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First Street Foundation and the
Flood Factor Assessment Tool

First Street Foundation.

A nonprofit formed to communicate risks from climate change to individual Americans - starting with flood risk.

We provide property-level comprehensive flood risk estimates.

We recognize an urgent need for consistent, property-level, publicly-available flood risk information for the entire United States.

By democratizing this peer-reviewed flood risk data, First Street empowers Americans to protect their most valuable asset - their homes.

First Street build an expert team to develop the first comprehensive, publicly available flood risk assessment for each of 142M properties in the contiguous US.

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We will complement FEMA's technical approach to solve this problem.

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F O U N D A T I O N

Until the total flood risk for every home in America is effectively calculated and communicated, property owners, buyers and renters will continue to suffer.

First Street Foundation has assembled a group of over 80 experts, scientists, economists and technologists to define flood risk and address this problem.

Difference in number of properties at *substantial flood risk* (FSF) compared to FEMA

More properties at risk
in FSF model ——→

| 0.5x | 1x | 2x | 3x | 4x | 5x | 6x | 7x | 8x | No data
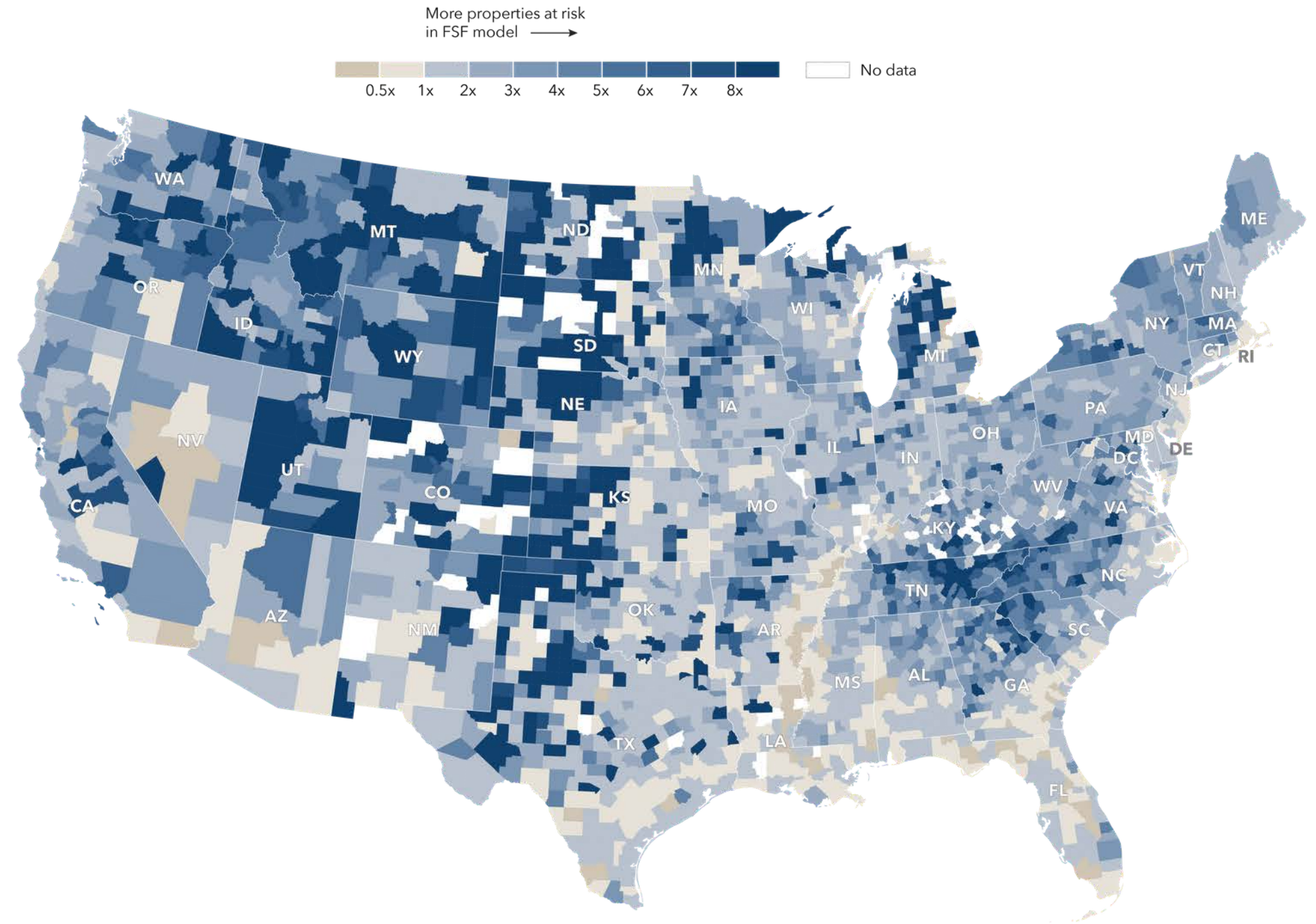
*Substantial risk is calculated as inundation 1 cm or more to the building in the 100-year return period (1% annual risk)

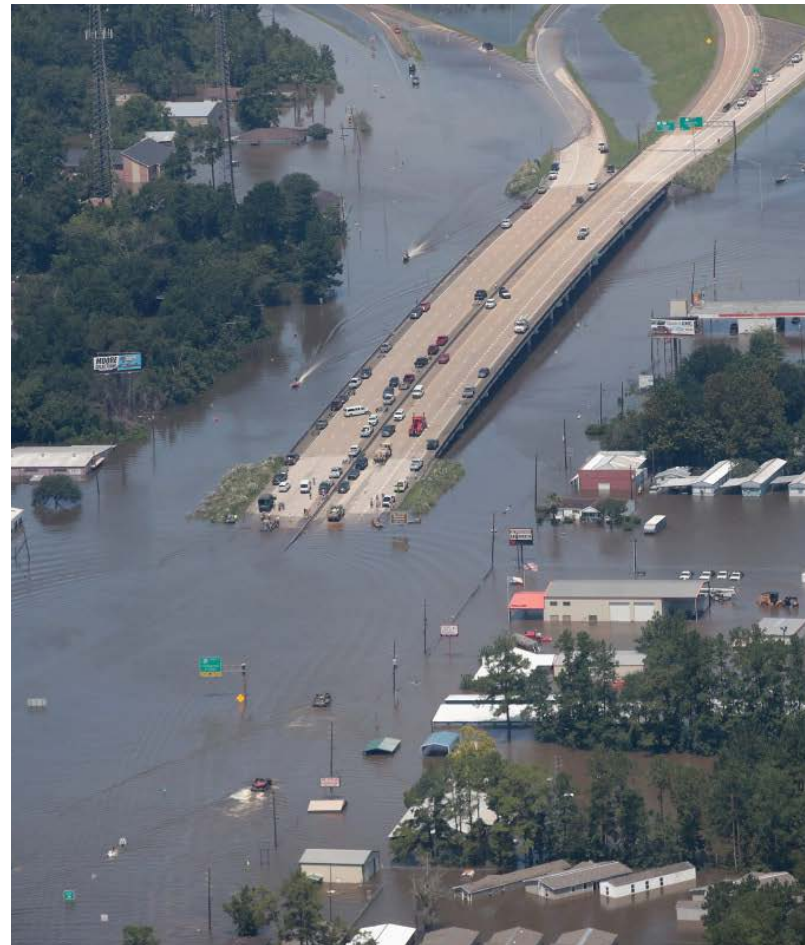# We began by modeling every major flood type.

KING TIDES
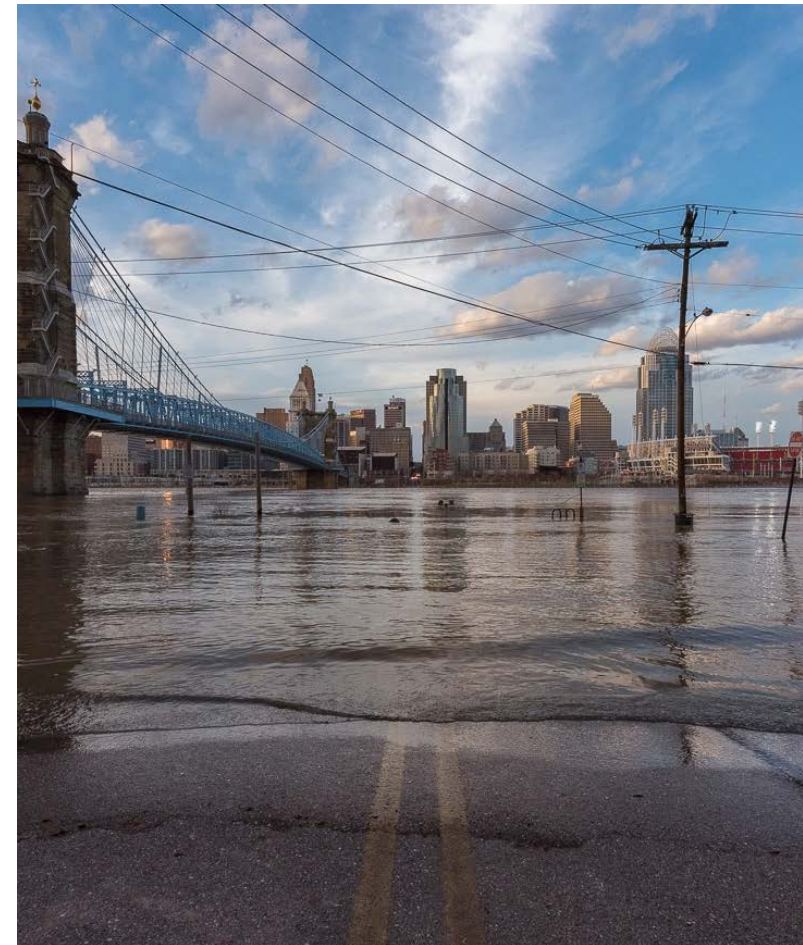
Tidal

Tidal flooding in Miami

PRECIPITATION

Pluvial

Pluvial flooding in Houston

RIVERINE

Fluvial

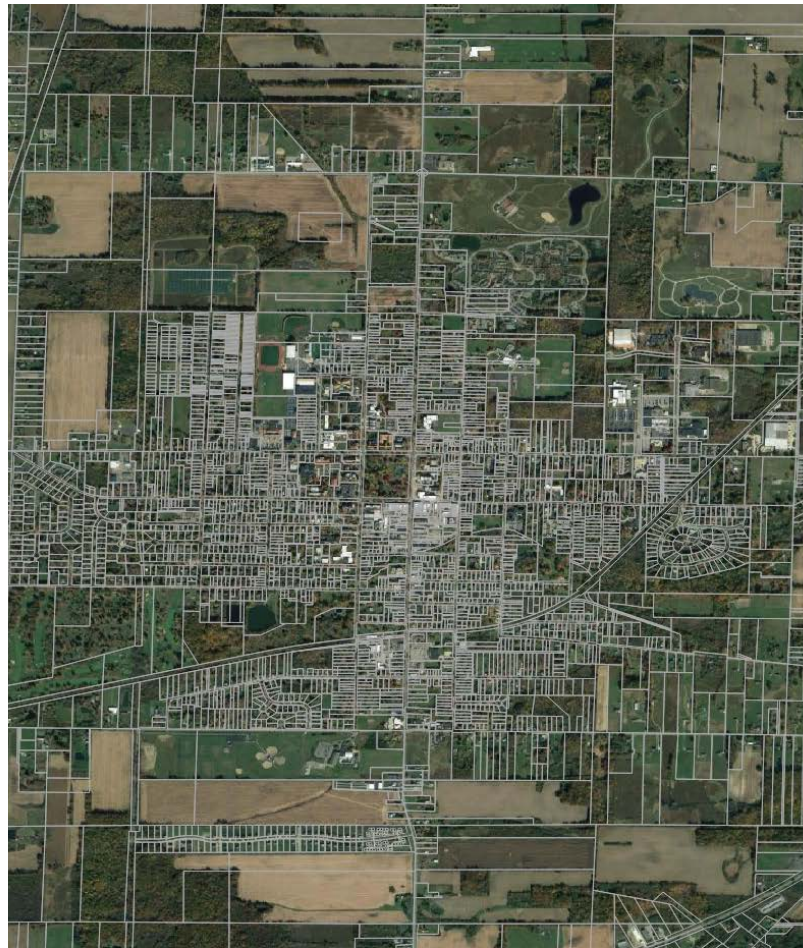Fluvial flooding in Cincinnati
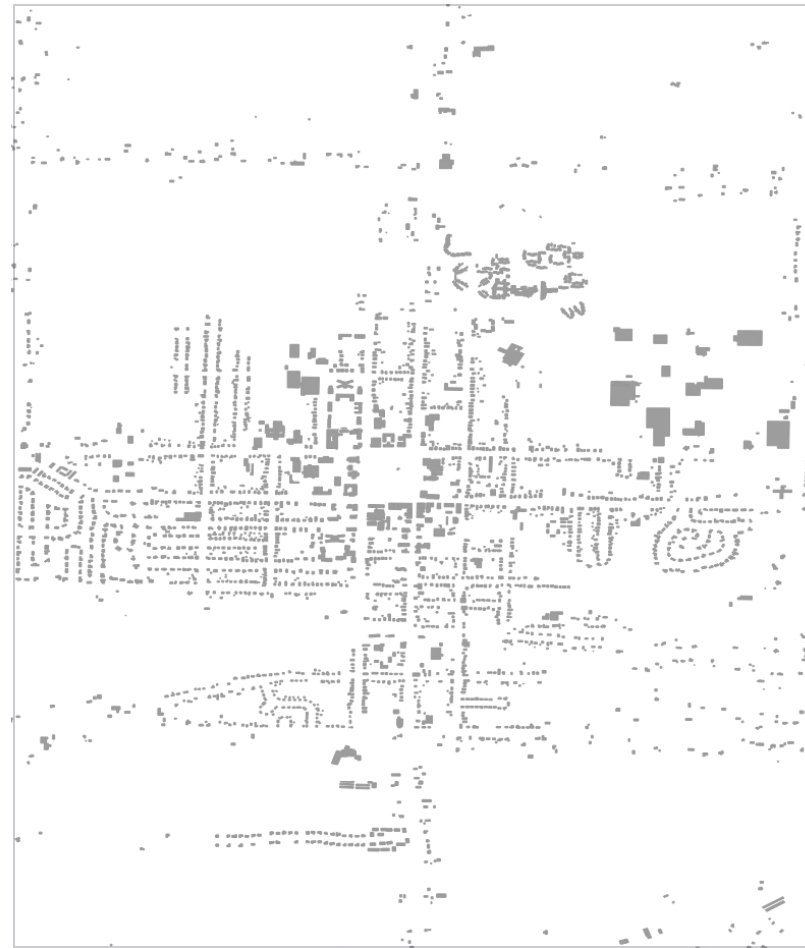
HURRICANE

Surge

Surge flooding in Wilmington

Determining a property's flood risk.
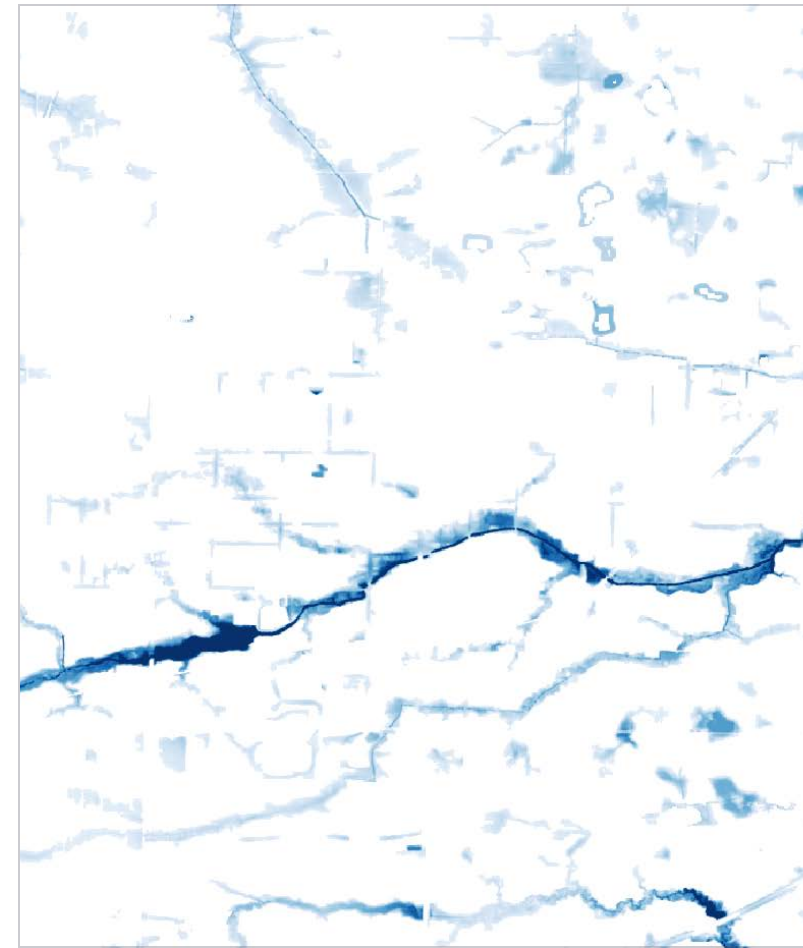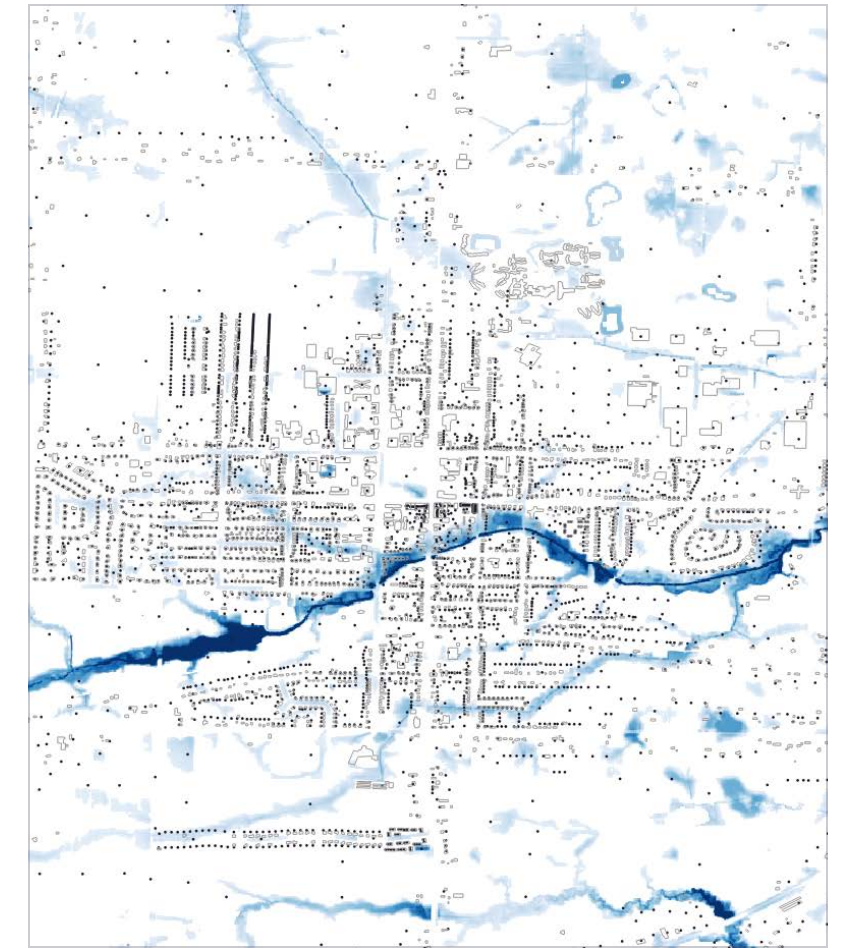
Parcel data

Building footprints


Hazard layer

Max depth

Edge of building footprint or depth at property centroid.

FEMA Flood maps only look at historical flooding events.

FEMA flood maps are created by calculating the frequency and impact of historic flooding events and do not account for any future environmental changes.

Sea levels

The ocean has risen 8.5 inches nationally since 1950 and is projected to rise another 4.5 inches by 2050. This increases tidal flooding and hurricane storm surge.

+13.0"
+8.5"
2050
2017
1950
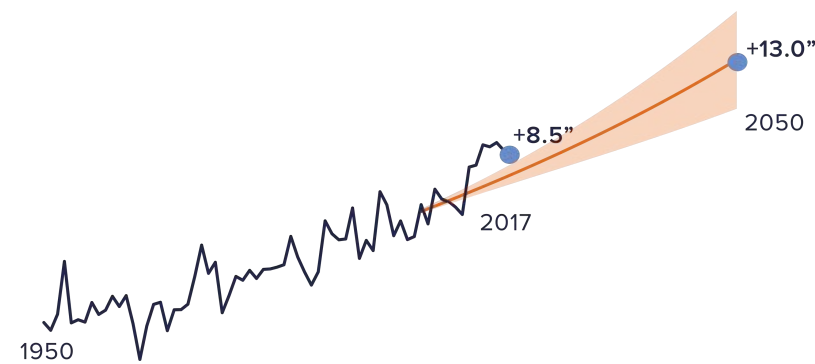
Observation Source: CSIRO
Projections Source: IPCC

Surface temperatures

The atmosphere is 1.9 degrees (F) warmer than it was in 1950. It is projected to warm another 1.28 degrees (F) by 2050. This impacts the frequency and intensity of pluvial (precipitation) and fluvial (riverine) flooding.

+3.19°
+1.91°
2050
2015
1950
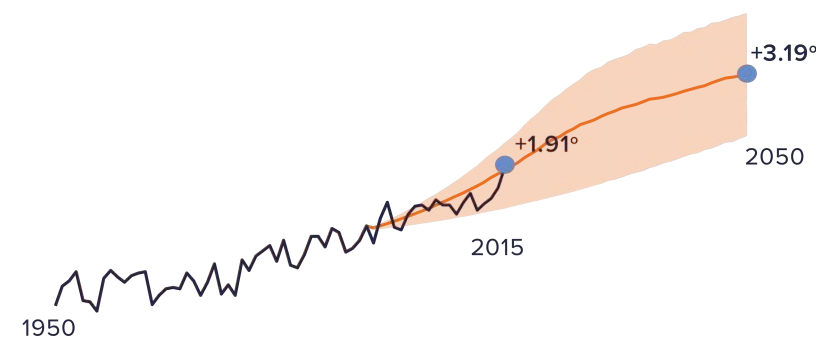
Observation Source: EPA
Projections Source: IPCC

Sea surface temperatures

The sea's surface temperature is 1.5 degrees (F) warmer than it was in 1950. It will rise another 0.5 degrees (F) by 2050. This impacts the intensity and geographic area hurricanes make landfall.

+2.0°
+1.5°
2050
2015
1950
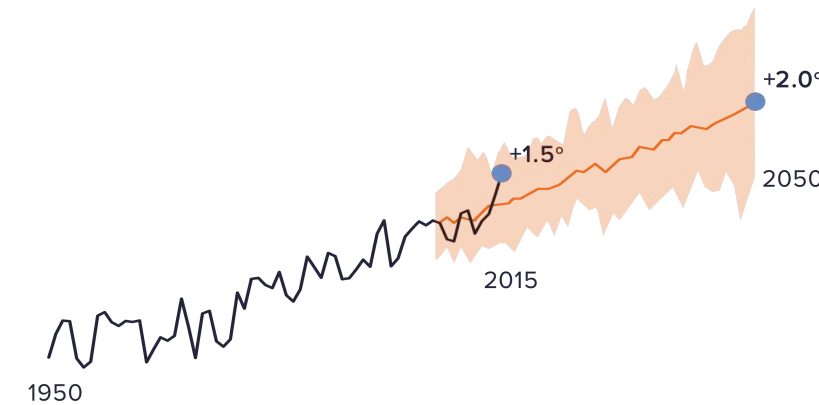
Observation Source: EPA
Projections Source: IPCC

IPCC Representative Concentration Pathways

CO_2 - equivalent (ppm)

750
650
550
450
350

2020   2030   2040   2050

RCP 8.5
RCP 4.5
RCP 6.0
RCP 2.5

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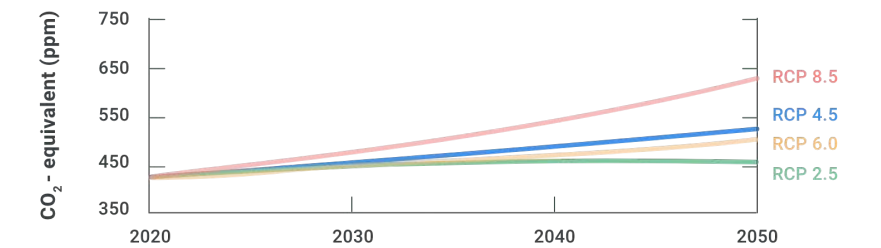
Adaptation database.

Over 23,000 features.

40 adaptation types (levees, seawalls, pumps, etc).

Green and grey infrastructure.

Post processing of hazard layers includes the effects of major infrastructure and adaptation features, with protection up to documented design standards (no dynamic operations).

Nationwide   ● **Cincinatti, Ohio**

23,044	**14.6M**	**Levee**	**500**	**Fluvial**	**7,862**
Total adaptation	Properties protected	Cincinnati Leveed Area	Return period	Scenario	Properties protected

▨ Areas of protection   ▦ 0.5 1   2   3+ ft   Depth of flooding simulated 1/100 flood event in 2020
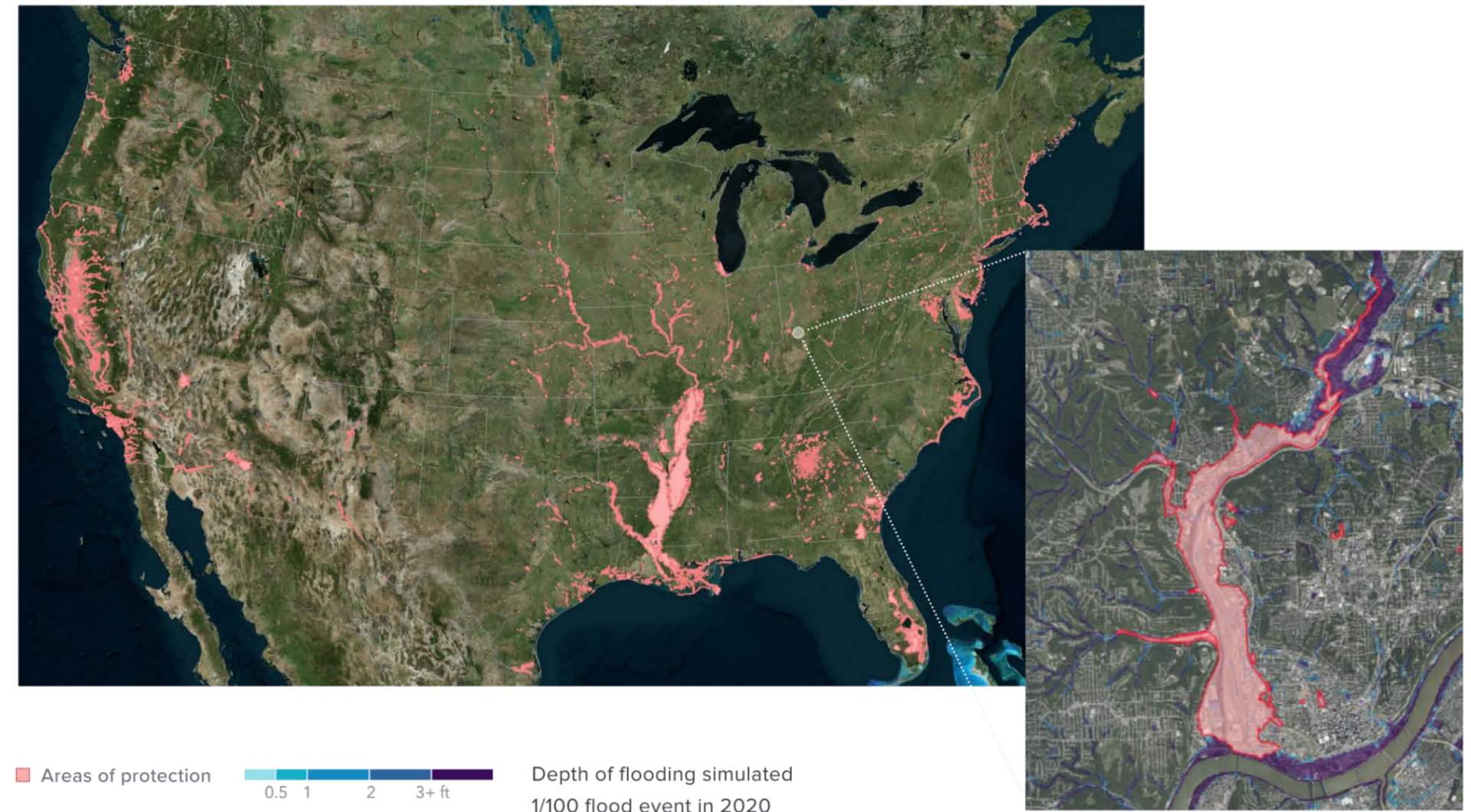
Sources of input data.

Precipitation frequency

NOAA Atlas 14

River flows

USGS Stream Gauge data

Tide and surge data

NOAA Tide Gauges

Elevation data

USGS National Elevation Database
supplemented with high res local
datasets (e.g. lidar)

Climate forecasts

CMIP5 simulations (21 models, RCP 4.5)

Downscaled data from NASA NEX-GDDP

Historic

USGS High Water Mark data

NFIP flood claims

FEMA Individual Assistance claims

Hurricanes

Synthetic Hurricane Tracks from K. Emmanuel

NOAA IBTrACS Historical Hurricane tracks

Property info

Property boundaries from LightBox/DMP

Building footprints from MapBox and Microsoft

FEMA Flood Zone (estimated) from MassiveCert

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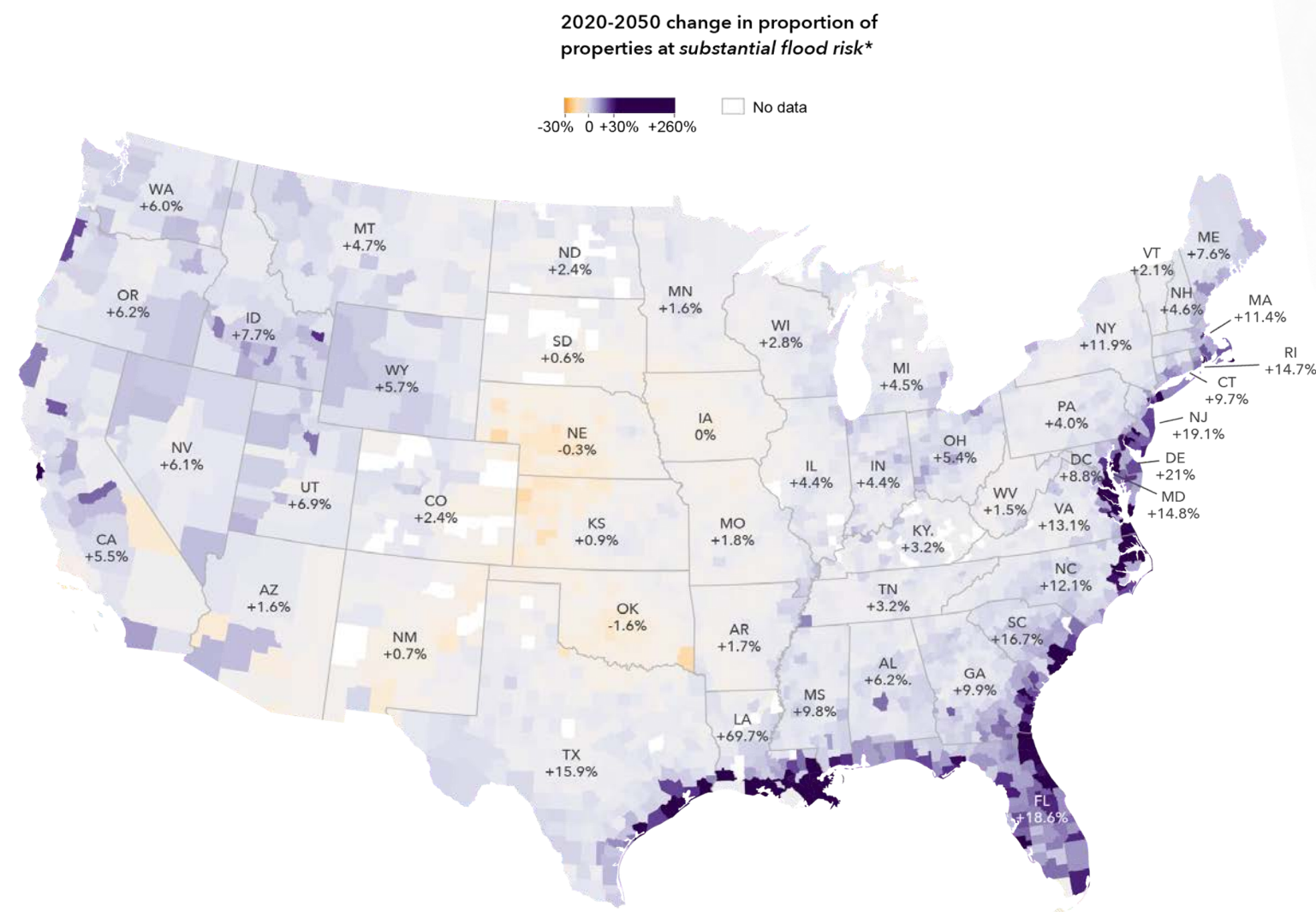FOUNDATION

Open, transparent methods and public data.

First Street's detailed technical methodology is publicly available on our website, providing transparency to how we built our national flood model and define risk. The First National Flood Risk Assessment Report (June 2020) and our newest report, The Cost of Climate: America's Growing Flood Risk (February 2021) discuss our model's findings and are also freely available.

Sources:
[Technical Methodology](#)
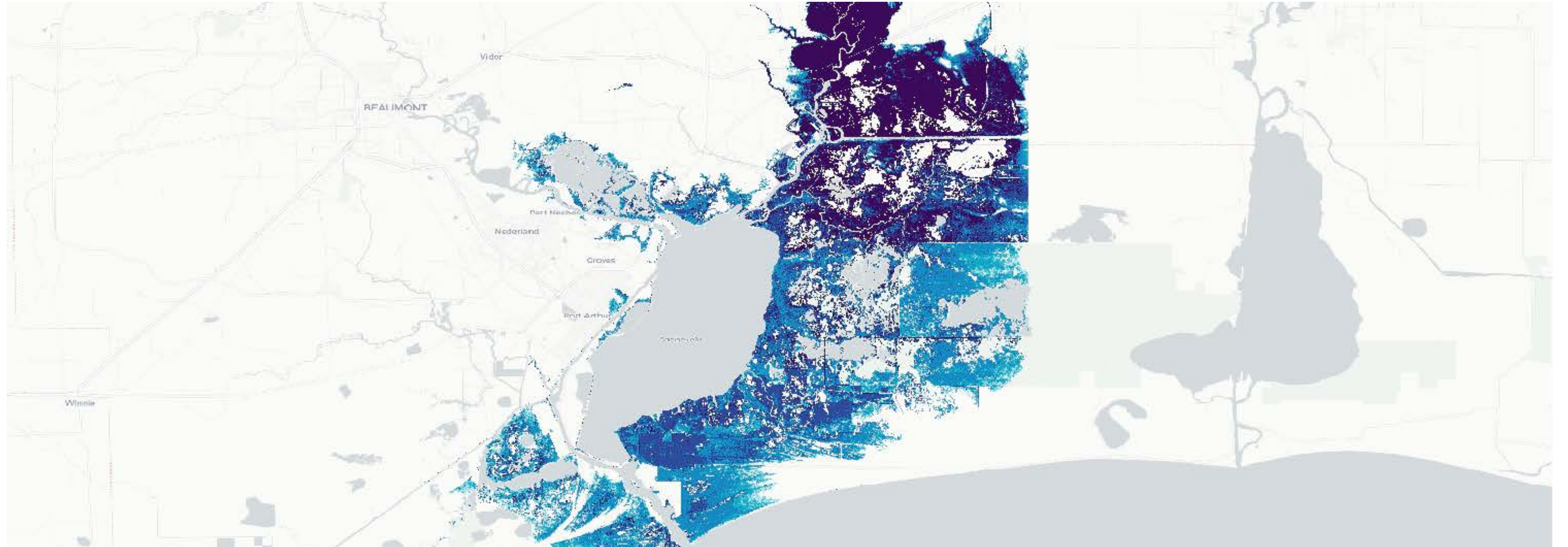[National Report](#)
[Flood Factor](#)

2020-2050 change in proportion of properties at *substantial flood risk**

-30%   0   +30%   +260%   No data

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River flood near Beaumont, TX

Flood Factor + Live Demo

Flood Factor.

Flood Factor has made this critical high resolution data available at scale.

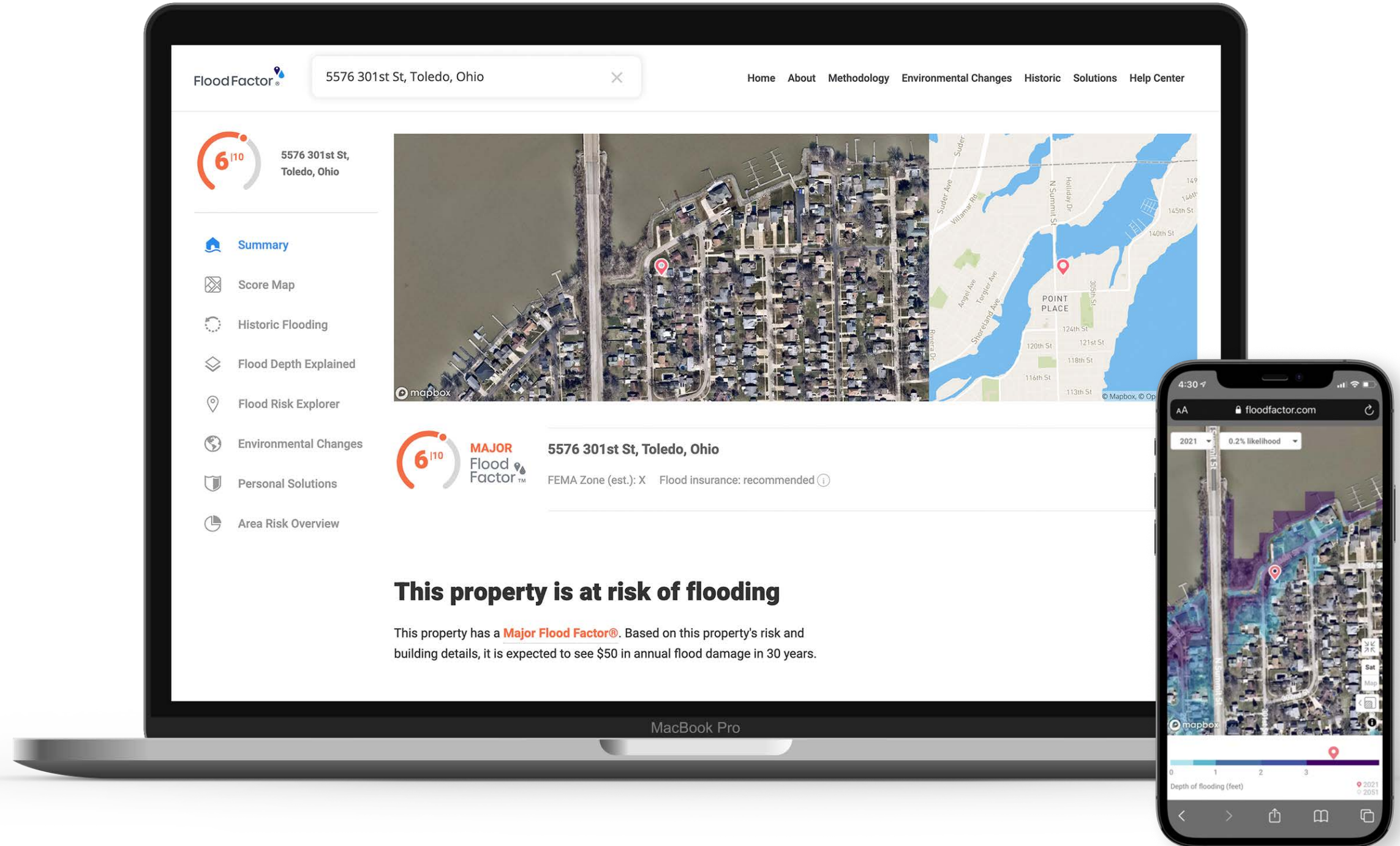First open source, peer reviewed, climate-adjusted solution available.

Produced at a 3m resolution to provide meaningful insights at the property level.

Endorsed by NAR as a helpful tool in the home buying and selling process.

Accessible where American's need it most, on real estate websites.

Flood Factor 🌢

5576 301st St, Toledo, Ohio   ✕

Home   About   Methodology   Environmental Changes   Historic   Solutions   Help Center

6 |10   **5576 301st St, Toledo, Ohio**

🏠 Summary
▦ Score Map
⬡ Historic Flooding
◈ Flood Depth Explained
◉ Flood Risk Explorer
🌐 Environmental Changes
🛡 Personal Solutions
◔ Area Risk Overview

6 |10   **MAJOR Flood Factor ™**

5576 301st St, Toledo, Ohio

FEMA Zone (est.): X   Flood insurance: recommended ⓘ

This property is at risk of flooding

This property has a **Major Flood Factor®**. Based on this property's risk and building details, it is expected to see $50 in annual flood damage in 30 years.

MacBook Pro

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River flood near Beaumont, TX

Publicly available data

First Street climate risk statistics.

The aggregated flood risk summary statistics datasets that we currently offer through the AWS platform are formatted as comma separated value (CSV) files organized by congressional district, county, and ZIP code.

- Each CSV file contains
- The county and ZIP code CSVs also contain
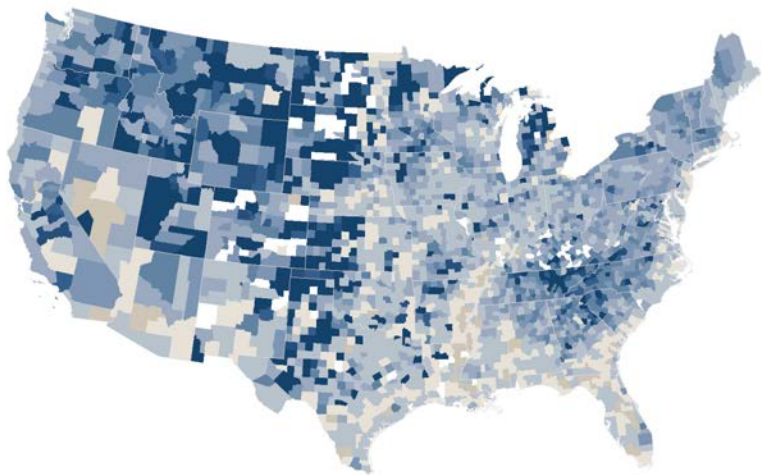
County level

Zip level
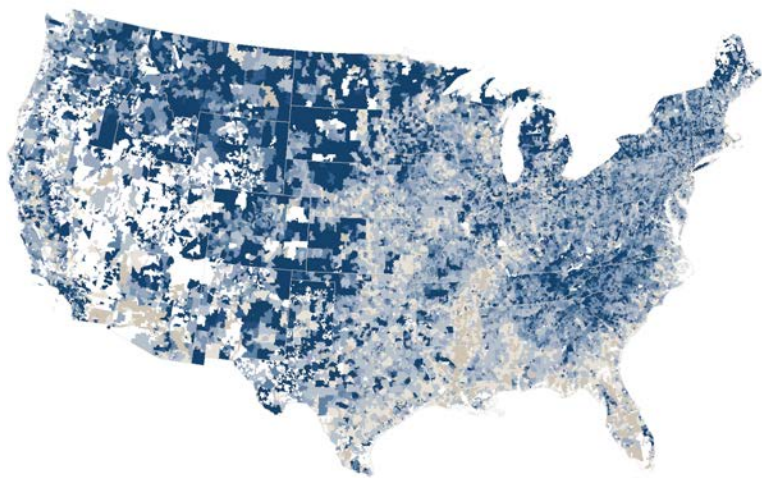
| Variable	Variable label
State	State
County	County Name
County FIPS	County FIPS
Latitude	Latitutde of Centroid
Longitude	Longitude of Centroid
Total Properties	Total Properties in County
FEMA Properties at Risk 2020 (total)	Total Properties Identified at Risk by FEMA, 2020
FEMA Properties at Risk 2020 (pct)	Percent of Properties Identified at Risk by FEMA, 2020
FS Properties at Risk 2020 (total)	Total Properties Identified at Risk by First Street Model, 2020
FS Properties at Risk 2020 (pct)	Percent of Properties Identified at Risk by First Street Model, 2020
FS Properties at Risk 2035 (total)	Total Properties Identified at Risk by First Street Model, 2035
FS Properties at Risk 2035 (pct)	Percent of Properties Identified at Risk by First Street Model, 2035
FS Properties at Risk 2050 (total)	Total Properties Identified at Risk by First Street Model, 2050
FS Properties at Risk 2050 (pct)	Percent of Properties Identified at Risk by First Street Model, 2050
FS-FEMA Difference, 2020 (total)	Absolute Difference in Risk between First Street Model and FEMA, 2020
FS-FEMA Difference, 2020 (pct)	Percent Change in Risk between First Street Model and FEMA, 2020
Avg Risk Score, (2+ Only)	Average Risk Score of Only Properties with ANY RISK (FloodFactor > 1)
Avg Risk Score, (All Props)	Average Risk Score of All Properties
Avg Risk Score, (FSF 1-100 Risk)	Average Risk Score of Properties with 1-100 First Street Model Risk in 2020
Avg Risk Score, (FEMA SFHA Risk)	Average Risk Score of Properties with 1-100 FEMA SFHA Risk, 2020
Avg Risk Score, (No FEMA SFHA Risk)	Average Risk Score of Properties without 1-100 FEMA SFHA Risk, 2020

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Accessing First Street data on AWS.

1. Create a free AWS account here
2. Login
3. Go to the First Street Foundation AWS S3 Bucket
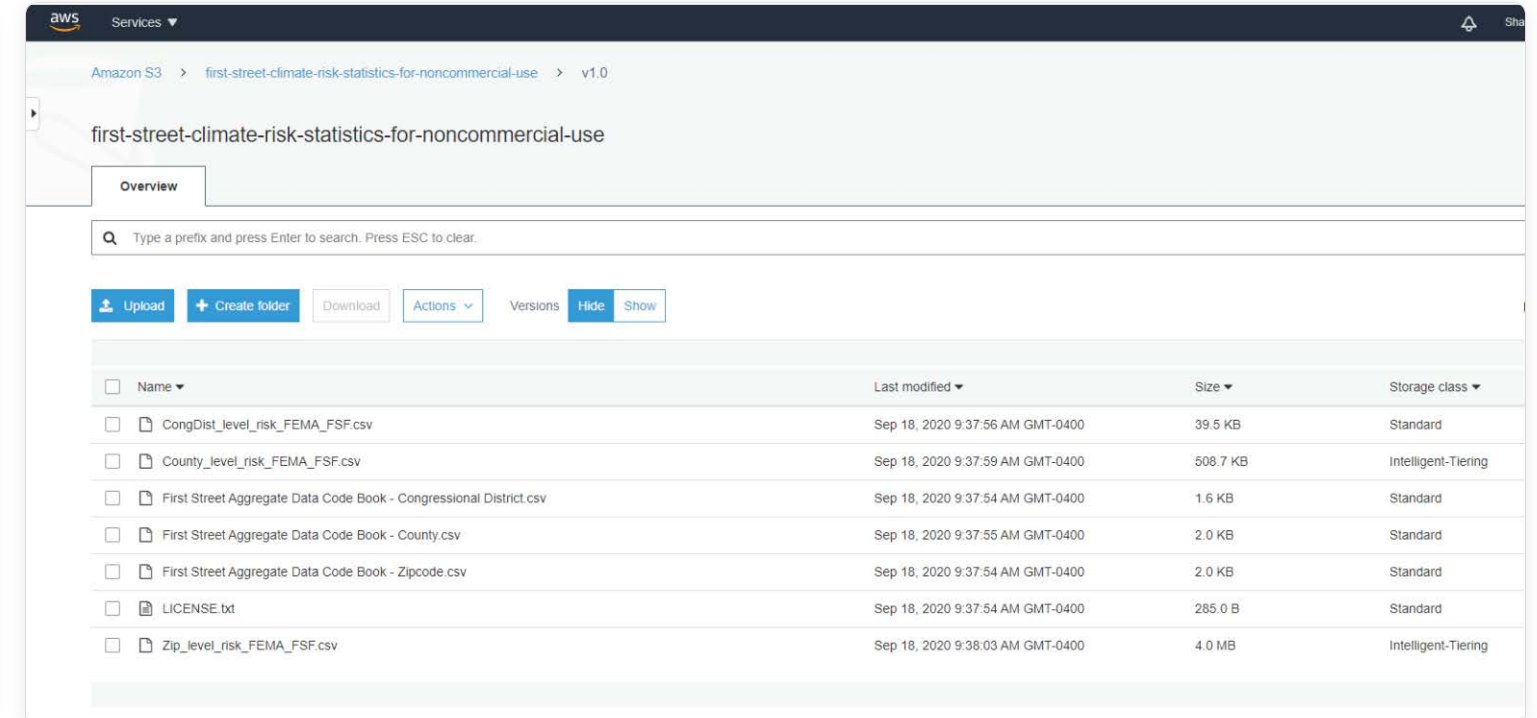4. Open folder v1.0 (or other versions) to download available datasets
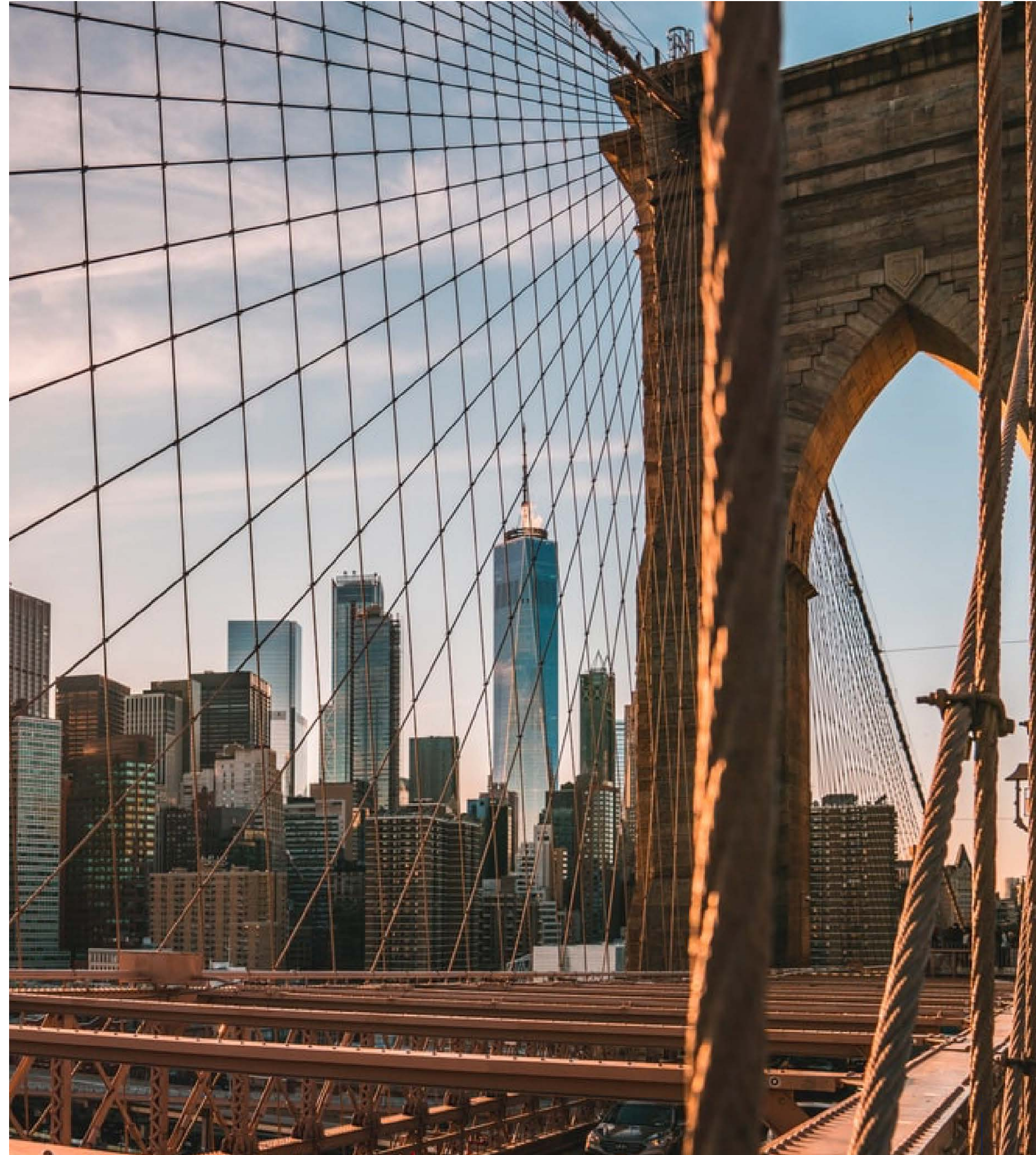
Step 1 & 2
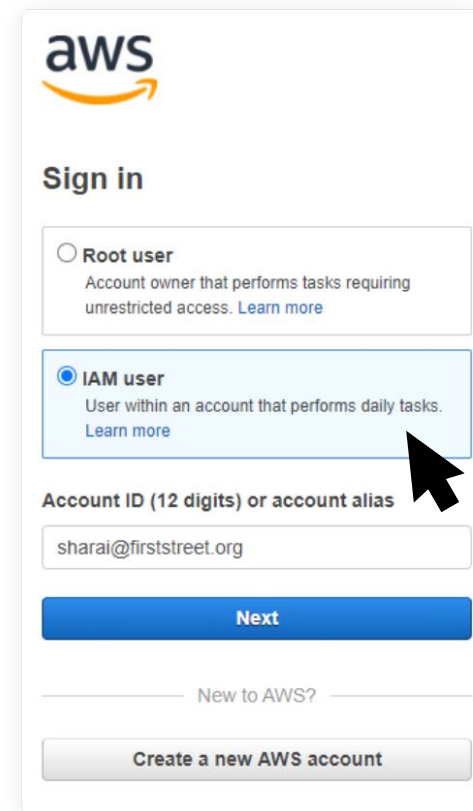
Step 3
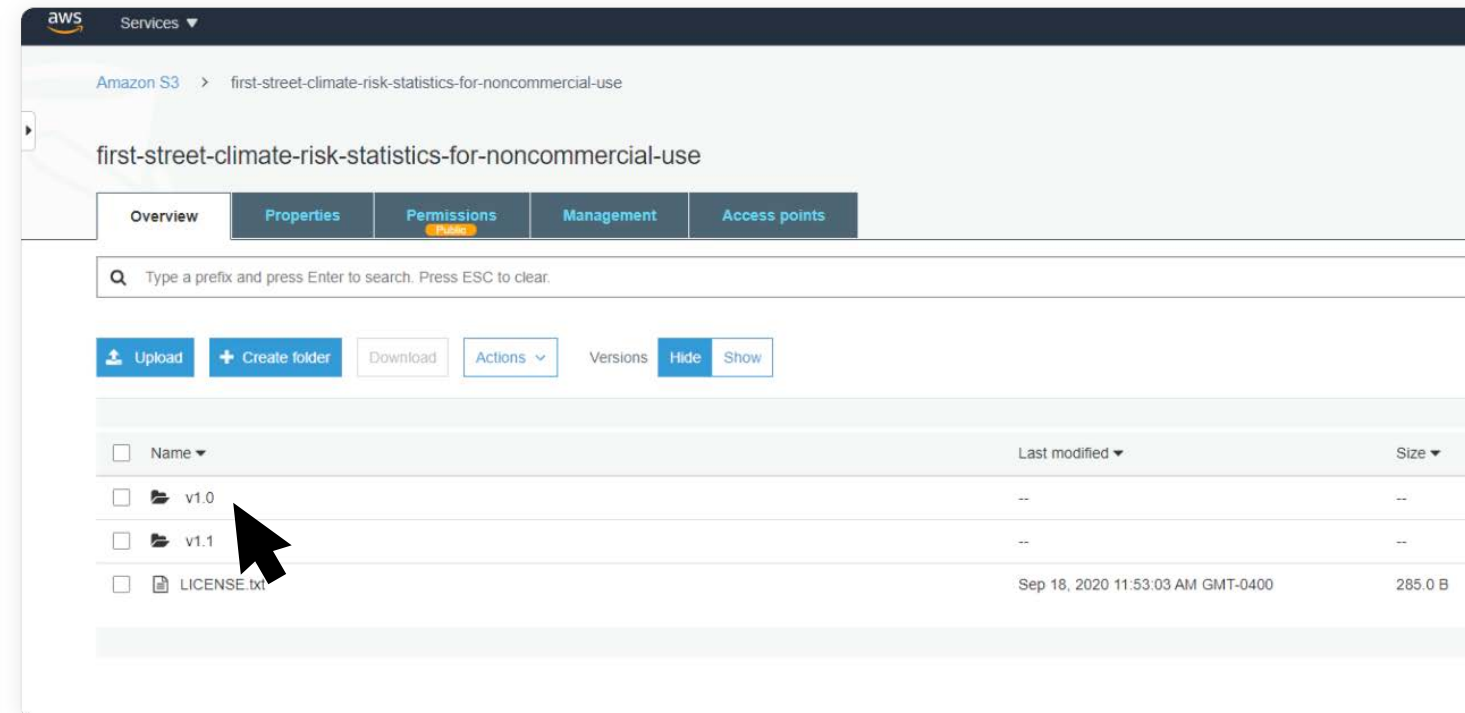
Step 4

First Street Foundation Public Sector Data Access Pilot Program.

Goals

1. Learn how communities can accelerate climate assessments and planning of flood mitigation efforts through the use of the First Street Foundation's hazard model dataset.
2. Maximize the use of First Street data for public good, and recognize that sharing it with local government experts will allow it to be leveraged immediately in service to their communities.

If interested then please fill out the application found here.

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Thank you