# Colorado – Grand Canyon Watershed

## Watershed Description

This watershed is defined by the Colorado River drainage area, beginning in Arizona at Lake Powell, through the Grand Canyon National Park, to Hoover Dam at Lake Mead. It does not include the Little Colorado River drainage. The watershed contains spectacular incised canyons formed by erosion of sandstone formations, as well as volcanically formed mountains and high plateaus.

Land ownership is divided approximately as: 57% federal, 22% tribal, 13% private, and 8% state. Most of the 17,110 square miles in this watershed are sparsely populated, with an approximate population of 67,500 people (2000 census). The largest communities are Kingman and Williams. Land use is primarily open grazing, recreation, and silviculture (forestry), with scattered mining districts. The Grand Canyon National Park, Kaibab National Forest, Lake Mead National Recreation Area, and Glen Canyon National Recreation Area are all located within this watershed and all have restricted land uses to protect natural resources. These federal lands also draw a large number of tourists and recreationists.

Elevations range from 1,000 feet (above sea level) along the Colorado River to 10,400 feet near Flagstaff. The majority of the watershed is between 5,000-7,000 feet elevation, with high desert fauna and flora, including coldwater aquatic communities where perennial waters exist.

### Water Resources

Precipitation varies from 10-15 inches a year, including about 1 inch of snowfall per year in higher elevations. Excluding the Colorado River and its reservoirs (Lake Powell and Lake Mead), surface water is sparse.

An estimate of surface water resources in the Colorado – Grand Canyon Watershed is provided in the following table. Waters on Tribal lands are not assessed by ADEQ; therefore, those statistics are shown separately.

Estimated Surface Water Resources in the Colorado – Grand Canyon Watershed

| | Perennial | Intermittent | Ephemeral |
|---|---|---|---|
| Stream miles | 480 | 260 | 14,870 |
| | Perennial | Non-perennial | |
| Lake acres | 68,400 | 13,415 | |

Additional Estimated Water Resources on Tribal Lands – Not Assessed

| | Perennial | Intermittent | Ephemeral |
|---|---|---|---|
| Stream miles | 125 | 5 | 3,740 |
| | Perennial | Non-perennial | |
| Lake acres | 390 | 0 | |

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





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## Assessments

The Colorado – Grand Canyon Watershed can be separated into the following drainage areas in Arizona:

| | |
|---|---|
| 14070006 | Lake Powell |
| 14070007 | Paria River |
| 15010001 | Marble Canyon |
| 15010002 | Grand Canyon |
| 15010003 | Kanab Creek |
| 15010004 | Havasu Creek |
| 15010005 | Lake Mead |
| 15010006 | Grand Wash |
| 15010007 | Red Lake |
| 15010009 | Fort Pearce Wash |
| 15010010 | Virgin River |
| 15010014 | Detrital Wash |

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.



ED_013248_00000480-00002

# CATARACT LAKE

15010004-0280
38 Acres

**Category 3**
Inconclusive

Colorado - Grand Canyon

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

## No Exceedances

## Monitoring Summary

Sampling period: 6/30/2012 - 9/30/2012

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT DAM | CGCAT-A | 100015 | USFS | Data Sharing Partnership |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (0) None | (0) None | (2) 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), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, copper, lead, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, copper, lead, mercury |
| Lab Detection Limits Not Low Enough | None |

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



ED_013248_00000480-00003

# COLORADO RIVER

Glen Canyon Dam - Lees Ferry
14070006-001
16.9 Miles

**Category 1**
Attaining all uses

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

Use Support

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Dissolved oxygen | 7.0 mg/L | 6/19/2013 | 6.8 mg/L | AWC is attaining with 2 exceedances in 37 samples (binomial). |
| | | 10/6/2014 | 6.8 mg/L | |
| SSC | 25 mg/L | 11/11/2014 | 86 mg/L | AWC is attaining with no median exceedance. |

## Monitoring Summary

Sampling period: 8/23/2010 - 12/8/2014

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT LEES FERRY, AZ<br>USGS 09380000 | CGCLR698.93 | 100743 | USGS | Ambient Monitoring |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (3-17) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, zinc | (14-38) Nitrate, nitrite, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen | (7-38) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids |

## 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 | None |

| Priority | Monitoring Recommendations |
|---|---|
| Low | Good core parameter and seasonal coverage. Keep monitoring for selenium. Although there were no total selenium exceedances, there were 4 dissolved selenium exceedances in 31 samples. Only 9 samples had both total and dissolved fractions reported, and all of them had the dissolved fraction grater than the total result. |



ED_013248_00000480-00004

# COLORADO RIVER

Unnamed Trib @ 360554.796/1120435.253 - Bright Angel Creek
15010001-001
1.06 Miles

**Category 3**
Inconclusive



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

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| SSC | 25 mg/L | 8/20/2014 | 933 mg/L | AWC is inconclusive. Not enough samples calculate a median. |

## Monitoring Summary

Sampling period: 8/20/2014 - 8/20/2014

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| NEAR GRAND CANYON, AZ USGS 09402500 | CGCLR610.88 | 101481 | USGS | Data Sharing Partnership |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (1) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, selenium, zinc | (1) 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*, nitrite/nitrate, fluorine, arsenic, chromium, boron, manganese, copper, lead, mercury |
| Missing Seasonal Distribution | Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, boron, manganese, copper, lead, mercury |
| Lab Detection Limits Not Low Enough | None |

| Priority | Monitoring Recommendations |
|---|---|
| Medium | Collect more suspended sediment samples due to the exceedance. Collect core parameters to represent at least 3 seasons during an assessment period. |



ED_013248_00000480-00005

# COLORADO RIVER

Parashant Canyon - Diamond Creek
15010002-003
27.621 Miles

**Category 5**
Impaired

## Selenium and SSC (2004)

IMPAIRMENT STATUS

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

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Arsenic | 10 ug/L | 11/21/2012 | 10.7 ug/L | DWS is inconclusive with 1 exceedance in 5 samples (binomial). |
| Dissolved oxygen | 7.0 mg/L | 5/23/2012 | 2.1 mg/L | AWC is inconclusive with 2 exceedances in 6 samples (binomial). |
| | | 7/23/2012 | 2.1 mg/L | |
| Lead | 15 ug/L | 11/21/2012 | 19.4 ug/L | DWS and FBC are inconclusive with 2 exceedances in 5 samples (binomial). |
| | | 8/25/2014 | 16.4 ug/L | |
| SSC | 25 mg/L | 8/25/2014 | 1420 mg/L | AWC remains impaired. Not enough samples to calculate a median. |
| | | 11/3/2014 | 62 mg/L | |

## Monitoring Summary

Sampling period: 1/24/2012 - 11/3/2014

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| ABOVE DIAMOND CREEK USGS 09404200 | CGCLR473.00 | 101483 | USGS | Data Sharing Partnership |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (2-6) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, zinc | (4-6) Nitrate, nitrite, nitrite/ nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen | (2-6) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids |

## Data Gaps and Monitoring Needs

| | |
|---|---|
| Exceedances Needing More Samples to Assess | Dissolved oxygen, arsenic, lead |
| Missing Core Parameters | *E. coli*, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | *E. coli*, mercury |
| Lab Detection Limits Not Low Enough | None |



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| Priority | Monitoring Recommendations |
| --- | --- |
| High | Collect samples to support development of suspended sediment and selenium TMDLs. Collect more arsenic, lead and dissolved oxygen samples due to the exceedances. |

| Impairment Discussion |
| --- |
| Reach remains impaired for suspended sediment due to insufficient data to assess. There were no selenium exceedances in 5 samples collected in this assessment period. |

Colorado - Grand Canyon



ED_013248_00000480-00007

# DOGTOWN RESERVOIR

15010004-0480
70 Acres

**Category 3**
Inconclusive

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

## No Exceedances

## Monitoring Summary

Sampling period: 6/30/2012 - 9/30/2012

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT BOAT RAMP | CGDOG-BR | 101319 | USFS | Data Sharing Partnership |
| AT DAM | CGDOG-A | 100019 | USFS | Data Sharing Partnership |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (0) None | (0) None | (4) pH |

## Data Gaps and Monitoring Needs

| | |
|---|---|
| Exceedances Needing More Samples to Assess | None |
| Missing Core Parameters | Zinc (dissolved), dissolved oxygen, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, lead, boron, manganese, copper, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, lead, boron, manganese, copper, mercury |
| Lab Detection Limits Not Low Enough | None |

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



ED_013248_00000480-00008

# HAVASU CREEK

Unnamed Trib @ 36°18'02"/112°45'14" - Colorado River
15010004-001B
0.87 Miles

**Category 3**
Inconclusive



## Use Support

FC - Inconclusive • FBC - Inconclusive • AWW - Inconclusive

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Selenium (dissolved) | 2 ug/L | 8/28/2012 | 2.2 ug/L | AWW is inconclusive with 1 chronic exceedance in 5 dissolved samples. Two total selenium samples did not have exceedances. |

## Monitoring Summary

Sampling period: 10/3/2010 - 10/15/2012

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| ABOVE COLORADO RIVER USGS 09404115 | CGHAV000.36 | 100568 | USGS | Ambient Monitoring |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (2-3) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, silver, thallium, zinc | (3) Nitrate, nitrite, nitrite/nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen | (2-5) Dissolved oxygen, pH |

## Data Gaps and Monitoring Needs

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

| Priority | Monitoring Recommendations |
|---|---|
| Low | Collect more selenium samples due to the exceedance. |



ED_013248_00000480-00009

# KAIBAB LAKE

15010004-0710
61 Acres

**Category 3**
Inconclusive

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

## No Exceedances

## Monitoring Summary

Sampling period: 6/30/2012 - 9/30/2012

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT DAM | CGKAI-A | 100027 | USFS | Data Sharing Partnership |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (0) None | (0) None | (2) 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), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, boron, manganese, copper, lead, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, boron, manganese, copper, lead, mercury |
| Lab Detection Limits Not Low Enough | None |

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



ED_013248_00000480-00010

# KANAB CREEK

Johnson Wash - Jacob Canyon
15010003-013
4.238 Miles

**Category 3**
Inconclusive

Colorado - Grand Canyon

DWS - Inconclusive • FC - Inconclusive • FBC - Inconclusive
AGL - Inconclusive • AWW - Inconclusive

Unsupported

## No Exceedances

## Monitoring Summary

Sampling period: 10/8/2010 - 10/8/2010

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| NEAR FREDONIA, AZ | CGKAN057.62 | 101829 | USGS | Ambient Monitoring |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (1) Manganese | (1) Nitrate, nitrite, nitrite/ nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen | (1) Dissolved oxygen, 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), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, lead, copper, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | Zinc (dissolved), dissolved oxygen, pH, cadmium (dissolved), copper (dissolved), *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, lead, copper, mercury |
| Lab Detection Limits Not Low Enough | None |

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



ED_013248_00000480-00011

# KANAB CREEK

Jump - up Canyon - Colorado River
15010003-001
12.769 Miles

**Category 5**
Impaired

IMPAIRMENT STATUS

*Add selenium to the 303(d) list.*

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

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Selenium | 2 ug/L | 8/27/2012 | 2.09 ug/L | AWW is impaired with 2 exceedances in 2 samples. |
| | | 10/13/2012 | 2.75 ug/L | |

## Monitoring Summary

Sampling period: 10/5/2010 - 10/13/2012

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| ABOVE COLORADO RIVER | CGKAN000.26 | 100577 | USGS | Ambient Monitoring |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (2-4) Antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, manganese, nickel, selenium, silver, thallium, zinc | (3-6) Nitrate, nitrite, nitrite/ nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen | (1-7) Dissolved oxygen, pH |

## Data Gaps and Monitoring Needs

| | |
|---|---|
| Exceedances Needing More Samples to Assess | None |
| Missing Core Parameters | Dissolved oxygen, *E. coli*, arsenic, chromium, lead, copper, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | Dissolved oxygen, *E. coli*, arsenic, chromium, lead, copper, mercury |
| Lab Detection Limits Not Low Enough | None |

| Priority | Monitoring Recommendations |
|---|---|
| High | Collect more selenium samples in support of TMDL development. |



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| Impairment Discussion |
| --- |
| Add selenium to the 303(d) list. Reach is impaired for selenium with 2 chronic exceedances in 2 samples. There were also 8 dissolved selenium samples, of which 4 samples exceeded the chronic criterion. |

Colorado - Grand Canyon



ED_013248_00000480-00013

# LAKE POWELL

14070006-1130
9770 Acres

**Category 5**
Impaired

## EPA mercury in fish tissue (2010)

IMPAIRMENT STATUS

DWS - Inconclusive • FC - Impaired • FBC - Inconclusive
AGI - Inconclusive • AGL - Inconclusive • AWC - Inconclusive

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Dissolved oxygen | 7.0 mg/L | 7/15/2010 | 5.2 mg/L | AWC is inconclusive with 1 exceedance in 1 sample. |

## Monitoring Summary

Sampling period: 7/13/2010 - 7/15/2010

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT STATE LINE | CGPOW-STATE | 102973 | USGS | Ambient Monitoring |
| AT LONE ROCK BEACH | CGPOW-LONER | 102974 | USGS | Ambient Monitoring |
| AT WARM CREEK BAY | CGPOW-WARM | 102976 | USGS | Ambient Monitoring |
| AT ANTELOPE MARINA | CGPOW-ANTEL | 102956 | USGS | Ambient Monitoring |
| AT DANGLING ROPE MARINA | CGPOW-DANGL | 102978 | USGS | Ambient Monitoring |
| AT RAINBOW BRIDGE | CGPOW-RAINB | 102977 | USGS | Ambient Monitoring |
| AT SAN JUAN RIVER INFLOW | CGPOW-JUAN | 102979 | USGS | Ambient Monitoring |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (0) None | (8) Nitrite, ammonia | (8) Dissolved oxygen |



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# Data Gaps and Monitoring Needs

| | |
|---|---|
| Exceedances Needing More Samples to Assess | Dissolved oxygen |
| Missing Core Parameters | Zinc (dissolved), cadmium (dissolved), copper (dissolved), pH, *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, boron, manganese, copper, lead, mercury (or mercury in fish tissue) |
| Missing Seasonal Distribution | Zinc (dissolved), dissolved oxygen, cadmium (dissolved), copper (dissolved), pH, *E. coli*, nitrite/nitrate, fluorine, arsenic, chromium, boron, manganese, copper, lead, mercury |
| Lab Detection Limits Not Low Enough | None |

| Priority | Monitoring Recommendations |
|---|---|
| High | Collect more samples in support of TMDL development. |

| Impairment Discussion |
|---|
| EPA overfile for mercury in fish tissue. Fish consumption advisory issued in 2012 and still in effect. |

Colorado - Grand Canyon



ED_013248_00000480-00015

# PARIA RIVER

Paria River, Utah border - Colorado River
14070007-123
29.426 Miles

**Category 5**
Impaired

*SSC (2004) and E. coli (2006/8).*
*Add selenium to the 303(d) list.*

IMPAIRMENT STATUS

FC - Inconclusive • FBC - Impaired • AWW - Impaired

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Arsenic | 30 ug/L (FBC) & 80 ug/L (FC) | 8/28/2012 | 170 ug/L | FBC and FC are inconclusive with 1 exceedance in 4 samples (binomial). |
| Chromium | 100 ug/L | 8/28/2012 | 640 ug/L | FBC is inconclusive with 1 exceedance in 4 samples (binomial). |
| Dissolved oxygen | 6.0 mg/L | 8/22/2012 | 5.8 mg/L | AWW is attaining with 1 exceedance in 13 samples (binomial). |
| *E. coli* | 235 cfu/100 mL | 8/28/2012 | 22298 cfu/100 mL | FBC remains impaired with 1 exceedance. |
| Lead | 15 ug/L | 8/28/2012 | 300 ug/L | FBC is inconclusive with 1 exceedance in 4 samples (binomial). |
| SSC | 80 mg/L | 8/28/2012 | 43000 mg/L | AWW remains impaired with 1 median exceedance. |
| | | 12/12/2012 | 220 mg/L | |
| | | 2/26/2013 | 540 mg/L | |
| | | 4/24/2013 | 150 mg/L | |
| Selenium | 2 ug/L | 8/28/2012 | 30 ug/L | AWW is impaired with 2 exceedances in 3 samples. |
| | | 2/26/2013 | 4.4 ug/L | |
| Bottom deposits | < 50% fines | 4/24/2013 | 60% | AWW is inconclusive with 1 exceedance. |
| Biocriteria | IBI ≥ 50 attaining<br>IBI 40 - 49 inconclusive<br>IBI ≤ 39 violating | 4/24/2013 | IBI 25 | AWW is inconclusive with 1 violation. |

## Monitoring Summary

Sampling period: 8/23/2010 - 8/31/2013

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT LEES FERRY, AZ<br>USGS 09382000 | CGPAR000.49 | 101073 | ADEQ | Ambient Monitoring |
| AT LEES FERRY, AZ | CGPAR001.23 | 101447 | USGS | Ambient Monitoring |



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| 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 | (1-21) 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, biocriteria, arsenic, chromium, lead |
| Missing Core Parameters | None |
| Missing Seasonal Distribution | None |
| Lab Detection Limits Not Low Enough | Selenium, mercury (dissolved) |

| Priority | Monitoring Recommendations |
|---|---|
| High | Collect arsenic, chromium and lead samples due to the exceedances. Collect verification samples for bottom deposits and biocriteria. Collect additional *E. coli* and suspended sediment samples to support TMDL development. Use a lower lab reporting limit for selenium. |

| Impairment Discussion |
|---|
| Reach remains impaired for *E. coli* (2006) and suspended sediment (2004) due to additional exceedances. Add selenium to the 303(d) list - there were two new A&W chronic exceedances in this assessment period. |

Colorado - Grand Canyon



ED_013248_00000480-00017

# VIRGIN RIVER

Beaver Dam Wash - Sand Hollow Wash
15010010-003
8.56 Miles

**Category 5**
Impaired

## *E. coli (2010), SSC and selenium (2004)*

IMPAIRMENT STATUS

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

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| *E. coli* | 235 cfu/100 mL | 4/28/2014 | 350 cfu/100 mL | FBC remains impaired with 1 exceedance in the last 3 years of assessment. |
| Selenium (dissolved) | 2 ug/L | 4/28/2014 | 2.2 ug/L | AWW remains impaired with 2 chronic exceedances. No total selenium was collected. |
| | | 7/30/2014 | 2.3 ug/L | |

## Monitoring Summary

Sampling period: 4/28/2014 - 11/6/2014

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT LITTLEFIELD, AZ<br>USGS 09415000 | CGVGR038.80 | 101836 | USGS | Data Sharing Partnership |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (0) None | (3) Nitrate, nitrite, nitrite/nitrate, nitrogen, phosphate, phosphorus, total Kjeldahl nitrogen | (1-3) Dissolved oxygen, *E. coli*, pH, simazine, total dissolved solids |

## Data Gaps and Monitoring Needs

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



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| Priority | Monitoring Recommendations |
|---|---|
| High | Collect samples to support development of selenium, suspended sediment and *E. coli* TMDLs. Collect core parameters to represent at least 3 seasons during an assessment period. |

| Impairment Discussion |
|---|
| Reach remains impaired for SSC (2004), selenium (2004) and *E. coli* (2010) with additional *E. coli* and selenium exceedances. No new data on SSC. |

Colorado - Grand Canyon



ED_013248_00000480-00019

# VIRGIN RIVER

Black Rock Gulch - Sullivans Canyon
15010010-006
10.282 Miles

**Category 3**
Inconclusive

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

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Bottom deposits | < 50% fines | 2/26/2013 | 70% | AWW is inconclusive with 1 exceedance. |

## Monitoring Summary

Sampling period: 7/21/2010 - 7/21/2010

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| BELOW I-15 REST STOP | CGVGR051.33 | 101834 | USGS | Ambient Monitoring |
| AT REST STOP | CGVGR052.23 | 100679 | ADEQ | Ambient Monitoring |

| Metal Samples | Nutrients & Related Samples | Other Samples |
|---|---|---|
| (0) None | (1) Nitrate, nitrite, nitrite/ nitrate, nitrogen, phosphorus, total Kjeldahl nitrogen | (1) Dissolved oxygen, pH |

## Data Gaps and Monitoring Needs

| | |
|---|---|
| Exceedances Needing More Samples to Assess | Bottom deposits |
| 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 | None |

| Priority | Monitoring Recommendations |
|---|---|
| Medium | Collect a verification sample for bottom deposits. There were also *E. coli*, selenium and bottom deposits exceedances in the previous (2012/14) assessment. |



ED_013248_00000480-00020

# VIRGIN RIVER

Sullivans Canyon - Beaver Dam Wash
15010010-004
9.734 Miles

**Category 5**
Impaired



IMPAIRMENT STATUS

## *Selenium (2012)*

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

## Exceedances

| Parameter | Applicable Standard | Date | Result | Designated use support comments |
|---|---|---|---|---|
| Boron | 1000 ug/L | 9/27/2012 | 1100 ug/L | AGI is inconclusive with 2 exceedances in 4 samples (binomial). |
| | | 4/24/2013 | 1100 ug/L | |
| SSC | 80 mg/L | 9/27/2012 | 130 mg/L | AWW is inconclusive with 1 median exceedance. |
| | | 12/13/2012 | 680 mg/L | |
| Selenium | 2 ug/L | 9/27/2012 | 3.4 ug/L | AWW remains impaired with 2 new exceedances in this assessment period. |
| | | 2/26/2013 | 3.05 ug/L | |
| Biocriteria | IBI ≥ 50 attaining<br>IBI 40 - 49 inconclusive<br>IBI ≤ 39 violating | 4/24/2013 | IBI 29 | AWW is inconclusive with 1 violation. |
| Bottom deposits | < 50% fines | 4/24/2013 | 57% | AWW is inconclusive with 1 exceedance. |

## Monitoring Summary

Sampling period: 9/27/2012 - 4/24/2013

| Site Name(s) | Site ID # | DEQ # | Sampling Agency | Purpose |
|---|---|---|---|---|
| AT MOUTH OF NARROWS | CGVGR044.58 | 101835 | 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 | (4) Dissolved oxygen, *E. coli*, pH, SSC, total dissolved solids, |



ED_013248_00000480-00021

# Data Gaps and Monitoring Needs

| | |
|---|---|
| Exceedances Needing More Samples to Assess | Boron, SSC, biocriteria, bottom deposits |
| Missing Core Parameters | None |
| Missing Seasonal Distribution | None |
| Lab Detection Limits Not Low Enough | Selenium, mercury (dissolved) |

| Priority | Monitoring Recommendations |
|---|---|
| High | Collect selenium samples to support TMDL development. Collect more boron, suspended sediment, bottom deposits and biocriteria samples due to the exceedances. Use a lower reporting limit for selenium. |

| Impairment Discussion |
|---|
| Reach remains impaired for selenium with additional exceedances. |



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