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Project Pigeon Watch: changes in flock size and color morph over time

Pigeons, often seen as brainless creatures, are actually one of the most intelligent birds on the planet. They are easily recognized and have adapted to live in cities, suburban and rural areas, and beaches. Populations have been established in North America for over two hundred years and across the world for much longer. Pigeons show specific behaviors and courting rituals that have made them the subject of multiple studies. In terms of courting, male pigeons often sexually select mates in their particular morph.

The purpose of this study originates from protocol following the Cornell Ornithology Lab's Project Pigeon Watch. This citizen science project involved the collection of data to see the prevalence of different pigeon morphs, and specifically male pigeons courting other pigeons. The original questions analyzed through this project were, why are pigeon flocks so diverse in color? Is sexual selection maintaining the diversity of feral pigeon flocks? For our specific group, we want to see if the sizes of flock by Zip Prefix change through time. In addition, we want to know if the F/20 flocks are smaller, perhaps due to the pandemic. We also focused on the trends in flock sizes to see if they continued this semester. Are there shifts in the relative dominance of the various morphs through time? If so, does this indicate random fluctuation, change in predatory environment, municipal pigeon eradication programs, or some combination of those factors?

The methods we used to collect our data was in two ways. The first way we obtained our data was through Dr. Rodrigue. Dr. Rodrigue has been compiling data on the observation of pigeon flocks and the morphs in them since the year 2000. We first received data in the form of a

spreadsheet from Dr. Rodrigue from her previous classes from 2000-2018 that systematically observed pigeon flocks and wrote down the number of pigeons in the flock, the kinds of morphs in the flock and number, courtships in the flock, and the location observed. For the second part of the data that we collected Dr. Rodrigue also provided us with the data but this time it was only for our class in 2020. Our class did what the previous classes have done in terms of observing pigeon flocks and recording our observations but Dr. Rodrigue brought our data together in a spreadsheet in order for us to observe the data as a whole.

When analyzing the data we had to first look at the 4 different zip codes we were assigned to analyze, zip codes 900, 907,908, and 926 for the years 2000-2018 first then we did it for our class 2020. The data was already separated by zip codes by Dr. Rodrigue from the years 2000- 2018 and the same goes for the data gathered by our class in 2020. We then made 3 different graphs, one of the graphs depicts the average between the two different data sets 2000-2018 and 2020, The second one shows the averages between the zip codes over the years, and the third shows the percentages of the flock sizes by zip codes. We then used these three charts to observe and analyze the four different zip codes and talk about them.

Since the early 2000's pigeon flock numbers have fluctuated in the 900 zip code area. The spaces here range from downtown to industrial areas and parks. In 2020, numerous commercial gas stations were sites for collecting data. From 2000 to 2003 with five visits a total of seventy-one pigeons were identified and in the following years, from 2007-2011 eighty-two pigeons were found. Flock morphs remain consistent with blue-bar pigeons being spotted the most. In 2013 to 2018 less pigeons were identified, sixty-two. The data for the flocks in 2020 might be slightly skewed since there were ten more visits than the previous years that the data was collected. The trend for many blue-bar pigeons was continued, however in 2020 there were twenty more checkered pigeons than blue-bar pigeons. Over the years there are very few if any

pied, white, and red pigeons. Since the blue-bar is the original pigeon color morph, it is understandable that they are identified the most.

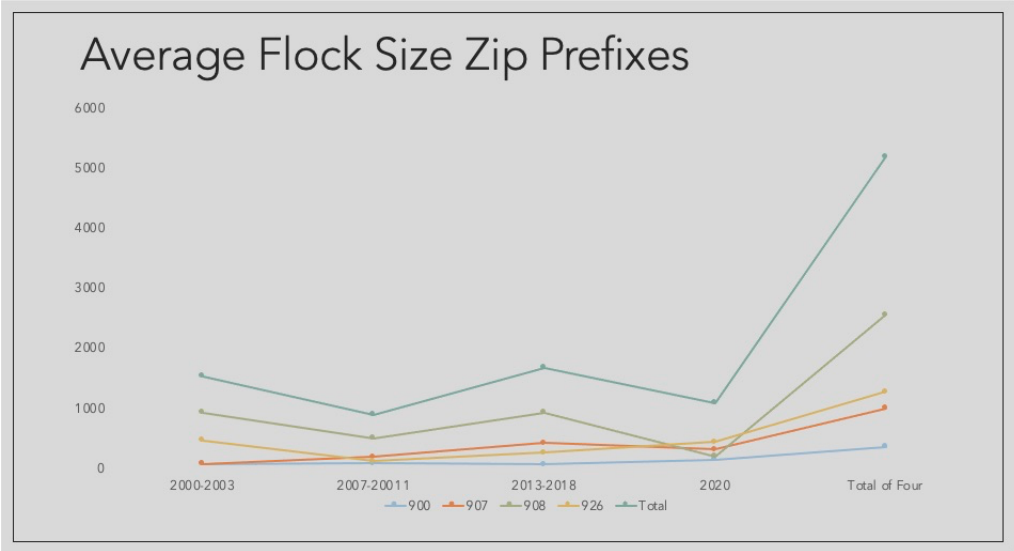
The 907 zip code describes Lakewood down to Signal Hill and out to Cerritos, Seal Beach and Avalon. Pigeon flock numbers have fluctuated in the 907 zip code area since the early 2000's. There were seven site visits from 2000-2001, where 91 pigeons were identified. From 2007 to 2008, twenty-two site visits took place, accounting for 252 pigeons identified. From 2013 to 2017, twenty-three visits took place identifying 344 pigeons. The fall class from 2020 made a total of 17 visits in areas of this zip code, totalling to 337 pigeons observed. It is important to note the difference in the number of visits to this zip code over the years, acknowledging that the most observations in this area occurred from 2013-2017. Despite these differences, the predominant morph observed was the same throughout the data. The morph observed most throughout all of the data was the blue-bar morph, which is logical because it is the original pigeon color morph. Although this was the case, it is important to acknowledge inconsistencies of the data. In many cases with the older classes data, there were gaps of information pertaining to the observed morph and even the time at which the observations took place.

In the 908 zip prefix fluctuated from the 2000-2018 timeframe, with the highest percentile of visits compared to the other four zip prefixes at 12.9% during the 2000-2003 timeframe, 51.8% during the 2007-2011 timeframe, and then a slight decrease to 49.1% during the 2013-2018 timeframe. The amounts of pigeons in this zip have stayed the highest compared to the other three zip prefixes but tremendously decreased during 2020 by more than 20% which is a drastic amount for such a short time period. The amount of visits per identified birds are skewed throughout the the 2000-2018 timeframes with 30 visits and 928 identified in 2000-2003 then a similar amount of visits with 29 but a much lower identified of 498 in 2007-2011 and then a increase in both visits and identified with 55 visits and 931 in 2013-2018. The fluctuating data

from the 908 zip prefix is so drastic that the massive change in the 2020 data can be viewed as both normal changes for the zip prefix or even due to the current situation happening in 2020.

In the Orange County 926 zip prefix we see a 3x decrease in the flock size from 2003 to 2011. Then we see the numbers slowly start to build up from 2011 to 2018 to 2020. We see a gradual increase in the pigeon population numbers but one interesting thing that we noticed is that the 926 zip prefix is usually below the 907 and 908 prefix in all the previous years but then all of a sudden in 2020, the 926 zip code surpasses all the zip codes in the average size of the flocks. Then we looked at the percentages and we see that 39.90% of the flock percentage was in the 926 zip code but in the previous year it was only at 15.30%, it doubled in size. In the zip code percentage chart you can see in blue that during 2000-2003 it was at 30.40% then it plummets to 13.50% and remains that way until 2020. What caused that plummet from 2003 to 2011? What caused the spike in flocks sizes in 2018-2020 in the 926 zip code? Why are there suddenly more pigeons in this zip code in 2020? A theory could be that in Orange County there are more people out and about and more restaurants are open and in turn that would attract more pigeon flocks to go there in search of food. Although this is just a theory that has not been tested, one thing for certain is that the Blue Bar pigeon morph has been king from 2000-2020 in the 926 zip code area!

Below are the graphs we made that depict the four zip codes we have focused on.


Average Flock Size Zip Prefixes
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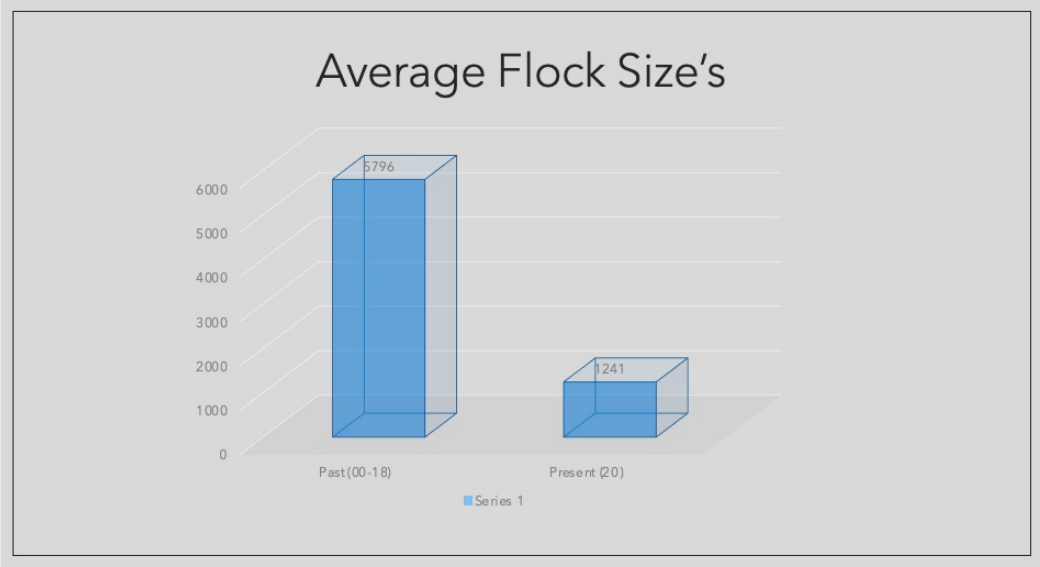
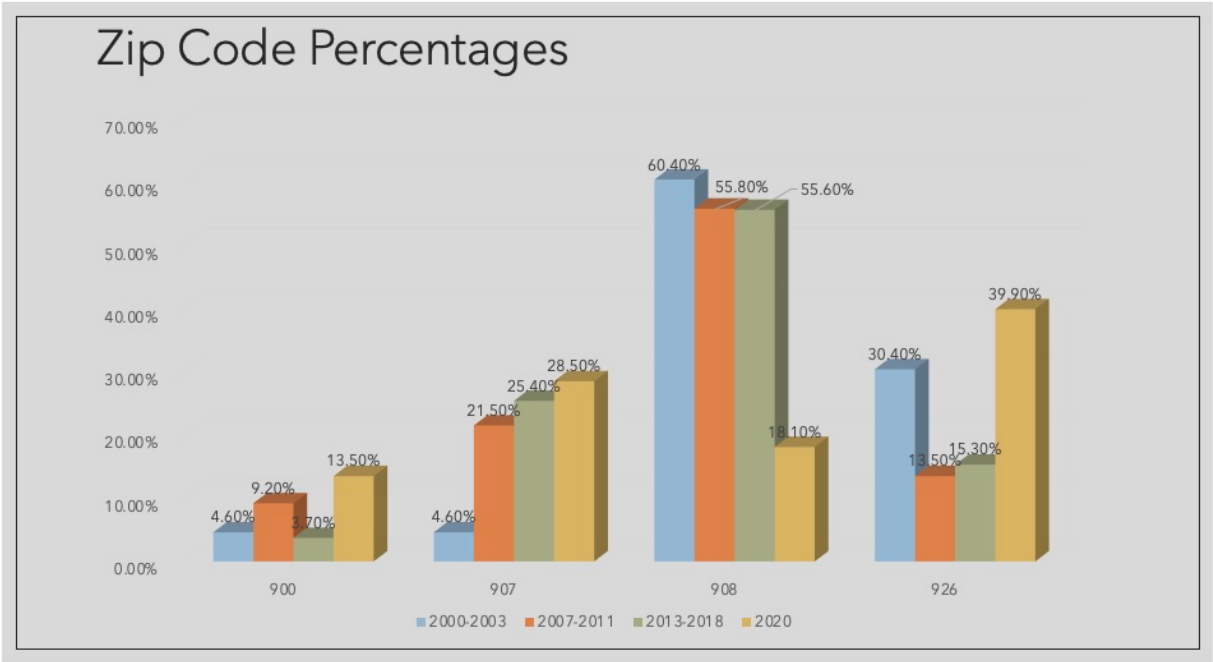
5000
4000
3000
2000
1000
0
2000-2003
2007-20011
2013-2018
2020
Total of Four
900
907
908
926
Total


Average Flock Size's
6000
5000
4000
3000
2000
1000
0
5796
1241
Past (00-18)
Present (20)
Series 1



Our data supported the trend of blue-bar pigeons being identified the most. There were no drastic decreases in flock sizes throughout the years, but they remained relatively consistent. There were slight dips in the population size, but within a few years the populations would rise to their previous numbers. In 2020 we can see a spike in the pigeon populations. This might be due to more pigeon site visits by the students or from the lack of people interacting with the birds due to covid.

Citations:

- LaBranche, M. S. 1999. Why Study Pigeons? Birdscope, Volume 13, Number 3: 3.
- Rodrigue, C.M. 20 Pigeon Watch Data Spreadsheet 2000-2018. Department of Geography
- Rodrigue, C.M. 20 Pigeon Watch Data Spreadsheet F'20. Department of Geography