In [1]:

```
import pandas as pd
data=pd.read_csv('database.csv');
```

```
C:\ProgramData\Anaconda3\lib\site-packages\IPython\core\interactiveshell.py:
3063: DtypeWarning: Columns (9,12,15,17) have mixed types.Specify dtype opti
on on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

In [3]:

```
data.head(5)
```

Out[3]:

	Record ID	Incident Year	Incident Month	Incident Day	Operator ID	Operator	Aircraft	Aircraft Type	Aircraft Make	Air M
0	127128	1990	1	1	DAL	DELTA AIR LINES	B-757-200	A	148	
1	129779	1990	1	1	HAL	HAWAIIAN AIR	DC-9	A	583	
2	129780	1990	1	2	UNK	UNKNOWN	UNKNOWN	NaN	NaN	
3	2258	1990	1	3	MIL	MILITARY	A-10A	A	345	
4	2257	1990	1	3	MIL	MILITARY	F-16	A	561	

5 rows × 66 columns

WHICH BIRD SPECIES CAUSED THE MOST DAMAGE??

In [6]:

```
import numpy as np
import sklearn as sklearn
import matplotlib.pyplot as plt
import seaborn as sns
import sys
import re
```

In [8]:

```
species = data["Species Name"]
species_count=species.value_counts()
print(species_count)
```

```
UNKNOWN MEDIUM BIRD    38531
UNKNOWN SMALL BIRD     32981
MOURNING DOVE           7653
GULL                    6580
UNKNOWN BIRD            6400
                       ...
MCKAY'S BUNTING            1
ANTILLEAN NIGHTHAWK        1
RAVENS                     1
NACUNDA NIGHTHAWK          1
CALIFORNIA TOWHEE          1
Name: Species Name, Length: 715, dtype: int64
```

In [9]:

```
species_count=species_count[species_count>4000]
print(species_count)
```

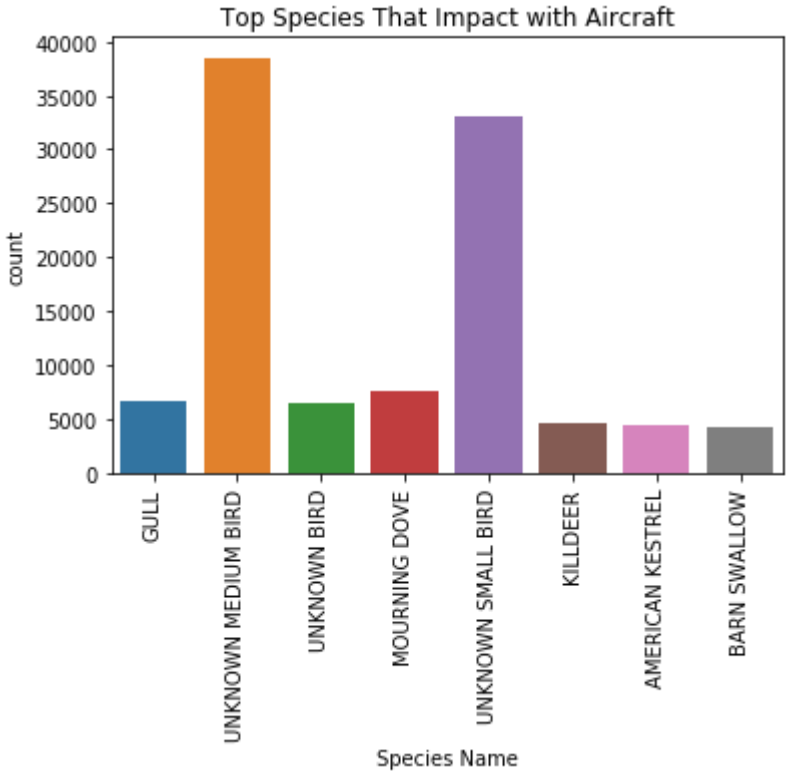
```
UNKNOWN MEDIUM BIRD    38531
UNKNOWN SMALL BIRD     32981
MOURNING DOVE           7653
GULL                    6580
UNKNOWN BIRD            6400
KILLDEER                4562
AMERICAN KESTREL        4476
BARN SWALLOW            4215
Name: Species Name, dtype: int64
```

In [12]:

```
top_species = ["UNKNOWN MEDIUM BIRD","UNKNOWN SMALL BIRD","MOURNING DOVE", "GULL","UNKNOW
top_species = species[species.isin(top_species)]
sns.countplot(top_species)
plt.title("Top Species That Impact with Aircraft")
plt.xticks(rotation='vertical')
```

Out[12]:

```
(array([0, 1, 2, 3, 4, 5, 6, 7]), <a list of 8 Text xticklabel objects>)
```



It is better to leave out all the Unknown Species Since we cannot gain any useful information out of them.

In [13]:

```
top_known_species = ["MOURNING DOVE", "GULL","KILLDEER", "AMERICAN KESTREL","BARN SWALLOW
top_known_species = species[species.isin(top_known_species)]
print(top_known_species.value_counts())
```

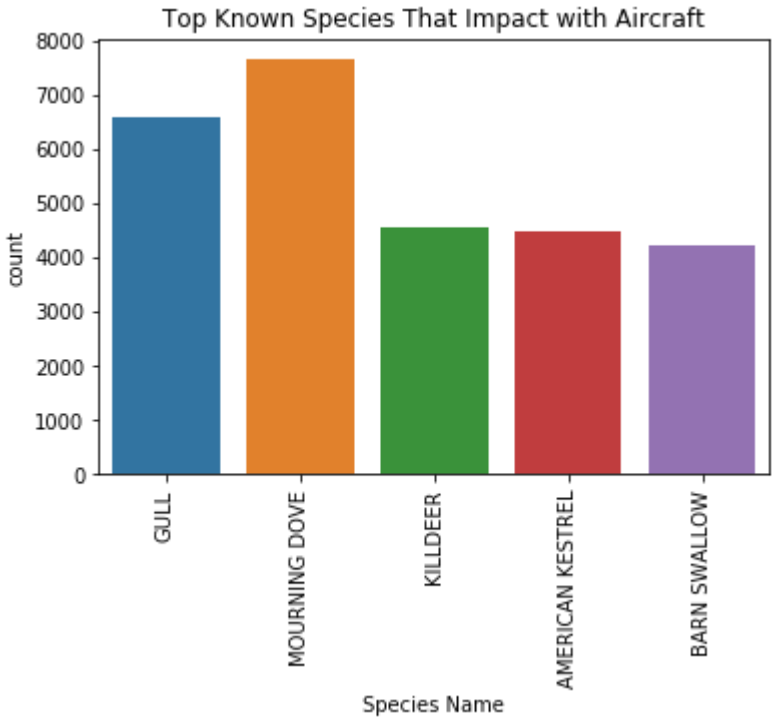
```
MOURNING DOVE       7653
GULL                6580
KILLDEER            4562
AMERICAN KESTREL    4476
BARN SWALLOW        4215
Name: Species Name, dtype: int64
```

In [14]:

```
sns.countplot(top_known_species)
plt.title("Top Known Species That Impact with Aircraft")
plt.xticks(rotation='vertical')
```

Out[14]:

```
(array([0, 1, 2, 3, 4]), <a list of 5 Text xticklabel objects>)
```



It is clear that "MOURNING DOVE" species of birds effect the aircrafts the most out of all known bird species.

Which part of the airplane is most prone to damage in wildlife strikes?

In [17]:

```
attributes=(list(data))
damage_x=[]
strike_x=[]
dam=".*Damage$"
stri=".*Strike$"
for i in attributes:
    if (re.match(dam, i)):
        damage_x.append(i)
    elif (re.match(stri, i)):
        strike_x.append(i)
```

In [18]:

```
damage_x
```

Out[18]:

```
['Aircraft Damage',
 'Radome Damage',
 'Windshield Damage',
 'Nose Damage',
 'Engine1 Damage',
 'Engine2 Damage',
 'Engine3 Damage',
 'Engine4 Damage',
 'Propeller Damage',
 'Wing or Rotor Damage',
 'Fuselage Damage',
 'Landing Gear Damage',
 'Tail Damage',
 'Lights Damage',
 'Other Damage']
```

We are not interested with the column of Aircraft Damage

In [19]:

```
damage_x=damage_x[1:]
damage_x
```

Out[19]:

```
['Radome Damage',
 'Windshield Damage',
 'Nose Damage',
 'Engine1 Damage',
 'Engine2 Damage',
 'Engine3 Damage',
 'Engine4 Damage',
 'Propeller Damage',
 'Wing or Rotor Damage',
 'Fuselage Damage',
 'Landing Gear Damage',
 'Tail Damage',
 'Lights Damage',
 'Other Damage']
```

In [20]:

```
strike_x
```

Out[20]:

```
['Radome Strike',
 'Windshield Strike',
 'Nose Strike',
 'Engine1 Strike',
 'Engine2 Strike',
 'Engine3 Strike',
 'Engine4 Strike',
 'Propeller Strike',
 'Wing or Rotor Strike',
 'Fuselage Strike',
 'Landing Gear Strike',
 'Tail Strike',
 'Lights Strike',
 'Other Strike']
```

In [21]:

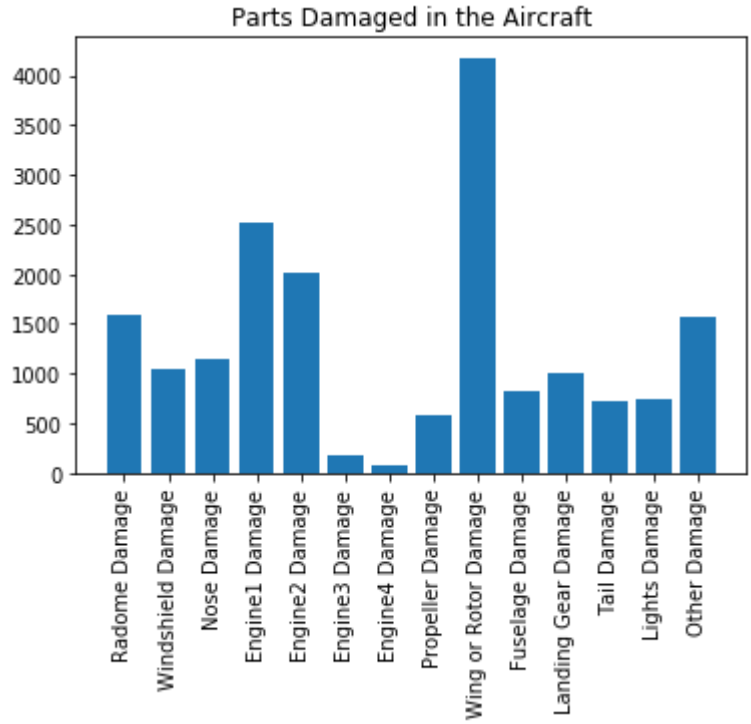
```
damage_y=[]
strike_y=[]
for i in strike_x:
    strike_y.append(data[i].sum())

for i in damage_x:
    damage_y.append(data[i].sum())
```

In [22]:

```
plt.bar(damage_x,damage_y)
plt.title("Parts Damaged in the Aircraft")
plt.xticks(rotation='vertical')
```

Out[22]:

```
([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13],
 <a list of 14 Text xticklabel objects>)
```

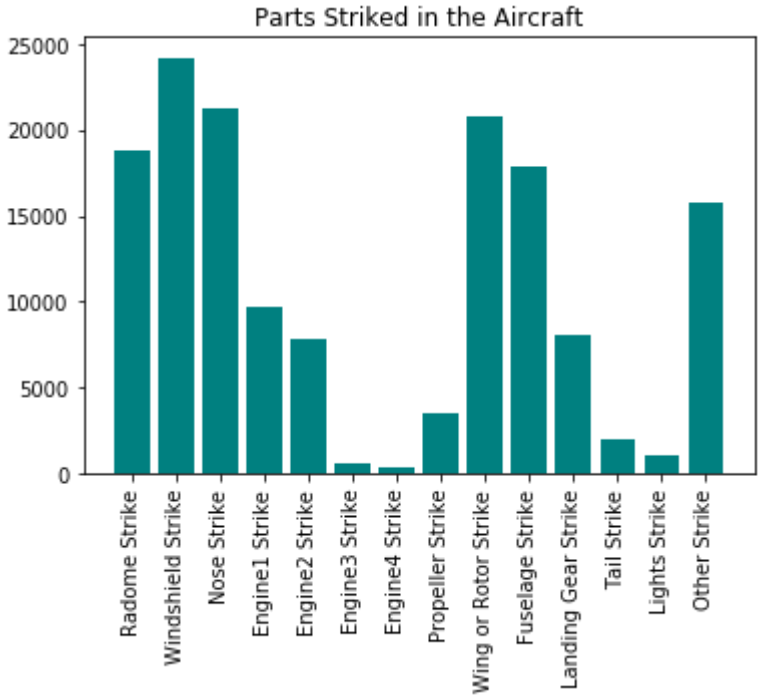


In [26]:

```
plt.bar(strike_x,strike_y,color='teal')
plt.title("Parts Striked in the Aircraft")
plt.xticks(rotation='vertical')
```

Out[26]:

```
([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13],
 <a list of 14 Text xticklabel objects>)
```



In [24]:

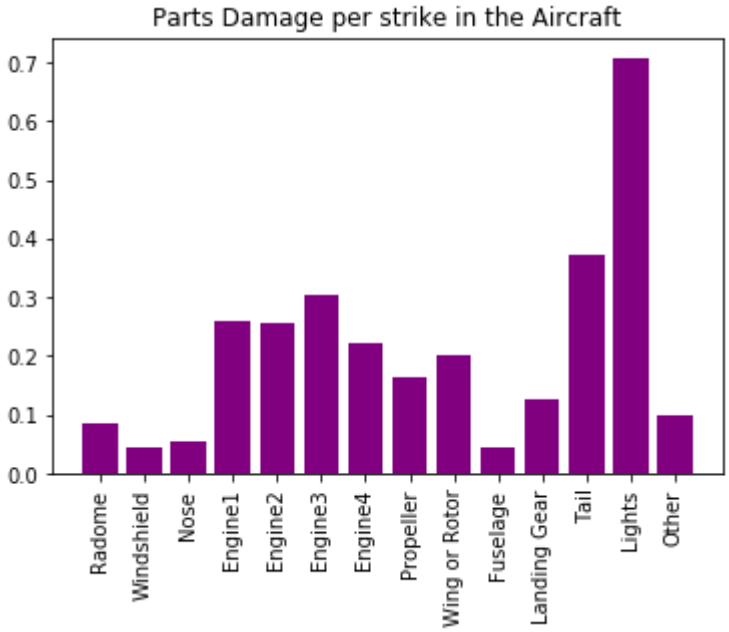
```
damage_per_strike=[]
parts=[]
for i in range(0,len(strike_x)):
    damage_per_strike.append(damage_y[i]/strike_y[i])
    parts.append(strike_x[i][:-7])
```

In [28]:

```
plt.bar(parts,damage_per_strike,color='purple')
plt.title("Parts Damage per strike in the Aircraft")
plt.xticks(rotation='vertical')
```

Out[28]:

```
([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13],
 <a list of 14 Text xticklabel objects>)
```



CONCLUSION:

From the Graphs above we can see that the part that reports most cases of damage in a wildlife strike is 'Wings or Rotor' Though most of the strikes are usually on the 'Windshield' But the most prone to damage are the 'Lights', they get damaged in approximately 70% of the strikes