Reservoirs

Data Sources and Management. Dams are not the only features that artificially impound water on the landscape. Reservoirs not associated with dams (i.e., farm ponds, industrial reservoirs) also impound water and alter natural hydrology by preventing it from flowing toward the natural discharge point of a watershed. To describe the amount of water impounded in non-dam reservoirs in Louisiana, we first had to discriminate between dam-associated and non-dam associated reservoirs. To do this we used the feature-types attribute field in the NHD waterbody dataset (U.S. Geological Survey et al. n.d.). This polygon layer dataset classifies waterbodies into feature types (i.e., Lake/Pond, Reservoir, Swamp/Marsh) for further analysis. We overlaid this waterbody layer with a dam layer to partition waterbodies associated with dams versus waterbodies not associated with dams. While we were primarily interested in the reservoir type, when doing the overlay, we observed that most of the waterbodies associated with dams in Louisiana are not called reservoirs but rather were classified as Lake/Pond. Therefore we expanded our criteria to include Lake/Pond feature types, and any other waterbody, regardless of feature type designation and used aerial imagery to ensure that we had correctly accounted for all artificially-impounded waterbodies in the study area.

Because dams often form the boundary of a waterbody, dam points are often not located within waterbody polygons. Therefore, we performed a distance analysis to identify the dam-associated reservoirs. To do this, we first calculated the distance from each dam to the nearest waterbody feature. Waterbodies associated with dams ranged from 0 – 3,442 m (mean 111 m median 27 m). This dispersion resulted in 197 dams (21% of total dams) with a distance value of 0 m and the resulting distribution showed a heavy positive skew with large values tailing off to the right side (Fig. 2). Quartile analysis showed the lower quartile at 3.5 m and the upper quartile at 83.6 m, with an interquartile range of 80.1 m. We considered any distance values more than 1.5 times greater than the upper quartile (203.8 m) as statistical outliers and used this value as the threshold distance to classify a waterbody as being associated with a neighboring dam. A search query using this distance threshold (203.8 m) associated 86.1% of the dams with a nearby waterbody and identified 1,202 waterbodies as being associated with dams. Of those waterbodies, only 84 (Fig. 1) were classified as reservoirs in the waterbody layer. These 1,202 waterbody features were then removed from further analysis of non-dam reservoirs, and the remaining reservoir features were used to create a reservoir index.

Data Analysis. We calculated a reservoir index to determine the amount of impounded water within each watershed. To do this, we used the selected non-dam reservoirs from the NHD waterbody dataset (U.S. Geological Survey et al. n.d. *b.*), which inventories a range of waterbodies (i.e., lake/pond, swamp/marsh), including reservoirs. The reservoir index was calculated as,

$$\sum \text{reservoir area}_{(\text{acres})} / \text{watershed area}_{(\text{acres})}.$$

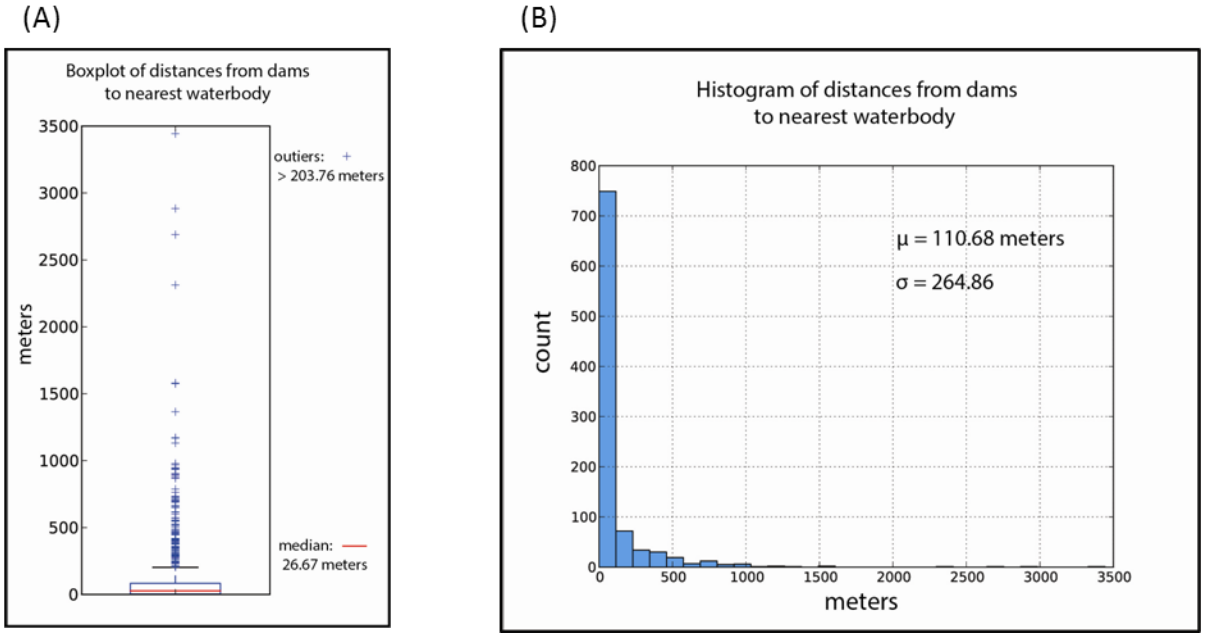

Fig. 1. Results of the distance analysis for reservoirs showing the spatial distance (A) and the count (B) of dams to the nearest waterbody. Results of this distance analysis resulted in the reclassification of waterbodies in the NHD waterbody layers as either dam- or non-dam reservoirs.

References

U.S. Geological Survey, U.S. Environmental Protection Agency, USDA Forest Service, and other Federal, State and local partners n.d., NHDWaterbody, U.S. Geological Survey, Reston Virginia <ftp://nhdftp.usgs.gov/DataSets/Staged/States/FileGDB/HighResolution/>.