In [1]:

```
import pandas as pd
import ipykernel
from pathlib import Path
import numpy as np
import matplotlib.pyplot as plt
from matplotlib.backends.backend_pdf import PdfPages
from matplotlib.ticker import MultipleLocator
from matplotlib.ticker import MaxNLocator
from scipy import stats

from sklearn.linear_model import LinearRegression
```

In [2]:

```
# "mock-data" file generated from xls spreadsheets of actual data to be used
df = pd.read_csv('rats_Garb_LU_ED_INC_POP_3.csv')
df.head()
```

Out[2]:

	CD	total_rats	tons_of_refuge	tons_of_MGP	tons_of_paper	tons_res_organics	tons_s
0	01 BRONX	2338	764007.8	32663.3	28960.3	141.5	
1	02 BRONX	2027	582803.0	34424.3	24529.8	NaN	
2	03 BRONX	2522	723072.8	34086.5	28189.1	NaN	
3	04 BRONX	4158	1598950.4	78164.7	61554.6	343.0	
4	05 BRONX	3365	1351276.7	88723.5	58439.9	21.3	

5 rows × 28 columns

In [3]:

```
#getting stats for rats

data = df.total_rats

# removing null values to avoid errors
data.dropna(inplace = True)

# percentile list
perc =[.25, .40, .60, .75]

# list of dtypes to include
include =['object', 'float', 'int']

# calling describe method
desc = data.describe(percentiles = perc, include = include)

# display
desc
```

Out[3]:

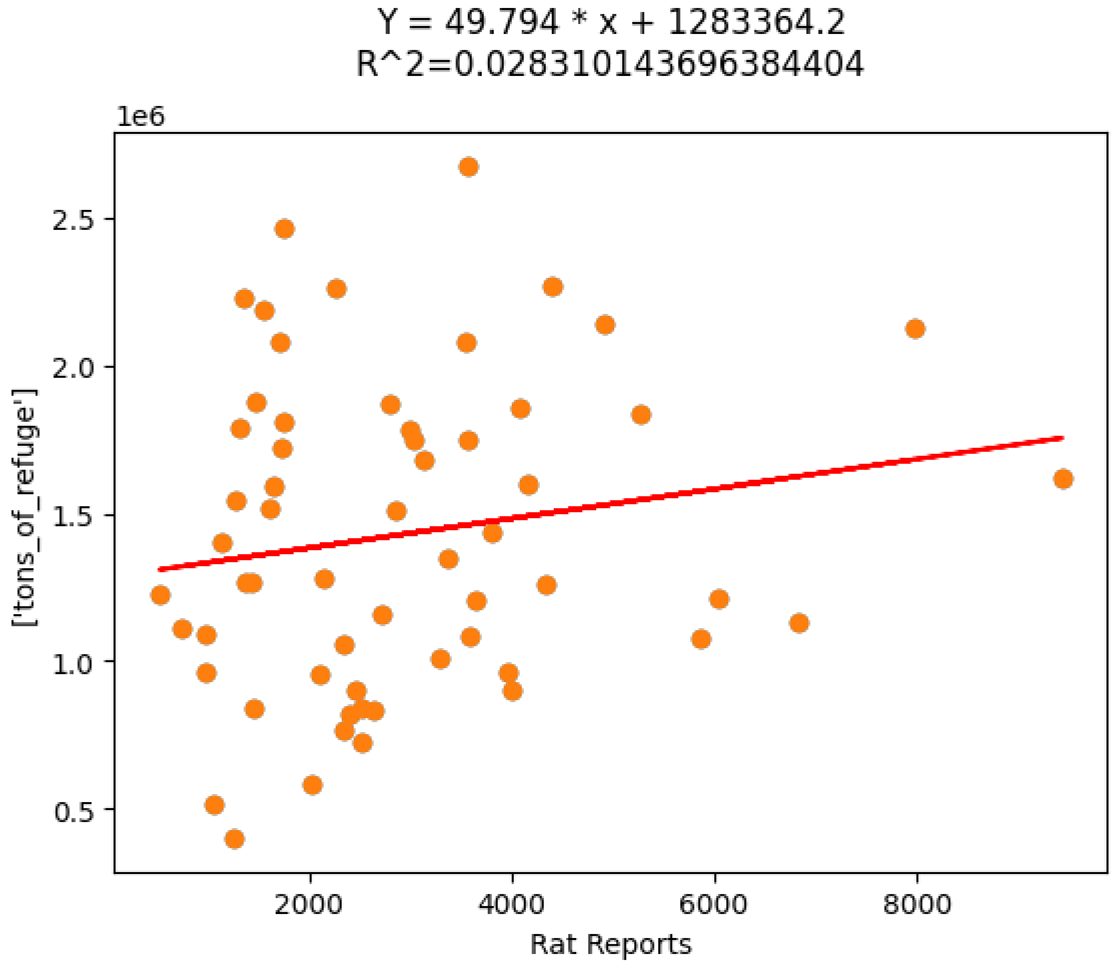
```
count      59.000000
mean     2897.949153
std      1775.622945
min       522.000000
25%      1572.000000
40%      2160.400000
50%      2517.000000
60%      2970.400000
75%      3625.500000
max      9437.000000
Name: total_rats, dtype: float64
```

In [4]:

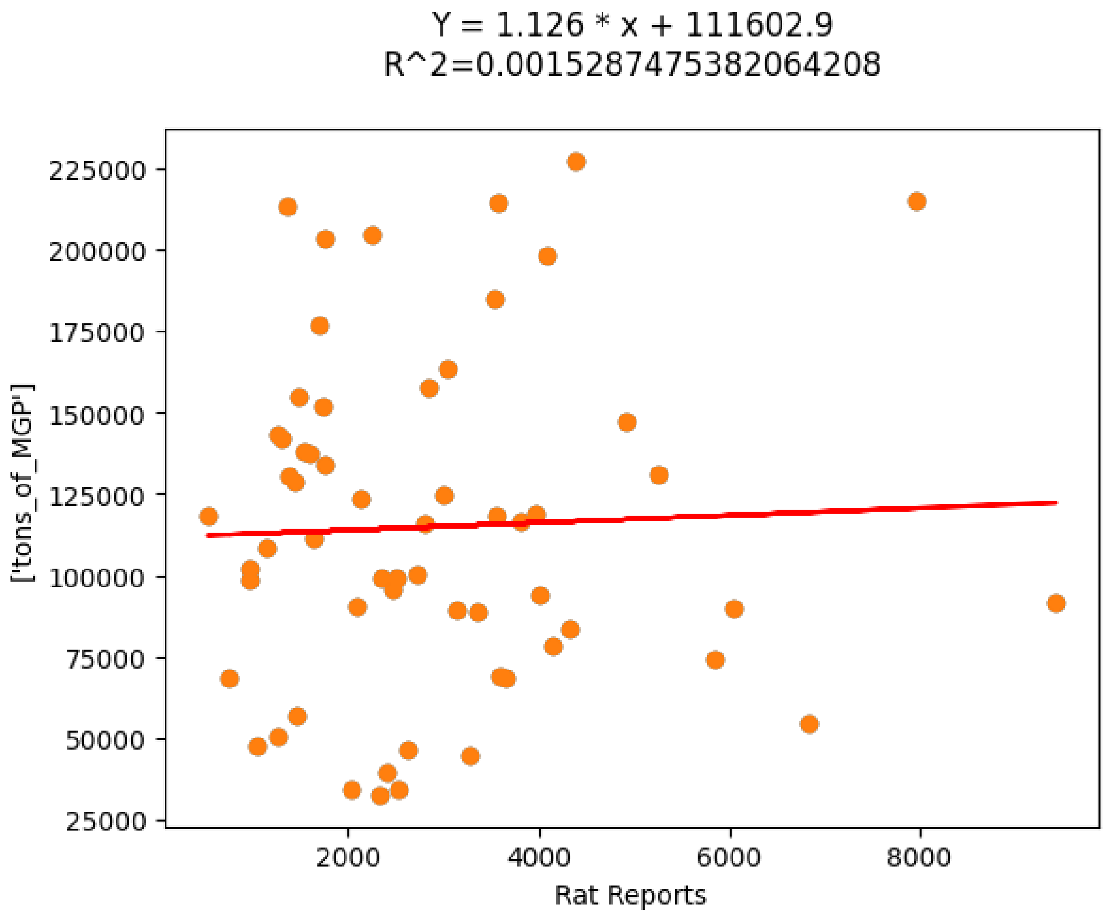
```
# columnList=['tons_of_MGP', 'tons_of_paper', 'tons_res_organics', 'tons_sch_
#              'tons_xmastrees', 'pct_LU1', 'pct_LU2', 'pct_LU3', 'pct_LU4', '
#              'pct_LU8', 'pct_LU9', 'pct_LU10', 'pct_LU11','BDorHigher', 'Ass
#              'LessHS', 'Adults25nOlder', 'Under18', 'eighteentoTwo']
columnList=['tons_of_refuge', 'tons_of_MGP', 'tons_of_paper',
            'tons_xmastrees', 'pct_LU1', 'pct_LU2', 'pct_LU3', 'pct_LU4', 'pc
            'pct_LU8', 'pct_LU9', 'pct_LU10', 'pct_LU11','BDorHigher', 'Assoc
            'LessHS', 'Adults25nOlder', 'Under18', '18to24']
```

In [6]:

```
for i in columnList:
    cdf=df
    cdf.dropna(axis='columns')
    # The data in the df column must be reshaped into an array with shape (nu
    # https://stackoverflow.com/questions/18691084/what-does-1-mean-in-numpy-
    plt.scatter(cdf.total_rats, cdf[i])
#     plt.xlabel('Rat Reports')
#     plt.ylabel([i])
    #plt.show()
    X = cdf.total_rats.values.reshape(-1, 1)
    # The shape of X is no samples, with a single feature (column)
    X.shape
    y = cdf[i]
    cdf[i].describe()
    # Create a model with scikit-learn
    model = LinearRegression()
    # Fit the data into the model
    # By convention, X is capitalized and y is lowercase
    model.fit(X, y)
    # The model creates predicted y values based on X values
    y_pred = model.predict(X)

    #calculate R-squared of regression model
    r_squared = model.score(X, y)

    # Plot the results. The best fit line is red.
    plt.scatter(X, y)
    plt.title(f'Y = {round(model.coef_[0], 3)} * x + {round(model.intercept_,
    plt.xlabel('Rat Reports')
    plt.ylabel([i])
    plt.plot(X, y_pred, color='red')
    plt.show()

    # The slope
    # The y-intercept
    print((model.coef_))
    print(model.intercept_)
    print(r_squared)
    filename = [i]
    plt.tight_layout()
    #plt.savefig(filename, format='png')
```

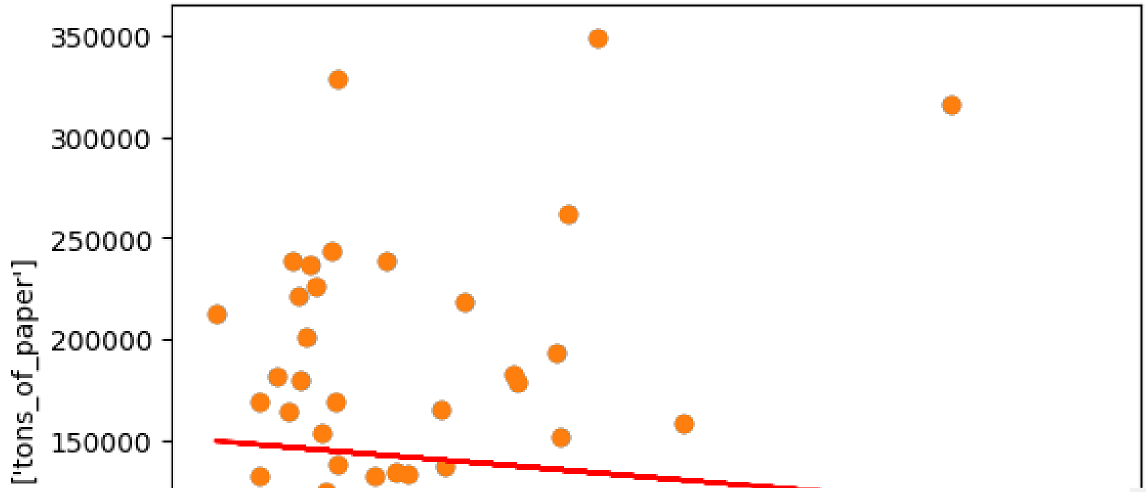



```
[49.79434272]
1283364.2284225286
0.028310143696384404
```



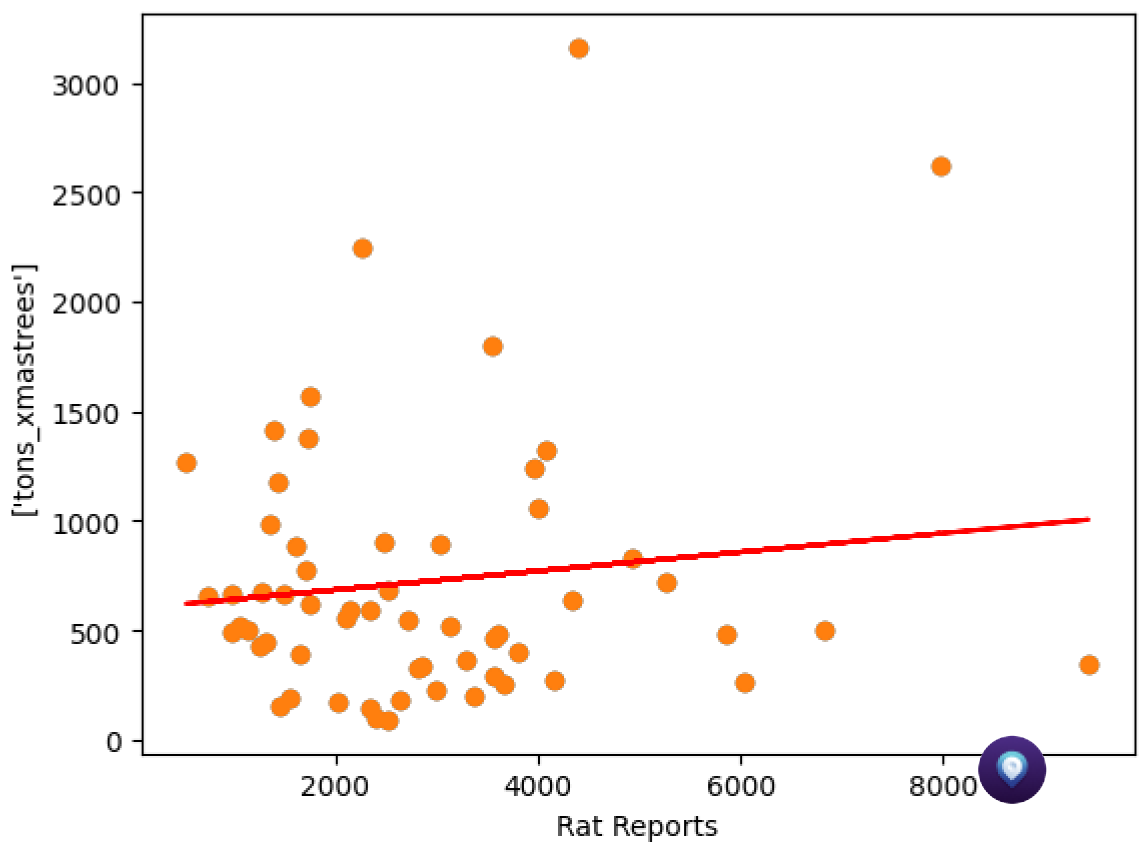

```
[1.12634825]
111602.86274860674
0.0015287475382064208
```

Y = -4.07 * x + 151900.3
R^2=0.008684318242411226

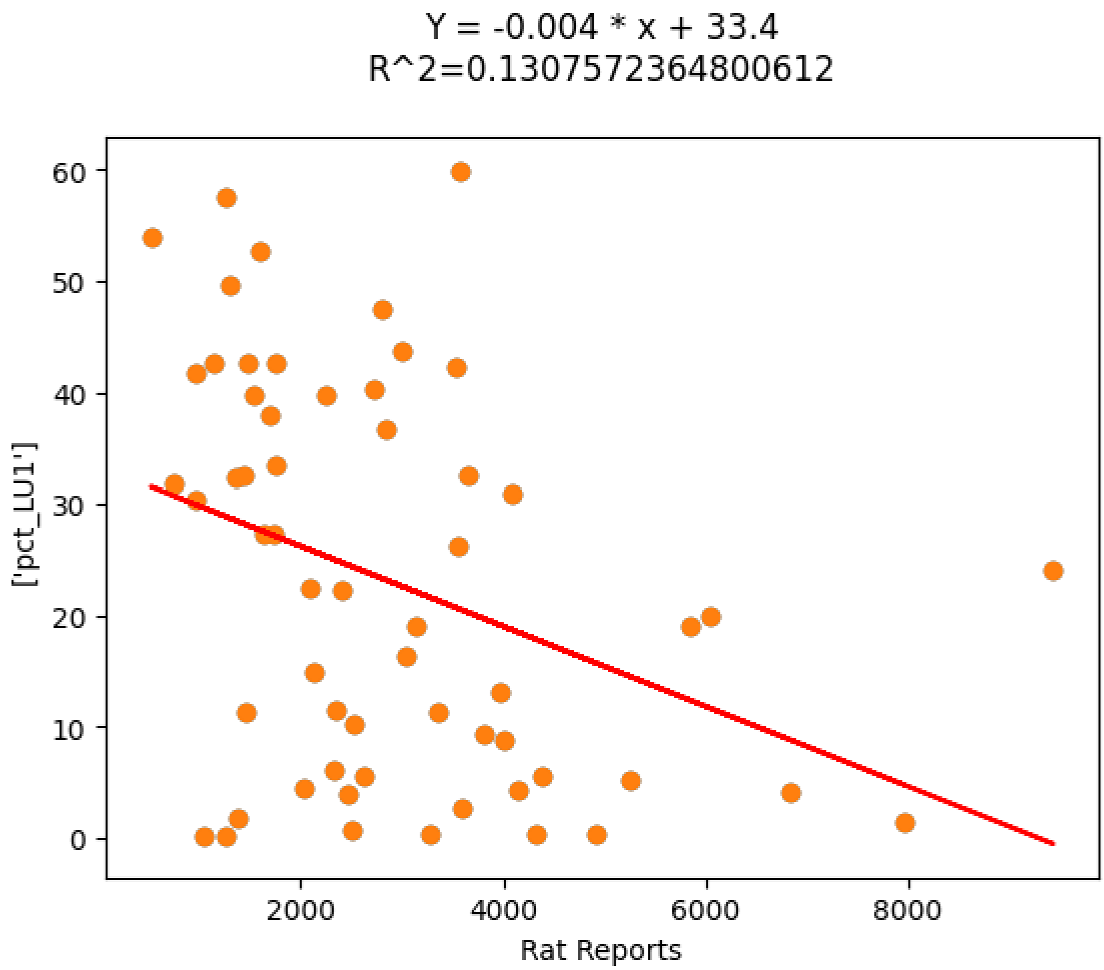



```
[-4.06960679]
151900.2610051436
0.008684318242411226
```

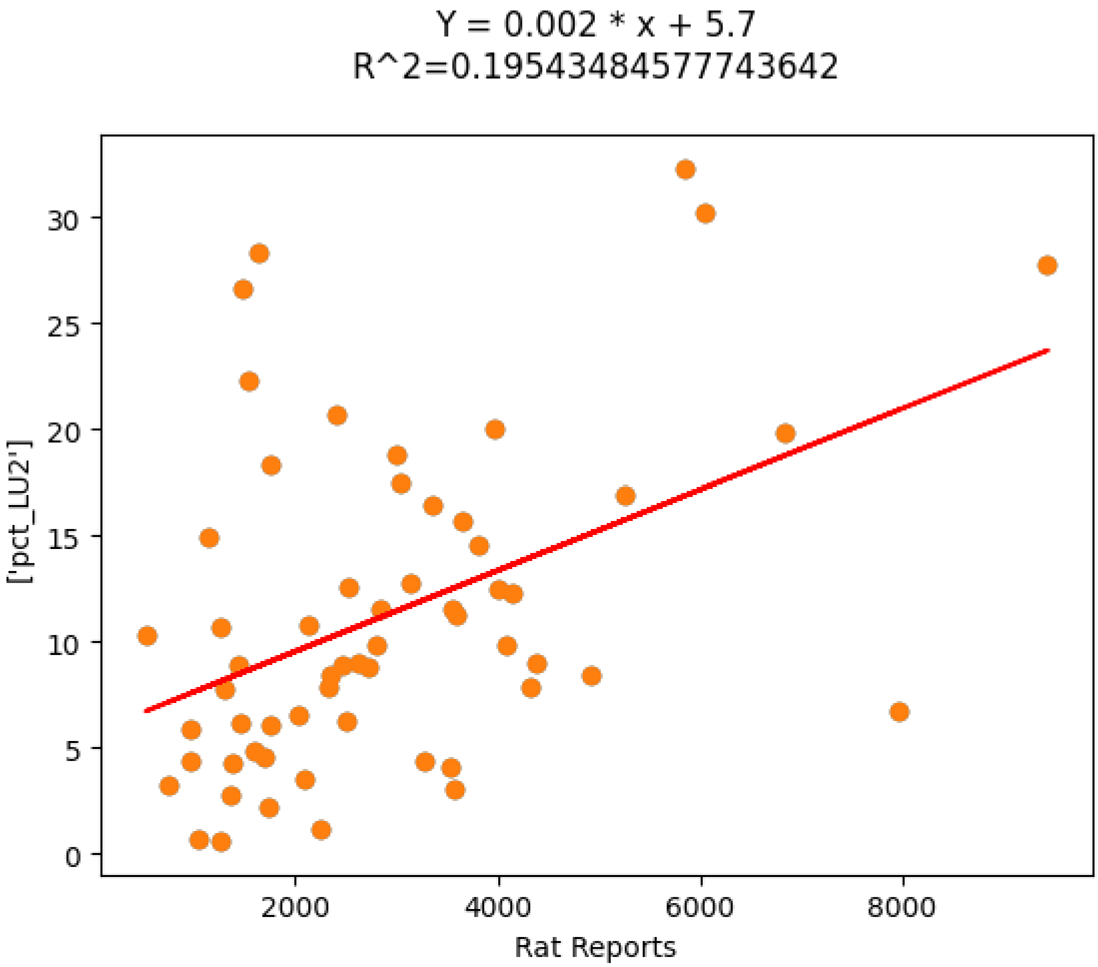
Y = 0.043 * x + 599.1
R^2=0.016009384915131486



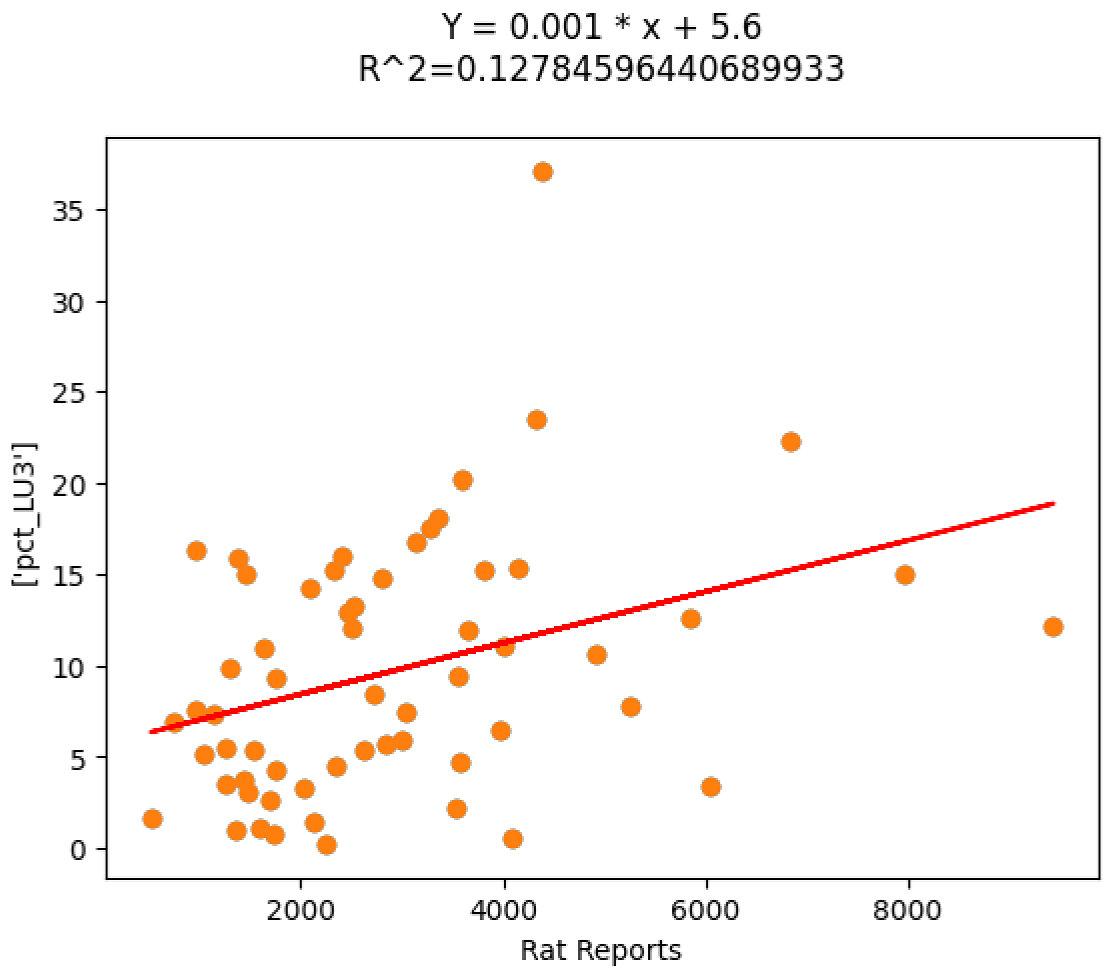
```
[0.04313309]
599.0702826728844
0.016009384915131486
```



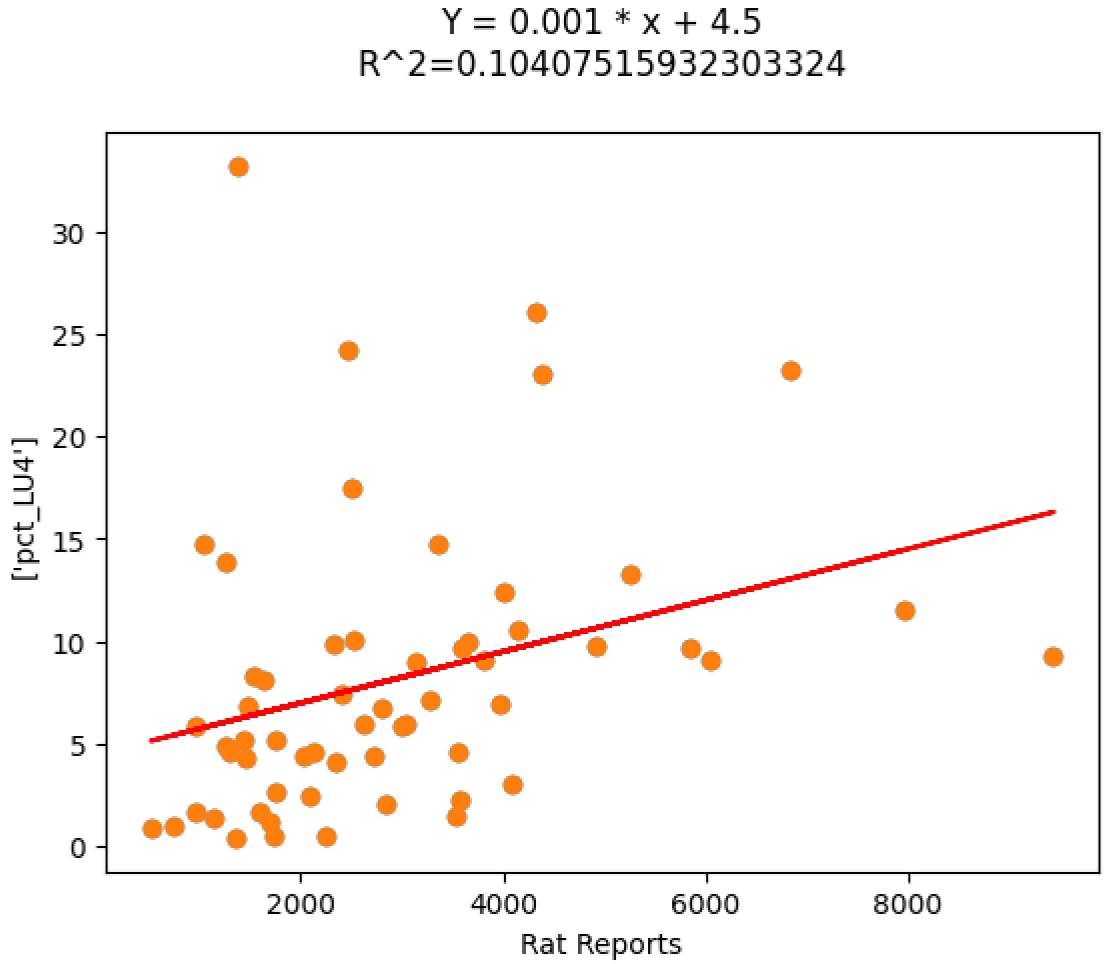
```
[-0.00360162]
33.42374069608063
0.1307572364800612
```



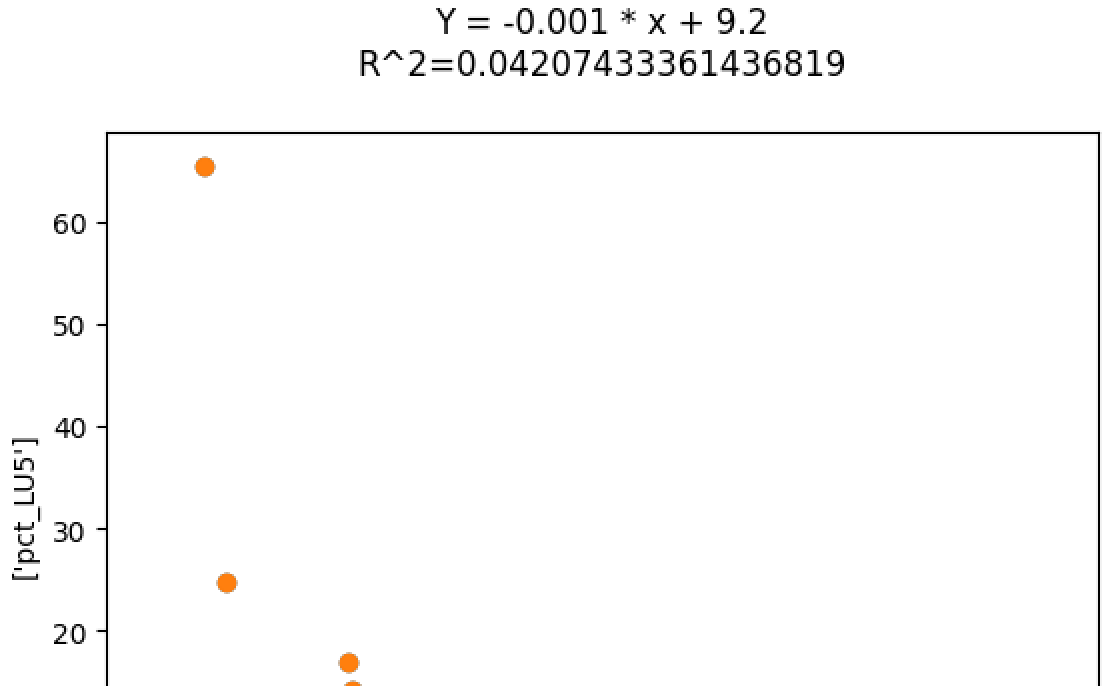

```
[0.00190677]
5.720035065914443
0.19543484577743642
```



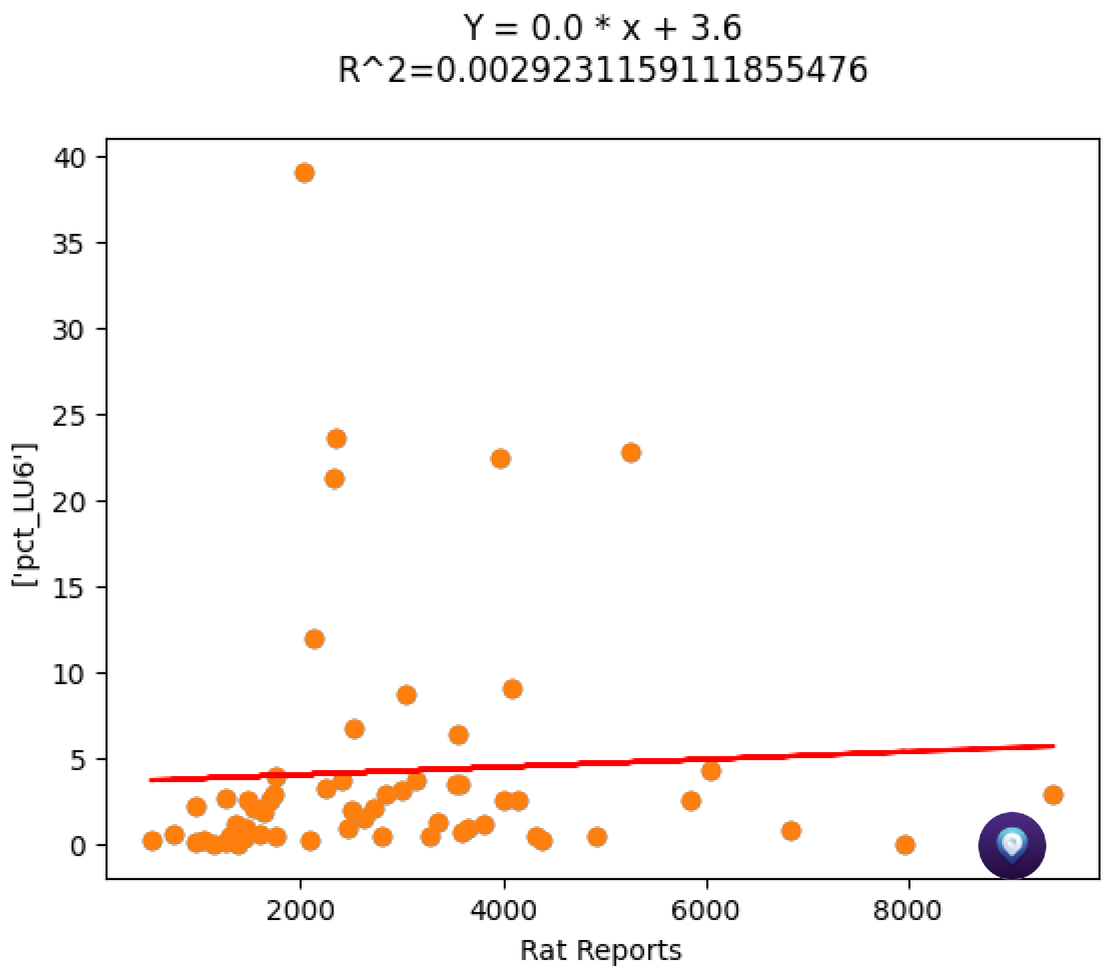

```
[0.00140806]
5.599177914932682
0.12784596440689933
```



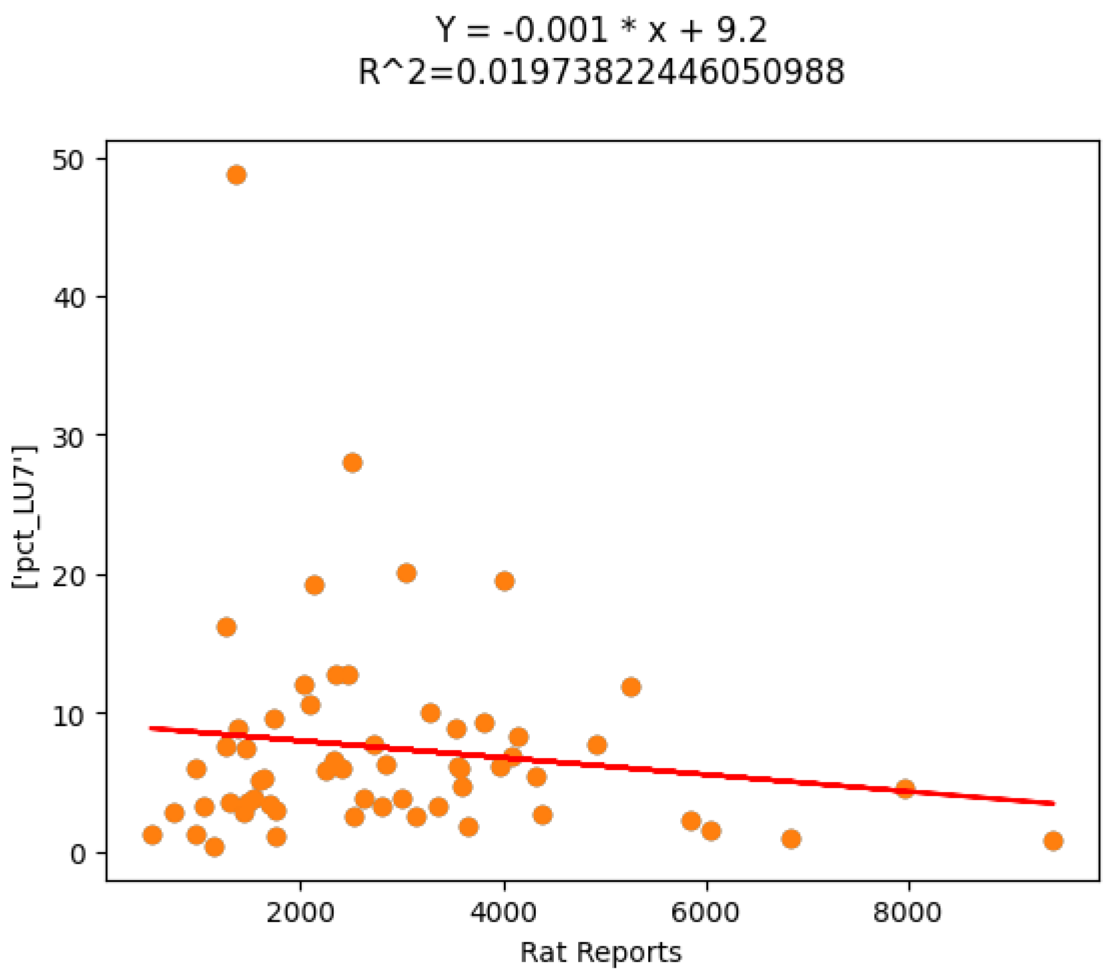

```
[0.00125325]
4.4766254327441315
0.10407515932303324
```



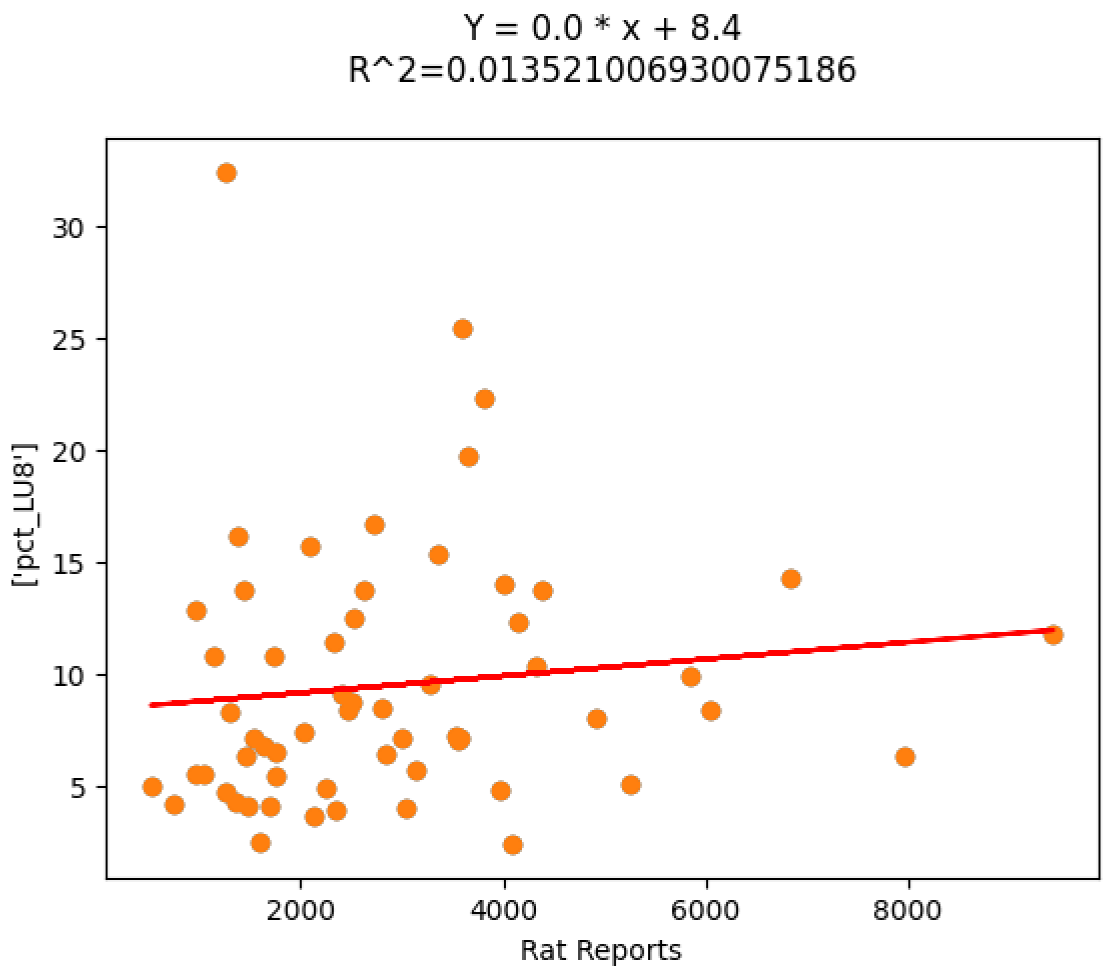

```
[-0.00100988]
9.231664784512414
0.04207433361436819
```



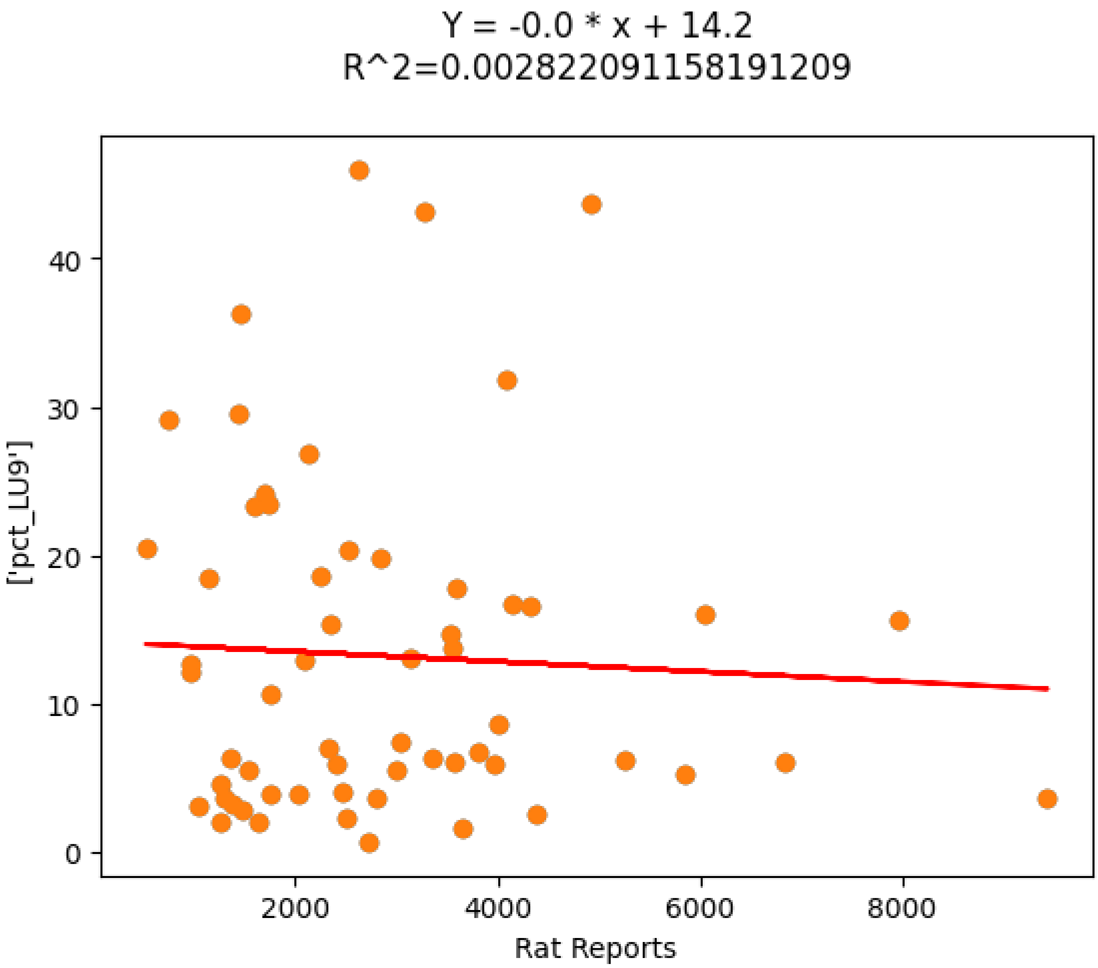
```
[0.00022246]
3.59092873347047
0.002923159111855476
```



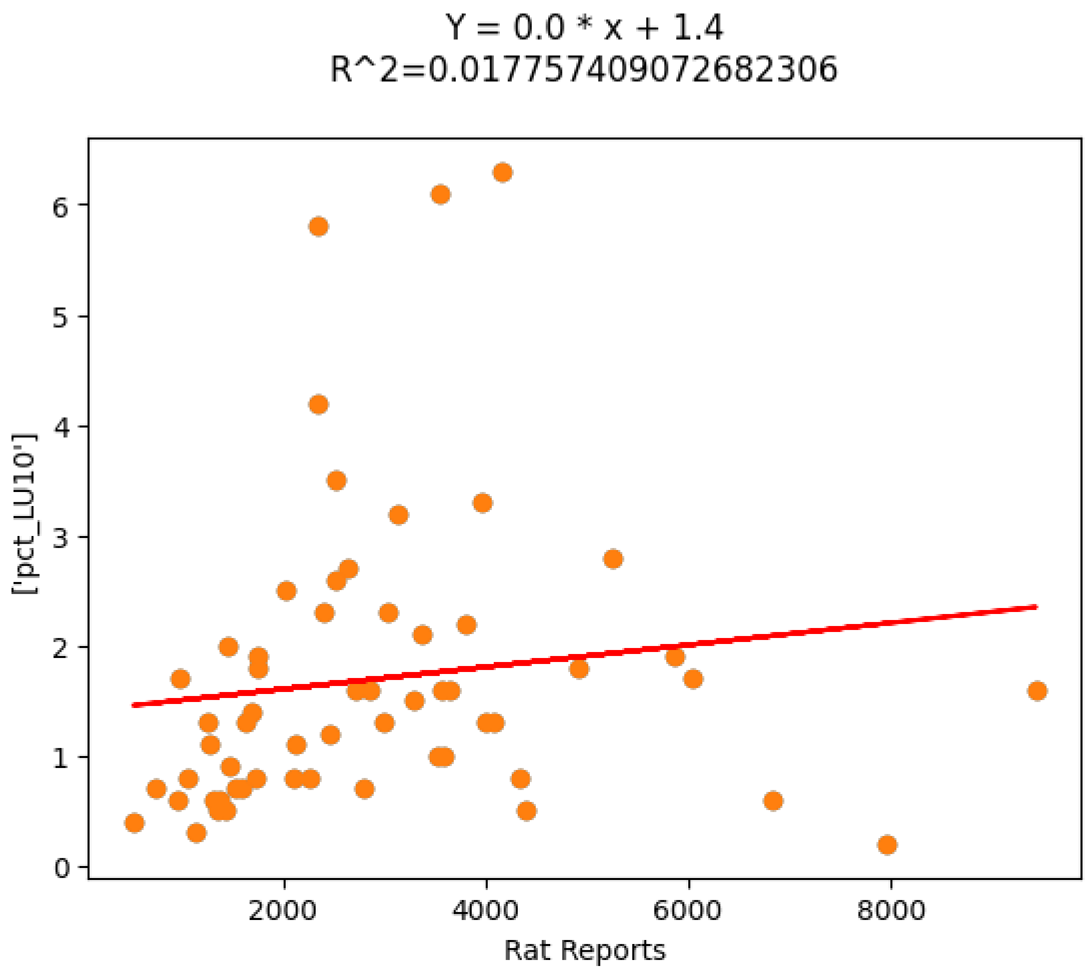
```
[-0.00060975]
9.200928299339719
0.01973822446050988
```



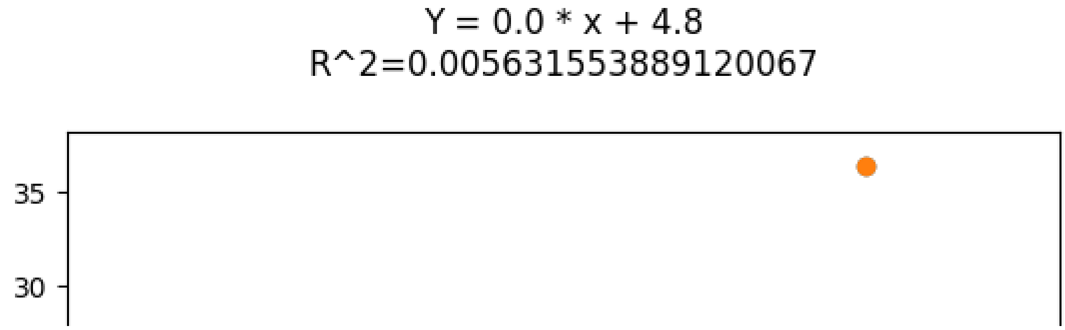
```
[0.00037634]
8.39073217194562
0.013521006930075186
```



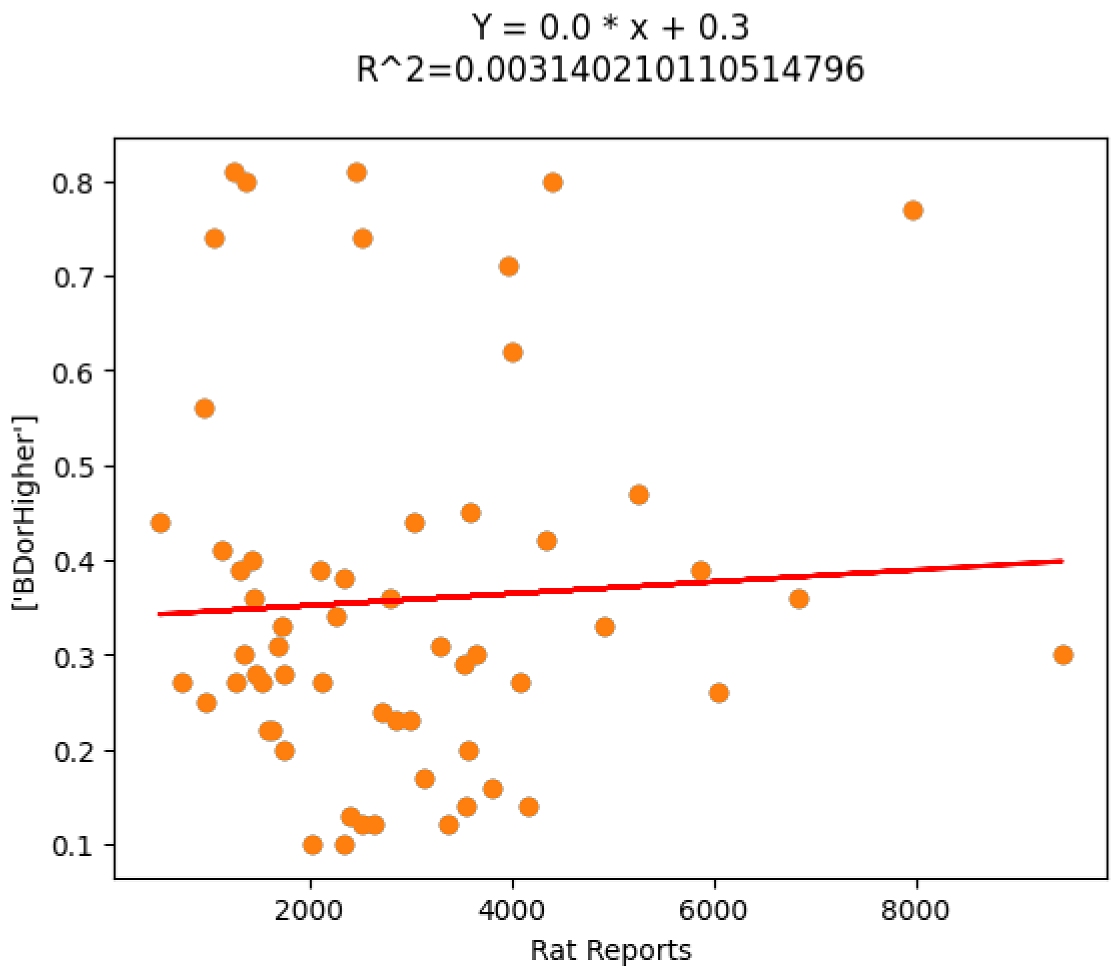
```
[-0.00033876]
14.212203751538457
0.002822091158191209
```



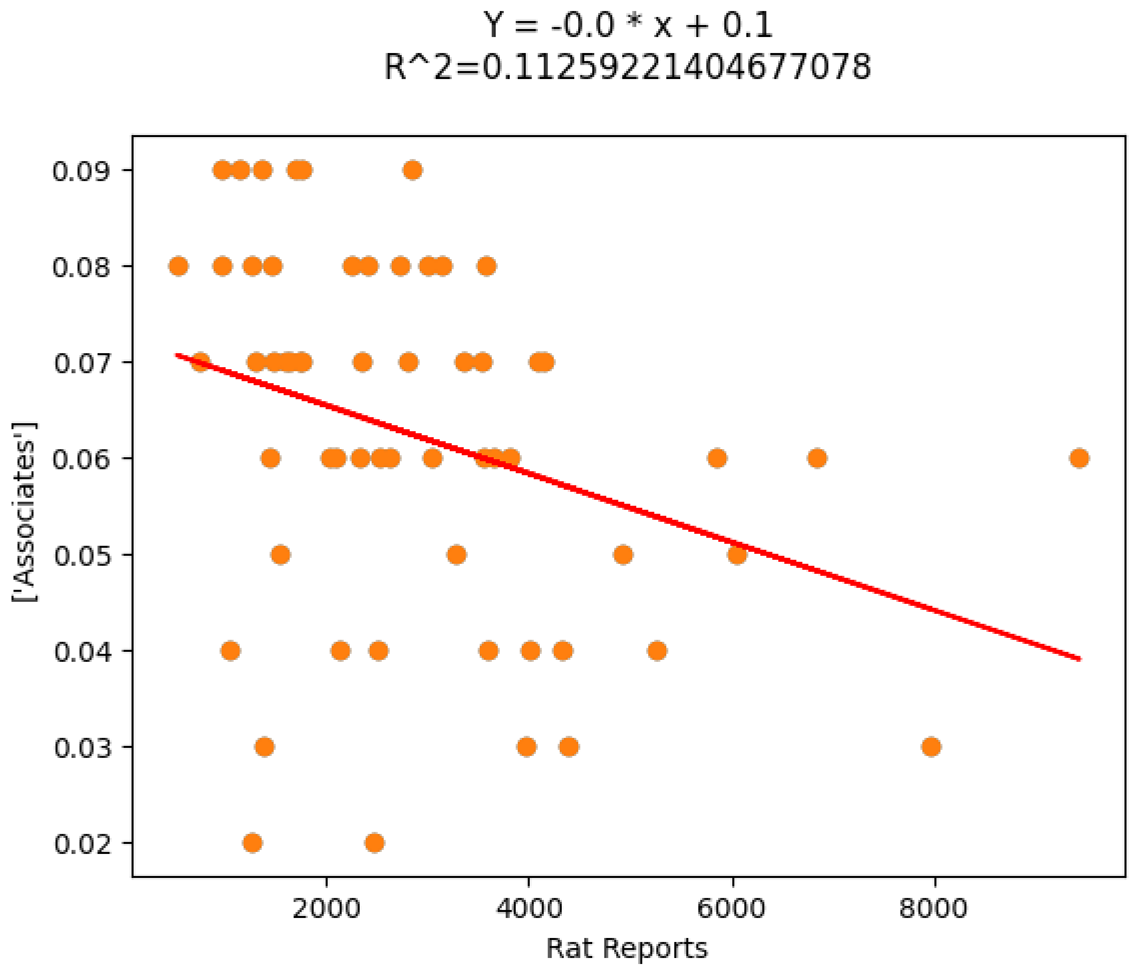

```
[0.00010015]
1.4046856247328312
0.017757409072682306
```



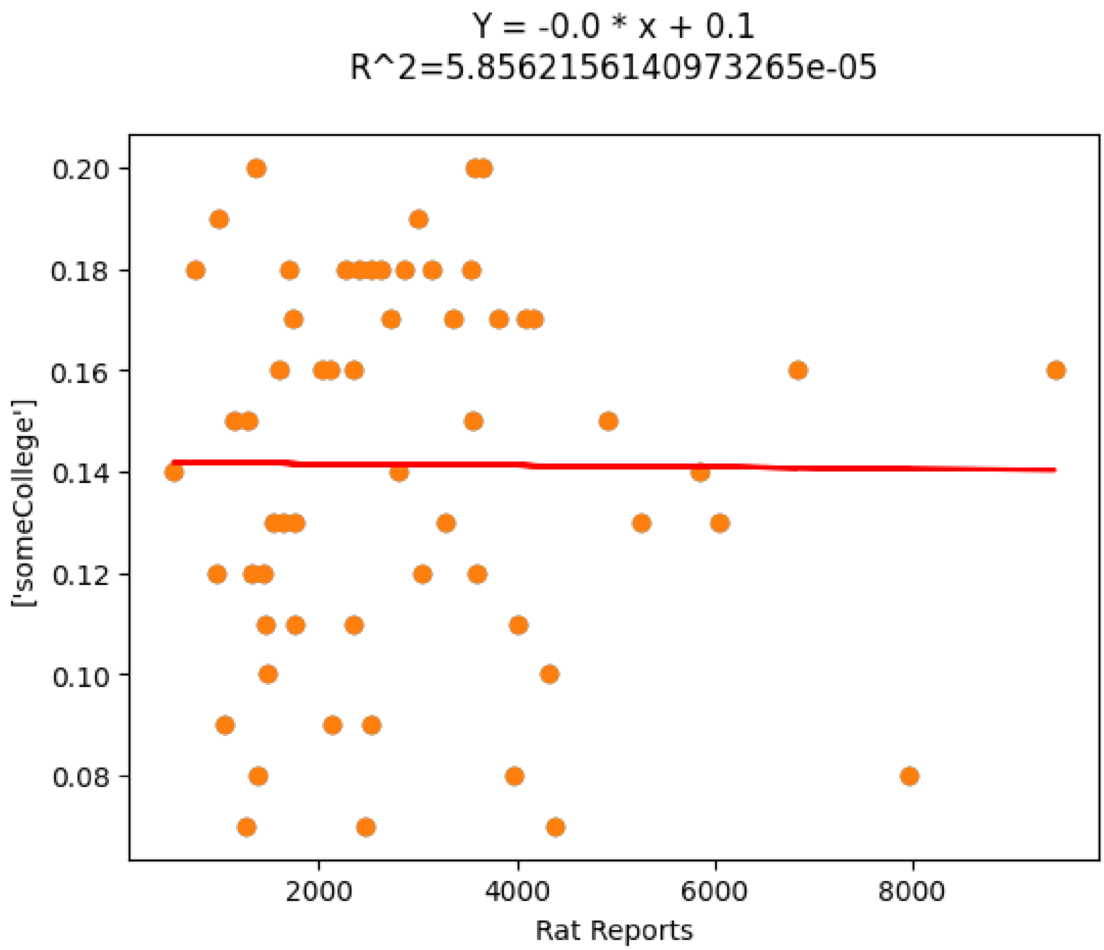

```
[0.00029175]
4.769775715695724
0.005631553889120067
```



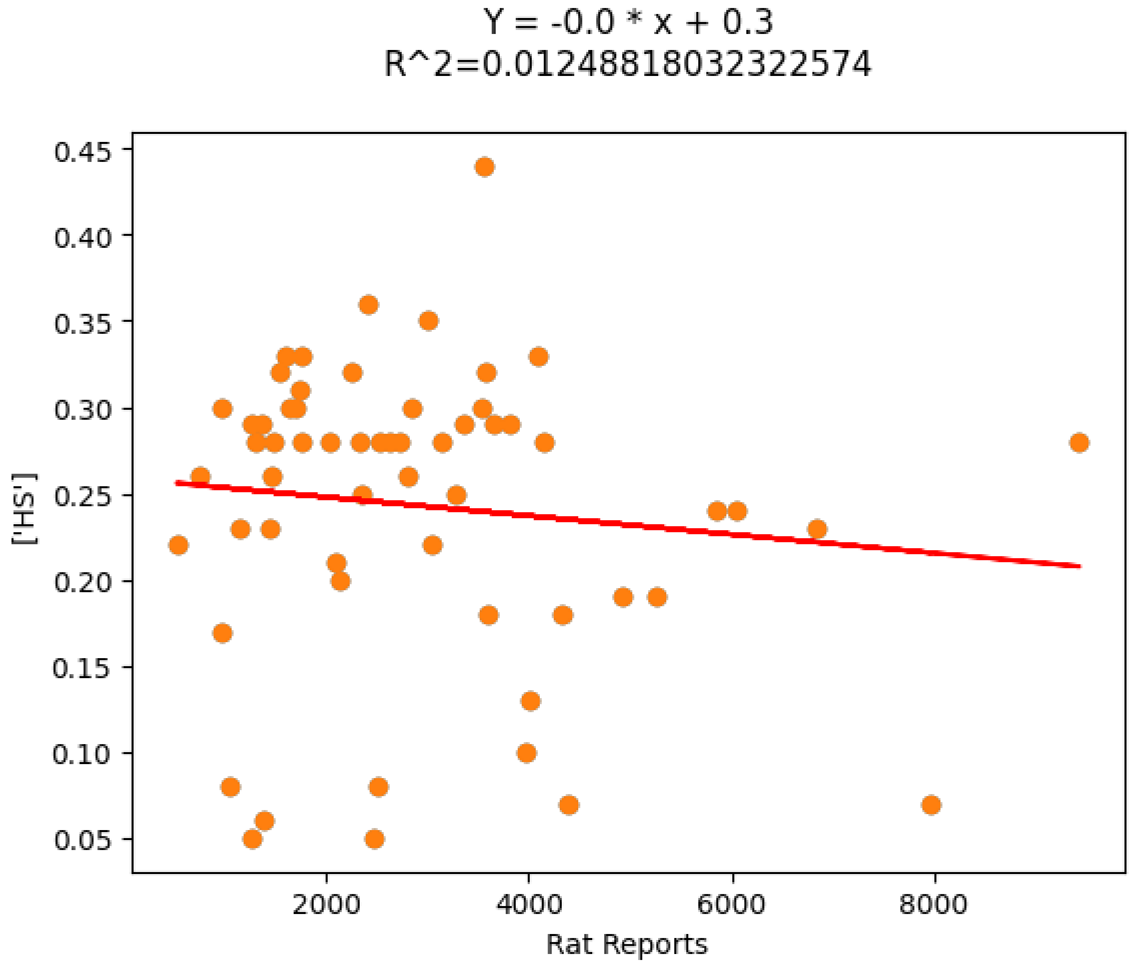
```
[6.27547797e-06]
0.3392716110473312
0.003140210110514796
```



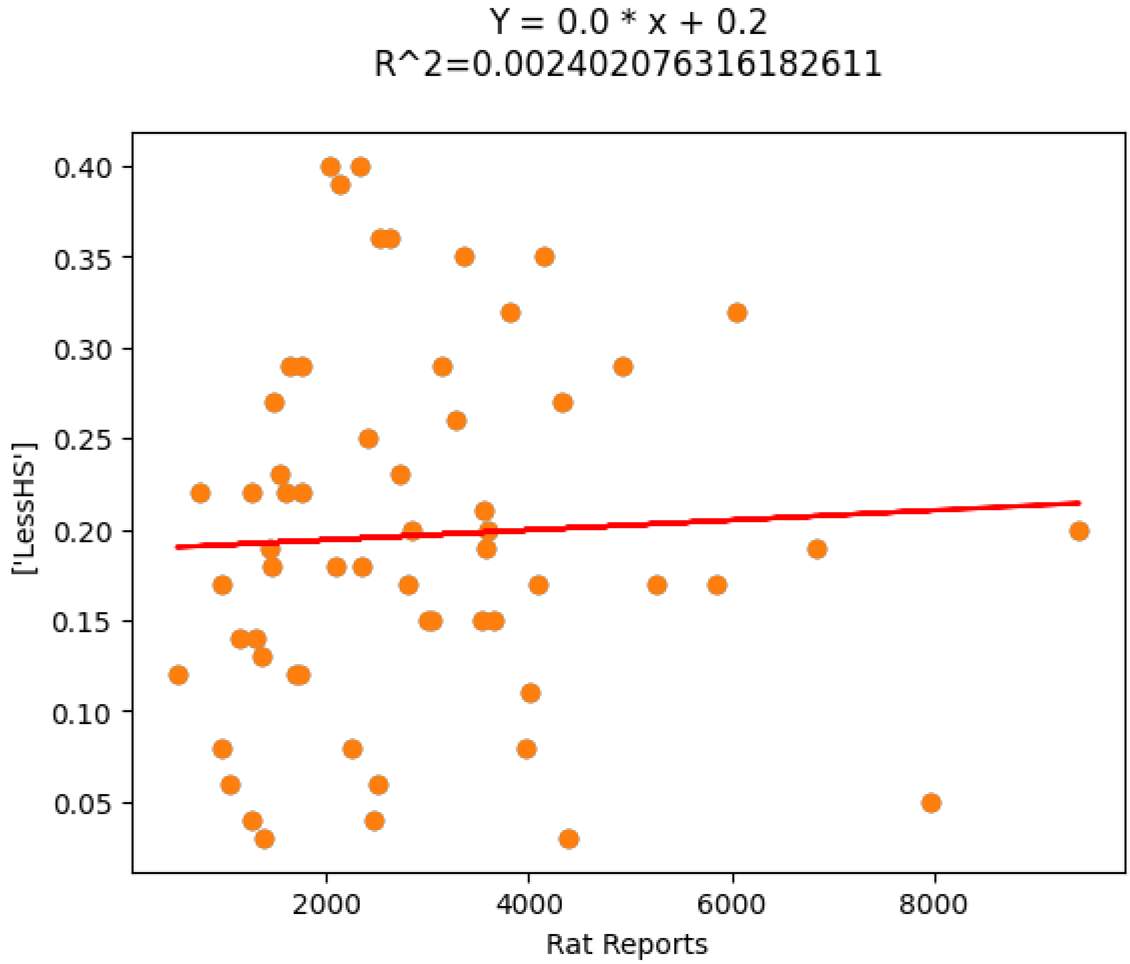

```
[-3.54526581e-06]
0.07247738987195385
0.11259221404677078
```



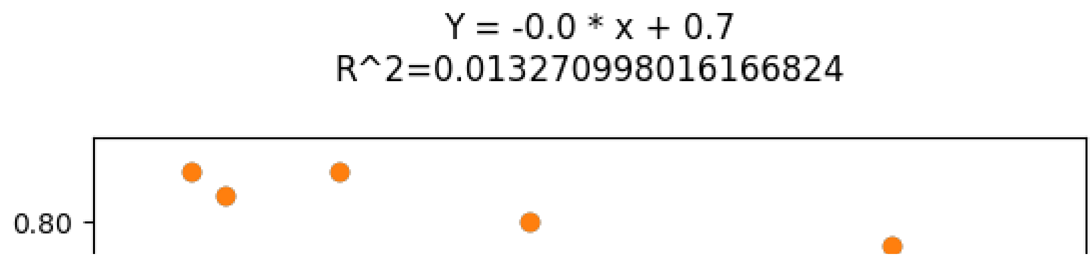

```
[-1.60752504e-07]
0.14182178478632154
5.8562156140973265e-05
```



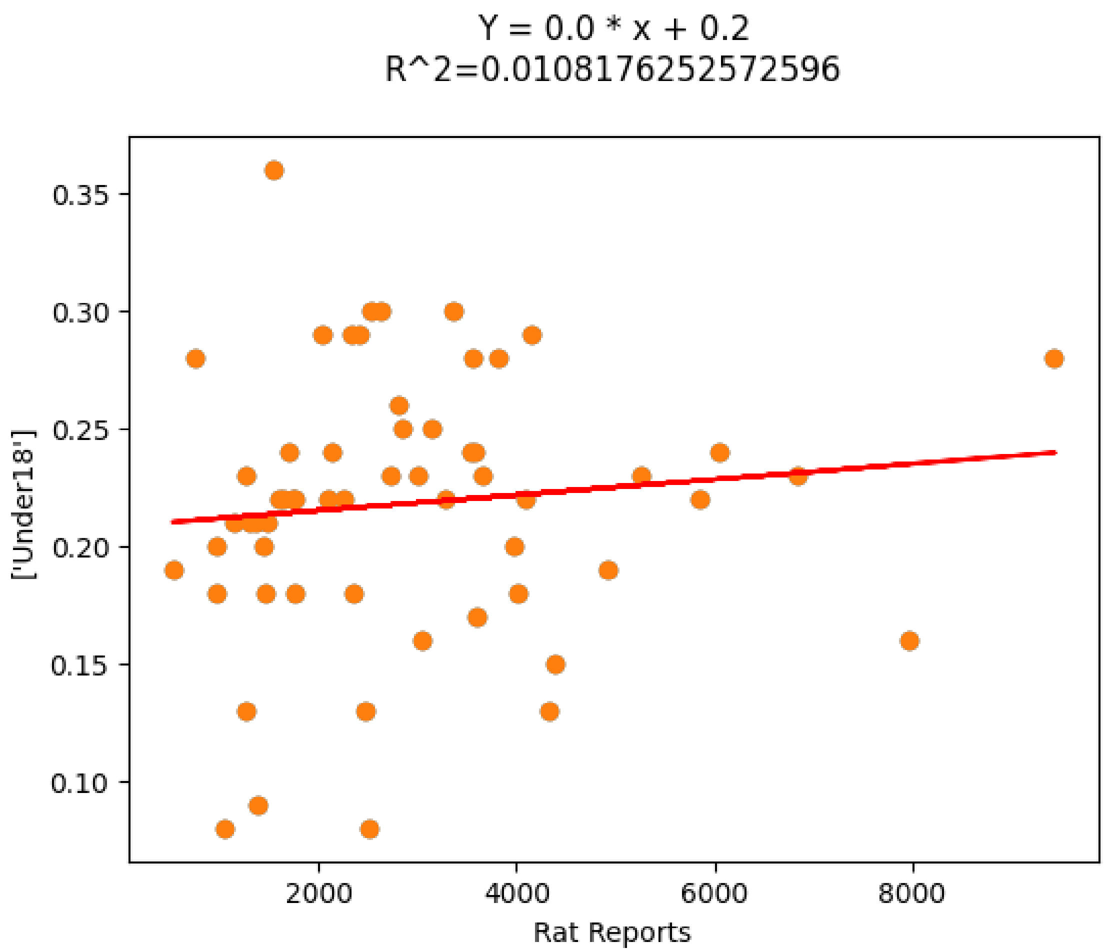

```
[-5.41805899e-06]
0.2587521069104024
0.01248818032322574
```



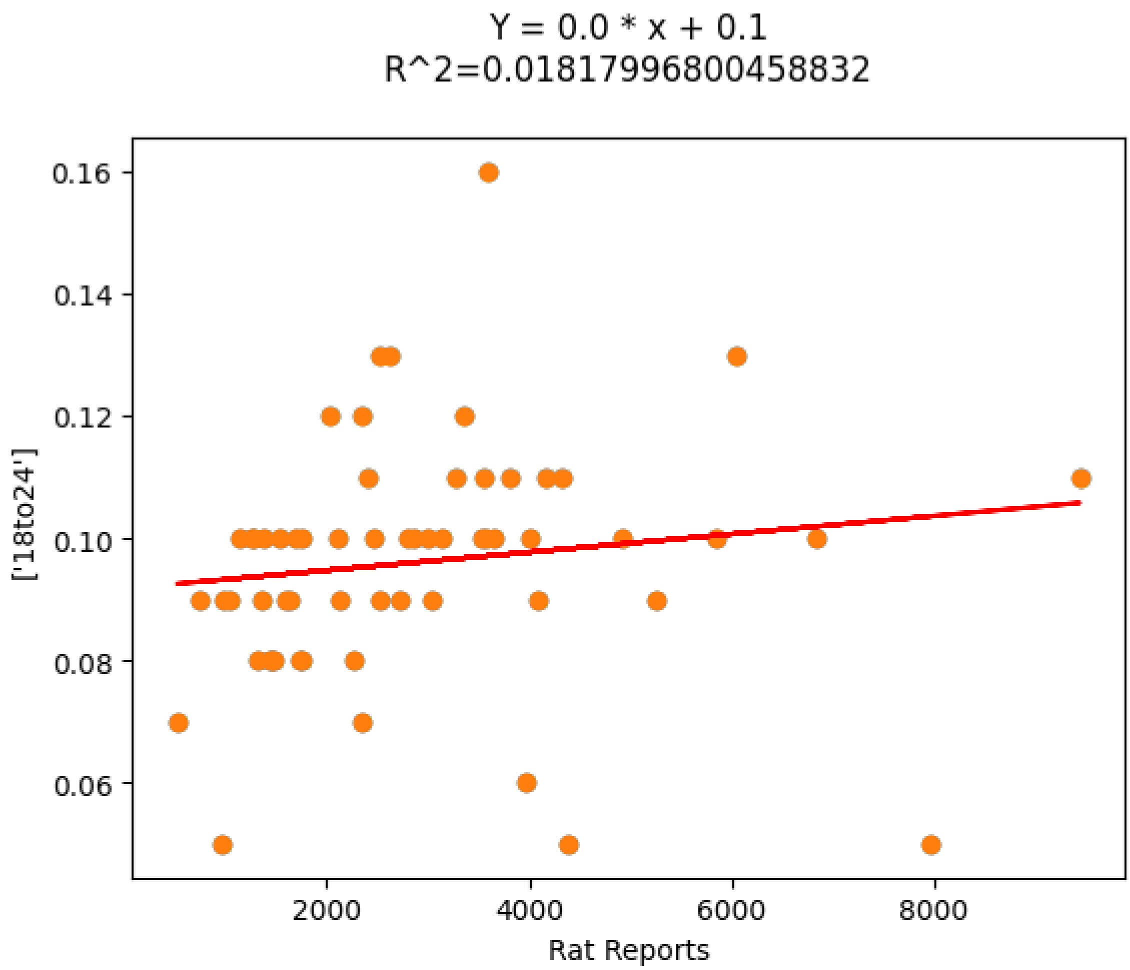

```
[2.71588925e-06]
0.1887396605303406
0.002402076316182611
```




```
[-4.31386105e-06]
0.6984335533711107
0.013270998016166824
```



```
[3.30777038e-06]
0.2083803513290559
0.0108176252572596
```




```
[1.48573534e-06]
0.09179610944171435
0.01817996800458832

<Figure size 640x480 with 0 Axes>
```

In [ ]:
```
#plt.savefig('NYCrats_linear_regression.png')
```

In [ ]:

In [ ]: