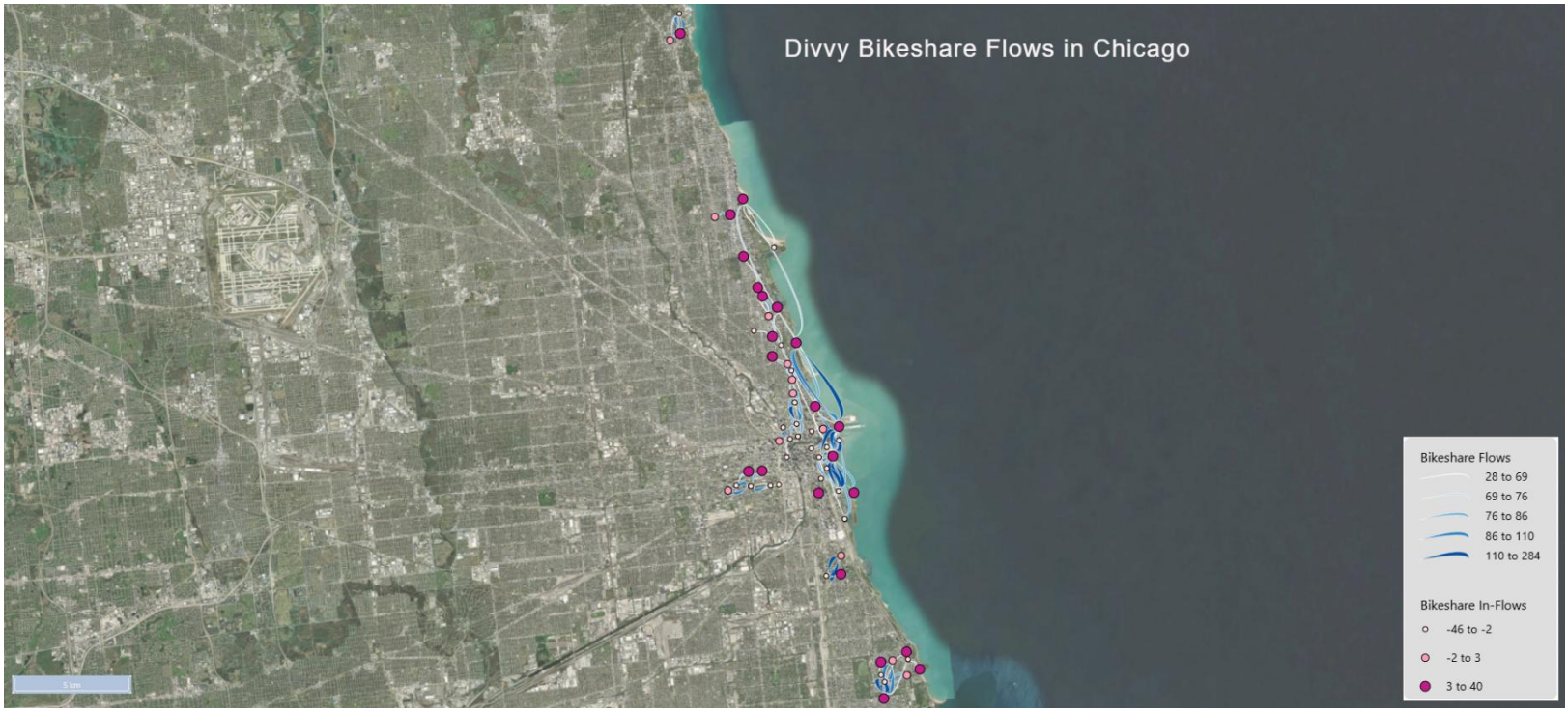

1. **Justification of your flow map design.** Please refer to the references to justify your choice of flow map symbology, including the point symbols, flow symbols, and the background choropleth map. Justify the choice of your node, flow and choropleth symbology, which should be different than the maps published in FlowMapper article and the tutorial video.
    a. I chose to use the Esri World Imagery basemap at 75% opacity. This basemap shows the land parcels, green spaces, and lake (including changes in water depth) that characterize the city of Chicago. I believe that it provides more context for the urban area than a solid basemap would. I chose to reduce the opacity so that the nodes and flows would stand out better against the basemap but not so much that the land's features would be invisible.
    b. For the nodes, I chose to map the "netFlow" attribute which gives us a range of [-46, 40]. I created three classes using quantile classification to best represent the linear data and employed a red-purple diverging color scheme to distinguish between net importers and net exporters (Koylu et al). I set the minimum radius to 3 and the maximum radius to 6. This ensured that the smallest nodes were still noticeable and that the largest nodes were visually salient but did not obstruct neighboring nodes. I kept transparency at 100% and even increased the stroke width to 1 to anchor Divvy station locations and to visualize bike user flow to and from stations (Koylu et al).

c. The flows were represented using a tapered flow line. I believe this symbology is preferable, as tapered flow lines are best suited to shorter flow distances, which are present due to this map's small spatial extent (Koylu). Further, tapered lines reduce clutter, which is optimal for our map that represents many short flow lines within a small geographic area. The flow lines employ a quantile classification, which is preferred over proportional, whose use often results in perceptual issues (i.e., difficulties in visualizing the differences between lines). I used a blue color gradient for the flow lines as well, which has been shown to prove more effective in communicating magnitude than line thickness (Dong). I felt that this color scheme worked well for this specific map, as flows with lower values were represented by a very light blue that contrasted well with its location on the darker lake; meanwhile, flows with high values were represented by a darker blue and contrasted with the light hues of the reduced opacity basemap.

2. **Interpretation of flow patterns. Discuss:**
    a. Places that attract (receive) the most flows, and the places that send the most flows:
        i. Places that receive the most flows are located along the shoreline of Lake Michigan. This is likely because of the reliance that tourists who tend to visit the lake and attractions (e.g., Shedd Aquarium, Field Museum) along the lake have on temporary modes of transportation; people may drop off bikes here after exploring a segment of the lakefront and/or before entering an attraction building. Meanwhile, places that send the most flows are more inland. This may be where a concentration of parking garages or bus stations might be, necessitating a change in transportation mode.
        ii. Instead of places that attract or send more flows than others, we see that stations tend to both send and receive bikes from the same station or small grouping of stations relatively equally. For example, Station A might send 100 bikes to Station B and receive 100 bikes from Station B. Some of these "paired" stations are located very close to one another and others are quite far away, but we consistently see this positive relationship between bikes sent and bikes received.
    b. General direction of flows (e.g., north-south, east-west, etc.) with context to the geography of the flow data set.
        i. As was mentioned before, stations tend to "trade" bikes with the same station or cluster of stations. In general, we see these trades occurring in the north-south direction, which makes sense as the

Divvy bike stations are concentrated in a north-south line down the coast of Lake Michigan. Further, people tend to primarily explore Chicago along the lake due to the concentration of entertainment, restaurants, and businesses, accounting for the north-south spatial pattern.

c. Flow patterns in relation to location characteristics displayed by node symbol and choropleth base map.
    i. We see the highest flow values over shorter distances and usually between Chicago "staples," such as Soldier Field. It is probable that Divvy constructed more nodes, or stations, where their (mainly) tourist audience would be likely to use them. This audience would likely not use the bikes for a long distance, as they are sightseeing rather than commuting (and regular commuters likely have their own bikes to save money), which is why high flow values are seen between close-together stations. There is a pair of stations (one near the top of the map and one near the middle) that send and receive bikes over a long distance, which is not commonly seen in this map. This may be an outlier representing a trip between two relatively popular and related locations. The terrain basemap chosen alongside a general knowledge of Chicago's layout allows users to understand where nodes are located and why certain nodes import or export a certain number of bikes.