

CHAPTER III

SUMMARY INFORMATION

This chapter provides a summary of assessed surface waters. Progress and comparisons with previous assessments are illustrated in the following chapter. Statewide summary statistics can provide a general sense of the status of water quality in Arizona. The statistics in this chapter exclude surface waters on tribal lands. Also, the statistics include waters that EPA listed as impaired in previous assessments.

Assessed Waters

Overall 54 (97801 acres) lakes and 370 (3763 miles) stream segments were assessed in this report. The following tables show the change in stream miles and lake acres assessed from the 2002 to 2012/14 assessment. These tables exclude the surface waters assessed in Category 3 (all uses “inconclusive”) because by default any water from which no data existed would belong in this category.

Total Waters Assessed

Support Type	Lakes/Acres					Streams/Miles				
	2002	2004	2006/8	2010	2012/14	2002	2004	2006/8	2010	2012/14
Estimated Waters	289630	289630	295590	295590	295590	90375	90375	90375	90375	90375
Water Assessed	40948	67340	88672	86234	93821	1671	2227	2806	2538	2098
Percent Assessed	14%	23%	30%	29%	32%	2.0%	2.5%	3.0%	2.8%	2.3%

*Waters Assessed excludes Category 3 – all uses assessed as “inconclusive”

*Estimated lake water size increased in 2006/08 due to enlargement of reservoirs.

The Total Waters Assessed table (above) indicates that a very low percentage of the state’s surface waters are assessed. This is primarily due to the fact that the majority of waters in Arizona are ephemeral (flowing in response only to precipitation events) and not easily sampled. The Total Perennial Waters Assessed table (below) adjusts for this by only looking at perennial lake acres and stream miles. Most ADEQ ambient monitoring is focused on perennial waters (waters that flow year round). Monitoring ephemeral and intermittent waters is limited to special investigations, such as TMDL development. In order increase the waters assessed ADEQ incorporates external data into the assessment. ADEQ requested external data submissions in January 2009 however; additional data was received outside of this formal request. Data from 22 external entities were used in the 2012/14 assessment. The largest data contributors are the Salt River Project, United States Geological Survey and Army Corp of Engineers. Approximately 50% of the data used in the assessment was from external sources.

External Data Contributors

Salt River Project	ASARCO	Slide Rock State Park	Sierra Club
United States Geological Survey	Friends of the Santa Cruz	BHP	United States Forest Service
Army Corp of Engineers	Arizona Game and Fish	National Park Service	Apache Nitrogen Products
Pinal Creek Group	Freeport McMoRan	Resolution Copper	Northern Arizona University
Various Volunteer Groups	City of Tempe		

Total Perennial Waters Assessed

Support Type	Lakes/Acres					Streams/Miles				
	2002	2004	2006/8	2010	2012/14	2002	2004	2006/8	2010	2012/14
Estimated Perennial Waters	168590	168590	174558	174558	174558	3530	3530	3530	3530	3530
Perennial Water Assessed	39873	66264	87773	85192	83588	1405	2081	2685	2102	1804
Percent Perennial Waters Assessed	24%	39%	50%	49%	48%	40%	59%	76%	60%	51%

* Perennial Waters Assessed excludes Category 3 – all uses assessed as “inconclusive”

As shown in the Perennial Waters Assessed table (above), a steady increase in the percent of perennial surface waters occurred from 2002 to 2008. However, the percent perennial waters assessed fell from 2008 to 2012/14, due to declining monitoring resources.

Another way to look at the effort and effectiveness of monitoring programs is to look at the number of lakes and stream reaches assessed. This is particularly revealing with lakes, as their sizes vary from less than an acre to 27,000 acres. Therefore, monitoring and assessing 20 small, but significant lakes might account for fewer acres than one large reservoir but provides for a larger sampling program in terms of the number of lakes sampled and assessed. This is shown when comparing 2006/8 to 2010 where the number of lakes assessed as attaining or impaired decreased by about 50% but the number of acres only decreased by approximately 2400 acres.

Number of Units and Acres/Miles Assessed

Support Type	Lakes					Stream Reaches				
	2002	2004	2006/8	2010	2012/14	2002	2004	2006/8	2010	2012/14
Assessment Units Assessed	30	51	79	39	39	137	172	298	213	193
Waters Assessed - Acres/ Miles	40948	67340	88672	86234	93821	1671	2227	2806	2538	2208

* Excluding Category 3 – all uses assessed as “inconclusive”

Assessed Waters by Category

The table below illustrates how the 54 lakes and 370 stream reaches were assessed in 2012/14. The greatest number of waters were assessed as inconclusive (Category 3).

Status of Assessed Waters 2012/14

Use Support Category	Lakes	Acres	Reaches	Miles
Category 1 (Attaining all uses)	0	0	18	189
Category 2 (Attaining some uses)	5	21233	73	978
Category 3 (Inconclusive)	15	3980	180	1585
Category 4 (4A,4A/4B,4B) (Not attaining)	12	2732	47	351
Category 5 (Impaired)	22	69857	55	689
Total	54	97801	373	3793

Approximately 22% of the lake acres and 28% of the stream miles assessed are attaining all or some of their uses, as compared to 78 and 50% respectively in the 2006/8 Assessment. Lake acres impaired or not attaining equal approximately 74% of the lake acres assessed. Impaired and not attaining stream miles equal approximately 28% of the stream miles assessed.

Designated Use Support

Narrative and numeric criteria were developed to protect the designated uses assigned to a surface water. Designated uses include agriculture, aquatic and wildlife, consumption, and recreation. The largest number of impairments is shown for the aquatic and wildlife designated use within both lakes and streams. The following table summarizes the designated use support by category for lakes and streams.

Lake Designated Use Support 2012/14

Support Type (Units)	Attaining	Inconc.	Impaired
Agricultural Irrigation	7	23	6
Agricultural Livestock Watering	5	30	6
Aquatic & Wildlife	2	31	21
Domestic Water Source	1	13	0
Fish Consumption	8	31	13
Body Contact	3	42	9
Support Type (Acres)	Attaining	Inconc.	Impaired
Agricultural Irrigation	29563	63604	600
Agricultural Livestock Watering	29382	65819	2013
Aquatic & Wildlife	20805	44456	32540
Domestic Water Source	8000	83102	0
Fish Consumption	3090	53247	40774
Body Contact	271	95493	2037

Stream Designated Use Support 2012/14

Support Type (by Units)	Attaining	Inconc.	Impaired
Agricultural Irrigation	66	81	3
Agricultural Livestock Watering	103	140	11
Aquatic & Wildlife	33	264	74
Domestic Water Source	15	30	3
Fish Consumption	120	156	7
Body Contact	66	255	52
Support Type (by Miles)	Attaining	Inconc.	Impaired
Agricultural Irrigation	987	1022	45
Agricultural Livestock Watering	1381	1653	97
Aquatic & Wildlife	406	2641	752
Domestic Water Source	178	481	48
Fish Consumption	1597	1739	63
Body Contact	906	2378	508

Fish Consumption Advisories

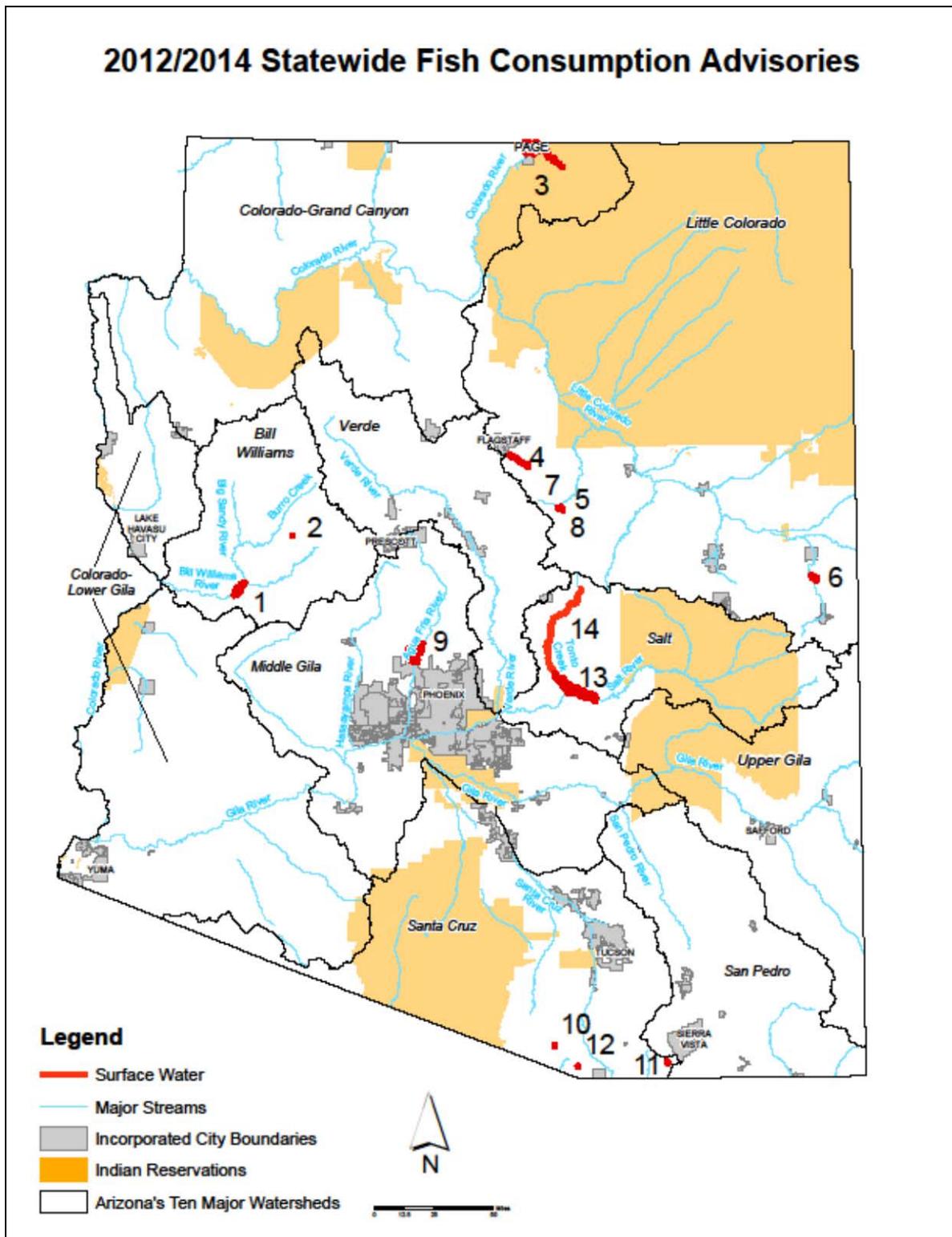
Fish consumption advisories have been issued on 16 lakes and portions of several rivers (see table and map below). The numbers in the table correspond to the labels on the map. These advisories are issued to inform the public about possible adverse health effects and they contain recommendations for how many fish meals (8-ounce portions) can safely be

consumed. Advisories may be directed at a specific subset of the population because some people are at greater risk (pregnant women and children). Additional information about fish tissue screening and fish advisories can be obtained by contacting ADEQ at (602) 771-4536 or Arizona Game and Fish Department (AGFD) at (602) 789-3260. Additional information can be obtained from the ADEQ (<http://www.azdeq.gov/environ/water/assessment/download/fish-0409.pdf>) and AGFD (http://www.azgfd.gov/h_f/fish_consumption.shtml) websites.

Fish Consumption Advisories (2012/14)

SURFACE WATER (year advisory issued)	SIZE	POLLUTANT OF CONCERN	ADVISORY
Bill Williams Watershed			
1. Alamo Lake (2004)	1414 a	Mercury	Meal = up to 8-ounces of largemouth bass or black crappie <ul style="list-style-type: none"> • Children under age 6: no consumption • Women of all ages: one meal/month • Adult men: six meals/month
2. Coors Lake (2004)	229 a	Mercury	Meal = up to 8-ounces of largemouth bass or black crappie <ul style="list-style-type: none"> • Children under age 6: no consumption • Women of all ages: one meal/month • Adult men: six meals per month
Colorado- Grand Canyon			
3. Lake Powell (2010)	9770 a	Mercury	<ul style="list-style-type: none"> • Pregnant women and children under age of 6: One 4 oz meal per month of striped bass • Women of childbearing age and children between 6 and 16 years of age: Two 8 oz meals per month of striped bass • Adult women past childbearing age and men older than 16: eight 8 oz fish meals per month of striped bass
Colorado – Lower Gila Watershed			
No fish Consumption Advisories			
Little Colorado Watershed			
4. Lake Mary, Upper & Lower (2002)	1625 a	Mercury	Do not consume walleye fish and limit consumption of other fish to one 8-ounce fillet per month.
5. Long Lake (2003)	594 a	Mercury	Do not consume any fish.
6. Lyman Lake (2004)	1500 a	Mercury	<ul style="list-style-type: none"> • Children under age 6: no consumption • Women of childbearing age and children under age of 16: one meal/month • Women not childbearing age: Consult healthcare provider • Adult men: meals meals/month
7. Soldiers Lake (2003)	28 a	Mercury	Do not consume any fish.
8. Soldiers Annex Lake (2003)	122 a	Mercury	Do not consume any fish.
Middle Gila Watershed			
9. Lake Pleasant (2006)	8000 a	Mercury	<ul style="list-style-type: none"> • Children under 6: no consumption of largemouth bass • Women of all ages and children under 16: one 8-ounce meal per month of largemouth bass • Adult men: Five 8-ounce meals per month largemouth bass
Santa Cruz Watershed			
10. Arivaca Lake (1996)	120 a	Mercury	Do not consume fish or other aquatic organisms.
11. Parker Canyon Lake (2002)	130 a	Mercury	<ul style="list-style-type: none"> • Children under age of 6: no consumption of largemouth bass, bluegill or pike • Children between ages 6 and 16: no consumption of largemouth bass, one 8-ounce meal/month of bluegill or pike • Women of all ages: one 8-ounce meal/month largemouth bass or bluegill, two 8-ounce meals/month pike • Adult men (above 15): Up to five 8-ounce meals/month.
12. Pena Blanca Lake (1995)	50 a	Mercury	Do not consume fish or other aquatic organisms.
Salt Watershed			
13. Roosevelt Lake (2006)	18345 a	Mercury	<ul style="list-style-type: none"> • Children under 6: no consumption of largemouth bass or channel catfish • Women of all ages and children under 16: one 8-ounce meal per month of largemouth bass or channel catfish • Pregnant women: only consume one 8-ounce largemouth bass below 13 inches in length per month • Adult men: Five 8-ounce meals per month largemouth bass or channel catfish
14. Tonto Creek (Bear Flat Campground to Roosevelt Lake) (2011)	62 mi	Mercury	<ul style="list-style-type: none"> • Do not consume smallmouth bass, green sunfish and black bullhead catfish • For common carp in this area: <ul style="list-style-type: none"> ○ Pregnant women and children under the age of 6: No consumption ○ Children between six and sixteen years of age: One 8 oz. fish meal/month ○ All adults (16 years or older): Two 8 oz. fish meals per month

The following map shows the location of the waters with fish consumption advisories. The numbers on the map correspond to the numbering in the table above.



Pollutants Causing Impairments

Although nutrients impair the greatest number of lakes, mercury impairs the greatest number of lake acres. Metals impair the largest number of stream reaches and miles followed by Escherichia coli (*E. coli*). The pollutants causing impairments are summarized in the following table.

Biocriteria and bottom deposit data are included in the waterbody data summary tables for informational purposes only and no assessment determinations will be made until the Impaired Water Identification Rule (A.A.C. R 18-11, Article 6) is updated.

Pollutants or Stressors Causing Impairment 2012/14

Pollutant Stressor Category	# Lakes	Acres	# Reaches	Miles
Nutrients and Related	33	7732.3	18	204.4
nitrogen	2	166	3	24.1
phosphorus	1	15	2	15.5
dissolved oxygen	10	3337.3	7	97.3
ammonia	8	1956	6	67.5
pH	10	2132	(see Metals & related)	
narrative nutrients	1	111	0	0
chlorophyll	1	15	0	0
Metals and related	12	67093	125	957.1
mercury in fish tissue	11	40049	6	61.7
selenium	1	27044	15	276.5
copper	0	0	40	259.6
zinc	0	0	17	65
pH	0	0	14	86.4
cadmium	0	0	14	55
beryllium	0	0	8	41.4
lead	0	0	4	40.9
arsenic	0	0	4	35.6
boron	0	0	2	33.6
manganese	0	0	1	1.4
Other	1	12.5	46	495.13
E. coli	1	12.5	30	312.5
SSC	0	0	13	162.43
chlorine	0	0	3	20.2

*Cannot total miles or acres because some waters are impaired by multiple stressors

CHAPTER IV ACTION PLAN

Monitoring and assessments are part of a process to identify impaired waters and then reduce discharges of pollutants in the watershed. Surface waters in Appendix B Categories 4 and 5 are impaired for one or more of their designated uses. Impaired waters that require a Total Maximum Daily Load Analysis (TMDL) are in Category 5. Waters that are not attaining a designated use and do not require a TMDL (at this time) are in Category 4. For example, once the TMDL is completed, the surface water is moved from Category 5 to Category 4A. If actions are being implemented so that surface water standards will be met during the next assessment cycle, ADEQ and EPA may agree to place the surface water in Category 4B, rather than Category 5. See the Assessment Methods document for further information.

It is important to recognize that all waters in Category 4 and 5 are protected under Arizona's Antidegradation Rule (Arizona Administrative Code R18-11-107), as a "Tier 1" water. No further degradation by that pollutant is allowed. Potential pollutant loadings must be considered by ADEQ and several federal agencies before permits or certifications are issued (e.g. AZPDES discharge permits, grazing permits).

Water Quality Improvement Strategies- A New Approach

Historically, ADEQ's approach to improving water quality began with developing TMDLs for impaired waters. TMDLs identify sources of pollution, conditions leading the impairment and reductions necessary to attain water quality standards. Pollutant loading can originate from two types of sources: point and nonpoint. Point sources are discrete conveyances of pollutants discharged directly to a surface water, such as wastewater treatment plant outfalls. Nonpoint sources are non-discrete discharges, including stormwater runoff generated by activities such as grazing, agriculture and forestry.

Waste load reductions from point sources can be managed through permitting programs such as AZPDES. However, there are few regulatory actions available to control nonpoint pollution, so load reductions from these sources are primarily voluntary. Nonpoint source pollution may include excessive sediment caused by the denudation of grasslands, the location of roads, bacteria from wildlife and/or recreation, metals from road cuts through ore bodies, and pesticides from historic agricultural practices.

Historically, TMDLs would include a TMDL Implementation Plan (TIP) that identified generic strategies, agencies or groups who potentially would be involved in implementation, a tentative schedule, and how effectiveness of improvements would be determined. Once a TMDL study was complete the ADEQ Water Quality Improvement Grant Program (WQIGP) would then work with interested stakeholders to implement water quality improvement projects. Unfortunately, this approach has proven to be ineffective for reducing nonpoint source pollution.

IN 2013 ADEQ revised our approach by coordinating the TMDL and WQIPG programs with a goal of improving water quality. The focus has shifted from simply completing TMDLs to

developing plans that will be implemented. The combined ADEQ Nonpoint Source (NPS) Program considers many different factors when prioritizing nonpoint source activities:

- Human health concerns
- Ecosystem health including ecological risk
- The beneficial uses of water
- Value of the watershed or groundwater basin to the public
- Vulnerability of the surface or ground water to additional environmental degradation
- Implement-ability
- Likelihood of achieving demonstrable environmental results
- Extent of alliance with other federal agencies and states to coordinate resources and actions
- Readiness to proceed.

NPS Program staff meets routinely to discuss Arizona's impaired waters and what management strategies can be applied to them in order to work towards meeting water quality standards. The Impaired Waters Table is the tool that showcases these coordination efforts. Arizona reports on updates to this table annually in its Nonpoint Source Annual Report- <http://www.azdeg.gov/envIRON/water/watershed/download/nonpoint2013.pdf> This tool allows the program to focus efforts on high priority Targeted Watersheds, while keeping track of the potential role that nonpoint source resources may be able to play in other waters throughout the state. Arizona's current Targeted Watersheds and pollutants of concern are:

- San Francisco River/Blue River watershed (Blue River from headwaters to San Francisco River, San Francisco River from Blue River to Limestone Gulch and from Limestone Gulch to the Gila River; *E. coli*)
- Granite Creek watershed (headwaters to Watson Lake; nutrients and *E. coli*)
- Oak Creek watershed (headwaters to Spring Creek and the Spring Creek drainage; *E. coli*)
- San Pedro River watershed (Babocomari Creek to Dragoon Wash; *E. coli*)
- Little Colorado River Headwaters watershed (West Fork LCR to Lyman Lake – four reaches; sediment/turbidity).
- Santa Cruz River watershed (Mexico border to Sapor Wash; *E. coli*)
- Boulder Creek watershed (Wilder Creek to Butte Creek; arsenic, copper, and zinc)

Impaired Waters List (303(d)-List)

Appendix C contains the 2012/14 303(d)List of Impaired Waters while Appendix G contains the priority ranking of the 303(d) Listed waters. Waters located in Targeted Watershed are high priority as are those waters that ADEQ anticipates TMDL completion within the next two years.

Water Quality Improvement Grants

Clean Water Act Section 319(h) funds are used to implement on-the-ground water quality improvement projects that address nonpoint sources of pollution. ADEQ administers these grants through our WQIGP. Projects designed to reduce loadings of pollutants causing impairment are given highest priority. As documented in the table in Appendix F, even before a TMDL can be developed, funds are often distributed to implement projects that will reduce pollutant loadings.

The Water Quality Improvement Grant Manual provides details about the grant process. A copy of the manual and other information about this program can be obtained by contacting the grant coordinator at (602) 771-4635 or toll free at (800) 234-5677 (extension 771-6535) or from the internet at www.azdeq.gov/environ/water/watershed/fin.html

Determining Water Quality Improvements

Once a TMDL has been developed, the surface water is removed from the 303(d) list, but usually the water is still impaired and simply moves from the Category 5 to the Category 4A list of not attaining (still impaired) waters. To determine that a water is no longer impaired by a pollutant, ADEQ must conduct additional monitoring. These new data must be collected during critical conditions – those environmental factors (stream flow, season, runoff events, location, runoff events) during which an exceedance of a water quality standard or criterion is most likely to occur based on past exceedances or modeling results. There may also be critical locations or sites where exceedances are most likely to occur. Critical conditions and locations are identified in Appendix D. This list is constantly being revised as new information is analyzed.

The number of samples required to establish that a surface water is no longer impaired varies by type of pollutant, but the factors are specified in the Impaired Water Identification Rule (see 2012/14 Assessment Methods document). The delisting criteria vary depending on the criteria used during the listing. Waters that have been delisted in the 2012/14 Assessment are contained in Appendix E.

Although assessments are not compliance based actions, once an assessment unit is identified as impaired, there are indirect consequences on dischargers or potential activities in the drainage area. For example, any entity seeking a permit for a new discharge or renewing an existing permitted discharge under the National (or Arizona) Pollutant Discharge Elimination System (NPDES/AZPDES) Program must demonstrate that it will not increase loadings for the parameter identified as causing the impairment. During the permit review cycle, additional monitoring may be required for the pollutant of concern. If discharge monitoring data or ambient in-stream monitoring data is available from a permitted facility, it may be used to model the discharge load during the TMDL. Such data can be used to accurately quantify the contribution from waste loads. After the TMDL is completed, ADEQ may renegotiate the permit discharge levels if the TMDL indicates that a waste load reduction is necessary. Discharge monitoring and ambient in-stream monitoring is invaluable in developing realistic discharge limitations.

Another example is that federally approved actions, such as grazing permits, may also be restricted when a stream is listed as impaired, if those actions would contribute pollutant loadings. ADEQ actively coordinates with the U.S. Forest Service and the Bureau of Land Management to identify strategies that would minimize load reductions especially to impaired waters.