California, Flood Risk, and National Flood Insurance Program

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Sacramento Weir, Jan. 11, 2017

Flood Risk in California

California has massive flood-risk exposure.

- Roughly 7 million people and $580 billion in buildings, public infrastructure, and crops are at risk from flooding (DWR, 2013).
- Of 81 Major Disaster Declarations in CA since 1954, 45 have involved flooding.

The Central Valley is the most flood-prone area of the State, a threat addressed during the past 100+ years by construction of levees, bypass channels, and upstream dams.

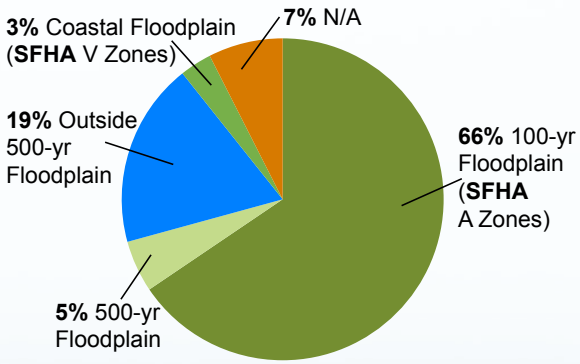
NFIP Overview

- The National Flood Insurance Program (NFIP) was established in 1968 to curtail development on US floodplains and along our coasts.
- Today, NFIP underwrites over 5 million policies, providing over $1.25 trillion in coverage, taking in over $3.5 billion/year in premiums.
- NFIP has limited, but not halted floodplain development.
- Flood losses have continued to climb, and NFIP is now **>$20 billion in debt**
  → going into Congressional reauthorization scheduled for 2017

Our Analyses

- Nationwide databases provided by FEMA:
  - NFIP flood-damage claims back to 1972
  - NFIP policies in force back to 1994
  - FEMA "severe repetitive loss" properties.
- Wide range of **attributes** accompany each database
- FEMA community designator combined with latitude and longitude to **improve geographical resolution**
- Combined with **other GIS information**, e.g.: census income data, social vulnerability indices, etc.
- **Focus on California, but with an eye to national context**

Results: Historical Flood Claims in SFHA



Number of NFIP paid claims in each Flood Zone

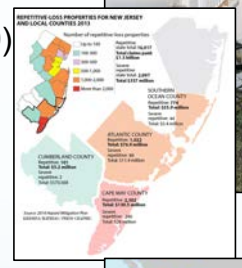
Flood Claims, Policies, and Gross National Payout Rates

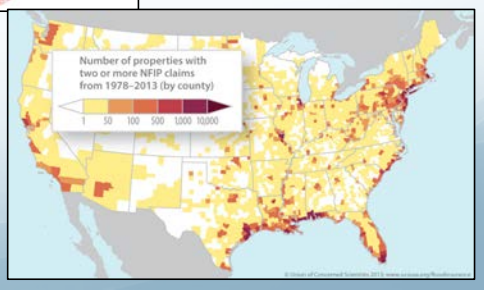
(Data: 1994-2014)	Paid Claims	Policies-in-force	Ratio of Claims/ Policies
Total	1,109,378	97,595,087	1.14%
SFHA	812,946	64,479,094	1.26%
100-yr Floodplain (SFHA A Zone)	781,240	62,707,980	1.25%
Coastal Floodplain (SFHA V Zone)	31,706	1,771,114	1.79%
500-yr Floodplain	56,552	4,486,201	1.26%
Non-SFHA	285,118	32,649,618	0.87%
Pre-firm	809,140	49,477,162	1.64%
Post-firm	290,519	47,632,007	0.61%

Persistent Repetitive Flood Losses

Severe Repetitive-Loss Properties:

- Definition: ≥4 claims of ≥$5k; or 2 claims ≥ structure value
- Just **0.58%** of NFIP policies (~30,000)
- But responsible for **10.6%** of all payments ($5.5 billion)
- Up to 40 claims per single structure (and counting)
- **One property in Alabama, valued at $153,000 has received $2.25 million in taxpayer-funded NFIP flood payments**



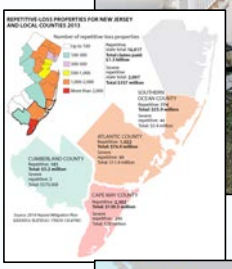


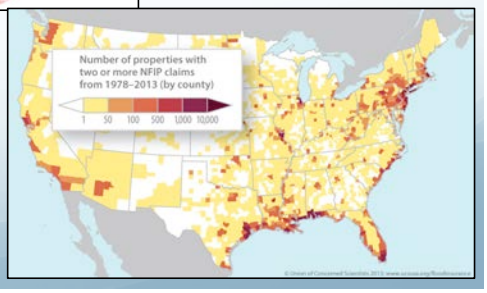
Persistent Repetitive Flood Losses

- **Natural Resources Defense Council (NRDC) has drafted legislative language to remove repetitive-loss properties from NFIP insurance roles:**

"property owners should agree in advance not to rebuild following floods that cause substantial damage and, instead, to accept a government buyout of their property and relocate. In exchange, they would receive a discount on their federal flood insurance coverage...."

(Hayat and Moore, 2015)



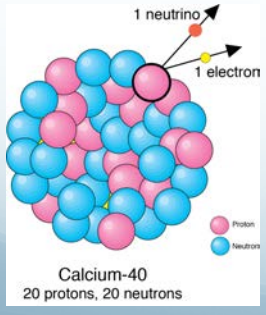


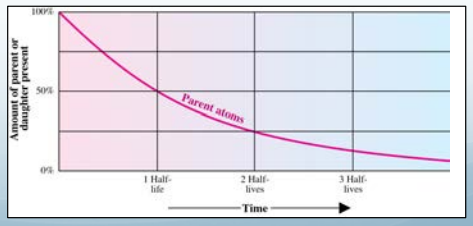
Insurance Penetration Issues: "Flood memory half-life"

"Our flood memory half-life is remarkably short ... Within six months, most of us will have forgotten the tragedy of the floods of 1997."

[or any year]

Gen. Gerald Galloway, retired,
former Commander, US Army Corps of Engineers
(Hearing before the Committee on Resources,
House of Representatives, 105th Congress)





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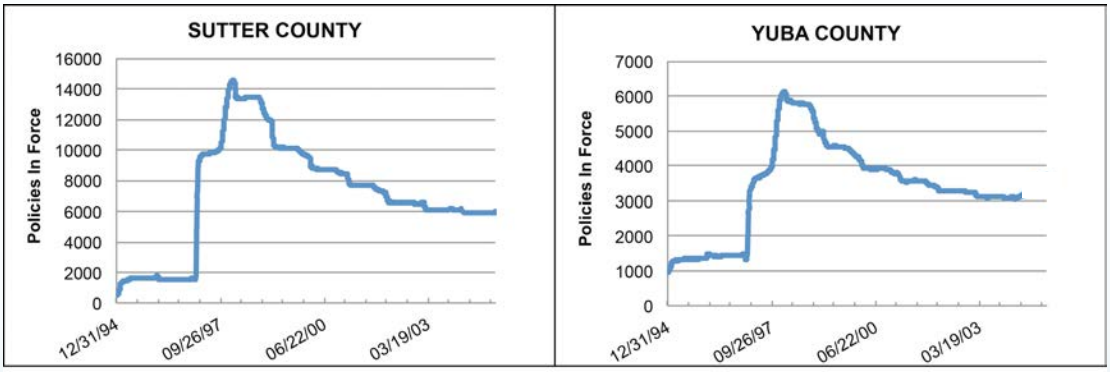

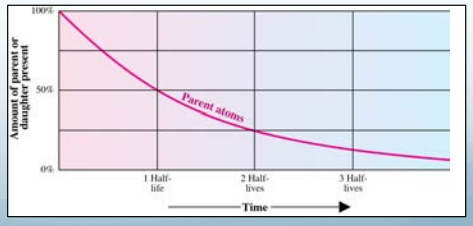

Conclusions

① The **NFIP is a "thin line in the sand"** -- imperfect, but the best framework we currently have for managing US flood losses

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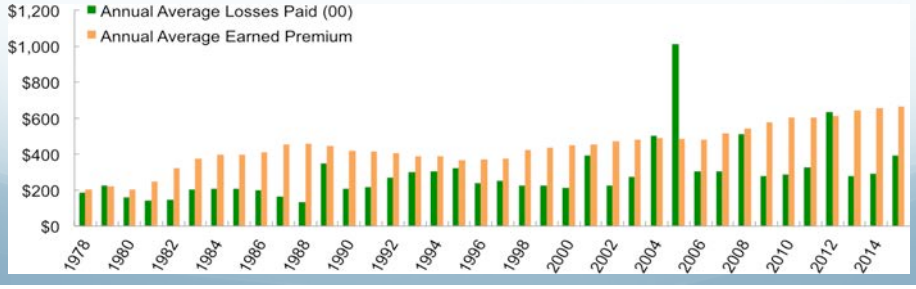
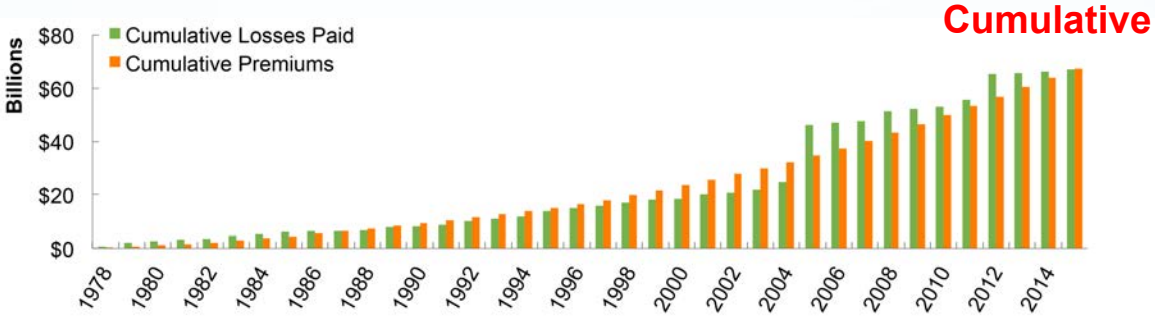
→ not least because the Program is a huge drain on Federal finances

NFIP is currently >$20 Billion in debt to the US Treasury



NFIP Deficit: Not that simple

Cumulative

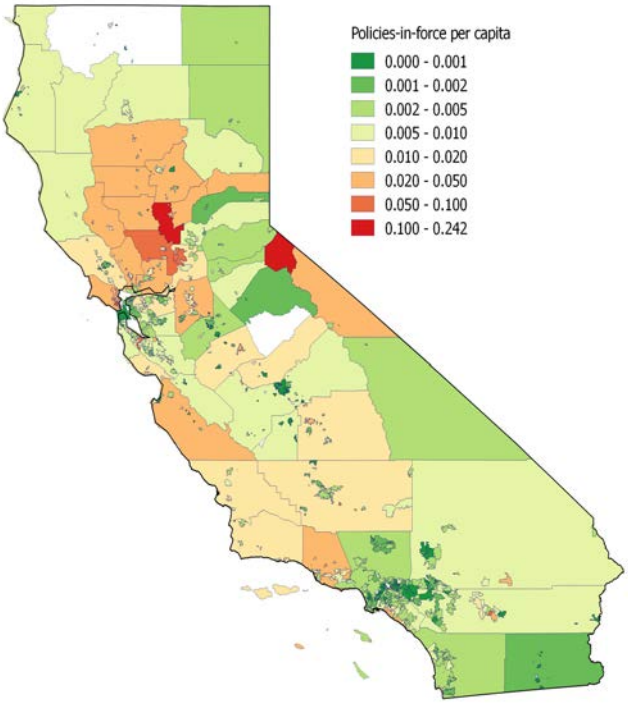


- NOT simply the case that claims >> premiums
- In fact, total NFIP premiums>claims
- But ... 34% of privately administered (WYO) premiums taken as fees

NFIP and California

California currently has:

- 290,000 NFIP policies
  (5.4% of US total)
- covering $82.6 billion in assets
  (6.1% of US total)
- $212.8 million in annual premiums
  (5.8% of US total)



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	Number of NFIP policies in-force	Policies in-force, total $coverage	Policy Premium In-force
SACRAMENTO CO.	55,044	$17,550,548,600	$26,246,881
LOS ANGELES CO.	33,653	$9,802,768,000	$24,410,506
ORANGE CO.	23,842	$6,595,794,400	$21,226,598
SANTA CLARA CO.	17,763	$4,658,578,500	$16,853,176
SAN DIEGO CO.	13,153	$3,522,603,100	$9,894,154
RIVERSIDE CO.	9,945	$2,737,890,000	$5,896,997
MARIN CO.	9,072	$2,575,923,800	$10,342,427
SAN JOAQUIN CO.	8,849	$2,667,708,600	$5,171,246
TULARE CO.	8,640	$2,192,216,400	$5,587,788
VENTURA CO.	8,119	$2,284,323,200	$4,857,563

	Policies per 1000 residents	Coverage per 1000 residents	Premiums per 1000 residents
SUTTER CO.	61.72	$19,675,505	$30,319
YUBA CO.	42.33	$12,857,283	$20,514
SACRAMENTO CO.	36.66	$11,689,962	$17,482
MARIN CO.	34.73	$9,861,090	$39,593
COLUSA CO.	28.77	$7,732,776	$19,840
YOLO CO.	24.25	$7,325,538	$14,816
LAKE CO.	31.51	$6,973,927	$25,383
SIERRA CO.	27.64	$5,790,529	$34,218
TEHAMA CO.	21.15	$4,853,568	$18,388
GLENN CO.	23.13	$4,808,106	$17,261

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BUT ... this is only the tip of California's flood exposure:

- **7 million people**
- **$580 billion in buildings, public infrastructure, and crops** (DWR, 2013)

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California and NFIP Payout Rates

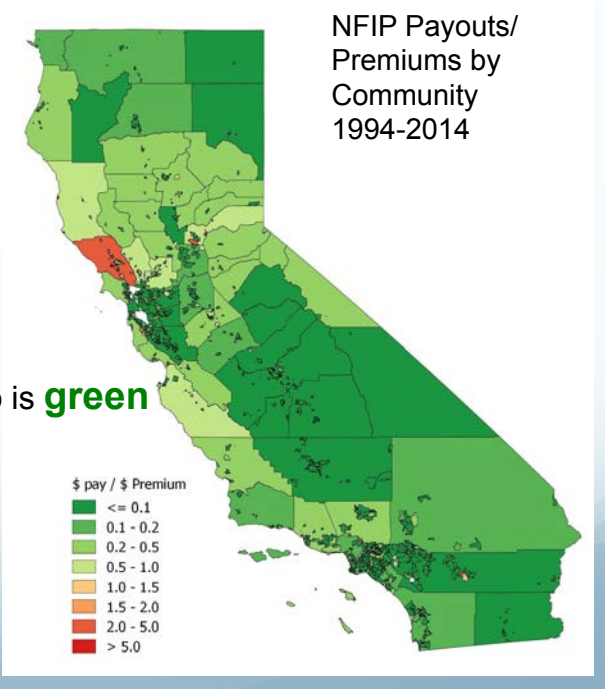
Payout Rates:

(cumulative $claims/$premiums)

- vary widely across California
- from <10%

  (even zero; to be discussed)
- to >500% (see map)

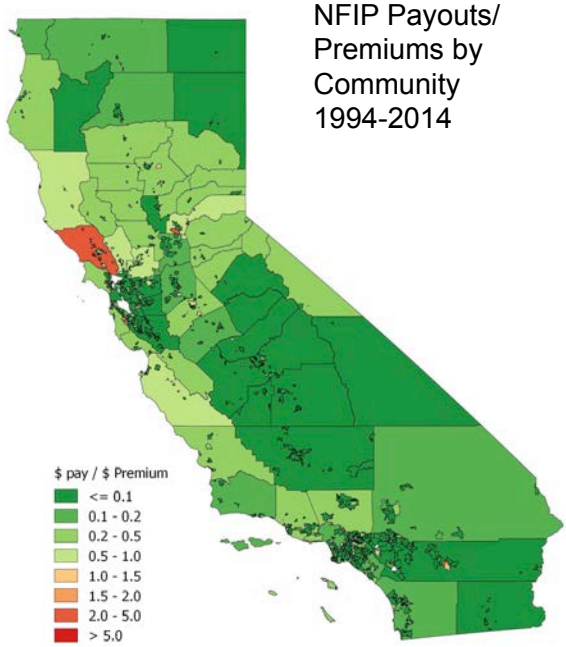
BUT ... large majority of the CA map is **green**



NFIP Payouts/ Premiums by Community 1994-2014

California and NFIP Payout Rates

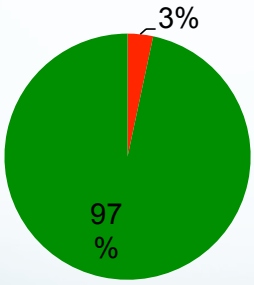
- **Since 1994, NFIP damage payouts in California total just 14% of premiums collected**
- **This imbalance exceeds $3 billion (2015 dollars) over 21 years.**
- **In the Central Valley, payouts have been just 9% of cumulative premiums.**



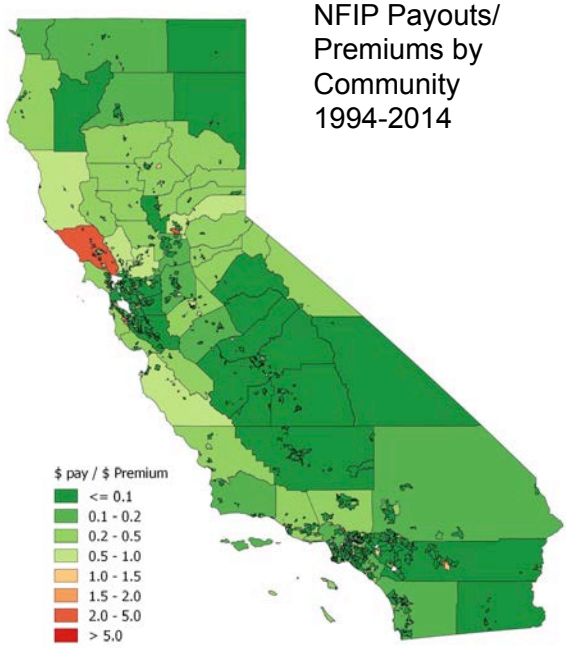
NFIP Payouts/ Premiums by Community 1994-2014

California and NFIP Payout Rates

- **97% of CA jurisdictions paid in cumulative premiums > claim payouts**



- **And 22% of CA jurisdictions had zero payouts in 21 years**

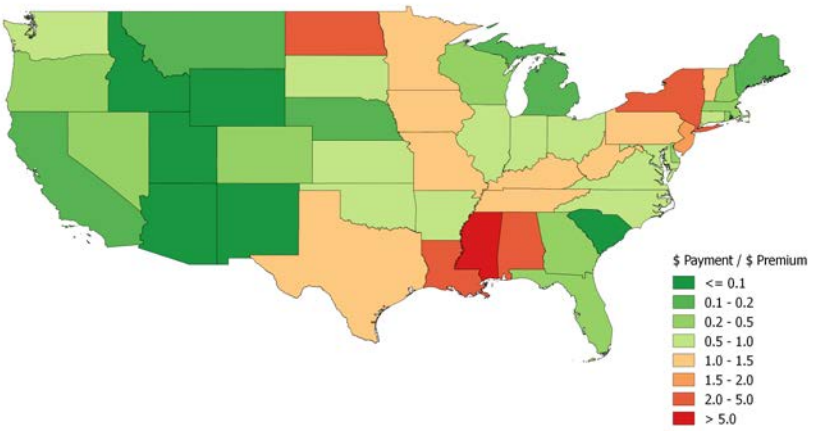


NFIP Payouts/ Premiums by Community 1994-2014

Nationwide Pattern

Largest net recipients (1994-2014)	payments/ premiums (%)
Mississippi	560%
Louisiana	382%
North Dakota	308%
New York	229%
Alabama	210%
New Jersey	173%
Iowa	144%
Tennessee	132%
Pennsylvania	127%
Minnesota	123%

Largest net payers (1994-2014)	payments/ premiums (%)
Wyoming	3%
Utah	4%
South Carolina	5%
Arizona	8%
Hawaii	8%
New Mexico	9%
Idaho	10%
Michigan	13%
California	14%
Nebraska	15%



BUT ... this begs the BIG QUESTION

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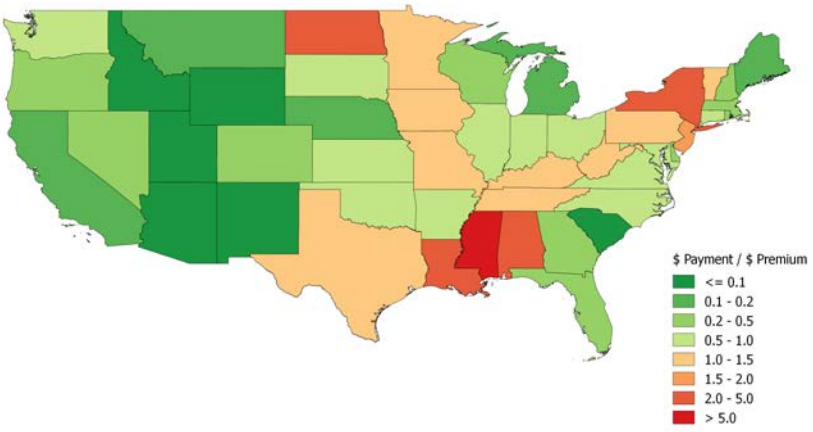
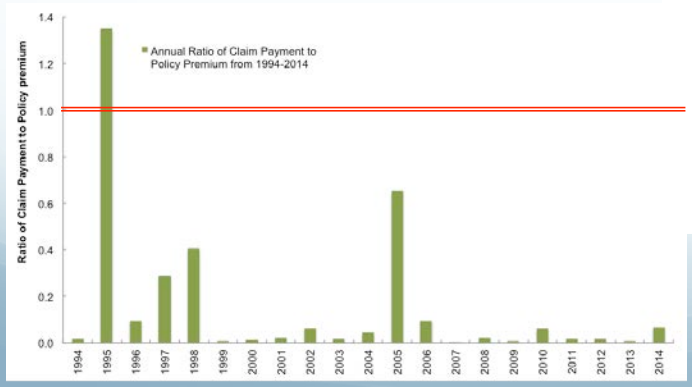
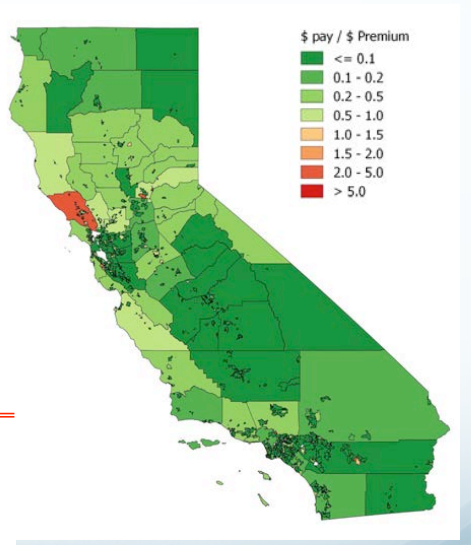


In the case of California

- The study period (1994-2015) included the three most damaging flood years in CA NFIP history
- In only one year (1995) did CA payouts>premiums
- And then only slightly (~135% of prem.)





Nationwide, with largest loss year removed from analysis

Largest net recipients (1994-2014)	payments/ premiums (%)	Rank with largest claims year removed (of 51)
Mississippi	560%	7
Louisiana	382%	12
North Dakota	308%	1
New York	229%	16
Alabama	210%	2
New Jersey	173%	15
Iowa	144%	14
Tennessee	132%	19
Pennsylvania	127%	3
Minnesota	123%	10

Largest net recipients (1994-2014; w/ largest claim year removed)	payments/ premiums (%)
North Dakota	188.82%
Alabama	136.26%
Pennsylvania	98.09%
West Virginia	77.16%
Missouri	72.76%
Texas	69.18%
Mississippi	66.88%
North Carolina	66.43%
Kentucky	65.63%
Minnesota	59.57%

Nationwide, with largest loss year removed from analysis

List and rankings of net NFIP payers changes little:

Largest net payers (1994-2014)	payments/ premiums (%)	Rank with largest claims year removed
Wyoming	3%	51 (1st)
Utah	4%	49 (3rd)
South Carolina	5%	50 (2nd)
Arizona	8%	45 (7th)
Hawaii	8%	46 (6th)
New Mexico	9%	47 (5th)
Idaho	10%	44 (8th)
Michigan	13%	41 (11th)
Californa	14%	43 (9th)
Nebraska	15%	42 (10th)

Largest net payers (1994-2014)	payments — premiums ($)	Rank with largest claims year removed
Florida	-$12,949,498,753	51 (1st)
California	-$3,302,518,547	50 (2nd)
South Carolina	-$1,776,464,934	48 (4th)
Massachusetts	-$736,112,961	44 (8th)
Georgia	-$591,866,481	43 (9th)
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Arizona	-$352,418,445	36 (16th)
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If not just lucky ... WHY is California a persistent net payer into NFIP

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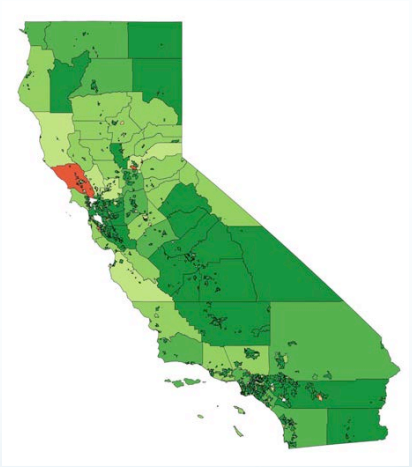

Has CA flood risk been:

- Overestimated?
- More successfully managed and mitigated?
- Other reasons? – *more analysis and research needed*

Recommendations

- The **NFIP is a "thin line in the sand"** -- imperfect, but the best framework we currently have for managing US flood losses

  "Headline" challenges:

  - Repetitive losses
  - Insurance penetration
  - Levees risk reduction
  - Levees & residual risk
  - Out-of-date and inaccurate mapping and risk estimation
  - Spread of risk vs. transfer of risk
  - Efficiency – e.g., excessive private fees
  - Equity – affordability and social justice
  - etc.

Recommendations

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- Heading into 2017 Congressional NFIP reauthorization -- we endorse the ASFPM agenda, particularly its goal to "subsidize **mitigation**, not insurance"

- **Repetitive losses** are a persistent drain on the NFIP. We endorse the NRDC initiative to wind-down repetitive losses, linking insurance affordability to binding mitigation

- We recommend that **California research and pursue a State Flood Insurance Program**, with savings invested in long-term risk reduction.

Recommendations

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Key Considerations for a State Flood Insurance Program

Dr. Howard Kunreuther has provided guidance on implementing any insurance program

Insurance and Behavioral Economics

by

Howard C. Kunreuther, Mark V. Pauly, Sacey McMorrow

Guidance from
Insurance and Behavioral Economics
by
Howard C. Kunreuther, Mark V. Pauly, Sacey McMorrow

- Any insurance scheme would need to address the issues of *efficiency* and *equity.*
- Efficiency - maximize the total net benefit. (benefits minus costs)
- Equity - ensure that goods and resources are distributed fairly.
    - Ensure those who benefit pay and those who do not benefit do not pay.
    - *Insurance stamps* might be issued to low-income families to help pay premiums.

Guidance from
Insurance and Behavioral Economics
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Howard C. Kunreuther, Mark V. Pauly, Sacey McMorrow

"If insurance is to play a central role in implementing risk management strategies for the public sector, an ideal arrangement would be one in which everyone subject to losses is personally responsible for the financial consequences of the disasters and so bears the costs and benefits of any risk-reducing measures or activities."

Information Design Principles

- Make Accurate Risk Assessments Available to Everyone
- Identify and Address Interdependencies
- Detect and Adjust Strategies for Behavioral Biases and Heuristics

Contract Design Principle

- Premiums Should Reflect Risk
- Define Equity across Buyers and Sellers and Apply it Consistently.

Regulatory Principles

- Avoid Premium Averaging
- Do Not Mandate Insurance Benefits Not Worth Their Cost
- Examine Impacts of Crowding-out Effects on Behavior

Next Steps

- CA should partner with private insurers and reinsurers, but move expeditiously, with an eye to looming changes in federal policy and rapid shifts in private flood-insurance market development
- **Important analytical questions** need to be answered, with input from
  - CA flood stakeholders
  - State water and flood and insurance agencies (e.g., DWR, CalOES, CA Dept. of Insurance)
  - Flood-risk researchers and modelers
  - Private insurance industry and finance community

(We think UC Davis is in a position to organize such a study)