Cut-off lows (COLs) can impact southwestern North America with heavy rainfall that leads to flooding. Despite the societal challenges presented by this weather phenomenon, there has been no recent study of COLs focused on this region. This information need, in combination with the current availability of large, multivariate atmospheric datasets, offers a clear data mining and applied research opportunity. Here, we describe our method to produce an objective, physically based algorithm that identifies COLs in reanalysis data, and apply this method to a known COL event. Results suggest that the initial algorithm is too selective for adequately identifying COLs, and needs additional adjustments in order to resolve the different spatial scales of COLs and reanalysis data. We further discuss the attributes of information extracted through this data mining approach that will be used to populate an event database for COL climatology over southwestern North America, as well as the verification of individual COL events. A Southwest COL database like the one described here has great potential to support development of an analog system that improves confidence in forecasted conditions and impacts of this important weather phenomenon.