Working Draft White Paper on Community Based Flood Insurance Opportunities in California

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1 Implementation of the National Flood Insurance Program is problematic for the Delta Legacy Communities

The Delta Legacy Communities are under-insured, both individually and collectively. The levees protecting the Legacy Communities are considered fragile relative to current FEMA 100-yr accreditation standards. If a levee were to fail, it could easily inundate whole communities to depths as high as 15 feet. Yet, less than half of the Delta Legacy Community residences have flood insurance. If they do have a National Flood Insurance Program (NFIP) insurance policy, it does not cover such things as the full replacement value, living expenses while the home is being rebuilt, or septic system repair. The existing NFIP policies for single-family residential structures are typically limited to a total loss value of $350,000, with a maximum of $250,000 for structure damage/replacement and a maximum of $100,000 for structure contents.

The insurance gap is widening. The first Flood Insurance Rate Map (FIRM) for Sacramento County was issued in March 1979. Owners of single-family residences built before 1979 have enjoyed a subsidized flood insurance rate, known as a pre-FIRM rate. In 2012, NFIP reforms removed this subsidy for many homeowners and set into motion significant rate increases. In 2014, after a backlash from homeowners who saw rates increase by as much as 25%, Congress passed the Homeowner's Flood Insurance Affordability Act of 2014 (HFIAA). Under HFIAA, rates will continue to increase but at a slower rate. The **Error! Reference source not found.** below, created from FEMA open-source data, shows that as the price of insurance increases, the number of policyholders decrease — widening the insurance gap.

The current NFIP pricing structure results in some homeowners paying too much and others paying too little. In 2019, the lowest annual flood insurance premium for residential structures in the Delta Legacy Communities was $237, the largest premium was $6,447. Thus, homes with similar risks pay drastically different amounts. Risk Rating 2.0 dubbed "Equity in Acton" seeks to fix this inequity. Unfortunately, the weight of the national bureaucracy, the inability of FEMA to modify existing regulations, and the inability of Congress to enact meaningful reform prevents Risk Rating 2.0 from living up to its full potential. The NFIP will always be hard to change due in part to the sheer magnitude of the program. With are more than $5.1 million NFIP policies in force, providing $1.25 trillion of content and building coverage, the NFIP is the largest single line insurance carrier in the world (Maurstad, 2027). Virtually every community in the U.S. has adopted some form of NFIP regulation.

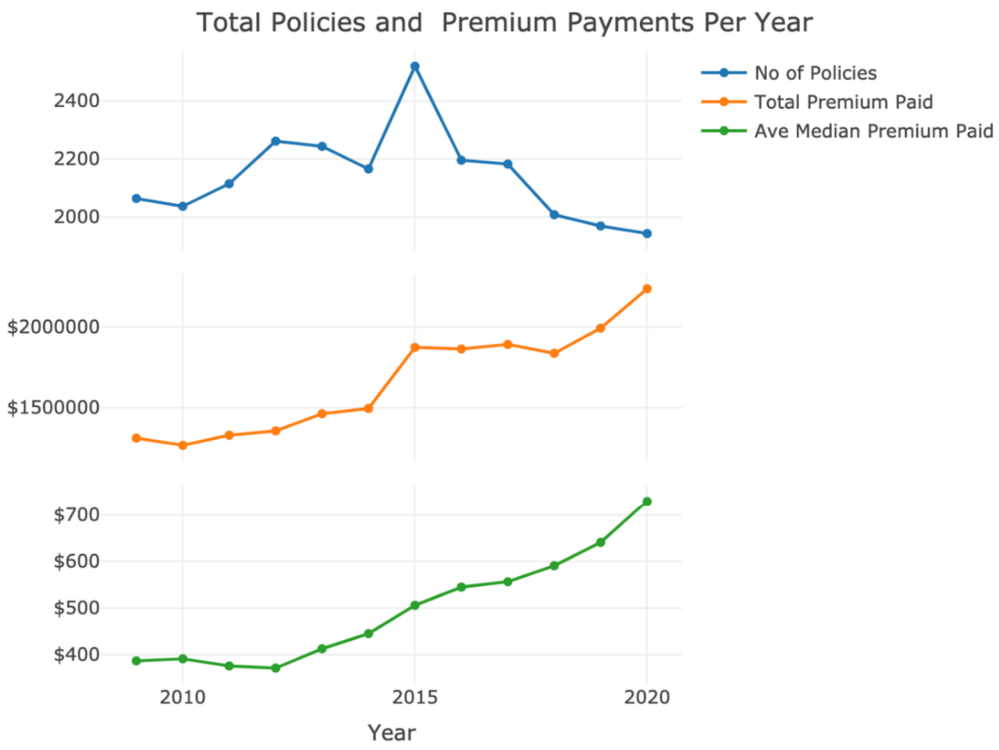


Figure 1: NFIP Number Policy and Premium Rates. Source: NFIP Open Source Data.

The NFIP pricing structure also adversely impacts low-income rental properties that are not owner-occupied . Roughly half of all policies written within the Delta Legacy Communities are for rental properties. When these policyholders renewed their policies in 2020, they saw an average premium increase of about 24 percent, which is inevitably passed along to the renter occupants. Conversely, many rental properties in the Delta Legacy Communities do not have a mortgage and do not have NFIP coverage. NFIP does provide coverage for renters' contents, but it is not strongly promoted and few renters choose to purchase it.

For 50 years, the NFIP has been the primary provider of flood insurance. However, due to a number of recent regulatory changes, this is changing. In 2018, it was estimated that about 3.5 to 4.5% of all primary residential flood policies issued nationwide were private flood insurance policies (Kousky et al., 2018). In 2016, data reported by Wholesale & Specialty Insurance Association (WSIA) estimated there were 4,265 private flood policies issued in California (WSIA, 2017). In 2017, that number had almost doubled, increasing to 7,411. By 2019, WSIA reported that there were 10,651 policies and $7,962,163 in premiums (WSIA, 2019). A 2019 white paper by Milliman (Rollins, 2019), suggests that the private market for flood insurance in California is between *$1 billion and $5 billion*. A 2019 market survey by WSIA found that the average 2018 private insurance premium per primary residential policy in the state of California was $748 (WSIA, 2019).

In addition to the regulatory changes, there are a number of reasons for the increase in private flood insurance programs. Significantly, global re-insurers are gaining familiarity with flood catastrophe models (Kousky et al., 2018). Their interest is fueled by the NFIP's relatively recent purchases of reinsurance. In 2021, the NFIP transferred $1.153 billion in risk to 32

private reinsurance companies. Combined with the three capital markets reinsurance placements from 2018 to 2020, FEMA has transferred $2.35 billion of the NFIP's flood risk to the private sector.

FEMA's new rating program, Risk Rating 2.0, which will be introduced in October 2021, builds on the experience gained from contracting with the reinsurance markets. Risk Rating 2.0 fundamentally changes the way that FEMA prices NFIP policies. It is the first major change in how it prices policies since the program was enacted in 1968. NFIP policies will no longer be priced based on the "in-out" Flood Insurance Rate Maps (FIRMs). Additionally, the pre- and post-FIRM subsidies will be phased out. Policies will instead be priced based on the location specific estimated flood risk. The location-specific flood risk will be determined by an ensemble of catastrophe models along with other factors such as the location near the potential flooding source, a river, stream, lake, and/or coastal proximity. For the first time, this will provide private firms with a benchmark to which they can measure their risk pricing. Solution: Community Based Flood Insurance

1.1 What is Community Based Flood Insurance?

Community Based Insurance has the potential to serve the community better than either the NFIP or private flood insurance. Community based flood insurance (CBI) is a single policy, purchased by a local governmental or quasi-governmental body, which covers a group of designated properties (Kousky and Shabman, 2015). It simplifies the process of setting the premium, which greatly reduces the cost of settling claims and provides administrative savings that can then be shared with property owners and/or used to fund flood risk reduction mitigation measures. It provides an opportunity to manage the flood risk collaboratively, which reduces uncertainty. Uncertainty pricing is one of the biggest components of premium pricing.

The increase in interest in private flood insurance brings with it an increased interest in CBI. The idea of CBI has been around for a long time, but until now technological, regulatory, governmental and administrative challenges have prevented it from being implemented. As noted, many of these potential obstacles have been overcome or changed, and today there is growing interest. The concept of CBI is a building block in *The Congressional Action Platform for a Clean Energy Economy and a Healthy, Resilient, and Just America* (Castor, 2020). Support for community based flood insurance is included within the draft language for the reauthorization of the National Flood Insurance Program. The legislation, if passed, would call for FEMA to initiate a pilot within 180 days of passage of the bill.

CBI is part of a broader Community Based Disaster Risk Management (CBDRM) approach to disaster risk management. CBDRM is an approach that supports local grassroots community disaster risk management. It is an approach strived for in FEMA's Whole Community philosophy (Agency, 2011) . It is widely promoted by countries that share the same low-income challenges as residents within the Delta Legacy Communities (Paripurno and Jannah, 2011) (Mysiak et al., 2016).

In this approach, the community plays an active role in the self-interpretation of hazards and disaster risk, and in the reduction, monitoring, and evaluation of their own performance in disaster risk reduction. Key to the successful implementation of a CBDRM program is the optimal mobilization of resources that the community has and has control over (Paripurno and

Jannah, 2011). Which is why the idea of CBI is attractive. It gives the community ownership of their flood risk; and, importantly, the assets that come with it. The community ceases to be viewed as hapless victims and are instead viewed as empowered citizens.

A CBI program presents an opportunity to align public agency staff, engineers, and private insurance around a unified goal of managing flood risk—providing the opportunity to both reduce flood insurance and fund mitigation measures (Kousky and Shabman, 2015). CBI is a risk transfer program developed in collaboration between engineers, insurance professionals, investors, and media professionals. It has the potential to:

- Allow insurance companies to take advantage of the detailed flood risk information developed by engineers, thus reducing costs;
- Compile detailed risk information for the graduated pricing of risk;
- Provide the specific form of coverage desired by the citizens;
- Implement quantifiable mitigation measures;
- Permit the community to accept some degree of risk, passing the savings on to their citizens;
- Roll program savings into mitigation measures or provide the local cash match for grant funding;
- Support an open and informed decision-making process;
- Reduce uncertainties associated with risk, which is one of the largest components of the risk premium; and
- Reduce longstanding environmental justice inequities.

1.2 What is a GHAD?

California has a unique government entity called Geologic Hazard Abatement Districts (GHAD), which are uniquely poised to fill the role of a CBI provider. A GHAD is a public agency formed by a community to provide a management structure and funding source to protect the community from landslides, erosion, liquefaction, flooding and other similar geologic hazards. GHADs are state-level agencies with powers to provide prevention, rapid response, and funding to address hazardous geologic conditions. Although formed by a local agency, a GHAD is a political subdivision of the State and is not an agent or instrument of a local agency. They were established by the California Legislature to allow local communities to develop a self-funding mechanism to mitigate the damaging effects of large-scale hazards such as landslides, earth movement, erosion and other similar hazards.

GHADs were created in California in 1979 by the Beverly Act to enable local residents to collectively mitigate geological hazards which pose a threat to their properties and their associated improvements. Statutes pertaining to GHADs are presented in California Public Resources Code Division 17. GHADs are designed to handle long-term abatement and maintenance of real property potentially threatened by geologic hazards.

GHADs have been granted similar authority as other local agencies, including:

- Taxing and/or assessment ability;
- Bonding ability;

- Certain legal immunity;
- Can sue and/or be sued;
- May exercise eminent domain.

A GHAD is intended to address the prevention, mitigation, abatement, and control of geologic hazards on designated land within its boundaries. Further, as a prudent landowner, a GHAD is able to acquire, construct, operate, manage, or maintain improvements on any land it specifically owns. There are no limits or requirements pertaining to size, number of units, or contiguous boundaries (i.e., a GHAD may contain numerous non-contiguous parcels, and may be developed for one or a handful of separate Delta Legacy Communities).

1.3 Why is a GHAD an attractive partner for insurers?

There are several features of a GHAD that makes it an attractive partner for insurers. First, unlike other government entities, such as city councils or flood control districts, the single focus of the GHAD is to mitigate the damaging effects of natural hazards. The GHAD boundaries are flexible and do not need to be contiguous. Depending on the desire of the community, the boundaries can be drawn to spread the risk widely, in such a way that only those property owners most concerned about their flood risk participate or in such a way as to exclude economically uninsurable risk areas. The board of the GHAD can be comprised of property owners who are concerned about their risk and seek to take proactive measures as opposed to city council members who may have other priorities. From the insurers perspective, it provides a single point of contact for the purchase of policies and administration of claims. The aggregation of the risk reduces the uncertainty associated with individual policies. Uncertainty is a key component in insurance pricing. Lastly, it provides a government structure that supports a partnership between the insurer and the community around a common goal of reducing flood risk.

Significantly, GHAD implementation may reduce the volatility associated with types of policies. The premium would be paid from property tax revenue guaranteed by the county in which the GHAD was formed. Because the premiums would come from ongoing tax revenue, the aggregated risk would be spread across time. Thus, a large loss early in the program would be recouped over time. Additionally, GHAD could self-insure certain layers of risk, minimizing both the moral hazard and the volatility associated with an aggregated loss. The GHAD could also receive state and federal grant funding to support ongoing, community-specific, structural-based flood management actions (including but not limited to levee repairs/improvements) and non-structural measures that could include flood-fight berms, ring levee systems, and enhanced community-specific flood emergency response programs.

1.4 How might a GHAD based flood insurance program work?

1.5 How might a GHAD based flood insurance program work?

It is envisioned that flood insurance would be provided by the GHAD in a three tiered program. Tier one - the Good Samaritan Tier would provide of a modest amount of recovery cash immediately after the disaster to everyone in the community. Tier 2 — the Insurance Tier would

provide a base level of insurance to everyone who sought to purchase it. Tier 3 — the Concierge Tier would consist of a policy providing other coverages as the community requested.

The GHAD would purchase a single policy and distribute it to the community.

The GHAD would be the policy holder and issue certificates to individual parcels.

1.5.1 Tier 1 - The Good Samaritan Tier

Tier 1 is intended to provide a small amount of immediate *ex ante* funds (as much as $10,000) to everpolicy holder who experiences a flood loss. The reason for this tier is four-fold.

This tier recognizes that low income households become even more vulnerable during and after disasters. A 2018 study conducted by FEMA's Individual and Community Preparedness Division found most respondents said they would not have enough money to cover a $500 emergency expense (NAC, 2019). When families lack savings or property insurance, there is no mechanism to fill the financial gap after a flood. A U.S. Department of Housing and Urban Development (HUD) study found that households with flood insurance were 37% more likely to have rebuilt after Hurricane Katrina. For this reason, flood insurance plays an important role in post flood disaster recovery. The immediate *ex ante* flood recovery funds could be utilized by the policy holders to cover temporary re-location living expenses or pay for immediate remediation repairs over and above the structure damage or content damage claims that are paid with a conventional NFIP policy.

This tier also recognizes that people have different perceptions of risk and different resources to purchase flood insurance. Many people are risk seeking and will not purchase flood insurance for any reason. Many people may not know that they have a flood risk, and if they do, they may be overwhelmed by other activities that drive them to "back burner" the purchase of flood insurance.

The NFIP currently provides a 40?

Lastly, this tier provides an incentive for the community to manage the more frequent smaller flood events.

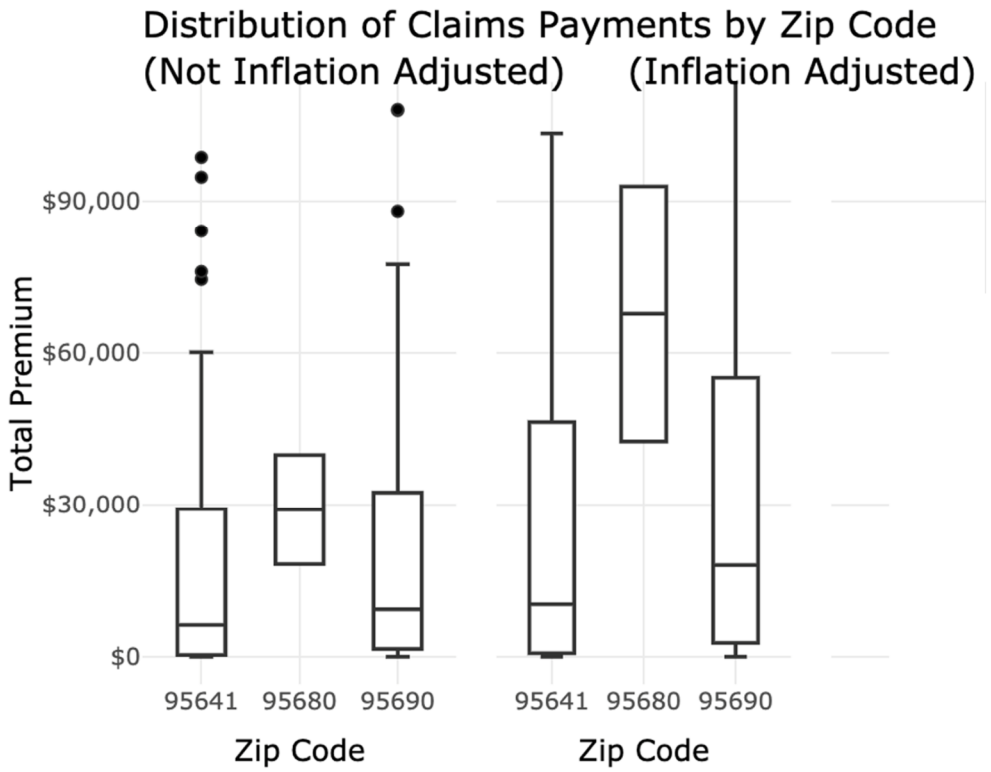
Tier 2 - The Insurance Tier

A study examining flood insurance claims in the US by Kousky and Michel-Kerjan

(Kousky and Michel-Kerjan, 2017) finds that there are a number of factors that go into a household's decision to purchase flood insurance. They find that most homeowners want to see some return on their premium payment and they want to collect as much as possible on their policy should they suffer a loss. In other words, they do not want to pay for a $250,000 policy if the most they will ever collect is $100,000. Research also suggests that most people disregard the possibility of a catastrophe. They suggest that a policy low deductible low-low loss level policy would be attractive.

The global insurance firm has expressed interest in providing a flood insurance policy that would provide $100,000 in building coverage and $20,000 in contents coverage with a $10,000

deductible for around $500. As shown in the figure below, this amount of coverage would pay 85% of all claims paid within the Delta Legacy Communities by the NFIP since 1977.



1.5.2 Tier 3 - High Risk Tier

The same study of claims in the US mentioned earlier by Kousky, and Michel-Kerjan

(Kousky and Michel-Kerjan, 2017) suggests that coverage for the rare or insurance terms --tail losses only would be attractive. Some individuals might prefer to self-insurance for the more frequent and modest losses but purchase a policy to cover catastrophic damage. Such a “tail insurance policy” would be cheaper than a more comprehensive coverage and thus, it is likely to be much more affordable.

Another reason for breaking out the policies into low, medium, and high tiers is that it allows the high tier to be managed separately. Rare, large events are simultaneously more difficult to evaluate statistically and may result in aggregated claims that threaten the solvency of any program. We see this with Hurricane Katrina. The sum of all insurance claims paid out by the NFIP was more significant than the same of all payments made by the program before 2005 (Kousky and Michel-Kerjan, 2017). The issue of how to pay off this debt is an issue of contention almost twenty years later.

This level of loss might be financed with a security such as a catastrophe bond. However, unlike the federal government, private reinsurers pay a cost for this capital. Alternatively, a state or local entity would need to pay a cost for capital, however, they enjoy the benefits of a tax-

exempt status that makes lending more attractive. Thus, they may be in a better position to accept this layer of risk.

1.6 How would claims be handled?

It is envisioned that the Tier 1 payments and potentially the Tier 2 would be handled as a parametric insurance policy. Traditional insurance is indemnity based. Coverage is based on the policy terms and conditions such as deductibles, exclusions, limits and sub-limits. Claims are paid when losses exceed the retention held by the insured. In contrast, parametric insurance losses are covered by predefined payments made when a predefined trigger is established. Parametric insurance is increasingly viewed as a viable alternative to traditional claims-based insurance. Many industries such as manufacturing, hotel/hospitality, real estate, construction projects, public entities, energy, and utilities purchase parametric insurance. After the 2017 hurricane season industry reported a massive rise in parametric hurricane inquiries (https://riskandinsurance.com/8-questions-for-robert-nusslein/). There is interest in parametric insurance for things beyond weather such as reduced tax revenue for a municipality operating a port that has reduced cargo traffic.

1.6.1 What are the characteristics of parametric insurance?

Unlike a traditional NFIP flood insurance program, parametric insurance pays a predetermined amount when an event exceeds a pre-determined index (trigger). An index is a objective measure (e.g. rainfall, river gage height, wind speed) that is highly correlated to the variable of interest (e.g. flood depth, flood loss). In the case of the Delta Legacy Communities, the triggering event could be a levee failure, the water surface elevation in the Lower Sacramento River at specific locations exceeding a predetermined Flood Warning or Flood Stage height, or an Atmospheric River event of a certain magnitude. An index must have the following properties:

- observable and easily measured.
- objective
- independently verifiable
- transparent
- reported in a timely manner
- consistent over time
- experienced over a wide area.

Challenges with implementing a parametric insurance program center around agreeing on the payout and on the triggering event and addressing basis risk. Basis risk is the difference between an insured's policies and the parametric insurance recovery. Basis risk is present in traditional insurance policies as well in the form of deductibles or retentions, exclusions, sub-limits and unresponsive cover, such as business interruption losses must result from physical damage to insured assets not just from the event. Third generation parametric structures allows for more flexibility by creating "either/or" triggers - a design driven by the convergence of multiple factors.

1.6.2 What are the benefits of parametric insurance?

The most significant and impactful benefit is the speed of the payment. With a parametric insurance program, payments can be made almost immediately. Increasingly advances in technologies such a block chain hold the potential to provide an almost instantaneous transfer of funds. The financial liquidity available from a parametric insurance policy can reduce some of the indirect effects of damage, such as human suffering, loss of livelihoods. Prompt payouts facilitate more rapid reconstruction. Actions that help communities and households recover more quickly, reduce the long-term consequences that accompany disasters.

Parametric insurance can also be used to fill in coverage gaps left by traditional policies. For example, parametric insurance can provide business interruption insurance even though the business is not directly impacted by the event. Further, payouts can be applied however the insured chooses, covering direct and indirect loss and any expenses associated with the event. In the case of the Delta Legacy Communities, a parametric policy could be purchased to cover flood fight activities.

Another benefit is that payments are known in advance.

The standard NFIP policy excludes coverage for mold damage due to the policy holder's failure to inspect and maintain property after flood waters recede. Because a parametric policy does not require damage inspectors, the prompt payments provide funding for the immediate mitigation of mold.

While the NFIP provides coverage for the clean up of pollutants, it does not provide coverage for testing or monitoring. This is something that could be economically conducted by the community or GHAD.

1.6.3 What would be the typical annual insurance premium(s) for a three-tiered CBI policy for single-family residences in a Delta Legacy Community?

Acknowledging that the Tier 1 and Tier 2 premiums and payments would likely be handled as a parametric insurance policy, and the High-Risk Tier 3 would be more optional to provide for additional catastrophic losses the following range of premiums are anticipated for each of the three Tiers.

Tier 1 – The Good Samaritan Tier

Tier 1 would be the minimum coverage that would be provided to all homeowners/renters living within the GHAD, preferably the entire populated center of the Delta Legacy Community. The policy holders of this tier would be entitled to a claim of up to $10,000 to use at their own discretion anytime the Sacramento River (and/or other distributary sloughs) reached flood stage at a pre-determination level; and/or there were evacuation measures or flood-fight activities occurring within the larger Reclamation District(s) where the Delta Legacy Community resides.

This premium amount would not include an added benefit assessment amount that is envisioned to accrue local cost-share amounts and long-term financing for flood community-specific risk

reduction structural-based management actions coupled with non-structural measures that may be identified in the Delta Legacy Community SCFRRP feasibility studies completed in 2021.

This tier would likely need to be funded from sources outside of the Legacy Communities. It would recognize that the low-income residents within the Legacy Communities are already overburdened by other costs. The payment for this tier might come from the State or County General Fund. It might also come from FEMA. This payment is similar to that provided by the FEMA Individual Assistance program. Unfortunately, payments from the FEMA IA program are seldom asked for in California and often take months to receive. The FEMA IA program could be a source of funding, but it would require a change to the Safford Act. This tier would also recognize that over the years the County has invested in 100-year protection for other parts of the County. Providing a parametric payment would compensate for the County's inability to provide 100-year protection to the residents within the Legacy Communities. Because it is unlikely that more than one community will fail at a time, the largest sum that the County would likely have to pay is about $2,500,000.

Tier 2 – The Insurance Tier

This Tier recognizes that households are unable or unwilling to spend much more than 1 percent of their income on flood insurance. This means that for flood insurance to be attractive, it must be offered in the $500 to $800 range. Conversations with international insurance firms suggest that a policy providing $100,000 building and $20,000 in contents coverage with a $10,000 deductible could be provided for $400 to $700. In this scenario, an additional $100 to $200 could be charged to each policy. This extra amount could be accumulated and would be a fungible source of funding to help pursue other larger grants.

In this scenario, everyone might be required to purchase flood insurance. Alternatively, those who chose not to buy flood insurance might be assessed a fee of $100 to $500. All fees would be subject to a Proposition 218 vote. Thus, an arrangement acceptable to a majority of the voters would need to be determined. Teasing out an arrangement that is not only acceptable, but that is supported by a majority of the voting residents will take a concerted effort. As finding an alternative to the NFIP is a goal specifically called for in both the 2020 Governor's Water Portfolio and in the 2017 Central Valley Flood Protection Plan, the County or the State might consider investing in outreach and surveys to determine the wishes of the community.

Tier 3 – High Risk Tier

Individuals who participate in a Health Maintenance Organization insurance plan are often provided the opportunity to pay extra to receive more specialized treatment. The term used to describe this extra insurance is "concierge insurance". Similarly, this tier would be a concierge insurance that would provide extra insurance above the basic plan. This level of insurance might provide for coverages that meet the $250,000 as might be required by lenders. It might also cover items not covered by NFIP policies such as housing relocation during reconstruction or debris removal. The cost of this additional tier would vary widely given the type of coverage provided. However, given the fact that the lower more frequent losses are covered in other tiers, it would not be unreasonable to assume that insurance in this tier might be obtained for around $1.50 per hundred dollars of insured value.

This tier might also be viewed as a catastrophe tier. In the past, through the Stafford Act, FEMA has provided Individual Assistance to homeowners and Public Assistance to communities. Recent increases in the minimum loss thresholds make it unlikely that FEMA assistance under the Stafford Act will be available to the Legacy Communities. Recognizing the impact of this change, the State may choose to fill the gap buy purchasing Catastrophe Insurance. This is an increasingly attractive option and is used by cities like New Orleans and New York City.

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Analysis of NFIP Claims and Policy Data for Sacramento County Legacy Communities

Kathleen Schaefer

April 1, 2021

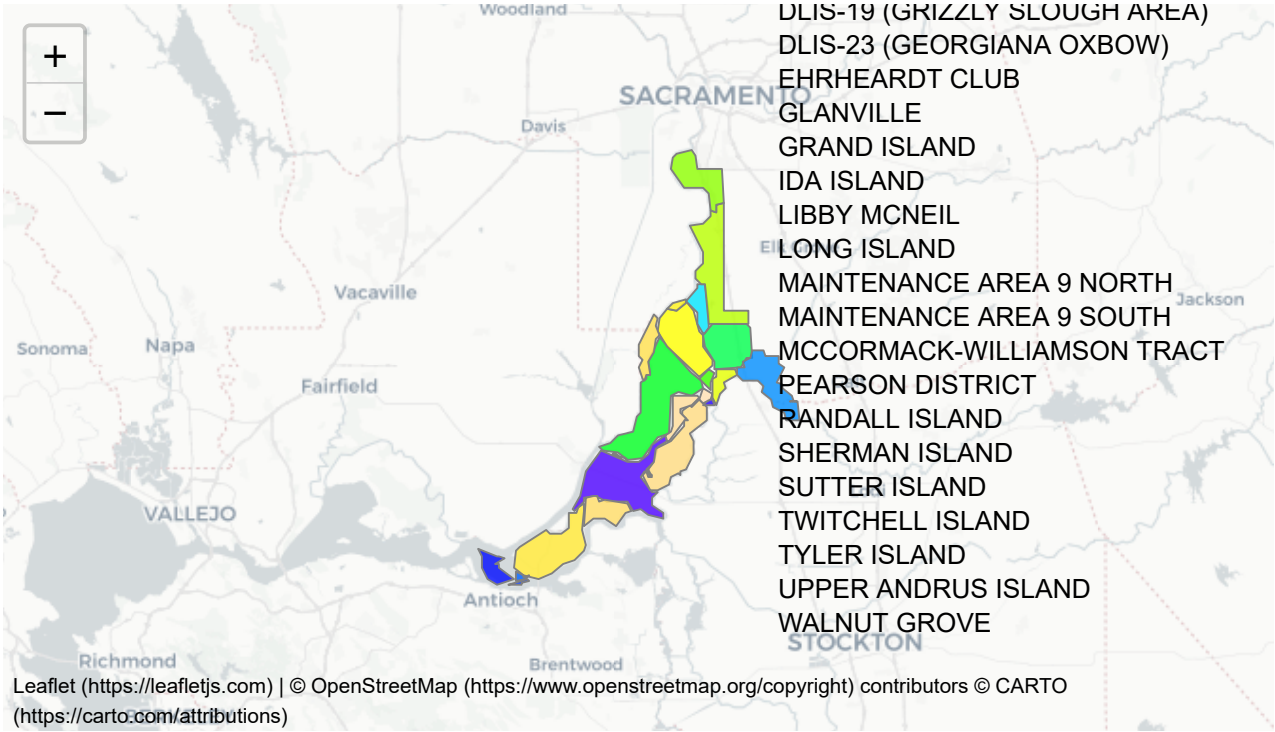
Purpose

The purpose of this file is to document the exploratory analysis of the opportunity for a CBI in the Delta Legacy Communities. It is to also present a cookbook of code and text for generating the analysis for the final report and for generating presenation material.

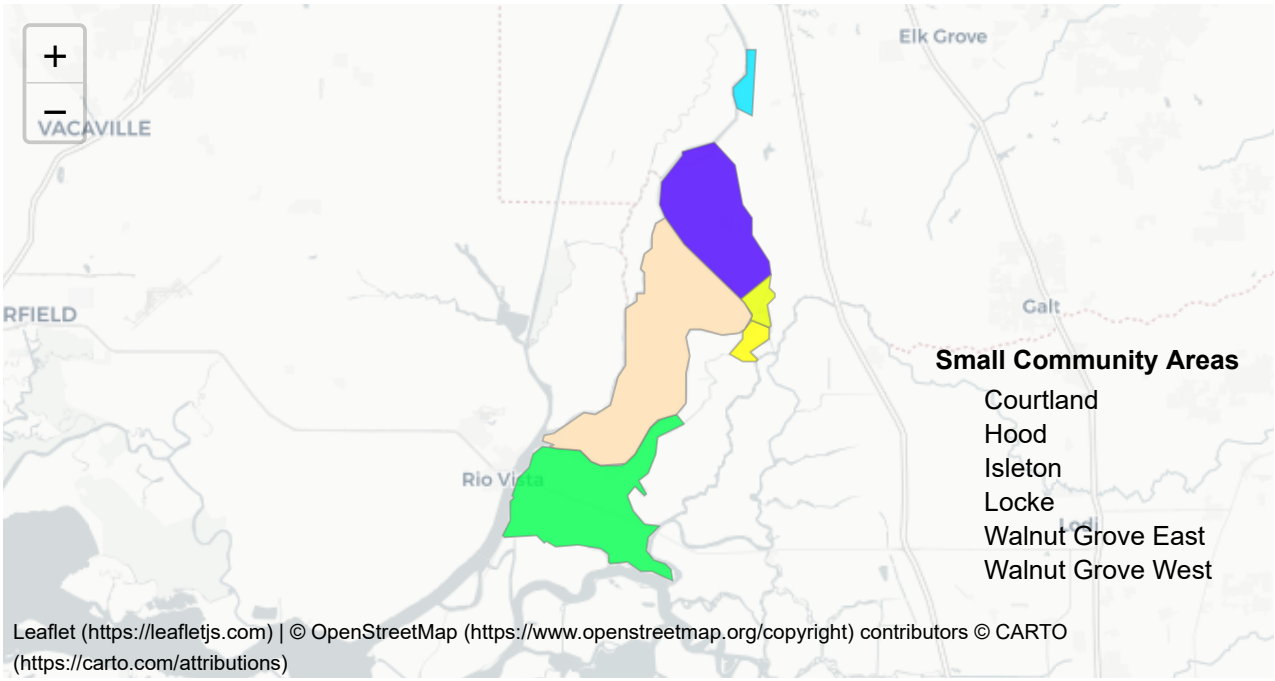
Introduction

The area of interest is located south of the City of Sacramento in the southern portion of the Sacramento County. It is a series of delta islands (polders) bounded on the west by the Sacramento River and on the south east by the Mokelumne River. The islands are shown in the figure below.

The Legacy Communities consist of the communities Hood, Locke, Cortland, Ryde and Walnut Grove. These communities are located in the unincorporated portion of Sacramento County. Isleton is an incorporated community. The Feasiblity Study information covers just the Legacy Communities. The policy and claims data analysis includes both the Legacy Communties and the City of Isleton. At this time, because of the challenges in coordinating two legislative bodies, Isleton is not included in the analysis for a Community Based Insurance. However, given the premum rates, that might change.



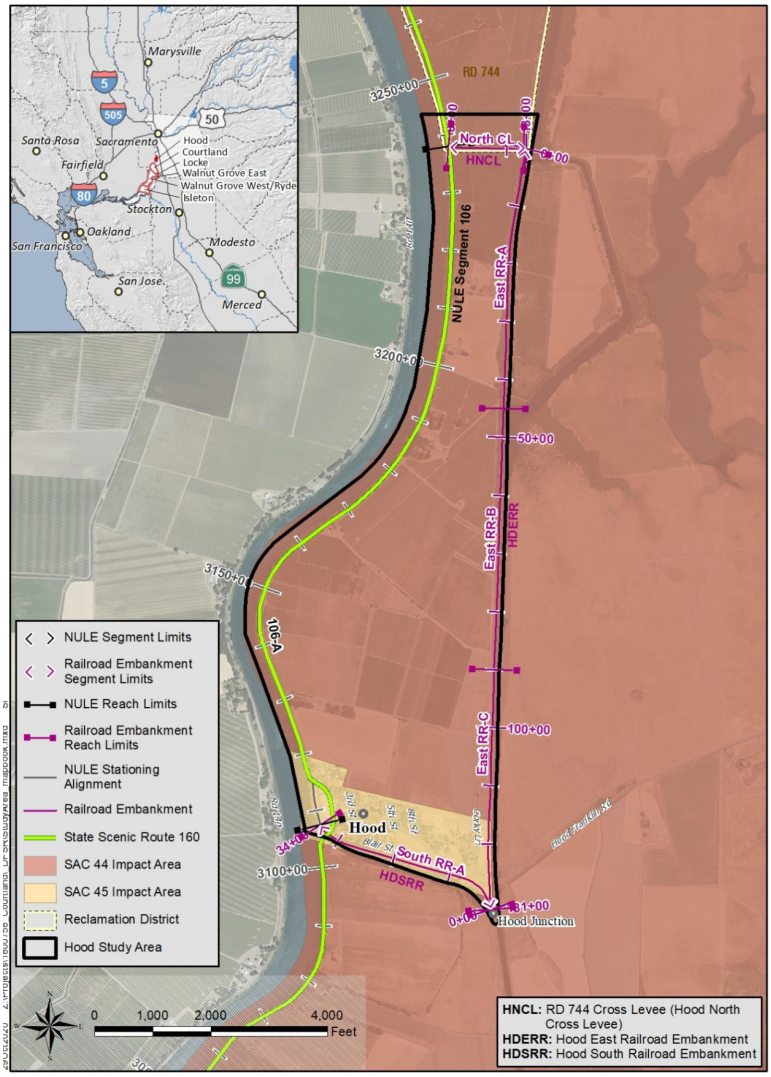
This study area is primarily an agricultural area with orchards and vineyards. There are six small “Legacy” communities within the area of interest: Courtland, Hood, Iselton, Locke, Walnut Grove and Ryde(not shown).



Physical Description

Hood

Hood The Legacy Community of Hood is located along the left bank of the Sacramento River approximately 16 miles downstream and southwest of downtown Sacramento along the Sacramento river. The community of Hood is bounded on the north by a 0.2 mile-long cross levee, which is formally known as the Reclamation District 744 cross levee. It is bounded on the west by Sacramento River levees maintained by DWR's Maintenance Area 9. Adjacent to the 2.5 miles of levees that protect the community of Hood to the south and east are approximately 3.1 miles of former railroad embankments that offer limited flood protection to Hood from the Morrison Creek watershed located to the east. None of the levees meet modern design standards and are thus uncertifiable.



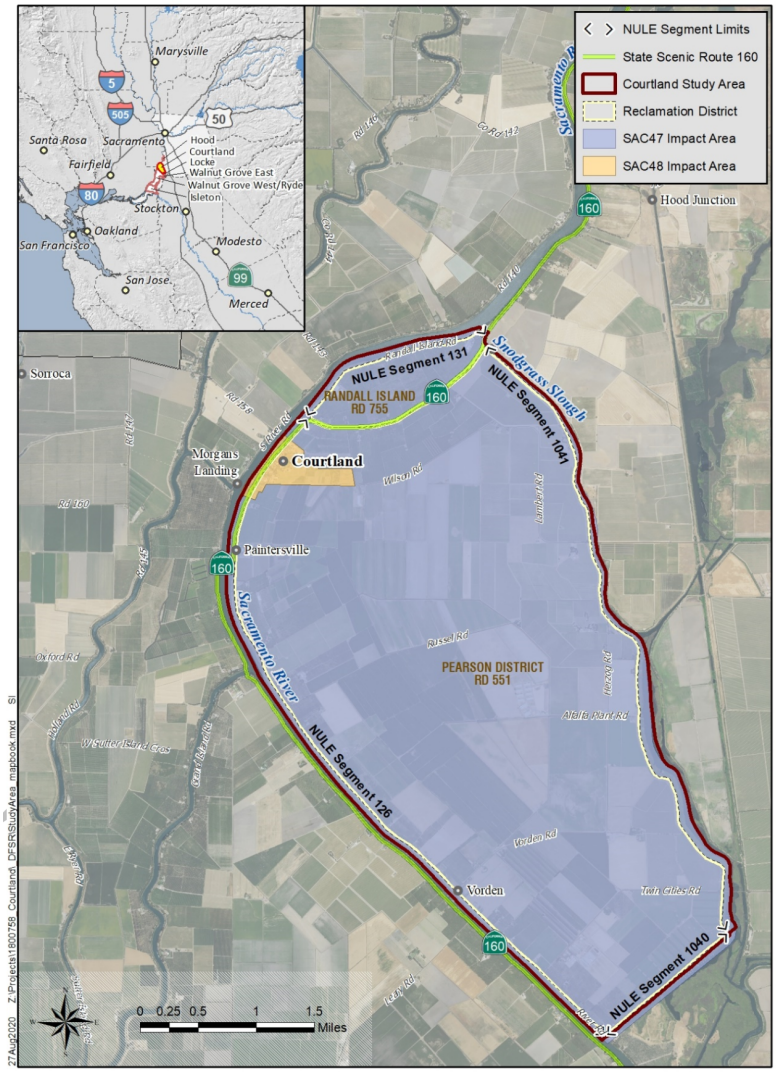
Vicinity Map of Hood

Courtland

The Legacy Community of Courtland is located along the left bank of the Sacramento River approximately 20 miles downstream and southwest of downtown Sacramento along the Sacramento River, approximately 4.1 miles downstream of Hood. It is located within the levee protected area known as Pearson District. The levees protecting the community of Courtland are maintained by Reclamation District 551 (RD 551). Levees upstream from the community on the adjacent tract of land known as Randall Island are maintained by RD 755. In total, the collective Courtland study area which comprises both Pearson District and Randall Island is protected by nearly 16 miles of levees which provide protection from flows in the Sacramento River to the north and to the west, Snodgrass Slough to the east, and Delta Meadows Slough to the south.

Courtland is located on the relative high ground next to the levee. The elevation of Courtland is between 8 and 12 feet North American Vertical Datum 1988 (NAVD 88).The top of the levee elevations vary from approximately 25 to 33 feet. Within the larger reclamation district area the land slopes toward the center where the elevation is 4 feet or more below sea level. The Sacramento River levees were originally constructed prior to 1906 using local dredge material. Over time these levees located along the left bank of the Sacramento River were improved. They are part of the State and federally authorized Sacramento River Flood Control Project (SRFCP) and were incorporated into the State Plan of Flood Control (SFPC). The levees were built on top of sandy soils and have the potential to fail due to underseepage and thorough seepage. For this reason, they are not accredited by FEMA. Achieving accreditation would entail constructing cut-off walls within the levee prism and/or wide seepage berms. These improvements are estimated to cost $15 million per mile. The

RD 551where Courtland is located is protected by levees from the Stone Lakes National Wildlife Refuge and Snodgrass Slough to the east and from the Cosumnes and Mokelumne River systems by the Delta Meadows Slough levees to the south.

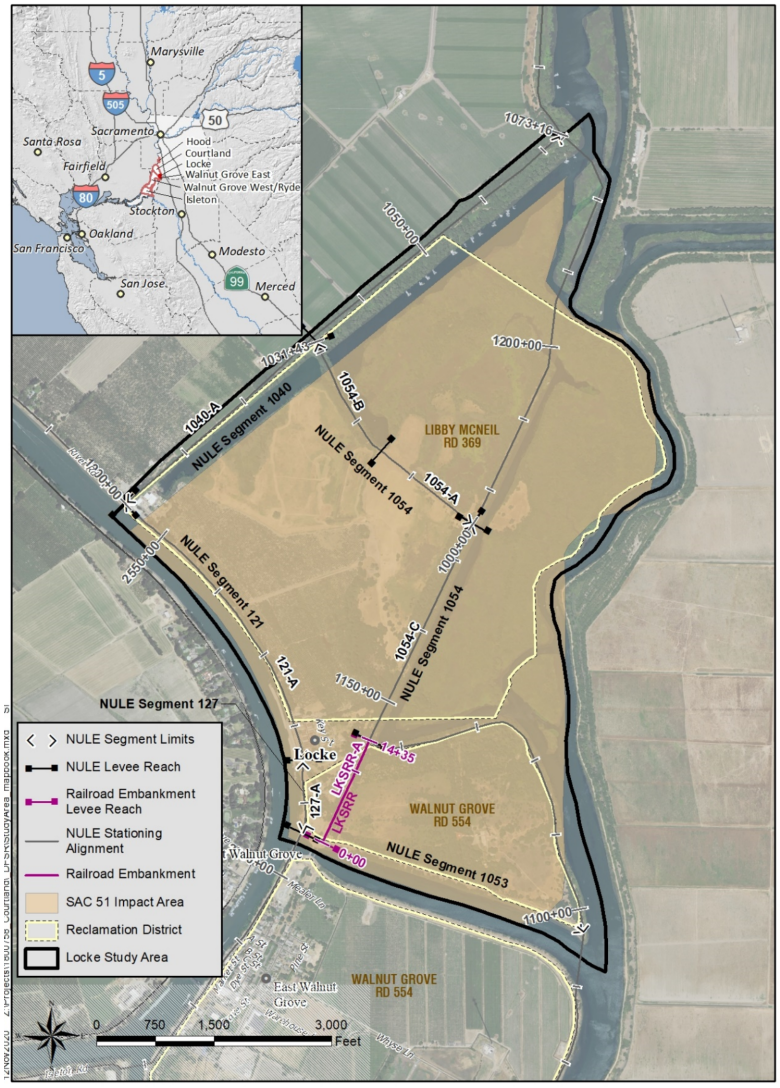


Vicinity Map of Courtland

Locke

The Community of Locke is located adjacent to the Sacramento River. It is located within the RD 369 or Libby McNeil Tract. RD 369 has a 4.5. It is bound on the south by Walnut Grove also known as RD 554. Levees bound both RD 369 and RD 554. Of these levees, 1.0 mile is in the State Plan of Flood Control system. The densely populated part of Locke encompasses approximately 10 acres and sits at an elevation of 9 to 10 feet. None of the levees meet FEMA accreditation. The ground elevation for the community of Locke is highest adjacent to the SPFC levee system along the left (east) bank of the Sacramento River (8 to 12 feet, NAVD 88). The ground elevations generally slope towards the east of RD 369, with elevations ranging from 2 to 4 feet, NAVD 88. The height of the levees range from 12 to 13 feet above the landside toe for the levee segment along the Sacramento River to as high as 27 feet for the segment along the Delta Meadows Slough.

The total population for the Locke and the adjacent agricultural area is 202 (DWR, 2017d). Income information for Locke separate and apart from the Walnut Grove census designated place (CDP) is not available; however, according to the 2016 and 2018 American Community Survey (ACS) the median household income for the Walnut Grove CDP, inclusive of East Walnut Grove and Locke, declined from $53,634 to $47,400 (United States Census Bureau, 2010). Locke may be considered a disadvantaged community as defined by the state of California. Sacramento County has designated Locke as a Special Planning Area (SPA). This subjects the community to special land use and planning requirements.



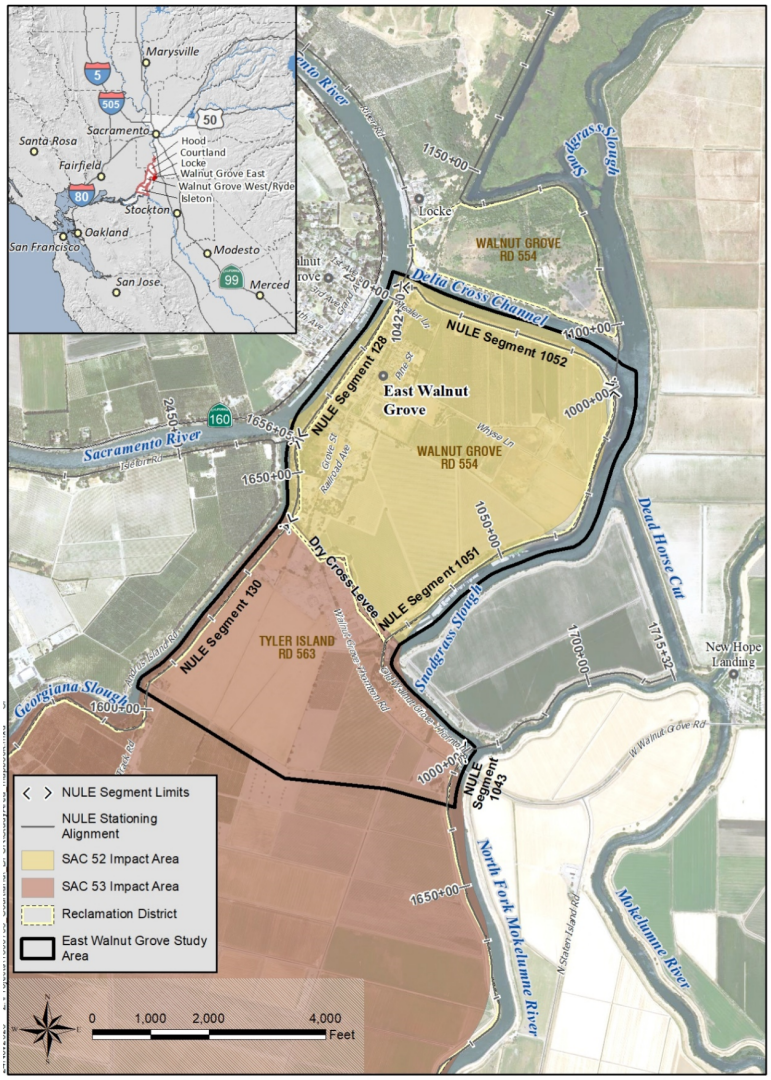
Vicinity Map of Locke

East Walnut Grove

Walnut Grove exists as one community on both sides of the Sacramento River. However because the levee systems are different they were separated into two communities in the most recent Draft Feasibility Study. East Walnut Gove is located along the east or left bank of the Sacramento River approximately 25 miles south of the Delta Cross Channel (DCC) and approximately 1.0 mile south of the community of Locke. The levees that protect East Walnut Grove are primarily maintained by Reclamation District (RD) 554. The levees protecting the industrial, southern portion of East Walnut Grove are located on the tract of land known as Tyler Island and are maintained by RD 563.

Walnut Grove is located within the larger agricultural area shared by RDs 554 and 563. RD 554 encompasses the tract of land known as Walnut Grove south of the Delta Cross Channel (DCC), and RD 563 includes the adjacent Tyler Island that includes the Walnut Grove industrial park area along Walnut Grove – Thornton Road.

East Walnut Grove is protected along the west by levees along the Sacramento River. It is protected along the north from levees along the Delta Cross Channel, along the east by levees along Snodgrass Slough and along the south by the Dry cross levee that separates Walnut Grove RD 554 from Tyler Island RD 563.

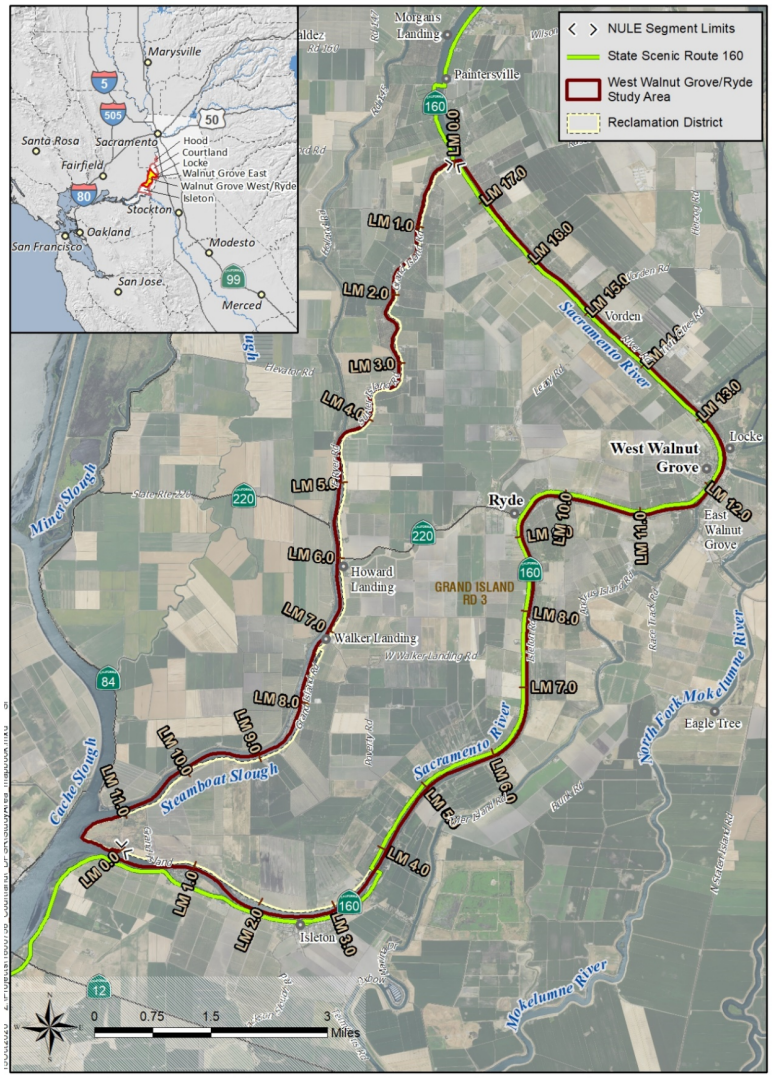


Vicinity Map of East Walnut Grove

West Walnut Grove/Ryde

West Walnut Grove and Ryde are both located along the right bank of the Sacramento River along the southwest boundary of Sacramento County. West Walnut grove is located within the the Grand Island (Reclamation District 30. Grand Island is protected by 29 miles of levees, 17.4 miles are located along the Sacramento River providing protect from the east and 11.4 miles are located along the Steamboat Slough providing protection from the west. The levees along the Sacramento River are part of the State and federally-authorized Sacramento River Flood Control Project and are now part of the State Plan of Flood Control.

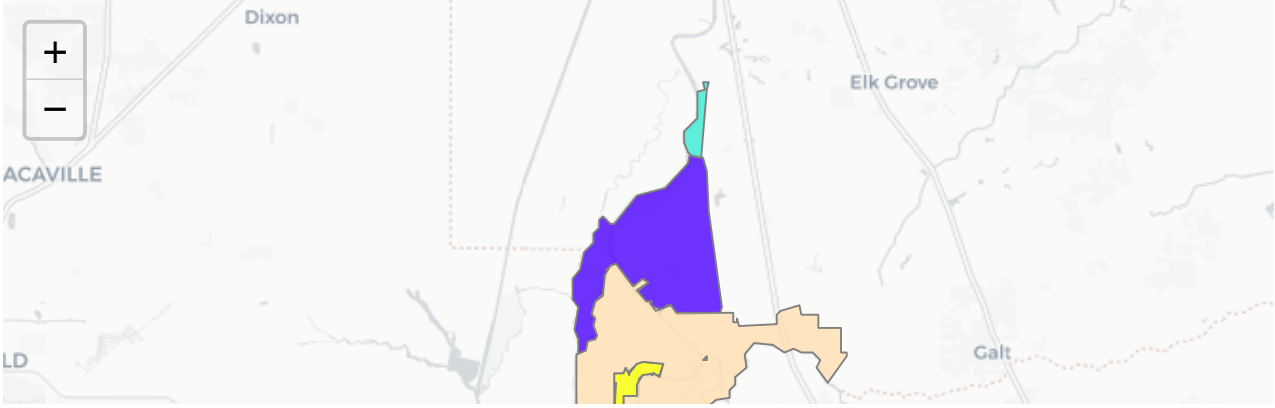
West Walnut Grove (Clampett Tract) sits at an elevation of 0 to 12 feet NAVD 88. Ryde sits at an elevation of -4 to 0 ft NAVD. The ground is highest adjacent to the levees and slope toward the center. The top of the levees vary from approximately 22 to 26 ft NAVD 88.

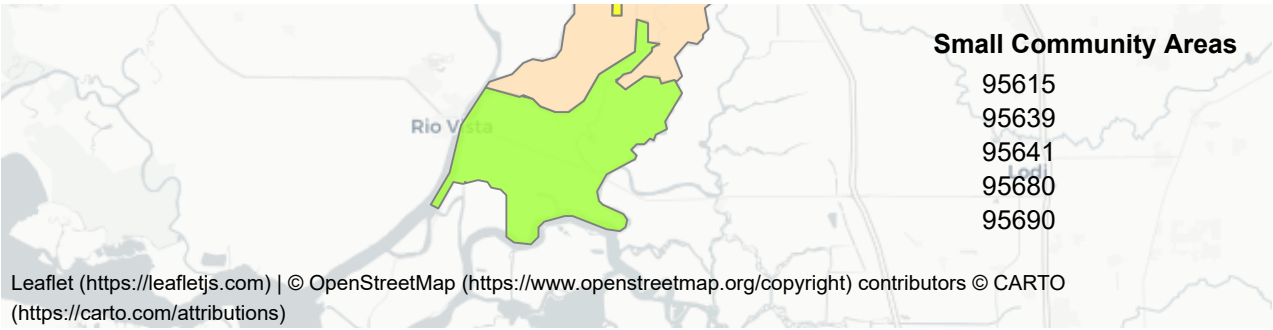


Vicinity Map of West Walnut Grove

How much are residents currently paying for NFIP flood insurance?

The following 2019 policy analysis is based on NFIP open source policy data downloaded from https://www.fema.gov/about/openfema/data-sets#nfip (https://www.fema.gov/about/openfema/data-sets#nfip). The FEMA NFIP open source policy data is aggregated at the zip code level which roughly aligns with the boundaries for the Sacramento County Legacy Community Flood Mitigation Study areas. The following shows the boundaries used in this NFIP policy and claims analysis.





In 2019, slightly more than $1 million in premiums was collected from 1,068 policies with a total insured value of $256M. Sacramento County is a CRS Class 2 community and thus, some NFIP policy holders receive as much as a 50% discount on premiums. The NFIP rating process consists of establishing the premium based on factors such as grandfathering or the age of the structure (pre-FIRM). The CRS discount is then applied to computed premium. After the CRS discount is applied, certain federally mandated fees are then added to the premium cost. The total amount paid by the homeowner is listed in the NFIP database as the policy cost. In the tables and charts below, *Premium* refers to the amount that includes the CRS discount but the fees. *Policy Cost* refers to the total amount paid by the policy holder and reflects both the *Premium* and the additional fees. The difference between the *Total Premium* and the *Total Policy Cost* ($345,000) represents the cost of fees and other charges not related to the actuarial premium cost. The average per policy amount of the fees is $323.

2019 NFIP Policy Summary for the Legacy Communities

No. Policies	Median Premium	Maximum Premium	Total Premium	Total Policy Cost	TIV Building	TIV
1069	$530	$23,527	$1,062,921	$1,409,055	$207,927,600	$265,862,200

Policy Summary

The following is a summary of the 2019 policy data by zip code. With the exception of the community of Ryde (Zip Code 96641), which has a median policy cost of $1,126, the median cost of flood insurance policies is less than $600.

2019 NFIP Policy Summary by Zip Code

ZIP	Reported City	No. Policies	Median Premium	Maximum Premium	Total Premium	Total Policy Cost	TIV
95615	Courtland	3	91	92	$259	$1,198	$15,200
95615	COURTLAND	204	530	4,291	$173,281	$242,494	$58,250,500
95639	HOOD	35	530	4,291	$30,763	$40,000	$9,161,100
95641	Isleton	2	857	866	$1,714	$2,121	$550,000
95641	ISLETON	337	1,133	6,707	$477,959	$603,265	$64,059,300
95680	RYDE	13	591	1,372	$8,856	$11,611	$3,982,000
95690	RYDE	1	158	158	$158	$482	$28,000
95690	SOLANO	1	1,580	1,580	$1,580	$2,117	$282,200

ZIP	Reported City	No. Policies	Median Premium	Maximum Premium	Total Premium	Total Policy Cost	TIV
95690	WALNUT CREEK	2	1,815	2,141	$3,630	$4,774	$250,000
95690	WALNUT GROVE	471	530	23,527	$364,721	$500,993	$129,283,900
Total	•	1069	NA	NA	$1,062,921	$1,409,055	$265,862,200

Policies by CRS Code

One of the reasons for the low price of flood insurance in these communities is attributed to the fact that Sacramento County is a CRS Class 2 county, the only one in the nation. CRS Class 2 communities receive a 40% discount for Special Flood Hazard Area (SFHA) (100-yr) polices and a 10% discount for Non SFHA policies. Not all policies are receiving this discount. There are 44 policies that are incorrectly rated and not receiving the benefit of the Class 2 rating. Class 6 communities receive only a 20% discount for SFHA policies and a 10% discount for Non SFHA policies. Class 7 communities receive only a 15% discount for SFHA policies and a 5% discount for Non SFHA policies. Class 8 communities receive only a 10% discount for SFHA policies and a 5% discount for Non SFHA policies.

No of NFIP Policies by CRS

CRS	No. Policies	Median Premium	Maximum Premium	Total Premium	Total Policy Cost	TIV
2	897	530	23,527	$738,346	$1,007,852	$230,431,600
6	1	421	421	$421	$534	$350,000
7	41	593	5,345	$42,686	$59,141	$6,705,200
8	1	2,001	2,001	$2,001	$2,376	$246,000
NA	129	1,887	7,255	$279,467	$339,152	$28,129,400
Total	1069	NA	NA	$1,062,921	$1,409,055	$265,862,200

The community of Isleton does not participate in the CRS program and thus homeowners should not receive a CRS discount. However, the data shows that roughly one-third of the residents are receiving the CRS class 2 discount.

No of NFIP Policies by CRS for the Community of Isleton

CRS	No. Policies	Median Premium	Maximum Premium	Total Premium	Total Policy Cost	TIV
2	216	748	6,707	$211,080	$280,089	$38,163,900
NA	121	1,889	6,645	$266,879	$323,176	$25,895,400
Total	337	NA	NA	$477,959	$603,265	$64,059,300

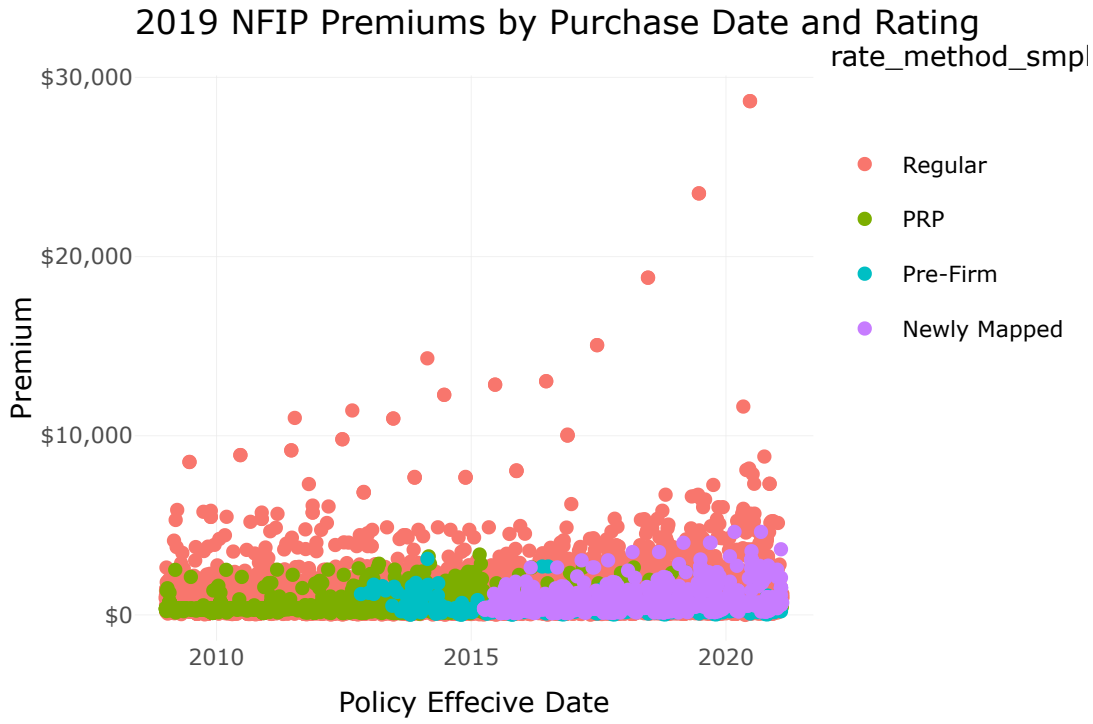
Policies by rating method

There are a variety of ways that policies may be written. The following table shows the different ways that policies are currently rated. Twenty-one polices are incorrectly receiving a preferred risk policy. This policy is available to homes outside the SFHA. There are no areas outside the SFHA in the study area. Significantly, there are 481 policies that are rated as newly mapped, which gives discount that is being phased out. The Total Isured Value (TIV) represents both TIV for both building and contents. The NFIP database does not break out the premium between building and contents so there is no way to know how much of the premium is associated with the building and how muchs is associated with the contents.

The data identifies 490 policies rated using method R. There is no R method identified in the metadata associated with the file. It is assumed that R refers to policies written in areas protected by a Provisionally Accredited Levee (PAL). At some point FEMA will reassess this area and the full deaccredited levee rating will be charged.

No of NFIP Policies by Rating Method

Rating Method	No. Policies	Median Policy Cost	Maximum Premium	Total Premium	Total Policy Cost	TIV
Regular	511	1,023	23,527	$707,521	$906,794	$89,802,300
PRP	23	376	2,399	$13,143	$18,511	$7,818,000
Pre-Firm	45	272	1,486	$14,995	$25,568	$9,255,900
Newly Mapped	490	530	4,030	$327,262	$458,182	$158,986,000
Total	1069	NA	NA	$1,062,921	$1,409,055	$265,862,200

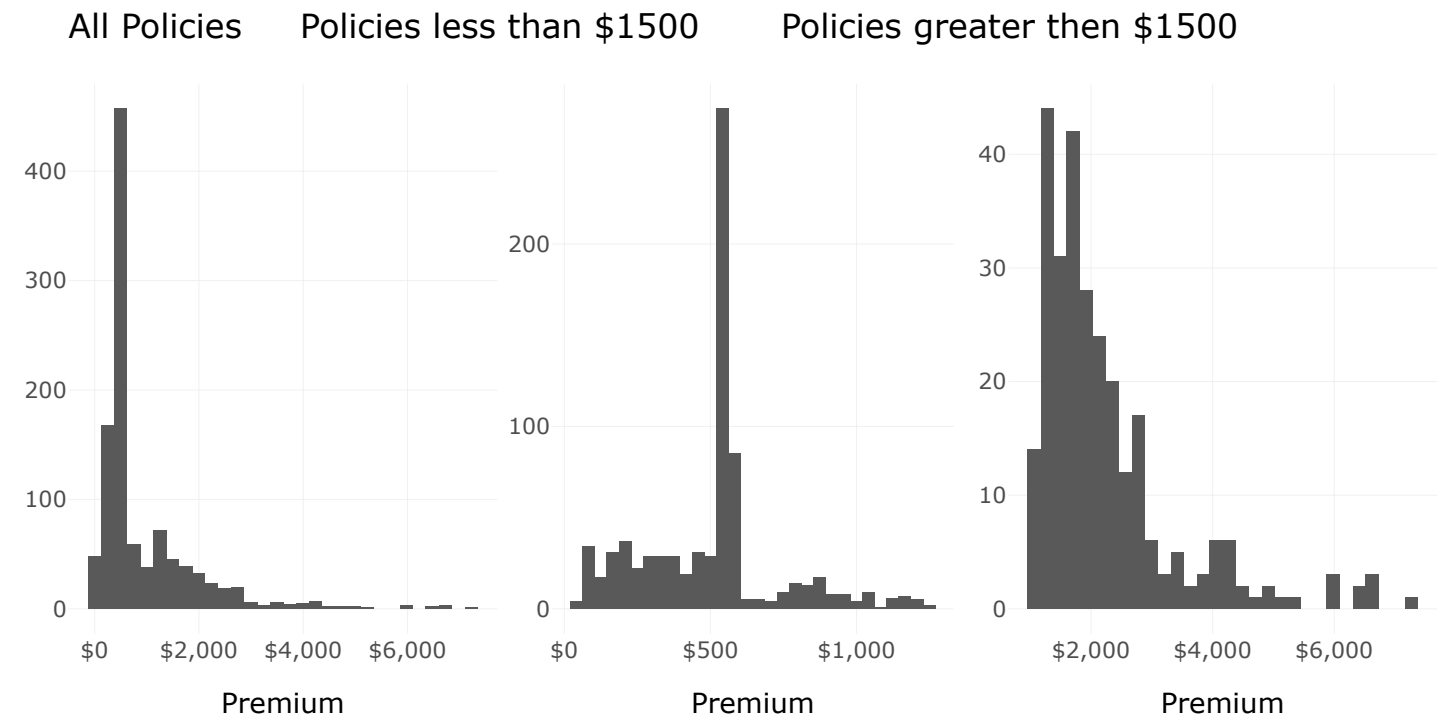


This table shows the CRS Class 2 policies by rating method. This shows that there are 339 policies that are rated manually. There is an opportunity to competitively price policies in this category.

CRS 2 Rated Policies

Rate Method	No. Policies	Median Premium	Maximum Premium	Total Premium	Total Policy Cost	TIV
Regular	354	791	23,527	$390,510	$517,164	$58,976,600
PRP	21	376	2,399	$12,346	$17,495	$7,118,000
Pre-Firm	40	266	1,486	$13,326	$22,599	$7,861,000
Newly Mapped	482	530	4,030	$322,164	$450,594	$156,476,000
Total	•	NA	NA	$738,346	$1,007,852	$230,431,600

The following three bar charts show the distribution of polices by payment amount. The first chart shows that the vast majority of the polices are written in the $500 range. Private flood insurance is reportedly being offered by a Lloyd's of London carrier for about $1500 per policy. The second chart is the distribution of polices less than $1500. The third chart is the distribution of policies greater than $1500. This chart shows the most likely opportunity for community based flood insurance to compete.



In 2019 there was one policy written for more than $20,000. When that policy is removed,it shows that with the exception of Isleton, 75% of the policies are less than $1000.

The following table provides additional detail on the policies that in 2019 were not rated correctly. The term *Premium* is used to identify the premium amount on which the CRS discount is calculated. The term *Policy Cost* is the cost calculated by adding together calculated premium, reserve fund assessment, federal policy fee, and HFIAA surcharge.

Non CRS 2 Rated Policies

CRS	Rate Method	Count	Median Premium	Maximum Premium	Total Premium	Over Charge Amount
6	PRP	1	421	421	$421	$0
7	Regular	30	1,000	5,345	$36,943	$10,866
7	Pre-Firm	5	355	360	$1,669	$93
7	Newly Mapped	6	530	1,395	$4,074	$226
8	Regular	1	2,001	2,001	$2,001	$667
Total	•	43	NA	NA	$45,108	$11,852

The estimated amount that homeowner's were overcharged in 2019 is estimated to be in excess of $12,000.

Policies by ownership or rental

The following presents a breakdown of owner occupied versus rental policies. This shows that there are roughly 600 owner occupied policies and 450 rental policies.

2019 Policies by Owner Occupied versus Rental

CRS	Count	Median Premium	Maximum Premium	Total Premium	Total Policy Cost
Rental	467	530	23,527	$527,929	$746,637
Residence	602	530	4,411	$534,992	$662,418
NA	1069	NA	NA	$1,062,921	$1,409,055

Policies by residential or commercial

The following presents a breakdown of residential versus commercial policies. This shows that there were 1046 owner occupied policies and 22 commercial policies.

Policies by Residential and Small Business

Small Business	Count	Median Premium	Maximum Premium	Total Premium	Total Policy Cost
Residential	1047	530	23,527	$1,042,934	$1,379,468
Small Business	22	352	4,030	$19,987	$29,587
NA	1069	NA	NA	$1,062,921	$1,409,055

Policies by agricultural versus non-agricultural

The following presents a breakdown of the agricultural versus non-agricultural policies. This shows that of the 1068 polices only 17 were on agricultural buildings.

Polices by Agricultural Building versus Non-Agricultural Building

Ag Bldg	Count	Median Premium	Maximum Premium	Total Premium	Total Policy Cost
Not Ag Building	1052	530	23,527	$1,057,706	$1,397,961
Ag Building	17	112	1,175	$5,215	$11,094
NA	1069	NA	NA	$1,062,921	$1,409,055

How many of the polices are grandfathered policies?

Many of the polices are grandfathered policies that will be phased out. The following shows the summary of grandfathered policies by zip code.

2019 Grandfathered Policies by Zip Code

ZIP	No. Policies	Maximum Premium	Median Policy Cost	Total Premium	Total Policy Cost	TIV
95615	144	593	528	$63,672	$100,250	$36,218,100
95639	20	593	496	$9,260	$13,250	$5,943,600
95641	113	598	257	$31,976	$57,820	$17,197,200
95680	10	593	560	$5,568	$7,379	$3,360,000
95690	382	593	529	$172,806	$261,657	$106,012,000
Total	•	NA	NA	$283,282	$440,356	$168,730,900

In 2018, FEMA compiled policy data to share with reinsurance bidders. The following table presents 2018 reinsurance data for this area. The source of the data is “NFIP”TRN_Combined_05_31_2017" file after preparation and augmentation by reinsurance broker analyst and imported into AIR’s Touchstonev5“. The building TIV is the enhanced building replacement value with application of actual cash value (ACV)/Co-insurance factors where appropriate. The contents TIV is the enhanced contents replacement value with application of ACV/Co-insurance factors. Contents are always settled at ACV. The Building and contents is the”limit" or insured amount for location.

2018 Reinsurance Data

	ZIP	Building TIV	Contents TIV	Building Limit	Contents Limit	TIV
1	95615	$43,665,010	$5,260,488	$34,774,100	$14,649,200	$49,423,300
2	95641	$64,461,333	$2,851,177	$58,187,300	$5,013,500	$63,200,800
3	95690	$117,643,283	$12,944,176	$97,582,100	$35,245,100	$132,827,200
5	Total	$343,412,908	$34,000,017	$288,125,600	$90,152,900	$378,278,500

2018 Reinsurance Data

ZIP	Building TIV 2018	Contents TIV 2018	TIV 2018	TIV 2019
95615	$43,665,010	$5,260,488	$49,423,300	$36,218,100
95641	$64,461,333	$2,851,177	$63,200,800	$17,197,200
95690	$117,643,283	$12,944,176	$132,827,200	$106,012,000
Total	$225,769,625	$21,055,841	$245,451,300	$159,427,300

The following chart shows the number of NFIP polices purchased over time. The following chart shows there is a distinct annual cycle for the purchase of NFIP policies. It also shows that the number of policies have declined as the price of the policies have increased.

These charts show that NFIP policy take-up rates have been steadily declining. This could reflect improvements flood control systems that remove people from the mandatory purchase Special Flood Hazard Area. It could also reflect an increase in private flood insurance purchases. Conversely it could reflect a lack of affordability. NFIP prices have continued to increase and they may no longer be viewed as affordable, particularly in light of the COVID related economic crisis.

How much would be saved by having the $10k deductable?

```
##
##    0    1    2    3    4    5    A    F    G
##  170 2622  329   35   10  317   42 2523   11
```

Premium Savings with a $10 K Deductible

Total Premium	Total w/o Deductible	Total with $10K Deductible	Total Savings
$1,226,244	$2,199,467	$857,792	$368,452

Premium Savings with a $10 K Deductible 2019 Only

Total Premium	Total w/o Deductible	Total with $10K Deductible	Total Savings
$130,565	$247,246	$96,426	$34,139

Claims Data

The following presents the claims data.

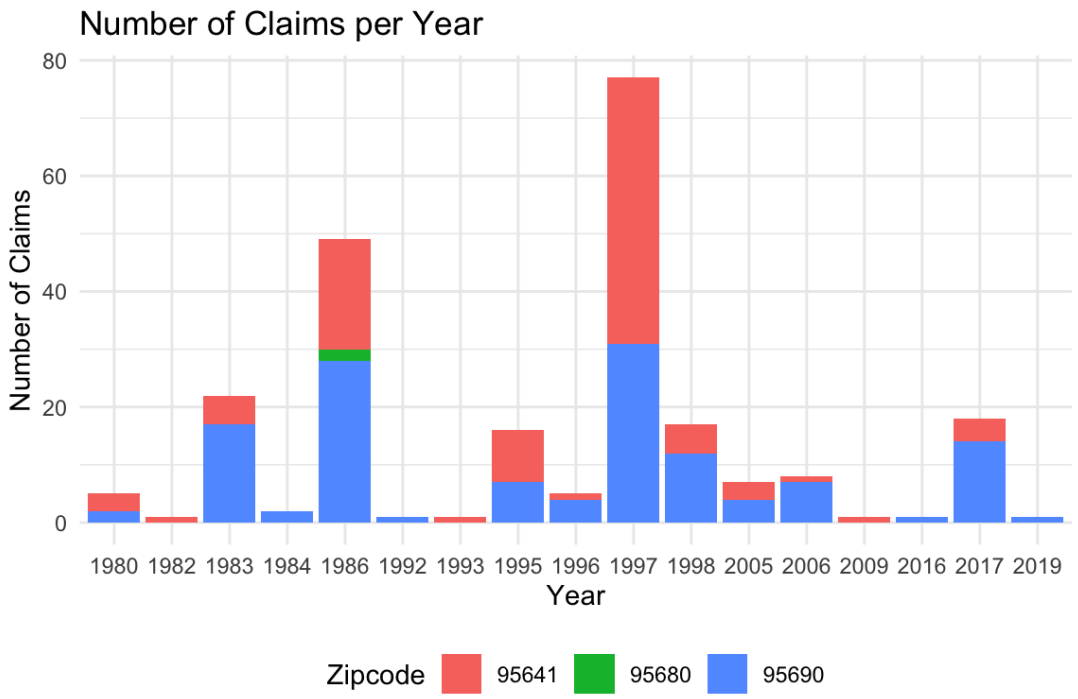
Claim Payments by Zip Code since 1980 (Not Inflation Adjusted)

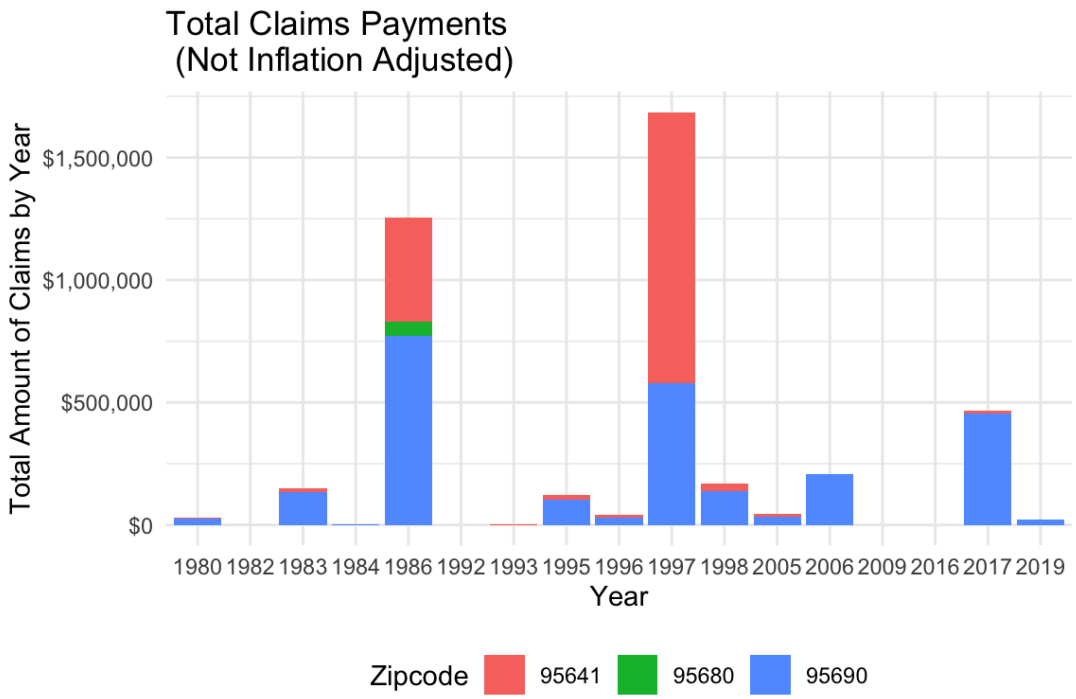
ZIP	No. Claims	Median Building Claim	Max Building Claim	Total Building Claim	Total Contents Claim	Total Claim
95641	99	3,979	92,100	$1,194,744	$443,280	$1,638,023

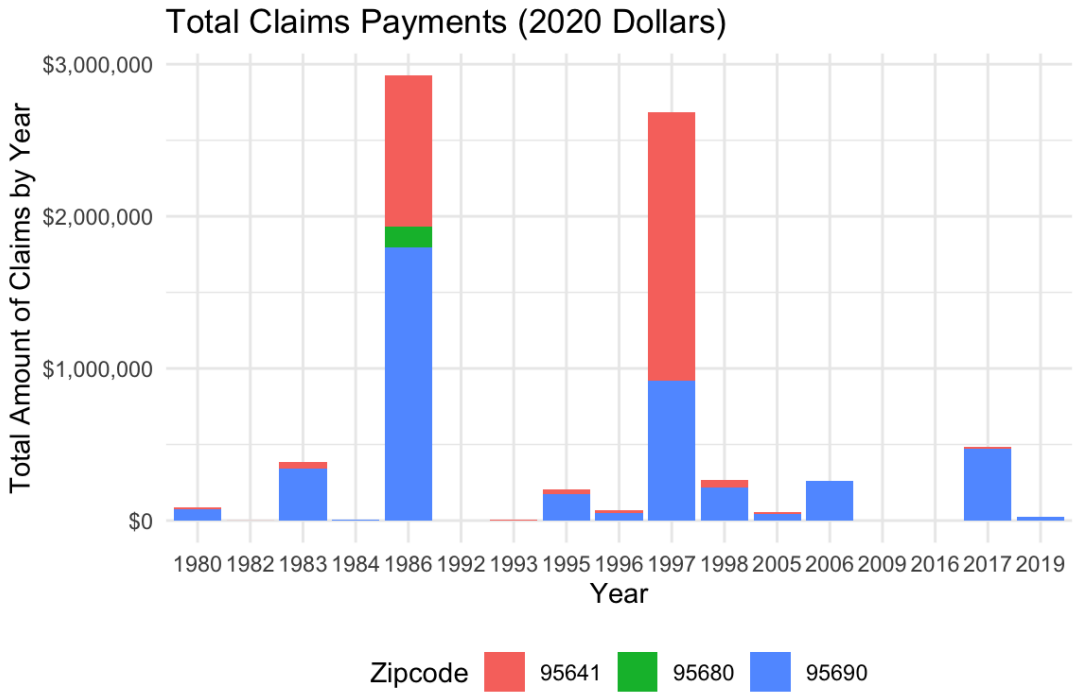
ZIP	No. Claims	Median Building Claim	Max Building Claim	Total Building Claim	Total Contents Claim	Total Claim
95680	2	17,967	18,226	$35,934	$22,100	$58,034
95690	131	7,536	106,169	$1,855,121	$645,579	$2,500,700
Total	232	NA	NA	$3,085,799	$1,110,959	$4,196,758

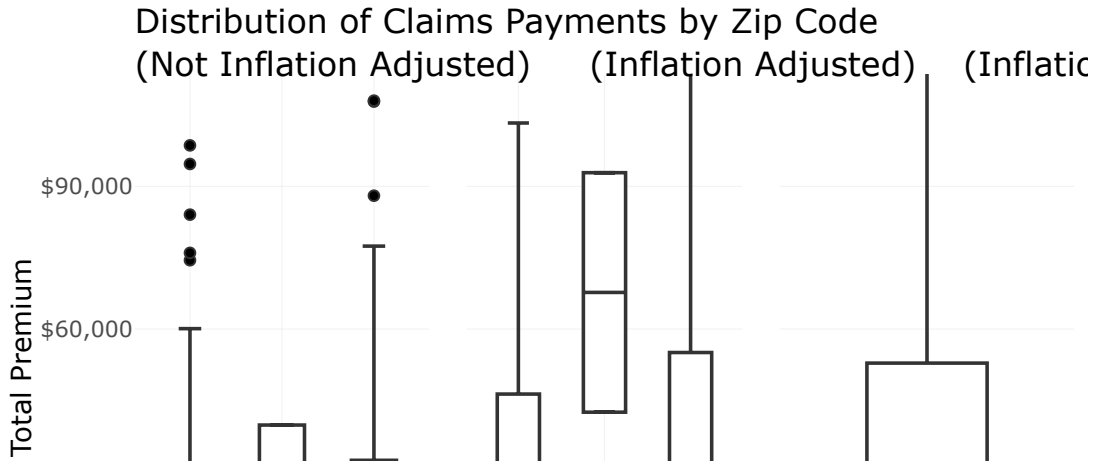
Claim Payments by Zip Code since 1980 (Inflation Adjusted)

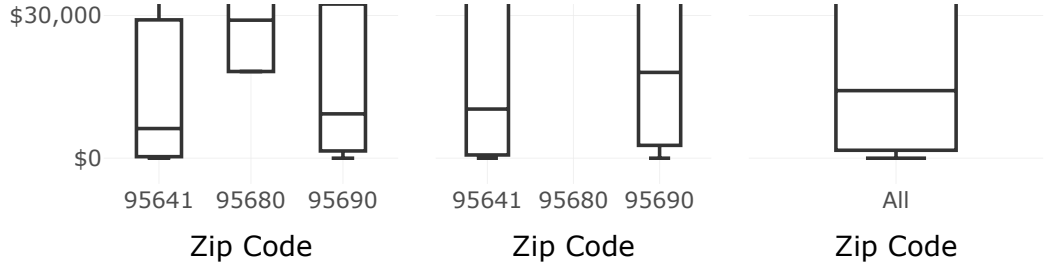
ZIP	No. Claims	Median Building Claim	Max Building Claim	Total Building Claim	Total Contents Claim	Total Claim
95641	99	6,339	214,836	$2,155,588	$782,427	$2,938,015
95680	2	41,911	42,513	$83,822	$51,551	$135,373
95690	131	12,631	119,664	$3,132,434	$1,255,702	$4,388,136
Total	232	NA	NA	$5,371,844	$2,089,681	$7,461,524




Total Claims Payments
(Not Inflation Adjusted)
Total Amount of Claims by Year
$1,500,000
$1,000,000
$500,000
$0
1980 1982 1983 1984 1986 1992 1993 1995 1996 1997 1998 2005 2006 2009 2016 2017 2019
Year
Zipcode
95641
95680
95690

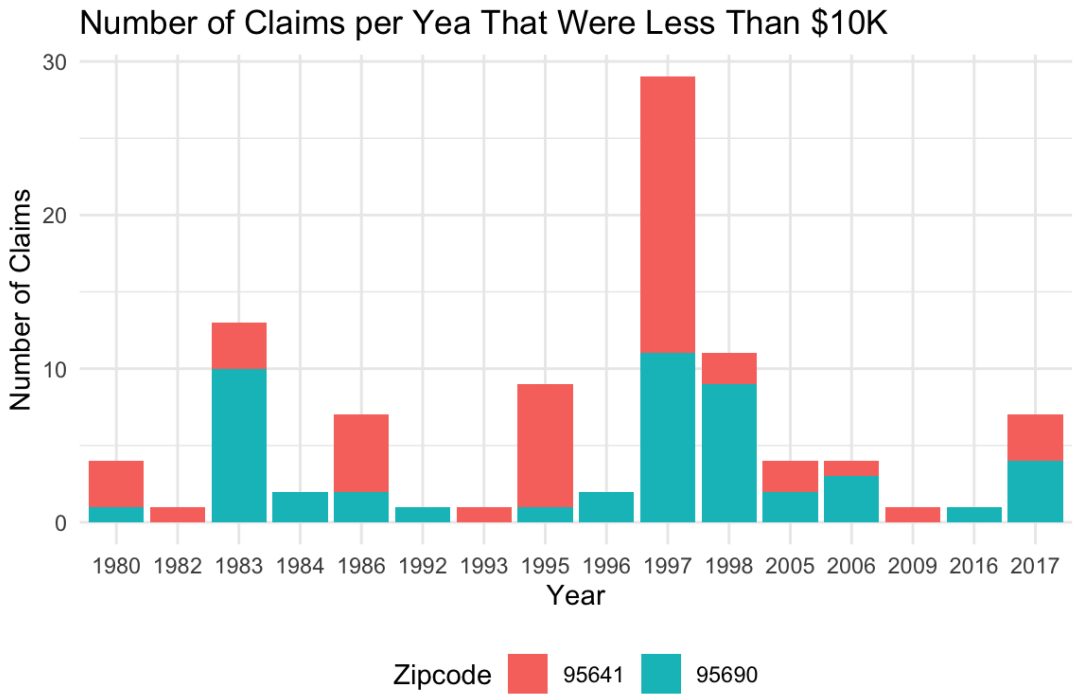

Total Claims Payments (2020 Dollars)
Total Amount of Claims by Year
$3,000,000
$2,000,000
$1,000,000
$0
1980 1982 1983 1984 1986 1992 1993 1995 1996 1997 1998 2005 2006 2009 2016 2017 2019
Year
Zipcode
95641
95680
95690


Distribution of Claims Payments by Zip Code
(Not Inflation Adjusted)
(Inflation Adjusted)
(Inflatic
Total Premium
$90,000
$60,000

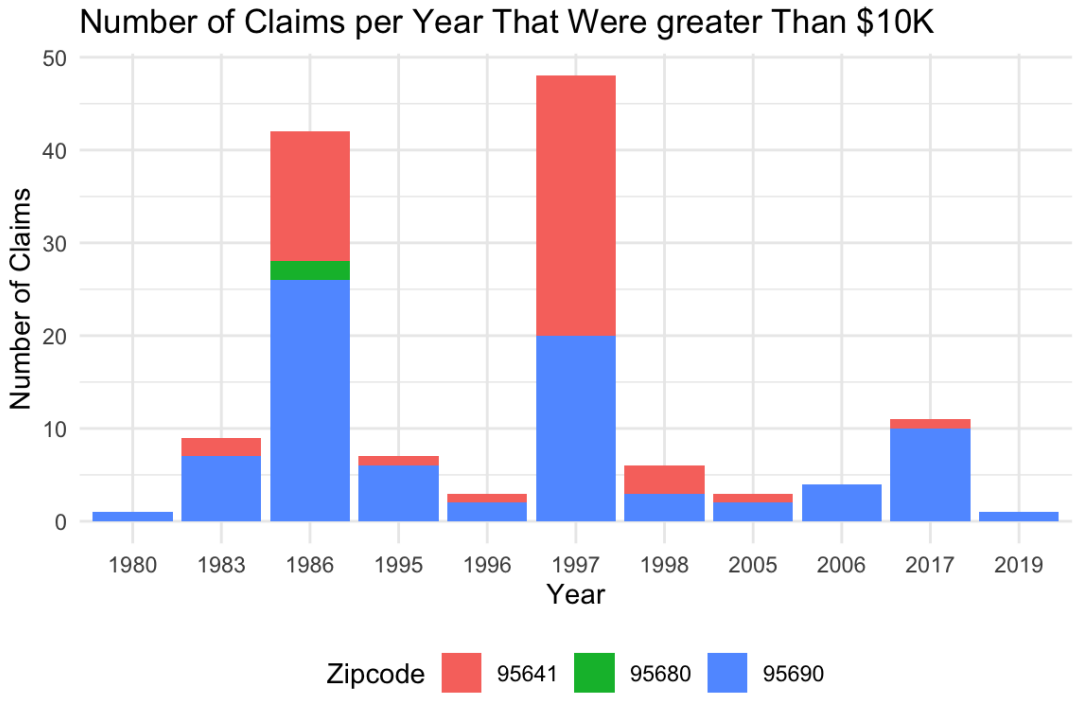


How many claims were less than $10,000?

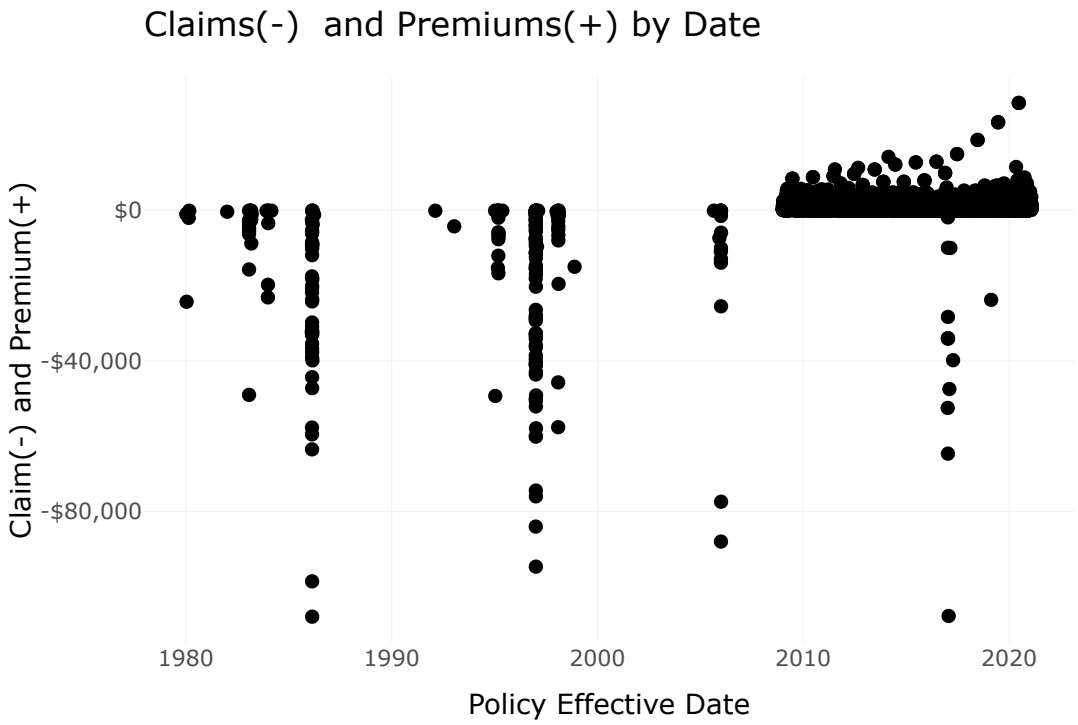
The following figure shows the number of claims that were less then $10K. Claim totals were inflation adjusted.



How many claims were greater than $10,000?



The data for the claims payments extends back to 1980. The data for the premiums only extends back to 2008. This chart shows the claims data as a negative value and the premium data as a positive value. It shows the distinct cycle of AR associated claims from storms occuring in 1986, 1996-1997, 2006, and 2017. In 1986, California experieced catastrophic floods that prompted a change in flood management. In 1997, California experinced similar flooding that reinforced the commitment to changes started in 1987. California continued to invest in flood control, passing a number of measures in 2008. The success of the measures can be seen in the numbers for 2017.

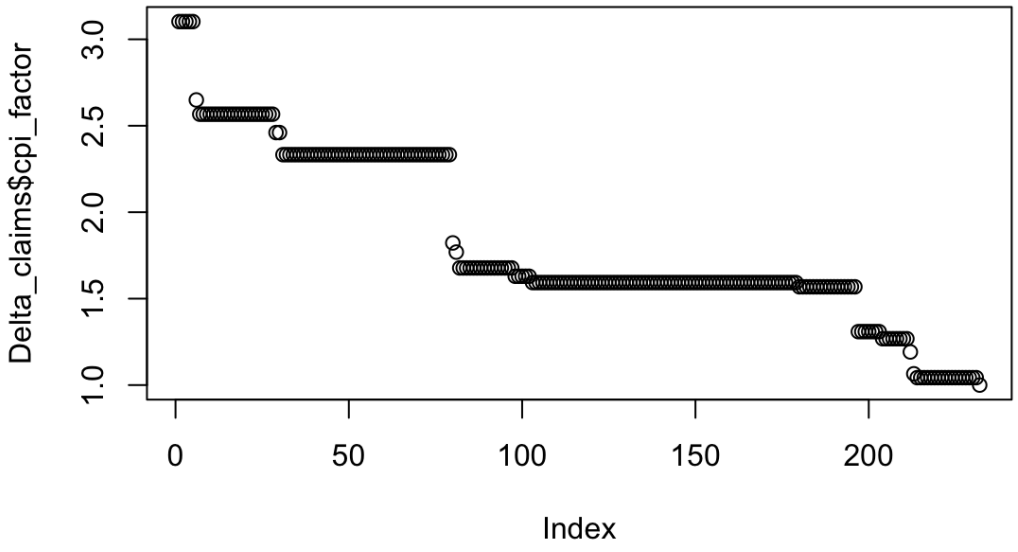


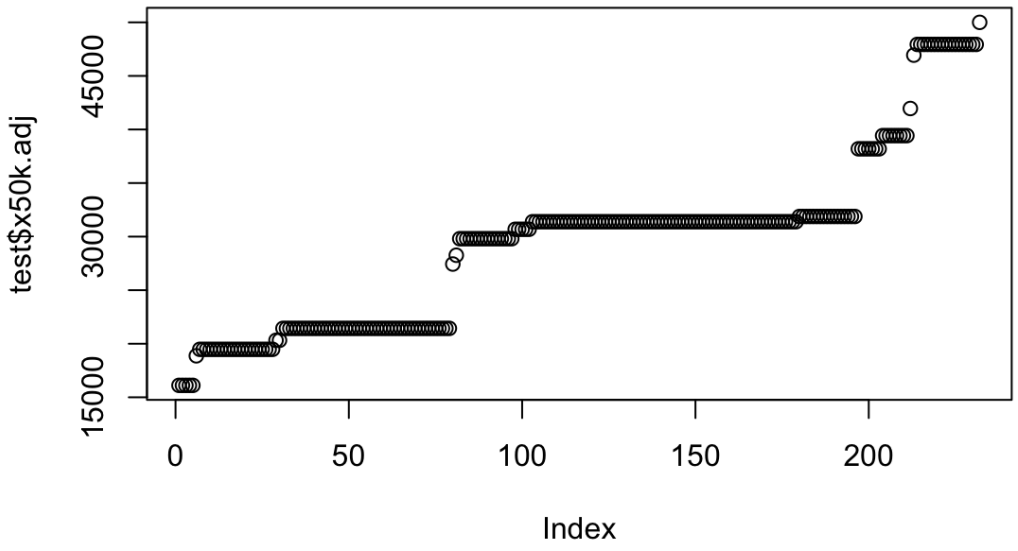
What percent of the policies had claims?

This analysis attempts to answer the question, what percentage of polices have had claims? The graph above shows that the number of policies remains relatively unchanged from year to year. Assuming that the average annual number of policies for the past ten years is a reasonable estimate, the average annual policy take up rate was computed. Average annual policy take up rate was then extended back 41 years, to coincide with the claims data. The following shows the estimated 41-year total number of claims and the 41-year total number of polices aggrigted by zip code.

Total Number of Claims and Policies(est.) since 1980 by Zip Code

ZIP	No. Policies	No. Claims	Percent of Policies with Claims
95571	8	NA	NA
95615	7,548	NA	NA
95639	1,488	NA	NA
95641	19,500	99	0.51%
95680	467	2	0.43%
95690	20,443	131	0.64%





Analysis without Isleton

Policies by ownership or rental

The following presents a breakdown of owner occupied versus rental policies. This shows that there are roughly 600 owner occupied policies and 450 rental policies.

2019 Policies by Owner Occupied versus Rental

CRS	Count	Median Premium	Maximum Premium	Total Premium	Total Policy Cost

CRS	Count	Median Premium	Maximum Premium	Total Premium	Total Policy Cost
Rental	346	530	23,527	$334,472	$487,888
Residence	386	530	2,463	$250,490	$317,902
NA	732	NA	NA	$584,962	$805,790

What percentage of claims were less that $10,000.

References

Citation: The agency’s preferred citation for each dataset is included in its metadata. Users should also cite the date that data was accessed or retrieved from fema.gov and/or Data.gov. Finally, users must clearly state that, ‘FEMA and the Federal Government cannot vouch for the data or analyses derived from these data after the data have been retrieved from the Agency’s website(s) and/or Data.gov.’