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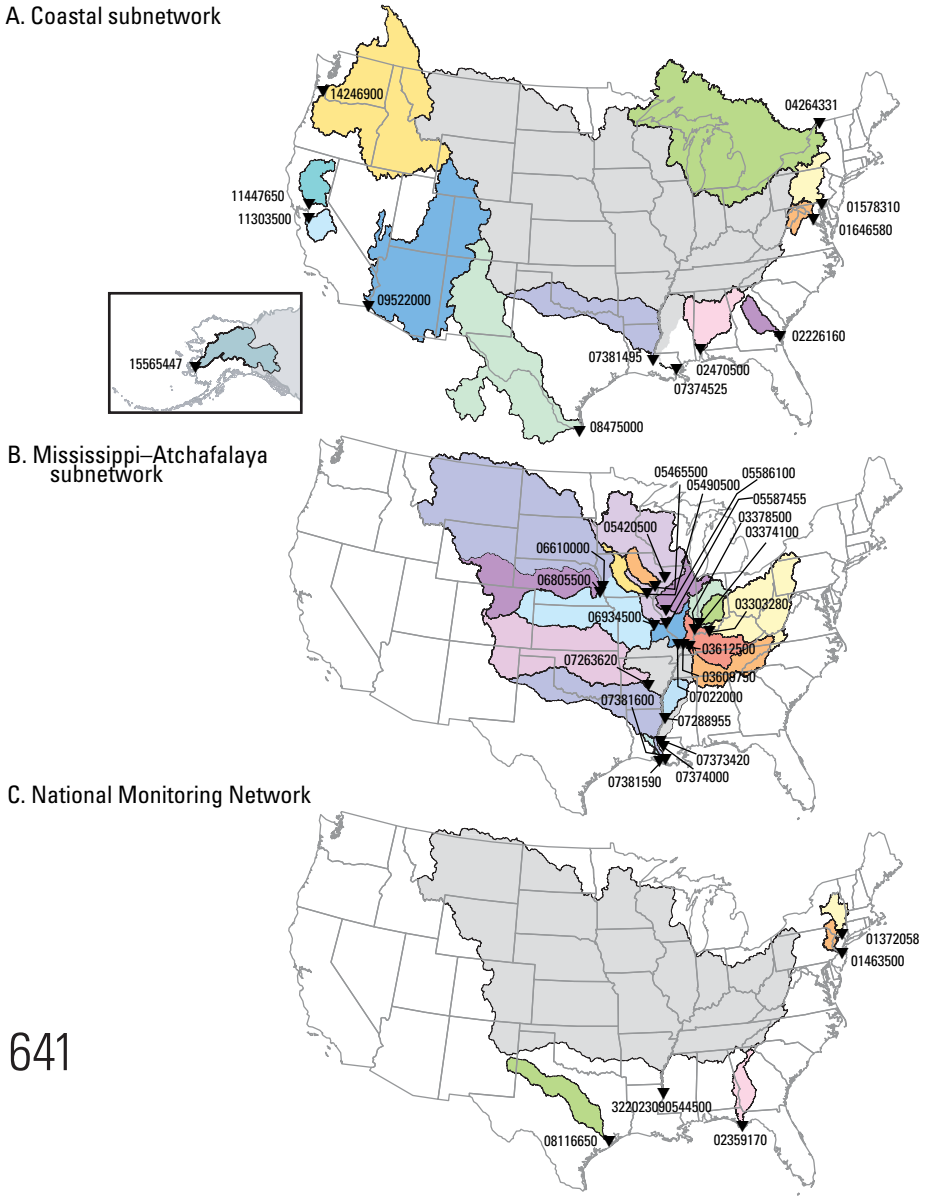
National Stream Quality Accounting Network

National Stream Quality Accounting Network and National Monitoring Network Basin Boundary Geospatial Dataset, 2008–13



Data Series 641

U.S. Department of the Interior
U.S. Geological Survey

National Stream Quality Accounting Network and National Monitoring Network Basin Boundary Geospatial Dataset, 2008–13

By Nancy T. Baker

National Stream Quality Accounting Network

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U.S. Department of the Interior
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U.S. Department of the Interior
KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

U.S. Geological Survey, Reston, Virginia: 2011

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Suggested citation:
Baker, N.T., 2011, National Stream Quality Accounting Network and National Monitoring Network Basin Boundary Geospatial Dataset, 2008–13: U.S. Geological Survey Data Series 641, 16 p.

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
mile (mi)	1.609	kilometer (km)
	Area	
acre	4,047	square meter (m^2)
acre	0.004047	square kilometer (km^2)
square mile (mi^2)	2.590	square kilometer (km^2)

National Stream Quality Accounting Network and National Monitoring Network Basin Boundary Geospatial Dataset, 2008–13

By Nancy T. Baker

Abstract

This report and the accompanying geospatial data were created to assist in analysis and interpretation of water-quality data provided by the U.S. Geological Survey's National Stream Quality Accounting Network (NASQAN) and by the U.S. Coastal Waters and Tributaries National Monitoring Network (NMN), which is a cooperative monitoring program of Federal, regional, and State agencies. The report describes the methods used to develop the geospatial data, which was primarily derived from the National Watershed Boundary Dataset. The geospatial data contains polygon shapefiles of basin boundaries for 33 NASQAN and 5 NMN streamflow and water-quality monitoring stations. In addition, 30 polygon shapefiles of the closed and noncontributing basins contained within the NASQAN or NMN boundaries are included. Also included is a point shapefile of the NASQAN and NMN monitoring stations and associated basin and station attributes. Geospatial data for basin delineations, associated closed and noncontributing basins, and monitoring station locations are available at *http://water.usgs.gov/lookup/getspatial?ds641_nasqan_wbd12*.

Introduction

This report and the accompanying geospatial data were created to assist in analysis and interpretation of water-quality data provided by the U.S. Geological Survey's National Stream Quality Accounting Network (NASQAN) and by the U.S. Coastal Waters and Tributaries National Monitoring Network (NMN), which is a cooperative monitoring program of Federal, regional, and State agencies. The Office of Water Quality of the USGS maintains three surface-water networks that provide stakeholders with reliable information over time for a fixed set of stations. Large rivers and the quality of water at the terminus of large watersheds entering receiving waters are monitored routinely at 33 stations through the NASQAN and at 5 stations through the NMN. Smaller rivers and streams are monitored at 114 stations through the National Water-Quality Assessment (NAWQA) Program "Status and Trends" network, and those basin boundaries will be published as part of a separate report (Naomi Nakagaki, U.S. Geological Survey, written commun., 2011).

To help meet the goals of both NASQAN and NMN, accurate basin boundary delineations are needed for each basin in the network. Geospatial basin boundary data are often used with water-quality data for modeling, calculating loads, and calculating selected basin characteristics. The major objective of the NASQAN program is to report on the concentrations and loads of selected constituents delivered by major rivers to the coastal waters of the United States (fig. 1*A*) and selected inland subbasins in priority river basins, such as the Mississippi-Atchafalaya River Basin subnetwork (fig. 1*B*), to determine the sources and relative yields of constituents within these basins. Additional information about the NASQAN program is available at *http://water.usgs.gov/nasqan/*.

The goal of the NMN is to provide information about the health of the Nation's oceans and coastal ecosystems and inland influences on coastal waters for improved resource management (fig. 1*C*). Additional information about the NMN program is available at *http://acwi.gov/monitoring/network/*.

Purpose and Scope

Methods for delineating NASQAN and NMN basin boundaries and the associated geospatial data files of the boundaries are provided in this report. The geospatial data files contain 38 separate ArcGIS (Environmental Systems Resource Institute, 2009) polygon shapefiles of basin boundaries for NASQAN and NMN stations. For the 30 basins that contained closed and noncontributing areas (the remaining 8 basins did not contain these areas), an associated polygon shapefile was generated and is included with this data. Also included is a point shapefile of the NASQAN and NMN monitoring stations and associated basin and station attributes. Geospatial data for basin delineations, associated closed and noncontributing basins, and monitoring station locations are available at *http://water.usgs.gov/lookup/getspatial?ds641_nasqan_wbd12*. This dataset is intended to be used with water-quality data collected for the 2008–13 (5-year) design component of NASQAN.

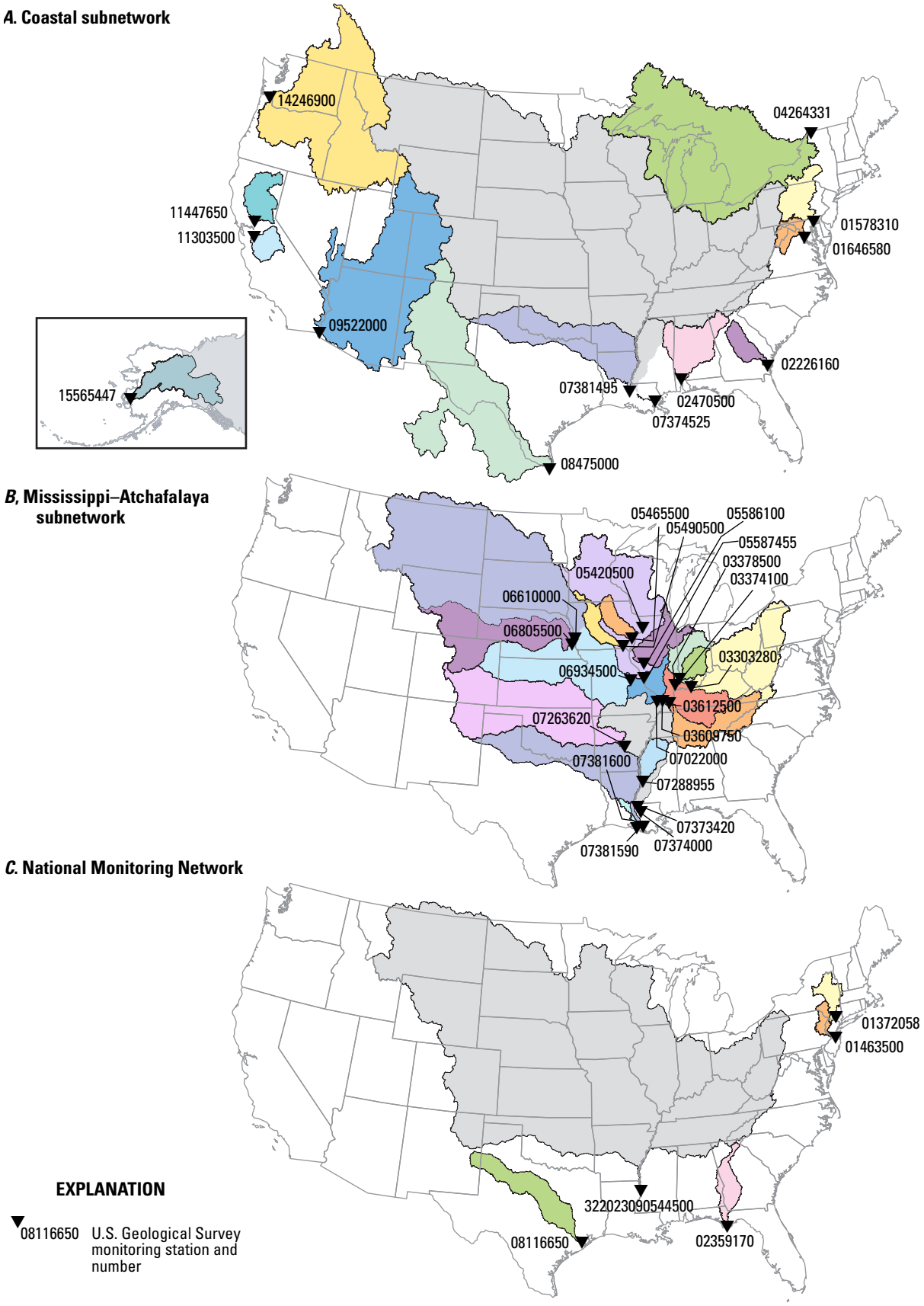


Figure 1. Location of *A*, basins included in the National Stream Quality Accounting Network Coastal subnetwork, *B*, the Mississippi-Atchafalaya River Basin subnetwork, and the *C*, the National Monitoring Network.

Data Sources for Delineation of NASQAN and NMN Boundaries

The primary data source for developing the NASQAN and NMN basin boundary delineations is the 12-digit National Watershed Boundary Dataset (WBD12), developed jointly by the USGS and the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) (U.S. Department of Agriculture, 2009). Digital topographic maps (1:24,000 scale) were used to delineate boundaries near the outlet (monitoring station location) of those basins where the outlet of the stream did not fall directly on a WBD12 boundary line. The portions of basins that extended into Canada beyond WBD12 boundaries were delineated from 1:100,000-scale Canadian Watershed Boundaries (Canadian Geospatial Data Infrastructure, 2009). The portion of the Rio Grande Basin that extends into Mexico was obtained from a Hydrologic Geodatabase for the Rio Grande developed by Patino and others (2004). The geospatial data are available online at *http://www.crwr.utexas.edu/riogrande.shtml* (Patino, 2004). Information about closed and noncontributing subbasins was obtained from WBD12 attribute information and Hydrologic Unit Maps (Seaber and others, 1987).

The WBD12 is a geospatial dataset that defines the aerial extent of individual watersheds for all surface drainages at the Subwatershed level, at 1:24,000 scale, for the United States. Subwatersheds are assigned a 12-digit Hydrologic Unit Code (HUC) based on its location within its larger watershed (table 1). An explanation of HUC hierarchy is given in *Federal Standards and Procedures for the National Watershed Boundary Dataset* (U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2011).

Table 1. Numerical hydrologic unit names, number of digits in code, common names, hydrologic unit levels, average sizes, and approximate number of hydrologic units, by type, in the United States.

[Modified from U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2011; mi^2, square miles]

Current numerical name	Digits in hydrologic unit code	Common name	Hydrologic unit level	Average size (square miles)	Approximate number of hydrologic units
2 digit	2	Region	1	177,560	21 (actual)
4 digit	4	Subregion	2	16,800	222
6 digit	6	Basin	3	10,596	370
8 digit	8	Subbasin	4	700	2,270
10 digit	10	Watershed	5	227 (40,000–250,000 acres)	20,000
12 digit	12	Subwatershed	6	40 (10,000–40,000 acres)	100,000

Delineation of the NASQAN and NMN Basin Boundary Dataset

NASQAN and NMN basins range in size from 7,000 to 1,145,000 mi^2 and were first extracted from the WBD12 based on the range of 8-digit HUCs contained within each basin. The 8-digit HUC (HUC_8) is an item in the WBD12 attribute table. Larger basins may encompass multiple Regions (2-digit HUCs). An example basin extraction may include: "HUC_8 > 05000000 AND HUC_8 < 07000000." This example extraction yields all Subwatersheds within the 05 (Ohio) and 06 (Tennessee) Regions. Next, internal Subwatershed boundaries were eliminated using the ArcGIS *Dissolve* command, resulting in a single boundary for an entire basin. The shapefile naming convention for each basin boundary is *b* followed by the 8-digit station identification number (for example b01646589). Attribute table item definitions for basin boundary polygons are listed in table 2.

The location of the NASQAN or NMN monitoring station is considered the outlet of the basin for this dataset. In many cases the outlet of the basin does not fall directly on a 12-digit Subwatershed boundary. For those basins, the outlet boundary from the monitoring station to the nearest Subwatershed boundary was digitized in ArcGIS-ArcMap (Environmental Systems Resource Institute, 2009) along the drainage divide, which was determined from 1:24,000-scale USA Topographic maps served by the Environmental Services Resource Institute at *http://server.arcgisonline.com/ArcGIS/rest/services/USA_Topo_Maps/MapServer* and provided by the National Geographic Society (2009).

Noncontributing areas and closed areas are often important considerations when calculating basin characteristics and water-quality loads and are, therefore, provided in a companion dataset. Drainage areas that do not contribute flow toward the outlet of a hydrologic unit are considered noncontributing. If the entire Subwatershed does not contribute flow, then it is labeled *closed* in either the HUC_10_DS or HUC_12_DS items of the WBD12 attribute table. If noncontributing areas are small and dispersed within the Subwatershed, then the noncontributing areas are summed and an estimated total noncontributing area is provided in the NCONTRB_A item of the WBD12 attribute table. To develop the companion dataset to the basin boundary delineations, closed and noncontributing Subwatershed areas within each basin were first extracted from the WBD12. Then all Subwatersheds labeled *closed* in items HUC_10_DS or HUC_12_DS in the WBD12 attribute table were selected, and Subwatersheds with item NCONTRB_A greater than zero but not labeled *closed* in HUC_10_DS or HUC_12_DS were also selected. Subwatersheds upstream of a closed system, or completely surrounded by closed Subwatersheds, often are not labeled *closed*; these Subwatersheds were determined by visual inspection and added to the appropriate polygon shapefile. Hydrologic units from Seaber and others (1987) also were used to identify additional Subwatersheds that should be included in the companion dataset.

A single shapefile, containing multiple closed and noncontributing polygons, was generated for each NASQAN and NMN basin that contained noncontributing areas. An item TYPE was added to the polygon attribute table to identify Subwatersheds that are closed or those that have noncontributing areas. If the value in NCONTRB_A was within 98 percent of the calculated area of the Subwatershed polygon, then it was labeled *closed*. If the value in NCONTRB_A was less than 98 percent, then the polygon was labeled *noncontributing*. The shapefile naming convention for each basin with closed and noncontributing areas is *n* followed by the 8-digit station identification number (for example n01646589). Attribute table item definitions for closed/noncontributing polygons are listed in table 2.

A point shapefile for all of the NASQAN and NMN monitoring stations is provided as part of the basin boundary dataset. Site information from the USGS National Water Information System (NWIS) was retrieved for each station (table 3). The percentage difference from published NWIS drainage areas and drainage areas calculated for these basin boundary delineations is provided in the attribute tables. Differences between the two sources range from –0.78 to 1.74 percent (table 3). See table 2 for attribute table item definitions for NASQAN and NMN stations.

Table 2. Attribute item table definitions for basin boundary polygons, closed/noncontributing polygons, and National Stream Quality Accounting Network and National Monitoring Network monitoring stations.

[NWIS, National Water Information System; NASQAN, National Stream Quality Accounting Network; HUC, Hydrologic Unit Code; —, not applicable; WBD12, National Water Boundary Dataset (U.S. Department of Agriculture, 2009)]

Item name	Item description	Equation used	Units of measure	Source
		Item definitions for basin boundary polygon data files		
AREA	Area of the basin polygon	—	Square meters	ArcGIS.
PERIMETER	Perimeter of the basin polygon	—	Meters	ArcGIS.
B03303280_	Basin file identifier	—	—	(Artifact from ArcInfo polygon #ID).
B033032801	Basin file identifier	—	—	(Artifact from ArcInfo polygon -ID).
STAID	Station identifier	—	—	NWIS.
STANAME	Station name	—	—	NWIS.
SUBNETWORK	NASQAN subnetwork name	—	—	NASQAN.
DAMI2	Drainage area of the basin	(DAMI2 = AREA/2,589,988.11)	Square miles	Calculated.
		Item definitions for closed/noncontributing polygon data files		
AREA	Area of the Subwatershed polygon	—	Square meters	ArcGIS.
PERIMETER	Perimeter of the Subwatershed polygon	—	Meters	ArcGIS.
STAID	Station identifier	—	—	NWIS.
HUC_12	12-digit Hydrologic Unit Code	—	—	WBD12.
ACRES	Area of the HUC_12 Subwatershed polygon	—	Acres	WBD12.
NCONTRB_A	Noncontributing area of the HUC_12 Subwatershed polygon	—	Acres	WBD12.
NCONTRBMI2	Noncontributing area of the HUC_12 Subwatershed polygon	(NCONTRBMI2/640)	Square miles	Calculated.
HUC12MI2	Area of the Subwatershed	(HUC12MI2 = AREA/2,589,988.11)	Square miles	Calculated.
NCONPCT	Percentage of the Subwatershed that is noncontributing	[(NCONTRBMI2/HUC12MI2)*100]	Percent	Calculated.
TYPE	Type of Subwatershed (closed or noncontributing)	(NCONPCT >=98 = CLOSED) OR (NCONPCT < 98 = NONCONTRIBUTING)	—	Assigned (based on NCONPCT value).

Table 2. Attribute item table definitions for basin boundary polygons, closed/noncontributing polygons, and National Stream Quality Accounting Network and National Monitoring Network monitoring stations.—Continued

[NWIS, National Water Information System; NASQAN, National Stream Quality Accounting Network; HUC, Hydrologic Unit Code; —, not applicable; WBD12, National Water Boundary Dataset (U.S. Department of Agriculture, 2009)]

Item name	Item description	Equation used	Units of measure	Source
		Item definitions for NASQAN and NMN station point data file		
STAID	Station identifier	—	—	NWIS.
NWIS_STAID	NWIS station identifier (includes agency code plus station number)	—	—	NWIS.
BASFILENAM	Basin boundary file name (b followed by staid)	—	—	Assigned (based on station id).
NCFILENAM	Closed/noncontributing polygons associated with each basin polygon file name (n followed by staid)	—	—	Assigned (based on station id).
NWIS_NAME	NWIS station name	—	—	NWIS.
SUBNETWORK	NASQAN subnetwork name	—	—	NASQAN.
LONGITUDE	Station longitudinal location (NAD83)	—	Decimal degrees	NWIS.
LATITUDE	Station latitudinal location (NAD83)	—	Decimal degrees	NWIS.
DAMI2	Drainage area of the basin	(DAMI2 = AREA/2,589,988.11)	Square miles	Calculated from basin boundary polygon.
TOTNCON	Sum of closed and noncontributing areas for the basin	—	Square miles	Calculated from closed/noncontributing polygons.
NWISDAMI2	NWIS published drainage area of the basin	—	Square miles	NWIS.
NWISCONMI2	NWIS published contributing drainage area of the basin	—	Square miles	NWIS.
NWISNCON	NWIS noncontributing drainage area of the basin in square miles	(NWISDAMI2 - NWISNCONMI2)	Square miles	Calculated.
NWISNASDIF	Percent difference between NWIS published drainage area and calculated area of the basin boundary	[(DAMI2 - NWISDAMI2)/NWISDAMI2] * 100	Percent difference	Calculated.

Table 3. National Stream Quality Accounting Network and National Monitoring Network monitoring stations, National Water Information System drainage areas of stations, calculated basin areas, and differences between National Water Information System drainage areas and calculated basin areas.

[HUC, hydrologic unit code; NASQAN, National Stream Quality Accounting Network; NWIS, National Water Information System; mi2, square miles; NMN, National Monitoring Network; MARB, Mississippi-Atchafalaya River Basin network; —, not available or not applicable]

Region	Station name	Receiving waterbody name	HUC6	HUC6 name	Station identification number	NASQAN subnetwork	NWIS drainage area, in mi²	Calculated basin area, in mi² (DAMI2)	Percent difference from NWIS and calculated area of the basin boundary [(DAMI2-NWIS)/NWIS] * 100
02 Mid-Atlantic	Hudson River below Poughkeepsie, N.Y.	New York Bay	20200	Upper Hudson	01372058	NMN	11,740	11,882	1.21
	Delaware River at Trenton, N.J.	Delaware Bay	20401	Northern Delaware	01463500	NMN	6,780	6,787	0.10
	Susquehanna River at Conowingo, Md.	Chesapeake Bay	20503	Southern Susquehanna	01578310	Coastal	27,100	27,086	-0.05
	Potomac River at Chain Bridge at Washington, D.C.	Chesapeake Bay	20700	Potomac	01646580	Coastal	11,570	11,570	0.00
03 South Atlantic-Gulf	Altamaha River near Everett City, Ga.	Altamaha River Estuary	30701	Altamaha	02226160	Coastal	14,000	14,111	0.79
	Apalachicola River near Sumatra, Fla.	Apalachicola Bay	31300	Apalachlcola	02359170	NMN	19,200	19,202	0.01
	Mobile River at Mt. Vernon, Ala.	Mobile Bay	31602	Mobile Bay-Tombigbee	02470500	Coastal	42,867	42,816	–0.12
04 Great Lakes	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y.	Gulf of St. Lawrence	41503	St. Lawrence	04264331	Coastal	298,800	297,955	-0.28
05 Ohio	Wabash River at New Harmony, Ind.	Ohio River	51201	Wabash	03378500	MARB	29,234	29,301	0.23
	White River at Hazleton, Ind.	Wabash River	51202	Patoka-White	03374100	MARB	11,305	11,303	–0.02
	Ohio River at Cannelton Dam at Cannelton, Ind.	Lower Mississippi River	51402	Lower Ohio	03303280	MARB	97,000	96,492	–0.52
	Ohio River at Dam 53 near Grand Chain, Ill.	Lower Mississippi River	51402	Lower Ohio	03612500	MARB	203,100	203,640	0.27

Table 3. National Stream Quality Accounting Network and National Monitoring Network monitoring stations, National Water Information System drainage areas of stations, calculated basin areas, and differences between National Water Information System drainage areas and calculated basin areas.—Continued

[HUC, hydrologic unit code; NASQAN, National Stream Quality Accounting Network; NWIS, National Water Information System; mi2, square miles; NMN, National Monitoring Network; MARB, Mississippi-Atchafalaya River Basin network; —, not available or not applicable]

Region	Station name	Receiving waterbody name	HUC6	HUC6 name	Station identification number	NASQAN subnetwork	NWIS drainage area, in mi^2	Calculated basin area, in mi^2 (DAMI2)	Percent difference from NWIS and calculated area of the basin boundary [(DAMI2-NWIS)/NWIS] * 100
06 Tennessee	Tennessee River at Highway 60 near Paducah, Ky.	Ohio River	60400	Lower Tennesee	03609750	MARB	40,330	40,325	-0.01
07 Upper Mississippi	Mississippi River at Clinton, Iowa	Gulf of Mexico	70801	Upper Mississippi-Skunk-Wapsipinicon	05420500	MARB	85,600	85,884	0.33
	Iowa River at Wapello, Iowa	Upper Mississippi River	70802	Iowa	05465500	MARB	12,500	12,500	0.00
	Des Moines River at Keosauqua, Iowa	Upper Mississippi River	71000	Des Moines	05490500	MARB	14,038	14,022	–0.11
	Mississippi River below Grafton, Ill.	Gulf of Mexico	71100	Upper Mississippi-Salt	05587455	MARB	171,300	172,536	0.72
	Illinois River at Valley City, Ill.	Upper Mississippi River	71300	Lower Illinois	05586100	MARB	26,743	26,673	-0.26
	Mississippi River at Thebes, Ill.	Gulf of Mexico	71401	Upper Mississippi-Meramec	07022000	MARB	713,200	710,441	–0.39

Table 3. National Stream Quality Accounting Network and National Monitoring Network monitoring stations, National Water Information System drainage areas of stations, calculated basin areas, and differences between National Water Information System drainage areas and calculated basin areas.—Continued

[HUC, hydrologic unit code; NASQAN, National Stream Quality Accounting Network; NWIS, National Water Information System; mi2, square miles; NMN, National Monitoring Network; MARB, Mississippi-Atchafalaya River Basin network; —, not available or not applicable]

Region	Station name	Receiving waterbody name	HUC6	HUC6 name	Station identification number	NASQAN subnetwork	NWIS drainage area, in mi²	Calculated basin area, in mi² (DAMI2)	Percent difference from NWIS and calculated area of the basin boundary [(DAMI2-NWIS)/NWIS] * 100
08 Lower Mississippi	Yazoo River below Steele Bayou near Long Lake, Miss.	Lower Mississippi River	80302	Yazoo	07288955	MARB	13,355	13,414	0.44
	Mississippi River above Vicksburg at mile 438, Miss.	Gulf of Mexico	80601	Lower Mississippi-Natchez	322023090544500	NMN	—	1,123,967	—
	[1]Mississippi River near St. Francisville, La.	Gulf of Mexico	80701	Lower Mississippi-Baton Rouge	07373420	MARB	1,125,300	1,144,886	1.74
	[1]Mississippi River at Baton Rouge, La.	Gulf of Mexico	80701	Lower Mississippi-Baton Rouge	07374000	MARB	1,129,766	1,145,342	1.38
	[1](COE) Atchafalaya River at Melville, La.	Atchafalaya Bay	80801	Atchafalaya-Vermilion	07381495	Coastal	93,316	93,511	0.21
	[1]Wax Lake Outlet at Calumet, La.	Gulf of Mexico	80801	Atchafalaya-Vermilion	07381590	MARB	—	[2]2,178	—
	[1]Lower Atchafalaya River at Morgan City, La.	Gulf of Mexico	80801	Atchafalaya-Vermilion	07381600	MARB	—	94,621	—
	[1]Mississippi River at Belle Chasse, La.	Mississippi River Estuary	80901	Southern Mississippi-New Orleans	07374525	Coastal	1,130,000	1,145,457	1.37
10 Missouri	Platte River at Louisville, Nebr.	Missouri River	102002	Lower Platte	06805500	MARB	85,370	85,329	0.05
	Missouri River at Omaha, Nebr.	Upper Mississippi River	102300	Missouri-Little Sioux	06610000	MARB	322,800	321,076	–0.53
	Missouri River at Hermann, Mo.	Upper Mississippi River	103002	Lower Missouri	06934500	MARB	522,500	519,408	–0.59

Table 3. National Stream Quality Accounting Network and National Monitoring Network monitoring stations, National Water Information System drainage areas of stations, calculated basin areas, and differences between National Water Information System drainage areas and calculated basin areas.—Continued

[HUC, hydrologic unit code; NASQAN, National Stream Quality Accounting Network; NWIS, National Water Information System; mi2, square miles; NMN, National Monitoring Network; MARB, Mississippi-Atchafalaya River Basin network; —, not available or not applicable]

Region	Station name	Receiving waterbody name	HUC6	HUC6 name	Station identification number	NASQAN subnetwork	NWIS drainage area, in mi²	Calculated basin area, in mi² (DAMI2)	Percent difference from NWIS and calculated area of the basin boundary [(DAMI2-NWIS)/NWIS] * 100
11 Arkansas-White-Red	Arkansas River at David D Terry Lock and Dam below Little Rock, Ark.	Lower Mississippi River	111102	Lower Arkansas-Fourche La Fave	07263620	MARB	158,429	157,787	–0.41
12 Texas-Gulf	Brazos River near Rosharon, Tex.	Brazos River Estuary	120701	Southern Brazos	08116650	NMN	45,339	45,415	0.17
13 Rio Grande	[1]Rio Grande near Brownsville, Tex.	Rio Grande Estuary	130900	Southern Rio Grande	08475000	Coastal	176,333	[3]177,415	0.61
15 Lower Colorado	[1]Colorado River at NIB, above Morelos Dam, Ariz.	Gulf of California	150301	Southern Colorado	09522000	Coastal	246,700	249,078	0.96
17 Pacific Northwest	Columbia River near Beaver Army Terminal, Oreg.	Columbia River Estuary	170800	Southern Columbia	14246900	Coastal	256,900	258,697	0.70
18 California	Sacramento River at Freeport, Calif.	San Francisco Bay	180201	Southern Sacramento	11447650	Coastal	—	23,724	—
	San Joaquin River near Vernalis, Calif.	San Francisco Bay	180400	San Joaquin	11303500	Coastal	13,536	13,511	—
19 Alaska	Yukon River at Pilot Station, Alaska	Norton Sound	190408	Yukon Delta	15565447	Coastal	321,000	318,508	-0.78

[1] Water-quality and streamflow at some sites are highly influenced by the diversion of water into or out of the basin. Eight sites in this dataset are known to be highly influenced by diversions: Data users are strongly encouraged to review figures 2–4 and read the section "Considerations of Flow Routing for Selected Basins in the Dataset."

[2]Includes only the area draining Bayou Teche and a small part of the Atchafalaya main stem near the Wax Lake Outlet.

[3]The drainage area published in U.S. Geological Survey NWIS is 176,333 mi² and does not include the noncontributing area or the 2,564 mi² for the Laguna Madre basin. Total calculated area of this basin is 215,270 mi², including 177,415 mi² contributing, 35,291 mi² noncontributing, and 2,564 mi² for the Laguna Madre diversion basin.

Consideration of Flow Routing for Selected Basins in the Dataset

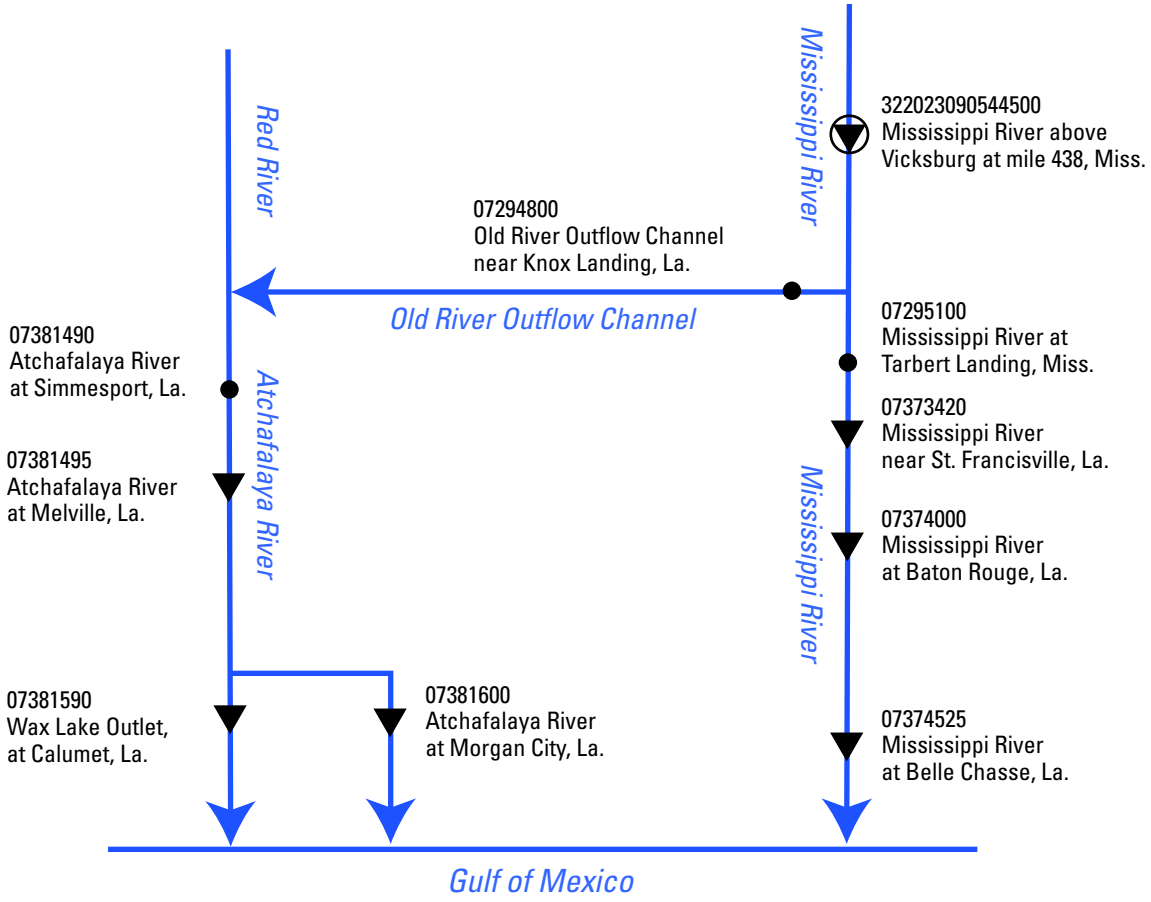
Large basins often have complicated flow regimens that should be considered when using water-quality and quantity data associated with these basins because the data collected at the monitoring site may not be indicative of conditions throughout the basin. The Lower Mississippi River and Atchafalaya River system, the Rio Grande, and the Lower Colorado River all have diversions that affect not only the quantity of water flowing past NASQAN or NMN stations but also the basin area contributing to that flow.

A portion of flow on the Lower Mississippi River is diverted through the Old River Outflow Channel to the Atchafalaya River (fig. 2). Affected stations on the Mississippi River side include 07373420 near St. Francisville, La., 07374000 at Baton Rouge, La., and 07374525 at Belle Chasse, La. Affected stations on the Atchafalaya River side of the diversion include 07381495 at Melville, La., 07381590 Wax Lake at Calumet, La., and 07381600 at Morgan City, La. Consideration of all of these stations together can provide a more accurate assessment of water-quality and flow data, because a single station downstream of the diversion may not be representative of the entire basin. Users of water-quality data for these stations should also consider flow records for U.S. Geological Survey station Old River Outflow Channel near Knox Landing, La. (07294800), Mississippi River at Tarbert Landing, Miss. (07295100), and Atchafalaya River at Simmesport, La. (07381490).

Basins 07381590, Wax Lake Outlet at Calumet, La., and 07381600, Atchafalaya River at Morgan City, La., should be considered together, because there is no reliable way to determine the areal portion of the Atchafalaya River Basin that drains through the Wax Lake Outlet and the portion that drains through the main stem (fig. 2). The Atchafalaya River bifurcates below Melville, La., and some flow drains through the main channel to Morgan City and some drains into the Wax Lake Outlet into the Gulf of Mexico. The basin boundary for 07381590, Wax Lake Outlet, includes only the area draining Bayou Teche and a small part of the Atchafalaya main stem near the Wax Lake Outlet. Users of the NASQAN water-quality data for either the Wax Lake Outlet and/or the Atchafalaya River at Morgan City should consider both basin boundaries and combined water-quality data for both stations. Because streamflow through the Wax Lake Outlet includes additional flow from the Atchafalaya River, flow and water-quality constituents may not be representative of that contributed by just the Wax Lake Outlet basin alone.

Much of the flow in the Rio Grande upstream from the Brownsville, Tex., station (08475000) is diverted into the Anzalduas Canal, which flows through the Anzalduas Dam near Mission, Tex., and then into the Arroyo Colorado (fig. 3*C*). Almost all the water withdrawn from the Arroyo Colorado or the Rio Grande for irrigation and municipal purposes is returned to the Arroyo Colorado. The Arroyo Colorado drains into the Laguna Madre (WBD12 HUCs 1211020801–1211020809), which effectively becomes an estuary for the Rio Grande during spring and summer irrigation seasons. Users of the NASQAN water-quality data for the Rio Grande near Brownsville, Tex., should consider flow and water-quality data for U.S. Geological Survey station Arroyo Colorado at Harlingen, Tex. (08470400) because it records much of the flow from the Rio Grande, while only a small portion of water from the basin flows past the Brownsville monitoring site. The Laguna Madre is included in the basin delineation for station 08475000. The drainage area for this delineation of the Rio Grande River near Brownsville is 215,270 mi^2, including 177,415 mi^2 contributing area, 35,291 mi^2 noncontributing area, and 2,564 mi^2 for the Laguna Madre diversion basin. The drainage area published in U.S. Geological Survey NWIS records is 176,333 mi^2 and does not include the noncontributing area or the Laguna Madre. When these two factors are taken into account, the resulting comparable drainage area is 177,415 for this delineation, or a 0.61 percent difference between the NWIS published area and the comparable drainage area for this version (table 2).

Much of the flow upstream of the U.S. Geological Survey station Colorado River at the Northern International Boundary (NIB), Ariz. (09522000), is diverted into the All-American Canal (fig. 4). The All-American Canal diversion is downstream of station Colorado River above Imperial Dam, Arizona-California (09429490). Flow data from this station should be considered when assessing water-quality records for the NIB station because this may better represent the total flow from the Colorado River Basin. Routing of flow from Lake Powell to the Southerly International Border (SIB) with Mexico is described in Appendix B of *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead* (U.S. Department of Interior, 2007).



EXPLANATION

U.S. Geological Survey station type

07381600	National Stream Quality Accounting Network monitoring station and number
322023090544500	National Monitoring Network monitoring station and number
07381490	Streamflow and/or sampling station and number
	Direction of flow

Figure 2. Mississippi-Atchafalaya River Basin flow routing and U.S. Geological Survey stations (modified from Aulenbach and others, 2007).

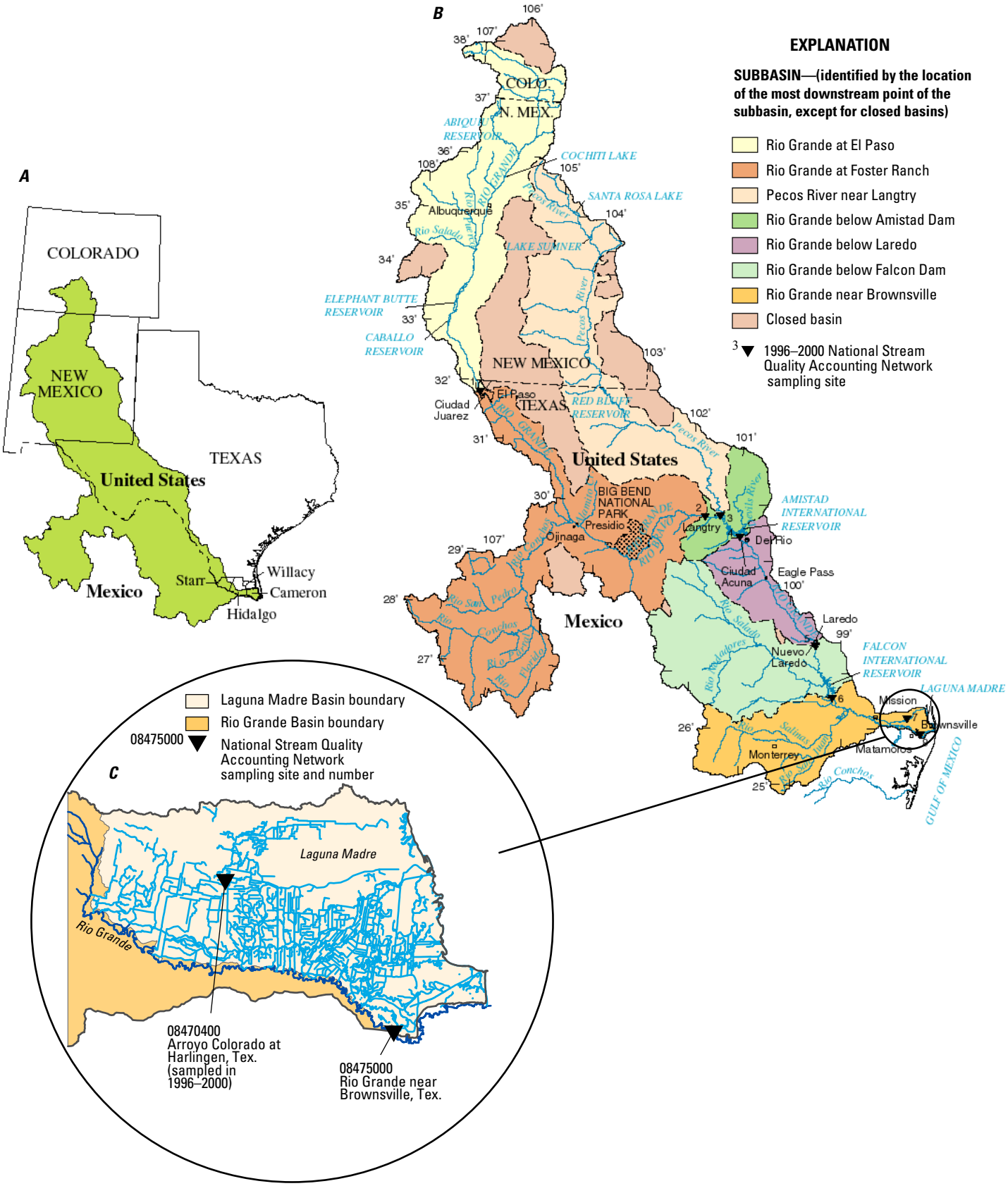


Figure 3. Location of *A*, the Rio Grande Basin in the United States and Mexico, *B*, the Rio Grande Basin and subbasin boundaries, and *C*, multiple diversions from the Rio Grande into the Laguna Madre Basin through Arroyo Colorado (modified from Lurry and others, 1998).

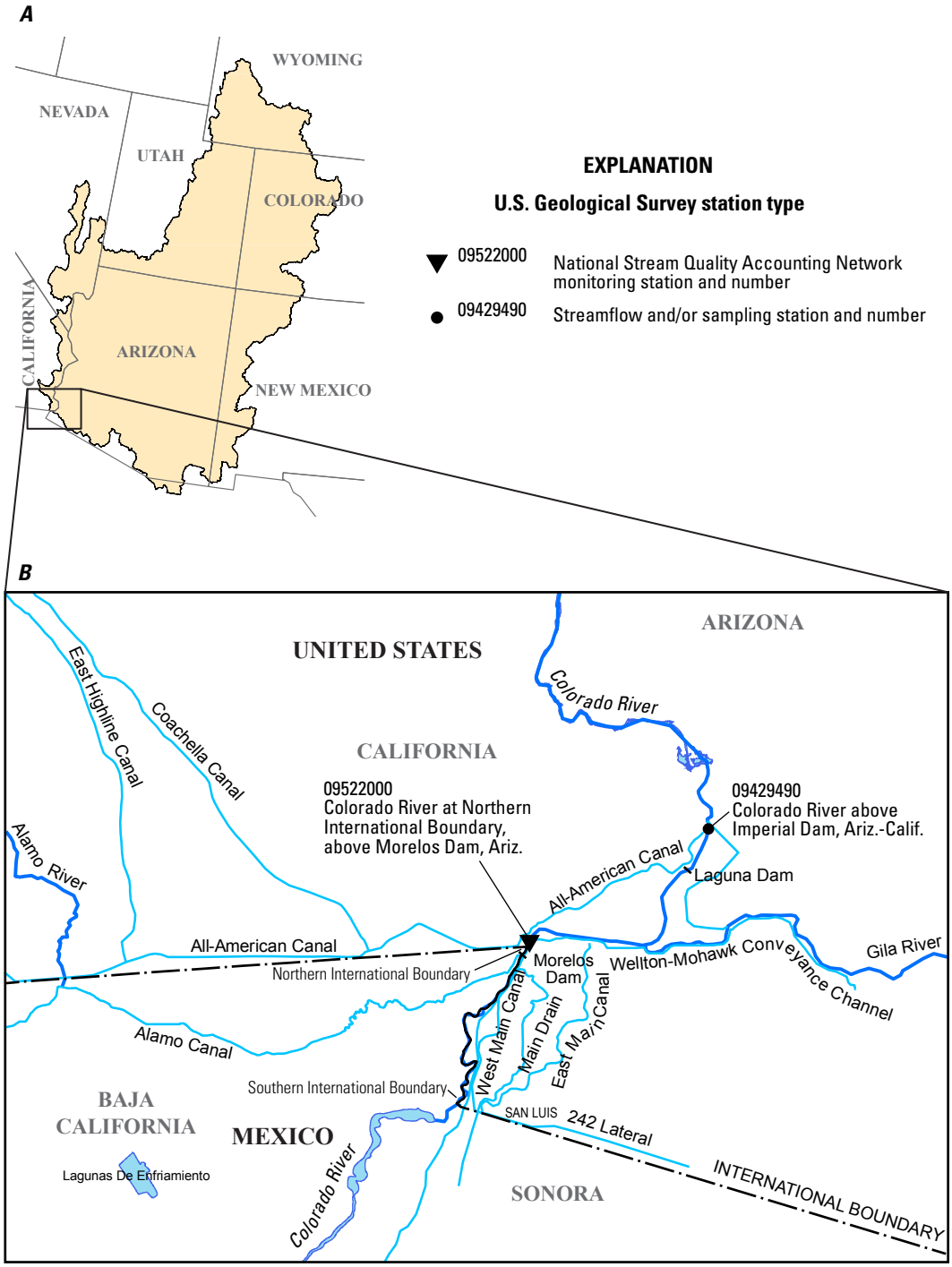


Figure 4. Location of *A*, the Colorado River in the United States, and *B*, the diversion into the All-American Canal relative to U.S. Geological Survey monitoring stations (modified from International Boundary and Water Commission, 2010, and U.S. Department of the Interior, 2007).

Summary

Geospatial basin boundary data from NASQAN and NMN are provided to assist in analysis and interpretation of water-quality data collected by the U.S. Geological Survey. The geospatial data contains polygon shapefiles of basin boundaries for 33 NASQAN and 5 NMN water-quality monitoring stations. In addition, 30 polygon shapefiles of the closed and noncontributing basins contained within the NASQAN or NMN basin boundaries and a point shapefile of monitoring stations and associated basin and station attributes are provided. Basin boundaries were delineated using the WBD12. Calculated drainage areas resulting from the delineation ranged from –0.78 to 1.74 percent of published NWIS drainage areas. Explanations of flow routing for the Lower Mississippi River-Atchafalaya River system, the Rio Grande, and the Lower Colorado River are provided to supply additional assistance to users of the accompanying data sets.

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