



CEC Flood Costing Project Case Study: United States

Third Virtual Expert Workshop

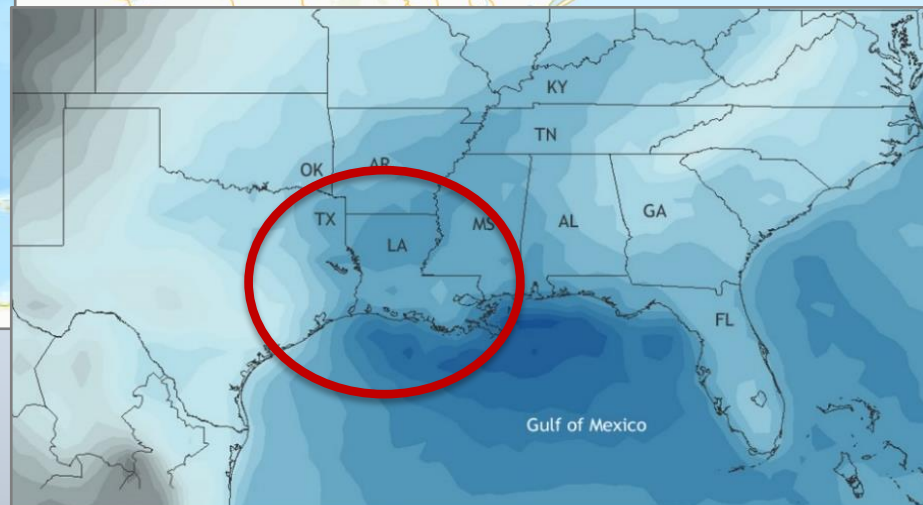
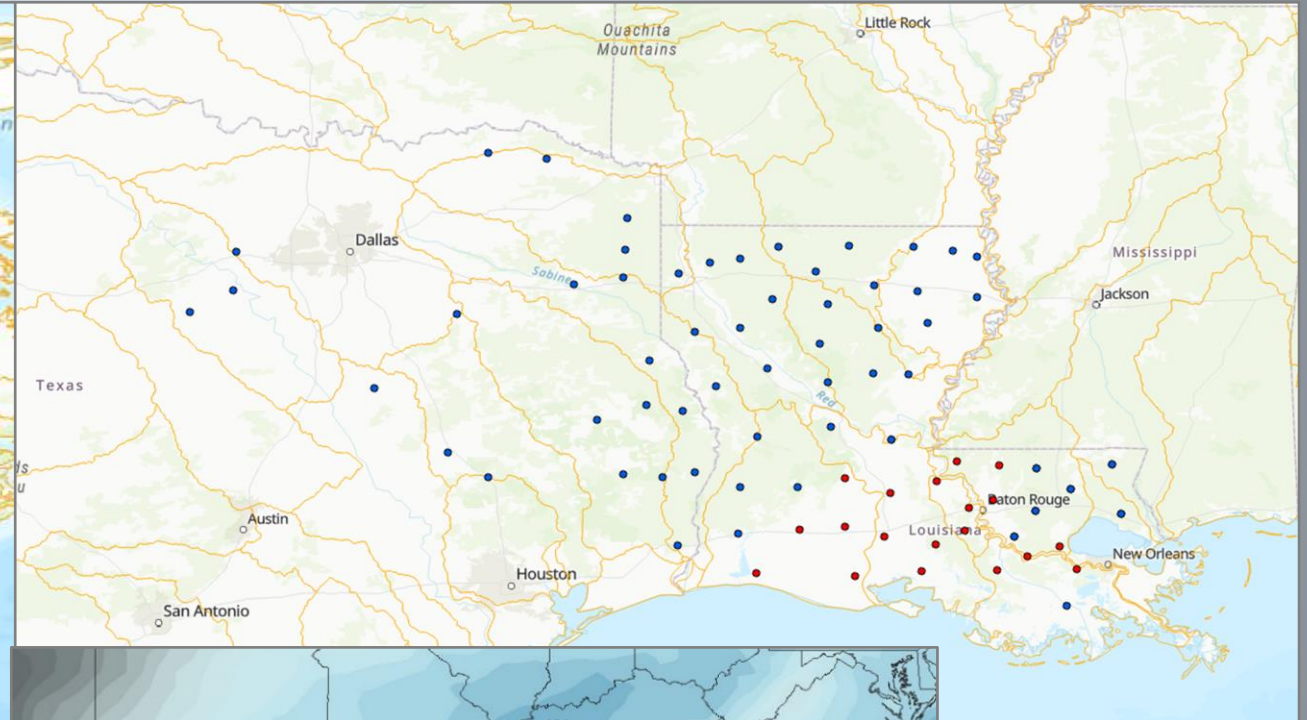
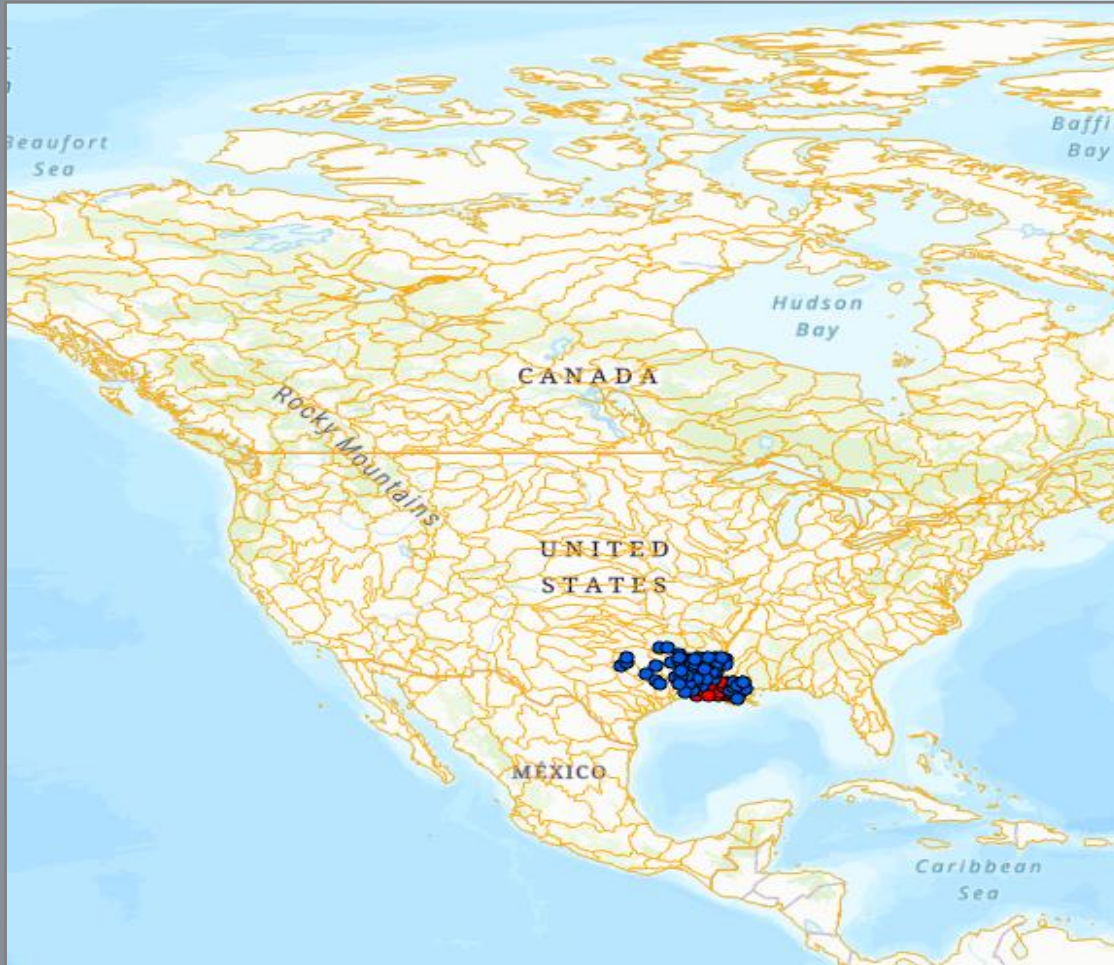
Lynn Rae, MS Natural Resources, PhD Student
School of Natural Resources and the Environment
University of Arizona



25-26 March 2021



Case Study Location

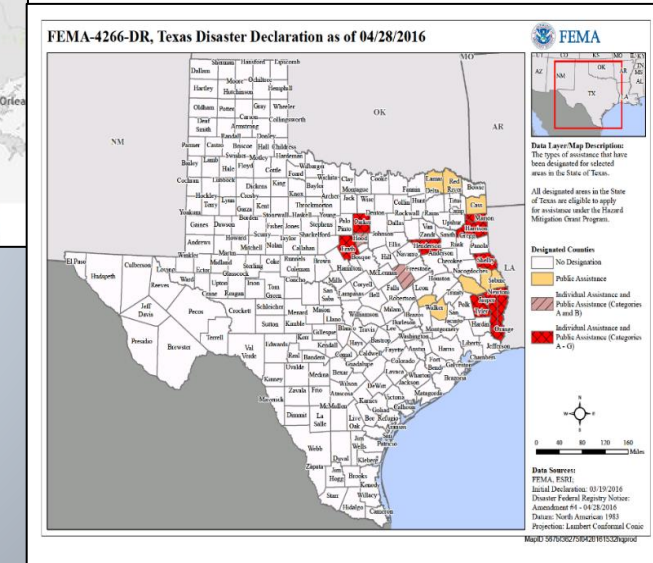
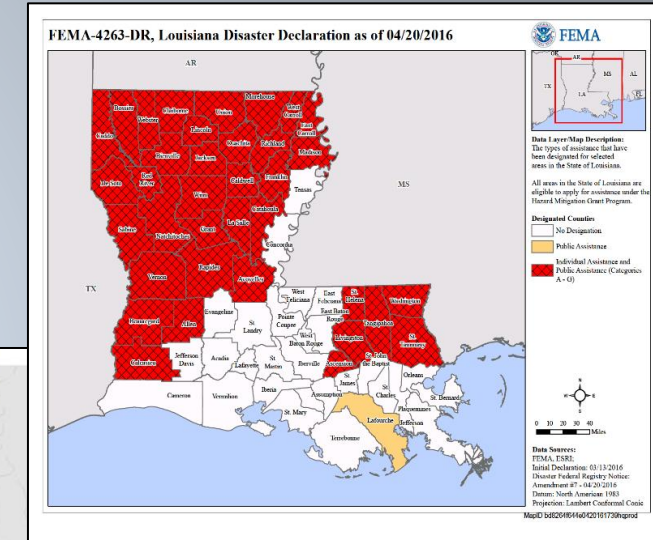
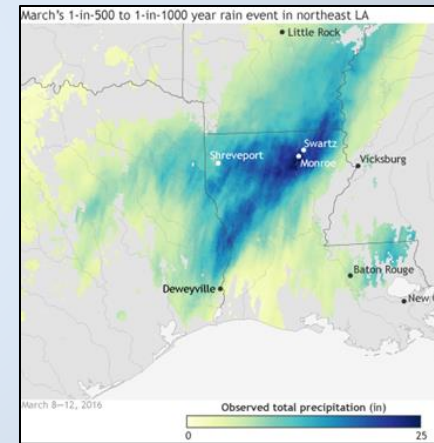


August 8-15, 2016
average daily precipitable water (mm)
NOAA Climate.gov
Data: MIRS (NES)



Case Study: Louisiana & Texas Flooding (March 2016)

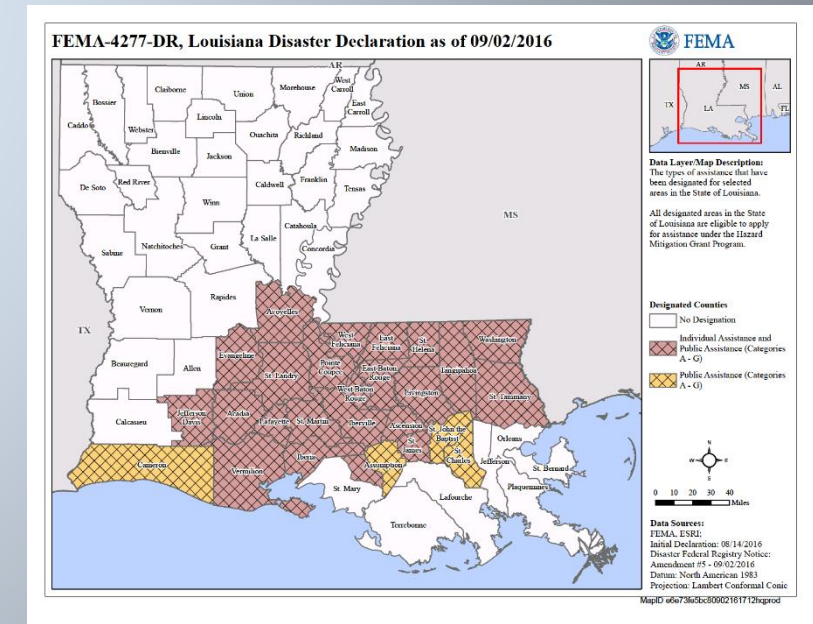
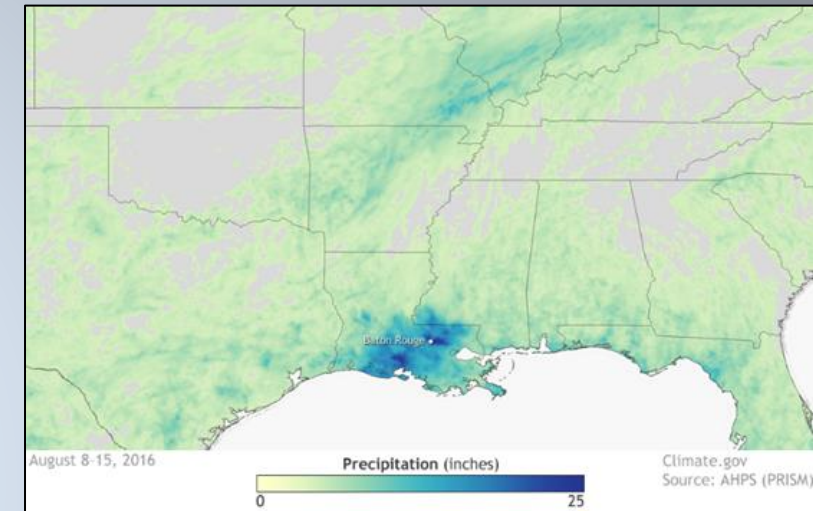
- **Cumulative rainfall amounts of 10 to 20 inches** across East Texas and much of inland Louisiana over a four-day period (NWS, 2016).
- **Impacted 36 parishes (counties)** in the northern and central region of the Louisiana, including **severe damages to infrastructure, large agricultural, and economic centers.**
- **Estimated economic impact to Texas and Louisiana was US\$2.5 billion** (NOAA, 2020).
- Impacts to the **Jena Band of Choctaw Indians** reservation
 - 11 Tribal households and 37 individual Tribal members were affected
 - damages to homes, loss of property, and displacement of families to temporary shelters and housing (USET, 2016).





Case Study: Louisiana Flooding (August 2016)

- In August, a second slow-moving tropical **storm system stalled over coastal Louisiana** for several days and produced massive levels of moisture.
- Resulted in **13 deaths, over 30,000 rescued** individuals, and more than **8 thousand individuals displaced** to shelters (NOAA, 2016).
- Louisiana estimated the **disruption of 20% of businesses**, totaling economic losses of more than **US\$324 million in labor productivity** and **US\$901 million of value added** at the time of the flooding, and **US\$119 million in agricultural losses** (LOED, 2017).
- **Total estimated economic impact** to the state of Louisiana was **US\$11 billion** (NOAA, 2020).





Data Sources for the U.S. Case Study

- Federal Emergency Management Agency (**FEMA**) Disaster Declarations
- FEMA National Flood Insurance Program (NFIP)
- FEMA Individual Assistance Program (IA)
- FEMA Public Assistance Funded Program (PAFP)
- National Oceanic and Atmospheric Administration (**NOAA**) Storm Event
- U.S Department of Agriculture (**USDA**) RMA
- Small Business Administration (**SBA**) Disaster Loans
- Private Property Insurance Marketplace
- Louisiana Office of Community Development, Disaster Recovery Unit
- U.S. Housing and Urban Development (**HUD**), CDBG





Data Collection Process and Analysis

- **Assessed costs** in the **open access federal disaster datasets** to identify **additional damages and data gaps** for the March 2016 and August 2016 flooding.
 - **Costs** that are **included in the** Extreme Events Economic Impact Database (**E³ID**).
 - **Damages and losses** that were **excluded from the E³ID** for various reasons.
- Conducted a **limited desktop review** of federal and state government disaster programs, Tribal government, Inter-Tribal organization, and non-governmental organization websites, and published peer-reviewed literature.
 - **Compiled annual reports, documents, and expenditure data** to identify additional state and county damages and losses attributed to the 2016 flooding events.
 - **Private property insurance marketplace data** were provided by NOAA.
- All cost estimates are CPI-adjusted to real 2020 \$USD.



The Most Significant Challenges Encountered

U.S. Flood events (2013-2017)	NOAA event estimate (CPI-adjusted cost, USD, 2020)	CEC flood-costing project event estimate (CPI-adjusted cost, USD 2020)
2016, Texas and Louisiana flooding	\$2.5 billion	\$662 million
2016, Louisiana flooding	\$11 billion	\$5.18 billion

- Detailed state and county **damage data are not easily accessible**
 - **Difficulty with determining if some damages and losses are duplicated** (i.e., state may be reporting allocations of damages already included in federal damage datasets).
- **Damage data**, such as costs attributed to emergency measures and response, **are highly aggregated** and some costs **may be combined with mitigation**.
- **Geographic and spatial differences** may result in the omission of some **damages and losses**.



The Most Significant Challenges Encountered

- **Uncertainty with the costing of cumulative and multi-impact events** that occur within similar geographic regions.
 - **State agencies may combine costs and allocate funds for multiple events** and it is difficult to discern which damages are attributed to a particular flood event.
 - **Allocations and reporting** of major flooding damages and losses **may occur over years.**
- Data for **damages and losses are defined and categorized differently** and may not reflect the definitions of the database indicators.
- **Limited availability and access to detailed and county-level private property insured marketplace data.**
- **No data are available for Indigenous communities and indirect damages.**

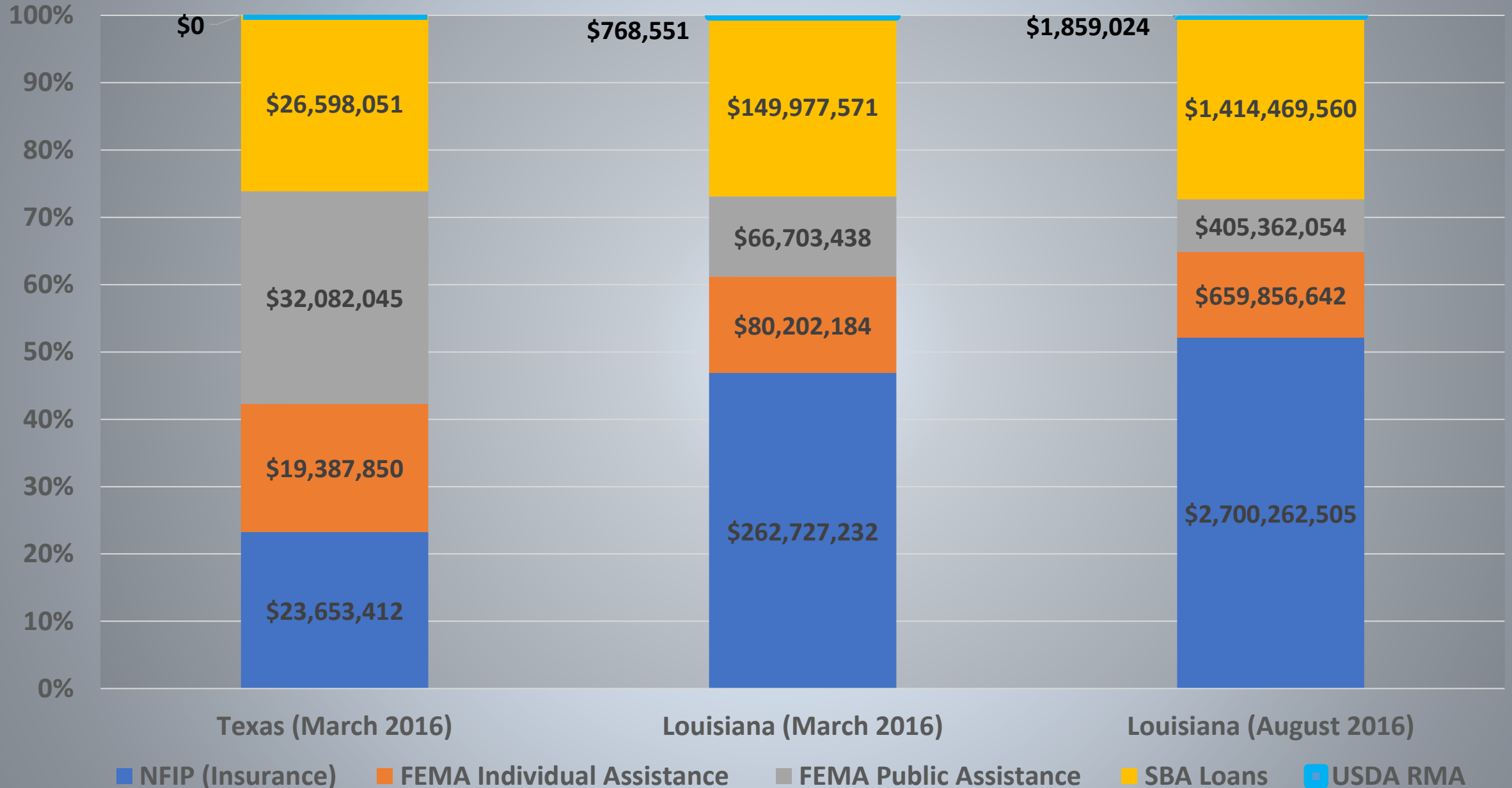


Direct Damages and Additional Losses included in the E³ID

Federal Disaster Program	Texas March Flooding	Louisiana March Flooding	Louisiana August Flooding	Total damage
NFIP (Insurance)	\$23,653,412	\$262,727,232	\$2,700,262,505	\$2,986,643,148
FEMA Individual Assistance (assistance for homeowners and renters)	\$19,387,850	\$80,202,184	\$659,856,642	\$759,446,676
FEMA Public Assistance Program	\$32,082,045	\$66,703,438	\$405,362,054	\$504,147,536
SBA Loans (home and business assistance)	\$26,598,051	\$149,977,571	\$1,414,469,560	\$1,591,045,182
USDA RMA (crop assistance)	\$0	\$768,551	\$1,859,024	\$2,627,575
Total damage	\$101,721,357	\$560,378,976	\$5,181,809,785	\$5,843,910,118

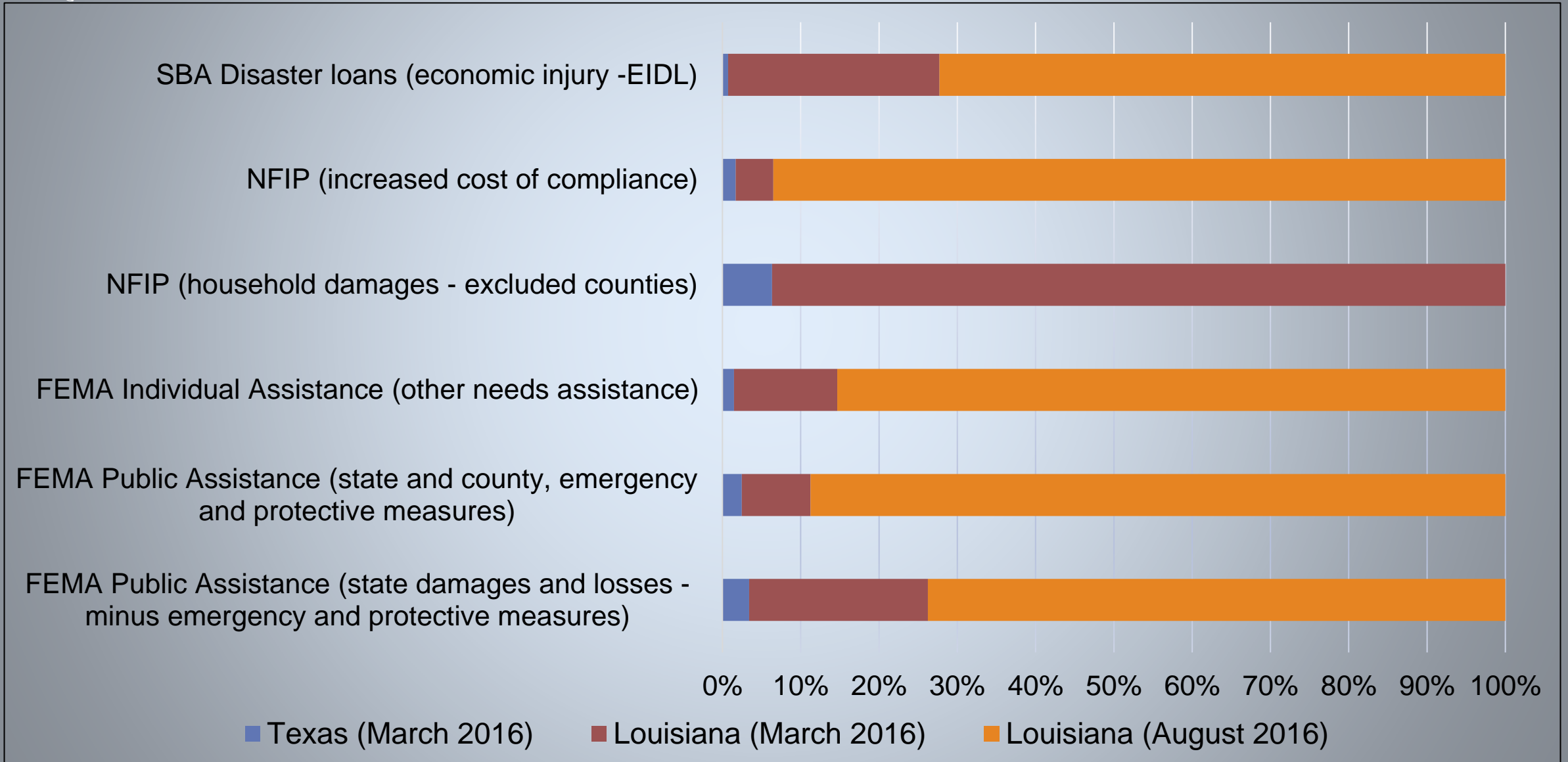
Source: U.S. federal disaster program open access data (data.gov)

Direct damages and additional losses included in the E³ID





Excluded Damages and Losses by Disaster Program





Excluded FEMA Public Assistance Damages and Losses

Type of damage and loss	Texas March Flooding	Louisiana March Flooding	Louisiana August Flooding	Total damage
State and County emergency and protective response measures (loss and additional cost)	\$11,179,355	\$39,813,636	\$402,024,127	\$453,017,118
State debris removal and clean-up (loss and additional cost)	\$380,939	\$905,603	\$7,743,741	\$9,030,283
State utility-related impacts (direct damage)	\$970,931	\$1,068,374	\$6,337,266	\$8,376,571
State buildings, facilities, and equipment (direct damage)	\$92,003	\$4,966,393	\$13,113,949	\$18,172,346
State impacts to parks and recreational facilities (direct damage)	\$33,669	\$954,068	\$119,942	\$1,107,680
State impacts to roads and bridges (direct damage)	\$154,919	\$3,046,529	\$6,219,329	\$9,420,777
State water infrastructure impacts (direct damages)	\$0	\$1,113,688	\$69,685	\$1,183,373
Statewide management costs	\$660,489	\$3,367,966	\$16,196,101	\$20,224,556
Total damage	\$13,472,305	\$55,236,257	\$451,824,140	\$520,532,704



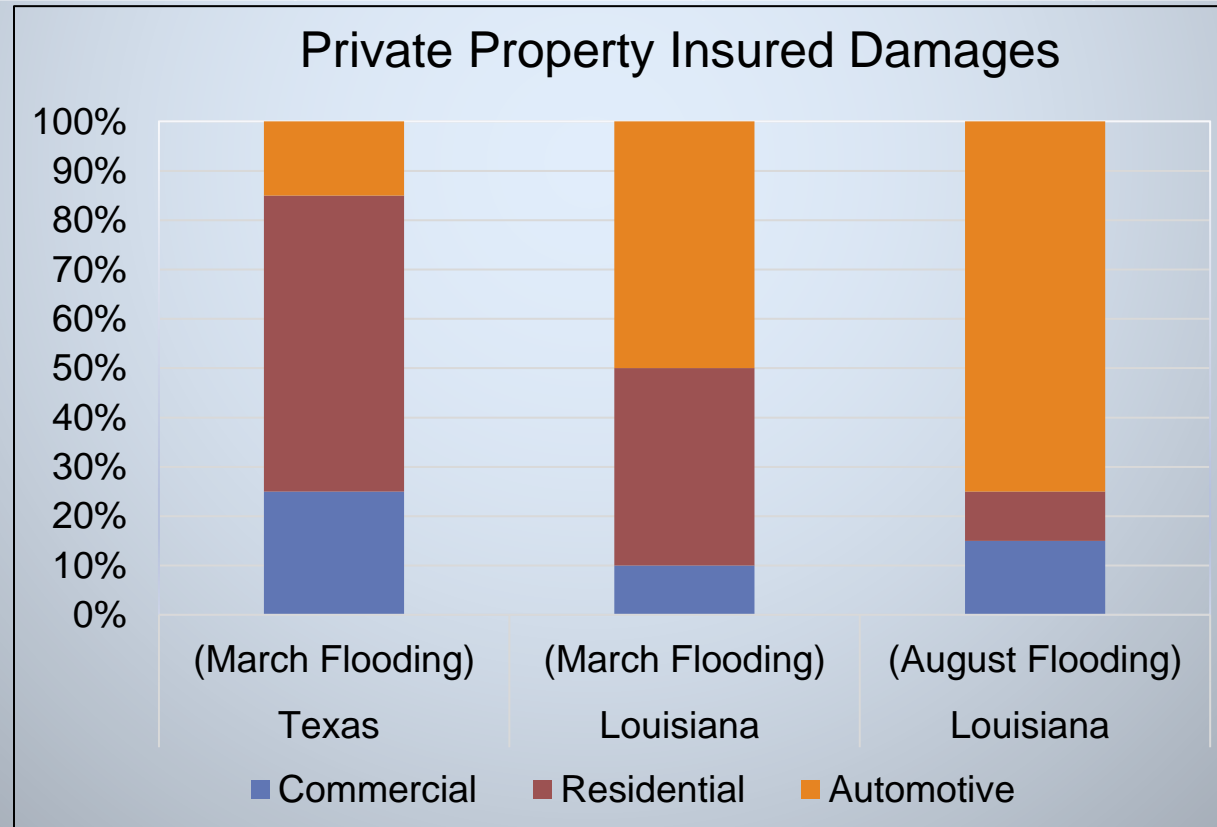
Summary of Additional and Excluded Damages and Losses

Type of Damage or Loss	Texas March Flooding	Louisiana March Flooding	Louisiana August Flooding	Total damage
SBA business economic injury	\$401,792	\$15,349,417	\$41,068,226	\$56,819,435
FEMA Individual Assistance (other needs assistance)	\$3,048,593	\$27,301,255	\$176,765,144	\$207,114,991
NFIP (household damages – for excluded counties)	\$131,013	\$1,933,358	\$0	\$2,064,371
NFIP (increased cost of compliance)	\$353,623	\$1,003,266	\$19,563,120	\$20,920,008
Louisiana farming impacts and recovery associated with combined 2016 flooding		\$10,643,924	\$10,643,924	\$21,287,848
Emergency food, shelter, and relief items (loss and additional cost)			\$19,302,424	\$19,302,424
Total damage	\$3,935,021	\$56,231,219	\$267,342,837	\$327,509,077



Private Property Insured Marketplace Damages

Type of Damage and Loss	Texas (March Flooding)	Louisiana (March Flooding)	Louisiana (August Flooding)
Commercial	\$26,250,000	\$11,000,000	\$148,500,000
Residential	\$63,000,000	\$44,000,000	\$99,000,000
Automotive	\$15,750,000	\$55,000,000	\$742,500,000
Total damage	\$105,000,000	\$110,000,000	\$990,000,000



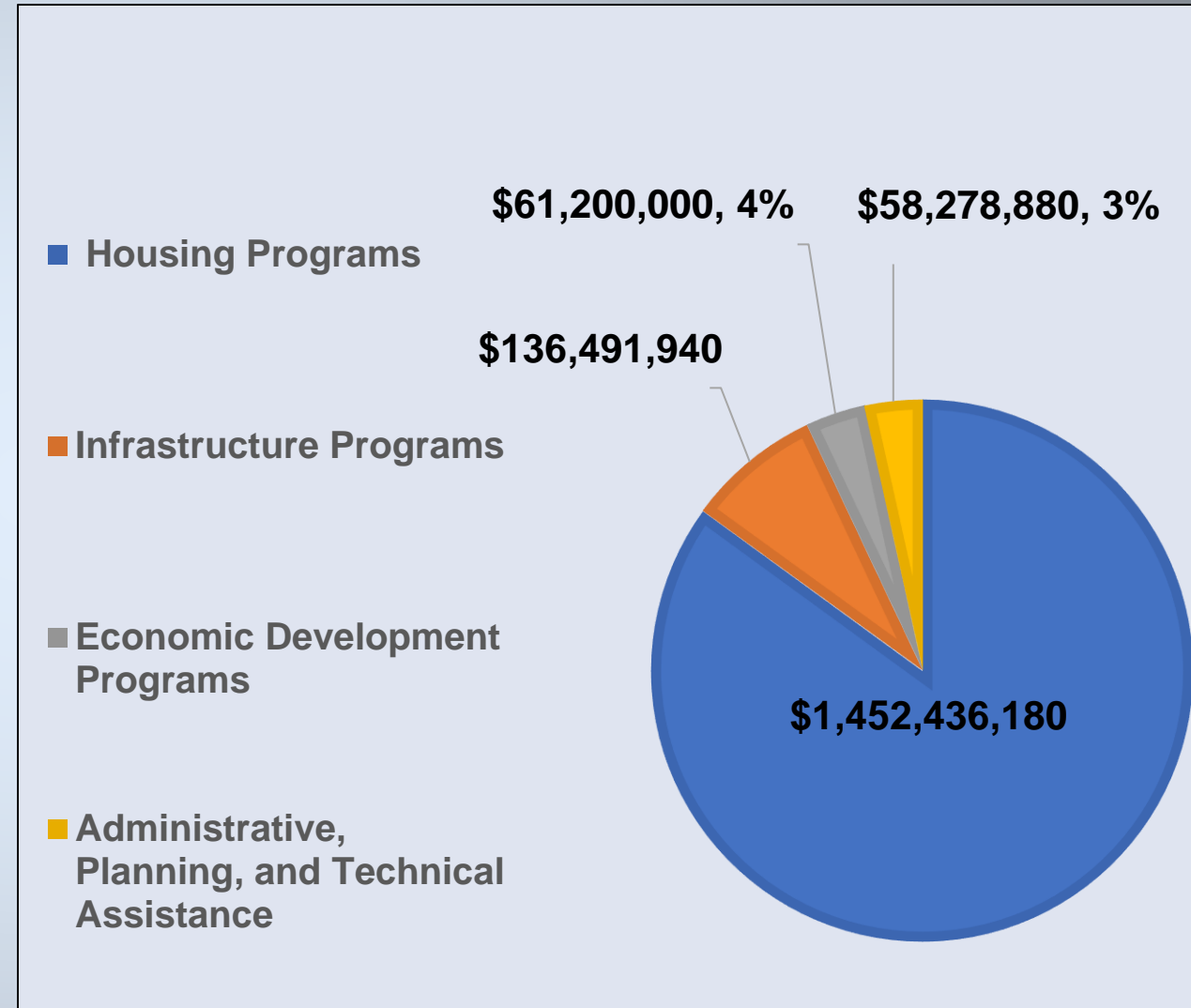
Source: (A. Smith, personal communication, December 23, 2020)



State of Louisiana, U.S. Housing and Urban Development Grants

Grantee	Amount
State of Louisiana	\$472,100,630
State of Texas	\$48,741,317
Total	\$520,841,946

- U.S. Department of Housing and Urban Development, **Community Development Block Grant (CDBG) disaster recovery (from the March and August 2016 flooding) funds for the unmet needs of the most impacted communities** (HUD, 2016).
- The **CDBG disaster grant program does not duplicate the damage and loss payouts of other federal disaster programs**. The CDBG costs are dispersed to various state subprograms and projects, and **some portion** of these damages **may be designated for mitigation**.



Source: Louisiana Office of Community Development, Disaster Recovery Unit (2021).



Thank you



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