Probable Playas Version 5

Release Notes
Last updated: June 10, 2019

Purpose

The dataset was developed to build an account of playas in the Playa Lakes Joint Venture Region for landscape planning purposes. Playa datasets like this one are put to use by the Playa Lakes Joint Venture, our partners, and other conservation organizations for habitat assessment and targeting conservation projects.

Playas are one of the most numerous wetland types in the Playa Lakes Joint Venture region. Playas are shallow, depressional wetlands that are generally round and small in size. They have clay-lined basins and naturally fill with water periodically from rainfall and its associated runoff. Precipitation is inconsistent in the PLJV region and drought is a common occurrence. The resulting wet-dry cycle of playas produces a highly diverse plant community. When wet, playas provide much needed seeds and invertebrates so migrating birds reach their breeding grounds in better condition. Likewise, birds that overwinter in the region have a better chance of success when playas are allowed to function naturally. Playa lakes may be the most important wetland habitat type for birds in this region. Playas are also a primary source of aquifer recharge. For more information visit www.pljv.org.

Abstract

This data layer depicts playas as identified through a compilation of six data sources: SSURGO soils data, National Wetlands Inventory (NWI) data, National Hydrography Dataset (NHD), analysis of Landsat TM imagery, analysis of National Agricultural Imagery Program (NAIP) imagery, and hand-delineation on aerial maps of select lands managed by The Nature Conservancy.

Data source varies across the layer's extent so please refer to the *author*, *source*, and *authorsid* fields in the attribute table to identify the source of any individual playa or refer to the State Summaries section below. The following data characteristics vary by source: data quality, attribute information, dates of acquisition and publication, and minimum mapping units (MMU). Please read the Data Sources section below for details. **IMPORTANT NOTES: The number of features in this dataset (n=71,852) is does NOT represent the number of playas, rather the number of polygons representing playas, whole or partial. This occurs because NWI coverage often maps a single playa as multiple adjacent polygons (for example, a single playa bisected completely by a road). Each distinct polygon has its own playa ID, therefore a whole playa may exist as multiple polygons with different IDs.

Constraints

These data should be used with caution, keeping in mind that they do not necessarily depict all playa areas. This dataset retains the spatial limitations of its sources. Map units included here may not all be playas, and it is possible that only a portion of some map units is actually playa.

Playa Data Sources and Assembly

Data Sources

SSURGO Soils. SSURGO soils data, produced by the Natural Resources Conservation Service (NRCS), are available for the entire Playa Lakes Joint Venture (PLJV) region and provide representation of playas, though many small features are missed. Spatial SSURGO data for the PLJV are based on soils data generally collected in the 1960's and 1970's and mapped at a 1:12,000 to 1:24,000 scale, with a minimum map size delineation of 1 - 10 acres. Please see metadata specific to individual counties for more details (https://websoilsurvey.sc.egov.usda.gov/).

Landsat. In 2003, Ducks Unlimited analyzed LANDSAT TM imagery to identify playas in Colorado, New Mexico, Kansas, Oklahoma, and Texas. For each scene, the "wettest" image from 1986 to 2000 was analyzed to extract water features using a thresholding technique which separates water from non-water using a "wetness" index that differences an infrared band from a visible green band. The outputs of this process were then mosaiced together and smoothed using a 3x3 focal majority window. All features under 1 acre in size were removed and the remaining features were converted to vector. Playa lakes were distinguished from other features by using a functional definition of surficially isolated wetlands. The vectorized surface water features were intersected with the route.drain file from the National Hydrography Dataset (NHD).

National Wetlands Inventory. The NWI program, administered by the US Fish and Wildlife Service, maps all wetland types including playas; however, NWI coverage is incomplete for the PLJV region. The only available state-wide coverage is for Nebraska. NWI data for Nebraska is based on 1:24,000 scale photointerpretation of National Aerial Photography Program (NHAP) or National High Altitude Photography (NAPP) images collected in the 1980's, with a target mapping unit of ¼ acre in the playa lakes region of the state. NWI coverage is also available for portions of Texas, New Mexico, and Oklahoma, produced through recent (2007) mapping efforts by the US Fish and Wildlife Service in conjunction with Texas Tech University. This effort used 1:12,000 scale interpretation of NAIP imagery collected in 2003 - 2005 (Texas - 2004, New Mexico - 2005, and Oklahoma - 2003), cross-referenced with SSURGO soils data. Wetland polygons as small as 0.01 acres are mapped in both of these NWI datasets. For more information see http://www.fws.gov/wetlands/Data/Products.html.

National Agricultural Imagery Program. NAIP data are 1-meter digital ortho photos based on aerial images collected during agricultural growing seasons across the US. Collection dates vary by state -- please see the SOURCE field to identify the year. Spectral resolution varies by state and year, either natural color (RGB) or RGB and Near Infrared. NAIP data were used to delineate playas in Colorado, Kansas, and for the NWI data for Texas, Oklahoma, and New Mexico. The NAIP is administered by the US Department of Agriculture Farm Services Agency. For more information see http://www.fsa.usda.gov/Internet/FSA_File/naip_2009_info_final.pdf.

National Hydrography Dataset. The NHD, managed by the US Geological Survey, maps surface water across the US based on 1:24,000 scale topographic mapping. The NHD often misses playa wetlands, especially small playas less than 2 acres. NHD is only used in Colorado as a playa data source; however, it is also used to eliminate potentially misclassified non-playa features by removing wetland polygons near linear water features such as rivers, streams, and canals. For more information see http://www.rsgis.msu.edu/resources/metadata/documents/Ex1_NHD-High-resolution.htm.

The Nature Conservancy. In Colorado, TNC hand-digitized 216 field-documented playas that occurred on the Smith Ranch in Lincoln County.

Compilation Process

There are six datasets that potentially represent playas in the PLJV region (listed above), each with varying levels of scale and accuracy. We considered NWI coverage and NAIP coverage in Kansas as complete datasets. Therefore, Nebraska and counties in Texas, New Mexico, and Oklahoma that have NWI coverage (see State Summaries below) only have one playa data source - NWI. NWI coverage is county-based except in Beaver County, OK where only the western half is covered, thus, we consolidated other data sources for the eastern half of Beaver County, OK as described below. Kansas also has only one data source for playas, NAIP cross-referenced with SSURGO and Digital Raster Graphics. In all other areas, we considered playa datasets (SSURGO, NHD, LANDSAT, TNC, and NAIP) to be incomplete because they often missed playas, particularly small playas (less than 2 acres).

To maximize the number of probable playas mapped in these areas, we consolidated all playa layers into one. We addressed cases of polygon duplication (i.e., the same polygon occurring in more than one dataset; intersecting or within 30m of each other), by retaining only one duplicated polygon. The retained polygon was selected based on the relative data quality among available layers, selecting the highest quality dataset available. We ranked dataset quality in descending order as follows: 1) TNC, 2) NAIP, 3) SSURGO, 4) NHD, and 5) LANDSAT. For example, if there existed two overlapping playa polygons in NAIP and NHD, the NAIP polygon would be used as the playa polygon - eliminating the NHD polygon.

State Summaries

Colorado. In Colorado, playas were identified through a compilation of five data sources (SSURGO, LANDSAT, NAIP, NHD, and digitization conducted by The Nature Conservancy on Smith Ranch, Lincoln County). Most of the playas come from LANDSAT and SSURGO datasets that were cross-referenced with each other as well as the other data sources, thus, the SOURCE field in the attribute table may list several sources for one playa if it was found in more than one dataset. The last data source listed represents the source of the geometry (polygon).

Kansas. In Kansas, all playas were derived from NAIP imagery (2003, 2004, 2005, and 2006) by the University of Kansas (published in 2009 and update in 2010). Hand digitized playas were cross referenced with Digital Raster Graphics (DRGs) and SSURGO soils data to improve the data set. These data are available at the Kansas Geospatial Community Commons website (http://www.kansasgis.org).

Nebraska. In Nebraska, all playas were derived from NWI coverage. Playas are not explicitly distinguished from other surface water or wetland features in the NWI data so features were classified as playas based on NWI wetland classes and modifiers. Identification of playas was further refined by applying boundaries within which playas could occur. The Nebraska Game and Parks Commission defined the Southwest Playas, Central Table Playas, and Todd valley Playas regions. Within these regions, NWI features described as Palustrine Emergent Marsh (PEM) with a water regime of Seasonally Flooded (C), Temporarily Flooded (A), or Intermittently Flooded (J), were classified as playas. Palustrine Farmed (Pf) areas were also included because they are defined as playa types. Excluded were PEM types that occurred within 30 meters of a river, stream, or other linear water feature as identified in the NHD.

New Mexico. In New Mexico, playas were identified through a combination of NWI, SSURGO, and LANDSAT data. NWI coverage was exclusively used in the three counties for which it was available (Quay, Curry, and Roosevelt counties). Unlike the NWI dataset for Nebraska, the NWI coverage for New Mexico distinguished playas from other wetlands so there was no need to interpret NWI classes and modifiers. In all other counties in the PLJV region of New Mexico, SSURGO or LANDSAT data were used to identify playas. However, only three counties mapped soil features that could be interpreted as possible playas (Roosevelt, Harding, and San Miguel), so only Harding and San Miguel have playas originating from SSURGO (Roosevelt has NWI coverage). All other counties rely exclusively on LANDSAT data.

Oklahoma. In Oklahoma, playas were mapped through NWI, SSURGO, and LANDSAT. NWI coverage was used for most of the Oklahoma panhandle where playas primarily occur, including Cimarron, Texas, and the western half of Beaver counties. Older NWI coverage was available for small scattered areas of Oklahoma and was used in place of SSURGO data. These areas include small parts of Alfalfa, Custer, Comanche, Cleveland, Canadian, and Oklahoma counties and also along the Red River in Jefferson, Cotton, and Tillman counties. In all other counties in the PLJV region of New Mexico, SSURGO or LANDSAT data were used to identify playas, with SSURGO polygons trumping LANDSAT polygons in cases of playa duplication. The soils data did not explicitly distinguish playas so interpretation of the MUSYM was required.

Texas. In Texas, playas were identified through a combination of NWI, SSURGO, and LANDSAT. NWI coverage was exclusively used for 27 counties in the Texas panhandle (Armstrong, Bailey, Briscoe, Carson, Castro, Crosby, Dallam, Deaf Smith, Floyd, Garza, Gray, Hale, Hansford, Hartley, Hockley, Hutchinson, Lamb, Lubbock, Lynn, Moore, Ochiltree, Oldham, Parmer, Potter, Randall, Sherman, and Swisher). Unlike the NWI dataset for Nebraska, the NWI coverage for Texas distinguished playas from other wetlands so there was no need to interpret NWI classes and modifiers. In all other counties in the PLJV region, playas were identified through SSURGO or LANDSAT, with SSURGO polygons trumping LANDSAT polygons in cases of playa duplication.

Attribute Dictionary

Attribute	Description
playaid	Unique code assigned to each playa polygon. Note that number of playa polygons is not precisely equal to number of playas, because some playas are split--for example, a playa bisected by a road will be rendered as two separate polygons, with two ID numbers.
acres	Size of playa in acres
state	U.S. state name
bcr	U.S. Bird Conservation Region (18 = shortgrass prairie, 19 = mixed grass prairie)
statebcr	Concatenation of state and BCR
countyname	County name
countyfips	County FIPS numeric code

hydromod	0 = unmodified, 1 = modified. Modifications include pits, ditches, or other structural changes to the playa that induce changes in the hydrologic function. Modifications were identified manually by classifying NAIP imagery or Digital Globe imagery. Ongoing Identification of new pits will be done with NAIP imagery each year, if a pit has been restored through a program, then the data will be updated accordingly.
hydrotxt	Same as 'hydromod' but with text values (1 = yes, 0 = no)
farmed	0 = unfarmed, 1 = farmed. The playa is designated as farmed if any of the playa basin was covered by crops, as determined by the USDA NASS Crop Data Layer, NAIP aerial imagery, or Conservation Reserve Program data.
farmedtxt	Same as 'farmed' but with text values (1 = yes, 0 = no)
healthy	0 = not healthy, 1 = healthy. A healthy playa is one that is not farmed, has no hydrological modifications, is not within a wind farm, and is not sedimented.
healthytxt	Same as 'healthy' but with text values (1 = yes, 0 = no)
cluster	0 = not in a cluster, 1 = in a cluster. A playa cluster is defined as an area of high playa density. Calculations of “high density” available here: https://github.com/PLJV/Cluster
meanwetfrq	Mean wetness frequency for a given playa as a proportion (for example, 0.1 = wet 10% of the time). Calculated pixel by pixel using LANDSAT 5 imagery over the 27 year period, 1985-2012.
meanwettxt	Same as 'meanwetfrq' but with text values (decimal value * 100) + %
sthick2013	Estimated saturated thickness of the Ogallala aquifer in 2013. Saturated thickness calculated based on 2009 spatial data and a subsequent 2013 technical update, both by USGS. Spatial data available at https://water.usgs.gov/GIS/metadata/usgswrd/XML/sir12-5177_hp_satthk09.xml and 2013 report at https://pubs.usgs.gov/sir/2014/5218/pdf/sir2014_5218.pdf
winddevyr	If a date is present, this is the date the playa was intersected by wind development.
winddevtxt	Yes/no field based on 'winddevyr'. If winddevyr = 9999, this field = 'no'. Else, 'yes'.
author	The organization that provided the data or did the analysis to digitize this particular playa as a playa.
source	The data source used by the author to determine that an area was a playa.
authorsid	The ID given to the playa in the corresponding author’s dataset.
fttoroad	Distance in feet to the nearest road.

Playa Clusters

Playa clusters represent groups of playas that likely provide increased benefits to wildlife when compared to playas that are more sparsely distributed. Research shows that clusters of playas are more frequently used by migrating waterfowl and shorebirds than sparsely distributed playas (Farmer and Parent 1997, Brennan 2006, Cariveau and Pavlacky 2008, Webb et al. 2010). Playa clusters are produced by spatial analysis of the probable playas layer, by identifying areas with either high playa density or high playa surface area, according to duck abundance data collected on playas. While multiple studies have demonstrated positive relationships between playa density and the total surface area of playas and duck abundance (Brennan 2006, Cariveau and Pavlacky 2008, Web et al. 2010); only one study provided

quantitative thresholds for playa density and surface area at which duck abundance sharply increased; thus, we used those thresholds to delineate playa clusters (Cariveau and Pavlacky 2008). The study, conducted in eastern Colorado, found that duck abundance increased when playa density in the surrounding 2km area reached 0.55 playas/km^2 or when playa surface area in the surrounding 2km area reached 0.55%/km^2. The density analyses were based on a 2-km radius because it is the estimated minimal dispersal distance of Northern Pintails as observed in south-central Nebraska. Because the Colorado study is the only one which provides the data necessary to map the relationship between duck use of playas and their density in the landscape, we applied these thresholds to the entire playa region to map playa clusters; however, we recognize that this relationship likely varies across the geographic region as playa distribution, size, and many landscape features vary. As additional data on waterfowl response to wetland density become available for other regions/states, they will be incorporated. Therefore, playa clusters may change with later versions of this product. See our Github repository for the source code defining how clusters are delineated: https://github.com/PLJV/Cluster

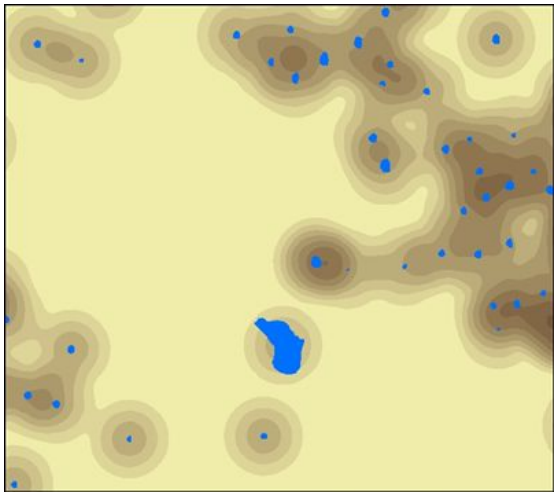

Figure 1. High Kernel point density

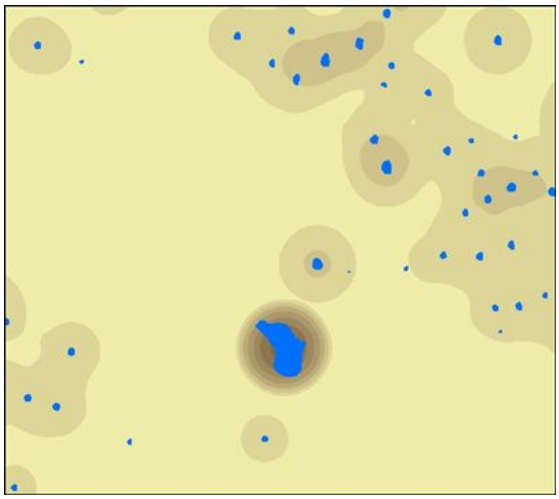

Figure 2. High Kernel surface area density

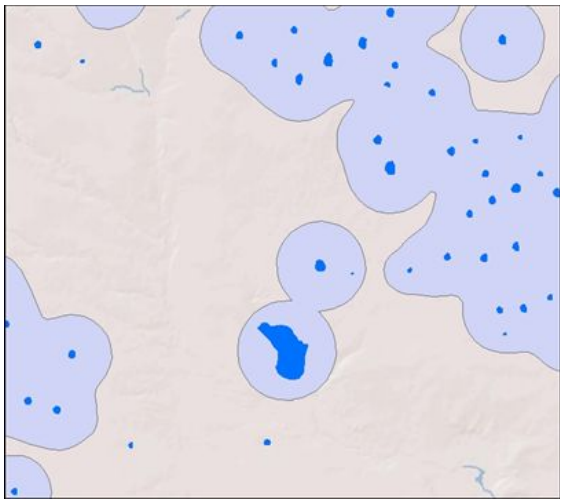

Figure 3. Resulting clusters

Contact

For information regarding this data set or the county-based playa maps, contact:

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References

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