

# Time Series Investigations

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.4      v readr      2.1.5
## v forcats    1.0.0      v stringr   1.5.1
## v ggplot2    3.5.1      v tibble    3.2.1
## v lubridate  1.9.3      v tidyr     1.3.1
## v purrr      1.0.2
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
##
## Attaching package: 'janitor'
##
##
## The following objects are masked from 'package:stats':
##
##   chisq.test, fisher.test

## Warning: package 'sf' was built under R version 4.4.2

## Linking to GEOS 3.12.2, GDAL 3.9.3, PROJ 9.4.1; sf_use_s2() is TRUE

## Warning: package 'sp' was built under R version 4.4.2

## Warning: package 'raster' was built under R version 4.4.2

##
## Attaching package: 'raster'
##
## The following object is masked from 'package:dplyr':
##
##   select

## Warning: package 'geojsonR' was built under R version 4.4.2

##
## Attaching package: 'glue'
##
## The following object is masked from 'package:raster':
##
##   trim

## Warning: package 'lwgeom' was built under R version 4.4.2
```

```

## Linking to liblwgeom 3.0.0beta1 r16016, GEOS 3.13.0, PROJ 9.5.1

## Warning in fun(libname, pkgname): GEOS versions differ: lwgeom has 3.13.0 sf
## has 3.12.2

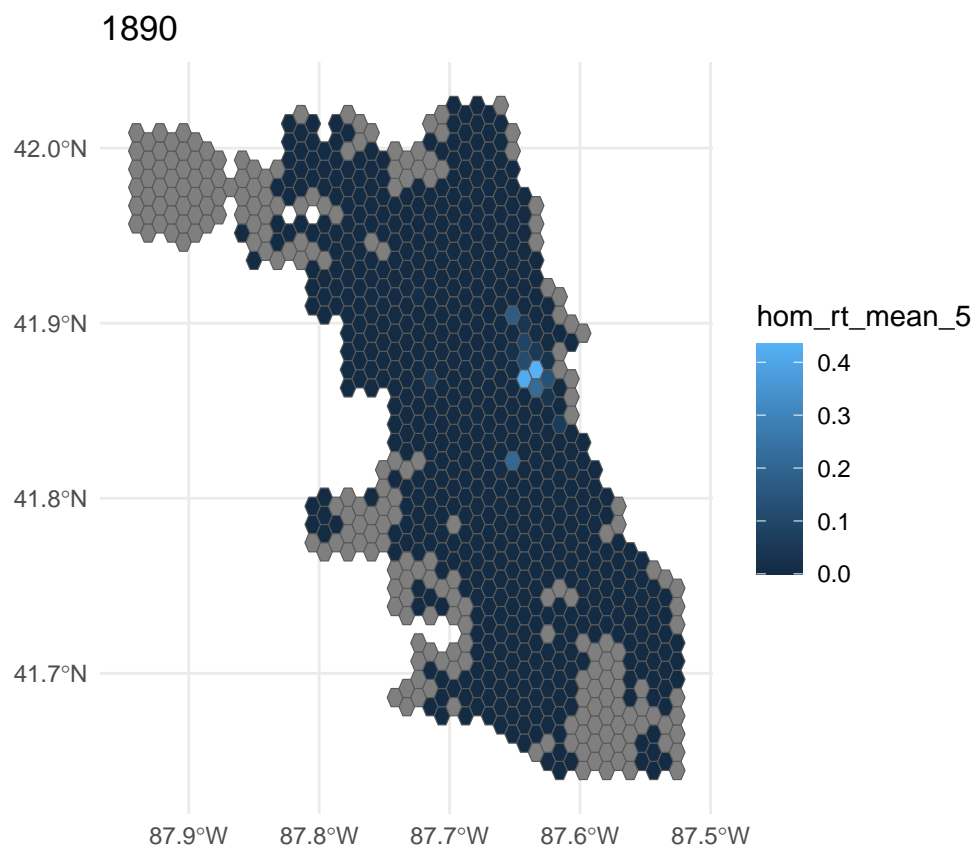
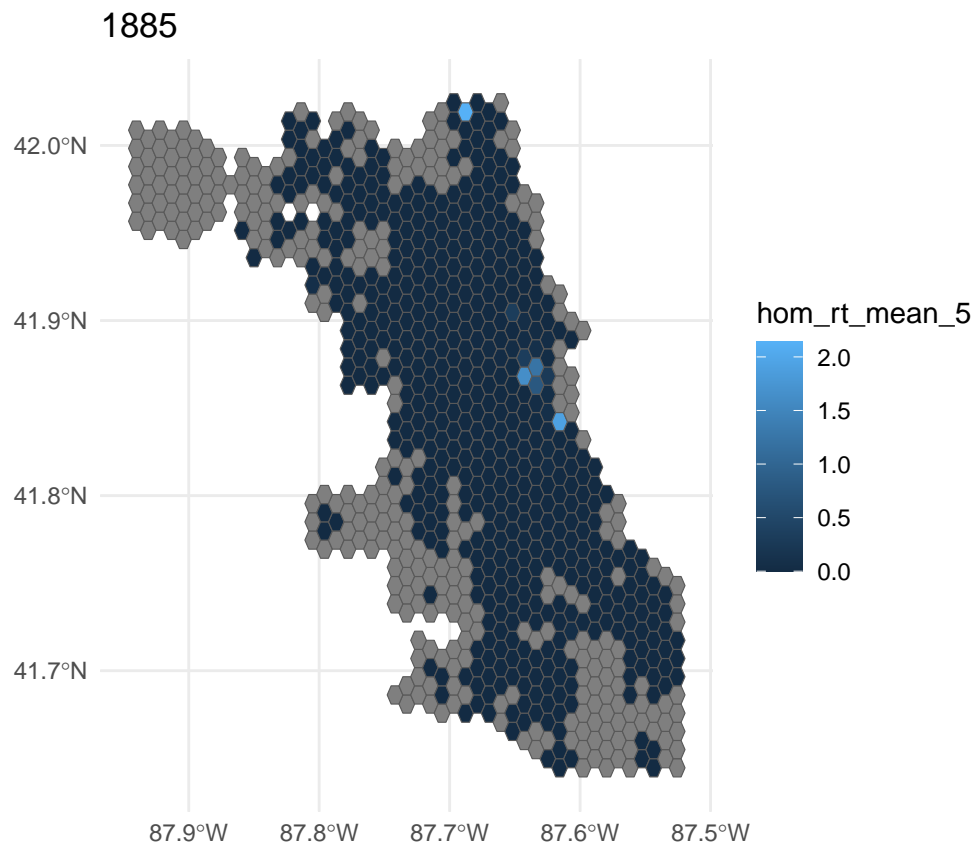
## Warning in fun(libname, pkgname): PROJ versions differ: lwgeom has 9.5.1 sf has
## 9.4.1

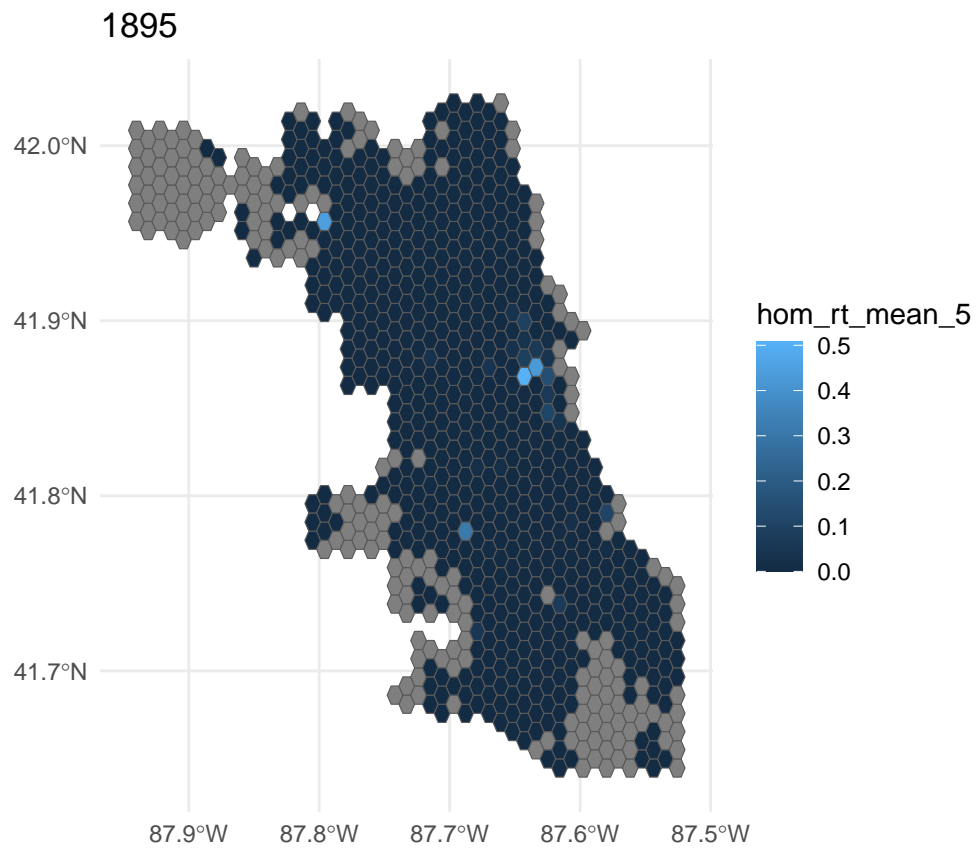
##
## Attaching package: 'lwgeom'
##
## The following object is masked from 'package:sf':
##
##     st_perimeter

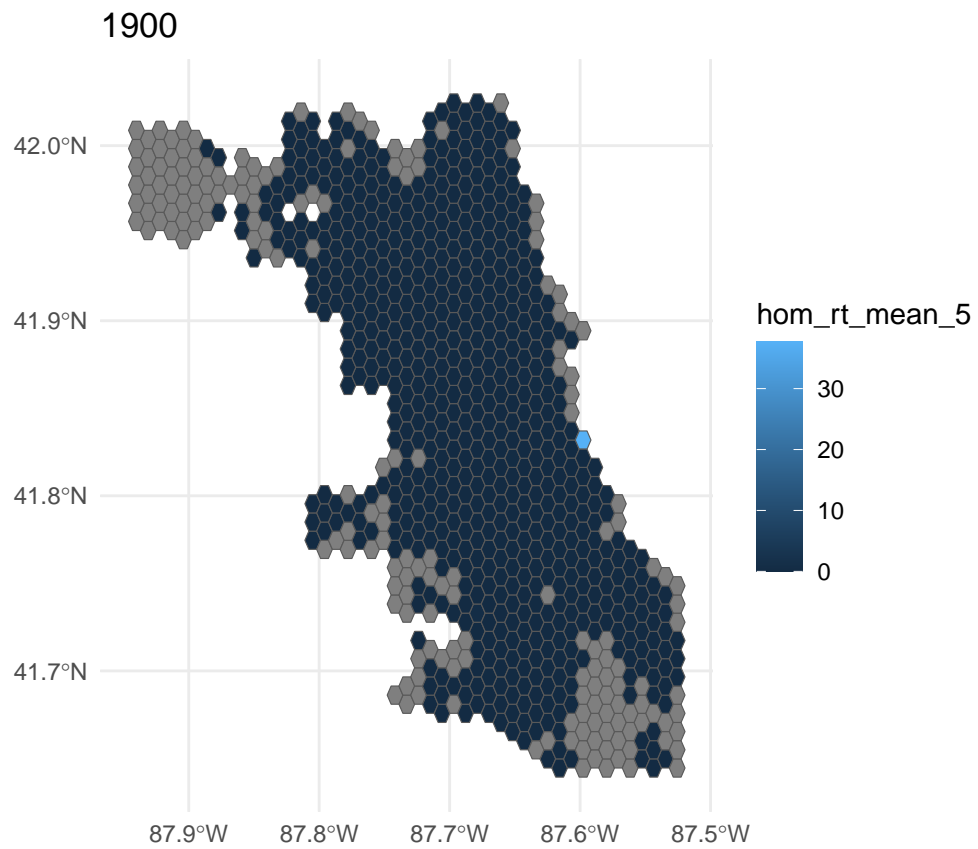
## Reading layer 'hex_merged_w_stats' from data source
##   'C:\Users\hbaue\OneDrive - The University of Chicago\Documents\GitHub\pre_1965\data\mst\hex_merged.
##   using driver 'GPKG'
## Simple feature collection with 110014 features and 48 fields
## Geometry type: POLYGON
## Dimension:      XY
## Bounding box:   xmin: -87.94612 ymin: 41.63934 xmax: -87.51956 ymax: 42.02957
## Geodetic CRS:   WGS 84

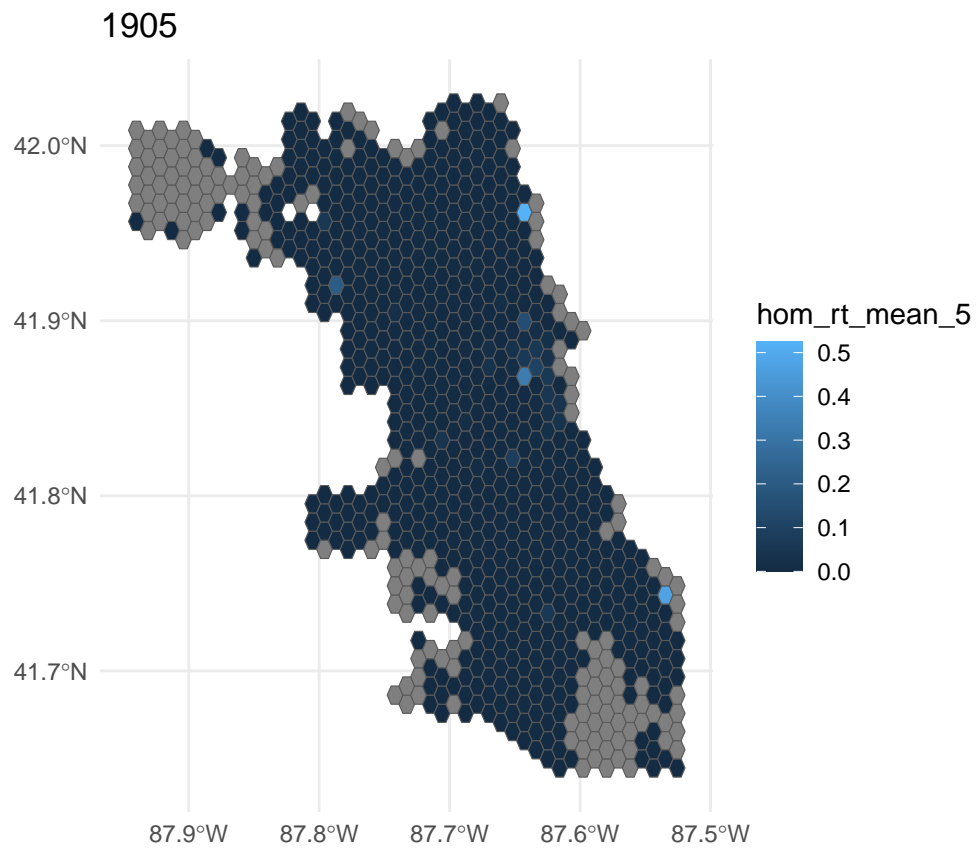
```

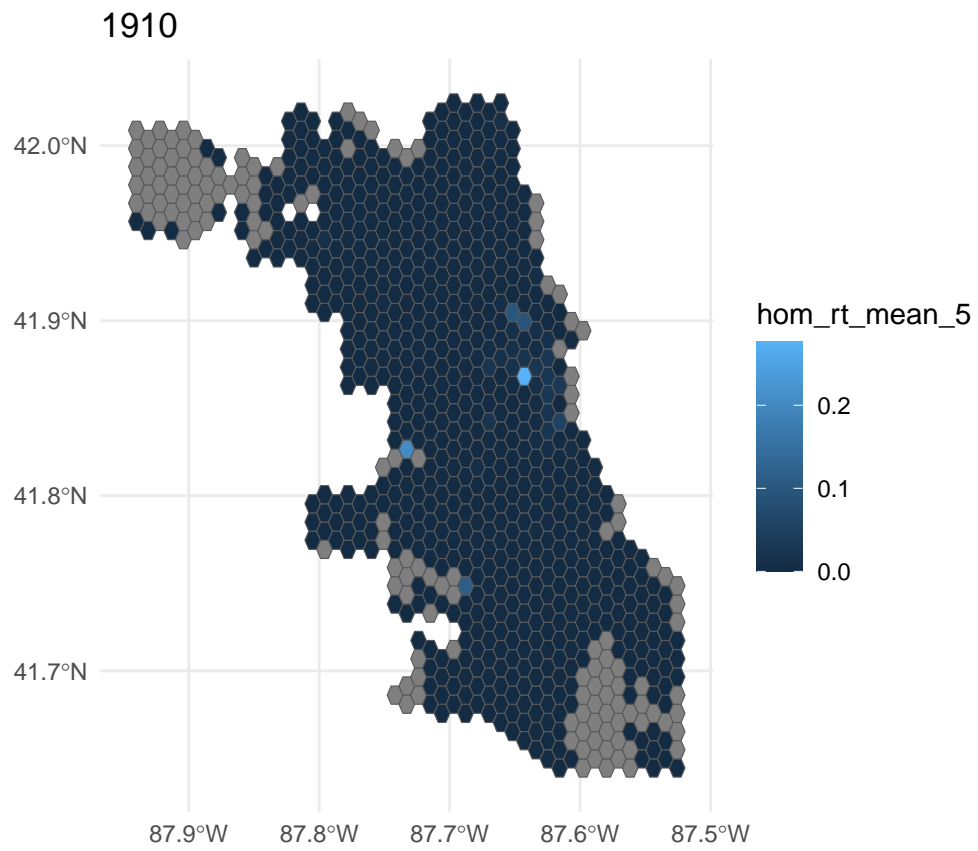
## General Plot

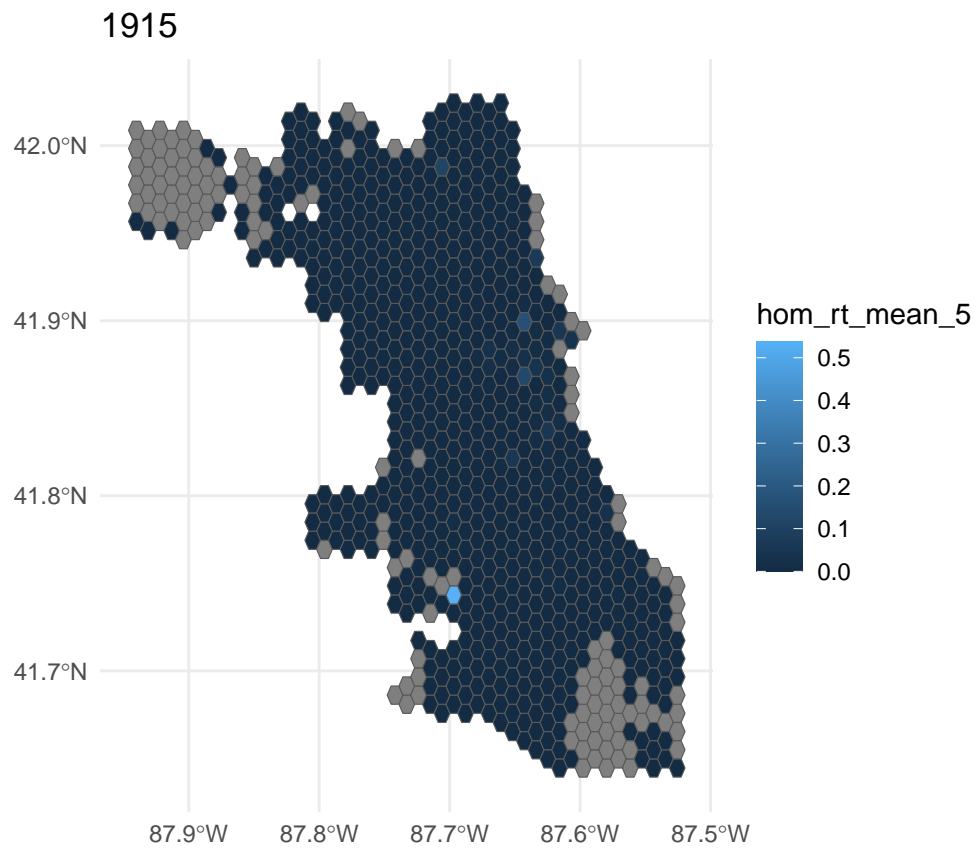




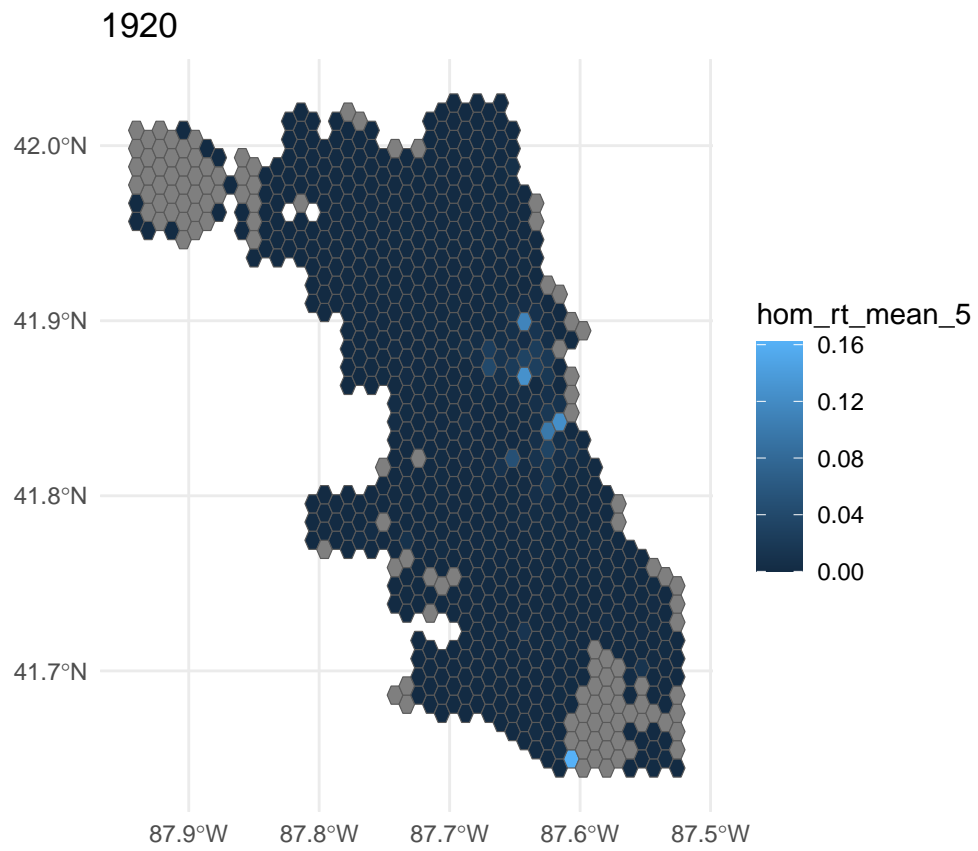


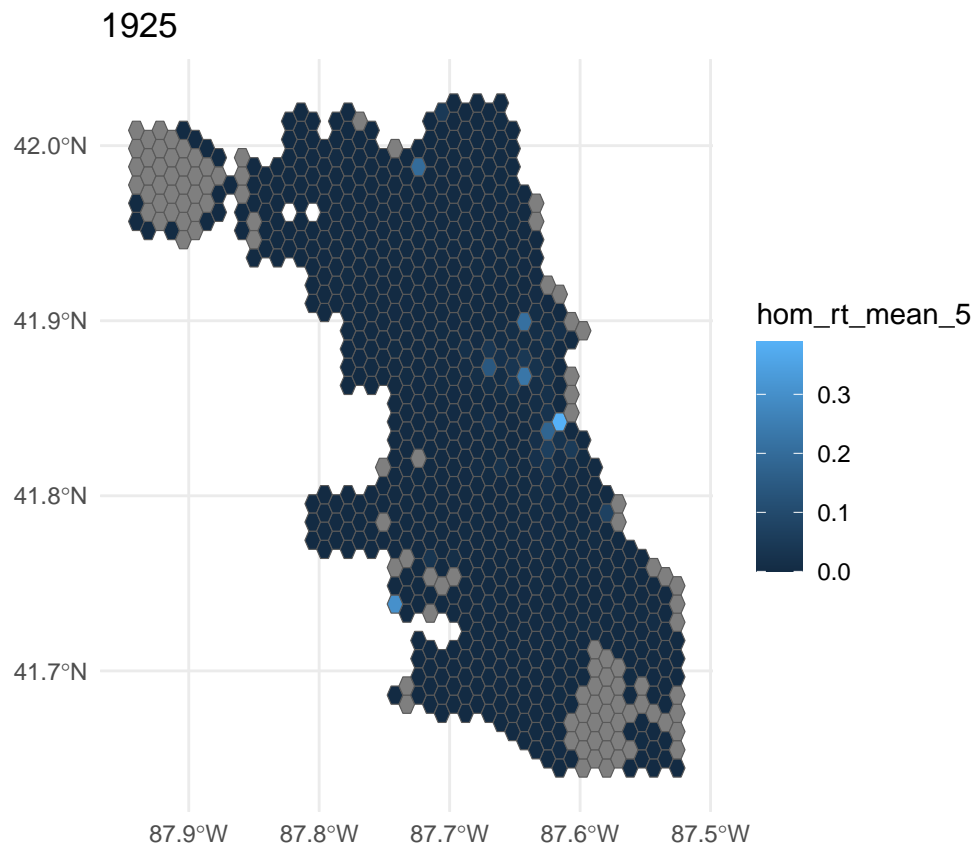


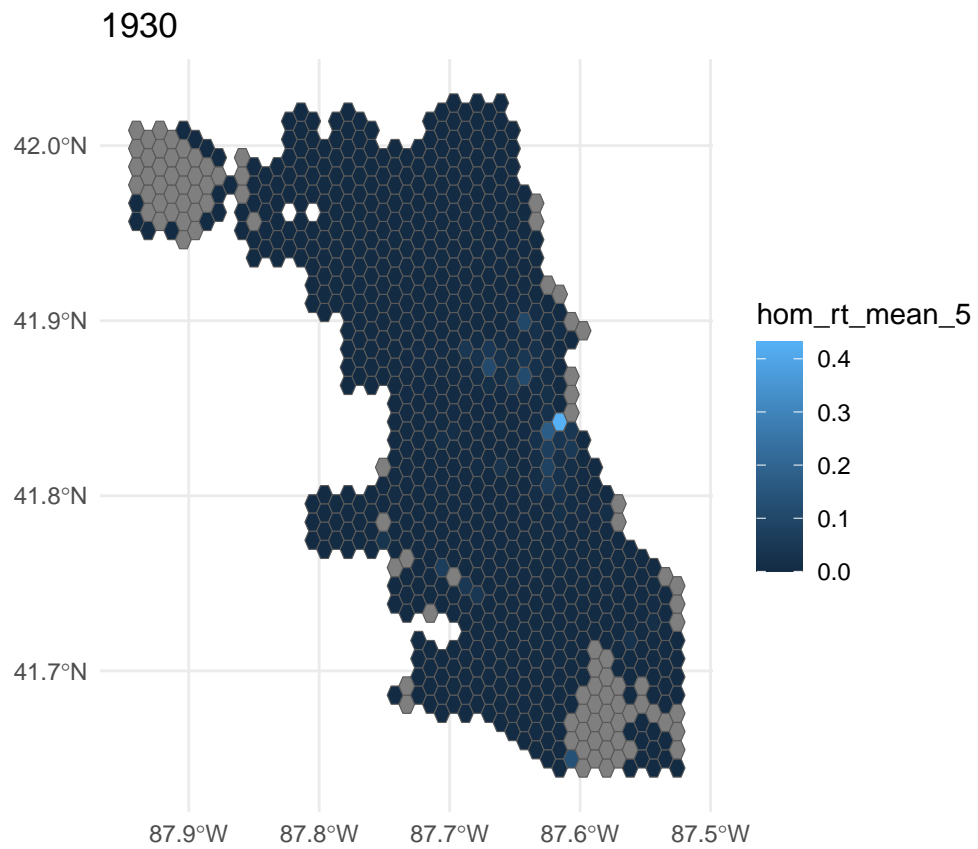




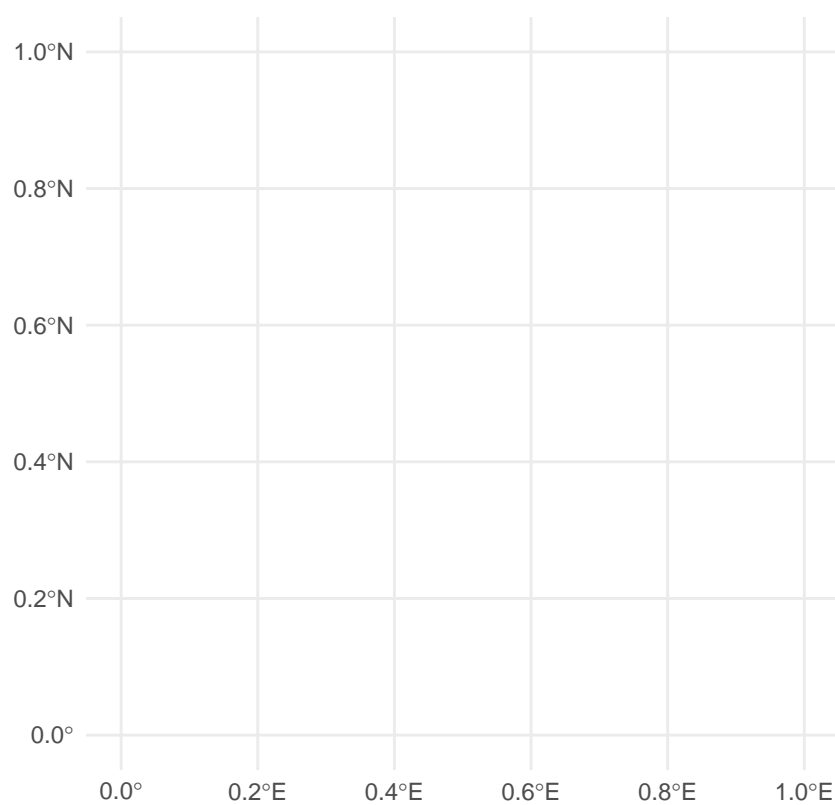


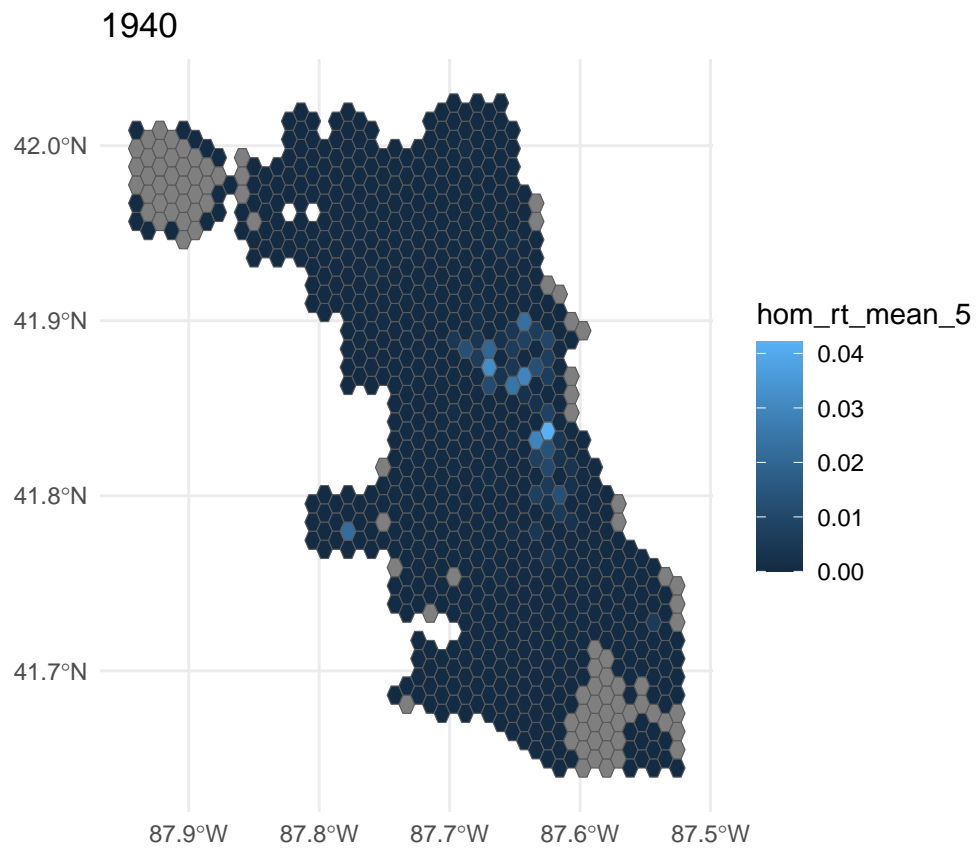


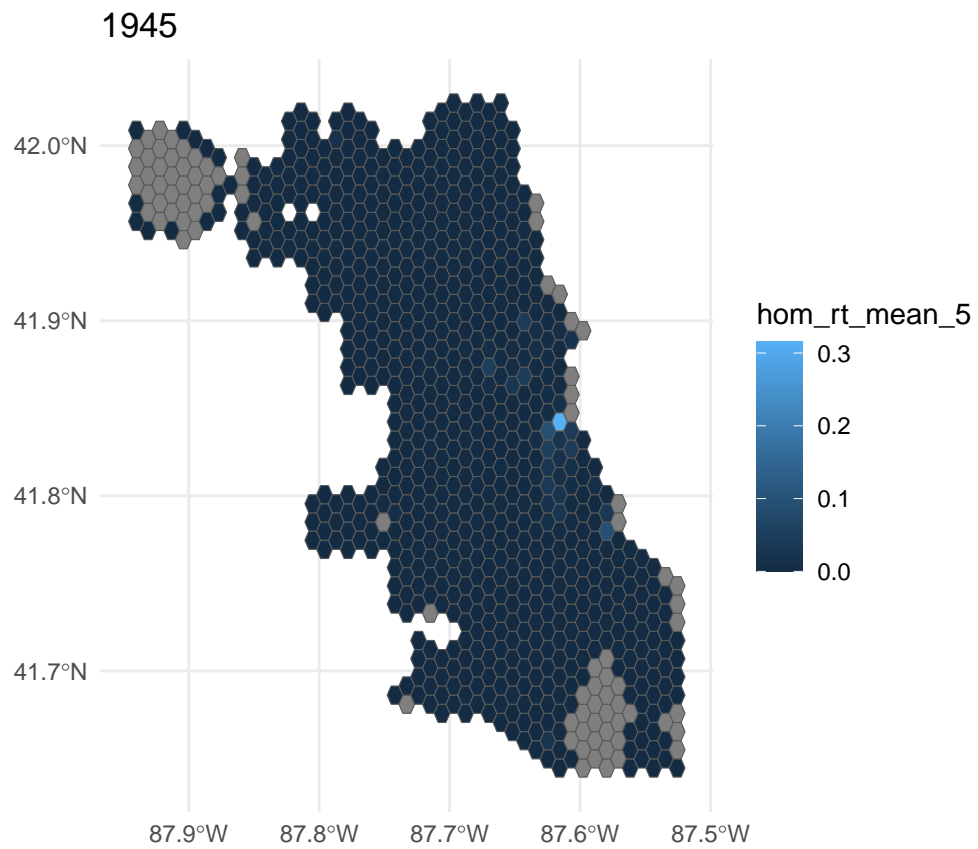


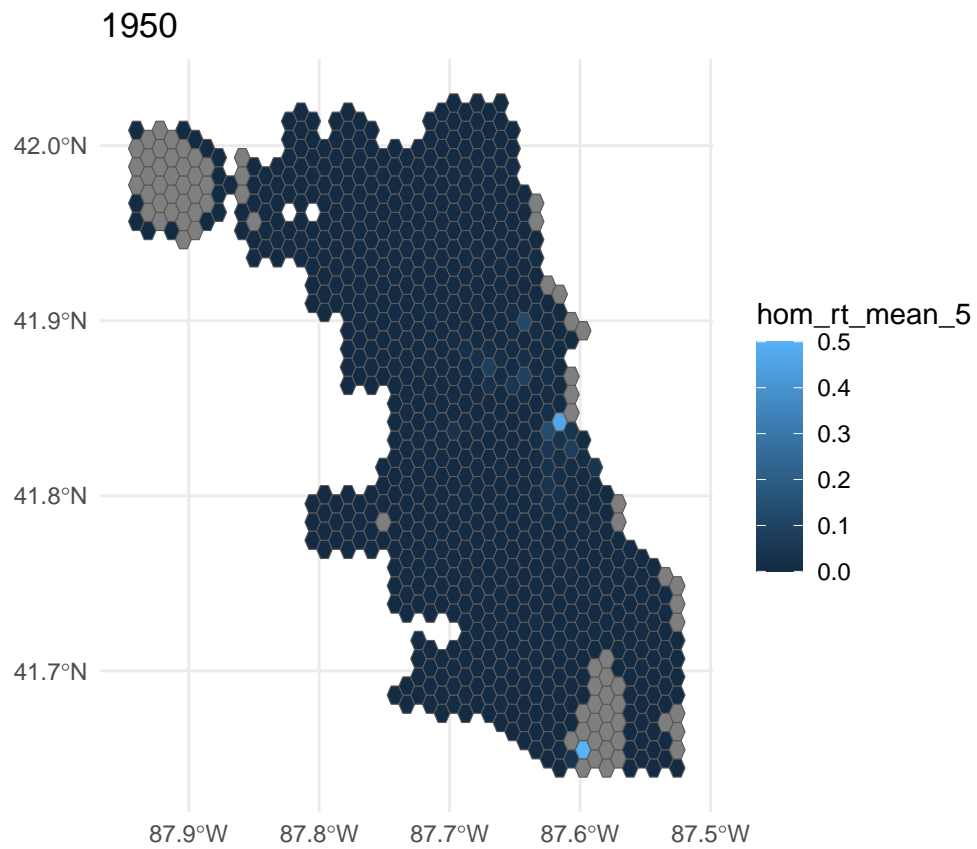


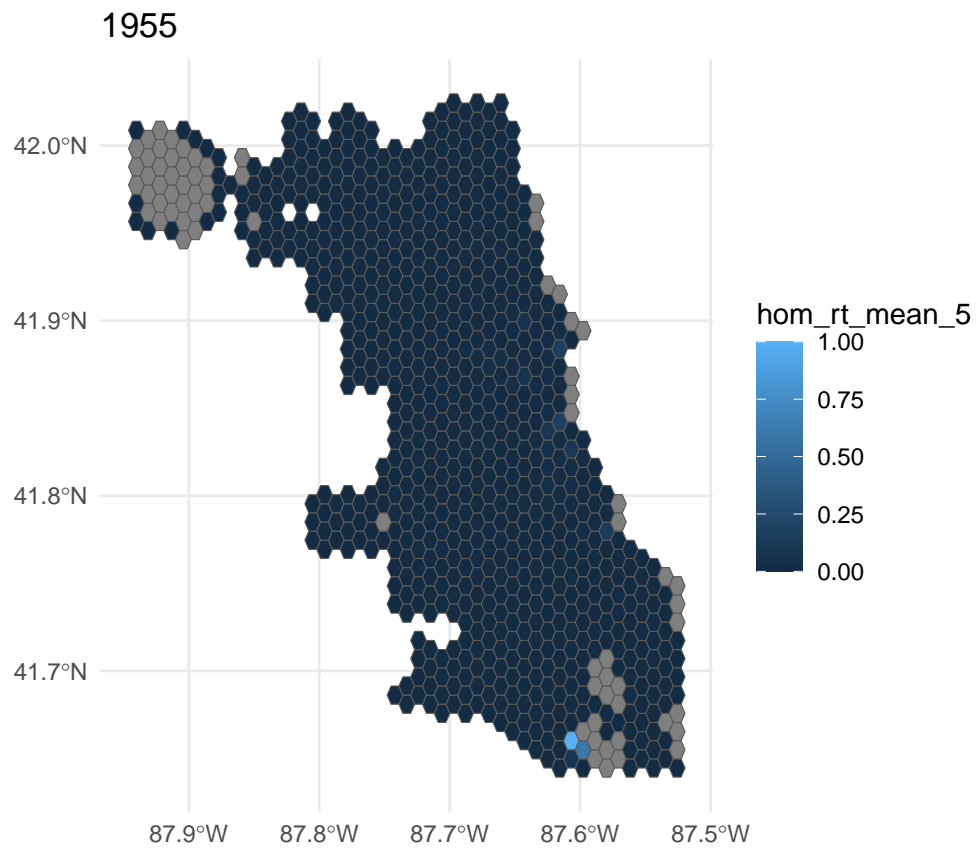
1935



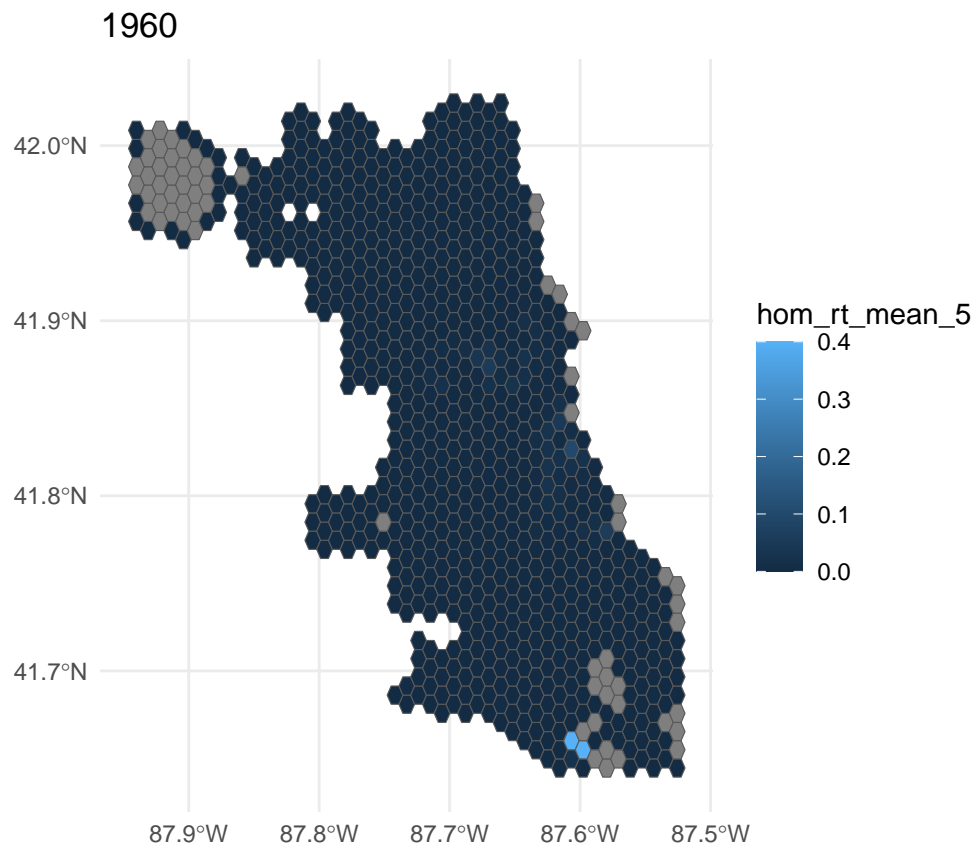


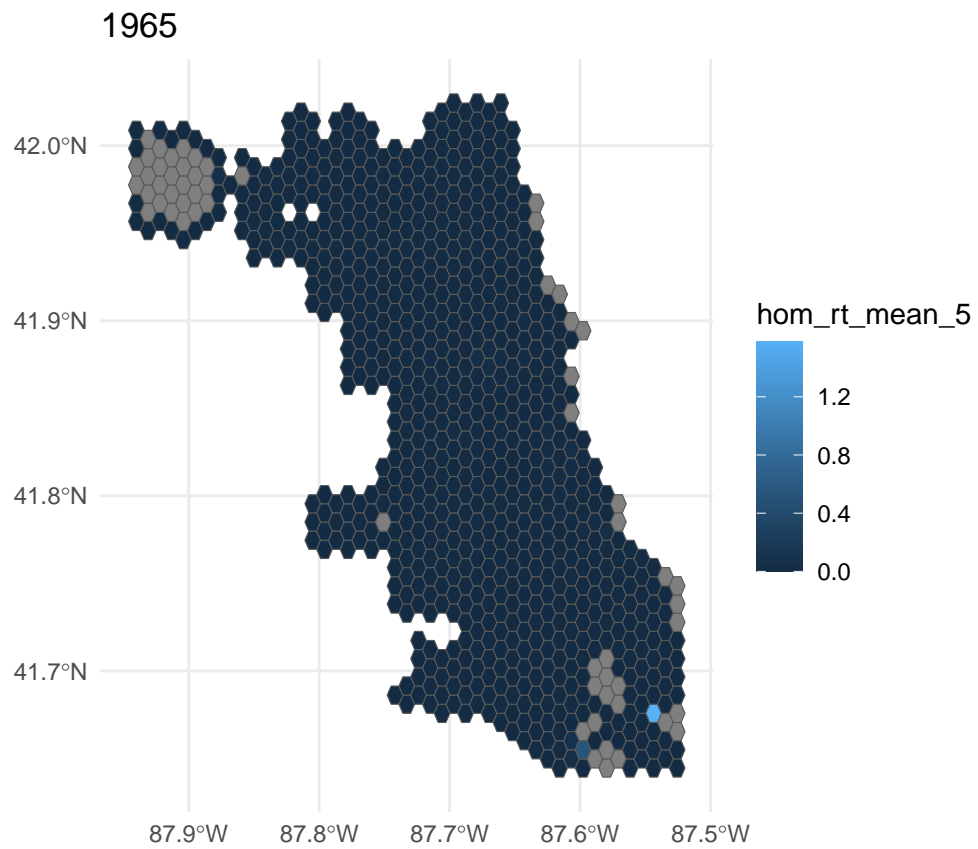








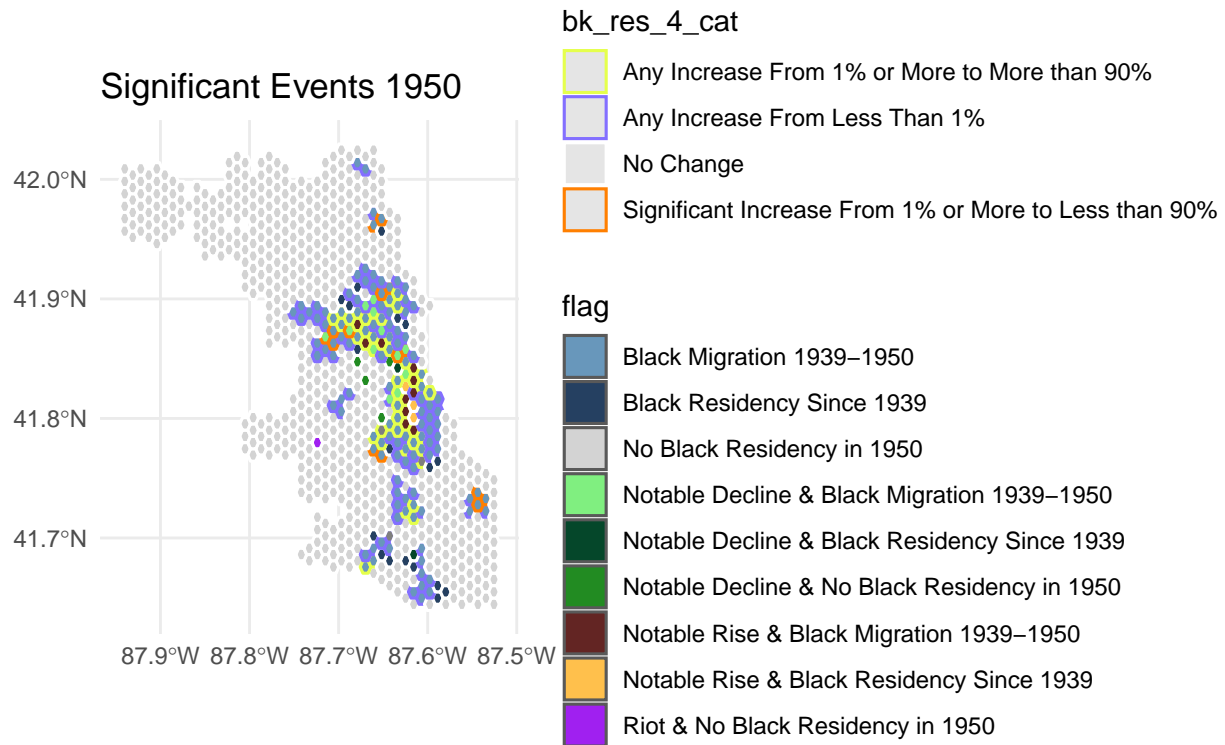




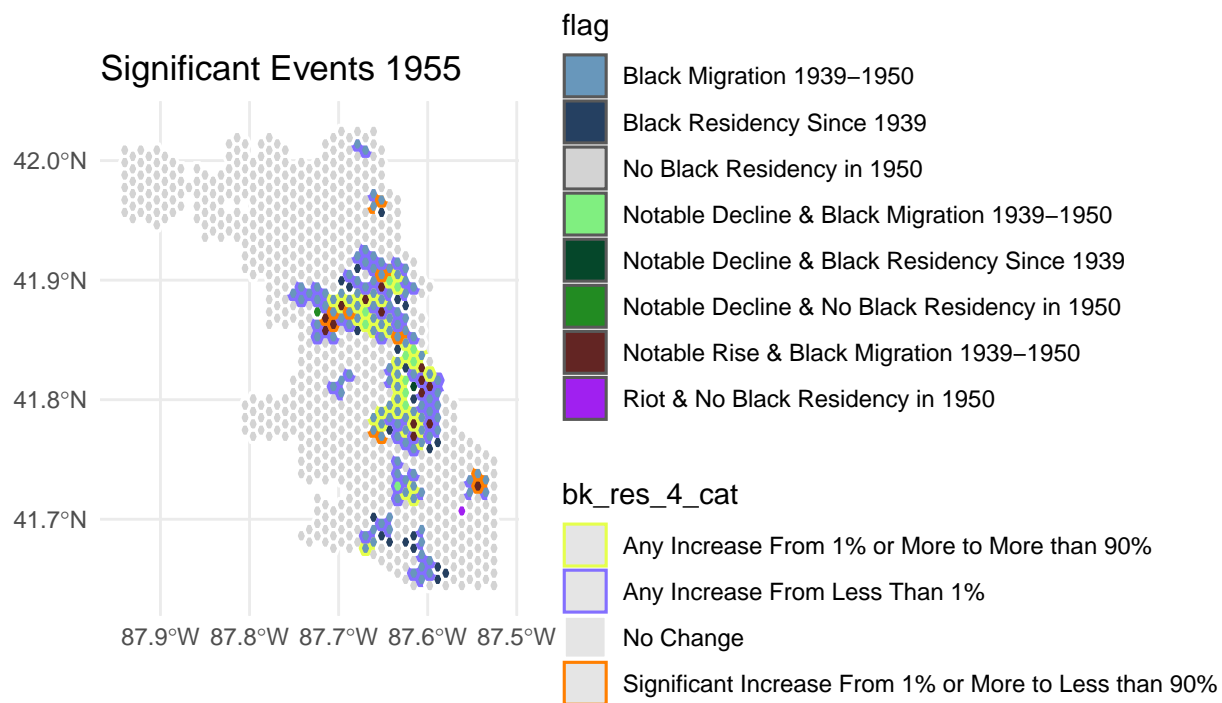
# Preliminary Identification of Changes

## Notable Rises

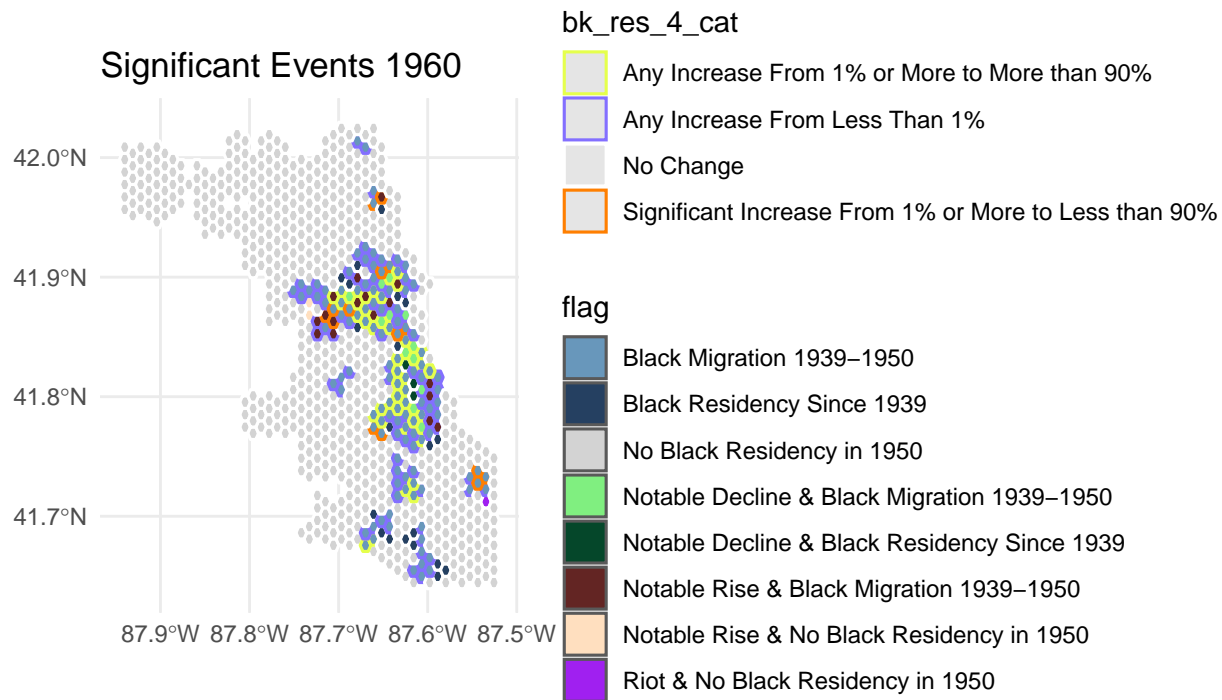
1950s - 1960s



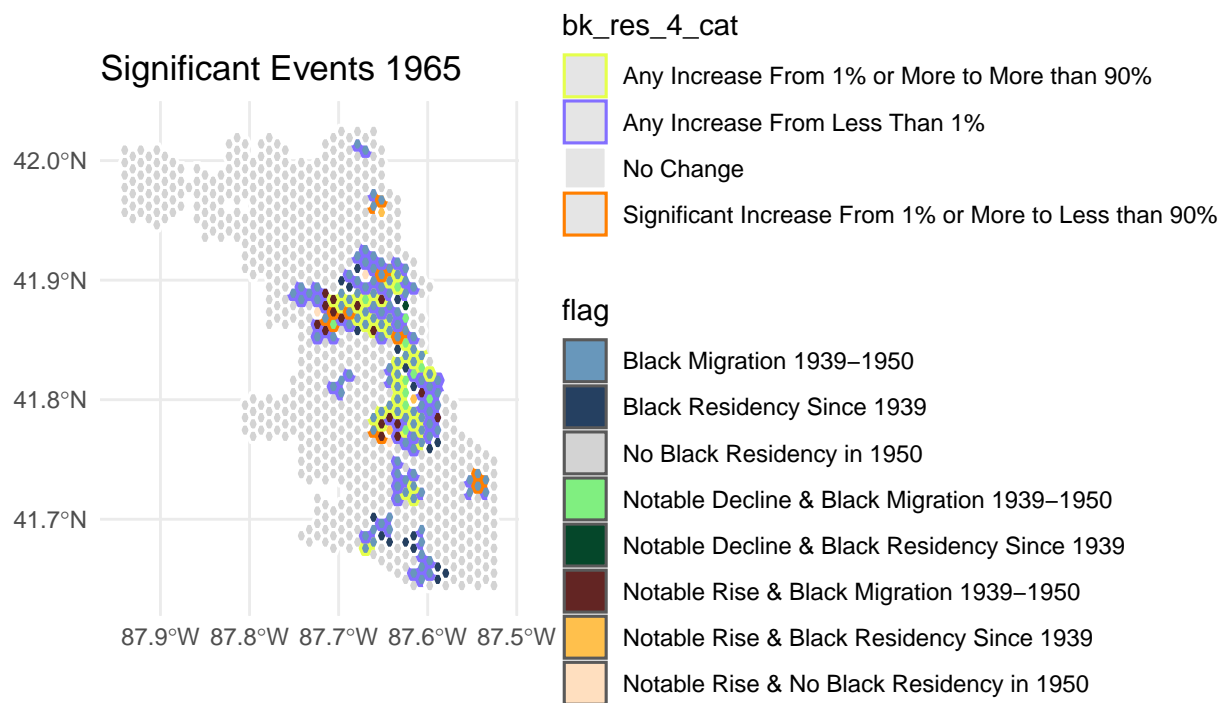
```
## # A tibble: 10 x 2
##   flag                                count
##   <chr>                             <int>
## 1 Black Migration 1939-1950           132
## 2 Black Residency Since 1939           18
## 3 No Black Residency in 1950          636
## 4 Notable Decline & Black Migration 1939-1950    12
## 5 Notable Decline & Black Residency Since 1939     2
## 6 Notable Decline & No Black Residency in 1950     4
## 7 Notable Rise & Black Migration 1939-1950        10
## 8 Notable Rise & Black Residency Since 1939         3
## 9 Riot & Black Migration 1939-1950                3
## 10 Riot & No Black Residency in 1950                1
```



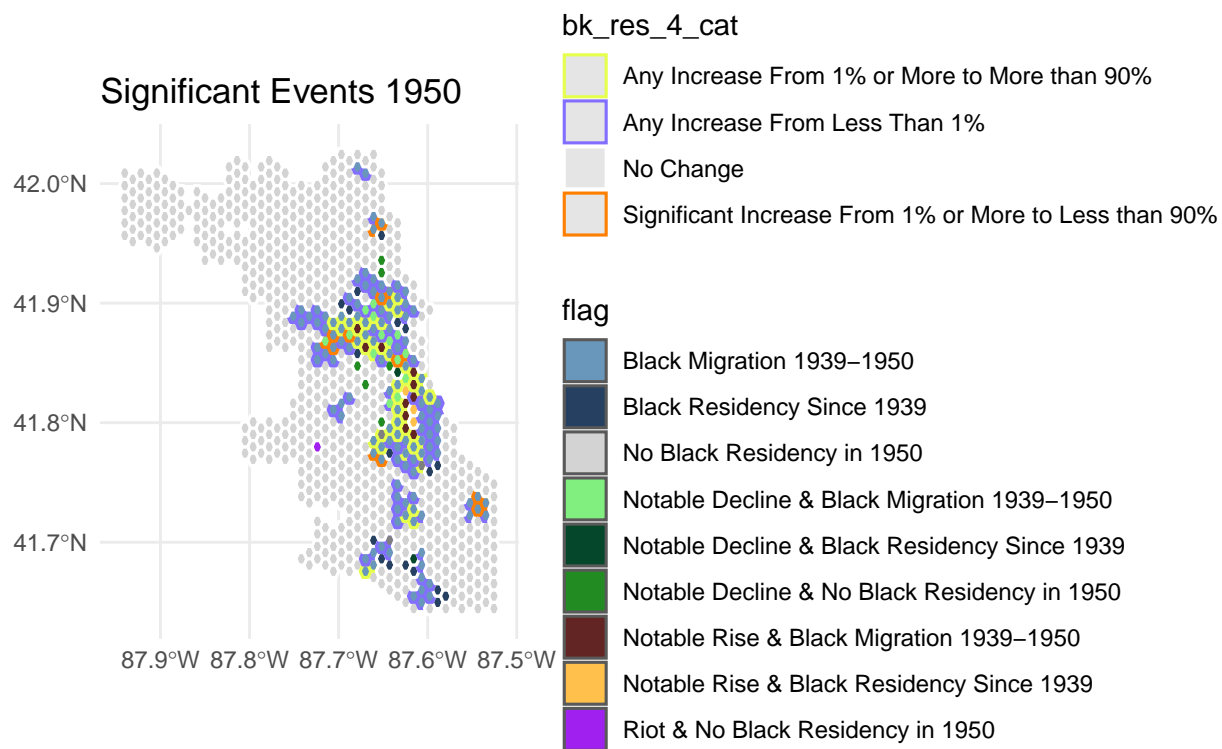
```
## # A tibble: 8 x 2
##   flag          count
##   <chr>        <int>
## 1 Black Migration 1939–1950      131
## 2 Black Residency Since 1939       22
## 3 No Black Residency in 1950     639
## 4 Notable Decline & Black Migration 1939–1950      11
## 5 Notable Decline & Black Residency Since 1939       1
## 6 Notable Decline & No Black Residency in 1950       1
## 7 Notable Rise & Black Migration 1939–1950      15
## 8 Riot & No Black Residency in 1950       1
```



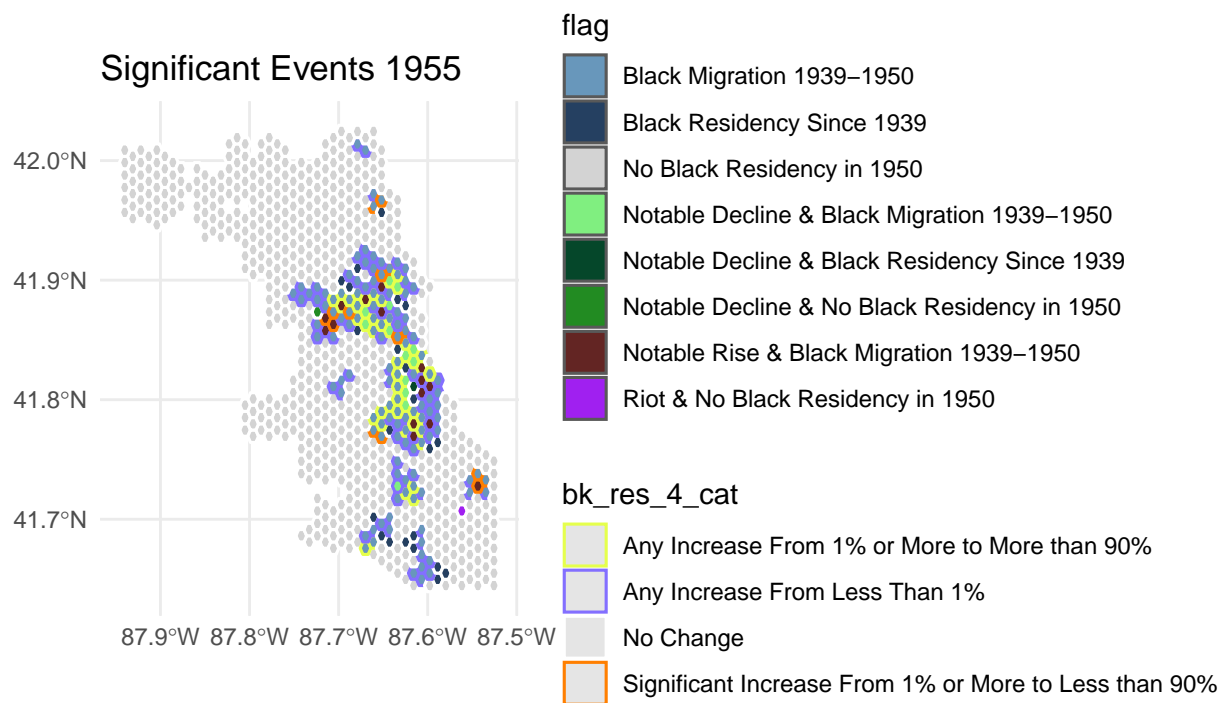
```
## # A tibble: 8 x 2
##   flag                                count
##   <chr>                             <int>
## 1 Black Migration 1939–1950             128
## 2 Black Residency Since 1939              20
## 3 No Black Residency in 1950            638
## 4 Notable Decline & Black Migration 1939–1950    12
## 5 Notable Decline & Black Residency Since 1939     3
## 6 Notable Rise & Black Migration 1939–1950       17
## 7 Notable Rise & No Black Residency in 1950        2
## 8 Riot & No Black Residency in 1950              1
```



```
## # A tibble: 8 x 2
##   flag                count
##   <chr>              <int>
## 1 Black Migration 1939–1950      128
## 2 Black Residency Since 1939      19
## 3 No Black Residency in 1950     638
## 4 Notable Decline & Black Migration 1939–1950      12
## 5 Notable Decline & Black Residency Since 1939       1
## 6 Notable Rise & Black Migration 1939–1950      17
## 7 Notable Rise & Black Residency Since 1939         3
## 8 Notable Rise & No Black Residency in 1950         3
```

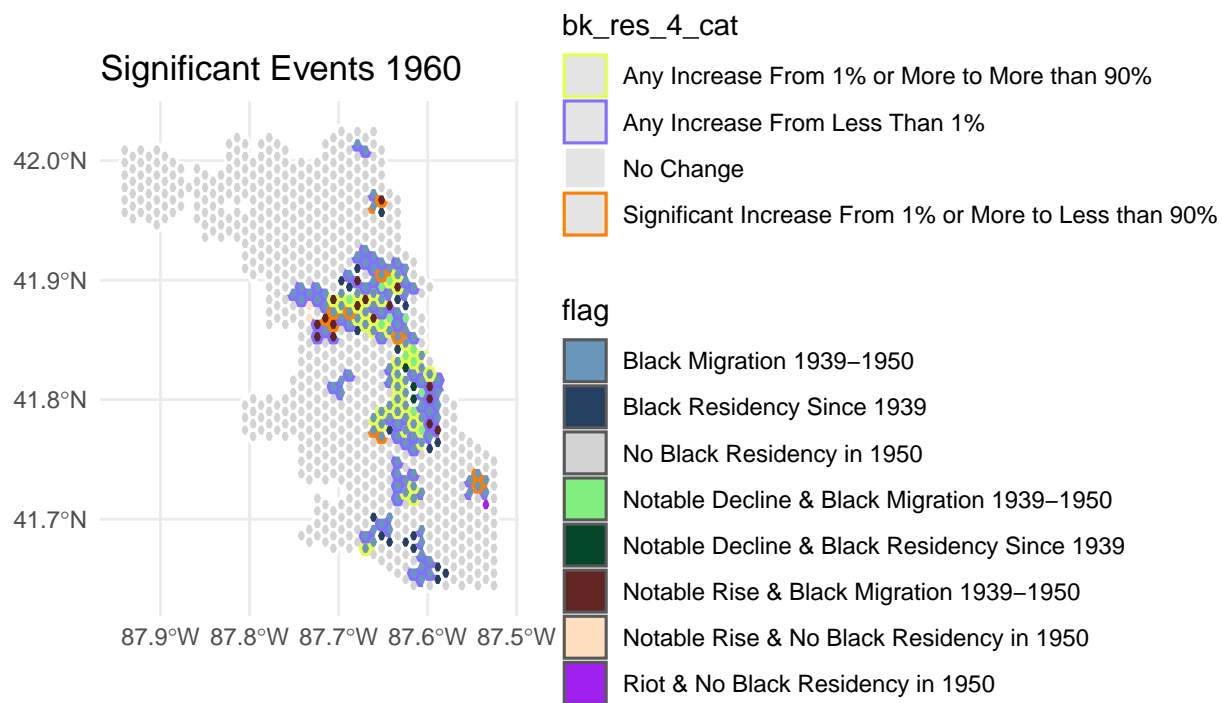


```
## # A tibble: 10 x 2
##   flag                                count
##   <chr>                             <int>
## 1 Black Migration 1939-1950           130
## 2 Black Residency Since 1939           18
## 3 No Black Residency in 1950          634
## 4 Notable Decline & Black Migration 1939-1950    14
## 5 Notable Decline & Black Residency Since 1939     2
## 6 Notable Decline & No Black Residency in 1950     6
## 7 Notable Rise & Black Migration 1939-1950        10
## 8 Notable Rise & Black Residency Since 1939         3
## 9 Riot & Black Migration 1939-1950                 3
## 10 Riot & No Black Residency in 1950                 1
```

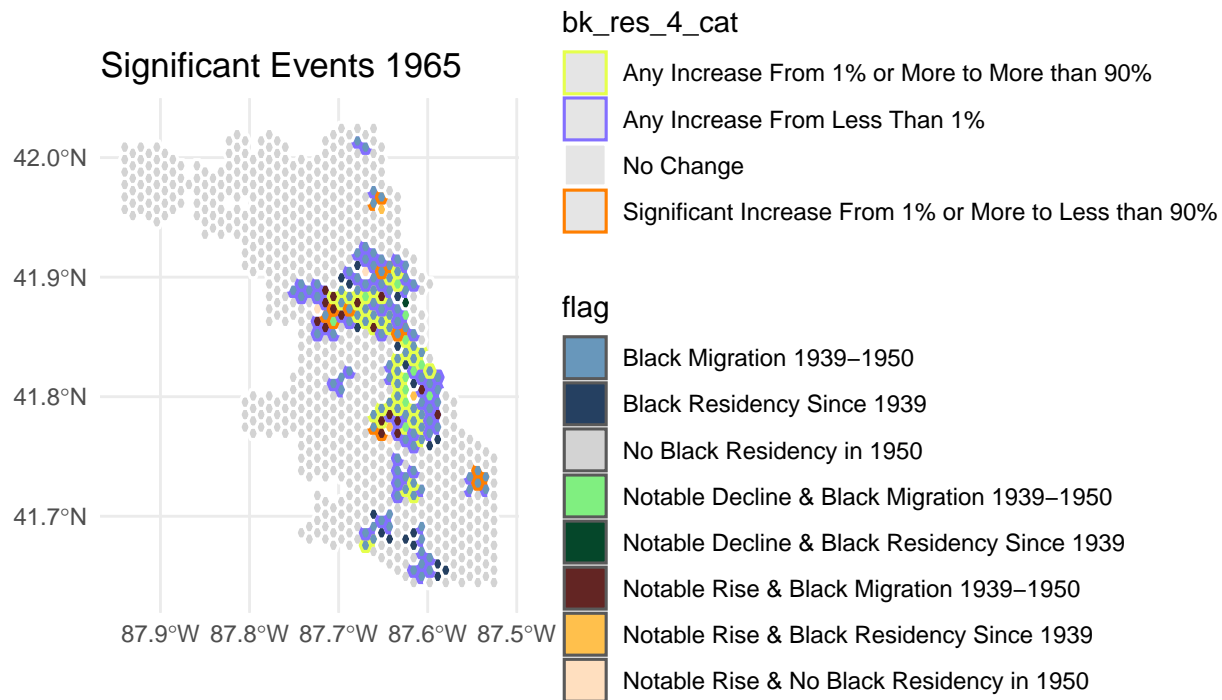


```
## # A tibble: 8 x 2
##   flag          count
##   <chr>         <int>
## 1 Black Migration 1939–1950      129
## 2 Black Residency Since 1939      22
## 3 No Black Residency in 1950     639
## 4 Notable Decline & Black Migration 1939–1950      13
## 5 Notable Decline & Black Residency Since 1939       1
## 6 Notable Decline & No Black Residency in 1950       1
## 7 Notable Rise & Black Migration 1939–1950      15
## 8 Riot & No Black Residency in 1950       1
```

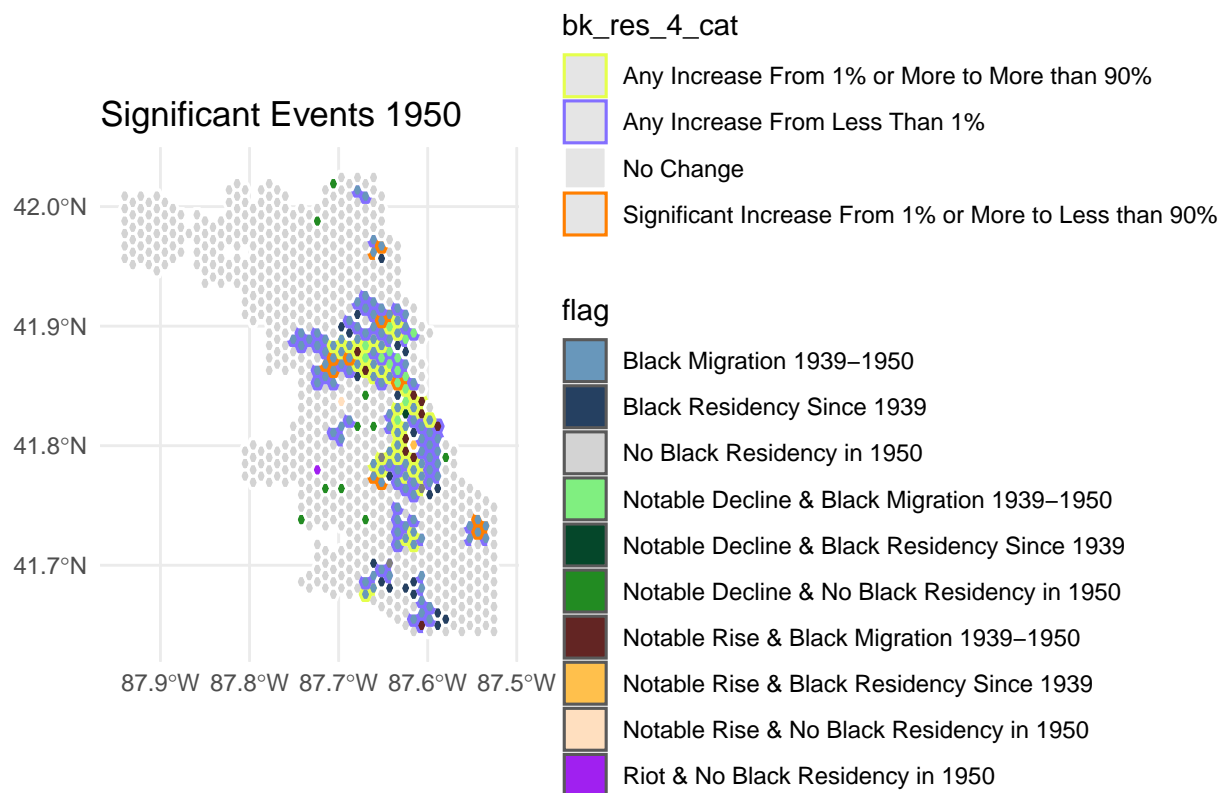




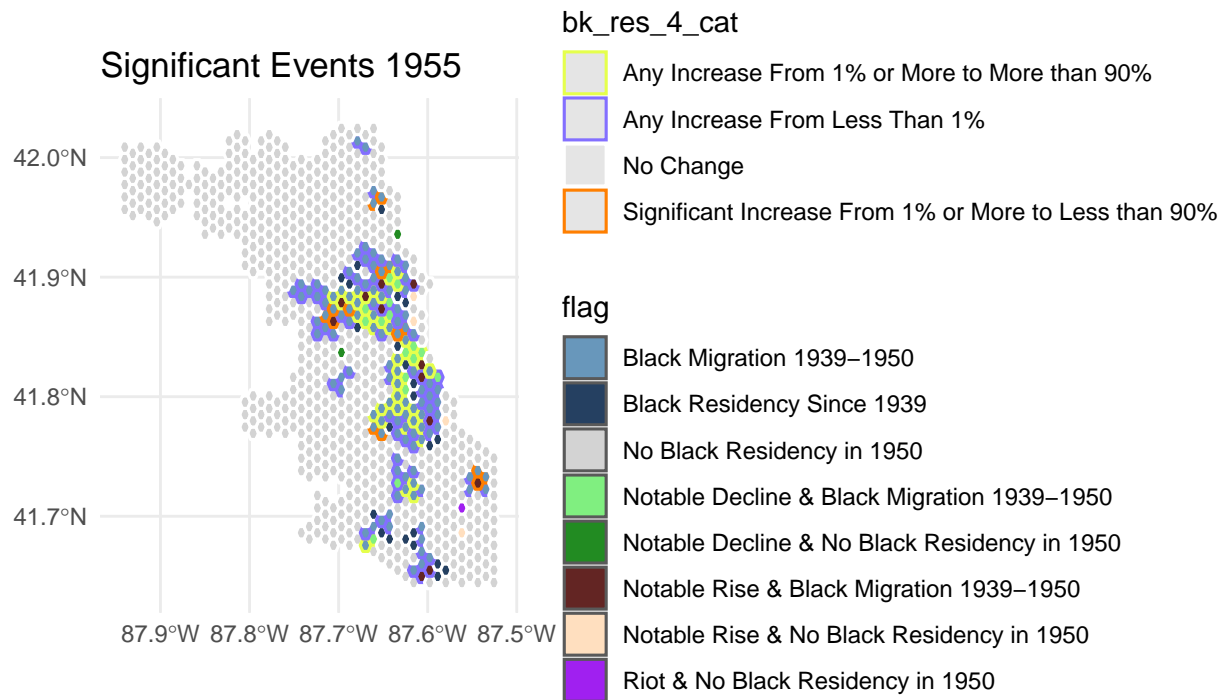
```
## # A tibble: 8 x 2
##   flag                                count
##   <chr>                                <int>
## 1 Black Migration 1939-1950             128
## 2 Black Residency Since 1939             20
## 3 No Black Residency in 1950           638
## 4 Notable Decline & Black Migration 1939-1950    12
## 5 Notable Decline & Black Residency Since 1939     3
## 6 Notable Rise & Black Migration 1939-1950     17
## 7 Notable Rise & No Black Residency in 1950       2
## 8 Riot & No Black Residency in 1950              1
```



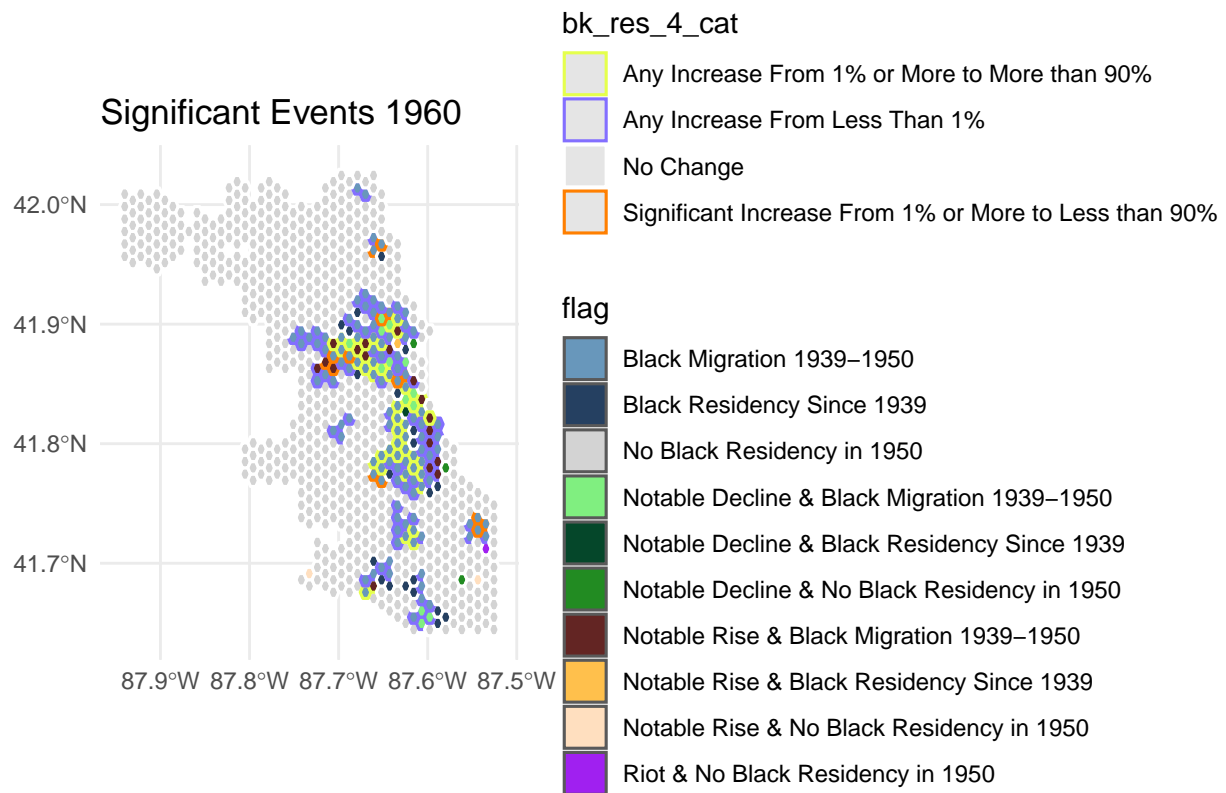
```
## # A tibble: 8 x 2
##   flag                                count
##   <chr>                             <int>
## 1 Black Migration 1939–1950             128
## 2 Black Residency Since 1939             19
## 3 No Black Residency in 1950           638
## 4 Notable Decline & Black Migration 1939–1950    12
## 5 Notable Decline & Black Residency Since 1939     1
## 6 Notable Rise & Black Migration 1939–1950       17
## 7 Notable Rise & Black Residency Since 1939        3
## 8 Notable Rise & No Black Residency in 1950        3
```



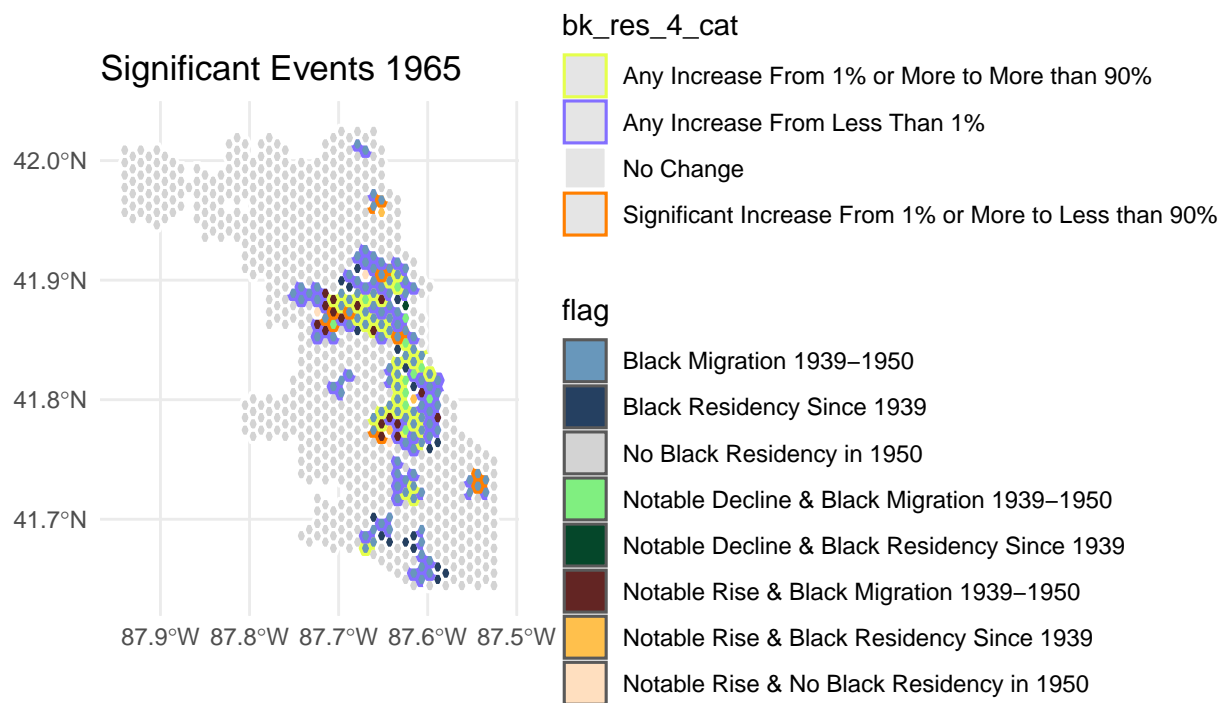
```
## # A tibble: 11 x 2
##   flag                                count
##   <chr>                             <int>
## 1 Black Migration 1939-1950           129
## 2 Black Residency Since 1939           21
## 3 No Black Residency in 1950          629
## 4 Notable Decline & Black Migration 1939-1950    15
## 5 Notable Decline & Black Residency Since 1939     1
## 6 Notable Decline & No Black Residency in 1950    10
## 7 Notable Rise & Black Migration 1939-1950       10
## 8 Notable Rise & Black Residency Since 1939        1
## 9 Notable Rise & No Black Residency in 1950        1
## 10 Riot & Black Migration 1939-1950              3
## 11 Riot & No Black Residency in 1950              1
```



```
## # A tibble: 8 x 2
##   flag                                count
##   <chr>                                <int>
## 1 Black Migration 1939-1950             129
## 2 Black Residency Since 1939             23
## 3 No Black Residency in 1950           634
## 4 Notable Decline & Black Migration 1939-1950    16
## 5 Notable Decline & No Black Residency in 1950     2
## 6 Notable Rise & Black Migration 1939-1950      12
## 7 Notable Rise & No Black Residency in 1950       4
## 8 Riot & No Black Residency in 1950             1
```



```
## # A tibble: 10 x 2
##   flag                count
##   <chr>              <int>
## 1 Black Migration 1939-1950      126
## 2 Black Residency Since 1939       21
## 3 No Black Residency in 1950     635
## 4 Notable Decline & Black Migration 1939-1950      13
## 5 Notable Decline & Black Residency Since 1939        1
## 6 Notable Decline & No Black Residency in 1950        3
## 7 Notable Rise & Black Migration 1939-1950       18
## 8 Notable Rise & Black Residency Since 1939         1
## 9 Notable Rise & No Black Residency in 1950         2
## 10 Riot & No Black Residency in 1950         1
```

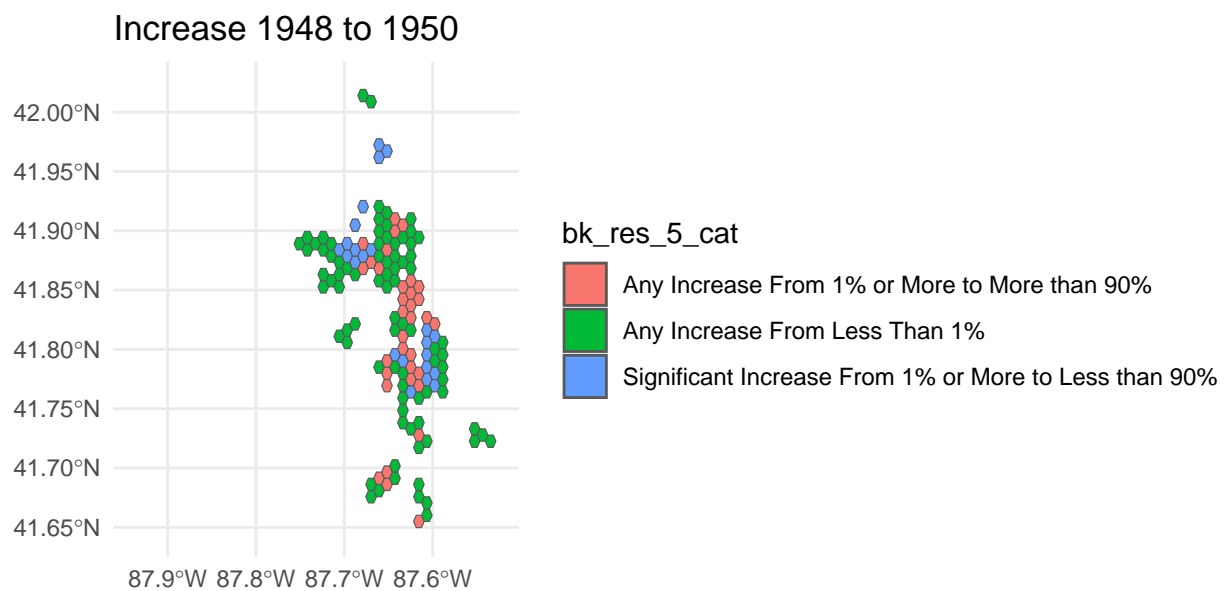
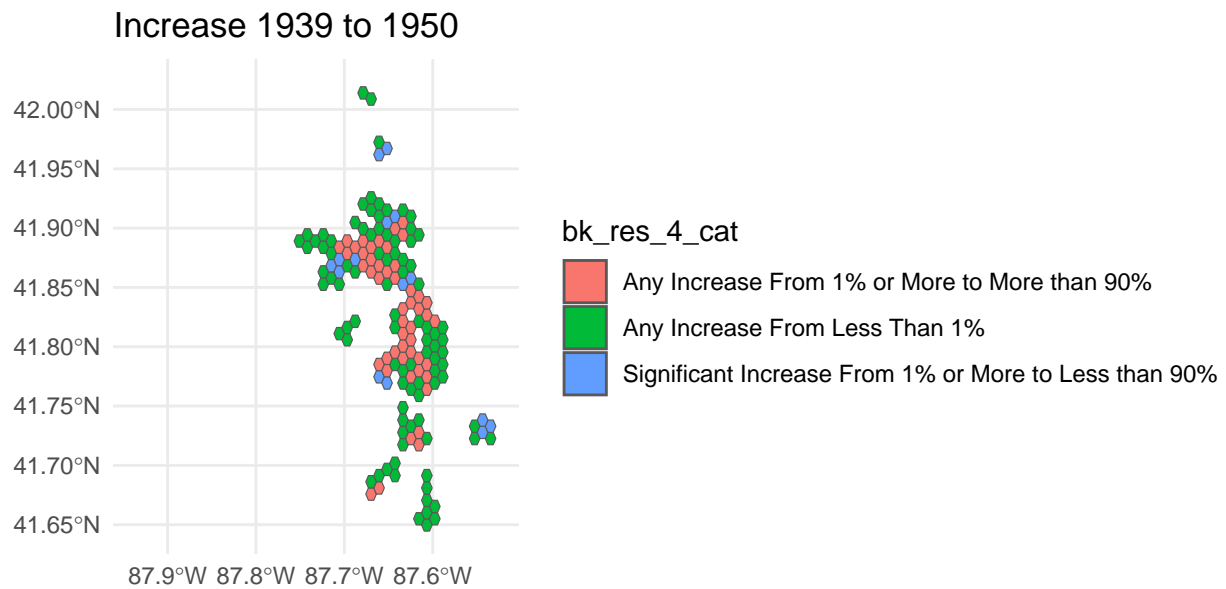


```
## # A tibble: 8 x 2
##   flag               count
##   <chr>             <int>
## 1 Black Migration 1939–1950      128
## 2 Black Residency Since 1939      19
## 3 No Black Residency in 1950     638
## 4 Notable Decline & Black Migration 1939–1950      12
## 5 Notable Decline & Black Residency Since 1939       1
## 6 Notable Rise & Black Migration 1939–1950      17
## 7 Notable Rise & Black Residency Since 1939         3
## 8 Notable Rise & No Black Residency in 1950         3
```

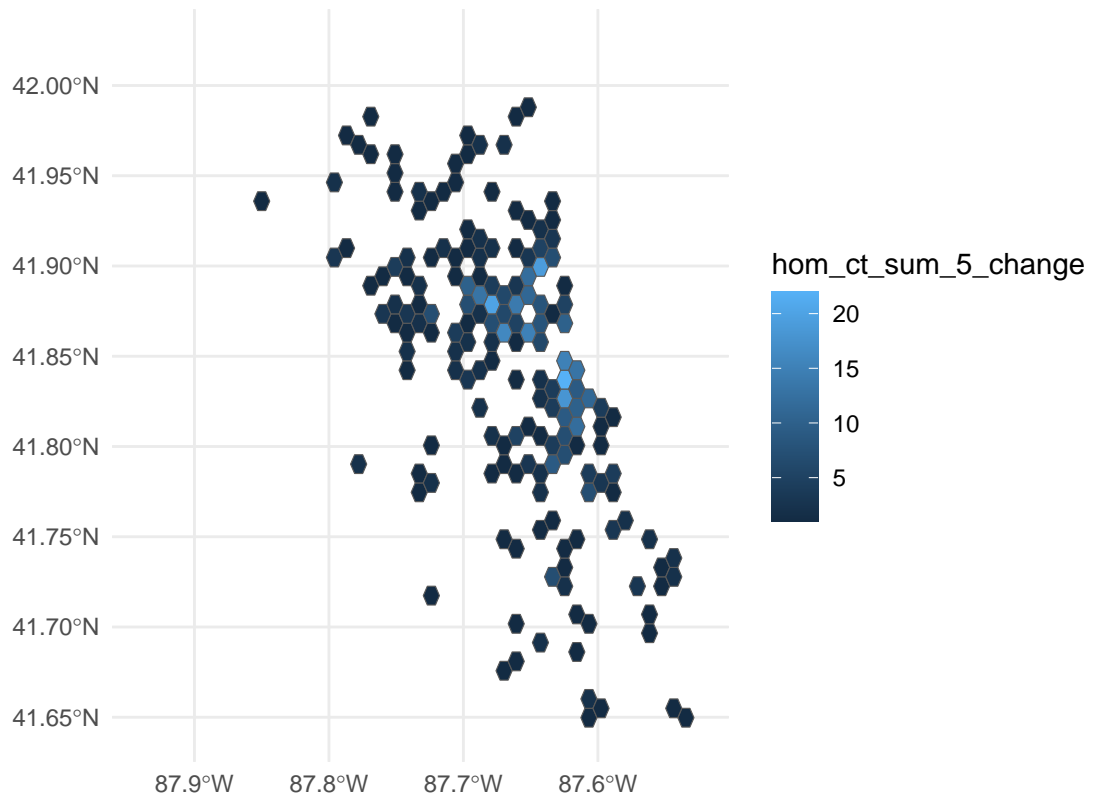
Investigate Riot Years

Investigate Zoning

Investigate Change in Black Residency to 1950

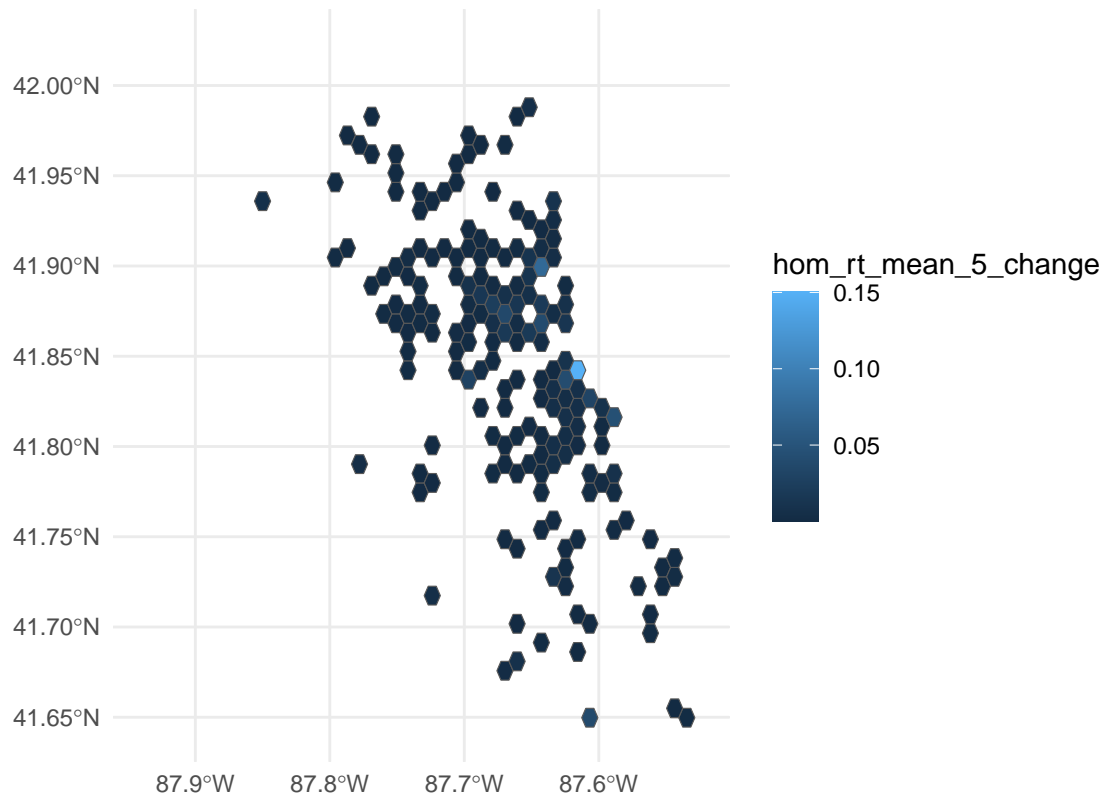


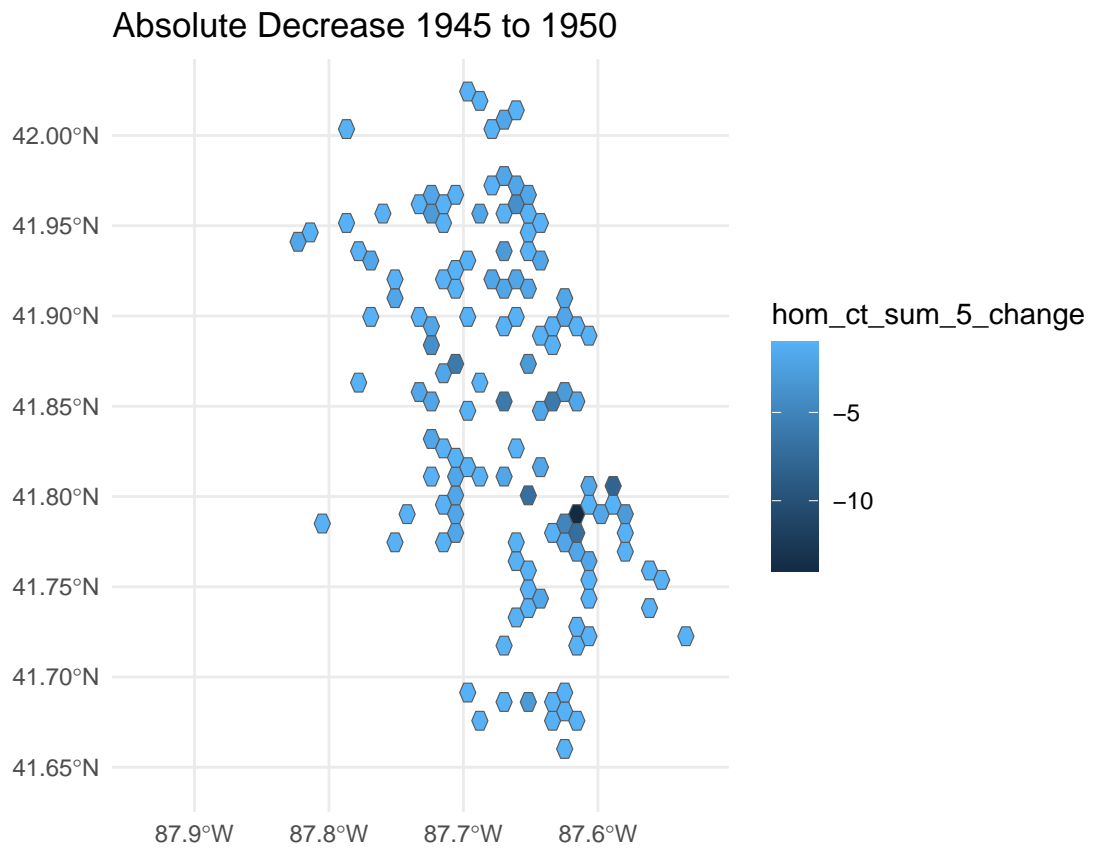
### Absolute Increase 1945 to 1950

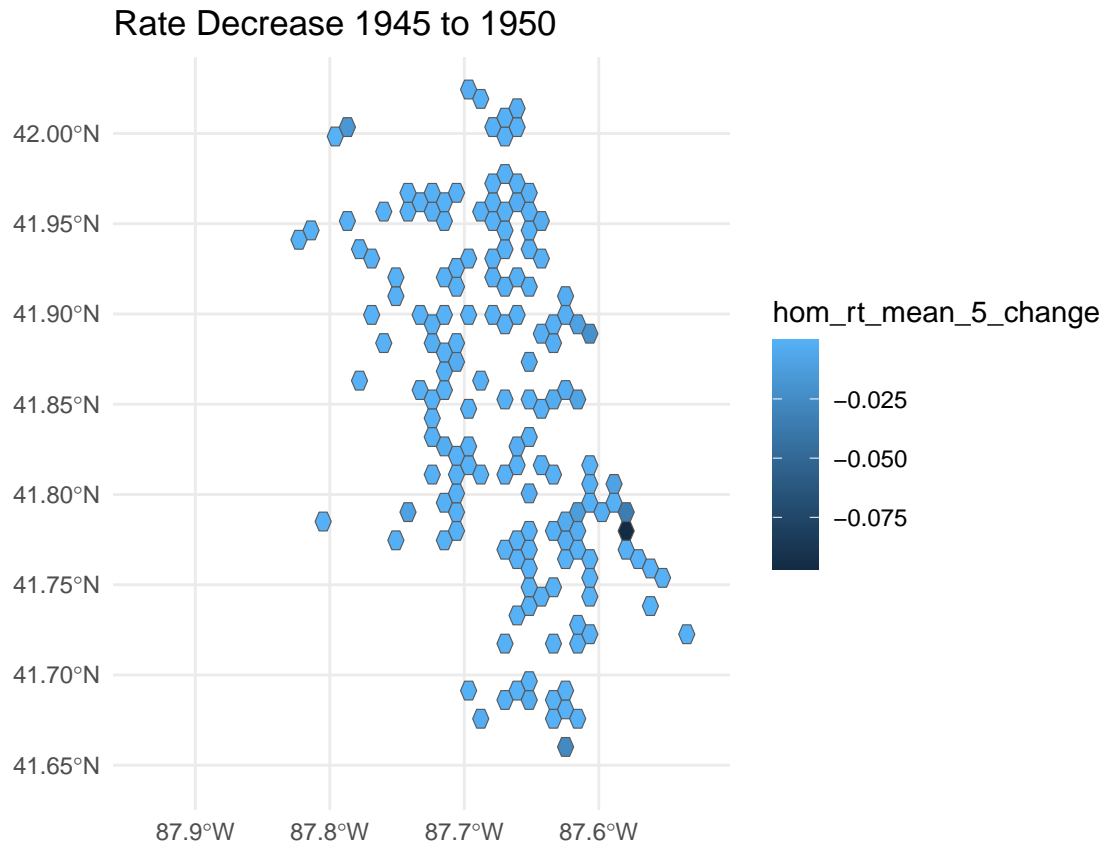




### Rate Increase 1945 to 1950







```
df_no_geom <- df %>% st_drop_geometry()

calc_cor <- function(var, control_var = "hom_ct_sum_5", data = df_no_geom) {
  print(var)
  correlation <- cor(data[control_var], data[var], use = "complete.obs")[1]
  output <- data.frame(variable = var,
                        correlation = correlation)
  return(output)
}

cols <- c("year_riot", "in_check", "still_desi", "def_decl", "hazardous", "industrial", "best", "comm",
          "bk_res_1", "bk_res_2", "bk_res_3", "bk_res_4_1", "bk_res_4_2", "bk_res_4_3", "bk_res_5_1",
          "bk_res_5_3" )
output <- map_df(cols, calc_cor)
```

```
## [1] "year_riot"
## [1] "in_check"
## [1] "still_desi"
## [1] "def_decl"
## [1] "hazardous"
## [1] "industrial"
## [1] "best"
## [1] "commercial"
## [1] "bk_res_1"
## [1] "bk_res_2"
```

```
## [1] "bk_res_3"  
## [1] "bk_res_4_1"  
## [1] "bk_res_4_2"  
## [1] "bk_res_4_3"  
## [1] "bk_res_5_1"  
## [1] "bk_res_5_2"  
## [1] "bk_res_5_3"
```