

Longitudinal Investigations Involving the Emergence of Novel Psychoactive Substances in the United States [NIJ Award #: 15PNIJ-22-GG-04434-MUMU]

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Overview

Novel psychoactive substances (NPS) continue to increase in prevalence in the United States and the constant turnover of these drugs is a concern due to unknown effects and toxicity. Many laboratories may not have the resources to stay current with NPS trends which means a central authority and repository is needed to provide assistance and guidance. The Center for Forensic Science Research and Education (CFSRE) developed **NPS Discovery** – an NIJ-funded open-access drug early warning system – in 2018 to streamline the identification of emerging NPS and to disseminate important information.

The CFSRE's NPS Discovery program focuses on the identification and monitoring of NPS through coupled sample-mining and data-mining analytical techniques. This is facilitated through collaborations with medical examiner and coroner offices, crime laboratories, police departments, hospitals, and public health and safety agencies, and includes drug materials and toxicology specimens. Our program also monitors online resources (e.g., gray market sites, drug use forums) for new NPS and important drug use information.

Emergence and prevalence of NPS vary greatly from jurisdiction to jurisdiction. NPS Discovery strives to provide knowledge of changing drug trends and impacts to laboratories, scientists, and stakeholders.

Life Cycle of NPS & Timeline of Testing



New Drug Discoveries Since 2018

Since 2018, NPS Discovery has reported **137** newly discovered NPS in the U.S. (Figure 1). **NPS opioids** remain the largest subclass (Figure 2). In 2022, NPS Discovery reported the discovery of **27** NPS for the first time.

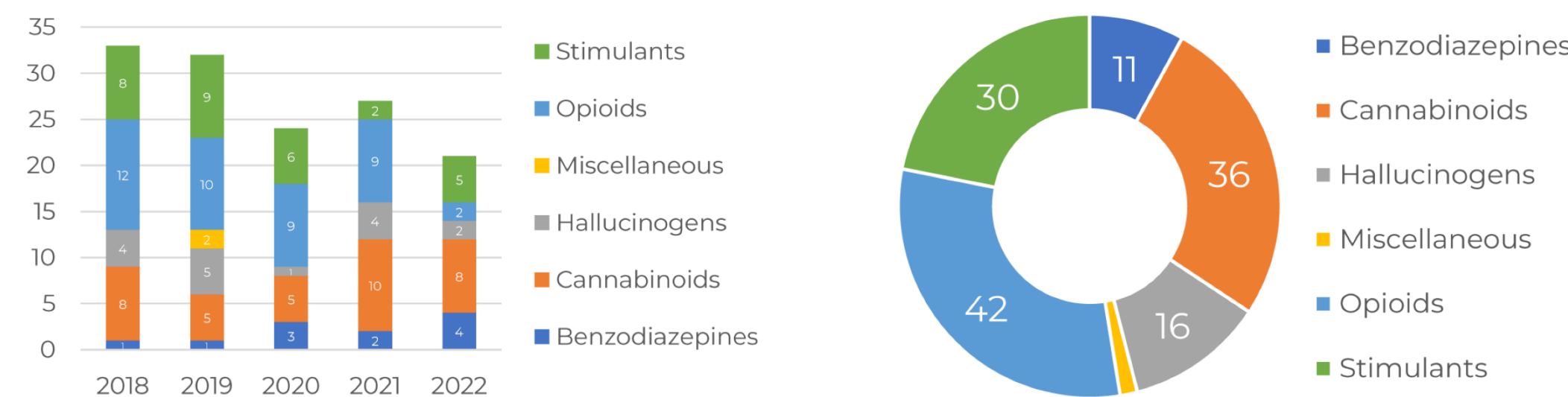


Figure 1: Newly discovered NPS reported for the first time since 2018.

Figure 2: Breakdown by subclass of newly discovered NPS, 2018-2022.

Since 2018, NPS Discovery has identified **218** NPS in forensic samples (Figure 3). **NPS opioids, stimulants, and cannabinoids** represent the largest subclasses. In 2022, **76** total NPS were detected (Figure 4).

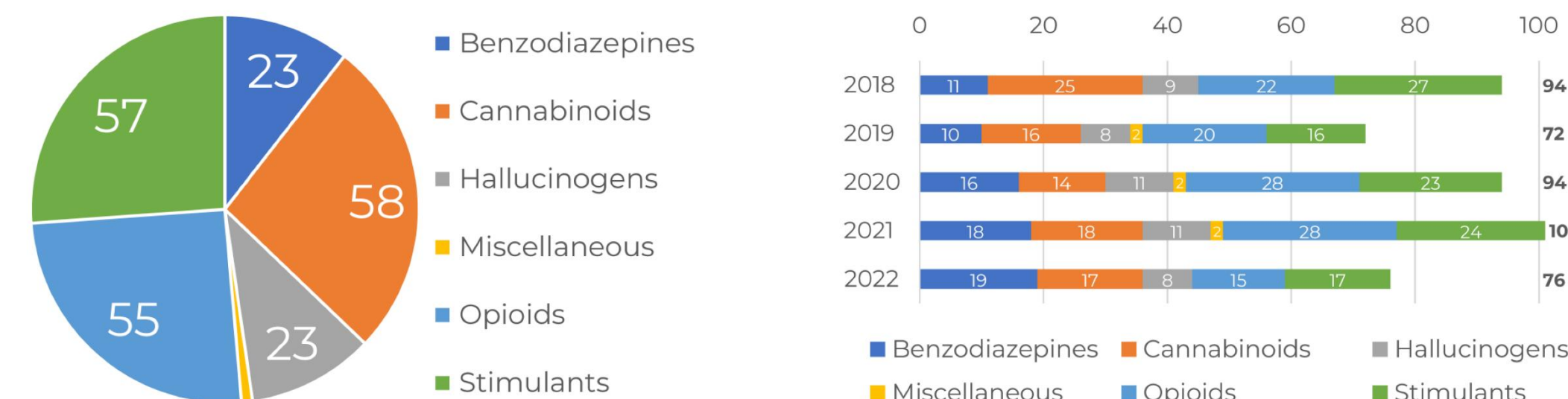


Figure 3: Breakdown by subclass of individual NPS detected, 2018-2022.

Figure 4: Individual NPS detected each year, cumulative since 2018.

In 2022, NPS Discovery observed over **2,200** total NPS detections within examined sample populations (Table 5), a portion of more than **10,000** total NPS detections since our program launched in 2018 (Figure 6).

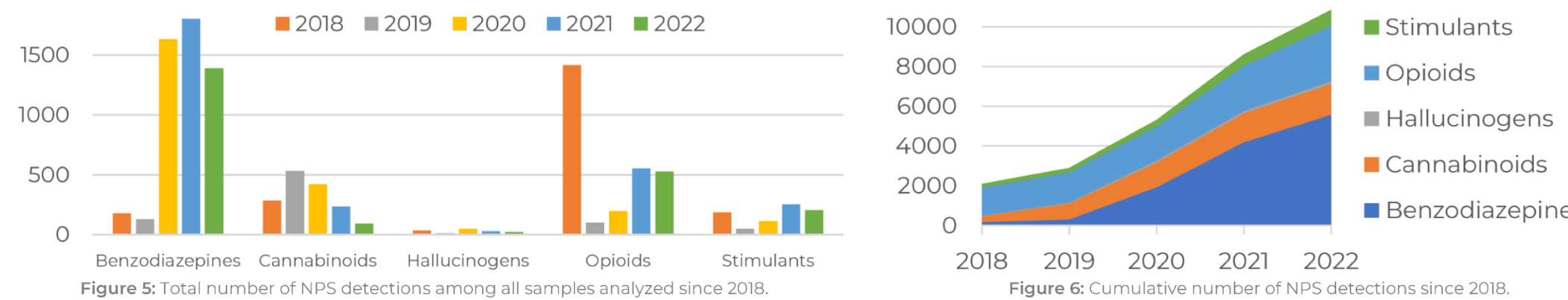


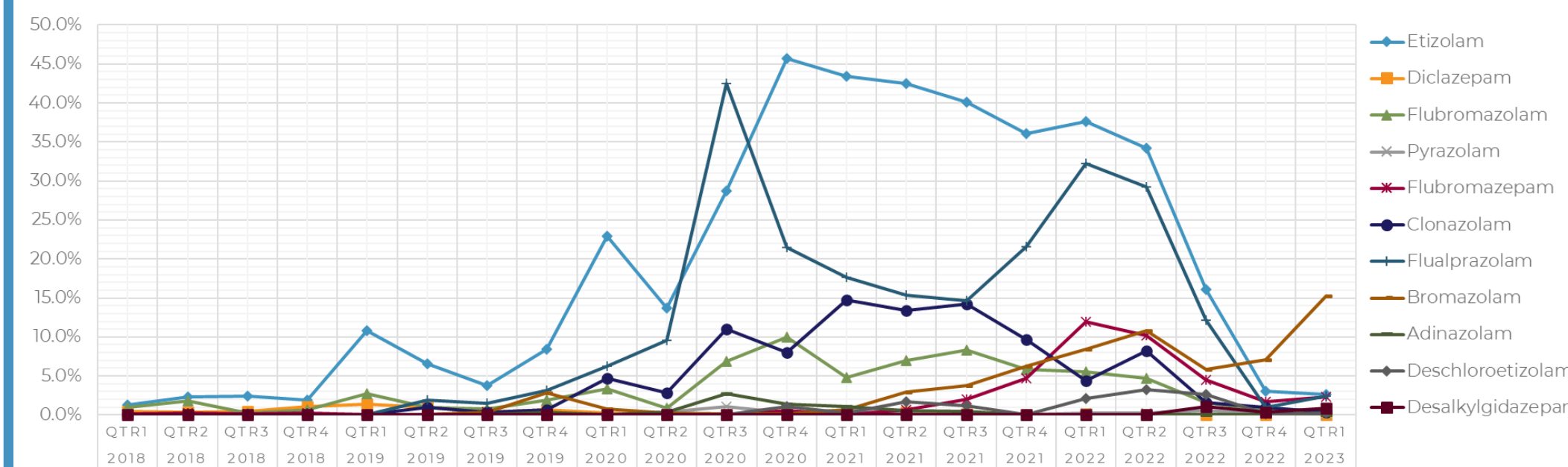
Figure 5: Total number of NPS detections among all samples analyzed since 2018.

Figure 6: Cumulative number of NPS detections since 2018.

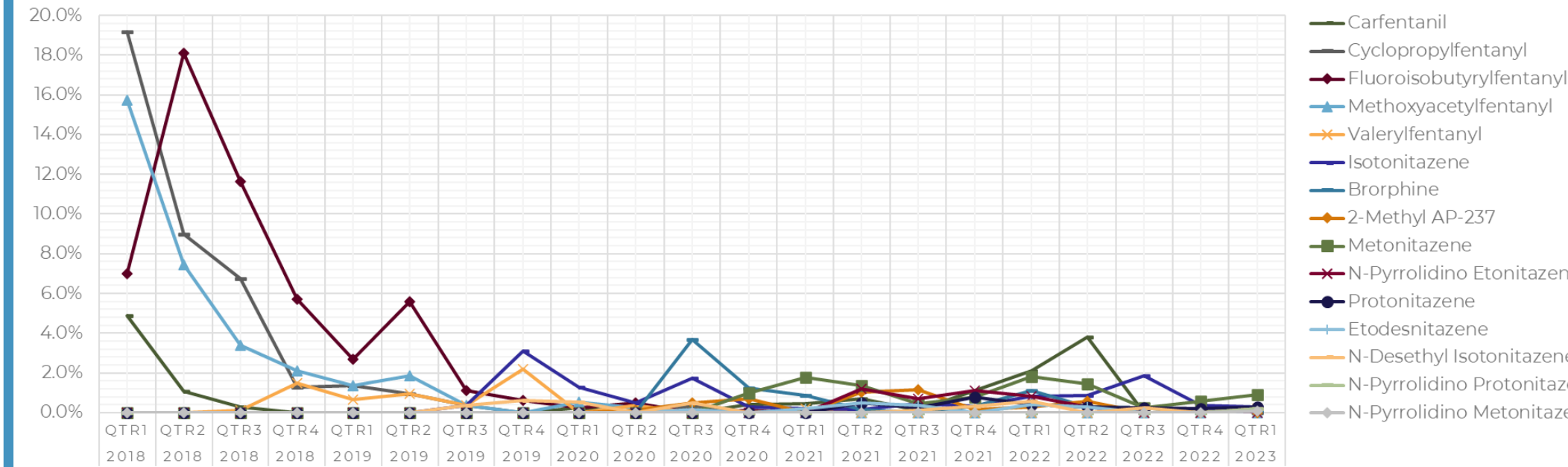
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NPS Trends in the United States

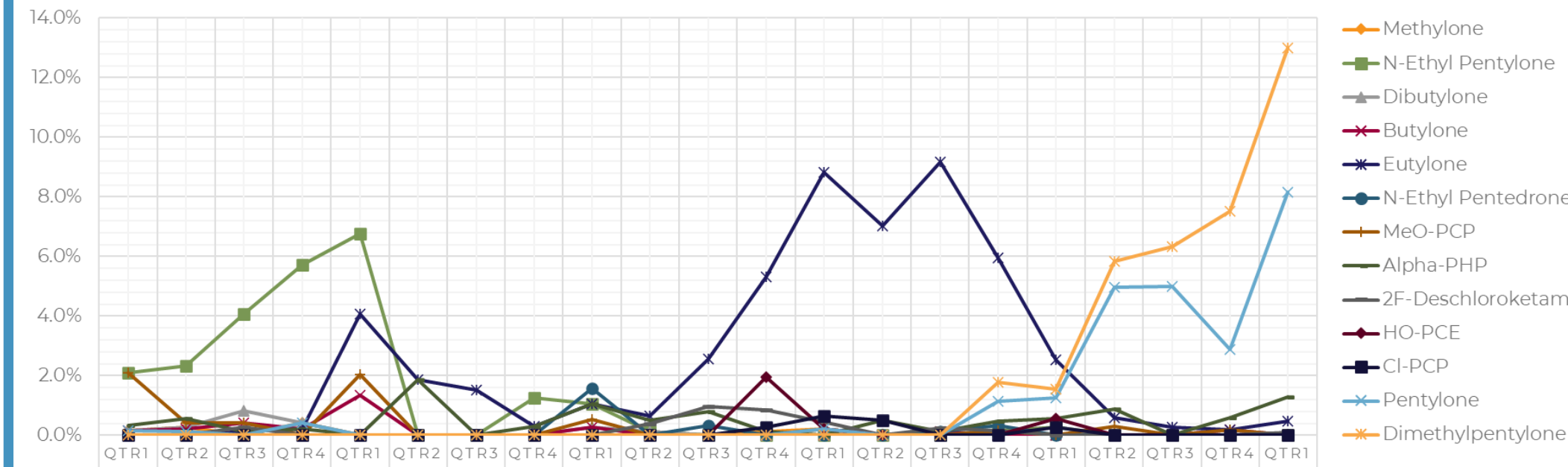
NPS Benzodiazepines ▼



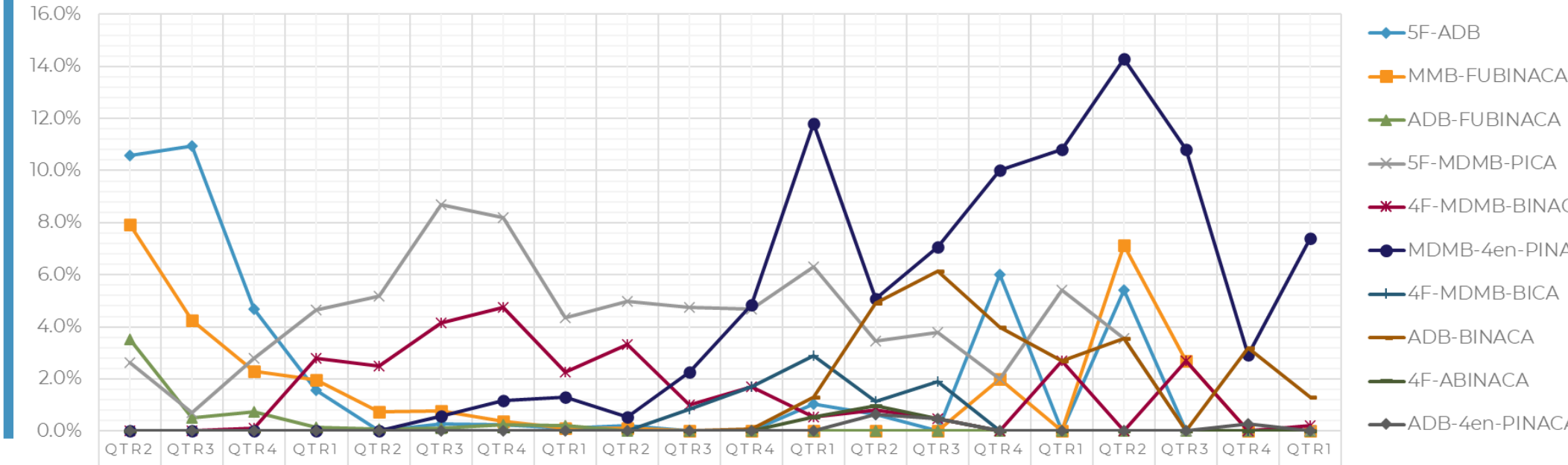
NPS Opioids ▼



NPS Stimulants & Hallucinogens ▼



Synthetic Cannabinoids ▼



NPS on the Horizon

| Opioids | Benzodiazepines |
|-----------------------------|-----------------------------|
| N-Pyrrolidino Protonitazene | N-Pyrrolidino Protonitazene |
| N-Desethyl Isotonitazene | Desalkylgidazepam |
| Stimulants/Hallucinogens | Synthetic Cannabinoids |
| N-Cyclohexyl Butylone | ADB-5'Br-PINACA |
| N-Propyl Butylone | CH-FUBBMPDORA |
| Fluorexetamine | |

Outcomes & Impacts of NPS Discovery

Visit our **open-access** website for new drug monographs, public alerts, trend reports, clinical reports, drug checking reports, and more!



NEW POTENT SYNTHETIC OPIOID—N-DESETHYL ISOTONITAZENE—PROLIFERATING AMONG RECREATIONAL DRUG SUPPLY IN USA

PURPOSE: The objective of this report is to provide updated guidance in developing an appropriate analytical scope of testing for novel psychoactive substances (NPS) in the United States and around the world based on current trends and intelligence. This report is based on information available in Q4-2022 and early Q1-2023 and is subject to change along with the drug market.

SUMMARY: The NPS landscape is changing rapidly, requiring laboratories to constantly remain abreast of new and emerging drug locally, nationally, and internationally. To meet individualized needs, laboratories are using existing methods or developing new ones for detection and confirmation of NPS. This can be challenging for scientists as information about NPS detection can be irregular and/or out-of-date, making it difficult to determine which drugs should be prioritized as a given item. **CFSRE, NPS Discovery, and the DOJ NPS Committee** have established the below recommendations for NPS scope based on information from extensive collaborations, partnerships, and initiatives which yield national and international perspectives. Suggested out-of-comprehension or reporting limits in rights are listed for each NPS. These values are categorized as: <1, 1K, and 10K mg/ml and determined based on currently available quantitative data and/or comparison to structurally similar NPS within the given subclass.

TIER ONE (STANDARD) (RECOMMENDED)

| Substance | Limit | Substance | Limit | Substance | Limit |
|-------------|-------|-----------------------------|-------|------------------|-------|
| Etizolam | <1 | N-Desethyl Isotonitazene | <1 | 5F-MDMB-BINACA | <1 |
| Flumazenil | <1 | Isotonitazene | <1 | 5F-MDMB-FUBINACA | <1 |
| Fluorazepam | <1 | Metonitazene | <1 | 5F-MDMB-PICA | <1 |
| Fluorazepam | <1 | N-Pyrrolidino Protonitazene | <1 | 5F-MDMB-PPICA | <1 |
| Fluorazepam | <1 | N-Propyl Butylone | <1 | 5F-MDMB-THIA | <1 |
| Fluorazepam | <1 | N-Propyl Butylone | <1 | 5F-MDMB-THIA | <1 |
| Fluorazepam | <1 | N-Propyl Butylone | <1 | 5F-MDMB-THIA | <1 |

TIER TWO (ALTERNATE)

| Substance | Limit | Substance | Limit | Substance | Limit |
|----------------------|-------|-----------------------------|-------|-------------|-------|
| 5-Aminoacetylcholine | <1 | N-Pyrrolidino Protonitazene | <1 | Fluorazepam | <1 |
| Flumazenil | <1 | N-Pyrrolidino Protonitazene | <1 | Fluorazepam | <1 |
| Fluorazepam | <1 | N-Pyrrolidino Protonitazene | <1 | Fluorazepam | <1 |
| Fluorazepam | <1 | N-Pyrrolidino Protonitazene | <1 | Fluorazepam | <1 |

TIER THREE (CONSIDER)

| Substance | Limit | Substance | Limit | Substance | Limit |
|--------------------|-------|------------------|-------|------------------|-------|
| Desethylflumazenil | <1 | 5F-MDMB-FUBINACA | <1 | 5F-MDMB-FUBINACA | <1 |
| Desethylflumazenil | <1 | 5F-MDMB-FUBINACA | <1 | 5F-MDMB-FUBINACA | <1 |
| Desethylflumazenil | <1 | 5F-MDMB-FUBINACA | <1 | 5F-MDMB-FUBINACA | <1 |

Recommended Scope for NPS Testing in the United States

NPS SCOPE | **Q1 2023**

PUBLIC ALERT | **JAN 2023**

FLORIDA - PENNSYLVANIA