2B. Obtaining Other Spatial Data to Map

A decision should be made on whether to include other spatial data in the map that would aid in understanding the spread and establishment of the pest. As the framework of code currently stands, one can easily input shapefiles and geojsons and with some alteration of the code, tifs can be accommodated as well.

The template will include several spatial features as seen in the spotted lanternfly pestHubMap. The decisions to include these layers were made in conversation with stakeholders and their needs to be able to identify areas to survey for SLF.

The included layers are:

- Establishment Risk: The ability of SLF to establish in each area on a scale from 0-10. See Huron et al. (2022) for the methodology to determine establishment risk
- Transport Risk: Represents to density of hubs in an area
- 1km County Survey Grids: Grids for each county at the 1km scale with standardized codes from the US National Grid to aid in survey efforts
- Counties Outline: Outlines of the counties within a given area or state

Each layer requires raw data. This example obtains all raw data from open sources. In step 3, the raw data will be cleaned and harmonized to be displayed on the map.

Raw spatial data sources:

1. Establishment Risk:
    a. Source: Huron, N.A., Behm, J.E. & Helmus, M.R. Paninvasion severity assessment of a U.S. grape pest to disrupt the global wine market. *Commun Biol* **5**, 655 (2022). https://doi.org/10.1038/s42003-022-03580-w
    b. Data: https://datadryad.org/stash/dataset/doi:10.5061/dryad.msbcc2g1b
        i. slftoh_ensemble_mean.tif
    c. Note: For this template, the raw establishment risk tif has been cropped to Pennsylvania to reduce the size of the file
2. 1km Grids
    a. Source: US National Grid (USNG) information center
    b. Data: https://usngcenter.org/portfolio-item/usng-gis-data/
3. Subcounties Outline
    a. Source: TIGER/Line shapefiles on data.gov
    b. Data (PA): https://catalog.data.gov/dataset/tiger-line-shapefile-2019-state-pennsylvania-current-county-subdivision-state-based

4. Counties Outline
    a. Source: tigris package in R
    b. Data: tigris::counties() – see step 3B
5. State Outline
    a. Source: tigris package in R
    b. Data: tigris::states() – see step 3B