



Oxbow System Assessment and Protocol Development – Phase 1

FINAL REPORT

FY-08 104(b)(3)

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ABSTRACT

Oxbow systems are unique natural systems that have attributes of lakes and wetlands. Little data exists about these systems in Oklahoma. The Beneficial Uses Monitoring Program (BUMP) conducted by the Oklahoma Water Resources Board currently monitors over 130 reservoirs in the state. This monitoring program is based on Use Support Assessment Protocols (USAP), found in Oklahoma Administrative Code (OAC) 745:46, that are designed to determine attainment of beneficial uses such as fish and wildlife propagation, agriculture, industrial and municipal process and cooling water, primary body contact recreation, secondary body contact recreation, and aesthetics. Separate protocols exist in Oklahoma to assess attainment of assigned beneficial uses based on the type of waterbody. There is one set for streams, another for lakes, and at this time none for wetlands. As oxbow systems are a meld of streams, lakes, and wetlands, the application of current USAP would likely not be appropriate for wetlands since they were developed for flowing waters and deep water habitats. Therefore, a comparison of USAP to assessment methods commonly used for wetlands (e.g., indices of biotic integrity [IBI] and hydrogeomorphic [HGM] classification and functional assessment) is needed to evaluate the appropriate means for assessing conditions in oxbow systems.

Prior to assessing conditions of oxbow wetlands, an inventory of oxbow systems that occur in Oklahoma is required. We examined aerial photographs of all 77 counties in Oklahoma to initially identify possible oxbows in the state. We relied on the physical characteristics of oxbows (e.g., characteristic shape, proximity to a river) for the initial identification. We field-verified 44 potential oxbow sites to assess our accuracy of initial oxbow identification. Thirty-six percent of the oxbows that were initially identified as oxbows were verified as oxbows. Based on this error rate, we determined that 940 oxbow systems are present in Oklahoma.

A Level 1 assessment, also known as landscape assessment, was also conducted by GIS. In this analysis, land cover data were used to qualitatively predict the condition of each oxbow. Further, we used probabilistic landscape assessment to assess 100 randomly selected oxbows. From these analyses, we estimate that 7% of the oxbows were in excellent condition, 48% in good condition, 42% in fair condition, and 3% in poor condition.

A Level 3 assessment scheme was also devised as part of this project. This plan will be used in an EPA-funded Phase II project to compare USAP to traditional wetland assessment methods such as HGM and IBI.

BACKGROUND

In Oklahoma, development and implementation of a comprehensive wetland monitoring program is a high priority. Wetland-focused projects recently conducted in the state include development of a probabilistic monitoring design, creation of an interactive wetland mapping system, development of procedures to evaluate use attainability in wetlands, and development of indices of biotic integrity using different biotic assemblages. The majority of this work has focused on closed depressional wetlands, although Oklahoma's wetland resources include a number of other important wetland types.

Oxbow systems are unique natural lakes/wetlands that have not been assessed in Oklahoma. These systems are unique in that they have attributes of both lakes and wetlands. Oxbow systems provide several key ecosystem services such as floodwater retention, nutrient and sediment retention, nursery grounds for fish, and habitat for local and migratory waterbirds, amphibians and macroinvertebrates. Although oxbow systems are highly variable in their physical and chemical characteristics, many of these systems are considered wetlands because they have relatively shallow depths, large amounts of sediments and nutrients, characteristic riparian and emergent plant assemblages, and seasonal hydroperiods.

These systems form when a U-shaped meander is cut off from the main portion of river by process of erosion and deposition. Erosion occurs as sediment is scoured from the outer bank of the meander. As erosion is occurring sediment is deposited on the inner bank of these bends. The area of deposition is called a "point bar." **Figure 1** shows this process occurring in two areas – bend A and bend B. This process continues, causing bend A and bend B to move closer to one another. Eventually the two bends meet forming a bypass of the meander. In time, deposition of sediments will cause the meander to be essentially cut off from the rest of the river. This new cut-off portion forms a lake that often exhibits a distinctive "bow" shape. Sometimes a small connection is kept between the oxbow and the river called a "tie-channel." This allows for an exchange of water and sediments. These tie channels can remain active for hundreds to thousands of years (Rowland and Dietrich, 2005). However, not all oxbows exhibit tie channels. Often oxbows only receive water from its parent river by seepage, rainfall, runoff, and during times of high flow.

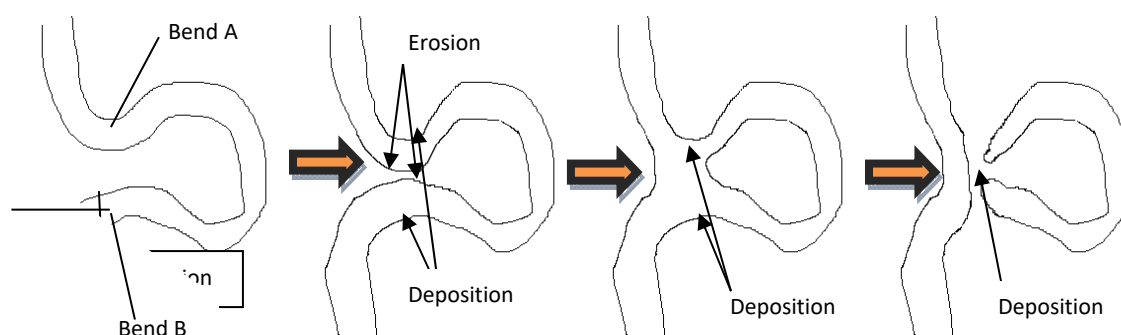


Figure 1: Oxbow formation showing erosional and depositional processes in a meander over time.

The amount of time this process occurs can vary depending on various factors such as sediment type and flow. The following aerial photographs (**Figure**) show the formation of an oxbow in Oklahoma.

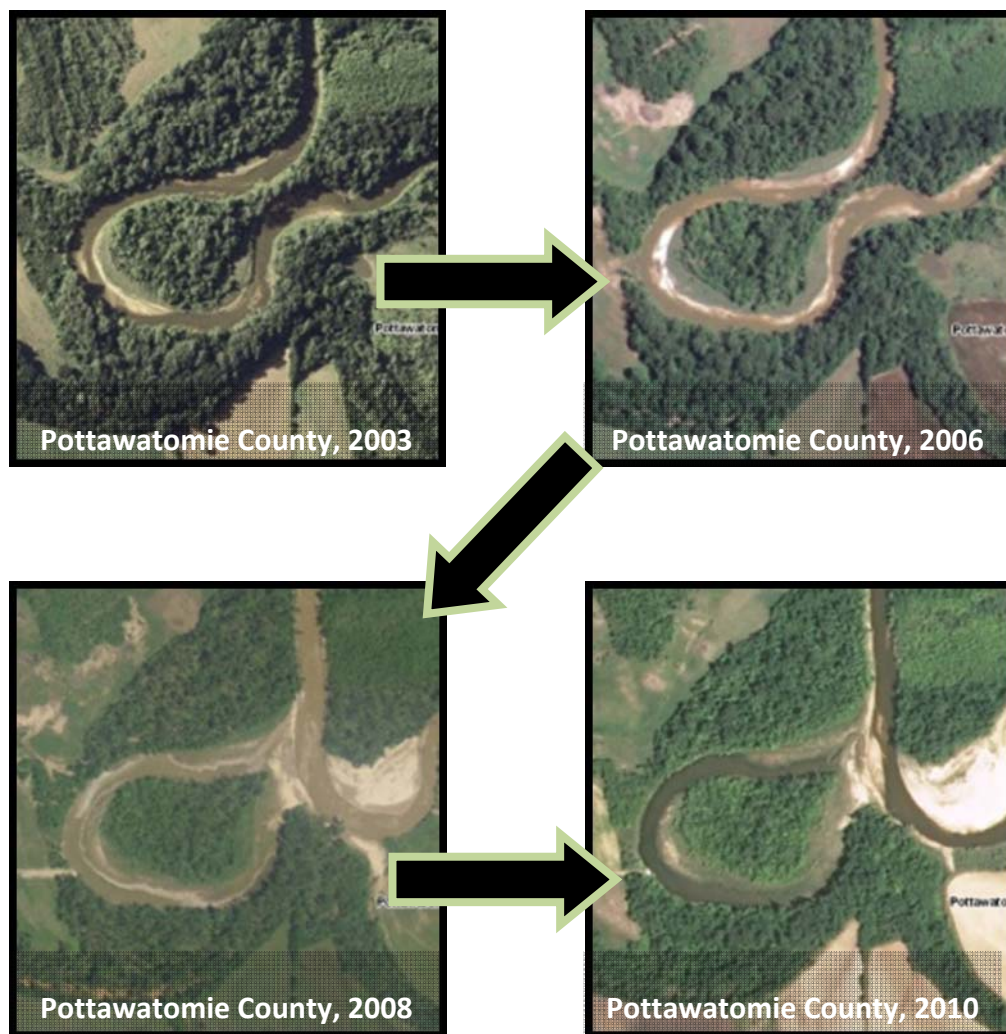


Figure 2: Oxbow formation in Pottawatomie County from 2003 to 2010.

The development of assessment/monitoring schemes to evaluate habitat quality is an important part of managing Oklahoma's surface water resources. The Beneficial Uses Monitoring Program (BUMP) conducted by the Oklahoma Water Resources Board currently monitors over 130 reservoirs in the state. This monitoring program is based on Use Support Assessment Protocols (USAP) that are designed to determine attainment of beneficial uses such as fish and wildlife propagation, agriculture, industrial and municipal process and cooling water, primary body contact recreation, secondary body contact recreation, and aesthetics. According to OAC 745:45, separate protocols exist in Oklahoma to assess attainment of assigned beneficial uses based on the type of water body. There is one set for streams,

another for lakes, and at this time none for wetlands. As oxbow systems are a meld of streams, lakes and wetlands, the application of current USAP would likely not be appropriate for wetlands since the protocols were developed for flowing waters and deep water habitats. Moreover, since oxbows have characteristics that are also consistent with wetland habitats, the application of USAP decision criteria relevant for lakes may indicate poor habitat quality in oxbows when in fact the water quality characteristics of the system may actually represent a “normal” condition profile for the wetland oxbow. An additional issue that has been highlighted by the results of previous projects supported by Wetland Program Development Grants (e.g., CD-976016-01 and CD-976016-02) is the importance of classifying wetlands into appropriate classes and subclasses when applying assessment techniques. Grouping wetlands into appropriate classes and subclasses can help control spatial variability and allow an easier determination of whether measured abiotic and biotic parameters in a wetland are indicative of human-induced habitat degradation or are considered the normal condition for the wetland. “Oxbow lakes” may therefore include several types of wetland habitats (e.g. systems within a 5-year flood plain vs. those in a 1-year flood plain) that must be identified and appropriately grouped before data are collected

The Oklahoma Water Resource Board (OWRB), Oklahoma Conservation Commission (OCC), and Oklahoma State University (OSU) are collaborating to assess oxbow lake systems through a three-phase project. Phase I will use a Level I assessment to identify the oxbow systems within the state, create a GIS map of oxbow wetland locations, identify key oxbow systems to be assessed, conduct an initial site visit to verify those sites, collaborate with Oklahoma’s Wetlands Technical Workgroup (OWTW), and deliver a categorized list and GIS-based map of oxbow systems in Oklahoma. Phase II will conduct Level III assessments of oxbow systems evaluating appropriateness of current USAP protocols, indices of biotic integrity (IBI’s), hydrogeomorphic (HGM) assessment for assessing condition of oxbow systems, and characterizing oxbow systems based on other abiotic and biotic parameters. Phase III will analyze the data and deliver recommendations for the appropriate protocols to assess oxbow systems, develop strategies for other wetland types, address oxbow system standards, assess presence of invasive species in oxbow systems, evaluate applicability of landscape assessment results, and provide an overall evaluation of the condition of oxbow systems in Oklahoma.

These three phases of the project address the need to conduct an inventory of oxbow systems in Oklahoma and evaluate the appropriate protocols necessary for assessing the ecological health of oxbow wetlands in Oklahoma. In the process of addressing this need, additional questions will be addressed such as:

- What type of classification scheme may be necessary to group oxbow wetlands for appropriate monitoring?
- What are the key functions of oxbow systems and what is their relationship to designated beneficial uses under the USAP approach?
- What constitutes a reference condition (pristine/nearly pristine) for oxbow systems?
- Are sampling protocols and metrics unique to oxbow systems or can lake and stream water chemistry protocols adequately assess system health?

This three-phase collaborative effort of OWRB, OCC, and OSU will further our understanding of these unique systems as well as strengthen measures for their protection.

PHASE I OVERVIEW

The objectives of Phase I are to identify and categorize oxbow systems, create GIS-based maps that accurately depict oxbow systems within Oklahoma, and create a collaborative process to assess all wetland types through work groups and other technical expertise. This project is comprised of the following tasks:

- **Planning and Implementation** – This task consisted of creating and the Oklahoma Wetland Technical Workgroup (OWTW), collaborating among OWRB, OCC, OSU, and OWTW to identify methodologies for assessments, identifying and locating oxbow systems, and field verification of oxbow systems.
- **Technical Collaboration** – Under this task, the involved agencies (OWRB, OCC, and OSU) along with the OWTW collaborated to design a sampling scheme that would be used in Phase II. Partnered agencies also developed a tool for conducting Level I landscape assessments of oxbows.
- **Phase I Completion** – This task consisted of GIS data, a categorized list of oxbows according to desktop analysis, and a Level III assessment plan.

PLANNING AND IMPLEMENTATION

The planning and implementation portion of this project consisted of identifying and locating oxbow systems, field verifying a portion of the identified oxbow systems, and the formation of OWTW.

IDENTIFYING OXBOW SYSTEMS

The identification of oxbow systems began in the spring of 2009. Color digital orthophoto quarter quads (DOQQ) from 2006 and 2008 were used to identify oxbows within ArcGIS. The *Streams_Level1* GIS layer used as the base layer for determining oxbow locations was derived from the USGS High Resolution National Hydrography Dataset (HRNHD) flowline data layer. The streams in each 8-Digit Hydrologic Unit (HUC) were selected from the original HRNHD layer and saved as a new shapefile. These streams were buffered at 1,500km. The process by which oxbows were located was primarily a visual inspection of DOQQs at 1:24,000 scale. A GIS analyst followed the rivers located in each county upstream, looking for “oxbows” within this buffered area, and creating points in GIS layer where oxbows were possible based on physical attributes. The created GIS layer was entitled *Oxbow_Points*. National Wetland Inventory (NWI) maps were also consulted to further facilitate identification of oxbows. The GIS analyst created points for areas near (approx. 1,500 km) rivers and streams that **a)** possessed the characteristic “bow” or “bean” shape or **b)** may have had that shape in the past but currently are considered depressional or riverine wetlands. Points were created for any area that met these criteria whether or not they appeared to have water in them at the time the aerial photographs were taken. Tributaries were also followed during the identification process. This process was done on a county by county basis.

As stated earlier, some features were given points even though they did not possess the characteristic oxbow shape. This was done to account for any temporal gradient. As oxbows age, they slowly transition from wetland to meadow to forest. In the early stages of this successional process, sedimentation occurs and the “bow” shape is lost.

Initially, 2,610 areas were identified as potential oxbow systems in the state. Field verification visits allowed project team members to develop a better understanding of what constituted an oxbow system. Therefore, a review of the initial oxbow list was conducted to more accurately identify oxbows. During this second iteration, we determined that > 1,400 classified oxbows were actually not oxbows. We then created a revised list of oxbows that is included in this report. This second iteration constitutes our finalized list of oxbows and encompasses 1,168 oxbows (**Figure**) and is found in **Appendix A**.

Oxbows were identified in all Oklahoma counties except for Cherokee, Craig, Delaware, Haskell, Mayes, Payne and Pittsburgh counties. Additionally, oxbows were identified in all Level III ecoregions except for the Boston Mountains, the East Central Texas Plains, and the Flint Hills.

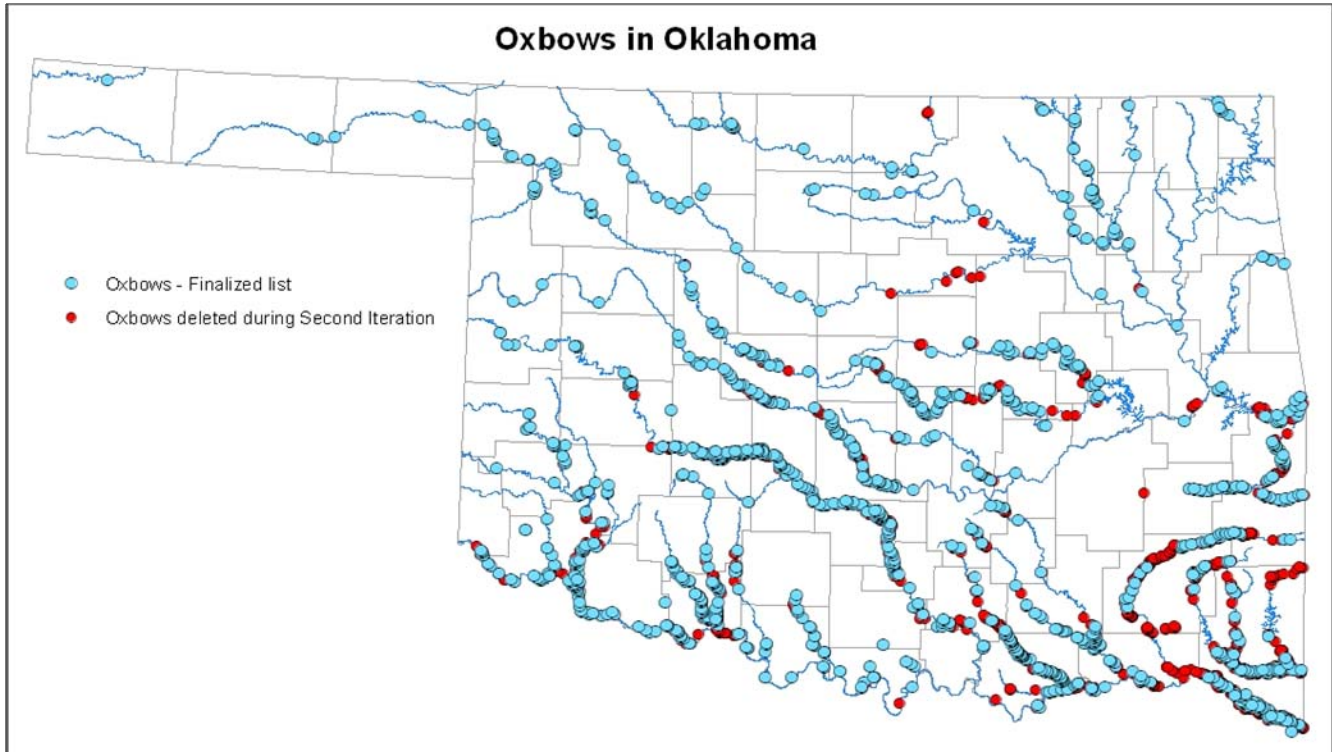


Figure 3: Map showing finalized list of oxbow locations.

FIELD VERIFICATION

One part of the project was to verify that areas that were identified as oxbows were actually oxbows. This was to be accomplished by visiting a random selection of sites to field verify whether the area was truly an oxbow. By using a probabilistic design we would be able to calculate an error rate for our field verification sites and apply that rate to calculating an overall error rate for a general population of oxbows.

We used General Random Tessellation Stratified (GRTS) methodology to select our pool of field verification sites from our initial population of 2,610 oxbows. GRTS is a method of obtaining a probabilistic sample draw while maintaining a spatial-balanced design. Our goal was to visit 45 sites for our verification process. We focused our verification on 15 areas with an 8-digit hydrologic unit code (HUC) that were selected by GRTS. From each of the 15 HUCs, we selected 3 sites that were field verified. In the end, 44 oxbows were field verified. Only two oxbows were able to be verified in one HUC because of lack of landowner permission.

Of the 44 sites that were field verified, 28 were determined not to be oxbows (**Figure**). This is equal to an error rate of approximately 64%. Therefore according to our error rate, of the 2,610 points initially identified as oxbows in the first iteration of the process, only 940 are actually oxbows.

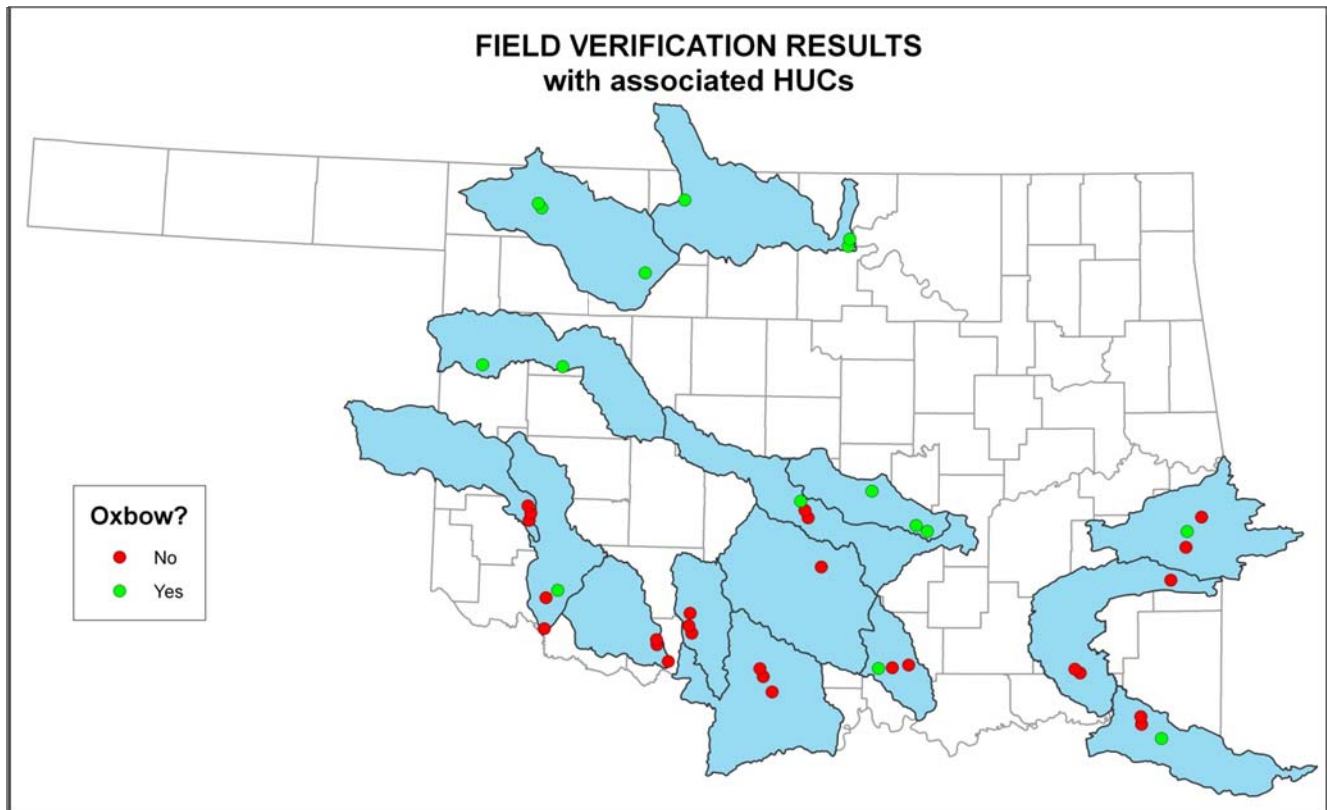


Figure 4: Field verification sites and results.

It should be pointed out that the error rate was applied to the initial number of 2,610 instead of the revised 1,168 because the field verification oxbows were drawn from the initial pool of 2,610. Of the 44 sites that were field verified, 20 points were deleted during the second iteration leaving 24 field verified sites on the finalized list of oxbows. Of these 24 sites, 8 were not oxbows. This gives an error rate of 33%. If this number is applied to the second iteration list of 1,168 “oxbows”, there are 782 oxbows in the state of Oklahoma. Twenty sites, however, is not statically robust enough to apply probabilistic methods to, and therefore, the previous number of 940 oxbows in the state is used.

TECHNICAL COLLABORATION

Another goal of this project was to promote collaboration between people and agencies with technical wetland expertise. This was achieved in several ways.

OKLAHOMA'S WETLANDS TECHNICAL WORKGROUP

Oklahoma's Wetland Workgroup (OWW) was established as part of the 1990 Legislative directive to develop *Oklahoma's Comprehensive Wetlands Conservation Plan*. This interagency working group, comprised of tribal, state, local and federal entities, meets as necessary to coordinate efforts to conserve, enhance, and restore the quantity and biological diversity of Oklahoma's wetland resources by implementing the State's Wetland Plan.

Oklahoma's Wetland Technical Workgroup (OWTW) was formed as a new, technical subgroup of OWW. OWTW was formed to focus technical expertise on the development of the State's wetlands program. The goals for this core group of technical experts will be to help guide the process of developing wetlands classification, monitoring, and assessment for the State of Oklahoma. The members of OWTW represent the knowledge base for wetlands in Oklahoma. In order to advance the wetlands program in the state, it is critical that OWTW provides input and feedback to help guide the development of wetlands classification, monitoring and assessment methods.

Members of the OWTW included people from OCC, OSU, OWRB, Oklahoma Biological Survey, University of Oklahoma, Oklahoma Department of Wildlife Conservation, USDA Natural Resources Conservation Service, US Army Corps of Engineers, US Fish and Wildlife Service, and EPA Region 6.

One of the roles of the workgroup is to serve as a type of sounding board for wetlands-related projects in the state. The OWTW will serve as a consultation body for all phases of this project and hopefully for future wetland work in the state.

OWTW met initially in March 2009. At this meeting, the Oxbow System Assessment and Protocol Development – Phase 1 project was discussed. The OWTW was asked for reference sites that could be used during this project. Other wetland projects were also discussed.

TECHNICAL CONSULTANT

Initially, it was planned that OCC, OSU, OWRB and OWTW would meet with a wetlands consultant about Arkansas' program development and implementation to determine how Oklahoma's Wetland Program can incorporate those processes. When it was learned that the developers of the California Rapid Assessment Method (CRAM) would be providing training in Oklahoma, it was decided that the partners in this project would attend that training instead of bringing in a consultant. The training was provided by the U.S. Army Corps of Engineers - Tulsa District and The U.S. Environmental Protection Agency - Region 6.

CRAM is a Level 2 type of assessment that uses reasonably simple and rapid protocols. This training provided instruction on how to conduct a rapid assessment on riverine systems. This type of assessment could be very helpful in Oklahoma by allowing wetland specialists to rapidly assess the condition of a wetland with a relatively small amount of effort.

LEVEL 1 – LANDSCAPE ASSESSMENT

One product of the technical collaboration between the partnered agencies was a method of conducting Level 1 assessments on wetlands in the state. A Level 1, or landscape, assessment is a diagnostic tool which allows the overall condition of a wetland to be assessed by examining land uses surrounding the target wetland. This is a desktop type of analysis, so it is a relatively quick and inexpensive method of determining condition.

Initially, a method devised by Penn State University was considered as a template for our method of determining condition (Wardrop, et al., 2007). This method used one type of land cover (forested) as a reference condition. This was chosen because that was the dominant pre-colonial land cover type in Pennsylvania. The less forested land cover that a wetland had around it, the lower the score, and thus the more disturbed it was. While this method was sufficient for a state such as Pennsylvania, it was deemed too simplistic for assessing oxbows in nine different Level III ecoregions.

Consequently, we decided to follow the U.S Army Corps of Engineers *Level 1 Ecological Integrity Assessment* (USACE, 2008) for our landscape assessment. This particular method assigns values from 0.0 – 1.0 to each type of land cover class found in the state. A buffer is created around each wetland needing to be assessed. The percent area of each land cover type within that buffer is then calculated. This is multiplied by a coefficient assigned to each land class which provides a sub-land use score for each land cover type. The sub-land use score for each land class is summed for each oxbow resulting in a final score for each oxbow.

Initially, the goal was to perform landscape assessments on all the points that were selected during the aerial photo identification process. It was decided that having a polygon with an area associated for each oxbow was important when creating the buffer for each oxbow. Many of our oxbows did not appear on National Wetlands Inventory (NWI) maps, so there was no associated two-dimensional polygon. Because of this, the only oxbows that would be assessed by GIS would be those that also appeared on NWI maps. One hundred oxbows were randomly chosen by GRTS method.

For determining the size of the buffer radius, best professional judgment and existing literature was used (Wardrop, et al., 2007). We placed a 1 km buffer around the oxbow. The core of the landscape assessment is the idea that different land uses have varying degree of impact on wetlands. Native landcover, i.e. forests, grasslands, and shrublands, have the least impact on the oxbow system and represent natural, pristine conditions. Some land uses, such as hay production may replace native vegetation with nonnative species yet still provide some ecological benefit. Alternatively, more intensive land uses, such as mining operations, high intensity urban development, and commercial/industrial development may completely destroy vegetation and greatly impact ecological processes. Two documents were used to aid in the derivation of the land use coefficients and the

scoring metric: *Assessing the Condition of Lands Managed by the U.S. Army Corps of Engineers: Level 1 Ecological Integrity Assessment* (USACE, 2008) and *Development of a Nontidal Inventory and Monitoring Strategy for Virginia - Phase 1: Level I Statewide Inventory and Level II Coastal Plain Assessment* (VIMS, 2005). Ultimately, these coefficients were assigned according to the consensus of collaborators regarding the potential impact of each land use. **Table 1** shows the land use coefficients used.

Table 1: Land classes and associated land use coefficients developed for Oklahoma oxbow level I assessment.

NLCD Class #	2001 NLCD Class	Land Use Coefficient
11	Water	1.0
21	Developed, Open Space	0.6
22	Developed, Low Intensity	0.4
23	Developed, Medium Intensity	0.2
24	Developed, High Intensity	0.0
31	Bare Rock/Sand/Clay	0.4
41	Deciduous forest	1.0
42	Evergreen Forest	1.0
43	Mixed Forest	1.0
52	Scrub/Shrub	1.0
71	Grasslands	0.8
81	Pasture/Hay	0.5
82	Cultivated Crops	0.2
90	Woody Wetlands	1.0
95	Emergent Herbaceous Wetlands	1.0

A 1 km-buffer was created around each wetland being assessed in GIS. The 2001 National Land Cover Database was then clipped to these buffers. The Percent Cover (PC) of each land cover type was then calculated. This was multiplied by a Land Use Coefficient (LU) giving a sub-land use score for each land cover type. The sub-land use score for each land class was then summed for each oxbow. This gave the Total Land Use Score for each oxbow. The following is the equation that was used to calculate the Total Land Use Score.

$$\text{Total Land Use Score} = \sum LU \cdot \frac{PC}{100}$$

Where: LU = Land Use Coefficient for each land use type
PC= Percent Cover of land area in assessment zone of the land use type

Based on the Total Land Use Score, the condition of the oxbow was determined. Four qualitative terms were used to describe the oxbow's condition: excellent, good, fair and poor. **Table 2** shows the scores associated with each condition rating.

Table 2: Scoring metric for landscape assessment.

Scoring Metric			
Excellent	Good	Fair	Poor
Total Land Use Score = 1.0-0.95	Total Land Use Score = 0.94 - 0.75	Total Land Use Score = 0.74 - 0.4	Total Land Use Score = 0.4 - 0.0

One hundred oxbows were assessed by the above method. Over half (55%) of the oxbow systems assessed were determined to be in good or excellent condition. **Figure** shows the number of oxbows that fell into each category, and **Figure** shows the locations.

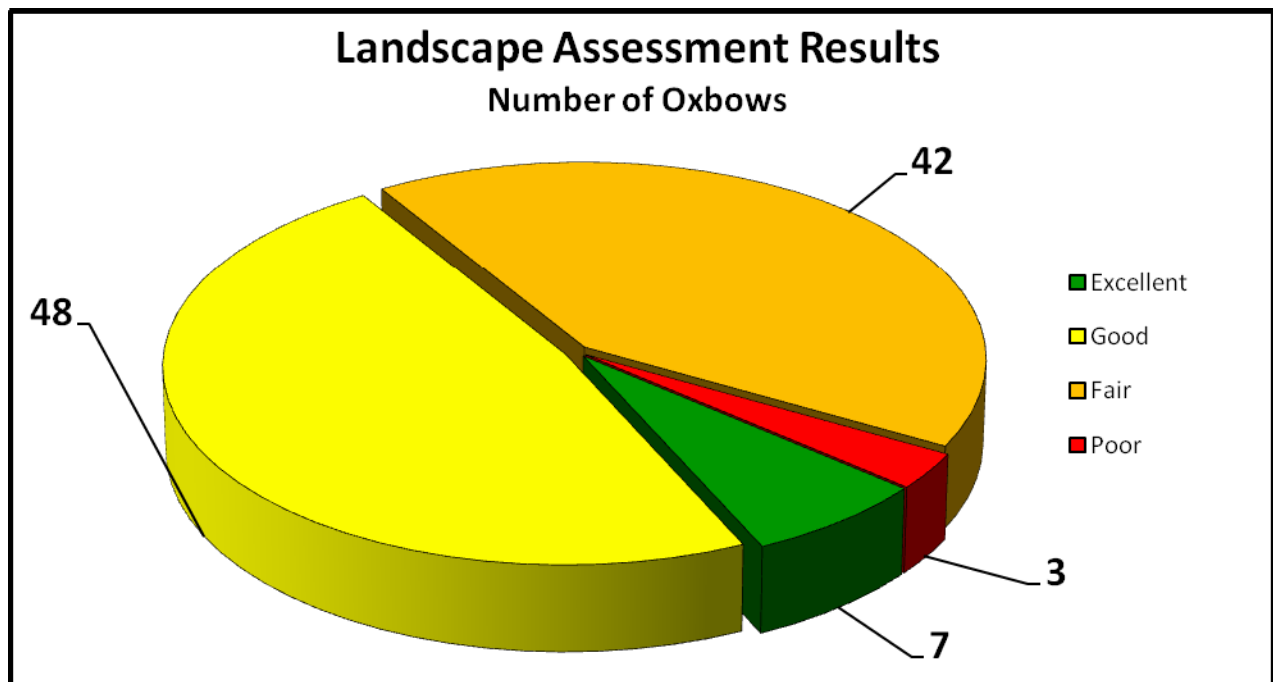


Figure 5: Results of landscape assessment.

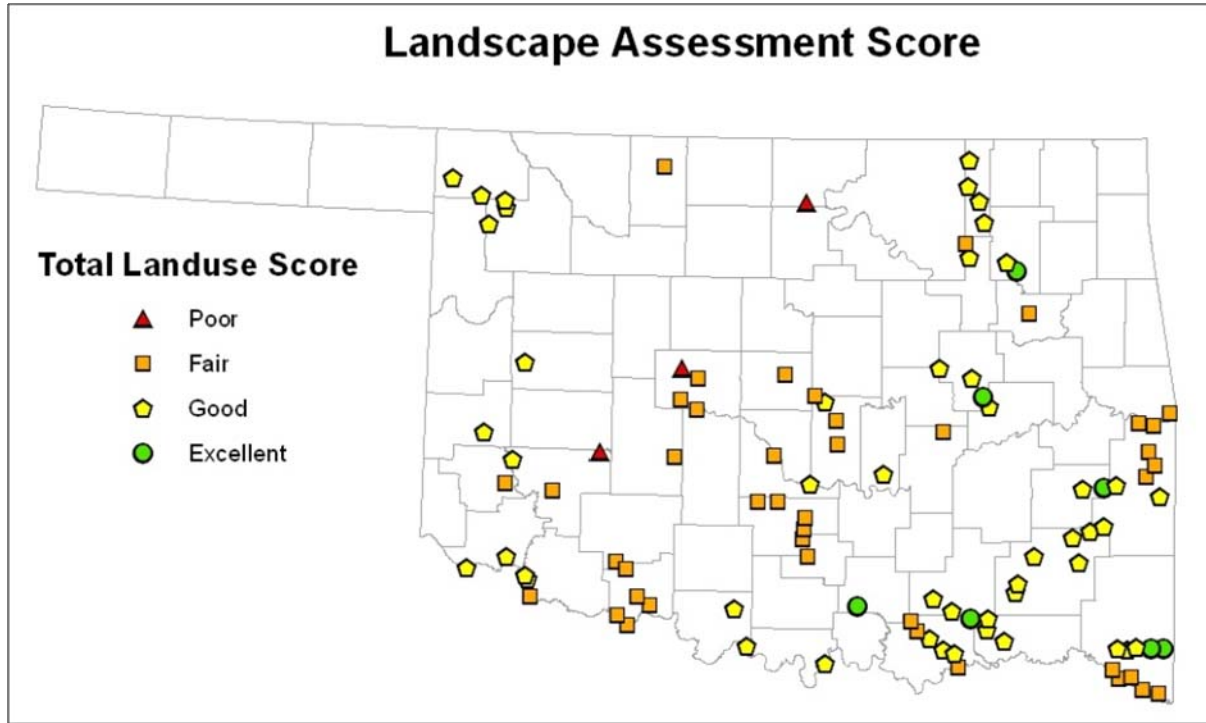


Figure 6: Location of oxbows assessed by landscape method and their associated qualitative score.

PHASE I COMPLETION

Phase I completion consisted of submitting a list of oxbows occurring in the state as well as a categorized list oxbows based on the results from the landscape assessment. These items are included in digital format. A plan for a Level III assessment was also to be devised. This Level III assessment will be used in the EPA funded Phase II project that will begin in Summer 2010.

LEVEL III ASSESSMENT PLAN

One goal of this project was to develop a Level III type of assessment plan that could be used in future projects. Currently, Phase II has been approved by EPA Region 6. The proposed assessment scheme will be used to assess the appropriateness of USAP by comparing it to traditional wetland assessment methods, such as HGM and IBIs.

Site Selection Using the oxbow wetland list generated by Phase I, GIS analysis, and ground-truthing, 12 oxbows will be selected for assessment by USAP, HGM functional models, IBI, USAP, and possibly California Rapid Assessment Method (CRAM). Half of the oxbows selected will be characterized by a temporary/semipermanent hydroperiod (i.e., wetland-like oxbows) and half of the oxbows will be characterized by a permanent hydroperiod (i.e., lake-like oxbows). Within each hydroperiod, we will select oxbows that encompass a range of conditions.

USAP Assessment For the USAP portion of the project, water quality data will be collected to assess whether the oxbow system supports the beneficial uses of agriculture, primary body contact, and fish and wildlife propagation. The analytes required will be:

- dissolved oxygen,
- pH,
- turbidity,
- *E. coli*,
- chlorides,
- sulfates, and
- TDS.

Additional parameters analyzed will include:

- Secchi depth,
- Nitrate-Nitrite,
- Orthophosphate,
- Total phosphorus,
- Total Kjeldahl nitrogen (TKN),
- Ammonia,
- TSS,

- Total hardness, and
- chlorophyll-*a*.

Within each oxbow, water quality sampling will be conducted at two sampling locations. Sampling will be conducted in different seasons in order to capture changes in water quality due to temporal gradients. Water quality sample collection will occur three times a year for two years with sampling events occurring at least 1 month apart until a total of 10-12 samples per oxbow are collected for each analyte. According to OAC 745:46-15-3-(d), USAP requires a total of 10 samples in order to determine the support status of beneficial uses.

Condition Assessment Data for assessment of oxbow wetland conditions using HGM functional models, IBI, and possibly CRAM protocols will also be collected. To assess conditions based on HGM functional models, pre-existing models developed for comparable systems (e.g., forested, low-gradient riverine wetlands [Ainslie et al. 1999]) will be relied upon. Macroinvertebrates and plants will be sampled from the wetlands to assess wetland condition based on macroinvertebrate and plant IBI's. Appropriate metrics for IBI's will be based on past IBI work (Bidwell et al. 2006, Hartzell et al. 2007) and guidelines provided in invertebrate and vegetation assessment modules on U.S. EPA's website (<http://www.epa.gov/waterscience/criteria/wetlands/>). Other biotic parameters that may also be collected for IBI's include bird and fish assemblages. A variety of water chemistry parameters (e.g., pH, dissolved oxygen, conductivity, temperature, total phosphorus and nitrogen, alkalinity, and hardness) and physical data (e.g., temporal and spatial patterns, water depth, and surrounding landscape metrics) will be recorded at each wetland.

CONCLUSION

The overall goal of this project was to gain critical knowledge regarding oxbow systems in the State of Oklahoma. This project has, for the first time ever, provided a comprehensive survey of oxbow locations, as well as the overall condition of the oxbow population in the state of Oklahoma. Of the over 900 oxbows in the state, more than half of those are in good to excellent condition based on the surrounding landuse. However, whereas a landscape assessment is a beneficial screening tool, we feel that the quality of these systems should be investigated further. This study will increase the knowledge base concerning oxbows and provide essential data in ongoing (Phase II) and future (Phase III) phases of this project. This project also highlighted some problems with using GIS to identify oxbows, as shown by our field verification results. This is due in part to the fact that oxbows can be very difficult to identify as they age. This is because they begin to lose their initial “bow” shape, and it then becomes difficult to differentiate these older oxbows from depressional wetlands.

BIBLIOGRAPHY

- Ainslie, W. B., R. D. Smith, B. A. Pruitt, T. H. Roberts, E. J. Sparks, L. West, G. L. Godshalk, and M. V. Miller. 1999. A Regional Guidebook for Assessing the Functions of Low Gradient, Riverine Wetlands in Western Kentucky. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS, Technical Report WRP-DE-17.
- Hartzell, D., J. R. Bidwell, and C. A. Davis. 2007. A comparison of natural and created depressional wetlands in central Oklahoma using metrics from indices of biological integrity. *Wetlands* 27:794-805.
- Mack, J. J. 2001. Ohio Rapid Assessment Method for Wetlands, Manual for Using Version 5.0. Ohio Environmental Protection Agency, Wetland Ecology Group, Division of Surface Water, Columbus, OH, USA, Ohio EPA Technical Bulletin Wetland/2001-1-1.
- Rowland, J.C. and W.E. Dietrich. 2005. The evolution of a tie channel. In G. Parker, and M.H. Garcia, *River, Coastal Estuarine Morphodynamic: Proceedings of the 4th IAHR Symposium on River, Coastal and Estuarine Morphodynamics*, pp.725-744.
- United States Army Corps of Engineers (USACE). 2008. Assessing the Condition of Lands Managed by the U.S. Army Corps of Engineers: Level 1 Ecological Integrity Assessment.
- Virginia Institute of Marine Science (VIMS). 2005. Development of a Nontidal Inventory and Monitoring Strategy for Virginia – Phase I: Level I Statewide Inventory and Level II Coastal Plain Assessment.
- Wardrop, DH, Kentula, ME, Stevens, DL, Jensen, SF, Brooks, RP. 2007 Assessment of Wetland Condition: An Example from the Upper Juniata Watershed in Pennsylvania, USA. *Wetlands* 27:416-431.

APPENDIX A

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
0	McCurtain	11140106	1114	33.64757030010	-94.53160786700
1	McCurtain	11140106	1114	33.64776865450	-94.52720527570
2	McCurtain	11140106	1114	33.65510203080	-94.50862125790
3	McCurtain	11140106	1114	33.65709581800	-94.53072242810
4	McCurtain	11140106	1114	33.65713555990	-94.51234070630
5	McCurtain	11140106	1114	33.66809888360	-94.56013666450
6	McCurtain	11140106	1114	33.67283290380	-94.56437189600
7	McCurtain	11140106	1114	33.68216616010	-94.56621342950
8	McCurtain	11140106	1114	33.68450493220	-94.59371918930
9	McCurtain	11140106	1114	33.68520699080	-94.62951365730
10	McCurtain	11140106	1114	33.68951884770	-94.62986491510
11	McCurtain	11140106	1114	33.69595029620	-94.62058602060
12	McCurtain	11140106	1114	33.69742793480	-94.68499215110
13	McCurtain	11140106	1114	33.69753446670	-94.68662627770
14	McCurtain	11140106	1114	33.69992138550	-94.70074087500
15	McCurtain	11140106	1114	33.70023283390	-94.62216434170
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19	McCurtain	11140106	1114	33.70358822310	-94.61789066540
20	McCurtain	11140106	1114	33.70396660910	-94.62564640230
21	McCurtain	11140106	1114	33.70469308780	-94.63191121190
22	McCurtain	11140106	1114	33.70931546430	-94.69706367430
23	McCurtain	11140106	1114	33.72439551760	-94.72318591170
24	McCurtain	11140106	1114	33.73360595670	-94.73004504570
25	McCurtain	11140106	1114	33.73851395970	-94.76183499250
26	McCurtain	11140106	1114	33.73861238380	-94.70543446180
27	McCurtain	11140106	1114	33.74439130570	-94.75795777090
28	McCurtain	11140106	1114	33.74583881540	-94.77193677910
29	McCurtain	11140106	1114	33.75230259770	-94.78033902540
30	McCurtain	11140106	1114	33.75324234910	-94.74081413330
31	McCurtain	11140106	1114	33.75569058210	-94.79202656640
32	McCurtain	11140106	1114	33.75999317610	-94.78190889160
33	McCurtain	11140106	1114	33.76216579220	-94.78644312340
34	McCurtain	11140106	1114	33.76295542240	-94.84371619840
35	McCurtain	11140106	1114	33.77121884390	-94.87127452890
36	McCurtain	11140106	1114	33.77088092560	-94.80467544220
37	McCurtain	11140106	1114	33.77245876260	-94.77266829610
38	McCurtain	11140106	1114	33.77602369280	-94.78752621550
39	McCurtain	11140106	1114	33.77808539890	-94.87596651750
40	McCurtain	11140106	1114	33.78606837180	-94.80988243500
41	McCurtain	11140106	1114	33.78753740370	-94.88722703580
42	McCurtain	11140106	1114	33.79809325380	-94.85579179530
43	McCurtain	11140106	1114	33.81182019920	-94.89655255320
44	McCurtain	11140106	1114	33.82016344820	-94.86686686110
45	McCurtain	11140106	1114	33.82663120980	-94.91762864760
46	McCurtain	11140106	1114	33.82676545790	-94.85116157330
47	McCurtain	11140106	1114	33.83321188070	-94.92387389640
48	McCurtain	11140106	1114	33.86527014900	-94.97163232590
49	McCurtain	11140106	1114	33.86635598370	-94.97513091200
50	McCurtain	11140106	1114	33.87919215580	-95.01159072200
51	McCurtain	11140106	1114	33.88823352920	-95.03707244310
52	McCurtain	11140107	1114	33.94019957340	-94.82310085560

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
53	McCurtain	11140107	1114	33.94213685590	-94.80545601710
54	McCurtain	11140107	1114	33.94143237900	-94.72846961270
55	McCurtain	11140107	1114	33.94260701100	-94.71903823310
56	McCurtain	11140107	1114	33.94378875250	-94.76591503600
57	McCurtain	11140107	1114	33.94428809460	-94.81306166850
58	McCurtain	11140107	1114	33.94241411840	-94.62744246430
59	McCurtain	11140107	1114	33.94456448880	-94.79194740360
60	McCurtain	11140106	1114	33.91633632720	-95.06289960020
61	McCurtain	11140106	1114	33.91807421540	-95.09820293890
62	McCurtain	11140107	1114	33.93282927430	-94.71618856930
63	McCurtain	11140107	1114	33.93707267650	-94.72476910350
64	McCurtain	11140107	1114	33.95669909590	-94.89380204420
65	McCurtain	11140107	1114	33.95668286920	-94.89210538930
66	McCurtain	11140109	1114	33.95317985760	-94.55454006130
67	McCurtain	11140107	1114	33.95700824210	-94.89446166220
68	McCurtain	11140107	1114	33.95804610050	-94.69957577040
69	McCurtain	11140107	1114	33.95867569360	-94.65390253380
70	McCurtain	11140107	1114	33.96194483310	-94.64591403060
71	McCurtain	11140107	1114	33.94595031980	-94.83453336030
72	McCurtain	11140107	1114	33.94777973380	-94.87958037400
73	McCurtain	11140107	1114	33.94666891560	-94.76144066400
74	McCurtain	11140107	1114	33.94822060890	-94.69755932850
75	McCurtain	11140109	1114	33.94623867980	-94.50522935230
76	McCurtain	11140107	1114	33.95043263940	-94.86448768470
77	McCurtain	11140107	1114	33.94928871450	-94.67525461470
78	McCurtain	11140107	1114	33.95013194890	-94.71348136020
79	McCurtain	11140109	1114	33.94851907720	-94.54903377950
80	McCurtain	11140107	1114	33.94992083540	-94.64985743220
81	McCurtain	11140107	1114	33.95289896240	-94.88282669620
82	McCurtain	11140107	1114	33.95070389160	-94.63235251100
83	McCurtain	11140109	1114	33.94915800990	-94.49153319610
84	McCurtain	11140107	1114	33.95122397620	-94.63629448450
85	McCurtain	11140107	1114	33.95492394730	-94.74634116090
86	McCurtain	11140108	1114	33.98197327150	-94.57765424130
87	McCurtain	11140107	1114	33.98790544970	-94.94185752520
88	McCurtain	11140107	1114	33.98984665590	-94.93618148780
89	McCurtain	11140108	1114	34.01625994880	-94.59191932830
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91	McCurtain	11140107	1114	34.02752149120	-94.97583408610
92	McCurtain	11140107	1114	34.02879759660	-95.00614976230
93	McCurtain	11140107	1114	34.03969238070	-94.92973192880
94	McCurtain	11140107	1114	34.04003526030	-94.93031343210
95	McCurtain	11140107	1114	34.04234830780	-95.01479022780
96	McCurtain	11140107	1114	34.04862753130	-95.03656172840
97	McCurtain	11140107	1114	34.10928664530	-94.89242767520
98	McCurtain	11140108	1114	34.13202446460	-94.70138201180
99	McCurtain	11140107	1114	34.14185971960	-94.91693977280
100	Pushmataha	11140107	1114	34.46477723380	-95.18485689600
101	Pushmataha	11140107	1114	34.46622412700	-95.16353195530
102	Pushmataha	11140107	1114	34.46656236850	-95.19022475240
103	Pushmataha	11140107	1114	34.46653589760	-95.16473724390
104	Pushmataha	11140105	1114	34.46904799070	-95.54061051630
105	Pushmataha	11140107	1114	34.46807063530	-95.16211738450
106	Pushmataha	11140107	1114	34.46998223930	-95.19469985590
107	Pushmataha	11140107	1114	34.49552446810	-95.13133677040
108	Pushmataha	11140105	1114	34.50610254070	-95.48884829110
109	Pushmataha	11140107	1114	34.50514007210	-95.10269490420
110	Pushmataha	11140107	1114	34.50656629530	-95.11330614600
111	Pushmataha	11140107	1114	34.50709635340	-95.11076520700
112	LeFlore	11110105	1111	35.11916531520	-94.61426864280
113	LeFlore	11110105	1111	35.12699067990	-94.63686253620

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
114	McCurtain	11140107	1114	34.23672574680	-94.91735760140
115	Pushmataha	11140105	1114	34.28997085330	-95.62283044630
116	Pushmataha	11140105	1114	34.29152291570	-95.62156873800
117	Pushmataha	11140105	1114	34.33574478660	-95.62911478920
118	Pushmataha	11140105	1114	34.33990564570	-95.63671757030
119	Pushmataha	11140105	1114	34.34138283480	-95.60661447390
120	McCurtain	11140107	1114	34.36583363420	-94.91578285290
121	Pushmataha	11140105	1114	34.38089072680	-95.58737831220
122	Pushmataha	11140107	1114	34.38354760160	-95.18304649140
123	McCurtain	11140107	1114	34.38989361740	-94.94057167590
124	Pushmataha	11140105	1114	34.41882997990	-95.57387872130
125	Pushmataha	11140107	1114	34.45699617850	-95.18312165480
126	Pushmataha	11140107	1114	34.46210740670	-95.19230354500
127	Pushmataha	11140107	1114	34.52899068450	-94.96282213800
128	Pushmataha	11140107	1114	34.53366405580	-94.94416314690
129	Pushmataha	11140105	1114	34.60616614100	-95.26245905320
130	Pushmataha	11140105	1114	34.60872085560	-95.25616180630
131	Pushmataha	11140105	1114	34.61495921050	-95.25453342990
132	Pushmataha	11140105	1114	34.61725276760	-95.24135275930
133	Pushmataha	11140105	1114	34.62102570310	-95.20080126980
134	Pushmataha	11140105	1114	34.62227348500	-95.19796640550
135	Pushmataha	11140105	1114	34.63376778630	-95.12335359370
136	Pushmataha	11140105	1114	34.63402214770	-95.10729302510
137	Pushmataha	11140105	1114	34.63752381360	-95.10635872570
138	Pushmataha	11140105	1114	34.63902880350	-95.08066580220
139	Pushmataha	11140105	1114	34.64395698160	-95.07949746700
140	LeFlore	11140105	1114	34.64233274220	-94.59383638570
141	Pushmataha	11140105	1114	34.65032321520	-95.07319445910
142	LeFlore	11140105	1114	34.64543894920	-94.54817536320
143	Pushmataha	11140105	1114	34.65764674930	-95.00927755740
144	LeFlore	11140105	1114	34.67068566620	-94.87230013430
145	Pushmataha	11140105	1114	34.67343055980	-95.01719741110
146	Pushmataha	11140105	1114	34.67337816600	-94.95653240310
147	Pushmataha	11140105	1114	34.67393213630	-95.01655610040
148	Pushmataha	11140105	1114	34.67421613310	-94.95035738730
149	Pushmataha	11140105	1114	34.67725966160	-95.00166467510
150	Pushmataha	11140105	1114	34.67812703850	-94.97898538900
151	Pushmataha	11140105	1114	34.67820366260	-94.96300253630
152	LeFlore	11140105	1114	34.67827826110	-94.91776085580
153	Pushmataha	11140105	1114	34.67931799220	-94.97990539600
154	Pushmataha	11140105	1114	34.67945995030	-94.96993699240
155	LeFlore	11140105	1114	34.68156551210	-94.94770761020
156	LeFlore	11140105	1114	34.68122003870	-94.87847815540
157	LeFlore	11140105	1114	34.68210876370	-94.91343419630
158	LeFlore	11140105	1114	34.68271910520	-94.92414344390
159	LeFlore	11110105	1111	34.84907426240	-94.58870088590
160	LeFlore	11110105	1111	34.85414113350	-94.62453767750
161	LeFlore	11110105	1111	34.85654063350	-94.55336063600
162	LeFlore	11110105	1111	34.86007490150	-94.58241042210
163	LeFlore	11110105	1111	34.86568032780	-94.67870823570
164	LeFlore	11110105	1111	34.86452853090	-94.52973909090
165	LeFlore	11110105	1111	34.87685177490	-94.71580789830
166	LeFlore	11110105	1111	34.87724533600	-94.49233729210
167	LeFlore	11110105	1111	34.87701601310	-94.47066960420
168	LeFlore	11110105	1111	34.88234123410	-94.72598152620
169	LeFlore	11110105	1111	34.88600147060	-94.73146160440
170	Latimer	11110105	1111	34.90438292380	-95.08636166770
171	Latimer	11110105	1111	34.90467873060	-95.07944826420
172	Latimer	11110105	1111	34.90554324000	-95.12168289570
173	Latimer	11110105	1111	34.90571207390	-95.13369486700
174	Latimer	11110105	1111	34.90557183030	-95.07774935230

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
175	Latimer	11110105	1111	34.90641305880	-95.12316490720
176	Latimer	11110105	1111	34.90623676300	-95.08753714300
177	Latimer	11110105	1111	34.90693545370	-95.08945269350
178	Latimer	11110105	1111	34.90928881400	-95.14217466290
179	Latimer	11110105	1111	34.91434497310	-95.05288865290
180	LeFlore	11110105	1111	34.91249186050	-94.84015535970
181	Latimer	11110105	1111	34.91590468730	-95.20783243200
182	LeFlore	11110105	1111	34.91463055150	-94.93531488690
183	Latimer	11110105	1111	34.91617723260	-95.03057402200
184	LeFlore	11110105	1111	34.91588731480	-94.96675733350
185	Latimer	11110105	1111	34.91798260970	-95.18158061030
186	Latimer	11110105	1111	34.91849561120	-95.02710786640
187	LeFlore	11110105	1111	34.91932682000	-94.91703151580
188	LeFlore	11110105	1111	34.92175080400	-94.93267184140
189	LeFlore	11110105	1111	34.92215004440	-94.94338738420
190	LeFlore	11110105	1111	34.92273599430	-94.85923820800
191	LeFlore	11110105	1111	34.92381192460	-94.91472913770
192	LeFlore	11110105	1111	34.92538767480	-94.88064214190
193	LeFlore	11110105	1111	34.92639298980	-94.96254811630
194	LeFlore	11110105	1111	34.92628204500	-94.88222382110
195	LeFlore	11110105	1111	34.92808753390	-94.90174143360
196	LeFlore	11110105	1111	34.92925248830	-94.98524520930
197	LeFlore	11110105	1111	34.92820187940	-94.86183769220
198	LeFlore	11110105	1111	34.93039604060	-94.98560567280
199	LeFlore	11110105	1111	34.93204319730	-94.98852576990
200	Pottawatomie	11090202	1109	34.93467830630	-97.14028553590
201	LeFlore	11110105	1111	34.95670729540	-94.69894393130
202	LeFlore	11110105	1111	34.96067091140	-94.69332937420
203	Seminole	11090203	1109	34.96783941510	-96.51982578260
204	LeFlore	11110105	1111	34.96514818790	-94.68182979830
205	LeFlore	11110105	1111	34.97484966210	-94.65824435140
206	LeFlore	11110105	1111	34.98032038610	-94.65962922280
207	Seminole	11090203	1109	34.99001827490	-96.58233397640
208	Seminole	11090203	1109	34.99400430950	-96.58544294300
209	Seminole	11090203	1109	34.99466434280	-96.58060049040
210	Seminole	11090203	1109	35.00045179960	-96.59960975290
211	Hughes	11090202	1109	35.00342437330	-96.35278631780
212	Seminole	11090203	1109	35.03809755320	-96.66541443880
213	LeFlore	11110105	1111	35.04127720880	-94.58062791410
214	LeFlore	11110105	1111	35.04266570040	-94.58224254480
215	LeFlore	11110105	1111	35.04568167490	-94.58578506500
216	LeFlore	11110105	1111	35.05550500250	-94.59513001050
217	LeFlore	11110105	1111	35.05817569910	-94.58595196540
218	LeFlore	11110105	1111	35.06438944560	-94.61015758370
219	LeFlore	11110105	1111	35.07483173280	-94.60327242280
220	LeFlore	11110105	1111	35.09399224180	-94.58854859660
221	Oklahoma	11100302	1110	35.57399343690	-97.28347867600
222	Okmulgee	11100303	1110	35.58420102520	-96.03015669820
223	Okmulgee	11100303	1110	35.58811786810	-95.99026536780
224	Oklahoma	11100302	1110	35.58390653340	-97.28822053730
225	Oklahoma	11100302	1110	35.58801636770	-97.34042501370
226	Okmulgee	11100303	1110	35.59851848900	-96.02182415350
227	Oklahoma	11100303	1110	35.59273609590	-97.41598393480
228	Okmulgee	11100303	1110	35.60450610640	-96.01878218280
229	Okmulgee	11100303	1110	35.63272011660	-96.00108334980
230	Okfuskee	11100303	1110	35.63220043620	-96.39177568030
231	Okmulgee	11100303	1110	35.63529317580	-96.18771485360
232	Okfuskee	11100303	1110	35.63522242990	-96.39921520970
233	Lincoln	11100303	1110	35.63976066180	-96.91538847050
234	Creek	11100303	1110	35.64477235670	-96.26138548660
235	Creek	11100303	1110	35.64516701550	-96.36958631300

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
236	Creek	11100303	1110	35.64953452310	-96.39918073850
237	Okmulgee	11100303	1110	35.65047812670	-96.02177645860
238	Creek	11100303	1110	35.65532304320	-96.47424717160
239	Okmulgee	11100303	1110	35.66379862440	-96.18174513810
240	Okmulgee	11100303	1110	35.66917103090	-96.09055758850
241	Creek	11100303	1110	35.67781173290	-96.40686425100
242	Creek	11100303	1110	35.67765516220	-96.45705502960
243	Okmulgee	11100303	1110	35.68037571480	-96.10036840630
244	Okmulgee	11100303	1110	35.69105730200	-96.10514104280
245	Lincoln	11100303	1110	35.69048128950	-96.66672547580
246	Lincoln	11100303	1110	35.69335204710	-96.65507724630
247	Latimer	11110102	1111	35.78740083820	-95.28087653260
248	Logan	11050002	1105	35.85037795760	-97.65766434490
249	Osage	11070106	1107	36.94068626080	-96.18669033430
250	Nowata	11070103	1107	36.94992494650	-95.59597064300
251	Ottawa	11070206	1107	36.96575633880	-94.99351222420
252	LeFlore	11110105	1111	35.13581703230	-94.63968053110
253	LeFlore	11110105	1111	35.13893731720	-94.64037540720
254	LeFlore	11110105	1111	35.14558470980	-94.65171847150
255	LeFlore	11110105	1111	35.14766264000	-94.65442435460
256	LeFlore	11110105	1111	35.16606020930	-94.66139916540
257	Pottawatomie	11090203	1109	35.17471881730	-96.94160877970
258	Pottawatomie	11090203	1109	35.17956663670	-97.08644579480
259	Pottawatomie	11090203	1109	35.19378505730	-96.91193735190
260	Pottawatomie	11090203	1109	35.19253321610	-97.12284543460
261	Pottawatomie	11090203	1109	35.19951556920	-96.88184314010
262	McIntosh	11100302	1110	35.25397422670	-96.17176592020
263	McIntosh	11100302	1110	35.25448490730	-96.15582871460
264	LeFlore	11110104	1111	35.26307451640	-94.60333958080
265	LeFlore	11110104	1111	35.26606320740	-94.62986453450
266	LeFlore	11110104	1111	35.26972623340	-94.61399361420
267	Muskogee	11090204	1109	35.27898142160	-95.23736102160
268	LeFlore	11110104	1111	35.27946298260	-94.59263772000
269	LeFlore	11110104	1111	35.29142463230	-94.69278665370
270	LeFlore	11110104	1111	35.29337971560	-94.49209644890
271	LeFlore	11110104	1111	35.30097958320	-94.70632638130
272	Sequoyah	11110104	1111	35.30258568790	-94.62754214470
273	Pottawatomie	11100302	1110	35.30949024040	-96.93935677600
274	Pottawatomie	11100302	1110	35.31009459610	-96.93149932060
275	Pottawatomie	11100302	1110	35.31429316470	-96.95300125710
276	Pottawatomie	11100302	1110	35.31660704900	-96.95593233170
277	Pottawatomie	11100302	1110	35.32065616720	-96.96624653360
278	Pottawatomie	11100302	1110	35.32438794500	-96.87892269320
279	LeFlore	11110104	1111	35.31926399620	-94.47952404010
280	Sequoyah	11110104	1111	35.32058413810	-94.54724005270
281	Okfuskee	11100302	1110	35.33219469440	-96.19377540980
282	Okfuskee	11100302	1110	35.33450953740	-96.24591933440
283	Okfuskee	11100302	1110	35.33629857310	-96.33115472240
284	Pottawatomie	11100302	1110	35.33441093600	-96.97033287880
285	Pottawatomie	11100302	1110	35.33829165360	-96.87247687590
286	Okfuskee	11100302	1110	35.34507544060	-96.27399193380
287	Pottawatomie	11100302	1110	35.34369068420	-96.97066094910
288	Okfuskee	11100302	1110	35.35057294320	-96.29170673890
289	Okfuskee	11100302	1110	35.35295431250	-96.23816070540
290	Sequoyah	11110104	1111	35.34458758210	-94.50346068860
291	LeFlore	11110104	1111	35.35480047210	-94.46952967080
292	Okfuskee	11100302	1110	35.36536358070	-96.35417632840
293	Pottawatomie	11100302	1110	35.37218187070	-96.85207004230
294	Okfuskee	11100302	1110	35.37935339010	-96.36384131370
295	Pottawatomie	11100302	1110	35.37606109930	-97.03244588770
296	Pottawatomie	11100302	1110	35.37790637370	-96.84270452860

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
297	Pottawatomie	11100302	1110	35.37798180340	-96.84636763260
298	Okfuskee	11100302	1110	35.38200468340	-96.37167484920
299	Sequoyah	11110104	1111	35.37696892170	-94.50765957150
300	Okfuskee	11100302	1110	35.38803688270	-96.40528529200
301	Pottawatomie	11100302	1110	35.38599921770	-97.02714913100
302	Okfuskee	11100302	1110	35.39856394780	-96.41246109230
303	McIntosh	11100302	1110	35.40161631750	-95.81618975190
304	Pottawatomie	11100302	1110	35.39892724330	-97.04020770110
305	Okfuskee	11100302	1110	35.40579144560	-96.40388032820
306	Pottawatomie	11100302	1110	35.40634706430	-96.78046253510
307	Sequoyah	11110104	1111	35.40157555750	-94.47409562980
308	Pottawatomie	11100302	1110	35.40801294570	-97.05090157840
309	Seminole	11100302	1110	35.41178574810	-96.73482902840
310	Pottawatomie	11100302	1110	35.41274523100	-96.71729409790
311	Seminole	11100302	1110	35.41372778660	-96.54433204210
312	McIntosh	11100302	1110	35.41632711680	-95.80730698170
313	Pottawatomie	11100302	1110	35.41598451680	-96.82316136330
314	Seminole	11100302	1110	35.42065472600	-96.54817502200
315	Pottawatomie	11100302	1110	35.42518322200	-97.03993323750
316	Pottawatomie	11100302	1110	35.42954473090	-96.85039281430
317	Pottawatomie	11100302	1110	35.43018115960	-96.83237089490
318	Sequoyah	11110104	1111	35.43634844760	-95.01038161010
319	Okfuskee	11100302	1110	35.43999611060	-96.51527647650
320	Okfuskee	11100302	1110	35.44288276250	-96.41157985890
321	Sequoyah	11110104	1111	35.44336853690	-95.01123648640
322	Seminole	11100302	1110	35.44756217200	-96.55428712060
323	Pottawatomie	11100302	1110	35.44450361650	-97.07831927310
324	Pottawatomie	11100302	1110	35.44503582170	-97.06445096690
325	Okfuskee	11100302	1110	35.45238560170	-96.53207696570
326	Sequoyah	11110104	1111	35.45531678650	-94.98777265260
327	Okmulgee	11100303	1110	35.46446269600	-95.85651946150
328	Lincoln	11100302	1110	35.46565831630	-97.09809904150
329	Lincoln	11100302	1110	35.46575282120	-97.10781181580
330	Okmulgee	11100303	1110	35.47185623280	-95.82362904800
331	Lincoln	11100302	1110	35.47508733960	-97.13528077070
332	McIntosh	11100303	1110	35.48844557790	-95.80718202720
333	Oklahoma	11100302	1110	35.50160960180	-97.22596168120
334	Oklahoma	11100302	1110	35.50424945190	-97.20322994410
335	Oklahoma	11100302	1110	35.51293837910	-97.21339173590
336	Okmulgee	11100303	1110	35.55458009810	-95.92626909320
337	Okmulgee	11100303	1110	35.55943567470	-95.93572341880
338	Okmulgee	11100303	1110	35.56548892330	-95.93400972530
339	Okmulgee	11100303	1110	35.56811077270	-95.96384634190
340	Okmulgee	11100303	1110	35.57020927710	-95.94188232490
341	Okmulgee	11100303	1110	35.57081666210	-95.95396787270
342	Okmulgee	11100303	1110	35.57235037440	-95.94271422750
343	Oklahoma	11100302	1110	35.57204352100	-97.28121637370
344	Kingfisher	11050002	1105	35.92446374470	-97.78920193060
345	LeFlore	11110101	1111	35.95052637000	-95.78643404500
346	Wagoner	11070105	1107	35.96231595670	-95.51530168170
347	Kingfisher	11050002	1105	35.96934869870	-97.92387557800
348	Kingfisher	11050002	1105	36.07200719700	-98.14468525460
349	Adair	11110103	1111	36.10447153210	-94.55950755280
350	Adair	11110103	1111	36.12600724190	-94.65167166410
351	Adair	11110103	1111	36.14261821840	-94.70640404740
352	Adair	11110103	1111	36.14449506100	-94.70515845900
353	Major	11050002	1105	36.17380718560	-98.22094298880
354	Rogers	11070105	1107	36.21198119580	-95.60998524170
355	Rogers	11070107	1107	36.21624779150	-95.77077386240
356	Rogers	11070105	1107	36.22100545560	-95.60354690170
357	Rogers	11070107	1107	36.22761263890	-95.78116888250

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
358	Tulsa	11070107	1107	36.24550343540	-95.87846921510
359	Rogers	11070105	1107	36.26718202520	-95.68044925550
360	Rogers	11070105	1107	36.27474417890	-95.69040662060
361	Rogers	11070105	1107	36.27630100350	-95.70311503380
362	Tulsa	11070107	1107	36.28767824350	-95.96901424080
363	Tulsa	11070107	1107	36.29565355540	-95.96055713010
364	Rogers	11070105	1107	36.30028020760	-95.69729403410
365	Tulsa	11070107	1107	36.37553706720	-95.99466222850
366	Pawnee	11060006	1106	36.39269143020	-96.63810192350
367	Major	11050001	1105	36.38208864230	-98.61306505710
368	Rogers	11070106	1107	36.43153078950	-95.80575778820
369	Major	11050001	1105	36.40353579580	-98.66994665690
370	Woods	11050001	1105	36.41184876360	-98.55186453230
371	Washington	11070106	1107	36.46233746080	-95.83646719530
372	Major	11050001	1105	36.43205033510	-98.76876542910
373	Osage	11070107	1107	36.46649490770	-96.01115208270
374	Rogers	11070106	1107	36.46848044500	-95.84428309300
375	Osage	11070107	1107	36.47355543950	-96.04209673330
376	Noble	11060006	1106	36.46969324840	-97.31335857740
377	Major	11050001	1105	36.45239490940	-98.46621791460
378	Rogers	11070106	1107	36.47965934690	-95.85930814220
379	Noble	11060006	1106	36.47966175120	-97.36647664550
380	Noble	11060006	1106	36.48773559790	-97.13526799240
381	Washington	11070106	1107	36.50118517220	-95.83875607210
382	Washington	11070106	1107	36.50433408380	-95.85081703210
383	Garfield	11060006	1106	36.49352495440	-97.73441843980
384	Alfalfa	11050001	1105	36.48434270050	-98.44727504420
385	Garfield	11060006	1106	36.49783063660	-97.70942989140
386	Woods	11050001	1105	36.53726514840	-98.93531863570
387	Noble	11060004	1106	36.58707857190	-97.18912262720
388	Kay	11060004	1106	36.59769706220	-97.05818730880
389	Washington	11070106	1107	36.60654892660	-95.86948578090
390	Kay	11060004	1106	36.60314338280	-97.05761239030
391	Washington	11070106	1107	36.61099199630	-95.87649518730
392	Kay	11060004	1106	36.61988440880	-97.19630378760
393	Washington	11070106	1107	36.63199814670	-95.88933360800
394	Woods	11050001	1105	36.62648837230	-98.98810118110
395	Nowata	11070103	1107	36.68962121700	-95.55490785030
396	Washington	11070106	1107	36.71982695060	-95.96965837240
397	Washington	11070106	1107	36.71987270050	-95.97293739430
398	Grant	11060004	1106	36.70883140790	-97.78754033110
399	Alfalfa	11060004	1106	36.80709341020	-98.25576480920
400	Alfalfa	11060004	1106	36.81278213210	-98.26229465610
401	Alfalfa	11060004	1106	36.81879978000	-98.27407014580
402	Alfalfa	11060004	1106	36.82828922540	-98.29059926690
403	Alfalfa	11060002	1106	36.82619264220	-98.49607515300
404	Alfalfa	11060004	1106	36.83137250390	-98.28042413040
405	Alfalfa	11060002	1106	36.82819145460	-98.46923794030
406	Alfalfa	11060002	1106	36.82751127760	-98.52259150310
407	Alfalfa	11060004	1106	36.83445733430	-98.27741532670
408	Washington	11070106	1107	36.86062700550	-95.96500478780
409	Washington	11070106	1107	36.86453332540	-95.96389738900
410	Washington	11070106	1107	36.87923016520	-95.96482066210
411	Ottawa	11070206	1107	36.89513423360	-94.92181958580
412	Ottawa	11070206	1107	36.91403743190	-94.96996783530
413	Osage	11070106	1107	36.92650157630	-96.17958859860
414	Osage	11070106	1107	36.92692764320	-96.17730869700
415	Ottawa	11070206	1107	36.92835796210	-94.97576570290
416	Ottawa	11070206	1107	36.93260438620	-94.98255074500
417	Seminole	11100302	1110	35.44404459380	-96.53033845800
418	McCurain	11140106	1114	33.62445670560	-94.55912528990

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
419	McCurtain	11140106	1114	33.67950488870	-94.58922228540
420	McCurtain	11140106	1114	33.70084521300	-94.64032488010
421	McCurtain	11140106	1114	33.70121694440	-94.71174450690
422	McCurtain	11140106	1114	33.70939931770	-94.69599786670
423	McCurtain	11140106	1114	33.74904470300	-94.75705231270
424	McCurtain	11140106	1114	33.75060783710	-94.77045086130
425	Bryan	11140101	1114	33.76187713650	-96.19253951280
426	McCurtain	11140106	1114	33.75754753620	-94.76677580210
427	McCurtain	11140106	1114	33.76392616090	-94.82072288490
428	Bryan	11140101	1114	33.77218248240	-96.20392968880
429	McCurtain	11140106	1114	33.82187052110	-94.92857356240
430	McCurtain	11140106	1114	33.82076195050	-94.92776414410
431	Bryan	11140101	1114	33.83692006770	-96.12429031160
432	Bryan	11140101	1114	33.84054860640	-96.14147618560
433	Bryan	11140101	1114	33.84186099880	-96.11273444720
434	Bryan	11140101	1114	33.84316260250	-96.12651989120
435	Bryan	11140101	1114	33.84631182800	-96.09862524050
436	Bryan	11140101	1114	33.84664063700	-96.04887739350
437	Bryan	11140101	1114	33.85112968320	-95.84977208080
438	Bryan	11140101	1114	33.85252521260	-95.83237452160
439	Bryan	11140101	1114	33.85382050580	-96.04930673990
440	Bryan	11140101	1114	33.85389864510	-96.04807943040
441	Bryan	11140101	1114	33.85480072250	-96.01149483140
442	Bryan	11140101	1114	33.85549862520	-95.85246747960
443	Bryan	11140101	1114	33.86003048190	-95.85701981310
444	Bryan	11140101	1114	33.86423108530	-95.85372159130
445	Love	11130201	1113	33.85673141430	-97.34708622580
446	Bryan	11140101	1114	33.86575228410	-95.76848891640
447	Love	11130210	1113	33.86416061420	-97.01472809320
448	Bryan	11140102	1114	33.87553828760	-95.96302444110
449	Bryan	11140102	1114	33.88319386070	-95.94556866600
450	Bryan	11140102	1114	33.88496000730	-95.94126406680
451	Bryan	11140102	1114	33.88705448200	-95.93889823240
452	Bryan	11140102	1114	33.88731570620	-95.93751665860
453	Bryan	11140102	1114	33.88738249100	-95.93996056820
454	Choctaw	11140101	1114	33.89160524500	-95.47516239010
455	Love	11130201	1113	33.88710321380	-97.32852822580
456	Bryan	11140102	1114	33.89648634240	-96.04617764250
457	Bryan	11140102	1114	33.94708538220	-96.15060393480
458	Bryan	11140102	1114	33.94890131430	-96.15244142650
459	Choctaw	11140101	1114	33.94863383610	-95.58538262320
460	Bryan	11140102	1114	33.89921717810	-96.03744743630
461	Bryan	11140102	1114	33.90167364630	-96.04120082210
462	Choctaw	11140101	1114	33.90162155470	-95.52646236140
463	Choctaw	11140101	1114	33.90596082590	-95.51861381700
464	Choctaw	11140101	1114	33.90754412910	-95.54358899860
465	Bryan	11140102	1114	33.90840328090	-96.05180484200
466	Bryan	11140102	1114	33.90907048320	-96.05291203150
467	Bryan	11140102	1114	33.91250762580	-96.05466102250
468	Bryan	11140102	1114	33.91297591670	-96.05575085880
469	Bryan	11140102	1114	33.91388182680	-96.06221945620
470	Bryan	11140102	1114	33.91675445260	-96.05647993100
471	Jefferson	11130201	1113	33.90461325310	-97.79995854230
472	Love	11130201	1113	33.91195022350	-97.26395972590
473	Love	11130201	1113	33.91179359860	-97.26751432350
474	Bryan	11140102	1114	33.92046963560	-96.06912558900
475	Bryan	11140102	1114	33.92054899150	-96.05340408510
476	Jefferson	11130201	1113	33.90428523580	-97.97410586350
477	Love	11130201	1113	33.91451686820	-97.27022952380
478	Choctaw	11140101	1114	33.92711360080	-95.53369221410
479	Bryan	11140102	1114	33.93034298470	-96.06901325040

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
480	Bryan	11140102	1114	33.93469015200	-96.08956782980
481	Bryan	11140102	1114	33.93529890310	-96.09224983250
482	Bryan	11140102	1114	33.94073444470	-96.11415798500
483	Bryan	11140102	1114	33.94264655260	-96.10516459050
484	Bryan	11140102	1114	33.94315422920	-96.10919628720
485	Bryan	11140102	1114	33.96242813940	-96.17060325500
486	Bryan	11140102	1114	33.96263696020	-96.16371639560
487	Bryan	11140102	1114	33.96385383150	-96.17664584960
488	Bryan	11140102	1114	33.96446952490	-96.19146051890
489	Bryan	11140102	1114	33.96571921790	-96.18291466550
490	Bryan	11140102	1114	33.96617907500	-96.20518806540
491	Bryan	11140102	1114	33.96818358770	-96.18752385470
492	Jefferson	11130201	1113	33.95969281370	-97.58977862530
493	Bryan	11140102	1114	33.95099645580	-96.13547203490
494	Bryan	11140102	1114	33.95223386120	-96.12130343780
495	Love	11130201	1113	33.94286061410	-97.49178642590
496	Bryan	11140102	1114	33.95310682300	-96.14073571850
497	Love	11130201	1113	33.94455129950	-97.48753369530
498	Bryan	11140102	1114	33.95421096830	-96.14390414830
499	Bryan	11140102	1114	33.95995583800	-96.16106322340
500	Bryan	11140102	1114	33.96169749030	-96.18390890360
501	Bryan	11140102	1114	33.97265164160	-96.19997836220
502	Choctaw	11140103	1114	33.97527242600	-95.69413650160
503	Love	11130201	1113	33.97113554740	-97.29617146430
504	Love	11130210	1113	33.97538781110	-97.00551643870
505	Jefferson	11130201	1113	33.97007428050	-97.59604549200
506	Love	11130210	1113	33.98457053040	-97.02945355830
507	Choctaw	11140103	1114	33.99759473220	-95.70458818570
508	Love	11130210	1113	34.00022637860	-97.06112144310
509	Choctaw	11140103	1114	34.00497373120	-95.72640020080
510	Bryan	11140102	1114	34.00759029130	-96.27898877390
511	Choctaw	11140103	1114	34.00953662900	-95.73701643150
512	Bryan	11140102	1114	34.01084368730	-96.27667629410
513	Choctaw	11140103	1114	34.01013538270	-95.73589329680
514	Bryan	11140102	1114	34.01316760680	-96.25434680740
515	Bryan	11140102	1114	34.01450075800	-96.28571110680
516	Bryan	11140102	1114	34.02627980080	-96.30115087640
517	Bryan	11140102	1114	34.02957910160	-96.30509520540
518	Bryan	11140102	1114	34.02968228050	-96.30866364250
519	Bryan	11140102	1114	34.03020295230	-96.30009220290
520	Bryan	11140102	1114	34.03062774480	-96.30603458930
521	Bryan	11140102	1114	34.03243292150	-96.31090870390
522	Bryan	11140102	1114	34.03464673470	-96.31691055760
523	Bryan	11140102	1114	34.03840778580	-96.32821961010
524	Bryan	11140102	1114	34.03932894330	-96.31880036510
525	Bryan	11140102	1114	34.04520790950	-96.33446729280
526	Jefferson	11130201	1113	34.03481582450	-97.58822676160
527	Bryan	11140102	1114	34.04708074370	-96.34007087080
528	Jefferson	11130201	1113	34.04124257580	-97.59521868070
529	Bryan	11140102	1114	34.05196763730	-96.33494675390
530	Jefferson	11130208	1113	34.03727996530	-97.97465151040
531	Jefferson	11130201	1113	34.04397761380	-97.59237302570
532	Bryan	11140102	1114	34.05585949750	-96.33983198010
533	Jefferson	11130201	1113	34.04635951910	-97.59309598540
534	Bryan	11140102	1114	34.05822565480	-96.34183480570
535	Bryan	11140102	1114	34.06099434230	-96.34219348970
536	Choctaw	11140104	1114	34.06653401330	-95.83770363470
537	Choctaw	11140104	1114	34.07035330950	-95.83495239340
538	Jefferson	11130201	1113	34.05366618340	-98.08886478980
539	Choctaw	11140104	1114	34.07499556990	-95.82764353510
540	Choctaw	11140104	1114	34.07538664480	-95.83885119290

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
541	Jefferson	11130201	1113	34.05734776140	-98.09039956720
542	Bryan	11130304	1113	34.07571637670	-96.56109370230
543	Bryan	11140102	1114	34.07779336790	-96.35760477990
544	Jefferson	11130201	1113	34.06103228030	-98.09930482450
545	Bryan	11130304	1113	34.08278931290	-96.55367875090
546	Choctaw	11140103	1114	34.08431501000	-95.80676994680
547	Bryan	11130304	1113	34.08361212210	-96.55767752890
548	Choctaw	11140103	1114	34.08687592850	-95.81271760240
549	Jefferson	11130201	1113	34.07535116860	-97.65286828700
550	Choctaw	11140103	1114	34.08998303490	-95.80185238410
551	Bryan	11140102	1114	34.09052823570	-96.36846192780
552	Carter	11130210	1113	34.08728988460	-97.21253541130
553	Bryan	11140102	1114	34.09346540050	-96.36937719400
554	Jefferson	11130201	1113	34.08247447580	-97.66683754010
555	Jefferson	11130201	1113	34.08343054810	-97.66967592800
556	Jefferson	11130208	1113	34.07928037730	-97.96852002230
557	Choctaw	11140103	1114	34.09597894750	-95.80228470270
558	Choctaw	11140104	1114	34.09866887770	-95.87731492760
559	Cotton	11130102	1113	34.07309182090	-98.46889814870
560	Cotton	11130102	1113	34.07409388060	-98.46466042400
561	Jefferson	11130208	1113	34.08403966760	-97.96695125060
562	Cotton	11130102	1113	34.07459561390	-98.47181522440
563	Choctaw	11140104	1114	34.10163339880	-95.88115896760
564	Choctaw	11140104	1114	34.10182183690	-95.85584662960
565	Choctaw	11140104	1114	34.10212796160	-95.90174212840
566	Choctaw	11140104	1114	34.10330571620	-95.87132092190
567	Choctaw	11140103	1114	34.10458652920	-95.83100817480
568	Bryan	11140102	1114	34.10460356710	-96.37730079580
569	Bryan	11140102	1114	34.10708045560	-96.37994802820
570	Bryan	11140102	1114	34.10822058940	-96.37875732010
571	Bryan	11140102	1114	34.10838506420	-96.38057853860
572	Choctaw	11140104	1114	34.10996942060	-95.86369672670
573	Choctaw	11140103	1114	34.11187387290	-95.83155680520
574	Bryan	11140102	1114	34.11221911640	-96.38080534000
575	Bryan	11140102	1114	34.11274581010	-96.38044381300
576	Bryan	11140102	1114	34.11325289160	-96.38172933280
577	Choctaw	11140103	1114	34.11460761570	-95.83665058150
578	Choctaw	11140104	1114	34.11700123890	-95.91407878860
579	Choctaw	11140104	1114	34.11938253930	-95.91918262050
580	Bryan	11140102	1114	34.12084396610	-96.38825175770
581	Cotton	11130102	1113	34.09701076620	-98.51376832640
582	Choctaw	11140103	1114	34.12655357720	-95.84115004160
583	Bryan	11140104	1114	34.13111686520	-95.95065122960
584	Cotton	11130102	1113	34.10541246910	-98.52427252690
585	Bryan	11140104	1114	34.13424039370	-95.95095335890
586	Choctaw	11140103	1114	34.13437776240	-95.82543364080
587	Bryan	11140102	1114	34.13482214790	-96.39165139060
588	Choctaw	11140103	1114	34.13902514970	-95.84911584140
589	Choctaw	11140103	1114	34.13633922330	-95.83664390700
590	Jefferson	11130201	1113	34.12651394410	-97.65773696780
591	Cotton	11130102	1113	34.11105361590	-98.52694177780
592	Jefferson	11130201	1113	34.12961275870	-97.65618975910
593	Choctaw	11140103	1114	34.14264528930	-95.83167241050
594	Bryan	11140102	1114	34.14595233020	-96.41747346760
595	Choctaw	11140103	1114	34.14807653370	-95.83864443980
596	Choctaw	11140103	1114	34.15069623650	-95.84226107760
597	Cotton	11130201	1113	34.13276259050	-98.15160204430
598	Bryan	11140102	1114	34.15277604310	-96.40687965380
599	Jackson	11130101	1113	34.41121321760	-99.72303667700
600	Comanche	11130203	1113	34.44264377570	-98.56482335550
601	Jackson	11130101	1113	34.42159306190	-99.39967056550

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
602	Murray	11130303	1113	34.46717782890	-97.14494689800
603	Tillman	11120303	1112	34.42919819590	-99.20564705940
604	Murray	11130303	1113	34.46870647970	-97.14629009630
605	Coal	11140103	1114	34.47521582200	-96.18251072280
606	Cotton	11130208	1113	34.45517625060	-98.17212575810
607	Comanche	11130203	1113	34.44999282830	-98.56650293850
608	Comanche	11130203	1113	34.45088074620	-98.56844737760
609	Murray	11130303	1113	34.47386367690	-97.14547406730
610	Cotton	11130208	1113	34.45951087640	-98.17977693120
611	Comanche	11130203	1113	34.45175638420	-98.56276812130
612	Comanche	11130203	1113	34.45326767480	-98.55957722910
613	Comanche	11130203	1113	34.45696158330	-98.56011379640
614	Murray	11130303	1113	34.48155555810	-97.13534255760
615	Murray	11130303	1113	34.48201643060	-97.12681748600
616	Murray	11130303	1113	34.48809761340	-97.14165042720
617		11130203	1113	34.47523309430	-98.58461698270
618	Cotton	11130208	1113	34.48560712920	-98.17803726940
619	Murray	11130303	1113	34.50112736670	-97.15016845590
620	Comanche	11130202	1113	34.48339505300	-98.35352246430
621	Murray	11130303	1113	34.50285242830	-97.14986887800
622	Tillman	11120303	1112	34.46508985040	-99.20436807560
623	Jackson	11120202	1112	34.46123886460	-99.36028882340
624	Grady	11130302	1113	35.10869945420	-98.03287647750
625	Caddo	11130302	1113	35.09898080430	-98.55019842520
626	Grady	11130302	1113	35.11212649970	-98.01696258980
627	Caddo	11130302	1113	35.10391401610	-98.46383758070
628	Grady	11130302	1113	35.11315442330	-98.02529874570
629	Grady	11130302	1113	35.11408264730	-98.01715341350
630	Grady	11130302	1113	35.11409944760	-98.03709049410
631	Grady	11130302	1113	35.11417144830	-98.04721412620
632	Kiowa	11130302	1113	35.10112694480	-98.69803649100
633	Caddo	11130302	1113	35.10758946290	-98.46981713940
634	Caddo	11130302	1113	35.10825362330	-98.55780383760
635	Bryan	11140102	1114	34.15289908230	-96.40906226470
636	Cotton	11130201	1113	34.13441968060	-98.15083549180
637	Cotton	11130102	1113	34.12765281400	-98.53953229050
638	Tillman	11130102	1113	34.12656316130	-98.73255986450
639	Atoka	11140104	1114	34.16144036210	-96.01771669760
640	Cotton	11130102	1113	34.13378341380	-98.54318682410
641	Atoka	11140104	1114	34.16178875590	-96.02350063090
642	Atoka	11140104	1114	34.16466514950	-96.04495164020
643	Johnston	11140102	1114	34.16482709940	-96.41277462110
644	Cotton	11130102	1113	34.13779210150	-98.55340213170
645	Tillman	11130102	1113	34.13572075310	-98.68857857330
646	Cotton	11130102	1113	34.13962213070	-98.55613865560
647	Tillman	11130102	1113	34.13613218500	-98.75076110390
648	Johnston	11140102	1114	34.16958404700	-96.41923884760
649	Atoka	11140104	1114	34.17521825430	-96.07691318270
650	Atoka	11140103	1114	34.17656326880	-95.83043733420
651	Atoka	11140104	1114	34.17772830460	-96.08513426470
652	Atoka	11140104	1114	34.17988950880	-96.09190382350
653	Jefferson	11130201	1113	34.17410001350	-97.67942037310
654	Johnston	11130304	1113	34.18459298040	-96.85517840720
655	Tillman	11130102	1113	34.15483455170	-98.80489005910
656	Tillman	11130102	1113	34.15949315130	-98.61541809260
657	Atoka	11140103	1114	34.18948117840	-95.83342438640
658	Johnston	11130304	1113	34.18855666510	-96.82434513560
659	Jefferson	11130201	1113	34.17929509060	-97.68786368370
660	Cotton	11130202	1113	34.17162709210	-98.28596664950
661	Tillman	11130102	1113	34.16554685530	-98.61613151110
662	Tillman	11130102	1113	34.16608477170	-98.62053738400

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
663	Johnston	11130304	1113	34.19677603660	-96.77896111490
664	Johnston	11130304	1113	34.20302653870	-96.82867909740
665	Johnston	11130304	1113	34.20487236300	-96.78075351020
666	Johnston	11130304	1113	34.20575865390	-96.64592735530
667	Johnston	11130304	1113	34.20731547670	-96.78177632220
668	Johnston	11130304	1113	34.21658829660	-96.81834447290
669	Johnston	11130304	1113	34.22248641320	-96.81841636830
670	Cotton	11130202	1113	34.19491394880	-98.30965485470
671	Johnston	11140102	1114	34.22058414340	-96.49554791210
672	Cotton	11130202	1113	34.19911945450	-98.29304254170
673	Johnston	11140102	1114	34.22240928020	-96.50549955880
674	Cotton	11130203	1113	34.20491327440	-98.31897721280
675	Cotton	11130202	1113	34.20520426550	-98.33653800900
676	Cotton	11130202	1113	34.20745248560	-98.35449172410
677	Cotton	11130202	1113	34.20996798710	-98.29697824710
678	Cotton	11130203	1113	34.21083487820	-98.35871461820
679	Cotton	11130203	1113	34.21127717430	-98.36091926690
680	Jefferson	11130201	1113	34.22231821000	-97.73935125630
681	Cotton	11130203	1113	34.21348543820	-98.38365867420
682	Atoka	11140104	1114	34.23568586410	-96.17163223640
683	Cotton	11130202	1113	34.21383897720	-98.29344714900
684	Cotton	11130203	1113	34.21266024940	-98.36189018650
685	Cotton	11130202	1113	34.21965751440	-98.29735641250
686	Cotton	11130203	1113	34.21851643050	-98.35942415360
687	Cotton	11130202	1113	34.22001669240	-98.29514228490
688	Cotton	11130202	1113	34.22000638530	-98.30546480780
689	Cotton	11130202	1113	34.22061980290	-98.29163014200
690	Tillman	11130102	1113	34.20794813710	-99.05099554120
691	Cotton	11130202	1113	34.22629853140	-98.30627446450
692	Atoka	11140104	1114	34.24980169140	-96.19350033450
693	Carter	11130303	1113	34.24743843690	-96.95164288870
694	Tillman	11130102	1113	34.21528816150	-98.96198329690
695	Carter	11130303	1113	34.25002307750	-96.95199503710
696	Cotton	11130202	1113	34.23160086530	-98.29948959040
697	Tillman	11130102	1113	34.21242336740	-99.12863030830
698	Tillman	11130102	1113	34.21602626530	-99.00609564290
699	Cotton	11130203	1113	34.23258339460	-98.39733094270
700	Atoka	11140104	1114	34.25765838890	-96.22506057700
701	Tillman	11130102	1113	34.22159197470	-99.13274861720
702	Tillman	11130102	1113	34.22033779490	-99.10259959980
703	Cotton	11130202	1113	34.23907250720	-98.29831620820
704	Cotton	11130203	1113	34.23968501160	-98.38929018650
705	Jefferson	11130201	1113	34.25087927980	-97.77215249250
706	Cotton	11130202	1113	34.24174070630	-98.30079853890
707	Tillman	11130102	1113	34.22876401740	-98.98142201490
708	Cotton	11130202	1113	34.24491592640	-98.29113023260
709	Cotton	11130203	1113	34.24458281320	-98.39617622860
710	Tillman	11130102	1113	34.22608396490	-99.17131470140
711	Tillman	11130102	1113	34.22733555780	-99.14230059840
712	Tillman	11130102	1113	34.22771503100	-99.18504114470
713	Jefferson	11130201	1113	34.26360201370	-97.77264182540
714	Cotton	11130203	1113	34.25648329810	-98.38987070390
715	Cotton	11130202	1113	34.26076222850	-98.29340806960
716	Cotton	11130203	1113	34.26364170250	-98.39657356000
717	Cotton	11130202	1113	34.26592264590	-98.29991214590
718	Carter	11130303	1113	34.29014192430	-97.01810139760
719	Tillman	11130102	1113	34.25647259500	-99.19174316090
720	Atoka	11140104	1114	34.30205270680	-96.27849274750
721	Carter	11130303	1113	34.30389784820	-96.98769361300
722	Carter	11130303	1113	34.30941120300	-96.98251169170
723	Cotton	11130202	1113	34.29527190940	-98.29038941250

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
724	Tillman	11130203	1113	34.28870032260	-98.63044080520
725	Cotton	11130203	1113	34.29408033700	-98.39935708660
726	Cotton	11130203	1113	34.30164081880	-98.39676109540
727	Cotton	11130203	1113	34.30376330610	-98.39812159670
728	Stephens	11130201	1113	34.31585305060	-97.78467237750
729	Tillman	11130102	1113	34.30596668530	-99.20133579580
730	Cotton	11130203	1113	34.32628090270	-98.41656301460
731	Stephens	11130201	1113	34.34443630780	-97.78137210230
732	Cotton	11130203	1113	34.33539823680	-98.43617050320
733	Cotton	11130203	1113	34.33687931480	-98.43707585020
734	Cotton	11130203	1113	34.33860095690	-98.43951565620
735	Cotton	11130202	1113	34.35142704040	-98.28212029380
736	Tillman	11130102	1113	34.33169669550	-99.19665692290
737	Johnston	11140102	1114	34.37819846790	-96.60341544490
738	Jackson	11130101	1113	34.33815208020	-99.20935952420
739	Jackson	11130101	1113	34.33933564810	-99.20673708870
740	Cotton	11130202	1113	34.36519118960	-98.28334415630
741	Cotton	11130208	1113	34.36846293260	-98.15890634530
742	Jackson	11130101	1113	34.35208263750	-99.21759863650
743	Cotton	11130202	1113	34.37473892010	-98.30180610100
744	Murray	11130303	1113	34.39314687640	-97.04227829420
745		11130101	1113	34.35785858440	-99.23022608420
746	Cotton	11130202	1113	34.38067714760	-98.30964902100
747	Atoka	11140104	1114	34.40494161430	-96.34715918610
748		11130101	1113	34.36389339040	-99.23129560210
749		11130101	1113	34.36593137700	-99.24108775880
750		11120303	1112	34.36873188590	-99.21531456030
751		11120303	1112	34.36997530650	-99.21052543470
752		11120303	1112	34.37130411470	-99.21158895070
753	Cotton	11130202	1113	34.39279334600	-98.31968471960
754		11130101	1113	34.37169668490	-99.23756941170
755	Cotton	11130202	1113	34.39633622450	-98.31822257080
756	Cotton	11130202	1113	34.39817805830	-98.32258434820
757	Tillman	11120303	1112	34.38110429360	-99.19794433200
758	Cotton	11130202	1113	34.40363409250	-98.32859974140
759	Cotton	11130203	1113	34.40105471220	-98.50716622130
760	Jackson	11130101	1113	34.37340125930	-99.61953347700
761	Jackson	11130101	1113	34.38394731050	-99.26283408370
762	Cotton	11130203	1113	34.40310623150	-98.50051621210
763	Cotton	11130203	1113	34.40396226850	-98.48076910460
764	Jackson	11130101	1113	34.37973499380	-99.44769163320
765	Tillman	11120303	1112	34.38890686060	-99.22008064730
766	Cotton	11130203	1113	34.40757834950	-98.48384581050
767	Jackson	11130101	1113	34.38961862990	-99.26655288260
768	Jackson	11130101	1113	34.38131752590	-99.64611515510
769	Jackson	11130101	1113	34.38901575060	-99.45367879680
770	Jackson	11130101	1113	34.38925335580	-99.45601204540
771	Cotton	11130203	1113	34.41497909890	-98.51658526910
772	Jackson	11130101	1113	34.39783875910	-99.46980425360
773	Comanche	11130203	1113	34.42221202730	-98.53532213070
774	Comanche	11130203	1113	34.42367836450	-98.52587210030
775	Johnston	11140102	1114	34.45185921430	-96.61926911770
776	Tillman	11120303	1112	34.41248978220	-99.23018904680
777	Jackson	11130101	1113	34.40790627600	-99.39697556470
778	Jackson	11130101	1113	34.40788806200	-99.49318121920
779	Murray	11130303	1113	34.46116080920	-97.11117709750
780	Jackson	11130101	1113	34.41266774760	-99.39709579640
781	Murray	11130303	1113	34.50534973110	-97.15185727440
782	Jackson	11130101	1113	34.45202304310	-99.78380005080
783	Jackson	11120202	1112	34.46641131820	-99.36783487300
784	Murray	11130303	1113	34.51446228450	-97.14120524060

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
785	Garvin	11130303	1113	34.51619513880	-97.15606644510
786	Murray	11130303	1113	34.51775067240	-97.14358481960
787	Jackson	11120303	1112	34.47893020610	-99.22360795740
788	Jackson	11130101	1113	34.46388842080	-99.79610563940
789		11130203	1113	34.49927768730	-98.59426395670
790		11130203	1113	34.50095471050	-98.59984787510
791	Jackson	11120303	1112	34.48731662950	-99.22805562310
792	Garvin	11130303	1113	34.52625131490	-97.16920312530
793	Jackson	11120303	1112	34.49118558630	-99.22733704040
794		11130203	1113	34.50861098320	-98.60117385770
795	Garvin	11130303	1113	34.53413074060	-97.16637402670
796	Tillman	11120303	1112	34.49814324560	-99.20418975710
797	Murray	11130303	1113	34.53989955980	-97.14532206230
798	Comanche	11130202	1113	34.53702706030	-98.37669059540
799	Murray	11130303	1113	34.56117407570	-97.15507515710
800	Jackson	11120202	1112	34.51808185000	-99.37996269740
801	Jackson	11130101	1113	34.50579926270	-99.83053322910
802	Murray	11130303	1113	34.57413442610	-97.16161610010
803	Harmon	11130101	1113	34.52123849250	-99.83984312830
804	Harmon	11130101	1113	34.52253667600	-99.84409170680
805	Jackson	11120303	1112	34.54473926710	-99.18239344540
806	Murray	11130303	1113	34.58336404850	-97.16587832220
807	Jackson	11120303	1112	34.54992828850	-99.18028962740
808	Harmon	11130101	1113	34.53223252290	-99.84809839640
809	Comanche	11130208	1113	34.57621011050	-98.16701933490
810	Comanche	11130202	1113	34.57418424930	-98.37553538080
811	Jackson	11120303	1112	34.55960591270	-99.18861389560
812	Pontotoc	11140102	1114	34.60324191770	-96.72677212420
813	Pontotoc	11140102	1114	34.60302630780	-96.71296560280
814	Jackson	11120202	1112	34.55566474290	-99.41862065870
815	Tillman	11120303	1112	34.56264140520	-99.17410080070
816	Jackson	11120202	1112	34.55662541880	-99.41850785950
817	Tillman	11120303	1112	34.57453546370	-99.09411213210
818	Murray	11130303	1113	34.60962148290	-97.18907032530
819	Tillman	11120303	1112	34.57633804940	-99.16404622440
820	Pontotoc	11140102	1114	34.61970056260	-96.76805304540
821	Pontotoc	11140104	1114	34.62595707840	-96.57045883650
822	Tillman	11120303	1112	34.59107757560	-99.10738393820
823	Pontotoc	11140104	1114	34.63172011390	-96.57055911820
824	Garvin	11130303	1113	34.65674941240	-97.19744930010
825	Garvin	11130303	1113	34.66416352100	-97.17755697040
826	Garvin	11130303	1113	34.66561432180	-97.18106110070
827	Garvin	11130303	1113	34.67478784030	-97.17676321520
828	Garvin	11130303	1113	34.67958991810	-97.17561119240
829	Pontotoc	11140104	1114	34.68584399530	-96.60432246790
830	Jackson	11120202	1112	34.64673709770	-99.56112669090
831	Garvin	11130303	1113	34.69832593010	-97.18428996280
832	Jackson	11120202	1112	34.65053838300	-99.55900392830
833	Pontotoc	11140104	1114	34.70380529080	-96.63195281320
834	Pontotoc	11140104	1114	34.70656415360	-96.63969990220
835	Garvin	11130303	1113	34.71893295770	-97.17318057360
836	Garvin	11130303	1113	34.72903545800	-97.16794446540
837	Garvin	11130303	1113	34.73207710050	-97.16997990450
838	Jackson	11120303	1112	34.70153300280	-99.05477245150
839	Kiowa	11120303	1112	34.70301546640	-99.06843147970
840	Coal	11140103	1114	34.75179771220	-96.33510588330
841	Garvin	11130303	1113	34.74921877600	-97.23857409240
842	Garvin	11130303	1113	34.75457858900	-97.24540661980
843	Jackson	11120202	1112	34.71150276290	-99.41951764010
844	Garvin	11130303	1113	34.75767067240	-97.22932332880
845	Garvin	11130303	1113	34.75898727890	-97.26198843240

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
846	Garvin	11130303	1113	34.76937015650	-97.22694665890
847	Garvin	11130303	1113	34.76964516910	-97.26874605240
848	Garvin	11130303	1113	34.77221786480	-97.22737444250
849	Garvin	11130303	1113	34.77383120260	-97.25630609940
850	Garvin	11130303	1113	34.77559857650	-97.25342707500
851	Garvin	11130303	1113	34.78204789460	-97.24991054930
852	Garvin	11130303	1113	34.78365337160	-97.24549209470
853	Jackson	11120303	1112	34.75645803260	-99.17247142640
854	Garvin	11130303	1113	34.79375548950	-97.27902074480
855	Garvin	11130303	1113	34.79859310480	-97.25577662310
856	Pontotoc	11140103	1114	34.81690108860	-96.42818421210
857	Pontotoc	11140103	1114	34.81806422880	-96.43025508910
858	Garvin	11130303	1113	34.81270423650	-97.34198882900
859	Garvin	11130303	1113	34.81808729130	-97.34278912460
860	Pontotoc	11140103	1114	34.82536021130	-96.46257427670
861	Pontotoc	11140103	1114	34.82880995670	-96.47812225630
862	Garvin	11130303	1113	34.82065799800	-97.60789955810
863	Garvin	11130303	1113	34.82098143240	-97.62112752260
864	Pontotoc	11140103	1114	34.83221209650	-96.51376538940
865	Garvin	11130303	1113	34.82711434060	-97.36636231280
866	Garvin	11130303	1113	34.82763055510	-97.38170205110
867	Garvin	11130303	1113	34.82789010550	-97.37575539380
868	Garvin	11130303	1113	34.82786791430	-97.41576717060
869	Garvin	11130303	1113	34.82581542910	-97.59346705800
870	Garvin	11130303	1113	34.83104688960	-97.35971848970
871	Garvin	11130303	1113	34.82949157010	-97.52892769520
872	Garvin	11130303	1113	34.82905121470	-97.64355285170
873	Garvin	11130303	1113	34.83241389040	-97.54182600320
874	Garvin	11130303	1113	34.83530836320	-97.48141268020
875	Grady	11130303	1113	34.83706126580	-97.44914424130
876	Garvin	11130303	1113	34.83578864050	-97.45061672340
877	Garvin	11130303	1113	34.83931924760	-97.41662010020
878	Grady	11130303	1113	34.84276767520	-97.45677963950
879	Comanche	11130302	1113	34.83321426840	-98.10873101150
880	Grady	11130303	1113	34.84721149090	-97.46819533800
881	Grady	11130303	1113	34.85090104400	-97.68184088250
882	Grady	11130303	1113	34.85487637780	-97.69015811050
883	Grady	11130303	1113	34.86392273720	-97.67902885840
884	Kiowa	11120303	1112	34.83780133110	-99.22017204470
885	Kiowa	11120303	1112	34.84327557280	-99.20849705970
886	Kiowa	11120303	1112	34.85541153270	-99.03369256150
887	Caddo	11130202	1113	34.87101519440	-98.37036056370
888	Kiowa	11120303	1112	34.86145994250	-99.03693092920
889	Kiowa	11120303	1112	34.86228096720	-99.03705935740
890	Kiowa	11120303	1112	34.86177923990	-99.16507996690
891	Grady	11130303	1113	34.89357908160	-97.68710880400
892	Kiowa	11120303	1112	34.86416927340	-99.16055202350
893	McClain	11090202	1109	34.90719109000	-97.02664436460
894	Grady	11130303	1113	34.90540984450	-97.70975534880
895	Grady	11130303	1113	34.90645615750	-97.72212264450
896	Grady	11130303	1113	34.91547927110	-97.73901907080
897	McClain	11090202	1109	34.92375789340	-97.14239975210
898	McClain	11090202	1109	34.92715666470	-97.16363283940
899	McClain	11090202	1109	34.92592182090	-97.16390115500
900	McClain	11090202	1109	34.92922452880	-97.19675575080
901	Grady	11130303	1113	34.92319989850	-97.76228770750
902	Kiowa	11120303	1112	34.90170259040	-99.02638401810
903	McClain	11090202	1109	34.93679509840	-97.23610672960
904	McClain	11090202	1109	34.93974557170	-97.21239070310
905	McClain	11090202	1109	34.94063470210	-97.20931759120
906	Grady	11130303	1113	34.93369865040	-97.78638334200

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907	McClain	11090202	1109	34.94609010400	-97.26645668340
908	McClain	11090202	1109	34.94362749650	-97.25915553710
909	Greer	11120304	1112	34.90210161970	-99.38662959420
910	Kiowa	11120303	1112	34.91058547530	-99.11217609770
911	McClain	11090202	1109	34.94585412280	-97.24660923630
912	McClain	11090202	1109	34.94884742480	-97.25618939920
913	Cleveland	11090202	1109	34.95201673900	-97.24386865760
914	Cleveland	11090202	1109	34.95863721110	-97.26066938930
915	McClain	11090202	1109	34.96136504760	-97.33601729420
916	McClain	11090202	1109	34.97514593170	-97.35342337530
917	Caddo	11130202	1113	34.95809575520	-98.47817207590
918	McClain	11090202	1109	34.97956808840	-97.35430930690
919	Grady	11130303	1113	34.97682962940	-97.79398423650
920	Caddo	11130202	1113	34.96357784410	-98.54535133520
921	Grady	11130303	1113	34.97744117900	-97.85409218930
922	Caddo	11130202	1113	34.96509616860	-98.54290727520
923	Caddo	11130202	1113	34.97174242380	-98.54200050280
924	Grady	11130303	1113	34.98826419310	-97.82031393230
925	Grady	11130302	1113	35.01101704840	-97.84762586980
926	Greer	11120304	1112	34.96667763740	-99.76813107720
927	Grady	11130302	1113	35.01412519050	-97.88841221160
928	Grady	11130302	1113	35.01592224730	-97.87041157210
929	Grady	11130302	1113	35.02460317460	-97.90209346320
930	McClain	11090202	1109	35.03413896160	-97.35778695990
931	Grady	11130302	1113	35.03044972300	-97.89989859440
932	Grady	11130302	1113	35.03415755250	-97.89993255990
933	Kiowa	11120302	1112	35.00970574950	-99.31648536290
934	Grady	11130302	1113	35.04234567520	-97.90523482030
935	Kiowa	11120302	1112	35.02473153240	-99.31991838010
936	Caddo	11130302	1113	35.04931407800	-98.31558645620
937	Caddo	11130302	1113	35.05106166490	-98.31026024310
938	Caddo	11130302	1113	35.05523213710	-98.28241584620
939	Caddo	11130302	1113	35.05709296460	-98.28348541370
940	Caddo	11130302	1113	35.06176349470	-98.31886083950
941	Caddo	11130302	1113	35.06310640540	-98.28109390940
942	Grady	11130302	1113	35.06956315900	-97.92536089330
943	Caddo	11130302	1113	35.06842243900	-98.31807555590
944	Kiowa	11120302	1112	35.04483957580	-99.33710272490
945	Grady	11130302	1113	35.07715582780	-97.93343830500
946	McClain	11090202	1109	35.08592121680	-97.40171738920
947	Caddo	11130302	1113	35.07509581200	-98.25693882260
948	McClain	11090202	1109	35.08955125310	-97.40802399990
949	Grady	11130302	1113	35.08308240680	-97.94961372240
950	Caddo	11130302	1113	35.07772990320	-98.36023709130
951	Grady	11130302	1113	35.08501235500	-98.00362395990
952	Grady	11130302	1113	35.08529143130	-98.01628551310
953	Caddo	11130302	1113	35.08320233440	-98.15182909250
954	Caddo	11130302	1113	35.08337819250	-98.14352346170
955	Caddo	11130302	1113	35.08289821390	-98.18404636630
956	Caddo	11130302	1113	35.07860230420	-98.40913565020
957	Caddo	11130302	1113	35.08172953690	-98.25617720040
958	Caddo	11130302	1113	35.08069491850	-98.32050877610
959	Caddo	11130302	1113	35.08000079650	-98.38060523130
960	McClain	11090202	1109	35.09569702750	-97.41389423730
961	Caddo	11130302	1113	35.08330414220	-98.26599910300
962	Caddo	11130302	1113	35.08644793250	-98.14076911450
963	Grady	11130302	1113	35.08774563440	-98.08584447220
964	Caddo	11130302	1113	35.08383295530	-98.31450492920
965	Grady	11130302	1113	35.08993725040	-98.01986397030
966	Caddo	11130302	1113	35.08366270720	-98.40484489080
967	Caddo	11130302	1113	35.08768703850	-98.21345092280

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
968	Caddo	11130302	1113	35.08931281180	-98.13466045640
969	Caddo	11130302	1113	35.08350199190	-98.44640063230
970	Caddo	11130302	1113	35.08905790740	-98.16577544870
971	Caddo	11130302	1113	35.08984289840	-98.13473498820
972	Caddo	11130302	1113	35.08863225990	-98.24893572250
973	McClain	11090202	1109	35.10212770800	-97.40983749360
974	Caddo	11130302	1113	35.09038769990	-98.23033110630
975	Caddo	11130302	1113	35.09285791970	-98.13365281550
976	Caddo	11130302	1113	35.09297672390	-98.13775210930
977	Caddo	11130302	1113	35.08812445590	-98.43105570210
978	Grady	11130302	1113	35.09537894980	-98.06917454030
979	Caddo	11130302	1113	35.09353407940	-98.19146475610
980	Caddo	11130302	1113	35.09577557310	-98.17379205560
981	Caddo	11130302	1113	35.09287099400	-98.25339518440
982	Grady	11130302	1113	35.09627577950	-98.07897682740
983	Caddo	11130302	1113	35.09484694530	-98.16623775590
984	Caddo	11130302	1113	35.09033691240	-98.42335204250
985	Caddo	11130302	1113	35.09642364730	-98.13417050870
986	Caddo	11130302	1113	35.09699823170	-98.18444752180
987	Caddo	11130302	1113	35.09516192420	-98.33663546960
988	Caddo	11130302	1113	35.09755517500	-98.18177238170
989	Grady	11130302	1113	35.10265635320	-98.03097172860
990	Grady	11130302	1113	35.10100564520	-98.02191156360
991	Caddo	11130302	1113	35.09786734970	-98.19873458190
992	Caddo	11130302	1113	35.09655291560	-98.32852308070
993	Grady	11130302	1113	35.10206819890	-98.05288535860
994	Grady	11130302	1113	35.10358281850	-98.04868814480
995	Caddo	11130302	1113	35.10320100920	-98.11943029740
996	Caddo	11130302	1113	35.10364177810	-98.11152317190
997	Grady	11130302	1113	35.10666867130	-98.05512734650
998	Caddo	11130302	1113	35.10553609770	-98.12002274120
999	Canadian	11100301	1110	35.56875234290	-97.93755392720
1000	Blaine	11090201	1109	35.56057386880	-98.42157004230
1001	Blaine	11090201	1109	35.56095032410	-98.46801613440
1002	Blaine	11090201	1109	35.56486461310	-98.46524386660
1003	Canadian	11100301	1110	35.59041066820	-98.02008728580
1004	Canadian	11100301	1110	35.59795243620	-98.04566928670
1005	Blaine	11090201	1109	35.59454300830	-98.51996279570
1006	Canadian	11100301	1110	35.60656910840	-98.03502855720
1007	Canadian	11100301	1110	35.60794848370	-98.05757903840
1008	Canadian	11100301	1110	35.61301274750	-98.08556495220
1009	Canadian	11100301	1110	35.61467853400	-98.10766483590
1010	Canadian	11100301	1110	35.62455333970	-98.10988720270
1011	Canadian	11100301	1110	35.63206729050	-98.17915330080
1012	Canadian	11100301	1110	35.64027508300	-98.16424603210
1013	Canadian	11100301	1110	35.64343621100	-98.15104676350
1014	Canadian	11100301	1110	35.64645671260	-98.16139428870
1015	Custer	11130301	1113	35.62912722400	-99.26434078440
1016	Custer	11130301	1113	35.62979111290	-99.26800753130
1017	Custer	11130301	1113	35.63089595480	-99.28209812100
1018	Custer	11130301	1113	35.63356448010	-99.28081538200
1019	Roger Mills	11130301	1113	35.62501289990	-99.68233513320
1020	Roger Mills	11130301	1113	35.62625208320	-99.72816185250
1021	Roger Mills	11130301	1113	35.63527181580	-99.44223057510
1022	Blaine	11090201	1109	35.66852119720	-98.58219025540
1023	Blaine	11090201	1109	35.70514600250	-98.59693282290
1024	Roger Mills	11130301	1113	35.68573413230	-99.77815903060
1025	Blaine	11100301	1110	35.72590284340	-98.30711441020
1026	Roger Mills	11130301	1113	35.68837117770	-99.78009996290
1027	Blaine	11100301	1110	35.72654952150	-98.33295735300
1028	Blaine	11100301	1110	35.75072782610	-98.36349664960

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1029	Blaine	11100301	1110	35.76725232800	-98.37320779530
1030	Blaine	11100301	1110	35.77377671430	-98.37151557080
1031	Dewey	11090201	1109	35.86430660280	-99.12971058540
1032	Cimarron	11040002	1104	36.90952139880	-102.49468726600
1033	Caddo	11130302	1113	35.11041652020	-98.47935877100
1034	Caddo	11130302	1113	35.11288339630	-98.59883995890
1035	Caddo	11130302	1113	35.11403564490	-98.59753304740
1036	Kiowa	11130302	1113	35.11349220830	-98.68141909760
1037	Kiowa	11120302	1112	35.09595413320	-99.37513842000
1038	Kiowa	11120302	1112	35.09938505840	-99.39512542720
1039	Kiowa	11120302	1112	35.10281138120	-99.32109201040
1040	Kiowa	11120302	1112	35.10200662340	-99.39196426640
1041	McClain	11090202	1109	35.14302994900	-97.42678571540
1042	Kiowa	11120302	1112	35.10396872330	-99.39703933880
1043	Kiowa	11120302	1112	35.11605986400	-99.40045419560
1044	McClain	11090202	1109	35.15349965920	-97.44636511990
1045	McClain	11090202	1109	35.16657864180	-97.45210233230
1046	McClain	11090202	1109	35.19952997240	-97.531411102360
1047	McClain	11090202	1109	35.19971664580	-97.52149130450
1048	McClain	11090202	1109	35.20020606290	-97.52857894780
1049	McClain	11090202	1109	35.20105985140	-97.51760975410
1050	McClain	11090202	1109	35.20223762160	-97.51769845350
1051	McClain	11090202	1109	35.20191561250	-97.50640624140
1052	McClain	11090202	1109	35.20233203560	-97.50792730090
1053	McClain	11090202	1109	35.20476996690	-97.52845382170
1054	McClain	11090202	1109	35.20599980070	-97.53108999320
1055	McClain	11090202	1109	35.20695216330	-97.53047860930
1056	Beckham	11120302	1112	35.17860506170	-99.57515360920
1057	Beckham	11120302	1112	35.18374626180	-99.57531968060
1058	Cleveland	11090202	1109	35.23920298220	-97.55513906800
1059	Beckham	11120302	1112	35.19660588780	-99.56539906650
1060	Beckham	11120302	1112	35.19757865460	-99.55345025390
1061	McClain	11090202	1109	35.24919604840	-97.56859118160
1062	McClain	11090202	1109	35.25173682870	-97.56763396130
1063	McClain	11090202	1109	35.26593455320	-97.56522071660
1064	McClain	11090202	1109	35.28392052340	-97.56416401520
1065	McClain	11090202	1109	35.30461237290	-97.58675148190
1066	Beckham	11120302	1112	35.26297749230	-99.56389635450
1067	Beckham	11120302	1112	35.26658868470	-99.56567849590
1068	Washita	11130302	1113	35.30718838210	-98.63140331390
1069	Canadian	11090202	1109	35.33984761690	-97.68102875530
1070	Canadian	11090202	1109	35.35270050400	-97.88954860270
1071	Canadian	11090202	1109	35.35446385450	-97.88944763980
1072	Canadian	11090202	1109	35.35961879590	-97.96561924860
1073	Canadian	11090202	1109	35.35962890950	-97.97596393850
1074	Canadian	11090202	1109	35.36221130530	-97.91507731690
1075	Canadian	11090202	1109	35.36149674280	-97.96862018260
1076	Canadian	11090202	1109	35.36795564590	-97.99179038190
1077	Canadian	11090202	1109	35.37206672650	-98.00909978860
1078	Canadian	11090202	1109	35.37840202190	-98.01087716400
1079	Canadian	11090202	1109	35.37992293420	-98.01525434190
1080	Canadian	11090202	1109	35.38213235610	-98.03662739210
1081	Canadian	11090202	1109	35.38644555290	-98.03033920570
1082	Canadian	11090202	1109	35.40528952010	-98.06598283410
1083	Canadian	11090202	1109	35.40677699840	-98.06835770330
1084	Canadian	11090202	1109	35.40716899370	-98.05828582500
1085	Canadian	11090202	1109	35.42691321370	-98.11104132570
1086	Washita	11130302	1113	35.43133135090	-98.90925598340
1087	Washita	11130302	1113	35.43298295810	-98.89665282140
1088	Washita	11130302	1113	35.43302815120	-98.90047716090
1089	Canadian	11090202	1109	35.44918020100	-98.17718876810

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
1090	Canadian	11090202	1109	35.44997262250	-98.17115418090
1091	Canadian	11090202	1109	35.45094681080	-98.15697941040
1092	Canadian	11090202	1109	35.45209720380	-98.18033159520
1093		11090202	1109	35.45261151100	-98.19295724570
1094	Washita	11130302	1113	35.44483592060	-98.91221990000
1095	Washita	11130302	1113	35.44691131420	-98.90131896610
1096	Washita	11130302	1113	35.44686737320	-98.90357958950
1097	Washita	11130302	1113	35.45124927890	-98.90063354480
1098	Canadian	11090202	1109	35.48261200020	-98.23280442220
1099	Canadian	11090202	1109	35.48372081030	-98.23393301420
1100	Canadian	11090202	1109	35.50157484530	-98.24508877470
1101	Custer	11130302	1113	35.49816159500	-98.95047585460
1102	Canadian	11090202	1109	35.52169327080	-98.26639414540
1103	Canadian	11100301	1110	35.53124333130	-97.72420172720
1104	Canadian	11090202	1109	35.53156013630	-98.28220889660
1105	Canadian	11100301	1110	35.55532603040	-97.92839834550
1106	Canadian	11100301	1110	35.55952964270	-97.98518754550
1107	Blaine	11090201	1109	35.55190590430	-98.44496533170
1108	Blaine	11090202	1109	35.55537612060	-98.35889887500
1109	Ellis	11090201	1109	35.85876294380	-99.69921524310
1110	Blaine	11100301	1110	35.91865871150	-98.50492771330
1111	Blaine	11100301	1110	35.94649433920	-98.52092418410
1112	Blaine	11100301	1110	35.96597048220	-98.51581952120
1113	Ellis	11090201	1109	35.95030208520	-99.51103039140
1114	Blaine	11100301	1110	36.07268606760	-98.56582824030
1115	Woodward	11100301	1110	36.30599717100	-99.11190143470
1116	Woodward	11100301	1110	36.34222954110	-99.19803137730
1117	Woodward	11100301	1110	36.34694838610	-99.20777200000
1118	Woodward	11100301	1110	36.37979465200	-99.20461753700
1119	Woodward	11100301	1110	36.38296831690	-99.20373921430
1120	Woodward	11100203	1110	36.43147627020	-99.58804103550
1121	Woodward	11100203	1110	36.44597367880	-99.58013119280
1122	Woodward	11100203	1110	36.46531178160	-99.57925762050
1123	Woodward	11100203	1110	36.46869818710	-99.58869335860
1124	Woodward	11100301	1110	36.54336957560	-99.44572948820
1125	Woodward	11100301	1110	36.56084851440	-99.44978140270
1126	Woodward	11100301	1110	36.58530104790	-99.46192347110
1127	Harper	11100301	1110	36.59540528640	-99.48646128470
1128	Harper	11100201	1110	36.60878359200	-99.63369031720
1129	Harper	11100201	1110	36.60932902700	-99.63863033460
1130	Harper	11100201	1110	36.62218824380	-99.75976837880
1131	Harper	11100201	1110	36.62748785900	-99.74174333190
1132	Woodward	11050001	1105	36.70401013910	-99.05725767190
1133	Harper	11100201	1110	36.70757106070	-99.85879313470
1134	Harper	11100201	1110	36.71167867840	-99.87042226440
1135	Texas	11100102	1110	36.66744987250	-101.06150629800
1136	Texas	11100102	1110	36.67160314390	-101.08241342300
1137	Beaver	11100102	1110	36.68536670440	-100.94265923100
1138	Harper	11100201	1110	36.72534573410	-99.87759156300
1139	Harper	11100201	1110	36.74028897210	-99.88123767910
1140	Harper	11050001	1105	36.77080671450	-99.32462228390
1141	Harper	11050001	1105	36.77681785930	-99.33307106100
1142	Beaver	11100201	1110	36.78158407000	-100.04725450700
1143	Harper	11100201	1110	36.78636177740	-99.93936908670
1144	Beaver	11100201	1110	36.81525381170	-100.38061565600
1145	Cotton	11130202	1113	34.20808218820	-98.29921101280
1146	Garvin	11130303	1113	34.79222729260	-97.32563186320
1147	Garvin	11130303	1113	34.79688591680	-97.27957876230
1148	Grady	11130303	1113	34.85887984340	-97.69104961900
1149	Grady	11130303	1113	34.84730536110	-97.68168360840
1150	Kiowa	11120303	1112	34.86783114540	-99.16423028700

ID	COUNTY	HUC_8	HUC4	LATITUDE	LONGITUDE
1151	Love	11130201	1113	33.86238268370	-97.34885951040
1152	Tillman	11130102	1113	34.22197616300	-99.10138165570
1153	Tillman	11130102	1113	34.27667061300	-99.18843091920
1154	Tillman	11120303	1112	34.39830868080	-99.21136300660
1155	Jackson	11120303	1112	34.59269607510	-99.11237681990
1156	McClain	11090202	1109	35.13212021060	-97.41328046940
1157	Okfuskee	11100303	1110	35.62128771830	-96.33816153580
1158	Johnston	11130304	1113	34.20386655890	-96.75615515150
1159	Johnston	11130304	1113	34.20484302520	-96.74181914200
1160	Okmulgee	11100303	1110	35.57526084990	-96.01055479280
1161	Washington	11070106	1107	36.97532660250	-95.93724446690
1162	Washington	11070106	1107	36.97837690120	-95.93762516290
1163	Osage	11070106	1107	36.97992562770	-96.21133626980
1164	Osage	11070106	1107	36.99540685230	-96.24820901640
1165	Osage	11070106	1107	36.96665575260	-96.18963927600
1166	Osage	11070106	1107	36.98965051040	-96.24088272600
1167	Pottawatamie	11100303	1110	35.42737280700	-97.07085966360