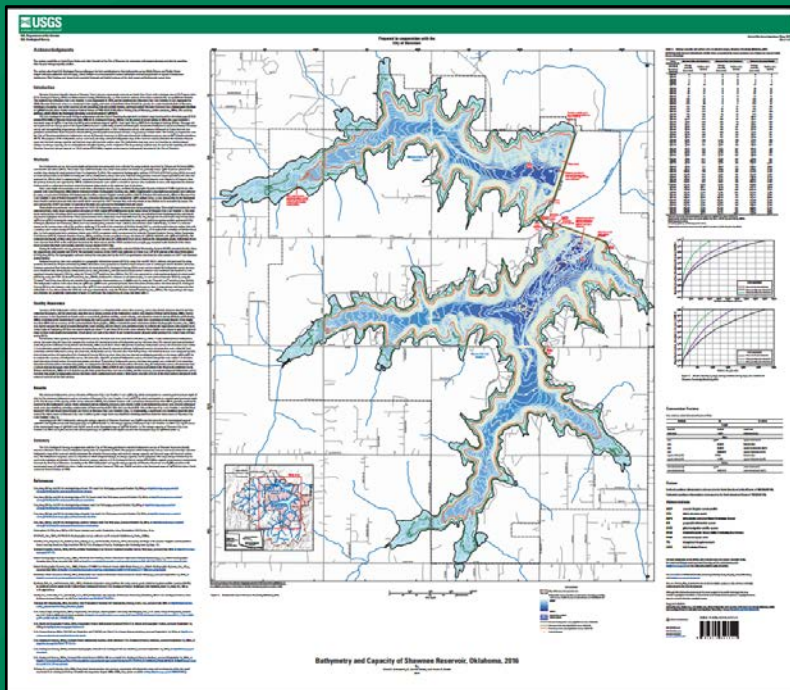


Shawnee Twin Lakes Bathymetric Survey, 2016: Map report, data release, and web-mapping application

Developed in partnership with
the City of Shawnee



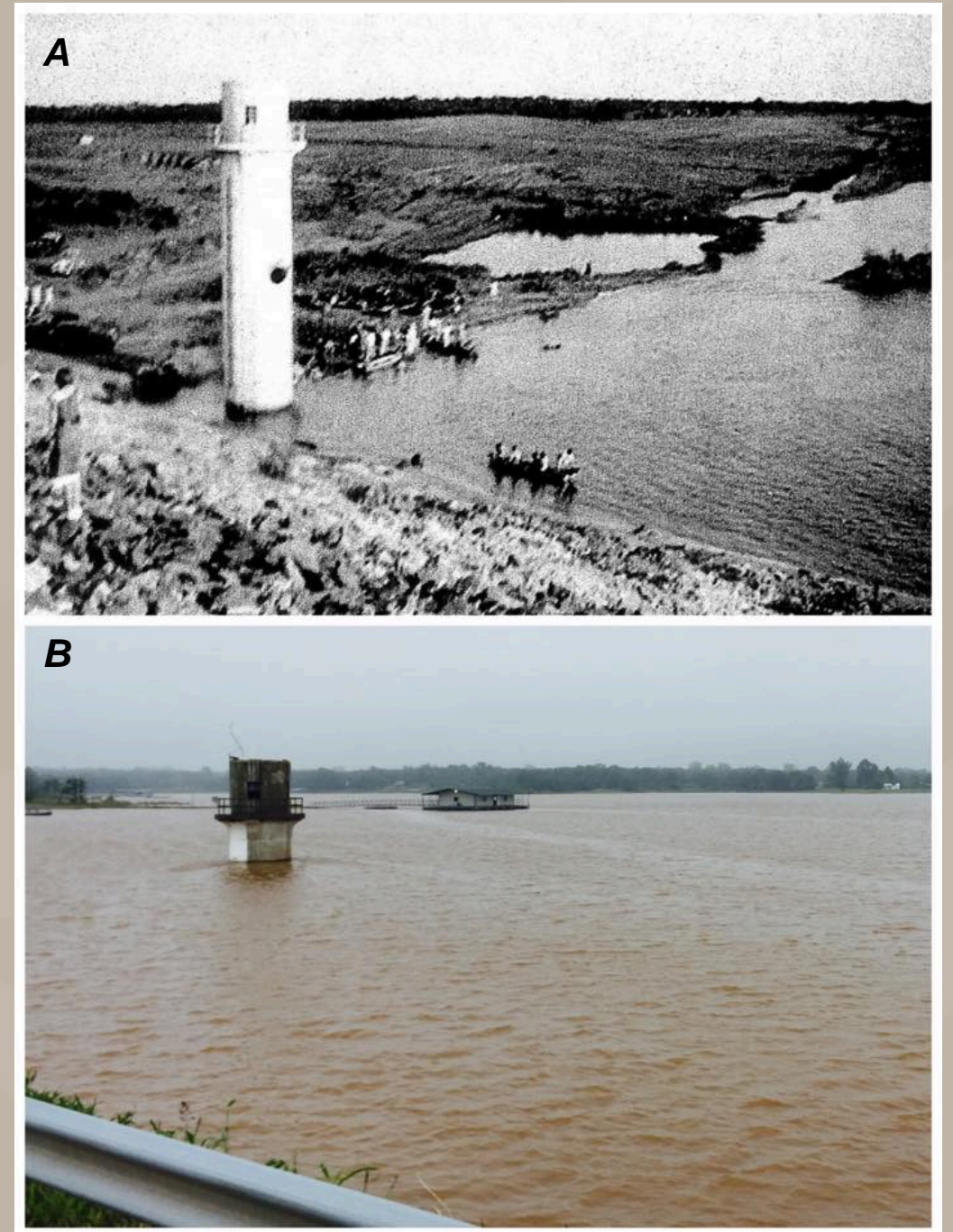
USGS Scientific Investigations Map 3374

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S. Jerrod Smith sjsmith@usgs.gov
Kevin A. Smith kevsmith@usgs.gov

Project Summary

PROJECT OBJECTIVES:

- ✔ Publish a detailed bathymetric map of Shawnee Twin Lakes
- ✔ Find the relation between:
 - Lake stage and surface area
 - Lake stage and storage
- ✔ Publish all survey data
- ✔ Develop a web mapping application to easily view bathymetric data in context



Shawnee Twin Lake #1 intake tower,
circa 1936 (A) and 2015 (B)

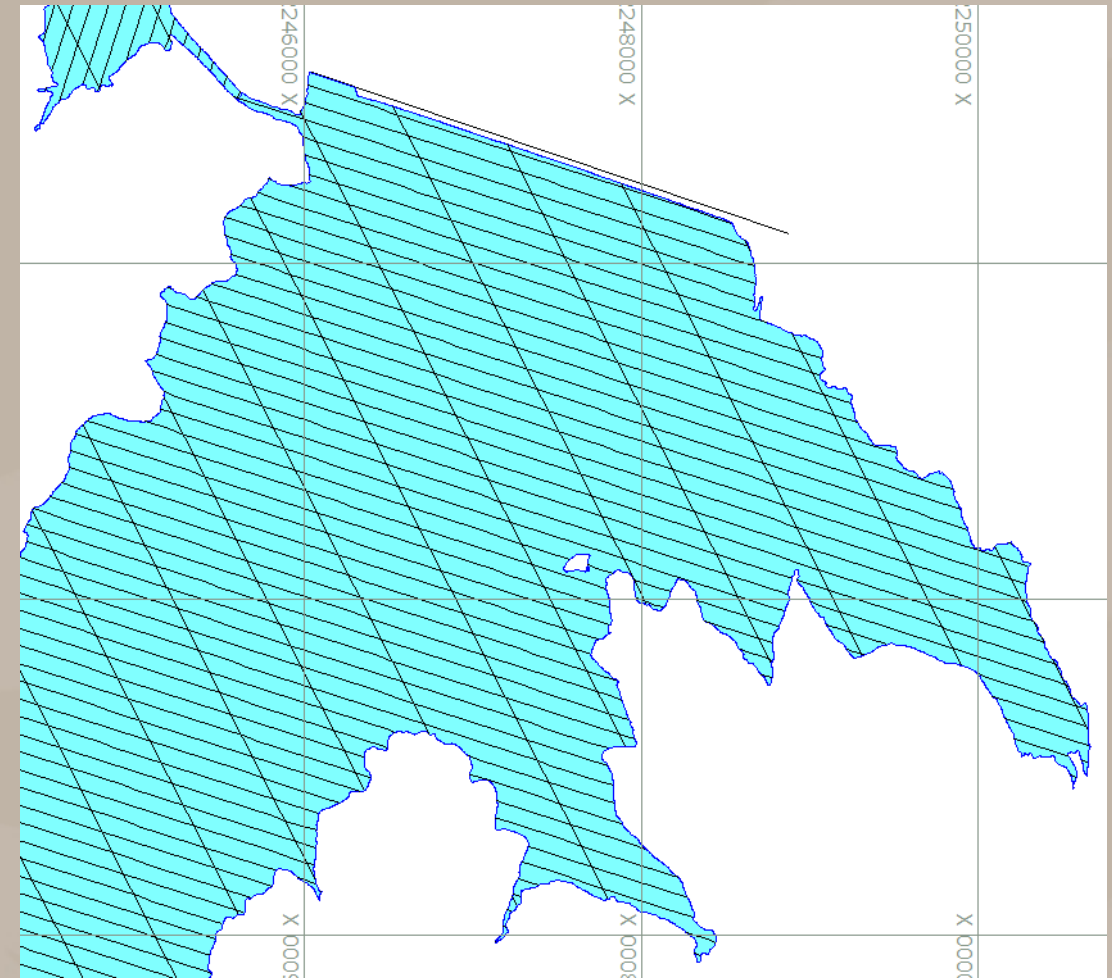
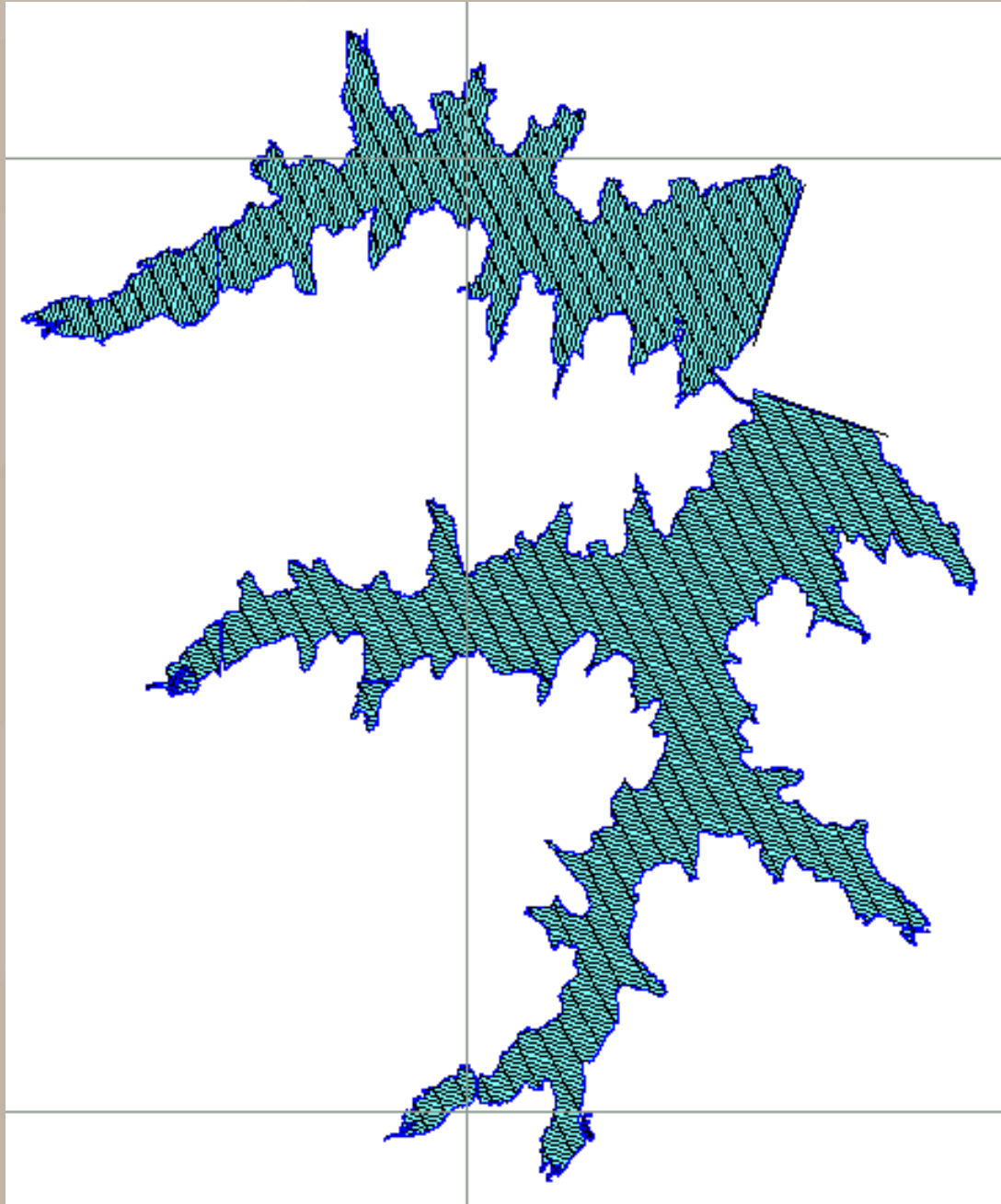
Project Summary

PROJECT SCOPE AND TIMELINE:

- Shawnee Twin Lakes, areas below 1,080.0' (NAVD 88)
 - about 5-feet above spillway altitude (1,075.0')
 - about 2-feet above stage of record (1,078.1'; May 24, 2015)
- Jun. 1, 2016 to Mar. 31, 2017
- Bathymetric survey performed Jun. 21 to Sep. 7, 2016
- Final report and data published Feb. 13, 2017

Project Methods

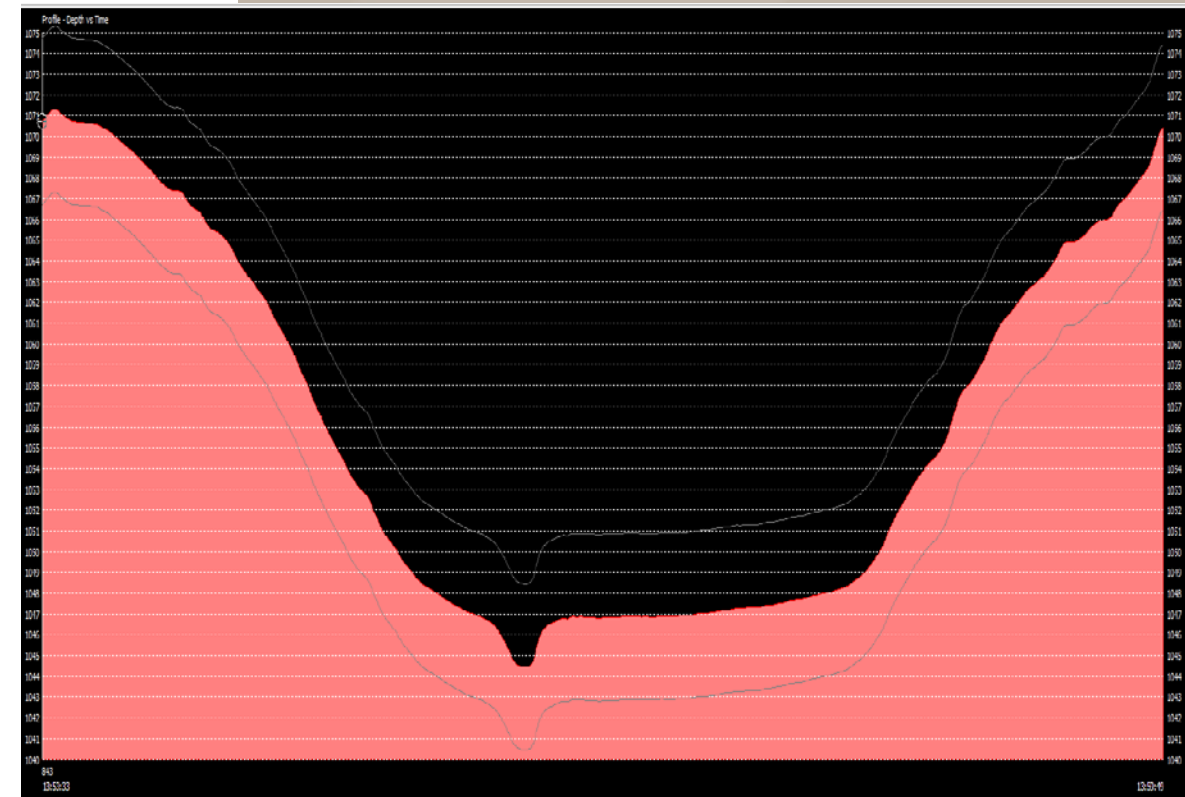
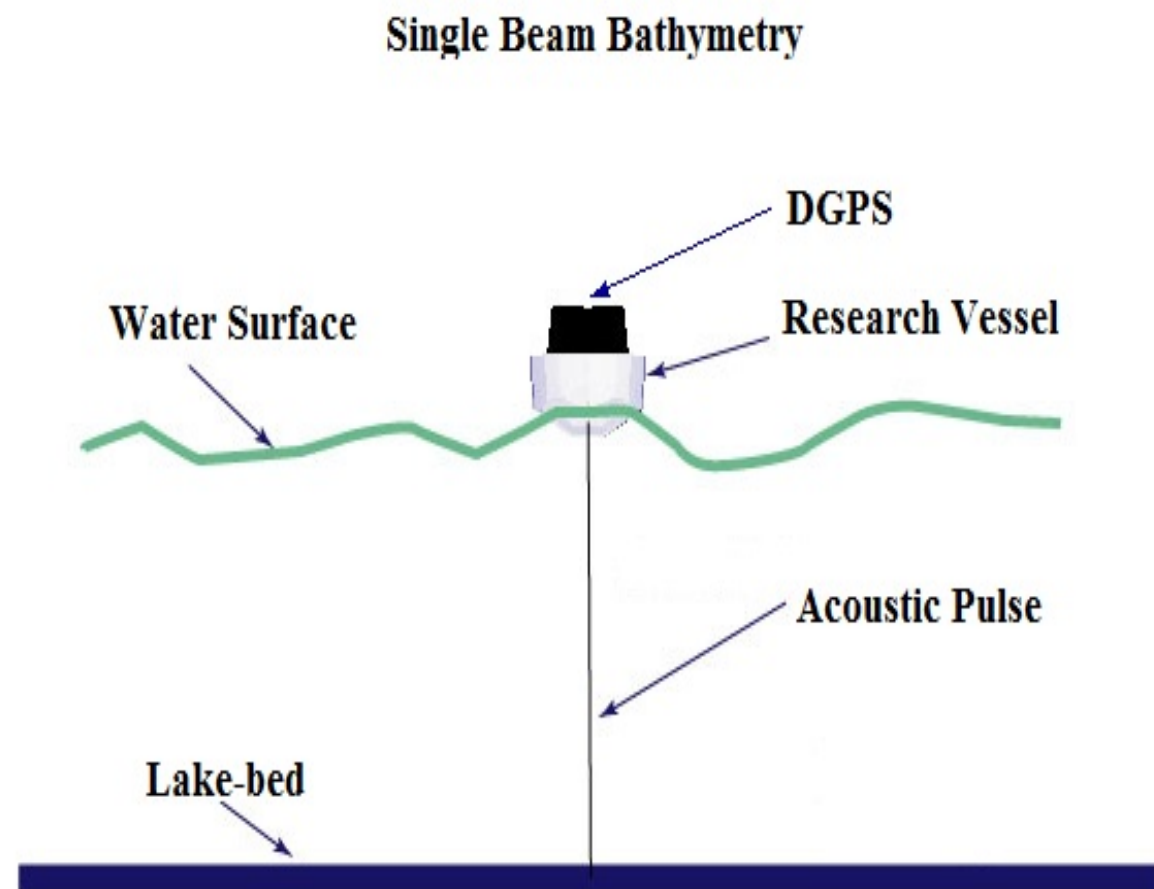
BATHYMETRIC COVERAGE:



- 100-foot spacing parallel to dam; 500-foot spacing 45° from dam
- Additional areas (submerged roads) surveyed in more detail
- Survey point about every foot

Project Methods:

EQUIPMENT:



Project Results

MAJOR FINDINGS:

Stage (water-surface altitude), in feet above NAVD 88)	Shawnee Twin Lake Number 1		Shawnee Twin Lake Number 2		Shawnee Twin Lakes (Total)	
	Storage capacity (acre-feet)	Surface area (acres)	Storage capacity (acre-feet)	Surface area (acres)	Storage capacity (acre-feet)	Surface area (acres)
1,059 (min)	7,203	614	2,706	289	9,909	904
1,069 (normal)	15,234	1,032	6,863	568	22,096	1,600
1,075 (flood)	22,336	1,347	10,884	789	33,220	2,136
1,078 (max)	26,632	1,536	13,463	941	40,095	2,477

[NAVD 88, North American Vertical Datum of 1988; Only selected stages are shown; Values are rounded to the nearest acre-foot or acre; columns may not sum to total because of rounding]

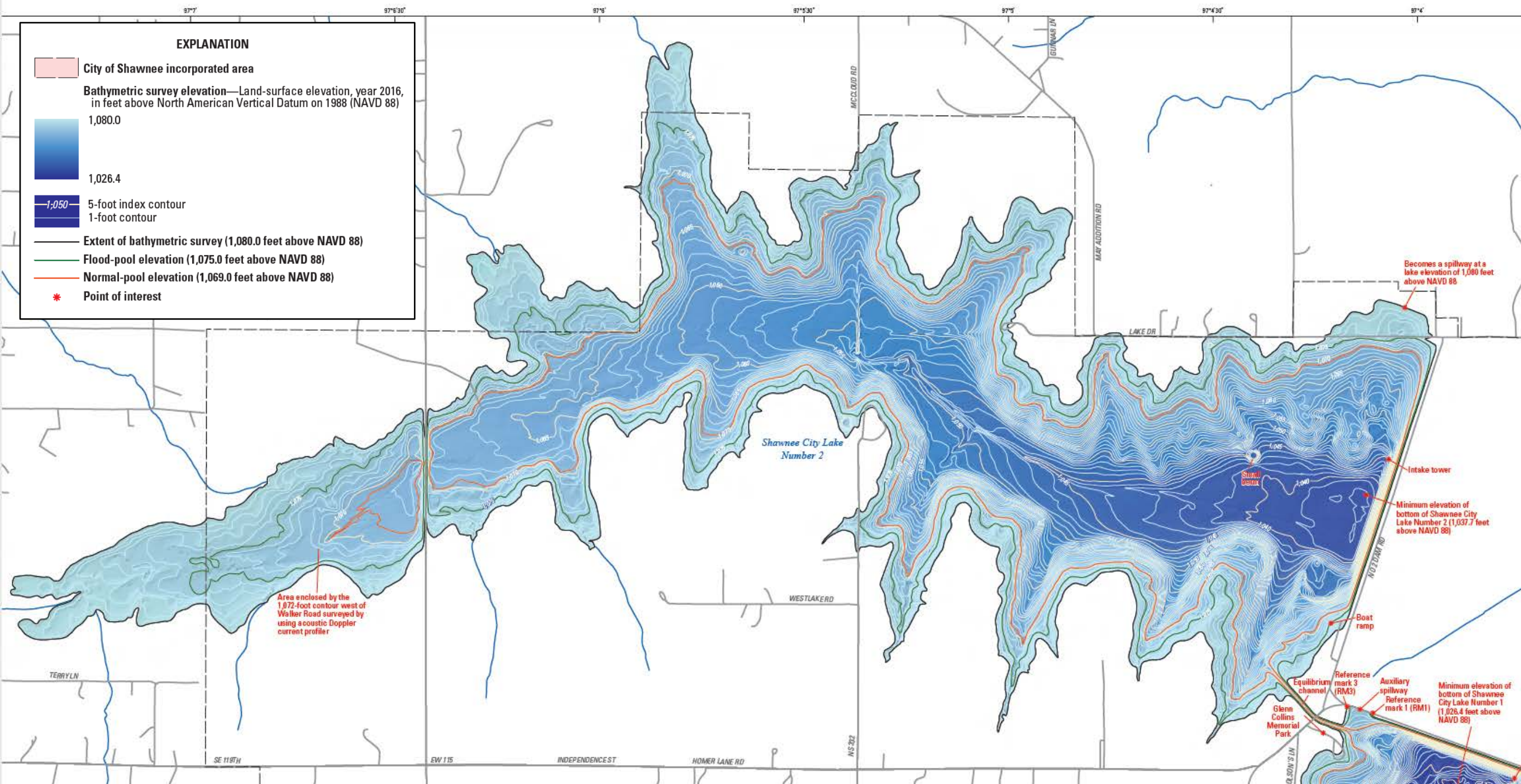
Project Results

PRODUCTS:

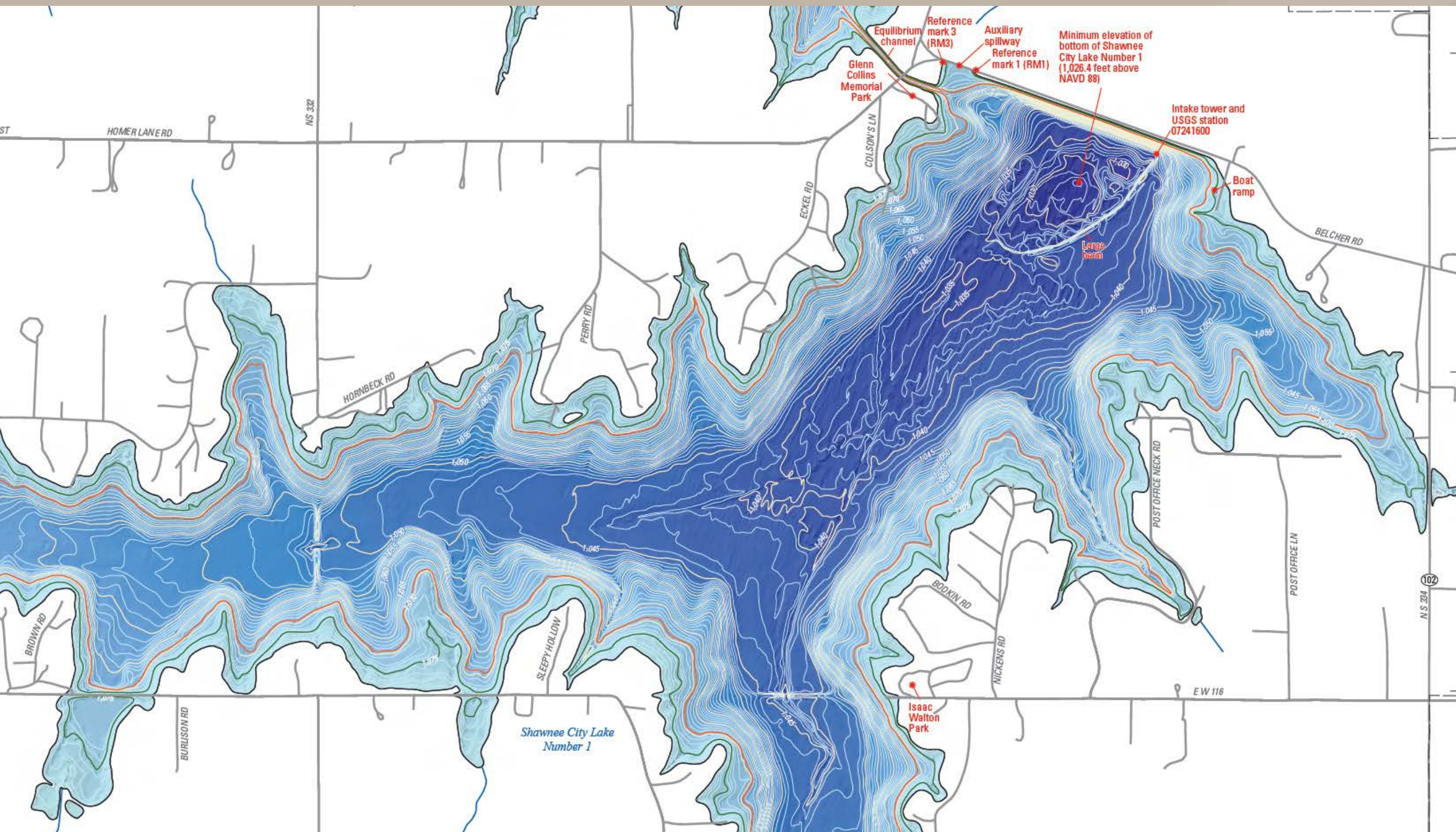
- Peer-reviewed USGS report documenting methods and results: Scientific Investigations Map (SIM) 3374
<https://dx.doi.org/10.3133/sim3374>
- Peer-reviewed data release: survey points and contours
<https://doi.org/10.5066/F72805SC>
- Updated stage-storage relation for real-time lake gage:
https://waterdata.usgs.gov/nwis/uv/?site_no=07241600
- Web-mapping application and web services:
<https://www.usgs.gov/apps/okwsc/shawnee/>

Map Report

Prepared in cooperation with the
City of Shawnee



Map Report



Data Release

- Survey points (nearly 1 million), contours, and breaklines available for download as shapefiles
- Gridded bathymetry image available for download as ASCII raster
- All data are fully documented with FGDC-standard metadata records

USGS ScienceBase-Catalog Communities Help Log in

ScienceBase Catalog → USGS Data Re... → Bathymetry an...

Bathymetry and Capacity of Shawnee Reservoir, Oklahoma, 2016

Go to View

Shapefile: [ShawneeBathymetry2016_Contours.zip](#)

ShawneeBathymetry2016_Contours.cpg	5 Bytes
ShawneeBathymetry2016_Contours.dbf	6.87 KB
ShawneeBathymetry2016_Contours.prj	557 Bytes
ShawneeBathymetry2016_Contours.sbn	2.29 KB
ShawneeBathymetry2016_Contours.sbx	268 Bytes
ShawneeBathymetry2016_Contours.shp	6.51 MB
ShawneeBathymetry2016_Contours.shx	1.89 KB
ShawneeBathymetry2016_Contours.shp.xml <i>Original FGDC Metadata</i>	18.12 KB View

Shapefile: [ShawneeBathymetry2016_SurveyPoints.zip](#)

ShawneeBathymetry2016_SurveyPoints.cpg	5 Bytes
ShawneeBathymetry2016_SurveyPoints.dbf	200.07 MB
ShawneeBathymetry2016_SurveyPoints.prj	557 Bytes
ShawneeBathymetry2016_SurveyPoints.sbn	8.49 MB
ShawneeBathymetry2016_SurveyPoints.sbx	107.39 KB
ShawneeBathymetry2016_SurveyPoints.shp	43.8 MB
ShawneeBathymetry2016_SurveyPoints.shx	7.96 MB
ShawneeBathymetry2016_SurveyPoints.shp.xml <i>Original FGDC Metadata</i>	20.07 KB View

Stage-Storage Relation

- Storage and area reported for each lake individually and in total
- Normal-pool (1,069') storage: 22,096 acre-feet
- Flood-pool (1,075') storage: 33,220 acre-feet

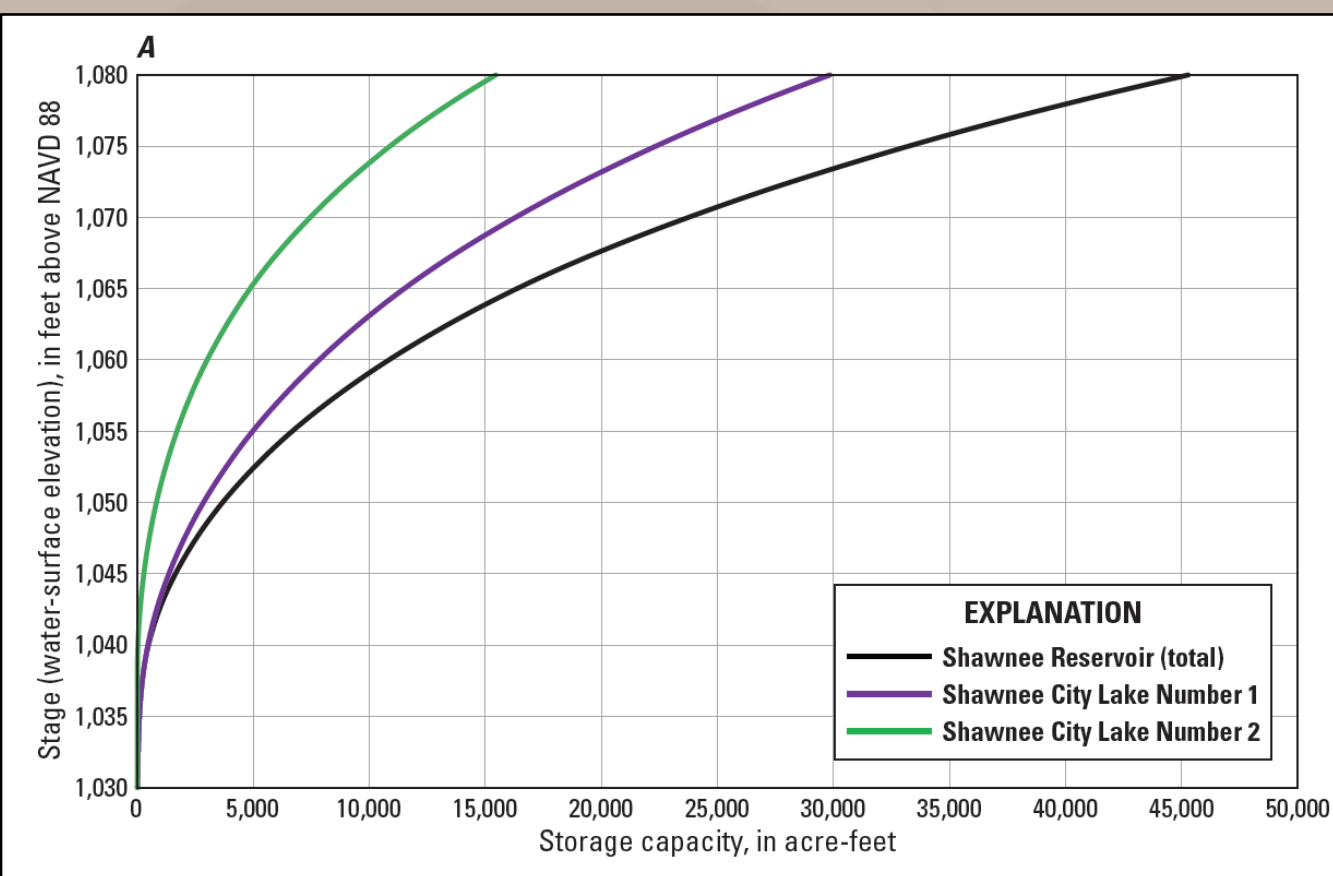


Table 1. Storage capacity and surface area at selected stages, Shawnee Reservoir, Oklahoma, 2016.

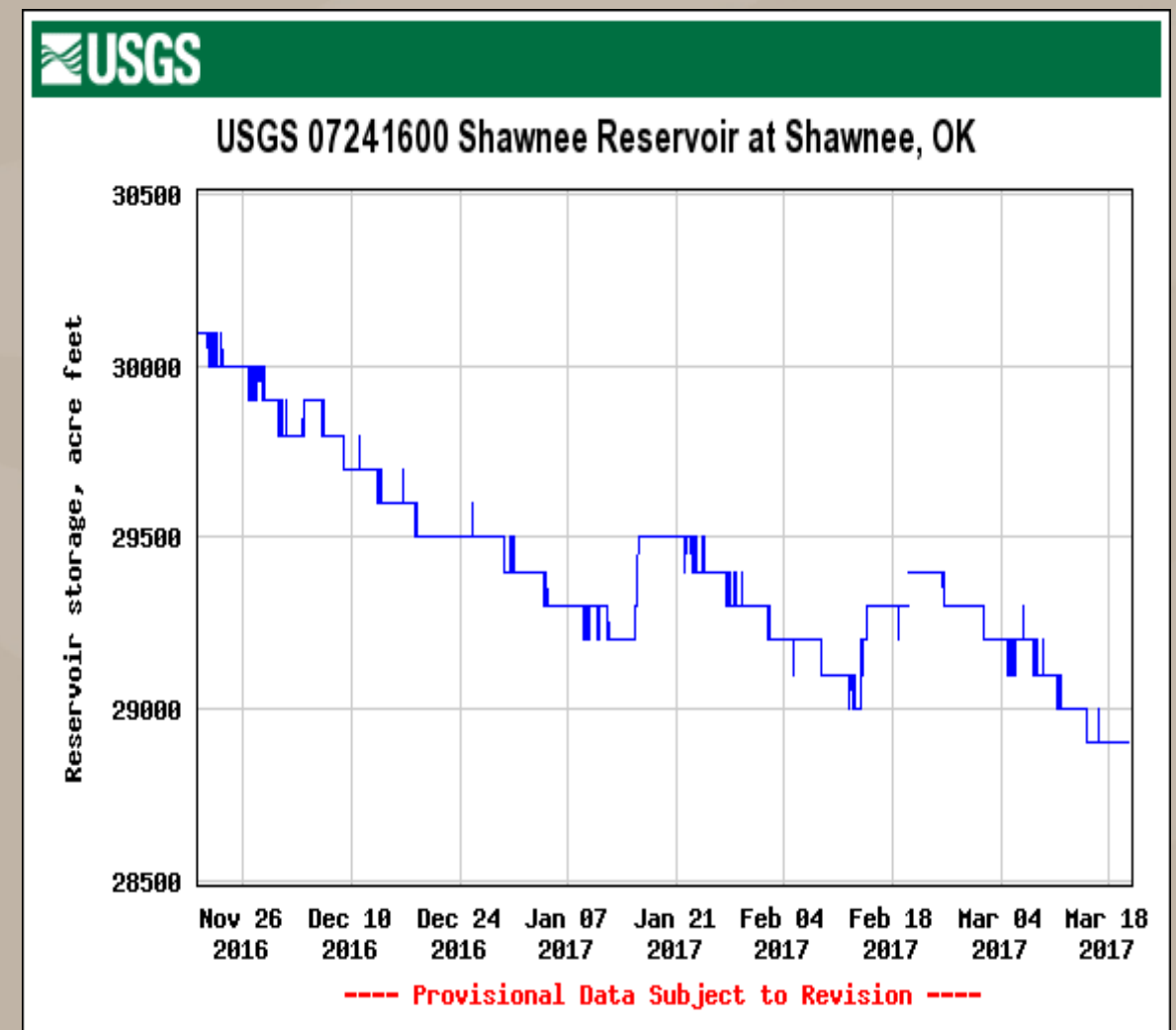
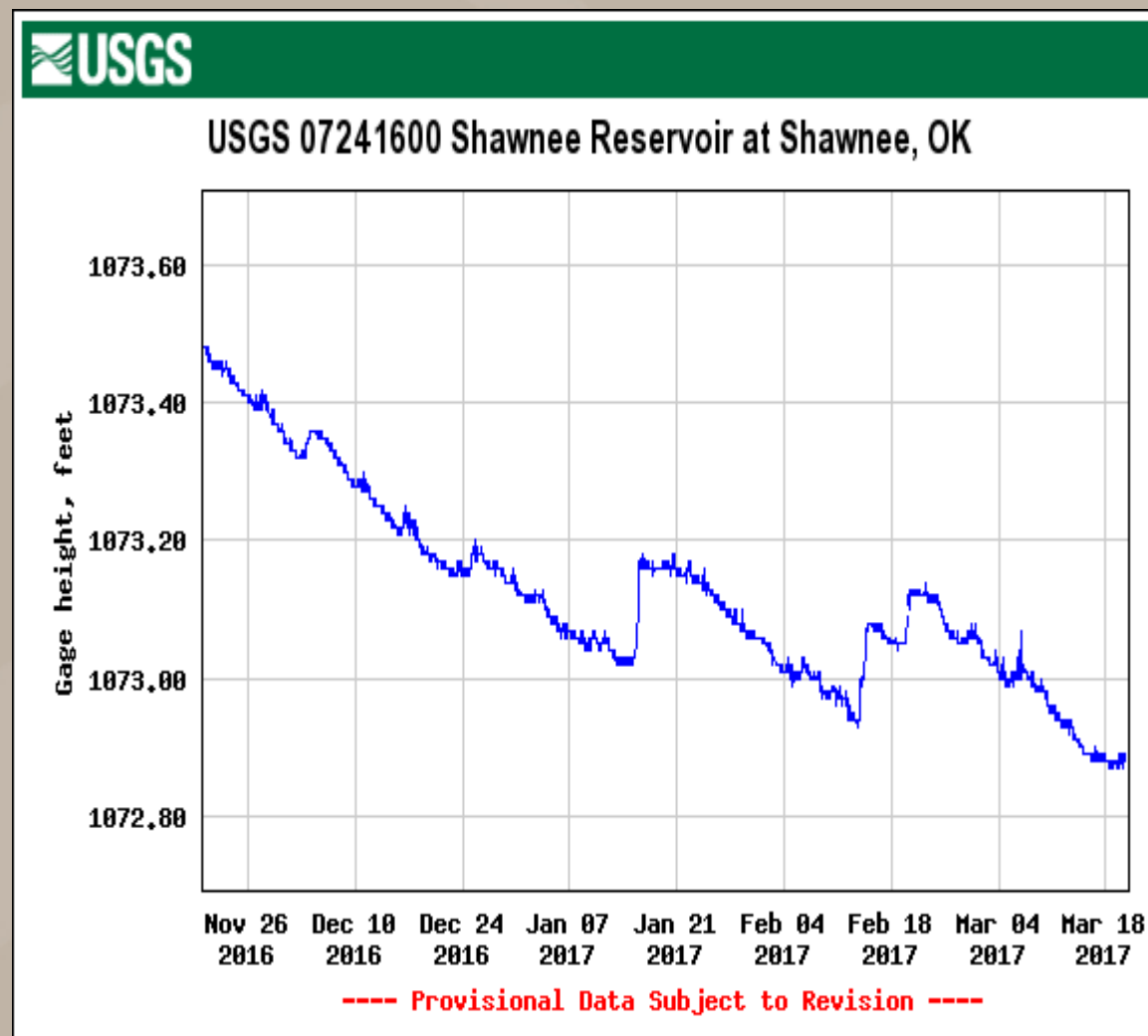
[NAVD 88, North American Vertical Datum of 1988. Values are rounded to the nearest acre-foot or acre. Columns may not sum to total because of rounding]

Stage (water-surface elevation; feet above NAVD 88)	Shawnee City Lake Number 1		Shawnee City Lake Number 2		Shawnee Reservoir (total)	
	Storage capacity (acre-feet)	Surface area (acres)	Storage capacity (acre-feet)	Surface area (acres)	Storage capacity (acre-feet)	Surface area (acres)
1,027.0	0	0	0	0	0	0
1,028.0	1	2	0	0	1	2
1,029.0	3	4	0	0	3	4
1,030.0	9	7	0	0	9	7
1,031.0	18	10	0	0	18	10
1,032.0	30	14	0	0	30	14
1,033.0	46	18	0	0	46	18
1,034.0	65	21	0	0	65	21
1,035.0	91	31	0	0	91	31
1,036.0	129	46	0	0	129	46
1,037.0	183	62	0	0	183	62
1,038.0	253	80	0	2	253	81
1,039.0	344	102	8	14	352	116
1,040.0	456	123	26	25	483	147
1,041.0	591	145	56	35	647	180
1,042.0	746	166	96	46	843	212
1,043.0	926	195	147	55	1,073	250
1,044.0	1,133	218	208	69	1,341	287
1,045.0	1,362	240	282	79	1,645	320
1,046.0	1,614	262	367	90	1,981	352
1,047.0	1,888	285	462	101	2,350	386
1,048.0	2,183	308	569	114	2,753	422
1,049.0	2,504	333	690	128	3,195	461
1,050.0	2,850	360	824	140	3,675	501
1,051.0	3,224	387	971	154	4,196	541
1,052.0	3,624	410	1,133	170	4,757	580
1,053.0	4,044	431	1,310	184	5,354	616
1,054.0	4,490	464	1,501	198	5,992	661
1,055.0	4,971	497	1,707	213	6,678	710
1,056.0	5,484	529	1,929	231	7,412	760
1,057.0	6,029	560	2,169	249	8,198	809
1,058.0	6,602	587	2,427	268	9,030	855
1,059.0	7,203	614	2,706	289	9,909	904
1,060.0	7,832	644	3,007	314	10,839	958
1,061.0	8,492	676	3,332	336	11,824	1,012
1,062.0	9,186	711	3,678	357	12,864	1,068
1,063.0	9,915	749	4,046	380	13,961	1,128
1,064.0	10,684	790	4,438	403	15,122	1,193
1,065.0	11,495	833	4,854	431	16,349	1,264
1,066.0	12,352	883	5,304	468	17,656	1,352
1,067.0	13,262	936	5,791	505	19,052	1,440
1,068.0	14,224	987	6,311	536	20,535	1,523
1,069.0	15,234	1,032	6,863	568	22,096	1,600
1,070.0	16,289	1,077	7,446	599	23,735	1,676
1,071.0	17,390	1,126	8,059	628	25,449	1,754
1,072.0	18,542	1,191	8,704	671	27,246	1,862
1,073.0	19,758	1,243	9,396	712	29,154	1,955
1,074.0	21,021	1,293	10,123	745	31,144	2,038
1,075.0	22,336	1,347	10,884	789	33,220	2,136
1,076.0	23,707	1,401	11,692	838	35,399	2,238
1,077.0	25,136	1,466	12,552	889	37,687	2,356
1,078.0	26,632	1,536	13,463	941	40,095	2,477
1,079.0	28,200	1,606	14,427	995	42,627	2,601
1,080.0	29,836	1,657	15,445	1,033	45,280	2,690

Real-Time Stage-Storage Relation

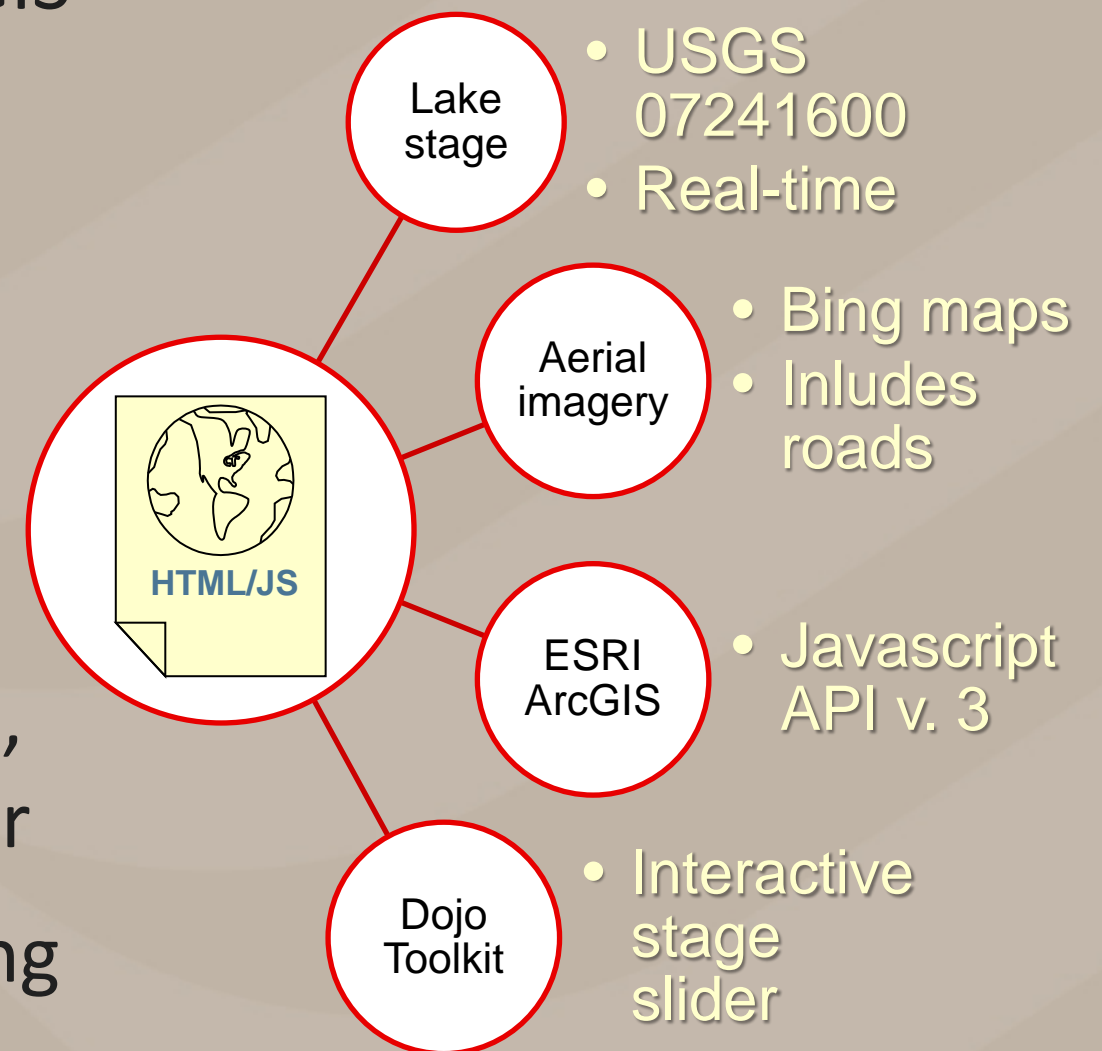
- Stage, storage, and weather data are reported in real time at USGS station 07241600

https://waterdata.usgs.gov/nwis/uv?site_no=07241600



Web Mapping Application

- Utilizes HTML, JavaScript, ESRI ArcGIS Javascript API, Dojo Toolkit
- Toggle layers showing:
 - Contours
 - Inundation area
 - Survey transects
- Works without a plugin in Chrome*, Safari, Firefox, and Internet Explorer
- Not yet optimized for mobile viewing
- Real-time stage and storage updated hourly



Web Mapping Application

Contents Symbols Tools/Help

- ☒ Bathymetric Survey Contours, June 21 - September 7, 2016 [\[data\]](#)
- ☒ OWRB lake features
- ☒ Bathymetric Survey Transects [\[data\]](#)
- ☒ Points of interest (*clickable*)
- ☒ Shawnee Twin Lakes: at stage of 1075 feet [NAVD88](#)

1080
1078 period max
1076 flood pool
1074
1072
1070 normal pool
1068
1066
1064
1062
1060
1058 period min
1056
1054
1052
1050
1048
1046
1044

1,073

Shawnee Reservoir current storage is 28900 acre-feet at a stage of 1072.89 feet, 2017-03-20 10:00 CDT

Points of interest

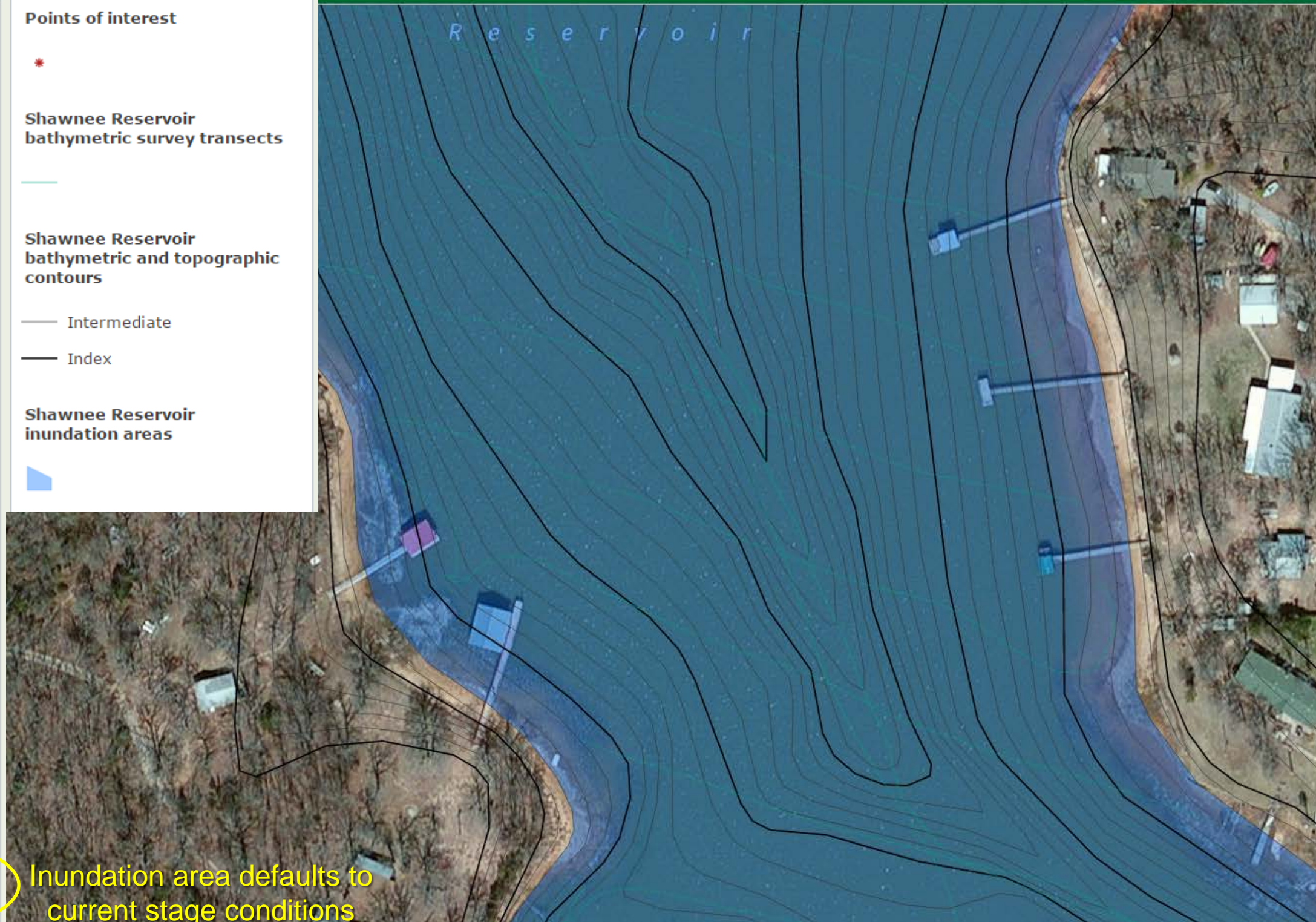
-

Shawnee Reservoir bathymetric survey transects

Shawnee Reservoir bathymetric and topographic contours

- Intermediate
- Index

Shawnee Reservoir inundation areas

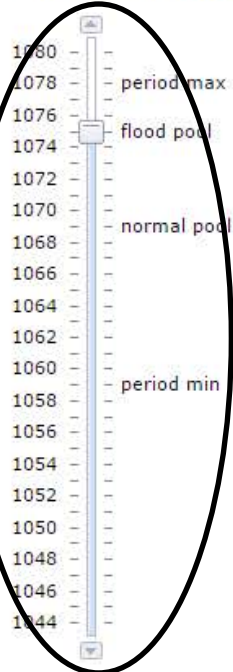


Web Mapping Application

USGS Shawnee Twin Lakes Data Viewer

Contents Symbols Tools/Help

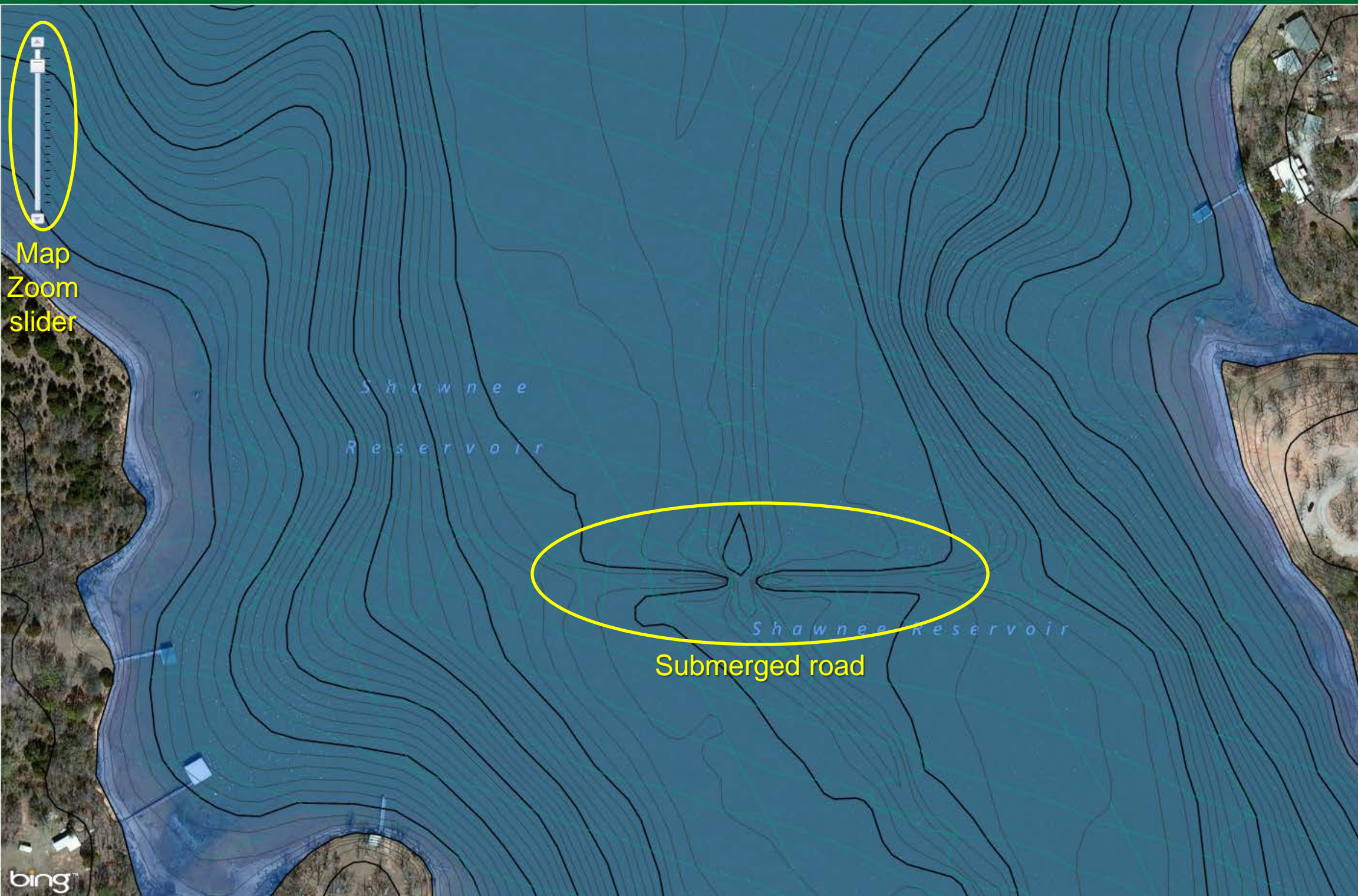
- ☒ Bathymetric Survey Contours, June 21 - September 7, 2016 [\[data\]](#)
- ☒ OWRB lake features
- ☒ Bathymetric Survey Transects [\[data\]](#)
- ☒ Points of interest (clickable)
- ☒ Shawnee Twin Lakes: at stage of 1075 feet [NAVD88](#)



Stage slider:
Changing the
stage auto-
updates the
inundation area



Map
Zoom
slider



Submerged road

Demonstration

Shawnee Twin Lakes web-mapping application:

<https://www.usgs.gov/apps/okwsc/shawnee/>

Shawnee Twin Lakes bathymetric survey report and data:

<https://doi.org/10.3133/sim3374>

