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Case Studies
Growth in Housing – Version 1
December 5, 2007

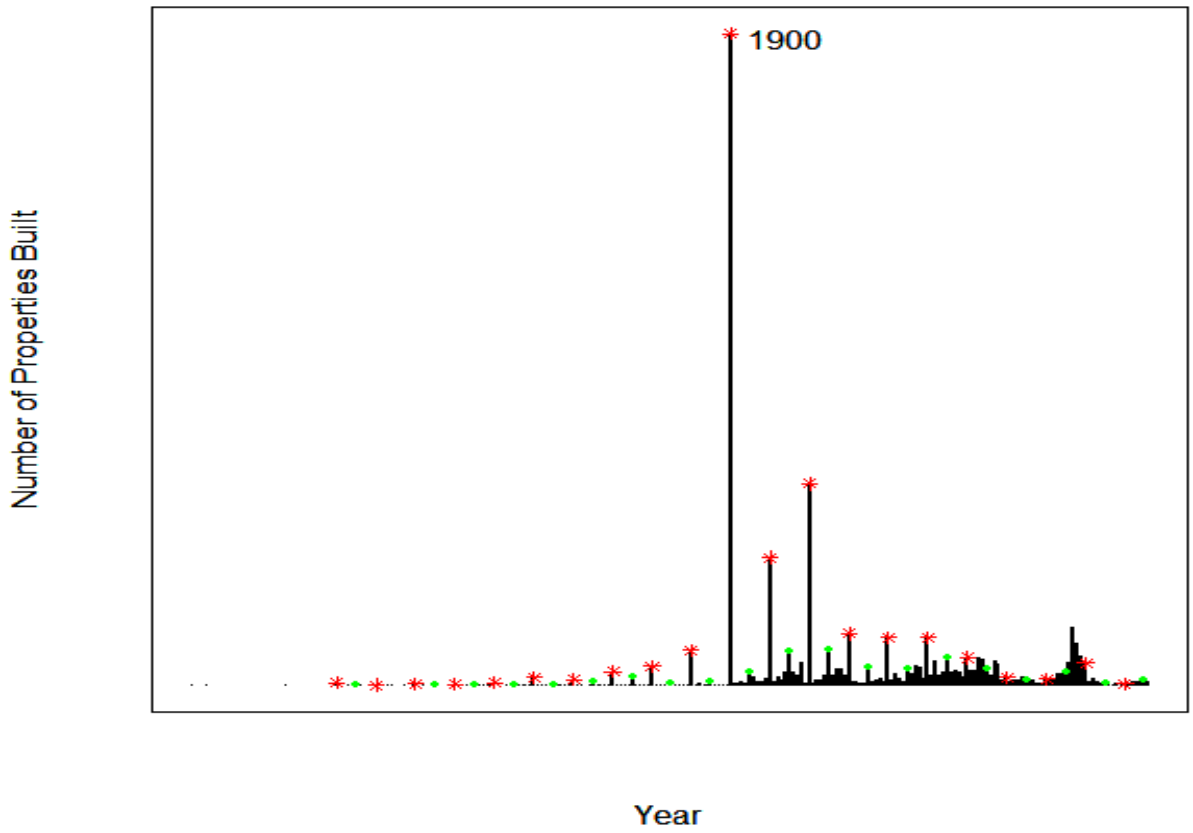
With records of construction dating back to the late seventeen hundreds, we began to wonder if there were any patterns of growth in regards to the New Haven properties. How did time affect the city's development? Was New Haven built steadily over time or could we find evidence that the majority of properties were erected during only a small number of years? In addition, were different parts of New Haven built up during different periods of time? And what about types of properties – were there any patterns in the kinds of buildings being constructed ?

Before tackling these curiosities, however, it was first very important to examine the year built variable on its own. Upon tabulating this variable[1], we can learn some interesting things:

- New Haven building dates range from 1763 to 2006.
- 3,689 properties have missing years built
  - 3,069 is due to vacant land
- Only three properties are documented as being built in the seventeen hundreds
  - 149 Elm Street
  - 182 Front Street
  - 105 Valley Street
- Under fifteen hundred properties were constructed in the 1800's
- Approximately 28% of New Haven properties are listed with a construction year of 1900
- The number of buildings spikes considerably at each decade
  - This is most severe during the start of the 1900's, as the peaks become smaller towards the latter end of the century

The following plot displays this final observation. Red stars represent the start of each decade and we can see that the majority of red stars coincide with building peaks. In addition, the green dots have been placed at every fifth year to show us that the minor construction surges seem to occur when the year ends with a five. We have hypothesized that these curious spikes are the result of rounding errors. When a precise year of construction is unknown, the date will be approximated and most commonly windowed around the beginning of, or midway through, a decade. We can also see that the building spikes are greatest during the first half of the twentieth century and become considerably less significant as we near the twenty first. This makes sense in terms of our hypothesis because the more recently a property is built, the higher the likelihood that its construction year is known and therefore more accurately preserved. For this reason, we would not necessarily expect more current buildings to suffer from such approximation errors. This finding is important because it seems to suggest that our year built variable is somewhat unreliable.

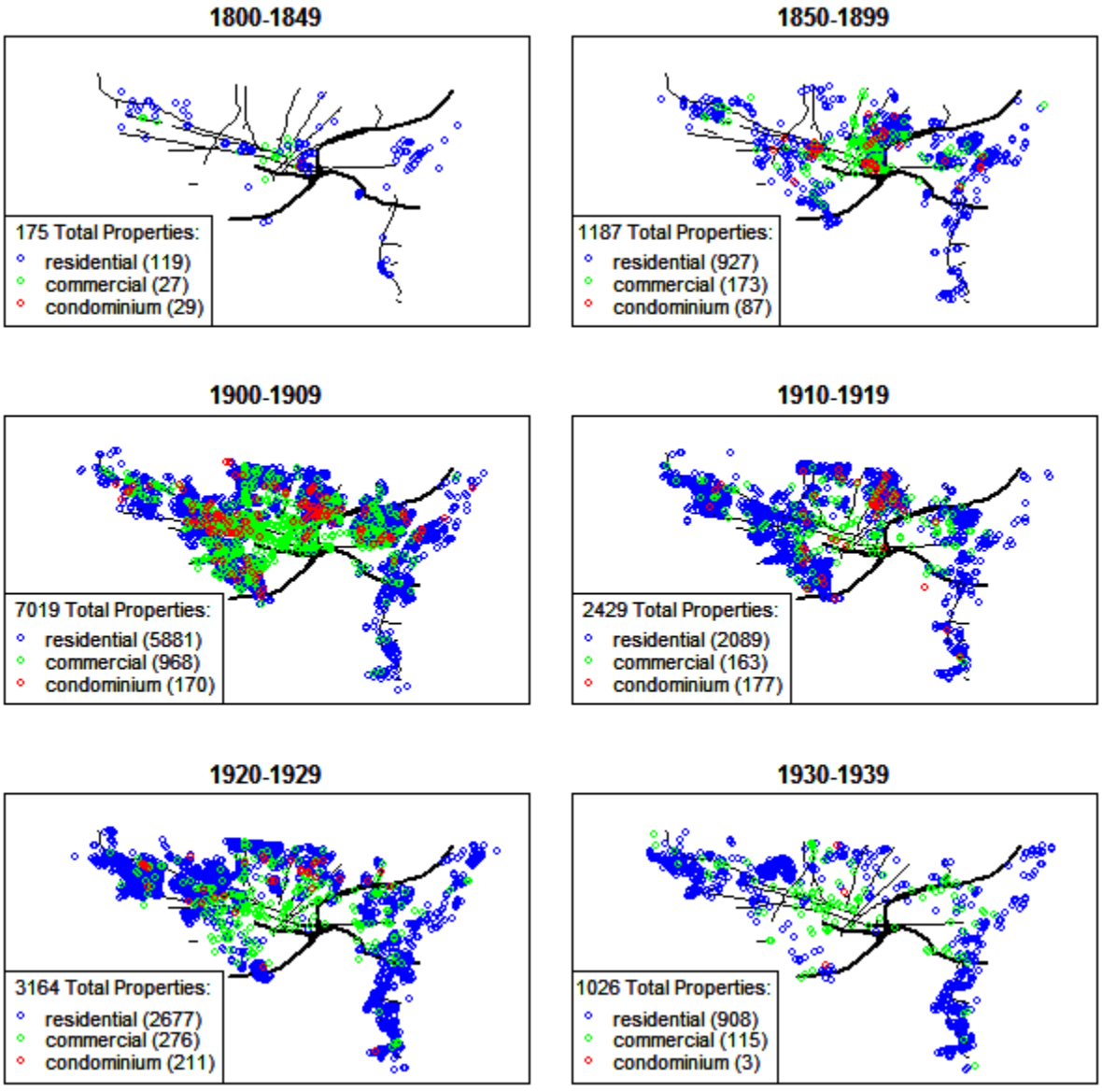
1 A complete table of year built is included at the end of this report



Moving forward with an understanding of this variable, we could now try to answer the questions previously posed and attempt to uncover building trends within the data. In order to create the following visual explanations:

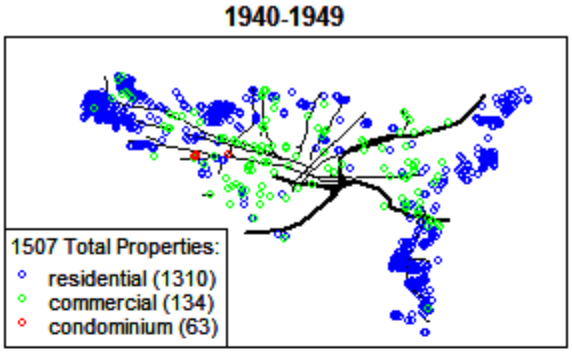
- Year built was collapsed into larger groups as a way to both counteract the rounding effect previously discussed as well as to gain a comparable amount of properties within each group
- Residential properties were determined by aggregating all properties listed as “Residential” under the 'Model' variable.
- Commercial properties were determined by aggregating all properties listed under 'Model' as:
  - “Commercial”
  - “Com Condo”
  - “Ind/Lg Com”
  - “Svc Sta/Gar”
- Condominiums were identified when 'Model' listed the property as
  - “Res Condo”
  - “Multi-Family” (these were included in condominiums and not residential because the 'Style' variable of these properties lists them as “Apartments”)

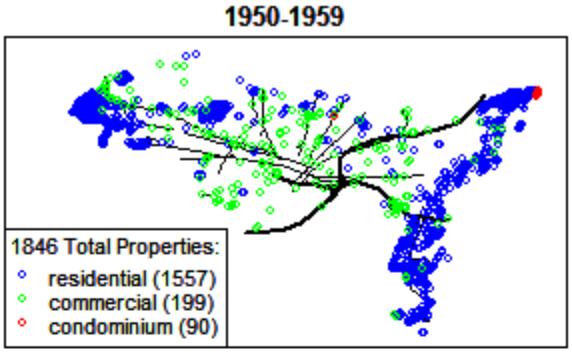
Plots by Year Built, part I

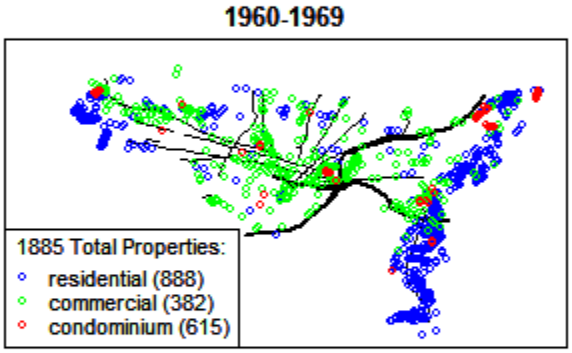


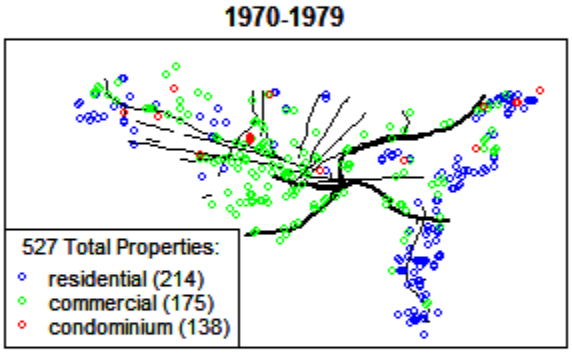
From a look to these six plots, some things become evident. First, we can visually observe the small number of buildings constructed in the nineteenth century. We can also see that during the eighteen hundreds most of the properties built downtown were either commercial or condominiums; residential properties were mainly built on the outskirts of the city. We can then see that from this time on, throughout the early nineteen hundreds, the construction of commercial properties, while still mainly concentrated in the center of the plot, begins to spread slightly more evenly across New Haven. A similar trend can also be observed for condominiums, as their construction seems to gradually move away from the city center. The pattern of residential properties also remains consistent in each of the plots; virtually no residential buildings appear downtown and the number of residential homes built around the city bounds continues to dominate construction. In addition, we can also see that with each passing decade, the residential properties seem to further tend towards the extremes.

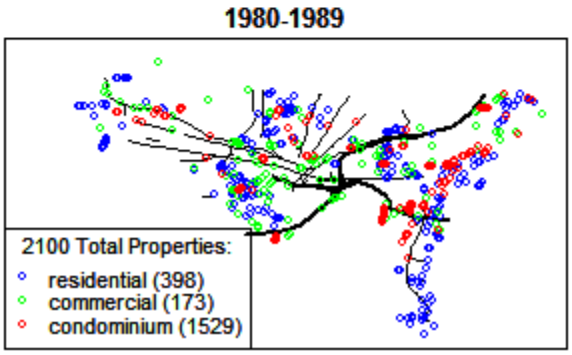
Plots by Year Built, part II

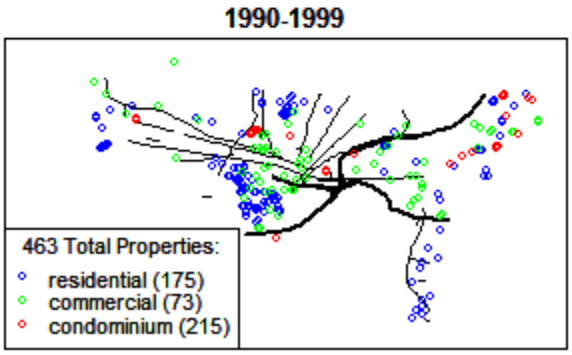






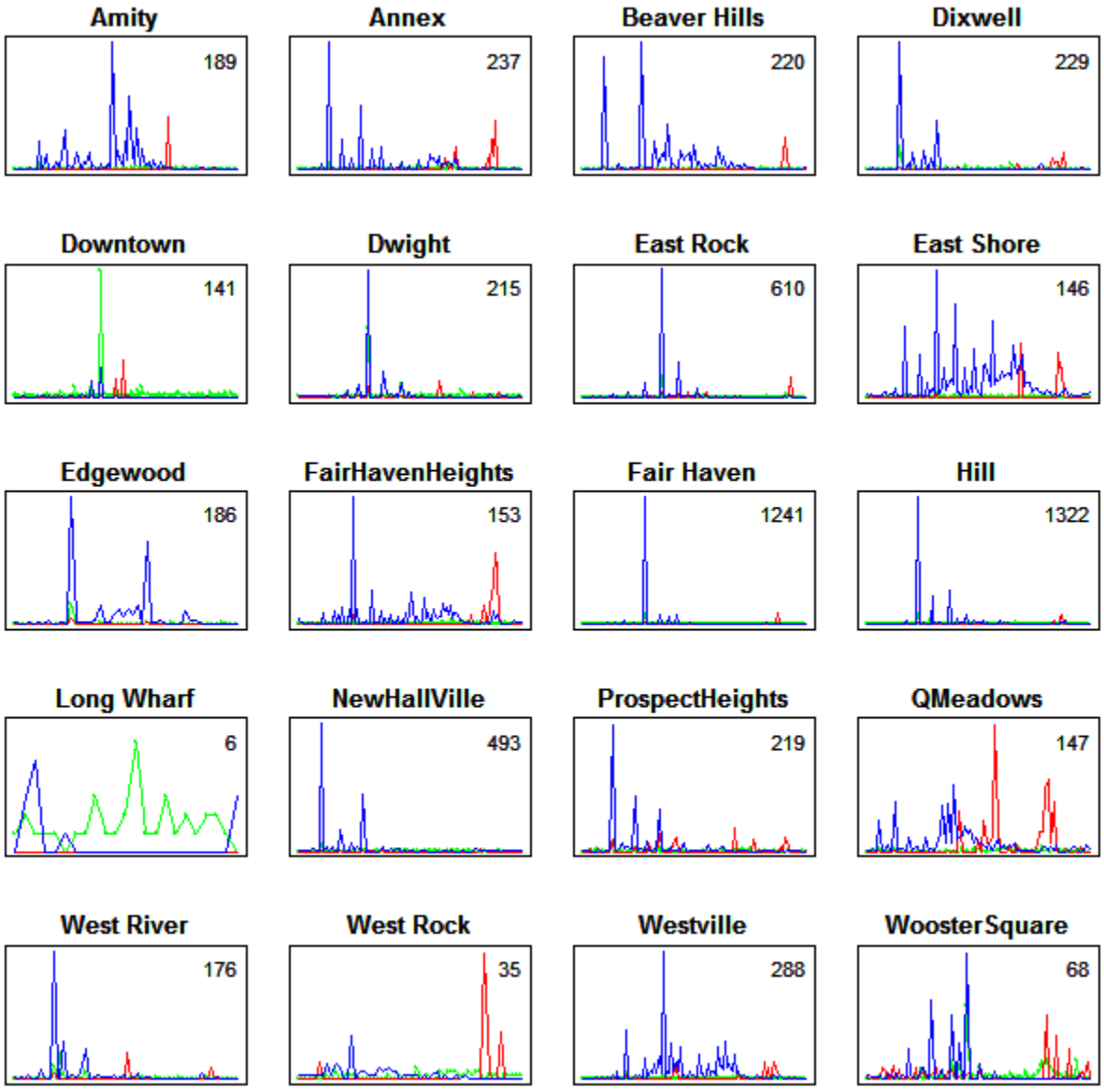






Continuing the visual representation of housing growth, we can see that the indicated trends previously discussed still appear to be evident in most of these plots. Up until the nineteen-eighties, we see the same increasing polarization of residential properties, as well as an increasing spread of commercial buildings and condominiums. It is also interesting to note that in the 1960s, the number of condominiums begins to rapidly increase while the number of residential properties begins to decrease. This trend continues throughout the rest of the century. With the 1980s, however, we can see greater diversity in the types of properties being built throughout New Haven; residential properties are no longer concentrated on the outskirts and condominiums and commercial properties now seem to be very evenly spread. The final plot appears to continue with these patterns, however, there are just less properties considered.

Although the previous maps allowed us to obtain general understandings of building trends, we wanted to take a closer examination and decided to consider the patterns of construction on a neighborhood level. Utilizing the 'neighborhood' variable that was added to our data, the following plots were made. It is important to note that the y-axes scales are not consistent across these plots. The plots were first constructed with this consistency to allow for a direct comparison *across neighborhoods*; however, the counts of properties were so significantly different for each neighborhood that when identical scales were used, it became impossible to detect trends *within neighborhoods*. Since the goal of the neighborhood breakdown was to study construction trends on smaller scales, each neighborhood plot has its own unique y-axis. The upper bound of each y-axis is printed on the plot.



Looking at these plots individually, we can see unique patterns within each New Haven neighborhood. In terms of residential properties, we can see that some neighborhoods, such as: Annex, Dixwell, and West River, reached the height of building in early years. Other neighborhoods, such as Edgewood, seemed to experience two peaks in residential construction while others, such as Amity and East Shore, display consistently high counts. In terms of condominiums, we can see that most

neighborhoods did not have any of these type buildings constructed until the end of the nineteen hundreds. As consistent with our observations from the New Haven maps, we can see that condominiums are constructed earliest Downtown. We can also see that, unlike all other neighborhoods, Quinnipiac Meadows is dominated by condo construction. Finally, we can also study the trends of commercial buildings. Although there are not many properties in total to be considered, we can see that Long Wharf seems to contain mostly commercial records. It can also be seen that Downtown and Wooster Square are the only other two neighborhoods that seem to display counts of commercial properties.

So what does New Haven look like now? The following table was created to display, by neighborhood, the current counts of properties.

Neighborhood	Commercial	Condominium	Residential	Total
Amity	100 (8.2%)	80 (6.6%)	1037 (85.2%)	1217
Annex	155 (10.6%)	305 (20.9%)	998 (68.4%)	1458
Beaver Hills	52 (4.2%)	91 (7.4%)	1081 (**88.3%**)	1224
Dixwell	179 (22.9%)	105 (13.4%)	497 (63.6%)	781
Downtown	386 (**73.2%**)	67 (12.7%)	74 (14%)	527
Dwight	258 (35.1%)	79 (10.7%)	398 (54.1%)	735
East Rock	278 (14.3%)	282 (14.5%)	1386 (71.2%)	1946
East Shore	32 (1.7%)	190 (10.3%)	1628 (88.0%)	1850
Edgewood	47 (7.8%)	12 (2.0%)	540 (**90.2%**)	599
FHavenHeights	58 (4.5%)	346 (26.8%)	885 (68.7%)	1289
Fair Haven	284 (11.8%)	207 (8.6%)	1918 (81.7%)	2409
Hill	428 (11.5%)	252 (6.8%)	3030 (81.7%)	3710
Long Wharf	35 (**74.5%**)	0 (0%)	12 (25.5%**)**	47
NewHallVille	107 (8.9%)	25 (2.1%)	1067 (67.5%)	1199
ProspectHeights	81 (8.7%)	223 (23.9%)	630 (67.5%)	934
Q Meadows	80 (5.6%)	628 (**43.8%**)	726 (50.6%)	1434
West River	104 (18.0%)	62 (10.7%)	412 (71.3%)	578
West Rock	40 (25.6%)	55 (35.3%)	61 (39.1%)	156
Westville	81 (3.7%)	244 (11.3%)	1841 (85.0%)	2166
WoosterSquare	182 (30.9%)	165 (**28.0%**)	242 (41.1%)	589

TABLE: YEAR BUILT

1763	1767	1787	1800	1803	1804	1805	1806	1810	1811	1812	1813	1814	1817
1	1	1	27	2	6	1	1	5	2	1	1	4	2
1820	**1822**	**1825**	**1829**	**1830**	**1831**	**1832**	**1833**	**1834**	**1835**	**1836**	**1837**	**1838**	**1839**
14	2	7	1	11	2	8	2	2	4	2	2	5	1
1840	**1841**	**1843**	**1844**	**1845**	**1846**	**1847**	**1848**	**1849**	**1850**	**1851**	**1852**	**1853**	**1854**
27	3	10	5	12	8	5	5	2	84	4	4	1	2
1855	**1856**	**1857**	**1858**	**1859**	**1860**	**1861**	**1862**	**1864**	**1865**	**1866**	**1867**	**1868**	**1869**
1	6	9	2	3	60	2	5	2	34	1	2	4	4
1870	**1871**	**1872**	**1873**	**1874**	**1875**	**1876**	**1877**	**1878**	**1879**	**1880**	**1881**	**1882**	**1883**
137	8	8	4	9	82	11	8	5	8	194	4	10	3
1884	**1885**	**1886**	**1887**	**1888**	**1889**	**1890**	**1891**	**1892**	**1893**	**1894**	**1895**	**1896**	**1897**
9	19	5	2	11	2	356	7	19	8	8	39	11	12
1898	**1899**	**1900**	**1901**	**1902**	**1903**	**1904**	**1905**	**1906**	**1907**	**1908**	**1909**	**1910**	**1911**
9	8	6560	17	16	36	24	140	82	38	43	63	1289	42
1912	**1913**	**1914**	**1915**	**1916**	**1917**	**1918**	**1919**	**1920**	**1921**	**1922**	**1923**	**1924**	**1925**
79	54	133	349	129	94	235	25	2029	26	51	55	104	366
1926	**1927**	**1928**	**1929**	**1930**	**1931**	**1932**	**1933**	**1934**	**1935**	**1936**	**1937**	**1938**	**1939**
104	166	168	95	520	35	39	22	29	177	39	59	75	31
1940	**1941**	**1942**	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**	**1950**	**1951**	**1952**	**1953**
480	50	125	76	40	169	117	204	180	66	480	95	245	97
1954	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**	**1961**	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**
142	285	128	150	131	93	279	144	156	272	256	165	99	242
1968	**1969**	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**
213	59	81	42	56	61	82	55	41	61	19	29	66	64
1982	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
66	110	116	131	229	587	430	301	229	44	68	31	16	19
1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**			
9	9	26	12	17	19	34	43	35	46	33			