

Bill Williams Watershed Water Quality Assessments

Watershed Description

The Santa Maria River and the Big Sandy River drainages merge at Alamo Lake to create the Bill Williams River, which connects to the Colorado River at Parker Dam. Land ownership is divided approximately as 45% federal, 28% state, and 27% private (no Tribal lands). With only 8,000 people (2000 census), this watershed does not have any large population centers. Open range grazing is the principal land use. A large mining complex is located in the Bagdad area, while historic mine sites are scattered throughout the watershed.

Elevations range from 8,417 feet (above sea level) at Hualupai Peak to 1,000 feet near the Colorado River. Most of the watershed is below 5,000 feet, with low desert fauna and flora (Sonoran Desert - Mohave Desert transition area) and warmwater aquatic communities where perennial waters exist.

Water Resources

There is little precipitation, from 13 inches a year, with an additional inch of snowfall per year in higher elevations, so surface water resources are sparse. Perennial flow in this watershed is frequently interrupted (short segments), even on the larger main-stem rivers. The largest lake, Alamo Lake, covers 11,950 acres; however, only an estimated 1,415 acres are perennial.

An estimate of surface water resources in the Bill Williams Watershed is provided in the following table, based on USGS digitized hydrology at 1:100,000, rounded to the nearest 5 miles or 5 acres.

Estimated Surface Water Resources in the Bill Williams Watershed

	Perennial	Intermittent	Ephemeral
Stream miles	185	655	5035
Lake acres	1832	11,950	

Ambient monitoring focuses on perennial waters; however, special investigations may identify water quality problems on intermittent and even ephemeral waters.

Assessments

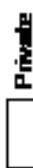
The Bill Williams Watershed can be separated into the following drainage areas in Arizona:

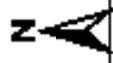
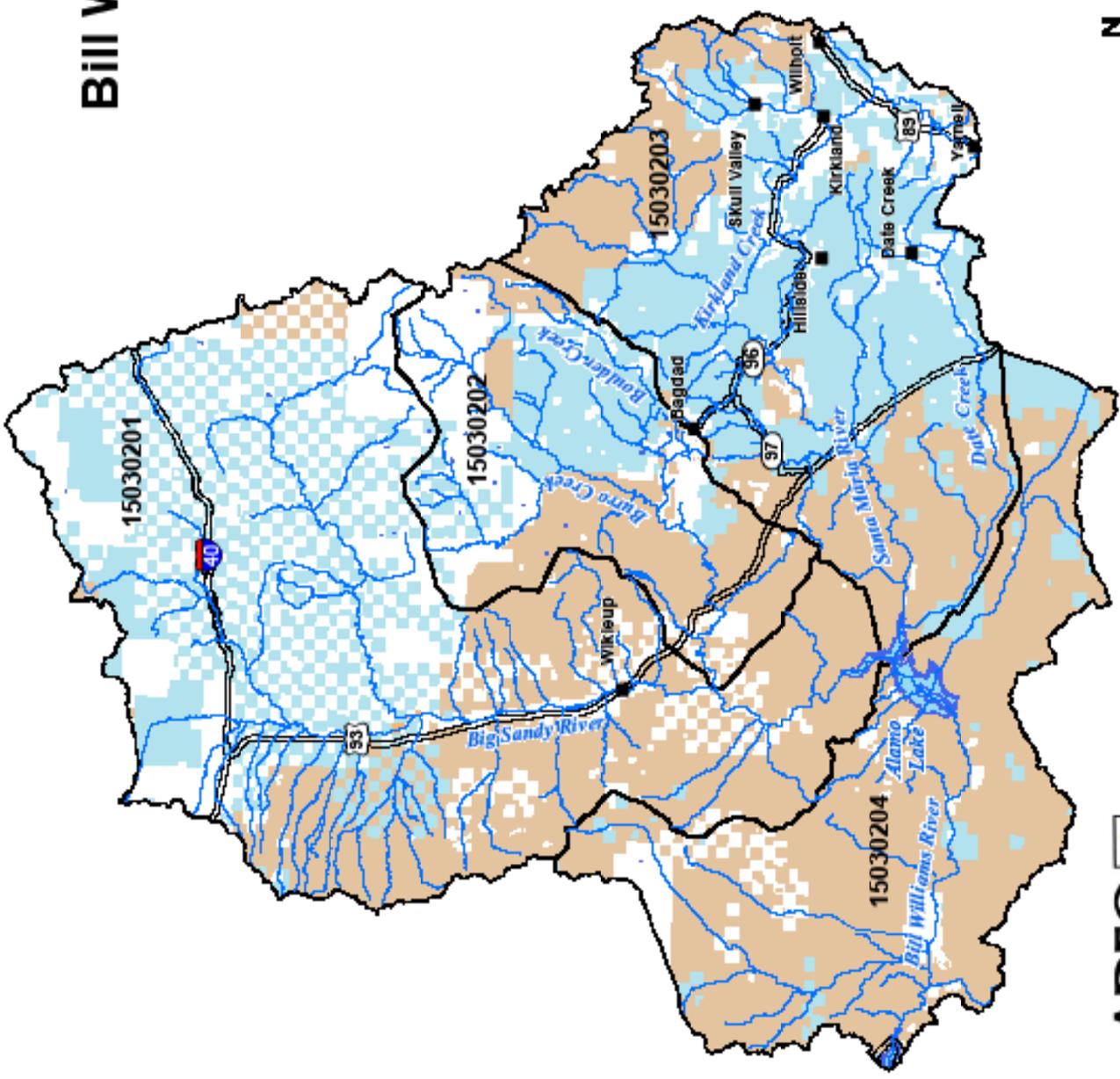
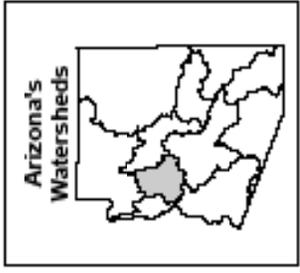
- 15030201 Big Sandy River
- 15030202 Burro Creek
- 15030203 Santa Maria River
- 15030204 Bill Williams River

These drainage areas and the surface waters assessed as “attaining” or “impaired” are illustrated on the following watershed map. Methods used to complete these assessments are described in the “Surface Water Assessment Methods and Technical Support” document.

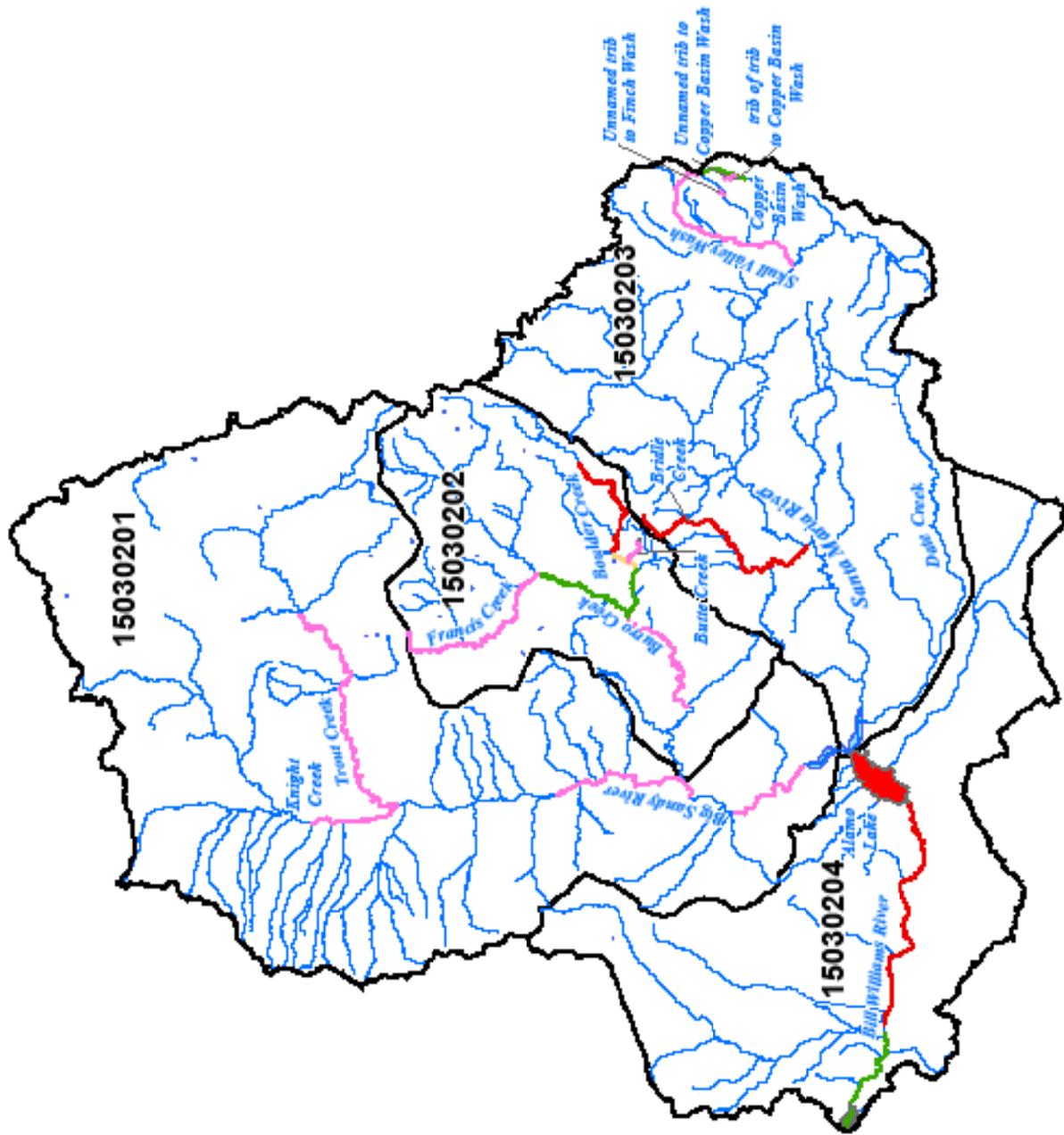
Bill Williams Watershed

Legend

-  Towns
 -  Streams
 -  Highways
 -  Lakes
 -  HUC Watershed Boundaries
- ### Land Ownership
-  Federal
 -  Private
 -  State/County/Municipal
 -  Tribal



Bill Williams Watershed 2012/2014 Assessment for Streams and Lakes



<p>Legend</p> <p>Assessed Lakes - 2012 ADEQ and EPA Listings</p> <ul style="list-style-type: none"> Attaining Increasing Not Attaining EPA Impaired Impaired <p>HUC Watershed Boundaries</p> <p>Assessed Streams - 2012 ADEQ and EPA Listings</p> <ul style="list-style-type: none"> Attaining Increasing Not Attaining EPA Impaired Impaired <p>Lakes Streams</p>		<p>See Individual HUC Printouts for Waters not Labeled</p> <p>ADEQ Arizona Department of Environmental Quality</p>
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A LAMO LAKE

15030204-0040A
1415 Acres

Category 5
Impaired

High pH (1996), ammonia (2004), and mercury in fish tissue (EPA, 2002)

FC - Impaired • FBC - Impaired • AGL - Impaired
A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Ammonia	0.24 ng/L	8/14/2006	0.28 mg/L	A&Ww chronic is inconclusive
pH	9.2 SU	8/7/2007	9.4 SU	AGL, FBC & A&Ww are inconclusive (binomial)
DO	5.8 mg/L	7/4/2006	5.5 mg/L	A&Ww is inconclusive (binomial)

Monitoring Summary

Sampling period: 7/4/2006 - 8/22/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
Across From Picnic Area (Mid Lake)	BWALA-NLS	105779	ADEQ	Clean Lakes Program
At Dam (Lower Lake)	BWALA-A	101350	ADEQ and COE	Clean Lakes Program, Ambient
Upper Lake	BWALA-B	101351	ADEQ and COE	Clean Lakes Program, Ambient
Mid Lake	BWALA-C	102514	ADEQ and COE	Clean Lakes Program, Ambient
Site 1 (Lower Lake)	BWALA-1	100001	COE	Ambient
Site 3 (Upper Lake)	BWALA-3	100003	COE	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(5) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4-5) Ammonia, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(5) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	pH, DO, ammonia
Missing Core Parameters	copper(dis & tot), cadmium, zinc, lead, <i>E. coli</i>
Missing Seasonal Distribution	All core parameters
Lab Detection Limits Not Low Enough	

Priority	Monitoring Recommendations
High	Collect dissolved oxygen, pH, and ammonia samples to support development of a nutrient TMDL. Use a more sensitive/reliable analytical method for hydrogen sulfide. Collect core parameters to represent at least 3 seasons during an assessment period.

Impairment Discussion
Lake remains impaired for high pH (1996), ammonia (2004), and mercury in fish tissue (2002).

BIG SANDY RIVER

Rupley - Alamo Lake North
15030201-001
10.2 Miles

Category 3

Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Bottom deposits	50%	5/18/2010	100%	A&Ww is inconclusive with only 1 exceedance during the assessment period.

Monitoring Summary

Sampling period: 12/9/2009 - 5/18/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
NEAR WIKIEUP, AZ	BWBSR015.60	100457	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	<i>E. coli</i>
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect bottom deposits samples due to the exceedance. Collect core parameters to represent at least 3 seasons in an assessment period.

BIG SANDY RIVER

Stove Spring - Sycamore
15030201-006
2.8 Miles

Category 3

Inconclusive

Bill Williams

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
SSC	80 mg/L	12/9/2009	110 mg/L	A&Ww is inconclusive. Only 1 single sample exceedance. Not enough samples to calculate a median.
Bottom deposits	50%	4/21/2010	98%	A&Ww is inconclusive. Only 1 exceedance in the assessment period.

Monitoring Summary

Sampling period: 12/9/2009 - 4/21/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
EAST OF WIKIEUP	BWBSR037.79	107384	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Bottom deposits, SSC
Missing Core Parameters	Dissolved oxygen
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), copper, <i>E. coli</i> , lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional suspended sediment and bottom deposits samples due to exceedances. A minimum of 4 suspended sediment samples within a 2-year period is needed to calculate a median. Collect core parameters to represent at least 3 seasons in an assessment period.

BIG SANDY RIVER

Sycamore - Burro Creek
15030201-004
13.8 Miles

Category 3

Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6 mg/L	5/18/2010	5.41 mg/L	A&Ww is inconclusive. 1 exceedance in 3 samples (binomial).
SSC	80 mg/L	12/16/2009	226 mg/L	A&Ww is inconclusive. Only 1 single sample exceedance. Not enough samples to calculate a median.
Bottom deposits	50%	5/18/2010	100%	A&Ww is inconclusive. Only 1 exceedance during the assessment period.
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	6/14/2010	IBI 46	A&Ww is inconclusive.

Monitoring Summary

Sampling period: 12/16/2009 - 5/18/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT HIGHWAY 93 BRIDGE	BWBSR034.68	100400	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-3) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Dissolved oxygen, SSC, bottom deposits, biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional dissolved oxygen, suspended sediment, and bottom deposits samples due to exceedances. Collect an additional macroinvertebrate sample to verify the bioassessment result. Collect core parameters to represent at least 3 seasons in an assessment period.

BILL WILLIAMS RIVER

Alamo Lake - Castaneda Wash
15030204-003
35.9 Miles

Category 5
Impaired

Ammonia and high pH (2006)

FC - Inconclusive • FBC - Impaired • AGL - Impaired
A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	2/22/2010	2.1 ug/L	A&Ww is inconclusive with 1 exceedance.
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	6/10/2010	IBI 43	A&Ww is inconclusive with 2 inconclusive IBI scores at 2 sites.
		6/10/2010	IBI 45	

Monitoring Summary

Sampling period: 7/4/2006 - 6/10/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT ABOVE GROUND PIPELINE	BWBWR025.86	107385	ADEQ	Ambient
BELOW ALAMO DAM	BWBWR038.52	102316	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(6) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3-9) Ammonia, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(6-9) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Selenium, biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	Zinc (dissolved), cadmium (dissolved), copper (dissolved), <i>E. coli</i> , copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect more total selenium samples to assess A&W attainment. Collect an additional macroinvertebrate sample to verify the bioassessment result. Many core parameters in need of seasonal coverage.

Impairment Discussion
Reach remains impaired for ammonia and high pH (2006).

BILL WILLIAMS RIVER

Mohave Wash - Colorado River
15030204-001
17.5 Miles

Category 2

Attaining some uses

FC - Inconclusive • FBC - Attaining • AGL - Inconclusive
A&Ww - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 8/31/2006 - 4/23/2006

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT MINERAL WASH, NEAR PLANET USGS 09426600	BWBWR009.92	100924	USGS	USGS Ambient
AT LAKE HAVASU, AZ.	BWBWR003.45	105129	USGS	USGS Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
None	(4-5) Nitrate, nitrite, nitrite/ nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(5) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), copper, lead
Missing Seasonal Distribution	Zinc (dissolved), copper, lead
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
Low	Copper, lead, and dissolved zinc need sample and seasonal coverage.

BOULDER CREEK

Butte Creek - Copper Creek
15030202-005B
1.8 Miles

Category 4A

Not attaining

Bill Williams

IMPACTMENT STATUS

Arsenic (1998)

FC - Attaining • FBC - Not Attaining • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Not Attaining

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	1/22/2007	42.6 ug/L	FBC remains not attaining. A minimum of 10 samples is required to determine attainment. No new data since the last assessment.

Monitoring Summary

Sampling period: 7/12/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COPPER CREEK	BWBOU005.15	102193	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-5) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(5) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i> , boron, lead
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i> , boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Medium	Collect arsenic samples during critical conditions and in critical locations. Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower lab reporting limit for dissolved cadmium.

Impairment Discussion

Reach remains impaired for arsenic (1998). TMDL for arsenic completed in 2004. The Hillside mine, located upstream of this reach, continues to degrade water quality. Additional sampling under critical conditions is needed to determine attainment of water quality standards.

BOULDER CREEK

Copper Creek - Burro Creek
15030202-005C
4.5 Miles

Category 2

Attaining some uses

Bill Williams

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	1/22/2007	41.8 ug/L	FBC is inconclusive with 1 exceedance in 5 samples (binomial).

Monitoring Summary

Sampling period: 7/12/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW MULHOLLAND WASH	BWBOU002.18	102224	Phelps Dodge	Permit monitoring
SITE B - BELOW COPPER CREEK	BWBOU005.11	101008	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(2-10) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(10) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Arsenic
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i> , boron, lead
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i> , boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Low	Collect additional arsenic samples due to the exceedance. Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower lab reporting limit for dissolved cadmium.

Boulder Creek

Tributary at 344114 / 1130334 - Wilder Creek
15030202-006B
14.4 Miles

Category 5
Impaired

IMPACTMENT STATUS

Beryllium (2010)

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Beryllium ^d	5.3 ug/L	7/10/2006	33 ug/L	A&Ww chronic remains impaired. 3 exceedances in the assessment period. No new data since the last assessment.
		1/22/2007	10 ug/L	
		5/15/2007	7.0 ug/L	

Monitoring Summary

Sampling period: 7/10/2006 - 5/15/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW WARM SPRING CREEK	BWBOU013.05	102219	Phelps Dodge	Permit monitoring
ABOVE HILLSIDE MINE	BWBOU008.92	100401	Phelps Dodge	Permit monitoring
DOWNSTREAM OF TUNGSTONA MINE DRAIN PIPE	BWBOU012.82	102233	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(12) Arsenic, beryllium, cadmium, chromium, copper, manganese, mercury, selenium, silver, zinc	None	(12) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i> , boron, lead
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i> , boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
High	Collect dissolved beryllium samples in support of TMDL development. Collect core parameters to represent at least 3 seasons during an assessment period. Use lower lab reporting limits for dissolved cadmium and dissolved silver.

Impairment Discussion
Remains impaired for beryllium (2010).

BOULDER CREEK

Wilder Creek - Butte Creek
15030202-005A
1.4 Miles

Category 4A

Not Attaining

*Arsenic, copper, and zinc (1998)
Beryllium, manganese, and low pH (2006/2008)*

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • A&Ww - Not Attaining

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	7/12/2006	63.1 ug/L	FBC remains not attaining. A minimum of 10 samples is required to determine attainment. No new data since the last assessment.
		11/1/2006	30.4 ug/L	
		1/22/2007	51 ug/L	
		5/1/2007	64.9 ug/L	
Copper ^d	26.6 ug/L ^{acute} , 16.6 ug/L ^{chronic} @ 206 mg/L hardness	11/1/2006	30 ug/L	A&Ww remains not attaining. No new data for this assessment period.
Zinc ^d	216.2 ug/L @ 206 mg/L hardness	11/1/2006	860 ug/L	A&Ww remains not attaining. No new data for this assessment period.
	89.8 ug/L @ 73 mg/L hardness	12/5/2007	90 ug/L	

Monitoring Summary

Sampling period: 7/12/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW HILLSIDE MINE	BWBOU008.35	100402	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-5) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(5) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i> , boron, lead
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i> , boron, lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Medium	Collect arsenic, copper, zinc, beryllium, manganese, and pH samples during critical conditions and in critical locations. Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower lab reporting limit for dissolved cadmium.

Impairment Discussion
There were no beryllium, manganese, or pH exceedances in this assessment period. However, attainment could not be determined due to the lack of data during critical conditions. TMDL for arsenic, copper, and zinc completed in 2004.

BRIDLE CREEK

Headwaters - Santa Maria River
15030203-027
25.8 Miles

Category 3
Inconclusive

PBC - Inconclusive • A&We - Inconclusive

Use Support

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
<i>E. coli</i>	576 cfu/100 mL, SSM	12/8/2009	2200 cfu/100 mL	PBC is inconclusive with 1 exceedance. Sample taken one day after massive winter storm.

Monitoring Summary

Sampling period: 12/8/2009 - 4/2/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW MOUNTAIN SPRINGS WASH	BWBRI009.54	102313	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(2-3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-3) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	<i>E. coli</i>
Missing Core Parameters	<i>E. coli</i>
Missing Seasonal Distribution	Zinc (dissolved), pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i>
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect <i>E. coli</i> samples due to exceedance. Core parameters need seasonal distribution.

BURRO CREEK

Boulder Creek - Black Canyon Creek
15030202-004
17.2 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Use Support

No Exceedances

Monitoring Summary

Sampling period: 7/12/2006 - 12/4/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE 6 MILE CROSSING	BWBR0023.54	102244	Phelps Dodge	Permit monitoring
BELOW MAMMOTH WASH	BWBR0025.09	102243	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(3-11) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(11) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i>
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i> , lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Low	Collect core parameters to represent 3 seasons during assessment period. Use lower reporting limits for dissolved mercury and cadmium.

BURRO CREEK

Francis Creek - Boulder Creek
 15030202-008
 13.8 Miles
 Outstanding Arizona Water

Category 2

Attaining some uses

FC - Attaining • FBC - Inconclusive • AGL - Inconclusive
 A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	4/20/2010	IBI 37	A&Ww is inconclusive.

Monitoring Summary

Sampling period: 7/12/2006 - 4/20/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE BOULDER CREEK	BWBRO029.91	100404	ADEQ/Phelps Dodge	Ambient/Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(2-7) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	(2) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-7) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Biocriteria
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i>
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i> , lead
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved), silver (dissolved)

Priority	Monitoring Recommendations
Medium	Collect core parameters to represent at least 3 seasons during an assessment period. Use lower lab reporting limits for dissolved metals (cadmium, copper, and silver).

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Use Support

No Exceedances

Monitoring Summary
 Sampling period: 11/1/2006 - 12/5/2007

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
HILLSIDE MINE AREA TRIBUTARY	BWBUT000.59	103504	Phelps Dodge	Permit monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-3) Arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, zinc	None	(3) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i>
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i>
Lab Detection Limits Not Low Enough	Cadmium (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Low	Collect core parameters to represent at least 3 seasons during an assessment period.

COORS LAKE
 15030202-5000
 230 Acres

Category 5
 Impaired

Mercury in fish tissue (EPA, 2004)

FC - Impaired • FBC - Inconclusive • A&Ww - Inconclusive

Monitoring Summary
 Sampling period: No current data

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
Mid Lake	BWCOO-B	102756	AGFD	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
None	None	None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	All designated uses
Missing Seasonal Distribution	All designated uses
Lab Detection Limits Not Low Enough	None

Priority	Monitoring Recommendations
High	Collect fish tissue mercury samples to support TMDL development. Collect core parameters to represent at least 3 seasons during an assessment period.

Impairment Discussion
EPA listing is due to a fish consumption advisory issued in 2004.

COPPER BASIN WASH

Headwaters - Tributary at 342811/1123531
15030203-032A
4.6 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGL - Inconclusive
A&Wc - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Cadmium ^d	0.64 ug/L ^{chronic} @ > 400 mg/L hardness	8/21/2008	4.3 ug/L	A&Wc is inconclusive (see discussion below)
		12/16/2008	2.2 ug/L	
		12/26/2008	1.1 ug/L	
		1/23/2010	0.7 ug/L	
Copper	500 ug/L	1/23/2010	518 ug/L	AGL is inconclusive with 1 exceedance in 5 samples (binomial).
Copper ^d	49.6 ug/L ^{acute} , 29.3 ug/L ^{chronic} @ >400 mg/L hardness	8/21/2008	430 ug/L	A&Wc is inconclusive (see discussion below)
		12/16/2008	170 ug/L	
		12/26/2008	160 ug/L	
		5/20/2009	150 ug/L	
		1/23/2010	99.2 ug/L	
Selenium	2 ug/L	1/23/2010	9.2 ug/L	A&Wc chronic is inconclusive. Dissolved result higher than total by more than 10%. This is also an estimate value below reporting limit. All reporting limits were higher than the chronic standard.

Monitoring Summary

Sampling period: 8/21/2008 - 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
COPPER BASIN WASH - AT FR56 BELOW COPPER BASIN MINE	BWCBW009.00	107324	ADEQ	TMDL
COPPER BASIN WASH - BELOW VICTORY STOCKPILE	BWCBW009.10	107323	ADEQ	TMDL

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
COPPER BASIN WASH - BELOW NORTH COMMERCIAL STOCKPILE	BWCBW009.38	107322	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1-5) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, zinc	None	(1-5) Dissolved oxygen, pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Copper, selenium
Missing Core Parameters	Dissolved oxygen, <i>E. coli</i>
Missing Seasonal Distribution	Dissolved oxygen, <i>E. coli</i>
Lab Detection Limits Not Low Enough	Arsenic, cadmium, cadmium (dissolved), selenium, zinc (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect dissolved copper and cadmium samples to reassess A&Wc attainment. (see discussion below) Collect more than 3 seasonally distributed dissolved oxygen and <i>E. coli</i> samples to complete core parameter coverage.

Attainment Discussion
While this reach is technically impaired for dissolved cadmium and copper, a closer review reveals that all or most of the exceedances came from a site (107324) immediately below an adit that was plugged in 2011. Therefore, rather than base an impairment on past data when a major change in the situation has occurred, ADEQ has decided to call the reach 'inconclusive' until enough post-adit-plugging data becomes available.

DWS - Inconclusive • FC - Inconclusive • FBC - Inconclusive
 AGI - Inconclusive • AGL - Inconclusive
 A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 50 attaining IBI 40-49 inconclusive IBI ≤ 39 violating	4/19/2010	IBI 47	A&Ww is inconclusive.

Monitoring Summary
 Sampling period: 2/25/2010 - 4/19/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE BURRO CREEK	BWFRA000.04	100406	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(2) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(2) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-2) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Biocriteria
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , nitrite/nitrate, fluoride, arsenic
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , nitrite/nitrate, fluoride, arsenic
Lab Detection Limits Not Low Enough	Copper (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect an additional macroinvertebrate sample to verify the bioassessment result. Collect core parameters to represent at least 3 seasons during an assessment period.

K NIGHT CREEK
 Wheeler Wash - Big Sandy Creek
 15030201-019
 9.9 Miles

Category 3
 Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
 A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Selenium	2 ug/L	2/26/2010	3.1 ug/L	A&Ww chronic is inconclusive. Only 1 exceedance in the assessment period.
SSC	80 mg/L	2/26/2010	400 mg/L	A&Ww is inconclusive. Only 1 single sample exceedance. Not enough samples to calculate a median.

Monitoring Summary

Sampling period: 2/26/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE BIG SANDY	BWKNI000.53	102311	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(1) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1) Dissolved oxygen, <i>E. coli</i> , pH, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Selenium, SSC
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , copper, lead
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional total selenium and suspended sediment samples due to exceedances. Collect core parameters to represent at least 3 seasons in an assessment period.

SKULL VALLEY WASH

Headwaters - Kirkland Wash
15030203-017
19.9 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • A&Ww - Inconclusive

Use Support

No Exceedances

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT SKULL VALLEY	BWSVW009.04	108782	ADEQ	TMDL
BELOW COPPER BASIN WASH	BWSVW002.82	108802	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(2) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, zinc, selenium	None	None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, <i>E. coli</i> , cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, <i>E. coli</i> , cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Boron, cadmium (dissolved), copper, nickel, selenium

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need sample number and seasonal coverage.

TROUT CREEK

Cow Creek - Knight Creek
15030201-014
32.1 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
A&Ww - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Lead ^d	4.18 ug/L ^{chronic} @ 160 mg/L hardness	5/19/2010	12 ug/L	A&Ww chronic is inconclusive. Only 1 exceedance in the assessment period.
Selenium	2 ug/L	4/1/2010	3.6 ug/L	A&Ww chronic is inconclusive. Only 1 exceedance in the assessment period.

Monitoring Summary

Sampling period: 4/1/2010 - 6/11/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
NEAR WIKIEUP	BWTRT002.43	100397	ADEQ	Ambient

Metal Samples	Nutrients & Related Samples	Other Samples
(3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-3) Dissolved oxygen, <i>E. coli</i> , pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Lead (dissolved), selenium
Missing Core Parameters	<i>E. coli</i>
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), <i>E. coli</i> , copper, lead
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect additional dissolved lead and total selenium samples due to exceedances. Collect core parameters to represent at least 3 seasons in an assessment period.

UNNAMED TRIB TO COPPER BASIN WASH TRIB
 Headwaters - Unnamed Trib to Copper Basin Wash
 15030203-045
 0.5 Miles

Category 3
 Inconclusive

PBC - Inconclusive • AWE - Inconclusive

Use Support

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Copper	1300 ug/L	1/23/2010	2270 ug/L	PBC is inconclusive with 1 exceedance in 1 sample (binomial).
Copper ^d	55.2 ug/L @ 250 mg/L hardness	1/23/2010	685 ug/L	AWE is inconclusive with 1 exceedance in 1 sample.

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COPPER BASIN ROAD	BWUUC000.01	108805	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, zinc	None	(1) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Copper (dissolved), copper
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Arsenic, boron, cadmium, cadmium (dissolved), selenium

Priority	Monitoring Recommendations
Medium	Collect more total and dissolved copper to verify exceedances. All core parameters need number and seasonal coverage.

UNNAMED TRIB TO COPPER BASIN WASH

Headwaters - Copper Basin Wash
15030203-4291
1.2 Miles

Category 3

Inconclusive

Use Support

PBC - Inconclusive • AWE - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Copper	1300 ug/L	1/23/2010	8280 ug/L	PBC is inconclusive with 1 exceedance in 1 sample (binomial).
Copper ^d	73.7 ug/L @ 340 mg/L hardness	1/23/2010	220 ug/L	AWE is inconclusive with 1 exceedance.
Lead	15 ug/L	1/23/2010	24.7 ug/L	PBC is inconclusive with 1 exceedance in 1 sample (binomial).

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT COPPER BASIN ROAD	BWUCB000.18	108804	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, zinc	None	(1) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Copper (dissolved), copper, lead
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Boron, cadmium, cadmium (dissolved), selenium, zinc (dissolved)

Priority	Monitoring Recommendations
Medium	Collect samples to determine assessment status and contribute to Copper Basin work. All core parameters need sample number and seasonal coverage.

UNNAMED TRIB TO FINCH WASH

Headwaters - Finch Wash
15030203-044
0.5 Miles

Category 3
Inconclusive

PBC - Inconclusive • A&We - Inconclusive

Use Support

No Exceedances

Monitoring Summary

Sampling period: 1/23/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE COPPER BASIN ROAD	BWUFW000.01	108803	ADEQ	TMDL

Metal Samples	Nutrients & Related Samples	Other Samples
(1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, zinc	None	(1) pH

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved)
Lab Detection Limits Not Low Enough	Boron, copper (dissolved), lead, lead (dissolved)

Priority	Monitoring Recommendations
Low	No exceedances but too little information to assess. All core parameters need sample number and seasonal coverage.