* For evaluative purposes, I’ve created three versions of exclusions, as follows:
* Night time population only
  + Assumes that distributed wind turbine heights are constrained by the residential population density, with nighttime population as a surrogate for residential population
  + Created by reclassifying Landscan 2011 night time population (from HSIP 2012 database) into the following classes:

|  |
| --- |
| 0 people per 90 m night time – 80 m max height |
| 1-4 people per 90 m night time – 50 m max height |
| 4-6 people per 90 m night time – 40 m |
| 6-10 people per 90 m night time – 30 m max height |
| >10 people per 90 m night time—exclude/no turbines allowed (this indicates a high population residential area) |

* + Results are saved in:
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions
    - \*\* raster values indicate the max height allowed in each cell
  + Project to WGS 84 albers coordinate systems and 200 m cell size consistent with the aws gcf80 rasters using nearest neighbor resampling
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions\usmaxhtm\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions\akmaxhtm\_200m
    - S:\mgleason\DG\_Wind\Data\Analysis\landscan\_exclusions\himaxhtm\_200m
* Night time population plus canopy cover
  + Night time population + canopy cover at 20%
    - Where canopy cover is greater than or equal to 20%, turbines less than 50m in height will be excluded. Turbines 50m and above will not be affected. Based on average canopy cover in the surrounding 90m by 90m area.
  + Night time population + canopy cover at 40%
    - Where canopy cover is greater than or equal to 40%, turbines less than 50m in height will be excluded. Turbines 50m and above will not be affected. Based on average canopy cover in the surrounding 90m by 90m area.
  + Implementation:
    - Calculate focal mean in 3x3 moving window off of the NLCD 2001 Canopy Cover rasters
      * Focal Statistics 3x3 rectangular moving window, stats = mean (output to esri grid for CONUS or gdb raster for AK, HI to facilitate completion on big rasters)
    - Reclassify two different versions:
      * >=20% 🡪 0, <20% 🡪 1
      * >=40% 🡪 0, <40% 🡪 1
      * In Raster Calculator:
        + "[region]\_3x3\_mean"<20
        + "[region]\_3x3\_mean"<40
    - Project reclassified canopy cover rasters to WGS 84 albers coordinate systems and 200 m cell size consistent with the aws gcf80 rasters using nearest neighbor resampling
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_cc\_20pc\_wgs84albers
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_cc\_40pc\_wgs84albers
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_cc\_20pc\_wgs84albers
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_cc\_40pc\_wgs84albers
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_cc\_20pc\_wgs84albers
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_cc\_40pc\_wgs84albers
    - Also project reclassified canopy cover rasters to WGS84, with same cellsize and alignment as reclassified Landscan nighttime pop exclusions rasters
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_cc\_20pc\_wgs84
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_cc\_40pc\_wgs84
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_cc\_20pc\_wgs84
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_cc\_40pc\_wgs84
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_cc\_20pc\_wgs84
      * F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_cc\_40pc\_wgs84
    - Create two versions of combined rasters:
      * 1) In WGS 84 at nominal 90 m resolution (consistent with landscan raster)
      * 2) in WGS 84 Albers at 200 m resolution (consistent with aws gcf 80 rasters)
    - Using the projected reclassified canopy cover rasters and (projected and unprojected) landscan exclusions, use Raster calculator to set the final exclusion layers:
      * For version 1:
        + Con(("us\_maxheightm" < 50) & ("us\_cc\_20pc\_wgs84" == 0),0,"us\_maxheightm")
        + 🡪 F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_20pc
      * For version 2:
        + Con(("usmaxhtm\_200m" < 50) & ("us\_cc\_20pc\_wgs84albers" == 0),0,"usmaxhtm\_200m")
        + 🡪F:\data\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_20pc\_200m
  + Results are saved as:
    - Version 1:
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc\_20pc
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc40pc
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_maxheight\_cc\_20pc
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi \_maxheight\_cc40pc
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_20pc
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us \_maxheight\_cc40pc
    - Version 2:
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_20pc\_200m
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc\_20pc\_200m
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_maxheight\_cc\_20pc\_200m
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\us\_maxheight\_cc\_40pc\_200m
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\hi\_maxheight\_cc\_40pc\_200m
      * S:\mgleason\DG\_Wind\Data\Analysis\canopy\_cover\canopy\_cover.gdb\ak\_maxheight\_cc\_40pc\_200m