# Designing Sustainable Landscapes:
# HUC6 Watersheds

## *A project of the University of Massachusetts Landscape Ecology Lab*

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- US Fish and Wildlife Service, North Atlantic-Appalachian Region
- Northeast Climate Adaptation Science Center (USGS)
- University of Massachusetts, Amherst

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*Reference*:

McGarigal K, Plunkett EB, Compton BW, DeLuca WV, and Grand J. 2020. Designing sustainable landscapes: HUC6 Watersheds. Report to the North Atlantic Conservation Cooperative, US Fish and Wildlife Service, Northeast Region.

# Changes in 2020 version

The extent of DSLland was modified slightly to better conform to the hydrological features that define some of the boundaries. The raster version of the HUC6s were expanded or clipped to match the changes in DSLland, and the polygon shape file was recreated from the raster.

# General description

This layer defines the subregions used for building cores in DSL landscape design (see technical document on landscape design, McGarigal et al 2020). It is based on the USGS Hydrologic Unit Codes (HUC) as extended in the USDA Watershed Boundary Dataset at the 6th level of the hierarchy (thus HUC6). In their original form these represent watersheds, sections of watersheds, and, especially in coastal areas, collections of watersheds of approximately equal size. They were chosen as the basic unit of our analysis because they were the size that stakeholders desired for subregions; are defined largely by natural boundaries, and are reasonably compact. We clipped the HUC6 boundaries to the Northeast Region and then manually edited the boundaries to make the HUCs and HUC fragments that remained within the Northeast Region more uniform in size and eliminate most disjunct HUC6s.

# Use and interpretation of this layer

This layer represents the subregions used for building DSL cores, thus the core-building algorithms all worked at the subregion level to allocate a fixed proportion of the subregion to cores. We are distributing the HUC6s to aid in the interpretation and analysis of the cores. The boundaries between the subregions can constrain the growth of individual cores, and the polygons represent the level at which cores are evenly distributed; within an equal percentage of the area within each modified huc6 polygons is allocated to cores.

# Derivation of this layer

## *Data source*

The USDA Watershed Boundary Dataset:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/dataset/
contains polygons at a finer level (HUC8) with attribution that allows aggregation to coarser levels including the HUC6 level.

## *Modification*

We dissolved HUC8 polygons on the HUC6 attributes to generate HUC6 polygons. We clipped the polygons to the Northeast Region and then did extensive manual editing of the polygons to eliminate slivers; merge small polygons (often at edges of the region); split large polygons; extend the polygons into ocean (at least 1.5 km; see below); and eliminate most disjunct polygons (some disjunct coastal areas were in the same polygon despite being separated by a polygon centered on a large river).

Then we converted our raster landcover to a binary grid indicating all upland, freshwater, and subtidal cells in the region, converted those cells to polygons, and buffered them by 1.5 km to produce polygons containing everything within the northeast region that was within 1.5 km of the coast. We chose the 1.5 km buffer as it captured almost all of the LC for all of the species we have modeled. We used this buffer to clip the HUC6 polygons. This left us with all the near-shore ocean assigned to a HUC6 and none of the ocean beyond 1.5 km within the HUC6 polygons.

Next, we dropped all of the original attribution as it was no longer accurate for most of the HUCs and added an LCCID field in which each HUC was assigned a numerical ID from 1 to 40 proceeding from North to South.

Finally, we converted the polygons to a raster and overwrote any cell that was nodata in either DSLland or our mask grid with nodata. This last step created a raster version that was consistent with our landcover suitable for use with our core building algorithms.

## GIS metadata

This data product is distributed as a geoTIFF raster (30 m cells) with integer cell values ranging from 1 to 40 representing the LCCID assigned to each of the HUC6 based subregions and as a shapefile with a single attribute "LCCID" which contains the same IDs. These data products can be obtained from McGarigal et al. (2020).

## Literature Cited

McGarigal K, Compton BW, Plunkett EB, DeLuca WV, and Grand J. 2020. Designing sustainable landscapes products, including technical documentation and data products. http://umassdsl.org/.