Data Analysis Report for New York Urban Park Ranger

1. Please find the screenshot of the publication table. It is present in the excel file named "Pooja_Output_File.xlsx" and the sheet name is "Publication Table"

Publication table

Caption: Annual trends in animal assistance requests (2018-2021), showing changes in reported animals, successful transfers to rehabilitators or animal care centers (ACC), types of animals reported, and variations in call sources. Missing values in the 'Number of Animals' column were excluded for accuracy. The 'Year' was derived from the 'Date and Time of Initial Call' column.

		Reported Animals Annual Trend			
Categories		**2018**	**2019**	**2020**	**2021**
Number of animals	ACC	345	212	219	133
	Rehabilitator	45	78	151	75
	Total	**390**	**290**	**370**	**208**
Animal Class	Birds	*105*	*217*	*381*	*196*
	Coyotes	2	7	5	4
	Deer	13	18	27	13
	Domestic	24	51	61	40
	Fish-numerous quantity	1	0	2	2
	Marine Mammals-seals only	3	5	13	1
	Raptors	36	45	56	40
	Small Mammals-RVS	*470*	*180*	*149*	*77*
	Small Mammals-non RVS	29	57	72	50
	Terrestrial Reptile or Amphibian	13	45	48	36
	Marine Reptiles	0	2	1	1
	Marine Mammals-whales, Dolphin	0	4	0	1
	Non Native Fish-(invasive)	0	0	1	0
	Rare, Endangered, Dangerous	0	0	1	0
	Total	**696**	**631**	**817**	**461**
Call source	Central	116	125	163	134
	Conservancies/"Friends of" Groups	*258*	60	55	29
	Employee	*180*	*213*	*281*	*147*
	Observed by Ranger	12	48	61	36
	Other	35	33	29	8
	Public	95	*152*	*228*	*107*
	Total	**696**	**631**	**817**	**461**

Note: Yellow bold values indicate yearly totals for each category. For the "Animal Class" and "Call Source" categories, green italic values indicate the maximum values per year, while light pink italic values indicate the second highest values per year .

2. Please find the screenshot of the importable table. It is present in the excel file named "Pooja_Output_File.xlsx" and the sheet name is "Importable Table"

Importable Table

Call Source	Animal Class	# of Animals	Final Ranger Action	Report_Year
Other	Birds	6	ACC	2021
Central	Birds	4	Rehabilitator	2021
Employee	Deer	0	Unfounded	2021
Employee	Small Mammals-RVS	0	Unfounded	2021
Central	Small Mammals-non RVS	1	ACC	2021
Employee	Birds	1	ACC	2021
Employee	Birds	0	Unfounded	2021
Public	Domestic	0	Unfounded	2021
Employee	Domestic	1	ACC	2021
Central	Domestic	0	Unfounded	2021
Central	Terrestrial Reptile or Amphibian	1	Relocated/Condition Corrected	2021
Employee	Small Mammals-non RVS	1	Advised/Educated others	2021
Employee	Domestic	0	Unfounded	2021
Central	Birds	1	Rehabilitator	2021
Employee	Birds	1	ACC	2021
Conservancies/"Friends of" Groups	Birds	1	Monitored Animal	2021
Central	Small Mammals-RVS	0	Unfounded	2021
Conservancies/"Friends of" Groups	Birds	0	Unfounded	2021
Conservancies/"Friends of" Groups	Birds	1	ACC	2021
Employee	Terrestrial Reptile or Amphibian	0	Unfounded	2021
Employee	Terrestrial Reptile or Amphibian	1	Relocated/Condition Corrected	2021
Central	Birds	1	ACC	2021
Central	Domestic	1	ACC	2021
Employee	Small Mammals-RVS	0	Unfounded	2021
Employee	Terrestrial Reptile or Amphibian	1	ACC	2021
Employee	Birds	12	Submitted for DEC Testing	2021
Central	Small Mammals-RVS	1	Relocated/Condition Corrected	2021
Central	Raptors	1	Advised/Educated others	2021
Employee	Raptors	1	Rehabilitator	2021
Central	Small Mammals-RVS	0	Unfounded	2021
Employee	Domestic	1	ACC	2021
Employee	Small Mammals-RVS	2	Relocated/Condition Corrected	2021
Central	Domestic	0	Unfounded	2021
Employee	Terrestrial Reptile or Amphibian	1	Relocated/Condition Corrected	2021
Central	Birds	0	Unfounded	2021
Central	Birds	1	ACC	2021
Conservancies/"Friends of" Groups	Birds	1	Rehabilitator	2021
Central	Raptors	1	Advised/Educated others	2021
Employee	Birds	1	ACC	2021
Employee	Fish-numerous quantity	12	Advised/Educated others	2021
Central	Terrestrial Reptile or Amphibian	1	Relocated/Condition Corrected	2021
Employee	Small Mammals-RVS	1	Monitored Animal	2021
Central	Terrestrial Reptile or Amphibian	1	Advised/Educated others	2021
Central	Raptors	1	Rehabilitator	2021
Employee	Birds	1	ACC	2021
Observed by Ranger	Birds	1	Relocated/Condition Corrected	2021
Employee	Domestic	1	Advised/Educated others	2021

3. Code snippets and insights drawn for each question

In order to answer the 3 questions, I had to perform data preprocessing steps like data cleaning, data manipulation, handling the missing values and data storage in excel file.

Step 1: Subset the data by columns to choose only those columns which will help in answering the dataset associated questions.
Step 2: Perform data cleaning by changing the datatype of "Date and Time of initial call" from "Object" to "DateTime".
Step 3: Column named "Animal Class" contains messy labels with values like (;,#) so in order to keep data consistent and reliable for further analysis, I am replacing the original messy string data by extracting only the label name after # and saving it as a new label.
Step 4: Adding a new column named "Report_Year" that extracts the year value from "Date and Time of initial call" column so that annual trend can be observed in further data analysis phase.
Step 5: Finally, drop the "Date and Time of initial call" column as it does not contribute for further analysis.
Step 6: There are 4 missing values in the '# of Animals' column, which is extremely minimal relative to the dataset size, so it is better to drop them.
Step 7: Storing the filtered dataframe in the new excel file named "Pooja_Output_File.xlsx" and sheet named "Importable Table"
Step 8: Read in the "Importable Table" dataset. Read the required data from the specific sheet of the excel file and inspect it.
Step 9: Perform appropriate grouping and aggregation pandas operations to answer the three questions.
Step 10: Finally**,** develop a publication table that follows table anatomy guidelines that answers the three specific questions.

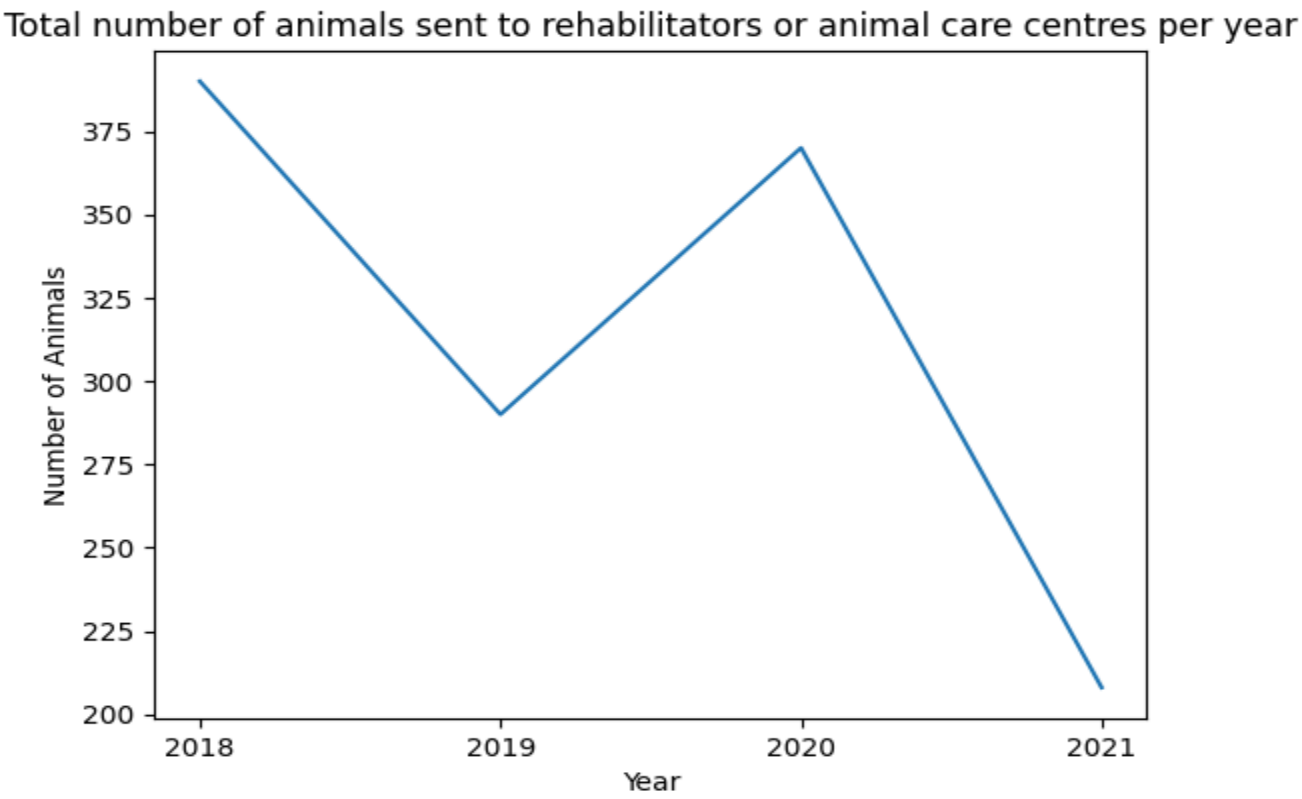
Question 1: How has the number of animals sent to rehabilitators or animal care centers changed over time?

```
# Creating a dataframe that holds only information for animals sent to rehabilitators
or animal care centres.
rehab_or_acc=final_df[(final_df['Final Ranger Action']=='Rehabilitator') |
(final_df['Final Ranger Action']=='ACC')]

# Computing the number of animals for each year to understand the annual trend.
no_of_animals_over_time=rehab_or_acc.groupby('Report_Year')['# of
Animals'].sum().reset_index()
print(no_of_animals_over_time)
```

Output:

Report_Year	# of Animals
2018	390
2019	290
2020	370
2021	208



Key Observations:

The lineplot titled "Total number of animals sent to rehabilitators or animal care centers per year" shows the annual trend of animals sent to rehabilitators or care centers from 2018 to 2021.

- **Decrease from 2018 to 2019:**
  - In 2018, the number of animals sent to rehabilitators or animal care centers was at its peak more than 375 animals.
  - In 2019, there was a significant decrease, dropping to 290 animals.
- **Increase from 2019 to 2020:**
  - In 2020, there was a recovery and an increase in the number of animals sent, rising back to 370 animals. This suggests that some factors may have led to more animals being reported or needing care compared to the previous year.
- **Sharp Decline from 2020 to 2021:**
  - The most noticeable change is the sharp decline from 2020 to 2021, where the number dropped to around 200 animals. This is a significant reduction and the lowest number in the observed period.

Although the dataset does not explain what resulted in the significant decline of total number of animals reported annually, as per my subjective opinion/assumptions(no factual proof or data inference), major possibilities could be external factors like environmental changes that influenced wildlife population or the COVID-19 pandemic during 2020 and 2021 likely affected the operations of rehabilitators and care centers. Strong factual observation about this is not available due to insufficient data pertaining to factors affecting this issue.

Conclusion: The lineplot highlights significant fluctuations, particularly the sharp decline in 2021, warranting further investigation. Understanding these trends is crucial for effective wildlife management and resource allocation.

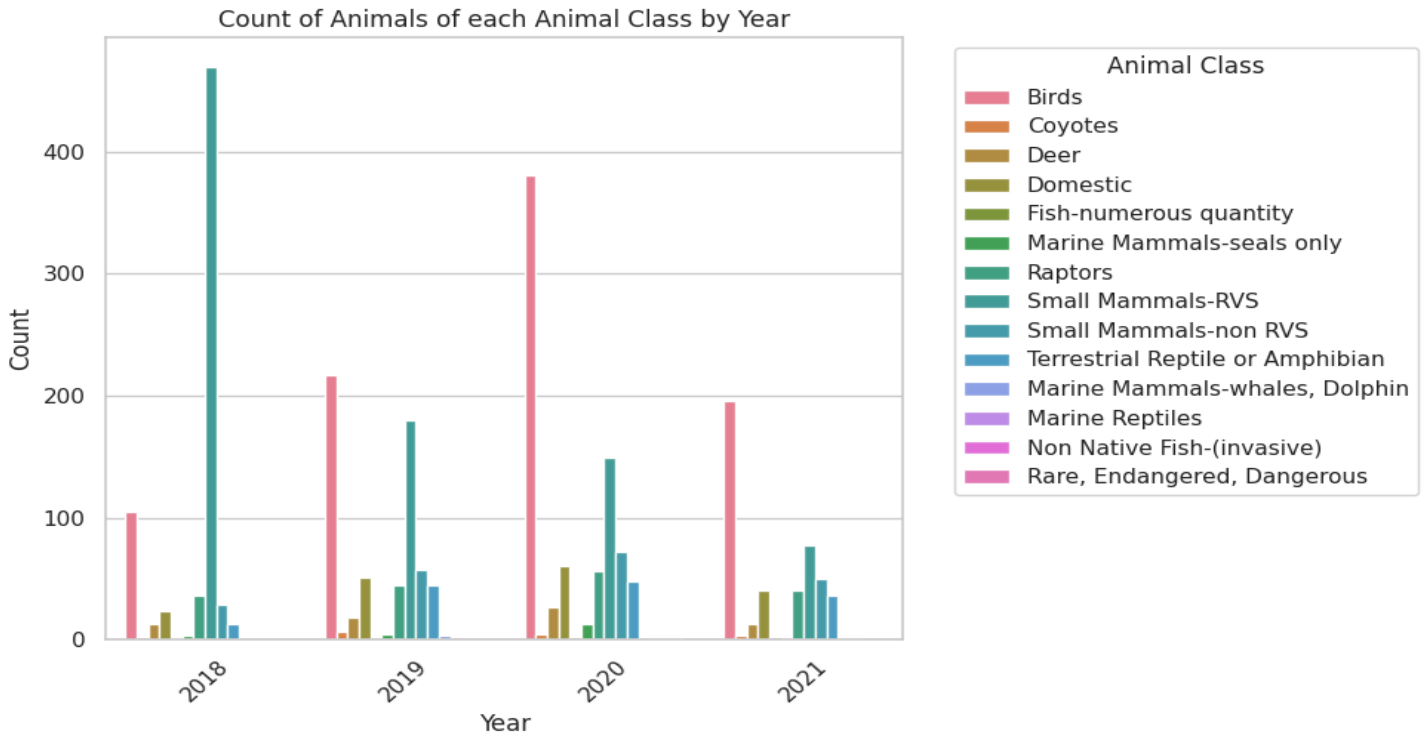
Question 2: How has the type of animal being reported changed over time?

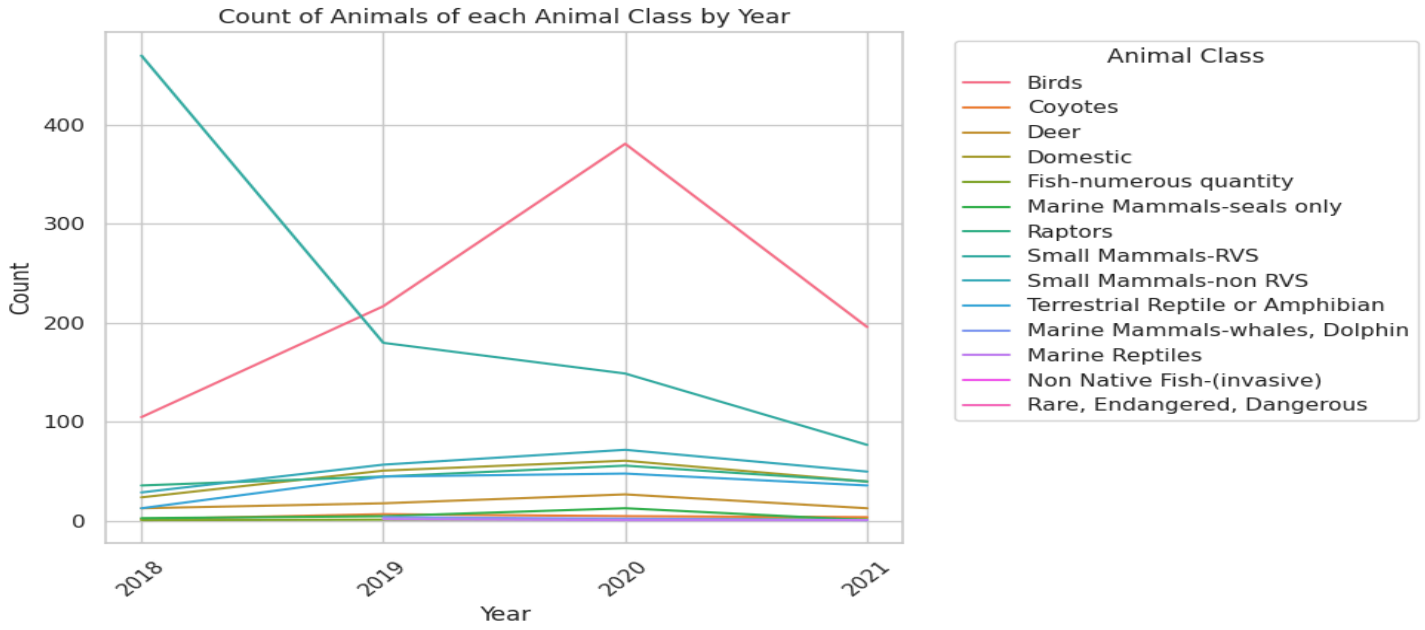
```
animal_class_over_time=final_df.groupby(['Report_Year','Animal
Class']).size().reset_index(name='Animal_Count')
print(animal_class_over_time)
```

Output:

Report_Year	Animal Class	Animal_Count
2018	Birds	105
2018	Coyotes	2
2018	Deer	13
2018	Domestic	24
2018	Fish-numerous quantity	1
2018	Marine Mammals-seals only	3
2018	Raptors	36
2018	Small Mammals-RVS	470
2018	Small Mammals-non RVS	29
2018	Terrestrial Reptile or Amphibian	13
2019	Birds	217
2019	Coyotes	7
2019	Deer	18
2019	Domestic	51
2019	Marine Mammals-seals only	5
2019	Marine Mammals-whales, Dolphin	4
2019	Marine Reptiles	2
2019	Raptors	45
2019	Small Mammals-RVS	180
2019	Small Mammals-non RVS	57
2019	Terrestrial Reptile or Amphibian	45
2020	Birds	381
2020	Coyotes	5
2020	Deer	27
2020	Domestic	61
2020	Fish-numerous quantity	2
2020	Marine Mammals-seals only	13
2020	Marine Reptiles	1
2020	Non Native Fish-(invasive)	1
2020	Raptors	56
2020	Rare, Endangered, Dangerous	1
2020	Small Mammals-RVS	149
2020	Small Mammals-non RVS	72
2020	Terrestrial Reptile or Amphibian	48
2021	Birds	196
2021	Coyotes	4

2021	Deer	13
2021	Domestic	40
2021	Fish-numerous quantity	2
2021	Marine Mammals-seals only	1
2021	Marine Mammals-whales, Dolphin	1
2021	Marine Reptiles	1
2021	Raptors	40
2021	Small Mammals-RVS	77
2021	Small Mammals-non RVS	50
2021	Terrestrial Reptile or Amphibian	36





Key Observations:

The bar plot and lineplot both titled "Count of Animals of each Animal Class by Year " shows the annual trend of different types of animals reported from 2018 to 2021. There are many trends that can be observed out of which the two main ones that I want to highlight are:

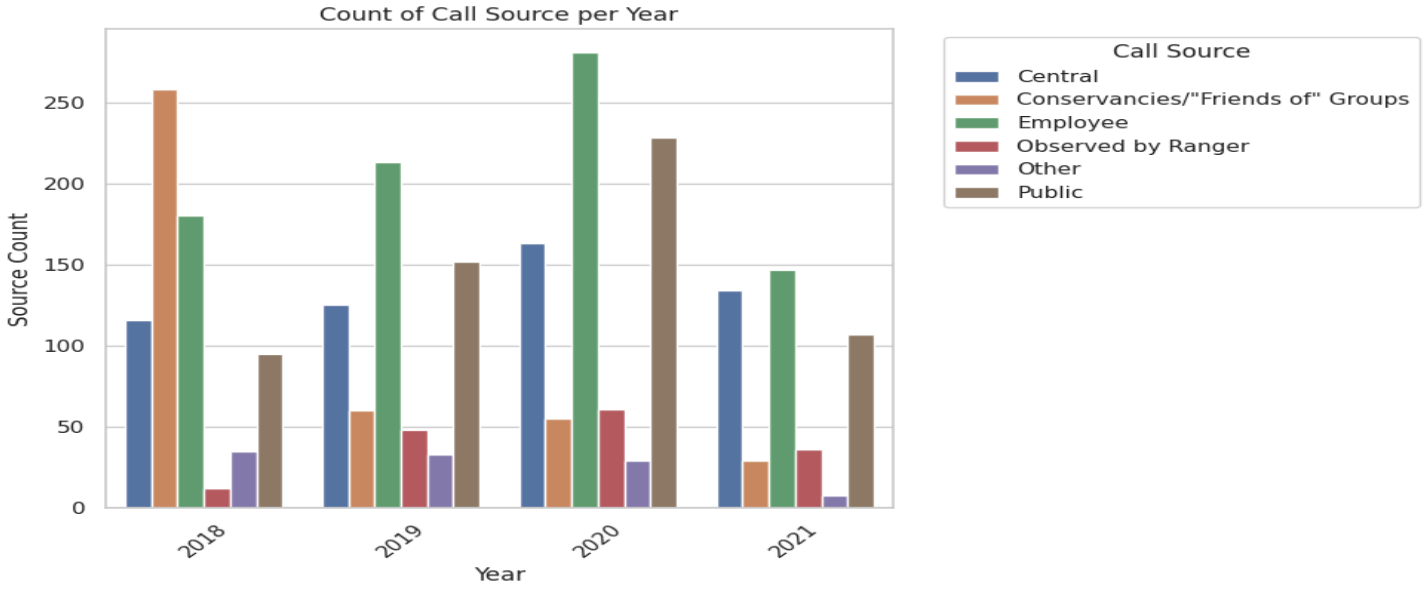
- The two most reported animal classes are "Birds" and "Small Mammals-RVS"
- The total number of "Birds" reports increased from 2018 to 2020 and drastically decreased from 2020 to 2021 whereas the total number of "Small Mammals-RVS" continuously decreased each year from 2018 to 2021.

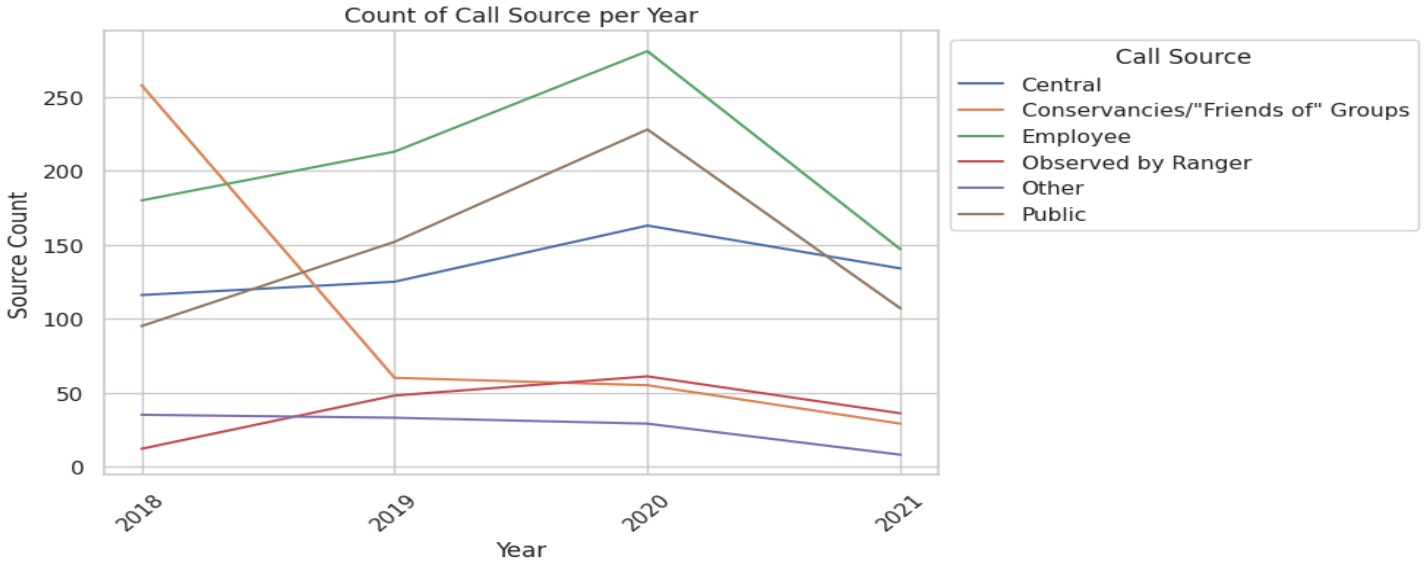
Question 3: How has the source of information (call source) changed over time?

```
call_source_over_time=final_df.groupby(['Report_Year','Call
Source']).size().reset_index(name='Source_Count')
print(call_source_over_time)
```

Output:

Report_Year	Call Source	Source_Count
2018	Central	116
2018	Conservancies/"Friends of" Groups	258
2018	Employee	180
2018	Observed by Ranger	12
2018	Other	35
2018	Public	95
2019	Central	125
2019	Conservancies/"Friends of" Groups	60
2019	Employee	213
2019	Observed by Ranger	48
2019	Other	33
2019	Public	152
2020	Central	163
2020	Conservancies/"Friends of" Groups	55
2020	Employee	281
2020	Observed by Ranger	61
2020	Other	29
2020	Public	228
2021	Central	134
2021	Conservancies/"Friends of" Groups	29
2021	Employee	147
2021	Observed by Ranger	36
2021	Other	8
2021	Public	107





Key Observations:

The bar plot and lineplot both titled "Count of Call Source per Year" shows the annual trend of varied call sources reported from 2018 to 2021. There are many trends that can be observed out of which the two main ones that I want to highlight are:

- In 2018 specifically, the most prominent call source is "Conservancies/"Friends of" Groups" followed by "Employee" and "Central".
- The two most prominent call sources are "Employee" and "Public" noticed from 2019 to 2021.

4. About the publication table

The publication table was created through Python code that consolidates answers to three specific questions. Additional hand formatting was applied to improve readability and understanding.

Yellow bold values indicate yearly totals for each category.

For the "Animal Class" and "Call Source" categories, green italic values indicate the maximum values per year, while light pink italic values indicate the second highest values per year.