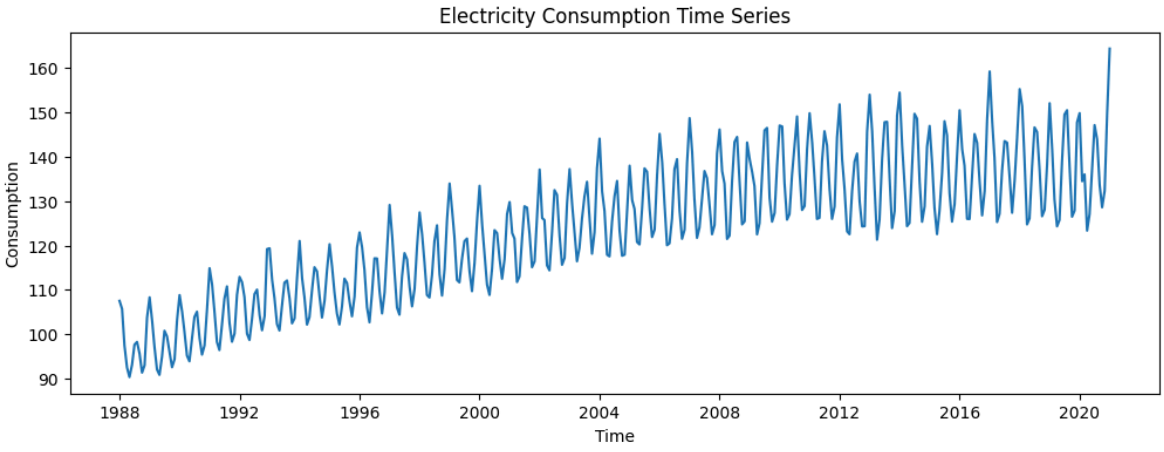
In [13]:
```
# Cell 1: Import required libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from statsmodels.graphics.tsaplots import plot_acf
from statsmodels.tsa.stattools import adfuller
```

In [16]:
```
# Cell 2: Load the dataset
# Replace 'electricity.csv' and column name with your actual file and column
df = pd.read_csv(r"ML471_S1_Datafile_Concept.csv")

df['DATE'] = pd.to_datetime(df['DATE'])
df.set_index('DATE', inplace=True)


# Select the correct series
series = df['Consumption']
```

In [17]:
```
# Cell 3: Quick overview
print(series.head())
print("\nMissing values:", series.isna().sum())
```

```
DATE
1988-01-01    107.5052
1988-02-01    105.6720
1988-03-01     97.4502
1988-04-01     92.4714
1988-05-01     90.3151
Name: Consumption, dtype: float64

Missing values: 0
```

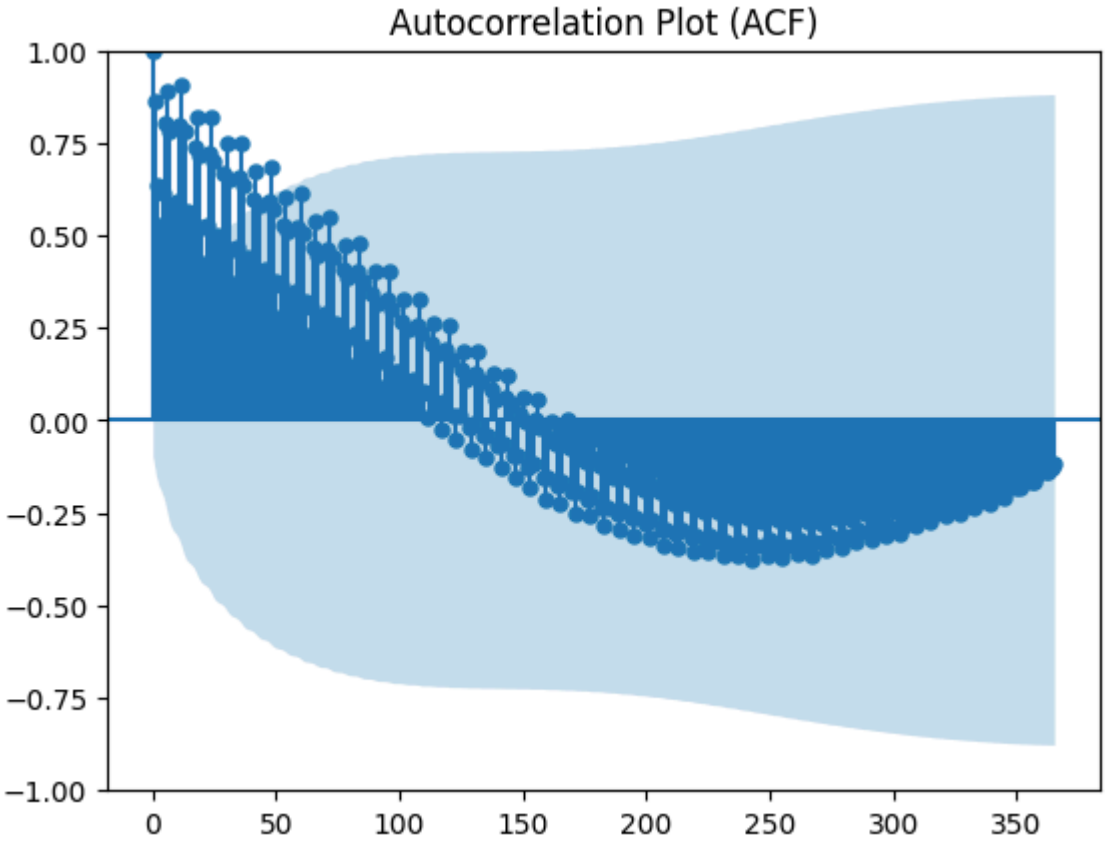
In [18]:
```
# Cell 4: Plot the time series
plt.figure(figsize=(12,4))
plt.plot(series)
plt.title("Electricity Consumption Time Series")
plt.xlabel("Time")
plt.ylabel("Consumption")
plt.show()
```



In [19]:
```
# Cell 5: Autocorrelation Plot (ACF)
plt.figure(figsize=(12,5))
plot_acf(series, lags=365)
```

```
plt.title("Autocorrelation Plot (ACF)")
plt.show()
```

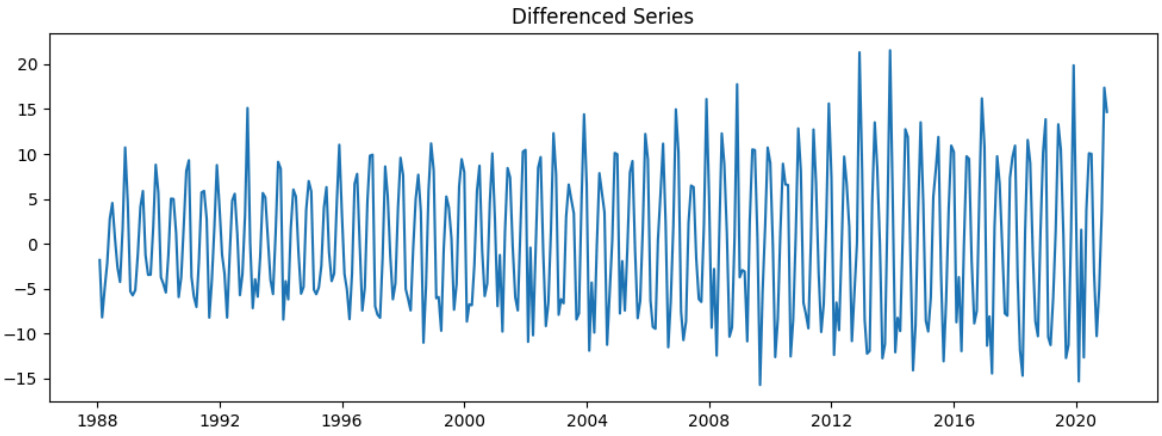
```
<Figure size 1200x500 with 0 Axes>
```



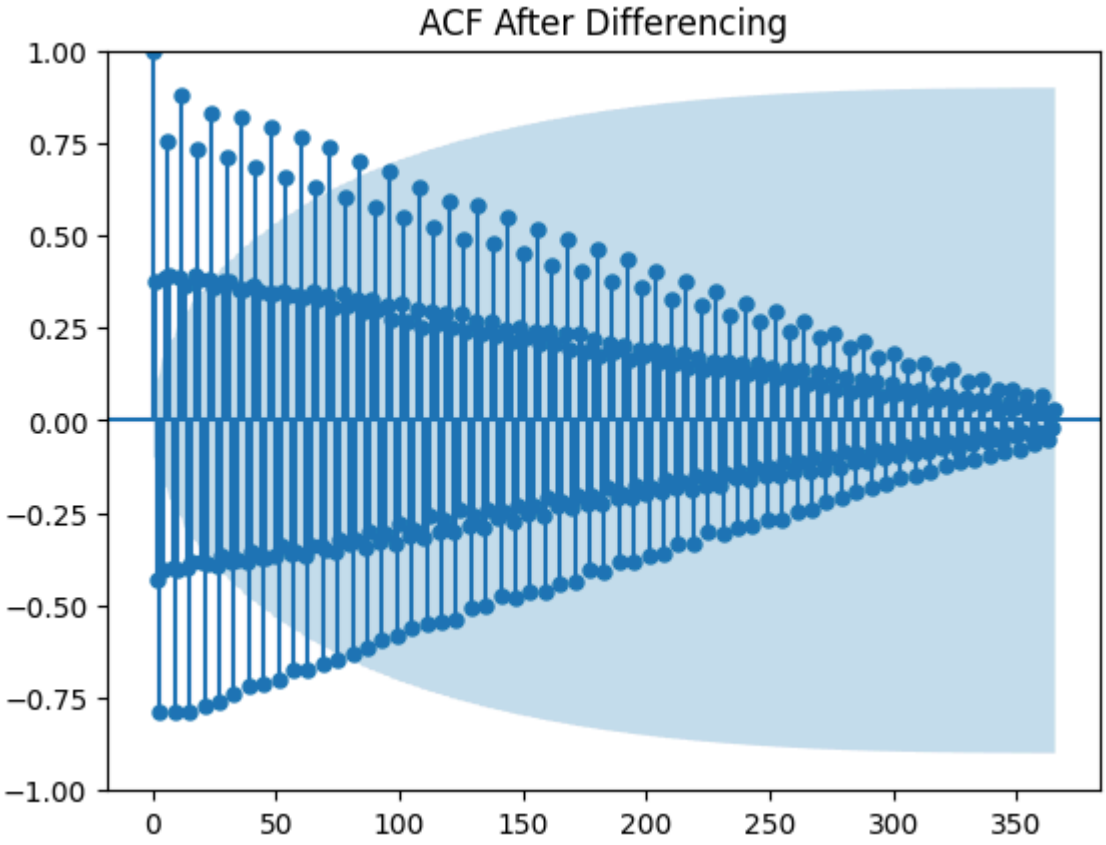
In [20]:
```
# Cell 6: Stationarity Check using ADF Test
adf_result = adfuller(series.dropna())

print("ADF Statistic:", adf_result[0])
print("p-value:", adf_result[1])
print("Critical Values:")
for k, v in adf_result[4].items():
    print(f"  {k}: {v}")
```

```
ADF Statistic: -2.256990350047131
p-value: 0.1862146911659065
Critical Values:
  1%: -3.4476305904172904
  5%: -2.869155980820355
  10%: -2.570827146203181
```

In [21]:
```
# Cell 7: Differencing (if needed)
diff_series = series.diff().dropna()

plt.figure(figsize=(12,4))
plt.plot(diff_series)
plt.title("Differenced Series")
plt.show()

plt.figure(figsize=(12,5))
plot_acf(diff_series, lags=365)
plt.title("ACF After Differencing")
plt.show()
```




```
<Figure size 1200x500 with 0 Axes>
```



In [ ]: