

Figure 3. Distribution of jabs per site across the four major habitat types. A total of 10 jabs were taken per site. For more information on the habitat types, see Appendix C.

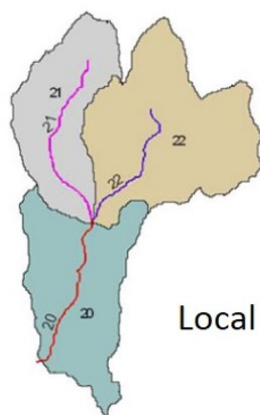
2.3 Landscape-scale Information (GIS-based)

Landscape-scale metrics were obtained for site disturbance characterization (Section 3) and classification (Section 4). A primary data source was the USEPA Stream-Catchment (StreamCat) Dataset (Hill et al. 2016), which covers the contiguous US. StreamCat is an extensive database of natural and anthropogenic landscape metrics that are associated with the National Hydrography Dataset (NHD) Plus Version 2 (NHDPlusV2) stream segments (McKay et al. 2012). StreamCat data are available at two spatial scales: local catchment and full upstream watershed (Figure 4). Some variables address site disturbance characterization (e.g., overall watershed condition (ICI and IWI), percent agricultural cover, percent urban cover, road density, and specific discharges or activities (National Pollutant Discharge Elimination System discharges, Confined Animal Feeding Operations, mining activity, etc.). Natural (classification) variables include geologic types, elevation, stream slope, catchment size, ecoregion, mean annual temperature, and precipitation, among others. In addition, NHDPlusV2 attribute data for flowline type (stream/river, canals/ditches, coastline, and artificial pathway) and slope were associated with biological sampling sites, as were EPA level III and IV ecoregions.

To associate the biological sampling sites with the StreamCat dataset, an intersect procedure was performed with Geographic Information System software (ArcGIS 10.7.1), which created an attribute table with a list of the biological sampling stations and unique identifiers for the NHDPlusV2 catchments (COMID/FEATUREID). The COMID was then used to link the biological sampling sites

with the StreamCat data tables, which were downloaded from the StreamCat website². The data were uploaded to MS Access and queries were created to generate tables with the desired StreamCat metrics.

The StreamCat data are not based on exact watershed delineations, except in instances where the site happens to be located at the downstream end of the NHDPlusV2 local catchment. To obtain more accurate, site-specific data, we used USGS StreamStats³ to delineate exact watersheds for each site, and then used the Regional Monitoring Network (RMN) GIS ArcMap tools (Gibbs and Bierwagen 2017) to generate land cover statistics, drainage area, sinuosity, flowline slope, watershed slope, and baseflow. The land cover statistics were based on the 2016 National Land Cover Database (NLCD). We used land cover data from two spatial scales (1-km upstream and total watershed) in our site disturbance analyses. For sinuosity and flowline slope, we traced flowlines and used the RMN GIS tools to calculate values for 500 and 1000-meter stream lengths. In addition, we screened for dams, mines, National Pollutant Discharge Elimination System (NPDES) major discharge permits, and Superfund National Priority List (NPL) sites within the 1-km upstream watershed.



A. Local Catchments for Reaches 20, 21, and 22

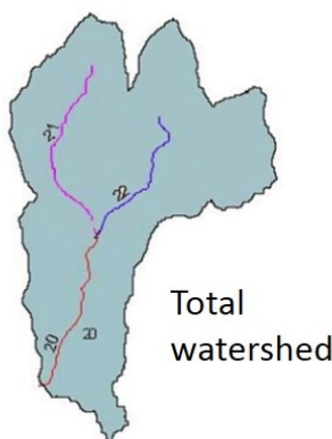
Local catchment

Definition: the landscape area draining to a single stream segment, excluding upstream contributions.

In this example, there are three local catchments (associated with unique flowline segments) –

- # 20 (green)
- # 21 (gray)
- # 22 (brown)

Each local catchment has a unique identifier (COMID or FEATUREID).



B. Total Upstream Watershed for Reach 20

Watershed-level

Definition: the local catchment plus the accumulated area of all upstream catchments

In this example there is one total watershed, comprised of the three local catchments (#20 + #21 + #22).

Figure 4. USEPA's StreamCat metrics (Hill et al. 2016) cover two spatial scales: local catchment and total watershed.

² <https://www.epa.gov/national-aquatic-resource-surveys/streamcat-dataset-0>

³ <https://streamstats.usgs.gov/ss/>