# Fire, Flight, and Fiscal Strain: Wildfire-Driven Out-Migration and California School Enrollment

Ransi Clark (ransi@caltech.edu)

R. Michael Alvarez (rma@caltech.edu)

September 15, 2026

**Abstract**

California schools are facing an enrollment crisis and, by extension, a fiscal crisis. Falling birth rates and out-migration from the state are the primary factors. Here we bring attention to a force that is accelerating this out-migration: destructive wildfires. We combine California's enrollment data with parcel level destruction to build a panel dataset of all schools affected by destructive California fires from 2015 to 2025. Using a localized differences-in-differences strategy we isolate the fire-related decline from the more general decline in enrollment, participation, and performance. School enrollment declines are considerable and persistent. The eight school districts with more than a 1000 affected parcels lost about 10000 students in this period, amounting to a 100 million dollars in funding losses annually. In the worst damaged school catchments, test participation drops immediately after fires, but the effect on proficiency is mostly null. We suspect that survivorship biases caused by enrollment losses and participation drops make other student outcomes incompletely observed. Learning from other loss events such as Hurricane Katrina, we note that though painful in the short-term, consolidations done sooner rather than later are better for student outcomes and school fiscal sustainability given the persistence of these enrollment losses.

School enrollment is declining across the United States because of a decline in births that started around 2007. But California's school enrollment declines are also affected by a high rate of out-migration from the state particularly among young families (Warren & Lafortune, 2020). A variety of reasons are causing this out-migration including high taxes and high housing costs. Exacerbating this decline are destructive wildfires that have become more numerous and increasingly more urban,

therefore affecting more students. Many of these young families are choosing to move out of their fire-ravaged school districts to adjacent school districts, but other families are leaving the state, while many families are seeking non-traditional options such as virtual schools (Horn, 2021).

Enrollment losses put California school districts in a thorny fiscal position. Even with increasing state level funding per student, funding is ultimately allocated based on average daily attendance, which is directly affected by enrollment (California Legislative Analyst's Office, 2026). Since schools operate with fixed costs and sign long-term contracts with their teachers and other suppliers, adjustments to funding cuts are painful. Enrollment-affected schools get some reprieve from funding allocation cuts through declining-enrollment funding that index average daily attendance to the highest of the average of the previous three years. But these policies are temporary and can entrench inefficiencies in school district operation at the cost of growing schools (Rothbart et al., 2026; Smith & Barnard, 2024).

Between 2013-2025, eleven school districts had more than 1000 parcels that sustained fire damage. Of these districts, eight lost enrollment over and above their pre-fire trend. These enrollment losses cumulatively amounted to about 10000 students lost by the district, and once the funding stopgaps expire, this amounts to about 100 million dollars in funding lost per year for these districts if the displaced students do not return. Our estimates of enrollment data at the zip code area level show that these losses are permanent. Nearby Californian school districts would have fiscally benefited from receiving the newly displaced students. But county level patterns of Internal Revenue Service migration data pre-2024 show that fire affected zip code areas lose about half their population to nearby states.

A destructive wildfire will create sharper losses in enrollment than a gradual decline due to falling birth rates or economic out-migration. They are more fiscally challenging in a variety of situations. When school facilities are destroyed, such as in the case of Camp Fire in 2018, school districts must move students to temporary locations and then find funding to repair the facilities. In Paradise, which the Camp Fire affected, this took more than seven years. Even when school facilities are intact, there are higher costs in the short-term involving debris and smoke damage. These costs are covered by funding sources outside of usual school funding allocation, but schools still suffer enrollment losses, much of it persistent, in the time the repairs are made. The Paradise School District lost more than half their students, going from 3779 in 2018 October to 1664 in 2019

October.

Fire displacement also affects the quality of school programs and curricula in the long-term. Displaced students become chronically absent and teachers spend more time accommodating the displacement. Teachers are also displaced. This, in turn, incentivizes parents to move students out of affected public schools to other forms of education. After the Eaton fire in Altadena, virtual schools saw large gains that otherwise would have gone to traditional schools. Discontinued programs due to enrollment losses create a vicious cycle, encouraging further enrollment losses (Pearman, 2026).

Fire affected schools tend to face other fiscal challenges as many supplemental sources of funding dry out. On average, about 30% of school funding comes from local property and parcel taxes. After fires, local property tax collections fall causing further funding gaps. Fires also reduce the value of school's own stock of buildings making it difficult to raise funds through leasing or selling facilities. Even outside of fires, observers generally find enrollment-affected schools have limited success fundraising by selling off buildings because their values are declining along with enrollment losses (Dowdall, 2011).

While it comes as no surprise that destructive wildfires will lead to population losses and therefore enrollment losses, it is difficult to disentangle these losses with the larger trend of enrollment losses and therefore to determine how persistent they are. Enrollment losses in California are also not uniform across counties. The area around Butte county, particularly consistig of Yuba and Sutter counties, are gaining enrollment, growing by 15% each in the 2013-2024 years. Counties around Sonoma County, like Napa and Marin, have been steadily losing enrollment since 2013. Southern California counties also have consistently losing enrollment since 2013. Because of these highly local trends in enrollment, we need to net out the local trends in enrollment change happening due to changing economics of these areas. To this end, we use a localized differences-in-differences estimator that will sequester the comparison sets to within a 20 mile radius of the affected zip code areas or schools.

We use CalFire's parcel level spatial layer to identify fire damage. School-level Census day enrollment numbers are from the federal government's Common Core of Data and test participation and proficiency are from the California Department of Education. We do not have access to student level data, which limits our analysis to those who remained in the area after the disaster. We do not

see large positive spikes in enrollment numbers in the school-level data, suggesting that evacuees were distributed somewhat evenly. We discuss most of our findings in terms of damage class at either the zip code area or school level because the effects of fires are highly heterogeneous even within affected schools. Fires tend to inflict high destruction in a handful of zip code areas or school catchment areas and their outcomes are much different from other areas with some but not an intense level of damage. These areas may also be gaining population.

Census day enrollment declines for zip code areas with more than a 1000 parcels of damage are persistent. This is expected, because rebuilding from fires takes close to seven years. Paradise Elementary that was lost in November 2018 has only just been rebuilt.

We also find that registration for testing in April of each school year and the test participation rate dropped precipitously in the year after the fire for school catchments with more than 1000 parcels of damage. However for few grade cohorts, neither proficiency nor mean scores changed markedly following a fire, even among the catchments with damage over 1000 parcels. While there are several reasons as to why fires, even with disruption, can increase school quality (such as smaller class sizes or a drop in behavioral problems in schools), the most proximal reason for this pattern of results is selection bias.

One type of selection bias is self-selection by students. Parent and teachers, affected themselves, do not enforce test participation as strictly. Therefore, students that sat the test in April after a fire are likely to be the least affected by fires and most prepared. So test participation declines in the aftermath of the fire, and more markedly for older students. One striking example of selection is Palisades High whose premises were destroyed in the Palisades Fire of January 2025. Only half of their eleventh grade class appeared for testing in April 2025. However, they performed markedly better than the previous cohorts that took the eleventh grade test, going from an average pre-Covid proficiency rate of 52% to 61% in April 2025. Another type of selection bias is introduced by privacy masking policies. Schools with low test registration in April are masked for privacy reasons, but these schools are those that are likely to be most affected.

Despite this positive selection, we find statistically significant declines in proficiency in some grade cohorts. Specifically, 4th, 6th, and 11th grade math and 4th and 11th grade reading. Previous studies have found similar negative effects on school-level grades from extended fire-related school disruptions in California (Miller & Hui, 2022). Others find a negative effect on district-level scores

by correlating grades with wildfire smoke exposure (Wen & Burke, 2022).

We focus on the specific effect of wildfire-related displacement rather than the smoke-related disruptions. Displacement is highly correlated with both school disruptions and wildfire smoke but affects a much smaller group more intensely. Much of the previous research of displacement on school performance studies from other types of disasters such as hurricanes, floods, or tornadoes. The immediate impact of hurricanes on both the remaining and leaving student population is negative (D. N. Harris & Larsen, 2023; Morrill & Westall, 2023). The medium-term effect seems to vary depending on mitigation efforts and previous instruction quality. A large-scale restructuring of the Katrina-affected New Orleans school district significantly improved outcomes for students remaining post-Katrina (D. N. Harris & Larsen, 2023). But, in the aftermath of Hurricane Florence and Hurricane Matthew (North Carolina), in contrast, proficiency worsened the year of the disaster and beyond (Fuller & Davis, 2021).

Spillover effects are also a concern here. Evacuees can perform poorly in their new schools, making it difficult to make local comparisons. We have limited means to correct for this because we only have school-level data. But disaggregating by damage level in zip code and school catchment area is a useful way to test for the robustness of our results. We generally do not find anything but null effects for low damage classes. In Katrina's case, the leavers (identified with individual data) that went elsewhere in Louisiana suffered a short-term drop in grades (Sacerdote, 2012). However, schools in Houston that accepted displaced students suffered no adverse effects (Imberman et al., 2012).

There is also a much broader literature on the effect of disruption induced by school closures and consolidations. While these disruptions are not so intense as that caused by a fire or a hurricane, they have important lessons for the consolidations that await in the future for many Californian fire-affected districts. Between 2000 to 2010, energized by a bipartisan federal push to resuscitate underenrolled urban schools, many big cities embarked on school consolidation projects (Dowdall, 2011; Sperry, 2012). Studies of these school closures and consolidations find that after grades drop somewhat in the first year, and then return to normal in subsequent years (De la Torre & Gwynne, 2009; Engberg et al., 2012; Kemple, 2015). Whenever students were moved to better performing schools, the students performed better themselves (De la Torre & Gwynne, 2009).

The pace and decisiveness of reforms also matter for the success of the consolidations for both

student outcomes and for the district's fiscal health. Post-Katrina reforms in Louisiana were rapid and faced little organized pushback. This shortened the disruption period and student outcomes quickly improved (D. N. Harris & Larsen, 2023). Studies of high schools show that the positive effects of school consolidations take time to accrue (Kemple, 2015; Larsen, 2020), so consolidations done earlier, just as performance and enrollment starts to decline, have the greatest benefit to most students.

There are other benefits to swift restructuring. School districts that begin to address their fiscal gaps earlier can prevent further deterioration of their asset values by leasing or selling unused premises while they still retain value (Dowdall, 2011). Experience from Detroit and Chicago shows that the longer districts delay their fiscal consolidation plans in the face of continuing enrollment loss, the harder it is to rehabilitate the fiscal situation (Sperry, 2012). Public school districts that do not move fast to manage their dwindling finances can find themselves in a vicious cycle, where concerned parents may move their children out of public schools to non-traditional forms of instruction such as virtual schools, worsening school quality and finances (Sanburn, 2016).

We make three contributions in this paper. The first is to demonstrate how wildfires are worsening the enrollment and fiscal problems in California schools. We show that enrollment declines are permanent and worsening, underscoring the need for action. The second is to show the difficulty of assessing post-fire performance due to selection effects caused by enrollment and participation declines. The third contribution is to outline a methodology that can better disentangle the local level confounders. In the subsequent sections, we describe our data sources, our localized differences-in-differences estimator, and present our results more fully.

# 1 Data

School-grade level data was obtained from the California Department of Education. The earliest test year the data is available for is 2015, and the latest is 2025. The test results for 2020 were not available, and the test year 2021 was removed because of low participation rates across the state. We limit analysis to public schools and charter schools.

This school-grade data contained the number that registered for April testing, the number of students tested, the number of students that attained proficiency, and the mean score for that

grade in the school. The participation rate is the number that tested as a percentage of the number that were registered for testing. The proficiency rate is the number that achieved proficiency as a percentage of those who tested. If the number of students enrolled at testing was below a threshold, all information was masked. The masking threshold changed year to year. The highest masking value was for 10 students.

In addition to enrollment at the time of testing, we also obtained Census Day enrollment numbers from the Common Core of Data maintained by the United States Department of Education. The September 2025 Census Day enrollment numbers were appended from the California Department of Education since this information was not yet available in the Common Core. Unlike test registration and score information, enrollment data was not masked. This additional information helps identify schools that are still in operation in the testing year. The geographical location of the school in that particular year was obtained from the Common Core of Data.

Since masking also removes information on the number registered for April testing, we create an imputed outcome where any grade that has its enrollment at testing masked is imputed as 10. If the school did not have a positive Census Day enrollment, no data were imputed. In addition, in years where the masking threshold was lower than 10, enrollment values smaller than 10 were changed to 10. The imputation zeroes out any year-on-year difference between small schools, but allows us to study the enrollment drops in larger schools which would otherwise be incalculable due to masking. The imputation did not affect the calculation of participation rates. If the number enrolled at testing was above the masking threshold but 10 or fewer, the participation rate was calculated using the original number. See further details in 1.1 of Appendix A in the supplement.

Parcel level information about wildfire related destruction is maintained by CalFire. This dataset begins in 2013 and is current. The damage data was aggregated to both zip code area level and the school catchment level. We identify a zip code as affected if more than 10 houses are damaged in the zip code. This identifies 149 zip codes as affected in the period. We further classify zip codes based on level of damage sustained. Of these 149, 10 had more than 1000 parcels of damage (4 of these were in 2025), another 44 had more than 100 parcels of damage but less than 1000, and the rest had fewer than 10 parcels of damage.

Attendance boundaries for California school districts is difficult to obtain in a format analyzable by geographic software and several do not report them online. So we proxied the school attendance

boundary with a 2-mile radius from the location of the school. Schools were marked as affected schools if more than 10 homes were affected in this 2-mile radius. We identified three damage classes that were somewhat different from the classes for zip code areas. The highest damage was kept at 1000, but the medium damage class was reduced to above 100, and the lower damage class is more than 10. So schools that had less than 10 houses damage in its 2-mile radius were considered unaffected. Because these schools outside the 20-mile radius could be affected and we do robustness checks varying these buffer distances, we refer to the schools with more than 10 homes of damage in their inner-radius (2-mile or 1-mile) as *in-perimeter schools*.

Since we are doing a localized differences-in-differences analysis, we also isolate *out-perimeter* schools. These are schools with less than 10 homes of damage in their 2-mile radius, but within a 20-mile radius of the fire perimeter. Although school district level characteristics affect the quality of the school, there are usually too few schools in the same district that are unaffected by the fire. Therefore, we extend the comparison set to be neighboring schools in a 20 mile radius, which may include schools from other districts.

Figure 1 shows the yearly counts of the affected schools split by damage class. The three damage classes are marked by the following symbols: the worst damage class of more than a 1000 homes by the square, the medium damage class of more than a 100 but less than a thousand homes by the triangle, and the minor damage class of less than a 100 but more than 10 by the circle.

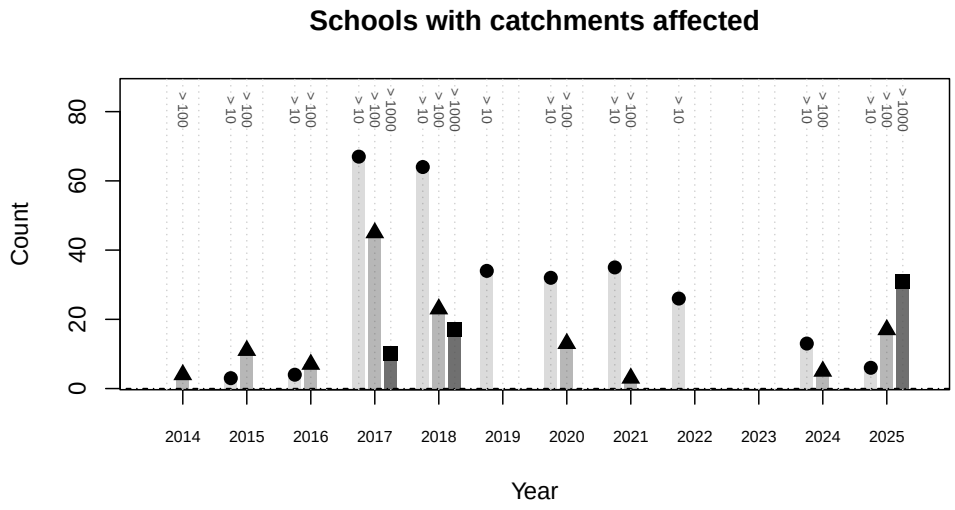


Figure 1: Counts of in-perimeter schools in the year

Fourteen of California's top 20 most destructive fires occurred after 2015. The figure above shows that 2017, 2018, and 2025 were the most destructive years for school catchment areas. The fires responsible for the largest amount of destruction near schools are Tubbs in 2017, Camp in 2018, and Eaton and Palisades in 2025. Even though some fires such as Dixie in 2021 burnt close to a million acres, they did not cause the same extent of losses around schools.

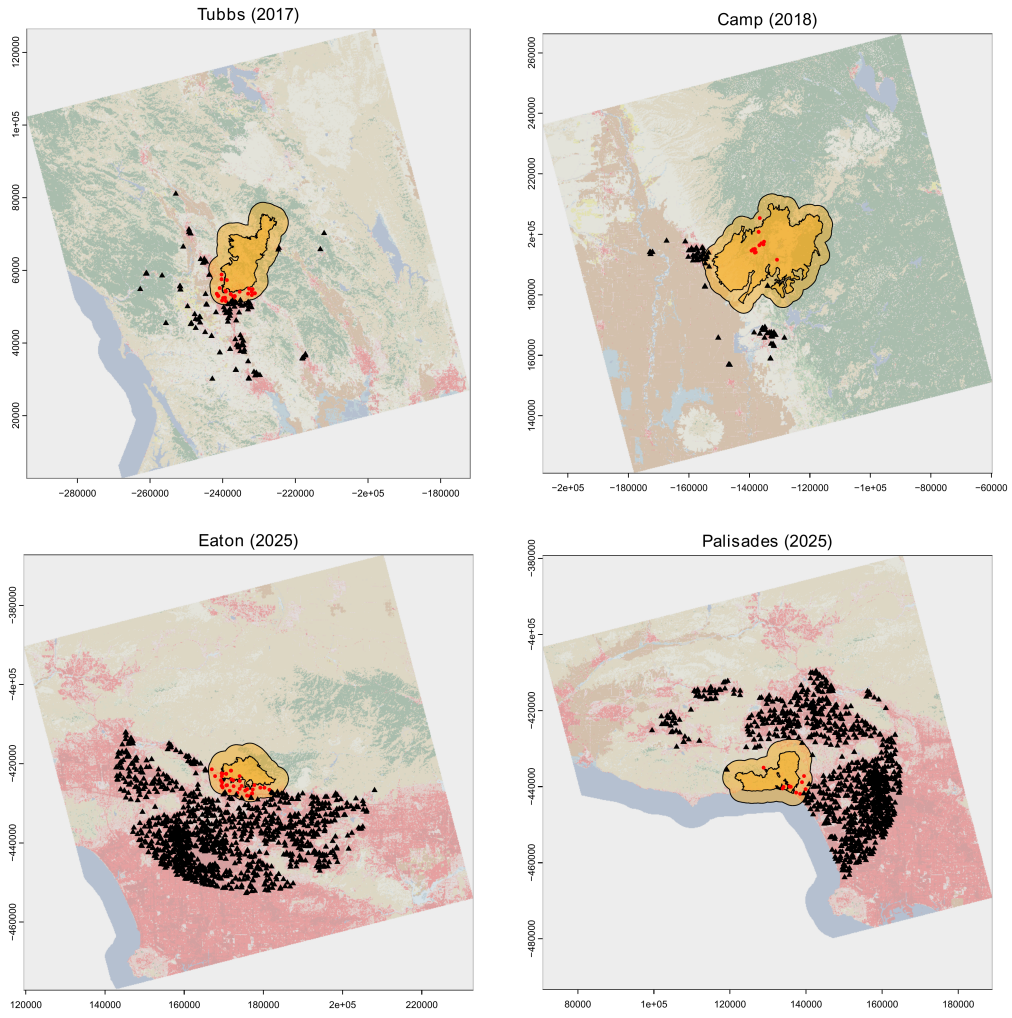


Figure 2: In-perimeter (red) and out-perimeter (black) schools for Tubbs (2017), Camp (2018), Eaton (2025) and Palisades (2025) fires

Figure 2 demonstrates the in-perimeter and out-perimeter schools for four fires: Tubbs (2017), Camp (2018), Eaton (2025), and Palisades (2025). The fire's burn scar is depicted in the darker orange shade and a 2-mile buffer of the perimeter is depicted in the lighter orange shade. The red dots show the in-perimeter schools, while the black triangles show the out-perimeter schools within

the 20-mile radius but had almost no damage in their catchment area.

## 2 Methods

Isolating the in-perimeter and out-perimeter schools is the first step in the localized differences-in-differences estimation. The second step is ensuring that the estimation routine can keep these contained within these sets. Commonly used regression implementations of differences-in-differences such as two-way fixed effects regressions (where a fixed effect is implemented at the zip code area level or school-grade level and year level) cannot be easily adapted to a setting where local sequestration of control and treatment sets are important.

We estimate differences-in-differences estimates for each in-perimeter zip code or each in-perimeter school first. These sub-estimates can then be aggregated flexibly. When schools within the fire perimeter differ in their extent of damage, having access to school-grade level effects allows aggregation within damage classes.

We formally describe the algorithm that calculates these estimates below. We do so in the context of schools at grade levels. The zip code level estimation is similar but simpler without the grade-level $g$ subscript. Let $Y_{s,g,t}$ be some outcome (enrollment numbers, participation rate) observed for school $s$, grade $g$ at testing year $t$. All out-perimeter schools have the class of damage normalized to 0. Also define the set of in-perimeter schools for each fire as $In_f$ and $Out_f$, and let the set cardinalities be $|In_f|$ and $|Out_f|$respectively. For any school in $In_f$ and a grade offered by that school $g$, let the school-grade level estimate is:

$$DID_{s,g,t} = |In_f|^{-1} \sum_{s \in In_f} (Y_{s,g,t} - Y_{s,g,t-1}) - |Out_f|^{-1} \sum_{s \in Out_f} (Y_{s,g,t} - Y_{s,g,t-1}).$$

The baseline year that the post-fire outcomes are differenced against is the testing year prior to the fire.

Further averaging of these estimates allows us to obtain fire level damage.

$$DID_f = |In_f|^{-1} \sum_{s \in In_f} DID_{s,g,t}.$$

These sub-estimates are further aggregated to produce total grade-level aggregates. Assuming

that for a grade $g$, there are $S_g$ schools in the in-perimeters of all fires, we denote the aggregate as,

$$DID_g = |S_g|^{-1} \sum_{s \in S_g} DID_{s,g,t}.$$

Damage-level averages can also be obtained. Assuming that for a grade $g$, there are $S_{g,d}$ schools that are within a fire perimeter and that also sustain $d$ level of damage,

$$DID_{d,g} = |S_{g,d}|^{-1} \sum_{s \in S_{g,d}} DID_{s,g,t}.$$

Equivalent damage-level averages for zip codes are notated as $DID_d^{\text{zip}}$ where $d$ is the level of damage specific to the zip code level.

Due to the small size of the in-perimeter sets, we opt to use a conformal predictive interval instead of a confidence interval (Barber et al., 2021). The conformal intervals will be wider than the confidence interval produced by standard techniques such as regressions. The conformal interval for these initial estimates $DID_{s,g,t}$ are obtained by assuming that the variance of the in-perimeter school is equivalent to the variance calculated of the out-perimeter schools. Intervals for aggregates are obtained from averaging these intervals. The estimation was implemented using software `didunit`. See Clark et al. (2026) for further details on the calculation of conformal intervals and aggregation procedure used by the software.

# 3 Results

We begin with the zip code area level results. The following figure 3 plots the estimated drop in enrollment for all grades 1 to 12 for schools located in that zip code in the immediate aftermath of the fires.

Schools in zip code areas with more than 1000 parcels of damage see the sharpest declines in enrollment, averaging at about a loss of 400 for these zip codes. For all other damage levels, the effect on enrollment is null. When damage is below 100 parcels, the effect is close to positive, possibly because these areas are receiving displaced populations from nearby affected areas. We also calculate the effect on enrollment two and three years after the fire (See Figures A.1 and A.2

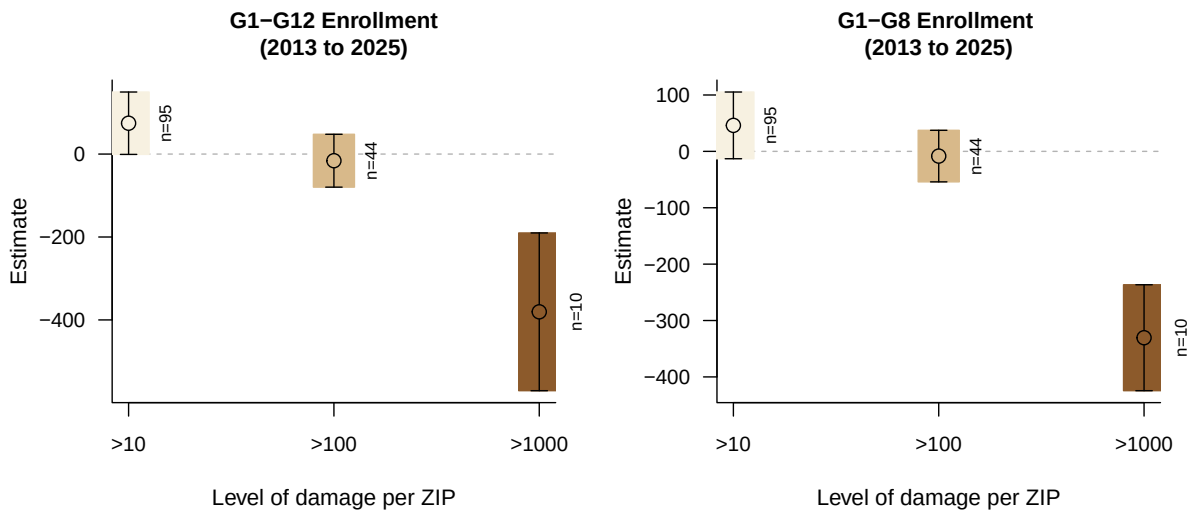


Figure 3: Disenrollment from fires from 2013-2025 at zip code level

in the supplement). With an average of loss of 400 per zip code with more than 1000 parcels of damage, we see the average exodus of about 4000 students lost over and above other underlying trends such as outmigration for economic reasons.

Some school districts are rather large especially compared to their neighbors, so school districts can lose enrollment in one zip code but gain in others. In these cases, a zip code level differences-in-differences estimate is not informative. However, we can provide some rough calculations of what the most affected (more than 1000 parcels) school districts may have lost due to fires by comparing the post-fire loss in enrollment to its pre-trend loss in enrollment.

There were 11 school districts that sustained more than 1000 parcels of damage over the period 2013 to 2025. Of this, 8 school districts lost enrollment over and above their pre-trend. These 8 school districts lost over 10000 students collectively, with the largest losses for Los Angeles Unified from the Palisades Fire (6790), Paradise schools from the Camp Fire (2062), Pasadena Unified from Eaton Fire (608), and Santa Rosa High School from the Tubbs Fire (505).

We now consider the school-level participation and performance results. All results are presented in four panel graphs where the top-left panel is the number of students registered for testing in April, the top-right panel is the percentage of the students that presented for the tests of those that were registered, the bottom-left are the percentage of the students that attained math or reading proficiency (as noted), and the bottom-right has the school-grade cohort's mean math or

reading score. The baseline outcomes are taken from the April testing cycle from before the fire. Enrollment in April differs from the enrollment used previously in figure 3, which is the enrollment on Census Day in September. The April enrollment is what was observed by the California testing system in April for that school and is more an indicator of test participation for the specific subject than enrollment in school itself since not all enrolled students will be testing for the specific tests. All interval estimates are 95%.

Figure 4 shows destructive effects of all fires in the sample for the four outcomes. There were a total of 62 fires that had at least one in-perimeter school in the sample from 2015-2025. The total number of in-perimeter schools in the sample is marked in red above the grade axis in the plot. Figure 5 presents these same results for schools with more than 1000 parcels of damage.

Testing registration declines are observable for all grades, and is most striking for high school students (grade 11). Figure 5 shows that the schools contributing to this decline are those that have the worst catchment damage, that is, over 1000 parcels in the 2-mile radius. Grades 4, 5, 8, and 11 in the medium damage class also see significant decline in enrollment. If the damage is minor, none of the grades see significant declines in enrollment. See Figure A.7 in the supplement for the full damage level breakdown.

The participation rate is the percentage of students of those registered whose exams were scored. This also declined for most grades but was only significant for grades 5 and 7 in all schools. When disaggregated by damage extent (top-right panel of Figure 5), the participation rates for the worst damage category show significant declines for all grades except the 3rd. Participation declines were not significant for other damage categories. See Figure A.7 in the supplement for math participation and Figure A.8 for reading participation across all damage categories.

Mean scores and proficiency rates in mathematics significantly declined only for grade 4. When disaggregated by damage, average proficiency or mean scores declined for grades 4, 6, and 11 in the worst damage class. Reading scores declined for grades 4 and 11 for all affected schools and for grades 4, 6, and 11 in the worst damage class. With very few exceptions, we see null effects for all other damage classes. Of all the grades, the worst performing grade in the worst damage class was the eleventh grade.

The estimates on participation underestimate the true impact on participation because participation is calculated as a percentage of students who were enrolled at time of testing. So participation

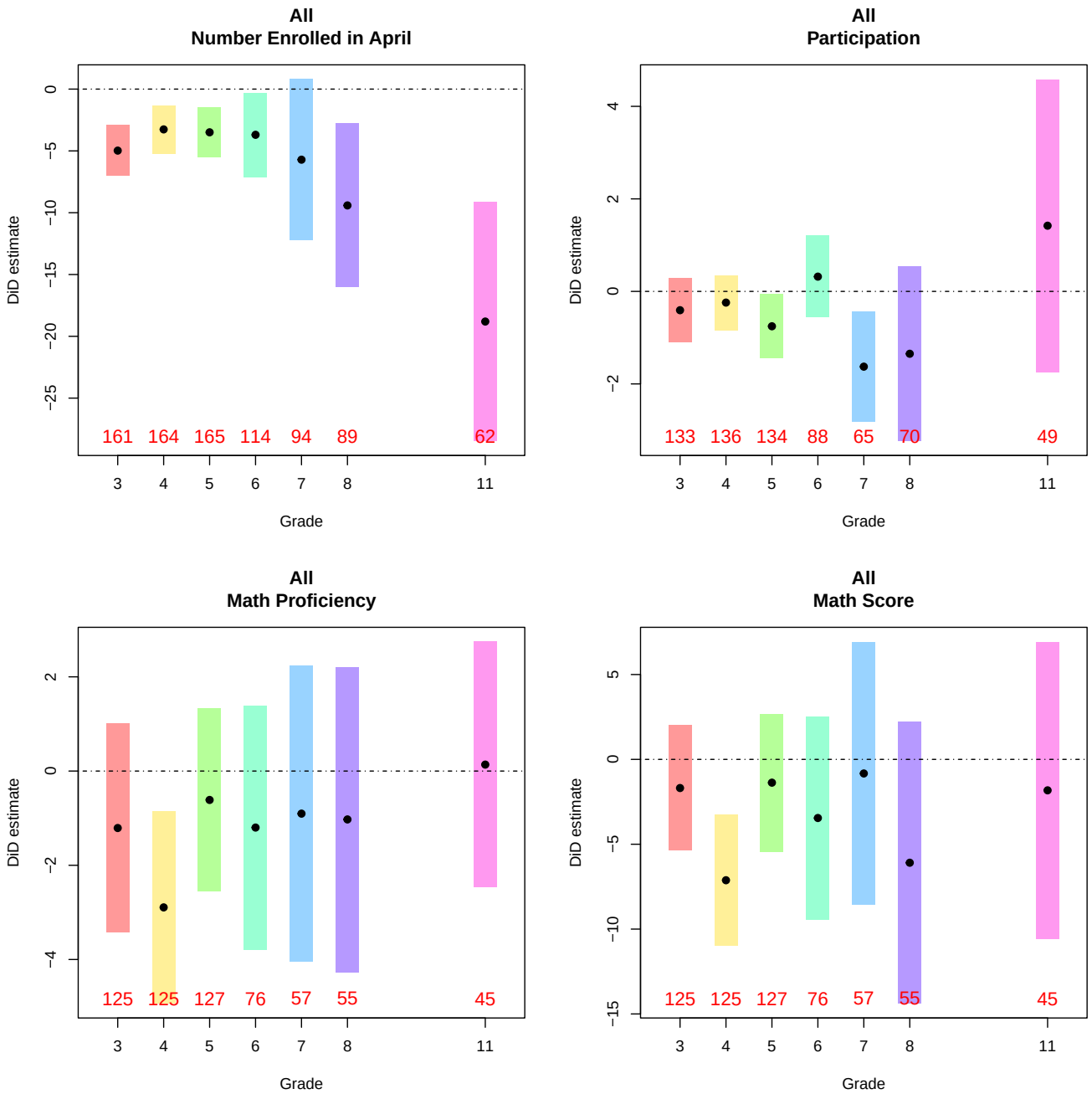


Figure 4: The displacement effect of fires from 2015-2025 on grade level participation and performance outcomes

rates are calculable for only those students that did not leave the school before testing registration for April.[1]

[1] An alternative calculation of participation rate is the number tested as a percentage of the number enrolled at Census Day. However, a Census Day enrollee is not always eligible to take the test. Using the Census Day enrollment can be misleading if particular schools enroll more students that are ineligible than others.

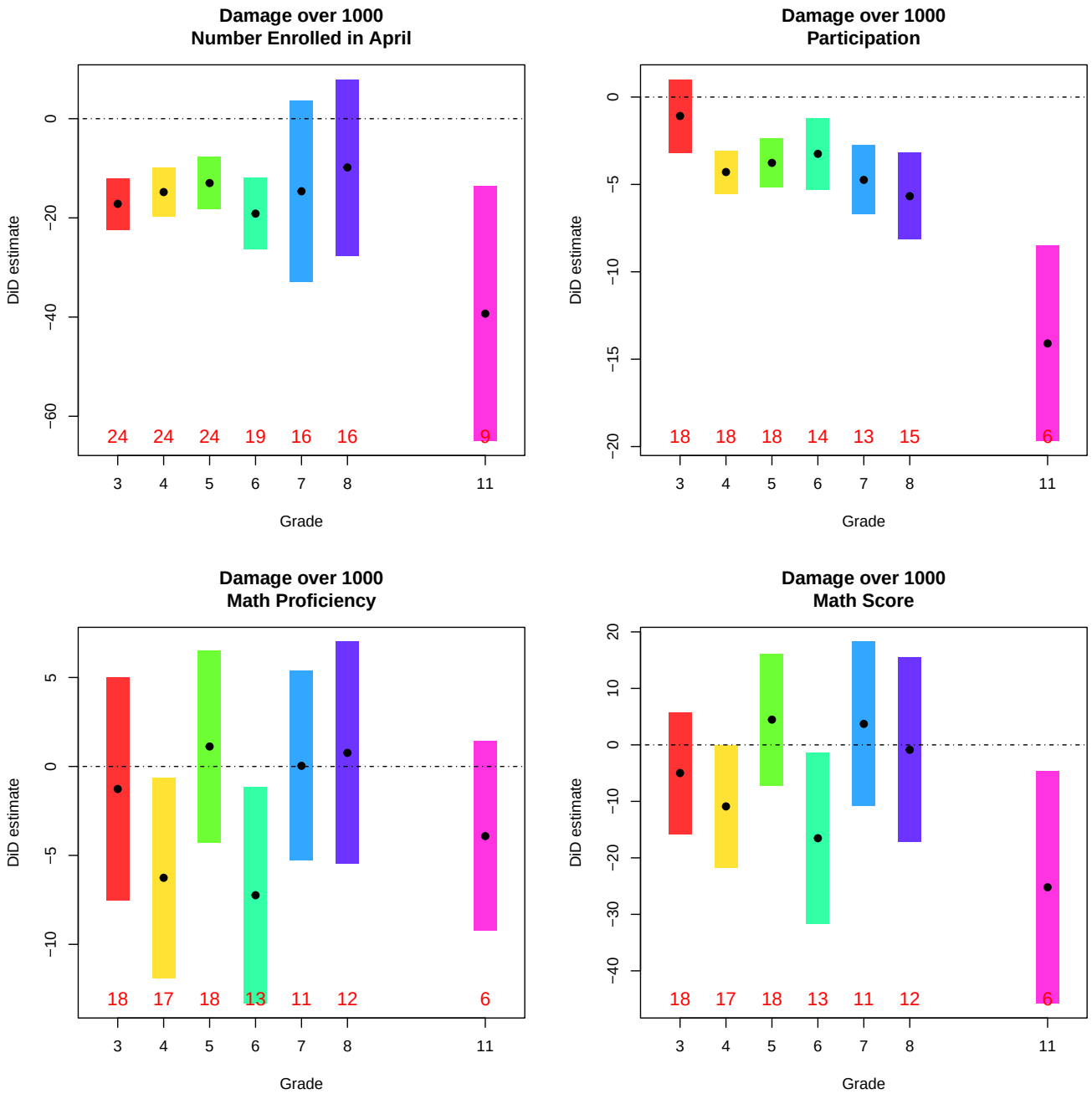


Figure 5: The displacement effect of fires from 2013-2025 on participation and performance among worst affected schools

Selection effects due to privacy masking also likely underestimate the negative effect on participation and performance. Notice the changes in sample size between the two top panels. For instance, there are 161 in-perimeter 3rd grade cohorts that were active on Census Day, but only 133 of them have participation information. The remaining schools either did not report grades

data or were excluded due to masking. We cannot be certain of the effect on participation declines if this information was available. But at least among the worst affected schools, a drastic drop in test registration would also suggest a decline in exams sat and scored. These drops in participation also forewarn another type of selection effect: self-selection into testing. Students enrolled in the same school but displaced is less likely to test, as are students that expect to perform poorly even if not displaced.

A common pattern we observe in the data is that an affected school sees drops in number of students tested but sees improvements in test performance. This school selection is seen in the context of Camp Fire with its effects on test participation and performance described in 6. Consider grade 7, for illustration. Five schools had students registered for grade 7 testing, but only 2 reported math scores. Of those who reported scores, the math proficiency and mean math score had both increased.

Another example of this pattern is Palisades High. The school was entirely destroyed in the Palisades Fire (2025). Out of the 724 students enrolled in Census Day of October 2024, only 305 appeared for testing. But those who appeared for testing did markedly better than even the 2019 pre-Covid baseline of 52%, with proficiency rate rising to 61%.

These performance results cannot be interpreted as the effect on the entire sample of displaced students. However, we can interpret them in the narrow sense of the effect on the stayers that chose to sit the test. Despite the positive selection concerns, for the worst displaced schools, math scores declined for 3 of the 7 grades.

We are not yet able to comment on the dynamic effect of the displacement, because we do not have the 2026 April testing results. The dynamic effect of fires such as Camp Fire and Woolsey Fire is also not observable because of testing disruption during the pandemic.

### 3.1 Fire level results

Disruption effects can differ among even the most destructive fires. Figures 6 and 7 show the estimates for our interested outcomes when considering the Camp (2018) and Eaton (2025) fires separately. The supplement includes similar figures for Tubbs (2017) and Palisades (2025) fires (Figure A.15 and A.16 respectively).

The Camp Fire directly damaged eight schools. Paradise Elementary, Achieve Charter, and

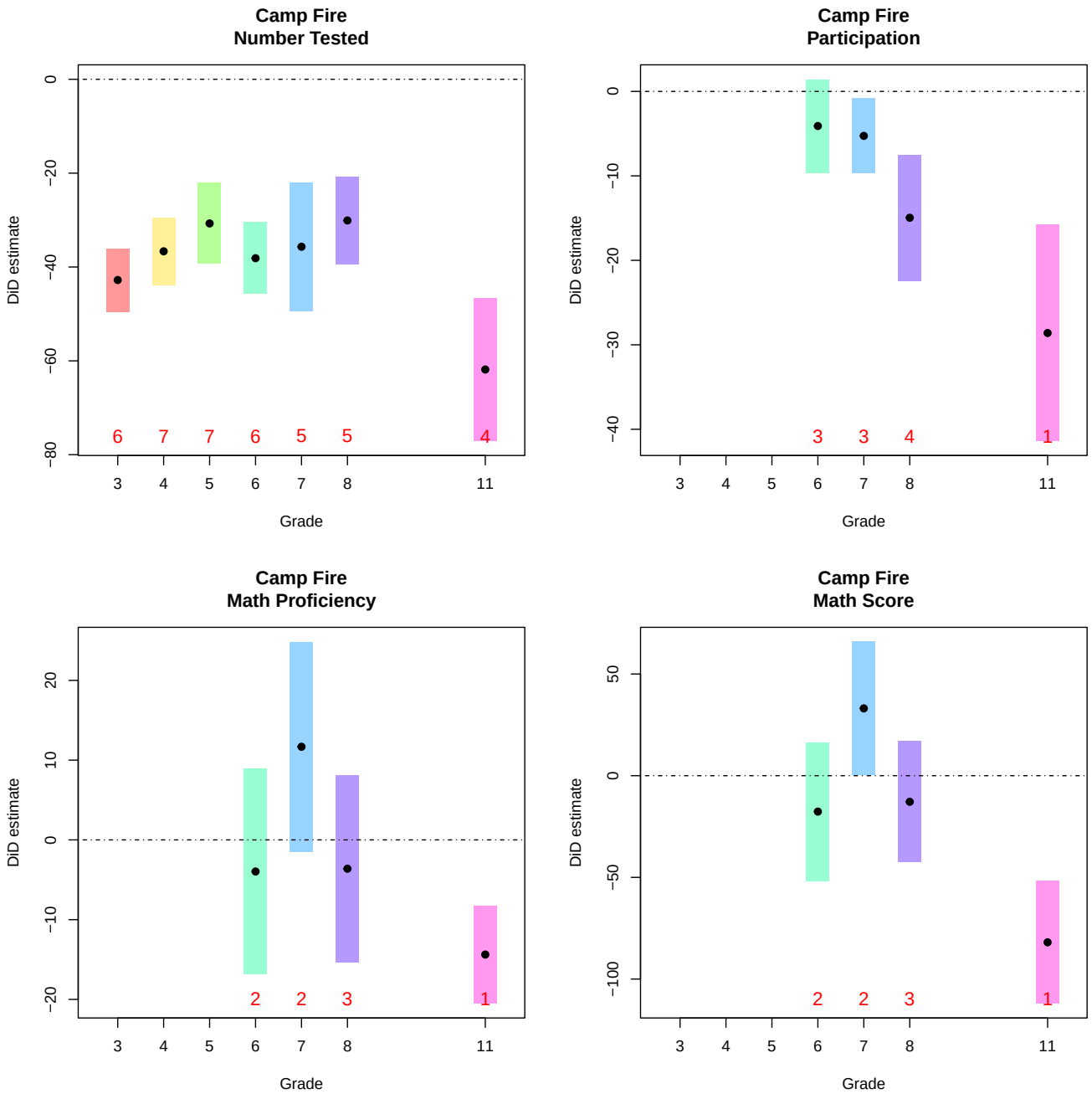


Figure 6: The effect of Camp Fire (2018) on test participation and performance

Ridgeview High completely collapsed, while others sustained various levels of damage (Schulze et al., 2020). Many affected schools consolidated to offer instruction in August 2019, but none of the affected schools offered the test in Spring 2019. This is observable from the top-left panel in Figure 6 where enrollment at testing dropped significantly for all schools. Participation rates declined

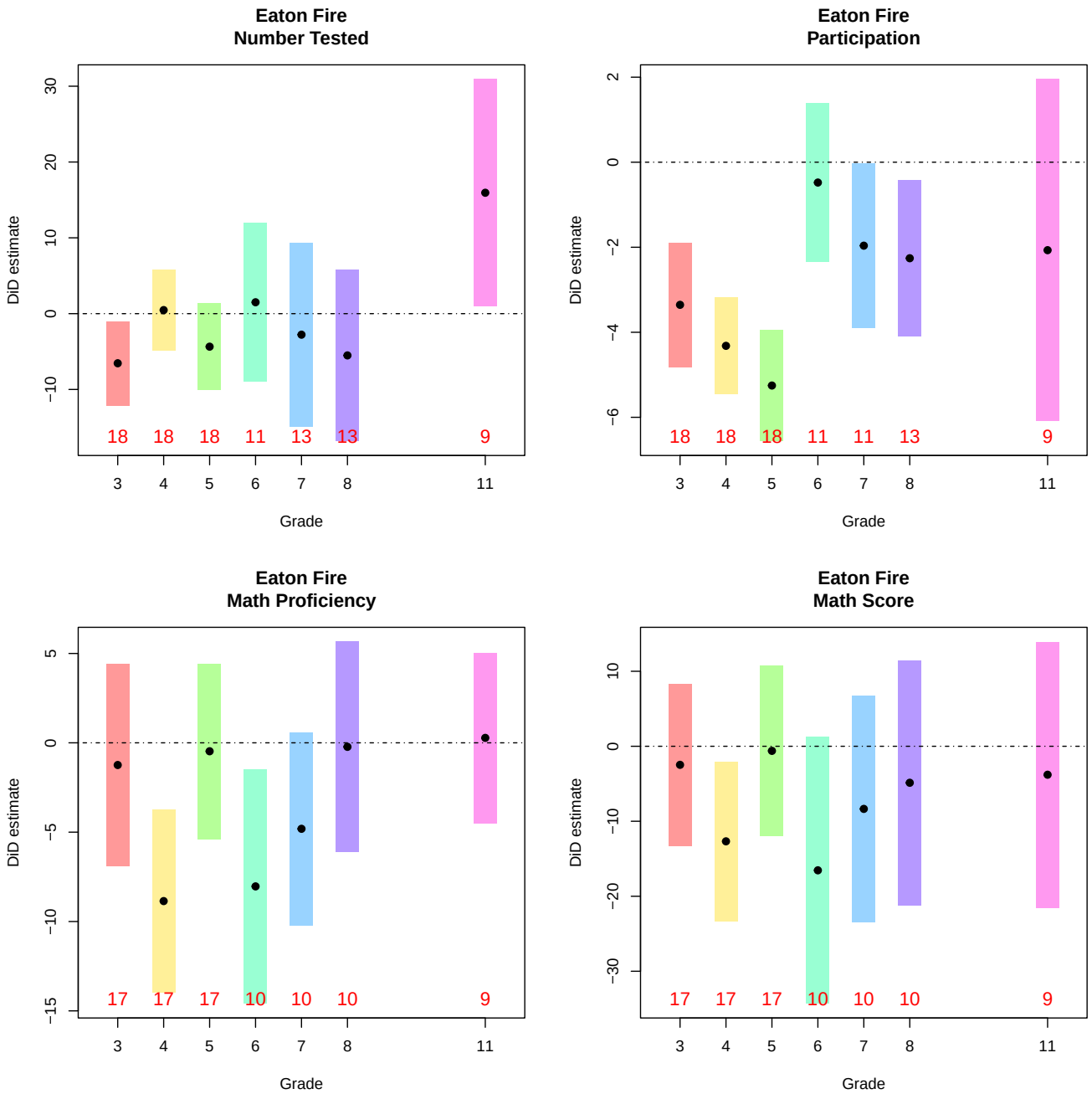


Figure 7: The displacement effect of Eaton Fire (2025)

significantly for grades 7, 8, 11. More importantly, there were considerable sample losses. None of the in-perimeter schools reported grades and therefore we do not observe any information for grades 3, 4, and 5.

Eaton fire did less direct property damage, and though having occurred closer to April testing

adaptation to the damage seems to have been swift. Therefore significant enrollment losses were only noticeable for grade 3, and except for two middle schools, all in-perimeter schools reported grades. However, participation rates significantly dropped for most grades. Exception were grades 6 and 11. But these drops were much less pronounced than Camp Fire, where participation rate drops were in double digits for grades 8 and 11. Significant proficiency declines were observed for some grades 4 and 6, with the grade 7 at the cusp of significance.

The Tubbs Fire (Figure A.15) showed similar patterns to the Camp Fire, with large declines in April registration as well as a number of in-perimeter schools that did not report any grades at testing. None of the in-perimeter high schools offered the test. Enrollment losses were significant for lower grades and half the elementary schools did not offer the test. For the schools that offered the test, however, there were no significant drops in participation rate, math proficiency, or math score. Palisades Fire (Figre A.16) showed a similar pattern; enrollment declined significantly, but other outcomes did not. There were also no sample losses, implying that all schools offered the test.

There are many possible conditions that could explain the difference between the Camp Fire and Eaton Fire. For one, the Camp Fire was more destructive. It destroyed a large percentage of the building stock in the town. Eaton Fire, although the second most destructive fire after Camp, did not destroy as many schools, and a much smaller percentage of the building stock. This would have allowed the school district to relocate affected students to other campuses in the vicinity in time for April tests. For example, the Aveson Global Leadership Academy moved to a nearby campus at the end of January and the Aveson Student Leaders did so in mid-February. Schools consolidated and relocated after Camp Fire, but this was not in time for April tests. For example, Paradise Ridge Elementary opened in 2019 consolidating the destroyed Paradise Elementary and Ponderosa Elementary.

We also hypothesize that practice with remote learning and teaching during 2020-21 may have students and teachers transition faster (Pacitto et al., 2026). Moving to online instruction seems to be a useful stopgap for high schools whose cohorts tend to be large. Palisades High, destroyed in the fire, moved to online instruction for some time before finding a new campus in an abandoned department store in Santa Monica. State guidelines, issued after destructive fires in 2017 and 2018, may have encouraged faster transitions by tying funding to plans for independent study (Li et al.,

2022).

# 4 Policy implications

Californian school districts are on a long-term trend of declining enrollment. These trends accelerated due to the pandemic as parents migrated out of the state, or sought other options such as online schools. Since most Californian schools are funded at the state level, the state has provided several stopgaps to help schools adapt to enrollment declines. One such policy is declining enrollment funding that determines funding based on the maximum of the average of the last three years' attendance and the previous year's attendance, rather than solely previous year's attendance (California Legislative Analyst's Office, 2026).

Fire affected districts benefit from this funding policy. However, with persistent declines such policies are only temporary relief. Declining enrollment funding is also expensive, costing California $4.6 billion in 2022-23 (Smith & Barnard, 2024). In addition to the cost to the taxpayer, the policy creates a misallocation disfavoring growing districts. For example, Los Angeles Unified received funding for 50,000 students that were never enrolled in 2022-23, reducing per-student funding for areas such as the Central Valley that gained enrollment.

School closures and consolidations are politically painful for school districts. So even when school districts are in dire financial straits and are on the verge of losing local control, school boards delay closures to avoid political pain. Various interest groups can use political leverage to make the closure process more costly even when it is inevitable. For instance, bowing to pressure from unions, Los Angeles Unified and Oakland Unified signed even more generous compensation contracts despite both districts spending more than they take in (Blume, 2025; DeBenedetti, 2026).

A better strategy for fire affected schools is to anticipate this declining enrollment and make plans for consolidation in under-enrolled schools. Prudently reducing costs now can help school districts better manage their stopgap funding and stop further bleeding. Wildfires and other disasters make this urgency more salient, and can be an opportunity for a less resistant reform process. In the aftermath of Hurricane Katrina, the state of Louisiana created a Recovery School Board that overtook all but the best performing schools in New Orleans, closed the lowest performing schools, and introduced a policy of open enrollment for all other remaining schools.

Some worry that such measures can make the disaster-related disruption feel worse (Cano, 2019). But the New Orleans reforms improved grades and college entry rates in the students in the near-term (D. Harris & Larsen, 2019) and reformed schools performed better decades later (Carroll & Harris, 2025).

# 5 Conclusion

Wildfires large enough to displace entire school districts is a relatively new phenomenon in the United States. But since the Valley Fire of 2015, this has become a common experience in California. The 2025 fires were particularly disastrous destroying 17,000 homes in Los Angeles County. This paper documents the impact of these fires on schools and students in affected school districts. We use a granular dataset on destruction to isolate where the disruption effects are the worst and specifically discuss the effects of long-term displacement as opposed to schooling disruptions.

Our results demonstrate that enrollment declines from public and charter schools are considerable, with the worst affected school districts losing about 10,000 students in that period. They are also persistent, indicating that few of the displaced return. These enrollment declines intensify an existing public school fiscal crisis induced by low birth rates, domestic out-migration, and an expansion of K-12 education choices.

In addition to a persistent decline in enrollment, we also find immediate declines in students registering and participating in the tests in April. Test participation monotonically declines with the level of damage sustained in the school catchment. Participation declines signal problems with test preparedness. But selection into testing by the least affected and better prepared students skews the true effect of displacement on test performance. Schools with the worst catchment damage are more likely to disappear from the sample of schools that remain to calculate test performance.

Without student-level data, the performance effects are not generalizable to the entire population of displaced students. Yet, despite selection into testing that occurs after fires, we still see declines in performance for three of the seven grades, with the steepest declines for the eleventh graders. This is a concern for matriculation rates and college enrollment, since older students have little time to recover their learning losses in comparison to their counterparts.

Fire-affected school districts thus face several challenges. Displacement leads to enrollment

declines and a budget crunch. The disaster also impedes the quality of instruction, leading to lower test participation, and at least for some grades, worse test performance. These quality declines in turn puts further pressure on enrollment, particularly as more and more parents are considering education options outside of traditional public schools. The possibility of cascading enrollment losses should incentivize school districts to resume normal operations with little delay. They could also use the disaster's urgency to good effect to consolidate schools into better performing schools, like in the case of post-Katrina New Orleans.

## References


Barber, R. F., Candes, E. J., Ramdas, A., & Tibshirani, R. J. (2021). Predictive inference with the jackknife+. *The Annals of Statistics*, *49*(1), 486–507.

Blume, H. (2025, August). *Hundreds of thousands fewer students, but few closed schools. can lausd make the math work?* Retrieved July 12, 2026, from https://www.latimes.com/california/story/2025-08-28/hundreds-of-thousands-fewer-students-but-few-closed-schools-can-lausd-make-the-math-work

California Legislative Analyst's Office. (2026, January). *Assessing a shift to enrollment-based school funding* (Report No. 5100) (Accessed July 12, 2026). California Legislative Analyst's Office. https://lao.ca.gov/Publications/Report/5100

Cano, R. (2019, September). *What wildfire did to one california town's schools in four years.* Retrieved July 14, 2026, from https://calmatters.org/projects/california-school-closures-wildfire-middletown-paradise-disaster-days/

Carroll, J. M., & Harris, D. N. (2025, August). *Creating and sustaining a new kind of education system after hurricane katrina in new orleans* (tech. rep.). Brookings Institution.

Clark, R., Katz, J. N., & Alvarez, R. M. (2026). Didunit: A unit-level multi-period differences-in-differences estimator in R. *SoftwareX*, *33*, 102467.

De la Torre, M., & Gwynne, J. (2009). *When schools close: Effects on displaced students in chicago public schools. research report.* ERIC.

DeBenedetti, K. (2026, April). Oakland unified has "no plan" for financial future, top alameda county schools chief warns [Accessed July 12, 2026]. https://www.kqed.org/news/12080861/oakland-unified-has-no-plan-for-fiscal-solvency-top-alameda-county-schools-chief-warns

Dowdall, E. (2011). Closing public schools in Philadelphia: Lessons from six urban districts. *Philadelphia, Pa.: Pew Charitable Trusts*.

Engberg, J., Gill, B., Zamarro, G., & Zimmer, R. (2012). Closing schools in a shrinking district: Do student outcomes depend on which schools are closed? *Journal of Urban Economics*, *71*(2), 189–203.

Fuller, S. C., & Davis, C. R. (2021). Academic progress for students following a hurricane. *Education Policy Initiative at the University of North Carolina at Chapel Hill*.

Harris, D., & Larsen, M. (2019). The effects of the new orleans post-katrina market-based school reforms on medium-term student outcomes. *Education Research Alliance for New Orleans*.

Harris, D. N., & Larsen, M. F. (2023). Taken by storm: The effects of hurricane katrina on medium-term student outcomes in new orleans. *Journal of Human Resources*, *58*(5), 1608–1643.

Horn, M. B. (2021). The rapid rise of pandemic pods. *Education Next*, *21*(1), 93–95.

Imberman, S. A., Kugler, A. D., & Sacerdote, B. I. (2012). Katrina's children: Evidence on the structure of peer effects from hurricane evacuees. *American Economic Review*, *102*(5), 2048–2082.

Kemple, J. J. (2015). High school closures in new york city: Impacts on students' academic outcomes, attendance, and mobility. report. *Research Alliance for New York City Schools*.

Larsen, M. F. (2020). Does closing schools close doors? the effect of high school closings on achievement and attainment. *Economics of Education Review*, *76*, 101980.

Li, A., Jimenez, F., Ehlers, R., & Simbol, A. (2022). *Climate change impacts across california: K-12 education* (tech. rep.). Legislative Analyst's Office. https://lao.ca.gov/Publications/Report/4586

Miller, R., & Hui, I. (2022). Impact of short school closures (1-5 days) on overall academic performance of schools in california. *Scientific Reports*, *12*. https://doi.org/https://doi.org/10.1038/s41598-022-06050-9

Morrill, M., & Westall, J. (2023). Heterogeneity in the educational impacts of natural disasters: Evidence from hurricane florence. *Economics of Education Review*, *94*, 102373.

Pacitto, J., Hayat, A., Hinks, J., Parfait, A., Rabi, A., & Ullah, N. (2026). Remote teaching and learning in emergencies: A rapid evidence review. *Education and Conflict Review*, *7*.

Pearman, F. (2026, May). *The fiscal consequences of school closures in California: Evidence from a statewide synthetic difference-in-differences design* (Technical Report) (Accessed July 12, 2026). Getting Down to Facts II. https://gettingdowntofacts.com/sites/default/files/The%20Fiscal%20Consequences%20of%20School%20Closures%20in%20CA%20Evidence%20from%20a%20Statewide%20Synthetic%20Difference-in-Differences%20Design.pdf

Rothbart, M. W., Cervantes, S., & Schwartz, A. E. (2026, February). *Hold harmless for whom? The impact of Covid era policies on school funding, teachers, and students* (Working Paper No. 285) (Accessed July 12, 2026). Center for Policy Research, Maxwell School of Citizenship and Public Affairs, Syracuse University. https://surface.syr.edu/cgi/viewcontent.cgi?article=1523&context=cpr

Sacerdote, B. (2012). When the saints go marching out: Long-term outcomes for student evacuees from hurricanes katrina and rita. *American Economic Journal: Applied Economics*, *4*(1), 109–135.

Sanburn, J. (2016, September). *Inside detroit's radical experiment to save its public schools.* Retrieved July 12, 2026, from https://time.com/4390000/detroit-public-schools-charters-debt/

Schulze, S. S., Fischer, E. C., Hamideh, S., & Mahmoud, H. (2020). Wildfire impacts on schools and hospitals following the 2018 california camp fire. *Natural Hazards*, *104*(1), 901–925.

Smith, A. G., & Barnard, C. (2024, June). *The cost of state hold harmless policies in K–12 education* (Policy Study) (Accessed July 12, 2026). Reason Foundation. https://reason.org/wp-content/uploads/the-cost-of-state-hold-harmless-policies-in-k-12-education.pdf

Sperry, S. (2012). Better schools through better politics: The human side of portfolio school district reform. portfolio school districts project. *Center on Reinventing Public Education.*

Warren, P., & Lafortune, J. (2020). Declining enrollment in california schools: Fiscal challenges and opportunities in the coming decade. *Public Policy Institute of California.*

Wen, J., & Burke, M. (2022). Lower test scores from wildfire smoke exposure. *Nature Sustainability*, *5*, 947–955. https://doi.org/https://10.1038/s41893-022-00956-y