

The Effect of Floodplains on House Values in Houston, Texas

Hypothesis

The goal of this project is to assess whether or not property and house values are affected by their location on a floodplain. My hypothesis is that if an area is more highly prone to flooding its property value will suffer.

- 1) I collected data from the city of Houston GIS open data (cohgis.mycity.opendata.arcgis.com). The floodplain data comes from FEMA. Both datasets were applied to a Texas basemap, as shown in **Figure 1**.

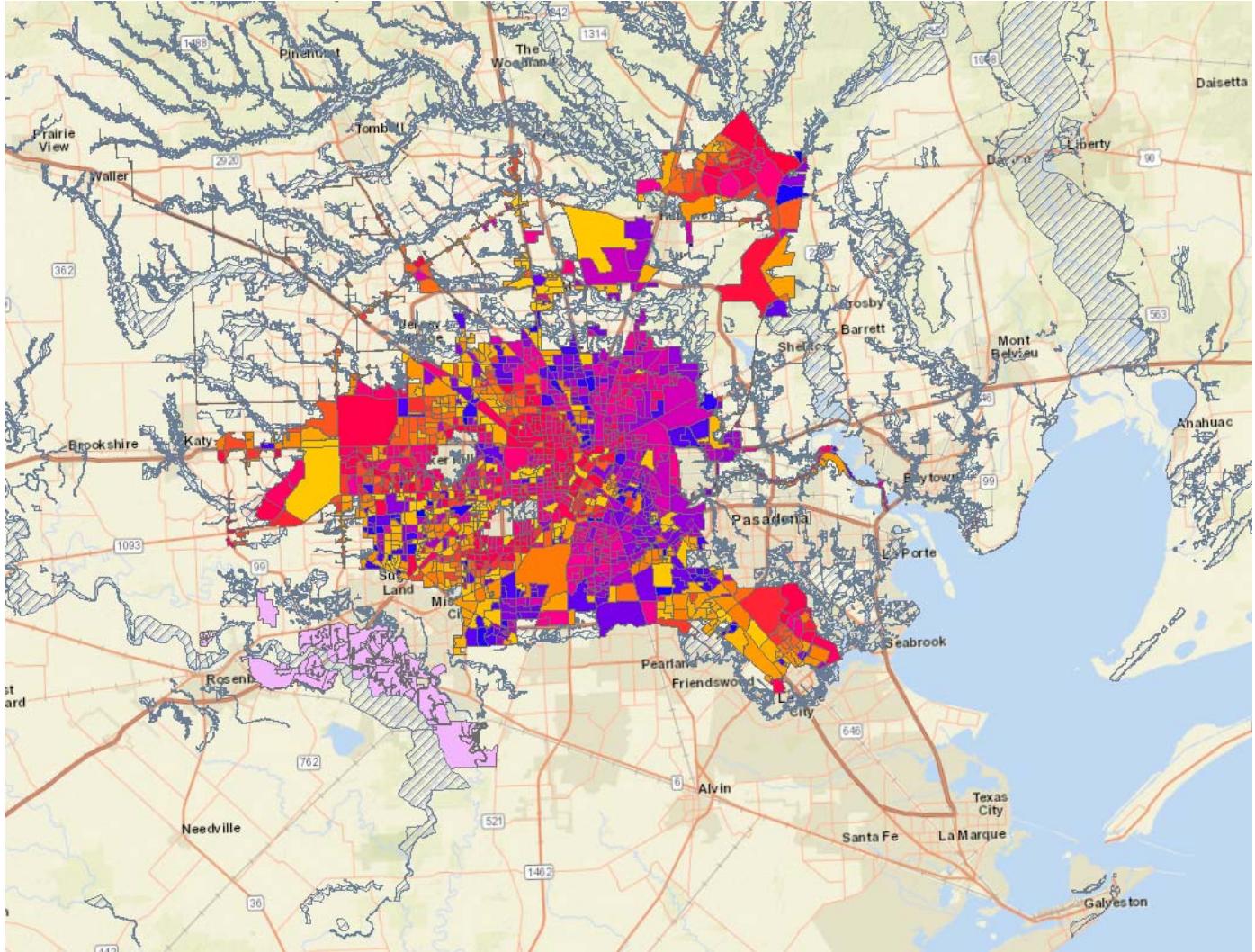


Figure 1: Initial layout of map after all data is added to the dataframe.

- 2) I clipped the floodplain data to within Houston city limits, as shown in **Figure 2**. (Median House Value data was only for Houston City limits)

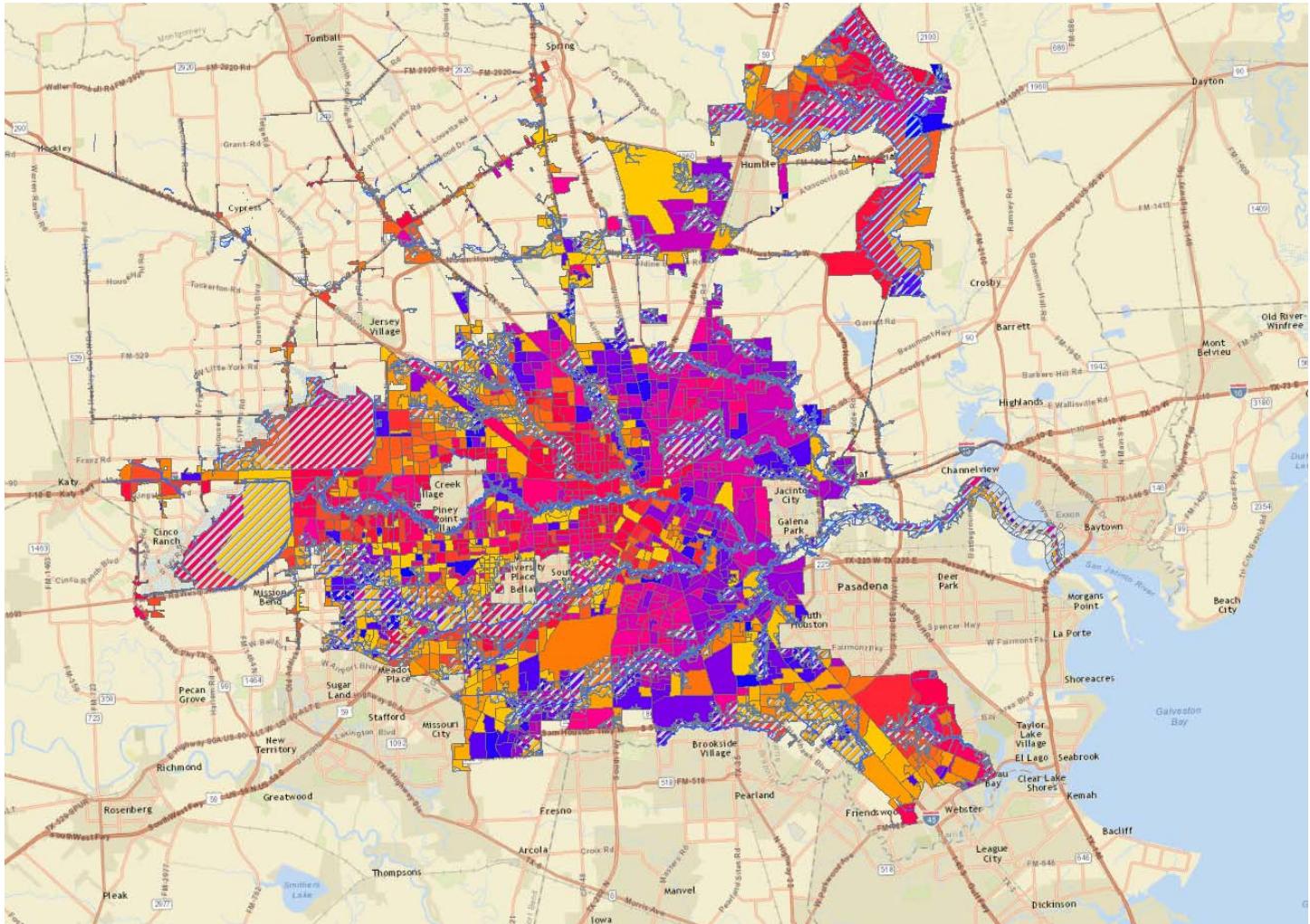


Figure 2: Map post-clipping to Houston city limits

- 3) I added the Median_House_Value_by_Census_Block_Group_2010 dataset and added a gradient to show the highs and lows of property values.
- The Median House Value field in the Attribute Table was out of order because it was a text field instead of a long integer field. I created a new value field called "HouseVal". That changed the text field into a long integer field. In order to group the values as ranks instead of each individual value, so as to clean up the Legend, I added a new value field called "Value". I grouped house values in increments of 10,000 up to 200,000. After 200,000, they were grouped by increments of 50,000 up to 1,000,000. The final attribute table is shown in **Figure 3**.
 - Areas that a 0 for House Value were changed to a light pink so it was more obvious.
 - I added 30% transparency to more easily see what part of the city is affected.
 - The final Median_House_Value_by_Census_Block_Group_2010 shapefile's gradient symbology is shown in **Figure 4**.

Median_House_Value_by_Census_Block_Group_2010

SUM_VAP_NH	SUM_VAP_1	SUM_VAP_2	SUM_VAP_3	SUM_VAP_4	SUM_VAP_Ha	SUM_VAP_5	SUM_VAP_6	SUM_Tothou	SUM_OccHU	SUM_Vacant	BO_ID	BG_ID_1	Median_Hou	Shapearea	Shapeplen	HouseVal	Value	
528	42	480	0	4	0	2	13	435	331	104	482013130001	482013130001	191100	3691631.856009	8228.392077	191100	200000	
576	29	537	1	8	0	1	4	491	363	128	482013130001	482013130003	190100	316102.406401	7096.06768	190100	200000	
249	167	5	0	77	0	0	9	362	144	218	482013402011	482013402011	194400	187753892.427007	57628.650301	194400	200000	
8	0	2	0	6	0	0	0	2	2	0	482013501001	482013501001	198800	1207457.583878	7933.450586	198800	200000	
1254	700	233	3	317	1	0	31	1066	950	116	482014133001	482014133001	190900	7778707.438876	15612.333452	190900	200000	
381	204	77	1	97	0	2	21	397	381	16	482014202002	482014202002	190900	4840949.034755	8797.53017	190900	200000	
661	543	22	0	95	0	1	3	447	427	20	482014217004	482014217004	194600	3384305.647032	10963.849108	194600	200000	
722	543	113	1	63	0	2	9	562	542	20	482014225000	482014225004	198400	5471382.388919	122477.0936	198400	200000	
664	133	507	1	15	1	7	12	1127	739	388	482014230001	482014230001	193400	4277705.845673	12872.978404	193400	200000	
1114	736	20	3	354	0	1	40	799	742	57	482014309004	482014309004	198500	6523789.006323	14131.79601	198500	200000	
1133	778	151	1	202	0	1	22	946	860	88	482014312011	482014312011	193500	4598065.595594	14240.02069	193500	200000	
370	343	12	0	13	0	2	2	283	263	20	482014312022	482014312022	196900	389043.92468	12183.083636	196900	200000	
716	447	135	2	132	0	0	10	578	537	41	482014514032	482014514032	198600	6588070.835575	11964.855309	198600	200000	
646	801	19	5	20	0	1	10	588	548	41	482015157000	482015157001	195600	11146465.815994	16281.409715	195600	200000	
2	0	1	1	0	0	0	0	0	2	2	0	482015409011	482015409011	191600	464940.238073	14655.27078	191600	200000
0	0	0	0	0	0	0	0	0	0	0	0	482015410022	482015410022	193300	1482273.655845	15993.738174	193300	200000
0	0	0	0	0	0	0	0	0	0	0	0	482015528005	482015528005	195800	5469383.834	325.265996	195800	200000
195	109	76	1	9	0	0	3	288	178	110	482015529004	482015529004	196200	1498625.426301	18881.284736	196200	200000	
0	0	0	0	0	0	0	0	1	1	0	482015534031	482015534031	190000	5008593.895502	2517.253387	190000	200000	
0	0	0	0	0	0	0	0	0	0	0	0	482015546001	482015546001	192500	242324.556183	9995.294986	192500	200000
0	0	0	0	0	0	0	0	0	0	0	0	48201557021	48201557021	193900	1817100.42095	45767.85714	193900	200000
228	20	192	0	15	0	1	2	186	184	2	48201234011	48201234011	186000	5200407.052112	6371.269825	186000	190000	
157	148	5	1	3	0	0	1	84	81	3	482012508003	482012508003	182000	35893193.797302	47801.726971	182000	190000	
437	8	422	0	5	0	2	2	353	258	95	482013127001	482013127001	183800	3244083.291589	7599.036583	183800	190000	
659	86	553	2	18	0	0	9	535	424	111	482013130002	482013130002	183300	5034886.612755	10391.166911	183300	190000	
1307	963	280	1	0	21	0	21	689	657	12	482013408001	482013408001	186800	14126861.073649	15194.654716	186800	190000	
888	777	88	0	6	1	15	676	635	14	482014209007	482014209007	188600	9736108.497848	14986.906119	188600	190000		
646	572	30	3	42	0	1	12	425	408	17	482014220003	482014220003	180300	554713.311297	10188.949937	180300	190000	
1217	1099	22	3	89	2	2	18	1153	1021	132	482014315012	482014315012	188600	3425074.343175	9242.450335	188600	190000	
1850	1237	195	7	401	5	5	48	1281	1212	69	482014516021	482014516021	182700	21763852.007478	22123.932927	182700	190000	
727	151	462	1	106	0	7	21	937	611	326	482014543014	482014543014	183500	6803461.915561	14297.596	183500	190000	
2217	1854	64	3	294	0	2	25	1436	1250	186	482015219001	482015219001	188600	31689451.397796	23484.743753	188600	190000	
367	222	104	5	36	0	0	3	291	281	10	482015410011	482015410011	185400	1880724.993797	26163.300015	185400	190000	
0	0	0	0	0	0	0	0	0	0	0	0	482015412031	482015412031	189200	1377249.45	6071.988145	189200	190000
21	15	3	0	3	0	0	0	17	17	0	482015526021	482015526021	183700	2988967.814943	20690.253714	183700	190000	
0	0	0	0	0	0	0	0	0	0	0	0	482015531004	482015531004	182000	64308.321825	1175.261996	182000	190000
0	0	0	0	0	0	0	0	0	0	0	0	482015547001	482015547001	188800	4998410.701239	2532.132859	188800	190000
45	27	5	0	13	0	0	0	40	38	2	482012413003	482012413003	169700	3680911.680085	10227.051571	169700	180000	
76	70	0	0	6	0	0	0	44	41	3	482012508002	482012508002	172100	14948107.581639	41841.042568	172100	180000	
806	744	44	5	9	4	0	4	493	462	31	482012511002	482012511002	177000	10485229.820563	15340.039037	177000	180000	
857	623	10	2	20	0	2	6	342	333	9	482012513003	482012513003	173600	9999689.938906	14932.23759	173600	180000	
805	24	771	0	7	1	2	2	690	514	176	4820125123002	4820125123002	170700	791706.004715	10966.812961	170700	180000	
616	29	573	1	12	0	1	13	527	393	134	482013127002	482013127002	173800	310466.973991	7632.872872	173800	180000	
359	31	312	0	14	0	2	3	265	247	18	482013510002	482013510002	175400	39443490.773111	49391.283225	175400	180000	
591	506	25	0	59	0	1	7	585	496	89	482014115022	482014115022	170200	5063880.746777	11427.622545	170200	180000	
1043	925	45	2	70	0	1	18	698	660	38	482014204002	482014204002	175500	7699396.992366	11281.435882	175500	180000	
705	468	188	5	41	1	2	9	532	510	22	482014233011	482014233011	176900	6191768.803416	1251.65968	176900	180000	
839	552	216	1	70	0	0	5	740	512	228	482014233014	482014233014	170300	841806.135063	12050.127128	170300	180000	
1267	1050	74	6	137	0	0	21	959	910	49	482014310001	482014310001	171800	9134754.41893	18489.177117	171800	180000	
1063	777	166	4	110	0	6	28	1059	977	82	482014313013	482014313013	171000	2550853.060893	10336.252641	171000	180000	
648	561	30	2	55	0	0	14	467	442	25	482014322001	482014322001	179200	6747541.249393	11452.482214	179200	180000	
551	230	284	0	33	2	2	14	610	525	85	482014326002	482014326002	171700	13091949.596855	18222.954799	171700	180000	
820	734	96	3	84	0	3	23	816	736	80	482014511002	482014511002	176300	501893.58737	11972.092707	176300	180000	
1156	1030	54	9	60	0	3	23	732	705	27	482014513001	482014513001	178200	8494541.982921	14262.361972	178200	180000	
1330	962	209	3	155	0	1	38	957	886	71	482014513003	482014513003	179400	10609584.84636	14228.23947	179400	180000	
1941	974	181	4	177	1	4	20	1771	1144	75	482014142001	482014142001	178400	2249851.863845	16429.84649	178400	180000	

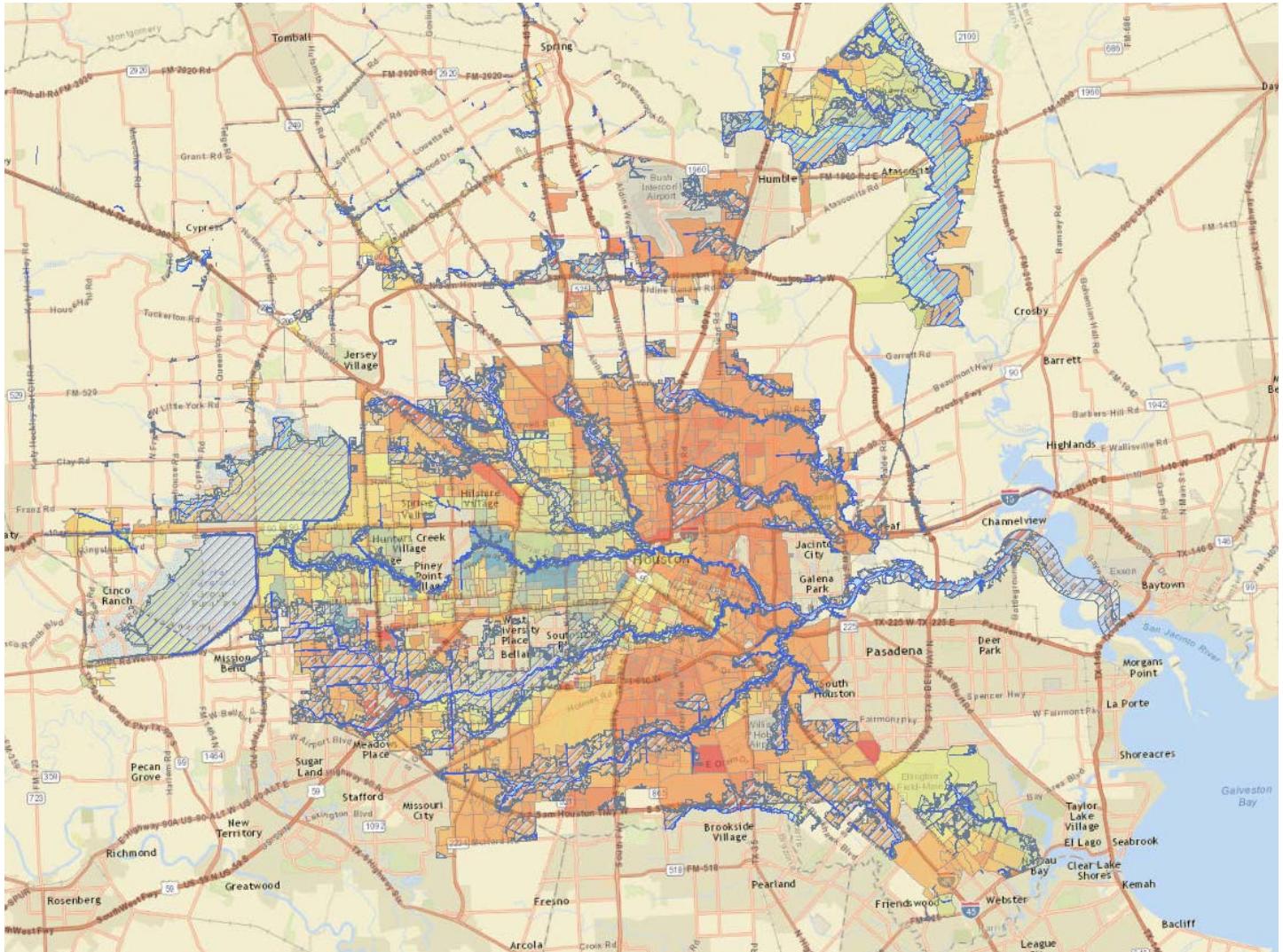


Figure 4: Map after gradient symbology and 50% transparency has been applied to the Median_House_Value_by_Census_Block_Group_2010 shapefile.

- 4) I wanted to make a graph showing the parts of the city that are affected by the different levels of flood.
 - a. Using the Select by Attribute tool, I separated Floodway, Special Flood Hazard Area, and 500 Year Floodplain into individual shapefiles
 - b. I used the Intersect tool to create shapefiles that show areas that are in the Floodway, Special Flood Hazard Area, and 500 Year Floodplain areas.
- 5) I created graphs using these new intersected shapefiles showing the property values of the areas within these zones.
 - a. I copied the attribute table into Excel and created histograms from there.

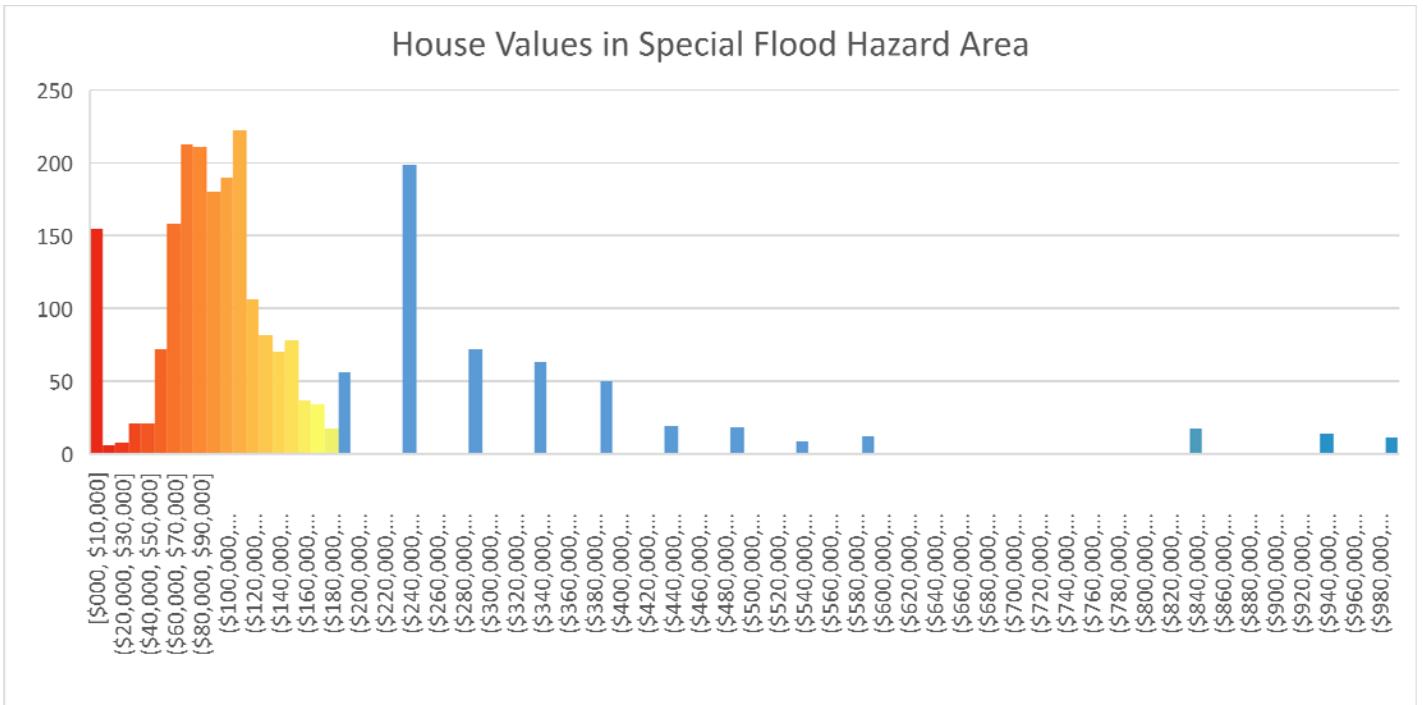


Figure 5: Each bar in the histogram was given a specific RGB color value that corresponded to its value in the Median_House_Value_by_Census_Block_Group_2010 shapefile symbology.

- b. I manually matched colors for the histograms to the colors of the census zones used in the map.
- c. I compared the three maps together with a graph of House Values not in any floodplain. These graphs are presented in **Figures 6, 7, 8, and 9**.

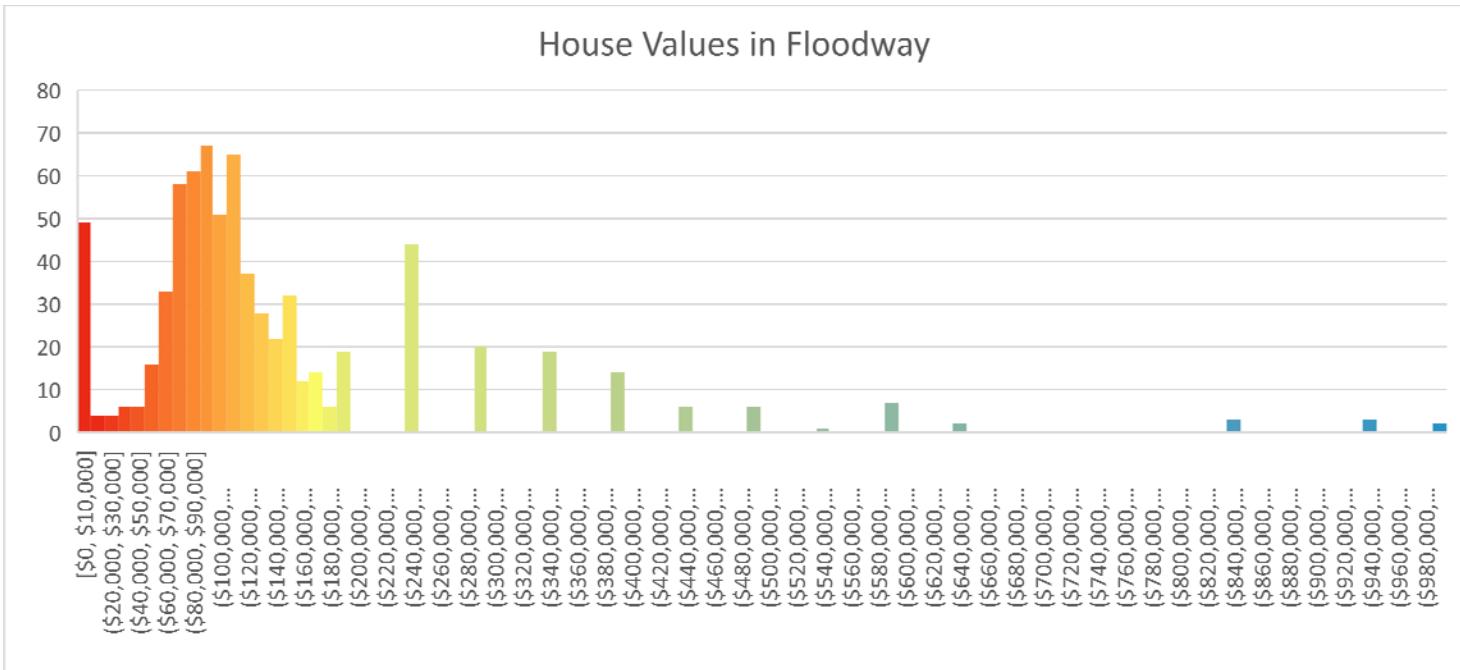


Figure 6: Histogram depicting the amount of houses falling in each House Value category within the general floodway.

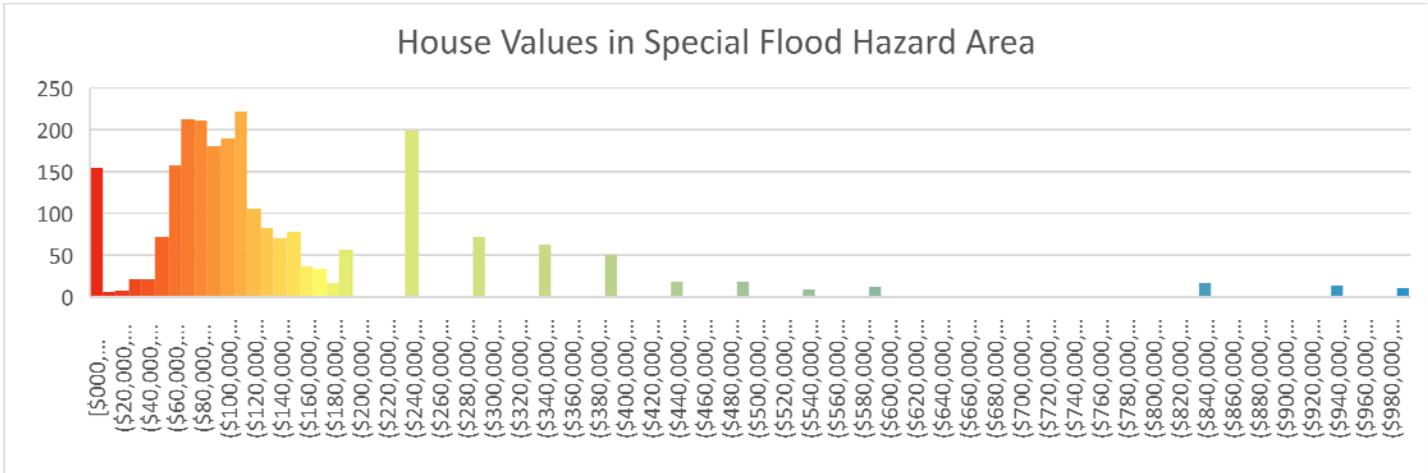


Figure 7: Histogram depicting amount of houses falling in each House Value category within the special flood hazard area.

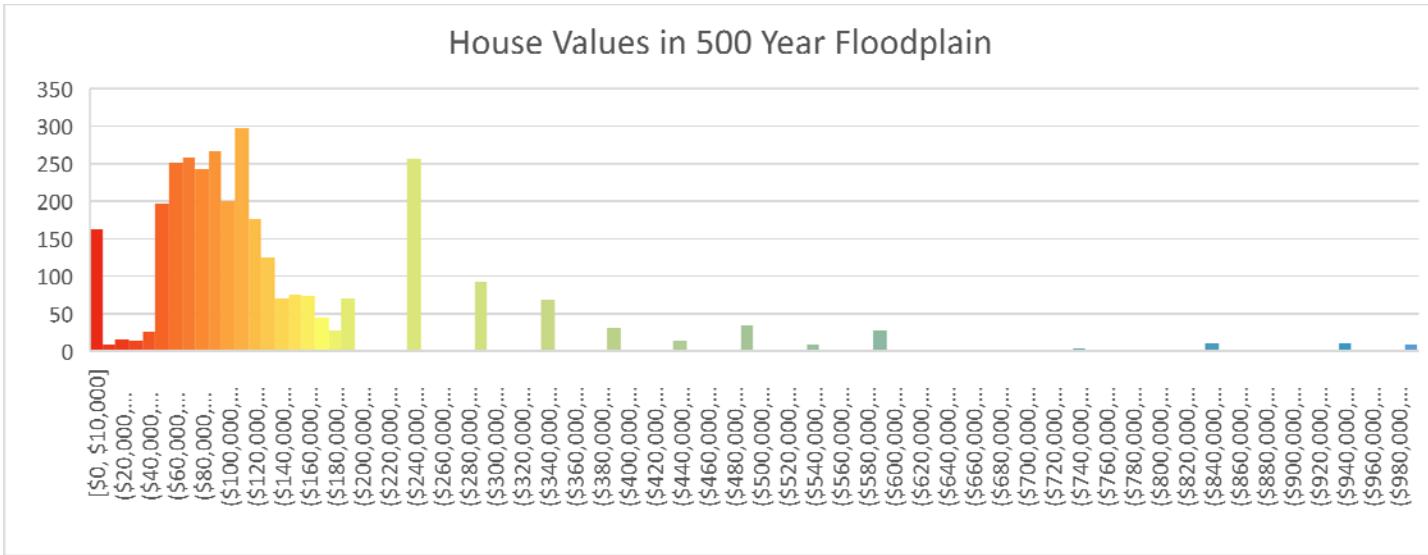


Figure 8: Histogram depicting the amount of houses falling in each House Value category within the 500 year floodplain.

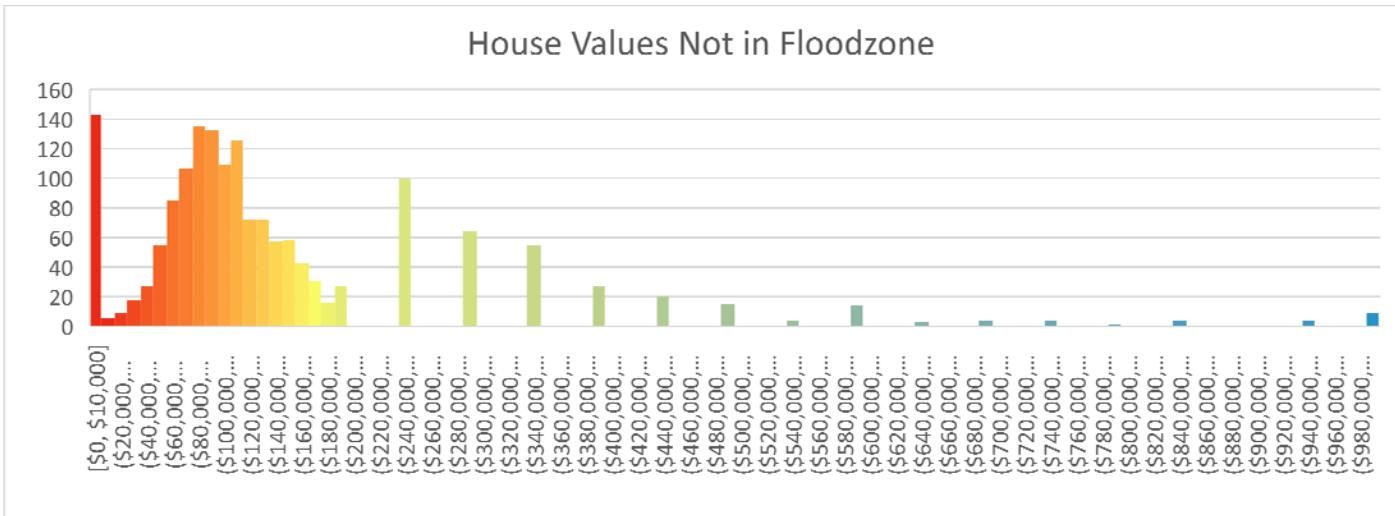


Figure 9: Histogram depicting the amount of houses falling in each House Value category outside of the floodzone.

- 6) The final map includes an inset of a closer view to the downtown Houston area for a clearer look at the symbology presented.

Conclusions:

As the graphs indicate, there doesn't seem to be a correlation between a district's location in a flood zone and its property value. This goes against my original hypothesis, but the end result is still very interesting. Considering Houston's historical location in low-lying, swampy area, it isn't all that surprising that property values are not significantly affected by the danger of flooding.

Map Showing the Effect of Floodplains on House Values in Houston, Texas

