2023 Analysis by Ward

In [1]:
```
%load_ext autoreload
%autoreload 2

import geopandas as gpd
import pandas as pd
import contextily as cx
import matplotlib.pyplot as plt

pd.set_option('display.max_columns', 50)

import seaborn as sns

# import utility functions
import sys
sys.path.append('../')
from src.utils import *
```

In [2]:
```
%matplotlib inline
import matplotlib as mpl
mpl.rcParams['figure.dpi']= 300
```

In [3]:
```
gdf_full = get_data(2023, geo=True)
```

```
Breakdown by Outlier Condition:
        Outlier Rents: 5461 (30%)
        Outlier Increase vs Base: 608 ( 3%)
        Outlier Increase vs Previous: 328 ( 2%)
        Overall: 5905 (33%)

Breakdown by Subset:
        5905 outliers (33%)
        12081 non-outliers (67%)


        8567 rent increase (48%)
        9419 no rent increase (52%)


        7146 exempt (40%)
        10840 not exempt (60%)
```

For this analysis, we will drop parcels that cannot be correctly mapped to a ward.

In [4]:
```
gdf = gdf_full.dropna(subset=["WARD"])
print("Number of parcels with Ward data: ", len(gdf))
print("Number of parcels without Ward data: ", len(gdf_full) - len(gdf))
```

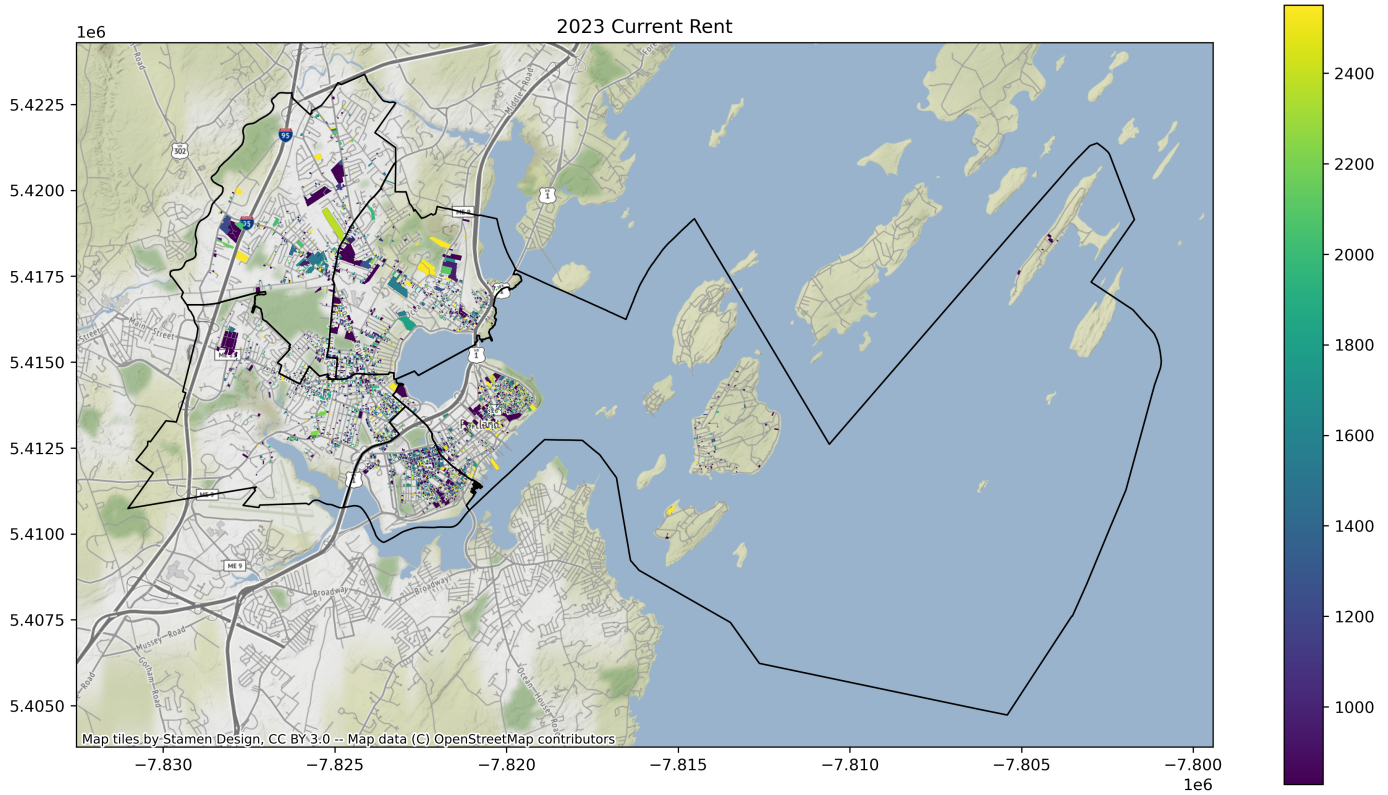
```
Number of parcels with Ward data:  17818
Number of parcels without Ward data:  168
```

In [5]:
```
wards = gpd.read_file("../../municipal-street-list/wards.geojson").to_crs(3857)
wards["NAME"] = wards["NAME"].astype(float)
```

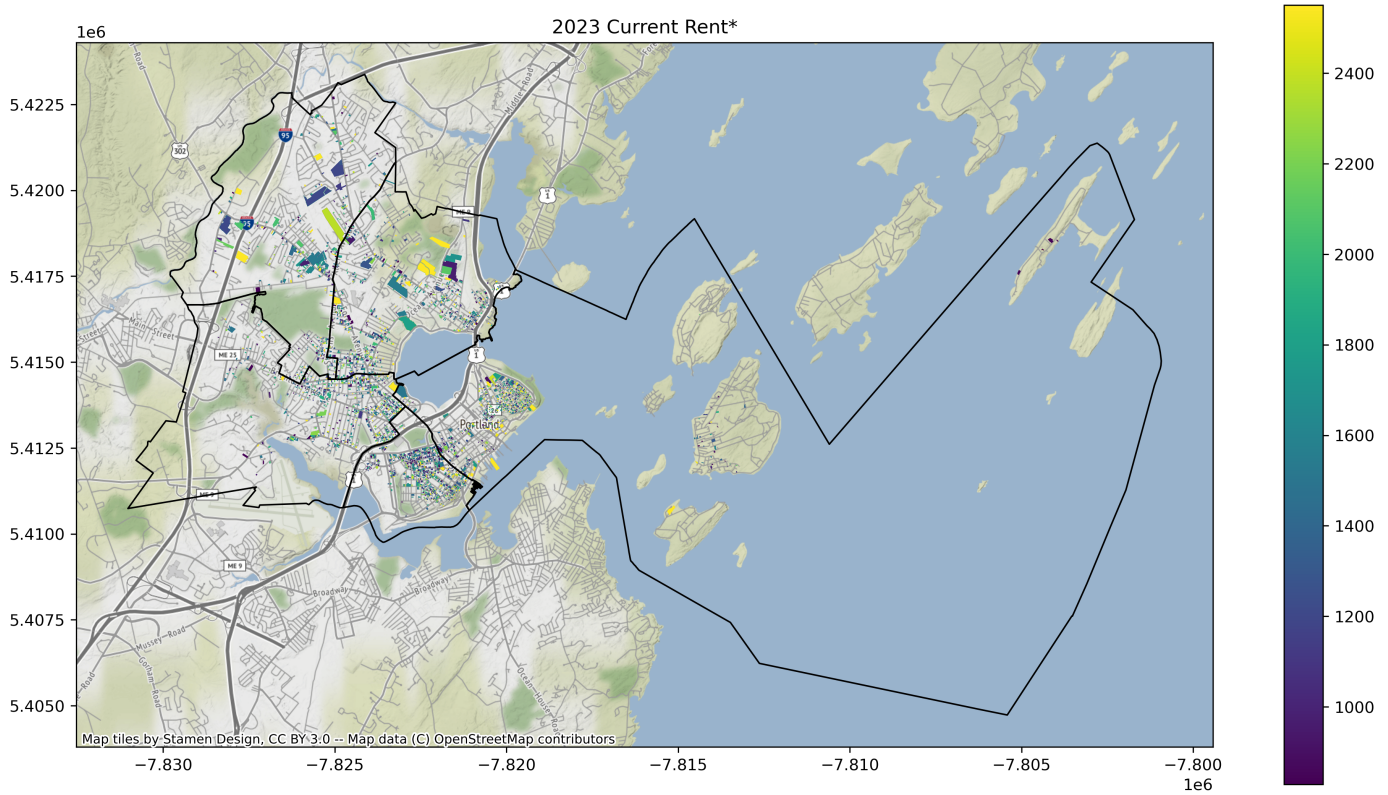
In [6]:
```
quantiles = gdf[~gdf["outlier"]][numerical_columns].quantile([.05, .95])
```

In [7]:
```
ax = gdf.plot("CurrentRent1", figsize=(16,9), legend=True, vmin=quantiles["CurrentRent1"]
ax.set_title("2023 Current Rent")
```

```
wards.plot(ax=ax, facecolor='none', edgecolor='k')
cx.add_basemap(ax)
```



In [8]:
```
ax = gdf[~gdf["outlier"]].plot("CurrentRent1", figsize=(16,9), legend=True, vmin=quantil
ax.set_title("2023 Current Rent*")
wards.plot(ax=ax, facecolor='none', edgecolor='k')
cx.add_basemap(ax)
```



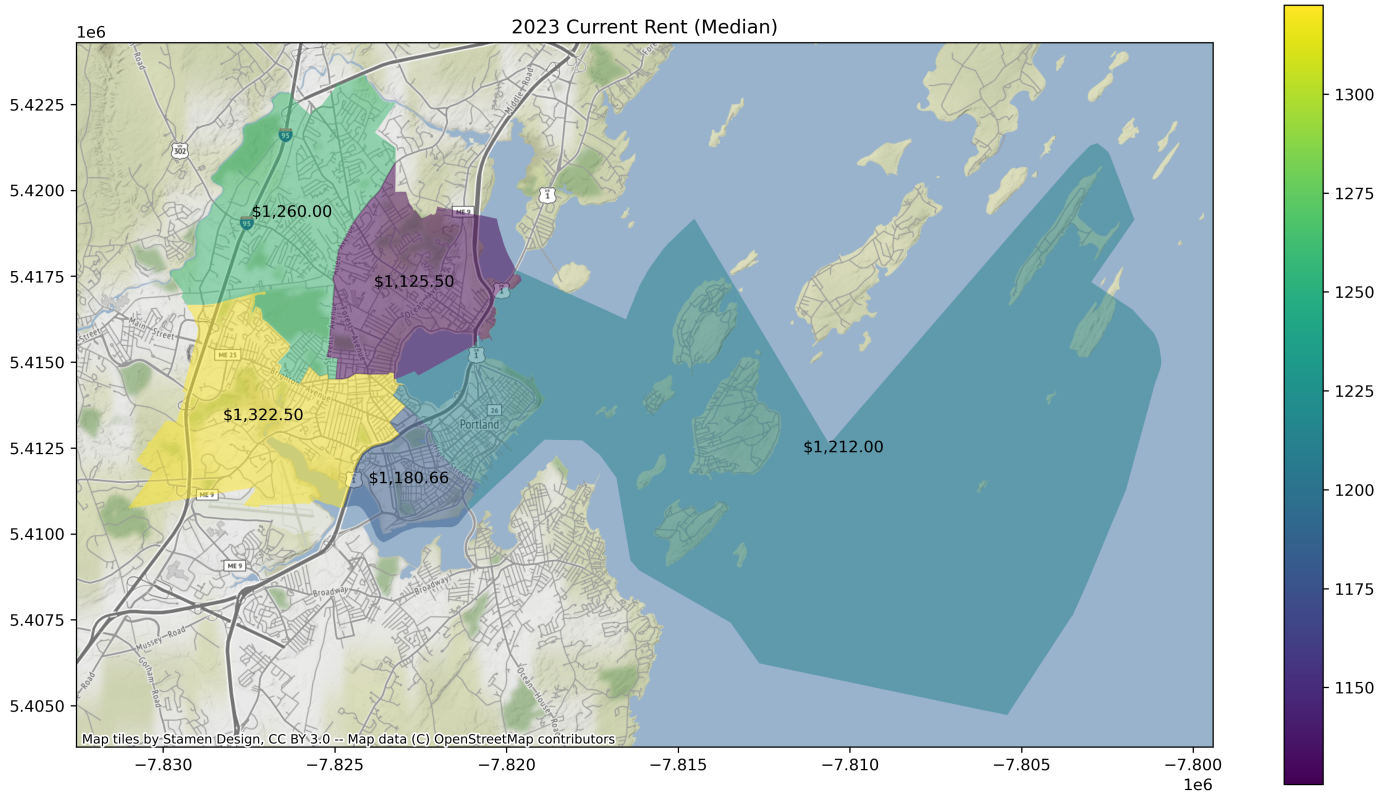
Ward Statistics

In [9]:
```
gdf_median = wards.merge(gdf.groupby("WARD").median(), left_on="NAME", right_index=True)
```

```
gdf_sum = wards.merge(gdf.groupby("WARD").sum(), left_on="NAME", right_index=True)
```

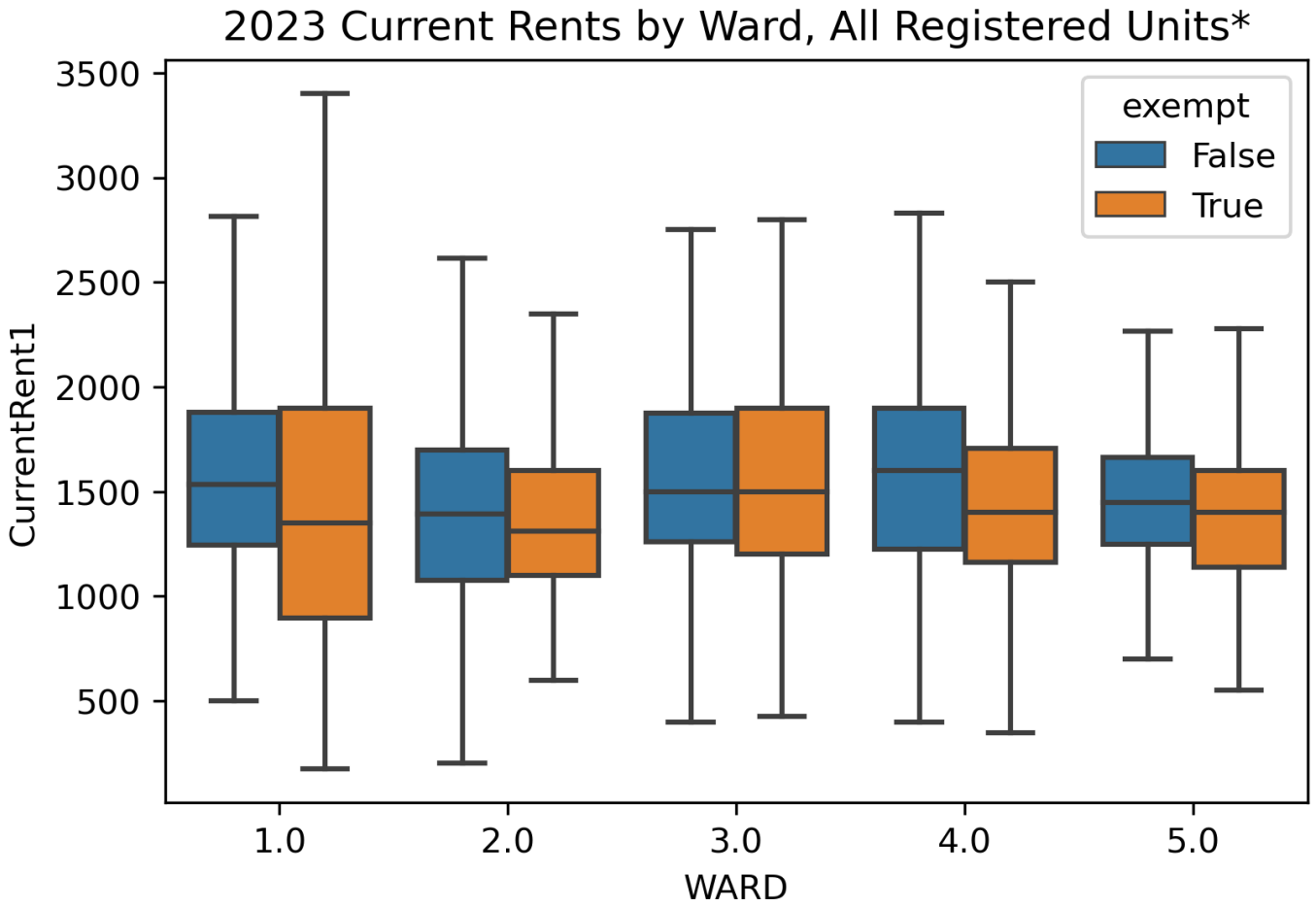
Maps (Choropleths)

In [10]:
```
ax = gdf_median.plot("CurrentRent1", figsize=(16,9), legend=True, alpha=0.5)
gdf_median.apply(lambda x: ax.annotate(text=f"${x['CurrentRent1']:,.2f}", xy=x.geometry.
ax.set_title("2023 Current Rent (Median)")
cx.add_basemap(ax)
```

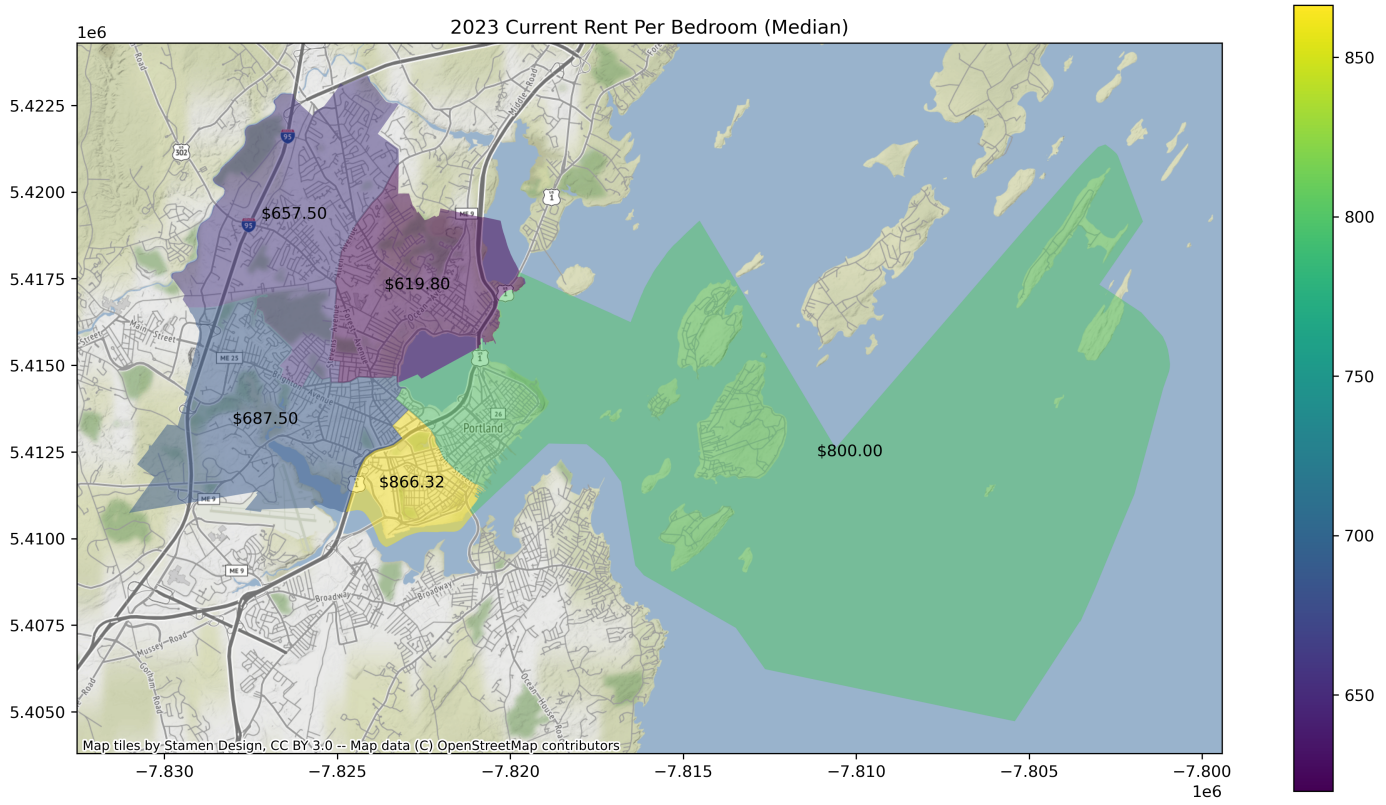


In [11]:
```
ax = sns.boxplot(
    data=gdf[~gdf["outlier"]].sort_values("CurrentRent1"),
    x="WARD",
    y="CurrentRent1",
    hue="exempt",
    showfliers=False,
    )
ax.set_title("2023 Current Rents by Ward, All Registered Units*")
```

Out[11]:
```
Text(0.5, 1.0, '2023 Current Rents by Ward, All Registered Units*')
```



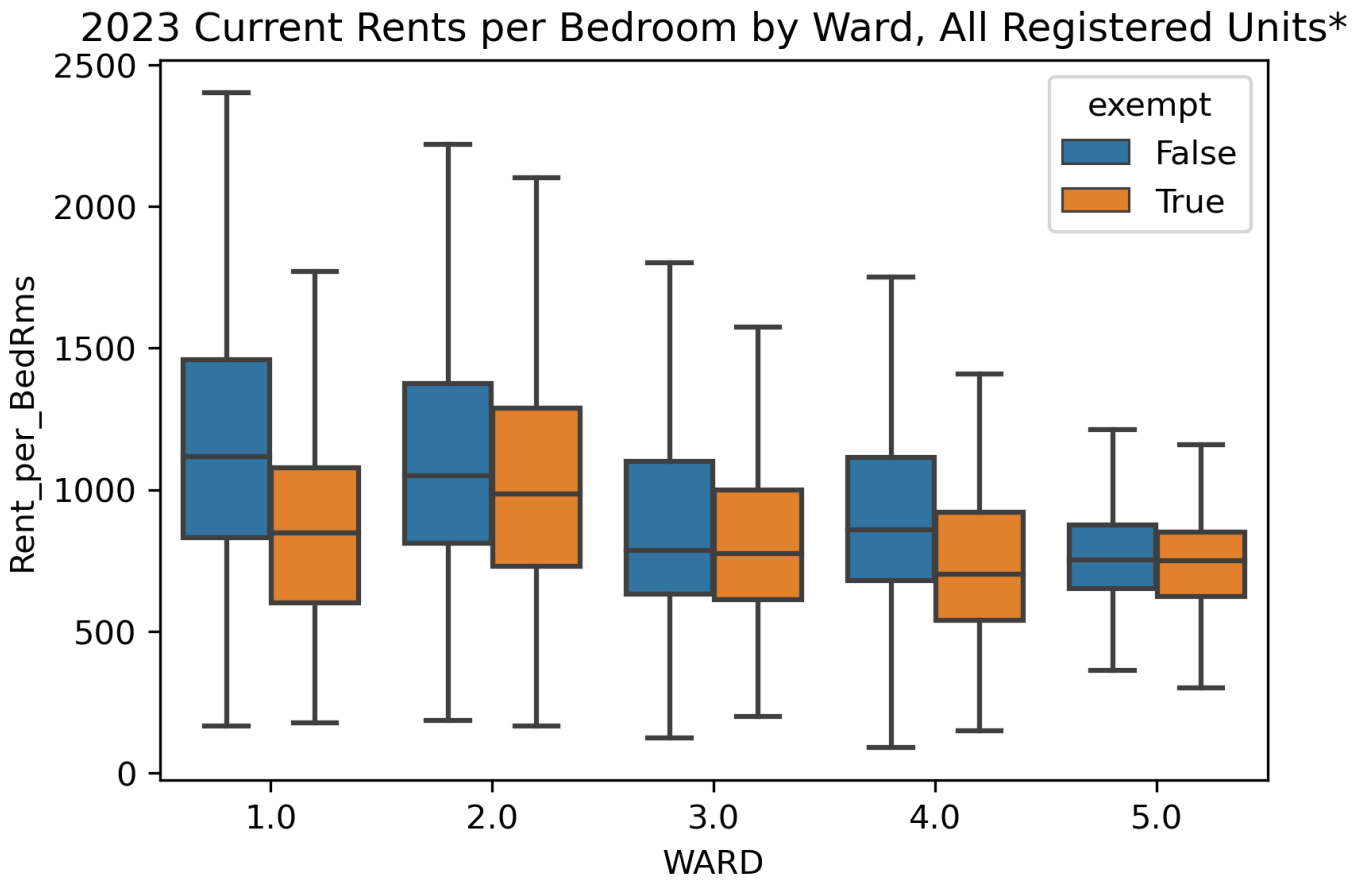
In [12]:
```
ax = gdf_median.plot("Rent_per_BedRms", figsize=(16,9), legend=True, alpha=0.5)
gdf_median.apply(lambda x: ax.annotate(text=f"${x['Rent_per_BedRms']:,.2f}", xy=x.geomet
ax.set_title("2023 Current Rent Per Bedroom (Median)")
cx.add_basemap(ax)
```



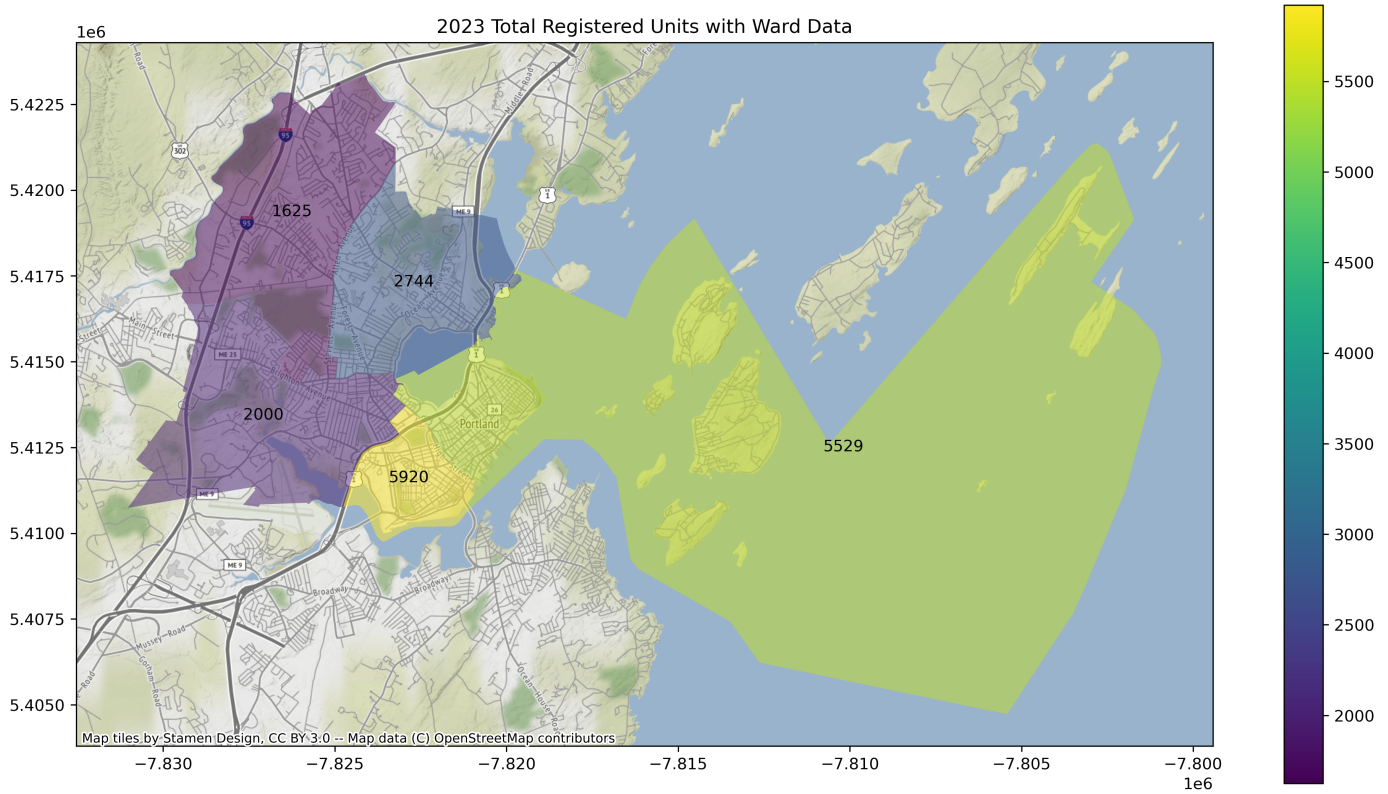
In [13]:
```
ax = sns.boxplot(
    data=gdf[~gdf["outlier"]].sort_values("Rent_per_BedRms"),
```

```
    x="WARD",
    y="Rent_per_BedRms",
    hue="exempt",
    showfliers=False,
    )
ax.set_title("2023 Current Rents per Bedroom by Ward, All Registered Units*")
```

Out[13]:
```
Text(0.5, 1.0, '2023 Current Rents per Bedroom by Ward, All Registered Units*')
```

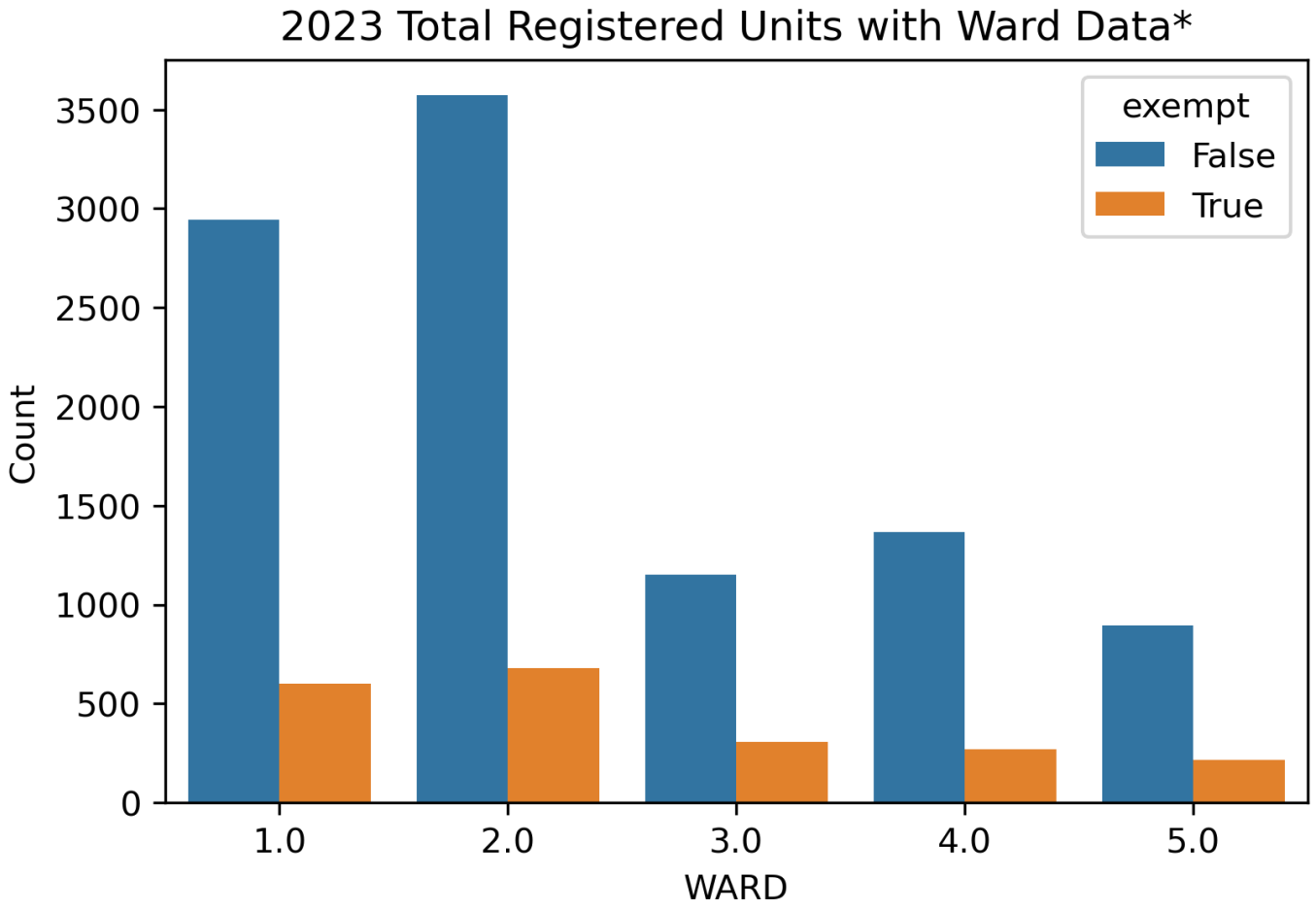


In [14]:
```
ax = gdf_sum.plot("Count", figsize=(16,9), legend=True, alpha=0.5)
gdf_sum.apply(lambda x: ax.annotate(text=x['Count'], xy=x.geometry.centroid.coords[0], h
ax.set_title("2023 Total Registered Units with Ward Data")
cx.add_basemap(ax)
```

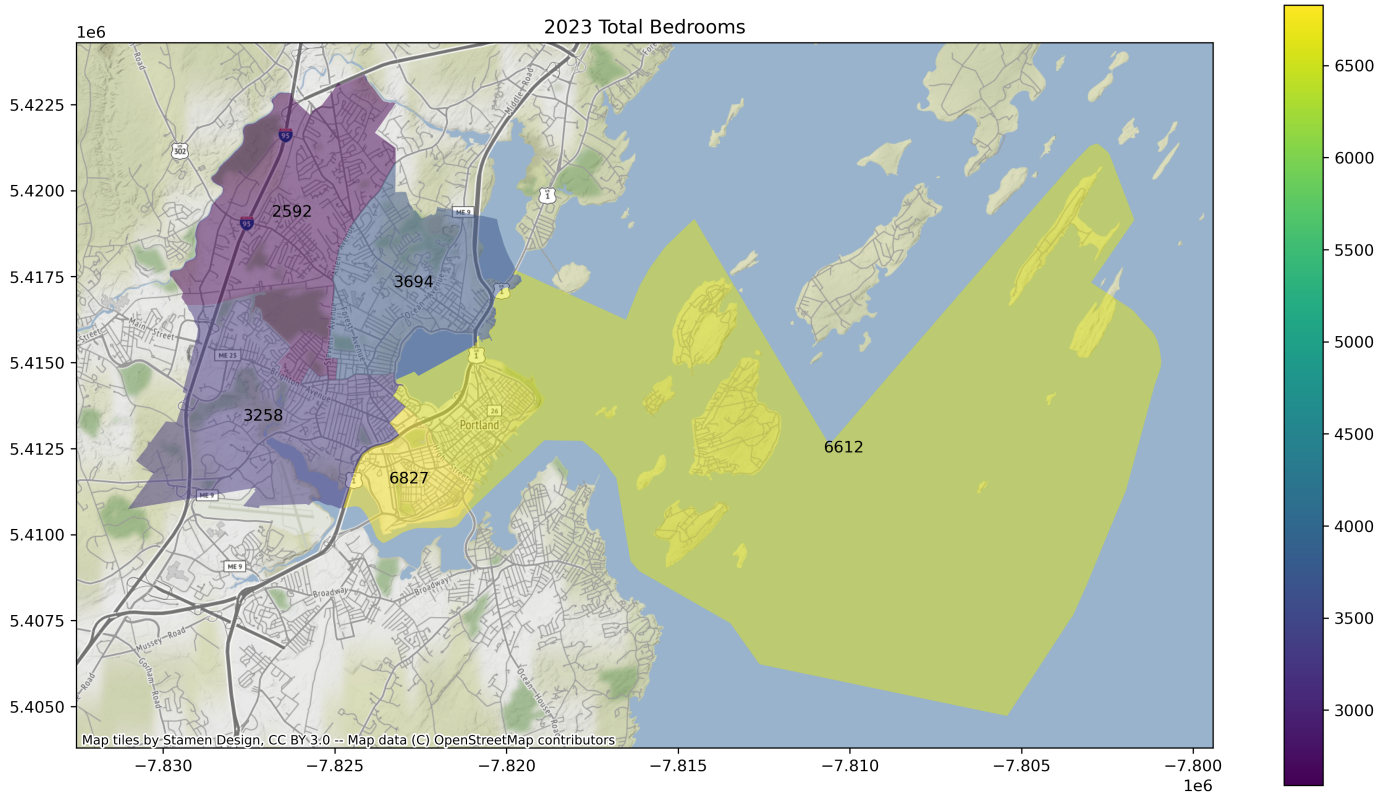


In [15]:
```
ax = sns.barplot(
    data=gdf[~gdf["outlier"]].sort_values("WARD"),
    x="WARD",
    y="Count",
    hue="exempt",
    estimator=np.sum
    )
ax.set_title("2023 Total Registered Units with Ward Data*")
```

Out[15]:
```
Text(0.5, 1.0, '2023 Total Registered Units with Ward Data*')
```



In [16]:
```
ax = gdf_sum.plot("nbrBedRms1", figsize=(16,9), legend=True, alpha=0.5)
gdf_sum.apply(lambda x: ax.annotate(text=x['nbrBedRms1'], xy=x.geometry.centroid.coords[
ax.set_title("2023 Total Bedrooms")
cx.add_basemap(ax)
```

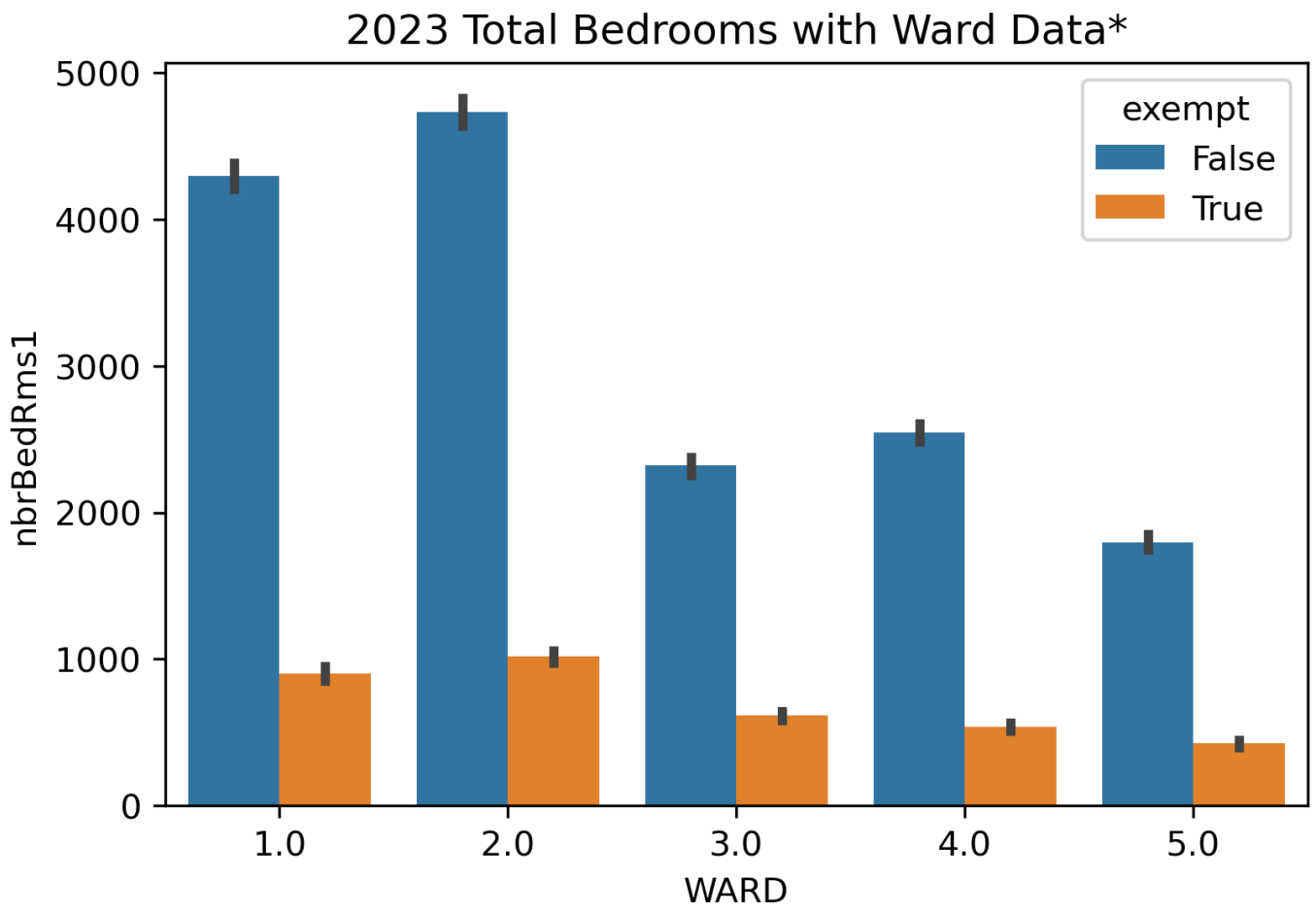


In [17]:
```
ax = sns.barplot(
    data=gdf[~gdf["outlier"]].sort_values("WARD"),
    x="WARD",
```

```
    y="nbrBedRms1",
    hue="exempt",
    estimator=np.sum
    )
ax.set_title("2023 Total Bedrooms with Ward Data*")
```

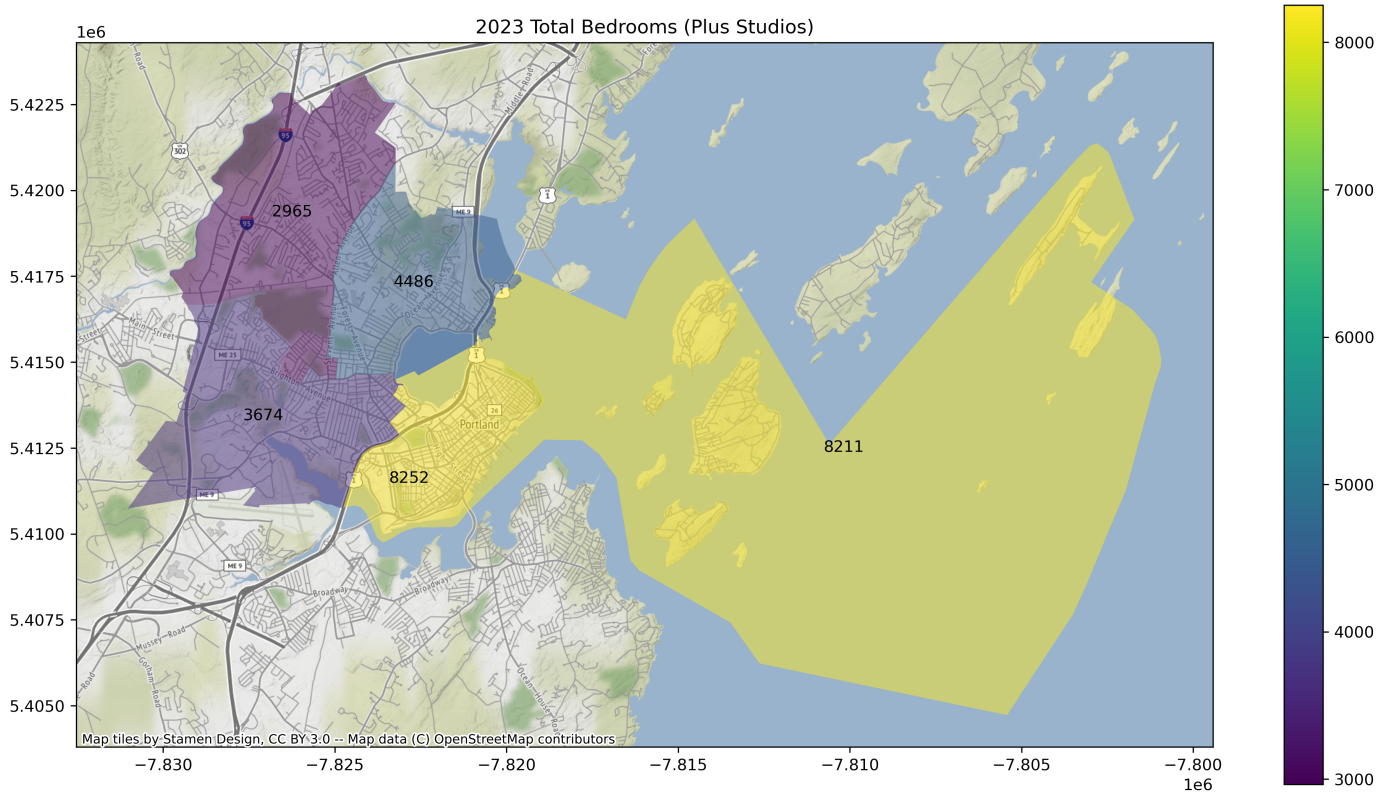
Out[17]:

```
Text(0.5, 1.0, '2023 Total Bedrooms with Ward Data*')
```



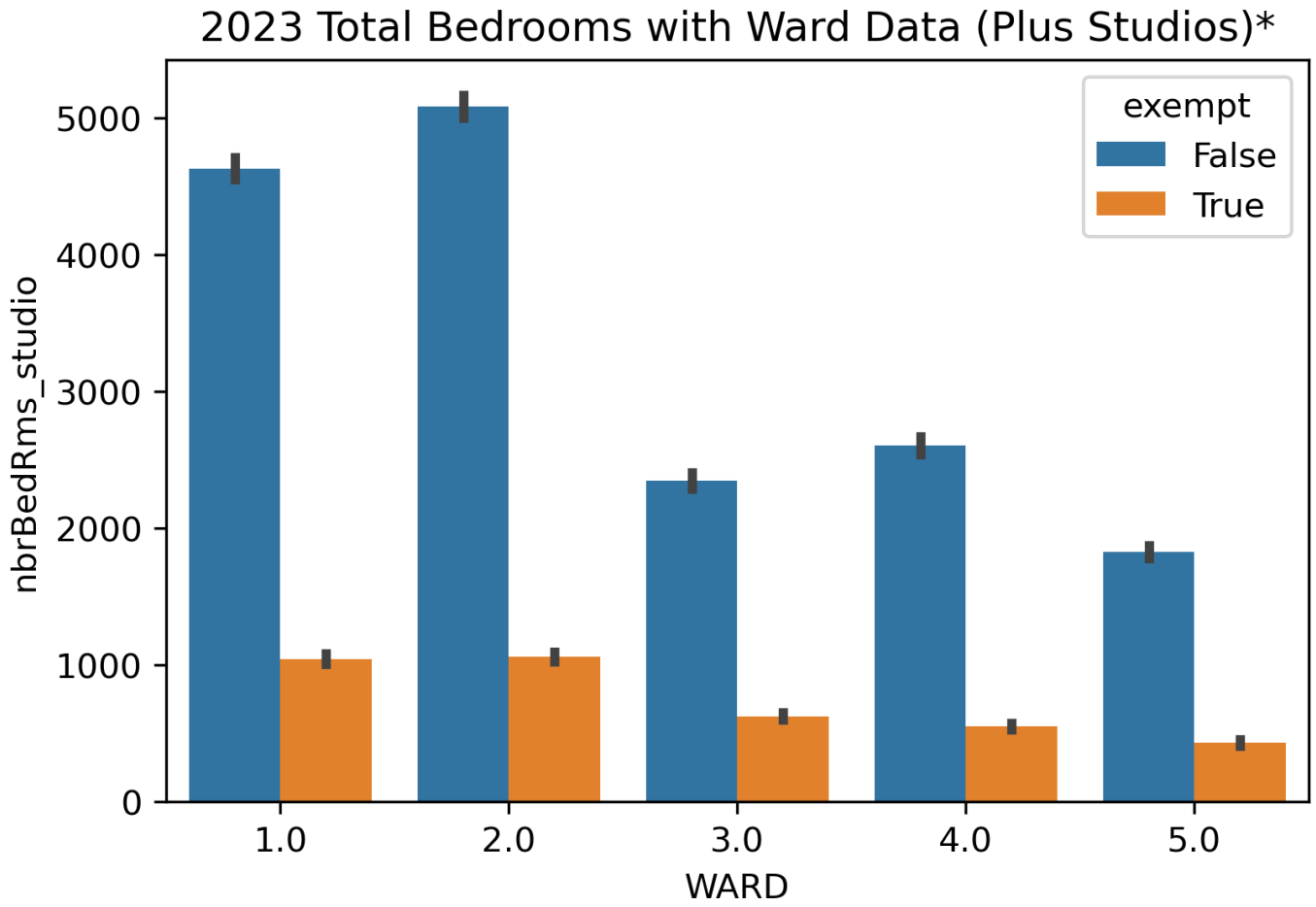
In [18]:

```
ax = gdf_sum.plot("nbrBedRms_studio", figsize=(16,9), legend=True, alpha=0.5)
gdf_sum.apply(lambda x: ax.annotate(text=x['nbrBedRms_studio'], xy=x.geometry.centroid.c
ax.set_title("2023 Total Bedrooms (Plus Studios)")
cx.add_basemap(ax)
```

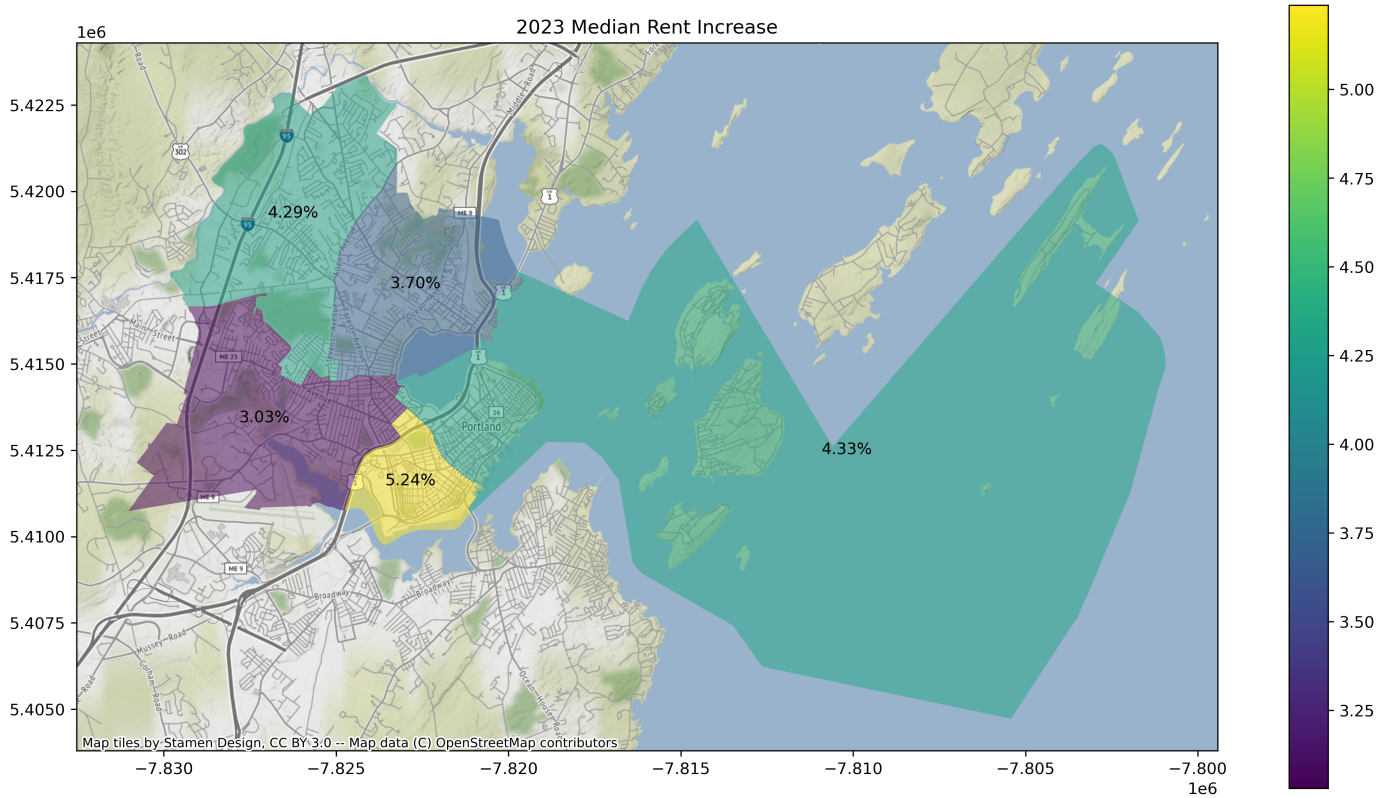


In [19]:
```
ax = sns.barplot(
    data=gdf[~gdf["outlier"]].sort_values("WARD"),
    x="WARD",
    y="nbrBedRms_studio",
    hue="exempt",
    estimator=np.sum
    )
ax.set_title("2023 Total Bedrooms with Ward Data (Plus Studios)*")
```

Out[19]:
```
Text(0.5, 1.0, '2023 Total Bedrooms with Ward Data (Plus Studios)*')
```



In [20]:
```
ax = gdf_median.plot("Rent_Inc_percent", figsize=(16,9), legend=True, alpha=0.5)
gdf_median.apply(lambda x: ax.annotate(text=f"{x['Rent_Inc_percent']:.2f}%", xy=x.geomet
ax.set_title("2023 Median Rent Increase")
cx.add_basemap(ax)
```

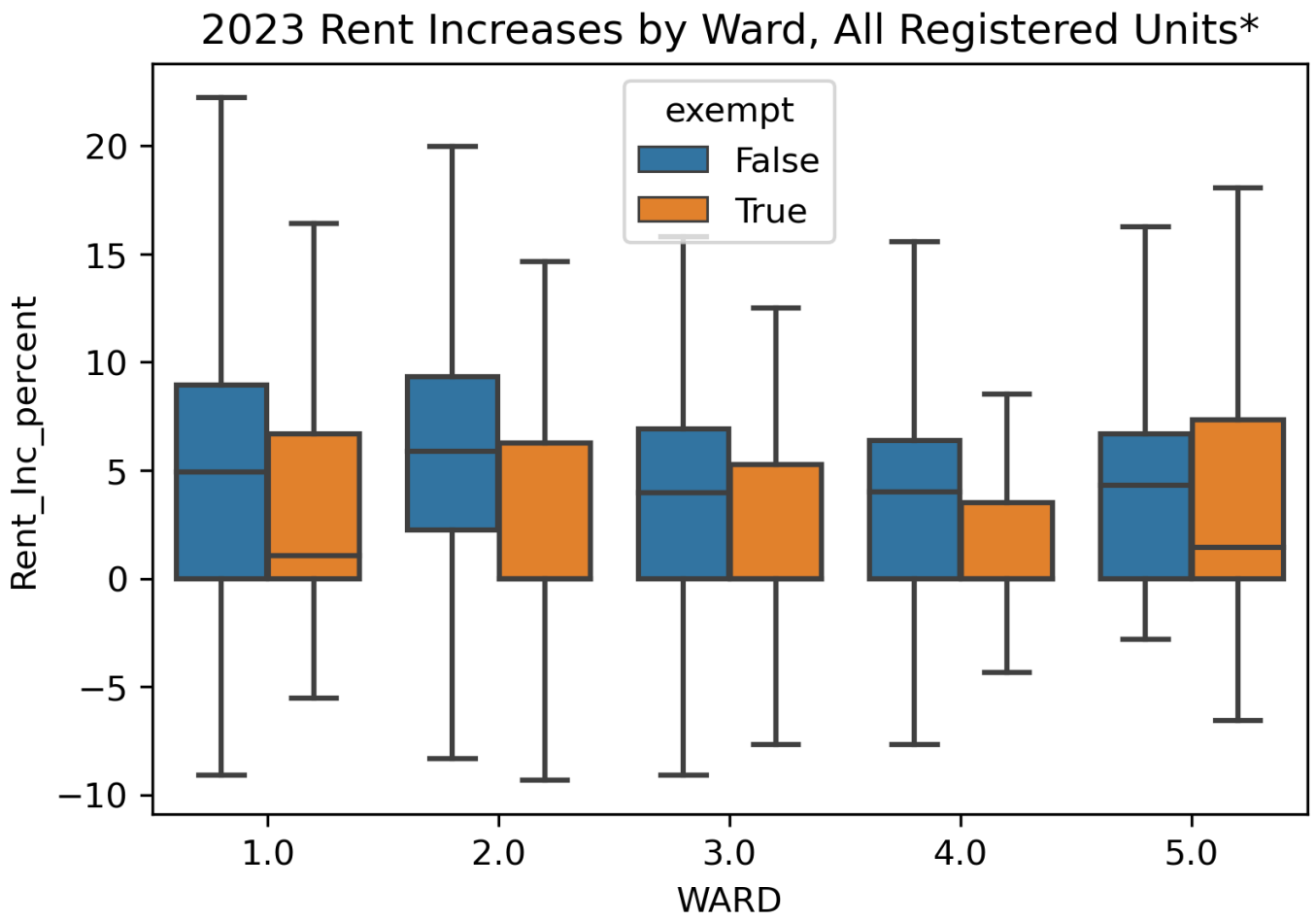


In [21]:
```
ax = sns.boxplot(
    data=gdf[~gdf["outlier"]].sort_values("WARD"),
```

```
    x="WARD",
    y="Rent_Inc_percent",
    hue="exempt",
    showfliers=False
    )
ax.set_title("2023 Rent Increases by Ward, All Registered Units*")
```

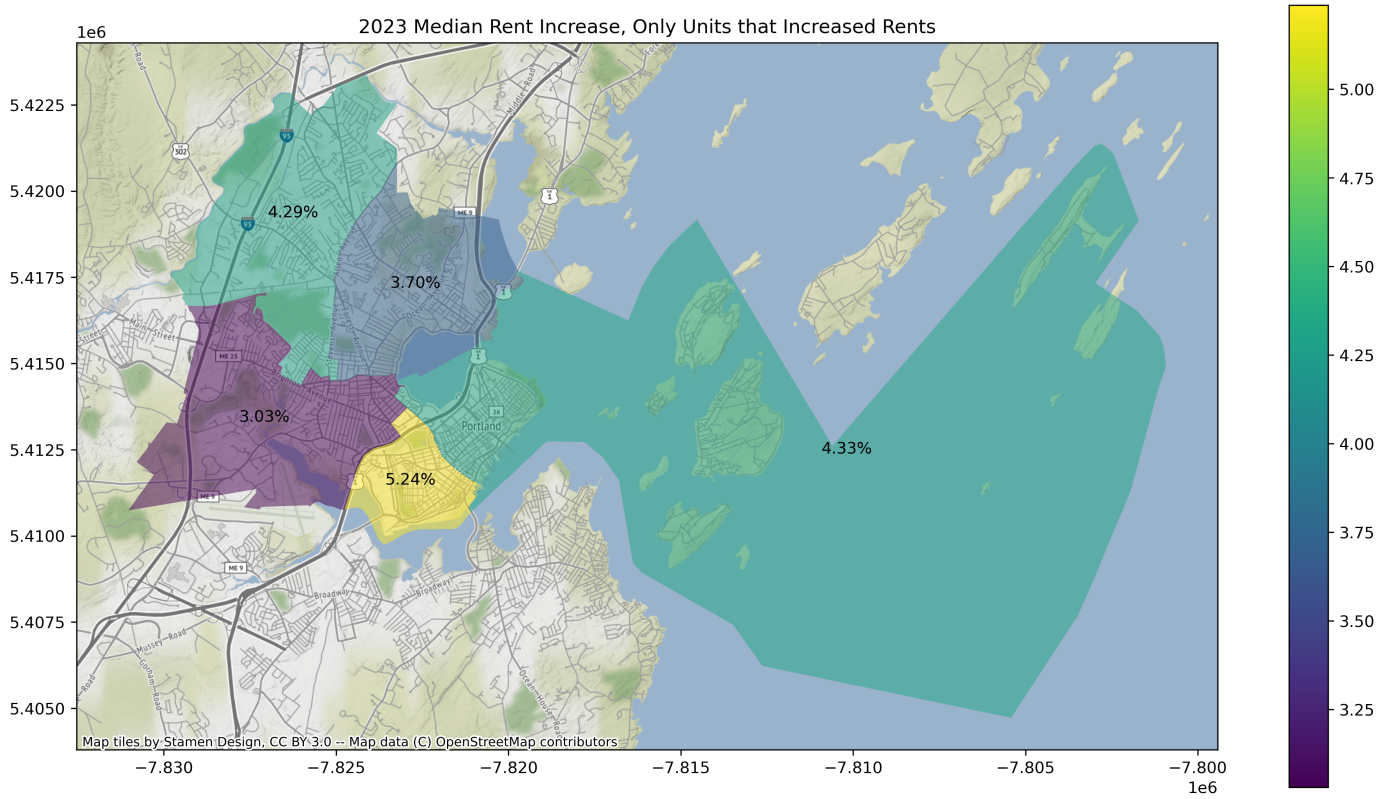
Out[21]:

```
Text(0.5, 1.0, '2023 Rent Increases by Ward, All Registered Units*')
```



In [22]:

```
ax = gdf_median.plot("Rent_Inc_percent", figsize=(16,9), legend=True, alpha=0.5)
gdf_median.apply(lambda x: ax.annotate(text=f"{x['Rent_Inc_percent']:.2f}%", xy=x.geomet
ax.set_title("2023 Median Rent Increase, Only Units that Increased Rents")
cx.add_basemap(ax)
```

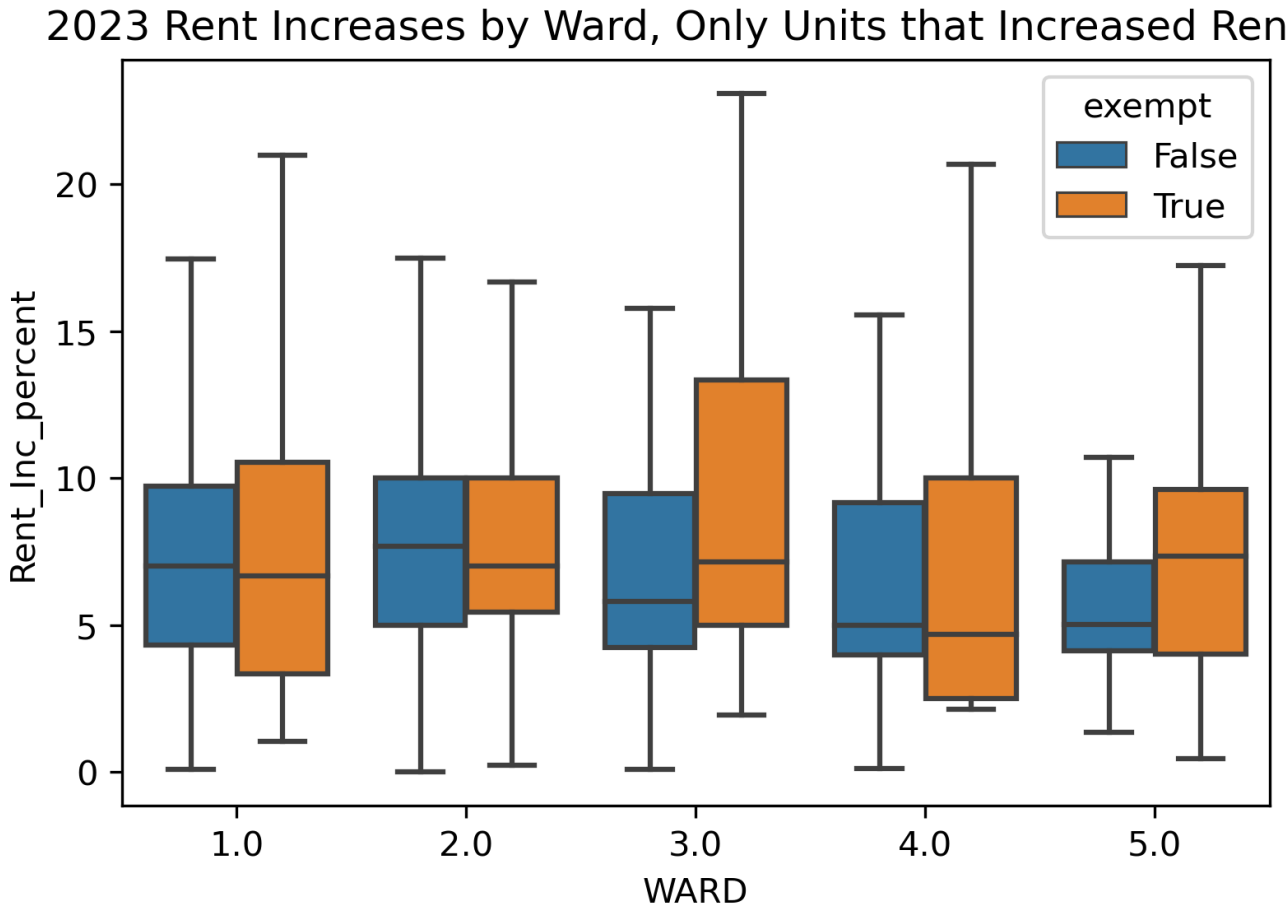


In [23]:

```
ax = sns.boxplot(
    data=gdf[~gdf["outlier"] & (gdf["Rent_Inc"] > 0)].sort_values("WARD"),
    x="WARD",
    y="Rent_Inc_percent",
    hue="exempt",
    showfliers=False
    )
ax.set_title("2023 Rent Increases by Ward, Only Units that Increased Rents*")
```

Out[23]:

```
Text(0.5, 1.0, '2023 Rent Increases by Ward, Only Units that Increased Rents*')
```


2023 Rent Increases by Ward, Only Units that Increased Rents*
exempt
False
True
Rent_Inc_percent
0
5
10
15
20
1.0
2.0
3.0
4.0
5.0
WARD