Delisting Reports Justifying the Removal of Waterbodies from the 2018 Impaired Waters List

Date of Report: April 2018

Background:

The Arizona Department of Environmental Quality is required by Section 303(d) of the Clean Water Act to submit to the Environmental Protection Agency a list of impaired waters every two years. The following waterbodies were included in the 2016 Impaired Water's List and are proposed to be delisted as part of the 2018 Impaired Waters List. A waterbody/pollutant can be removed from the 303(d) List (delisted) if the requirements in Arizona Administrative Code R18-11-605(E)(2) are met, which are paraphrased below.

- A TMDL has been approved
- New data show that surface water standards are met and samples represent critical conditions and critical locations;
- New surface water quality criterion or designated use;
- New assessment methods or change in implementation procedures for narrative standards;
- Naturally occurring conditions are shown to be the sole cause of not meeting the water quality criterion; or
- Reevaluation of the assessment information indicates an error or deficiency in the original analysis resulted in an inappropriate listing.

TELEPHONE LAKE (15020005-1500)

Impairment: Ammonia (2010)
Impairment Year: 2010
Designated Uses: Aquatic and Wildlife (Effluent Dependent Water)
Applicable Standards: Ammonia

Justification: Army Corp of Engineers completed an Approved Jurisdictional Determination on 6/14/17 that this waterbody is not a waters of the United States.

PINTAIL LAKE (15020005-5000)

Impairment: Ammonia (2010)
Impairment Year: 2010
Designated Uses: Aquatic and Wildlife (Effluent Dependent Water)
Applicable Standards: Ammonia

Justification: Army Corp of Engineers completed an Approved Jurisdictional Determination on 6/14/17 that this waterbody is not a waters of the United States.

COLORADO RIVER (15030101-0015)

Impairment: Selenium (2004)
Impairment Year: 2004
Designated Uses: Aquatic and Wildlife (Warmwater Fishery)

ED_013248_00001246-00001

Applicable Standards: Selenium

Justification: No selenium exceedances in 3 samples. Selenium collected from Willow Beach Fish Hatchery at same location as original exceedance. 2010 assessment had the wrong WBID listed (15030101-0960) and should have used 15030101-015. AZPDES Permit AZ0000132 took selenium out of the Willow Beach Fish Hatchery permit in 2016 because 'data indicate [selenium] levels are consistently below the standard…'. The Aquatic and Warmwater chronic standard is 2 ug/L. The delist rule from the technical manual http://static.azdeq.gov/wqd/wqa/2016_cwaa_final.pdf for chronic selenium is "No exceedances during the assessment period and parameter of concern samples were collected".

Data collected since 7/1/2012

WBID	STATION_CD	STATION_ALT_NAME	ACTIVITY_END_DATE	COLLECTING_AGENCY	Depth	CAS_QUALIFIER_NAME	LAB_RESULT	LAB_RESULT_UNIT	LAB_QA_FLAGS	SUBSTANCE_NAME	LAB_METHOD	DETECTION_LIMIT	DETECTION_LIMIT_UNIT
15030101-015	CLMOHWBFH	WILLOW BEACH FISH HATCHERY	2/5/13	USFWS		TOTAL			ND	SELENIUM	EPA 200.9	0.002	MG/L
15030101-015	CLMOHWBFH	WILLOW BEACH FISH HATCHERY	10/15/13	USFWS		TOTAL			ND	SELENIUM	EPA 200.9	0.002	MG/L
15030101-015	CLMOHWBFH	WILLOW BEACH FISH HATCHERY	11/4/14	USFWS		TOTAL			ND	SELENIUM	EPA 200.9	0.002	MG/L

LAKE MOHAVE (15030101-0960)

Impairment: Selenium (2010)
Impairment Year: 2010
Designated Uses: Aquatic and Wildlife (Warmwater Fishery)
Applicable Standards: Selenium

Justification: No selenium exceedances in 3 samples. Selenium ranged from 1.6 to 2.0 (at but not above the standard). The Aquatic and Warmwater chronic standard is 2 ug/L. The delist rule from the technical manual http://static.azdeq.gov/wqd/wqa/2016_cwaa_final.pdf for chronic selenium is "No exceedances during the assessment period and parameter of concern samples were collected".

Data collected since 7/1/2012

WBID	STATION_CD	STATION_ALT_NAME	ACTIVITY_END_DATE	COLLECTING_AGENCY	Depth	CAS_QUALIFIER_NAME	LAB_RESULT	LAB_RESULT_UNIT	LAB_QA_FLAGS	SUBSTANCE_NAME	LAB_METHOD	DETECTION_LIMIT	DETECTION_LIMIT_UNIT
15030101-0960	CLMOH-A	LAKE MOHAVE - AT DAVIS DAM USGS 09422500	12/5/2016	ADEQ	7.6	TOTAL	0.0016	MG/L		SELENIUM	EPA 200.8	0.0005	MG/L
15030101-0960	CLMOH-A	LAKE MOHAVE - AT DAVIS DAM USGS 09422500	11/30/2017	ADEQ	0	TOTAL	0.0020	MG/L		SELENIUM	EPA 200.8	0.0001	MG/L
15030101-0960	CLMOH-A	LAKE MOHAVE - AT DAVIS DAM USGS 09422500	3/6/2017	ADEQ	10	TOTAL	0.0017	MG/L		SELENIUM	EPA 200.8	0.0005	MG/L

CAVE CREEK (15040006-852A)

Impairment: Selenium (2004)
Impairment Year: 2004

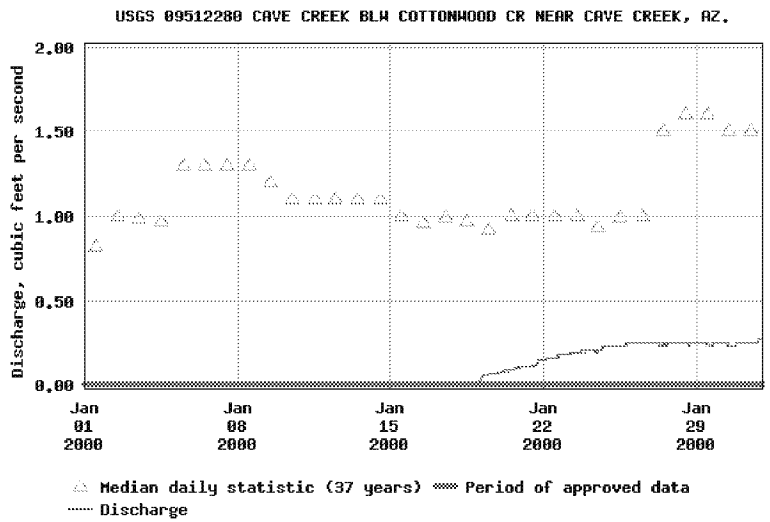
Designated Uses: Aquatic and Wildlife (Coldwater Fishery)
Applicable Standards: Selenium

Justification: No selenium exceedances in 11 samples exceeded (all non-detect). The delist rule for selenium is 'no exceedances during the assessment period and parameter of concern samples collected'. The delist rule from the technical manual http://static.azdeq.gov/wqd/wqa/2016_cwaa_final.pdf for chronic selenium is "No exceedances during the assessment period and parameter of concern samples were collected"Critical conditions were at baseflow. Samples collected were collected at or near baseflow conditions.

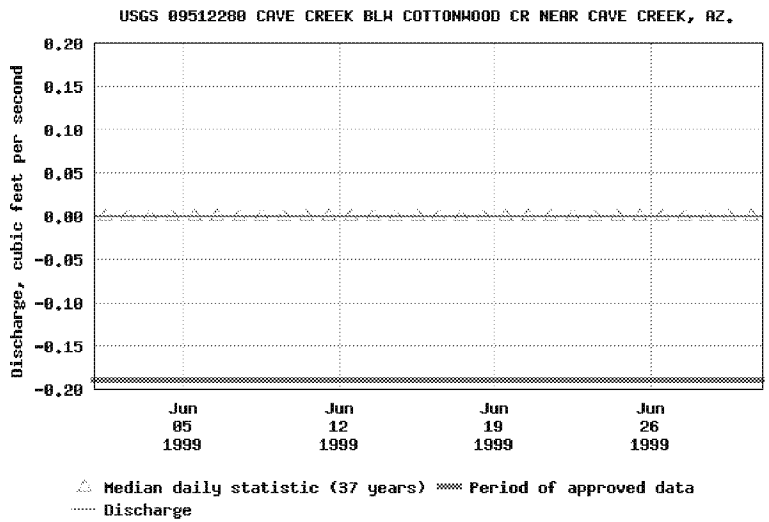
Flow conditions for Original Exceedance / Impairment

Cave Creek was originally listed in the 2004 assessment based on two selenium exceedances which occurred on 6/14/1999 and 1/24/2000.

Discharge, cubic feet per second
Most recent instantaneous value: 0.00 12-07-2017 15:15 MST



Discharge, cubic feet per second
Most recent instantaneous value: 0.00 12-07-2017 15:15 MST



Data collected since 7/1/2012

WBID	STATION_CD	STATION_ALT_NAME	ACTIVITY_END_DATE	COLLECTING_AGENCY	Depth	CAS_QUALIFIER_NAME	LAB_RESULT	LAB_RESULT_UNIT	LAB_QA_FLAGS	SUBSTANCE_NAME	LAB_METHOD	DETECTION_LIMIT	DETECTION_LIMIT_UNIT
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	9/10/2014	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.004	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	11/24/2014	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	2/9/2015	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	6/16/2015	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L

WBID	STATION_CD	STATION_ALT_NAME	ACTIVITY_END_DATE	COLLECTING_AGENCY	Depth	CAS_QUALIFIER_NAME	LAB_RESULT	LAB_RESULT_UNIT	LAB_QA_FLAGS	SUBSTANCE_NAME	LAB_METHOD	DETECTION_LIMIT	DETECTION_LIMIT_UNIT
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	8/23/2016	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.0005	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	11/30/2016	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.0005	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	3/1/2017	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.0005	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	6/1/2017	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.0001	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	7/18/2017	ADEQ		TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.0001	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	10/2/2017	ADEQ		TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	1/8/2018	ADEQ		TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.0001	MG/L
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	9/10/2014	ADEQ		OTHER	4.5	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	11/24/2014	ADEQ		OTHER	0.51	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	2/9/2015	ADEQ		OTHER	0.7	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	6/16/2015	ADEQ		OTHER	0.108	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	8/23/2016	ADEQ		OTHER	2.3	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	11/30/2016	ADEQ		OTHER	0.23	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	3/1/2017	ADEQ		OTHER	1.5	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	6/1/2017	ADEQ		OTHER	0.07	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	7/18/2017	ADEQ		OTHER	0.1	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	10/2/2017	ADEQ		OTHER	0.23	CFS		FLOW	FIELD		
15040006-852A	UGCAV016.84	CAVE CREEK - ABOVE HERB MARTYR CAMPGROUND	1/8/2018	ADEQ		OTHER	0.12	CFS		FLOW	FIELD		

DELIST REPORT FOR MINERAL CREEK (MIN) (15050100-012C)

Impairment: Dissolved copper (1992), selenium (2004) and Dissolved Oxygen (2006/8)
Impairment Year: Multiple
Designated Uses: Aquatic and Wildlife (Warmwater Fishery)
Applicable Standards: Copper, Dissolved Oxygen, Selenium

Justification: Mineral creek is diverted through a tunnel at Ray mine. The aquatic and wildlife designated use was changed and approved by EPA in the 2016 triennial review. The copper, dissolved oxygen and selenium exceedances through the tunnel were for the aquatic life use and therefore do not apply.

ROSE CANYON LAKE (15050302-1260)

Impairment: Low pH (EPA 2004)
Impairment Year: 2004
Designated Uses: Aquatic and Wildlife cold water (A&Wc), Full Body Contact (FBC), Fish Consumption (FC), and Agriculture Livestock (AgL)
Applicable Standards:

The standard for pH includes minimum and maximum values by designated use (A.A.C. R18-11-109(B)).

pH	FBC / A&W / AgL
Maximum	9.0
Minimum	6.5

Justification: The seasonally depressed pH values seen at Rose Canyon Lake demonstrate a natural condition as follows:

- There are no known mines or other anthropogenic sources of low pH
- The only development in the watershed is a 43 site campground operated through a concessionaire to the Coronado Forest Service
- Low alkalinity (2-32 mg/L) and low hardness (17-36 mg/L) due to type of granitic geology
- Small steep watershed above 7000 ft fed by snowmelt and receiving over 30 inches or precipitation
- Intense runoff events deposit phenolic or tannin (humic acid) compounds that naturally lower pH; total organic carbon was 17.9 mg/L and 19.5 mg/L in Aug 2014, the high range for AZ reservoirs
- Vegetation is dominated by Ponderosa Pine and Gambel Oak
- Trophic State Index (TSI) scores indicate the lake is Eutrophic with dystrophy associated with organic carbon and Total Suspended Solid (TSS) inputs
- The depressed pH condition is similar to Bear Canyon Lake, also a natural condition that EPA Region 9 has approved (2017)

Natural condition is a term that describes the quality of surface water that exists in the absence of human-caused pollution or disturbance. ADEQ is requesting to delist Rose Canyon in accordance with A.A.C. R18-11-605(E)(2)(a)(vi) which states, "Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards". A.A.C. R18-11-119 also states "Where the concentration of a pollutant exceeds a water quality standard and the exceedance is not caused by human activity but is due solely to naturally-occurring conditions, the exceedance shall not be considered a violation of the water quality standard." (A.A.C., 2009)

Evaluation of the data used for the 2004 water quality assessment and subsequent data collected since that time, demonstrate what appears to be a naturally occurring condition: low alkalinity waters under prolonged periods of steep thermal and chemical stratification, results in pH below the lower bound of the pH standard, in a range from 6.1 SU to 6.5 SU between 3 - 10 meters deep. pH has not been found below 6.1 SU. ADEQ proposes that low pH (6.1-6.5 SU) below the thermocline is a natural condition of Rose Canyon Lake.

Background

Rose Canyon Lake is among several small man-made reservoirs constructed by the Arizona Game and Fish Department for recreation in the late 1950s to late 1960s. The phenomenon of low pH in lakes is rare in Arizona, as most reservoirs are well buffered. This report evaluates the occurrence of low pH in small headwater reservoirs, comparing land uses, morphology, geology, soils, vegetation and climatic patterns within the context of "natural condition" and designated use support.

Rose Canyon Lake is small at only seven surface acres with a watershed of 493 acres. The lake's drainage is near the top of the larger Bear Canyon Creek Watershed (Figure 1). Rose Canyon exhibits low pH when strongly stratified in July and August, in part based on canyon morphometry, granitic geology, and coniferous

vegetation. The lake was listed as impaired for low pH in 2004. This document will make the case that depressed pH is a seasonal natural condition at Rose Canyon Lake.

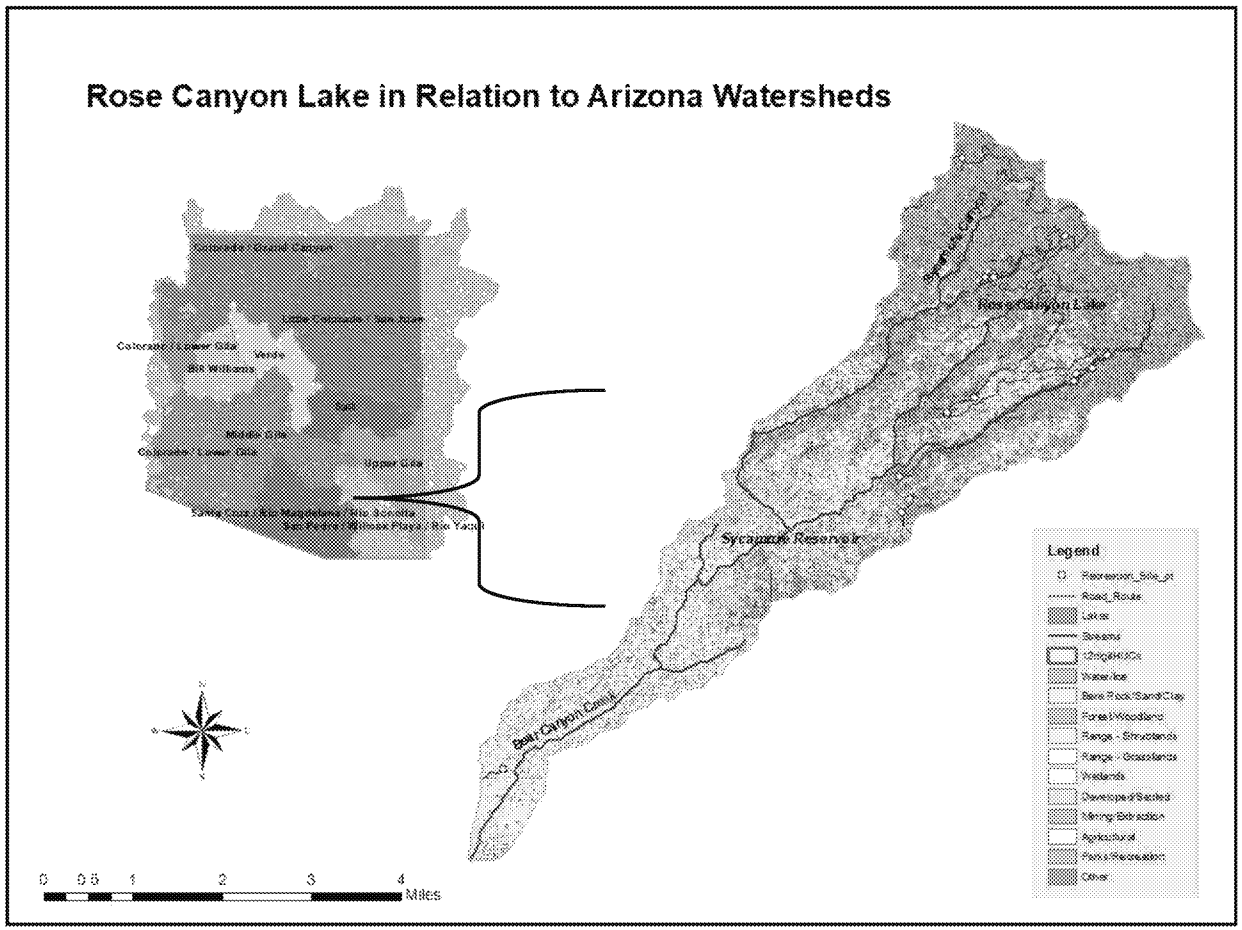


Figure 1. Location and Land Use of Rose Canyon Lake Watershed, AZ

At the elevation of Rose Canyon, the drainage is steep and dominated by Ponderosa Pine forest and granitic rock formations. A paved road off the Santa Catalina Highway (Figure 2) goes through Rose Canyon Campground and leads to a small parking area a short walk from the water. Tall trees and rocky slopes line the shore and there is a trail that leads around the water's edge to a fishing dock located near the dam (CNF web site). The type of granite in the area is a mix of

feldspar and quartz. Studies have shown that lakes in granitic geology often have low alkalinity and pH (Stauffer, 1990; Adirondack Lakes Survey Corporation; 1990). Soils are sandy loam and loamy sand, but the organic top layer is black/brown with charcoal and leaf litter (University of Arizona Southwest Library website).

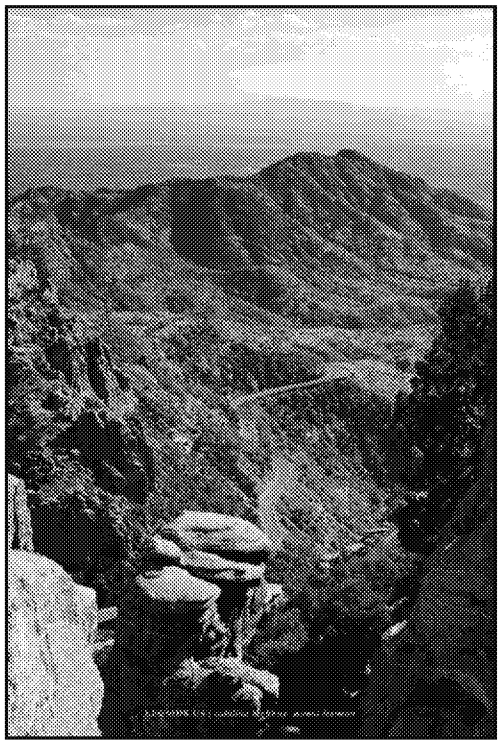


Figure 2. Santa Catalina Highway (Tucson in distance)

Surface runoff can transport significant loads of nutrients and organic matter from a catchment to a lake, especially when the surrounding slopes are steep. Klimaszyk and Rzymski (2013) found that coniferous litter has a higher impact on the level of DOC than deciduous litter. Significant DOC and ammonium peaks were observed in runoff from a Scots Pine forest in Poland, collected after heavy rainfall and during intensive snowmelt; DOC concentrations were comparable to those found in transitional and raised bogs. The resulting dystrophication (added color from humic acids) significantly affects the thermal structure, favors production by very small planktonic algae and bacteria, and may also significantly decrease pH.

A study of Rose Canyon Lake, Sewell et. al (1969), found that pine litter has effects on the watershed as well as within a lake or reservoir. Phenolic compounds in decaying pine litter result in release of flavenoids and polymers (tannins), various acids, carbohydrates, and salts. Loading to lakes from Ponderosa pine litter was found to be as much as 0.5-1 g/liter of snowmelt. Snowmelt and recharge from shallow groundwater contributes these compounds to lakes, which then exacerbate acidic conditions. Extreme runoff events during summer monsoon storms may also mobilize and deliver these compounds to the lake.

Comparison between Similar Reservoirs

Descriptions

ADEQ has sampled other canyon reservoirs similar to Rose Canyon in elevation (Table 1). Bear Canyon Lake and Woods Canyon Lake also show depressed pH during summer stratification, as they are also primarily fed by snowmelt (Table 2).

Table 1. Description of Similar Canyon Reservoirs

Lake Name	Mean Basin Elev (ft)	Size (acres)	Watershed Size (acres)	Ratio W:L	Max/Mean Depth (ft)	Mean Precip (in)
Bear Canyon 1964	7760	60	1241.6	20.7	50/30	38.1
Woods Canyon 1956	7670	55	5644.8	102.6	40/25	38.7
Rose Canyon 1959	7240	7	493	70.4	33/20	33.2

Table 2. Comparison of Key Water Quality Parameters

Reservoir (# events)	Temp (^{o}C)	DO (mg/L)	pH (SU)	Hardness	Total Alk as CaCO3 (mg/L)	Bicarbonate (mg/L)	Chlor-a (*ug*/L)
Bear Canyon (8)	6-21	0.42-8.1	5.6-8.1	<33	5-10	5-10	< 3
Woods Canyon (19)	5-22	0.04-9.2	5.7-8.1	<33	5-17	11-17	< 3 except one 15.8
Rose Canyon (5 pre-fire) (2 post-fire)	5-23	0.06-8.4	6.2-9.1	17-36	<2-32 62-91(Aug 2014)	<2-32 62-91 (Aug 2014)	1.2-18.9

Comparison of profile data from the three reservoirs shows similar patterns in summer stratified conditions. (Appendix A).

Key Points from Data comparisons

- Alkalinity is low in a range, usually less than 32 mg/L as bicarbonate
- All reservoirs may ice over (all or part); as a result mixing occurs in fall and spring
- All reservoirs stratify strongly in mid to late summer; temperature gradient and DO gradient are steep
- During stratified period, DO loss in the hypolimnion (below the thermocline) may reach hypoxic (3 mg/L) to anoxic (< 1 mg/L) levels
- Depending on reservoir depth and degree of stratification, low pH (< 6.5 SU) is present in the bottom 1-6 m (10-40 percent of water column)
- Productivity in reservoirs with smaller watershed to lake area ratios is low to moderate (chlor-a under 4 *ug*/L), whereas reservoirs with a larger watershed to lake area ratio or fire impacts show higher productivity (chlor-a >10 *ug*/L)

- Periods of lower pH and DO are accompanied by negative ORP, indicating moderately to strongly reducing conditions
- Wet years, with high snowpack and snowmelt, allow these reservoirs to flush; pH, DO, and ORP levels are moderated in the following stratification period

Trends in Water Quality with Season at Rose Canyon Lake (1998-2014)

ADEQ has sampled Rose Canyon once in 1998, once in 2000, three times in 2001, and once in 2014. ADEQ collected depth profile data using an YSI multiprobe and samples for lab analysis of nutrients, chlorophyll, algae identification, metals, and other inorganic parameters. In August of 2003, following the Aspen Fire, Rose Canyon was visited by Dr. David Walker (University of Arizona Environmental Research Lab in Tucson) at ADEQ's request. Dr. Walker used a Hydrolab multi-probe to get a depth profile of the lake from the shore, focusing on DO and pH. Shading by and decomposition of the large influx of ash and debris depleted most water column oxygen, and fish were forced to seek refuge in the top meter. pH readings were from 6.2 to 6.33 from 0.5 m to the maximum profile depth of 3.5 m. It is not known how long this condition persisted.

It is known that wildfire in the Rose Canyon Lake watershed has resulted in higher lake productivity as compared to similar high elevation canyon lakes. In the summer of 2006, AGFD responded to a fish kill in Rose Canyon following another round of intense monsoon rains and debris flow (AGFD, personal communication with Kevin Bright).

The 2004 305(b) water quality assessment found the lake "inconclusive" for low pH but EPA over-filed to add Rose Canyon to the 2004 303(d) list as "impaired" for low pH. The critical period for lower pH is mid to late summer when the lake stratifies. Alkalinity, hardness and specific conductivity in Rose Canyon are typically very low for Arizona reservoirs, suggesting little buffering capacity.

Field Data Profiles from Bear Canyon, Woods Canyon, and Rose Canyon

Bear Canyon								Woods Canyon								Rose Canyon						
Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH
LCBCL-A	10/18/2000		0.1	13.62	6.65	6.85		LCWCL-A	10/19/1994		0.2	10.62	7.58	7.6		SCROS-A	7/30/1998		0.1	23.84	8.32	9.16
LCBCL-A	10/18/2000		1	13.54	6.6	6.75		LCWCL-A	10/19/1994		1.1	10.52	7.56	7.44		SCROS-A	7/30/1998		1	22.19	8.48	9.19
LCBCL-A	10/18/2000		2	13.52	6.6	6.69		LCWCL-A	10/19/1994		2.1	10.26	7.46	7.38		SCROS-A	7/30/1998		2	19.83	6.75	8.54
LCBCL-A	10/18/2000		5	13.18	6.58	6.71		LCWCL-A	10/19/1994		3	10.11	7.38	7.36		SCROS-A	7/30/1998		3	17.88	0.99	7.2
LCBCL-A	10/18/2000		6	12.59	6.4	6.67		LCWCL-A	10/19/1994		4	10.06	7.24	7.32		SCROS-A	7/30/1998		4	12.68	0.24	6.72
LCBCL-A	10/18/2000		9	12.37	5.23	6.57		LCWCL-A	10/19/1994		5	10.05	7.2	7.28		SCROS-A	7/30/1998		5	9.06	0.16	6.45

Bear Canyon								Woods Canyon								Rose Canyon						
Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH
LCBCL-A	10/18/2000		10	11.04	1.15	6.12		LCWCL-A	10/19/1994		6	10.05	7.29	7.17		SCROS-A	7/30/1998	lake stratified	6	7.97	0.14	6.37
LCBCL-A	10/18/2000		11	8.59	0.46	5.8		LCWCL-A	10/19/1994		7	10.01	7.13	7.15		SCROS-A	7/30/1998		7	6.8	0.16	6.29
LCBCL-A	10/18/2000	lake in turnover	11.8	8.28	0.35	5.82		LCWCL-A	10/19/1994		8	9.97	6.94	7.12		SCROS-A	7/30/1998		8	6.48	0.13	6.19
								LCWCL-A	10/19/1994		9	8.41	0.28	6.49								
LCBCL-A	5/16/2001	surface warming	0.1	17.03	7.87	7.38		LCWCL-A	10/19/1994	lake almost turned	10	7.28	0.39	6.49		SCROS-A	10/4/2000		0.1	19.7	7.06	7.85
LCBCL-A	5/16/2001		1	17.04	7.78	7.31										SCROS-A	10/4/2000		1	18.1	7.05	8.07
LCBCL-A	5/16/2001		2	16.76	7.79	7.28		LCWCL-A	6/19/1996		0.4	20.51	8.2	7.01		SCROS-A	10/4/2000		2	17.3	7.18	8.23
LCBCL-A	5/16/2001		3	16.54	7.79	7.26		LCWCL-A	6/19/1996		1	19.96	8.22	7.06		SCROS-A	10/4/2000		3	16.1	0.63	7.32
LCBCL-A	5/16/2001		3.5	12.58	8.82	7.33		LCWCL-A	6/19/1996		2	19.7	8.27	7.08		SCROS-A	10/4/2000	lake stratified	4	13.7	0.3	7.16
LCBCL-A	5/16/2001		4	11.1	9.32	7.2		LCWCL-A	6/19/1996		3	19.59	8.25	7.09		SCROS-A	10/4/2000		5	11.1	0.25	7.49
LCBCL-A	5/16/2001		5	9.59	8.84	6.93		LCWCL-A	6/19/1996		4	19.49	8.24	7.06		SCROS-A	10/4/2000		6	9.78	0.24	7.56
LCBCL-A	5/16/2001		10	6.47	7.5	6.43		LCWCL-A	6/19/1996	lake stratified	5	14.61	6.97	6.45		SCROS-A	10/4/2000		7	9.4	0.21	7.61
LCBCL-A	5/16/2001	lake setting up	11.5	5.95	7.16	6.23		LCWCL-A	6/19/1996		5.9	13.01	4.71	6.2		SCROS-A	10/4/2000		8	8.74	0.22	7.64
								LCWCL-A	6/19/1996		7.1	10.81	2.11	6.01		SCROS-A	10/4/2000		9	8.61	0.2	7.59
LCBCL-A	6/13/2001		0.1	18.24	8	7.02		LCWCL-A	6/19/1996		8	9	0.23	6.01		SCROS-A	10/4/2000		9.7	8.54	0.19	7.43
LCBCL-A	6/13/2001		1	18.28	7.86	7.09		LCWCL-A	6/19/1996		9	8.25	0.1	6.03								
LCBCL-A	6/13/2001		2	18.22	7.8	7.09		LCWCL-A	6/19/1996		10	7.98	0.19	6.06		SCROS-A	6/27/2001		0.1	22.49	6.48	7.96
LCBCL-A	6/13/2001		5	18.14	7.76	7.14		LCWCL-A	6/19/1996		10.7	7.84	0.14	6.1		SCROS-A	6/27/2001		1	19.95	6.54	7.1

Bear Canyon								Woods Canyon								Rose Canyon						
Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH
LCBCL-A	6/13/2001	lake stratified	6	11.65	9.38	6.94										SCROS-A	6/27/2001		2	NA	6.32	7.79
LCBCL-A	6/13/2001		7	9.53	8.33	6.53		LCWCL-A	10/19/2000		0.1	13.67	7.35	6.42		SCROS-A	6/27/2001		3	NA	3.1	7.34
LCBCL-A	6/13/2001		8.2	7.76	6.28	6.31		LCWCL-A	10/19/2000		1	13.42	7.29	6.46		SCROS-A	6/27/2001		4	NA	0.23	6.8
								LCWCL-A	10/19/2000		2	13.26	7.26	6.44		SCROS-A	6/27/2001	lake stratified	5	NA	0.11	6.33
LCBCL-A	9/18/2001		0.2	19.87	7.39	7.81		LCWCL-A	10/19/2000		5	12.98	7.07	6.4		SCROS-A	6/27/2001		6	NA	0.07	6.2
LCBCL-A	9/18/2001		1.1	19.78	7.3	7.47		LCWCL-A	10/19/2000		6	12.86	6.93	6.44		SCROS-A	6/27/2001		7	NA	0.08	6.2
LCBCL-A	9/18/2001		2.1	18.38	7.32	7.35		LCWCL-A	10/19/2000	lake turning	8.1	10.91	0.72	5.76		SCROS-A	6/27/2001		8	NA	0.07	6.15
LCBCL-A	9/18/2001		3.2	18.2	7.26	7.2		LCWCL-A	10/19/2000		9.2	7.91	0.43	5.89		SCROS-A	6/27/2001		9	NA	0.06	6.17
Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH
LCBCL-A	9/18/2001		4	18.16	7.26	7.2																
LCBCL-A	9/18/2001		5.1	18.05	7.07	7.08		LCWCL-A	5/16/2001		0.1	18.45	7.58	7.38		SCROS-A	8/21/2014		0.1	20.74	NA	7.11
LCBCL-A	9/18/2001	lake stratified	6.1	16.81	6.26	6.77		LCWCL-A	5/16/2001		1	18.44	7.42	7.26		SCROS-A	8/21/2014		1	20.42	NA	7.18
LCBCL-A	9/18/2001		7.1	12.89	4.54	6.36		LCWCL-A	5/16/2001		2	18.03	7.4	7.25		SCROS-A	8/21/2014		2	20.02	NA	7.1
LCBCL-A	9/18/2001		8	9.95	1.73	6.04		LCWCL-A	5/16/2001		3	17.84	7.4	7.23		SCROS-A	8/21/2014		3	19.91	NA	7.03
LCBCL-A	9/18/2001		9	8.36	0	5.92		LCWCL-A	5/16/2001		3.5	10.87	9.42	7.12		SCROS-A	8/21/2014		4	17.9	NA	6.49
LCBCL-A	9/18/2001		10	7.63	0	5.96		LCWCL-A	5/16/2001		4	9.43	9.48	7.1		SCROS-A	8/21/2014	lake stratified	5	12.55	NA	6.29
								LCWCL-A	5/16/2001		5	8.19	9.14	6.99		SCROS-A	8/21/2014		6	10.2	NA	6.24
LCBCL-A	5/3/2005		1	15.02	7.88	7.65		LCWCL-A	5/16/2001		6	6.83	8.65	6.89		SCROS-A	8/21/2014		7	9.4	NA	6.24
LCBCL-A	5/3/2005	still mixed	8	10.4	5.74	7.06		LCWCL-A	5/16/2001	still mixed	10.1	5.82	6.04	6.58		SCROS-A	8/21/2014		8	8.94	NA	6.2

Bear Canyon								Woods Canyon								Rose Canyon						
Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH		Site: SW Site ID	Sample: Date	Comment	Depth	Temp	DO	pH
LCBCL-A	10/22/2009		0.1	11.18	7.87	6.79		LCWCL-A	6/12/2001		0.1	20.16	7.67	7.69								
LCBCL-A	10/22/2009		1	11.18	7.84	6.79		LCWCL-A	6/12/2001		0.5	20.16	7.11	7.4								
LCBCL-A	10/22/2009		2	11.18	7.84	6.84		LCWCL-A	6/12/2001		1	20.17	7.03	7.32								
LCBCL-A	10/22/2009		3	11.19	7.83	6.85		LCWCL-A	6/12/2001		2.5	19.94	6.94	7.29								
LCBCL-A	10/22/2009		4	11.18	7.83	6.81																
LCBCL-A	10/22/2009		5	11.18	7.83	6.81		LCWCL-A	9/18/2001		0.1	19.82	7.13	7.48								
LCBCL-A	10/22/2009		6	11.17	7.83	6.8		LCWCL-A	9/18/2001		1.1	19.33	7.12	7.36								
LCBCL-A	10/22/2009		7	11.17	7.82	6.79		LCWCL-A	9/18/2001		3.1	19.08	7.09	7.27								
LCBCL-A	10/22/2009		8	11.17	7.83	6.72		LCWCL-A	9/18/2001		4.9	18.7	5.87	7.04								
LCBCL-A	10/22/2009		9	11.17	7.83	6.72		LCWCL-A	9/18/2001		6	16.24	2.81	6.6								
LCBCL-A	10/22/2009		10	10.73	6.74	6.72		LCWCL-A	9/18/2001		7	12.63	0.27	6.34								
LCBCL-A	10/22/2009	lake almost turned	11	7.53	0.45	6.23		LCWCL-A	9/18/2001		7.9	9.1	0.08	6.24								
								LCWCL-A	9/18/2001		9.1	7.81	0.04	6.19								
BCL = Bear Canyon Lake																						
WCL = Woods Canyon Lake																						
RCL = Rose Canyon Lake																						
Hypoxia to anoxia																						
Below WQS																						

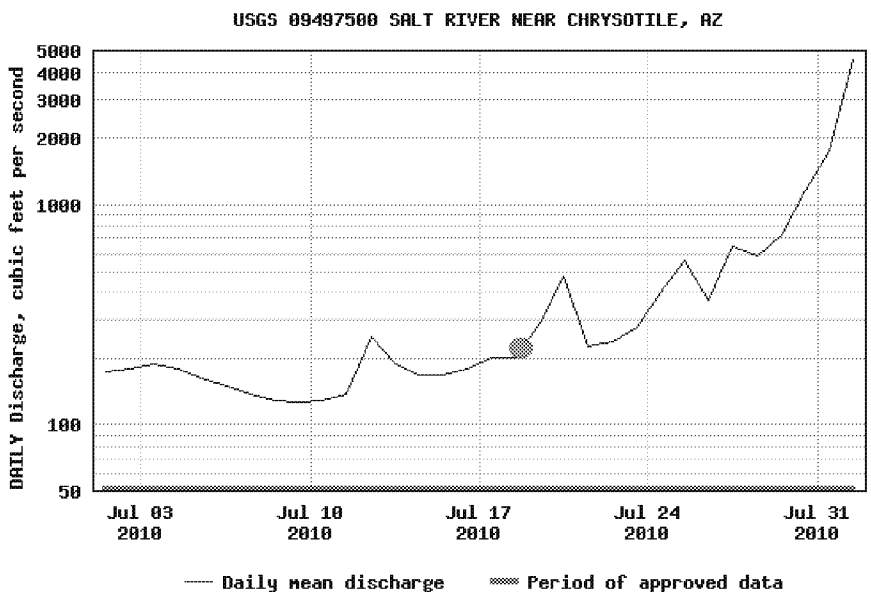
SALT RIVER (15060103-007)

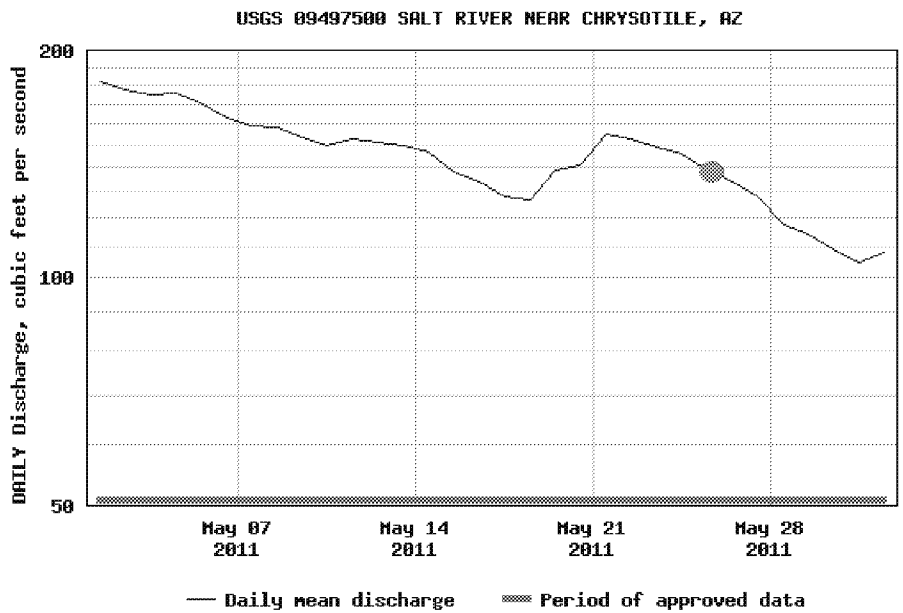
Impairment: Selenium (2012/14)
Impairment Year: 2014
Designated Uses: Aquatic and Wildlife (Warmwater Fishery)
Applicable Standards: Selenium

Justification: No selenium exceedances in 3 samples. Detection limit for selenium was 1 ug/L, which is below the AWW chronic standard of 2 ug/L. The delist rule from the technical manual http://static.azdeq.gov/wqd/wqa/2016_cwaa_final.pdf for chronic selenium is "No exceedances during the assessment period and parameter of concern samples were collected". This reach was originally listed as impaired based on two selenium exceedances. Critical conditions are met because flow conditions for the 2015/16 samples were similar to the 2010 and 2011 samples.

Flow conditions for Original Exceedance/ Impairment

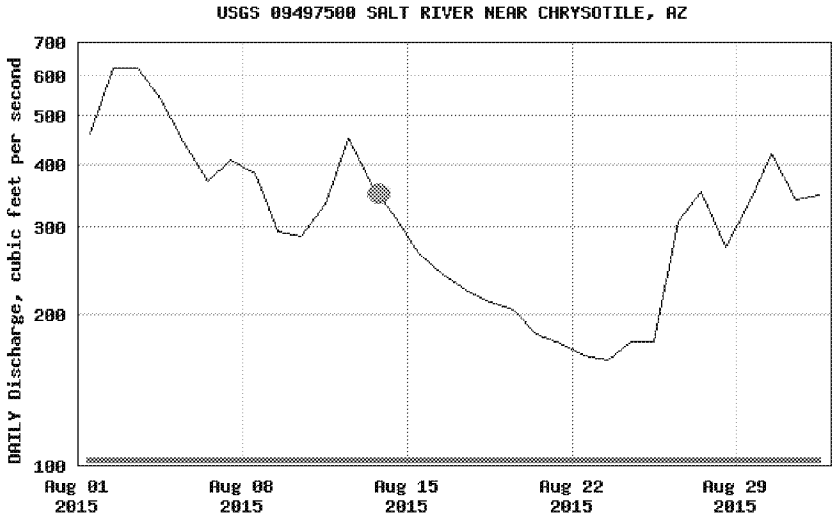
The original exceedances for selenium occurred on 7/19/10 and 5/25/11.

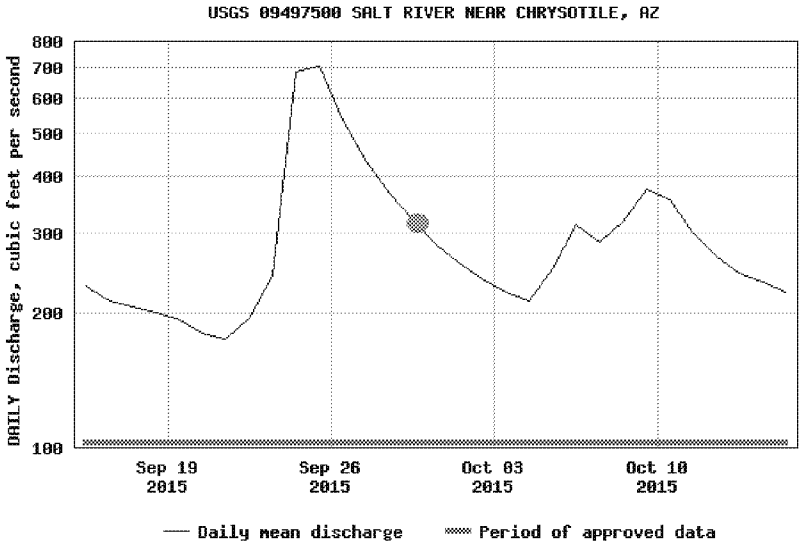


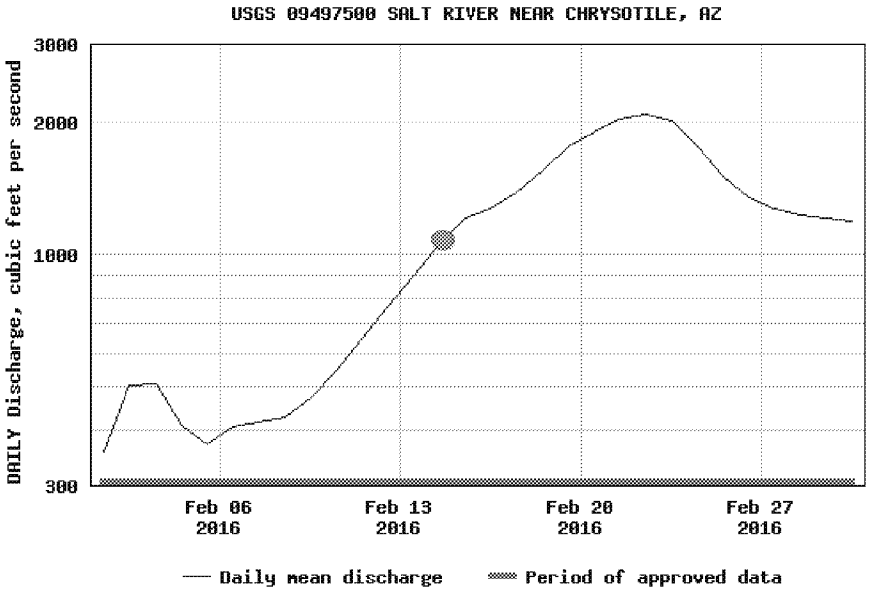


Flow Conditions for Recent Sampling

Samples were collected on 2/16/16, 10/1/15 and 8/13/15.







Data collected since 7/1/2012

WBID	STATION_CD	STATION_ALT_NAME	ACTIVITY_END_DATE	COLLECTING_AGENCY	Depth	CAS_QUALIFIER_NAME	LAB_RESULT	LAB_RESULT_UNIT	LAB_QA_FLAGS	SUBSTANCE_NAME	LAB_METHOD	DETECTION_LIMIT	DETECTION_LIMIT_UNIT
15060103-007	SRSLR139.75	SALT RIVER - AT GLEASON FLAT	8/13/2015	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L

15060103-007	SRSLR139.75	SALT RIVER - AT GLEASON FLAT	10/1/2015	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L
15060103-007	SRSLR139.75	SALT RIVER - AT GLEASON FLAT	2/16/2016	ADEQ	0	TOTAL		MG/L	ND	SELENIUM	EPA 200.8	0.001	MG/L
15060103-007	SRSLR139.75	SALT RIVER - AT GLEASON FLAT	10/1/2015	ADEQ		OTHER	275	CFS		FLOW	FIELD		

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