

Appendix 7. Description of Spatial Datasets Used to Calculate Basin-Scale Annual Groundwater Discharge Estimates by Evapotranspiration

The U.S. Geological Survey (USGS) Water Resources Mission Area maintains a clearinghouse for publicly available geographic information system (GIS) data on the USGS Water Resources National Spatial Data Infrastructure (NSDI) node. The NSDI is a physical, organizational, and virtual network designed to enable the development and sharing of digital geographic information resources (Federal Geographic Data Committee, 2007). GIS datasets created to help calculate basin-scale groundwater discharge estimates by evapotranspiration for Dixie Valley have been placed on the Water Resources NSDI node for public access. Brief descriptions and access information are included in this appendix. Complete dataset descriptions, including source documentation and processing steps, can be accessed in the metadata documents accompanying the datasets on the Water Resources NSDI node. The datasets are in GIS format and require specialized software to view.

Groundwater Discharge Area for Dixie Valley, Churchill County, Nevada

The groundwater discharge area (GDA) represents the area where discharge from evaporation by open water or bare soil and transpiration from phreatophytes (plants that rely on groundwater to fulfill a part of their water needs) exceeds the volume of water contributed by precipitation. The GDA was mapped using a combination of field reconnaissance, National Agriculture Imagery Program imagery from 2006, Landsat imagery, and other available GIS data including a 10-meter digital elevation model and water-level data. The boundary is mapped at about 1:24,000-scale. The GDA in digital GIS format is available from the Water Resources NSDI node at http://water.usgs.gov/lookup/getspatial?pp1805_GDA.

Temperature-Normalized Enhanced Vegetation Index for Dixie Valley, Churchill County, Nevada

Vegetation indexes such as the Enhanced Vegetation Index (EVI) use the contrast between measured absorption of light by plants in the red wavelengths and reflectance in the

near-infrared wavelengths to help identify vegetated areas and to characterize the health and spatial extent of vegetation communities. EVI was calculated for 10 Landsat 5 Thematic Mapper scenes and combined with brightness temperature (T_B) from for the same 10 scenes. The resulting modified EVI was multiplied by 1 million and then used to scale actual and potential groundwater discharge by evapotranspiration (ET_g) to the basin level. Brightness temperature was used to modify the EVI in an effort to reduce abnormally high vegetation index values in the GDA resulting from forbs, annual grasses, and biological soil crusts. Dividing EVI by T_B was intended to lower EVI values in areas containing annual plants and grasses with relatively high temperatures while leaving areas containing relatively cooler phreatophytes less altered. The multi-summer mean (2009–11) image of temperature-normalized EVI is available from the Water Resources NSDI node, at http://water.usgs.gov/lookup/getspatial?pp1805_VI.

Evapotranspiration Units for Dixie Valley, Churchill County, Nevada

Evapotranspiration (ET) units are spatially constrained by the GDA and delineated based on information from the temperature-normalized EVI described in the section, “Temperature-Normalized Enhanced Vegetation Index for Dixie Valley, Churchill County, Nevada.” Each ET unit represents a generalized grouping of vegetation and soil conditions that were used as the basis for estimating total ETg. ET units were partitioned as follows: playa lake, playa, sparse shrubland, moderate-to-dense shrubland, and grassland. ET units in digital GIS format is available from the Water Resources NSDI node, at http://water.usgs.gov/lookup/getspatial?pp1805_ETunits.

Reference Cited

Federal Geographic Data Committee, 2007, Federal Geographic Data Committee Web site, accessed May 15, 2013, at <http://www.fgdc.gov/>.