San Pedro Watershed

Watershed Description

This watershed encompasses three hydrological areas:

- San Pedro River, which begins in the mountains near Cananea Sonora, Mexico, and flows north about 100 miles through the southeast corner of Arizona to join the Gila River near Winkelman, Arizona;
- Willcox Playa, a terminal basin (does not drain out of the area), which contains a 30,000 acre ephemeral lake (playa); and
- Two relatively short drainages that flow to the Rio Yaqui in Mexico: Whitewater Draw and Black Draw.

It is a 7,015 square mile watershed is lightly populated with only 130,000 people (2000 census). Communities in the area include the rapidly growing Sierra Vista area and several historic towns, such as Tombstone, Douglas, and Bisbee. Grazing is widespread, with significant areas of irrigated agriculture located on the eastern side of the watershed. Historic copper, silver, and gold mining took place across the watershed; however, only a few mines are still active. Land ownership is divided approximately as: 40% private, 40% state, 20% federal (no tribal land). The Bureau of Land Management established a 50,000 acre San Pedro Riparian National Conservation Area in 1988 to protect this critical habitat.

Elevation varies from 4,000 feet (above sea level), with desert grassland and warmwater aquatic communities, to 10,700 feet at Mount Graham, with alpine forest. Areas above 5,000 feet typically support coldwater aquatic communities where perennial waters exist.

Water Resources

The area gets little precipitation, with 10-15 inches of rain and 0-5 inches of snow. Springs provide perennial flow to segments of the San Pedro River and other streams in this watershed. Concerns have been raised about ground water pumping and water demand in the rapidly growing Fort Huachuca Army Base – Sierra Vista area and the potential impact on perennial flow in the San Pedro River. In 2003, a Fort Huachuca Preservation Legislation required the Secretary of Interior to develop water use management and conservation measures necessary to restore and maintain the sustainable yield of the aquifer.

An estimate of surface water resources in the Salt Watershed is provided in the following table.

Estimated Surface Water Resources in the San Pedro Watershed

	Perennial	Intermittent	Ephemeral
Stream miles	195	665	6,610
	Perennial	Non-perennial	
Lake acres	1,319	29,471	

Estimated miles and acres are based on U.S. Geological Survey digitized hydrology at 1:100,000 and have been rounded to the nearest 5 miles or 5 acres. Ambient monitoring focuses on perennial waters; however, special investigations have identified water quality problems on intermittent and even ephemeral waters.

Assessments

The San Pedro Watershed can be separated into the following drainage areas (subwatersheds):

15050201	Willcox Playa
15050202	Upper San Pedro
15050203	Lower San Pedro
15080301	Whitewater Draw
15080302	San Bernardino Valley

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.

ARAVAIPA CREEK

Aravaipa Cyn Wilderness - San Pedro River
15050203-004C
12.598 Miles

Category 5
Impaired

Add E. coli to the 303(d) list.

IMPAIRMENT STATS

FC - Attaining • FBC - Impaired • AGL - Attaining
AWW - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6.0 mg/L	8/18/2010	4.94 mg/L	AWW is inconclusive with 2 exceedances in 2 samples (binomial).
		7/26/2011	5.6 mg/L	
E. coli	235 cfu/100 mL	9/24/2014	488 cfu/100 mL	FBC is impaired with 2 exceedances in 4 samples. Field notes indicate that the samples were collected under baseflow conditions.
		10/22/2014	435.2 cfu/100 mL	
SSC	80 mg/L	8/18/2010	1051.5 mg/L	AWW is inconclusive. The exceedance on 7/26/11 was storm-related. Not enough samples to calculate a median for 2010. There was no median exceedance in 2014.
		7/26/2011	10010.5 mg/L	
		10/22/2014	193 mg/L	
Selenium	2 ug/L	7/26/2011	16.9 ug/L	AWW is inconclusive with 1 exceedance in 5 samples.

Monitoring Summary

Sampling period: 7/22/2010 - 4/21/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT HIGHWAY 77 BRIDGE	SPARA000.28	105601	ADEQ	TMDL Monitoring
AT WOODS RANCH	SPARA010.19	100212	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(4-6) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(2-4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-7) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Dissolved oxygen, selenium, SSC
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Selenium, mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect more *E. coli* samples in support of TMDL development. Collect more selenium, suspended sediment and dissolved oxygen samples due to exceedances.

Impairment Discussion
Add *E. coli* to the 303(d) list.

ARAVAIPA CREEK

Stowe Gulch - Aravaipa Wild. Bndry
15050203-004B
15.539 Miles

Category 1
Attaining all uses

FC - Attaining • FBC - Attaining • AGL - Attaining
AWW - Attaining

No Exceedances

Monitoring Summary

Sampling period: 8/9/2011 - 6/11/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT EAST TRAIL HEAD	SPARA019.41	100210	ADEQ	Ambient Monitoring
AT HELLS HALF ACRE CANYON	SPARA013.78	100716	ADEQ	Ambient Monitoring
AT NATURE CONSERVANCY NEAR KLONDYKE	SPARA026.35	106882	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(11-13) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(10-12) Ammonia, nitrite/ nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(3-12) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, biocriteria, bottom deposits

Data Gaps and Monitoring Needs

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

Priority	Monitoring Recommendations
Low	Good core parameter coverage.

BASS CANYON

Tributary at 322606 / 110131
15050203-899B
7.9 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Attaining • AGL - Attaining
AWW - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 50 attaining IBI 40 - 49 inconclusive IBI ≤ 39 violating	4/4/2012	IBI 47	AWW is inconclusive.
		4/2/2013	IBI 42	

Monitoring Summary

Sampling period: 10/19/2011 - 4/2/2013

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE DOUBLE R CANYON	SPBAS001.64	100215	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(4-5) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4-5) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-5) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Copper (dissolved), selenium, mercury (dissolved)

Priority	Monitoring Recommendations
High	Two biocriteria violations in this reach indicate the presence of pervasive stressor(s) on benthic macroinvertebrate communities. Collect additional samples to identify possible macroinvertebrate stressors.

BIG CREEK

Headwaters - Grant Creek
15050201-312
8.667 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
AWC - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	7.0 mg/L	6/3/2014	5.74 mg/L	AWC is attaining. Low dissolved oxygen due to groundwater upwelling.

Monitoring Summary

Sampling period: 6/3/2014 - 6/3/2014

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
NEAR TREASURE PARK	SPBIG007.41	109982	ADEQ	Ambient Monitoring

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, *E. coli*, pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead, mercury (or mercury in fish tissue)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead, mercury
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), mercury (dissolved)

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

BREWERY GULCH

Headwaters - Mule Gulch
15080301-337
1.1 Miles

Category 5
Impaired

Copper (EPA 2004 and ADEQ 2006/08)

IMPAIRMENT STATUS

PBC - Inconclusive • AWE - Impaired

No Exceedances

Monitoring Summary

Sampling period: No samples

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
N/A				

Metal Samples	Nutrients & Related Samples	Other Samples
(0) None	(0) None	(0) None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	All core parameters
Missing Seasonal Distribution	All core parameters
Lab Detection Limits Not Low Enough	N/A

Priority	Monitoring Recommendations
Medium	Data collection is ongoing to determine effectiveness of BMPs (soil remediation and stormwater diversions) implemented by Freeport-McMoRan Inc. (FMI) since 2007.

Impairment Discussion
Remains impaired for copper (EPA 2004 & ADEQ 2006/8). Reach is included within the Mule Gulch TMDL.

BUEHMAN CANYON

Headwaters - end of Unique Water
15050203-010A
10.474 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGL - Attaining
AWW - Attaining

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6.0 mg/L	8/17/2012	2.8 mg/L	AWW is attaining. Low dissolved oxygen due to groundwater upwelling.
		4/16/2013	3.57 mg/L	
E. coli	235 cfu/100 mL	8/17/2012	411 cfu/100 mL	FBC is inconclusive with 1 exceedance in 4 samples.

Monitoring Summary

Sampling period: 8/17/2012 - 4/16/2013

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW UNNAMED DRY WASH	SPBHC004.31	101175	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(3-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	*E. coli*
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Selenium, mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect more *E. coli* samples due to the exceedance.

COPPER CREEK

Headwaters - Prospect Canyon
15050203-022A
6.641 Miles

Category 5
Impaired

Add cadmium, copper, zinc and selenium to the 303(d) list.

IMPAIRMENT STATUS

FC - Inconclusive • FBC - Inconclusive • AGL - Inconclusive
AWW - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Cadmium	50 ug/L	6/21/2011	425 ug/L	AGL and FBC are inconclusive with 2 exceedances in 2 samples (binomial).
		10/20/2011	540 ug/L	
Cadmium (dissolved)	6.2 ug/L chronic @ > 400 mg/L hardness	6/21/2011	365 ug/L	AWW is impaired with 2 exceedances in 2 samples.
		10/20/2011	590 ug/L	
Copper	500 ug/L	6/21/2011	41000 ug/L	AGL and FBC are inconclusive with 2 exceedances in 2 samples (binomial).
		10/20/2011	100000 ug/L	
Copper (dissolved)	29.3 ug/L chronic @ > 400 mg/L hardness	6/21/2011	36000 ug/L	AWW is impaired with 2 exceedances in 2 samples.
		10/20/2011	85000 ug/L	
Dissolved oxygen	6.0 mg/L	6/21/2011	5.68 mg/L	AWW is inconclusive with 1 exceedance in 2 samples (binomial).
pH	6.5 SU	10/20/2011	5.61 SU	AGL, AWW and FBC are inconclusive with 1 exceedance in 2 samples (binomial).
Selenium	2 ug/L	6/21/2011	8 ug/L	AWW is impaired with 2 exceedances in 2 samples.
		10/20/2011	15 ug/L	
Zinc	5106 ug/L	6/21/2011	8500 ug/L	FC is inconclusive with 2 exceedances in 2 samples (binomial).
		10/20/2011	18000 ug/L	
Zinc (dissolved)	379.298 ug/L chronic @ > 400 mg/L hardness	6/21/2011	9250 ug/L	AWW is impaired with 2 exceedances in 2 samples.
		10/20/2011	17000 ug/L	

Monitoring Summary

Sampling period: 6/21/2011 - 10/20/2011

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
UPSTREAM FROM CHILDS AND ALTWILKLE MINE SITE	SPCOP010.29	109003	ADEQ	SPS
AT CHILDS AND AL-TWILKLE MINE SITE	SPCOP009.81	109004	ADEQ	SPS

Metal Samples	Nutrients & Related Samples	Other Samples
(2-3) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, zinc	(3) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(3) Dissolved oxygen, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Cadmium, copper, pH, dissolved oxygen, zinc
Missing Core Parameters	*E. coli*
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, copper, lead, mercury
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect more dissolved metals and selenium samples in support of TMDL development. Collect more cadmium, copper, zinc, pH and dissolved oxygen samples due to exceedances. Collect core parameters to represent at least 3 seasons during an assessment period.

Impairment Discussion
Add cadmium, copper, zinc and selenium to the 303(d) list.

DODSON WASH

Headwaters - San Pedro River @ 32 53'20.15"/110 43'35.65"
15050203-026
9.742 Miles

Category 3
Inconclusive

PBC - Inconclusive • AWE - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 7/22/2010 - 8/12/2010

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE SAN PEDRO RIVER	SPDDW000.13	105623	ADEQ	TMDL Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(2) Selenium	(0) None	(0) None

Data Gaps and Monitoring Needs

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

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

GRANT CREEK

Headwaters - Tributary at 323809 / 1095635
15050201-033A
6.8 Miles

Category 2
Attaining some uses

DWS - Attaining • FC - Attaining • FBC - Attaining
AGL - Attaining • AWC - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 52 attaining IBI 46 - 51 inconclusive IBI ≤ 45 violating	5/16/2012	IBI 35	AWC is inconclusive with 1 biocriteria violation. There was a previous violation in 2009.

Monitoring Summary

Sampling period: 9/14/2011 - 5/17/2012

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW POST CREEK	SPGRA007.71	100561	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

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

Priority	Monitoring Recommendations
High	Two biocriteria violations (2009 and 2012) in this reach indicate the presence of pervasive stressor(s) on benthic macroinvertebrate communities. Collect additional samples to identify possible macroinvertebrate stressors. Use lower reporting limits for dissolved metals.

HOT SPRINGS CANYON

Headwaters - San Pedro River
15050203-013
25.918 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Attaining • AGL - Attaining
AWW - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Bottom deposits	< 50% fines	4/4/2012	53%	AWW is inconclusive with 1 violation.

Monitoring Summary

Sampling period: 10/19/2011 - 4/4/2012

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE SAN PEDRO RIVER	SPHSC000.22	109022	ADEQ	TMDL Monitoring
BELOW WILDCAT CANYON	SPHSC010.67	100574	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(3-5) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3-4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Bottom deposits
Missing Core Parameters	None
Missing Seasonal Distribution	Phosphorus
Lab Detection Limits Not Low Enough	Mercury (dissolved)

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

MILLER CANYON

Headwaters - Broken Arrow Ranch
15050202-409A
4.3 Miles

Category 2
Attaining some uses

DWS - Attaining • FC - Attaining • FBC - Attaining
AGL - Attaining • AWC - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 9/11/2014 - 2/10/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
SOUTH OF CARR PEAK	SPMLC013.56	106505	ADEQ	Ambient Monitoring
MILLER CREEK	SPMLC012.68	110365	ADEQ	Ambient Monitoring

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	(3) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

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

Priority	Monitoring Recommendations
Medium	Collect core parameters to represent at least 3 seasons during an assessment period. Collect a follow-up macroinvertebrate sample to confirm the biocriteria violation in 2009.

MULE GULCH

Bisbee WWTP Outfall - Highway 80 bridge
15080301-090C
3.8 Miles

Category 5
Impaired

IMPAIRMENT STATUS

Copper (1990)

AWEDW - Impaired • PBC - Impaired

No Exceedances

Monitoring Summary

Sampling period: No samples

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
N/A				

Metal Samples	Nutrients & Related Samples	Other Samples
(0) None	(0) None	(0) None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	All core parameters
Missing Seasonal Distribution	All core parameters
Lab Detection Limits Not Low Enough	N/A

Priority	Monitoring Recommendations
Medium	Data collection is ongoing to determine effectiveness of BMPs (soil remediation and stormwater diversions) implemented by Freeport-McMoRan Inc. (FMI) since 2007.

Impairment Discussion
Remains impaired for dissolved copper (1990). As a result of FMI projects, pH, dissolved cadmium and zinc have been delisted in 2012/14.

MULE GULCH

Headwaters - Lavender Pit
15080301-090A
3.0 Miles

Category 5
Impaired

Impairment Status

Copper (1990)

FC - Inconclusive • PBC - Inconclusive • AWW - Impaired

No Exceedances

Monitoring Summary

Sampling period: No samples

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
N/A				

Metal Samples	Nutrients & Related Samples	Other Samples
(0) None	(0) None	(0) None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	All core parameters
Missing Seasonal Distribution	All core parameters
Lab Detection Limits Not Low Enough	N/A

Priority	Monitoring Recommendations
Medium	Data collection is ongoing to determine effectiveness of BMPs (soil remediation and stormwater diversions) implemented by Freeport-McMoRan Inc. (FMI) since 2007.

Impairment Discussion
Remains impaired for copper (1990).

MULE GULCH

Lavender Pit - Bisbee WWTP Discharge
15080301-090B
0.8 Miles

Category 5
Impaired

Impairment Status

Copper (1990)

PBC - Inconclusive • AWE - Impaired

No Exceedances

Monitoring Summary

Sampling period: No samples

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
N/A				

Metal Samples	Nutrients & Related Samples	Other Samples
(0) None	(0) None	(0) None

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	All core parameters
Missing Seasonal Distribution	All core parameters
Lab Detection Limits Not Low Enough	N/A

Priority	Monitoring Recommendations
Medium	Data collection is ongoing to determine effectiveness of BMPs (soil remediation and stormwater diversions) implemented by Freeport-McMoRan Inc. (FMI) since 2007.

Impairment Discussion
Remains impaired for dissolved copper (1990). As a result of FMI projects, pH delisted in 2012/14.

RAMSEY CANYON

Headwaters - Forest road 110
15050202-404A
4.4 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Attaining • AGI - Attaining
AGL - Attaining • AWC - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 9/11/2014 - 6/17/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT BOX CANYON	SPRMC011.11	101060	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(3-4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3-4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Cadmium (dissolved), selenium, mercury (dissolved)

Priority	Monitoring Recommendations
Medium	There was a biocriteria violation in the last assessment. Collect a verification sample to confirm the biocriteria status.

SAN PEDRO RIVER

Aravaipa Creek - Gila River
15050203-001
13.26 Miles

Category 4A
Not attaining

IMPAIRMENT

E. coli (2004)

STATUS

FC - Attaining • FBC - Not Attaining • AGL - Inconclusive
AWW - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Arsenic	30 ug/L	9/24/2014	59.9 ug/L	FBC is inconclusive with 1 exceedance in 6 samples (binomial).
Dissolved oxygen	6.0 mg/L	7/22/2010	0.75 mg/L	AWW is inconclusive with 3 exceedances in 6 samples (binomial).
		7/27/2010	3.16 mg/L	
		8/18/2010	4.17 mg/L	
E. coli	235 cfu/100 mL	7/22/2010	36294 cfu/100 mL	FBC remains not-attaining with 5 exceedances in 9 samples.
		7/27/2010	41060 cfu/100 mL	
		8/18/2010	129970 cfu/100 mL	
		9/24/2014	3629.4 cfu/100 mL	
		10/22/2014	387.3 cfu/100 mL	
Lead	100 ug/L (AGL) 15 ug/L (FBC)	9/24/2014	555 ug/L	AGL and FBC are inconclusive with 1 exceedance in 6 samples (binomial).
SSC	80 mg/L	7/22/2010	91920 mg/L	AWW is attaining. All exceedances are storm-related. No median exceedance.
		7/27/2010	56091 mg/L	
		8/18/2010	66261.5 mg/L	
		7/26/2011	1969.5 mg/L	
		10/22/2014	95 mg/L	
Selenium	2 ug/L (AWW chronic) 50 ug/L (AGL)	7/22/2010	158 ug/L	AWW chronic is attaining. All exceedances occurred under acute conditions. AGL is attaining with 2 exceedances in 10 samples (binomial).
		7/27/2010	64.7 ug/L	
		8/18/2010	36.6 ug/L	
		7/26/2011	43.9 ug/L	
Biocriteria	IBI ≥ 50 attaining IBI 40 - 49 inconclusive IBI ≤ 39 violating	4/3/2012	IBI 42	AWW is inconclusive.

Monitoring Summary

Sampling period: 7/22/2010 - 1/26/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW DODSON WASH	SPSPR006.75	106483	ADEQ	Ambient Monitoring
IMMEDIATELY BELOW ARAVAIPA CONFLUENCE	SPSPR013.29	108482	ADEQ	TMDL Monitoring
ABOVE CONFLUENCE WITH ROMERO WASH	SPSPR001.54	106563	ADEQ	TMDL Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(5-13) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(5-6) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(7-13) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Lead, dissolved oxygen, arsenic
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Arsenic, selenium, mercury (dissolved)

Priority	Monitoring Recommendations
High	Continue monitoring for *E. coli*. Collect more arsenic, dissolved oxygen and lead samples due to the exceedances. Collect a verification sample for biocriteria.

Impairment Discussion
Remains impaired for *E. coli* (2004). *E. coli* TMDL completed in 2013. Chronic selenium impairment de-listed in 2010.

SAN PEDRO RIVER

Babocomari River - Dragoon Wash
15050202-003
16.951 Miles

Category 5
Impaired

IMPAIRMENT STATUS

E. coli (2004)

FC - Inconclusive • FBC - Impaired • AGI - Inconclusive
AGL - Attaining • AWW - Attaining

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
E. coli	235 cfu/100 ml	9/9/2010 8	461.1 cfu/100 mL	FBC remains impaired with 5 exceedances in 18 samples.
		7/26/2012	1700 cfu/100 mL	
		8/16/2012	3629.4 cfu/100 mL	
		7/25/2013	2400 cfu/100 mL	
		8/22/2013	2400 cfu/100 mL	
Lead	15 ug/L	9/23/2014	54 ug/L	FBC is inconclusive with 1 exceedance in 3 samples (binomial).
pH	9.0 SU	2/23/2012	10 SU	AGI, AGL, FBC and AWW are attaining with 2 exceedances in 19 samples (binomial).
		8/22/2013	10 SU	

Monitoring Summary

Sampling period: 8/23/2010 - 5/19/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
NORTH OF HIGHWAY 80	SPSPR101.25	100276	ADEQ	Ambient Monitoring
AT FAIRBANKS, AZ	SPSPR117.97	100287	ADEQ	Intensive Survey
NEAR FAIRBANK USGS 314323110113701	SPSPR118.20	109302	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(1-3) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, zinc	(3-29) Ammonia, nitrate, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-41) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Lead
Missing Core Parameters	Boron, mercury (or mercury in fish tissue)
Missing Seasonal Distribution	Boron, mercury
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect more *E. coli* samples in support of TMDL development. Collect lead and pH samples due to the exceedances. Collect core parameters to represent at least 3 seasons during an assessment period.

Impairment Discussion
Remains impaired for *E. coli* (2004).

SAN PEDRO RIVER

Charleston - Walnut Gulch
15050202-006
8.873 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • AWW - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Bottom deposits	< 50% fines	4/16/2012	52%	AWW is inconclusive.

Monitoring Summary

Sampling period: 11/10/2011 - 4/16/2012

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
BELOW GRAVEYARD GULCH	SPSPR126.35	100653	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Bottom deposits
Missing Core Parameters	None
Missing Seasonal Distribution	pH
Lab Detection Limits Not Low Enough	Mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect core parameters to represent at least 3 seasons during an assessment period. Collect an additional bottom deposit sample due to the exceedance.

SAN PEDRO RIVER

Dragoon Wash - Tres Alamos Wash
15050202-002
15.494 Miles

Category 3
Inconclusive

FC - Inconclusive • FBC - Inconclusive • AGI - Inconclusive
AGL - Inconclusive • AWW - Inconclusive

No Exceedances

Monitoring Summary

Sampling period: 2/9/2011 - 3/10/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
APACHE NITROGEN CONTAMINATION AREA	SPSPR100.16	103662	HARG	Data Sharing Partnership
AT 4TH STREET BRIDGE NEAR BENSON USGS 315754110164301	SPSPR095.98	109323	ADEQ	Ambient Monitoring

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

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	None
Missing Core Parameters	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, boron, manganese, copper, lead, mercury (or mercury in fish tissue)
Missing Seasonal Distribution	Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, boron, manganese, copper, lead, mercury
Lab Detection Limits Not Low Enough	Mercury (dissolved), ammonia

Priority	Monitoring Recommendations
Low	Collect core parameters to represent at least 3 seasons during an assessment period. Use a lower reporting limit for ammonia (< 1 mg/L).

SAN PEDRO RIVER

Mexico border - Charleston
15050202-008
28.327 Miles

Category 5
Impaired

E. coli and copper (2010). Add dissolved oxygen to the 303(d) list.

IMPAIRMENT STATUS

FC - Attaining • FBC - Impaired • AGI - Attaining
AGL - Attaining • AWW - Impaired

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6.0 mg/L	12/8/2011	1.6 mg/L	AWW is impaired with 8 exceedances in 36 samples (binomial). The exceedance on 6/28/12 was due to low flow. There were no other comments about flow conditions or flow measurements associated with these exceedances.
		6/28/2012	0.6 mg/L	
		7/26/2012	4.6 mg/L	
		8/16/2012	5.4 mg/L	
		9/20/2012	5.5 mg/L	
		6/27/2013	4.4 mg/L	
		7/25/2013	3.1 mg/L	
		9/12/2013	5.6 mg/L	
		11/21/2013	5.7 mg/L	
E. coli	235 cfu/100 mL	5/12/2011	280 cfu/100 mL	FBC remains impaired with 8 exceedances in 19 samples.
		9/15/2011	2000 cfu/100 mL	
		6/28/2012	1300 cfu/100 mL	
		7/26/2012	3629.4 cfu/100 mL	
		8/16/2012	3629.4 cfu/100 mL	
		7/25/2013	1700 cfu/100 mL	
		8/22/2013	2400 cfu/100 mL	
		9/12/2013	520 cfu/100 mL	
Lead	15 ug/L	9/23/2014	31.5 ug/L	FBC is inconclusive with 1 exceedance in 4 samples (binomial).
pH	Max 9.0 SU (AGI, AGL, FBC, AWW) Min 6.5 SU (AGL, FBC, AWW)	5/12/2011	11 SU	AGI is attaining with 4 exceedances in 38 samples (binomial). AGL, FBC and AWW are attaining with 5 exceedances in 38 samples (binomial).
		8/16/2012	6.19 SU	
		7/25/2013	9.2 SU	
		8/22/2013	10 SU	
		9/12/2013	12 SU	

Parameter	Applicable Standard	Date	Result	Designated use support comments
SSC	80 mg/L	7/18/2014	231 mg/L	AWW is attaining. This single sample exceedance occurred within 48 hours of a storm event. No median exceedance.

Monitoring Summary

Sampling period: 10/4/2010 - 6/15/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT PALOMINAS, AZ USGS 09470500	SPSPR150.09	100275	ADEQ	Ambient Monitoring
AT CHARLESTON, AZ USGS 09471000	SPSPR127.50	100291	SIER	Data Sharing Partnership
ABOVE HIGHWAY 90	SPSPR134.35	100288	SIER	Data Sharing Partnership
NEAR HEREFORD ROAD, AZ USGS	SPSPR144.76	101497	SIER	Data Sharing Partnership

Metal Samples	Nutrients & Related Samples	Other Samples
(1-4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, zinc	(3-21) Ammonia, nitrate, nitrite, nitrite/nitrate, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen	(1-88) Dissolved oxygen, *E. coli*, pH, SSC, simazine, total dissolved solids, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Lead
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Cyanide, mercury (dissolved)

Priority	Monitoring Recommendations
High	Collect more *E. coli*, dissolved copper and dissolved oxygen samples in support of TMDL development. Collect additional lead samples due to the exceedance.

Impairment Discussion
Add dissolved oxygen to the 303(d) list. Remains impaired for *E. coli* and dissolved copper (2010). There were only four samples of dissolved copper and no AWW exceedances.

SAN PEDRO RIVER

Peppersauce Wash - Aravaipa
15050203-003
21.275 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Inconclusive • AGL - Attaining
AWW - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Dissolved oxygen	6.0 mg/L	7/22/2010	5.78 mg/L	AWW is inconclusive with 3 exceedances (7/21/08, 7/22/10, 8/18/10) in 12 samples (binomial). The other exceedances were due to groundwater upwelling.
		8/18/2010	4.32 mg/L	
		7/26/2011	4.83 mg/L	
		8/9/2011	1.81 mg/L	
		4/3/2012	4.89 mg/L	
		4/15/2014	4.36 mg/L	
		4/6/2015	2.99 mg/L	
E. coli	235 cfu/100 ml	7/22/2010	36294 cfu/100 mL	FBC is inconclusive with 3 storm-related single sample exceedances outside the assessment window (last 3 years of monitoring).
		7/27/2010	30760 cfu/100 mL	
		8/18/2010	57940 cfu/100 mL	
SSC	80 mg/L	7/22/2010	11378 mg/L	AWW is attaining. All exceedances are storm-related. No median exceedance.
		7/27/2010	53859 mg/L	
		8/18/2010	85320 mg/L	
		7/26/2011	35303 mg/L	
Selenium	50 ug/L (AGL) 2 ug/L (AWW chronic)	7/22/2010	22.3 ug/L	AGL is attaining with 2 exceedances in 11 sample (binomial). AWW chronic is inconclusive with 1 exceedance in 10 samples. All other exceedances are storm related and do not represent chronic conditions.
		7/27/2010	34.6 ug/L	
		8/18/2010	53.35 ug/L	
		7/26/2011	54.8 ug/L	
		12/5/2011	2.5 ug/L	
Biocriteria	IBI ≥ 50 attaining IBI 40 - 49 inconclusive IBI ≤ 39 violating	4/15/2014	IBI 47	AWW is inconclusive.
Bottom deposits	< 50% fines	4/15/2014	73%	AWW is inconclusive.
		4/3/2012	67.6%	
		4/3/2013	70%	
		4/6/2015	69.3%	

Monitoring Summary

Sampling period: 7/22/2010 - 4/6/2015

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
AT HIGHWAY 77 NEAR MAMMOTH	SPSPR022.15	105599	ADEQ	TMDL Monitoring
ABOVE OLD CAMP GRANT MILITARY RESERVATION BOUNDRY	SPSPR015.42	108902	ADEQ	Ambient Monitoring
DOWNSTREAM OF WHEATFIELDS IRRIGATION RETURN DITCH	SPSPR014.18	109562	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(9-14) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(9-10) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(2-15) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, biocriteria, bottom deposits

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Bottom deposits, dissolved oxygen, selenium, *E. coli*, biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	None
Lab Detection Limits Not Low Enough	Selenium, mercury (dissolved)

Priority	Monitoring Recommendations
High	Initiate a bottom deposit TMDL once the Impaired Waters Identification Rule is updated. Collect *E. coli*, selenium and dissolved oxygen samples due to exceedances. Collect a verification sample for biocriteria.

TURKEY CREEK

Headwaters - Rock Creek
15050201-002A
13.9 Miles

Category 2
Attaining some uses

FC - Attaining • FBC - Attaining • AGI - Attaining
AGL - Attaining • AWC - Inconclusive

Exceedances

Parameter	Applicable Standard	Date	Result	Designated use support comments
Biocriteria	IBI ≥ 52 attaining IBI 46 - 51 inconclusive IBI ≤ 45 violating	5/14/2012	IBI 36	AWC is inconclusive with 1 biocriteria violation.

Monitoring Summary

Sampling period: 12/6/2011 - 5/14/2012

Site Name(s)	Site ID #	DEQ #	Sampling Agency	Purpose
ABOVE UPPER CAMP-GROUND	SPTUR028.53	102113	ADEQ	Ambient Monitoring

Metal Samples	Nutrients & Related Samples	Other Samples
(4) Antimony, arsenic, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc	(3-4) Ammonia, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen	(1-4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, bottom deposits, biocriteria

Data Gaps and Monitoring Needs

Exceedances Needing More Samples to Assess	Biocriteria
Missing Core Parameters	None
Missing Seasonal Distribution	Dissolved oxygen
Lab Detection Limits Not Low Enough	Cadmium (dissolved), copper (dissolved), lead (dissolved), zinc (dissolved), mercury (dissolved)

Priority	Monitoring Recommendations
Medium	Collect another macroinvertebrate sample to confirm the biocriteria violation. Use lower reporting limits for dissolved zinc, cadmium and copper. Collect core parameters to represent at least 3 seasons during an assessment period.