

Mapped flood zones track U.S. flood insurance uptake more closely than recorded flood burden

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CECREH

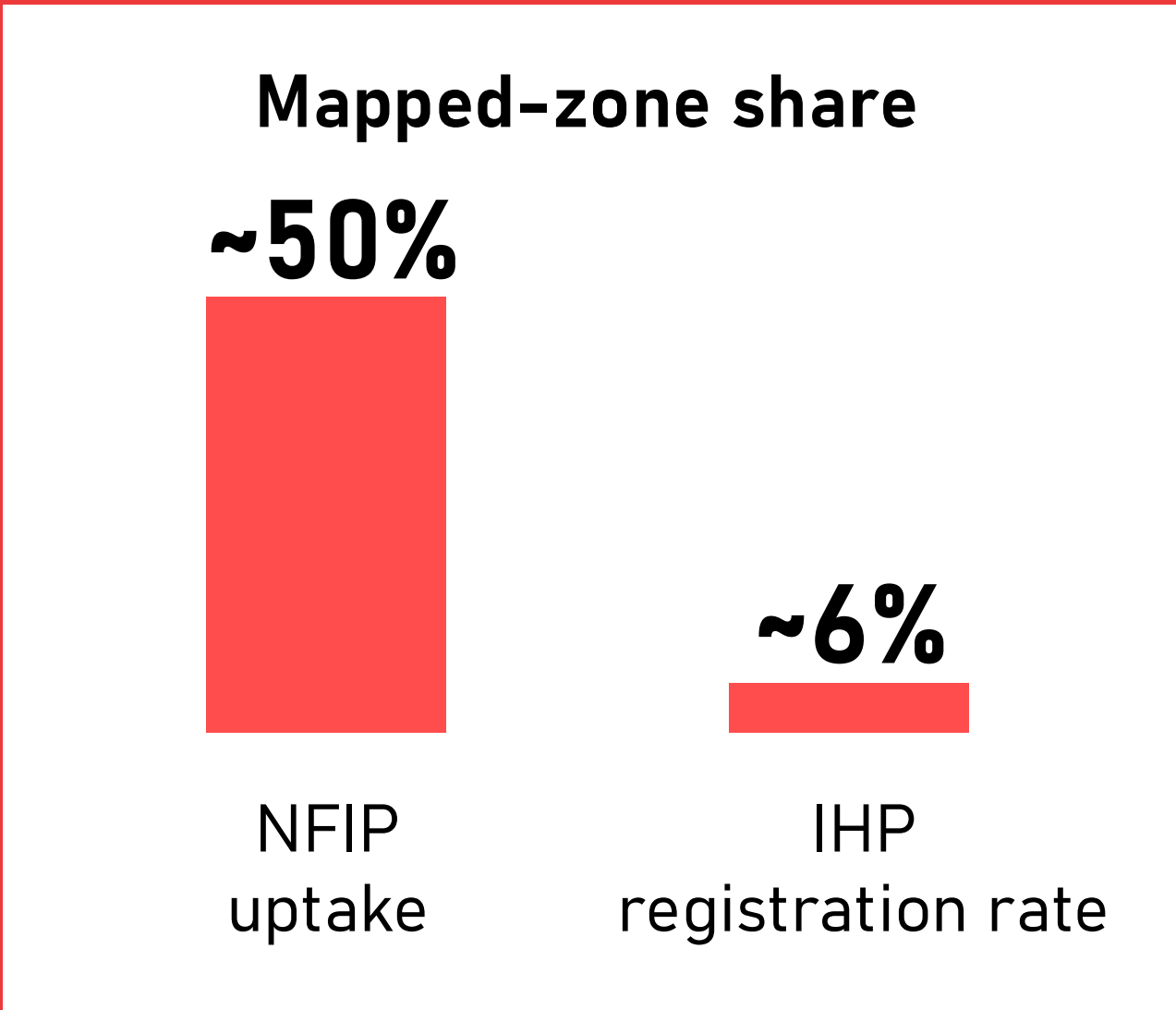
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Mapped zones account for ~50% of explained variation in insurance uptake, versus ~6% in the declaration-adjusted IHP rate.

Models evaluated in states left out of training



Introduction

Research question

Do mapped zones track insurance uptake more closely than recorded burden?

Why mapped zones matter

Special Flood Hazard Areas (SFHAs) mark the 1%-annual-chance floodplain and guide National Flood Insurance Program (NFIP) mandates.

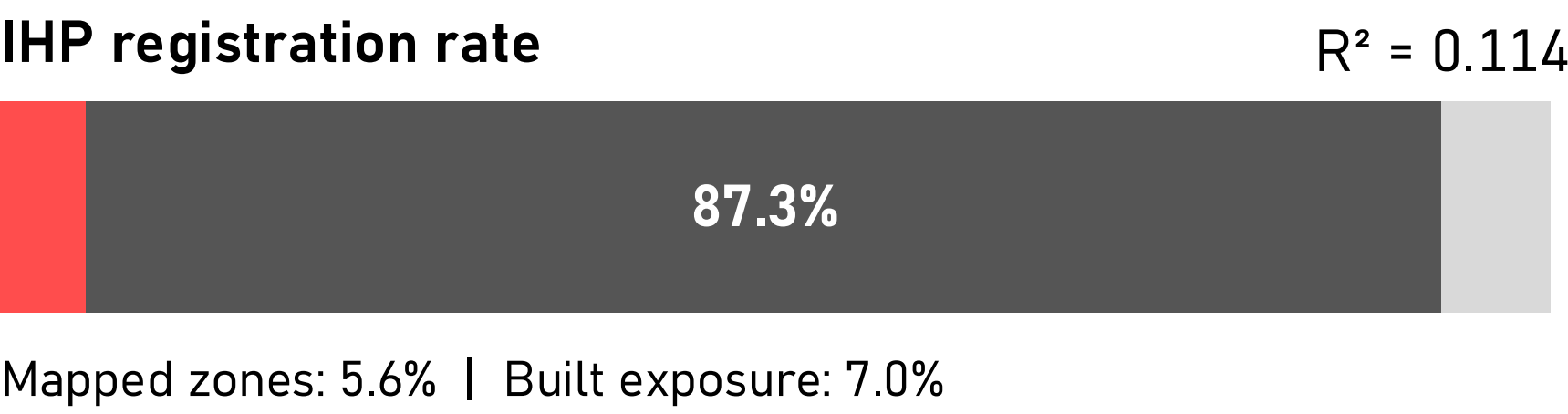
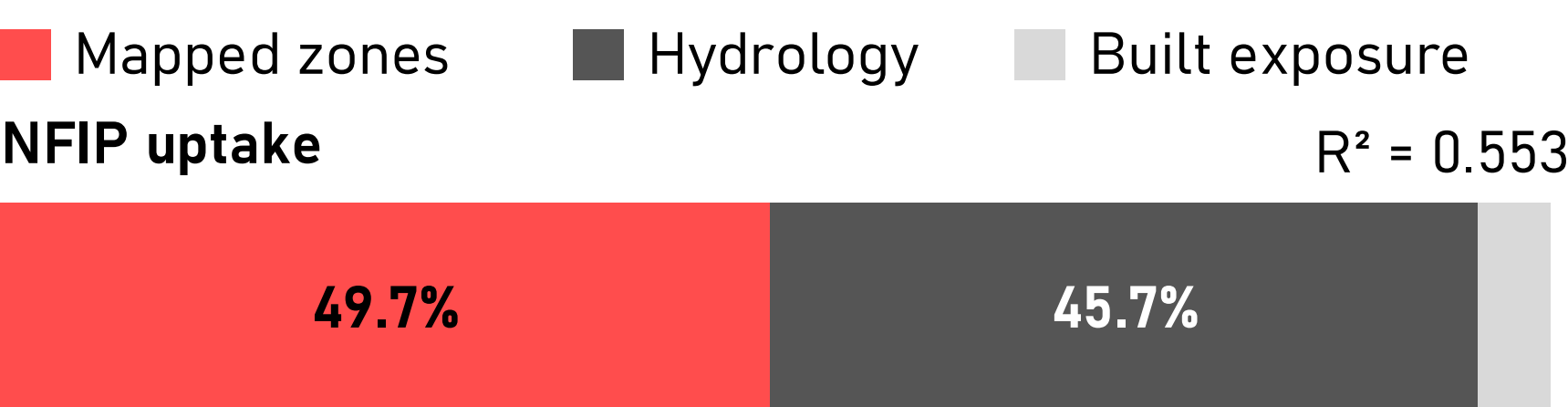
Record definitions

FEMA Individuals and Households Program (IHP): flood-damage registrations per 1,000 household-declaration exposures (2010–2024), shaped by declarations, applications and eligibility.

NFIP uptake: active policy terms per 1,000 housing units (2024), not unique insured households.

Results – Highlights

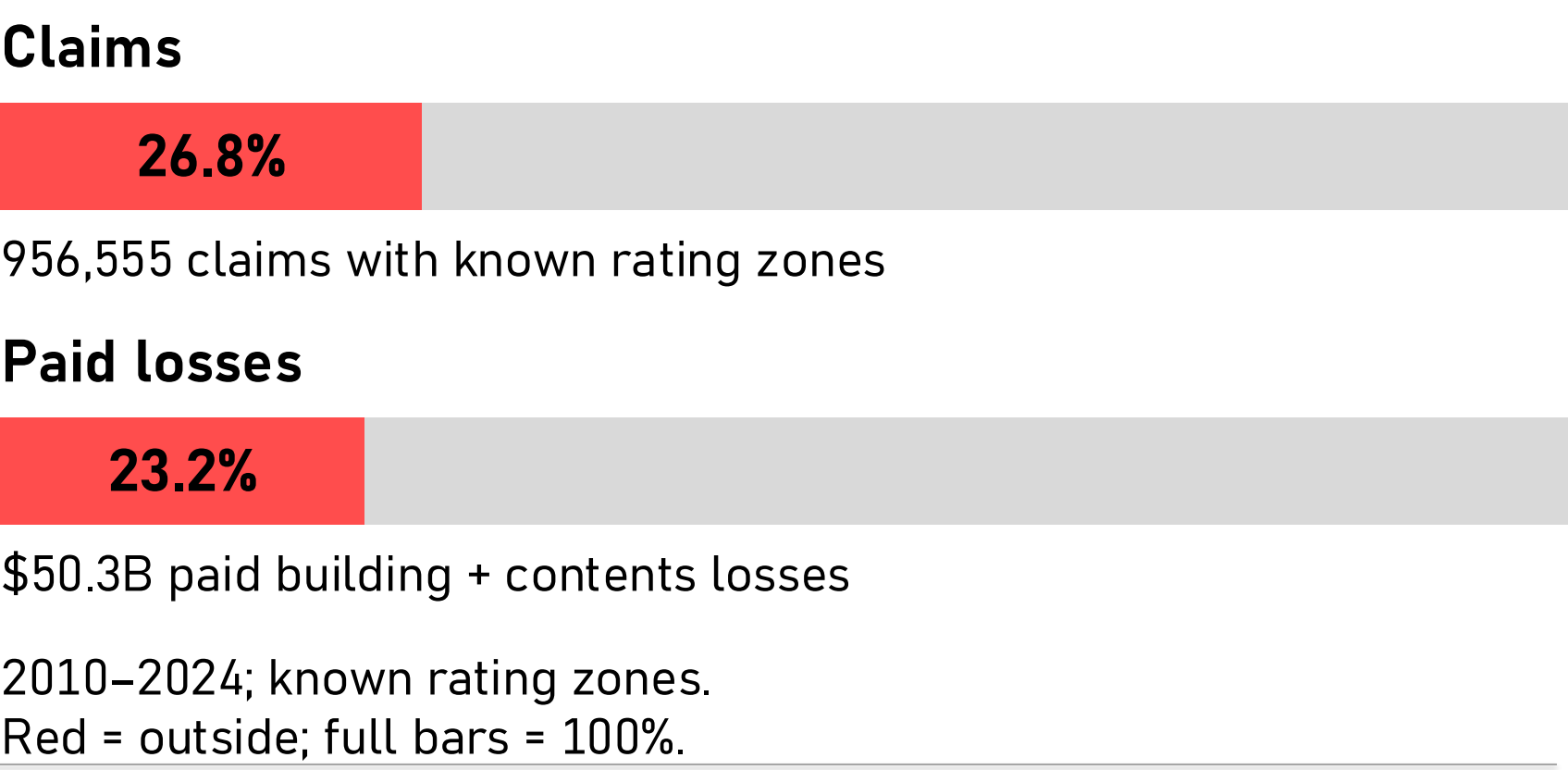
Share of explained variation (%)



Mapped-zone difference: 44 percentage points
95% interval: 10–64

The hydrology contrast is uncertain; IHP models perform poorly in later years.

Outside rated high-risk zones



Conclusions

A common national framework shows that mapped flood zones align more closely with insurance uptake than with recorded flood-assistance registrations.

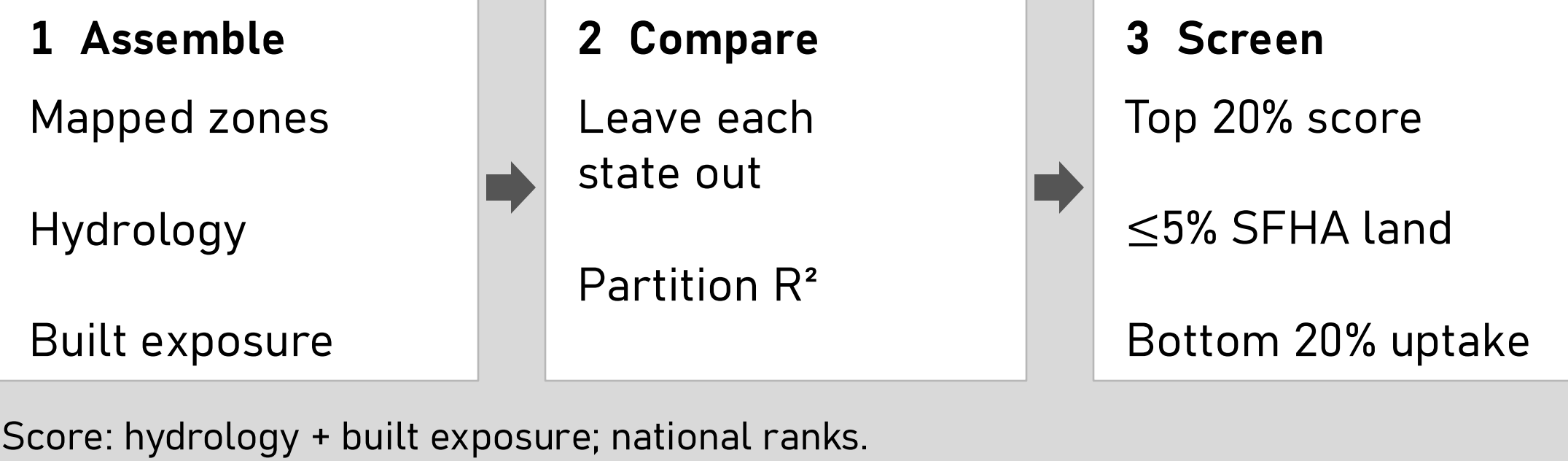
The mismatch can guide local review beyond SFHA boundaries, with independent local evidence required before targeting outreach or map review.

Methods

83,360 census tracts
50 states + D.C.

Flood maps, soils, precipitation, built exposure.

Predictor comparison



Next Steps

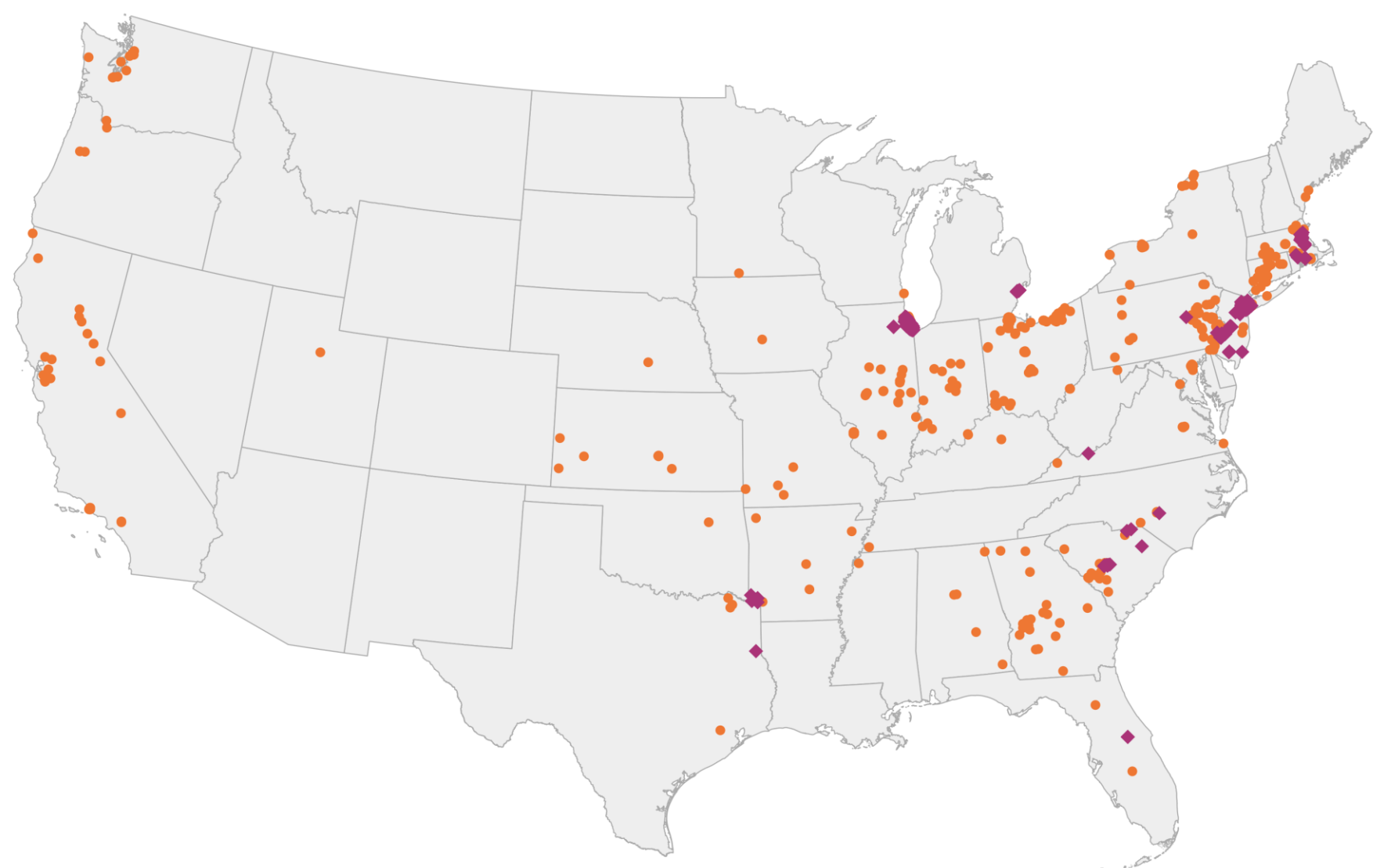
Compare screens with independent local loss and service records; improve parcel-level loss and coverage data.

Exploratory screen

Eight definitions select 1,226–2,266 tracts

1,348 selected tracts
4.82M residents

- ◆ 550 selected tracts
Top 20% nationally for IHP registration rate
- 798 selected tracts
Below the top 20% for IHP registration rate



National counts and rate ranks. Conterminous U.S. map; two selected Alaska tracts omitted. IHP overlap is not independent validation.

References

FEMA. OpenFEMA IHP Valid Registrations v2; NFIP Redacted Claims and Policies (data).
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Wilson, B., Tate, E., & Emrich, C. T. (2021). Flood Recovery Outcomes and Disaster Assistance Barriers for Vulnerable Populations. Frontiers in Water, 3, 752307.

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