
Task 4 What is the Coordinate Reference System of the selected dataset?

In [52]:
```
APA.crs
```

Out[52]:
```
<Geographic 2D CRS: EPSG:4326>
Name: WGS 84
Axis Info [ellipsoidal]:
- Lat[north]: Geodetic latitude (degree)
- Lon[east]: Geodetic longitude (degree)
Area of Use:
- name: World.
- bounds: (-180.0, -90.0, 180.0, 90.0)
Datum: World Geodetic System 1984 ensemble
- Ellipsoid: WGS 84
- Prime Meridian: Greenwich
```

Task 5 How many features does the selected dataset contain?

In [53]:
```
print("The data set I selected has " + str(APA.shape[0]) + " features.")
#using .shape to define the amount of features
```

```
The data set I selected has 37 features.
```

Task 6 Define a sub-setting criterion to create a new geopandas dataframe where you filter the selected dataset based on a categorical attribute.

In [54]:
```
APAcat = APA[["NAME"]] #showing which categorical attribute to include
APAcat.head(10)
```

Out[54]:

	NAME
0	Skelmorlie
1	Largs A
2	Largs B
3	Millport
4	West Kilbride
5	Dalry
6	Burnhouse
7	Barmill
8	Gateside
9	Longbar

Task 7 Define a sub-setting criterion to create a new geopandas dataframe where you filter the selected dataset based on a numerical attribute.

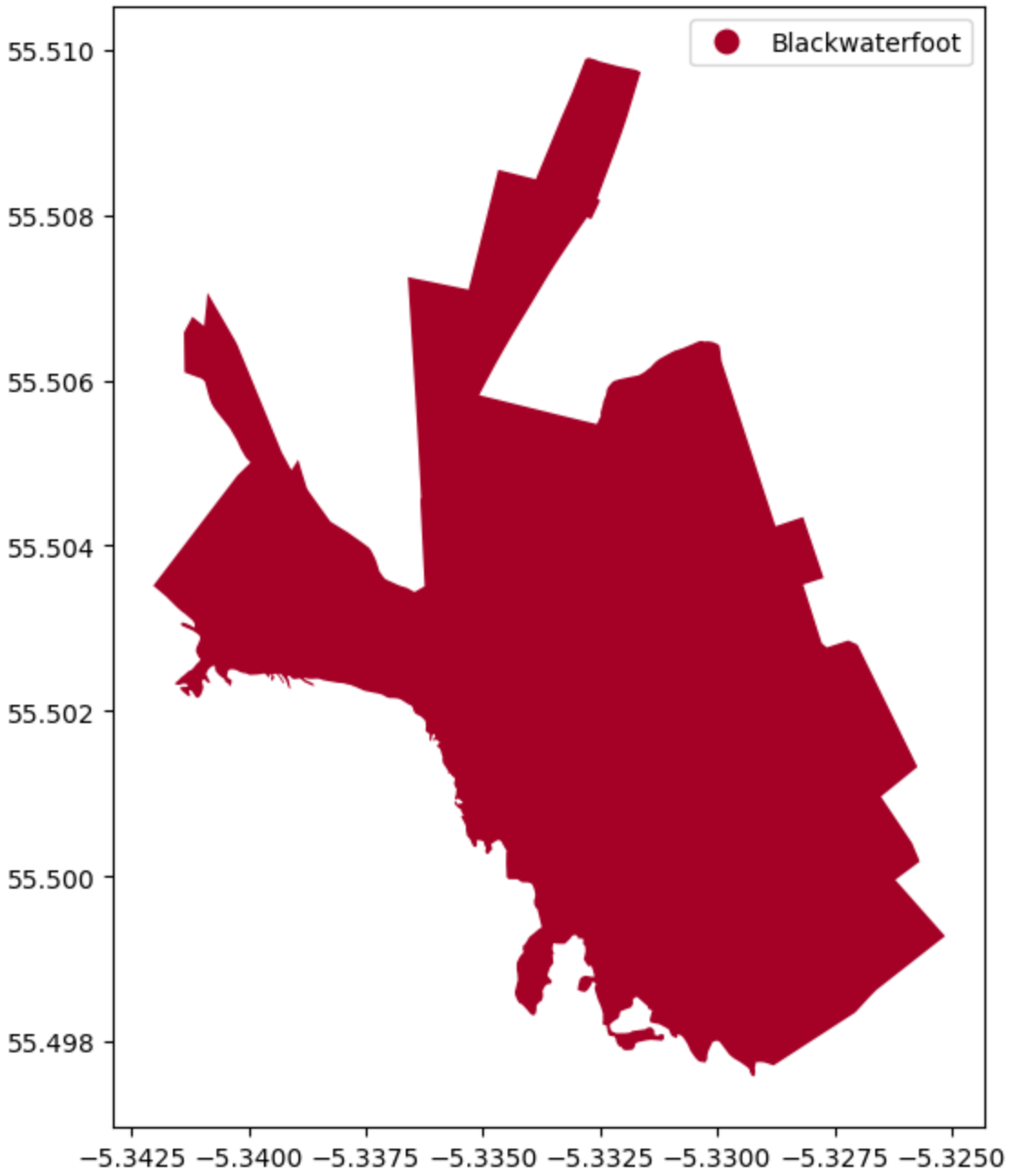
In [55]:
```
APAnum = APA["NAME"] == "Blackwaterfoot" #showing which numerical attribute to include
APAnum.tail(10)
```

Out[55]:
```
27     True
28    False
29    False
30    False
31    False
32    False
33    False
34    False
35    False
36    False
Name: NAME, dtype: bool
```

Task 8 Plot the new/filtered geopandas dataframe using one of the attributes to create a choropleth map.

In [56]:
```
APAnum = APA[APA["NAME"] == "Blackwaterfoot"]
#shows only those with the attribute Blackwaterfoot within the NAME category

APAnum.plot(column="NAME", cmap='RdYlBu', legend=True) #plots the map, including the legend
plt.show()
```


Blackwaterfoot
55.510
55.508
55.506
55.504
55.502
55.500
55.498
−5.3425
−5.3400
−5.3375
−5.3350
−5.3325
−5.3300
−5.3275
−5.3250

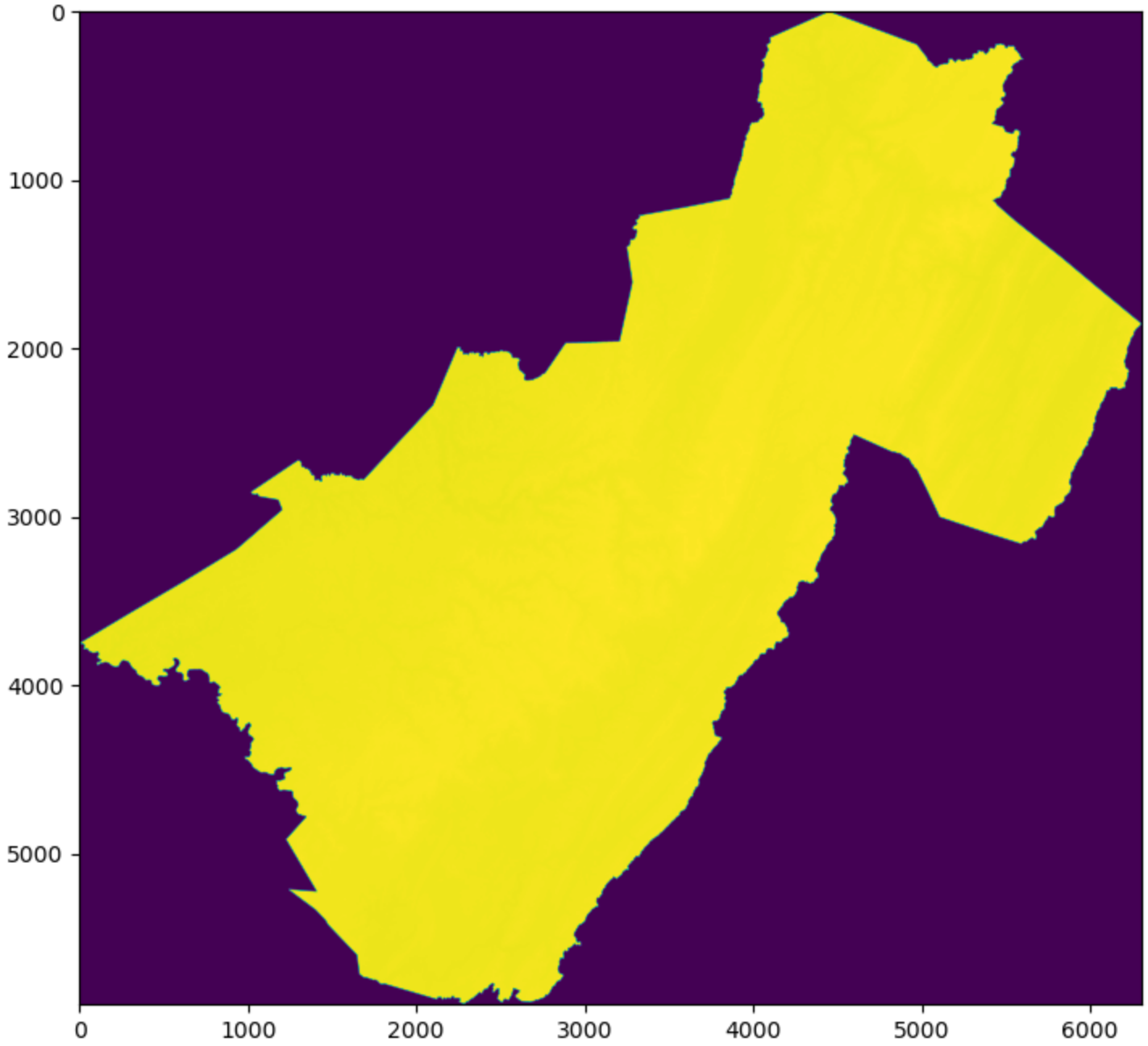
Python Rasterrio

The dataset for this part of the assignment is elev.tif a 30 m spatial resolution digital elevation model (DEM) derived from the National Elevation Dataset (NED) in Canada with elevation in meters.

In [59]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import geopandas as gpd
import contextily as ctx
import rasterio as rio
from rasterio import plot
from rasterio.plot import show
from rasterio.plot import show_hist
```

Task 1 Read the file as a rasterio dataset

In [61]:
```
with rio.open('elev.tif') as elev: #imports dataset as elev
    elev = elev.read(1) #reads dataset
show(elev) #shows dataset
```



Out[61]: <AxesSubplot: >

Task 2 What is the CRS of the dataset?

In [62]:
```
with rio.open('elev.tif') as elev: #opens dataset
    crs = elev.crs #defines the CRS
print(crs) #prints CRS
```

```
EPSG:32617
```

Task 3 Describe the raster dataset regarding the raster extent (bounds), the reference system, and how many bands are in this dataset.

In [63]:
```
raster_extent = elev.bounds #deines the bounds within dataset
reference_system = elev.crs #defines the CRS (reference system) within dataset
amount_of_bands = elev.count #defines the amount of bands within dataset

print("Results:")
print(raster_extent)
print(reference_system)
print(amount_of_bands)
print(" ")
print("Description:")
print("The raster dataset we are working with is using the " + str(reference_system) +
      " , the Projected coordinate system for the area between 84°W and 78°W, "
      " northern hemisphere between equator and 84°N, " +
      " onshore and offshore. It has " + str(amount_of_bands) +
      " band, meaning that it only has one data layer showing the elevation in meters in Canada. "
      " The raster extent (bounds) of the dataset, is " + str(raster_extent) +
      " showing the area which the dataset encompases.")
```

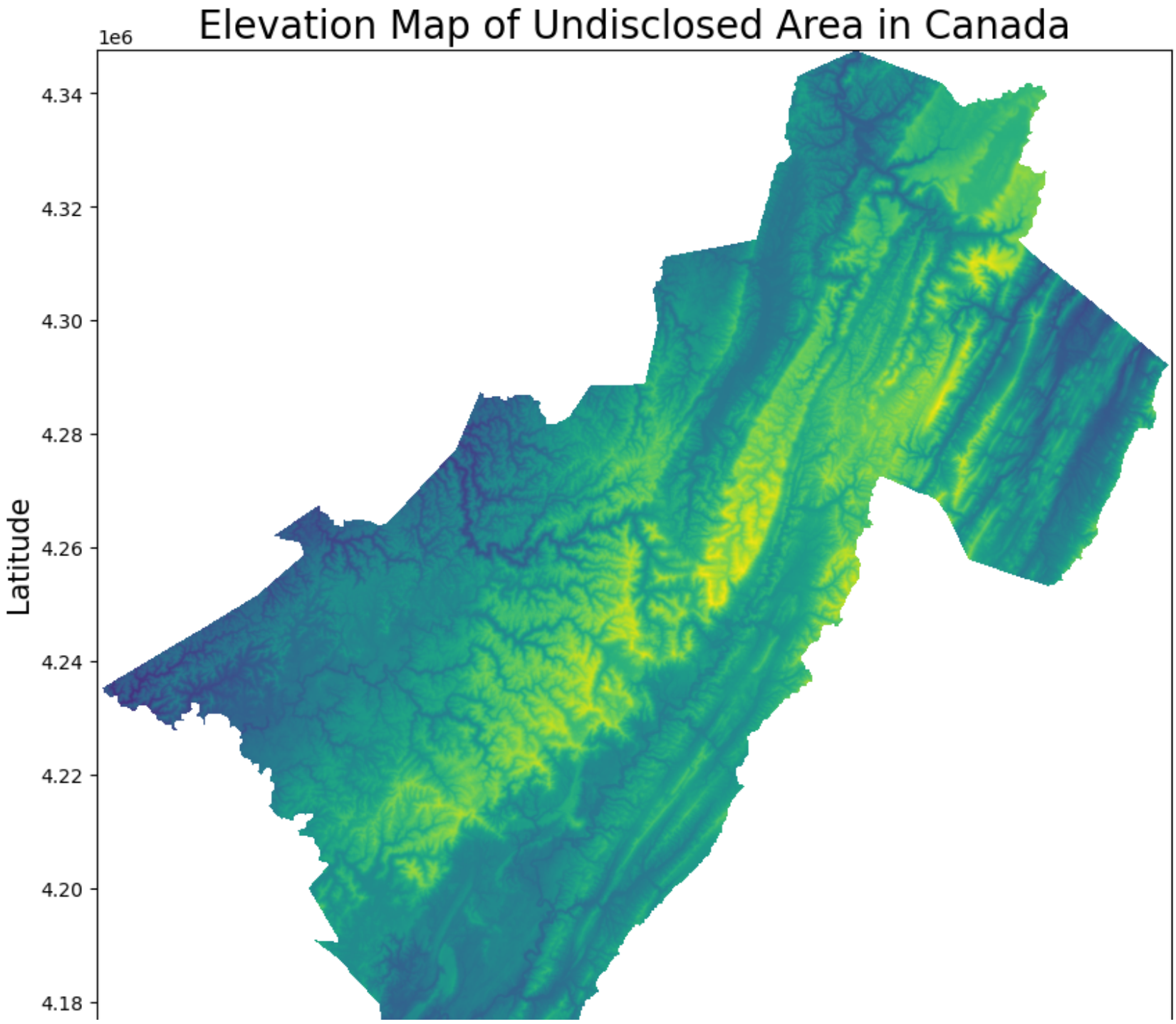
```
Results:
BoundingBox(left=479753.39945587853, bottom=4170823.2037591375, right=668843.3994558785, top=4347733.20375
9138)
EPSG:32617
1

Description:
The raster dataset we are working with is using the EPSG:32617 , the Projected coordinate system for the a
rea between 84°W and 78°W,  northern hemisphere between equator and 84°N,  onshore and offshore. It has 1
band, meaning that it only has one data layer showing the elevation in meters in Canada.  The raster exten
t (bounds) of the dataset, is BoundingBox(left=479753.39945587853, bottom=4170823.2037591375, right=66884
3.3994558785, top=4347733.203759138) showing the area which the dataset encompases.
```

Task 4 Create a plot/map of the raster dataset.

In [64]:
```
elev = rio.open('elev.tif') #opens dataset as elev
fig2, ax = plt.subplots(figsize=(10,10)) #defines the figure as a subplot on one ax
show(elev, ax=ax) #shows the data (aka prints it)
elev.close() #closes raster file
ax.set_title('Elevation Map of Undisclosed Area in Canada', fontsize=20) #prints title onto dataset
ax.set_xlabel('Longitude', fontsize=15) #prints x label onto dataset
ax.set_ylabel('Latitude', fontsize=15) #prints y label onto dataset
```

Out[64]:
```
Text(0, 0.5, 'Latitude')
```

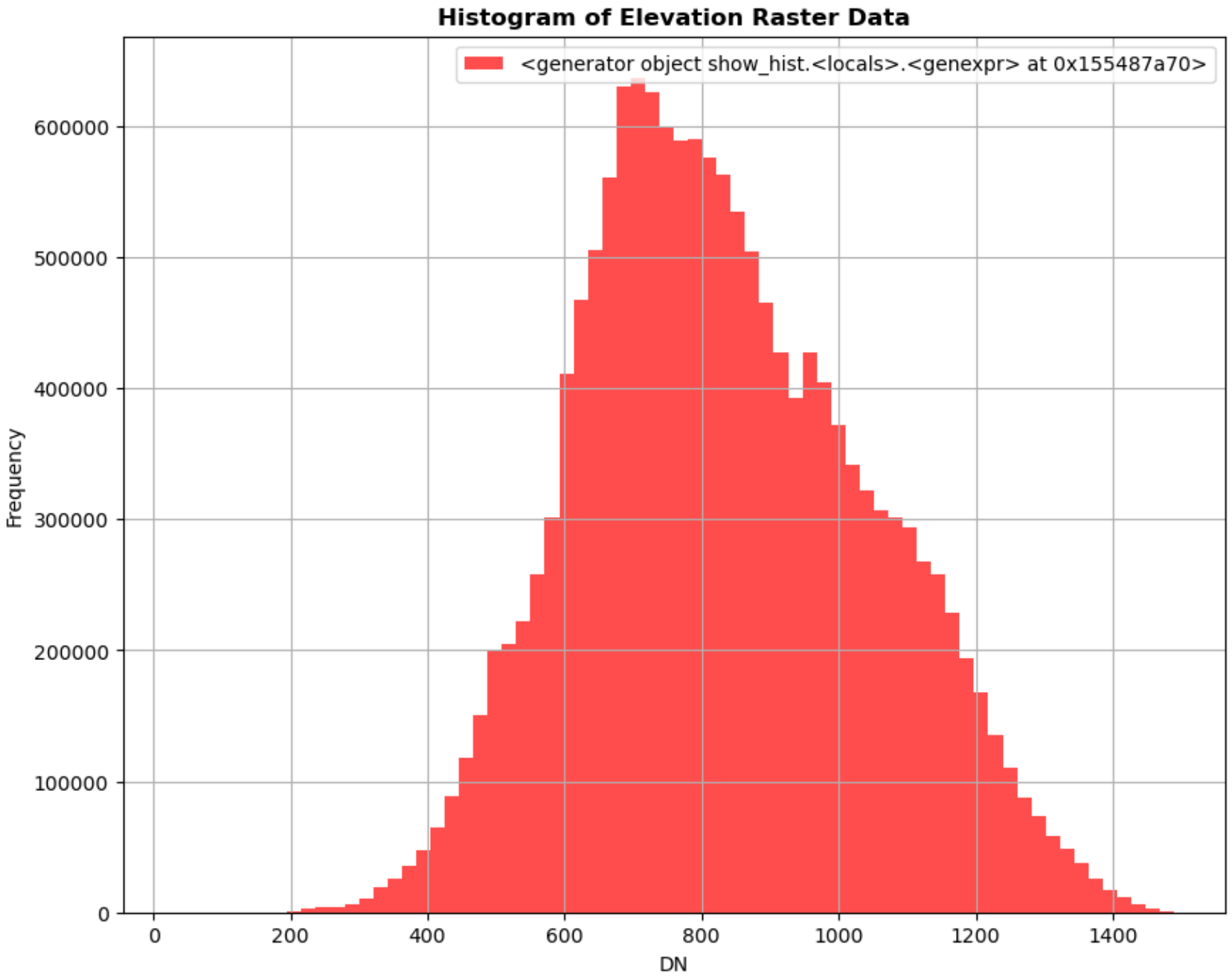

Elevation Map of Undisclosed Area in Canada
1e6
4.34
4.32
4.30
4.28
4.26
4.24
4.22
4.20
4.18
Latitude

Task 5 Create Histograms from the raster.

In [65]:
```
elev = rio.open('elev.tif') #opens dataset

show_hist(elev, bins=70, lw=0.0, stacked=False, alpha=0.7, histtype='stepfilled',
          title='Histogram of Elevation Raster Data')
# prints histogram while defining the different proximities, data amounts etc.

elev.close()#closes datset
```


Histogram of Elevation Raster Data
<generator object show_hist.<locals>.<genexpr> at 0x155487a70>
Frequency
DN
0
100000
200000
300000
400000
500000
600000
0
200
400
600
800
1000
1200
1400