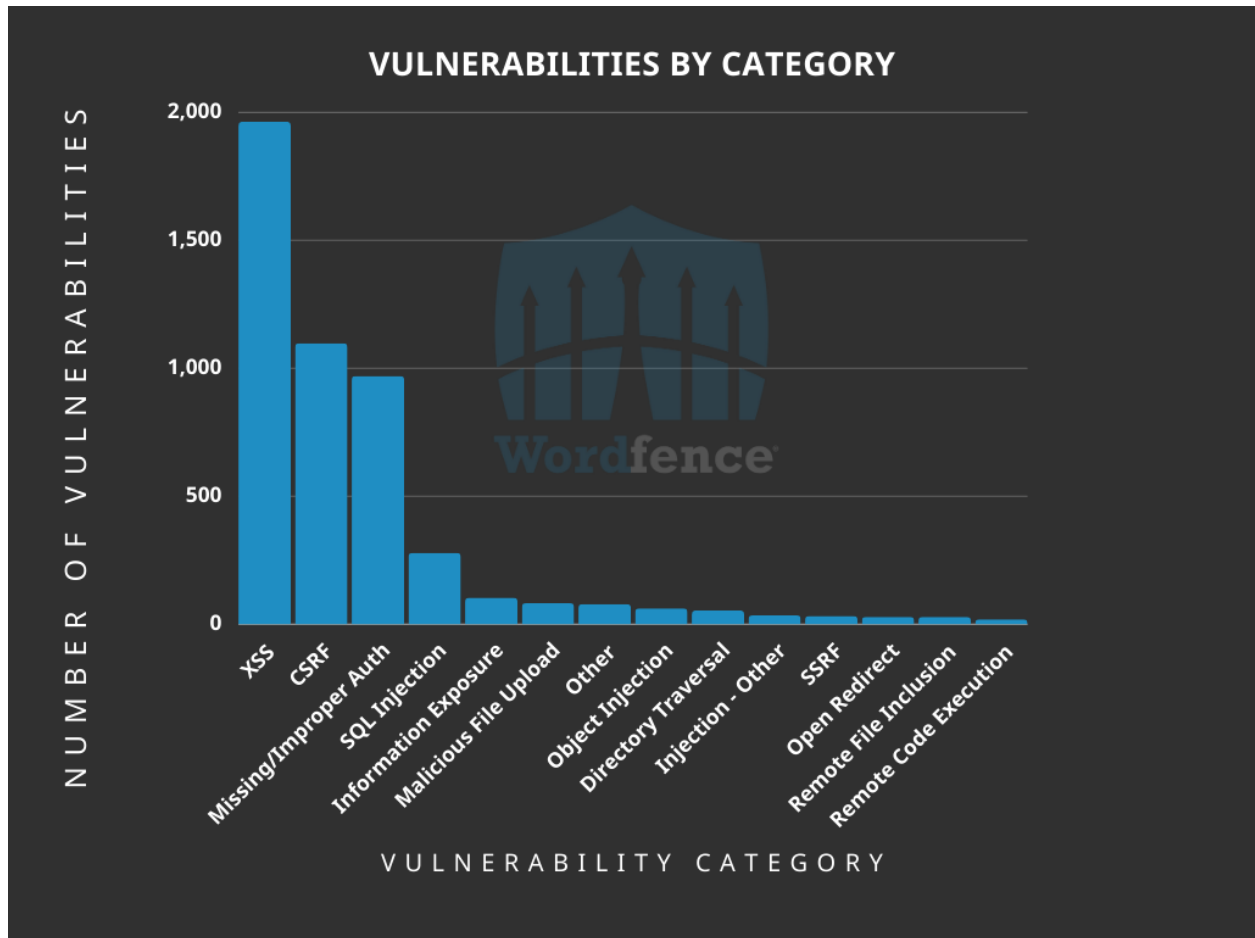
While the top 5 vulnerability types remained the same as in 2022, we saw a massive increase in several categories, especially Cross-Site Request Forgery and Missing Authorization vulnerabilities. However, the vast majority of these vulnerabilities had minimal impact and are extremely unlikely to be exploited in the wild.

Cross-Site Scripting also saw a large increase in disclosed vulnerabilities, with the most common impactful variant being Stored Cross-Site Scripting via shortcode, which requires a user with Contributor-level access to exploit. Much of the rest of the increase was due to Cross-Site Scripting requiring Administrator capabilities to exploit, which has minimal impact on most sites.

All in all, we tracked 4,833 vulnerabilities disclosed in the WordPress ecosystem in 2023, more than double the number disclosed in 2022. These vulnerabilities impacted 3,996 unique plugins and themes as well as WordPress core. Note that distinct vulnerabilities within a shared codebase used by multiple themes and plugins are counted as a single vulnerability.

### The Top 5 Vulnerability Types Disclosed in 2023

1. Cross-Site Scripting(XSS) was once again by far the most common category of vulnerability at 1,963 vulnerabilities disclosed, However, 654 - more than a third - of the reported Cross-Site Scripting vulnerabilities required Administrator Privileges.
2. Cross-Site Request Forgery came in second at 1,098 vulnerabilities, which is nearly 3 times the number disclosed in 2022.
3. Missing Authorization and Authorization bypass vulnerabilities were the third most common vulnerability category disclosed in 2023, at 885 vulnerabilities disclosed. This is once again almost triple the number disclosed in 2022.
4. SQL Injection vulnerabilities saw a smaller increase since 2022, coming in at 279 vulnerabilities disclosed.
5. Information Disclosure rounded out the top 5 with 98 disclosed.



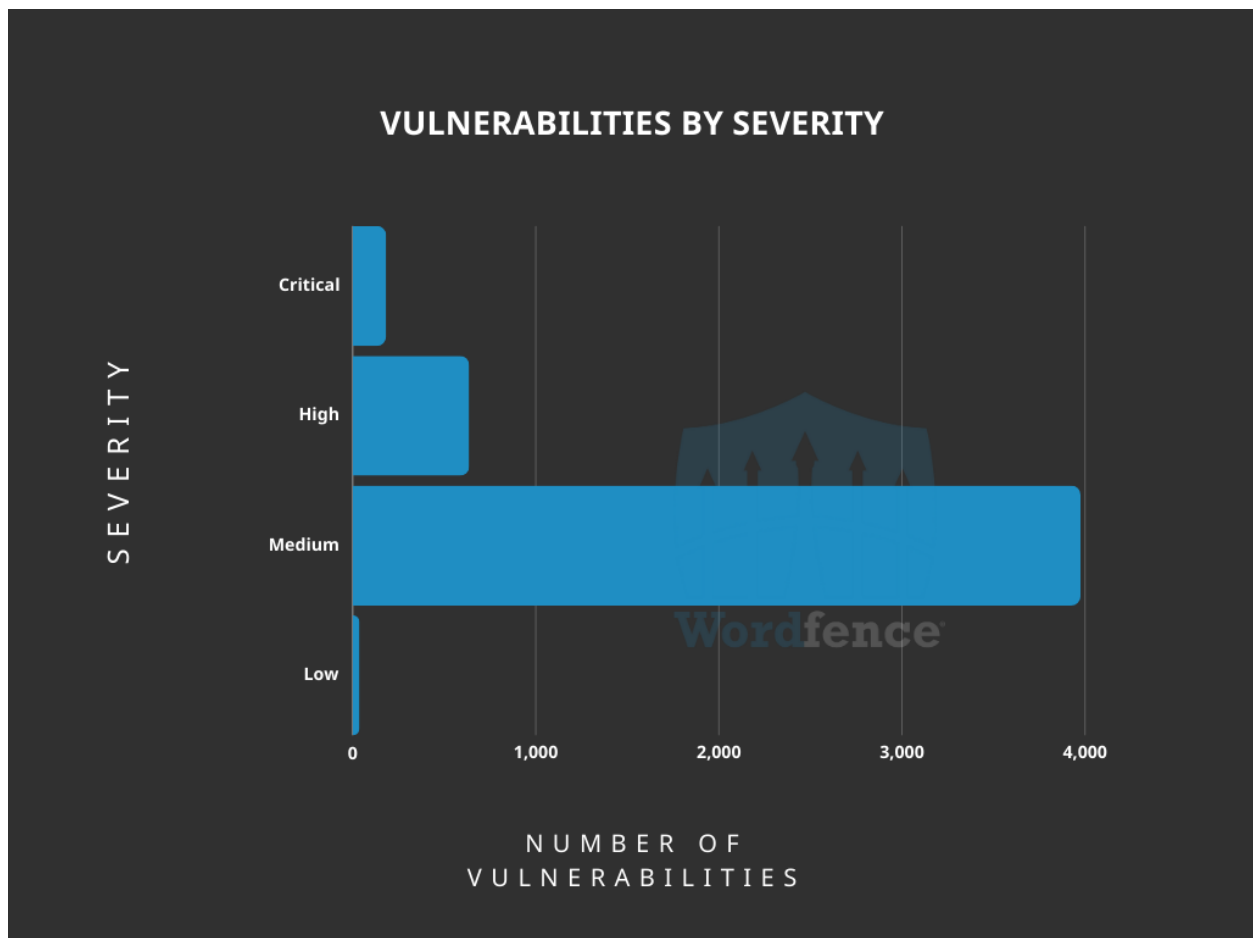
*Pictured: A bar chart showing vulnerabilities disclosed in 2023 broken down by category*

These vulnerability types can be prevented during initial development by following best practices. Unfortunately, while most are also simple to patch, finding these vulnerabilities by code review alone is a herculean task. With the [Wordfence Bug Bounty Program](#), we are funding hundreds of researchers to engage in research and responsible disclosure, which is critical to addressing as many of these vulnerabilities as possible.

## Vulnerability Severity

Traditionally, vulnerability severity is determined by CVSS score. Standardized CVSS scoring helps system and network administrators determine which patches to prioritize. However, the CVSS Scoring system was originally developed by the owners and operators of large-scale networks and reflects their priorities and attack surfaces.

Here is the distribution of vulnerabilities disclosed in 2023 broken down by standard CVSS severity:



*Pictured: a breakdown of disclosed vulnerabilities by CVSS severity*

There are a few key factors that mean that standardized CVSS scores don't always appropriately reflect impact in a WordPress environment:

- In a typical large system, vulnerabilities requiring user interaction are much easier to exploit - a single system might have thousands or millions of users, so an attacker could spam thousands of emails attempting to exploit a reflected Cross-Site Scripting or

Cross-Site Request Forgery vulnerability and expect at least a few victims to click on a link. WordPress, on the other hand, is composed of millions of individual systems, most of which only have a few users each. Since each CSRF and Reflected XSS vulnerability requires a payload tailored to an individual site, vulnerabilities requiring user interaction are far more difficult to exploit successfully. This may warrant scoring vulnerabilities that require user interaction lower.

- In a typical large system, the administrative back-end is rarely publicly documented, so blind stored Cross-Site Scripting often remains exploratory, requiring attackers to iterate multiple times to determine the best way to pivot their attacks and escalate privileges. In WordPress, on the other hand, the administrator dashboard is well-documented and there are numerous known ways to trivially escalate privileges and take over a site using a blind stored Cross-Site scripting vulnerability, to the point where they are some of the most popular vulnerabilities to exploit in WordPress.
- In many corporate networks, an attacker may be able to trivially gain administrator privileges on a single machine - their main challenge will be pivoting to other machines in order to achieve their objective. On a WordPress site, gaining administrator privileges and maintaining persistence is often the end goal in itself, since most attackers monetize their operations by selling access to compromised sites. This means that vulnerabilities requiring a High level of privileges are unlikely to be meaningfully impactful, or exploited at all.

With the new CVSSv4 Scoring Standard approaching widespread adoption, we will soon be able to more closely reflect the true impact of vulnerabilities on WordPress sites. In the meantime we'll provide a preview of how vulnerability severity is likely to change going forward taking these factors into account.

Using a methodology that assigns a "Low" score to any vulnerability that requires User Interaction or Administrator Privileges, a "Medium" score to any Stored Cross-Site Scripting that requires Contributor or Author Privileges, a "High" score to any stored Cross-Site Scripting vulnerability that requires Subscriber Privileges, and a "Critical" score to Unauthenticated Cross-Site Scripting that can lead to site takeover, results in a very different distribution.





*Pictured: a breakdown of disclosed vulnerabilities by WordPress-specific severity*

## The Top 5 Individual Security Researchers Contributing to WordPress Security in 2023

We would like to extend thanks to the many security researchers contributing to the safety of the WordPress ecosystem, including Wordfence's own István Márton (Lana Codes) and Marco Wotschka, who came in at #1 and #5, respectively, for the most vulnerabilities reported during 2023.

<a href="#">István Márton (Lana Codes) - Wordfence</a>	653 Vulnerabilities Reported
<a href="#">Rafie Muhammad</a>	299 Vulnerabilities Reported
<a href="#">Mika</a>	231 Vulnerabilities Reported
<a href="#">Abdi Pranata</a>	206 Vulnerabilities Reported
<a href="#">Marco Wotschka - Wordfence</a>	190 Vulnerabilities Reported

# Threat Report

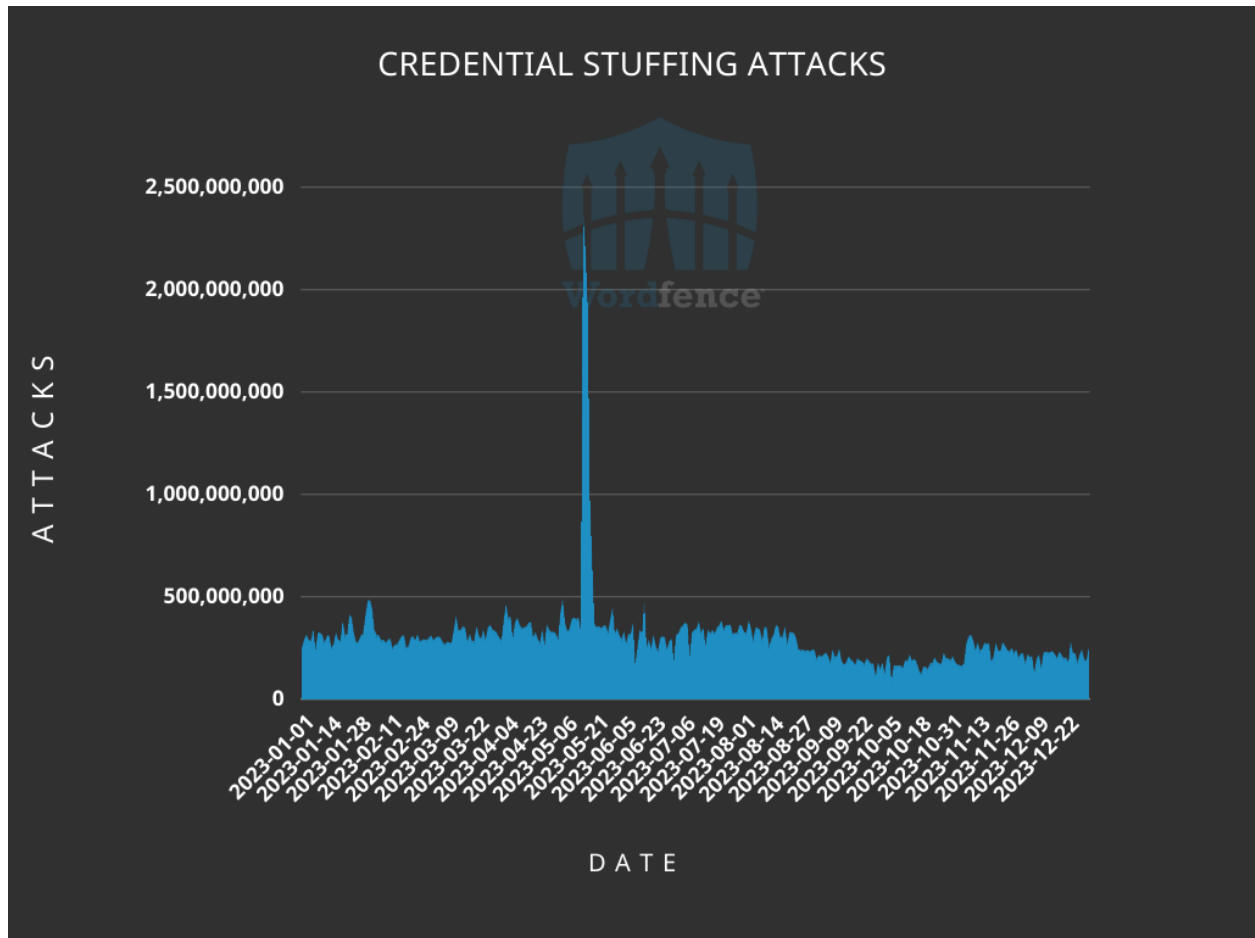
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## Credential Stuffing

The most common type of attack against WordPress sites is Credential Stuffing, also referred to as Password Spraying or Brute Forcing (which is something of a misnomer, as traditional Brute Forcing involves attempting every possible combination of characters in an attempt to guess a password).

Due to the widespread availability of leaked passwords from data breaches, this type of attack is very likely to see some success on a large scale, though the chances of compromising any individual website are small. Many attackers make use of existing botnet infrastructure or rent time on compromised servers to carry out these attacks, making it impossible to trace their true origin.

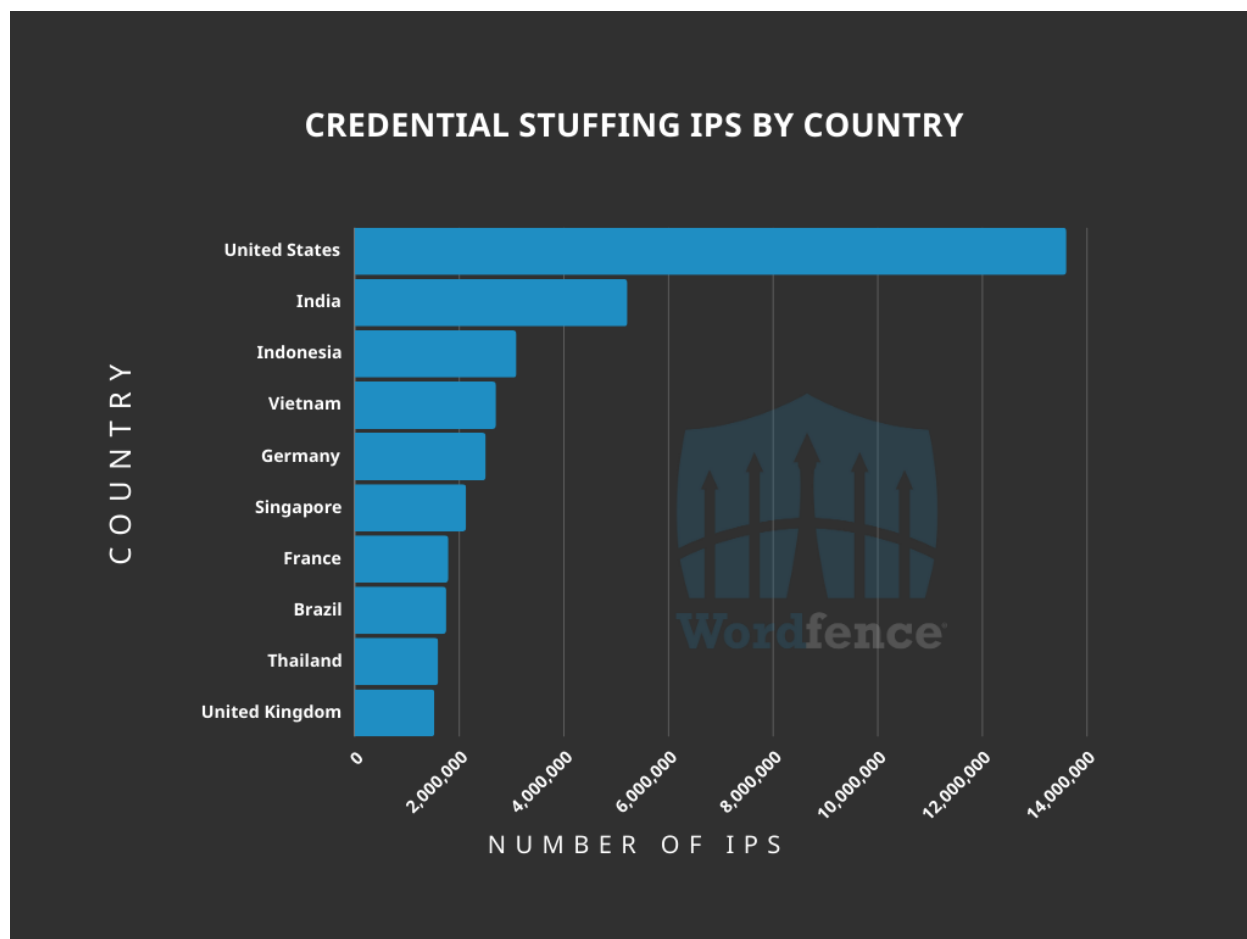
Wordfence blocked more than 100 Billion Credential stuffing attacks in 2023, originating from over 74 million distinct IP addresses. This is actually a significant reduction compared to 2022, and speaks to the success that international law enforcement has had taking down botnets in 2023.



*Pictured: A line chart of Credential Stuffing attacks broken down by date*

While 2023 was fairly quiet overall, there was a huge surge in activity that peaked on May 13-14, 2023, which gradually died down by May 20. While we cannot definitively attribute this attack spike to a specific event, it occurred shortly *after* the arrest of several of the largest botnet operators.

As with last year's report, the United States had the most IP addresses engaged in Credential Stuffing attacks, and Indonesia, Singapore, and Thailand joined the top 10 countries, replacing Canada, Australia, and Italy.



*Pictured: A bar chart of Credential Stuffing IP counts broken down by Country*

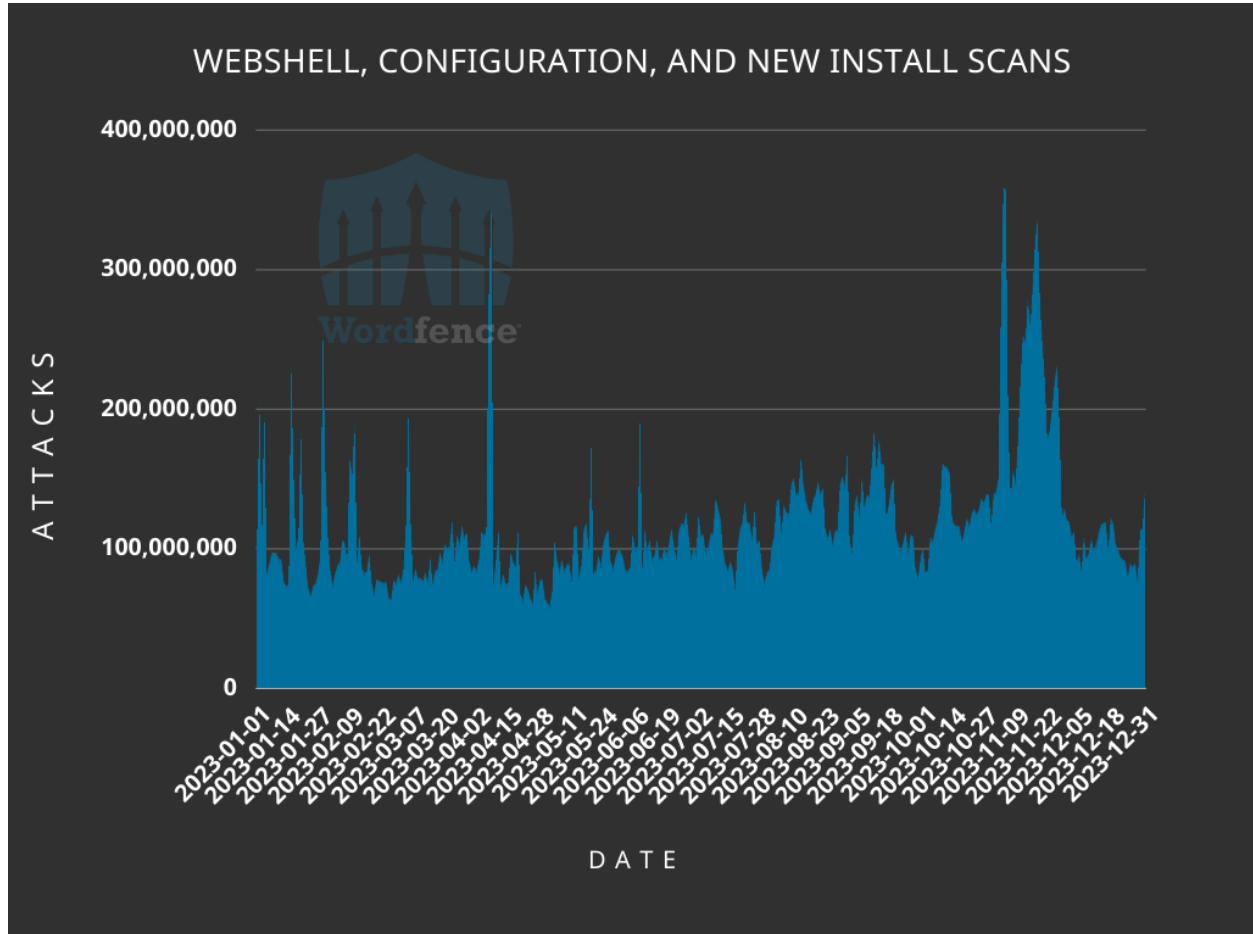
Stolen credentials remain the leading cause of account compromise across all organizations, and WordPress is no exception. Many people reuse the same credentials for multiple sites, and data breaches exposing old passwords are common. The most effective defense against this type of attack is to use strong unique passwords for each site and implement Multi Factor Authentication (MFA).

Attackers have become significantly more sophisticated and while TOTP(Time-Based One-Time Password) MFA solutions, such as the one offered by the Wordfence Plugin, remain one of the best ways to secure a site from credential compromise, attackers have turned to phishing kits capable of bypassing all forms of MFA except for hardware tokens. These phishing kits trick users into authenticating on an attacker-controlled site using their password and TOTP token, which then passes on the credentials and One-Time Password to the target environment and hijacks their session. Fortunately, the same factors that largely protect WordPress sites against attacks requiring user interaction apply here - they are unlikely to stop a targeted attack, but there are relatively few competent adversaries in the WordPress space and any given individual site is unlikely to be targeted.

## Crawling for Webshells and Configurations

As in 2022, the second most common type of attack was exploratory, crawling for existing backdoors and webshells, configuration information, and fresh WordPress installations.

We saw more than 42 Billion Attacks of this type in 2023, almost double the amount we saw in 2022.



*Pictured: A line chart of attacks probing for webshells, backups, configuration information, readme.txt files, and fresh WordPress installations broken down by date.*

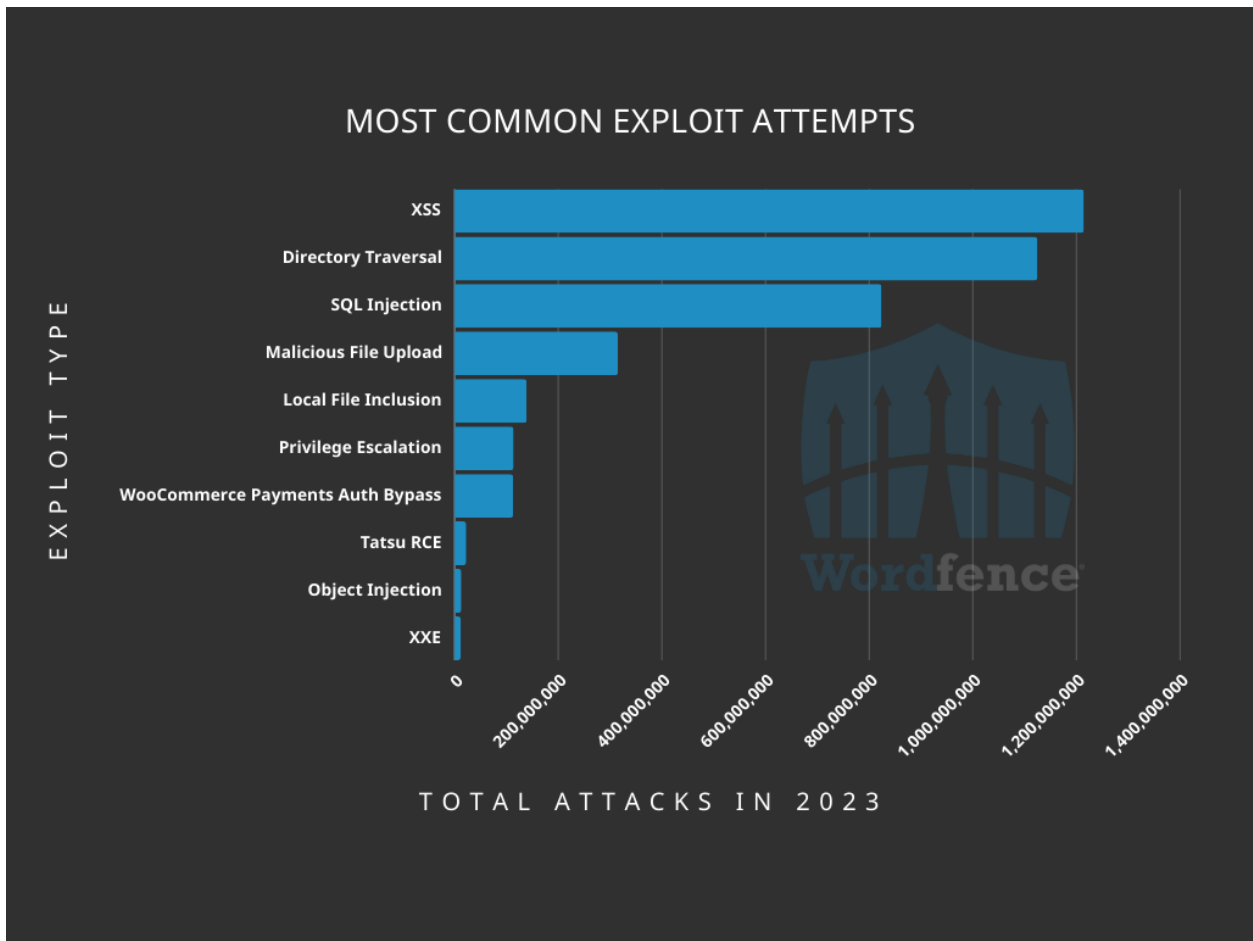
## Attacks Targeting Vulnerabilities

Cross-Site Scripting overtook SQL Injection to become the most targeted vulnerability type in 2023, as payloads designed to insert malicious administrative users and install backdoors into plugin and theme files became more popular.

Directory Traversal attacks, which can allow attackers to download database or server credentials and other sensitive data, were also widely exploited, as were Local File Inclusion attacks, which can provide attackers with the same information or remote code execution in some cases.

Other heavily-targeted vulnerability types included malicious file uploads, which can also be used to execute code on the server.

While the majority of Web Application Firewalls on the market provide protection against Cross-Site Scripting, SQL Injection, and Directory Traversal the Wordfence Firewall additionally protects against a large number of vulnerabilities specific to the WordPress ecosystem, including Privilege Escalation, Authentication Bypass, and plugin-specific Remote Code Execution vulnerabilities, all of which appeared in the top 10 most widespread attack types. The Wordfence firewall also includes multiple layers of defense against malicious file uploads, which includes scanning files for executable PHP and known malware in addition to blocking executable file extensions.



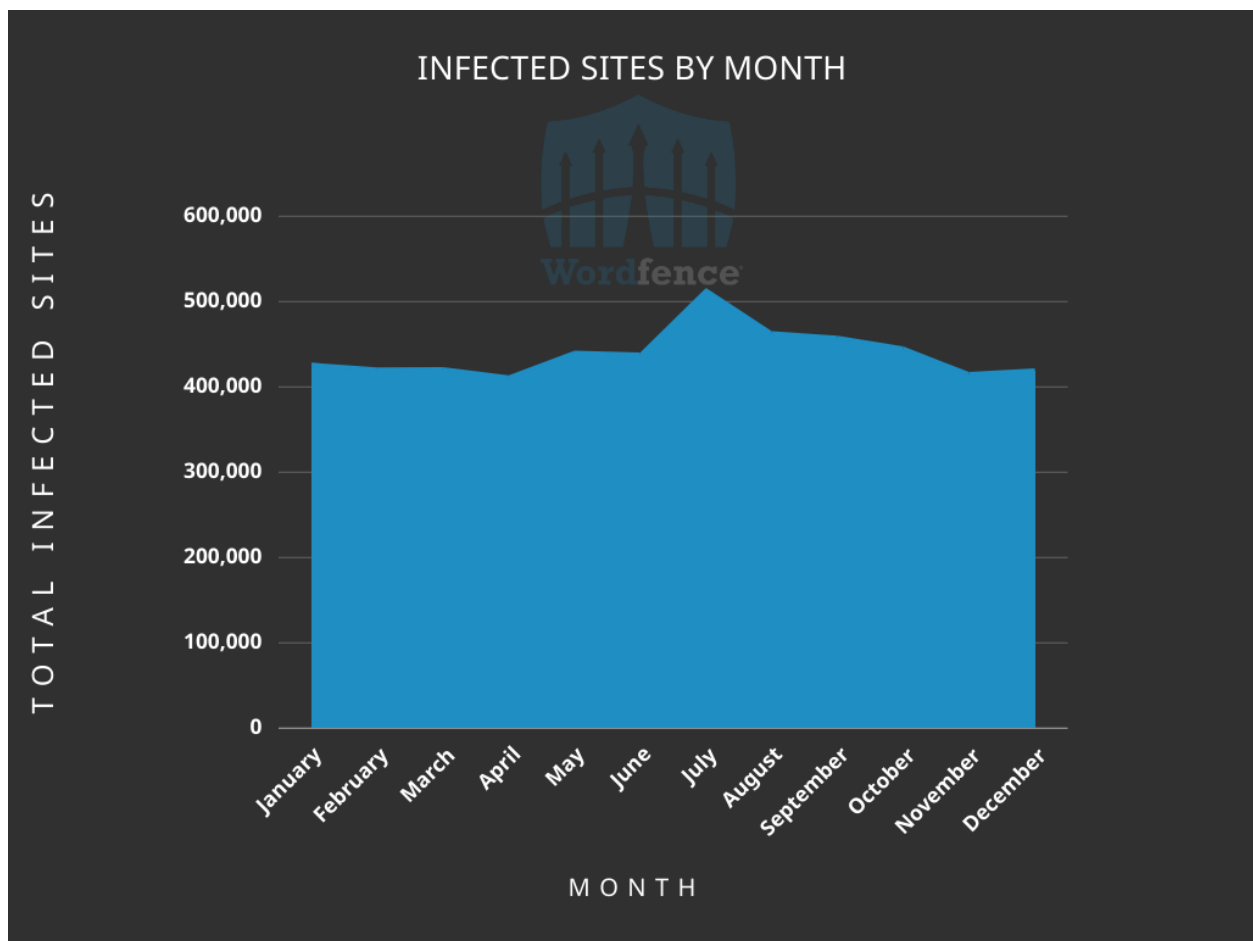
*Pictured: A bar chart of the most common exploit attempt types broken down by the firewall rule used to block the attempt*



## Malware Report

Total infections declined slightly compared to the last 2 years, with malicious files found on roughly 1.1 million total sites over the course of the year. We did see a large increase in July compared to the rest of the year, which correlates with the disclosure of several Critical vulnerabilities impacting over a million sites.

While the Wordfence Firewall provides protection against these vulnerabilities, the free version of Wordfence receives new firewall rules 30 days after they are released to Premium, Care, and Response customers, and many site owners install Wordfence only after their site has become compromised.



*Pictured: A line chart of sites with at least one malware signature reporting an infection broken down by date*

The most common malware variants remained detectable by our older signatures, with the majority using character and base64 encoding as well as comment abuse for obfuscation. The

one exception was a new signature designed to detect [mathematical operations combined with array indexing](#) for obfuscation.



*Pictured: a newer malware variant using multiple forms of obfuscation including comment abuse, mathematical operations, and array indexing.*

As always, the Wordfence team remains committed to detecting new malware variants and improving our signature set on an ongoing basis. With the launch of [Wordfence CLI](#), defenders can make use of our malware detection signatures to rapidly scan multiple sites for malware and vulnerabilities and perform remediation, all for free. While new malware detection signatures are only initially available to Wordfence Premium, Care, Response, and paid Wordfence CLI users, they become free for users of the Wordfence plugin after 30 days.

# Key Takeaways To Keep in Mind for 2024

## Cross-Site Scripting Grabs the Spotlight

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One of the oldest and most prevalent web application vulnerabilities, Cross-Site Scripting has once again made a comeback. While Cross-Site Scripting vulnerabilities are widespread and successful exploitation can be catastrophic, these vulnerabilities are easy to defend against and even easier to patch. In 2024, there's no excuse for not running a Web Application Firewall, as even the most basic feature set should include protection against this type of vulnerability. The free version of Wordfence Firewall protects against Cross-Site Scripting attacks as well as many other more WordPress-specific vulnerabilities.

## Malware and Vulnerability Scanning is Still Relevant

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While many hosts use hardened WordPress configurations that limit the ability of attackers to deploy malware, millions of sites are still using more traditional web host management solutions. Protecting the WordPress Web Application alone is no longer sufficient - the entire hosting account is an attack surface, and responding to a security incident in a timely manner requires regular malware scans. With Wordfence CLI, defenders can scan for vulnerabilities and malware, and remediate infections at scale.

## Multi-Factor Authentication and Regular Updates Remain Important

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While the adoption of Multi-Factor Authentication and password best practices is on the rise, many organizations still reuse passwords across accounts, and use older, less-secure forms of MFA, such as SMS, or even no MFA at all. Likewise, WordPress has made it significantly easier to keep plugins and themes updated with a user-friendly auto-update mechanism, and regularly pushes updates for critical vulnerabilities even in cases where the user-facing auto-update mechanism is not enabled. Nonetheless, many sites intentionally and fully disable automatic updates, even for critical security issues, which significantly increases their chances of compromise. If your organization has disabled automatic updates to prevent compatibility issues, ensure that you have a process in place to rapidly review security patches and apply them before they can be targeted.

## Conclusion

Our mission is to make the web safer for everyone, and you can help! If you're a developer or security researcher, you can show off your skills and get paid the highest bounties in the WordPress space by [joining our Bug Bounty Program](#), which launched in November of 2023. If you represent a hosting company or agency, check out [Wordfence CLI!](#) It's free to use commercially for enterprises and includes malware scanning and remediation as well as vulnerability scanning. Together, we can make 2024 the best year yet for WordPress security!