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# “LAWS OF THE RIVERS”

## THE LEGAL REGIMES OF MAJOR INTERSTATE RIVER SYSTEMS OF THE UNITED STATES

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# FOREWORD

Why study and compare interstate rivers?

At first glance, the rivers analyzed in this report seem so different as if to defy comparison. The Colorado River is the dominant waterway in the arid Southwest. More than 28 million people in Las Vegas, Denver, Phoenix, Los Angeles and other cities depend on the river for water and power. Four and a half million acres in the United States and Mexico are irrigated with its water. The Potomac River, by contrast, irrigates little land and generates virtually no electricity, but provides municipal and industrial water supplies to Washington, D.C. and its suburbs. The Columbia River can generate more electricity than any other river in the nation and seems to have almost nothing in common with the Delaware River, three thousand miles away, which has no dams on its main stem at all.

Taken as a whole, however, the interstate rivers examined in this report perform in remarkably similar ways and suffer similar problems. In most basins, there is not enough water to meet the demands and uses of everyone and at the same time satisfy all the environmental demands. The ensuing conflicts often extend beyond the basin's geographic boundaries and implicate numerous local, state, interstate and international jurisdictions. Sometimes conflicts are generational – extending for decades and consuming enormous amounts of money, time and energy. Some conflicts are resolved for a brief period of time only to flare up again when population grows or when an extended drought occurs.

The Colorado River Commission of Nevada, which initiated this study, wanted to learn whether the management of rivers other than the Colorado River can offer innovative solutions to the problems facing the desert Southwest. The Commission acts as a trustee for the State of Nevada's interest in the Colorado River and is concerned about whether the Colorado River can continue to meet Nevada's needs, and, more broadly, whether the river is sufficient to meet the needs of all river users in the Southwest.

We began this study by asking a basic question: Do other major interstate rivers in the United States find themselves in the similar situation as the Colorado River? What similarities and differences exist between major interstate river systems? What can the Commission learn from these other rivers – and what can river managers elsewhere learn from the Colorado?

The report we have produced contains a detailed collection of information about the laws and physical infrastructure of 14 interstate river systems. There are, of course, many other river studies, each tending to focus on specific basins or problems. It has been difficult, if not impossible, for a river manager in one river basin to find the legal infrastructure of another river system, for comparison purposes, without conducting significant original research. This report is designed to help remedy that situation. The information is presented in as neutral a fashion as we know how. We avoid taking sides in disputes, and do not offer suggestions or preferences for how to resolve problems.

More detailed comparisons will require work not yet undertaken. The report, however, does suggest some obvious conclusions. The legal regimes of major interstate rivers were mostly devised by political means and fragmented compromises, not by considering the hydrology, uses, water supply or environmental impacts of an entire basin. The laws of the rivers were often

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adopted piecemeal by Congress and/or the states. There is a dominant federal role in each river system, resulting primarily from the expenditure of hundreds of millions of dollars to build infrastructure – dams, locks and other public works that have significantly altered the natural flow of the rivers.

Individual practitioners working on any of the legal regimes may find particular fault with or omission from the material compiled here. But the breadth of the information will hopefully provide a foundation to make up for any overlooked details and will assist river managers, no matter where they are located.

Our report will succeed if it encourages a more careful examination of interstate rivers and engenders creative thinking by those who manage rivers and/or seek to change the way the rivers are run. Hopefully, the report will also assist river managers, users and others in their search for solutions to growing problems of insufficient supply and competing demands.

The primary research of the study was conducted between 2004 and early 2006 by the Columbia Research Corporation, a consulting company in Seattle, Washington, with whom the Commission contracted. Preparation of the final report was completed by the staff of the Water Division of the Colorado River Commission.

Most of the research incorporated in the report has been reviewed by others involved in the management of the rivers discussed. We appreciate and acknowledge the advice of those lawyers, river managers and others who took the time to review select chapters of the work prior to its publication. Our work product is more accurate and comprehensive because of their suggestions.

We welcome your comments and reactions.



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## **1.0 INTRODUCTION**

### **1.1 STUDY OBJECTIVE — A FOUNDATION STUDY**

Problem solvers too often look only at their immediate surroundings, their own backyard, for solutions. That approach often fails to consider the existence of the same or similar problem in other environments. The Colorado River Commission of Nevada therefore sought to create a compendium of information on major interstate river systems in the United States – a platform from which problems arising in the Colorado River Basin could be evaluated in a more comprehensive light.<sup>1</sup>

This report does not attempt to make more than elementary comparisons between interstate rivers. Its primary objective is to establish a foundation of information from which a more sophisticated analysis and comparisons between various rivers can proceed.

A foundation study, such as this report, is a reasonable place to begin when seeking creative solutions. An observation from Edward O. Wilson warrants repeating:

Scientists themselves do not think in straight lines. They contrive concepts, evidence, relevance, connections, and analysis as they go along, parsing it all into fragments and in no particular order. Herbert Simon, a Nobelist who has devoted part of his career to the subject, says of the complexity of concept formation: “What chiefly characterizes creative thinking from more mundane forms are (i) willingness to accept vaguely defined problem statements and gradually structure them, (ii) continuing preoccupation with problems over a considerable period of time, and (iii) extensive background knowledge in relevant and potentially relevant areas.”<sup>2</sup>

Hopefully this report will satisfy at least the third of those characteristics. In order to compile this background knowledge, we examined 14 major interstate river systems. In alphabetical order, they are:

1. The Alabama-Coosa-Tallapoosa Rivers (the “ACT”) in Alabama and Georgia;
2. The Apalachicola-Chattahoochee-Flint Rivers (the “ACF”) in Alabama, Georgia and Florida;
3. The Arkansas River, a tributary of the Mississippi River, which was chosen because it is the subject of the most protracted water allocation litigation in the country;

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<sup>1</sup> We use the term “interstate river system” to mean the main stem of the interstate river, plus its tributaries, and infrastructure (i.e., dams, locks, canals, etc). Some tributaries, e.g. the Missouri, are so large, that we have discussed them as an “interstate river system” in their own right.

<sup>2</sup> Edward O. Wilson, *Consilience, the Unity of Knowledge*, Alfred A. Knopf, New York, 1998, p. 64.



**FIGURE 1.** Major interstate river systems in the continental United States.

4. The Colorado River, the most diverted of the major interstate rivers in the nation;
5. The Columbia River, which produces more electricity than any river in the nation;
6. The Connecticut River, the longest river in New England;
7. The Delaware River, which drains part of New York, New Jersey, Pennsylvania and Delaware, and which supplies water for 15 million people;
8. The Great Lakes-St. Lawrence River Waterway, which stretches from Minnesota to the Atlantic Ocean;
9. The main stem of the Mississippi River, from its source in Minnesota to its mouth in Louisiana;
10. The Missouri River, another tributary of the Mississippi River, which contains the largest water storage reservoirs in North America;
11. The Potomac River, which supplies water to Washington, D.C., and its suburbs;
12. The Rio Grande, which forms the U.S. boundary with Mexico for 1,254 miles;
13. The Susquehanna River, which drains part of New York, Pennsylvania and Maryland; and
14. The Tennessee - Cumberland Rivers, two rivers that flow into the Ohio River within miles of each other and are linked by a navigation canal.

These rivers and their tributaries drain most of the continental United States. They run through diverse physical terrain: from desert to forest, and from sparsely populated areas to large cities. What the rivers have in common is this: they cross one or more state boundaries or even serve as boundary itself; the federal government has built dams, locks, irrigation canals and other infrastructure that changed forever the natural landscape; and there are competing uses for water. Summary information on each of these river systems is presented in **Tables 1 through 4** at the end of this chapter.

The study posed the following questions for each interstate river system:

- Who operates the river?
- Is there a long-term operational strategy for the entire interstate river system?
- What are the day-to-day (short-term) operational criteria used by management?
- How do interested parties know “who got or will get what?”
- What is the role of interstate compacts?
- What institutions are created by international treaties?
- What is the role of Native American tribes?
- What are the present conflicts?
- How are conflicts resolved?

To answer those questions, we collected extensive background information on the laws and physical infrastructure of each interstate river. We deliberately did not take sides in disputes nor did we offer specific suggestions or preferences for how to resolve problems. Rather, we encourage others to work from the information contained in this report, thinking creatively about the management of interstate river systems and fashioning their own solutions. We have done our best to identify the laws and history relevant to the legal regimes of each of the studied river systems. Individual practitioners working within any one of these regimes may find particular fault with or omissions from the material compiled here. But we hope the breadth of the information provided here as a foundation will make up for any overlooked details.

## **1.2 MANAGEMENT OF THE COLORADO RIVER: SEEKING SOLUTIONS**

Management of the Colorado River involves the states of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming, as well as the Secretary of the Interior of the United States, acting through the Bureau of Reclamation in the Lower Colorado River Basin. By necessity, management is a collaborative task.

Collaboration has not, however, always been a watchword of management because of multiple competing demands for water, power, navigation, recreation, and fish and wildlife habitat. Western water law’s mandate of “first in time, first in right” further complicates collaborative efforts to manage interstate rivers. It therefore becomes incumbent upon all officials to seek management regimes and practices that successfully conquer conflicting individual self interests.

The alternative is to admit failure, or decrease the quality of the resource, or accept inevitable environmental constraints, all in the face of growing demand, or commit to increasingly frequent and protracted litigation. But what shall we do? Where are the solutions? One might ask: “Who needs more to think about?” The obvious answer suggested by the question is that difficult questions should be postponed until some catastrophe mandates their attention. That approach has become, unfortunately, the approach too often taken. Meanwhile, difficult national natural resource problems are creeping up on the American population. The initiation of disciplined, apolitical, creative thinking is long overdue.

### **1.3 SOURCES OF LEGAL INFORMATION**

Since the time of the American Revolution, the management of interstate rivers has raised difficult legal issues. Who decides how much water is diverted? What rights, if any, does a downstream state have to restrict upstream withdrawals? What are the ramifications of building federal dams across rivers? Who owns the water in the reservoirs and what control, if any, do adjacent or downstream states have over federal infrastructure?

In preparing this report, we examined a broad array of legal documents that fall into six general categories:

- International treaties;
- Interstate compacts;
- Federal statutes;
- Federal rules, regulations and operating plans;
- Federal court decisions; and
- Interagency and multi-party agreements (i.e., contracts between one or more public agencies and/or other parties).

Some rivers, such as the Colorado, are governed by all of the above laws. In other river basins, the legal regime is limited to a handful of federal statutes. Ironically, the main stem of the Mississippi River, the river with the largest flow and arguably the biggest economic impact on the U.S. population, has the fewest proscriptive laws.

When state statutes (i.e., the duties of a state water master) have a significant impact on river management issues, they are noted in the text. A detailed survey of state water rights laws, however, is beyond the scope of this report.

Law review articles, annual reports from interstate compact commissions, documents prepared by the U.S. Army Corps of Engineers (“Corps of Engineers”) and the U.S. Bureau of Reclamation (“the Bureau”), and presentations by water rights lawyers at conferences have also been reviewed. Numerous phone interviews with representatives of the Corps of Engineers, the Bureau, business trade groups, environmental groups and others were also conducted.

Two web sites were particularly helpful in obtaining data: 1) the Corps of Engineers' National Inventory of Dams<sup>3</sup> web site, <http://crunch.tec.army.mil/nid/webpages/nid.cfm>, and 2) the Bureau of Reclamation's statistical and background information posted on its "Data Web." [www.usbr.gov/dataweb](http://www.usbr.gov/dataweb).

Professor George W. Sherk's treatise, "*Dividing the Waters: The Resolution of Interstate Water Conflicts in the United States*" (Kluwer Law International) (2000), proved to be a particularly useful reference book.

The compendium of "Federal Reclamation and Related Laws Annotated," published by the U.S. Department of the Interior (1866-2002) (four volumes), was an invaluable resource because it contains every federal statute enacted by Congress pertaining to irrigation and the Bureau of Reclamation's responsibilities under law.

#### **1.4 KEY TERMS**

The following abbreviations and units of measurement are used in the report:

- AF (acre-feet) = the amount of water to cover an acre one-foot deep (equivalent to approximately 326,000 gallons).
- MAF = million acre feet.
- cfs = cubic feet per second, a common measure of river flow. To convert cfs to acre feet, multiply by 724. E.g., 10,000 cfs equals 724,000 AF per year.
- MGD = million gallons per day.
- MW = megawatt (million watts), a measure of electrical generating capacity.
- MWh = megawatt hours, the amount of energy produced or consumed over an hour. E.g., 1 MW of capacity produces 1 MWh of energy in an hour.
- aMW = average megawatt, the amount of energy produced by 1 MW of capacity during an entire year (8,760 hours). E.g., 1 MW of capacity equals 8,760 MWh during a year, or 1 aMW. Conversely, a power plant that produces 876,000 MWh per year is said to have generated 100 aMW (total MWh divided by 8,760).

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<sup>3</sup>The National Inventory of Dams was created pursuant to the National Dam Inspection Act of 1972, Pub. L. No. 92-367; the Water Resources Development Act of 1986, Pub. L. No. 99-662; and the Water Resources Development Act of 1996, Pub. L. No. 104-303 (section 215).

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**TABLE 1. Physical facts of the major interstate river systems**

	<b>Columbia</b>	<b>Colorado</b>	<b>Rio Grande</b>	<b>Mississippi</b>	<b>Missouri</b>	<b>Arkansas</b>	<b>Tennessee &amp; Cumberland</b>
<b>Location</b>	Pacific Northwest	Southwest	Southwest	Central U.S.	Great Plains	Central South	The South
<b>Source</b>	Rocky Mountains, British Columbia, Canada	Rocky Mountains, western Colorado	San Juan Mountains, southern Colorado	Lake Itasca in Minnesota	Rocky Mountains, eastern Montana	Rocky Mountains, eastern Colorado	Western Slopes, Appalachian Mtns.
<b>Mouth</b>	Pacific Ocean	Gulf of California	Gulf of Mexico	Gulf of Mexico	The Mississippi River at St. Louis, MO	The Mississippi River in eastern Arkansas	Ohio River
<b>Length</b>	1,410 miles	1,450 miles	1,952 miles	2,340 miles	2,619 miles	1,396 miles	652 miles -- Tennessee 687 miles—Cumberland
<b>Major U.S. tributaries</b>	Snake, Spokane, Yakima, Deschutes, Willamette and others	San Juan, Green, Gunnison, Virgin, Gila and others	Pecos	Missouri, Arkansas, Illinois, Ohio, Red and others	Yellowstone, Belle Fourche, Platte, Niobrara, Republican, Kansas	Canadian, Purgatoire, Neosho-Grand, Cimarron	See template for details
<b>Annual Flows</b>	Between 192-198 MAF at Pacific Ocean	15 MAF average at Lee Ferry, AZ	821,000 AF at Elephant Butte Dam, NM, and 1.6 MAF at Brownsville, TX	434 MAF at Gulf of Mexico	23 MAF in South Dakota and 63.7 MAF at St. Louis, MO	36.6 MAF at the Mississippi River	48 MAF -- Tennessee 20 MAF -- Cumberland into the Ohio River
<b>Cities (adjacent)</b>	Wenatchee, WA; Tri-Cities, WA; Vancouver, WA	No major cities	Albuquerque, NM; El Paso TX; Ciudad Juarez and others in Mexico	Minneapolis-St. Paul, MN; St. Louis, MO; Memphis, TN; New Orleans, LA	Bismarck, ND; Pierre, SD; Sioux City, IA; Kansas City, MO; St. Louis, MO	Pueblo, CO; Wichita, KS; Tulsa, OK; Fort Smith, AR; Little Rock, AR	Knoxville, TN; Chattanooga, TN; Paducah, KY; Nashville, TN
<b>Basin Size (square miles)</b>	259,000 (7.5% of the United States <sup>4</sup> )	242,000 (8.3% of the United States)	336,000 (6.3% of the United States <sup>5</sup> )	1,200,000* (40% of the United States)	529,000 (18% of the United States)	185,000 (6% of the United States)	59,000 (both rivers)(2% of the United States)
<b>Basin Population</b>	7.0 million	6.7 million	7 million (both U.S. and Mexico)	84 million <sup>6</sup>	12 million	4.5 million	8.6 million

<sup>4</sup>Fifteen percent of the Columbia River Basin is in Canada. The 7.5% figure represents only the U.S. portion: 219,000 sq. miles.

<sup>5</sup>Forty-five percent of the Rio Grande Basin is in Mexico. The 6.3% figure represents only the U.S. portion: 186,000 sq. miles.

<sup>6</sup>Includes all tributaries.

**TABLE 1. Physical facts of the major interstate river systems (cont'd)**

	ACF	ACT	Delaware	Susquehanna	Potomac	Connecticut	Great Lakes & St. Lawrence
<b>Location</b>	The South	The South	Central East	Central East	Central East	Northeast	Midwest-Northeast
<b>Source</b>	Northern Georgia	Northern Georgia	New York	New York	West Virginia	Fourth Connecticut Lake, New Hampshire	Multiple sources for each Great Lake. The lakes empty into the St. Lawrence River
<b>Mouth</b>	Apalachicola Bay, Florida	Mobile, Alabama	Delaware Bay	Chesapeake Bay	Chesapeake Bay	Long Island Sound, Atlantic Ocean	The Gulf of Saint Lawrence (Canada), Atlantic Ocean
<b>Length</b>	385 miles	320 miles	330 miles	444 miles	383 miles	410 miles	2,340 miles (from Lake Superior to the Gulf of St. Lawrence)
<b>Major U.S. Tributaries</b>	“ACF” refers to the Apalachicola, Chattahoochee and Flint Rivers	“ACT” refers to the Alabama, Coosa and Tallapoosa Rivers	West Branch, East Branch, Lackawanna and others	Lehigh, Schuylkill and others	Shenandoah, Monocacy, Anacostia, and the Occoquan	Multiple. See template for list.	Multiple. See template for list.
<b>Annual Flows</b>	19 MAF	26.7 MAF	8.5 MAF at Trenton, NJ	29 MAF	7.8 MAF	11.6 MAF	260 MAF into the Gulf of St. Lawrence
<b>Cities (adjacent)</b>	Atlanta, GA; Columbus, GA; Albany, GA	Rome, GA; Selma and Montgomery, AL	Trenton, NJ; Philadelphia, PA; Wilmington, DE	Binghamton, NY; Harrisburg, PA; Wilkes-Barre, PA	Washington, DC	Lebanon, NH; Brattleboro, VT; Mt. Holyoke, MA; Springfield, MA; Hartford, CT	Duluth, MN; Milwaukee, WI; Chicago, IL; Gary, IN; Detroit, MI; Toledo, OH; Cleveland, OH; Erie, PA; Buffalo, NY; Rochester, NY Canadian cities include Toronto (Ontario) and Montreal (Quebec)
<b>Basin Size (square miles)</b>	19,000 (0.006% of the United States)	22,800 (0.007% of the United States)	13,539 (0.005% of the United States)	27,510 (0.009% of the United States)	14,670 (0.005% of the United States)	11,250 (0.004% of the United States)	398,000 (13.4% of the United States)
<b>Basin Population</b>	4.5 million	2.8 million	7.8 million	4.1 million	5.4 million	500,000	27 million people and 10 million people in Canada. 10% of the U.S. population lives in the Great Lakes Basin; 30% of the Canadian population lives in the Great Lakes Basin

**TABLE 2. Laws of the Rivers**

	Columbia	Colorado	Rio Grande	Mississippi (Main Stem)	Missouri	Arkansas	Tennessee & Cumberland
<b>Equitable Apportionment</b>	No	No	No	No	No, not on the main stem. Yes, on two tributaries: the North Platte and the Laramie	No	No
<b>Statutes: Power Allocation</b>	Yes Project Act (1933) Power Act (1980)	Yes Hoover Plant Act (1984)	No	No	No	No	No
<b>Water Allocation</b>	No	Yes Boulder Canyon Act (1928)	No	No	No	No	No
<b>Basin-Wide Planning</b>	Yes – for power only Power Act (1980)	No	No	No	No	No	Yes TVA Act (1933) for the Tennessee River Basin
<b>Interstate Compacts</b>	Yes	Yes	Yes	No	No, not on the main stem	Yes	Yes
<b>Name and Date of the Interstate Compacts</b>	Three: Salmon (1918) Fisheries (1970) Power (1980)  Plus one on the Snake River (1950)	Two: Colorado River (1922) Upper Basin (1948)	One: Rio Grande (1939)  Plus one on the Pecos (1949) (tributary)  Plus one on Costilla Creek (1963) (tributary)	N/A	Six on tributaries: South Platte (1926) Republican (1943) Belle Fourche (1944) Yellowstone (1951) Upper Niobrara (1969) Big Blue (1972)	Three on the main stem: Arkansas River (1949) Arkansas River (1966) Arkansas River (1973)  Plus one on the Canadian River (1952)	Tenn-Tom Waterway
<b>International Treaties</b>	Yes, with Canada: 1909 boundary 1961 storage 1985 salmon	Yes, with Mexico: 1848 boundary 1944 water	Yes, with Mexico: 1848 boundary 1906 water 1944 water	No	No	No	No

**TABLE 2. Laws of the Rivers (cont'd)**

	ACF	ACT	Delaware	Susquehanna	Potomac	Connecticut	Great Lakes & St. Lawrence
<b>Equitable Apportionment</b>	No	No	Yes 1931 and 1954 Supreme Court Decrees	No	No	No. The Supreme Court declined to apportion the river in 1931.	No
<b>Statutes: Power Allocation</b>	No	No	No	No	No	No	Yes – at Niagara Falls. 16 U.S.C. § 836.
<b>Water Allocation</b>	No	No	No	No	No	No	No
<b>Basin-Wide Planning</b>	No	No	No	No	No	No	No
<b>Interstate Compacts</b>	No	No	Yes	Yes	Yes	Yes	Yes
<b>Name and Date of the Interstate Compacts</b>	N/A	N/A	Delaware River (1961)	Susquehanna River (1970)	Potomac River (1940 and 1970)	Four: New England Interstate Water Pollution Control (1947) Connecticut River Flood Control (1953) New Hampshire-Vermont Interstate Sewage and Waste (1976) Connecticut River Atlantic Salmon (1983)	One: Great Lakes Basin (1968)  Another compact (the Great Lakes – St. Lawrence River Basin Water Resources Compact) was proposed in 2005. The states and Congress have yet to approve it.
<b>International Treaties</b>	No	No	No	No	No	No	Yes, multiple with Canada: 1909 boundary and water quality 1950 Niagara Falls 1955 Great Lakes fisheries  See text for discussion of various State-Provincial agreements.

**TABLE 3. Infrastructure on the major interstate river systems**

	<b>Columbia</b>	<b>Colorado</b>	<b>Rio Grande</b>	<b>Mississippi (Main Stem)</b>	<b>Missouri</b>	<b>Arkansas</b>	<b>Tennessee &amp; Cumberland</b>
<b>Federal Dams</b>	31	13	21	29 locks and dams (for navigation)	7	20	39
<b>Other Gov't Dams</b>	10 (in excess of 100 MW)	None	1	2	None	8	None
<b>Private Dams</b>	11 (in excess of 100 MW)	None	None	1	None	None	None
<b>Dams Outside the U.S.</b>	Yes, 3 in Canada	Yes, in Mexico	Yes, 2 on border with Mexico; 14 in Mexico	N/A	N/A	N/A	N/A
<b>Total Generating Capacity (All owners)</b>	31,656 MW	4,200 MW	246 MW	145 MW	2,485 MW (Main stem)	1,077 MW	6,595 MW
<b>Federal Transmission (Population Served)</b>	Yes (12 million)	Yes (36 million)	Yes (1 million)	None (None)	Yes (7 million)	Yes (10 million)	Yes (8.6 million)
<b>Reservoir Storage (MAF)</b>	48.5	60	18.25	None	75 MAF on the main stem, and 141 MAF for the entire river basin	5.6	23.4
<b>Municipal Water Supply</b>	<300,000	28 million	2 million	18 million	3 million	2.5 million	7-8 million
<b>Federal Irrigation (Acres)</b>	Yes 2.2 million	Yes 4 million in the U.S.	Yes 1 million in the U.S.	No	Not on the main stem	Yes 322,000	No
<b>Out-of-Basin Diversions</b>	No	Yes to Missouri River Basin to Rio Grande Basin to Arkansas River Basin to Utah	No	No	No, but the Red River (North Dakota) project is under construction	No	Yes Tenn-Tom Waterway
<b>Flood Control</b>	Dams	Dams & levees	Dams & levees	Levees, dikes and other infrastructure	Levees, dikes and other infrastructure	Levees, dikes and other infrastructure	Dams
<b>Navigation</b>	Yes, 465 miles	None	None	Yes, 2340 miles the entire length of the river	Yes, 735 miles between St. Louis, MO, and Sioux City, IA	Yes, 445 miles between Tulsa and the mouth	Yes 642 miles on the Tennessee 381 miles on the Cumberland Plus, 234 miles on the Tenn-Tom Waterway

**TABLE 3. Infrastructure on the major interstate river systems (cont'd)**

	ACF	ACT	Delaware	Susquehanna	Potomac	Connecticut	Great Lakes & St. Lawrence
<b>Federal Dams</b>	5	6	None on the main stem; 5 on tributaries	None on the main stem; 14 on tributaries	1	None of the main stem; 14 on tributaries	1 on the U.S.-Canadian border (St. Mary's River between Lake Superior and Lake Huron) (Army Corps of Engineers)
<b>Other Gov't Dams</b>	1	1	5 (on tributaries)	3	5	6	3, all owned by the New York Power Authority
<b>Private Dams</b>	6	11	66 MW	4 plus pumped storage	None	8 (with capacity of ≥10 MW)	1, the Ludington Pumped Storage on Lake Michigan
<b>Dams Outside the U.S.</b>	N/A	N/A	N/A	N/A	N/A	N/A	5 dams owned by Ontario Power Generation at Welland Canal, Niagara Falls, and on the St. Lawrence River
<b>Total Generating Capacity (all owners)</b>	727 MW	2,152 MW	66 MW, all private	2,148 MW, all private	None	1,615 MW <sup>7</sup> all private	8,045 MW
<b>Federal Transmission (Population served)</b>	None	None	None	None	None	None	None
<b>Reservoir Storage (MAF)</b>	4.27	5.3	1.43	2.75	0.197	2.8	3 MAF at New York Power Authority Dams on the St. Lawrence River and at Niagara Falls
<b>Municipal Water Supply</b>	4.5 million	2.8 million	15 million	5.1 million	5 million	2.5 million	8.2 million people adjacent to the Great Lakes; 33 million people in the Great Lakes Basin
<b>Federal Irrigation (acres)</b>	No	No	No	No	No	No	No
<b>Out-of-Basin Diversions</b>	Yes to ACT	Yes to ACF	Yes to New York City to New Jersey	Yes to Baltimore, MD to Chester, PA	No	Yes to Boston	Yes, by the City of Chicago from Lake Michigan into the Chicago River (Mississippi River Basin)
<b>Flood Control</b>	Dams	Dams	Yes 5 federal dams on tributaries	Yes 14 federal dams on tributaries	Yes 1 federal dam on the main stem	Yes 14 Federal dams on tributaries	Yes, on some tributaries
<b>Navigation</b>	Yes, 164 miles on the Chattahoochee; 135 miles on the Flint	Yes, 305 miles on the Alabama	Yes, 150 miles	Yes, 5 miles	No	Yes, 38 miles	Yes, 2,340 miles from Duluth, Minnesota to the Atlantic Ocean

<sup>7</sup>Almost two-thirds of the generating capacity comes from Northfield Mountain, a pumped storage facility in Connecticut.

**TABLE 4. Cost of the federal infrastructure on the major interstate river systems**

	Columbia	Colorado	Rio Grande	Mississippi	Missouri	Arkansas	Tennessee & Cumberland
<b>Cost of the Federal Dams</b>	\$10.3 billion	\$4.7 billion	\$750 million	See “navigation” below	\$3.7 billion	\$1.3 billion	Not readily available. TVA has total assets of \$35 billion (including coal and nuclear plants)
<b>Cost of Federal Transmission Lines</b>	\$6 billion	\$950 million	\$13 million	None	\$1.4 billion	\$222 million	See dams above
<b>Cost of Federal Water Supply Infrastructure</b>	See dams above	\$4.125 billion	See dams above	None	None on the main stem	\$103 million	None
<b>Cost of Federal Flood Control Infrastructure</b>	See dams above <sup>8</sup>	\$8.3 million <sup>9</sup>	See dams above	\$7.6 billion in Lower Basin	\$360 million	See dams above	None
<b>Cost of Federal Navigation Infrastructure</b>	\$700 million to build and maintain the channel from the mouth to Portland, OR	None	None	\$3.5 billion in Upper Basin \$6.1 billion in Lower Basin	\$943 million	\$1.2 billion for the McClellan-Kerr System	\$2 billion for the Tenn-Tom Waterway

<sup>8</sup>Dams in Canada also provide power and flood control storage. See Columbia River chapter for details.

<sup>9</sup>This number reflects the Army Corps of Engineers’ cost to build Alamo and Painted Rock Dams in Arizona. Data on the Bureau of Reclamation’s cost to build the Lower Basin levees in Arizona and California was not available.

**TABLE 4. Cost of the federal infrastructure on the major interstate river systems (cont'd)**

	ACF	ACT	Delaware	Susquehanna	Potomac	Connecticut	Great Lakes & St. Lawrence
<b>Cost of the Federal Dams</b>	\$1.1 billion	\$877 million	\$210 million	\$770 million	\$215 million	\$250 million	See cost of “navigation” below
<b>Cost of Federal Transmission Lines</b>	None <sup>10</sup>	None <sup>10</sup>	None	None	None	None	None
<b>Cost of Federal Water Supply Infrastructure</b>	None	None	None	None	Not available <sup>11</sup>	None	None on the St. Lawrence River
<b>Cost of Federal Flood Control Infrastructure</b>	See dams above	See dams above	See dams above	\$150 million on levees on tributaries	Small expenses	See dams above, and \$75 million (mostly around Hartford, CT)	Relatively small expenses on tributaries in the Great Lakes Basin
<b>Cost of Federal Navigation Infrastructure</b>	See dams above	See dams above	\$1.36 billion (includes the navigation channel to Trenton, NJ, and the Chesapeake & Delaware Canal between the lower river and Chesapeake Bay)	None	None	None (except for maintaining the navigation channel from Long Island Sound to Hartford, CT)	\$1.5 billion, including expenditures to build and maintain locks and navigation infrastructure on the St. Mary’s River (Lake Superior/Lake Huron), and to maintain other navigation channels between lakes and for harbors in major cities bordering the Great Lakes.  This sum includes the U.S. cost of building the St. Lawrence Seaway (\$136 million) (29% of the total cost, with the remainder paid for by Canada)

<sup>10</sup>The Southeastern Power Administration (SEPA), a federal power marketing agency, has no transmission infrastructure of its own and relies on other utilities to deliver federal power.

<sup>11</sup>The USACE owns and operates the Washington Aqueduct, which supplies municipal water to Washington, D.C. Cost data is not readily available.

## **2.0 ORGANIZATION OF THE REPORT**

To present information in a fashion that facilitates comparison among interstate river systems, we developed a standard template with the following sections:

- Introduction
- Uses of the River
- The Legal Regime
- Management and Operational Strategies
- Current Issues and Conflicts, and
- Conflict Resolution

This chapter describes the template.

### **2.1 INTRODUCTION**

Each chapter begins with a short introduction containing background information about the history, location and physical characteristics of the river. The section identifies the source, mouth, length and tributaries of each river.

### **2.2 USES OF THE RIVER**

This section provides an overview of the varied ways in which the river is used: water supply; hydropower; navigation; flood control; recreation; and fish and wildlife habitat.

On each interstate river examined in this report, the federal government has built dams or locks. The U.S. Army Corps of Engineers (“Corps of Engineers”) and U.S. Bureau of Reclamation (“the Bureau”) are the main dam-building agencies.

The Corps of Engineers has exclusive responsibility for flood control, even if the Bureau or another entity built the dam.<sup>12</sup> Navigation is also the Corps of Engineers’ exclusive responsibility. The Corps’ legal authority dates back to 1899, when Congress enacted the Rivers and Harbors Act.<sup>13</sup> This authority trumps conflicting state law or state proposals.<sup>14</sup> The Corps

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<sup>12</sup>See, section 7 of the Flood Control Act 33 U.S.C. § 709. “[I]t shall be the duty of the Secretary of the Army to prescribe regulations for the use of storage allocated for flood control or navigation at all reservoirs constructed wholly or in part with Federal funds provided...and the operation of any such project shall be in accordance with such regulations....” The Corps of Engineers has published regulations that list each non-Corps project and the amount of storage allocated for flood control. See, 33 C.F.R. § 208. Only the Tennessee Valley Authority (TVA) is exempt from this provision.

<sup>13</sup>Codified at 33 U.S.C. § 401 et seq.

<sup>14</sup>*Sanitary Dist. of Chicago v. United States*, 266 U.S. 405 (1925).

maintains a network of 12,000 miles of inland and coastal waterways. Among its facilities are 200 locks.<sup>15</sup>

In the West, the Bureau has built an extensive network for transporting water hundreds of miles, sometimes through harsh terrain and high mountains. Examples include the Central Arizona Project on the Colorado River and the tunnels through the Rocky Mountains to move water from the western slope of the Continental Divide to the eastern slope.

In some river basins, the federal government owns high-voltage power lines and related infrastructure to deliver power from dams to utilities and other customers. The Corps and Bureau are not responsible for this task. Instead, those duties belong to federal power marketing agencies that are part of the U.S. Department of Energy.<sup>16</sup> Each power marketing agency has its own territory.

See **Chapter 4** for an overview of the key federal agencies involved in the operation and management of interstate rivers.

## **2.3 THE LEGAL REGIME**

This section contains a chronological compendium of the international treaties, interstate compacts, federal statutes, and U.S. Supreme Court and other federal court opinions that comprise the “law of the river.”

### **2.3.1 International Treaties**

Four of the rivers examined for this report – the Columbia, Colorado, Rio Grande and the Great Lakes/St. Lawrence – are governed in part by an international treaty.<sup>17</sup>

### **2.3.2 Interstate Compacts**

An interstate compact is a binding legal instrument, a contract, between two or more states, signed pursuant to the Compact Clause of the U.S. Constitution.<sup>18</sup> As a general rule, Congress must consent to each compact that affects the operation of a navigable river.

The report identifies all of the compacts that affect river management, not just those that apportion or allocate water. **Chapter 3** contains a legal analysis on the law of interstate water allocation, including interstate compacts.

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<sup>15</sup>The busiest lock is in Illinois, where the Ohio River flows into the Mississippi River. The John Day Lock on the Columbia River has the highest lift: 110 feet.

<sup>16</sup>The four federal power marketing agencies are: 1) the Bonneville Power Administration; 2) the Western Area Power Administration; 3) the Southwestern Power Administration; and 4) the Southeastern Power Administration.

<sup>17</sup>The other rivers – the ACF, ACT, Arkansas, Connecticut, Delaware, Mississippi, Missouri, Potomac, Susquehanna and Tennessee – are not international waterways. The Mississippi and Missouri Rivers drain a tiny part of Canada but there are no relevant international treaties that address river management issues.

<sup>18</sup>Article I, Section 10, Clause 3 of the Constitution states: “No state shall, without the consent of Congress...enter into any agreement or compact with another state, or with a foreign power....”

### **2.3.3 Federal Statutes**

A number of federal statutes pertain to each river basin. There is, however, no single federal statute that creates a common mechanism for resolving interstate water allocation disputes. Instead, federal statutes typically address individual river basins and specific problems. The statutes, for example, authorize construction of a dam or irrigation project and may delegate authority to a federal agency to adopt rules for operating the infrastructure.

### **2.3.4 Federal Court Decisions**

Many water disputes have found their way into federal court. The U.S. Supreme Court has jurisdiction in lawsuits filed by one state against another state<sup>19</sup> and is the final arbiter of equitable apportionment lawsuits and interpretations over the meaning of interstate compacts and federal law.

## **2.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers and/or the Bureau of Reclamation usually manage and/or operate the rivers examined in this report.<sup>20</sup> See **Chapter 4** for a brief history and summary of their duties.

### **2.4.1 Long-term Operational Strategy**

In most basins, there is no comprehensive, long-term operational strategy for the entire interstate river system. Planning for water and power is fragmented between government agencies (federal, state and local level) and private parties.

### **2.4.2 Short-term Operational Strategy**

Federal rules and regulations address, among other things, the criteria for the delivery of surplus water, the prevention of floods, the restriction of navigation at certain times of year and other issues.

The Corps of Engineers and the Bureau often publish their short-term operational strategies for a specific river or river basin in a document called an “Annual Operating Plan,” “Master Water Manual,” or a “Record of Decision.” These documents typically have the force of law and are binding on the agency, subject to review by federal courts.<sup>21</sup>

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<sup>19</sup>The U.S. Constitution states: “The judicial Power shall extend...to Controversies between two or more states...In all Cases...in which a State shall be Party, the Supreme Court shall have original jurisdiction.” Article III § 2.

<sup>20</sup>On the Tennessee River, the Tennessee Valley Authority (“TVA”) is the dominant federal agency.

<sup>21</sup>It is not the label that an agency puts on a document that counts but whether the agency seeks to implement actions based on the record. See, e.g., *South Dakota v. Ubbelohde*, 330 F.3d 1014, 1028-1029 (8th Cir. 2003), *cert. denied*, 541 U.S. 987 (2004), holding that the U.S. Army Corps of Engineers’ (“USACE”) Master Water Control Manual for the Missouri River was a binding document and not just a policy statement because the USACE prioritized activities and referred to specific decisions it said it would take once the Manual was adopted. “There is no indication in the text of the Manual that the USACE is free to ignore its provisions if it chooses. Indeed, the language of the Manual appears to assume that members of the Corps must follow its provisions.” *Id.* at 1028.

### **2.4.3 River Accounting Mechanisms**

Who monitors water diversions? On some rivers, this information is easily accessible, the result of a quick Internet search. In other river basins, the lack of reliable information on withdrawals and diversions has aggravated the underlying water dispute and precipitated litigation in federal court. See, for example, the analysis of “River Accounting Mechanisms” in the chapters on the Apalachicola-Chattahoochee-Flint (“ACF”) and Alabama-Coosa-Tallapoosa River (“ACT”) River Basins.

### **2.4.4 The Role of Interstate Compacts**

What effect do interstate compacts have on the allocation of water or on the operations of the river? If the compact is just a planning mechanism, the report notes this limitation. On the other hand, if the compact allocates water to specific states or users, the report summarizes those provisions.

The interstate compacts examined for this report are diverse. There is no common rule of how compacts address water allocation disputes. Some compacts are short and straightforward; others have been the subject of years of protracted litigation. See **Chapter 3**.

### **2.4.5 International Treaties and Agreements**

There are two important cross-border institutions created by international treaties:

- For rivers that cross the U.S.-Canadian border, the International Joint Commission (“IJC”) attempts to resolve disputes.
- For rivers that cross the U.S.-Mexican border, the International Boundary and Water Commission (“IBWC”) does the same.

In addition, the North American Free Trade Agreement (“NAFTA”) has led to the creation of two new institutions, the North American Development Bank and the Border Environmental Cooperation Commission (“BECC”).

### **2.4.6 The Role of Native American Tribes**

Native American Tribes play a more significant role on Western rivers, such as the Columbia, than on rivers in other parts of the country, such as the Delaware, Susquehanna and Potomac. The report notes when Tribes are involved in major decisions or have filed litigation over water and tribal fishing rights.

### **2.4.7 The Role of Federal Courts**

Federal courts are often asked to resolve complex legal issues regarding the allocation of interstate water rights or environmental disputes regarding interstate river operations. As a general rule, however, federal courts have not assumed day-to-day control over interstate rivers. It is rare to find a river managed by a judge.

## **2.5 CURRENT ISSUES AND CONFLICTS**

This section briefly discusses the current issues and conflicts on the particular interstate river system. These issues can be grouped into the following general categories: water supply and allocation; power supply and allocation; and international and interstate environmental disputes.

### **2.5.1 Water Supply and Allocation**

This part of the report identifies existing disputes regarding interstate water supply and allocation. The conflicts range from long-standing and well-publicized allocation fights between upstream and downstream states (and/or users) to obscure, technical issues of river management that address the hydrology of tributaries.

### **2.5.2 Power Supply and Allocation**

On some rivers, such as the Columbia, there are conflicts over power supply and allocation issues. If the federal government built large dams decades ago, as is the case on the Columbia, the issue often comes down to who gets the low-cost hydro power?

### **2.5.3 Environmental Issues**

This section identifies the major environmental issues and disputes that have an impact on the management of interstate rivers.

A detailed review of *intrastate* environmental issues (i.e., Clean Water Act permits or state regulations) is beyond the scope of this report. Instead, this section focuses on issues, such as compliance with the Endangered Species Act (“ESA”), which typically implicates several states and/or federal agencies. On the Missouri River, for example, the length and timing of the navigation season is now at risk because of a six-year drought and competing uses for the water, including flows reserved for threatened or endangered fish listed under the ESA. On the Colorado River, this section contains a brief summary of salinity control efforts and proposals to restore river flows in the Delta in Mexico.

## **2.6 CONFLICT RESOLUTION**

This section addresses the common methods used to resolve conflicts: These methods include: Congressional, administrative and judicial allocation of water and/or power; arbitration or mediation; litigation; infrastructure improvements and environmental restoration; and interagency or multi-party agreements.

### **2.6.1 Congressional Allocation of Water or Power**

Congressional allocation of water and power from interstate rivers is rare. Two notable exceptions: the Boulder Canyon Project Act of 1928 (Congressional allocation of water resources between the Colorado River’s the three Lower Basin states of Arizona, California and Nevada); and Congressional allocation of power from Niagara Falls, New York. 16 U.S.C. § 836. For most of the rivers studied, this section will simply list “not applicable” to indicate that Congress has not intervened with a specific allocation of either water or power.

## **2.6.2 Administrative Allocation of Water or Power**

“Administrative allocation” refers to the ability of a federal agency to allocate or reallocate water or power to different states or users.

**Water:** If Congress appropriates funds to build a dam for a specific purpose, the Corps of Engineers and the Bureau of Reclamation have limited authority to allocate or reallocate storage space in the reservoir for another use.<sup>22</sup>

**Power:** Four federal power marketing agencies – Bonneville, Western, Southwestern and Southeastern – sell and deliver power from federal dams. Typically, these agencies have the legal authority to allocate or reallocate power by contract, depending on the particular circumstance and statute. As a general rule, public agencies (i.e., state and local) and rural electric cooperatives receive “preference” to federal power.

## **2.6.3 Judicial Allocation of Water or Power**

**Water:** The U.S. Supreme Court has allocated water between states according to the doctrine of equitable apportionment. The doctrine allows the Supreme Court to divide the waters by balancing a number of different criteria. See **Chapter 3** for a list of the Supreme Court’s equitable apportionments cases.

**Power:** Federal courts will typically defer to the expertise of the administrative agency to which Congress has delegated these duties. See, for example, the discussion in the Columbia River section for the deference traditionally accorded by federal courts to the Bonneville Power Administration, a federal power marketing agency.

## **2.6.4 Arbitration or Mediation**

Arbitration and mediation are rarely used to solve interstate water disputes. Exceptions are noted in the text.

## **2.6.5 Litigation**

This section notes major pending litigation and summarizes the issues. Because this subject is in constant flux, the status of pending litigation should be reviewed when this document is used.

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<sup>22</sup>Section 6 of the Flood Control Act of 1944, for example, allows the Corps of Engineers to sign contracts for “surplus water” with states, municipalities and other entities for domestic and industrial uses, *provided that* the contracts “shall not adversely affect existing lawful uses of water.” 33 U.S.C. § 708. The Water Supply Act of 1958 requires the Corps of Engineers to obtain Congressional approval before it modifies reservoirs or makes operational changes that “seriously affect the purposes for which the project was authorized, surveyed, planned or constructed.” 43 U.S.C. § 390b(d).

### **2.6.6 Infrastructure Improvements and Environmental Restoration**

Water conflicts can sometimes be resolved or mitigated by new infrastructure improvements and environmental restoration efforts. Programs to preserve and restore habitat for endangered species are the prime example.

### **2.6.7 Interagency and Multi-Party Agreements**

Federal, state and local agencies have occasionally signed contracts with each other and/or with private parties to resolve interstate water and power allocation issues. These agreements, many of them quite innovative, are listed in this section. Examples include:

- The Susquehanna River Basin Commission in Pennsylvania bought storage space in two Corps of Engineers' dams and used the water as back up source for power plant owners during drought.
- Nevada and Arizona signed an interstate water banking contract that allows Arizona to store (bank) water from the Colorado River in Arizona on behalf of Nevada.
- In the Pacific Northwest, a group of electric utilities and federal agencies signed the Pacific Northwest Coordination Agreement to cooperatively manage power generation from their dams. The goal is to create a single utility operating system in a region of the country noted for disparate ownership.

There are two appendices to this report. **Appendix A** contains data on annual water usage in the United States. **Appendix B** contains information on the major dams in each interstate river system examined in this report and the total costs of building and maintaining the infrastructure. These costs, compiled from the record of the Corps of Engineers and Bureau of Reclamation, reflect total expenditures to date in real dollars, not adjusted for inflation or the time value of money.

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## **3.0 RESOLVING INTERSTATE WATER DISPUTES**

There are three ways to apportion interstate rivers:

First, the states in the river basin may seek relief in the U. S. Supreme Court, relying on the Court's original jurisdiction under the Constitution to apportion the river equitably.

Second, Congress may allocate the waters, relying on its powers over interstate commerce and navigation.

Third, the states, with Congressional consent, can sign an interstate compact – a binding agreement. Interstate compacts allow for direct negotiations between the affected states and offer – at least in theory – more latitude to fashion a flexible and amicable agreement.

Each of these mechanisms is analyzed in more detail below.

### **3.1 EQUITABLE APPORTIONMENT IN THE SUPREME COURT**

#### **3.1.1 The Historical Context**

In 1901, when William McKinley was president and Henry Ford had yet to produce the first Model A, Kansas sued Colorado for diverting so much water from the Arkansas River that it ran dry in summer.

Kansas' claim, heard by the U.S. Supreme Court in 1902, established for the first time, that states may turn to the Court as the arbiter of interstate water disputes. *Kansas v. Colorado*, 185 U.S. 125 (1902). The Court noted that the Judiciary Act of 1789 – and Article 3 of the Constitution – gave it original jurisdiction to decide controversies between states.<sup>23</sup> *Kansas v. Colorado*, 185 U.S. at 139-140.

Colorado, however, asserted that the Court had no power to resolve the dispute over the Arkansas River. In simple terms, Colorado argued it could divert as much water as it pleased under its own laws. The Court summarized Colorado's arguments this way:

“The state of Colorado contends that, as a sovereign and independent state, she is justified, if her geographical situation and material welfare demand it in her judgment, in consuming for beneficial purposes all the waters within her boundaries; and that, as the sources of the Arkansas River are in Colorado, she may absolutely and wholly deprive Kansas and her citizens of any use of or share in the waters of that river.” *Kansas v. Colorado*, 185 U.S. at 143.

Colorado's argument was unconvincing, the Court concluded. States, as sovereign entities, have a right to petition the Court—the only practical forum in which to seek relief. “Bound hand and

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<sup>23</sup>The U.S. Constitution states: “The judicial Power shall extend...to Controversies between two or more states...In all Cases...in which a State shall be Party, the Supreme Court shall have original jurisdiction.” Article III § 2.

foot by the prohibitions of the Constitution, a complaining state can neither treat, agree, or fight with its adversary without the consent of Congress. A resort to the judicial power is the only means left....” *Kansas v. Colorado*, 185 U.S. at 144, quoting *Rhode Island v. Massachusetts*, 12 Pet. 726, 9 L. Ed 1261 (1832).

### 3.1.2 An Alternative to War?

Colorado also asserted in its response that Kansas could not represent its citizens in what it said was a controversy between private parties (i.e., upstream diverters in Colorado and downstream users in Kansas). The Court rejected that claim, too, because states in their capacity as *parens patriae* can sue on behalf of their citizens.

The Court quoted from a decision it had issued only two years earlier—this one involving a dispute between Missouri and Illinois:

“[I]t must surely be conceded that if the health and comfort of the inhabitants of a state are threatened, the state is the proper party to represent and defend them. If Missouri were an independent and sovereign state, all must admit she could seek a remedy by negotiation, and, failing that, by force.” *Kansas v. Colorado*, 185 U.S. at 142-143, citing *Missouri v. Illinois*, 180 U.S. 208 (1900).

If the Court’s reference to the use of force between the states seems hyperbole to us a century later, it is important to note that at the turn of the last century, when the opinion was written, the Civil War (1861-1865) was still a recent memory.<sup>24</sup> If states, like Kansas, could not seek relief before the Court, where else would they turn for help?

Nonetheless, the Court declined to grant Kansas the injunctive relief it had requested. The justices held that Kansas simply had not provided enough facts for the Court to make a decision—a ruling that set the stage for Kansas to try a second time, which it did.

In 1907, Kansas was back before the U.S. Supreme Court, but the justices ruled again that Kansas had not made its case. *Kansas v. Colorado*, 206 U.S. 46, 98 (1907). The Court unequivocally held that a state could not withdraw water within its borders to the substantial detriment of a downstream state. Each state has an “equitable” right to use the benefits of the river. The Supreme Court said it could – and would, if necessary – use its power to divide the waters fairly between the states, to implement an “equitable apportionment” of the Arkansas River and, by implication, other interstate waters. In 1949, the two states agreed on the terms of an interstate compact (see **Arkansas River** chapter).

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<sup>24</sup>Several justices had served in the Civil War or held positions in private practice where they worked on legal issues precipitated by the conflict. Justice Horace Gray (1882-1902) served as counselor to the Governor of Massachusetts on legal and constitutional questions, including those arising from the Civil War. Justice John Marshall Harlan (1877-1911) served as an officer for the Union Army during the Civil War.

### 3.1.3 The Cases

To date, the Supreme Court has considered equitable apportionment petitions on eight rivers but approved a final apportionment decree for only three: the Delaware; the Laramie; and the North Platte. In the other five petitions, the Court held that the complaining state did not provide sufficient evidence to obtain an apportionment decree.

The Supreme Court's equitable apportionment cases are listed in **Table 5**.

**TABLE 5.** U.S. Supreme Court equitable apportionment cases.

River	Case	Initial Supreme Court Decision
Arkansas	<i>Kansas v. Colorado</i>	185 U.S. 125 (1902) <sup>25</sup>
Laramie	<i>Wyoming v. Colorado</i>	259 U.S. 419 (1922) <sup>26</sup>
Connecticut	<i>Connecticut v. Massachusetts</i>	282 U.S. 660 (1931) <sup>27</sup>
Delaware	<i>New Jersey v. New York</i>	283 U.S. 336 (1931) <sup>28</sup>
North Platte	<i>Nebraska v. Wyoming</i>	295 U.S. 40 (1935) <sup>29</sup>
Walla Walla	<i>Washington v. Oregon</i>	297 U.S. 517 (1936) <sup>30</sup>
Colorado	<i>Arizona v. California</i>	298 U.S. 558 (1936) <sup>31</sup>
Vermejo	<i>Colorado v. New Mexico</i>	459 U.S. 176 (1982) <sup>32</sup>

## 3.2 CONGRESSIONAL ACTION

A second way to resolve interstate water disputes is for Congress itself to apportion all or a part of the river. This approach, however, has been used only twice.

<sup>25</sup>The ruling was followed by a second opinion, *Kansas v. Colorado*, 206 U.S. 46 (1907)(dismissing a revised complaint because Kansas had not demonstrated harm). The states eventually signed an interstate compact in 1949.

<sup>26</sup>The opinion was followed by subsequent decisions. *Wyoming v. Colorado*, 259 U.S. 419 (1922)(decree). *Wyoming v. Colorado*, 286 U.S. (1932)(interpreting prior decree and refusing to dismiss). *Wyoming v. Colorado*, 309 U.S. 572 (1940)(denying Wyoming's request to hold Colorado in contempt). *Wyoming v. Colorado*, 353 U.S. 953 (1957)(new joint decree).

<sup>27</sup>The opinion was followed by *Connecticut v. Massachusetts*, 283 U.S. 789 (1931)(decree dismissing Connecticut's complaint).

<sup>28</sup>The Court amended the decree in *New Jersey v. New York*, 347 U.S. 995 (1954).

<sup>29</sup>The opinion was followed by years of litigation. *Nebraska v. Wyoming*, 325 U.S. 589 (1945)(apportionment decree). *Nebraska v. Wyoming*, 345 U.S. 981 (1953)(supplemental decree). *Nebraska v. Wyoming*, 507 U.S. 584 (1993)(modification of decree). *Nebraska v. Wyoming*, 515 U.S. 1 (1995)(allowing Nebraska and Wyoming to proceed with litigation). *Nebraska v. Wyoming*, 534 U.S. 40 (2001)(decree).

<sup>30</sup>The Court held that Washington had not shown by clear and convincing evidence that Oregon's diversions of the Walla Walla River caused harm to Washington interests.

<sup>31</sup>The Court refused to apportion the river. Years later, in *Arizona v. Colorado*, 373 U.S. 546 (1963), the Court held that Congress had apportioned the lower river when it enacted the Boulder Canyon Project Act of 1928.

<sup>32</sup>The opinion was followed by *Colorado v. New Mexico*, 467 U.S. 310 (1984)(overruling a special master's report allowing Colorado to withdraw waters from the Vermejo River).

The first time was when Congress enacted the Boulder Canyon Project Act of 1928.<sup>33</sup> Thirty-five years after its passage, the Supreme Court held in a landmark opinion that the Act constituted a comprehensive scheme to divide the waters in the Lower Basin of the Colorado River among three states: Arizona; California; and Nevada.<sup>34</sup> *Arizona v. California*, 373 U.S. 546 (1963), and *Arizona v. California*, 376 U.S. 340 (1964)(decree).

Since 1928, Congress has stepped in and provided a legislative solution in only one other river basin: the 1990 legislation relating to Pyramid Lake and the Truckee and Carson Rivers between Nevada and California.<sup>35</sup>

### **3.3 INTERSTATE COMPACTS**

The third and most common way for states to resolve interstate water disputes is to sign a compact.

#### **3.3.1 The Compact as Contract**

An interstate compact is a binding legal instrument—a contract—between two or more states. *Green v. Biddle*, 8 Wheat 1 (1823). Some compacts create interstate commissions to interpret and enforce the agreement. Others do not. Some compacts have been the subject of prolonged litigation before the U.S. Supreme Court. Others have proceeded smoothly, with no apparent conflict. There is no uniform experience.

#### **3.3.2 History**

The U.S. Constitution expressly permits states to sign compacts with each other – so long as Congress consents. The Compact Clause – Article I, Section 10, clause 3 – states:

No state shall, without the consent of Congress...enter into any agreement or compact with another state, or with a foreign power....”

Congress approved the first interstate compact in 1783. The compact, like many that followed, altered boundary lines between states.<sup>36</sup> Until 1920, there were only 36 interstate compacts.

Since then, the compact has become a common tool for resolving cross-border problems. There are now more than 200 interstate compacts on subjects such as state boundaries, probation and

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<sup>33</sup>43 U.S.C. § 617.

<sup>34</sup>California asked the Court to use the principles of prior apportionment to allocate the Lower Basin. The Court declined to do so and relied instead on the 1928 Act.

<sup>35</sup>Truckee-Carson-Pyramid Lake Water Settlement Act of 1990, Pub. L. No. 101-618, Title II, 104 Stat. 3294.

<sup>36</sup>The origins of the compact go back to the nation’s colonial period, when royal land charters left borders subject to frequent change. To settle disputes, the colonies negotiated compromises submitted for approval to the Privy Council in England. The short-lived Articles of Confederation authorized states to enter into a treaty, confederation or alliance so long as Congress approved the agreement. The concern about unregulated interstate arrangements – or even worse, an agreement between a state and a foreign power – led to the adoption of the Compact Clause in the U.S. Constitution. See, “Interstate Compacts,” a paper by Prof. Michael Buenger (2004), for the Council of State Governments. [www.csg.org](http://www.csg.org).

parole, bridges and rail traffic, pollution, taxes, child adoption and water allocation. The Council of State Governments estimates that each state has signed an average of 27 compacts.<sup>37</sup>

### **3.3.3 State Approval**

An interstate compact is typically adopted in identical form by the state legislatures of the signing states.<sup>38</sup> The compact normally specifies *how* a state must ratify the agreement and accept its terms and conditions.<sup>39</sup> If a compact requires a state to enact it into law, the state cannot delegate this authority to an agency but must obtain approval from the state legislature.<sup>40</sup>

The process of adopting a compact is similar to that of a contract. There is an offer – the drafting of an agreement and its submission to the legislature – followed by acceptance, typically the enactment of the compact into law by the legislature. The legal consideration – the bargain – is the settlement of a dispute (i.e., who gets what from the river) or the adoption of a regulatory program common to both states (i.e., interstate pollution control regulations).

### **3.3.4 Congressional Consent**

Although the Constitution states that no state shall enter into a compact without the consent of Congress, the U.S. Supreme Court held 112 years ago that not all compacts require Congressional consent. *Virginia v. Tennessee*, 148 U.S. 503 (1893).

If the subject of the compact has been delegated in the Constitution to the states, then requiring Congressional approval would impinge on traditional state authority and independence. A compact that changed a marine boundary, for instance, would not need an act of Congress. Because it did not affect the power of the federal government,<sup>41</sup> the compact did not enhance the power of the states so as to threaten the supremacy of the federal government.<sup>42</sup>

Congress usually consents to a compact by passing a statute that approves the document after it has been ratified by the participating states. That situation, however, is not always the case. Congress can consent *in advance* of state ratification.<sup>43</sup> The effect of Congressional consent is to

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<sup>37</sup>The Council's web site has a list of all the existing interstate compacts. See: [www.csg.org/CSG/Programs/National+Center+Interstate+Compacts/search.htm](http://www.csg.org/CSG/Programs/National+Center+Interstate+Compacts/search.htm)

<sup>38</sup>See, for example, the statute enacted by Kansas to join the Arkansas River Compact of 1949, KSA 82a-520, and the identical statute enacted by Colorado, CRS 37-69-101 through 106.

<sup>39</sup>*Sullivan v. Comm'r, Dept. of Transp.*, 708 A.2d 481 (Pa. 1998)(failure of legislature to approve a compact rendered it invalid in Pennsylvania). But see different result if a compact itself expressly authorizes a state official to sign the agreement. *Whitlatch v. Comm'r, Dept. of Transp.*, 715 A.2d 387 (Pa. 1998).

<sup>40</sup>Buenger paper, *supra* at note 36.

<sup>41</sup>See, *Intake Water Company v. Yellowstone River Compact Comm'n*, 769 F.2d 568 (9th Cir. 1985), *cert. denied*, 476 U.S. 1163 (1986).

<sup>42</sup>*New Hampshire v. Maine*, 426 U.S. 363 (1976). For a similar holding in a different area of law, see *United States Steel Corp. v. Multistate Tax Comm'n*, 434 U.S. 452 (1978)(a compact to create an interstate tax commission without Congressional approval was valid because the commission could do nothing that member states could not do on their own right, and the compact did not increase state power to the detriment of the federal government).

<sup>43</sup>See, e.g., *Cuyler v. Adams*, 449 U.S. 433 (1981)(Congress had given its implied consent to the compact years earlier and intended the statute be a broad grant of consent). See, also, *Seattle Master Builders v. Pacific N.W. Elec.*

convert an issue or problem, previously the focus of state law, into federal law, enacted pursuant to Congress' Constitutional powers. As a result, Constitutional infirmities, such as interference with interstate commerce, become cured.<sup>44</sup>

Some interstate compacts, for example, were signed *before* the federal government built dams and other infrastructure on the river. The Colorado River is a prominent example: the Colorado River Compact of 1922 set the stage for the construction of Boulder (now Hoover) Dam. On the other hand, the compact authorizing the creation of the Northwest Power and Conservation Council for the Columbia River was approved by Congress in 1980, five years *after* the last major federal dam in the basin was finished.<sup>45</sup>

In some instances, Congressional authorization to build a federal dam was made contingent on Congressional consent to an interstate compact. In 1950, for example, Congress approved construction of Sanford Dam in Texas on the Canadian River (a tributary to the Arkansas River), but construction could not commence until New Mexico, Oklahoma and Texas agreed to an interstate water allocation compact, and Congress consented to it.<sup>46</sup>

### 3.3.5 Presidential Veto

The president can veto an interstate compact, though it is rare. In 1942, President Franklin Roosevelt vetoed the proposed Republican River Compact between Colorado, Kansas and Nebraska.<sup>47</sup> A year later, Congress consented to a revised compact, which the president then approved.<sup>48</sup>

### 3.3.6 Interstate River Compacts

There are 38 interstate river compacts in the United States, most of them in the Western states. They address water supply, water allocation, planning, flood prevention, pollution control or other problems.

**Table 6** lists the existing interstate river compacts in alphabetical order. The abbreviations used for "purpose" are as follows:

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*Power*, 786 F.2d 1359 (9th Cir. 1986), *cert. denied*, 479 U.S. 1059 (1987)(Congress could approve a compact to create an interstate power planning council before the compact was ratified by the states).

<sup>44</sup>*Intake Water Company v. Yellowstone River Compact Comm'n*, 769 F.2d 568 (9th Cir. 1985), *cert. denied*, 476 U.S. 1163 (1986).

<sup>45</sup>The compact addressed power planning, fish and wildlife restoration and other issues, not water allocation. Pacific Northwest Electric Power Planning and Conservation Act (commonly called the "Northwest Power Act"), 16 U.S.C. § 839 et seq.

<sup>46</sup>43 U.S.C. § 600c(b). The states ultimately agreed, and Congress consented to the Canadian River Compact in 1952. 66 Stat. 74.

<sup>47</sup>H.R. Doc. No. 690, 77<sup>th</sup> Congress, 2d Session at 1 (1942).

<sup>48</sup>57 Stat. 86 (1943).

**F** for flood prevention and control

**Multi** for multi-purpose (i.e., water allocation, water planning, power planning or pollution control, etc.)

**P** for planning (usually water supply)

**PC** for pollution control (including sanitation and sewage control)

**W** for water allocation (apportionment)

A single initial indicates a single-purpose compact. The first compact listed below, the Animas-La Plata Project Compact, for example, allocated water between Colorado and New Mexico in anticipation that the federal government would build an irrigation project, but the compact did not address flood prevention, pollution control or other subjects. The Delaware, Potomac and Susquehanna River Basin Compacts, in contrast, addressed a variety of interrelated issues and are labeled “multi” to reflect those purposes.

**Table 7** contains a subset of the compacts listed in Table 6, and lists the 22 water apportionment compacts currently in effect in the United States in chronological order from the date Congress consented.

**TABLE 6.** Interstate river compacts. [In alphabetical order.]

<b>Name</b>	<b>States</b>	<b>Purpose</b>
Animas-La Plata Project	Colorado and New Mexico	W
Arkansas River	Colorado and Kansas	W
Arkansas River	Kansas and Oklahoma	W
Arkansas River	Oklahoma and Arkansas	W
Bear River	Idaho, Utah and Wyoming	W
Belle Fourche	South Dakota and Wyoming	W
Bi-State Development	Illinois and Missouri	Multi
Canadian River	New Mexico, Oklahoma and Texas	W
Colorado River	Arizona, California, Colorado, Nevada, New Mexico, Wyoming and Utah	W
Connecticut River Flood Control	Connecticut, Massachusetts, New Hampshire and Vermont	P&F
Costilla Creek	Colorado and New Mexico	W
Delaware River*	Delaware, New Jersey, New York and Pennsylvania	Multi
Kansas-Missouri Flood Prev.	Kansas and Missouri	P&F
Kansas-Nebraska Big Blue	Kansas and Nebraska	W
Klamath River Basin	California and Oregon	W
La Plata River	Colorado and New Mexico	W
Merrimack River	Massachusetts and New Hampshire	P&F
New England Interstate Water Pollution Control	Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont	PC
New Hampshire-Vermont	New Hampshire and Vermont	PC
Ohio River Valley Sanitation	Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee and West Virginia	PC
Pecos River	New Mexico and Texas	W
Pacific Northwest Electric Power Planning	Idaho, Montana, Oregon and Washington	Multi

**TABLE 6 (cont'd).** Interstate river compacts. [In alphabetical order.]

<b>Name</b>	<b>States</b>	<b>Purpose</b>
Potomac River	Maryland, Pennsylvania, Virginia, West Virginia and District of Columbia	Multi
Red River	Arkansas, Louisiana, Oklahoma and Texas	W
Red River of the North	Minnesota, North Dakota and South Dakota	P&F
Republican River	Colorado, Kansas and Nebraska	W
Rio Grande	Colorado, New Mexico and Texas	W
Sabine River	Louisiana and Texas	W
Snake River	Idaho and Wyoming	W
South Platte River	Colorado and Nebraska	W
Susquehanna River*	Maryland, New York and Pennsylvania	Multi
Thames River	Connecticut and Massachusetts	P&F
Tri State Sanitation	Connecticut, New Jersey and New York	PC
Upper Colorado River	Arizona, Colorado, New Mexico, Utah and Wyoming	W
Upper Niobrara River	Nebraska and Wyoming	W
Wabash Valley	Illinois and Indiana	P&F
Wheeling Creek Watershed	Pennsylvania and West Virginia	P&F
Yellowstone River	Montana, North Dakota and Wyoming	W

\* The United States government is also a signatory to the compact and has a voting representative on the compact commission.

**TABLE 7.** Interstate water apportionment compacts. [Listed by year.]

<b>Name</b>	<b>Date</b>	<b>Citation</b>
La Plata River Compact	1925	43 Stat. 796
South Platte River Compact	1926	44 Stat. 195
Colorado River Compact	1928	45 Stat. 1057 70 Cong. Record 324 (1928)
Rio Grande Compact	1939	53 Stat. 785
Republican River Compact	1943	57 Stat. 86
Belle Fourche River Compact	1944	58 Stat. 94
Upper Colorado River Compact	1949	63 Stat. 31
Arkansas River Compact (CO/KS)*	1949	63 Stat. 145
Pecos River Compact	1949	63 Stat. 159
Snake River Compact	1950	64 Stat. 29
Yellowstone River Compact	1951	65 Stat. 663
Canadian River Compact	1952	66 Stat. 74
Klamath River Basin Compact	1957	71 Stat. 497
Amended Sabine River Compact	1962	76 Stat. 34 (amending 68 Stat. 690) (1954)
Amended Costilla Creek Compact	1963	77 Stat. 350 (amending 60 Stat. 246)(1946)
Arkansas River Basin (KS/OK)**	1966	80 Stat. 1409
Animas-La Plata Project Compact	1968	82 Stat. 897
Upper Niobrara Basin Compact	1969	83 Stat. 86
Kansas-Nebraska Blue River Compact	1972	86 Stat. 193
Arkansas River Basin (OK, AR)***	1973	87 Stat. 569
Red River Compact	1980	94 Stat. 3305
Amended Bear River Compact	1980	94 Stat. 4 (amending 72 Stat. 38)(1958)

\*Between Colorado and Kansas \*Between Kansas and Oklahoma \*\*\* Between Oklahoma and Arkansas

### **3.3.7 Interpreting Compacts**

An interstate compact has the characteristics of a statute but the force of a contract, and it is interpreted according to the federal common law of contracts if Congress has consented to the agreement. “[A] compact when approved by Congress becomes a law of the United States. . . . It remains a legal document that must be construed and applied in accordance with its terms.” *Texas v. New Mexico*, 482 U.S. 124, 128 (1987).

A compact may trump a provision in a state constitution. *Washington Metro Area T.A v. One Parcel of Land*, 706 F.2d 1312, 1321-22 (4th Cir. 1983)(Congressional delegation of condemnation authority to a compact agency does not bar it from exercising those powers even if the constitution of a participating state prohibits the action).<sup>49</sup>

Furthermore, a compact may supersede a prior state water right. *Hinderlider v. La Plata River Ditch Co.*, 304 U.S. 92 (1938). An equitable apportionment by compact binds the states “even so where the State had granted the water rights before it entered into the compact.” *Id.* at 106.

### **3.3.8 Withdrawal and Termination**

Compacts terminate pursuant to their terms. Some compacts require *all* of the signing states to withdraw or terminate the arrangement. Other compacts allow a single state to withdraw from the arrangement. The Potomac River Basin Interstate Compact – between Maryland, West Virginia, Pennsylvania, Virginia and the District of Columbia – expressly allows “any signatory body” after one year’s notice to withdraw from the compact.<sup>50</sup> Congressional approval of compacts raises the question whether Congress must also approve termination.<sup>51</sup>

### **3.3.9 Role of Commissions**

Compacts sometimes establish a commission, composed of representatives from the participating states, to resolve issues, publish basic information and implement the agreement.

The federal government is a voting member on three commissions, the Delaware River Basin Commission; the Susquehanna River Basin Commission; and the Interstate Commission on the Potomac River Basin Commission. The latter commission has no regulatory powers, unlike the Delaware and Susquehanna Commissions.

In other river basins, the federal government has a non-voting seat on an interstate compact commission.

In the case of a two-state compact, the non-voting federal representative cannot break an impasse even if one or both of the states desire such a result. That was the situation facing New Mexico

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<sup>49</sup>Nor do state courts have the authority to interpret a compact that addresses issues involving the rights of other states or the federal government. *West Virginia ex rel. Dyer v. Sims*, 341 U.S. 22 (1931)

<sup>50</sup>Article VII, Pub. L. No. 91-407, 84 Stat. 856, 860 (1970)(amending Pub. L. No. 76-93, 54 Stat. 748)(1940).

<sup>51</sup>The Supreme Court has not addressed whether Congress would have to repeal its consent in order for the states to terminate the compact.

and Texas on the Pecos River. Neither side could agree on what the Pecos River Compact of 1949 meant. The Supreme Court refused to grant voting powers to the federal representative. *Texas v. New Mexico*, 462 U.S. 554 (1983). The Court held that the states had created the commission and were bound by its structure. The solution was for New Mexico and Texas to renegotiate the compact terms, the Court said. But New Mexico and Texas did not, and the Court ultimately resolved the dispute: it found that New Mexico had breached the compact. *Texas v. New Mexico*, 482 U.S. 124 (1987).

### **3.3.10 Indian Treaty Rights**

The federal government's treaties with Indian Tribes generally pre-date the adoption of interstate water compacts. In some Treaties, the federal government did not reserve water rights for (European) settlers, and the U.S. Supreme Court has held that those rights remain with the Tribes.<sup>52</sup> In some instances, an interstate compact will expressly say that it has no affect on Indian treaty rights.<sup>53</sup>

### **3.3.11 The Jurisdiction of the U.S. Supreme Court**

A violation of the terms and conditions of a compact gives rise to a claim for contract breach. The U.S. Supreme Court is the only judicial forum to resolve the dispute *if* they are between states (as opposed to private parties and a state).<sup>54</sup>

The Supreme Court typically appoints a Special Master, who serves much like a federal district court judge, hearing evidence, ruling on preliminary motions and filing a report to which the states can take exception. As a general rule, the Supreme Court accepts most of the findings of a Special Master.<sup>55</sup>

Litigation before the Supreme Court seldom yields prompt results. In the case of the Pecos River dispute, for example, Texas first sued New Mexico in 1975, but it was not until 1990 that the Court entered a stipulated judgment in its favor.<sup>56</sup>

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<sup>52</sup>*Winters v. United States*, 207 U.S. 564 (1908)(creation of Indian reservation included water rights, which were reserved for the tribe). See also, *Arizona v. California*, 373 U.S. 546, 599-601 (1963).

<sup>53</sup>See, e.g., Article VII of the Colorado River Compact 1922, and Article XVI of the Rio Grande Compact of 1949.

<sup>54</sup>See Article III, section 2 of the U.S. Constitution, which grants the Court "original jurisdiction" in cases between states. See also, 28 U.S.C. § 1251(a), which provides the Supreme Court shall have original *and exclusive jurisdiction* of all controversies between two or more states. The result is different if the issue, for example, is the application of collective bargaining laws to an interstate compact agency, and the plaintiff is not a state but a labor union. *Local 68 v. The Delaware River and Bay Authority*, 688 A.2d 569 (1997).

<sup>55</sup>The case of *Colorado v. New Mexico*, 467 U.S. 310 (1984), is an exception. The Court in that case overruled the findings of a Special Master allocating water to Colorado from the Vermejo River. The Court held that the Special Master's decision was error, and sustained New Mexico's exceptions to the Special Master's findings.

<sup>56</sup>*Texas v. New Mexico*, 494 U.S. 111 (1990).

### **3.3.12 The U.S. as an Indispensable Party**

If the Supreme Court concludes that the United States is not named in the suit but is an indispensable party, the suit will be dismissed. *Texas v. New Mexico*, 352 U.S. 991 (1957). In that case, the Supreme Court held that the claim by Texas against New Mexico for breach of the Rio Grande Compact of 1939 could not proceed because Texas did not name the United States, which served as a trustee of Indian claims at issue in the dispute.

### **3.3.13 Remedies**

The Supreme Court has a variety of remedies at its disposal if it finds that a state has breached a compact. The Court can order “water” or “money” remedies: it can direct that a state supply water to the downstream state; or it can allow a Special Master to impose money penalties, if the Special Master so chooses. *Texas v. New Mexico*, 482 U.S. 124 (1987).

Finally, the Supreme Court may appoint a special “River Master” to permanently account for water diversions and provide technical information to the Special Master or the Court itself. The Court has taken that step only twice: once in a dispute involving the Delaware River, *New Jersey v. New York*, 347 U.S. 995 (1954); and more recently in litigation over the Pecos River, *Texas v. New Mexico*, 482 U.S. 124 (1987).

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## **4.0 THE KEY FEDERAL AGENCIES**

Each of the rivers examined for this report is in varying degree a “federal river” in which an agency of the U.S. government manages all or part of the river and has a significant impact on short-term or long-term river operations.

### **4.1 THE DAM-BUILDING AGENCIES**

Three federal agencies have built dams on the rivers of the United States for power, flood control, irrigation, navigation, water supply, recreation and other purposes. The three agencies are: 1) the U.S. Army Corps of Engineers (“Corps of Engineers” or “USACE”); 2) the U.S. Bureau of Reclamation (“the Bureau” or “USBR”); and 3) the Tennessee Valley Authority (“TVA”).

**Table 8** shows the total generating capacity and reservoir storage at federal dams owned by each agency.

**TABLE 8.** Generating capacity and reservoir storage at federal dams.

<b>Agency</b>	<b>No. of Dams</b>	<b>Generating Capacity (MW)</b>	<b>Storage (MAF)</b>
USACE	75	24,420	218.7
USBR	58	14,758	245.0
TVA	39	5,556	18.2
<b>TOTAL</b>	<b>162</b>	<b>44,734</b>	<b>481.9</b>

**Table 9** lists the ten largest hydroelectric facilities in the United States, ranked by generating capacity.<sup>57</sup> The dams in *italics* are owned by the federal government.

<sup>57</sup>The structures owned by private power companies are typically smaller than the federal structures. The largest private power dam in the nation in terms of power capacity is Conowingo Dam on the lower Delaware River owned by Susquehanna Power Company and Philadelphia Electric Company.

**TABLE 9.** Ten largest hydroelectric facilities in the United States. [Ranked by generation capacity/megawatts.]

<b>Facility Name</b>	<b>State</b>	<b>Waterway</b>	<b>Generation (MW)</b>	<b>Owner</b>
<i>Grand Coulee</i>	WA	<i>Columbia</i>	<i>6,800 MW</i>	<i>USBR</i>
<i>Chief Joseph</i>	WA	<i>Columbia</i>	<i>2,457</i>	<i>USACE</i>
<i>John Day</i>	WA-OR	<i>Columbia</i>	<i>2,160</i>	<i>USACE</i>
<i>Hoover</i>	AZ-NV	<i>Colorado</i>	<i>2,100</i>	<i>USBR</i>
Bath County PS*	VA	Little Back	2,100	Dominion Power**
Robert Moses	NY	Niagara	1,950	NY Power Authority
<i>The Dalles</i>	WA-OR	<i>Columbia</i>	<i>1,807</i>	<i>USACE</i>
Ludington PS*	MI	Lake Michigan	1,872	Consumers/Detroit**
<i>Raccoon Mtn. PS*</i>	<i>TN</i>	<i>Tennessee</i>	<i>1,618</i>	<i>TVA</i>
<i>Glen Canyon</i>	<i>AZ</i>	<i>Colorado</i>	<i>1,288</i>	<i>USBR</i>

\* PS means “pumped storage.” In a pumped storage plant, water is pumped uphill during times of low demand to a reservoir from where the water flows by gravity through turbine-generators during times of peak demand.

\*\* Indicates private power utility. Dominion Power is based in Virginia. Consumers Energy and Detroit Edison in Michigan jointly own the Ludington plant.

**Table 10** shows the ten largest storage reservoirs in the United States (all owners). Note that eight of the ten are owned by the Corps of Engineers and Bureau, and are on rivers examined in this report.

**TABLE 10.** Ten largest storage reservoirs in the United States.

<b>Dam</b>	<b>Reservoir</b>	<b>River</b>	<b>State</b>	<b>Owner</b>	<b>Storage (MAF) *</b>
Hoover	Mead	Colorado	AZ-NV	USBR	28.3 MAF
Glen Canyon	Powell	Colorado	AZ	USBR	27.0
Oahe	Oahe	Missouri	SD	USACE	19.3
Garrison	Sakakawea	Missouri	ND	USACE	18.5
Fort Peck	Fort Peck	Missouri	MT	USACE	15.4
Grand Coulee	Roosevelt	Columbia	WA	USBR	9.6
Libby	Koocanusa	Columbia	MT	USBR	5.8
Shasta	Shasta	Sacramento	CA	USBR	4.6
Toledo Bend	Toledo Bend	Sabine	LA	Sabine Auth.	4.5
Fort Randall	Francis Case	Missouri	SD	USACE	3.8

\* Includes total reservoir storage for flood control and other purposes.

The Corps of Engineers, Bureau of Reclamation and TVA have different missions, as explained below.

#### **4.1.1 The Corps of Engineers**

The Corps of Engineers is the oldest of the dam-building agencies, and traces its origins to the American Revolution, when the Continental Congress first established a position within the Army called the “Chief of Engineers.” The first man to hold the position, Colonel Richard Gridley, directed fortifications during the Battle of Bunker Hill in 1775.

Over the years, the Corps of Engineers has built dozens of dams for flood control, navigation, power and other purposes. It is not limited by geographic area, though historically the agency has not built dams for water supply and irrigation. The Corps of Engineers is part of the U.S. Department of Defense. [www.usace.army.mil](http://www.usace.army.mil)

##### **Navigation**

Federal statutes addressing the Corps of Engineers’ authority over navigation date back to the early 1800s, when Congress authorized it to assist in clearing debris and maintaining river channels. Since then, Congress has enacted dozens of project-specific statutes authorizing the Corps of Engineers to perform work on rivers around the nation.

##### **Flood Control**

Floods on the Mississippi River and the Missouri River in the 1920s prompted Congress to create the first comprehensive flood control programs, and place authority for those programs in the Corps of Engineers. State power to regulate and control floods within its borders was preempted by this broad federal authority.<sup>58</sup>

##### **Power**

The Corps of Engineers is the largest federal generator of hydroelectricity with the capacity to produce 24,200 MW. The agency relies on federal power marketing agencies to sell and distribute electricity from its dams.

#### **4.1.2 The Bureau of Reclamation**

The Bureau was initially created in 1902 as the “U.S. Reclamation Service” to build irrigation and water storage projects in the arid West, “to make the desert bloom.” The Bureau now operates about 180 projects in 17 Western states with a total value of approximately \$20 billion.<sup>59</sup>

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<sup>58</sup>*Water Power Co. v. Water Comm’rs*, 168 U.S. 349, 366. *United States v. Rio Grande Irrigation Co.*, 174 U.S. 690, 706-707 (1899). *United States v. Appalachian Electric Power Co.*, 311 U.S. 377 (1940).

<sup>59</sup>In alphabetical order, the 17 states in the West are: Arizona; California; Colorado; Idaho; Kansas; Montana; Nebraska; Nevada; New Mexico; North Dakota; Oklahoma; Oregon; South Dakota; Texas; Utah; Washington; and

The Bureau's projects (i.e., dams, canals, etc.) provide agricultural, municipal and industrial water to one-third of the population in the West.<sup>60</sup> The Bureau's dams have the capacity to produce 14,758 MW, making it the largest generator of electricity in the West. Power is sold and delivered by federal power marketing agencies. The Bureau is part of the U.S. Department of Interior. [www.usbr.gov](http://www.usbr.gov)

### **The Initial Congressional Goal**

In the early 1900s, Congress contemplated that the Bureau's construction program would be self-sufficient, without appropriated funds. Instead, the sale of public lands in the West would go into an earmarked fund to support the Bureau's activities.<sup>61</sup> Upon completion of a project (i.e., dam or canal), irrigators were to pay the Bureau for ten years without interest for the cost of the project.<sup>62</sup> At that point, the federal government would turn over the asset to the irrigators (or to a public irrigation district) to own and manage.

This vision did not come to pass. The U.S. General Accounting Office described the Bureau's initial experience:

Early on, it was discovered that the costs of establishing irrigated farming on previously unfarmed, arid land were much higher than expected and the costs of building water projects were much higher than originally estimated.<sup>63</sup>

As a result, Congress lengthened the repayment period and made it easier for the Bureau to build projects.<sup>64</sup>

### **Role of State Water Rights**

Under Section 8 of the Reclamation Act of 1902, the Bureau is required to conform with State water rights laws, and its duties cannot interfere with state laws regarding the control, appropriation, use or distribution of water in irrigation or the vested rights of

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Wyoming. The 1902 Reclamation Act, also called the Newlands Act after its chief author, U.S. Rep. Francis Newlands (D-NV), listed 16 states. 32 Stat. 388. Texas was added to the list of eligible states in 1905.

<sup>60</sup>The Secretary of Interior is authorized to sell surplus water from any irrigation project for non-irrigation uses if there is no other practicable source of water supply for the non-irrigation purpose. 43 U.S.C. § 521.

<sup>61</sup>Section 1 of the Reclamation Act of 1902, Pub. L. No. 57-161, 32 Stat. 388, as amended at 43 U.S.C. 391.

<sup>62</sup>Section 4 of the Reclamation Act of 1902, Pub. L. No. 57-161, 32 Stat. 388, 390, as amended at 43 U.S.C. 419.

<sup>63</sup>U.S. General Accounting Office, "Bureau of Reclamation: Reclamation Law and the Allocation of Construction Costs for Federal Water Projects," testimony submitted to the Subcommittee on Water and Power Resources, Committee on Resources, U.S. House of Representatives, May 6, 1997.

<sup>64</sup>See, e.g., the Reclamation Extension Act of 1914, 38 Stat. 686, extending the repayment period from 10 to 20 years.

users.<sup>65</sup> The Reclamation Act states that “beneficial use” is the “the basis, the measure and the limit of the [water] right.”<sup>66</sup>

### **Size Limitation**

The Reclamation Act of 1902 limited the size of tracts of land for which individuals or other legal entities were to receive federal water to 160 acres. This limitation was raised to 960 acres in the Reclamation Reform Act of 1982.<sup>67</sup>

#### **4.1.3 The Tennessee Valley Authority**

The Tennessee Valley Authority, a federal corporation with a limited geographic mission, is authorized to build dams and other projects, and to manage the Tennessee River, which drains part of seven states in the South.

TVA has the capacity to produce more electricity than any other public agency in the country—31,517 MW. Of that total, 5,307 MW (17%) is hydropower from 29 dams and a large pumped storage facility.

Unlike the Corps of Engineers, which has a nationwide mission, and the Bureau of Reclamation, which has responsibilities in the West, the TVA has discrete duties primarily in a single watershed, the Tennessee River Basin. TVA also owns and operates coal and nuclear power plants. TVA sells and delivers its own power and does not rely on a federal power marketing agency for this function.

## **4.2 THE POWER MARKETING AGENCIES**

Four power marketing agencies, all part of the U.S. Department of Energy, sell and deliver electricity from federal dams owned by the Corps of Engineers and the Bureau of Reclamation. These agencies include: the Bonneville Power Administration; Western Area Power Administration; Southwestern Power Administration; and Southeastern Power Administration. Each agency has its own service territory. The power marketing agencies supply electricity to “preference” utilities—public agencies and cooperatives—that serve about 68 million people.<sup>68</sup>

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<sup>65</sup>43 U.S.C. § 383.

<sup>66</sup>43 U.S.C. § 372. For background, see Frank J. Trelease, “*Arizona v. California: Allocation of Water Resources to People, States and Nation*,” 163 Supreme Court Review 158, 193. “Thus the reclamation laws originally set up a dual control, a partnership between nation and state; the states had a voice in the projects that the national government had to respect. Section 8, viewed in the light of state appropriation procedures, deliberately subjected national policy to the possibility of state control and even of state veto. It was possible that some projects, or features of projects, could have been blocked by the states. But most federal projects have been eagerly sought by local interests.”

<sup>67</sup>43 U.S.C. § 390aa to zz-1.

<sup>68</sup>The first federal statute to grant preference in the distribution and use of a public resource was the Desert Land Act of 1877, 43 U.S.C. § 321-323, 19 Stat. 377. The Act provided that surplus reclamation water on public lands should be held for public use, irrigation, mining and manufacturing. The principle of public preference was first applied to the sale of electricity from federal dams in the Boulder Canyon Project Act of 1928, and expanded during the New

Three power marketing agencies own extensive high-voltage transmission lines and related infrastructure—the exception is the Southeastern Power Administration in Georgia. **Table 11** contains basic facts about the four federal power marketing agencies. “MW” refers to megawatts of capacity. “MWh” refers to “megawatt hours” (actual energy sold in 2005, both firm and non-firm). Revenues include monies received from all services, including transmission.

**TABLE 11.** Federal power marketing agencies, basic facts (2005).

<b>Agency</b>	<b>MW (Dams Only)</b>	<b>MWh Sold* (Millions)</b>	<b>Revenues (Millions)</b>
Bonneville	20,445**	86.9	\$3,400
Western	10,261	39.6	833
Southeastern	3,412	8.9	223
Southwestern	2,053	3.7	91
<b>TOTAL</b>	<b>36,171</b>	<b>139.1</b>	<b>\$4,547</b>

\* A million megawatt hours are equivalent to a billion kilowatt hours.

\*\* The Bonneville Power Administration also markets power from one nuclear power plant in Washington and other firm contracts and resources not included in the above number.

#### **4.2.1 The Bonneville Power Administration**

The Bonneville Power Administration (“BPA”), headquartered in Portland, Oregon, is the marketing agency for federal dams on the Columbia River and its tributaries in the Pacific Northwest. BPA’s service territory (300,000 square miles) includes parts of eight states and is somewhat larger than the Columbia River Basin (259,000 square miles). [www.bpa.gov](http://www.bpa.gov)

In alphabetical order, the states served in part by BPA are: California, Idaho, Nevada, Montana, Oregon, Washington, Wyoming and Utah. The core states in BPA’s service territory—where most of the power is sold and delivered—are Washington, Oregon, Idaho and Montana (west of the continental divide). Only a small portion of the other states are in BPA’s territory.

BPA was created in 1937 under the Bonneville Project Act.<sup>69</sup> BPA owns 15,340 miles of high-voltage transmission lines. BPA supplies power to utilities that serve about 12 million people.

#### **4.2.2 The Western Area Power Administration**

The Western Area Power Administration (“Western”), headquartered in Lakewood, Colorado, was created in 1977, when Congress established the Department of Energy. The agency is the marketing agency for federal dams in the rest of the West, including those on the Arkansas, Colorado, Missouri and Rio Grande rivers.

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Deal to other projects. See, for example, the preference clause in the Tennessee Valley Authority Act (1933), 16 U.S.C. § 831 et seq.; the Bonneville Project Act (1937), 16 U.S.C. § 832 et seq.; and the Fort Peck Project Act (1938), 16 U.S.C. § 833 et seq.

<sup>69</sup>16 U.S.C. § 832 et seq.

Western's service territory includes parts of 15 states (in alphabetical order): Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Texas, Utah, and Wyoming. [www.wapa.gov](http://www.wapa.gov) Western supplies power to utilities that serve about 36 million people.

To spread the benefits of low-cost federal power, Western recently reallocated a portion of its supply to new preference customers and Native American Tribes.

#### **4.2.3 The Southwestern Power Administration**

The Southwestern Power Administration ("Southwestern"), headquartered in Tulsa, Oklahoma, is the marketing agency for 26 Corps of Engineers dams in the south-central United States. Southwestern's service territory includes parts of six states (in alphabetical order): Arkansas, Kansas, Louisiana, Missouri, Oklahoma and Texas. Southwestern supplies power to utilities that serve 7 million people. [www.swpa.gov](http://www.swpa.gov)

#### **4.2.4 The Southeastern Power Administration**

The Southeastern Power Administration ("Southeastern"), headquartered in Elberton, Georgia, is the marketing agency for Corps of Engineers dams in the South. Southeastern's service territory includes parts of 11 states (in alphabetical order): Alabama, Florida, Georgia, Illinois, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. Southeastern supplies power to utilities that serve 13 million people. [www.sepa.doe.gov](http://www.sepa.doe.gov)

### **4.3 FISH AND WILDLIFE AGENCIES**

Two federal agencies play an important role in the preservation and restoration of river fish and wildlife species under the Endangered Species Act (ESA): the United States Fish and Wildlife Service ("USFWS") and the National Oceanic and Atmospheric Fisheries Agency ("NOAA Fisheries").

The ESA establishes a national program for the conservation and restoration of endangered fish, wildlife, plants and habitat.<sup>70</sup> Section 2 directs all federal agencies to conserve endangered species.<sup>71</sup> The Act authorizes the Secretary of the Interior to "list" animal and plant species that are threatened or endangered<sup>72</sup> and designate critical habitat for those species.<sup>73</sup> Once a species is listed, two provisions become particularly important. Section 9 of the Act provides that no person may "take," meaning to kill, collect or harm a listed species,<sup>74</sup> except as authorized under the Act.<sup>75</sup> In addition, Section 7 requires that all federal agencies insure that "any action

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<sup>70</sup>16 U.S.C. § 1531 et seq.

<sup>71</sup>16 U.S.C. § 1531.

<sup>72</sup>16 U.S.C. § 1533.

<sup>73</sup>16 U.S.C. § 1533(a)(3).

<sup>74</sup>16 U.S.C. § 1532 (19).

<sup>75</sup>16 U.S.C. § 1538.

authorized, funded, or carried out...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species.”<sup>76</sup>

If a proposed action may affect a listed species, the lead federal agency must consult with the USFWS or NOAA Fisheries. If the USFWS or NOAA Fisheries concludes that the proposed action would jeopardize a listed species or adversely modify critical habitat, then USFWS or NOAA Fisheries must suggest “reasonable and prudent” alternatives that can be taken by the lead federal agency in implementing its proposed action.<sup>77</sup> The ESA has directly affected operations on many rivers around the country.<sup>78</sup>

#### **4.3.1 The National Oceanic and Atmospheric Agency Fisheries Service**

The National Oceanic and Atmospheric Agency Fisheries Service has jurisdiction under the ESA over salmon, steelhead and other anadromous fish that spawn in fresh water but migrate to sea for most or all of their adult lives.<sup>79</sup> NOAA Fisheries Service is part of the U.S. Department of Commerce. [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov)

#### **4.3.2 The U.S. Fish and Wildlife Service**

The U.S. Fish and Wildlife Service performs the same role under the ESA for birds and non-ocean migrating fish. The USFWS is part of the U.S. Department of the Interior. [www.fws.gov](http://www.fws.gov)

### **4.4 THE FEDERAL ENERGY REGULATORY COMMISSION**

The Federal Energy Regulatory Commission (“FERC”) is the chief federal regulatory agency for licensing *non-federal dams* on navigable rivers. FERC typically issues a license for up to 50 years. FERC, however, does not license the construction and operation of federal dams.<sup>80</sup> There are more than 1,000 FERC-licensed dams in existence today.

FERC was created in 1977 and is part of the U.S. Department of Energy. The president appoints the five FERC commissioners. The agency was known as the Federal Power Commission between 1920 and 1977. [www.ferc.gov](http://www.ferc.gov) FERC also approves the power and transmission rates of the federal power marketing agencies.

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<sup>76</sup>16 U.S.C. § 1536.

<sup>77</sup>16 U.S.C. 1536(b)(3)(A).

<sup>78</sup>See, e.g. *Tennessee Valley Authority v. Hill*, 437 U.S. 153 (1978)(enjoining completion of Tellico Dam because of its impacts to the protected snail darter).

<sup>79</sup>NOAA Fisheries Service was formerly called the National Marine Fisheries Service (“NMFS”).

<sup>80</sup>It is up to Congress to approve the construction of a federal dam (and appropriate the funds).

## 5.0 THE COLUMBIA RIVER

### 5.1 INTRODUCTION

Captain Robert Gray, a Boston trader and the first American to circumnavigate the globe, entered the estuary of the Columbia River in 1792 and named it after his ship, *Columbia Rediviva*. The lower river was first explored by Lewis and Clark between 1805-1806.

A British fur trader, David Thompson, was the first European to navigate from source to mouth. In 1846, the United States and Great Britain signed the Oregon Treaty, making the 49th parallel the boundary line between the two nations and thereby dividing the waters of the Columbia River: the northern third remained under British control.

The river that Gray named after his ship begins in the western slopes of the Rocky Mountains in British Columbia, Canada, and enters the United States in a remote part of Washington. From there, it flows in a southerly and somewhat circuitous path until it is joined by the Snake River. The river then heads west, forming the boundary between Oregon and Washington.

Of all the rivers in the continental United States, only the Mississippi River carries more water. In its natural conditions, prior to the mid-1800s, the Columbia River sustained one of the world's largest salmon and steelhead populations: between 10-16 million fish migrated up stream each year.<sup>81</sup>



**FIGURE 2.** Columbia River Gorge, Oregon.

[Source: Wikipedia, [http://en.wikipedia.org/wiki/Columbia\\_River](http://en.wikipedia.org/wiki/Columbia_River)]

The Columbia River drains a 259,000 square-mile basin that includes portions of seven states (Oregon, Washington, Idaho, Montana, Nevada, Wyoming, and Utah) and one Canadian province. The river travels more than 1,410 miles before emptying into the Pacific Ocean between Oregon and Washington.

<sup>81</sup>Source: Northwest Power and Conservation Council, 1987. See Appendix D of the Columbia River Basin Fish and Wildlife Program, "Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin," Portland, Oregon.



**FIGURE 3.** The Columbia River Basin, showing major dams and tributaries.

[Source: Wikipedia, [http://en.wikipedia.org/wiki/Columbia\\_River](http://en.wikipedia.org/wiki/Columbia_River)]

There are several major tributaries along the Columbia River including: the Clark Fork/Pend Oreille rivers; the Cowlitz; the Deschutes; the Okanogan; the John Day; the Lewis; the Snake; the Spokane; the Walla Walla; the Willamette; and the Yakima—all within the United States; and the Kootenay—in both the United States and Canada. The largest of these, the Snake River, begins in the Grand Teton Mountains in Wyoming and flows 1,036 miles until it reaches the Columbia River near the Tri-Cities (Kennewick, Pasco, and Richland) in southeast Washington.

Flows in the Columbia River average between 192-198 MAF per year at the mouth. Between 5-10% of the water in the river has been diverted along the way, most of it for agricultural irrigation.<sup>82</sup> A network of dams provides a total of nearly 60 MAF of storage in both the United States and Canada.<sup>83</sup>

<sup>82</sup>The heavy tidal influence at the mouth of the Columbia River makes it difficult to establish a precise amount.

<sup>83</sup>The Columbia River, despite the number and size of dams, has comparatively little storage capacity when compared with its annual flows. The river can store about 40% of annual runoff (as measured at The Dalles Dam,

## 5.2 USES OF THE COLUMBIA RIVER

The Columbia River serves many uses including hydropower generation; navigation; water supply for irrigation; flood control; recreation; and fish and wildlife habitat. Each of these is discussed briefly below.

### 5.2.1 Hydropower

In the late 1920s, the U.S. Army Corps of Engineers (“Corps of Engineers”) concluded that the Columbia contained 40% of the hydroelectric capacity in the continental United States. Major dam



**FIGURE 4.** Aerial view of Grand Coulee Dam on the Columbia River, Washington. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Grand\\_Coulee\\_Dam](http://en.wikipedia.org/wiki/Grand_Coulee_Dam)]

construction did not begin until the Roosevelt Administration undertook to implement the Corps of Engineers’ recommendations in 1933, at the start of the New Deal. The last major dam constructed on the Columbia and its tributaries was finished in 1975.

The Columbia now generates more electricity than any other river in the United States, having a total generating capacity of 31,656 MW.<sup>84</sup> The Corps of Engineers and the U.S. Bureau of Reclamation (“the Bureau”) collectively own a network of major dams on the Columbia River and its tributaries. Grand Coulee is the farthest upstream dam. Bonneville Dam, 40 miles east of Portland, Oregon, is the closest to the river’s mouth. The network is known as the “Federal Columbia River Power System.”

The Bonneville Power Administration, a federal power marketing agency, owns three-quarters of the high-voltage transmission grid in the Pacific Northwest: about 15,300 miles of lines that deliver electricity from the Federal Columbia River Power System and other sources to utility customers. BPA’s service territory – for purposes of distributing power – includes the entire Pacific Northwest.

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which straddles the river between Washington and Oregon). Contrast that figure with the Colorado River, where federal dams allow for four years’ worth of average annual flows.

<sup>84</sup>The generating capacity of the federal dams in the Columbia River Basin is 20,445 MW; non-federal dams in excess of 100 MW capacity, 6,483 MW; private dams in excess of 100 MW capacity, 2,807 MW; and those in Canada, 1,921 MW. See **Appendix B** for details.

The Columbia River's heaviest runoff and greatest hydroelectric potential occur in spring and summer – the period of lowest power use in the Pacific Northwest. As a result, the federal government has built large transmission lines, called the Pacific Northwest-Pacific Southwest Intertie, to California and the desert Southwest to sell surplus power, and to receive power during winter when the existing power system in the Pacific Northwest cannot meet demand.

The extensive federal transmission infrastructure allows BPA to sell power to utilities that supply most of the Pacific Northwest (population: 12 million).

### **5.2.2 Navigation**

The Columbia River is also used for navigation. A deep channel allows ocean-going vessels to travel upstream to Portland, Oregon, and Vancouver, Washington. A shallow channel allows barges to travel upstream to Lewiston, Idaho.

The Corps of Engineers owns eight navigation locks on the lower Columbia and the Snake River. The federal dams with locks on the lower Columbia River are: Bonneville; The Dalles; John Day; and McNary. The dams on the Snake River are: Ice Harbor; Lower Monumental; Little Goose; and Lower Granite. The locks allow ships and barges to travel upstream to the Tri-Cities area in Washington, and about 460 miles to Lewiston, Idaho. About 37% of all U.S. wheat exports are shipped on the Columbia River.

### **5.2.3 Water Supply**

There is a total of approximately 59.7 MAF of reservoir storage in the Columbia River Basin: 31.2 MAF in the United States; and 28.5 MAF in Canada.<sup>85</sup> The main stem of the Columbia River flows through few cities of any size. There is no central repository for information regarding diversions for municipal water supply. Best estimate: about 300,000 people depend on the river in the United States directly for water.

Waters of the Columbia River are also put to beneficial use for irrigation. The federal infrastructure owned by the Bureau of Reclamation irrigates about 2.2 million acres in the Pacific Northwest. The Bureau's projects include:

#### **The Columbia Basin Project**

The Columbia Basin Project consists of reservoirs and canals that irrigate 671,000 acres in eastern Washington. Water comes from Franklin Roosevelt Lake, the reservoir at Grand Coulee Dam.

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<sup>85</sup>Of the 31.2 MAF of reservoir storage in the United States, 22.2 MAF is held in federal reservoirs; 3.5 MAF is held in non-federal (other governmental) reservoirs; and 5.5 MAF is held in privately-owned reservoirs. See **Appendix B** for details.

### **The Yakima Project**

The Yakima Project consists of dams and canals on the Yakima River in eastern Washington. This project irrigates 464,000 acres. Kachess and Keecheless Dams are the heart of the project.

### **The Palisades Project**

The Palisades Project on the upper Snake River irrigates about 650,000 acres in eastern Idaho and parts of Wyoming. Palisades Dam is the centerpiece of the project.

### **The Boise Project**

The Boise Project in Idaho consists of a network of dams and canals that irrigates about 400,000 acres in the southwestern part of the state and in eastern Oregon. Anderson Ranch on the Boise River (South Fork) is the largest structure.

## **5.2.4 Flood Control**

The Columbia has the potential to flood – and did cause significant flooding, for example, in western Oregon in 1948. The Corps of Engineers relies primarily on the upstream operation of Mica Dam in Canada (owned by B.C. Hydro) and three upstream dams in the United States for flood control (Grand Coulee in Washington, Libby in Montana and Albeni Falls in Idaho). With few exceptions, there is no major federal infrastructure (i.e., levees, dikes, floodways, etc.) currently in place on the main stem of the Columbia River to control floods.

## **5.2.5 Other Uses**

Other uses of the Columbia River include: recreation (i.e., fishing, boating, wind surfing, etc.) and the preservation of habitat (fish and wildlife). For details on efforts to restore fish habitat, see discussion of environmental issues at section 5.5.3.

## **5.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Columbia River Basin are:

1. The Treaty Between the United States and Great Britain In Regard to Limits Westward of the Rocky Mountains of 1846 (“the Oregon Treaty”), 9 Stat. 869, established the 49th parallel as the border between the British and American sections of what was called the “Oregon Country.” Both countries had jointly occupied the area since the Anglo-American Convention of 1818. The effect of the Treaty was to divide the Columbia River: the headwaters and roughly 400 miles remained in Canada; the remaining 800 miles were in the United States.
2. In the 1850s, the U.S. government signed treaties with Native American Tribes in the Columbia River Basin, commonly known as the “Stevens Treaties” after Isaac I. Stevens, the Superintendent of Indian Affairs for the Washington Territory. See,

- for example, the treaty with the Yakima Nation, 12 Stat. 25 (1855), and the Treaty of Medicine Creek, 10 Stat. 1132 (1854).
3. In 1902, Congress authorized the Bureau of Reclamation to build the first federal irrigation projects in the Columbia River Basin: Black Canyon, Boise Ranch, Minidoka, and Anderson Ranch, all in the Snake River Basin in Idaho. Pub. L. No. 57-161, 32 Stat. 388.
  4. In 1905, the U.S. Supreme Court held that the 1859 treaty between the federal government and the Yakima Indians in Washington expressly reserved their rights to take fish from the Columbia River at the “usual and accustomed places in common with citizens of the [Washington] territory.” *United States v. Winans*, 198 U.S. 371 (1905).
  5. In 1909, the United States and Canada signed the Boundary Waters Treaty, 36 Stat. 2448, which created the International Joint Commission (“IJC”) to prevent and resolve border disputes. The IJC also has a significant role in the Great Lakes – St. Lawrence River Basin.
  6. In 1918, Congress consented to the Columbia River Compact, Pub. L. No. 65-123, 40 Stat. 515, which granted Washington and Oregon concurrent jurisdiction over the lower Columbia River (where it serves as the boundary between both states). The Compact required that all state laws and regulations for the protection and preservation of fish be enacted or amended with the mutual approval of both states.
  7. In 1925, Congress consented to the states of Washington, Oregon, Idaho and Montana negotiating and entering into a water allocation compact not later than January 1, 1927, to equitably apportion the Columbia River and its tributaries. The 1927 deadline was subsequently extended but a compact was not adopted. 43 Stat. 1268.
  8. In 1927, Congress authorized the Corps of Engineers to examine the potential of building a network of dams on the Columbia River for power, irrigation and flood control. Pub. L. No. 69-560, 44 Stat. 1010. A report, which called for the construction of 10 dams on the main stem of the river, was submitted in 1932 to the Hoover Administration, but it declined to act.
  9. In 1933, Congress authorized the first federal dam, Bonneville, on the main stem of the Columbia River, Pub. L. No. 73-67, 48 Stat. 195. The dam was built 40 miles east of Portland, Oregon.
  10. In 1935, Congress enacted the Rivers and Harbors Act, Pub. Law No. 74-409, 49 Stat. 1028, 1039-1040, which authorized the Bureau of Reclamation to complete Grand Coulee Dam in Washington. The Roosevelt Administration had previously funded preliminary work pursuant to the National Industrial Recovery Act of June 16, 1933.

The U.S. Supreme Court's opinion in *Arizona v. United States*, 295 U.S. 174 (1935) (federal agency could not build a dam across a navigable waterway without express statutory authorization), forced the Roosevelt Administration to obtain the needed Congressional approval before proceeding with Grand Coulee Dam. The Rivers and Harbors Act of 1935 gave the Administration the necessary authority to go ahead.

11. In 1936, the U.S. Supreme Court denied Washington's attempt to restrain Oregon from diverting waters in the Walla Walla River, a tributary to the Columbia. The Court said the river was not navigable, and Washington had failed to meet the burden of proof necessary to show wrongdoing on Oregon's part. *Washington v. Oregon*, 297 U.S. 517 (1936).
12. In 1937, Congress enacted the Bonneville Project Act, 16 U.S.C. § 832 et seq., which established the Bonneville Power Administration to sell electricity from Bonneville Dam, then nearing completion.

Prior statutes had authorized the Corps of Engineers and the Bureau of Reclamation to build dams on the Columbia River, but they had not addressed who would get priority to federal power or how it would be delivered. The Act established BPA as an interim agency to market electricity.

The Bonneville Project Act provided that public bodies and cooperatives would receive "preference and priority" to federal power. Although BPA did not – and does not to this day – own the dams, it has the responsibility to deliver power to utilities and other customers, and to build transmission lines to assure the "widespread use" of electricity in the region.

13. In 1938, Congress enacted the Preservation of Fishery Resources Act (the "Mitchell Act"), 16 U.S.C. § 755 et seq., to fund hatcheries and other improvements (e.g., fish ladders) on the Columbia River and other rivers.
14. In 1943, Congress enacted the Columbia Basin Project Act, 16 U.S.C. § 835. The Act placed Grand Coulee Dam under the Reclamation Project of 1939, setting the stage for the construction of the major infrastructure needed to irrigate up to 500,000 acres in eastern Washington.
15. In 1943, the federal government acquired a large tract of land in southeast Washington bordering the Columbia River at Hanford to produce plutonium for nuclear weapons. The "Manhattan Project" – so named because the secret funding was contained in the Corps of Engineers' budget for the Manhattan (New York) District – produced plutonium for the bomb dropped in 1945 on Nagasaki, Japan.
16. In 1944, Congress enacted the Flood Control Act, 16 U.S.C. § 825s, which required that electricity generated at the Corps of Engineers' dams would be transmitted and disposed of "in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles." The Act also stated that the federal government would give

preference in the sale of power to public bodies and cooperatives. See, also, Bonneville Project Act of 1937, 16 U.S.C. § 832c.

17. In 1950, Congress consented to the Snake River Compact, Pub. L. No. 81-464, 64 Stat. 29, which apportioned waters in the upper Snake River between its headwaters in the Grand Teton Mountains of Wyoming and the downstream border with Idaho, a distance of 70 miles. Idaho received 96% of the allocation.
18. In 1952, Congress consented to Washington, Oregon, Idaho, Montana and Wyoming negotiating and entering into a Columbia Interstate Compact, a proposed water allocation compact for the Columbia River Basin. Pub. L. No. 82-572, 66 Stat. 737. (See entry for 1925 – the first such authorization granted by Congress.) Then, in 1954, Congress authorized Nevada and Utah to join the effort. Pub. L. No. 83-484, 68 Stat. 468. Washington and Oregon declined to ratify the compact, though several states ratified the agreement and it remains on the books in places. E.g., in Nevada, see NRS 538.530 et seq.
19. The U.S.-Canada Treaty of 1961 (“Columbia River Treaty”)(ratified in 1964) provided for the construction of four dams (three in Canada, one in Montana) for hydropower, storage and flood control. 15 UST 1555, T.I.A.S 5638. The International Joint Commission helped develop the Treaty principles, but the treaty itself was negotiated in large part by the province of British Columbia, the Canadian federal government and the United States.

The effect of the Treaty was to double the amount of the storage available on the Columbia River. Under the Treaty, Canada sold its share of the “downstream benefits” (i.e., increased power production) from its dams to U.S. utilities. Forty-one utilities bought rights to Canada’s share of this power for 30 years. Canada has since requested that the utilities return the power.

The Treaty assumed the coordinated operations of dams in the United States and led to the adoption of the Pacific Northwest Coordination Agreement (“PNCA”), one of the most important agreements on the Columbia River.

The Treaty did not apportion waters, except that it allowed Canada to use water from the Kootenay River (a tributary). The Treaty prevented future diversions by Canada, except for “consumptive” uses and by mutual accord.

20. In 1964, Congress enacted the Pacific Northwest Consumer Power Preference Act (“Preference Act”), 16 U.S.C. § 837, which gave the Pacific Northwest – as a region – the first rights to power from the federal dams on the river. The Act defined “surplus energy,” limited the length of power contracts to entities outside of the region, and authorized construction of the Pacific Northwest-Pacific Southwest Intertie (high-voltage transmission lines) to move power between the Columbia River dams and California and the Desert Southwest.
21. In 1966, Congress enacted the Grand Coulee Third Power Plant Authorization, Pub. L. No. 89-448, 80 Stat. 2000, as amended by Pub. Law 89-561, 80 Stat. 714

- (1966), which allowed the Bureau of Reclamation to add 1,800 MW of capacity to the dam. Grand Coulee can now produce more electricity than any dam in the United States.
22. In 1970, Congress consented to the Pacific Marine Fisheries Compact, Pub. L. No. 91-315, 84 Stat. 415, which sought to promote and protect anadromous fisheries between Alaska, California, Idaho, Oregon and Washington. The Compact created the Pacific Marine Fisheries Commission, which serves as a forum for discussion and attempts to achieve consensus among the states. The Commission does not have regulatory or management authority.
  23. In 1974, Congress enacted the Federal Columbia River Transmission System Act, 16 U.S.C. § 838 et seq., which expanded BPA's authority to build and own high-voltage transmission lines. The Act made BPA into a "self-financing" agency, dependent on revenue from the sale of power and transmission services, not annual appropriations from Congress.
  24. In 1976, Congress enacted the Magnuson-Stevens Fishery Conservation and Management Act (commonly called the "Magnuson-Stevens Act"), 16 U.S.C. § 1801 et seq., which addressed marine fisheries in the United States (between 3-200 miles off the coast). The Act created regional fishery management councils, including one in the Pacific Northwest, to establish quotas on commercial harvest and engage in research. The Pacific Fishery Management Council addresses issues on the West Coast.
  25. In 1980, Congress enacted the Pacific Northwest Electric Power Planning and Conservation Act ("Northwest Power Act"), 16 U.S.C. § 839 et seq. The Act had three key provisions: 1) it authorized BPA to acquire electricity from non-federal power plants, and expanded its responsibility in the area of energy conservation; 2) it created the Pacific Northwest Electric Power Planning and Conservation Council (commonly called the "Northwest Power and Conservation Council") to produce a regional energy plan with priorities on energy conservation and develop a basin-wide fish and wildlife mitigation program; and 3) it created a public process at the Council to involve and educate the public about regional energy issues.

The Northwest Power and Conservation Council is an interstate compact agency whose eight members are appointed (two each) by the governors of the four Pacific Northwest states (Washington, Oregon, Idaho and Montana).

The Northwest Power Act preserved "preference and priority" for public agencies and cooperatives (see entry in 1937), but also required BPA to sign initial 20-year contracts with the Direct Service Industries ("DSIs") (primarily aluminum companies). Those contracts expired in 2001.

The Act also created the "Residential Exchange Program" for utilities (primarily but not exclusively investor-owned utilities) to obtain low-cost federal power from BPA for their residential and small-farm customers. The Residential

- Exchange is a paper transaction in which the utilities “sell” high-cost power at their average system cost and “buy” cheaper federal power. The program was intended to reduce wholesale rate disparities in the region.
26. In 1980, the U.S. Supreme Court rejected Idaho’s demands that it have a say in the allocation decisions on commercial salmon fisheries made by Washington and Oregon, pursuant to the Columbia River Compact of 1918. Idaho argued that as an upstream beneficiary, it had a right to an apportionment of fish. *Idaho ex rel. Evans v. Washington and Oregon*, 444 U.S. 380 (1980). The apportionment, as Idaho requested, was improper unless Idaho could demonstrate a concrete injury. In 1983, the Court concluded that Idaho had failed to show injury and denied its apportionment request. 462 U.S. 1017 (1983).
  27. In 1984, the U.S. Supreme Court held that BPA had broad discretion to allocate power from the federal power system on the Columbia River. *Aluminum Company of America v. Central Lincoln Peoples’ Utility District*, 467 U.S. 380 (1984). The Court said it would defer to BPA’s interpretation of the Northwest Power Act of 1980 because BPA had helped write the legislation and the matter being challenged (i.e., the level of service to the Direct Service Industries) was technical in nature.
  28. The Non-Treaty Storage Agreement of 1984 allowed British Columbia Hydro and Power Authority (“B.C. Hydro”) and BPA to coordinate the flow of water from Mica Dam in British Columbia, the largest storage dam on the Columbia. The Agreement, signed initially for a 10-year period, has been extended.
  29. The Pacific Salmon Treaty of 1985, signed between the United States and Canada, sought to preserve salmon runs in both countries by creating a Pacific Salmon Commission to manage ocean harvest (beyond the 200-mile limit of each country).
  30. In 1986, Congress prohibited a federal agency from studying the transfer of water out of the Columbia River Basin to another river basin, unless approved by the governors of the affected states. See 33 U.S.C. § 2265, part of the Water Resources Development Act. The restriction was sponsored by Sen. Henry M. Jackson (D-WA).
  31. In 1986, the U.S. Court of Appeals for the Ninth Circuit upheld the constitutionality of the Northwest Power and Conservation Council, and rejected the contention that the Council members were federal officers within the meaning of the Appointments Clause (and could only be named by the President, not the governors). *Seattle Master Builders, v. Pacific Northwest Electric Power*, 786 F.2d 1359 (9th Cir. 1986), *cert. denied*, 479 U.S. 1059 (1987). The court also rejected a challenge to the Council’s model conservation standards.
  32. In 1988, the Northwest Power and Conservation Council, pursuant to the Northwest Power Act of 1980, designated 44,000 miles of river and tributaries in

- the Columbia River Basin as “protected areas” for wildlife and habitat, where hydroelectric development was prohibited.
33. In 1989, the U.S. Department of Energy, the U.S. Environmental Protection Agency (“EPA”) and the Washington State Department of Ecology signed the “Tri-Party Agreement” to clean up the Hanford site (see entry for 1943). The Agreement outlined a 30-year clean-up schedule to bring Hanford into compliance with federal and state environmental laws.
  34. In 1994, Congress enacted the Confederated Tribes of the Colville Reservation Grand Coulee Dam Settlement Act, Pub. L. No. 103-436, 108 Stat. 4577, which compensated the Colville Nation in Washington for the taking of property and inundation of fishing grounds caused by the construction of Grand Coulee Dam in the 1930s, almost 60 years earlier. The Act settled a claim pending in the U.S. Court of Federal Claims. The settlement required BPA to pay \$53 million to the Tribes.
  35. In 1997, a federal appeals court upheld BPA’s five-year contracts with the Direct Service Industries (aluminum companies) and said it deferred to BPA’s expertise and its Congressional mandate to operate as a business. *Ass’n. of Public Agency Customers v. Bonneville Power*, 126 F.3d 1158 (9th Cir. 1997).
  36. In 1998, BPA issued a Record of Decision for its proposed Power Subscription Strategy that would guide it in signing new power sales contracts. In addition to supplying preference customers, the Strategy called for BPA to sell 1,900 aMW to investor-owned utilities (“private power”) and 1,500 aMW to the Direct Service Industries (primarily aluminum companies). In 2000, BPA signed the contracts, which expire in 2011.
  37. In 2005, a federal district court judge in Portland, Oregon, ordered NOAA Fisheries to prepare a new Biological Opinion (“BiOp”) addressing the river operations of the Corps of Engineers and Bureau of Reclamation (the “action agencies”). The judge found that NOAA Fisheries had violated Section 7 of the Endangered Species Act, 16 U.S.C. 1536(a)(2), by inadequately considering the impacts of federal dams on wild salmon populations. His decision was upheld, *National Wildlife Fed. v. Nat’l Marine Fish. Serv.*, 422 F.3d 782 (9th Cir. 2005).
  38. Authorizing statutes for each of the federal dams on the Columbia and its tributaries are listed below. The date in parenthesis is the date of Congressional authorization. In some cases, construction began years later. Source: BPA statute book, [www.bpa.gov](http://www.bpa.gov)
    - \* Black Canyon, Pub. L. No. 57-161, 32 Stat. 388 (1902).
    - \* Boise River, Pub. L. No. 57-161, 32 Stat. 388 (1902).
    - \* Minidoka, Pub. L. No. 57-161, 32 Stat. 388 (1902), and Pub. L. No. 61-289, 36 Stat. 836 (1910).

- \* Anderson Ranch, Pub. L. No. 57-161, 32 Stat. 388 (1902).
- \* Bonneville, Pub. L. No. 73-67, 48 Stat. 195 (1933).
- \* Grand Coulee, 16 U.S.C. 835. Pub. L. 74-409, 49 Stat. 1028, 1040 (1935).
- \* Big Cliff, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938).
- \* Detroit, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938).
- \* Cougar, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938).
- \* Green Peter, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938).
- \* Foster, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938).
- \* Lookout Point, Pub. L. No. 75-761, 52 Stat. 1215, 1222, and Pub. L. No. 81-516, 64 Stat. 163, 179 (1950).
- \* Dexter, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938), and Pub. L. No. 81-516, 64 Stat. 163, 179 (1950).
- \* Hills Creek, Pub. L. No. 75-761, 52 Stat. 1215, 1222 (1938), and Pub. L. No. 81-516, 64 Stat. 163, 179 (1950).
- \* Hungry Horse, 43 U.S.C. § 593a, Pub. L. No. 76-260, 53 Stat. 1187 (1939), and Pub. L. No. 78-329, 58 Stat. 270, 271 (1943).
- \* Palisades, Pub. L. No. 76-260, 53 Stat. 1187 (1939), and Pub. L. No. 81-864, 64 Stat. 1083 (1950).
- \* Roza, President Roosevelt pursuant to Pub. L. No. 61-289, 36 Stat. 835, and Pub. L. No. 68-292, 43 Stat. 672, 701 (1924).
- \* Ice Harbor, Pub. L. No. 79-14, 59 Stat. 10, 21 (1945).
- \* Lower Monumental, Pub. L. No. 79-14, 59 Stat. 10, 21 (1945). Pub. L. No. 79-14, 59 Stat. 10, 21 (1945).
- \* Little Goose, Pub. L. No. 79-14, 59 Stat. 10, 21 (1945).
- \* Lower Granite, Pub. L. No. 79-14, 59 Stat. 10, 21 (1945).
- \* McNary, Pub. L. No. 79-14, 59 Stat. 10, 21 (1945).
- \* Chief Joseph, Pub. L. No. 79-525, 60 Stat. 634, 637 (1946).
- \* Chandler, Pub. L. No. 80-629, 62 Stat. 382 (1948).
- \* Albeni Falls, Pub. L. No. 81-516, 64 Stat. 163, 178 (1950).
- \* John Day, Pub. L. No. 81-516, 64 Stat. 163, 179 (1950).
- \* The Dalles, Pub. L. No. 81-516, 64 Stat. 163, 179 (1950).
- \* Libby, Pub. L. No. 81-516, 64 Stat. 163, 179 (1950).
- \* Dworshak (formerly Bruces Eddy), Pub. L. No. 87-874, 76 Stat. 1173, 1193 (1962).

## **5.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The main stem of the Columbia River in the United States is managed by three federal agencies,<sup>86</sup> each having a different core mission:

- The Corps of Engineers manages the federal dams for flood control and navigation;
- The Bureau of Reclamation manages its dams and irrigation projects; and
- The Bonneville Power Administration sells and delivers electricity from both Corps of Engineers and Bureau dams.

Federal agency and utility managers report to their respective agencies. There is no single “river authority” that has enforcement duties. Over a period of two decades, starting in the 1930s and ending in the mid-1950s, Congress considered but never enacted a “Columbia River Authority,” similar to the Tennessee Valley Authority, with basin-wide authority over a wide variety of power and natural resource issues.

In addition, the U.S. National Oceanic and Atmospheric Association’s National Marine Fisheries Service and the U.S. Fish and Wildlife Service have specific obligations under the Endangered Species Act. They have formed a “Federal Caucus” along with land management and other agencies to coordinate and resolve ESA problems.

An entity called the “Regional Forum,” composed of federal and non-federal river managers, makes many of the operational decisions related to salmon and ESA-issues by consensus. Issues are first brought before a Technical Management Team (“TMT”). If no agreement is reached, the issue is presented to mid-level managers who comprise the Implementation Team. If no agreement is possible, the Executive Committee – composed of high-ranking officials from BPA, NOAA Fisheries, the Corps of Engineers, Bureau of Reclamation and USFWS, plus representatives from the four Pacific Northwest states and Native American Tribes – makes the decision. This committee-driven process has been used since 1996, the date of the first NOAA Fisheries’ Biological Opinion. [www.salmonrecovery.gov](http://www.salmonrecovery.gov)

### **5.4.1 Long-term Operational Strategy**

There is no long-term operating strategy for the Columbia River Basin, though there is a regional strategy for power planning but not for water supply and allocation problems. The Northwest Power and Conservation Council has the responsibility to establish a 20-year power plan, which is revised every five years, and to prepare a strategy for restoring fish and wildlife habitat. [www.nwcouncil.org](http://www.nwcouncil.org)

The Council’s power plan must give priority first to conservation; second to renewable resources; third to power plants using waste heat or resources of high fuel efficiency (i.e., combined-cycle gas turbines); and last, to all other plants. 16 U.S.C. § 839b(e)(1). The plan

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<sup>86</sup>There are five non-federal dams on the main stem of the Columbia River owned by three public utility districts. The Federal Energy Regulatory Commission (“FERC”) licenses those dams but does not manage their operation.

guides BPA, but the Council has no authority to mandate that local governments (i.e., public utility districts and municipalities) or independent power producers abide by its contents.

#### **5.4.2 Short-term Operational Strategy**

With respect to day-to-day operations, federal and utility managers rely on three key documents:

- The Pacific Northwest Coordination Agreement (“PNCA”). The PNCA coordinates real-time planning between the electric utilities and the federal government, as if the network of dams was owned by a single entity. The Northwest Power Pool in Portland, Oregon, implements the agreement.
- The Mid-Columbia Hourly Coordination Agreement for moment-by-moment coordination of seven dams on the main stem of the Columbia River in Washington. Two of dams are federal (Grand Coulee and Chief Joseph) and five are non-federal (Wells, Rock Island, Rocky Reach, Wanapum and Priest Rapids). The agreement allows for coordinated dispatch of the dams to reduce reservoir fluctuations and increase power production. The dams are dispatched from Grant County Public Utility District’s Ephrata office.
- The “Biological Opinions” prepared by NOAA Fisheries to preserve and restore threatened and endangered salmon runs.

#### **5.4.3 River Accounting Mechanisms**

Public documents from BPA and utilities typically disclose who received the benefits from the federal system and at what cost. In recent years, BPA has redacted data from power sales contracts, even with public agencies, and it is often difficult to tell who received surplus power at what price. But basic information about the amount sold is available in BPA annual reports and other documents. [www.bpa.gov](http://www.bpa.gov). There is no central repository for information about withdrawals for domestic water and irrigation, which remain a state issue.

#### **5.4.4 The Role of Interstate Compacts**

There are no water allocation compacts on the main stem of the Columbia River. In 1950, Idaho and Wyoming signed the Snake River Compact to apportion the headwaters of the Snake River, the Columbia’s largest tributary, but the compact addresses water apportionment in a small geographic area and has no significant effect on interstate downstream operations.

In addition, there are three interstate compacts that address the management of salmon and other anadromous fish. The Columbia River Compact of 1918 obligated Washington and Oregon to enact identical laws and regulations to preserve fish in the portion of the lower river that serves as the state boundary.

The Pacific Marine Fisheries Compact of 1970 sought to promote and protect anadromous fisheries between Washington, Oregon, Idaho, Alaska and California. The Compact created the Pacific States Marine Fisheries Commission, headquartered in Portland, Oregon, to facilitate cooperation between the states. The Commission does not have regulatory duties. [www.psmfc.org](http://www.psmfc.org)

Finally, the Northwest Power Act of 1980 created the Northwest Power and Conservation Council as an interstate compact agency. 16 U.S.C. § 839 et seq. The Council is composed of eight members – two appointed by each of the governors of Washington, Oregon, Idaho and Montana. The Council by statute addresses power and fish and wildlife issues in the Columbia River Basin, not state water rights or water allocation. The Council is located in Portland, Oregon. [www.nwcouncil.org](http://www.nwcouncil.org)

The Council must comply with statutory requirements to explain why it rejected program recommendations from tribes and state fish and wildlife agencies. and must give due weight to their recommendations. *N.W. Resource Info. Center v. N.W. Power Planning*, 35 F.3d 1371 (9th Cir. 1994).

But the Council has no authority to regulate or manage ocean harvest, which remain under the separate responsibilities of two entities: the Pacific Fishery Management Council, created by the Magnuson-Stevens Act of 1976, 16 U.S.C. 1801 et seq., which regulates harvest of salmon and other fish between 3-200 miles off the coast, and the Pacific Salmon Commission, created by the Pacific Salmon Treaty of 1985 (between the U.S. and Canada), which regulates ocean harvest beyond the 200-mile border.

Finally, it is important to note that the Council cannot order BPA to undertake a particular course of action. The Council can guide but not command federal river management. *N.W. Resource Info. Center v. N.W. Power Planning*, 35 F.3d at 1378-1379.

#### **5.4.5 International Treaties and Agreements**

The International Joint Commission, created by a 1909 treaty with Canada, attempts to prevent and resolve boundary disputes between the two nations. [www.ijc.org](http://www.ijc.org). The IJC played an important role in the drafting of the United States-Canada Treaty of 1961 (ratified in 1964). In addition, the IJC has adopted orders to main river levels on the Kootenay, Columbia and Okanagan Rivers that cross the border between the two countries.

The Pacific Salmon Commission, headquartered in Vancouver, British Columbia, monitors and regulates the ocean harvest of salmon. The Commission was created by the Pacific Salmon Treaty of 1985. [www.psc.org](http://www.psc.org)

#### **5.4.6 The Role of Native American Tribes**

Thirteen tribes – with a total population of 50,000 enrolled members – live in the Columbia River Basin. Many tribes have a treaty or other right (i.e., from a presidential Executive Order) to divert or use water out of the Columbia or its tributaries, or to fish from the river. In alphabetical order, the tribes are:

- Burns Paiute Tribe
- Coeur d’Alene Tribe
- Confederated Salish and Kootenai Tribes of the Flathead Reservation
- Confederated Tribes of the Colville Reservation

- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Indian Reservation
- Grande Ronde Tribe
- Kalispell Tribe of Indians
- Kootenai Tribe of Idaho
- The Nez Perce
- Shoshone-Bannock Tribes
- Shoshone-Paiute Tribes
- Spokane Tribe
- Yakima Nation<sup>87</sup>

Many tribes take an active role in Columbia River management issues. The Columbia River Inter-Tribal Fish Commission, founded in 1977 by the Yakama, Warm Springs, Umatilla, Nez Perce and other treaty Tribes, coordinates efforts to preserve fishing rights and salmon habitat on the Columbia River and tributaries. [www.critfc.org](http://www.critfc.org)

#### **5.4.7 The Role of Federal Courts**

A federal judge in Portland, Oregon, has assumed temporary, partial control over certain river operations. In 2005, a federal district court judge in Portland, Oregon, ordered NOAA Fisheries to prepare a new Biological Opinion addressing the river operations of the Corps of Engineers and Bureau of Reclamation (the “action agencies”). The judge found that NOAA Fisheries had violated Section 7 of the ESA, 16 U.S.C. 1536(a)(2), by inadequately considering the impacts of federal dams on wild salmon populations. *National Wildlife Fed. v. National Marine Fish. Serv.*, 422 F.3d 782 (9th Cir. 2005)

### **5.5 CURRENT ISSUES AND CONFLICTS ON THE COLUMBIA RIVER**

The Columbia River, despite its size, is constrained because of continuing pressure to manage the river to restore salmon runs, as well as to operate the river for fish, not power. In the last 15 years, federal regulations and mandates to enhance the migration of fish (upstream and downstream) have reduced the generation of Columbia River power by about 1,000 MW (roughly 12%).

Furthermore, population growth in the last 25 years, primarily in western Washington and Oregon, has exceeded the capacity of the federal power system. Electricity from the federal power system remains cheap compared with other sources, and there are unresolved issues of “who will get what” from the federal dams.

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<sup>87</sup>Originally spelled “Yakima,” but the Nation changed its name to “Yakama” in the mid-1990s.

### **5.5.1 Water Supply and Allocation**

Water withdrawals are controlled by state law. The issuance of new water rights from the Columbia River is contentious because of concerns that increased water consumption will impair efforts to provide more water for fish migration at certain critical times and places.

### **5.5.2 Power Supply and Allocation**

Federal power is allocated on the Columbia River by an administrative process. Congress delegated this responsibility to BPA, which last allocated electricity from the federal power system in 2000.

The current system of BPA power supply contracts and allocations expires in 2011. The existing Federal Columbia River Power System can probably meet the needs of BPA's public agency and rural electric cooperative customers until then.

In 2006, BPA proposed a new allocation method to take effect on October 1, 2011. See, [www.bpa.gov/pl/regionaldialogue/07-2006policy\\_proposal.pdf](http://www.bpa.gov/pl/regionaldialogue/07-2006policy_proposal.pdf)

### **5.5.3 Environmental Issues**

#### **Endangered Species Act Compliance**

Fish passage to Canada was initially blocked by Grand Coulee Dam, which was completed in 1941, and later by Chief Joseph Dam, 55 miles downstream of Grand Coulee, which remains impassable to this day. Other dams make passage upstream and/or downstream difficult for salmon on the Snake and lower Columbia.

Federal regulations and mandates to enhance the migration of fish (upstream and downstream) have reduced the generation of Columbia River power in the last 12 years by about 1,000 aMW (roughly 12%).

As of 2005, there were twelve ESA-listed fish stocks on the Columbia and tributaries, and one proposed listing, as shown in **Table 12**.

#### **Breaching Four Federal Dams**

Some environmental groups and tribes have advocated removing, or "breaching," four federal dams on the lower Snake River in Washington to facilitate salmon passage and help restore habitat. The goal is to return that part of the river to a more natural condition, as it was before the Corps of Engineers built the dams in the 1960s and 1970s.

Removing the dams would prevent navigation on that portion of the river and would prohibit barges and tow traffic from reaching Lewiston, Idaho. If successful, the dam removal would also have the effect of reducing BPA's annual available energy by 1,500 aMW. Congress has not appropriated funds for breaching the dams, which remains controversial in the Pacific Northwest.

**TABLE 12.** List of threatened, endangered, and proposed species on the Columbia River and its tributaries.

<b>Threatened</b>
<ul style="list-style-type: none"><li>- Columbia River Chum Salmon</li><li>- Lower Columbia River Chinook Salmon</li><li>- Lower Columbia River Steelhead</li><li>- Middle Columbia River Steelhead</li><li>- Snake River Steelhead</li><li>- Snake River Fall Chinook Salmon</li><li>- Snake River Spring/Summer Chinook Salmon</li><li>- Upper Willamette River Chinook Salmon</li><li>- Upper Willamette River Steelhead</li></ul>
<b>Endangered</b>
<ul style="list-style-type: none"><li>- Snake River Sockeye Salmon</li><li>- Upper Columbia River Steelhead</li><li>- Upper Columbia River Spring Chinook Salmon</li></ul>
<b>Proposed</b>
<ul style="list-style-type: none"><li>- Lower Columbia River Coho Salmon</li></ul>

### **Nuclear Waste**

The Columbia River flows past the Hanford Reservation in Washington, a large tract of federal property where the government built nuclear reactors during World War II as part of the Manhattan Project. After the end of the war, the U.S. Atomic Energy Commission built additional reactors at the site, and the government has stored large quantities of nuclear waste there. Some of the underground tanks have leaked. Cleanup costs run in the billions and will take decades, probably until 2030.

### **Industrial and Agricultural Pollution**

The Columbia River generally runs through remote areas. As a general rule, industrial pollution is not a critical issue, though there are some exceptions: 1) Near the city of Trail, British Columbia, Canada, where industrial pollutants have affected water quality on the main stem in both Canada and the United States; and 2) part of Coeur d'Alene River and Lake, where mining debris has contaminated water supplies. The owner of the Trail smelter, Teck Cominco, is liable under the U.S. Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") for downstream damages in the United States. See *Pakootas v. Teck Cominco*, 59 Env't Reporter Case 1870, 2004 WL 2578982 (E.D.Wa). Plaintiffs are members of the Colville Tribe.

## **5.6 CONFLICT RESOLUTION**

### **5.6.1 Congressional Allocation of Water or Power**

The last major federal legislation affecting the Columbia River was the Northwest Power Act of 1980, 16 U.S.C. § 839 et seq. The Act did not allocate water or power but instead gave the Bonneville Power Administration broad discretion to allocate power supplies.

### **5.6.2 Administrative Allocation of Water or Power**

BPA completed a comprehensive reallocation of power in 2000 and signed contracts with utility and industrial customers. BPA has no authority to allocate or re-allocate water rights, which remain a state issue. BPA, as noted above, has proposed a new method for allocating federal power starting on October 1, 2011. BPA said it intends to sign the new allocation contracts in 2008.

### **5.6.3 Judicial Allocation of Water or Power**

The U.S. Supreme Court has never apportioned water in the Columbia River. Only once has the Supreme Court ruled on power allocation issues in the region. See, *Aluminum Company of America v. Central Lincoln Peoples' Utility District*, 467 U.S. 380 (1984). The Court said it would defer to the Bonneville Power Administration's interpretation of the Northwest Power Act because BPA had helped write the legislation and the matter being challenged (i.e., the level of service to the Direct Service Industries) was technical in nature.

### **5.6.4 Arbitration or Mediation**

Arbitration or mediation is infrequently used as a conflict resolution tool in the Columbia River Basin. There is one recent exception: Congress in 2004 approved the Snake River Basin Adjudication ("SRBA"), the subject of a long mediation between Idaho, the Nez Perce Tribe and other parties.

### **5.6.5 Litigation**

#### **BPA Contracts and Rates**

Litigation in federal court is the most common mechanism for resolving conflicts under the Northwest Power Act and other federal statutes addressing the operation of the Columbia River.

Since 1980, the U.S. Court of Appeals for the Ninth Circuit ("Ninth Circuit") has issued 40 decisions on rates, power allocation issues and contracts. The Ninth Circuit, rather than federal district court, has exclusive jurisdiction over decisions made by BPA and the Northwest Power and Conservation Council. 16 U.S.C. § 839f(e)(5).

In most instances, the Ninth Circuit has deferred to BPA. See, for example, *Association of Public Agency Customers v. Bonneville Power*, 126 F.3d 1158, 1171 (9th Cir. 1997)(Because Congress gave the BPA Administrator the authority to run the agency like

a business, the court would defer to his decision). See also, *Portland General Electric Co. v. Johnson*, 754 F.2d 1475 (9th Cir. 1985)(BPA did not have to follow statutory ratemaking procedures in unusual circumstances).

### **Endangered Species Act**

Lawsuits challenging the federal salmon recovery plan for the Columbia River Basin and other actions under the Endangered Species Act are brought in federal district court. Extensive litigation has followed each prior Biological Opinion (“BiOP”) issued by the National Oceanic and Atmospheric Administration Fisheries.

The BiOp addresses, among other things, water flows for juvenile fish. In certain times of year, utilities are required to “spill” water (i.e., send it over the dam, not through the turbines). The federal agencies have a web site dedicated to Pacific Northwest salmon issues. [www.salmonrecovery.gov](http://www.salmonrecovery.gov)

In 2005, a federal district court judge in Portland, Oregon, ordered NOAA Fisheries to prepare a new BiOp to protect the downstream migration of juvenile salmon. Federal agencies are required to file quarterly reports with the judge. *National Wildlife Federation v. National Marine Fisheries Service et. al, affd.*, 422 F. 3d 782 (9<sup>th</sup> Cir. 2005).

## **5.6.6 Infrastructure Improvements and Environmental Restoration**

Since 1980, federal agencies have undertaken the most extensive salmon restoration program in the nation. About \$6.7 billion has been spent by 2005 on infrastructure improvements and lost revenue from power sales to aid the upstream and downstream passage of salmon in the Columbia River Basin. For details about existing programs, see the Northwest Power and Conservation Council web site. [www.nwcouncil.org](http://www.nwcouncil.org)

## **5.6.7 Interagency and Multi-Party Agreements**

There are two interagency and multi-party agreements that affect how the main stem of the Columbia River is managed.<sup>88</sup> A third agreement, the “Tri-Party Agreement,” addresses cleanup activities at the Hanford site in Washington.

### **The Pacific Northwest Coordination Agreement**

In 1997, BPA and major electric utilities (public and private) voluntarily agreed by contract to manage the flow of the river according to the revised terms and conditions of

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<sup>88</sup>There are additional agreements on tributaries. For example, utilities seeking to obtain a 50-year license renewal from the Federal Energy Regulatory Commission on dams on the Lewis River (a tributary of the Columbia River in Washington) reached an accord with environmental groups, Tribes and others. Unveiled in 2004, the agreement affects four dams on the Lewis River (Merwin, Yale, Swift No. 1 and 2, with a combined capacity of 570 MW) owned by PacifiCorp and Cowlitz County Public Utility District.

the Pacific Northwest Coordination Agreement (“PNCA”). The 1997 agreement replaced an earlier agreement adopted in 1963.

Although BPA and the utilities have their own “control areas,” where they manage the flow of power on a real-time basis, the signatories to the PNCA plan for and coordinate operations of their dams and other power plants to maximize efficiency. The Northwest Power Pool, established during World War II, manages the PNCA.

**The Hanford Reach Fall Chinook Protection Program**

The 2005 Hanford Reach Fall Chinook Protection Program regulates flow fluctuations in the 75-mile-long area below Priest Rapids Dam (Tri-Cities, Washington) to protect habitat where 100,000 fall Chinook salmon returned in 2003 to spawn. The area is the only place on the Columbia River in the United States that is still free-flowing. Grant County Public Utility District, BPA, NOAA Fisheries and other parties signed the agreement implementing the program, which replaced the Vernita Bar Agreement of 1988, which had specified certain flows at spawning season to protect young salmon.

**Hanford Cleanup – The “Tri-Party Agreement”**

In 1989, the U.S. Department of Energy, the U.S. Environmental Protection Agency and the Washington State Department of Ecology signed the “Tri-Party Agreement” to clean up the Hanford site in Washington, home to the nation’s largest repository of nuclear materials. The agreement is a binding document in which the parties acknowledge their responsibilities for certain actions. [www.hanford.gov](http://www.hanford.gov)

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## 6.0 THE COLORADO RIVER

### 6.1 INTRODUCTION

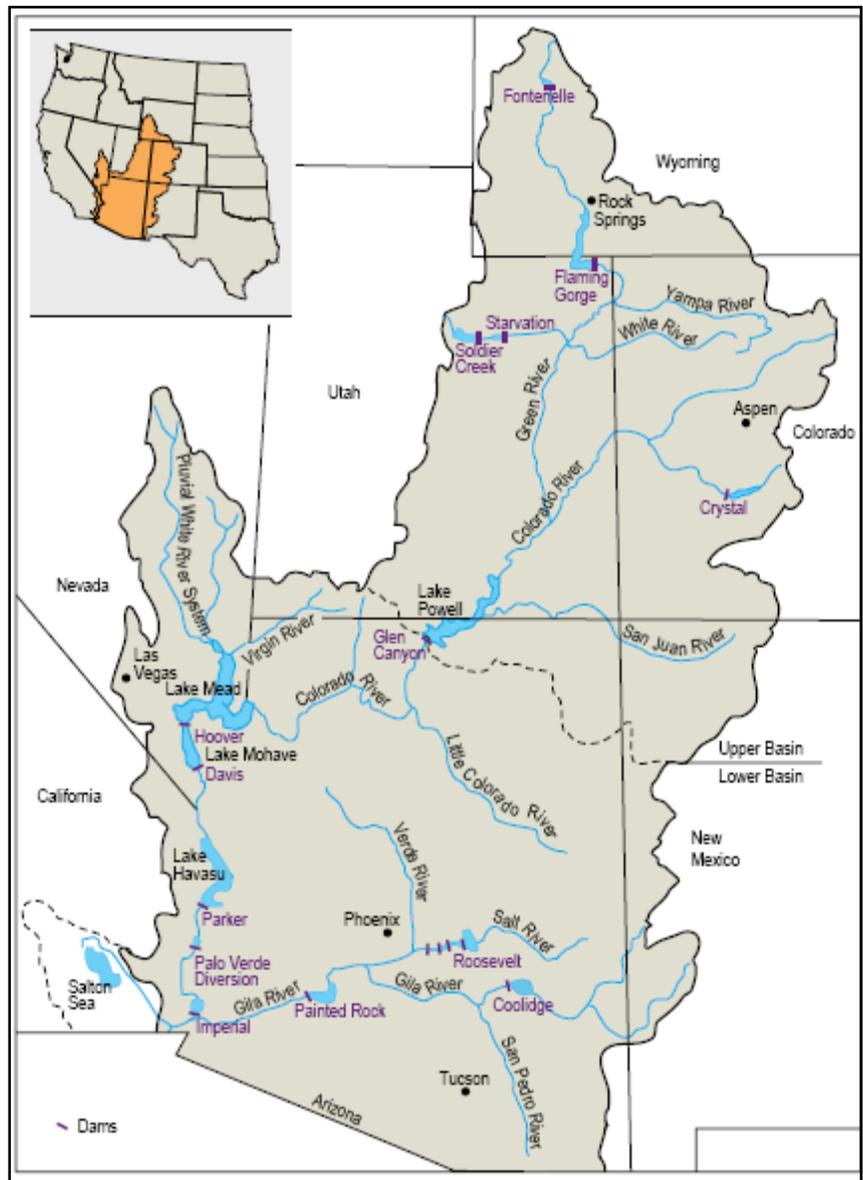
From its source on the western slopes of the Rocky Mountains, the Colorado River flows 1,450 miles before it empties into the Gulf of California.

Precipitation averages between 60 inches in the mountains and as little as 2.5 inches in some parts of the lower basin. In its natural condition, the Colorado River ran red with silt and regularly flooded the Delta area in the Gulf of California. Seventy percent of the Colorado River's natural flows occurred in only three months: May, June and July.

The river and its tributaries drain parts of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and a small part of Mexico. The Colorado River Basin contains 242,000 square miles in the United States (about 8% of the continental U.S) and 2,000 square miles in Mexico.

Throughout its course, the Colorado River accepts water from a number of major tributaries, including: the San Juan River in New Mexico; the Green River in Wyoming and Utah; the Gunnison River in Colorado; the Gila, Little Colorado, and Bill Williams Rivers in Arizona; and the Virgin and Muddy Rivers in Nevada.

Based on historical records dating from the early 1900s, the average annual flow of the Colorado River at Lee Ferry, Arizona (the dividing point between the Upper and Lower Basins) is between 13-15 MAF. Little water now reaches the Gulf of California because the river is extensively diverted along the way.



**FIGURE 5.** The Colorado River Basin. [Source: Found at: <http://fire.biol.wvu.edu/trent/alles/ColoradoRiverIntro.pdf>]

Despite the harsh climate in parts of the lower basin, Native Americans settled the area, including the area around Phoenix, Arizona, as long as two thousand years ago. The first European to explore the lower Colorado River was the Spaniard Melchior Diaz, who traveled upstream 100 miles from the mouth of the river in 1540.

Even in the mid-1800s, the area in Arizona and Nevada was considered uninhabitable. In 1857, Lieutenant Joseph Ives of the U.S. Corps of Topographical Engineers described the lower Grand Canyon as “altogether valueless,” and predicted that “ours has been the first, and will doubtless be the last, party of whites to visit this profitless locality. It seems intended by nature that the Colorado River, along the greater portions of its lonely and majestic way, shall be forever unvisited and undisturbed.”

Twelve years later, Major John Wesley Powell traversed the entire Grand Canyon and explored other parts of the river basin. The settlers and farmers of the Imperial Valley in Southern California near the Mexican border were among the first organized interests to contemplate and later demand large dams to regulate the River’s flow and canals to move water.

The U.S. Supreme Court summarized the problems faced in taming the river for human uses:

The natural flow of the Colorado was too erratic, the river at many places too deep, and the engineering and economic hurdles too great for small farmers, larger groups, or even States to build storage dams, construct canals, and install the expensive works necessary for dependable year-round supply. Nor were droughts the basin’s only problems; spring floods due to melting snows and seasonal storms were a recurring menace....Another troublesome problem was the erosion of land and the deposit of silt which fouled waters, choked irrigation works, and damaged good farmland and crops. *Arizona v. California*, 373 U.S. 546, 553 (1963).

Disagreements between the states slowed down the move to build dams and canals. Upstream states – as well as Arizona – feared California would appropriate most of the water for itself. Subsequent negotiations between the states produced the Colorado River Compact of 1922, which apportioned the river between the Upper and Lower Basins. The Compact set the stage for the construction of Boulder (now called Hoover) Dam by the U.S. Bureau of Reclamation. Since then, the Bureau has built other large structures on the river, including Glen Canyon Dam.

The Colorado River has now transformed vast landscapes once considered too remote and difficult to sustain human population or agriculture.

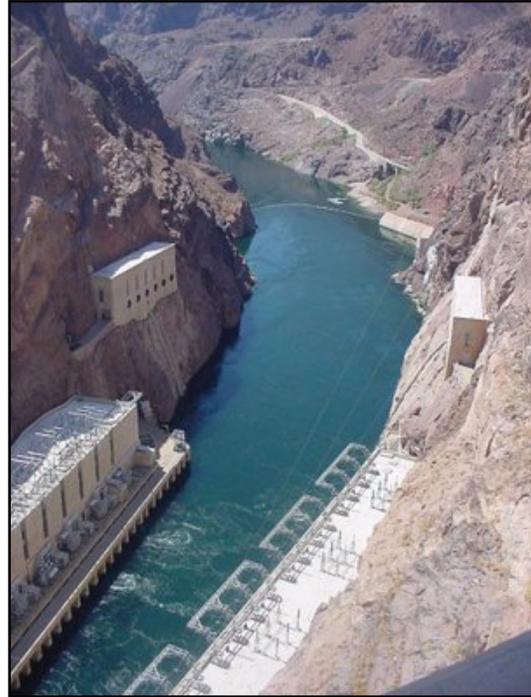
## **6.2 USES OF THE COLORADO RIVER**

The Colorado River is the most diverted of the major interstate rivers in the nation. It is a source of hydropower as well as a source of water supply for irrigation, municipal and industrial uses. The river also provides for recreation and fish and wildlife habitat.

### 6.2.1 Hydropower

The total power generating capacity from federal dams on the Colorado River is about 4,200 MW.<sup>89</sup>

The Western Area Power Administration (“Western”), a federal power marketing agency within the U.S. Department of Energy, sells and delivers this power, primarily to areas in the Desert Southwest. [www.wapa.gov](http://www.wapa.gov). Western owns about 4,000 miles of transmission lines used to deliver Colorado River Basin power to utility and public agency customers. Between 30 and 40 million people may have access to Colorado River Power at some time during a typical year. In addition, Western has a share in the Pacific Northwest-Pacific Southwest Intertie, a network of transmission lines that moves electricity between California and Washington, and between other parts of the Pacific Northwest and Southwest.



**FIGURE 6.** View of the Colorado River from atop Hoover Dam. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Colorado\\_river](http://en.wikipedia.org/wiki/Colorado_river)]

### 6.2.2 Navigation

The Colorado River is not used as a commercial waterway and contains no federal infrastructure for navigation.

### 6.2.3 Water Supply

Normal reservoir storage along the Colorado River and its tributaries is approximately 60 MAF, of which 88% is stored in Lake Mead (behind Hoover Dam) and Lake Powell (behind Glen Canyon Dam).

About 28 million people depend on the Colorado River as a source of water supply. Major U.S. cities served by the river include: Los Angeles; Las Vegas; Phoenix; San Diego; Denver; and Salt Lake City.

Despite the sheer number of people who rely on Colorado River water for their drinking water and domestic supply, the major use of the river is for irrigation. Water diverted from the Colorado River irrigates four million acres of agricultural land in the United States and 500,000 acres in Mexico.

<sup>89</sup>Hoover Dam, originally named Boulder Dam, generates about half (2,100 MW) of the total hydropower on the Colorado River; the other major generating facility is Glen Canyon Dam, which generates approximately 1,288 MW of hydropower. For additional information, see **Appendix B**.

The Bureau of Reclamation, along with local water and irrigation districts, has built one of the largest networks of dams, canals, tunnels and pumping stations for storing and moving water in the United States. Included in this network are Flaming Gorge, Navajo, Glen Canyon, and Hoover Dams; the Colorado River Aqueduct; the Central Arizona Project; and the All-American and Coachella Canals. The dams on the river constitute a “vast, interlocking machinery – a dozen major works delivering water according to Congressionally-fixed priorities for home, agricultural and industrial uses to people spread over thousands of miles.” *Arizona v. California*, 373 U.S. 546, 589 (1963).

#### **6.2.4 Flood Control**

Each of the major Bureau dams on the Colorado River has a flood control component. The U.S. Army Corps of Engineers (“Corps of Engineers”) also owns two major dams in Arizona, Painted Rock and Alamo, with a normal storage of zero acre feet (in a typical year, there is little or no water in the reservoir) but a maximum flood control storage of 6.2 MAF.

In addition, the Colorado River Front Work and Levee System, first authorized in 1925 and 1927, is designed to control floods on 700 miles between Lee Ferry in northern Arizona and the Mexican border. The system consists of jetties, dikes and dredging for flood control and salinity control. The system includes Senator Wash Dam, an off-stream reservoir near Yuma, Arizona, which holds excess water that is released as needed.

#### **6.2.5 Other Uses**

The Colorado River Basin includes some of the nation’s most popular national parks and recreation areas such as: Grand Canyon; Zion; Bryce; Arches; as well as Lakes Powell, Mead and Havasu (federal reservoirs). Tourism is a major source of revenue for many communities.

### **6.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Colorado River Basin are:

1. The Guadalupe Hidalgo Treaty of 1848, 9 Stat. 922 and 18 Stat. 492, ended the war between the United States and Mexico, and established the international boundary line between the two nations. The Treaty set the boundary for two rivers: the Colorado; and the Rio Grande (see Chapter 7).

The Treaty also gave U.S. vessels and citizens the right to “uninterrupted passage” to the Gulf of Mexico (on the portion of the Colorado River south of the border). Articles V and VII. Neither country, without the permission of the other, could construct “any work that may impede or interrupt, in whole or in part, the exercise of this right...” Article VII.

2. The Convention between the United States and Mexico of 1884, 24 Stat. 1011, established rules for the location of the international boundary between the two countries if the Colorado River or Rio Grande changed course. [This issue would later become important on the Rio Grande. See Chapter 7.]

3. In 1904, Congress authorized the newly-created Bureau of Reclamation to purchase the infrastructure of three private ditch companies and construct Laguna Dam on the lower Colorado River in California.
4. In 1920, Congress asked the Secretary of the Interior to study diversions of water from the Colorado River for irrigation of farm land in the Imperial Valley in southern California near the Mexican border. Pub. L. No. 66-208, 41 Stat. 600 (“the Kinkaid Act”).

The Secretary’s report to Congress, prepared in response, declared that the control of floods and development of the Colorado River are “particularly national problems.” The report recommended construction of a large dam and reservoir at or near Boulder Canyon on the Nevada-Arizona border, and an All-American Canal from the lower Colorado River to the Imperial Valley. The Canal would replace an existing structure (the Alamo Canal) built partially in Mexico.<sup>90</sup>

5. In 1921, Congress authorized the seven states in the Colorado River Basin – Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming – to negotiate and enter into a compact for the “equitable division and apportionment” of water. Pub. L. No. 67-56, 42 Stat. 171.
6. In 1922, the U.S. Supreme Court held that the state doctrine of prior appropriation would apply to an *interstate river*, thus preventing Colorado from diverting water that belonged to a Wyoming land owner who had prior appropriation rights. *Wyoming v. Colorado*, 259 U.S. 419 (1922), *modified* by 260 U.S. 1 (1922).

Although the Court’s ruling resolved a dispute over the Laramie River (a tributary to the North Platte River in the Missouri Basin), the opinion prodded negotiators to reach a compact on the Colorado River.

Upper Basin states in the Colorado River Basin feared that “California, by appropriating and using Colorado River water...would, under the interstate application of the prior appropriation doctrine, be ‘first in time’ and therefore ‘first in right.’ Nor were such fears limited to the northern most States. Nevada, Utah and especially Arizona were all apprehensive that California’s rapid declaration of appropriative claims would deprive them of their just share of basin water available after construction of [Boulder Canyon Dam]....” *Arizona v. California*, 373 U.S. 546, 576 (1963).

7. In 1922, negotiators from the states in the Colorado River Basin and the federal government succeeded in adopting a water allocation compact, the Colorado River Compact of 1922, 70 Congressional Record 324 (1928). The Colorado River Compact divided the Colorado River Basin into an Upper and Lower Basin.

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<sup>90</sup>The 60-mile long Alamo Canal, initially constructed by private entities, helped transform parts of the Imperial Valley, but conflicts developed between the Mexican government and American farmers with property in Mexico. The proposed solution was an “All-American” canal to pass Mexico.

The negotiators, however, could not reach agreement on an equitable apportionment between the seven states. Instead, they were only able to allocate waters *between the basins*, a compromise suggested by Secretary of Commerce Herbert Hoover, who served as the U.S. representative to the negotiations.

The key elements of the Colorado River Compact were:

### **Priorities**

The Compact said agricultural and domestic uses were the prime uses of the river. Water could be impounded to produce power, but such use would be subservient to agricultural and domestic purposes, and “shall not interfere with or prevent” those purposes. Article IV.

### **Upper and Lower Basins**

The dividing point between the Upper and Lower Basins was Lee Ferry, Arizona, on the main stem of the river, one mile downstream from where the Paria River joins the Colorado River, and 16 miles downstream from where Glen Canyon Dam now sits.

The Upper Basin states included those portions of Arizona, Colorado, New Mexico, Utah and Wyoming which naturally drain into the Colorado River System *above* Lee Ferry, and all parts of those states outside of the drainage area that “are now or shall hereafter be beneficially served” by waters diverted above Lee Ferry. Article II (f).

The Lower Basin states included those portions of Arizona, California, Nevada, New Mexico and Utah which naturally drain into the Colorado River System *below* Lee Ferry and all parts of those states outside of the drainage area that “are now or shall hereafter be beneficially served” by waters diverted below Lee Ferry. Article II (g).

### **States in the Upper and Lower Divisions**

The Compact identified four states in the “Upper Division”: Colorado, New Mexico, Utah and Wyoming; and three states in the “Lower Division”: Arizona, California and Nevada. Article II.

### **Allocations**

The Compact allocated 7.5 MAF of water in perpetuity between the Upper and Lower Basins. Article III (a). The Compact created an obligation of the four states in the Upper Division not to cause the flow of the river at Lee Ferry to be

depleted below an aggregate of 75 MAF over a consecutive 10-year period.<sup>91</sup> Article III (d).

In addition, the Lower Division states have the right to an additional 1 MAF per year.<sup>92</sup> Article III(b).

### **Mexico**

The Compact did not guarantee Mexico any water but said that “if, as a matter of international comity,” the U.S. recognized Mexico had water rights, then Mexico’s allocation would come from waters *surplus* to the United States. Article III(c).

If, however, surplus waters could not meet Mexico’s allocation, then the Upper and Lower Basin would equally bear the burden of the deficiency. Article III(c).

Mexico subsequently received an allocation of 1.5 MAF when it signed the 1944 U.S.-Mexico Water Treaty.

### **Tribal Water Rights**

The Compact did not affect Native American water rights. “Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian Tribes.” Article VII.

### **Congressional Ratification**

The Compact required the consent of Congress and approval of the state legislatures of all the signatory states.

Five months after signing, however, Arizona’s new governor rejected the Compact because he said it left his state at the mercy of California, which would divert water under the prior appropriation doctrine faster than Arizona and would establish legal rights to Colorado River water first.

Arizona eventually signed the Compact in 1944. But Arizona’s refusal to do so in the 1920s ultimately led to Congressional approval of the Compact in 1928 contingent on six states, not seven, ratifying the agreement.

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<sup>91</sup>Although the Upper *Basin* contains a small portion of Arizona, the Upper *Division* does not. The Lower *Basin* contains a small portion of New Mexico and Utah, but the Lower *Division* does not. Thus, the legal obligation to deliver 75 MAF over a 10-year period appears to fall only on Colorado, New Mexico, Utah and Wyoming – the four Upper *Division* states but not Arizona. Likewise, the beneficiaries of the 75 MAF are only the three Lower *Division* states: Arizona, California and Nevada. New Mexico and Utah have not asserted claims to water that passes beyond Lee Ferry into the Lower *Basin*.

<sup>92</sup>The rights and obligations of the various states regarding the “extra” 1 MAF are still an issue today.

8. In 1925, Congress consented to an interstate compact for the La Plata River, Pub. L. No. 68-346, 43 Stat. 796. The compact apportioned the water of the La Plata River (a tributary to the San Juan River in the Upper Colorado River Basin) between Colorado and New Mexico.
9. In 1925 and 1927, Congress enacted the Colorado River Front Work and Levee System, Pub. L. No. 68-585, 43 Stat. 1186, 1198 and 44 Stat. 1010, 1021, which authorized the Bureau of Reclamation to construct levees and dikes for flood control in the Lower Basin, initially near Yuma, Arizona, and later in other parts of Arizona, Nevada and California.
10. In 1928, Congress enacted the Boulder Canyon Project Act, 43 U.S.C. § 617, 45 Stat 1057 (1928). President Calvin Coolidge signed the legislation.

The Act authorized the Secretary of the Interior to construct Boulder Dam (now Hoover Dam) on the border between Nevada and Arizona. At the time, the dam was the largest project ever undertaken by the federal government.

Congress mandated that the dam should be used first for river regulation, improvement of navigation and flood control; second for irrigation and domestic uses and satisfaction of perfected water rights; and third for power. 43 U.S.C. § 617e.

In addition, the Act contained the following key provisions: First, Congress consented to the Colorado River Compact of 1922, 43 U.S.C. § 617l. The Act created two ways for the Compact to become effective:

- If all seven states ratified the agreement, as the original signers in 1922 anticipated, and the President by public proclamation so declared; *or*
- If only six states ratified the agreement (thus allowing the agreement to take effect in the absence of Arizona) and the President by public proclamation so declared *and* the California legislature agreed to accept a limit on annual Colorado River diversions of 4.4 MAF.

Under the second option, “...California, by act of its legislature, shall agree irrevocably and unconditionally...as an express covenant and in consideration of the passage of this act, that the aggregate annual consumptive use...of water of and from the Colorado River for use in California...shall not exceed four million four hundred thousand acre feet.” 43 U.S.C. § 617c(a).

California’s legislature subsequently passed the 1929 Limitation Act, agreeing to those terms.<sup>93</sup>

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<sup>93</sup>As a practical matter, California regularly exceeded the 4.4 MAF limit by contracting with the Bureau of Reclamation for the unused apportionments of Arizona and Nevada. See the U.S. Supreme Court’s 1964 decree in *Arizona v. California*, below, which gave California the right to half the available surplus. It was not until the Federal Quantification Agreement of 2003 that California began to reduce its use of Colorado River water to meet

Second, the Act authorized Arizona, California and Nevada to enter into a separate interstate compact for the following quantities of annual water diversions in the Lower Basin of the Colorado (43 U.S.C. § 617c(a)):

California:	4.4 MAF
Arizona:	2.8 MAF
Nevada:	0.3 MAF
TOTAL	7.5 MAF

Third, the Act also authorized construction of the All-American Canal adjacent to the Mexican border for delivering water to California. 43 U.S.C. § 617. The Canal had been sought for decades by agricultural interests in the Imperial Valley.

Fourth, the Act authorized and directed the Bureau of Reclamation to serve as the sole contracting agent for Colorado River water in the Lower Basin. 43 U.S.C. § 617d.

11. In 1930, the Bureau of Reclamation signed 50-year contracts for the sale of power from Hoover Dam. California utilities – public and private – were required to purchase 100% of the firm energy generated at the dam, thus underwriting part of the construction costs.
12. In 1931, the U.S. Supreme Court upheld the purposes of the Boulder Canyon Project Act. The Court dismissed Arizona’s challenge that the federal government had impermissibly invaded Arizona’s sovereign rights by seeking to build Boulder Dam on its border and to divert water in Arizona for uses in California and elsewhere. *Arizona v. California*, 283 U.S. 423 (1931).
13. In 1934, the U.S. Supreme Court rejected another attempt by Arizona challenging the federal authority to construct Boulder Dam. In *Arizona v. California*, 292 U.S. 342 (1934), the Court denied Arizona’s request to submit oral testimony in probable actions arising out of the Colorado River Compact. The evidence was not material to a determination of rights under the Boulder Canyon Project Act, the Court concluded.
14. In 1935, the U.S. Supreme Court, at Arizona’s request, invalidated the federal government’s attempt to build Parker Dam, downstream of Boulder Dam on the Arizona-California border. *United States v. Arizona*, 295 U.S. 174 (1935). Unlike Boulder Dam, for which Congress had approved specific legislation in 1928, no such legislation existed for Parker Dam. The Court said the River and Harbor Act of 1899, 33 U.S.C. § 401, required specific Congressional approval before the federal government could proceed to obstruct the Colorado River.

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the 4.4 MAF limit.

15. In 1935, in response to the U.S. Supreme Court opinion above, Congress expressly authorized the Bureau of Reclamation to build Parker Dam, 49 Stat. 1028, 1039-1040. [The statute also authorized completion of Grand Coulee Dam on the Columbia River. See Chapter 5 on the Columbia River.]
16. In 1936, the U.S. Supreme Court rejected yet another lawsuit filed by Arizona. This petition asked the Court to equitably divide the Colorado River, but Arizona did not name the United States as an indispensable party. Every right that Arizona asserted was subordinate to or dependent upon the United States, the Court held.

Furthermore, Arizona had not presented a sufficient showing that it was capable of diverting water from the river, which at the time contained 9.7 MAF of unappropriated water. *Arizona v. California*, 298 U.S. 558 (1936).

17. In 1937, the Secretary of the Interior authorized a finding of feasibility to build the Colorado-Big Thompson Project Act, based on legislation initially enacted in 1910 and 1924. The project consisted of a network of dams and canals to move water from the western slopes of the Rocky Mountains to the Denver area, which lies in the Missouri River Basin. The C-BT Project was the first federal water project to traverse the Continental Divide.
18. In 1938, the U.S. Supreme Court held that the La Plata River Compact of 1925 could apportion water rights on the La Plata River in Colorado even if the state had granted prior water rights to a private entity. "...[T]he apportionment is binding upon the citizens of each State and all water claimants, even where the State had granted the water rights before it entered into the compact." *Hinderlider v. La Plata River & Cherry Creek Ditch Co.*, 304 U.S. 92, 106 (1938).
19. In 1940, Congress enacted the Boulder Canyon Project Adjustment Act, 43 U.S.C. 618. The Act provided for a revised basis for setting rates for power from Hoover Dam to ensure complete recovery of costs and established certain annual payments to Arizona and Nevada.
20. The United States-Mexico Treaty of 1944 ("Relating to the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande") ("Mexican Water Treaty"), 59 Stat. 1219, guaranteed an annual amount of 1.5 MAF from the Colorado River to Mexico. Article 10(a). The amount could go up in years when the United States determined there was sufficient surplus water to deliver to Mexico. If, however, a drought or serious accident made it "difficult" for the United States to meet the guaranteed 1.5 MAF, then "water allotted to Mexico...will be reduced in the same proportion as consumptive uses in the United States are reduced." Article 10(b).

The Treaty authorized the International Boundary and Water Commission ("IBWC") to resolve disputes. Article 2.

The IBWC was given the responsibility to operate and maintain the yet-to-be built Morelos Diversion Dam. The Treaty also required the IBWC to keep a record of water flows in each country.

The Treaty did not address water quality (i.e., levels of salinity) of deliveries from the United States to Mexico.

Later that year, Arizona finally ratified the Colorado River Compact – 22 years after it was signed. Arizona was the last of the seven states to do so.

21. In 1948, negotiators from the four states in the Upper Basin reached an agreement on allocating water among themselves. In 1949, Congress consented to the Upper Colorado River Basin Compact, Pub L. No. 81-37, 63 Stat. 31, which apportioned use of the Upper Basin waters according to each state's contribution of the river's flow:

Colorado:	51.75 %
Utah:	23.00 %
Wyoming:	14.00 %
New Mexico:	11.25 %

In addition, Arizona received 50,000 AF because a tiny portion of the state was located in the Upper Basin. The Compact, however, did not affect the Lower Basin states, which could not reach agreement on how to allocate the Colorado River below Lee Ferry, Arizona.

22. In 1952, Arizona filed suit in the U.S. Supreme Court asking it to adopt an equitable apportionment formula for the Lower Basin. The petition marked the fourth time that Arizona asked the Court to intervene in allocation issues on the Colorado River. Arizona's suit was ultimately resolved only in 1964 when the Court adopted the final decree on water allocation for the Lower Basin. [See below.]
23. In 1954, Congress enacted the Parker-Davis Project Act, 68 Stat. 143, which consolidated the operations of Parker Dam and Davis Dam, initially authorized as separate projects.
24. In 1956, Congress enacted the Colorado River Storage Project Act, 43 U.S.C. § 620, which authorized the construction of four dams in the Upper Basin: Glen Canyon; Flaming Gorge; Navajo; and Curecanti (now the Wayne N. Aspinall Storage Unit).

By this time, the large Lower Basin Dams – Hoover, Parker and Davis – were all completed. The Upper Basin sought to have the Bureau of Reclamation build the dams for the basin's own use and for storage to ensure Upper Basin deliveries to the Lower Basin, pursuant to the 1922 Colorado River Compact.

The largest and most important dam was Glen Canyon, upstream from Lee Ferry, Arizona. The dam can store approximately 24 MAF and allows the Upper Division states to meet the terms of the 1922 Compact, which required, among other things, that the states in the Upper Division release 75 MAF on a rolling 10-

year average to the Lower Division states. Glen Canyon Dam also produces large amounts of power.

The Act also authorized 11 additional irrigation projects on tributaries in the Upper Basin.<sup>94</sup> Finally, the Act authorized any state in the Colorado River Basin to bring an action in the U.S. Supreme Court against the Secretary of the Interior for failure to comply with the Colorado River Compact of 1922 and other statutes, 43 U.S.C. § 620(m).

25. In 1962, Congress approved the San Juan-Chama Project Act, Pub. L. No. 87-483, 76 Stat. 96, which authorized the Bureau of Reclamation to build the San Juan-Chama Transmountain Diversion Project, to move water out of the Colorado River Basin to the upper Rio Grande Basin.

The Act amended the Colorado River Storage Project Act of 1956, 43 U.S.C. § 620a, to allow diversion of water from tributaries in the San Juan River in the Colorado River Basin into the Chama River in the upper Rio Grande.<sup>95</sup>

26. In 1962, Congress also authorized the Fryingpan-Arkansas Project to divert water from southwestern Colorado to the Arkansas River Basin in southeastern Colorado. The statute required the Bureau of Reclamation to operate the project according to specific principles approved by Congress. Pub. L. No. 87-590, 76 Stat. 389. The Fryingpan-Arkansas Project was the third major trans-boundary diversion that moved water out of the Colorado River Basin to another river basin. (The Colorado-Big Thompson Project was the first and San Juan-Chama was the second. See above.)
27. In 1963, Congress consented to a third interstate compact in the Colorado River Basin. The Animas-La Plata Project Compact between Colorado and New Mexico, Pub. L. No. 90-537, 82 Stat. 898, established priorities on water use in anticipation that Congress would fund the Animas-La Plata Dam and irrigation project.
28. In 1963, the U.S. Supreme Court issued its landmark ruling in *Arizona v. California*, 373 U.S. 546 (1963), holding that the Boulder Canyon Project Act of 1928 constituted a Congressional scheme to apportion water in the Lower Basin. The Court's opinion brought a conclusion to an 11-year legal battle, begun by Arizona in 1952.

The Court held that neither the law of prior appropriation nor the Colorado River Compact of 1922 was relevant to the ongoing dispute over water allocation in the

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<sup>94</sup>The dams were called “participating projects” because the construction costs were paid from power revenues received by the Bureau from the sale of power at Upper Basin projects. The power revenue underwrote the costs of the participating projects, which were beyond the ability of water users. Congress subsequently authorized 10 additional participating projects.

<sup>95</sup>Colorado consented to the San Juan-Chama diversion when it signed the Rio Grande Compact of 1939.

Lower Basin. The Court therefore declined to “apportion” the water by relying on the compact or its past equitable apportionment decisions. Instead, the Court concluded that the Boulder Canyon Act of 1928 constituted the “law of the river” affecting the three lower Basin of Arizona, California and Nevada.

The Court concluded that the 7.5 MAF for the Lower Basin was therefore allocated by Congress as follows:

California:	4.4 MAF (and 50% of the surplus)
Arizona:	2.8 MAF (and 46% of the surplus)
Nevada	0.3 MAF (and 4% of the surplus)
TOTAL	7.5 MAF

Each state’s entitlement had the same priority. (Arizona, however, subsequently accepted a lower priority in 1968 in exchange for Congressional authorization of the Central Arizona Project. See below.)

The Court rejected California’s attempt to reduce Arizona’s share of the Colorado by the amount of water in tributaries in Arizona. Each state held an exclusive right to use the tributaries within its borders – in addition to what Congress apportioned, the Court held. The opinion – and the decree entered the following year that implemented the decision – was a victory for Arizona.<sup>96</sup>

The Court concluded that the Secretary of Interior has the authority to promulgate “shortage criteria” pursuant the Act. *Id.* at 593-94.

29. In 1964, the U.S. Supreme Court adopted the final decree in *Arizona v. California*, 376 U.S. 340 (1964). The decree granted five Native American Tribes water rights dating back to the establishment of their reservations, which predated the Colorado River Compact of 1922. Those rights were to be met by the state in which the tribe was located.
30. In 1964, Congress enacted the Pacific Northwest Consumer Power Preference Act of 1964 (“Preference Act”), 16 U.S.C. § 837, which authorized construction of the Pacific Northwest-Pacific Southwest Intertie (high-voltage transmission lines) to move surplus power between the two regions.
31. In 1968, Congress enacted the Colorado River Basin Project Act, 43 U.S.C. § 1501 et seq., which, among other things, authorized the Bureau of Reclamation to build the Central Arizona Project. The Act limited Arizona’s diversion during drought to assure California’s annual use of 4.4 MAF.

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<sup>96</sup>California has virtually no tributaries and contributes almost no flow to the river. Arizona, on the other hand, has tributaries that contribute flows of about 2 MAF to the Lower Basin. Thus, Arizona’s allocation consisted of the 1928 Congressional apportionment *and* full use of its tributaries.

The Act also addressed other issues:

Section 602(a) of the Act, 43 U.S.C. § 1552(a), directed the Secretary of Interior to prepare criteria for the long-term operation of reservoirs on the Colorado River, consistent with the provisions of the Colorado River Compact of 1922, the Upper Colorado River Basin Compact of 1948 and the U.S.-Mexican Water Treaty of 1944.

The Act authorized the Bureau of Reclamation to participate in the Navajo Generating Station, a 2.25-MW coal plant near Lake Powell at Page, Arizona. The federal share of the plant is used to pump water through the Central Arizona Project canals to Phoenix and other areas in Arizona.

Finally, the Act authorized construction of the Animas-La Plata Project in Colorado and New Mexico, first proposed in the 1963 compact between the two states.

32. The Treaty between the United States and Mexico of 1970 (“Treaty to Resolve Pending Boundary Differences and Maintain the Rio Grande and Colorado River as the International Boundary”) addressed the remaining boundary issues along the Colorado River and Rio Grande. TIAS 7313, 23 UST 371.
33. In 1970, the Secretary of the Interior adopted “Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs,” commonly called Operating Criteria, which established principles for operating the federal reservoirs in the Upper and Lower Basins. 35 Fed. Reg. 8951. The Secretary’s authority to do so had been granted by Congress under Section 602(a) of the Colorado River Basin Project Act of 1968. 43 U.S.C. 1552(a).
34. In 1972, Congress enacted amendments to the Clean Water Act, Pub. L. No. 92-500, 86 Stat. 816, which required states to adopt plans, approved by the U.S. Environmental Protection Agency, to control salinity. The states in the Colorado River Basin subsequently formed the Colorado River Basin Salinity Control Forum to develop a basin-wide program.
35. In 1973, the International Boundary and Water Commission approved Minute 242, which established standards for salinity control of water arriving at Morelos Diversion Dam in Mexico.
36. In 1974, Congress enacted the Colorado River Basin Salinity Control Act, 43 U.S.C. § 1571-1599, which authorized the Bureau of Reclamation to build the Yuma Desalting Plant in Arizona and other salinity control projects to improve water quality in the Lower Basin. The Act was intended to meet the U.S. obligations to Mexico under Minute 242.
37. In 1977, Congress enacted the Department of Energy Organization Act, 42 U.S.C. § 7131. The Act transferred the power marketing functions from the Bureau of Reclamation to the Western Area Power Administration, an agency within the

- newly-created Department of Energy. Western assumed the obligations to sell and deliver electricity from Hoover Dam and other Colorado River projects owned by the Bureau (and on other rivers as well).
38. In 1978, Congress approved the first of several water rights settlements with Native American Tribes and communities in the Lower Colorado River Basin. The Ak Chin Settlement Act directed the Secretary of the Interior to deliver 85,000 AF of water from the Central Arizona Project to tribal lands near Phoenix. Pub. L. No. 98-530, 98 Stat. 2698.
  39. In 1982, Congress approved the Southern Arizona Water Rights Settlement Act for the San Xavier and Shuck Toak District of the Tohono O'odham Nation (formerly the Papago Tribe), and authorized it to obtain water from the Central Arizona Project. Pub. L. No. 97-293, 96 Stat. 1261, 1274.
  40. In 1983, the U.S. Supreme Court issued a supplemental decree in the *Arizona v. California* litigation, addressing tribal water rights and the circumstances under which the tribes could increase their entitlements. *Arizona v. California*, 460 U.S. 605 (1983).
  41. In 1984, Congress enacted the Hoover Power Plant Act (Boulder Project Act amendments), 43 U.S.C. § 619a, which allocated power from Hoover Dam to nine public and private entities, including the Colorado River Commission of Nevada and others named in the statute.
  42. In 1988, Congress approved the Salt River Pima-Maricopa Indian Community Water Right Settlement Act, which gave the tribal population water from the Central Arizona Project and certain groundwater rights. Pub. L. No. 100-512, 102 Stat. 2549.
  43. In 1988, Congress approved the San Luis Rey Indian Water Rights Settlement Act, which, among other things, authorized the Secretary of the Interior to build a new lined canal to replace unlined portions of the All-American Canal in the Imperial Valley of southern California. Pub. L. No. 100-675, 102 Stat. 4000. The Act also provided for a supplemental water supply of 16,000 AF for the benefit of various Indian communities.
  44. In 1988, Congress approved the Colorado-Ute Indian Water Rights Settlement Act, which established water rights from future federal water projects in place of their reserved water rights claims. Pub. L. No. 100-585, 102 Stat. 2973.
  45. In 1990, Congress approved the Fort McDowell Indian Community Water Right Settlement, which allocated water from the Central Arizona Project and the Verde River to tribal members. Pub. L. No. 101-628, 104 Stat. 4469, 4480.
  46. In 1992, Congress approved the San Carlos Apache Water Rights Settlement, which gave the tribe water from the Central Arizona Project and certain tributary rivers in Arizona. Pub. L. No. 102-575, §§ 3701-3711, 106 Stat. 4600, 4740. The statute also reallocated water from the 1984 Ak-Chin Settlement. The Secretary of Interior's discretion to implement the agreement was upheld in *Maricopa-*

- Stanfield Irrigation and Drainage Dist. v. U.S.*, 158 F.3d 428 (9th Cir. 1998)(irrigation districts had no property right in excess water and the Secretary had discretion to reallocate the supply).
47. In 1992, Congress approved the Utah Ute Indian Water Right Compact Agreement that quantified the water rights of certain Utah tribes and provided for a \$125-million tribal development fund. Pub. L. No. 102-575, 106 Stat. 4600, 4650.
  48. In 1992, Congress approved the Jicarilla-Apache Tribe Water Rights Settlement Act, which authorized the tribe to divert 33,500 AF from the Colorado River Basin and also obtain water from the San Juan-Chama Project in the Rio Grande Basin. Pub. L. No. 102-441, 106 Stat 2237.
  49. In 1992, Congress enacted the Grand Canyon Protection Act, Pub. L. No. 102-575, 106 Stat. 4602, 4669-4673, which established operating criteria for the releases of water at Glen Canyon Dam to protect the downstream environment in Grand Canyon National Park.
  50. In 1999, the Secretary of Interior adopted regulations to allow interstate water banking in the Lower Basin of the Colorado River. See, “Off Stream Storage of Colorado River Water and Development of and Release of Intentionally Created Unused Apportionment in the Lower Division States,” 43 C.F.R. Part 414. See, also, 64 Fed. Reg. 59006 (Nov. 1, 1999).
  51. The regulations were based on the Secretary’s authority under the Boulder Canyon Project Act of 1928 and Article II(B)(6) of the Decree in *Arizona v. California*, 376 U.S. 340 (1964). (See discussion under “Interagency and Multi-Party Agreements.”)
  52. In 2000, Congress authorized the Bureau of Reclamation to implement endangered fish recovery programs on the Upper Colorado and San Juan River Basins to protect habitat and restore endangered and threatened species. Pub. Law. No. 106-392, 114 Stat. 1602.
  53. In 2000, the International Boundary and Water Commission adopted Minute 306, calling for studies on restoring the ecology of the Colorado River Delta and establishing a “framework” of cooperation between the United States and Mexico.
  54. In 2001, the Secretary published interim guidelines to determine, among other things, when surplus Colorado River water was available for use by Arizona, California and Nevada. See, “Colorado River Interim Surplus Guidelines.” 66 Fed. Reg. 7772 (January 25, 2001). The criteria are scheduled to remain in effect until 2016.
  55. In 2003, the Secretary of the Interior and four water agencies in California, as well as the State of California, signed the “Federal Quantification Settlement Agreement” to reduce California’s over-dependence on Colorado River and limit annual diversions of water to 4.4 MAF. The Secretary also signed the Colorado

River Water Delivery Agreement with four water and irrigation districts that shifted use from agricultural to municipal.

56. In 2004, Congress enacted the Gila River Indian Community Water Rights Settlement Act which, among other things, amended the 1968 Colorado River Basin Project Act to award New Mexico with additional water from the Gila River Basin. The Act allowed New Mexico to divert water without challenge from downstream water rights in Arizona. The water was in addition to what the U.S. Supreme Court Decree of 1964 awarded to New Mexico. 43 U.S.C. § 1524(f).
57. In 2005, New Mexico and the Navajo Nation reached an \$800-million water rights settlement for the San Juan Basin. Under the terms of the Settlement, Congress would authorize the construction and operation of the Navajo-Gallup Water Supply Project and other infrastructure improvements. In exchange, the Navajo Nation would relinquish water rights in the basin. Congress must approve and fund the settlement.

## **6.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Bureau of Reclamation is the dominant federal agency on the main stem of the Colorado River. The Bureau is an agency of the Interior Department, and the Secretary of the Interior is therefore the single most important official in determining the long-term strategy for the Lower Basin. With the exception of certain perfected water rights (which predate the 1928 Boulder Canyon Project Act), all users of main stem Colorado River water in the Lower Basin must have contracts with the Secretary, acting through the Bureau.

The Upper Basin States, however, operate under a different legal regime. The Upper Colorado River Basin Compact of 1948, not the Boulder Canyon Project Act of 1928, is the controlling legal document for those states. The Upper Basin states “report” – but only in the sense of submitting information – to the Upper Colorado River Commission. The Commission has no plenary rule-making authority.

### **6.4.1 Long-term Operational Strategy**

In general, there is no long-term operating strategy for the Colorado River. The River is divided into two basins, each with its own legal regime.

In the Upper Basin, the individual states retain greater autonomy, subject to the two interstate compacts and state water laws, but not the Secretary of the Interior’s rule-making authority.

In the Lower Basin, the Secretary of the Interior has the authority, granted by Congress and interpreted by the U.S. Supreme Court, to develop a long-term strategy. Under the Boulder Canyon Project Act of 1928, the Secretary has broad authority to enter into contracts and promulgate regulations for surplus water. 43 U.S.C. § 617 et seq. Under Section 602(a) of the Colorado River Basin Project Act of 1968, the Secretary, acting through the Bureau of Reclamation, has developed long-range criteria for the management of the lower Colorado River. 43 U.S.C. § 1552(a).

### 6.4.2 Short-term Operational Strategy

The Secretary of the Interior has adopted the following rules and criteria for day-to-day, or short-term river operations:

1. In 1970, the Secretary promulgated “Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs,” (“Operating Criteria”), which established principles for operating federal reservoirs in the Upper and Lower Basins. 35 Fed. Reg. 8951.

The regulations were adopted pursuant to Section 602(a) of the Colorado River Basin Project Act of 1968, and apply to all dams on the Colorado River.<sup>97</sup>

In general, if the Secretary determines that active storage in Lake Powell (Glen Canyon Dam) is less than active storage in Lake Mead (Hoover Dam), then the water released from Lake Powell for the coming year will be 8.23 MAF. This figure is based on 7.5 MAF (per the 1922 Compact) *plus* the Upper Basin’s obligations to Mexico (.75 MAF) *minus* the .02 MAF that flows into the Colorado River from the Paria River (a small tributary) above Lee Ferry. On the other hand, if active storage in Lake Powell is higher than active storage in Lake Mead, the Secretary can order releases greater than 8.23 MAF.

The Secretary of the Interior holds a formal review of the operating criteria every five years.

2. In 2001, the Secretary published interim surplus guidelines to determine, among other things, when surplus Colorado River water was available for the three Lower Basin states (Arizona, California and Nevada). See, “Colorado River Interim Surplus Guidelines.” 66 Fed. Reg. 7772 (January 25, 2001). The criteria are scheduled to remain in effect until 2016. There are four levels of “surplus” water, each defined by the elevation at Lake Mead behind Hoover Dam.
3. Finally, the Secretary of the Interior is required to submit an annual report to Congress and the Governors of the Colorado River Basin States describing river operations and the plan for operation in the current year. See, the “2006 Annual Operating Plan for Colorado River Reservoirs,” adopted pursuant to Section 602(a) of the Colorado River Storage Act of 1968.

The purpose of the Secretary’s Annual Operating Plan is to determine:

- The projected operations of Colorado River reservoirs;
- The quantity of water in storage in the Upper Basin reservoirs;

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<sup>97</sup>The Secretary’s Operating Criteria apply to dams built under four different statutes: the Colorado River Storage Project Act of 1956 (Glen Canyon, Navajo, Flaming Gorge and the Aspinall Project); the Boulder Canyon Project Act of 1928 (Hoover Dam); the Reclamation Act (Davis Dam) and the Rivers and Harbors Act (Parker Dam).

- The available water for deliver pursuant to the 1944 U.S.-Mexico Water Treaty and related agreements;
- Whether the requirements of main stem users in the Lower Basin will be met under normal, surplus or shortage conditions; and
- Whether there is sufficient water to allow interstate water banking to occur (e.g., whether water apportioned to, but unused by, one or more Lower Basin states exists and can be used to satisfy requests of other Lower Basin states), pursuant to Section II(B)(6) of the U.S. Supreme Court’s decree in *Arizona v. California*, 376 U.S. 340, 343 (1964).

### 6.4.3 River Accounting Mechanisms

Article V of the U.S. Supreme Court’s decree in *Arizona v. California*, 376 U.S. 340 (1964), required the Secretary of the Interior to compile and maintain records of diversions and usage in the Lower Basin. The Secretary does so in the “Decree Accounting Reports.” The Bureau of Reclamation posts current and historical information on its web site. [www.usbr.gov/lc/region/g4000/wtracct.html](http://www.usbr.gov/lc/region/g4000/wtracct.html)

**Table 13** shows the most current data on the types of consumptive uses in the Colorado River Basin (U.S. only), as compiled by the Bureau and the Colorado River Board of California.

**TABLE 13.** Types of consumptive uses in the Colorado River Basin, United States (2000). [Source: USBR, “2004 Consumptive Use Report,” Table C-6, page 22.]

<b>Irrigated Agriculture*</b> (AF)	<b>Municipal Industrial</b> (AF)	<b>Reservoir Evaporation</b> (AF)	<b>Return Flow</b> (AF)	<b>Total</b> (AF)
11,719	2,698	2,523	(272)	16,668
70.3%	16.2%	15.1%	(1.4%)	100%

\* The agriculture and municipal/industrial figures reflect data from both the Bureau of Reclamation and the Colorado River Board of California. The Bureau calculates the amount of water exported outside of the Colorado River Basin (5,547 AF per year) but does not monitor uses once the water is received in other basins. The Colorado River Board, however, publishes data that shows about 80% of all water received from the Colorado River goes for agricultural consumption. The remaining 20% goes for municipal and industrial consumption.<sup>98</sup>

In addition to the Bureau, two other agencies also compile important data on the flows and uses of the Colorado River. The Upper Colorado River Commission, created by the Upper Colorado River Basin Compact of 1948, prepares an annual report to Congress and the President that includes, among other things, the budget and activities for the preceding year. Pub. L. No. 81-37, 63 Stat. 31 at Article VIII(d)(13). The report shows annual withdrawals in the Upper Basin.

<sup>98</sup>5,547 AF x .80 = 4,438 AF, which was added to Bureau’s data for agriculture uses. 5,547 AF x .20 = 1,109 AF, which was added to the Bureau’s municipal/industrial data.

The International Boundary and Water Commission (“IBWC”) compiles flow records on the Lower Colorado River to ensure Mexico obtains its allowable share under the 1944 U.S. Mexican-Water Treaty. [www.ibwc.state.gov](http://www.ibwc.state.gov)

With respect to power, the Western Area Power Administration’s annual report and related documents describe “who gets what” from the federal power system. [www.wapa.gov](http://www.wapa.gov) The largest source of power in the Colorado River Basin is Hoover Dam (2,024 MW). The Hoover Dam Power Plant Act of 1984, specifies “who gets what” from the dam. 43 U.S.C. § 619a.

**Table 14** below shows Western’s five largest customers for power generated at federal dams in the Colorado River Basin.

**TABLE 14.** Western’s five largest customers of power from federal dams on the Colorado River (2004). [Measured in megawatt hours (MWh) received.]

<b>Name of Entity</b>	<b>Amount Purchased (MWh)</b>	<b>% of Total</b>
Colorado River Commission of Nevada	1,201,643	3.7
Metropolitan Water District of S. California	1,143,279	3.5
Arizona Power Authority	772,303	2.4
Los Angeles Dept. of Water and Power	593,122	1.8
Utah Associated Municipal Power	537,019	1.7

#### **6.4.4 The Role of Interstate Compacts**

Two compacts on the Colorado River – the Colorado River Compact of 1922 and the Upper Colorado River Compact of 1948 – are essential parts of the “laws of the river.”

Two other compacts – the La Plata River Compact of 1925 and the Animas-La Plata Project Compact of 1968 – are limited in scope and only affect a single tributary.<sup>99</sup>

##### **The Colorado River Compact of 1922**

The Compact divided the waters between the Upper and Lower Basin, and imposed an obligation on the four states of Colorado, New Mexico, Utah and Wyoming to deliver 75 MAF to the Lower Basin on average during a 10-year period. Section III(3). The Compact did not allocate water between the states, nor did the Compact create a

<sup>99</sup>The La Plata River Compact, agreed upon by the parties within weeks after the Colorado River Compact, was approved by Congress in 1925, three years **before** Congress approved the Colorado River Compact. The La Plata River Compact can accurately be described as the first interstate water allocation compact to obtain Congressional approval. The Colorado River Compact is commonly known by the year in which the parties reached agreement (1922) rather than the year Congress formally consented (1928), and is therefore described first.

commission to administer its provisions. Congress consented to the Compact in the Boulder Canyon Project Act of 1928.

**The La Plata River Compact of 1925**

The Compact was signed by Colorado and New Mexico. Pub. L. No. 63-345, 43 Stat. 796. Key measurements on the La Plata River are taken at a gauge at the Colorado-New Mexico border and farther downstream in New Mexico. The Compact gave the “unrestricted right” of each state to use all of water in the river within its borders between December 1 and February 15. Between February 15 and December 1, the Compact regulated withdrawals, depending on measurements at the two gauges.

**The Upper Colorado River Basin Compact of 1948**

The Compact, Pub. L. No. 81-37, 63 Stat. 31, allocated water among the four Upper Basin states based on each state’s contribution of the river’s flow:

Colorado:	51.75 %
Utah:	23.00 %
Wyoming:	14.00 %
New Mexico:	11.25 %

In addition, Arizona received 50,000 AF because a tiny portion of the state was located in the Upper Basin.

The 1948 Compact created the Upper Colorado River Commission with one representative from each of the four states. The chairman of the commission is a non-voting federal representative. The Compact can be terminated at any time upon unanimous agreement of the parties. Article VIII(a). The Commission is located in Salt Lake City, Utah.

Water in the Lower Basin has *not* been allocated by an interstate compact. Instead, the U.S. Supreme Court in *Arizona v. California* (1963) held that Congress had apportioned water in the Lower Basin according to a formula contained in the Boulder Canyon Project Act, with California receiving 4.4 MAF; Arizona 2.8 MAF; and Nevada .3 MAF.

**The Animas-La Plata Compact of 1968**

The Compact addressed the rights of Colorado and New Mexico to divert water from the Animas-La Plata Federal Reclamation Project, first authorized by the Colorado River Basin Project Act of 1968. The Compact, consented by Congress in the same year as the dam authorization, gave both Colorado and New Mexico the right to store and divert water from the river. Construction on the project was delayed until the 1990s and is only now being built.

#### **6.4.5 International Treaties and Agreements**

The International Boundary and Water Commission was created by the U.S. - Mexico Water Treaty of 1944, 59 Stat. 1219. The IBWC owns and operates Morelos Dam in Mexico and implements standards to control salinity. The IBWC has two “sections,” one in the U.S. Department of State, the other in the Foreign Ministry of Mexico (the Comision Internacional de Limites y Aguas or “CILA”). [www.ibwc.state.gov](http://www.ibwc.state.gov)

#### **6.4.6 The Role of Native American Tribes**

There are 34 Native American Tribes that live in the Colorado River Basin. Ten Tribes have senior water rights and are part of a “Ten Tribes Partnership.” The ten Tribes in alphabetical order are: Chemehuevi, Cocopah, Colorado River, Fort Mojave, Jicarilla Apache, Navajo Nation, Northern Ute, Quechan Tribe of the Fort Yuma Reservation, Southern Ute, and Ute Mountain Ute Indian.

Many of the Tribes have senior water rights that predate the signing of the Colorado River Compact of 1922. The U.S. Supreme Court Decree in *Arizona v. California*, 376 U.S. 340 (1964), preserved water for five Tribes: the Fort Mojave; the Chemehuevi; the Colorado River; the Quechan; and the Cocopah. Several other Tribes subsequently settled water rights claims with the U.S. government. See “Legal Regime” chronology for details and citations to specific statutes.

In 2005, New Mexico and the Navajo Nation reached a comprehensive \$800-million water rights settlement for the San Juan Basin, part of the Colorado River watershed. Under the terms of the Settlement, Congress would authorize the construction and operation of the Navajo-Gallup Water Supply Project and other infrastructure improvements. In exchange, the Navajo Nation would relinquish rights to about 44% of their historic rights in the San Juan basin. Congress must approve the settlement.

If enacted into law, New Mexico’s 11.25 % share of the Upper Colorado River Basin apportionment would be allocated as follows:

Navajo Nation	56 %
San Juan Chama	17 %
Non-Indian Uses	16 %
Power Plants	6 %
Jicarilla-Apache Nation	5 %
TOTAL	100 %

In addition, several Tribes purchase power from the Western Area Power Administration and thus have a contractual interest in power-related management issues.

Finally, the Tribes currently participate in Colorado River restoration efforts to create habitat under the Endangered Species Act for threatened or endangered fish and birds.

#### **6.4.7 The Role of Federal Courts**

Federal courts do not currently play an active role in the day-to-day management of the Colorado River. Cooperative programs to resolve Endangered Species Act problems are now underway. These programs are intended to diminish the risk that litigation will be filed to resolve ESA problems.

### **6.5 CURRENT ISSUES AND CONFLICTS ON THE COLORADO RIVER**

The population in the Southwest is expected to increase significantly in the next two decades. The Lower Basin states on the Colorado River – Arizona, California and Nevada – are nearing full consumptive use of their allocation under the Colorado River Compact of 1922 and the Boulder Canyon Project Act of 1928. The Upper Basin states – Colorado, New Mexico, Utah and Wyoming – collectively use approximately 57% of their allocation.

There are still significant unresolved issues surrounding the meaning and ramifications of provisions in the Colorado River Compact of 1922 and “who will get what” from the river. A five-year drought, which began in 2000, appears to be ameliorating (2006), but reservoir levels remain low. A new sustained dry spell would increase pressures on the river.

The federal government has not promulgated shortage criteria, but in February 2006, the seven basin states submitted a proposal to the Secretary of Interior for a coordinated strategy for operating Hoover and Glen Canyon Dams under low reservoir conditions.

#### **6.5.1 Water Supply and Allocation**

Water supply and allocation issues are, and will likely remain, the most pressing issue in the future. Nevada and Arizona’s population is expected to double in 25 years. California is expected to grow by 50 percent in the next 15 years.

The Lower Basin, as a whole, now uses of all its Compact allocation, while the Upper Basin uses about 57% of its apportioned water. Furthermore, the original estimate of the amount of water in the Colorado River was made in the 1920s during a period of higher than normal water flows. There is scientific evidence that a severe drought in the 1500s produced an annual flow of only 10 MAF.

In February 2006, the seven states in the Colorado River Basin submitted a joint proposal to the Secretary of the Interior to develop shortage criteria for the Lower Basin and to develop coordinated management strategies under low-reservoir conditions at Lake Mead (Hoover Dam) and Lake Powell (Glen Canyon Dam). The proposal responded to the Secretary’s announcement that she would develop shortage criteria. 70 Fed. Reg. 57322 (September 30, 2005). Neither the Secretary nor the Bureau of Reclamation has in place “detailed guidelines” to determine if there is a shortage of water on the Colorado River and how to respond.

The goals of the proposed shortage criteria are to delay the onset of shortages in the Lower Basin states; maximize protection of the Upper Division states, and provide for more efficient, flexible rules to operate reservoirs in both basins.

The heart of the proposal is to reduce releases from Lake Mead and Lake Powell under certain specified drought conditions, e.g., if the reservoir levels at Lake Powell and Lake Mead drop below a certain level, then less water is released for downstream use.

If adopted by the Secretary and the Bureau of Reclamation, the shortage criteria would be the first major changes to river governance in several decades. The Bureau of Reclamation must first complete an environmental impact statement prior to deciding whether to adopt or modify the proposed shortage criteria.

### **6.5.2 Power Supply and Allocation**

At present, there are no major conflicts in the Colorado River Basin over power supply and allocation issues. The Hoover Power Plant Act of 1984, 43 U.S.C. § 619b, identifies specific customers of firm electric power from Hoover Dam. The Western Area Power Administration is the federal power marketing agency.

### **6.5.3 Environmental Issues**

There are currently a number of environmental conflicts and issues throughout the Colorado River Basin. A brief discussion of the more pressing issues is presented below.

#### **Endangered Species Act Compliance**

The following species of fish are now listed as endangered by the U.S. Fish and Wildlife Service (USFWS): the humpback chub; the bonytail chub; the Colorado squawfish; and the razorback sucker.

USFWS has designated 1,980 miles of the river as critical habitat for endangered fish.

Four birds are listed as endangered: the Southwestern willow flycatcher; the Yuma clapper rail; the California condor; and the California brown pelican.

#### **a. The Upper Colorado River Program**

In 1988, federal and state agencies, as well as Native American Tribes and private organizations, formed the Upper Colorado River Endangered Fish Recovery Program to help restore endangered fish habitat and runs. Program participants, who include water users, signed a 10-year extension in 2001.

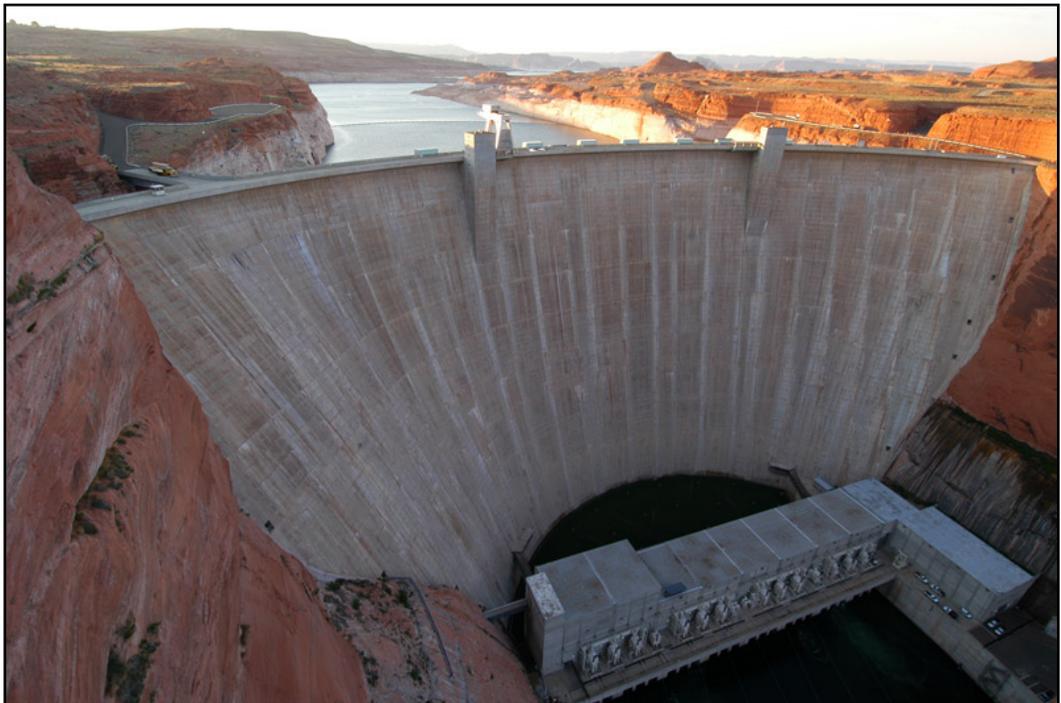
Funds come from a combination of appropriations from Congress, allocations from the Bureau of Reclamation and the Western Area Power Administration, and a one-time fee on water users. The USFWS has said it will consider removing the species from its threatened or endangered species list when populations reach a self-sustaining level. <http://coloradorecovery.fws.gov>

b. The Lower Colorado River Program

Another multi-party effort is underway among federal agencies, states, water users and others in the Lower Colorado Basin. The Lower Colorado River Multi-Species Conservation Program plans to create or restore about 8,100 acres of habitat for 26 species of threatened or endangered fish and birds. The total implementation cost over 50 years is estimated at \$620 million. The Bureau of Reclamation implements the program. Execution of agreements with USFWS took place in 2005, along with the release of a Record of Decision by the Secretary of the Interior. [www.usbr.gov/lc/lcrmscp](http://www.usbr.gov/lc/lcrmscp)

**Glen Canyon Dam Adaptive Management Program**

In 1991, the Secretary of the Interior adopted criteria for releases of water from Glen Canyon Dam, upstream from the Grand Canyon National Park. The criteria were intended to protect downstream habitat and create new sand bars for wildlife and recreation (i.e., camping). The Secretary has since adopted more stringent guidelines pursuant to the Grand Canyon Protection Act of 1992. Some environmental groups advocate removing Glen Canyon Dam or changing its operations even more dramatically to restore natural flows.



**FIGURE 7.** Glen Canyon Dam, Arizona. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Glen\\_Canyon\\_Dam](http://en.wikipedia.org/wiki/Glen_Canyon_Dam)]

**Sedimentation**

The upper Colorado River carries large amounts of silt. Between 1935 and 1963, an average of 91,500 AF of sediment was deposited each year in Lake Mead behind Hoover

Dam. Since 1964, when Glen Canyon Dam was finished upstream, there has been little accumulation of sediment behind Hoover Dam. Lake Powell behind Glen Canyon Dam, however, now collects between 65,000 and 90,000 AF of sediment each year.

### **Salinity**

The Bureau of Reclamation estimates that salinity causes between \$500-\$700 million in annual damage to crops and farmland in the United States. Estimates of damage to crop land in Mexico are not known.<sup>100</sup> High salinity is generally associated with return flows from irrigation. Water in the Upper Basin of the Colorado typically has 100-200 mg/l of total dissolved solids (“TDS”). In the early 1960s, the river near the Mexican border measured 1,500 mg/l – more than twice the natural salinity.

### **Uranium Tailings**

There are 130 acres of radioactive wastes, uranium tailings, near Moab, Utah. The Colorado River is less than 1,000 feet away. The U.S. Department of Energy has agreed to move the tailings by rail to Crescent Junction, Colorado, where the waste will be buried in a deep hole lined with a protective layer to prevent seepage. The cost is estimated at \$472 million. For the DOE’s Record of Decision, executed pursuant to its authority under the Uranium Mill Tailings Radiation Control Act, 42 U.S.C. 7901 et seq., see 70 Fed. Reg. 55358 (September 21, 2005). [www.gj.em.doe.gov/moab](http://www.gj.em.doe.gov/moab)

### **Restoration of the Salton Sea**

The Salton Basin is a 8,360-square mile, closed basin in the desert of Southern California and Mexico. The Basin was once part of the Colorado River delta. In 1905, flooding caused the Colorado River to break through the Alamo Canal and flow into the Basin for 18 months, forming what is now known as the “Salton Sea”. Since then, the Salton Sea – about 370 square miles – has been fed primarily by agricultural runoff from the Imperial, Coachella and Mexicali Valleys. At present, the Salton Sea is California’s largest lake. Inflows average about 1.3 MAF, carrying with it four millions tons of dissolved salt. Approximately 10-15% of the inflow comes from the New River in Mexico, one of the most polluted waterways in that country. There is no outlet. Water is lost only through evaporation.

The Salton Sea Authority, created under California law in 1993, has endorsed a diked impoundment to reduce salinity. [www.salttonsea.ca.gov](http://www.salttonsea.ca.gov)

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<sup>100</sup>High salinity makes it difficult to grow vegetables and fruits. Salt in water system damages household and municipal pipes.

### **The Colorado River Delta**

The International Boundary and Water Commission has called for cooperation between the United States and Mexico on ways to restore the Delta. See, IBWC Minute 306 approved in 2000.

In 2003, a federal district judge in Washington, D.C., rejected attempts to force the Bureau of Reclamation to increase flows in the United States to restore the Delta. *Defenders of Wildlife v. Norton*, 257 F.Supp.2d 53 (D.D.C. 2003)(the Bureau's authority to make additional releases would depend on changes to the U.S. Supreme Court's 1964 Decree, and the Bureau did not have the discretion to adjust water deliveries in Mexico). Nonetheless, the issue of increased flows to the Delta remains important. The Sonoran Institute in Arizona published a report in 2005 with conservation priorities for the Colorado River Delta in Mexico and the United States. A copy of the report can be found at [www.sonoran.org](http://www.sonoran.org).

## **6.6 CONFLICT RESOLUTION**

### **6.6.1 Congressional Allocation of Water or Power**

The last Congressional allocation of water on the Colorado River occurred in 1928, when Congress enacted the Boulder Canyon Project Act of 1928, 43 U.S.C. § 617.

The last Congressional allocation of power occurred in 1984, when Congress passed the Hoover Power Plant Act (Boulder Project Act amendments), 43 U.S.C. § 619a.

There is no pending legislation in Congress that would comprehensively reallocate water or power in the Colorado River Basin.

### **6.6.2 Administrative Allocation of Water or Power**

#### **Water**

The scope of the administrative authority of the Secretary of the Interior to reallocate water on the Colorado River is subject to debate. The Secretary has the authority, pursuant to Article II (B)(6) of the Decree in *Arizona v. California*, to deliver water allocated to one state into another state if the water would otherwise go unused. The Secretary of Interior has also exercised administrative authority to promulgate surplus regulations and to propose shortage regulations. Adoption of operating criteria for the Lower Basin, taking into account the management of Lake Powell (physically in the Upper Basin), may have the effect of enhancing water use, while not formally reallocating rights to water between basins or between states.

The Secretary has signed two important agreements that allow for voluntary transfers between water agencies:

a. Federal Quantification Settlement Agreement and Delivery Agreement

In 2003, the Secretary and four water agencies in California, as well as the State of California, signed the “Federal Quantification Settlement Agreement” to reduce California’s over-dependence on Colorado River by about 800,000 AF and limit annual diversions to 4.4 MAF. Record of Decision at 69 Fed. Reg. 12202 (March 15, 2004).

Although California had agreed to the 4.4 MAF limit in 1928, it had been drawing surplus water from the river, increasing its total withdrawals of Colorado River water to 5.2 MAF per year. The “extra” water available to California was met by diverting the unused apportionment of Arizona and Nevada. By 2003, Arizona and Nevada had reached full use of their apportionments and the declared surpluses of Colorado River water were expected to diminish or end.

The Federal Quantification Settlement Agreement, among other things, transferred up to 200,000 AF from the Imperial Irrigation District to the San Diego County Water Authority for up to 75 years, and allowed an additional 77,000 AF to flow annually to San Diego for 110 years. The additional water will be conserved by lining the All-American and Coachella canals with concrete to prevent seepage. In addition, the agreement transferred water from the IID to the Metropolitan Water District of Southern California (“MWD”)(110,000 AF).

The agreement also called for the state to restore the Salton Sea and to select a preferred alternative and funding mechanism by December 2006.

Also in 2003, the Secretary signed the companion “Colorado River Water Delivery Agreement.” The Delivery Agreement, among other things, reduced the diversions of the Imperial Irrigation District at Imperial Dam near the Mexican border and provided more water upstream behind Lake Havasu (Parker Dam) for the Colorado River Aqueduct, thus increasing the water supply in Los Angeles and San Diego.

b. Interstate Water Banking

Interstate water banking contracts reallocate future unused water from one state to another. In 1999, the Secretary adopted interstate water banking regulations (“Offstream Storage of Colorado River Water in the Development and Release of Intentionally Created Unused Apportionment in the Lower Division States”), 64 Fed. Reg. 59006 (Nov. 1, 1999). (See discussion below on Interagency and Multi-Party Agreements.)

**Power**

The Western Area Power Administration sells and delivers power from Colorado River dams to various wholesale customers, public and private. Section 9(a) of the Reclamation Act of 1939 requires Western to give preference to public agency and cooperative customers.

In 2004, as part of its Power Marketing Initiative, Western decided to extend its existing contracts for firm electric service (and *not* reallocate power among all potential eligible customers). Western reserved a small portion of the power at federal dams for new preference customers, primarily Native American Tribes.

Western's power sales contracts typically last for 20 years. The Hoover Dam contracts for firm electric customers expire in 2017. Western signed 20-year Glen Canyon Dam extension contracts in 2004. Western is in the process of signing 20-year contract extensions from the Parker-Davis Project to go into effect in 2008.

### **6.6.3 Judicial Allocation of Water or Power**

The last major opinion on the subject of Colorado water allocation was the U.S. Supreme Court's 1964 final decree in *Arizona v. California*, implementing the 1963 opinion. Subsequent decrees clarified certain limited issues but did not change the Court's basic holding that Congress had apportioned water in the Lower Basin when it enacted the Boulder Canyon Project Act of 1928. The several decrees of the Supreme Court in the case of *Arizona v. California* were consolidated by the Court in 2006.

### **6.6.4 Arbitration or Mediation**

Not used.

### **6.6.5 Litigation**

In 2003, the Navajo Nation sued the Department of Interior and other officials in federal district court in Arizona, demanding an allocation of Colorado River water. *Navajo Nation v. U.S. Department of Interior*, 03-cv-0507. The litigation is now on hold pending settlement talks. See, "Joint Status Report" submitted by the parties to the court (October 13, 2005). If the Navajo Nation lawsuit is successful, it could affect the interstate water banking program permitted pursuant to the Secretary of the Interior's regulations.

In 2005, economic interests in the Mexicali Valley, in Mexico, together with environmental interests in the United States, challenged the Secretary's construction of new lined portions of the All American canal in the U.S. District Court for Nevada. *Consejo de Desarrollo Economico de Mexicali v. United States*, 2006 WL 1788407 (D.Nevada 2006). The action was dismissed on issues of standing, exclusivity of the 1944 U.S. – Mexico Water Treaty and limitation of statutory mandate, under the National Environmental Policy Act, to consider environmental effects outside the United States. In 2006, the case was appealed to the Ninth Circuit Court of Appeals, which initially granted an injunction pending oral argument against commencement of construction of canal lining, *Consejo de Desarrollo Economico de Mexicali, et al v. United States*, (9<sup>th</sup> Cir. 06-16345.)

In 2006, environmental interests challenged the Secretary's operation of Glen Canyon Dam, seeking additional consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act and supplementation of the Secretary's environmental impact statement in support of the Secretary's 1996 adoption of an "adaptive management program" for the Grand Canyon. *Center for Biological Diversity, et al. v. United States Bureau of Reclamation*, No 3:06-cv-

00404-DGC, U.S. District Court, District of Arizona. The case was settled prior to action on summary judgment motions. The Bureau of Reclamation agreed to commence preparation of “environmental compliance documents.”

### **6.6.6 Infrastructure Improvements and Environmental Restoration**

Among the most important current infrastructure improvements and environmental restoration projects are:

#### **Lining of the All-American and Coachella Canals**

When complete, the lining of the All-American and Coachella Canals will prevent seepage of about 94,000 AF of water per year and will help California meet the diversion limits specified in the 2003 Quantification Settlement Agreement.

The project was authorized by Congress in 1988 in Pub. L. No. 100-675, 102 Stat. 4000, the San Luis Rey Indian Water Rights Settlement Act. The Act precluded the use of federal funds, thus requiring California water users to pay the Bureau of Reclamation for the cost of the project.

Work on the All-American Canal is scheduled for completion in 2008. The project consists of building a 23-mile concrete-lined canal parallel to the existing structure. Work on the Coachella Canal will likely finish in 2007. Water conserved will become available for use by California water agencies. California participants in the project include: the Imperial Irrigation District; the Coachella Valley Water District; the San Diego Water Authority; and the State of California. In 2003, the California legislature appropriated \$200 million to pay most of the construction expense.

In the past, water seeping from the All-American Canal flowed in a shallow aquifer to northern Mexico where it was used primarily for agriculture. Mexico had raised concerns about the loss of this water if the Canal is lined or a new canal built parallel to the leaking structure.

In 2005, a Mexican business group and two environmental groups sued the Bureau of Reclamation over the All-American Canal project. See section 6.6.5 above.

#### **The Upper Colorado River Endangered Fish Recovery Program**

The program involves a public-private partnership to recover fish on the upper portion of the Colorado River. The effort includes infrastructure improvements (i.e., retrofitting canals or enlarging reservoirs to make water available to augment flows for fish, etc.).

### **6.6.7 Interagency and Multi-Party Agreements**

#### **Interstate Water Banking**

The Secretary of Interior has promulgated regulations permitting “interstate water banking” arrangements between state and local government agencies in the lower Colorado River Basin. 43 CFR § 414.

In 2002, the Arizona Water Banking Authority agreed to store or “bank” 1.25 MAF for the Southern Nevada Water Authority. The SNWA agreed to pay the Authority \$300 million over the life of the contract (\$240 per AF).

The water banking transactions consist of four separate components:

- Nevada requests that Arizona place a specific quantity of water (not to exceed 100,000 AF per year) in an aquifer in Arizona for storage.
- At a later date, when Nevada needs the water, it directs that Arizona retrieve the water and use it for Arizona’s own use.
- Arizona then forebears (relinquishes) an identical amount of water from its apportionment from the Colorado River, creating an “intentionally created unused apportionment” or “ICUA.” Arizona directs the Secretary of Interior to deliver this water to Nevada.
- The Secretary of Interior delivers Arizona’s unused apportionment to Nevada. The Colorado River Commission of Nevada and Southern Nevada Water Authority have signed a similar agreement with the Metropolitan Water District of Southern California.

These arrangements are made pursuant to Section II(B)(6) of the U.S. Supreme Court Decree of 1964, which authorized the Secretary of the Interior to contract for the storage and delivery of Colorado River water. *Arizona v. California*, 376 U.S. 340 (1964).

#### **Endangered Species Act Programs**

There are two Colorado River Basin programs involving federal agencies and multiple parties (public and private) that attempt to resolve ESA problems. The first is the Upper Colorado River Endangered Fish Recovery Program. The second is the Lower Colorado River Multi-Species Conservation Program.

#### **Salt River Project Agreement**

In 1994, the Bureau of Reclamation and Corps of Engineers entered into an operating agreement with the Salt River Project in Arizona and with the Central Arizona Water Conservation District in which the SRP would schedule and operate the federal share (546 MW) of the Navajo Generating Station (coal plant). The agreement expires in 2016.

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## 7.0 THE RIO GRANDE

### 7.1 INTRODUCTION

The first human settlements in the Rio Grande Basin date back to 700 B.C. or even earlier, and contain the oldest continually-inhabited parts of the United States. In 1848, the United States acquired large parts of the basin at the end of the Mexican-American War.

The source of the Rio Grande is in Colorado. From there the river flows south, bisecting New Mexico and crossing into Texas near El Paso. The river then changes direction: for 1,254 miles it flows mostly southeast, forming the international boundary between the United States and Mexico. The southern half of the Rio Grande Basin lies in the Chihuahuan Desert, the largest arid tract in North America.

Known as the Rio Grande in the United States and as the Rio Bravo del Norte in Mexico, this 1,952-mile river drains more than 336,000 square miles. About 55% (186,000 miles) of the basin is in the United States.



**FIGURE 8.** Map showing the Rio Grande and Pecos River Basins.  
[Source: USGS, found at: <http://nm.water.usgs.gov/>.]

In the U.S., the Rio Grande drains parts of three states (Colorado, New Mexico and Texas). In Mexico, the river drains parts of five states in Mexico (Chihuahua, Coahuila, Nuevo Leon, Tamaulipas, and Durango).

Major tributaries to the river in the United States include the: Pecos River;<sup>101</sup> Chama River (“Rio Chama”); Conejos River; Jemez River and Devils River. In Mexico, major tributaries include the: Rio Conchos; Rio Salado; and Rio San Juan.

In southern Colorado, the Rio Grande has an average annual flow of 654,000 AF. When the river flows into New Mexico, it has an average annual flow of 327,000 AF. In central New Mexico, the Rio Grande has an average annual flow of 1.1 MAF at Otowi Bridge, near Santa Fe. In southern New Mexico at Elephant Butte Dam, the average annual flows are 821,000 AF into the reservoir.<sup>102</sup> Below the dam, however, the Rio Grande is so diverted it has very low flows for much of the year near El Paso, Texas. The river resumes again 290 miles downstream at the confluence with the Rio Conchos, a Mexican tributary with average annual flows of about 646,000 AF. Downstream, the Rio Grande is joined by the Pecos River from Texas, which has average annual flows of 189,000 AF. Farther downstream, the river is diverted again. On average, 1.6 MAF reaches Brownsville, Texas, the last gauge before the Gulf of Mexico. In times of serious drought, however, the river has run dry.

Approximately 7 million people reside in the Rio Grande River Basin in both the United States and Mexico. Cities adjacent to the river include: Albuquerque (NM); Las Cruces (NM); Brownsville (TX); El Paso (TX); Ciudad Juarez (Mexico); Ciudad Acuna (Mexico); Piedras Negras (Mexico); Nuevo Laredo (Mexico); and Matamoros (Mexico).

## **7.2 USES OF THE RIO GRANDE**

The Rio Grande, as shaped by man, consists of four distinct segments:

- The sparsely-populated upper river in the San Juan Mountains and San Luis Valley, a high desert area of southern Colorado;
- Central New Mexico, the “Middle Rio Grande,” where the river flows through Albuquerque;
- Southern New Mexico, the “Rio Grande Project” at Elephant Butte and Caballo Dams. From there, the river flows through El Paso, Texas, where it is diverted primarily for irrigation and municipal water supplies; and
- The lower river, which forms the international border between Texas and Mexico, parts of which are too dry or polluted for human use until tributaries restore flows.

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<sup>101</sup>Because the Pecos River has its own discrete legal regime, the laws of the river on the Pecos are discussed separately from the Rio Grande in section 7.3

<sup>102</sup>Source: New Mexico Interstate Stream Commission (2006). There are two channels that convey water into Elephant Butte Reservoir: the Low Flow Conveyance Channel (“LFCC”); and the Rio Grande (floodway). The 821,000 AF figure represents the average annual flows from both sources.

By the time the Rio Grande reaches the Gulf of Mexico, about 95% of the water has been diverted. Of that amount, 80% is used for agricultural purposes.

The U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers (“Corps of Engineers”) both own dams in the Rio Grande Basin. The International Boundary and Water Commission (“IBWC”) also owns two large dams, Falcon and Amistad, in the lower Rio Grande. The dams straddle the international border between the United States and Mexico.



**FIGURE 9.** The Rio Grande near Brownsville, Texas.  
[Source: Wikipedia,  
<http://en.wikipedia.org/wiki/Image:Matamoros008.JPG>]

As is the case for many rivers in the arid southwest, the Rio Grande is over-appropriated: there are more users for the water than there is water in the river.

### **7.2.1 Hydropower**

There are 21 dams along the Rio Grande and its tributaries in the United States. Only five dams in the United States have the ability to generate hydropower: Elephant Butte Dam (28 MW); El Vado Dam (8 MW);<sup>103</sup> Abiquiu Dam (13 MW); Falcon (32 MW); and Amistad (66 MW). See **Appendix B** for details. The total generating capacity of all dams in the U.S. portion of the Rio Grande Basin is 147 MW.

The Western Area Power Administration, a federal power marketing agency, sells power from Elephant Butte Dam in New Mexico. Western also sells power from the U.S. share of the Falcon-Amistad Dams. There is little federal transmission infrastructure. Power from the Falcon-Amistad Dams is delivered directly to two rural electric cooperatives in Texas: Medina Electric Cooperative and South Texas Electric Cooperative.

### **7.2.2 Navigation**

There is no significant commercial navigation along the Rio Grande upstream from the Gulf of Mexico.

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<sup>103</sup>The ownership of El Vado Dam is currently the subject of federal district court litigation in New Mexico. The U.S. Bureau of Reclamation and the Middle Rio Grande Conservancy District (“MRGCD”) both claim title to the dam and related infrastructure.

### 7.2.3 Water Supply

Total reservoir storage in the Rio Grande Basin in both the U.S. and Mexico is 12.2 MAF, divided equally between the two countries. Two million acres of farm land – half in the U.S. and half in Mexico – are irrigated with water from the river.

**Table 15** shows the seven largest reservoirs in the Rio Grande Basin.

**TABLE 15.** The largest seven reservoirs in the Rio Grande Basin.

<b>Name</b>	<b>River</b>	<b>State</b>	<b>Capacity (MAF)</b>
Amistad	Rio Grande	Texas-Coahuila	3.151
Falcon	Rio Grande	Texas-Tamaulipas	2.653
La Boquilla	Rio Conchos	Chihuahua	2.353
Elephant Butte	Rio Grande	New Mexico	2.065
Abiquiu	Rio Chama	New Mexico	1.201
Venustiano Carranza	Rio Salado	Coahuila	1.122
El Cuchillo	San Juan	Nuevo Leon	0.091

The major irrigation projects in the Rio Grande Basin in the United States are as follows:

#### **The San Luis Valley Project**

The Bureau of Reclamation’s San Luis Valley Project in Colorado irrigates 81,000 acres. The projects consist of Platoro Dam on the Conejos River, a tributary of the Rio Grande, and the Closed Basin wells. Private irrigation on 400,000 acres brings the total to 500,000 acres.

#### **The Middle Rio Grande**

The Middle Rio Grande Conservancy District (“MRGCD”) irrigates 55,000 acres in central New Mexico. The district manages El Vado Dam and three diversion dams (Angostura, Isleta and San Acacia). The Middle Rio Grande Project began in the 1950s. The MRGCD and the U.S. Bureau of Reclamation are contesting title of the dams and related infrastructure. *Rio Grande Silvery Minnow v. Keys*, case no. 05-2315, now pending in the U.S. Court of Appeals for the Tenth Circuit. [www.mrgcd.com](http://www.mrgcd.com)

#### **The Rio Grande Project**

The Bureau’s Rio Grande Project irrigates 178,000 acres in New Mexico and Texas. The Rio Grande Project originally consisted of Elephant Butte Dam, but now includes Caballo Dams, six diversion dams (Percha, Leasburg, Mesilla, American and Riverside) and various canals. Some water – 60,000 AF, pursuant to the 1906 treaty between the United States and Mexico – is delivered to Mexico by the International Boundary and Water Commission to irrigate 25,000 acres.

The Elephant Butte Irrigation District and the El Paso County Water Improvement District No. 1 receive water from the reservoir behind Elephant Butte Dam. The districts operate and maintain a water distribution system built originally by the U.S. Bureau of Reclamation. See, [www.ebid-nm.org](http://www.ebid-nm.org) and [www.epcwidl.org](http://www.epcwidl.org)

### **The Lower Rio Grande**

Water from the Falcon-Amistad Dams on the lower Rio Grande is used for irrigation and municipal purposes in Texas. Total diversions vary significantly from year to year, but average between 800,000 AF and 1.2 MAF. Municipal use has priority over agriculture, pursuant to Texas water law and average between 235,000 and 262,000 AF per year.<sup>104</sup>

### **San-Juan Chama Project**

The Bureau's San Juan-Chama Project supplies on average 96,200 AF per year from the Colorado River Basin to the Rio Grande Basin in northern New Mexico. The water is used for irrigation and other purposes. Heron Dam in New Mexico was originally the only reservoir designated to receive San Juan-Chama water, but some deliveries are now stored in two downstream dams in New Mexico, Abiquiu (Corps of Engineers) and El Vado (USBR/MRGCD).<sup>105</sup> The water stored behind these dams goes to municipal and industrial users. The City of Albuquerque is the largest consumer.

### **The Pecos River**

On the Pecos River in northeast New Mexico, the Carlsbad Project includes the Santa Rosa Dam, built by the Corps of Engineers, and three dams built by the Bureau (Sumner, Brantley and Avalon). The project irrigates 25,000 acres.

## **7.2.4 Flood Control**

The Corps of Engineers operates four flood control dams on the Rio Grande in New Mexico: Jemez Canyon; Abiquiu; Galisteo; and Cochiti. In addition, the Corps has built levees near Albuquerque, Las Cruces, New Mexico, and El Paso, Texas. Levees are also in place between Cochiti Reservoir and San Marcial. The Corps is currently reconstructing 43.5 miles of existing bank levee along the river near Albuquerque, New Mexico. The Corps also loans money for the repair and rehabilitation of acequias (community irrigation ditches) that irrigate approximately 160,000 acres. Many of the acequias have been in existence since Spanish colonization in the 17th and 18th centuries.

The International Boundary and Water Commission ("IBWC") owns and maintains flood control and related projects in the Rio Grande Basin, including the Rio Grande Canalization and

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<sup>104</sup>E-mail from Texas Water Master, March 3, 2006.

<sup>105</sup>Over the years, San Juan Chama water has been stored in other New Mexico reservoirs: McClure and Nichols on the Santa Fe River; Nambé Falls Reservoir on the Rio Nambé; Cochiti and Elephant Butte on the Rio Grande; and Jemez Canyon on the Jemez River.

Rectification Project, which extends upstream from El Paso, Texas. Although located entirely in the United States, the IBWC maintains the infrastructure to assure delivery of water pursuant to the 1906 Water Treaty. The project includes levees for flood control protection. The IBWC also owns and maintains levees on 180 miles on the lower Rio Grande, between Falcon Dam and Brownsville, Texas.

### **7.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” on the Rio Grande are:<sup>106</sup>

1. The Treaty of Guadalupe Hidalgo of 1848, 9 Stat. 922 and 18 Stat. 492, between the United States and Mexico, established the Rio Grande as the boundary line between the two countries.
2. The Convention between the United States and Mexico of 1889, 26 Stat. 1512, created the International Boundary Commission, later called the International Boundary and Water Commission. The Commission’s primary duties were to survey and maintain the international boundary along the Rio Grande and Colorado Rivers.
3. In 1895, the Secretary of the Interior approved a proposal by a private entity, the Rio Grande Company, to build Elephant Butte Dam.
4. In 1896, the Secretary of the Interior, at the request of downstream users in Texas concerned about the over-allocation of the river, ordered an “embargo” on further irrigation development of the Rio Grande Basin in Colorado and New Mexico. To implement the embargo, the Secretary suspended the issuance of right-of-way permits across federal land.
5. In 1905, Congress authorized the U.S. Bureau of Reclamation, rather than private interests, to build the Rio Grande Project, consisting of a dam at Engle, New Mexico (Elephant Butte Dam), as a federal irrigation project. Pub. L. No. 58-104, 33 Stat. 814. The Act also extended the Bureau’s authority under the 1902 Reclamation Act to a portion of Texas bordering the Rio Grande, thus allowing Texas to receive water from the Rio Grande Project.
6. In 1906, the federal government, pursuant to an ordinance adopted in the Territory of New Mexico, appropriated two million acres of water from the Rio Grande for storage at Elephant Butte Dam.
7. The Convention between the United States and Mexico of 1906, (“the 1906 Treaty”), 34 Stat. 2953, allocated water to Mexico and settled an international dispute over upstream diversions. Under the 1906 Treaty, the United States was obligated to deliver 60,000 AF to Mexico after completion of Elephant Butte Dam

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<sup>106</sup>The laws on the Pecos River are discussed separately in this section.

- and the distribution system (i.e., canals). The water was to be delivered at no cost to the Mexican border. Articles II and III. In return, Mexico waived its rights to water in the Rio Grande between El Paso and Fort Quitman (80 miles downstream). Article IV. Mexico and the United States agreed to prorate shortages in case of “extraordinary drought or serious accident” to the irrigation system in the United States. Article II.
8. In 1925, the Secretary of the Interior suspended the 29-year-old water embargo in Colorado and New Mexico.
  9. In 1928, Congress authorized the Secretary of the Interior to enter into an agreement with the Middle Rio Grande Conservancy District, a subdivision of the State of New Mexico, to build irrigation and flood control works for certain Pueblo (Indian) lands and to preserve Pueblo water rights, Pub. L. No. 70-169, 45 Stat. 312.
  10. In 1930, Congress consented to a temporary (interim) interstate water compact on the Rio Grande between Colorado, New Mexico and Texas. The Compact maintained the status quo on major diversion projects, pending negotiations for a final compact. Pub. L. No. 71-370, 46 Stat. 767 (1930). For a brief discussion of this history, see *City of El Paso v. Reynolds*, 563 F. Supp. 379, 383-384 (D.N.M. 1983).
  11. The Convention between the United States and Mexico of 1933, 48 Stat. 1621, authorized the United States to build Caballo Dam in New Mexico, 17 miles downstream of Elephant Butte Dam. The Convention also authorized other projects, including the Rio Grande Rectification Project, which straightened and stabilized a 105-mile portion of the river upstream of El Paso, Texas.
  12. In 1935, Texas sued New Mexico and the Middle Rio Grande Conservancy District in the U.S. Supreme Court, seeking to enjoin water diversions from Elephant Butte Dam. The Court appointed a special master, *Texas v. New Mexico*, 298 U.S. 644 (1936).
  13. In 1935, Congress extended the life of the temporary Rio Grande compact, Pub. L. No. 74-98, 49 Stat. 325, pending negotiations for a permanent compact.
  14. In 1936, Congress enacted the Rio Grande Canalization Project in New Mexico to build a canal from Caballo Reservoir to the southern part of the state. Pub. L. No. 74-648, 49 Stat. 1463.
  15. In 1939, negotiators from Colorado, New Mexico and Texas reached an agreement on a permanent Rio Grande Compact, and Congress consented to the agreement. Pub. L. No. 76-96, 53 Stat. 785. The Compact, among other things, established limits on how much water Colorado and New Mexico could consume from the river before it flowed into the neighboring downstream state.

Once the Compact was approved, Texas dismissed its 1935 lawsuit in which it sought to enjoin diversions. *Texas v. New Mexico*, 308 U.S. 510 (1939).

The essential elements of the Rio Grande Compact were:

- Colorado was required to deliver water to the New Mexico border based on two gauges, one on the Rio Grande, the other on a tributary, the Conejos River;
- New Mexico was obligated to deliver water to Elephant Butte Reservoir, which in effect became the border with Texas for purposes of the Texas's rights under the compact;
- Both Colorado and New Mexico could accrue debits (under delivery of water) or credits (over delivery) with specified limits and conditions; and
- Colorado consented to the diversion of waters from the San Juan Basin in the Colorado River to the Rio Grande. Article IX. Pursuant to this provision, Congress approved the San Juan-Chama Project (diversion) in 1962.

To administer its provisions, the Compact established a four-member Rio Grande Commission, composed of one member from each state and a non-voting representative of the United States, named by the President, who serves as commission chairman.

16. In 1944, Congress enacted the Flood Control Act, Pub. L. No. 78-534, 58 Stat. 887, which authorized the U.S. Bureau of Reclamation to construct Platoro Dam in Colorado on the Conejos River, a tributary of the Rio Grande.
17. The U.S.-Mexico Treaty of 1944 (“The Treaty Respecting Utilization of Waters of the Colorado and the Tijuana Rivers and of the Rio Grande”)(“the 1944 Water Treaty”), 59 Stat. 1219, authorized the two countries to construct, operate and maintain dams on the lower Rio Grande. [The Treaty also gave Mexico 1.5 MAF from the Colorado River. See Colorado River chapter of this report.]

The 1944 Water Treaty changed the name of the International Boundary Commission to the International Boundary and Water Commission and gave it significant new duties in the area of water allocation, flood control, border sanitation and other areas.

The 1944 Water Treaty, however, only allocated waters downstream of Fort Quitman, Texas (80 miles south of El Paso). The agreement did not address upstream water allocation issues between the United States and Mexico, which were (and are to this day) covered by the 1906 Water Treaty.

The 1944 Water Treaty allocated the following waters to the United States:

- One-half of the flows in the main channel of the Rio Grande downstream from Fort Quitman, Texas;
- All of the flow into the Rio Grande from the Pecos River in Texas and other named rivers in the United States; and
- One-third of the flow from the Rio Conchas and five other tributaries in Mexico that flow into the Rio Grande, provided that this flow shall not be less than 350,000 AF as an average amount over five consecutive years.

The 1944 Water Treaty allocated the following waters to Mexico:

- One-half of the flow in the main channel of the Rio Grande downstream from Fort Quitman, Texas;
- All of the flows reaching the Rio Grande from the San Juan and Alamo Rivers in Mexico; and
- Two-thirds of the flow from the Rio Conchas and five other tributaries in Mexico that flow into the Rio Grande.

In total, the Treaty allocated 58% of the Rio Grande's average annual flow to the United States and 42% to Mexico.

18. In 1948, Congress enacted the Flood Control Act, Pub. L. No. 80-858, 62 Stat. 1171, which authorized the Middle Rio Grande Project in central New Mexico. The Act authorized the Corps of Engineers to build two dams: 1) Abiquiu Dam on the Chama River; and 2) Jemez Canyon Dam on the Jemez River. The projects were the first major Corps dams in the Rio Grande Basin.
19. In 1951, Texas sued New Mexico and the Middle Rio Grande Conservancy District in the U.S. Supreme Court, seeking to enjoin of diversions from the Rio Grande until the defendants lowered their 200,000 AF "water debt" to Texas. The Court dismissed the suit in 1957 because it failed to include the United States as an indispensable party. *Texas v. New Mexico*, 352 U.S. 991 (1957).
20. In 1955, a federal district court in Texas held that water belonging to Texas was committed to the service of the Rio Grande Project. A Texas statute giving priority to municipal water agencies did not give the City of El Paso, Texas, a right to appropriate water that was already appropriated and governed by the Rio Grande Compact of 1939. *El Paso Water Improvement District v. City of El Paso*, 133 F. Supp. 894, 907 (W.D.Tex. 1955), *aff'd on other grounds*, 243 F.2d 927 (5th Cir. 1957), *cert. denied*, 355 U.S. 820 (1957).
21. In 1960, Congress authorized the U.S. Bureau of Reclamation to participate with Mexico in the construction of Amistad Dam to span the Rio Grande between Texas and Mexico. Pub. L. No. 86-605, 74 Stat. 360. The dam had been authorized by the U.S.-Mexico Water Treaty of 1944.

22. In 1960, Congress enacted the Flood Control Act, Pub. L. No. 86-645, 74 Stat. 480, 492-494, which authorized the Corps of Engineers to build two more dams in central New Mexico: 1) Cochiti on the Rio Grande; and 2) Galisteo near the confluence of Galisteo Creek and the Rio Grande.
23. In 1962, Congress approved the San Juan-Chama Project Act, Pub. L. No. 87-483, 76 Stat. 96, which authorized the U.S. Bureau of Reclamation to build the San Juan-Chama Transmountain Diversion Project, including Heron Dam on the Chama River, and other structures on the upper Rio Grande. Colorado had given a conditional consent to the diversion when it signed the Rio Grande Compact of 1939 (Article IX). The Act amended the Colorado River Storage Act of 1956 to allow for diversion of water from tributaries in the San Juan River in the Colorado River Basin into the Chama River in the upper Rio Grande Basin, 43 U.S.C. § 620a. Heron Dam in New Mexico was authorized to accept only San Juan-Chama water and not “native” water (originating east of the Continental Divide).
24. In 1963, Congress authorized the U.S. Bureau of Reclamation to participate with Mexico in the construction of Falcon Dam to span the Rio Grande between Texas and Mexico, downstream of Amistad Dam. Pub. L. No. 88-237, 77 Stat. 475. The dam had been authorized by the U.S.-Mexico Water Treaty of 1944.
25. The Chamizal Convention between the United States and Mexico of 1963, TIAS 5515, 15 UST 21, resolved a long-standing border dispute between the two countries concerning 600 acres in or adjacent to El Paso, Texas. The Convention transferred approximately 437 acres to Mexico, pursuant to a 1911 arbitration recommendation. The U.S. and Mexico agreed to share equally in the cost of rechanneling the river.
26. In 1966, Texas and New Mexico sued Colorado in the U.S. Supreme Court, alleging that Colorado’s accrued water debt impermissibly exceeded 900,000 AF under the Rio Grande Compact of 1939. The Court stayed the case pending negotiations between the parties. *Texas and New Mexico v. Colorado*, 391 U.S. 901 (1968). The lawsuit was ultimately dismissed in 1985 after Elephant Butte Dam in New Mexico spilled excess water for Texas. 474 U.S. 1017 (1985).
27. The Treaty between the United States and Mexico of 1970, TIAS 7313, 23 UST 371, resolved the remaining boundary issues along the Rio Grande and Colorado River. The International Boundary and Water Commission implemented the Treaty’s provisions.
28. In 1972, Congress enacted the Closed Basin Project Act, Pub. L. No. 92-514, 86 Stat. 964, which authorized construction of 170 wells in San Luis Valley near Alamosa, southern Colorado, to pump groundwater and discharge 60,000-140,000 cfs into the Rio Grande.
29. In 1981, Congress expanded the authority of the U.S. Bureau of Reclamation to store water from the San Juan-Chama Project in two other downstream reservoirs

- in New Mexico: Elephant Butte and Abiquiu. Pub. L. No. 97-140, 95 Stat. 1717. Previously, only Heron Dam was authorized to accept San Juan-Chama water.
30. In 1983, a federal district court judge in New Mexico invalidated a New Mexico statute that prohibited the export of ground water out of state. The decision followed the U.S. Supreme Court opinion in *Sporhase v. Nebraska*, 458 U.S. 941 (1982). *City of El Paso v. Reynolds*, 563 F.Supp. 379, 383-384 (D.N.M. 1983).
  31. In 1987, Congress enacted the Rio Grande Pollution Correction Act, which, among other things, authorized the International Boundary and Water Commission to address cross-border problems of pollutants “caused by discharges of raw and inadequately treated sewage and other wastes” that flow into the river from Mexico and United States. 22 U.S.C. § 277g(a).
  32. In 1992, Congress enacted the Jicarilla-Apache Tribe Water Rights Settlement Act, Pub. L. No. 102-441, 106 Stat. 2237, which gave the tribe an annual allotment of 6,500 AF from the San Juan-Chama Project in New Mexico. [The Act also gave the tribe an allotment of 33,500 AF to Colorado River water in the Navajo Basin in New Mexico. See Colorado River chapter for details.]
  33. In 1993, the United States and Mexico signed the North American Free Trade Agreement (“NAFTA”), 32 I.L.M. 289 (parts 1-3); 32 I.L.M. 605 (parts 4-8)(entered into force January 1, 1994). Subsequent to the approval of NAFTA, the United States and Mexico agreed to establish the North American Development Bank and the Border Environment Cooperation Commission to fund infrastructure improvements along the border between the two countries.
  34. In 2002, the U.S. Court of Appeals for the Tenth Circuit rejected attempts by the federal government to quiet title in federal district court to water rights in the Rio Grande Basin. The Court held that the lower court was within its discretion to decline jurisdiction on grounds that state water law governed the rights of the parties. *U.S. v. City of Las Cruces*, 289 F.3d 1170 (10th Cir. 2002).
  35. In 2003, the International Boundary and Water Commission approved Minute 309. The Minute allocated water “saved” from efficiency projects in Mexico. The Minute said Mexico’s savings of 321,000 AF would flow into the Rio Conchas and then the Rio Grande, thus allowing the United States to obtain one-third of the benefits of the savings, pursuant to the U.S. - Mexico Water Treaty of 1944.

In chronological order, the major “laws of the river” on the Pecos River are:

1. In 1949, Congress consented to an interstate compact on the Pecos River, one of the largest tributaries in the Rio Grande Basin. The Pecos River Compact, Pub. L. No. 81-91, 63 Stat 159, apportioned water between New Mexico and Texas. The Pecos, which drains eastern New Mexico and parts of Texas, joins the Rio Grande near Langtry, Texas, at the upper end of what is now Amistad Reservoir. The Compact was 20 years in the making. The crucial provision in the Compact prohibited New Mexico from depleting the flow of the river at the New Mexico-

Texas boundary below an amount available to Texas under conditions measured in 1947.

2. In 1983, the U.S. Supreme Court issued the first of several decisions on the Pecos River. Texas had invoked the original jurisdiction of the Court, seeking a decree compelling New Mexico to deliver water in accord with the Pecos River Compact of 1949. A special master recommended, among other things, that the federal commissioner or some other third party be given a vote on the Pecos River Commission to break a deadlock between Texas and New Mexico. To this particular recommendation, both New Mexico and the federal government filed exceptions.

The Court concluded that the Pecos River Compact did not create a procedure to break a deadlock between New Mexico and Texas. Under the terms of the Compact, the federal representative was a non-voting member. The justices declined to reform the Compact or provide a remedy by granting voting rights to the federal representative, despite the “paralyzing” impasse that gave rise to the suit. *Texas v. New Mexico*, 462 U.S. 554, 565 (1983). Once Congress consented to a compact, the agreement was transformed into the law of the United States, and “no court may order relief inconsistent with its express terms.” *Id.* at 564.

The Supreme Court noted that the 1947 condition apparently overstated the flows in the river. But the solution was for New Mexico and Texas to “consider amending their Compact.” *Id.* at 565. “Time and time again we have counseled States engaged in litigation with one another...that their dispute ‘is one more likely to be wisely solved by co-operative study and by conference and mutual concession...[rather] than by proceedings in any court however constituted.’” *Id.* at 575, quoting *New York v. New Jersey*, 256 U.S. 296, 313 (1921).

3. In 1987, the Pecos River dispute was back in the U.S. Supreme Court, which held that New Mexico had failed pursuant to the Pecos River Compact of 1949 to deliver 340,100 AF to Texas over the past 33 years. *Texas v. New Mexico*, 482 U.S. 124 (1987). Although New Mexico believed it had behaved in good faith, the Court said New Mexico was not relieved from its duties under the Compact. “[G]ood faith differences about the scope of contractual undertakings do not relieve either party from performance.” *Id.* at 129. The Court remanded the case back to a Special Master to determine if New Mexico’s debt should be repaid in money or water. The Court appointed a River Master to make an accounting of annual water deliveries. *Texas v. New Mexico*, 485 U.S. 388 (1988).
4. In 1990, the U.S. Supreme Court approved the Pecos River settlement under which New Mexico paid Texas \$14 million. *Texas v. New Mexico*, 494 U.S. 111 (1990)(stipulated judgment).

## **7.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Bureau of Reclamation and Corps of Engineers each own dams and manage portions of the Rio Grande. The Bureau operates its dams on the river primarily for irrigation. The Corps of Engineers operates its dams for flood control and occasionally for sediment control.

### **7.4.1 Long-term Operational Strategy**

There is no single entity responsible for developing a comprehensive, long-term, operational strategy for the Rio Grande River in the United States and Mexico – or even within the U.S. border. As stated previously, the river is essentially divided into four different segments for purposes of water allocation and river management:

- The upper river in the San Luis Valley of southern Colorado;
- The river in central New Mexico, in the vicinity of Albuquerque, where it is used for farming and municipal purposes;
- The area in southern New Mexico, where the Bureau owns Elephant Butte and Caballo Dams, and where the river is largely diverted for irrigation and water supplies as part of the Rio Grande Project. Here, the 1906 Treaty with Mexico plays an essential role by requiring the United States to deliver 60,000 AF to the border; and
- The lower river, where the International Boundary and Water Commission has built the Falcon-Amistad Dams, pursuant to the U.S.-Mexico Water Treaty of 1944.

### **7.4.2 Short-term Operational Strategy**

#### **Middle Rio Grande (central New Mexico)**

The Bureau, Corps of Engineers and Middle Rio Grande Conservancy District prepare a joint Annual Operating Plan (“AOP”) for the portion of the Rio Grande above Elephant Butte Dam.

The 2003 Emergency Drought Water Agreement also plays a key role. The agreement expires in 2013. See “Interagency and Multi-Party Agreements”

The Bureau, Corps of Engineers and the New Mexico Interstate Stream Commission (“NMISC”) have proposed a joint Water Operations Review and accompanying environmental impact statement for the portion of the Rio Grande north of Caballo Dam, New Mexico. If adopted in 2006, as scheduled, the Water Operations Review would allow the agencies to more effectively coordinate river operations and optimize reservoir levels. The NMISC is responsible for assuring state compliance with New Mexico’s interstate compacts.

#### **The Rio Grande Project (southern New Mexico and Texas)**

There is no agreed-upon operating plan for the Lower Rio Grande Project between Elephant Butte Dam in New Mexico and the border with Texas. The U.S. Bureau of Reclamation delivers Mexico’s 60,000 AF, pursuant to the 1906 Treaty. That amount,

however, represents only between seven and eight percent of total withdrawals. The rest goes to the United States and is split between New Mexico and Texas. The Bureau relies on contracts and historical practice to distribute water to Elephant Butte Irrigation District (New Mexico) and the El Paso County Water Improvement District (Texas). The lack of an operating agreement, combined with an ongoing New Mexico state court adjudication of water rights, has the potential to raise serious conflicts between New Mexico and Texas.

### **The Lower Rio Grande in Texas**

In the lower basin, the Texas Water Master controls water diversions. By Texas law, municipal use receives preference over agricultural use. [www.tceq.state.tx.us](http://www.tceq.state.tx.us)

#### **7.4.3 River Accounting Mechanisms**

There are several river accounting mechanisms that record “who got or gets what” from the Rio Grande.

The Rio Grande Compact of 1939 specifies the location of river gauges to measure diversions and flows along the river in the United States. The Rio Grande Compact Commission publishes an annual report. [www.tceq.state.tx.us/nav/util\\_water/interstate.html](http://www.tceq.state.tx.us/nav/util_water/interstate.html)

The Pecos River Compact of 1949 authorizes the Pecos River Commission to require the signatory states of New Mexico and Texas to disclose the amount of water consumed and flows in the river. Article V(d). The commission publishes an annual report. [www.tceq.state.tx.us/nav/util\\_water/interstate.html](http://www.tceq.state.tx.us/nav/util_water/interstate.html)

The U.S.-Mexico Water Treaty of 1944 requires the International Boundary and Water Commission to “keep a record of the waters belonging to each country,” taking into account the consumptive uses, withdrawals and losses. Article 9. The IBWC posts annual flow data between Elephant Butte Dam in New Mexico and the Gulf of Mexico on its web site. [www.ibwc.state.gov/wad/Water\\_Bulletin\\_73.pdf](http://www.ibwc.state.gov/wad/Water_Bulletin_73.pdf)

The Bureau of Reclamation posts deliveries from Elephant Butte Dam to Elephant Butte Irrigation District and the El Paso County Water Improvement District on its web site.

The Texas Water Master records diversions from behind Falcon-Amistad Dams.

#### **7.4.4 The Role of Interstate Compacts**

One interstate compact, the Rio Grande Compact of 1939, apportions water on the Rio Grande:

### **The Rio Grande Compact of 1939**

The Rio Grande Compact was signed by Colorado, New Mexico and Texas. The Compact affects river management in Colorado (including the Closed Basin) and New Mexico, but *not* the drainage area below Ft. Quitman, Texas, 80 miles southeast of El

Paso. The Compact therefore excludes 1,175 miles of the river – the entire border between Texas and Mexico – from the scope of the agreement.

The Compact contains tables identifying Colorado’s obligations to deliver water downstream to New Mexico, and for New Mexico to deliver water downstream to Elephant Butte Reservoir.

Unlike many other compacts, where an upstream state agrees to deliver a set quantity to the downstream state(s), the Rio Grande Compact establishes indexes based on variable flows. E.g., if a certain amount of water flows past gauge X, then New Mexico has an obligation to deliver quantity Y to Elephant Butte Reservoir.

On average, Colorado consumes between 50-75% of the Rio Grande before it reaches New Mexico. Article II describes Colorado’s requirements under the Compact. The Rio Grande then receives additional water from tributaries in New Mexico.

The Compact allows Colorado and New Mexico to accrue debits and credits under certain conditions. Article VI.

The Compact prohibits Colorado and New Mexico from increasing storage within their borders if there is less than 400,000 AF of usable water in Elephant Butte and Caballo Reservoirs. Article VII. Usable water is the combined content of Elephant Butte and Caballo Reservoirs, less the accrued credits of Colorado and New Mexico, and less any San Juan-Chama water in Elephant Butte Reservoir.

This restriction became particularly important in the early 2000s. A long drought reduced levels below 400,000 AF in 2002, triggering “Article VII conditions.” New Mexico, however, had “credit” water from previous wet years and was therefore able to reach an accord with Texas. New Mexico relinquished its credit water, which Texas agreed to accept in phases, thus allowing New Mexico to store water upstream in the Middle Rio Grande area for municipal water supply and for instream flows for threatened and endangered species.

The Compact does *not* identify how much water is supposed to cross the border between New Mexico and Texas. Instead, the Compact addresses water released from Elephant Butte Dam, leaving for another day the issue of how much water downstream users in southern New Mexico can divert before the Rio Grande crosses the border into Texas.

Two irrigation districts currently have priority contract rights to withdraw water from Elephant Butte reservoir:

- Elephant Butte Irrigation District (“EBID”) in Las Cruces, New Mexico, receives 57% of the water from the U.S. Bureau of Reclamation’s Rio Grande Project, which includes Elephant Butte and Caballo Dams. [www.ebid-nm.org](http://www.ebid-nm.org)
- El Paso County Water Improvement District in Texas receives the remaining 43% of the water. [www.epcwidl.org](http://www.epcwidl.org)

When return flows are counted, the actual useable amount for the two irrigation districts is approximately 921,000 AF per year.

Mexico's treaty share of 60,000 AF per year is deducted from this sum, and the remainder (861,000 AF) is divided between EBID and the El Paso district. A third district, the Hudspeth County Conservation and Reclamation District in Texas, receives water rights of 27,000 AF to irrigate 9,000 acres, but its rights are subordinate to El Paso's needs and dependent on El Paso having surplus water.

The Rio Grande Compact Commission administers the terms of the Compact. The Commission is composed of one representative from Colorado, New Mexico and Texas. A non-voting federal representative serves as chairman. Article XII. The Commission has the power to promulgate regulations.

Although Texas filed petitions on three separate occasions with the U.S. Supreme Court, alleging that New Mexico was not delivering the required amount of water under the Rio Grande Compact, the disputes were settled. The Court has never ruled on the terms of the Rio Grande Compact.

In addition, there are two interstate water allocation compacts on tributaries of the Rio Grande:

#### **The Pecos River Compact of 1949**

The Pecos River Compact requires New Mexico to deliver water to Texas consistent with river conditions defined in 1947. This one date, and what it means, has led to extensive litigation. The Pecos River Compact Commission is composed of three members: one each from New Mexico and Texas, and a non-voting federal member. Article V. The Commission was deadlocked on the interpretation of the term "1947 condition." The U.S. Supreme Court refused to reform the compact to allow the federal member to vote. *Texas v. New Mexico*, 462 U.S. 554 (1983). The Compact was a binding contract between the states, approved by Congress, and "we are not free to rewrite it." *Id.* at 565. The Supreme Court eventually found that New Mexico had breached the Compact. As of 2006, New Mexico has spent about \$30 million to purchase state water rights to free up instream flows for Texas. *Texas v. New Mexico*, 494 U.S. 111 (1990) (stipulated judgment).

#### **The Costilla Creek Compact of 1963 (Amended)**

The Costilla Creek Compact requires Colorado to deliver specific quantities of water to precise locations. New Mexico obtained 63.5% of the water in Costilla Reservoir; the remainder is allocated to Colorado. The Compact affects only a limited amount of the water in the Rio Grande Basin and has not proved controversial. The Compact created the Costilla Creek Compact Commission, composed of the official in each state responsible for public water supplies. The U.S. Geological Survey ("USGS") was called on to collaborate with the Commission to administer the Compact. Article VIII.

#### **7.4.5 International Treaties and Agreements**

There are two companion treaties between the United States and Mexico – one signed in 1906, the other in 1944 – that allocate water in the Rio Grande Basin. Under the 1906 Treaty, the United States was obligated to deliver 60,000 AF to Mexico after the completion of Elephant Butte Dam in New Mexico. In return, Mexico waived its rights to water in the Rio Grande between El Paso Texas and Fort Quitman, Texas, a distance of 80 miles. Under the 1944 Treaty, the United States and Mexico divided the waters in the Rio Grande Basin south of Fort Quitman. See “Legal Regime” section.

The International Boundary and Water Commission (“IBWC”) is responsible for implementing treaties and resolving cross-border disputes. The IBWC is both an engineering and a diplomatic agency, seeking technical and diplomatic solutions to boundary and water issues. The IBWC operates the Falcon-Amistad Dams and manages the flow of the river in the lower portion of the Rio Grande near the Gulf of Mexico. The IBWC has two “sections.” The U.S. Section is an independent federal agency that receives advice from the U.S. Department of State. The Mexican Section is affiliated with the Ministry of Foreign Affairs of Mexico. The two Sections maintain separate offices: the U.S. section is in El Paso, Texas; the Mexican counterpart is across the Rio Grande in Ciudad Juarez. Decisions of the IBWC are made in the form of “minutes,” approved by both Sections. The minutes are legally binding agreements between the United States and Mexico. [www.ibwc.state.gov](http://www.ibwc.state.gov)

Following adoption of the North American Free Trade Agreement (“NAFTA”), 32 I.L.M. 289 (parts 1-3); 32 I.L.M. 605 (parts 4-8)(entered into force January 1, 1994), the United States and Mexico created two new “sister” institutions:

- The North American Development Bank (“NADB”)(“Banco Desarrollo de America del Norte”), which loans money for infrastructure improvement projects (i.e., sewers, roads, water efficiency). The NADB is located in San Antonio, Texas. [www.nadbank.org](http://www.nadbank.org); and
- The Border Environment Cooperation (“BECC”), which certifies projects for funding by the NADB (e.g., sanitation, water pollution, recycling and water efficiency). The BECC is located in Ciudad Juarez, Mexico. [www.cocef.org](http://www.cocef.org)

In 2004, the United States and Mexico agreed to amend the NADB-BECC charter, creating a single 10-member Board of Directors for both institutions.

#### **7.4.6 The Role of Native American Tribes**

Eighteen Pueblos (tribes) have existing water rights not restricted by the Rio Grande Compact of 1939 or by state law. The 18 Pueblos, in alphabetical order, are: Acoma; Cochiti; Isleta; Jemez; Laguna; Nambe; Picuris; Pojoaque; San Felipe; San Ildefonso; San Juan; Sandia; Santa Ana; Santa Clara; Santo Domingo; Tesuque; Taos; and Zia.

In 2006, New Mexico, the United States, three Pueblos and other parties proposed a settlement of the Aamodt litigation initially filed in 1966. *New Mexico ex rel. State Engineer v. Aamodt*, civil docket 66cv6639 (D.N.M.). The adjudication of the dispute, which involves water rights in the

Nambe-Pojoaque-Tesuque (the “N-P-T Basin”), is one of the longest running federal cases. The proposed settlement is available on the New Mexico Interstate Stream Commission’s web site. [www.ose.state.nm.us/legal\\_ose\\_aamodt\\_info.html](http://www.ose.state.nm.us/legal_ose_aamodt_info.html)

#### **7.4.7 The Role of Federal Courts**

Federal courts have not assumed a daily management role over Rio Grande operations.

### **7.5 CURRENT ISSUES AND CONFLICTS ON THE RIO GRANDE**

#### **7.5.1 Water Supply and Allocation**

The following paragraphs discuss the current conflicts regarding water supply and allocation of the Rio Grande.

##### ***An Over - Allocated River***

The population in and around El Paso and its sister city in Mexico, Ciudad Juarez, is expected to increase from two million to almost five million by 2020. The freshwater supply in two aquifers, the Hueco Bolson and Mesilla Bolson, is limited. There is, however, a significant amount of brackish water in the aquifers. As a result, the El Paso Water Utilities (“EPWU”) and Fort Bliss are jointly building the nation’s largest inland desalination plant to use brackish water from the Hueco Bolson. El Paso is also planning to import water from the east and south to address long-term (20-40 year) needs. EPWU is also seeking to purchase water rights from the Rio Grande (i.e., converting agricultural use to municipal supplies). Ciudad Juarez is examining the possibility of importing water into the Rio Grande Basin. The combination of rapid population growth, diminishing fresh water supply in the two aquifers and an over-allocated river may lead to conflicts in the coming years.

Population growth in the Albuquerque - Santa Fe area may also create a new round of water supply issues. Similar population pressures will likely be felt in the lower Rio Grande south of Laredo, Texas (Nuevo Laredo in Mexico). The population there is expected to triple by 2050.

##### ***Continued Drought***

According to the New Mexico Interstate Stream Commission, since the winter of 1996-97, only one winter has brought normal snowfall. The winter of 2005-2006 was the warmest on record with snow levels at the lowest ever recorded.

##### ***Agricultural versus Domestic Allocations***

In New Mexico, about 76% of all water is used for agriculture. The amount of water needed for municipal and industrial water supplies has put pressure on farmers and irrigation districts to transfer rights (by sale, lease or other transaction) to use Rio Grande water.

### **Interpretation of the Rio Grande Compact of 1939**

The Rio Grande Compact did not spell out how much water would flow from New Mexico to Texas. Instead, the Compact treated the “border” as if it was in New Mexico, downstream of Elephant Butte Dam. As the area has grown – and as more water is diverted in southern New Mexico for irrigation – the rights of Texas have become more uncertain.

To date, the parties have not been able to develop an agreed-upon operating agreement for Elephant Butte Dam that would identify the specific obligations of New Mexico to Texas. A lengthy state court adjudication in New Mexico, now in its 20th year, complicates matters because it could award an amount of water to New Mexico farmers that may further diminish the flows in river and reduce water flowing to Texas.

### **7.5.2 Power Supply and Allocation**

The Rio Grande dams in the United States produce small amounts of power (147 MW).<sup>107</sup> Interstate power allocation issues are not a major source of conflict.

### **7.5.3 Environmental Issues**

#### **Endangered Species Act Compliance**

In 1994, the U.S. Fish and Wildlife Service (“USFWS”) listed the silvery minnow as endangered. 59 Fed. Reg. 36,988 (July 20, 1994). In 1995, USFWS listed a migratory desert bird, the southwestern willow flycatcher, as endangered. 60 Fed. Reg. 10,693 (February 27, 1995).

In 1999, environmental groups filed suit against the Bureau of Reclamation and the Corps of Engineers for failure to complete consultation with the USFWS over the impact those agencies were allegedly having on the silvery minnow in the Middle Rio Grande area. Other parties, including the State of New Mexico, the Middle Rio Grande Conservancy District and the City of Albuquerque, intervened in opposition.

In part because of that lawsuit, the Bureau of Reclamation, the Corps of Engineers, USFWS, the Bureau of Indian Affairs and several non-federal groups formed the “Middle Rio Grande Endangered Species Act Work Group” to develop a program for protecting and improving the status of listed species. In 2003, the USFWS completed a Biological Opinion, which found that the Bureau and Corps of Engineers’ efforts were insufficient and which identified a number of reasonable alternatives for preventing jeopardy to the listed species.

The U.S. Court of Appeals for the Tenth Circuit held that the Bureau had discretion to reduce San Juan-Chama Project water deliveries under its existing contracts to comply

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<sup>107</sup>This figure includes the U.S. share of the Falcon-Amistad Dams. Half the power output goes to Mexico.

with the ESA restrictions. *Rio Grande Silvery Minnow v. Keys*, 333 F.3d 1109 (10th Cir. 2003). The court affirmed a federal district court injunction compelling the Bureau to maintain sufficient flow in the Rio Grande for the minnow. But the opinion was vacated because the court later found that the appeal of the preliminary injunction was moot. *Rio Grande Silvery Minnow v. Keys*, 355 F.3d 1215 (10th Cir. 2004).<sup>108</sup>

Meanwhile, cooperative efforts to provide water for the silvery minnow continue. The Bureau has created a voluntary water leasing program in which it leases unused San Juan-Chama Project water. The City of Albuquerque and the New Mexico Interstate Stream Commission constructed a “refugium” for breeding and rearing the minnow. In addition, rescue and salvage operations transport fish from dry downstream parts of the river to more rapidly-flowing upstream portions of the river. The Middle Rio Grande Conservancy District is also building an off-channel sanctuary for the silvery minnow.

### **Agricultural Runoff and Salinity**

Pesticide residue and salinity are a problem in the lower portion of the Rio Grande. The portion of the Rio Grande that registers the highest concentrations of pesticides residue is between El Paso, Texas, and Amistad Dam, a sparsely-populated portion of the river basin.

### **Sewage**

The Rio Grande below El Paso, Texas, is also polluted with a combination of inadequately treated sewage and agricultural runoff. A number of government studies have documented the river’s degradation where it serves as the international border between the United States and Mexico.

### **Invasive Species**

Invasive aquatic and riparian species are another cross-border problem. Several exotic species, in particular the water hyacinth and hydrilla, choke flows and decrease the efficiencies of water deliveries. The salt cedar, a tree that can reach 25 feet in height, has infested miles of river banks, displacing native cottonwoods and willow.

### **Deforestation**

The National Water Commission of Mexico has reported that deforestation in the Mexican portion of the Rio Grande Basin has lead to soil erosion, reduced biodiversity

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<sup>108</sup>Congress subsequently prohibited the U.S. Bureau of Reclamation from restricting or reallocating water from the San Luis-Chama Project to meet ESA requirements. On November 22, 2005, the U.S. District Court, District of New Mexico, issued a Memorandum Opinion and Order and Final Judgment in which it concluded that further claims involving San Juan-Chama Project water would be dismissed as moot, but non-San Juan-Chama Project claims would not be dismissed as moot as such claims remain “a live and justiciable issue for agency and/or judicial interpretation.” (Mem. Op., *Rio Grande Silvery Minnow v. Keys*, United States District Court No. CIV 99-1320 (D.NM) (Doc. No. 684) (filed Nov. 22, 2005) (Mem. Op.).

and possible worsening of drought impacts. Logging in the Sierra Tarahumara in Chihuahua has reduced filtration of rainwater into aquifers and affected water quantity and quality.

## **7.6 CONFLICT RESOLUTION**

### **7.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power from the Rio Grande, though the two treaties with Mexico – one signed in 1906, the other in 1944 – allocated water between the two countries.

### **7.6.2 Administrative Allocation of Water or Power**

The Texas Water Master distributes water from Falcon-Amistad Dams to agricultural and municipal users in Texas. [www.tceq.state.tx.us](http://www.tceq.state.tx.us)

There are no major interstate conflicts over power allocation at the present time.

### **7.6.3 Judicial Allocation of Water or Power**

As a general rule, federal courts have not allocated water or power in the Rio Grande Basin, though they have resolved interstate water conflicts. The U.S. Supreme Court held in a dispute over the Pecos River Compact, a tributary of the Rio Grande, that New Mexico diverted too much water and exceeded its compact allocation. *Texas v. New Mexico*, 494 U.S. 111 (1990)(stipulated judgment).

### **7.6.4 Arbitration or Mediation**

Arbitration and mediation are used rarely. International diplomacy resolved an international dispute in 2005 with Mexico. Since the early 1990s, Mexico had not allowed sufficient water to flow into the Rio Grande from the Rio Conchas, pursuant to the U.S.–Mexico Water Treaty of 1944. By 2004, Mexico had accumulated a deficit of approximately 717,000 AF. In 2005, the United States and Mexico settled the long-standing disagreement over the “water debt.” Secretary of State Condoleezza Rice announced Mexico would take steps to eliminate its debt by September 30, 2005. Mexico has now done so.

### **7.6.5 Litigation**

There are no pending lawsuits over the Rio Grande, Pecos River or Costilla Creek interstate water compacts. There is, however, a major adjudication now underway in New Mexico state court to determine the water rights in the Rio Grande between Elephant Butte Dam and the border with Texas, 100 miles downstream. The adjudication involves 20,000 individuals and corporations and is now in its 20th year. The federal government’s attempts to quiet title in a separate federal proceeding failed. *U.S. v. City of Las Cruces*, 289 F.3d 289 (10th Cir. 2002).

### **7.6.6 Infrastructure Improvements and Environmental Restoration**

As of 2006, the North American Development Bank (“NADB”) has agreed to fund 20 water efficiency projects for irrigated agriculture in the United States and Mexico with an expected annual savings of 360,622 AF. Total NADB funding is \$80 million (half for each country). Additional funding in the United States and Mexico comes from irrigation districts, state agencies, federal agencies and other sources. Mexico selected the Delicias Irrigation District in north Chihuahua as the recipient for NADB funding. The NADB estimated that Mexico could save about 200,000 AF of water each year in that irrigation district alone. Some of the water saved will be transferred to the United States in compliance with Minute 309 of the IBWC, approved in 2003.

New Mexico’s Water Plan also identifies aging water distribution infrastructure as a problem in that state.

### **7.6.7 Interagency and Multi-Party Agreements**

#### **Endangered Species Act Collaboration**

In 2002, federal agencies, state agencies in New Mexico and private parties signed a Memorandum of Understanding creating a “Middle Rio Grand Endangered Species Act Collaborative Program” to protect populations of the Rio Grande silvery minnow and the southwestern willow flycatcher. Efforts included construction of a refugium by the City of Albuquerque and the New Mexico Interstate Stream Commission for the minnow, and a variety of habitat preservation activities by the Middle Rio Grande Conservancy District and other organizations. The collaboration effort includes the area between the Colorado-New Mexico boundary and the headwaters of Elephant Butte reservoir.

#### **Emergency Drought Water Agreement**

A 10-year “Emergency Drought Water Agreement” of 2003 was signed by the Bureau of Reclamation; Corps of Engineers; U.S. Department of Interior; New Mexico Interstate Stream Commission; New Mexico State Engineer; and New Mexico Attorney General.

The agreement provides water for two threatened and endangered species (the silvery minnow and the southwestern willow flycatcher) on the Middle Rio Grande in New Mexico, and reduces the risk for the next 10 years that the U.S. Fish and Wildlife Service (“USFWS”) will find that water management agencies have jeopardized the continued existence of these species.

Concurrent with that agreement, New Mexico relinquished to Texas up to 217,500 AF of “credit water” at Elephant Butte Reservoir that exceeded its delivery requirement under the Rio Grande Compact of 1939. The water was then released, first to Mexico pursuant to the 1906 Treaty, and then to the Elephant Butte Irrigation District and El Paso County Water Improvement District.

New Mexico’s relinquishment allowed it to store a like amount of water in upstream dams for use in the Middle Rio Grande area. The storage was allocated to three entities:

the Middle Rio Grande Conservancy District for irrigation; the City of Santa Fee for municipal uses; and the Bureau of Reclamation for the silvery minnow, pursuant to the terms of the Emergency Drought Water Agreement.

In the absence of the agreement, Article VII of the Rio Grande Compact would have precluded New Mexico from storing upstream water and would have restricted its ability to supply users in the Middle Rio Grande area and to address ESA issues.

**Texas Clean Rivers Program**

In cooperation with the IBWC, Texas has created a Clear Rivers Program, a water quality monitoring effort on the Texas portion of the Rio Grande Basin.

**New Mexico-Texas Water Commission**

After a 1991 state court litigation settlement, New Mexico and Texas created a joint commission to cooperate on water-related problems in the Rio Grande Project (Elephant Butte and Caballo Dams). [www.nm-txwatercomm.org](http://www.nm-txwatercomm.org)

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## 8.0 THE MISSISSIPPI RIVER – MAIN STEM

### 8.1 INTRODUCTION

The Mississippi River Basin drains most of the central United States, from the eastern slopes of the Rocky Mountains to the western slopes of the Appalachian Mountains. The river starts in Lake Itasca<sup>109</sup> in Minnesota – a tiny body of water only 30 feet deep – and ends as a torrent in Louisiana. The flow of the Mississippi River at its mouth exceeds that of any river in North America. The river deposits an average of 159 million tons of sediment a year in the Gulf of Mexico. No other waterway in the nation deposits this quantity of sediment at its mouth.



**FIGURE 10.** Map of the Mississippi River Basin. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Mississippi\\_river](http://en.wikipedia.org/wiki/Mississippi_river)]



**FIGURE 11.** The source of the Mississippi River on the edge of Lake Itasca, Minnesota. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Mississippi\\_River](http://en.wikipedia.org/wiki/Mississippi_River)]

The Mississippi River Basin is composed of six sub-basins: the upper Mississippi; the Missouri; Ohio; the Arkansas-Red-White; the Tennessee; and the lower Mississippi.

For purposes of this study, only the main stem of the Mississippi River is examined below. Three of its major tributaries – the Missouri, Arkansas and Tennessee/Cumberland Rivers – are analyzed in Chapters 9, 10, and 11 of this study, respectively.

The Mississippi River, with a length of about 2,340 miles, is the second longest river in the United

<sup>109</sup>The lake was named by explorer Henry Schoolcraft in the 1832, who coined the name “Itasca” – a shortened version of the Latin phrase, “*veritas caput*” (true head).

States, exceeded only by the Missouri River. The Mississippi River Basin encompasses approximately 1.2 million square miles and includes portions of 31 states and a small part of two Canadian provinces (Alberta and Manitoba). The basin includes 40% of the continental United States. Major tributaries to the Mississippi include the: Missouri River; Arkansas River; Illinois River; Ohio River; Tennessee River; White River; and Red River.

On average, 434 MAF of water flows through the Mississippi River per year, as measured at the Gulf of Mexico. A drop of water falling in Lake Itasca, Minnesota, takes 90 days to reach the ocean.

About 12 million people live in the corridor of the river, and 84 million people (30% of the nation's population) in the river's basin. Cities adjacent to the river include: Minneapolis (MN); St. Paul (MN); Dubuque (IA); St. Louis (MO); Memphis (TN); Greenville (MS); Vicksburg (MS); Baton Rouge (LA); and New Orleans (LA).

The first European to see the Mississippi River delta was Hernando De Soto in 1543. Two French explorers, Jacques Marquette and Louis Joliet, ventured into the upper Mississippi River Basin in 1673, and a third, Rene Robert LaSalle, was the first to travel the length of the river by canoe in 1682 from the Great Lakes to the Gulf of Mexico. LaSalle claimed the entire Mississippi River Valley for France, calling it "Louisiana" after King Louis IV. In 1803, the United States acquired the area west of the Mississippi as part of the Louisiana Purchase.



**FIGURE 12.** The Mississippi River in New Orleans. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Mississippi\\_River](http://en.wikipedia.org/wiki/Mississippi_River)]

In 1829, the U.S. Army Corps of Engineers ("Corps of Engineers") assumed responsibility for flood control and navigation on the Mississippi River but for decades relied on a "levees-only" solution. During the Great Flood of 1927, the river broke out of its banks in 145 places and drove 700,000 people from their homes. In response, Congress passed the Flood Control Act of 1928, which authorized the first comprehensive system of infrastructure, including floodways. Even those improvements, and subsequent ones authorized by Congress, have proven insufficient to protect downstream cities from floods and hurricanes. The Great Flood of 1993 caused \$15-\$20 billion in damage. Hurricane Katrina in 2005 caused 1,425 deaths and approximately \$75 billion in damage.

## **8.2 USES OF THE MISSISSIPPI RIVER**

The Mississippi River and its tributaries are the nation's largest commercial waterway. There are 12,350 miles of navigable river and canals in the basin that allow barge traffic to travel between Louisiana and Minnesota; up the Illinois River to the Great Lakes; up the Missouri River from St. Louis to Sioux City, Iowa; up the Ohio River to western Pennsylvania; and up the Arkansas River to Tulsa, Oklahoma. No other river system in the nation contains the scale of federal investment for navigation and flood control.

The Mississippi consists of two basins:

In the Upper Basin – above the confluence of the Ohio River at Cairo, Illinois – the Corps of Engineers owns a network of 29 locks and dams (an “aquatic staircase”) for commercial navigation. But the locks and dams, spaced at intervals along an 850-mile stretch of the Upper Mississippi, do not have reservoirs for reservoir storage and are not used for flood control. Instead, the Corps of Engineers relies on dams on tributaries for flood control storage.

In the Lower Basin – below the confluence of the Ohio River – the main stem runs “open-river” to the Gulf – with no locks or dams. The river channel, however, contains an extensive network of levees, floodways, dikes and other infrastructure, all built and maintained by the Corps of Engineers. The Corps also relies on dams on tributaries in the Lower Basin for flood control storage. The Lower Basin is generally less populated and developed than the Upper Basin. Even to this day, the river ecosystem in many places consists of forests, grassland, backwaters and wetlands. Forty percent of the migratory waterfowl traversing the United States use the Mississippi River.

For several decades, the lower Mississippi River has been “seeking” to flow into the Atchafalaya River in central south Louisiana. Only man-made barriers constructed by the by Corps of Engineers have prevented the river from moving from its historic channel to the Atchafalaya and by-passing Baton Rouge and New Orleans.

### **8.2.1 Hydropower**

Although the Corps of Engineers owns a series of locks and dams on the main stem of the Mississippi River, these structures only allow for barge and tow traffic to move up river. Very little hydropower is generated by the Mississippi River.

### **8.2.2 Navigation**

The entire length of the main stem of the Mississippi River – 2,340 miles – is available for commercial navigation. The river moves 500 million tons of goods a year, including 60% of the nation's corn and 45% of its soybean exports. The Corps of Engineers dredges 115 million cubic yards of materials each year to maintain the current waterway. The largest ports in the world (in tonnage) are the Port of New Orleans and Port of South Louisiana. [www.portno.com](http://www.portno.com) and [www.portsl.com](http://www.portsl.com)

Ocean-going vessels can move upstream from the Gulf to Baton Rouge, Louisiana. The Corps of Engineers maintains a channel 9' deep and 300' wide for barges and other traffic above Baton Rouge, Louisiana, and a channel 45' deep and 500' wide below Baton Rouge.

The Corps also owns and operates the Upper Mississippi River Navigation System, consisting of locks and dams extending north from the mouth of the Ohio River at Cairo, Illinois, to Minneapolis-St. Paul, Minnesota, a distance of 850 miles.



**FIGURE 13.** The Lock & Dam at Dubuque, Iowa.  
[Source: Wikipedia, [http://en.wikipedia.org/wiki/Mississippi\\_River](http://en.wikipedia.org/wiki/Mississippi_River)]

### **8.2.3 Water Supply**

There is no federal infrastructure to move water from the main stem of the Mississippi River to consumers.

#### **Municipal**

Fifty cities depend on the main stem of the Mississippi for municipal water supply to serve approximately 18 million people.

#### **Irrigation**

Unknown. Each state monitors its own irrigation withdrawals. There is no central database of water withdrawals in the Mississippi River Basin.

#### **Industrial**

There are hundreds of industries along the path of the river and its tributaries, and 31

nuclear plants in the basin. Water usage is monitored by each state. There is no central data base of water withdrawals in the Mississippi River Basin.

#### **8.2.4 Flood Control**

Since 1928, the Corps of Engineers has built dams, levees, floodways, pumping plants and other infrastructure to control flooding in the Lower Mississippi River Basin. The system – the “Mississippi River and Tributaries Project” – extends between Cape Girardeau, Missouri (north of the confluence of the Ohio River) and southern Louisiana. There are now 44 flood control lakes and reservoirs; 59 pumping stations; 8,375 miles of levees; 3,731 miles of flood control channels and ditches, and 692 miles of wing dams. The Project is approximately 88% complete and is expected to be finished in 2032 at the current level of federal funding.

### **8.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” on the main stem of the Mississippi River are:

1. In 1824, Congress authorized the Corps of Engineers to maintain parts of the river channel by removing snags and debris. 4 Stat. 32. Periodic authorizations by Congress continued for several decades as the Corps was given discrete assignments in both the Upper and Lower Basins.
2. In 1849 and 1850, Congress passed the first of the Swamp Lands Acts, authorizing the sale of swamp and overflow lands unfit for cultivation to 15 states. The purpose of the Act was to develop and expedite swamp drainage. 43 U.S.C. §§ 982-984, 5 Stat. 519.
3. In 1878, Congress directed that the Corps of Engineers maintain a 4.5 foot-deep navigation channel in the Upper Mississippi River Basin.
4. In 1879, Congress created the Mississippi River Commission, 33 U.S.C. 641 et seq., to survey and investigate improvements for navigation, flood control and commerce in the Lower Mississippi River Basin. The Commission focused almost exclusively on levees until the Great Flood of 1927. The Commission exists to this day, and oversees the Mississippi River and Tributaries Project.
5. In 1880, Congress authorized the first federal dam in the Mississippi River Basin. Lake Winnibigoshish in Minnesota was located near the headwaters of the river.
6. In 1888, Congress enacted the Rivers and Harbors Act, 33 U.S.C. § 601 et seq., which authorized the Corps of Engineers to remove snags and construct improvements, including fish passage facilities on the river. The Act followed on the heels of the Eads Plan to coordinate navigation for 950 miles between Cape Girardeau, Missouri, and the Gulf of Mexico.
7. In 1907, Congress enacted legislation directing the Corps of Engineers to maintain a six-foot deep navigation channel in the Upper Mississippi River Basin.

8. In 1913, Congress authorized the Corps of Engineers to build the first lock and dam on the main stem of the Mississippi River near Minneapolis - St. Paul, Minnesota.
9. In 1917, Congress passed the Ransdell-Humphreys Act, the first federal flood control legislation, which authorized the Corps of Engineers to build additional levees in the Mississippi River Basin. Pub. L. No. 64-367, 39 Stat. 948.
10. In 1928, Congress enacted the Flood Control Act, 45 Stat. 534, 33 U.S.C. § 702c, in the aftermath of the Great Flood of 1927. The extent of the damage – 11 million acres under water – made clear that the Mississippi River Commission’s “levees-only” program was insufficient to control floods on the river. The Act authorized the Corps of Engineers to build the Mississippi River and Tributaries Project, the first comprehensive system of public works in the Lower Basin. The 1927 flood demonstrated that “levees alone would not protect the [Mississippi] valley from floods.” *United States v. Sponenbarger*, 308 U.S. 256, 261-262 (1939).
11. In 1930, Congress enacted the Rivers and Harbors Act, Pub. L. No. 71-250, which authorized the Corps of Engineers to build a nine-foot deep navigation channel and a series of locks and dams between Alton, Illinois, and Minneapolis, Minnesota. Subsequent authorizations expanded the network of locks and authorized other channel improvements.
12. In 1934, Congress enacted the Overton-Dear Act, which amended the Flood Control Act of 1928 to relieve private property owners from having to donate levee rights-of-way at no cost to the federal government.
13. In 1936, Congress enacted the Flood Control Act, 33 U.S.C. § 701a, which declared it was national policy for the Corps of Engineers to develop flood control projects on rivers across the nation.

The Act, among other things, authorized the Corps of Engineers to investigate the construction of Denison Dam on the Red River in Oklahoma in part to control flooding in the lower Mississippi River. The U.S. Supreme Court later upheld the Corps of Engineers’ broad authority in the area of flood control and rejected Oklahoma’s challenges to the ability of the federal government to construct dams on non-navigable rivers within a state for flood control. “Floods pay no respect to state lines. Their effective control in the Mississippi valley has become increasingly a subject of national concern in recognition of the fact that single states are impotent to cope with them effectively.” *Oklahoma ex rel Phillips v. Atkinson*, 313 U.S. 508, 521-522 (1941).

14. In 1944, Congress enacted the Flood Control Act, Pub. L. No. 78-534, 58 Stat. 887, which, among other things, authorized the Corps of Engineers to maintain a 12-foot deep navigation channel on the Mississippi River between Cairo, Illinois, and Baton Rouge, Louisiana.

15. In 1986, Congress enacted the Upper Mississippi Management Act, 33 U.S.C. § 652 et seq., which created a collaborative mechanism for states in the upper basin.
16. In 1986, Congress enacted the Water Resources Development Act, 33 U.S.C. § 2212, which, among other things, mandated that half of the cost of navigation improvements would come from the U.S. Treasury and the other half, from the Inland Waterways Trust Fund, which was supported by a tax on oil purchased for barge traffic.
17. In 1990, Congress enacted the Coastal Wetlands Planning Protection and Restoration Act, 16 U.S.C. § 3951 et seq., which authorized the Corps of Engineers to preserve and restore wetlands in Louisiana. The Act established a goal of “no net loss” of wetlands through a combination habitat acquisition and regulatory measures.

## **8.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers “runs” the river in the sense that it manages and maintains the navigation and flood control infrastructure, but it has no ability to store or allocate water on the main stem. The Corps has six district offices which manage different portions of the river: 1) St. Paul, Minnesota; 2) Rock Island, Illinois; 3) St. Louis, Missouri; 4) Memphis, Tennessee; 5) Vicksburg, Mississippi, and 6) New Orleans, Louisiana. The Mississippi Valley District headquarters are in Vicksburg.

The Mississippi River Commission, created by Congress in 1879, has primary authority over the Mississippi River and Tributaries Project in the Lower Basin. The Commission has seven members: three from the Corps of Engineers; one from the National Oceanic and Atmospheric Administration; and three civilians, two of whom must be engineers. All members are nominated by the President, subject to Senate confirmation.

### **8.4.1 Long-term Operational Strategy**

The Corps of Engineers has proposed an extensive program to build new locks, replace aging infrastructure, and restore the Upper Mississippi Basin. Although the Corps prepares master plans for segments of the river, there is no single, long-term, basin-wide strategy document.

### **8.4.2 Short-term Operational Strategy**

The Corps of Engineers has an operating plan for each of the 29 navigation locks. There is no single operating plan for all the locks on the Mississippi River.

### **8.4.3 River Accounting Mechanisms**

The federal government has no role in the diversion of water from the Mississippi River for domestic water supply or irrigation. Individual states keep track of diversions. There is no central clearinghouse for this information. States and federal agencies in the Upper Mississippi Basin share data about water withdraws on a voluntary basis through the Upper Mississippi River

Basin Association. The association has also arranged for parties to cooperate on monitoring water quality and other issues. [www.umrba.org](http://www.umrba.org)

#### **8.4.4 The Role of Interstate Compacts**

There are no interstate compacts affecting water apportionment or river operations on the main stem of the Mississippi River. There are, however, numerous interstate compacts on tributaries of the Mississippi River. The Arkansas River, for instance, has three interstate water allocation compacts. See Arkansas River, Chapter 10, for details. There are six interstate water allocation compacts on tributaries of the Missouri River. See Missouri River, Chapter 9, for details.

#### **8.4.5 International Treaties and Agreements**

The Mississippi is a domestic, not an international, river.

#### **8.4.6 The Role of Native American Tribes**

Native American Tribes do not play a significant role in the management of the main stem of the Mississippi River.

#### **8.4.7 The Role of Federal Courts**

The federal courts do not play a role in the management and/or operation of the Mississippi River.

### **8.5 CURRENT ISSUES AND CONFLICTS ON THE MISSISSIPPI RIVER**

The 2005 flooding of New Orleans during Hurricane Katrina demonstrated the force of nature and vulnerability of federal infrastructure. The cost of rebuilding New Orleans and making extensive infrastructure improvements to the locks and dams in the Upper Mississippi Basin remains a pressing issue.

#### **8.5.1 Water Supply and Allocation**

Water supply is not a major issue, given the huge quantities in the river.

#### **8.5.2 Power Supply and Allocation**

There are no power supply and allocation conflicts or issues on the main stem of the Mississippi River.

#### **8.5.3 Environmental Issues**

##### **Water Quality**

There is no single set of water quality standards for the Mississippi River, and the standards approved by individual states may differ in essential matters (e.g., the pollutants covered and the manner in which standards are implemented). The cumulative

impact of runoff and discharges from industries, power plants and waste water treatment facilities is a concern for downstream domestic users, despite the enormous flow of the Mississippi River in the lower basin.<sup>110</sup> The problem is in part seasonal: the greatest concentration of herbicides in the river occurs between May and August during the summer growing season. See, publications of the U.S. Environmental Protection Agency (“EPA”). [www.epa.gov/msbasin](http://www.epa.gov/msbasin)

### **Loss of wetlands**

Wetlands are disappearing in Louisiana in part as a result of the levee system and industrialization. About 25-35 square miles of wetlands are damaged or destroyed each year, according to the EPA.

### **Hypoxia**

Part of the Gulf of Mexico suffers from hypoxia (low dissolved oxygen levels), which destroys or damages fish and wildlife habitat. The EPA has identified a 7,000-square mile-area with signs of this problem.

### **Invasive Species**

The zebra mussel – a tiny, bottom-dwelling clam native to Europe – was first detected in the Great Lakes system in the mid-1980s and has since spread to the Mississippi River. The mussel multiplies rapidly and can clog intake-pipes for municipal plants and power plants and reduce the populations of native mussels.

## **8.5.4 Other**

### **Flood control**

Flood control continues to be a very significant problem for cities and towns adjacent to the Mississippi River, as Hurricane Katrina in 2005 made painfully clear. There are no reservoir storage facilities on the main stem of the river. Instead, the Corps of Engineers owns a total of 44 flood control reservoirs on tributaries. The largest reservoirs are in Montana, North Dakota and South Dakota in the upper Missouri River Basin. Dams on the Tennessee and Cumberland Rivers also help regulate the flow of the Mississippi south of its confluence with the Ohio River.<sup>111</sup>

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<sup>110</sup>An analysis of pollution prevention or potential long-term public health impacts is beyond the scope of this report.

<sup>111</sup>Both the Tennessee and Cumberland Rivers flow into the Ohio, which then empties into the Mississippi River a short distance later. Kentucky Dam (TVA) and Barkley Dam (USACE) are jointly managed between the two agencies and can significantly reduce flood levels downstream on the Mississippi River. See Tennessee-Cumberland River chapter for details.

### **Navigation**

Congestion of tow boats and barges is a problem for operators, who, along with the Corps of Engineers, have proposed new locks on the Upper Mississippi River. Many locks were built in the 1930s and are deteriorating. The Corps of Engineers has asked Congress for \$2 billion for new, larger locks. See, proposal for the Upper Mississippi River-Illinois Waterways System. [www2.mvr.usace.army.mil/umr-iwwsns](http://www2.mvr.usace.army.mil/umr-iwwsns)

## **8.6 CONFLICT RESOLUTION**

### **8.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water from the main stem of the Mississippi River.

### **8.6.2 Administrative Allocation of Water or Power**

There is no existing legal mechanism to allocate water by administrative allocation. The states manage their own water withdrawal programs. Power produced at the locks owned by the Corps of Engineers is small and goes to neighboring communities or utilities.

### **8.6.3 Judicial Allocation of Water or Power**

The U.S. Supreme Court has never considered a water apportionment case involving the main stem of the Mississippi River.

### **8.6.4 Arbitration or Mediation**

Not used.

### **8.6.5 Litigation**

There is no outstanding litigation in federal court that significantly affects Corps of Engineers' operations on the main stem of the Mississippi River.

### **8.6.6 Infrastructure Improvements and Environmental Restoration**

The Corps of Engineers has proposed new upper river locks and a range of restoration projects as part of a 50-year plan for the Upper Basin of the Mississippi River. The Corps has also embarked on a significant program to acquire wetlands and flood plain habitat in the lower Mississippi River valley.

### **8.6.7 Interagency and Multi-Party Agreements**

The Corps of Engineers has no significant interagency and multi-party agreements that affect the operations of the main stem of the Mississippi River.

## **9.0 THE MISSOURI RIVER — A TRIBUTARY OF THE MISSISSIPPI RIVER**

### **9.1 INTRODUCTION**

In 1673, two French explorers, Marquette and Joliet, were the first Europeans to see the lower Missouri River at its confluence with the Mississippi. In 1803, the United States acquired the land in the basin as part of the Louisiana Purchase for \$15 million. Lewis and Clark, the first Americans to survey the area, traveled up the Missouri River from St. Louis, Missouri in 1804.

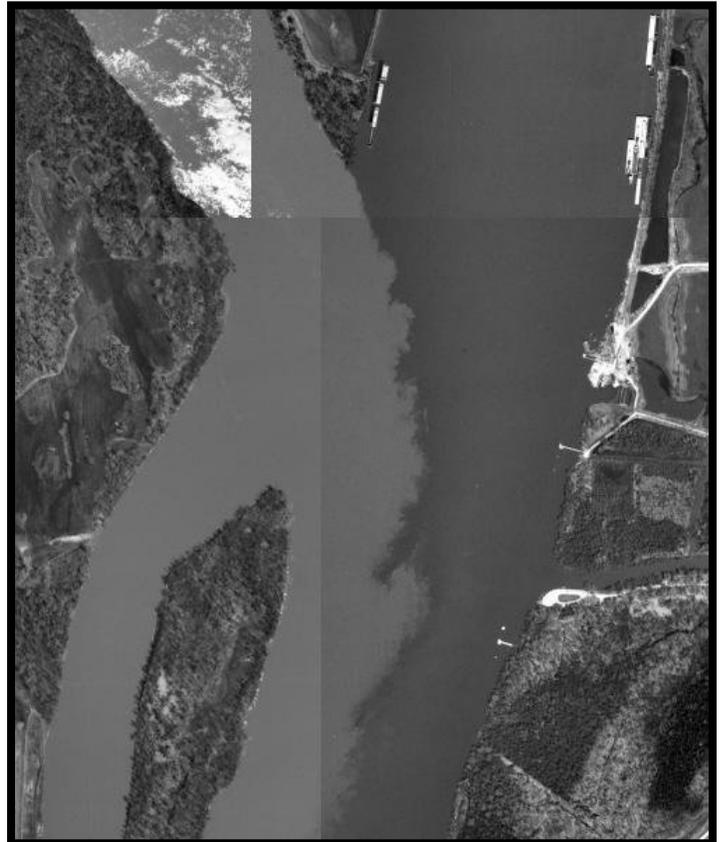
The Missouri stretches 2,619 miles and is the longest river in the country, 269 miles longer than the Mississippi itself.

The topography of the Missouri River basin is extremely diverse. The upper basin, which includes a large section of Montana, Wyoming, North Dakota and South Dakota, is mostly arid or semi-arid. The lower basin, which includes part of Nebraska, Kansas, Iowa and Missouri, is more humid. Prior to the construction of the large federal dams in the basin, the area along the banks of the Missouri River was subject to extreme flooding.

The Missouri – nicknamed the “Big Muddy” – once deposited 250 million tons of sediment each year at its confluence with the Mississippi River. In its natural condition, the river was sometimes a mile wide and only inches deep, and was famous for its abrupt changes in location.

“Time after time, it has gotten out of its bed in the middle of the night with no apparent provocation, and has hunted a new bed, all littered with forests, cornfields, brick houses, railroad ties, and telegraph poles,” a newspaper reporter and humorist named George Fitch wrote in 1907. “Later it has suddenly taken a fancy to its old bed, which by this time has been filled with suburban architecture, and back it has gone with a whoop and rush as if it had found something worthwhile. It makes farming as fascinating as gambling. You never know whether you are going to harvest corn or catfish.”

The Missouri River drains an area of approximately 529,000 square miles



**FIGURE 14.** Aerial view of the Missouri River at its confluence with the Mississippi River. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Missouri\\_river](http://en.wikipedia.org/wiki/Missouri_river)]

(18% of the continental U.S.) and 9,700 square miles in Canada. The basin includes all of Nebraska and parts of 9 other states (Montana, North Dakota, South Dakota, Minnesota, Iowa, Wyoming, Colorado, Kansas, and Missouri) and portions of Alberta, Canada.

Major tributaries include the: Yellowstone River; Belle Fourche River; Platte River; Niobrara River; Republican River; Big Blue; and Kansas River. The average yearly flow of the river below Gavins Point Dam on the border between South Dakota and Nebraska is 23 MAF, but is 63.7 MAF per year at Hermann, Missouri, near St. Louis.

About 12 million people live in the Missouri River Basin. Cities adjacent to the river include: Bismarck (ND); Pierre (SD); Sioux City (IA); Omaha (NE); Nebraska City (NE); Kansas City (MO); and St. Louis (MO).



**FIGURE 15.** Map of the United States showing the Missouri River Basin. [Source: <http://www.nwd-mr.usace.army.mil/rcc/>]

## 9.2 USES OF THE MISSOURI RIVER

The Missouri River is home to the largest reservoir system in North America. The farthest upstream dam on the main stem is Canyon Ferry, near Helena, Montana. The farthest downstream is Gavins Point on the border between South Dakota and Nebraska. The Missouri River reservoir system provides flood control, navigation, power, irrigation, recreation, water supply, water quality, and fish and wildlife habitat.

### **9.2.1 Hydropower**

Seven federal dams on the main stem of the upper Missouri River have a total generating capacity of 2,485 MW. See **Appendix B** for details. The Western Area Power Administration, a federal power marketing agency, sells and delivers all of the power from federal dams to utilities. Western owns 8,000 miles of transmission lines in the basin. [www.wapa.gov](http://www.wapa.gov)

### **9.2.2 Navigation**

Barges can travel upstream from St. Louis, Missouri, to Sioux City, Iowa, a distance of 735 miles. About 8 million tons of cargo is shipped each year; the vast majority is sand and gravel. Commercial tonnage is less than one million tons per year. To facilitate commercial navigation, the U.S. Army Corps of Engineers (“Corps of Engineers”) has built the 236-mile “Bank Stabilization and Navigation Project.” The Missouri River is naturally “self-scouring” and requires little dredging. The navigation season for barges and towboats is typically eight months long. There is no navigation in winter because of ice on the upper stretches of the river.

### **9.2.3 Water Supply**

The total storage capacity of the federal reservoirs along the main stem of the Missouri River is approximately 75 MAF. See **Appendix B** for details. In addition, there are about 3,100 multiple purpose reservoirs and 14,100 single-purpose reservoirs on tributaries of the river, which provide large quantities of storage. In total, the Missouri River has the capacity to store 141 MAF of water, more than an interstate river system in North America.

#### **Municipal Water Supply**

There are 1,600 intakes for municipal supply, irrigation, power plants, industries and other uses on the main stem of the Missouri River. Three million people depend on the main stem of the river for their water supply.<sup>112</sup>

#### **Irrigation**

Irrigation in the Missouri River Basin depends on surface water (70%) and ground water (30%) and consumes a total of 14 MAF, spread out over 7.4 million acres of irrigated land.<sup>113</sup> There are no large irrigation diversion projects from federal dams on the main stem of the Missouri River.<sup>114</sup> The U.S. Bureau of Reclamation, however, provides water for irrigation from tributaries of the Missouri River.

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<sup>112</sup>USACE Master Water Control Manual (2004) at page E-2.

<sup>113</sup>USACE Master Water Control Manual (2004) at IV-29.

<sup>114</sup>USACE Master Water Control Manual (2004) at E-9. Diversions from federal reservoirs on the main stem of the Missouri River irrigate only about 40,000 acres, mostly through the use of pipeline easements to private irrigators.

### **Thermal Power Plants**

The Missouri River supplies water for 25 coal and nuclear power plants with a capacity of 15,084 MW. Those plants withdraw 1.7 MAF per year. Most of the water is returned later to river.<sup>115</sup>

#### **9.2.4 Flood Control**

Approximately 1.4 million acres of agricultural land is subject to flooding along the banks of the Missouri River. Ninety percent of those lands are located downstream from Gavins Point Dam.

The Corps of Engineers has built a network of levees as part of the Federal Agricultural Levee Project and the Federal Urban Levee Project, which protects Omaha, Nebraska; Council Bluffs, Iowa; and Kansas City, Missouri. In addition, it has built the Missouri River Streambank Stabilization Program to prevent erosion.

The Corps of Engineers an agreement with the Bureau of Reclamation to provide replacement flood control storage. The agreement affects the Bureau's Canyon Ferry, Clark Canyon and Tiber projects in Montana, which contain a total of 1.1 MAF in system replacement flood control storage. The Corps has not exercised this option since the drought of the 1980s.

#### **9.2.5 Other Uses**

Sports fishing and recreation on federal reservoirs in the upper Missouri River Basin provide a significant source of income to many small local communities. The Corps of Engineers owns and manages numerous sites for public access.

### **9.3 THE LEGAL REGIME**

In chronological order, the major "laws of the river" in the Missouri River Basin are:

1. In 1832, Congress authorized the Corps of Engineers to improve the navigation of Ohio and Mississippi Rivers to enhance the operation of the lower Missouri River and to remove obstructions on the lower Missouri River, 4 Stat. 551, 552.
2. In 1912, Congress enacted the Rivers and Harbors Act of 1927, 37 Stat. 201, 219, Pub. L. No. 62-241, which authorized construction of a six-foot navigation channel from the mouth at St. Louis, Missouri, to Kansas City, Missouri.
3. In 1922, the U.S. Supreme Court held that Colorado could not divert water from the Laramie River, a tributary to the North Platte (which flows into the Missouri River). *Wyoming v. Colorado*, 259 U.S. 419 (1922), modified 260 U.S. 1 (1922).

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<sup>115</sup>USACE Master Water Control Manual (2004) at E-8. The power plants use the water for "once-through cooling." The amount of water diverted, while large, is not a consumptive use.

The Court's opinion marked the first application of the law of prior appropriation to an interstate river.

4. In 1926, Congress consented to the first interstate compact in the Missouri River Basin. The South Platte River Compact, Pub. L. No. 69-37, 44 Stat. 195, apportioned the waters of this tributary between Colorado and Nebraska.
5. In 1927, Congress enacted the Rivers and Harbors Act of 1927, Pub. L. No. 69-560, 44 Stat. 1010, 1013, 1020, which appropriated \$12 million to construct a navigable channel between Kansas City, Missouri, and Sioux City, Iowa. As a result of this statute, the Corps of Engineers undertook the first comprehensive study of the Missouri River for flood control, navigation, irrigation and power.
6. In 1935, Congress enacted the Rivers and Harbors Act of 1935, Pub. L. No. 74-409, 44 Stat. 1028, 1048, which authorized the Corps of Engineers to complete Fort Peck Dam in Montana. Fort Peck was the first large dam on the Missouri River. The Roosevelt Administration had previously funded construction pursuant to the National Industrial Recovery Act of June 16, 1933.

The U.S. Supreme Court's opinion in *Arizona v. United States*, 295 U.S. 174 (1935)(federal agency could not build a dam across a navigable waterway without express statutory authorization), forced the Roosevelt Administration to obtain the needed Congressional approval before completing Fort Peck Dam. The Rivers and Harbors Act of 1935 gave the Administration the necessary authority to go ahead.

7. In 1938, Congress enacted the Fort Peck Project Act, 16 U.S.C. § 833 et seq., which authorized construction of hydroelectric facilities at Fort Peck Dam and authorized the Corps of Engineers to adopt a comprehensive plan for the Missouri River Basin.
8. In 1943, Congress consented to the second interstate compact in the Missouri River Basin. The Republican River Compact, Pub. L. No. 78-60, 57 Stat. 86, created a water allocation compact between Colorado, Kansas and Nebraska to divide the waters of the Republican River and its tributaries. After the signing of the Compact, the Corps of Engineers and Bureau of Reclamation built nine reservoirs in the Republican River basin.
9. In 1944, Congress consented to the third interstate compact in the Missouri River Basin. The Belle Fourche River Compact, Pub. L. No. 78-236, 58 Stat. 94, allocated water on the Belle Fourche River, a tributary that runs through Wyoming and South Dakota.
10. In 1944, Congress enacted the Flood Control Act, Pub. L. No. 78-534, 58 Stat. 887, which remains to this day the most important single piece of legislation affecting the Missouri River.

The Act authorized the Corps of Engineers and Bureau of Reclamation to develop the upper Missouri River (commonly known as the “Pick-Sloan Missouri Basin Project”). The project contemplated the construction of 213 dams to irrigate 5.3 million acres.

The Act combined elements of a Corps of Engineers’ plan to develop the Missouri River (the Pick Plan) and a related Bureau of Reclamation plan (the Sloan Plan). The Act attempted to reconcile these potentially competing plans into a comprehensive blueprint for the upper Missouri River Basin.

The Act gave the Corps of Engineers the responsibility to build dams on the main stem of the Missouri River, which were to be managed as a single project, the “Missouri River Mainstem Reservoir System.”

All the dams built on the main stem of the river were authorized by this legislation, with the exception of Fort Peck Dam, which was initially authorized by the Rivers and Harbors of 1935 and then re-authorized by the Flood Control Act for multiple purposes.

Initially, the Bureau of Reclamation contemplated the irrigation of a vast amount of upstream acreage, most of it in the eastern Dakotas. Only a small fraction of that amount is now under irrigation with federal water.

Section 1(b) of the Act, the O’Mahoney-Milliken Amendment, mandated that navigation shall be “subordinate” to the future beneficial consumptive uses of water rising in states located (wholly or in part) west of 98th Meridian.<sup>116</sup>



**FIGURE 16.** Fort Randall Dam, South Dakota. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Fort\\_Randall\\_Dam](http://en.wikipedia.org/wiki/Fort_Randall_Dam)]

<sup>116</sup>Some legal analysts have argued that the O’Mahoney-Milliken Amendment in 1944 was part of political compromise that set the stage for the passage the following year of the Rivers and Harbors Act, allowing the Corps of Engineers to build navigation improvements on the lower Missouri River. Without the protection in the O’Mahoney-Milliken Amendment, the upper basin states (i.e., North Dakota and South Dakota) would not have agreed to improvements for navigation in the lower basin. The reason: navigation improvements inevitably meant greater pressure for increased lower basin flows – water that would otherwise stay in reservoirs in the upper basin.

11. In 1945, Congress enacted the Rivers and Harbors Act of 1945, Pub. L. No. 79-14, 59 Stat. 10, 19, which among other things, authorized the Corps of Engineers to construct a nine-foot deep navigation channel between Sioux City, Iowa, and St. Louis, Missouri.
12. In 1945, the U.S. Supreme Court held that the evidence supported the ruling of a Special Master to equitably apportion the North Platte River, a tributary of the Missouri River that runs through three states: Wyoming, Colorado and Nebraska.  
  
“[W]here there is not enough water in the river to satisfy the claims asserted against it, the situation is not basically different from that were two or more persons claim the right to the same parcel of land.” *Nebraska v. Wyoming*, 325 U.S. 589, 610 (1945).
13. In 1951, Congress consented to the fourth interstate compact in the Missouri River Basin. The Yellowstone River Compact, Pub. L. No. 82-231, 65 Stat. 663, apportioned waters of this tributary between Montana, North Dakota and Wyoming.
14. In 1953, the U.S. Supreme Court resolved allocations issues and modified the Decree for the North Platte River. The Decree addressed operational issues caused by the construction of the Bureau of Reclamation’s Glendo Dam. *Nebraska v. Wyoming*, 345 U.S. 981 (1953).
15. In 1954, President Eisenhower proposed an interstate compact for the main stem of the Missouri River in his State of the Union Speech. Congress, however, never passed legislation consenting to the compact, though bills were introduced. See, S. Rep. No. 2322, 83rd Congress, 2d Session (1954).
16. In 1957, the U.S. Supreme Court modified its 1922 decree on the Laramie River and enjoined Colorado from diverting water for use outside of the river basin. *Wyoming v. Colorado*, 353 U.S. 953 (1957).
17. In 1969, Congress consented to the fifth interstate compact in the Missouri River Basin. The Upper Niobrara River Compact, Pub. L. No. 91-52, 83 Stat. 86, apportioned the waters of this tributary between Wyoming and Nebraska.
18. In 1972, Congress consented to the sixth interstate compact in the Missouri River Basin. The Kansas-Missouri Big Blue River Compact, Pub. L. No. 92-308, 86 Stat. 193, apportioned waters between Kansas and Nebraska. The compact governs the drainage of the Big Blue River, a tributary to the Kansas (which in turn flows into the Missouri River).

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The O’Mahoney-Milliken Amendment, from this point of view, protected the upper basin states by requiring that in case of a conflict, navigation would be subordinate to the upper river’s “beneficial uses,” such as irrigation. See, for example, John P. Guhin, *The Law of the Missouri*, 30 S.D.L Review 347, 403-410 (1985).

19. In 1985, the U.S. Court of Appeals for the Tenth Circuit held that the interstate compact on the South Platte River, signed in 1926, was subject to the provisions of two subsequently-enacted laws, the Clean Water Act in 1972 and the Endangered Species Act in 1973. As a result, the Corps of Engineers' refusal to issue a permit for sand and gravel was a proper action under those statutes. *Riverside Irrigation District v. Andrews*, 758 F.2d 508 (10th Cir. 1985).
20. In 1985, the U.S. Court of Appeals for the Ninth Circuit held that once approved by Congress, the Yellowstone River Compact became federal, not state law. As a result, parties could not raise objections that it impermissibly interferes with interstate commerce. *Intake Water Company v. Yellowstone River Compact Commission*, 769 F.2d 568 (9th Cir. 1985), *cert. denied*, 476 U.S. 1163 (1986).
21. In 1988, the U.S. Supreme Court issued its opinion in *ETSI Pipeline Project v. Missouri*, 484 U.S. 495 (1988), holding that the Corps of Engineers, not the Department of Interior, had the authority to sign contracts with municipal and industrial users for surplus water from Corps reservoirs on the Missouri River. At issue was a large proposed diversion from Oahe Dam in South Dakota. The Court said the "dominant function" of Oahe Dam and other main stem reservoirs authorized by the Flood Control Act of 1994 was flood control and navigation. *Id.* at 512.
22. In 1988, the U.S. Supreme Court denied an attempt by South Dakota for a declaratory ruling that the O'Mahoney-Millikin Amendment to the Flood Control Act of 1944 constituted an apportionment of the river in the upper basin. *South Dakota v. Nebraska*, 485 U.S. 902 (1988). See, also, *South Dakota v. Nebraska*, 474 U.S. 941 (1985).
23. In 1990, a federal court of appeals rejected South Dakota's attempts to enjoin the Corps of Engineers from reducing the water level in Lake Oahe to assure downstream fish migration. *South Dakota v. Hazen*, 914 F.2d 147 (8th Cir. 1990).
24. In 1993, the U.S. Supreme Court reviewed again the decree for the North Platte River, this time in conjunction with the operation of Tri-State Dam. *Nebraska v. Wyoming*, 507 U.S. 584 (1993).
25. In 1995, the U.S. Supreme Court issued another opinion involving the North Platte River. *Nebraska v. Wyoming*, 515 U.S. 1 (1995). The Court allowed Nebraska to submit testimony before a Special Master about damages caused by water diversions in Wyoming, but also allowed Wyoming to go forward with a claim alleging that federal officials had contravened federal and state water law by entering into certain water supply contracts. The Court also allowed Nebraska to amend its equitable apportionment complaint to claim water from Wyoming to be used in Nebraska for compliance with Endangered Species Act ("ESA") issues.
26. In 1996, a federal district court in Colorado upheld the U.S. Environmental Protection Agency's veto of the Corps of Engineers' permit to place fill required for construction of the proposed Two Forks Dam near Denver, Colorado. EPA's

veto prevented construction of the dam on the South Platte River. *Alameda Water & Sanitation District v. Reilly*, 930 F. Supp. 486 (D. Colo. 1996).

27. In 2003, the U.S. Court of Appeals for the Eighth Circuit held in *South Dakota v. Ubbelohde*, 330 F.3d 1014, 1028 (8th Cir. 2003), *cert. denied*, 541 U.S. 987 (2004), that the Corps of Engineers' 1979 Master Water Control Manual was a binding document, not just a policy statement. The Corps of Engineers had argued that the Manual was a voluntary document and not subject to judicial review. The Eighth Circuit relied in part on the Corps' regulations, 33 CFR § 222.5, and on language in the Manual itself in reaching its conclusion that the Manual was intended by the Corps to create binding obligations.

The Eighth Circuit therefore held that a federal district court in Nebraska correctly ordered the Corps of Engineers to abide by the 1979 Manual and a 2002 Annual Operating Plan in managing water levels from Lake Oahe.

At the same time, the Eighth Circuit dissolved two injunctions entered by federal district courts on behalf of North and South Dakota that prohibited the Corps of Engineers from lowering of water levels in reservoirs in those states. North and South Dakota had argued the Corps was obligated to give equal weight to recreation (i.e., higher water levels in reservoirs for sports fishing). The Eighth Circuit cited the 1988 Supreme Court opinion in *ETSI Pipeline Project* for the conclusion that the dominant functions of the Missouri River dams were flood control and navigation. *Id.* at 1027. The Corps' 1979 Manual and 2002 Annual Operating Plan were consistent with those priorities.

28. In 2004, the Eighth Circuit upheld the denial of all challenges to the Corps of Engineers' new 2004 Master Water Manual, which revised the 1979 manual that had been litigated in the *Ubbelohde* case. *In Re Operation of Missouri River System Litigation*, 421 F.3d 618 (8th Cir. 2005). Petitions in five different federal district courts had been consolidated into a single action upon request of one of the parties. See, *In Re Operation of the Missouri River System Litigation*, 363 F.Supp.2d 1145 (D. Minn. 2004)(multi-district litigation).

The Eighth Circuit reiterated that the dominant functions of the Flood Control Act of 1944 (authorizing the upstream dams) were flood control and navigation. The court also held that the Corps of Engineers had the discretion during a drought to reduce or eliminate the navigation season. *In Re Operation of the Missouri River System Litigation*, 421 F.3d at 629. The Flood Control Act did not describe how the Corps of Engineers should balance dominant over secondary interests, such as recreation. The court therefore deferred to the Corps' decisions.

#### **9.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The key federal agency on the main stem of the Missouri River is the Corps of Engineers. Management of the Missouri's tributaries, however, is decentralized and involves the Bureau of Reclamation, state agencies, irrigation districts and other entities.

#### **9.4.1 Long-term Operational Strategy**

The Corps of Engineers published a “Master Water Control Manual” (2004), which contains a detailed strategy for managing the federal dams on the upper Missouri River. The manual, 14 years in the making, is the most detailed analysis of river management issues on the upper basin. Although the Corps of Engineers argued it was not obligated to implement the water control manual and there was no law to apply, courts have held that the document is a binding regulation issued pursuant to 33 CFR § 222.5. *South Dakota v. Ubbelhode*, 330 F.3d 1014, 1029 (8th Cir. 2003), *cert. denied*, 541 U.S. 987 (2004). Nonetheless, the courts have granted discretion to the Corps to deviate from the manual in certain limited circumstances. *In Re Operation of the Missouri River System Litigation*, 421 F.3d 618 (8th Cir. 2005).

#### **9.4.2 Short-term Operational Strategy**

##### **The Corps of Engineers**

Neither the Rivers and Harbors Act of 1935 nor the Flood Control Act of 1944 established priorities for managing Missouri River dams. As a result, the Corps of Engineers believes it has a broad mandate to balance competing uses of the river:

“Congress did not assign a priority to these operational uses. Instead, it was contemplated that the Corps, in consultation with affected interests and other agencies, would consider all of the authorized purposes when making decisions to optimize development and utilization of the water resources of the Missouri River.” (Emphasis added.)

The Corps of Engineers relies on its 2004 Master Water Control Manual which establishes guidelines and criteria for operating the main stem dams and reservoirs. The Master Manual has created four “zones” within reservoirs for different uses. The Master Manual called for the Corps of Engineers to suspend navigation in severe droughts. Power from the dams is generally used to meet peak demands. The only dam that does not provide peaking power is Gavins Point, the farthest downstream dam. The dam is operated primarily to provide stable flows for navigation.

To date, federal courts have deferred to the Corps of Engineers. *South Dakota v. Ubbelhode*, 330 F.3d 1014, 1019 (8th Cir. 2003), *cert. denied*, 541 U.S. 987 (2004). *In Re Operation of the Missouri River System Litigation*, 421 F.3d 618 (8th Cir. 2005).

##### **The Bureau of Reclamation**

The Bureau operates dams on tributaries, pursuant to the Flood Control Act of 1944, which created the Pick-Sloan Plan for the Missouri River. The Bureau has published its own Annual Operating Plans for dams on tributaries in the Missouri River Basin.

#### **9.4.3 River Accounting Mechanisms**

There are few withdrawals on the Upper Missouri River from the Corps of Engineers’ dams. The Lower Missouri River, however, has extensive diversions for municipal water, agriculture and

power plant operations. In Missouri, for example, most of the withdrawals supply coal and nuclear power plants – water that eventually returns to the river. Each state monitors its own withdrawals and return flows. There is no central clearinghouse for Missouri River water diversions.

#### **9.4.4 The Role of Interstate Compacts**

There are no interstate compacts on the main stem of the Missouri River. Six tributaries (the South Platte, Republican, Belle Fourche, Yellowstone, Upper Niobrara and Big Blue Rivers) are governed in part by interstate water allocation compacts.<sup>117</sup>

In chronological order, from the date that Congress consented, the interstate water allocation compacts in the Missouri River Basin are:

##### **The South Platte Compact**

The South Platte Compact (1926) between Colorado and Nebraska allowed Colorado to retain the full and uninterrupted use of the river within its boundaries in certain times of year, except for the diversion of water into a cross-border canal located in part in Nebraska. The Compact did not create a Commission to administer its provisions. Pub. L. No. 69-37, 44 Stat. 195.

##### **The Republican River Compact**

The Republican River Compact (1943) between Colorado, Kansas and Nebraska apportioned the basin's water supply above the Kansas-Nebraska state line by calculating the annual water supply in numerous sub-basins and then allocating a certain percent of each basin to the three states. Pub. L. No. 78-60, 57 Stat. 86. The apportionment of the sub-basins resulted in the following allocations:

Nebraska:	50 %
Kansas:	40 %
Colorado:	10 %

The Compact did not create a commission but left implementation in the hands of three states. Article IX. The Compact called on the U.S. Geological Survey to “collaborate” with state officials to collect, correlate and publish “water facts” necessary for the administration of the Compact. Article X.

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<sup>117</sup>A seventh compact – between Kansas and Missouri – addressed the prevention and control of floods in seven counties in and adjacent to Kansas City, Kansas, and Kansas City, Missouri. See, the Kansas-Missouri Flood Prevention and Control Compact of 1997. The Compact created an 11-member commission (five from each state plus a non-voting federal representative). Article III. See Missouri Revised Statutes, 70.327.

Eight federal dams and six irrigation dams were built in the 25,000-square-mile basin. By the late 1970s, there were water shortages along certain parts of the river.

The most controversial aspect of the Compact was whether it regulated ground water. Kansas alleged that Nebraska and Colorado were over pumping ground water from deep wells in the Ogallala aquifer. In 1998 Kansas filed a lawsuit against Nebraska and Colorado in the U.S. Supreme Court. Nebraska filed a counterclaim in 2000. The case was settled in 2003 pursuant to terms approved by a special master, who ruled that groundwater withdrawals that deplete stream flows were subject to the Compact and its allocation formulas. The practical effect of his ruling was to require upstream states to offset new ground water depletions to stay within their Compact allocations. The three states agreed to waive all claims against each other related to the use of water before December 15, 2002. The states have agreed on a model to monitor groundwater.

### **The Belle Fourche River Compact**

The Belle Fourche River Compact (1944) between Wyoming and South Dakota apportioned the unappropriated waters of this tributary. Pub. L. No. 78-236, 58 Stat. 94. The compact allocated water according to the following formula:

South Dakota 90 %      Wyoming 10 %

The Compact did not create a Commission but called on the USGS to “collaborate” with state officials to collect, correlate and publish “water facts” necessary for the administration of the Compact. [See similar provision in the Republican River Compact.]

### **The Yellowstone River Compact**

The Yellowstone River Compact (1951) between Montana, North Dakota and Wyoming apportioned the unappropriated water of this tributary. Pub. L. No. 82-231, 65 Stat. 663. The compact allocated water according to the following formulas:

Clarks Fork  
Wyoming 60 %      Montana 40 %

Bighorn River  
Wyoming 80 %      Montana 20 %

Tongue River  
Wyoming 40 %      Montana 60 %

Powder River  
Wyoming 42 %      Montana 58 %

The Compact also preserved North Dakota’s share of the waters of the Yellowstone within its boundaries.

The Compact prohibited diversions without the unanimous consent of the four signatory states. Article X.

The Compact did not create a Commission to administer the agreement or divide waters between Montana and North Dakota. Article III. But the Compact created a three-member Commission to administer the agreement between Montana and Wyoming.

Each state has one member and the USGS names a non-voting representative to serve as chairman. Article III.

The U.S. Court of Appeals for the Ninth Circuit held that once approved by Congress, the Yellowstone River Compact became federal law. As a result, parties could not raise objections that it impermissibly interfered with interstate commerce. *Intake Water Company v. Yellowstone River Compact Commission*, 769 F.2d 568 (9th Cir. 1985), *cert. denied*, 476 U.S. 1163 (1986).

#### **The Upper Niobrara River Compact**

The Upper Niobrara River Compact (1969), between Wyoming and Nebraska, allocated storage and ground water development at Anchor Dam (a Bureau of Reclamation project completed in 1960). Pub. L. No. 91-52, 83 Stat. 86.

The Compact did not create a Commission but called on the U.S. Geological Survey (“USGS”) to collaborate with state officials to collect, correlate and publish water facts necessary for the administration of the Compact. [See similar provision in the Republican River Compact and Belle Fourche Compact.]

#### **The Kansas-Nebraska Blue River Compact**

The Kansas-Nebraska Blue River Compact (1972) between Kansas and Nebraska apportioned the water in this 10,000-square mile tributary basin. The Compact requires certain minimum flows at certain times of year. The Compact apportions the waters of the Little Blue River and the Big Blue River and limits the size of new reservoirs. The Compact created a three-member commission, one from each state with a non-voting federal representative to serve as commission chairman. Article III. Pub. L. No. 92-308, 86 Stat. 193.

None of the above compacts appears to create a significant constraint on the operation of the main stem of the Missouri River.

### **9.4.5 International Treaties and Agreements**

Portions of tributary basins of the Missouri River are in Canada, but there are no international treaties that allocate or apportion water.

### **9.4.6 The Role of Native American Tribes**

There are 30 Native American Tribes within the Missouri River Basin who control more than 15

million acres within the basin. Thirteen reservations are located directly on the main stem of the river while others are dispersed on tributaries.

The 13 reservations located adjacent to the river include:

- Fort Peck Indian Reservation
- Fort Berthold Indian Reservation
- Standing Rock Indian Reservation
- Cheyenne River Indian Reservation
- Lower Brule Indian Reservation
- Crow Creek Indian Reservation
- Yankton Indian Reservation
- Ponca Tribal Lands
- Santee Indian Reservation
- Winnebago Indian Reservation
- Omaha Indian Reservation
- Iowa Indian Reservation
- Sac and Fox Indian Reservation

Some tribes are active in habitat restoration efforts undertaken pursuant to the Endangered Species Act and in a variety of other river management issues. See web site of the Mni Sose Intertribal Water Rights Coalition. [www.mnisose.org](http://www.mnisose.org) Tribes in the upper basin intervened in the litigation challenging the Corps of Engineers' decisions to operate the Missouri River for navigation. See the *Ubbelhode* case, 310 F.3d 1014 (8th Cir. 2003), *cert. denied*, 541 U.S. 987 (2004), and *In Re Operation of the Missouri River System Litigation* for details, 421 F.3d 618 (8th Cir. 2005).

#### **9.4.7 The Role of Federal Courts**

In general, the federal courts have deferred to the Corps of Engineers, which they describe as the “river master” of the Missouri River. *In Re Operation of the Missouri River System Litigation*, 421 F.3d 618 (8th Cir. 2005), upholding the Corps' discretion in balancing competing priorities on the Missouri River.

### **9.5 CURRENT ISSUES AND CONFLICTS ON THE MISSOURI RIVER**

The Missouri River, now in a six-year drought, faces serious problems of water allocation. There is concern that a continuing drought could further curb or even halt the navigation season and pose problems for electric utilities that operate coal and nuclear power plants that depend on cooling water from the river.

### **9.5.1 Water Supply and Allocation**

Twenty-five coal and nuclear power plants (capacity: 15,000 MW) depend on Missouri River water for their operations. By 2006, the long drought and ESA restrictions have raised concerns that electric utilities would have to reduce or modify operations.<sup>118</sup>

### **9.5.2 Power Supply and Allocation**

Power is sold from dams owned by the Corps of Engineers and the Bureau of Reclamation dams on the upper Missouri River by the Western Area Power Administration, a federal power marketing agency. There are no major conflicts at present, though the ongoing drought is forcing Western to buy power on the market to meet its existing contractual obligations with utilities and other customers.

### **9.5.3 Environmental Issues**

#### **Interbasin Transfers to the Red River in North Dakota**

Although the Missouri River is primarily a domestic, not an international river, there is an ongoing dispute over diversions in North Dakota with international implications.

The North West Area Water Supply (“NAWS”) Project would transfer water from the upper Missouri River watershed in western North Dakota to the Red River Basin in the eastern part of the state, an area that has suffered from water supply problems for years. Water there flows north into the Province of Manitoba, Canada, and eventually into Hudson Bay. NAWS is a joint project of the U.S. Bureau of Reclamation (part of the Department of Interior) and North Dakota. Construction began in 2002. When complete in 2008, NAWS would serve about 80,000 people in and around the City of Minot.

Manitoba, however, has sued the Department of Interior and North Dakota, alleging that the NAWS Project would likely introduce non-native biota to the Red River watershed and that the Department had failed to consider these consequences under the National Environmental Policy Act (“NEPA”), 42 U.S.C. 4321 et seq.

In February 2005, a federal district court judge ordered the Department to reevaluate the environmental consequences under NEPA but deferred action on Manitoba’s request for an injunction prohibiting federal defendants from expending funds or taking further action on the project. *Government of the Province of Manitoba v. Norton*, 398 F.Supp.2d 41 (D.D.C. 2005).

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<sup>118</sup>See, “Impacts of Possible Changes in Missouri River Flows on Nebraska’s Electric Energy Industry,” a report from the Nebraska Power Association (December 2003).

### **Endangered Species Act**

The U.S. Fish and Wildlife Service has listed three species on the Missouri River as threatened or endangered: 1) the pallid sturgeon; 2) the interior least tern; and 3) the piping plover.

In 2005, a federal appeals court rejected efforts by environmental groups to force the Corps of Engineers to change the flows from the upper Missouri River dams to help preserve and to restore the listed species, and protect downstream habitat. The environmental groups wanted the Corps to release more water in spring and less in summer, simulating the river's natural hydrograph. The court said the Corps was not required to take those steps. *In Re Operation of the Missouri River System Litigation*, 421 F.3d 618 (8th Cir. 2005).

### **Water Quality**

Pesticide residues have been found in Missouri River fish. Elevated levels of mercury and arsenic, which occur naturally in the soil and rock, as well as storm water runoff and industrial effluent, are also a concern.

### **Sedimentation**

Sedimentation, which is building up behind the dams, has caused a total loss of 4.4% of storage capacity by 1995 (a loss of 89,000 AF each year). Sedimentation reduces the channel capacity and raises reservoir levels, and is of particular concern at Gavins Point Dam, the farthest downstream of the major dams. Gavins Point had lost 18.3% of its storage capacity by 1995. Prior to the construction of the federal dams, most of the sediment flowed in the Missouri River until it emptied into the Mississippi River. Sedimentation can block the intakes of municipal water systems and other users. Even with the large dams on the Missouri, the amount of sedimentation below the dams is significant: at St. Louis, where the river meets the Mississippi, total sediment reaches 125 million tons (half of what the natural river carried).

## **9.5.4 Other**

### **Shorter Navigation Season**

Because of the continuing drought, the Corps of Engineers truncated the navigation season by about six weeks in 2004, 2005 and 2006 in order to hold additional water behind upstream dams. Normally, the river is open between April 1 and December 1 each year for commercial barge and tow traffic.

### **Sports Fishing and Recreation**

North and South Dakota introduced non-native fish (i.e., walleye and Chinook salmon) to the federal reservoirs in the Upper Missouri River Basin to provide an economic boost to rural communities. There is, however, an operational conflict between the management of the river to preserve and enhance the sports fishing in the upper basin versus

downstream stream flows for the ESA-listed pallid sturgeon. Raising the level of the river in spring below the dams for sturgeon draws down reservoirs and reduces the spawning grounds of non-native fish in the reservoirs.

## **9.6 CONFLICT RESOLUTION**

### **9.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power from the Missouri River.

### **9.6.2 Administrative Allocation of Water or Power**

The Corps of Engineers has the discretion to balance competing uses and to adjust river flows from reservoirs to meet multiple needs, but it has no administrative authority to allocate water or power.

### **9.6.3 Judicial Allocation of Water or Power**

The U.S. Supreme Court has never considered a water apportionment case involving the main stem of the Missouri River, but has allocated water on tributaries. See the North Platte litigation, *Nebraska v. Wyoming*, 515 U.S. 1 (1995).

### **9.6.4 Arbitration or Mediation**

To date, arbitration and mediation have not been used to resolve water or power allocation or management disputes in the Missouri River.

### **9.6.5 Litigation**

Multiple challenges to the Corps of Engineers' 2004 Master Water Manual for the Missouri River have been dismissed. *In Re Operation of the Missouri River System Litigation*, 421 F.3d 618 (8th Cir. 2005).

### **9.6.6 Infrastructure Improvements and Environmental Restoration**

The Corps of Engineers has embarked on an ambitious 20-year, \$3-billion "Missouri River Fish and Wildlife Mitigation" program for the entire length of the river and parts of some tributaries, such as the Yellowstone River. That effort includes a program to mitigate loss of wildlife habitat in four Lower Basin states: Iowa, Nebraska, Kansas and Missouri.<sup>119</sup>

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<sup>119</sup>USACE Annual Report 2004, Civil Works Activities, Section 26 (Omaha, Nebraska District). See page 26-12 (total amount) and page 26-25 (expenditures until 2004).

### **9.6.7 Interagency and Multi-Party Agreements**

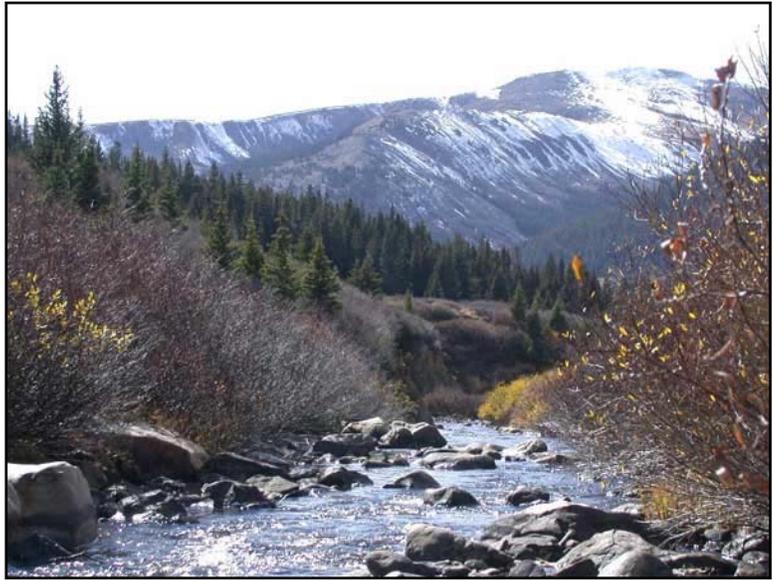
The Corps of Engineers has no significant interagency and multi-party agreements affecting the Missouri River, except for the replacement flood control storage with the Bureau of Reclamation.

There, however, several cooperative efforts underway in the Missouri River Basin. The Missouri River Basin Association is a coalition of eight states and the Mni Sose Tribal Water Rights Coalition. [www.mrba-missouri-river.com](http://www.mrba-missouri-river.com). Federal agencies have formed a Missouri River Recovery Implementation Committee (“MRRIC”) to address Endangered Species Act (“ESA”) problems in the basin. The MRRIC is working with the U.S. Institute for Environmental Conflict Resolution.

## **10.0 THE ARKANSAS RIVER – A TRIBUTARY OF THE MISSISSIPPI RIVER**

### **10.1 INTRODUCTION**

The first Europeans to see the Arkansas River were members of Francisco Coronado's expedition, who crossed the river in 1541 near present day Dodge, Kansas, looking for the cities of Cibola, a mythical land of golden treasures. A year later, fellow Spaniard Hernando De Soto traveled to the junction of the Arkansas with the Mississippi. Father Jacques Marquette, the French explorer, gave the river its name: he called it the "Akansa" in his journal of 1673. The United States acquired the Arkansas River Basin from France in 1803 as part of the Louisiana Purchase. In 1805-06, Zebulon Pike traveled up the Arkansas River. John Fremont traversed the river in the other direction in 1843-1844.



**FIGURE 17.** The headwaters of the Arkansas River near Leadville, Colorado. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Arkansas\\_river](http://en.wikipedia.org/wiki/Arkansas_river)]

The modern-day Arkansas River has three distinct characters: a steep mountain river through the Rocky Mountains in central Colorado; a prairie river with wide, shallow banks through southeastern Colorado and Kansas; and a tamed river as it moves through eastern Oklahoma and Arkansas, where it is a navigation channel for barges.

The largest tributary of the Arkansas River is the Canadian River, which begins in the Sangre de Cristo Mountains of southern Colorado and flows through northeastern New Mexico and the Texas Panhandle until it reaches Lake Eufala, Oklahoma, where it empties into the Arkansas River.

The Arkansas River drains portions of six states: Arkansas; Colorado; Kansas; New Mexico; Oklahoma; and Texas. At 1,396 miles in length, the Arkansas River is the fourth longest river in the United States. Its source is in the eastern slopes of the Rocky Mountains near Leadville, Colorado, and it empties into the Mississippi River in southeast Arkansas, 600 miles north of New Orleans.

The river basin contains 185,000 square miles. The flow of the Arkansas River when it empties into the Mississippi River averages 36.6 MAF per year. In addition to the Canadian River, the other major tributaries include: the Oklahoma River; the Purgatoire River in Colorado; the Little

Arkansas River in Kansas; the Ninnescah River in Kansas; the Illinois River in Arkansas and Oklahoma; the Neosho-Grand River in Oklahoma; the Verdigris River in Kansas and Oklahoma; and the Cimarron River in New Mexico and Oklahoma.

Approximately 4 million people live in the Arkansas River Basin. Major cities located adjacent or near the river include: Pueblo (CO); Wichita (KS); Tulsa (OK); Muskogee (OK); Fort Smith (AR); and Little Rock (AR).

## **10.2 USES OF THE ARKANSAS RIVER**

The upper Arkansas River in Colorado is used for irrigation and municipal water supply. In Kansas, the river is used primarily for irrigation. In eastern Oklahoma, a “staircase” of locks and dams allows commercial barge traffic to travel up the river for 445 miles near Tulsa, as part of the “McClellan-Kerr Arkansas River Navigation System.”

### **10.2.1 Hydropower**

The total generating capacity of all dams in the Arkansas River Basin is approximately 1,077 MW.<sup>120</sup> The Western Area Power Administration, a federal power marketing agency, sells and delivers power from federal dams in Colorado on the upper Arkansas River Population served: one million. [www.wapa.gov](http://www.wapa.gov)

The Southwestern Power Administration, another federal power marketing agency, sells power from federal dams in Oklahoma and Arkansas on the lower Arkansas River and its tributaries. Southwestern supplies power to about 7 million people.<sup>121</sup> [www.swpa.gov](http://www.swpa.gov)

### **10.2.2 Navigation**

The McClellan-Kerr Arkansas River Navigation System (“MCKARNS”) consists of 18 locks and dams that allow ocean-going vessels to traverse the Arkansas from its mouth at the Mississippi to Catoosa (near Tulsa), Oklahoma, a distance of 445 miles. [www.swl.usace.army.mil/navigation/mckarns.html](http://www.swl.usace.army.mil/navigation/mckarns.html)

The MCKARNS project was begun in 1952 and finished in 1969, with a minimum depth of 9 feet and minimum width of 250 feet. In FY 2004, 12.9 million tons of cargo were moved on the system. Barges going upstream first enter the White River, which drains into the Mississippi River. The next segment (9 miles) is manmade – a navigation channel connecting the White and Arkansas Rivers. For the next 377 miles through Arkansas and Oklahoma, the MCKARNS and the Arkansas River are one and the same. Then, at Muskogee, Oklahoma, MCKARNS leaves the

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<sup>120</sup>Of the 1,077 MW total generating capacity, approximately 838 MW is produced by federal infrastructure; the non-federal generating capacity is approximately 239 MW. See **Appendix B** for additional information.

<sup>121</sup>Southwestern has significant responsibilities outside of the Arkansas River Basin. It sells power from 24 dams owned by the Corps of Engineers (eight within the basin). The 7-million figure for population served includes Southwestern’s entire service territory. The Arkansas River dams are an integral part of this transmission network, and power is moved throughout its territory.

Arkansas River and follows the Verdigris River north for 50 miles until the Port of Coosa, Oklahoma.

### **10.2.3 Water Supply**

There is a total of approximately 11.3 MAF of storage on the main stem of the Arkansas River; about 8.7 MAF is federal reservoir storage and the remaining 2.6 MAF is non-federal reservoir storage. See **Appendix B** for details.

#### **Municipal Water Supply**

Dams and diversions meet the needs of approximately 2.7 million people in the Arkansas River Basin. The major municipal water projects are:

- The Fryingpan-Arkansas Project, which supplies water for about 380,000 people in southeast Colorado, including the cities of Colorado Springs and Pueblo;
- Cheney Dam on the North Fork of the Ninnescah River in Kansas, which supplies municipal water to about 320,000 people in Wichita. The dam, built by the Bureau of Reclamation, is operated by the City of Wichita;
- Lake Meredith, the reservoir behind Sanford Dam on the Canadian River in Texas, which supplies drinking water to Amarillo, Lubbock and nine other cities in the Texas Panhandle. The Canadian River Municipal Water Authority (“CRMWA”) owns and operates the distribution system, which includes 322 miles of aqueducts to deliver water from the dam, built by the U.S. Bureau of Reclamation. CRMWA supplies municipal water to about 500,000 people; [www.crmwa.com](http://www.crmwa.com)
- Stanley Draper Dam, which supplies 500,000 people in the area of Oklahoma City, Oklahoma;
- Spavinaw and Eucha Dams, which supply 400,000 people in the area of Tulsa, Oklahoma; [www.tulsawater.com](http://www.tulsawater.com)
- Norman Dam, built by the Bureau of Reclamation, which supplies about 100,000 people in the area of Norman, Oklahoma;
- Fort Smith Dam, which supplies water to 75,000 people in the area of Fort Smith, Arkansas; [www.fortsmithwater.org](http://www.fortsmithwater.org) and,
- Maumelle Dam, which supplies water to 388,000 people in the Little Rock, Arkansas, and other communities in central Arkansas. [www.cark.com](http://www.cark.com).

#### **Irrigation**

The Bureau of Reclamation has built two significant irrigation projects in the upper Arkansas River Basin that irrigate 322,000 acres:

- The Fryingpan-Arkansas Project allows average annual diversions of 640,000 AF from the Colorado River Basin to the Arkansas River Basin in eastern Colorado.

Water from the Project irrigates 281,000 acres.

- In New Mexico, the Tucumcari Project on the Canadian River consists of an 84-mile long canal from Conchos Dam (owned by the Corps of Engineers) and a distribution system to irrigate 41,000 acres.

#### **10.2.4 Flood Control**

The federal dams built by the U.S. Army Corps of Engineers (“Corps of Engineers”) and the Bureau of Reclamation provide flood control protection as part of their multiple purposes. In addition, Sanford Dam on the Canadian River in the Texas Panhandle provides flood control benefits.

### **10.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Arkansas River Basin are:

1. In 1902, the U.S. Supreme Court allowed Kansas to proceed with claims that Colorado was diverting water from the Arkansas River and depleting the downstream supply. The Court, however, said it did not have enough facts to allocate water between the two states. *Kansas v. Colorado*, 185 U.S. 125 (1902).
2. In 1907, the dispute between Kansas and Colorado was back in the U.S. Supreme Court, which issued a landmark opinion holding that no state could unilaterally impose its laws and policies upon another state to allocate the flow or use of an interstate water. Kansas, a riparian law state, and Colorado, a prior appropriation state, argued opposing theories of “who should get what” from the Arkansas River. The Court dismissed without prejudice the claims of Kansas to halt Colorado’s diversions, but said Kansas was free to file in the future “whenever it shall appear that, through a material increase in the depletion of the waters of the Arkansas by Colorado...the substantial interests of Kansas are being injured...” *Kansas v. Colorado*, 206 U.S. 46 (1907).
3. In 1936, Congress enacted the Flood Control Act, Pub. L. No. 74-738, 49 Stat. 1570, which authorized the Corps of Engineers to build John Martin Dam in Colorado on the Arkansas River, 60 miles west of the Kansas border, and Conchas Dam on the Canadian River, a tributary of the Arkansas, near Tucumcari, New Mexico.
4. In 1938, Congress authorized the Bureau of Reclamation to build a canal and water distribution system from Conchas Dam on the Canadian River, Pub. L. No. 75-477, 52 Stat. 211. Construction began in 1940 and was reauthorized in 1944 as an emergency food project during World War II.
5. In 1941, Congress enacted the Flood Control Act, Pub. L. No. 77-228, 55 Stat. 638, 645, which incorporated a plan for the Grand River, a tributary of the Arkansas, in Oklahoma.

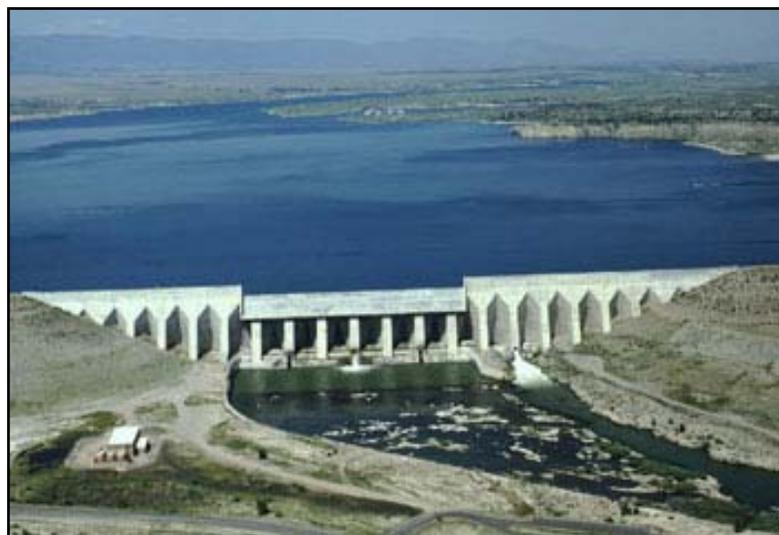
6. In 1943, the U.S. Supreme Court issued another ruling on the dispute between Kansas and Colorado over water in the Arkansas River. The Court held that Colorado was entitled to an injunction barring water users in Kansas from pursuing claims in lower courts against Colorado for upstream diversions. In addition, the Court denied – again – the contention of Kansas that it could prove Colorado’s increased use of water harmed downstream users in Kansas. The Court therefore refused to equitably apportion the river, but suggested instead that the states resolve their differences by negotiating an interstate compact. *Colorado v. Kansas*, 320 U.S. 383, 392 (1943).
7. In 1945, Congress authorized Colorado and Kansas to negotiate and enter into an interstate compact no later than January 1, 1950, to resolve allocation disputes on the Arkansas River, 1950. Pub. L. No. 79-34, 59 Stat. 53. The President was required to designate a representative to the negotiations. The compact was not binding unless ratified by Congress.
8. In 1946, Congress enacted the Rivers and Harbors Act of 1946, which authorized the Corps of Engineers to build the McClellan-Kerr Arkansas River Navigation System in Oklahoma and Arkansas on the lower portion of the Arkansas River, Pub. L. No. 79-525, 60 Stat. 634. The system included locks and dams between Tulsa, Oklahoma and the mouth of the river (445 miles).
9. In 1949, after three years of negotiation, Colorado and Kansas agreed on terms of an interstate compact. Congress consented to the Arkansas River Compact, Pub. L. No. 81-82, 63 Stat. 145, which divided the waters in the Arkansas River between the two states, and established operating criteria for John Martin Reservoir in Colorado, owned by the Corps of Engineers. The Compact created the “Arkansas River Compact Administration” to administer the agreement.  
  
The Arkansas River Compact was not intended “to impede or prevent future beneficial development of the Arkansas River basin in Colorado or Kansas,” provided that the Arkansas River “shall not be materially depleted in useable quantity or availability” in Colorado or Kansas. Article IV-D. This section would become one of the most litigated phrases of any interstate compact.
10. In 1950, Congress authorized the Bureau of Reclamation to build the Canadian River Project, including Sanford Dam, on the Canadian River in Texas, 43 U.S.C. § 600(b). The dam was the second on the river [see 1936 entry for Conchas Dam]. The bill specified that construction could not commence until Congress consented to a Canadian River Compact between New Mexico; Oklahoma; and Texas. 43 U.S.C. § 600c(b). The states had attempted to negotiate a compact in the 1920s but could not reach agreement. This time, negotiations proved successful, and the states submitted a Canadian River Compact to Congress only two years later.
11. In 1952, Congress consented to the Canadian River Compact, Pub. L. No. 82-345, 66 Stat. 74, which allocated waters in the Canadian River Basin between New Mexico, Oklahoma and Texas.

12. In 1958, Congress authorized the Corps of Engineers to build the Trinidad Project in Colorado on the Purgatoire River, a tributary of the Arkansas. Pub. L. No. 85-500, 72 Stat. 297, 309. The Corps of Engineers subsequently established operating principles for the dam in an attempt to comply with the 1949 Arkansas River Compact and avoid adverse effects on downstream uses in Kansas.
13. In 1960, the U.S. Supreme Court held that the Corps of Engineers had the “superior right” to build and operate the Ft. Gibson Dam on the Grand River, a tributary of the Arkansas River. The federal government did not need to compensate the Grand River Dam Authority, an entity established under Oklahoma law, for the “taking” of downstream water power and development rights by the Corps of Engineers. *United States v. Grand River Dam Authority*, 363 U.S. 229, 232 (1960).

The Supreme Court acknowledged that the federal government had frustrated “an enterprise [the construction of a dam by the state authority]” by proceeding with Fort Gibson, but it did so “by reason of the exercise of a superior governmental power.” *Id.* at 236. The Grand River Dam Authority could only show that a prospective business opportunity was lost. Under those circumstances, when the United States “appropriates the flow either of a navigable or non-navigable stream pursuant to its superior power under the Commerce Clause, it is exercising established prerogatives and is beholden to no one.”

14. In 1962, Congress authorized the Bureau of Reclamation to build the Fryingpan-Arkansas Project Act, Pub. L. No. 87-590, 76 Stat. 389. The project included dams, diversion tunnels and other infrastructure to move water from the Fryingpan River in the Colorado River Basin through the Rocky Mountains to the eastern slopes, where the water flowed into the Arkansas River Basin. The project included Ruedi Dam on the western slopes and Pueblo Dam and other structures in eastern Colorado.

The Act expressly provided that the Fryingpan-Arkansas Project must be operated under the “Operating Principles” adopted by Colorado in



**FIGURE 18.** Pueblo Dam, Colorado.  
[Source: U.S. Bureau of Reclamation Website,  
<http://www.usbr.gov/dataweb/dams/co00299.htm>]

- 1959 and published in U.S. House of Representatives Document 130 (87th Congress, 1st Session).
15. In 1966, Congress consented to the second of three compacts on the Arkansas River. The Arkansas River Basin Compact of 1965, Pub L. No. 89-789, 80 Stat. 1405, 1409, attempted to equitably apportion the river between Kansas and Oklahoma.
  16. In 1970, the U.S. Supreme Court held that three Indian Nations – the Choctaw, Chickasaw and Cherokee – retained title to certain portions Arkansas River bed in Oklahoma. *Choctaw Nation v. Oklahoma*, 397 U.S. 620 (1970).
  17. In 1973, Congress consented to the third of three compacts on the Arkansas River. The Arkansas River Basin Compact of 1970, Pub. L. No. 93-152, 87 Stat. 569, apportioned the Arkansas River between Oklahoma and Arkansas. With the signing of this compact, the river was in effect subject to a succession of interstate compacts, the first between Colorado and Kansas, then between Kansas and Oklahoma, and finally between Oklahoma and Arkansas.
  18. In 1984, the U.S. Supreme Court declined to adopt the findings of a Special Master who had recommended an equitable apportionment of the Vermejo River, a tributary to the Canadian River in Colorado and New Mexico. *Colorado v. New Mexico*, 467 U.S. 310 (1984). The Court held that Colorado had not demonstrated by clear and convincing evidence that it should be permitted to divert water from the Vermejo River.
  19. In 1985, Kansas sued Colorado – again – in the U.S. Supreme Court over the flows in the Arkansas River. This time, the petition concerned the provisions of the Arkansas River Compact of 1949. The petition alleged that 1) upstream operations of Trinidad Dam (jointly operated by the Corps of Engineers and Bureau of Reclamation) in Colorado had injured Kansas; 2) storage of excess water in winter at Pueblo Dam (part of the Bureau of Reclamation’s Fryingpan-Arkansas Project) had harmed Kansas; and 3) new deep irrigation wells in Colorado had depleted the water otherwise available for use by Kansas from the Arkansas River and therefore violated the compact. 475 U.S. 1079 (1986).
  20. In 1987, the U.S. Supreme Court held that the interest of three Native American Tribes – the Choctaw, Chickasaw and Cherokee Nations – was subject to the rights of navigation retained by the United States. *United States v. Cherokee Nation of Oklahoma*, 480 U.S. 700 (1987). The nations had argued that the construction of the McClellan-Kerr Arkansas River Navigation System on the lower river was a “taking” of their property that required compensation.
  21. In 1991, the U.S. Supreme Court addressed another dispute in the Arkansas River Basin, this one concerning the provisions in the Canadian River Compact of 1952. The suit involved water releases from Conchas Dam in New Mexico (a Corps of Engineers structure) and retained in Ute Dam (built by the New Mexico Interstate Stream Commission after the Compact was signed).

- The Court held that New Mexico had impermissibly stored more than 200,000 AF in Ute Dam. The water should have flowed through to Oklahoma and Texas, the Court concluded. *Oklahoma and Texas v. New Mexico*, 501 U.S. 221 (1991). The Court left the issue of remedy unresolved.
22. In 1993, the U.S. Supreme Court decided the remedy in the Canadian River Compact dispute and entered a stipulated judgment for Oklahoma and Texas and against New Mexico. The Court found that because New Mexico had been in violation of the Compact since 1987, it had to provide not more than 200,000 AF to Oklahoma and Texas. *Oklahoma and Texas v. New Mexico*, 510 U.S. 126 (1993).
  23. In 1995, the U.S. Supreme Court ruled – again – on the dispute between Kansas and Colorado over the Arkansas River. The Court rejected the claims of Kansas that upstream operations of Trinidad and Pueblo Dams in Colorado had injured Kansas. But the Court allowed Kansas to proceed with a claim – based on the findings of a Special Master – that Colorado’s use of deep irrigation wells had violated the Arkansas River Compact of 1949. *Kansas v. Colorado*, 514 U.S. 673 (1995).
  24. In 2001, the U.S. Supreme Court held that Kansas could recover monetary damages from Colorado, including pre-judgment interest, for violations of the Arkansas River Compact of 1949, based on Colorado’s depletion of water from deep irrigation wells. *Kansas v. Colorado*, 533 U.S. 1 (2001).
  25. In 2002, Congress enacted the Cherokee, Choctaw and Chickasaw Claims Settlement Act, which gave the three tribes title to the riverbed and banks and paid them \$40 million for past damages. Pub. L. No. 107-331, 116 Stat. 2834, 2845-55. The Act ended a 95-year old dispute going back to 1907, when Oklahoma became a state.
  26. In 2004, the U.S. Supreme Court adopted the findings of a Special Master on monetary damages owed by Colorado to Kansas, pursuant to the opinion 1995 and 2001 opinions. *Kansas v. Colorado*, 543 U.S. 86 (2004). The Court declined the request of Kansas to appoint a “River Master” to decide remaining technical disputes. The two states are now attempting to negotiate a final decree addressing ground water modeling and other issues.

#### **10.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Bureau of Reclamation and the Corps of Engineers both have key roles in managing the flows of the Arkansas River and its tributaries:

- The Bureau owns the Fryingpan-Arkansas Project in Colorado; Pueblo Dam in southeast Colorado; and Sanford Dam in the Panhandle of Texas.

- The Corps of Engineers owns Trinidad and John Martin Dams in Colorado; Conchas Dam in New Mexico; and a series of dams in Oklahoma and Arkansas on the lower river and its tributaries.

#### **10.4.1 Long-term Operational Strategy**

There is no comprehensive, long-term operational strategy currently in place for the entire Arkansas River Basin.

#### **10.4.2 Short-term Operational Strategy**

##### **John Martin Dam**

The Corps of Engineers' John Martin Dam in Colorado, 60 miles west of the border with Kansas, was authorized in 1936 and completed in 1948. It was the first dam on the main stem of the Arkansas River. The Arkansas River Compact of 1949 between Colorado and Kansas established operating criteria for John Martin Dam by creating an agreed-upon reservoir pool for flood control and conservation storage, and by specifying the times for water releases. The current operating procedures for John Martin Dam were revised in 1980.

##### **Fryingpan-Arkansas Operating Principles**

These criteria were adopted by Colorado in 1959 and were published in U.S. House of Representatives Document 130 (87th Congress, 1st Session) as a condition of authorizing the Fryingpan-Arkansas Project. The purpose of the operating principles is to impose limits on the amount of water that could be diverted by the project in western Colorado. A series of tunnels, pumping stations and related infrastructure moves water from the Colorado River Basin across the Continental Divide to the Arkansas River Basin in southeastern Colorado, a semi-arid area where the river has been over-appropriated since the 1880s. The water is used for municipal and agricultural purposes. A state agency – the Colorado Water Conservation Board – and three local water districts (the Colorado River Water Conservation District, the Southwestern Water Conservancy District and the Southeastern Colorado Water Conservancy District) signed the operating principles in 1960. The principles are posted on the Southeastern Colorado Water Conservancy District's web site: [www.secwcd.org](http://www.secwcd.org)

##### **Trinidad Project Operating Principles**

Trinidad Dam on the Purgatoire River (a tributary) in Colorado was completed in 1976. Trinidad Dam is located upstream of the John Martin Dam and is operated according to principles agreed upon by the Corps of Engineers (the owner) and other entities, including: the U.S. Bureau of Reclamation, the State of Kansas, the Arkansas River Compact Administration, created by the Arkansas River Compact of 1949, and the Purgatoire River Water Conservancy District in Colorado.

The Operating Principles mandated that Trinidad Dam be operated without adverse effect on downstream users or the inflow of water to John Martin Reservoir (which has its own operating criteria set forth in the Arkansas River Compact of 1949).

Trinidad's Operating Principles were the subject of litigation in the U.S. Supreme Court, which found that Kansas had not demonstrated that the storage practices at Trinidad Dam deviated from the operating principles and violated the Arkansas River Compact. *Kansas v. Colorado*, 514 U.S. 673 (1995). "Kansas argues that 'departure from the Operating Principles is *ipso facto* a violation of the Compact.'" *Id.* at 682. But Article IV of the 1949 Compact required Kansas to show the Trinidad dam operations caused a material depletion of water at the border. Kansas, the Court concluded, had not offered evidence to support its contentions. *Id.* at 683.

### **Power Generation at Lower River Dams**

Dams on the lower river – including those that are part of McClellan-Kerr Arkansas Navigation Project – generate power for peak use. The Southwestern Area Power Administration sells and delivers the power, and integrates the dam operations into its eight-state transmission network.

### **10.4.3 River Accounting Mechanisms**

The interstate compacts on the Arkansas and Canadian Rivers require parties to provide an accurate accounting. See annual reports from the compact commissions.

### **10.4.4 The Role of Interstate Compacts**

There are four interstate water allocation compacts. Each governs a different part of the Arkansas River Basin. The management of the Arkansas River and its tributaries is therefore divided into discrete segments. Three compacts affect the main stem of the Arkansas River; the fourth compact allocates water on the largest tributary of the Arkansas River, the Canadian River.

### **The Arkansas River Compacts (1949, 1965, and 1970)**

The Arkansas River Compact of 1949, between Kansas and Colorado, established operating criteria for John Martin Dam in Colorado, built by the Corps of Engineers. The criteria established release times for water and created conservation and flood control pools in the reservoir.

Article IV-D states that the agreement "is not intended to impede or prevent future beneficial development of the Arkansas river basin in Colorado and Kansas...provided that the waters of the Arkansas River...shall not be materially depleted in usable quantity or availability...."

This section would become the subject of U.S. Supreme Court litigation. See "Legal Regime" chronology and the "Trinidad Dam Operating Principles."

The Compact created the Arkansas River Basin Compact Administration consisting of three representatives from each state with a non-voting federal chairman. Each state has only one vote. Decisions must be unanimous. Article VIII-D. The Administration (with both states agreeing) could refer a dispute to binding arbitration. Article VIII-D.

The 1949 Compact did not end disagreements between the two states. See *Kansas v. Colorado*, 514 U.S. 673 (1995)(holding that Colorado’s use of deep irrigation wells impermissibly depleted the flow in the river at the Kansas border). A subsequent U.S. Supreme Court opinion in 2004 addressed the calculation of damages. *Kansas v. Colorado*, 543 U.S. 86 (2004). As of 2006, the parties are attempting to develop a computer model that will implement the Supreme Court’s opinion and measure Colorado’s future compliance.

The two other Arkansas River Compacts have proven uncontroversial:

The Arkansas River Basin Compact of 1965, between Kansas and Oklahoma, allocated water in five sub-basins between the states, specifying the amount of storage that Kansas and Oklahoma could use “free and unrestricted.” Articles V and VI. Kansas and Oklahoma also agreed to abate “man-made pollution within each state’s respective borders.” Article IX. The Compact created the “Kansas-Oklahoma Arkansas River Commission” composed of three members from each state. The Commission has a non-voting federal representative. Article X.

The Arkansas River Basin Compact of 1970, between Oklahoma and Arkansas, adopted the same approach, and divided the waters in five sub-basins. The Compact created the “Arkansas-Oklahoma Arkansas River Compact Commission” composed of three members from each state. The Commission has a non-voting federal representative. Article VIII.

### **The Canadian River Compact of 1952**

Three states – New Mexico, Oklahoma and Texas signed the Canadian River Compact. The Compact created a three-member Commission to implement the agreement but required that “a unanimous vote of the commissioners for the three signatory states shall be necessary” before the Commission takes action. Article IX.

The most important substantive provision in the Compact allowed New Mexico to use water (“free and unrestricted”) for its own purposes, but limited New Mexico’s ability to impound more than 200,000 AF of water originating below Conchas Dam in New Mexico. Article IV.

This provision became the subject of litigation in the 1990s when Oklahoma and Texas, the two downstream states, filed a petition in the U.S. Supreme Court challenging New Mexico’s impoundment of water downstream of Conchas Dam in Ute Dam, completed in 1963 by the New Mexico Interstate Stream Commission. See “Legal Regime” chronology.

Although the Compact’s 200,000 AF limitation referred to waters which “originate”

below Conchas Dam, the provision made sense only if it was also applied to water released at Conchas Dam and subsequently retained in Ute Dam, the Supreme Court held. As a result, New Mexico had violated the Compact from 1987 to 1993. The Court ordered New Mexico to release not more than 200,000 AF for Oklahoma and Texas. *Oklahoma and Texas v. New Mexico*, 510 U.S. 126 (1993).

#### **10.4.5 International Treaties and Agreements**

The Arkansas is a domestic, not an international, river.

#### **10.4.6 The Role of Native American Tribes**

Native American Tribes do not play a significant role in water allocation and river management disputes on the Arkansas River. The Cherokee, Choctow and Chickasaw Nations have settled claims against the United States government for the taking of their river bed lands in the Arkansas River Basin. See 2002 statute in “The Legal Regime” section and the U.S. Supreme Court opinions in 1970 and 1987.

#### **10.4.7 The Role of Federal Courts**

Federal courts have not assumed day-to-day responsibilities for managing the Arkansas River.

### **10.5 CURRENT ISSUES AND CONFLICTS ON THE ARKANSAS RIVER**

Colorado and Kansas have yet to completely resolve their dispute over “who gets what” from the Arkansas River. The apportionment dispute, which began in 1901 when William McKinley was president, is still ongoing, though the states have narrowed differences, and expect to submit a proposed final decree to the Supreme Court for approval in 2006.

#### **10.5.1 Water Supply and Allocation**

Litigation over the Arkansas River – filed by Kansas against Colorado – is still unresolved though negotiators from both states are close to agreeing on a final decree. In 2004, the U.S. Supreme Court held that Kansas could not collect prejudgment interest from 1969, as it had requested, but could do so from 1985. The Court declined to appoint a special River Master, as it had done for the Pecos River, *Texas v. New Mexico*, 482 U.S. 124 (1987), and for the Delaware River, *New Jersey v. New York*, 347 U.S. 995 (1954). In 2005, Colorado and Kansas reached agreement in principle on how to model the flow of ground water and its interaction with surface water in the Arkansas River.

#### **10.5.2 Power Supply and Allocation**

There are no major power supply conflicts at present in the Arkansas River Basin.

#### **10.5.3 Environmental Issues**

There are no major interstate environmental conflicts at present in the Arkansas River Basin that impact water or power allocation disputes. There are major cleanup efforts underway in parts of

the basin (i.e., mine tailings in Leadville, Colorado), but these water quality measures have not affected downstream interstate operations.

## **10.6 CONFLICT RESOLUTION**

### **10.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power from the Arkansas River.

### **10.6.2 Administrative Allocation of Water or Power**

The Southwestern Area Power Administration sells power by long-term contract to public agencies and cooperatives (“preference customers”). Neither the Corps of Engineers nor the Bureau of Reclamation has the authority to allocate power from dams on the Arkansas River.

### **10.6.3 Judicial Allocation of Water or Power**

The U.S. Supreme Court has in effect forced a re-allocation of water on the Canadian River, the largest tributary of the Arkansas River. In *Oklahoma and Texas v. New Mexico*, 510 U.S. 126 (1993)(Decree), the Court ordered New Mexico to release water from Ute Dam (owned by the New Mexico Interstate Stream Commission) to Texas and Oklahoma because New Mexico had been in violation of the Canadian River Compact since 1987.

### **10.6.4 Arbitration or Mediation**

Not used.

### **10.6.5 Litigation**

Colorado and Kansas have resolved most of the issues in their long-standing dispute. With the exception of that lawsuit, there is no other major ongoing litigation affecting the interstate operations of the Arkansas River.

### **10.6.6 Infrastructure Improvements and Environmental Restoration**

No significant efforts, except for the Superfund cleanup of mine tailings near Leadville, Colorado.

### **10.6.7 Interagency and Multi-Party Agreements**

There are a number of interagency and multi-party contracts. See discussion above under “operating criteria” for the multi-party agreements between the water conservancy districts in Colorado for the Fryingpan-Arkansas Project and between federal and state entities regarding the operation of Trinidad Dam on the Purgatoire River (a tributary) in Colorado.

In addition, the Southwestern Area Power Administration has signed an agreement to participate in the Southwest Power Pool (“SPP”), a utility consortium to more effectively manage utility transmission infrastructure in the South. The SPP administers Southwestern’s transmission tariff.

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## **11.0 THE TENNESSEE-CUMBERLAND RIVERS – PART OF THE MISSISSIPPI RIVER BASIN**

### **11.1 INTRODUCTION**

The Tennessee and Cumberland Rivers drain portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee and Virginia. Precipitation in the area averages about 50 inches a year.

The two basins have a total area of about 59,000 square miles (41,000 square miles for the Tennessee River, and 18,000 square miles for the Cumberland River). The basins are home to more than 8 million people. Major cities include: Knoxville (TN); Nashville (TN); Chattanooga (TN); Florence (AL); Decatur (AL); and Paducah (KY).

The Tennessee River has its headwaters in the Appalachian Mountains of eastern Tennessee. The river is one of the dominant waterways in the South, draining virtually all of Tennessee and parts of six other states. From its source, the river travels 652 miles until it empties into the Ohio River at Paducah, Kentucky.<sup>122</sup> Major tributaries of the Tennessee River include the: Little Tennessee River; Clinch River; French Broad River; Holston River; Hiwassee River; Elk River; and Duck River. Flows from Kentucky Dam, the farthest downstream dam on the Tennessee River, average 48 MAF per year.

The Cumberland River begins in eastern Kentucky and flows 687 miles before emptying into the Ohio River at Smithland, Kentucky, only 12 miles upstream from where the Tennessee meets the Ohio River.<sup>123</sup> Major tributaries of the Cumberland River include the: Stones River; Obey River; Laurel River; and Caney Fork River. Flows from Barkley Dam, the farthest downstream dam on the Cumberland River, average 20 MAF per year.

Hernando DeSoto, the first European to see the mouth of the Mississippi River, also explored reaches of the Tennessee River in 1540. The French established several trading posts along the Tennessee River as an east-west route between the Mississippi River and South Carolina. The French loss in the Indian Wars in the 1760s transferred control of the area to the British.

With American independence, the area became part of the “Territory South of Ohio,” with Knoxville as its capital. The first steamboat traveled up the Tennessee River to Muscle Shoals, Alabama, in 1821. During the Civil War (1861-1865), major battles were fought in the Tennessee River Basin, including Shiloh, Ft. Henry, and Chattanooga.

The U.S. Army Corps of Engineers (“Corps of Engineers”) built Wilson Dam on the Tennessee River in 1924. It was the Corps’ first multi-purpose federal hydroelectric project. Efforts to establish a new federal entity to build more dams, first proposed by Senator George Norris (R-Nebraska), were stymied in Congress and later by President Herbert Hoover.

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<sup>122</sup>The Ohio River then empties 46 miles later into the Mississippi River.

<sup>123</sup>The Ohio River then empties 58 miles later into the Mississippi River.

It was not until Franklin Roosevelt became president that significant federal investments were made in federal infrastructure in the river basin. The Tennessee Valley Authority (“TVA”), created in 1933 during Roosevelt’s whirlwind 100 days in office, was a government corporation with the powers of private enterprise to provide flood control, navigation, electricity, economic development and other benefits to the region. At the time, the river basin had among the highest rates of illiteracy, poverty and deforestation in the nation. The Tennessee River basin is the only one in the country where a single corporation (TVA) controls the operation of an interstate river.<sup>124</sup>

## **11.2 USES OF THE TENNESSEE-CUMBERLAND RIVERS**

The Tennessee River Basin is now home to a network of federal dams, coal plants and nuclear plants. The entire TVA power system has the capacity to produce more electricity than any other public entity in the United States.<sup>125</sup> More water is withdrawn for TVA coal and nuclear power plant operations than for any other use. TVA is among the largest buyers of coal in the nation.

The Corps of Engineers owns dams on the Cumberland River. TVA and the Corps of Engineers coordinate power and water releases from their reservoirs. In addition, the Tennessee and Cumberland Rivers are linked by a navigation canal that connects the reservoir behind Kentucky Dam (TVA) with the reservoir behind Barkley Dam (Corps of Engineers).

Finally, the Tennessee-Tombigbee (“Tenn-Tom”) Waterway connects southern Tennessee directly with the Tombigbee-Black Warrior Rivers at Demopolis, Alabama, and allows commercial traffic to by-pass the Mississippi River. The Corps of Engineers surveyed the area in 1874-75, when it began planning to build a canal, an idea first suggested in the 1700s by a French explorer.

### **11.2.1 Hydropower**

There are 18 federal dams and one large pumped storage project on the main stem of the Tennessee and the Cumberland Rivers. The combined generating capacity of TVA dams on the main stem of the Tennessee River and the Corps of Engineers’ dams on the Cumberland River is 4,737 MW.

TVA also owns 20 additional dams on tributaries with the capacity to produce 1,496 MW. Thus, the total generating capacity in both basins at dams owned by TVA and the Corps of Engineers is 6,233 MW.

In addition, four privately-owned dams (on the Little Tennessee River and Cheoah River, both tributaries of the Tennessee River) have the capacity to produce 362 MW, bringing the total amount of hydroelectric capacity in the Tennessee and Cumberland River Basins to 6,595 MW. See **Appendix B** for details.

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<sup>124</sup>See Columbia River chapter for a brief discussion of failed attempts to create a corporation modeled on TVA.

<sup>125</sup>TVA’s power system is 85% thermal (coal, nuclear, gas) and only 15% hydroelectric (including the Raccoon Mountain pumped storage facility). See, in contrast, the amount of power produced at dams owned by the Corps of Engineers and Bureau of Reclamation in the Columbia River Basin.

### **11.2.2 Navigation**

The TVA system of locks and dams allows barge and commercial tow traffic to navigate 642 miles up the Tennessee River to Knoxville, Tennessee.

The Corps of Engineers' system of locks and dams allows barge and commercial tow traffic to navigate 381 miles up the Cumberland River to Celina, Tennessee.

In addition, the Tennessee-Tombigbee (“Tenn-Tom”) Waterway allows commercial traffic to move through 10 locks on a 234-mile canal that connects the Tennessee and Tombigbee Rivers. The northern end of the waterway is at Pickwick Lock and Dam on the Tennessee River, near Florence, Alabama. The Tenn-Tom Waterway connects with the Tombigbee-Black Warrior Rivers at Demopolis, Alabama. Prior to construction, navigation had to go through the Mississippi River system, a detour of 800 miles. Ten million tons, mostly forest products and coal, are shipped annually on the Tenn-Tom Waterway.

The Tenn-Tom Waterway was the largest earth-moving project in history, exceeding the amount excavated for the Suez Canal and Panama Canal. The project opened for commerce in 1985.

### **11.2.3 Water Supply**

The Tennessee River provides approximately 741,000 AF per year for municipal water supply (about 4 million people). Water supply is a local responsibility. However, TVA issues permits for all water withdrawals pursuant to Section 26(a) of the Tennessee Valley Authority Act of 1933. TVA does not own infrastructure for transporting water. The water users (i.e., municipalities and industries) are responsible for constructing and maintaining their own infrastructure.

### **11.2.4 Flood Control**

The Tennessee and Cumberland Rivers, untamed, flooded regularly and caused significant damage. The dams owned by TVA and the Corps of Engineers were all built in part to control floods. TVA relies primarily on dams, not levees, for flood control. The Corps of Engineers has built levees upstream in eastern Kentucky.

### **11.2.5 Other Uses**

The reservoirs behind the TVA and Corps of Engineers dams are popular recreation sites. TVA owns about 100 public recreation areas that offer opportunities for boating, fishing, hiking and camping.

## **11.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Tennessee and Cumberland River Basins are:

1. In 1916, as the United States prepared to enter into World War I, President Woodrow Wilson selected Muscle Shoals, Alabama, on the Tennessee River, as

the site for two nitrate plants for explosives and a hydroelectric dam built by the Army Corps of Engineers. See, National Defense Act (Section 124), Pub. L. No. 64-85, 39 Stat. 166, 215. The war ended before the plants were finished.

In 1921, after the end of the war, Congress put the partially-complete nitrate plants and dam up for sale to a company that would convert them for the manufacture of fertilizer. A proposed sale to industrialist Henry Ford was blocked by Congress because of the efforts of Sen. George Norris (R-Nebraska). As a result, the property remained in federal hands.

In 1926, Sen. Norris introduced the first bill to authorize the federal government to expand the Muscle Shoals Project and build more dams on the Tennessee River. The legislation never became law.

2. In 1933, Congress created the Tennessee Valley Authority (“TVA”), a federal corporation with a broad range of duties to build dams and other infrastructure for navigation, flood control, agricultural and industrial development, and power, 48 Stat. 58, codified at 16 U.S.C. § 831 et seq. The legislation also gave TVA the authority to own and manage Wilson Dam, originally built by the Corps of Engineers.

Unlike previous versions of the legislation, which were vetoed by the president, Franklin Roosevelt signed the legislation within two months of taking office. The TVA Act created a three-member Board of Directors, appointed by the President and confirmed by the Senate, to manage the agency. TVA was created “in the interest of National Defense and for the agricultural and industrial development [of the Tennessee River valley] and to improve navigation in the Tennessee River...”. 16 U.S.C. § 831. The Act gave preference to states, counties, municipalities and cooperatives for the sale of federal power. 16 U.S.C. § 831i.

3. In 1936, the U.S. Supreme Court upheld the constitutionality of TVA and rejected arguments that electricity from the dams was not federal property and could not be disposed of by the government in accordance with the TVA statute. *Ashwander v. Tennessee Valley Authority*, 297 U.S. 288 (1936).
4. In 1944, Congress passed the Flood Control Act, Pub. L. No. 78-534, 58 Stat. 887, which, among other things, required TVA and the Corps of Engineers to coordinate their flood control efforts to prevent downstream damage to cities and property along the Ohio River (into which the Tennessee River flows) and the downstream levee system on the Mississippi River (into which the Ohio River flows).
5. In 1958, Congress consented to the Tennessee-Tombigbee Waterway Development Authority Compact to promote the development of the waterway. Pub. L. No. 85-653, 72 Stat. 609. The compact currently consists of Alabama, Kentucky, Tennessee and Mississippi.

6. In 1958, Congress consented to the Tennessee River Basin Water Pollution Control Compact, Pub. L. No. 85-734, 72 Stat. 823, which authorized seven states in the basin to sign an agreement to regulate pollutants. Only three states adopted the compact: Tennessee, Kentucky and Mississippi, and the compact is not in effect.
7. In 1959, Congress amended the 1933 TVA Act by making TVA a “self-financing” agency, not dependent on federal appropriations. Pub. L. No. 86-157, 73 Stat. 338. The amendments also prohibited TVA and its utility customers (“distributors”) from supplying power outside of TVA’s defined service territories. 16 U.S.C. § 831n-4(a). This provision is referred to as “The Fence” because it bounds TVA’s sales activities.
8. In 1978, the U.S. Supreme Court halted TVA from completing Tellico Dam on the Little Tennessee River, a tributary of the Tennessee River. At issue was the discovery of a small (three-inch) fish, the snail darter, a native to the waters of eastern Tennessee. Dam opponents used the newly-discovered fish to stop construction on grounds that the dam threatened the last habitat for the fish and therefore violated the Endangered Species Act of 1973. The Supreme Court concluded that the ESA was intended to protect fish and wildlife, no matter how small. *Tennessee Valley Authority v. Hill*, 437 U.S. 153 (1978). The next year, Congress passed an exemption to the ESA allowing TVA to finish the dam.
9. In 1992, Congress enacted the Energy Policy Act, which, among other things, prohibited the Federal Energy Regulatory Commission (“FERC”) from ordering TVA to deliver power from outside its service territory to utility customers within its service territory. 16 U.S.C. § 824k(j). This language is known as the “Anti-Cherry Picking” provision because it prevents non-TVA suppliers from targeting TVA’s utilities as new customers.
10. In 2004, Congress approved a major change in the structure of the TVA board of directors, the first since 1933. See, Consolidated Appropriations Act of 2005, Pub. L. No. 108-447, 118 Stat. 2809, 2963. Instead of three full-time members, the TVA board would be composed of nine, part-time members. The nine members are appointed by the President and confirmed by the Senate. This legislation also required TVA to file annual and quarterly reports (10Ks) with the Securities and Exchange Commission, though TVA was not required to register its debt instruments (i.e., bonds).

#### **11.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

Two key federal agencies manage the Tennessee and Cumberland Rivers and their tributaries:

##### **The Tennessee Valley Authority**

TVA is the dominant agency with a service territory of 84,272 square miles – almost twice as large as the Tennessee River Basin (41,000 square miles). [www.tva.gov](http://www.tva.gov)

TVA has 12,700 employees and operating revenues of \$7.8 billion (fiscal year 2005).

**Table 16** shows the square miles of each state in the TVA service territory.

**TABLE 16.** TVA service territory. [Square miles by state].

State	Sq. Miles in TVA Territory	% of Total
Alabama	8,380	10
Georgia	3,300	4
Kentucky	10,914	13
Mississippi	16,000	19
Tennessee	42,000	50
North Carolina	1,737	2
Virginia	1,941	2
<b>TOTAL</b>	<b>84,272</b>	<b>100%</b>

TVA owns nine dams on the main stem of the Tennessee River, plus 20 other dams on tributaries; 11 coal plants; 3 nuclear plant; 6 combustion turbine plants (which run on natural gas or oil); 1 pumped storage hydro facility; 1 wind energy site; and 16 small solar energy sites.

In total, TVA’s power plants have the capacity to produce 31,517 MW. TVA generates more electricity than any other federal entity, including the Bureau of Reclamation and the Corps of Engineers.

TVA sells power to 158 municipal and electric cooperatives and 61 large industries. TVA is its own “marketer” and does not rely on a federal power marketing agency.

**Table 17** shows the amount of power TVA generated in 2005 by fuel type. “Fossil” refers primarily to coal.<sup>126</sup> TVA is one of the largest buyers of coal in the United States.

<sup>126</sup>The figures in Table 17 represent actual energy generated in 2005, not installed capacity. Thus, hydro power generation produced 10% of total TVA generation that year, though TVA’s dams and its large pumped storage facility represent about 17% of total TVA installed generating capacity. The dams and pumped storage are typically used to supply peaking power. Production will therefore vary from year-to-year, depending on a number of factors, including weather.

**TABLE 17.** TVA power generation by fuel type (2005). [Source: TVA 2005 Annual Report.]

<b>Fuel Type</b>	<b>MWh</b>	<b>% of Total</b>
Fossil	98.4	62
Nuclear	45.2	28
Hydro	15.7	10
Other	0.6	<1
<b>TOTAL</b>	<b>159.9</b>	<b>100%</b>

**The Corps of Engineers**

The Corps of Engineers owns nine dams in the Cumberland River Basin with the capacity to produce 926 MW. Total reservoir storage is 6.3 MAF. The Corps of Engineers does not own coal, nuclear or thermal power plants. Power from Corps’ dams on the Cumberland River is marketed by the Southeastern Power Administration, headquartered in Elberton, Georgia. [www.sepa.doe.gov](http://www.sepa.doe.gov)

**11.4.1 Long-term Operational Strategy**

TVA has prepared a long-term Strategic Plan for its operations but the document is general in nature and does not affect either the Corps of Engineers’ dams or state-permitted water withdrawals.

**11.4.2 Short-term Operational Strategy**

**TVA Reservoir Operations Study**

In May 2004, TVA published a detailed Reservoir Operations Study and adopted a Record of Decision for a comprehensive river management plan that gave greater emphasis to recreation. [www.tva.gov/environment/reports/ros\\_eis/index.htm](http://www.tva.gov/environment/reports/ros_eis/index.htm)

The environmental impact statement (“EIS”) analyzed different power dispatch (i.e., operation) alternatives.<sup>127</sup>

<sup>127</sup>Figure 4.23-01 (Typical Dispatch of TVA Generating Resources to Meet Daily Power Demand).

**Cooperative Agreements for Power, Flood Control and Navigation**

TVA has cooperative operational agreements with the Corps of Engineers and with Alcoa, which owns dams on tributaries of the Little Tennessee River. The Corps of Engineers furnishes TVA with the daily amount of hydropower available from its dams, and TVA schedules the hourly releases. A similar agreement between TVA and Alcoa allows TVA to schedule releases of water from Alcoa's dams. The Alcoa dams are typically "run of the river" (i.e., with little storage).

The TVA and Corps of Engineers also cooperate to coordinate discharges from Kentucky Dam (TVA) and Barkley Dam (Corps of Engineers), the furthest downstream structures on the Tennessee and Cumberland Rivers.

The reservoirs behind Kentucky and Barkley Dams are connected by a navigation canal. During flood season but before the waters crest, TVA and the Corps of Engineers reduce the level of water in the reservoirs to create as much storage as possible. The effectiveness of this strategy depends on both TVA and the Army accurately forecasting the timing and magnitude of flood crest (peak). The goal is to protect downstream structures on the Ohio River and the downstream levee system on the Mississippi River.

**Tennessee-Tombigbee Waterway**

TVA and the Corps of Engineers have a contract for the operation of the Tennessee-Tombigbee Waterway that allows water to be diverted from the Tennessee River. In 2000, about 224,000 AF was diverted.

**11.4.3 River Accounting Mechanisms**

**Water**

Under Section 26(a) of the TVA Act, the TVA permits obstructions in and along the Tennessee River system, including water withdrawal structures.<sup>128</sup> TVA coordinates its permitting activities with the Corps of Engineers, which has overlapping permit responsibility under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, 33 U.S.C. 1344.

In 2004, the U.S. Geological Survey and TVA published a survey of water use in the Tennessee River Basin using 2000 data.<sup>129</sup> **Table 18** shows the results from the 2004 USGS-TVA report.<sup>130</sup>

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<sup>128</sup>48 Stat. 71, codified at 16 U.S.C. 831y-1.

<sup>129</sup>TVA and the USGS will repeat the survey using 2005 data.

<sup>130</sup>United States Geological Survey ("USGS"), "Water-Resources Investigations Report," 03-4302 (2004)(prepared in cooperation with the Tennessee Valley Authority).

**TABLE 18.** Annual water use in the Tennessee River Valley in 2000.

<b>Type of Use</b>	<b>Acre-feet</b>
Power Plants	11,505,000
Industrial	1,340,000
Domestic Water Supply	741,000
Irrigation	77,000
Miscellaneous	10,000
<b>Total</b>	<b>13,673,000</b>
Return Flows	12,946,000
<b>Net Consumption</b>	<b>727,000</b>

For the Tennessee River watershed, return flows accounted for 95% of the water withdrawn. Total consumptive uses only account for the remaining 5% of the total.

### **Power**

TVA supplies power to 8.6 million people. TVA publishes generation statistics as well as detailed information about the status of the reservoirs and power production. See its web site. [www.tva.gov](http://www.tva.gov)

The Southeastern Power Administration, a federal power marketing agency, publishes operational and financial data and lists production from each dam owned by the Corps of Engineers in the Cumberland River Basin. [www.sepa.doe.gov](http://www.sepa.doe.gov)

### **11.4.4 The Role of Interstate Compacts**

There are no water allocation compacts in the Tennessee River Basin. The proposed Tennessee River Basin Water Pollution Control Compact of 1958 was never ratified by all the states and has no legal effect.

In 1958, Congress consented to the Tennessee-Tombigbee Waterway Development Authority Compact, creating an interstate body to promote the development of a navigable waterway connecting the Tennessee and Tombigbee Rivers. Current members include Alabama, Kentucky, Mississippi and Tennessee. Florida was a member between 1967-1990. The waterway, the Authority promotes economic development and trade potential. [www.tenntom.org](http://www.tenntom.org)

### **11.4.5 International Treaties and Agreements**

The Tennessee is a domestic, not an international, river.

#### **11.4.6 The Role of Native American Tribes**

Native American Tribes do not currently play a significant role in the management of the Tennessee River.

#### **11.4.7 The Role of Federal Courts**

There is no ongoing litigation that allows federal courts to become involved in the day-to-day management of the Tennessee River.

### **11.5 CURRENT ISSUES AND CONFLICTS ON THE TENNESSEE-CUMBERLAND RIVERS**

Since the U.S. Supreme Court decision in *TVA v. Hill* (1978), the Tennessee River has been relatively free of the type of conflicts seen elsewhere over water and power allocations and Endangered Species Act restrictions.<sup>131</sup> New industries and competing requests for water withdrawals, however, may force TVA to change operation of the river. Some public agency customers of TVA have expressed an interest in diversifying their supplies and ending TVA's monopoly.

#### **11.5.1 Water Supply and Allocation**

There are currently no major water supply and allocation issues on the Tennessee River. There is, however, concern in some states over proposed water transfers out of the Tennessee River. The City of Corinth, Mississippi, for example, has asked TVA and the Corps of Engineers for permission to withdraw 16 million gallons per day from the Pickwick Dam Reservoir in Tennessee. Alabama objected. Another area of concern is that increased water withdrawals for new industry elsewhere in the Tennessee River Basin could impact TVA's downstream thermal power plant operations.

#### **11.5.2 Power Supply and Allocation**

TVA supplies power to 158 municipal and electric cooperatives (called "distributors") that accounted for 84% of TVA total revenue in 2005. TVA also supplies power to 61 industrial customers. As of 2006, six distributors have given notice they intend to seek other power suppliers when their contracts with TVA expire in the 2008-2010 period. Those contracts account for approximately 3.2% of TVA's operating revenues in 2005. TVA and other distributors are currently in negotiation over new contract terms.

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<sup>131</sup>See "Legal Regime" section of this chapter.

### **11.5.3 Environmental Issues**

A number of plants, mollusks, fish, amphibians and other animals are listed as threatened or endangered under the Endangered Species Act. TVA believes that main stem reservoirs (rather than tributaries) are the most likely places to find the threatened or endangered species.<sup>132</sup>

TVA has established programs to monitor populations of threatened and endangered species, but as a general rule, TVA's hydro operations have not been significantly affected to date (2006) by ESA problems.

### **11.5.4 Other**

TVA's service territory is defined by two federal statutes. First, "The Fence," added to the TVA Act in 1959, precludes both TVA and its distributors from supplying power to customers outside of TVA's boundaries. 16 U.S.C. § 831n-4(a). Second, the "Anti-Cherry Picking" provision, part of the Energy Policy Act of 1992, prohibits the Federal Energy Regulatory Commission ("FERC") from ordering TVA to deliver non-TVA power to its customers. 16 U.S.C. § 824k(j).

As a result of both statutes, TVA has a monopoly in its service territory and is prohibited from selling outside of the area, except to those utilities that have historically exchanged power with TVA. Whether these two provisions should be revised or deleted is an ongoing issue for some utilities in the area.

## **11.6 CONFLICT RESOLUTION**

### **11.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power from the Tennessee River, though the TVA Act of 1933 granted preference to federal power to states, counties, municipalities and cooperatives. 16 U.S.C. § 831i.

### **11.6.2 Administrative Allocation of Water or Power**

TVA's utility customers are "full-requirements customers" and cannot buy power elsewhere. TVA is the monopoly supplier. There is some discussion and interest on the part of distributors to end the monopoly and allow utilities greater choice. TVA's contracts typically "roll over" every year with a 5, 10 or 15-year termination provision.

### **11.6.3 Judicial Allocation of Water or Power**

Federal courts have not allocated water or power from the Tennessee River.

### **11.6.4 Arbitration or Mediation**

Not used.

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<sup>132</sup>See Chapter 4.13 of TVA's Reservoir Operations Study. [www.tva.gov/environment/reports/ros\\_eis/index.htm](http://www.tva.gov/environment/reports/ros_eis/index.htm)

### **11.6.5 Litigation**

The Tennessee and Cumberland Rivers are not the subject of major litigation that would affect interstate river operations or allocation issues.

### **11.6.6 Infrastructure Improvements and Environmental Restoration**

In the 1980s, TVA invested several billion dollars in pollution reduction equipment (i.e., “scrubbers”) for its coal plants. TVA’s program is scheduled for completion in 2010. [www.tva.gov/environment/reports/envreports/aer2005/pollution\\_prevention.htm](http://www.tva.gov/environment/reports/envreports/aer2005/pollution_prevention.htm).

### **11.6.7 Interagency and Multi-Party Agreements**

TVA has cooperative coordination agreements with the Corps of Engineers and with TAPOCO, Inc. (an Alcoa subsidiary) to control floods and generate power. The TVA-Corps of Engineers’ coordination agreements affect flood control and navigation (i.e., the canal connecting TVA’s Kentucky Dam with the Corps’ Barkley Dam).



and Savannah, Georgia. Apalachicola Bay in Florida – the mouth of the ACF River Basin – was a major harbor primarily for cotton in the mid-1800s, but is now home to Florida’s oyster industry.

## 12.2 USES OF THE APALACHICOLA-CHATTAHOOCHEE-FLINT RIVERS

There are 12 dams in the ACF River Basin: five are owned by the U.S. Army Corps of Engineers (“Corps of Engineers”); six by Georgia Power Co.; and one by Crisp County, Georgia. Reservoirs at two of the Corps of Engineers’ dams in Georgia – Lake Lanier (Buford Dam) and Walter F. George Lake (George Dam) – contain two-thirds of the water storage capacity in the ACF River Basin.



**FIGURE 20.** View of the Apalachicola River, Florida.  
[Source: Wikipedia,  
[http://en.wikipedia.org/wiki/Apalachicola\\_river](http://en.wikipedia.org/wiki/Apalachicola_river)]

In 1874, the Corps of Engineers dredged the Chattahoochee River to create a six-foot deep navigation channel. The Rivers and Harbors Act of 1945 authorized the Corps of Engineers to create a nine-foot deep navigation channel.

There are numerous power plants (nuclear, coal and gas) in the ACF River Basin. Sixty percent of all withdrawals on the Chattahoochee River are used for thermal power plant operations.

### 12.2.1 Hydropower

There are five federal dams in the ACF River Basin with a total generating capacity of 378 MW. Several other dams (owned and operated by other government agencies and private parties) bring the total generating capacity in the ACF Basin to 727 MW. See **Appendix B** for details.

The Southeastern Power Administration, a federal power marketing agency, sells and delivers electricity from dams owned by the Corps of Engineers in the ACF basin to utilities. SEPA, however, does not own transmission lines and is dependent on utilities to “wheel” (transport) the power.

### 12.2.2 Navigation

The Corps of Engineers owns three locks in the ACF River Basin (Jim Woodruff, George W. Andrews, and Walter F. George) for barges to travel upstream from Apalachicola Bay on the Chattahoochee River to Columbus, Georgia (164 miles), and from Apalachicola Bay on the Flint River to Bainbridge, Georgia (135 miles).

### **12.2.3 Water Supply**

Federal dams in the ACF Basin can store approximately 3.9 MAF, with an additional 0.376 MAF of storage supplied by non-federal dams. There is no federal water supply infrastructure in the ACF River Basin. Water supply is a local responsibility. About 4.5 million people rely on the rivers in the ACF Basin for their water supply. Basin-wide withdrawals in 1995 – the year that the Corps of Engineers published a draft environmental impact statement for the ACF River Basin – were 618 MGD (691,933 AF per year). A current basin-wide number is probably in the range of 800,000 to 900,000 AF per year.

#### **Municipal**

The City of Atlanta and its suburbs – which represents 45% of Georgia’s population – depend in large part on the Chattahoochee River for their municipal and industrial water supply.

Gwinnett County has an intake directly in Lake Lanier behind Buford Dam. The Atlanta Regional Commission (“ARC”), however, does not. Instead, the ARC withdraws water downstream of Buford Dam and is increasingly dependent on the Corps of Engineers operating the dam in a way that reduces peak power production and increases the amount of water in the river seven days a week, particularly during summer.<sup>133</sup>

Lake Oliver behind Oliver Dam, owned by Georgia Power Company, serves as the main water supply for the City of Columbus, Georgia.

#### **Thermal Power Plants**

Although withdrawals for municipal and industrial use have increased significantly, the primary use of the Chattahoochee River is for thermal power plants (i.e., coal and gas) not domestic water supply. Data shows that about 60% of all water withdrawals in the ACF River Basin go for this purpose. Recent data on power plant withdrawals is not available, but in 1997, about 2,694 MGD (3 MAF) was withdrawn just from the Chattahoochee River alone. Most of the water (between 80-95% is later returned to the river).

#### **Inter-Basin Transfers**

There are numerous inter-basin transfers. The ACF and ACT basins move water between each other, with 43 MGD moving from the ACT to the ACF, and 8 MGD going the other way.

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<sup>133</sup>Lake Allatoona in the ACT River basin also supplies a portion of the city’s water.

#### **12.2.4 Flood Control**

The Corps of Engineers' dams in the ACF River Basin were built in part for flood control. The farthest upstream reservoir with flood control benefits is Lake Lanier, Georgia.

### **12.3 THE LEGAL REGIME**

In chronological order, the major "laws of the river" in the Apalachicola-Chattahoochee Flint ("ACF") River Basin are:

1. In 1859, the U.S. Supreme Court held that the entire river bed of the Chattahoochee River belonged to Georgia, including the portion of the river that forms the boundary line between Alabama and Georgia. *Alabama v. Georgia*, 64 U.S. 556 (23 How. 505)(1859).
2. In 1944, Congress enacted the Flood Control Act, 33 U.S.C. § 708, which among other things authorized the Corps of Engineers to sign temporary contracts with states, municipalities, private concerns or individuals for surplus water at any reservoir "provided that no contracts for such water shall adversely affect then existing lawful uses of such water."
3. In 1945, Congress authorized the Corps of Engineers to design and build Buford Dam and create Lake Sidney Lanier (reservoir), north of Atlanta on the upper Chattahoochee River. Pub. L. No. 79-14, 59 Stat. 10, 17, amended in 1946, Pub. L. No. 79-525, 60 Stat. 634, 635. The legislation specifically authorized the Corps of Engineers to build the dam for flood control and power generation, though the Corps of Engineers would later assert that local water supply usage was an incidental benefit at Buford Dam. *Southern Federal Power Customers, Inc. v. Caldera*, 301 F.Supp.2d 26, 28 (D.D.C. 2004).
4. In 1958, Congress enacted the Rivers and Harbors Act, which among other things allowed the Corps of Engineers to store water belonging to a city or other entity in federal reservoirs for municipal and industrial uses *if* water supply was one of the original authorized purposes of the dam. See, Title III of Act, commonly called the "1958 Water Supply Act," 43 U.S.C. § 390(b-f).

The Water Supply Act restricted the ability of the Corps of Engineers to make structural or operational changes to reservoirs. Those modifications that would "seriously affect the purposes for which the project was authorized, surveyed, planned or constructed, or which would involve major structural or operational changes" shall be made *only* after Congressional approval.

5. In 1972, Congress authorized the Corps of Engineers to prepare a Metropolitan Atlanta Area Water Resources Management Study and develop a long-term water supply plan for the area. The Corps completed the study in 1981. The next year, the Corps proposed construction of a new dam, downstream of Buford Dam, to store additional water for Atlanta.

In response to criticisms about the environmental impacts, the Corps of Engineers withdrew the dam proposal and proposed a plan in 1989 to shift 20% of the Lake Lanier reservoir behind Buford Dam from power generation to water supply, thus meeting Atlanta's municipal and industrial needs until 2010.

6. In 1990, Alabama sued the Corps of Engineers in federal district court in Birmingham, Alabama, challenging a number of Corps activities, plans and actions regarding the management of three federal reservoirs in Georgia: Lake Lanier (Buford Dam) in the upper ACT River Basin; and Lake Allatoona and Carter's Lake in the upper ACT River Basin. *Alabama v. U.S. Army Corps of Engineers*, no. CV-90-BE-1331-E.

In its complaint, Alabama alleged among other things that the Corps of Engineers' management violated the Water Supply Act of 1958 because the reservoir storage contracts would diminish water rights in Alabama and would violate the National Environmental Policy Act ("NEPA").

To foster settlement negotiations, Alabama agreed to hold the lawsuit in abeyance if the Corps of Engineers simultaneously agreed not to execute new reservoir storage contracts with Atlanta ("the 1990 Joint Stay"). The stay was subsequently extended as the parties attempted to negotiate the dispute. Any party could unilaterally give notice to terminate the stay but had to abide by its terms for 80 days after giving notice of termination.

7. In 1992, Alabama, Georgia and Florida (a downstream state in the ACF but not the ACT River Basin) signed a Memorandum of Agreement ("the 1992 MOA") with the Corps of Engineers. The agreement called for the Corps of Engineers to prepare a comprehensive study of the ACF and ACT River Basins to address water reallocation issues. As part of the MOU, the parties expressly allowed increased withdrawals to continue or increase in response to reasonable demand.
8. In 1997, upon completion of the 1992 study and after years of negotiation, Alabama, Georgia and Florida agreed on the terms of an interstate compact. Congress consented to the Apalachicola-Chattahoochee-Flint ("ACF") Compact, Pub. L. No. 105-104, 111 Stat. 2219. At the same time, Congress also consented to the Alabama-Coosa-Tallapoosa ("ACT") Compact.

The language in the two compacts was almost identical. Neither compact established an allocation formula for the river. Instead, the compacts created an interstate commission composed of Alabama, Georgia and Florida, plus a non-voting federal member, to develop "an allocation formula for equitably apportioning the surface waters" of each basin while "protecting water quality, ecology and biodiversity." Article VII(a).

Once the Commission decided on an interstate allocation formula, the federal commissioner had 255 days to file a concurrence.<sup>134</sup> If, however, the Commission was unable to reach an agreement on an allocation formula, the Compact would automatically expire by December 31, 1998.

While negotiations were underway, the parties agreed to language called the “live and let live” provision, which preserved existing withdrawal rights and allowed for reasonable increases:

“[A]ny person who is withdrawing, diverting, or consuming water resources of the ACF Basin as of the effective date of this Compact, may continue to withdraw, divert or consume such water resources ....The parties to this Compact further agree that any such person may increase the amount of water resources withdrawn, diverted or consumed to satisfy reasonable increases in the demand...between the effective date of this Compact and the date on which an allocation formula is approved.” Article VIIc.9. In 1998, Georgia, Alabama and Florida postponed the deadline for reaching an accord on a water allocation agreement. The new deadline after multiples extensions was 2003.

9. In 2003, after unsuccessful negotiations, the ACF Compact expired. Meanwhile, litigation in federal court continues to this day.

## **12.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers is the key federal agency in the ACF River Basin.

### **12.4.1 Long-term Operational Strategy**

With the expiration of the ACF Compact, there is no long-term operational strategy for the entire basin.

### **12.4.2 Short-term Operational Strategy**

The Corps of Engineers relies on its historic operating criteria, some of which have not been significantly revised since the 1950s. The Corps’ attempt to sign new reservoir storage contracts, which would establish new criteria, is the subject of protracted litigation now pending in federal court.

### **12.4.3 River Accounting Mechanisms**

Alabama and Florida have alleged that the Corps of Engineers has operated secretly and that it is difficult, if not impossible, to understand the downstream ramifications of the reservoir storage proposed by the Corps with Atlanta-area water suppliers. The issue of “who got or who gets

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<sup>134</sup>For a history and a critique of the “concurrence” language, see George William Sherk, “The Management of Interstate Water Conflicts in the Twenty-First Century: Is it Time to Call Uncle?” 12 N.Y.U. Environmental Law Journal 764 (2005).

what” is complicated by the fact that the Corps of Engineers’ contracts allocate reservoir storage space, not water. Under Georgia law, the water supply agencies must obtain state permits.

#### **12.4.4 The Role of Interstate Compacts**

There are no interstate compacts in the ACF River Basin. The proposed ACF Compact expired in 2003 without Alabama, Florida and Georgia agreeing to an allocation formula.

#### **12.4.5 International Treaties and Agreements**

The rivers in the ACF Basin are domestic not international.

#### **12.4.6 The Role of Native American Tribes**

Native American Tribes did not play a major role in the negotiation of the ACF Compact and do not play a significant role in the operation of the ACF Rivers.

#### **12.4.7 The Role of Federal Courts**

Federal courts have not assumed a role in the day-to-day river management. However, multiple lawsuits filed and pursued after the demise of the ACF Compact suggest that federal courts may play a very significant role in the next few years.

### **12.5 CURRENT ISSUES AND CONFLICTS ON THE APALACHICOLA-CHATTAHOOCHEE-FLINT RIVERS**

In the 1970s, metropolitan Atlanta began to boom – and for the last three decades has seen uncommonly rapid growth.<sup>135</sup> The Chattahoochee River – which still supplies about 70% of its needs – is one of the smallest rivers flowing past a major city in the United States. Atlanta lies above the “fall” line in Georgia that divides the northern part of the state, which has virtually no accessible ground water, from the southern part with aquifers.

The “water wars” over the ACF River Basin began in the 1980s, after the basin suffered a series of droughts (1981, 1986, and 1988). To mitigate the impacts of the drought and address Atlanta’s needs, the Corps of Engineers proposed earmarking the reservoir storage space – which had been previously allocated for power – for municipal and industrial water supply.

The downstream states – Alabama and Florida – criticized the Corps’ proposal. Alabama said the proposal would leave less in the river for it to use for hydropower on dams within its border and for other uses. Florida objected to the potential harm on the oyster industry in Apalachicola Bay.

Although the three states signed an interstate compact in 1997 and appeared to be on their way to

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<sup>135</sup>Atlanta’s population has stayed relatively constant for some years at about 420,000, but the suburbs and surrounding towns have grown steadily, bringing the metropolitan population to about 4.1 million, almost the population of Alabama itself.

resolving the conflict, negotiations broke down and the compact expired. Litigation is now pending in federal courts. How much water can the greater Atlanta withdraw from the Chattahoochee River? That’s the key question that remains unanswered at present.

### 12.5.1 Water Supply and Allocation

The demands on the ACF rivers are expected to increase significantly in the coming years. **Table 19** shows the expected growth in municipal and industrial demand in the ACF River Basin.

**TABLE 19.** Expected municipal and industrial demand, ACF River Basin. (Millions of gallons per day).

Area	1995	2020	% Increase
Alabama	106	120	13.2
Florida	57	79	38.5
Georgia	618	763	23.4
<b>TOTAL</b>	<b>781</b>	<b>962</b>	<b>23.2%</b>

### 12.5.2 Power Supply and Allocation

Power supply issues are a major potential source of conflict in the ACF River Basin. Although a petition filed by the Southeastern Federal Power Customers, Inc. (“SeFPC”) in federal district court was settled in 2003, both Alabama and Florida have challenged the settled agreement. See “Litigation” section for details.

### 12.5.3 Environmental Issues

In 1998, the U.S. Fish and Wildlife Service (“USFWS”) listed seven species of freshwater mussels in the ACF River Basin as protected species under the Endangered Species Act (“ESA”), 63 Fed. Reg. 12664 (March 16, 1998). In 1990, the USFWS listed the Gulf sturgeon as a threatened species. 55 Fed. Reg. 18357 (May 2, 1990). In 2003, the USFWS designed critical habitat for the Gulf sturgeon. 68 Fed. Reg. 13375 (March 19, 2003). Then, in 2006, the USFWS proposed to designate certain segments of the Apalachicola River as critical habitat for the “fat threeridge” and “purple bankclimber” mussel. 71 Fed. Reg. 32746 (June 6, 2006).

Issues relating to the ESA are now before a federal court in Alabama. Florida has alleged that the Corps of Engineers violated the ESA by reducing flows in the river below Jim Woodruff Lock and Dam, thus jeopardizing threatened and endangered mussels and other aquaculture in the Florida Panhandle. The outcome will likely affect river operations in the upper and lower basin.

## 12.6 CONFLICT RESOLUTION

### 12.6.1 Congressional Allocation of Water or Power

Congress has not allocated water or power in the ACF River Basin, though it consented in 1997 to an interstate compact between Alabama, Florida and Georgia that was designed to develop a

water allocation formula for the basin. The Compact expired in 2003. The Southeastern Power Administration allocates power from federal dams by contract.

### **12.6.2 Administrative Allocation of Water or Power**

Whether the Corps of Engineers can sign reservoir storage contracts at Lake Lanier in the ACF River Basin and allow greater diversions for the Atlanta area is the subject of ongoing litigation in federal court.

The Corps of Engineers does not have the authority to allocate federal power. The responsibility for selling and delivering power from federal dams in the ACF River Basin is vested in the Southeastern Power Administration, a federal power marketing agency. [www.sepa.gov](http://www.sepa.gov)

### **12.6.3 Judicial Allocation of Water or Power**

Courts have not allocated water or power to date. If, however, Alabama or Florida files equitable apportionment petitions in the U.S. Supreme Court, the situation would change. The Supreme Court would be asked to appoint a special master to recommend an equitable apportionment of the rivers in the ACF River Basin.<sup>136</sup> See **Chapter 3** for a list of the Court's apportionment cases.

### **12.6.4 Arbitration or Mediation**

The federal district court in Washington, D.C., ordered mediation in the litigation filed by the SeFPC utilities. A Settlement Agreement between the utilities, the Corps of Engineers and Georgia was reached in 2003. The federal district court in Alabama has also ordered mediation in the litigation filed by Alabama (and later joined by Florida) against the Corps of Engineers. As of 2006, the mediation effort is underway but no settlement has been reached.

### **12.6.5 Litigation**

Multiple party litigation is now ongoing in three federal district courts: Alabama, Georgia and Washington, D.C.

The following paragraphs summarize the chronology of events in the ACF River Basin litigation:

In 2000, while Alabama, Florida and Georgia were attempting to negotiate a water allocation formula for the entire ACF River Basin, a group of municipal and rural electric utilities, the Southeastern Federal Power Customers, Inc., sued the Corps of Engineers in federal district court in Washington, D.C.

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<sup>136</sup>The U.S. Supreme Court's 1859 opinion in *Alabama v. Georgia* may deter Alabama or make its equitable apportionment claim more difficult. The Court held that Georgia owned the water in the Chattahoochee up to the western (Alabama) bank, thus giving Georgia a larger historic claim to the river that forms the boundary between the two states. *Alabama v. Georgia*, 64 U.S. 556 (23 How. 505)(1859).

The SeFPC group alleged that the Corps of Engineers had impermissibly allowed increased reservoir storage at Lake Lanier behind Buford Dam in Georgia to meet the needs of Gwinnett County (suburban Atlanta) *and* had changed the timing and amount of downstream flows from Lake Lanier to allow the Atlanta Regional Commission (“ARC”) to make additional withdrawals from an intake it had on the Chattahoochee River below the dam.

These two operational changes – additional reservoir storage and released flows timed specifically for Atlanta’s needs – harmed the SeFPC utilities that purchased power from Buford Dam, it alleged. Because of change in river operations ordered by the Corps of Engineers to meet Atlanta’s increasing demands for water, SeFPC said its utility members could buy less peaking power from the Southeastern Power Administration (“SEPA”). Furthermore, the SeFPC utilities still had to pay the capital costs of Buford Dam in their rates. *Southeastern Federal Power Customers v. Caldera*, case no. 1:00-cv-02975 (D.D.C.).

In 2001, Georgia filed its own petition against the Corps of Engineers, this one in federal district court in Atlanta. In its complaint, Georgia sought to force the Corps of Engineers to allow extra storage at Lake Lanier for Atlanta’s municipal and industrial uses.

Georgia demanded that the Corps of Engineers:

- Allow municipal and industrial withdrawals from Lake Lanier by 297 MGD by 2030;
- Increase water released from Buford Dam to allow more downstream withdrawals (below the dam) by Atlanta up to 408 MGD; and
- Enter into long-term contracts for municipal and industries to provide certainty for the Atlanta area.

Georgia’s request for municipal and industrial use totaled 705 MGD (789,340 AF per year). Georgia’s complaint was based upon the Corps’ refusal to grant the water supply request and sign long-term contracts. *Georgia v. U.S. Army Corps of Engineers*, 2:01-cv-0026 (N.D.Ga.). For a history of the litigation, see *Georgia v. U.S. Army Corps of Engineers*, 302 F.3d 1242, 1247 (11th Cir. 2002).

On January 9, 2003, after court-ordered mediation, the Corps, Georgia and the plaintiff SeFPC utilities reached a Settlement Agreement in the federal district court litigation in Washington, D.C. *Southeastern Federal Power Customers v. Caldera*, case no. 1:00-cv-02975 (D.D.C.).

The Settlement Agreement permitted the Corps of Engineers to sign interim 10-year interim storage agreements with three water suppliers in the Atlanta area: the City of Gainesville, Georgia; Gwinnett County; and the Atlanta Regional Commission. The Settlement Agreement also provided for automatic renewal of the contracts for 10 years. In return, the water suppliers agreed to pay higher fees for reservoir storage to compensate power users (who received a credit

on their bills.)<sup>137</sup> Under the terms of the Settlement Agreement, the Corps of Engineers proposed to allow increased water withdrawals by about 24% from Lake Lanier at Buford Dam.<sup>138</sup>

In the Settlement Agreement, the Corps of Engineers agreed it was required to conduct an environmental analysis under the National Environmental Policy Act *prior* to executing the interim storage agreements. The interim agreements would convert to permanent agreements if Congress authorized them or if a competent court ruled that no Congressional authorization was required. *Southeastern Federal Power Customers v. Harvey*, 400 F.3d 1, 3 (D.C. Cir. 2005).

Meanwhile, on July 22, 2003, the governors of Georgia, Alabama and Florida signed a Memorandum of Understanding (“the 2003 MOU”) containing an initial allocation formula for the ACF River Basin. The MOU was intended to provide guidance to staff for negotiating the final allocation formula under the 1997 Compact.

The MOU, if adopted, would have allowed Georgia to increase withdrawals from the ACF River Basin up to 705 MGD (789,340 AF per year) by 2030. The 705 MGD ceiling was what Georgia had demanded in 2000 from the Corps of Engineers.

When the 2003 MOU was made public, the document was criticized by some entities in Alabama and Florida for being too generous to Georgia. Negotiators from Alabama and Florida would later allege that they were unaware of the 2003 Settlement Agreement in federal district court in Washington, D.C. (in which the Atlanta-area water supply agencies agreed to cap their withdrawals for 20 years at 537.4 MGD). Some officials in Alabama and Florida said they would not have supported the signing of the MOU had they known of the Settlement Agreement.

On August 31, 2003, roughly five weeks later, the ACF River System Compact expired. Florida refused to agree to another extension. Both Alabama and Florida accused Georgia of having negotiated a “secret” Settlement Agreement with the Corps of Engineers and the SeFPC utilities to resolve the federal district court litigation, and they objected to the 10-year interim agreements that Georgia and the Corps proposed to execute as part of the settlement agreement.

Alabama and Florida were then granted permission by the federal district court in Washington, D.C., to intervene in the litigation, where they sought to challenge the legality of the 2003 Settlement Agreement between the SeFPC utilities, the Corps and Georgia.

In addition, the ACF dispute returned to federal district court in Alabama. On September 22, 2003, the Corps of Engineers gave notice that it was terminating the 1990 Joint Stay entered into federal district court in Alabama.<sup>139</sup>

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<sup>137</sup>The agreements were for 10-years but were renewable at the sole discretion of the water supply agencies for another 10 years.

<sup>138</sup>In 2000, the Atlanta-area withdrew 420 MGD. Under the Settlement, the water supply agencies would withdraw a maximum of 537.4 MGD.

<sup>139</sup>The Joint Stay had prohibited the Corps of Engineers from entering “any contracts or amendments which are the subject of [Alabama and Florida’s] the complaint in this action unless expressly agreed to, in writing” by Alabama and Florida.

On October 15, 2003, the federal district court in Alabama concluded that the Corps of Engineers had violated the 1990 Joint Stay when it signed the 2003 Settlement Agreement and offered new 10-year interim storage contracts to the Atlanta-area water supply agencies. The Alabama federal district court enjoined the Corps of Engineers from signing the 2003 Settlement Agreement, pending a decision on the merits by the federal district court in Washington, D.C. In February 2004, the federal district court judge in Washington, D.C. upheld the validity of the 2003 Settlement Agreement but made his approval “conditional” pending the lifting of the 2003 injunction in Alabama. The D.C. court then dismissed the case as moot and allowed the Corps to proceed to prepare an environmental impact statement on the 10-year interim reservoir storage contracts. *Southern Federal Power Customers, Inc. v. Caldera*, 301 F. Supp.2d 26, 35 (D.D.C. 2004).

The dispute then shifted back – once again – to Alabama. In February 2005, the Alabama federal district court refused to dissolve or modify its 2003 injunction prohibiting the Corps of Engineers from entering the 2003 Settlement Agreement in federal district court in Washington, D.C. The judge’s action occurred 16 months *after* the Corps of Engineers had voluntarily terminated the 1990 Joint Stay and *after* the federal district court in D.C. upheld the validity of the settlement and dismissed the case.

Then, in March 2005, a Court of Appeals for the District of Columbia Circuit held that the federal district court erred when it dismissed Alabama and Georgia’s challenge to the 2003 Settlement Agreement. Because the Alabama injunction was still in effect, the approval of the 2003 Settlement Agreement was conditional and therefore not a final order. *Southeastern Federal Power Customers v. Harvey*, 400 F.3d 1 (D.C. Cir. 2005).

Finally, in September 2005, the U.S. Court of Appeals for the Eleventh Circuit held that the Alabama federal district court had erred when it imposed an injunction barring the Corps of Engineers from implementing the 2003 Settlement Agreement. The federal district court had improperly used a preliminary injunction to punish the Corps of Engineers for allegedly violating the terms of the 1990 Joint Stay, the appeals court held. Furthermore, the 1990 Joint Stay had been terminated by the Corps of Engineers and was no longer in effect in 2005, when the Alabama court refused to lift the injunction. The Eleventh Circuit noted that the 2003 Settlement Agreement required the Corps of Engineers to prepare the requisite NEPA analysis before signing the 10-year “interim” contracts with the Atlanta-area water supply agencies.<sup>140</sup>

Meanwhile, the litigation continues in Alabama and Georgia federal district courts. Both Alabama and Florida have filed amended complaints in the 1990 litigation in Alabama against the Corps of Engineers. *Alabama v. U.S. Army Corps of Engineers*, case no. CV-90-BE-0331-E. In its amended complaint in Alabama, the state of Alabama alleged that the Corps of Engineers continues to make decisions affecting both the ACT and ACF River Basins in violation of the National Environmental Policy Act, 42 U.S.C. § 4321 et seq., the Administrative Procedure Act, 5 U.S.C. § 551 et seq., and the Endangered Species Act (“ESA”), 16 U.S.C. § 1560(g). Georgia

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<sup>140</sup>It is not clear whether the appeal on the merits of the 2003 Settlement Agreement can take place now or whether the federal district court in Washington, D.C., will allow an appeal after the EIS is completed.

has asked a federal district court in Atlanta to enjoin the Corps from implementing interim flows for listed mussels and the Gulf sturgeon. As a result of the increased flows, Georgia has been harmed because the upstream Chattahoochee reservoir system may run dry, it alleged in 2006. *Georgia v. U.S. Army Corps of Engineers*, case no. 1:06-CV-1473.

#### **12.6.6 Infrastructure Improvements and Environmental Restoration**

Until 2006, Endangered Species Act problems have not forced river managers to change the flow of the major rivers in the ACF Basin or invest in significant infrastructure improvements for environmental restoration. However, Florida in 2006 alleged that the Corps of Engineers' management of the Chattahoochee River in Georgia had – and was continuing to – damage threatened and endangered mussels and aquatic life in Apalachicola Bay. This issue is still pending in federal district court.

#### **12.6.7 Interagency and Multi-Party Agreements**

None.

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## **13.0 THE ALABAMA-COOSA-TALLAPOOSA (ACT) RIVERS**

### **13.1 INTRODUCTION**

The Alabama-Coosa-Tallapoosa River Basin (the “ACT” River Basin) drains parts of Georgia and Alabama. (See Figure 19.) The basin contains the watersheds of three rivers. The Coosa River begins in southeastern Tennessee, near Chattanooga. The Tallapoosa River begins in northern Georgia. The two rivers converge in central Alabama, near the city of Montgomery, to form the Alabama River, which flows south toward Mobile Bay and the Gulf of Mexico.

The ACT River Basin shares 233 miles of a common border with the Apalachicola-Chattahoochee-Flint River Basin. Together the river basins are the subject of growing controversy over “who gets what,” a sign that the “water wars,” once discussed in the context of the arid Southwest, have now emerged in the Southeast, where annual rainfall averages 44 inches.

The ACT River Basin contains 22,800 square miles. A small portion of the headwaters – less than one percent of the basin – is located in Tennessee. The Tallapoosa River runs from the southern end of the Appalachian Mountains in Georgia, south and west into Alabama. The Coosa River begins in the northwestern corner of Georgia and ends just northeast of the Alabama state capital, Montgomery, where it merges with the Tallapoosa River to form the Alabama River. Near Mobile, Alabama, at the Gulf of Mexico, the Alabama River is joined by the Tombigbee River to form the Mobile River.

The flows into Claiborne Lake, the farthest downstream federal reservoir in the ACT River Basin, average 26.7 MAF per year. Major tributaries to the system include: the Coosawattee River, the Oostanaula River, and the Etowah River, all in Georgia; and the Black Warrior, Cahaba and Tombigbee Rivers in Alabama.

Between 2.8 and 3 million people live in the ACT River Basin (73% live in Alabama; and 27% in Georgia). Major cities include: Rome (GA); Montgomery (AL); Selma (AL); and Mobile (AL).

Spanish explorer Hernando de Soto traveled the length of the Coosa and part of the Alabama River in 1540. He was followed by French and English explorers and traders who sought to establish outposts in the area. The Treaty of Paris in 1763 gave the ACT Basin territories to England, and it was not until 1795 that the United States finally acquired the entire area.

### **13.2 USES OF THE ALABAMA-COOSA-TALLAPOOSA RIVERS**

There are 18 dams and reservoirs in the basin: 6 owned by the U.S. Army Corps of Engineers (“Corps of Engineers”); 11 by Alabama Power Company; and one by a municipal water agency. The dams were built for power, flood control, water supply, navigation and other uses. The farthest upstream reservoirs are Lake Allatoona on the Etowah River and Carter’s Lake Carter on

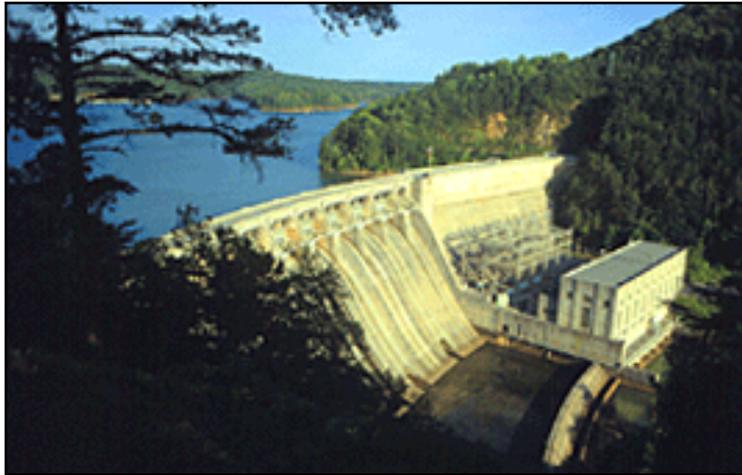
the Coosawattee River, both tributaries to the Coosa River. Atlanta relies on both reservoirs, owned by the Corps of Engineers, for a portion of its water supply.<sup>141</sup>

Congress first appropriated funds in 1826 to improve the harbor in Mobile, Alabama (roughly the same time that Congress also approved funds for navigation improvements on the Mississippi River). A system of locks and dams now allows for barge traffic 305 miles upstream from the Gulf of Mexico to Rome, Georgia.

### 13.2.1 Hydropower

There are a total of six federal dams in the ACT River Basin, four of which have the ability to generate 798 MW of hydropower. An additional 1,354 MW of hydropower is generated by the privately-owned dams in the basin. See **Appendix B** for details.

The Southeastern Power Administration, a federal power marketing agency, sells and delivers electricity from dams owned by the Corps of Engineers in the ACT basin to utilities. SEPA, however, does not own transmission lines and is dependent on other utilities to “wheel” (transport) the power. [www.sepa.doe.gov](http://www.sepa.doe.gov)



**FIGURE 21.** Allatoona Dam and Lake, Georgia.  
[Source: <http://allatoona.sam.usace.army.mil/>]

### 13.2.2 Navigation

About 800,000 tons – of which 80% were forest products and pulp – moved on the lower ACT River in the late 1990s.<sup>142</sup> Barge traffic in recent years has decreased considerably from what it was 20 years ago. The Corps of Engineers owns three locks at dams on the lower Alabama River: Robert F. Henry Lock; Millers Ferry Lock; and Claiborne Lock (the farthest downstream). All locks are located between Montgomery and Mobile, Alabama. The locks allow commercial traffic to travel upstream to Rome, Georgia.

<sup>141</sup>The majority of Atlanta’s water supply comes from Lake Lanier on the Chattahoochee River (behind Buford Dam owned by the Corps of Engineers. See chapter on the ACF River Basin.

<sup>142</sup>Source: Corps of Engineers’ Institute of Water Resources (1997), cited in the Corps’ draft Environmental Impact Statement for “Water Allocation for the ACT River Basin” (1998).

### **13.2.3 Water Supply**

There is a total of approximately 5.3 MAF of storage in the ACT River Basin. Of this amount, about 1.8 MAF is stored at federal dams, and the remaining 3.5 MAF, at privately-owned dams. There is no federal water supply infrastructure in the ACT River Basin. About 2.8 million people rely on the ACT River Basin for their water supply.

Two entities in Georgia, the Cobb-Marietta Water Authority (43 MGD) and the City of Cartersville (12 MGD) rely on Lake Allatoona for municipal water supply. The Birmingham (Alabama) Water Works Board owns Purdy Lake (52 MGD) for municipal water supply. In total, these three entities withdraw about 107 MGD (about 120,000 AF per year).

### **13.2.4 Flood Control**

The six dams and locks owned by the Corps of Engineers provide flood control protection.

## **13.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Apalachicola-Coosa-Tallapoosa (“ACT”) River Basin are:

1. In 1945, Congress enacted the Rivers and Harbors Act, Pub. L. No. 79-14, 59 Stat. 10, 17, which among other things authorized the Corps of Engineers to build a navigation channel from Mobile, Alabama, to Rome, Georgia. [See chapter on the ACF River Basin for events in the 1980s and 1990s.]
2. In 1997, after years of negotiation, Alabama and Georgia agreed on the terms of an interstate compact. Congress consented to the Alabama-Coosa-Tallapoosa Compact, Pub. L. No. 105-105, 111 Stat. 2233, between Georgia and Alabama.

At the same time, Congress also consented to the Apalachicola-Chattahoochee-Flint (“ACF”) Compact between Georgia, Alabama and Florida, which attempted to resolve conflicts in that basin. Pub. L. No. 105-104, 111 Stat. 2219.

The language in the two compacts was almost identical. Neither compact established an allocation formula for the river. Instead, the compacts created an interstate commission with a non-voting federal member to develop “an allocation formula for equitably apportioning the surface waters” of each basin while “protecting water quality, ecology and biodiversity.”

The Compact created the ACT Commission, composed of Alabama and Georgia, plus a non-voting federal member appointed by the President. If the Commission decided on an allocation formula, the federal commissioner had 255 days to file a concurrence. If, however, the Commission was unable to do so, the Compact would automatically expire by December 31, 1998.

While negotiations to establish a water allocation formula were underway, the parties agreed to language called the “live and let live” provision, which preserved existing withdrawal rights and allowed for reasonable increases:

“[A]ny person who is withdrawing, diverting, or consuming water resources of the ACT Basin as of the effective date of this Compact, may continue to withdraw, divert or consume such water resources....The parties to this Compact further agree that any such person may increase the amount of water resources withdrawn, diverted or consumed to satisfy reasonable increases in the demand...between the effective date of this Compact and the date on which an allocation formula is approved.” Article VIIc.

3. On July 31, 2004, the ACT Compact expired because the commissioners could not agree on an allocation formula for the basin. [The expiration of the ACT followed by a year the expiration of the ACF Compact. See ACF chapter for details and the litigation that was filed while the ACT and ACF commissioners were attempting to negotiate the water allocation formula.]
4. On 2004, Alabama reopened the dormant 1990 litigation and filed an amended complaint in its litigation against the Corps of Engineers. *Alabama v. U.S. Army Corps of Engineers*, case no. CV-90-BE-0331-E.

Alabama alleged, among other things, that the Corps of Engineers continued to make decisions affecting both the ACT and ACF River Basins in violation of the National Environmental Policy Act, 42 U.S.C. § 4321 et seq., the Administrative Procedure Act, 5 U.S.C. § 551 et seq., and the Endangered Species Act, 16 U.S.C. § 1560(g).

Alabama’s complaint resurrected allegations raised initially fifteen years earlier but subsequently put on hold by the 1990 Joint Stay. Alabama argued into complaint that the Corps of Engineers had illegally reallocated large amounts of reservoir storage for municipal water supply use by Atlanta.

## **13.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers is the lead federal agency.

### **13.4.1 Long-term Operational Strategy**

With the expiration of the ACT Compact, there is no long-term strategy – or an accepted allocation formula – between Alabama and Georgia.

### **13.4.2 Short-term Operational Strategy**

The Corps of Engineers relies on its historic operating criteria, some of which have not been significantly revised since the 1950s. The Corps’ attempt to sign new long-term reservoir contracts – which would establish new criteria – is the subject of protracted litigation now pending in federal court.

### **13.4.3 River Accounting Mechanisms**

Alabama has alleged that the Corps of Engineers has operated secretly and that it is difficult, if not impossible, to understand the downstream ramifications of the Corps' proposed reservoir storage contracts with Atlanta-area water suppliers. The issue of "who got or who gets what" is complicated by the fact that the Corps' contracts allocate reservoir storage space, not water, which remains a matter of Georgia law.

### **13.4.4 The Role of Interstate Compacts**

There are no interstate compacts in the ACT River Basin. The proposed ACT Compact expired in 2004 without Alabama and Georgia agreeing to an allocation formula.

### **13.4.5 International Treaties and Agreements**

None. The ACT River Basin lies entirely in the United States

### **13.4.6 The Role of Native American Tribes**

Native American Tribes did not play a major role in negotiating the ACT Compact and do not currently play a significant role in managing the ACT River Basin.

### **13.4.7 The Role of Federal Courts**

Federal courts have not assumed a role in the day-to-day river management. However, multiple lawsuits filed and pursued after the demise of the ACT Compact suggest that courts may play a significant role in the next few years. [See "Litigation" section in the ACF chapter.]

## **13.5 CURRENT ISSUES AND CONFLICTS ON THE ALABAMA-COOSA-TALLAPOOSA RIVERS**

### **13.5.1 Water Supply and Allocation**

The chief dispute in the ACT River Basin continues to revolve around how much water Georgia – and specifically the greater Atlanta region – can divert for domestic water supply.

### **13.5.2 Power Supply and Allocation**

Power supply is a potential source of conflict in the ACT River Basin. Although the SeFPC litigation – see ACF chapter for details – pertains only to the ACF River Basin, the Alabama Power Company has raised objections to water withdrawals for Atlanta because of downstream impacts on hydropower operations in the ACT River Basin. Those issues are now pending before a federal district court in Alabama.

### **13.5.3 Environmental Issues**

See discussion of Endangered Species Act ("ESA") problems in the ACF River Basin.

## **13.6 CONFLICT RESOLUTION**

### **13.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power in the ACT River Basin, though it consented in 1997 to an interstate compact between Alabama and Florida that was designed to adopt a water allocation formula for the basin. The Compact expired in 2004.

### **13.6.2 Administrative Allocation of Water or Power**

#### **Water**

Whether the Corps of Engineers can reallocate storage space and allow greater diversions for the Atlanta area is the subject now being litigated in federal district court.

In 2004, a federal district court judge in Washington, D.C., upheld the validity of a 2003 Settlement Agreement between the Corps of Engineers, Georgia and the Southeastern Federal Power Customers in the ACF Basin. The Settlement Agreement called for the Corps of Engineers to offer interim 10-year contracts for additional storage space at Lake Lanier in the ACF River Basin.

If the Settlement Agreement is upheld on appeal, it would likely give the Corps of Engineers the authority to reallocate additional storage space at reservoirs in the upper ACT River Basin for water supply agencies in the Atlanta area.

#### **Power**

The Corps of Engineers does not have the authority to allocate federal power. The responsibility for selling and delivering power from federal dams in the ACT River Basin is vested in the Southeastern Power Administration, a federal power marketing agency. [www.sepa.doe.gov](http://www.sepa.doe.gov)

### **13.6.3 Judicial Allocation of Water or Power**

Not used to date. If, however, Alabama pursues an equitable apportionment petition in the U.S. Supreme Court, the situation would change. The Supreme Court would be asked to appoint a special master who would recommend an “equitable apportionment” of the rivers in the ACT River Basin. See Chapter 3 for a list of the Court’s apportionment cases.

### **13.6.4 Arbitration or Mediation**

Not used.

### **13.6.5 Litigation**

The federal court litigation in the ACT and ACF River Basins overlap. To avoid a repetitive discussion, the details of the litigation are discussed in the chapter on the ACF River Basin.

### **13.6.6 Infrastructure Improvements and Environmental Restoration**

Endangered Species Act problems have not forced river managers to change the flow of the major rivers in the ACT Basin or invest in significant infrastructure improvements for environmental restoration.

### **13.6.7 Interagency and Multi-Party Agreements**

None.

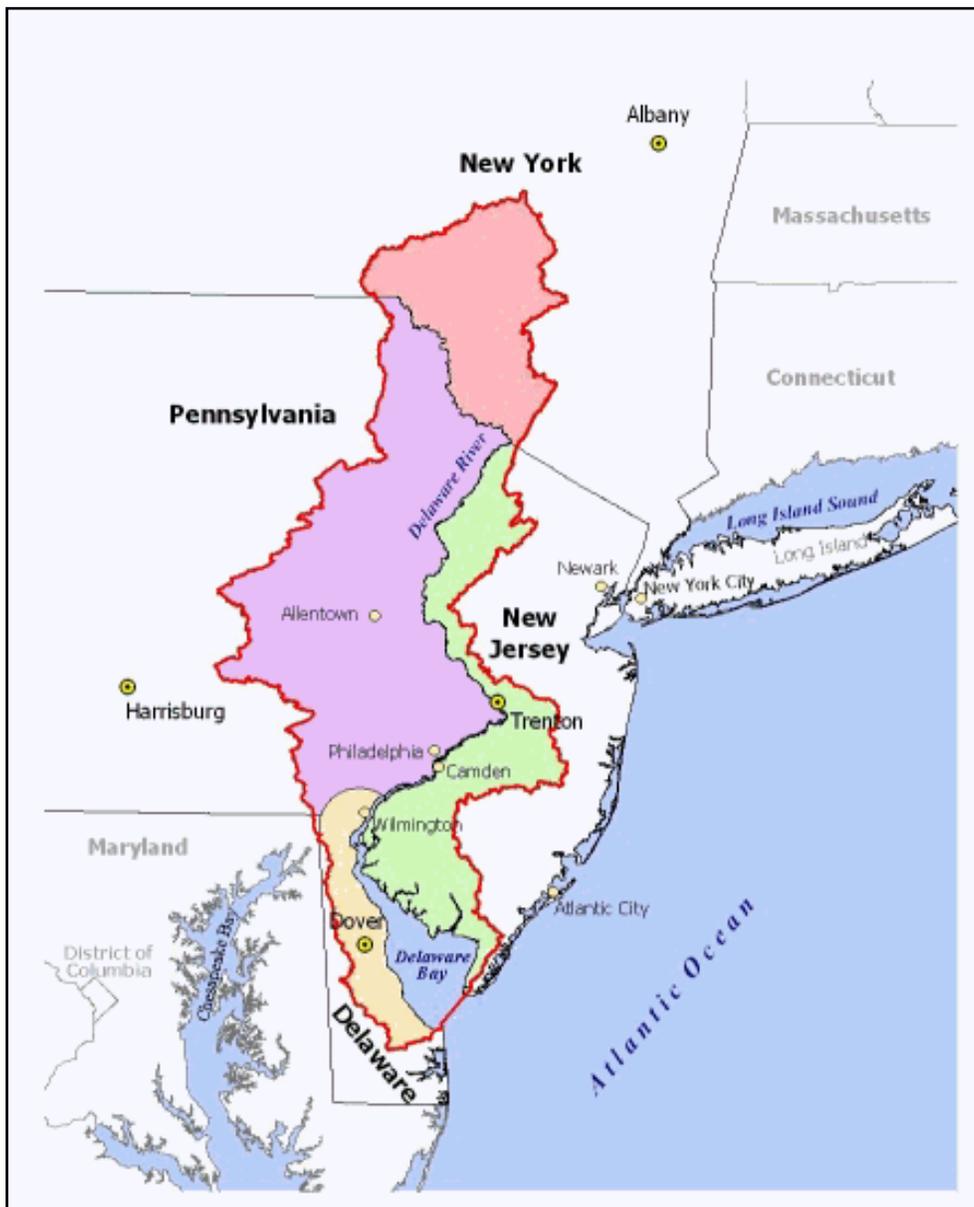
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## 14.0 THE DELAWARE RIVER

### 14.1 INTRODUCTION

The first Europeans to colonize the Delaware River basin were from Sweden. They established a short-lived colony in 1638 in the lower basin and later capitulated to the Dutch commander Peter Stuyvesant, whose claims were in turn supplanted by British Lord Baltimore, who extended his dominion over much of what is now the lower Delaware River.

In 1776, General George Washington crossed across the frozen Delaware River during an ice storm to attack British and Hessian troops near Trenton, New Jersey. The battle was one of the turning points of the Revolutionary War.



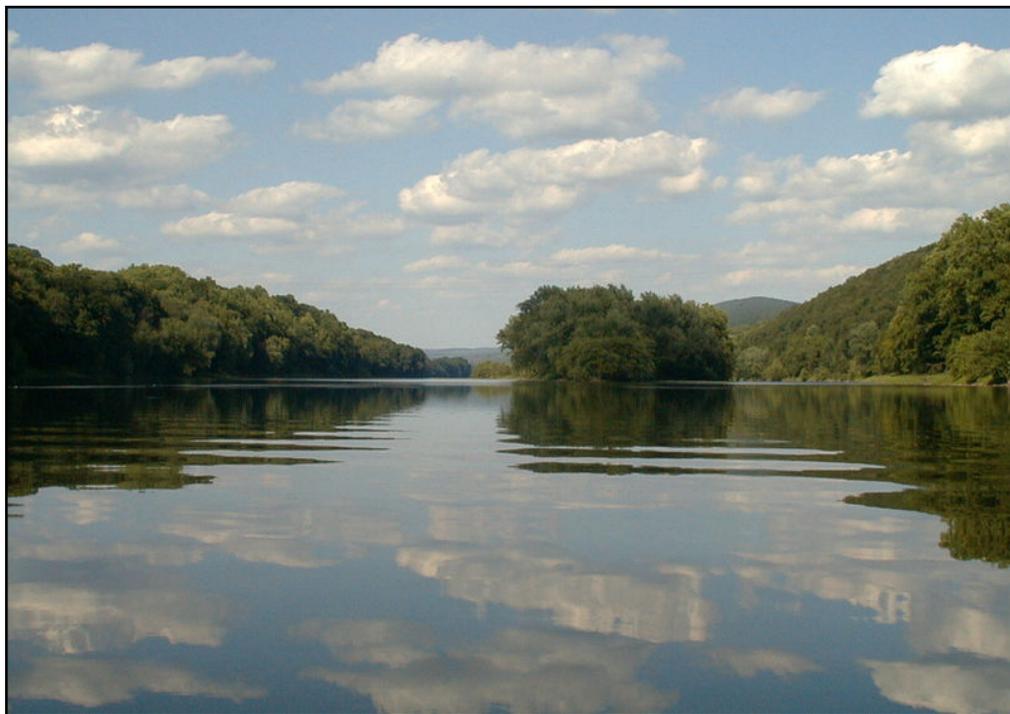
**FIGURE 22.** Map of the Delaware River Basin. [Source: <http://www.state.nj.us/drbc/drbc4.htm>]

In the early 1800s, a corporation with both public and private shareholders started to build the Chesapeake and Delaware Canal, linking the lower Delaware River with Chesapeake Bay, 14 miles to the west. The canal was completed only in 1829, with help from the U.S. Army Corps of Engineers (“Corps of Engineers”), which operates it to this day.

In the 1950s, the Corps of Engineers proposed building Tocks Island Dam and a 37 mile-long reservoir on the main stem of the Delaware River between Pennsylvania and New Jersey. After years of controversy, the proposal was abandoned in the 1970s, and formally deauthorized by Congress in 1992.

The Delaware River is one of the most important sources of water supply in the eastern United States. From its source in New York, the Delaware River flows in a southerly direction, forming the boundary between New York and Pennsylvania, then between Pennsylvania and New Jersey, and finally between Delaware and New Jersey. Half of the basin is in Pennsylvania. The area receives about 42 inches of rain a year.

The Delaware River drains portions of four states: Delaware; New Jersey; New York; and Pennsylvania. The river originates in New York, where the West Branch and East Branch converge at the town of Hancock, to form the main stem of the river. The Delaware River empties into Delaware Bay and then into the Atlantic Ocean, 330 miles from its source.



**FIGURE 23.** View of the Delaware River from above the Delaware Water Gap. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Delaware\\_River](http://en.wikipedia.org/wiki/Delaware_River)]

The Delaware River Basin encompasses 13,539 square miles and includes 216 tributaries, including: the West Branch, East Branch and Neversink Rivers in New York; and the Lackawaxen, Lehigh and Schuylkill Rivers in Pennsylvania. Flows at Trenton, New Jersey, average 8.5 MAF per year. Natural flows, however, are highly variable and ranged from 329,000 cfs during a severe flood in 1955 to 1,180 cfs during a drought in 1961.

Major cities adjacent to the river include: Port Jervis (NY); Trenton (NJ); Camden (NJ); Philadelphia (PA); and Wilmington (DE). Approximately 7.8 million people live within the river basin.

## **14.2 USES OF THE DELAWARE RIVER**

The Delaware is the longest undammed river east of the Mississippi. Fifteen million people rely on it for their water supply. Within the Delaware River Basin, the river supplies the cities of Philadelphia, Trenton and others. In addition, a large population outside of the Delaware Basin, including New York City, relies on reservoirs in the upper Delaware River for a portion of its water supply.

The Corps of Engineers owns five flood control dams built on tributaries. The Delaware River Basin's primary industries include: 1) dairy farming and tourism in the less-populated upper basin; 2) oil refineries, chemical companies and pharmaceutical firms in the more densely-populated middle basin; and 3) poultry and fishing in the Delaware Bay region.

The lower Delaware River is home to the largest freshwater port complex in the world, including docking facilities in Pennsylvania, New Jersey and Delaware.

Once one of the most polluted rivers in the country when it entered Delaware Bay, the river is now clean enough to sustain populations of shad and other species. Three-quarters of the non-tidal river have been added to the National Wild and Scenic Rivers System. Several tributaries have received similar protection under state law. Trout fishing downstream of reservoirs in New York produces an estimated \$30 million a year in economic activity.

### **14.2.1 Hydropower**

Neither the federal dams nor the dams owned and/or operated by other governmental agencies in the Delaware River Basin have the ability to generate hydropower. Although there are no dams on the main stem of the Delaware River, several corporations own hydroelectric dams on tributaries. The combined generating capacity of these dams is 66 MW. The largest of these, Lake Wallenpaupack in Pennsylvania, is owned by PPL and has the capacity to produce 44 MW.

### **14.2.2 Navigation**

#### **Upstream Navigation**

Commercial navigation is possible for 130 miles from Delaware Bay upstream to Trenton, New Jersey. The Corps of Engineers has responsibility for dredging the tidal portion of the river to maintain the proper depth.

#### **The Chesapeake and Delaware Canal**

The Corps of Engineers is also responsible for operating and maintaining the Chesapeake and Delaware Canal across Delaware and Maryland. The canal connects the lower Delaware River with Chesapeake Bay. The canal – 14 miles long, 450 feet wide and 35

feet deep – carries 40% of all the ship traffic in and out of the Port of Baltimore, Maryland.

### **14.2.3 Water Supply**

The Delaware River Basin Commission, created by the 1961 interstate compact, monitors water diversions and issues permits for large withdrawals. See, Pub. L. No. 87-328, 75 Stat. 688. Reservoirs owned by the Corps of Engineers and non-federal entities can store a total of 1.43 MAF. See **Appendix B** for details.

The largest single user is the City of New York, which diverts water from three municipal-owned reservoirs in the upper Delaware River Basin for approximately 50% of its domestic water supply. The U.S. Supreme Court’s Amended Decree, *New Jersey v. New York*, 347 U.S. 995 (1954), established a maximum allowable diversion of 800 MGD. Water is delivered by an 84-mile long tunnel and aqueduct to the Croton System, and then to the city.

The Delaware and Raritan Canal diverts water from the Delaware River Basin to northeast New Jersey. The U.S. Supreme Court’s 1954 Amended Decree set this figure at a maximum of 100 MGD.

In total, the New York City and the New Jersey out-of-basin diversions total up to 900 MGD (equivalent to about 1 MAF per year).

Philadelphia draws its water supplies from the lower Delaware River (main stem) and from the Schuylkill River (tributary). The city relies on the Delaware River for about 60% of its supply.

### **14.2.4 Flood Control**

The five dams owned by the Corps of Engineers were built primarily for flood control. In addition, the Corps of Engineers has built levees on tributaries to control floods.

### **14.2.5 Other Uses**

Parts of the Delaware River Basin are popular for fishing, boating and recreation. The river now supports year-round fish populations, and in some places, marinas line the shore where only commercial ships were once found.

## **14.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Delaware River Basin are:

1. In 1783, before the U.S. Constitution was adopted, Pennsylvania and New Jersey signed an “anti-dam treaty” to make the Delaware River between the two states a common highway for navigation.
2. In 1923, New Jersey, New York and Pennsylvania began negotiations for a “tri-state” compact on the Delaware River. Although the three states initially reached

an agreement, once in 1925 and again in 1927, the state legislatures of Pennsylvania and New Jersey refused to ratify the accord.

New York City's declaration that it intended to use the Delaware River in upstate New York as a source for its municipal supply set off a confrontation with the other states. New Jersey filed a petition in 1929 in the U.S. Supreme Court seeking an equitable apportionment of the Delaware River.

3. In 1931, the U.S. Supreme Court held that New York City could withdraw an average of 440 million gallons per day ("MGD")(492,638 AF per year) but no more than that amount from reservoirs the city planned to build in the upper Delaware River Basin. *New Jersey v. New York*, 283 U.S. 336 (1931).

The Court's opinion, based on the principles of equitable apportionment, cited *Kansas v. Colorado*, 206 U.S. 46 (1907)(relating to the Arkansas River) and other decisions in which downstream states sought protection from diversions by an upstream state.

The Supreme Court said:

A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it. New York has the physical power to cut off all the water within its jurisdiction. But clearly the exercise of such a power to the destruction of the interest of lower States could not be tolerated. And on the other hand equally little could New Jersey be permitted to require New York to give up its power altogether in order that the river might come down to it undiminished. Both States have real and substantial interests in the River that must be reconciled as best they may." *New Jersey v. New York*, 283 U.S. at 342-343.

The Supreme Court's Decree – adopted at the same time – required New York City to release sufficient water from its reservoirs to maintain a specified flow downstream at Port Jervis, New York. The decree also required New York to treat industrial waste from plants at Port Jervis, New York. *New Jersey v. New York*, 283 U.S. 805 (1931).

4. In 1936, New York, New Jersey, Pennsylvania and Delaware formed an advisory interstate commission, the Interstate Commission on the Delaware River ("INCODEL"), to develop a strategy for increasing water supply, reducing water pollution and addressing the environmental impacts of increased population and industrial development in the Delaware River watershed. The Commission was a precursor to the more influential commission established under the 1961 interstate compact.
5. In 1954, the U.S. Supreme Court issued an Amended Decree in *New Jersey v. New York*, 347 U.S. 995 (1954), allowing greater diversions (up to 800

MGD)(895,705 AF per year) by the City of New York following the completion of the Cannonsville Reservoir in upstate New York.

In addition, the Amended Decree also allowed New Jersey to divert up to 100 MGD per day (112,000 AF per year) for its own use. Those diversions were contingent on both New York and New Jersey meeting certain downstream flow requirements. Finally, the decree appointed the chief hydraulic engineer of the U.S. Geological Survey (or his designee) as the River Master to enforce the decree.<sup>143</sup>

6. In 1961, Congress consented to the Delaware River Basin Compact, which included four states: New York; New Jersey; Pennsylvania; and Delaware. Pub. L. No. 87-328, 75 Stat. 688. The Compact also included the federal government as a signatory and full participant.

At the time, 43 state agencies, 14 interstate agencies and 19 federal agencies exercised fractured control over the river. The Compact created the Delaware River Basin Commission (“the Commission”), which included the four governors and a voting federal representative appointed by the President. Article 2.

The Compact gave broad authority to the Commission to prepare a comprehensive plan for the basin, allocate water, build new reservoirs, engage in flood prevention and control pollution. The Compact authorized the Commission to build dams and/or own water in reservoirs, including Tocks Island on the Delaware River. Articles 4-9.

Finally, the Commission was given the authority to modify the diversions and releases specified in the Supreme Court’s 1954 Amended Decree upon unanimous consent of the four states that are party to the compact *and* the City of New York, which was a party to the equitable apportionment petition in the Supreme Court. Article 3, Section 3.3.

7. In 1962, the Commission approved its first Comprehensive Plan, which included the proposed Tocks Island Dam and other reservoir projects.
8. In 1965, the Commission declared a state of water supply emergency and implemented emergency water allocations.
9. In 1968, the Commission adopted water quality regulations for the Delaware River, at the time the most comprehensive of any river basin in the nation. The Commission’s regulations, imposed five years before the enactment of the Clean Water Act and the creation of the U.S. Environmental Protection Agency, addressed sewage and other discharges, particularly in the lower river basin.

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<sup>143</sup>This was the first time that the Supreme Court had ever appointed a River Master to enforce a decree. The only other time the Court has done so was over a long-standing dispute on the Pecos River, *Texas v. New Mexico*, 488 U.S. 917 (1988).

10. In 1973, the Commission adopted regulations requiring metering of retail customer connections for new water supply systems in the Delaware River Basin.
11. In 1975, the Commission, on a 3-1 vote, recommended that Congress abandon Tocks Island Dam. Three states – New York, New Jersey and Delaware -- voted against construction. Pennsylvania voted to proceed; the federal government abstained.<sup>144</sup>
12. In 1975, a federal district court in Pennsylvania upheld the Delaware River Basin Commission's authority to impose charges on seven cities for storing water at federal reservoirs in the Delaware River Basin. The Commission had previously contracted for a portion of the reservoirs at two Corps of Engineers' dams and sought to recover its costs by imposing charges on the cities. *Borough of Morrisville v. Delaware River Basin Comm'n*, 399 F. Supp. 469 (E.D.Pa. 1975), *aff'd mem.*, 532 F.2d 745 (3d Cir. 1976).
13. In 1977, the Commission adopted flood plain regulations to restrict development in the 100-year flood plain and prohibit construction in certain areas.
14. In 1978, Congress added 114 miles of the Delaware River to the National Wild and Scenic River System. See, 16 U.S.C. 1274(a).
15. In 1979, a federal appellate court held that the U.S. Supreme Court's equitable apportionment decrees of 1931 and 1954 altered prior state riparian rights in Pennsylvania. Landowners' rights to water from the Delaware River were limited by the Supreme Court's decrees *and* the 1961 interstate compact, which expressly adopted the terms and conditions of the decrees. *Badgley v. City of New York*, 606 F.2d 358 (2d Cir. 1979). The Court held that the doctrine of *parens patriae* permitted the state to act on behalf of its citizens when it signed the 1961 interstate compact.
16. In 1982, a federal appellate court held that the Commission's authority and expertise to develop hydroelectric power in the Delaware River Basin did not give it a "superior" position in obtaining a permit from the Federal Energy Regulatory Commission. The court held that FERC properly granted a preliminary study permit to a Pennsylvania borough, not the Commission, because the borough was the first applicant. *Delaware River Basin Comm'n v. F.E.R.C.*, 680 F.2d 16 (3d Cir. 1982).
17. In 1982, a federal district court in Pennsylvania upheld a Delaware River Basin Commission resolution that implemented a "grandfather clause" exemption in the Delaware River Basin Compact. The exemption was added to the Compact by Congress in 1961. The exemption prohibited the Commission from imposing

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<sup>144</sup>For a history of the Tocks Island Dam controversy and background on creation of the Delaware River Basin Commission, see Richard C. Albert, "Damming the Delaware: the Rise and Fall of Tocks Island Dam," (Pennsylvania State University Press: 2005).

charges on water diversions if the state had granted permission prior for the diversions to signing the Compact. The Commission's resolution implementing this exemption was a "rational implementation" of the provision added by Congress, the court held. *Delaware River Basin Commission v. Bucks County Water and Sewer Authority*, 545 F.Supp. 138 (E.D. Pa. 1982).

18. In 1983, after four years of deliberation, the Commission approved the Interstate Water Management ("Good Faith") Report allowing the Commission to amend the terms of the Supreme Court's 1954 Amended Decree during times of drought emergency.

The parties to the 1954 litigation – including the City of New York which was not a signatory to the Delaware River Basin Compact – supported the Good Faith Report, which established more stringent criteria for managing the Delaware River during times of low flow and for achieving short-term reductions in consumption.

The Good Faith Report also authorized the Commission to expand two federal reservoirs for additional storage and required utilities in the basin to build a storage reservoir to offset the amount of water consumed by utility power plants during drought. Only the utility storage reservoir – Merrill Creek in New Jersey – has been built.

19. In 1985, the Commission adopted a well registration program to regulate large ground water users in the Delaware River Basin.
20. In 1986, the Commission adopted metering of large withdrawals from ground and surface water in the Delaware River Basin as part of water conservation program.
21. In 1992, the Commission adopted special regulations to protect water quality in two Scenic River sections of the Delaware River.
22. In 1996, the Commission adopted regulations to control the discharge of pollutants from wastewater treatment plants in the tidal portions of the Delaware River.
23. In 1997, Congress mandated that the President must designate a regular officer of the Army Corps of Engineers as the federal representative to the Commission. Pub. L. No. 105-18 § 301.

#### **14.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers owns five dams on tributaries of the Delaware River. The most important agency in managing the water resources in the Delaware River Basin, however, is the Delaware River Basin Commission, which has the federal government as a full partner. [www.state.nj.us/drbc](http://www.state.nj.us/drbc). See discussion below on interstate compacts.

In addition, the Delaware River is one of two interstate rivers in the nation with a court-appointed “River Master.” The Office of the Delaware River Master<sup>145</sup> in the U.S. Geological Survey (“USGS”) has responsibility to:

- Enforce the U.S. Supreme Court’s decree, see *New Jersey v. New York*, 347 U.S. 995 (1954);
- Compile and correlate data;
- Conserve the waters in the river and in the New York City reservoirs in the Delaware River Basin; and
- Prepare annual reports for the U.S. Supreme Court. See River Master’s duties in Article VIII of amended decree.

The River Master has a web site: <http://water.usgs.gov/orh/nrwww/odrm>. The Delaware River Master is located in Reston, Virginia, with a local office in Milford, Pennsylvania.

#### **14.4.1 Long-term Operational Strategy**

The Delaware River Basin Commission – created by the 1961 interstate compact – has prepared a Comprehensive Plan (2001) and a Water Resources Plan (2004). The Comprehensive Plan is a compilation of existing policies and regulations enacted by the Commission. The Water Resources Plan identifies three scenarios for future water demand but does not contain a strategy for meeting the high and forecasted (medium) scenarios. The Water Resources Plan shows that the current supply is probably insufficient to meet demand in 2011 (high demand) and 2016 (forecast/medium demand). The Commission is seeking to prevent shortages by working with state and local agencies, private parties and other stakeholders to reduce demand.

#### **14.4.2 Short-term Operational Strategy**

The Delaware River system is not managed in the sense that other rivers with dams and significant infrastructure are “managed.” The main stem of the Delaware River is undammed. Nonetheless, there are important criteria implemented by the Office of the River Master (created to enforce the U.S. Supreme Court’s 1954 Amended Decree). The Office of the River Master and the Delaware River Basin Commission maintain two key minimum flow targets:

- 1,750 cubic feet per second (cfs) at Montague, New Jersey, downstream from Port Jervis, New York (the “Montague” flow); and
- 3,000 cfs at Trenton, New Jersey (downstream from Montague but upstream from Philadelphia).

The Trenton minimum flow is designed in part to avoid salt water intrusion into the lower Delaware River that would adversely affect fresh water aquifers as well as industrial and municipal water intakes in the area of Wilmington, Delaware, Camden, New Jersey, and

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<sup>145</sup>The Pecos River, a tributary to the Rio Grande, is the other river with a court-appointed River Master.

Philadelphia, Pennsylvania. The River Master also coordinates the flow of private dams in upstate New York (i.e., the Mongaup Group) to ensure flows for fish.

In addition, the Delaware River Basin Commission has adopted regulations that contain detailed criteria for river management. The criteria include a “water code” that describes the standards that public agencies must meet (i.e., to reduce waste) in their municipal systems, and the adoption of retail water pricing rates to encourage conservation and other matters. The Commission has established a priority of uses in case of a drought emergency.

#### **14.4.3 River Accounting Mechanisms**

The Delaware River Basin Commission maintains records on water use and posts some information on its web site. The DRBC relies on state agencies in the basin for much of its water use data. [www.state.nj.us/drbc/wateruse](http://www.state.nj.us/drbc/wateruse)

#### **14.4.4 The Role of Interstate Compacts**

The Delaware River Basin Compact, approved by Congress in 1961, lasts for 100 years from its initial effective date and automatically renews for another 100 years unless parties terminate it during a certain window. Pub. L. No. 87-328, 75 Stat. 688. Section 1.6. The federal government, however, can withdraw at any time if Congress so chooses.<sup>146</sup> Section 1.4.

The Compact vested the Delaware River Basin Commission with the broadest duties of any interstate compact commission in the nation. The Commission is located in West Trenton, New Jersey. [www.state.nj.us/drbc](http://www.state.nj.us/drbc)

The Commission has five voting members, one from each state and one federal representative. Section 2.2. The President designates the federal representative, who must be a member of the Corps of Engineers, holding appointment as a regular Army officer. The appointment is subject to Senate confirmation. 111 Stat. 158 at Section 301. The Commission’s regulations are found at 18 C.F.R. § 401 et seq.

The Commission is one of two federal interstate compact commissions where the federal government votes as an equal party with the participating states.<sup>147</sup>

The Commission can:

- Prepare a comprehensive plan for the entire river basin, Article 3 and Article 13;
- Allocate or apportion waters *between states* in accordance with the doctrine of equitable apportionment, Article 3;
- Acquire, construct or operate dams, reservoirs and other projects to store water or generate electricity, Article 3, 4 and 9;

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<sup>146</sup>The federal government has not contributed funds to the Commission since FY 1997. Although the federal government is a full partner “on paper,” the cumulative federal shortfall is measured in millions of dollars.

<sup>147</sup>The other federal interstate compact is on the Susquehanna River. See Chapter 15.

- Sell bonds to pay for reservoirs and other projects;
- Store and release water from reservoirs, Article 4;
- Compile flood warning information and disseminate the data to the public, Article 3;
- Impose water supply charges on users that divert large amounts of surface water (non-consumptive use of more than 1,000 gallons per day and 100,000 gallons in any quarter) from the Delaware River and its tributaries. See, Basin Regulations (“Water Supply Charges”), Section 5.3.3; and
- Build facilities to control, dilute or abate pollution, Article 5.

Finally, the Commission – with consent of all the parties – can modify the diversions and releases specified in the Supreme Court’s 1954 Decree (i.e., the four signatory states *and* the City of New York must all concur). Section 3.3. The states agreed that they would not individually attempt to modify the 1954 Amended Decree by seeking redress in the U.S. Supreme Court. Section 3.4.

The parties modified the Decree in 1983 when they adopted the “Good Faith” report.<sup>148</sup> The Good Faith Report proposed phased-in reductions in diversions that were automatically triggered under low-flow conditions.

#### **14.4.5 International Treaties and Agreements**

None. The Delaware is a domestic not an international river.

#### **14.4.6 The Role of Native American Tribes**

Native American Tribes have not played a significant role in the management of the Delaware River.

#### **14.4.7 The Role of Federal Courts**

The U.S. Supreme Court’s equitable apportionment decision in 1931 and the Amended Decree in 1954 constitute a core part of the law of the river. The Amended Decree created an Office of the River Master whose responsibilities include monitoring downstream flows to ensure compliance with the Decree. The River Master prepares an annual report for the Supreme Court. The Supreme Court maintains jurisdiction but neither it nor the River Master actively manage the river and its tributaries on a day-to-day basis.

There is no major pending federal court litigation that addresses interstate river management or water allocation issues in the Delaware River Basin.

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<sup>148</sup>The “Good Faith” report is formally known as the “Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission, Pursuant to Commission Resolution 78-20.”

## 14.5 CURRENT ISSUES AND CONFLICTS ON THE DELAWARE RIVER

During normal conditions, the Delaware River can currently meet the disparate demands for water. The basin, however, is likely to face constraints during sustained drought, as it did in the 1960s, the driest period on record.

Withdrawals for power plant operations – which now equal municipal withdrawals – are expected to increase significantly in the next decades. Minimum flow requirements in the upper basin for recreation and wildlife pose an additional challenge, particularly during drought. Minimum flow requirements in the lower basin are necessary for different reasons: to prevent salt water intrusion into potable water and industrial intakes in downstream urban areas, and to maintain the ecology of Delaware Bay.

### 14.5.1 Water Supply and Allocation

The Delaware River Basin Commission estimates that water use for power generation will increase significantly in the next decades.

**Table 20** shows the current annual consumptive use in the Delaware River Basin and the projected trends in the year 2020. About 312 MGD, equivalent to 349,000 AF per year, is currently used in the basin.

**TABLE 20.** Trends in water use, Delaware River Basin. (Millions of gallons per day.) [Source: Delaware River Basin Commission.]

Type of Use	1996 (actuals)	2020	% Increase
Power Generation	93	162	74.2
Public Water Supply	92	99	7.6
Industrial	71	71	0
Agricultural	30	24	-20.0
Domestic Self-Supply (Wells)	20	24	20.0
Other	6	13	117.0
<b>TOTAL</b>	<b>312</b>	<b>393</b>	<b>26.0</b>

The Delaware River Basin Commission has a conservation program and is working with state and local agencies, private parties and other stakeholders. Nonetheless, if the trend in water use continues, the Delaware River will face new stresses as both public agencies and utilities seek to withdraw more water. Note that most power generation withdrawals are returned to the river – the figures above do not represent consumptive uses.

### **14.5.2 Power Supply and Allocation**

Because there are no dams – federal or private – on the main stem of the Delaware River, power allocation issues do not arise. The Corps of Engineers’ dams on tributaries do not generate power.

### **14.5.3 Environmental Issues**

#### **Upstream Releases in New York for Trout**

The U.S. Supreme Court’s Amended Decree (1954) did not address minimum flows for fish habitat and passage. The issue of how much water New York City will release from its reservoirs for fish is yet unresolved, but may eventually impact long-term water availability and allocation issues. An interim fisheries protection program is in effect until May 2007. [www.state.nj.us/drbc/Res-Fisheries.htm](http://www.state.nj.us/drbc/Res-Fisheries.htm)

#### **The Dwarf Wedgemussel**

The dwarf wedgemussel, native to upstate New York, is listed as endangered by the federal government. The freshwater mussel was discovered in portions of the upper Delaware River Basin. To date, river operations have not changed, but the U.S. Fish and Wildlife Service and other agencies are conducting studies to acquire additional information.

### **14.5.4 Other**

#### **Interpretation of the 1961 Interstate Compact**

There are a number of provisions in the 1961 interstate compact and the Supreme Court’s 1954 Amended Decree that raise important legal questions of interpretation. It is not clear, for example, whether the Decree would have priority over proposed flow restrictions under the Endangered Species Act.

## **14.6 CONFLICT RESOLUTION**

### **14.6.1 Congressional Allocation of Water or Power**

Not applicable. Congress has not allocated water or power in the Delaware River Basin.

### **14.6.2 Administrative Allocation of Water or Power**

The Delaware River Basin Commission can reallocate waters “in accordance with the doctrine of equitable apportionment” to and among the states. Pub. L. No 87-328, 75 Stat. 688, at Section 3.3.

The Commission can also modify the terms of the Supreme Court’s 1954 Amended Decree with concurrence of all the parties – including the City of New York. Section 3.3(a).

The Commission has never exercised its equitable apportionment powers between states under Section 3.3, but it has used its authority under Section 3.3(a) to modify the Amended Decree by adopting recommendations of the 1983 Good Faith Report, such as a drought allocation formula to ensure minimum flows in the river at certain designated points.

#### **14.6.3 Judicial Allocation of Water or Power**

Courts have not allocated water in the Delaware River Basin since the U.S. Supreme Court's 1931 and 1954 equitable apportionment decrees. See "Legal Regime" section.

#### **14.6.4 Arbitration or Mediation**

Not used. The Commission attempts to seek common ground among competing users and has established a number of advisory committees on subjects such as flood control and toxics control.

#### **14.6.5 Litigation**

The last major litigation over the Delaware River occurred in the 1950s, leading up to the U.S. Supreme Court's 1954 Amended Decree. See "Legal Regime" section above.

#### **14.6.6 Infrastructure Improvements and Environmental Restoration**

The Commission has not invested dollars in infrastructure improvements (i.e., fish hatcheries), but has focused instead on flow requirements in the upper Delaware River Basin for fish habitat and passage.

#### **14.6.7 Interagency and Multi-Party Agreements**

The Delaware River Basin Commission has purchased storage at two Corps of Engineers' dams on tributaries: Beltzville Dam on Pohopoco Creek; and Blue Marsh Dam on the Schuylkill River, both in Pennsylvania. The Commission uses funds obtained from large water users to pay for a percent of the acquisition costs of the reservoirs. The Corps of Engineers allows the Commission to control a portion of the reservoirs during drought.

## 15.0 THE SUSQUEHANNA RIVER

### 15.1 INTRODUCTION

Measured in average flow, the Susquehanna River is the largest river lying entirely within the United States that drains to the Atlantic Ocean. Its source is in upstate New York. From there the Susquehanna River follows a southerly course, draining parts of Pennsylvania and Maryland before emptying into Chesapeake Bay. The Susquehanna River is the largest tributary of Chesapeake Bay, contributing about half of its water. Large portions of the basin remain primarily rural – about 60% is forested.

The Susquehanna River drains portions of three states: New York, Pennsylvania, and Maryland. At 444 miles in length, the Susquehanna River is the longest river on the American East Coast. Rising as the outlet of Otsego Lake in Cooperstown, New York, the North Branch of the Susquehanna River crosses into Pennsylvania near the town of Athens. It receives the smaller West Branch near Sunbury, Pennsylvania and crosses into northern Maryland approximately 30 miles northeast of Baltimore. The river ultimately empties into the northern end of the Chesapeake Bay at Havre de Grace.

The Susquehanna River Basin contains 27,510 square miles, of which nearly 76% is located in Pennsylvania. Major tributaries include: the Unadilla, Chenango and Chemung Rivers in New York; and the

Lackawanna, West Branch and Juniata Rivers in Pennsylvania.

Over 4 million people live in the Susquehanna watershed. Cities adjacent to the river include: Binghamton (NY); Oneonta (NY); Harrisburg (PA); and Wilkes-Barre (PA). Flows into Chesapeake Bay average 29 MAF per year.



**FIGURE 24.** The Susquehanna River near the Chesapeake Bay.  
[Source: Wikipedia, [http://en.wikipedia.org/wiki/Susquehanna\\_River](http://en.wikipedia.org/wiki/Susquehanna_River)]

In the 18th century, the lower Susquehanna River was inhabited by the Lenape tribe, which negotiated with William Penn, founder of the Pennsylvania Colony, to allow settlement. During the Civil War, union soldiers positioned themselves on the west bank of the Susquehanna River to prevent General Robert E. Lee from crossing the river. The Susquehanna River runs through the center of Pennsylvania's coal-producing region.

## **15.2 USES OF THE SUSQUEHANNA RIVER**

About 446 MGD (500,000 AF per year) are withdrawn for peak consumptive water uses in the Susquehanna River Basin.

One of the most flood prone areas of the nation, the Susquehanna River Basin experiences a major flood on average every 20 years. Average annual flood damages are about \$150 million in present day dollars. To reduce flooding, the U.S. Army Corps of Engineers (“Corps of Engineers) built 14 dams on tributaries. Except for a turbine-generator (owned by a private company) at Raystown Dam (owned by a private company) in, Pennsylvania, the Corps of Engineers’ dams do not produce power.

During the first half of the 20<sup>th</sup> century, private power utilities built four dams for power generation on the lower main stem of the Susquehanna River. These projects, along with other environmental factors, eliminated annual runs of migratory fishes up the river. In recent years, the dam owners and other entities (both federal and state) have participated in an extensive effort to restore lower Susquehanna River habitat for such migratory species, particularly American Shad.

The river provides water for three nuclear power plants in Pennsylvania. One of these, the Three Mile Island nuclear power plant – scene of the famous 1979 accident – is located on the Susquehanna River southeast of Harrisburg, Pennsylvania.

### **15.2.1 Hydropower**

Except for the small power station at Raystown Dam, none of the federal dams in the Susquehanna River Basin, nor any of the dams owned by other governmental agencies, have the ability to generate hydropower. The private dams on the lower river have a generating capacity of 2,148 MW. A single facility, the Muddy Run pumped storage facility, generates half this capacity. See **Appendix B** for details. There is no federal transmission infrastructure in the basin.

### **15.2.2 Navigation**

The Susquehanna River is essentially non-navigable to commercial traffic. Only five miles upstream from Chesapeake Bay are open to commercial vessels.

### **15.2.3 Water Supply**

There is a total of approximately 2.75 MAF of storage in the Susquehanna River basin, the vast majority at federal dams on tributaries. See **Appendix B** for details.

The Susquehanna River supplies water to 4.1 million people in the basin. In addition, the City of Baltimore and Chester Water Authority, of Chester, Pennsylvania, can divert water outside the basin to supply an additional 1.1 million people for a total of about 5.2 million people.<sup>149</sup>

A number of power plants also withdraw large amounts of water, including Exelon's Peach Bottom nuclear plant on the Conowingo reservoir, PPL's Susquehanna Steam Electric Station on the Susquehanna River near Berwick, PA, and the Three Mile Island Nuclear Power Plant mentioned above.

#### **15.2.4 Flood Control**

The Corps of Engineers operates its dams primarily for flood control and recreation, though the Susquehanna River Basin Commission has acquired 30,600 AF of storage in these federal dams for storage and release during low flow periods.

### **15.3 THE LEGAL REGIME**

In chronological order, the major "laws of the river" in the Susquehanna River Basin are:

1. In 1970, Congress approved the Susquehanna River Basin Compact between the states of New York, Pennsylvania and Maryland and the federal government. Pub. L. No. 91-575, 84 Stat. 1509.

Unlike other compacts which were negotiated after extensive litigation (see the discussion on the Delaware River, for example), the Susquehanna River was not the subject of major litigation prior to the Compact's adoption.

Supporters of the Compact were concerned that major cities outside of the basin would attempt to divert water. The drafters relied on the Delaware River Compact of 1961 in their approach to creating an interstate compact commission for the Susquehanna River.<sup>150</sup>

As a result, the Compact is one of two in the nation – the Delaware River Basin Compact is the other – that was signed by the federal government and that granted the federal government a vote, as if it were a state, on the Susquehanna River Basin Commission.

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<sup>149</sup>Baltimore's withdrawals vary significantly from year-to-year. Baltimore uses the Susquehanna River as a backup, not a primary, source for municipal supply. Although Baltimore has the right to divert 137 mg/d, it diverted no water in 2004 and 2005. During past droughts, however, Baltimore has relied on the Susquehanna River. The Susquehanna River Basin Commission can limit Baltimore's diversions to 64 mg/d under certain conditions.

<sup>150</sup>The origins of the Susquehanna River Basin Compact go back to the early 1960s, when a political science professor, Frederick Zimmerman, and a state legislator from Pennsylvania, Harris Breth, worked together to prepare the first drafts and hold legislative hearings.

The Susquehanna Compact grants broad powers to the Commission to monitor, manage and regulate water withdrawals.

The purpose of the Compact was to establish “comprehensive planning, programming and management” of the Susquehanna River Basin’s water resources. The Commission has the authority to review and approve “projects” that affect the rivers and ground water in the basin (Article 3), and “to regulate and control withdrawals and diversions from surface and ground waters of the basin in specially protected areas and during drought emergencies.” Article 11.

The Maryland legislature, however, approved the Compact with a reservation that granted to the City of Baltimore the right to construct and operate facilities for water diversion from the lower Susquehanna River “which it determines to be in its own interest.” That language would lead to litigation. See below.

2. In 1995, a state court in Pennsylvania held that the Susquehanna River Basin Commission’s regulations on water withdrawals preempted local regulations. *Levin v. Bd. of Supervisors of Benner Township*, 669 A.2d 1063 (Pa.Cmwlth. 1995), *aff’d per curiam*, 689 A.2d 224 (Pa. 1997). To permit the imposition of different conditions by a local board would result in a “splintering of authority and responsibility, the very mischief the Susquehanna River Basin Commission was designed to remedy.” *Id.* at 1079. See, also, *State College Borough Water Authority v. Bd. of Supervisors of Halfmoon Township*, 659 A.2d 640 (Pa.Cmwlth. 1995).
3. In 2000, a federal district court judge upheld the Commission’s authority to regulate and control water diversions from the river by the City of Baltimore, despite Maryland’s “reservation” of authority when it signed the compact in 1970. *Mayor and City Council of Baltimore v. Susquehanna River Basin Commission*, case no. 1:98-cv-3135 (motion granting summary judgment for defendant)(D. Md., March 30, 2000).

At issue was Baltimore’s right to withdraw water from the reservoir behind Conowingo Dam. The dam straddles the border of Pennsylvania and Maryland. In 1960, Baltimore had signed an agreement with the dam’s owner (a private power company) allowing it to use project lands to install an intake and withdraw 250 MGD from the reservoir. Baltimore then built a system in 1966 to divert up to 500 MGD and a 35-mile long conduit from the dam.

In the intervening years, Baltimore had used water from Conowingo Dam only intermittently because of higher transportation (i.e., pumping) and treatment costs. When Baltimore sought in 1998 to exercise its contractual right to divert 250 MGD, the Susquehanna River Basin Commission made a threshold determination that Baltimore’s proposed new water treatment plant and proposed withdrawals were subject to the Commission’s review. Baltimore then filed a declaratory action motion, asking the federal court to hold that the Commission’s determination was null and void.

The court rejected Baltimore's request, holding that Maryland's Compact reservation was not valid. The Compact provided that amendments and supplements added by one legislature to the agreement must be "concurrent in by all of the others." Section 15.20. Not only had this not happened, but Pennsylvania's legislature had added a section to its statute saying the Compact consisted of only the agreement of the signatories. "[A]ny matters within the enabling legislation which is not included in the Compact shall have no effect." *Mayor and City Council of Baltimore*, Slip.Op. at 16.

Furthermore, when Congress approved the Compact, the Maryland reservation was preempted by the language of the Compact and had no legal effect, the judge concluded. "Any state legislation that attempts to completely divest the Commission of authority over one of the largest users of those waters would violate not only the letter of the Compact, but the spirit of the Compact as well."

## **15.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers is the key federal agency on the Susquehanna River. A U.S. Army Corps of Engineers officer serves as the federal representative on the Susquehanna River Basin Commission.

### **15.4.1 Long-term Operational Strategy**

The Susquehanna River Basin Commission monitors and permits large withdrawals and is involved in a number of important flood control activities. The Commission prepared a Comprehensive Plan in 1973, which was updated in the late 1980s but has undergone no major revision since that time.

### **15.4.2 Short-term Operational Strategy**

The Corps of Engineers operates its dams primarily for flood control and recreation. In the lower river basin, private power companies operate their run-of-river dams primarily for power generation. The Susquehanna River Basin Commission has adopted a management plan for Conowingo Dam where there are potentially-conflicting uses between the need to: 1) generate power; 2) supply water for a pumped storage hydroelectric facility; 3) supply cooling water for a nuclear power plant; 4) provide a backup municipal supply for the City of Baltimore; and 5) create flows for fish passage.

### **15.4.3 River Accounting Mechanisms**

The Susquehanna River Basin Commission posts its project review actions on its web site. [www.srbc.net](http://www.srbc.net)

### **15.4.4 The Role of Interstate Compacts**

The Susquehanna River Basin Commission, created in 1970, administers the federal-interstate Susquehanna River Basin Compact. The Commission's authority is basin-wide – from the headwaters of the river to Havre de Grace, Maryland, but does not include Chesapeake Bay.

Located in Harrisburg, Pennsylvania, the four-member Commission (three states plus the federal government) manages the Basin's rivers to prevent droughts and floods. The Commission issues permits for large withdrawals and consumptive uses, monitors water quality and measures the impact of the Susquehanna River on the ecology of Chesapeake Bay. The Commission also works to restore depleted migratory fish runs. [www.srbc.net](http://www.srbc.net)

The Commission coordinates its drought management plan with the Delaware River Basin Commission, whose territory lies directly to the east, and with the states that signed the Compact.

The Compact is one of two "federal interstate compacts" (along with the Delaware) where the federal government is a signatory to the agreement and has a vote on the commission.<sup>151</sup>

The Commission has four members – one from each of the states (New York, Pennsylvania and Maryland) and the federal representative. The Commission's regulations are found at 18 C.F.R. § 801 et seq.

Under the terms of the Compact, the Commission can allocate water the waters of the basin "to and among the states signatory to this compact and impose related conditions, obligations and release requirements." Article 3.8. Three out of the four votes on the commission would be sufficient to make this and other major decisions. Article 2.5 As a practical matter, major decisions are usually unanimous. The allocation powers in Article 3.8 have never been exercised. Cooperation and consensus are the norm for the Commission to date.

The Compact expires in 100 years but will continue for another 100 years if no state notifies the Commission of its intention to terminate the agreement. Article 1.5.

The Commission purchased storage at two dams owned by the Corps of Engineers in Pennsylvania for water supply:

- At Cowanesque Dam, the Commission bought 25,000 AF for use as "make-up" water in low flow conditions. The Commission's water will go to supply two nuclear power plants owned by Pennsylvania Power & Light Co. at Berwick and the operating Three Mile Island plant near Harrisburg.
- At Curwensville Dam, the Commission purchased 5,600 AF for release in low-flow conditions for consumptive use.

Both storage purchases (a total of 30,600 AF) were made pursuant to the authority of the Corps of Engineers to sell surplus reservoir space under the Water Supply Act of 1958, as amended by the Water Resources Development Act of 1986.

#### **15.4.5 International Treaties and Agreements**

The Susquehanna River is a domestic river and lies entirely within the United States.

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<sup>151</sup>The federal government has not contributed funds to the Commission since FY 1997. Although the federal government is a full partner "on paper," the cumulative federal shortfall is now measured in millions of dollars.

#### **15.4.6 The Role of Native American Tribes**

Native American Tribes do not currently play a significant role in the management of the Susquehanna River.

#### **15.4.7 The Role of Federal Courts**

The Federal Courts do not currently play a role in the management and operation of the Susquehanna River.

### **15.5 CURRENT ISSUES AND CONFLICTS ON THE SUSQUEHANNA RIVER**

#### **15.5.1 Water Supply and Allocation**

The Susquehanna River Basin is relatively “water rich” and unpopulated but still faces constraints in water usage during drought, particularly in the lower river, where nuclear power plants and the City of Baltimore have intakes. Continued population growth, along with increased agriculture and thermal power plant use, could further constrain the river during droughts and increase the amount of consumptive use from the basin.

#### **15.5.2 Power Supply and Allocation**

Not applicable. The Corps of Engineers’ dams in the Susquehanna River do not produce power except for a small power station (owned by a private company) at Raystown Dam in Pennsylvania.

#### **15.5.3 Environmental Issues**

##### **Sedimentation**

The lower river dams – Safe Harbor, Holtwood and Conowingo – catch sediment (natural and man-made from runoff) and other materials. Most of the sediment is transported downstream during floods. But Safe Harbor and Holtwood Dams have already reached their saturation point for retaining sediment. Conowingo Dam may reach saturation in about 20 years. When that happens, sediment will begin to flow through to Chesapeake Bay, where existing sedimentation levels and accumulation of phosphorous are already a concern.<sup>152</sup>

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<sup>152</sup>The Susquehanna River contributes about half of the inflow into Chesapeake Bay. High levels of phosphorous feed algae blooms, which in turn reduce dissolved oxygen concentrations, harming other aquatic organisms.

#### 15.5.4 Other

##### *Conowingo Dam Operations*

The Susquehanna River Basin Commission is attempting to resolve potential conflicts involving the use of the waters at Conowingo Reservoir. The dam, owned by Exelon, is the farthest downstream structure on the river (10 miles from Chesapeake Bay), and its impounded waters straddle the boundary between Pennsylvania and Maryland. The reservoir provides water for power, municipal supply, the Muddy Run Pumped Storage, cooling of the Peach Bottom nuclear power plant, recreation and fish passage. The Commission adopted a management plan for Conowingo Pond in 2006, but some issues remain unresolved, including the rights of Baltimore to take more water from the reservoir during drought.



**FIGURE 25.** View of Conowingo Dam, lower Susquehanna River.  
[Source: Wikipedia, [http://en.wikipedia.org/wiki/Conowingo\\_Dam](http://en.wikipedia.org/wiki/Conowingo_Dam)]

#### 15.6 CONFLICT RESOLUTION

The following paragraphs briefly discuss the methods by which conflicts regarding the Susquehanna River are addressed and resolved.

##### 15.6.1 Congressional Allocation of Water or Power

Congress has not allocated water or power from the Susquehanna River. Instead, it has delegated that power to the SRBC.

### **15.6.2 Administrative Allocation of Water or Power**

The SRBC has the authority under the Compact to allocate waters between the states, though the Commission has not done so. 84 Stat. 1515, Section 3.8. The Commission also has the authority to develop and operate dams for the purpose of generating power. The Commission has not done so either.

The Commission also has the authority to regulate and control withdrawals and diversions from both surface and ground waters under its general authority to manage the waters of the basin. Article 11 of the Compact. The Commission has exercised this power. See discussion above under “Role of Interstate Compacts.”

### **15.6.3 Judicial Allocation of Water or Power**

Courts have not allocated water or power from the Susquehanna River.

### **15.6.4 Arbitration or Mediation**

Not used.

### **15.6.5 Litigation**

There is no major pending litigation that addresses interstate river management issues in the Susquehanna River Basin.

### **15.6.6 Infrastructure Improvements and Environmental Restoration**

Since 1970, electric utilities and other entities (federal and state) have worked cooperatively to restore American Shad and native herring runs on the Susquehanna River. Four dams – four built by private entities on the lower river between 1904 and 1932 (York Haven, Holtwood, Safe Harbor and Conowingo) – did not have fish passage facilities. By 1921, there were no shad to be harvested.

**Table 21** below shows the shad harvest between 1890 and 1920.

**TABLE 21.** Commercial shad landings from the Susquehanna River.

<b>Year</b>	<b>Millions of Pounds</b>
1880	2.5
1890	2.2
1900	1.4
1910	0.1
1920	None

The electric utilities that own the four dams have now modified the structures to allow upstream fish passage. As a result of those and other efforts, the Susquehanna and its largest tributaries up to Binghamton, New York, have reopened to shad and herring for the first time in almost 100

years. In 2001, almost 200,000 shad (a modern-day record) passed the lowest of the dams (Conowingo).

### **15.6.7 Interagency and Multi-Party Agreements**

#### **Storage Agreements with the Corps of Engineers**

The Commission has purchased storage at two reservoirs in Pennsylvania (Curwensville and Cowanesque Dams) owned by the Corps of Engineers, pursuant to the Water Supply Act of 1958 and the Water Resources Development Act of 1986.

#### **Chesapeake Bay**

The Susquehanna River empties into Chesapeake Bay and supplies about half of its freshwater. Chesapeake Bay is the largest estuary in the United States and is generally shallow in depth (about 21 feet on average but often less).

There a number of interstate and multi-party agreements, including the “Chesapeake 2000” accord between Maryland, Pennsylvania, Virginia, the District of Columbia, the U.S. Environmental Protection Agency and the Chesapeake Bay Commission.<sup>153</sup> Past efforts included a voluntary partnership between various states, the Chesapeake Bay Agreement, signed in 1983 and revised in 1987.

The goal of the Chesapeake 2000 effort is to help reduce nitrogen, phosphorous and sediments in the bay (and in rivers that flow into the Bay) and to help restore the oyster and fishery industry and general bay ecology. The main water quality problem in the Bay is its low dissolved oxygen, the result in part of upstream discharges from sewage treatment plant and other sources. [www.chesapeakebay.net](http://www.chesapeakebay.net). See the Chesapeake Bay Foundation web site. [www.cbf.org](http://www.cbf.org)

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<sup>153</sup>The Chesapeake Bay Commission is a tri-state commission created in 1980 to advise the legislatures of Maryland, Virginia and Pennsylvania on common matters concerning the Bay and to promote uniformity of legislation.

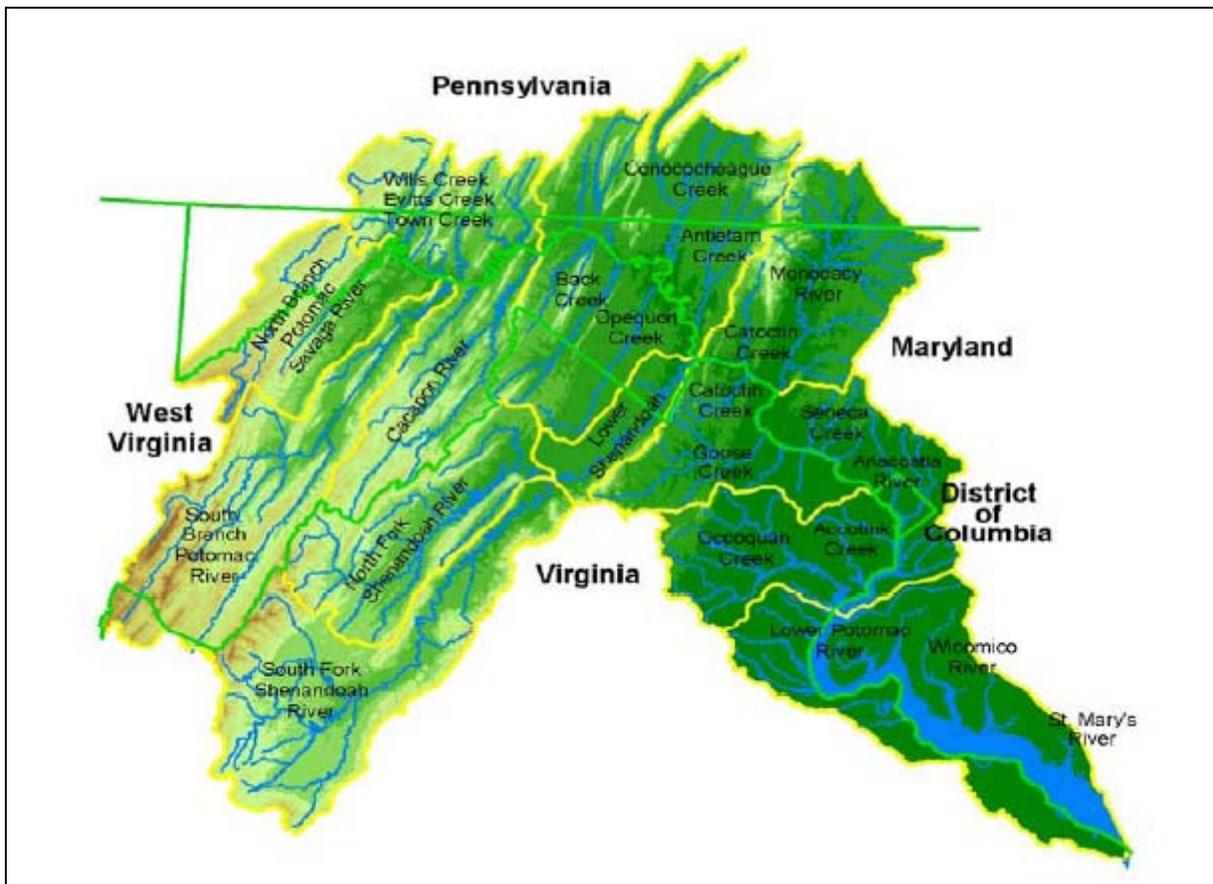
## 16.0 THE POTOMAC RIVER

### 16.1 INTRODUCTION

The Potomac is rich in American history and has been called “the nation’s river.” The first recorded description of the Potomac came from Captain John Smith in 1608, who found fish “lying so thick with their heads above water (that) for want of nets, we attempted to catch them with a frying pan.” George Washington was born in and spent most of his life in the Potomac Valley Basin. In the 1800s and early 1900s, mining, agriculture and untreated sewage contributed to a sharp decline in the quality of water in the Potomac River Basin, a trend that has been largely reversed in the last few decades.

The Potomac River begins in the Appalachian Mountains of West Virginia. From there it flows generally east, past Washington, D.C., until it empties into the Chesapeake Bay.

The river drains portions of four states – Maryland, Pennsylvania, Virginia, and West Virginia -- plus the District of Columbia. It is 383 miles long and has a drainage area of about 14,670 square miles. The majority of the Potomac River Basin – 58% – is covered by forests. Agriculture occupies 32%, and development and wetlands each account for 5% of the basin. Approximately 5.3 million people live in the Potomac River watershed.



**FIGURE 26.** The Potomac River Basin. [Source: Interstate Commission on the Potomac River Basin website. Found at: <http://www.potomacriver.org/index.htm>]

The river has two sources. The North Branch begins at Fairfax Stone at the junction of Grant, Tucker and Preston Counties in West Virginia. The source of the South Branch is near Hightown in Highland County, Virginia. The two branches converge east of Green Spring in Hampshire County, West Virginia, to form the Potomac River. The river eventually flows into the Chesapeake Bay near Point Lockout, Maryland.

Major tributaries to the Potomac River include the: Shenandoah River; Monocacy River; Savage River; Anacostia River; Occoquan River; and Antietam Creek. At the last measuring gauge before the river empties into the tidal estuary, the flows average 7.8 MAF per year.



**FIGURE 27.** View of the Potomac River from Mount Vernon, Virginia.  
[Source: Wikipedia, [http://en.wikipedia.org/wiki/Potomac\\_River](http://en.wikipedia.org/wiki/Potomac_River)]

## **16.2 USES OF THE POTOMAC RIVER**

### **16.2.1 Hydropower**

The Potomac River is not used to generate significant hydropower.

### **16.2.2 Navigation**

There is no significant commercial navigation on the Potomac River, except for traffic on the tidal estuary portion of the river.

### **16.2.3 Water Supply**

The Potomac River supplies water to Washington, D.C., and surrounding suburbs.

There are four water storage dams (one federal and three non-federal) in the Potomac River Basin that play an important role in the supply of water for municipal and industrial purposes. In addition, two dams in the Patuxent River in Maryland (outside of the Potomac River Basin) are also managed as part of a coordinated interstate water supply strategy. About four million people in the metropolitan Washington, D.C., area receive their domestic water from the Potomac River.

Total usable reservoir storage capability of all dams (federal and non-federal) is 71.4 billion gallons (approximately 219,000 AF) for all uses. See **Appendix B**.

The following entities withdraw water from the Potomac River Basin:

- The Washington Aqueduct Division (“WAD”) of the U.S. Army Corps of Engineers (“Corps of Engineers”). The WAD operates the aqueduct that serves the District of Columbia.
- The Washington Suburban Sanitation Commission (“WSSC”) serves Montgomery and Prince George’s Counties in Maryland. [www.wsscwater.com](http://www.wsscwater.com)
- The Fairfax County Water Authority (“FCWA”) supplies Fairfax County, Virginia. [www.fcwa.org](http://www.fcwa.org)
- Various small cities, including Rockville, Maryland, and Leesburg, Virginia, also rely on the Potomac River and its tributaries for water supply.

#### **16.2.4 Flood Control**

The Corps of Engineers’ Jennings Randolph Dam provides flood control. The Corps, however, does not own or manage a network of levees, dikes and other flood control infrastructure on the main stem of the Potomac River.

### **16.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Potomac River Basin are:

1. In 1609, King James I gave a land charter to the London Company, which included the entire Potomac River.
2. In 1632, King Charles I gave a competing charter to the Lord Baron of Baltimore which included the Potomac River and parts of the basin – the precise boundaries remained in dispute.
3. In 1688, King James II gave a patent for Virginia’s Northern Neck – the capes at Chesapeake Bay – to Lord Thomas Culpeper.
4. In 1776, Virginia ceded ownership of part of the river to Maryland, but reserved “the free navigation and the use of the Potowmack...”. Later that year, Maryland rejected Virginia’s reservation of navigation rights. In effect, Maryland controlled fishing and navigation on the river, while Virginia controlled the capes at Chesapeake Bay and forced Maryland residents to pay a toll to pass.
5. In 1785, Maryland and Virginia signed an Interstate Compact, ratified by both legislatures, which made the Potomac River a “common highway” for navigation,

and reserved the power to build wharves and other improvements, so long as they did not obstruct navigation.<sup>154</sup>

6. In 1859, Congress authorized the Corps of Engineers to control and operate the water supply system for Washington, D.C.
7. In 1874, Maryland and Virginia submitted a boundary dispute under the 1785 Compact to a panel of prominent lawyers for resolution. In 1877, the lawyers issued their award, known as the “Black-Jenkins Award,” placing the boundary between the two states at the low-water mark on the Virginia shore of the Potomac, thus granting Maryland the ownership of the river bed.
8. In 1879, Congress approved the boundary lines of the Black-Jenkins Award, 20 Stat. 481.
9. In 1894, the U.S. Supreme Court held that the Compact between Virginia and Maryland was valid even though it was adopted under the defunct Articles of Confederation. *Wharton v. Wise*, 153 U.S. 155, 173 (1894). Because the states had entered into the Compact prior to the adoption of the U.S. Constitution, Congress had not previously consented to the compact, but it did so by implication in 1879, when it approved the Black-Jenkins Award. *Virginia v. Maryland*, 540 U.S. 56 (2003).
10. In 1940, Congress enacted the Interstate Commission on the Potomac River Basin to help the basin states and federal government protect and conserve the water and land resources within the basin. 43 Stat 748. Commissioners from Maryland, Virginia, West Virginia, Pennsylvania, the District of Columbia and the federal government were represented on the Commission. At the time, the chief concern was untreated sewage and the resulting public health and environmental ramifications.
11. In 1957, Maryland attempted to unilaterally abrogate the 1785 Compact. Virginia responded by filing suit against Maryland in the U.S. Supreme Court. *Virginia v. Maryland*, 355 U.S. 269 (1957). A Special Master convinced the parties to settle their dispute and draft a new compact.

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<sup>154</sup>The Compact, negotiated at Mt. Vernon, Virginia, at the invitation of George Washington, was signed under the Articles of Confederation. Negotiators included historical figures, such as James Madison, Edmund Randolph and George Mason for Virginia; and Samuel Chase, later associate justice of the U.S. Supreme Court, for Maryland. After completing the compact, the negotiators, called “commissioners” at the time, proposed a meeting of all the states to draft a general trade and commerce agreement. Only five states showed up in 1786 at the convention in Annapolis, Maryland, but the representatives agreed unanimously to try again, this time at a meeting to deal with a broad range of defects in the Articles of Confederation. Their suggestion led to the Constitutional Convention in Philadelphia in 1787.

12. In 1958, Maryland and Virginia renegotiated the 1785 Compact. The 1958 Compact was also drafted at Mt. Vernon. Congress consented to the Compact the same year. Pub. L. No. 87-783, 76 Stat 797. The Compact expressly preserved the rights of the states to build wharves and other improvements into the river, even though title to the river bed rested with Maryland, not Virginia. The Compact also created the Potomac River Fisheries Commission to regulate the harvesting of fish and seafood, and to conduct research into fishery resources.
13. In 1970, Congress consented to amendments to the 1940 interstate compact which, among other things, expanded the duties of the Interstate Commission on the Potomac River Basin, to collect data and to implement cooperative agreements on water allocation. 33 U.S.C. § 567b, Pub. L. No. 91-407, 84 Stat. 856. The expanded duties have allowed the Commission to establish a cooperative organization (the “CO-OP”) for coordinating water withdrawals during normal and drought conditions.
14. In 1976, Congress consented to the states of Maryland, Virginia, Pennsylvania and the District of Columbia negotiating a low-flow water agreement. Section 181 of Pub. L. No. 94-587, 90 Stat. 2917 at 2939-40 (Water Resources Development Act).
15. In 1978, Maryland, Virginia, the District of Columbia, the Fairfax County Water Authority and the Washington Suburban Sanitary Commission signed the “Potomac River Low Flow Allocation Agreement.” The agreement attempted to assure adequate supplies in the Washington Aqueduct for the District of Columbia during severe drought.
16. In 1982, the Corps of Engineers, the District of Columbia, the Fairfax County Water Authority and the Washington Suburban Sanitary Commission signed a “Water Supply Coordination Agreement.” The parties agreed to operate their water systems in a coordinated manner to optimize available water supplies during normal and drought conditions.
17. In 1996, the Fairfax County Water Authority sought to build an intake 725 feet from the Virginia shore into the tidal reach of the Potomac River. Maryland said it had authority over that part of the river and refused to issue the permit to Virginia, which filed suit in the U.S. Supreme Court. In 2003, the U.S. Supreme Court ruled in Virginia’s favor and held that Maryland lacked authority to regulate the project. *Virginia v. Maryland*, 540 U.S. 56 (2003).

## **16.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers is the lead federal agency: it built Jennings Randolph Dam, and it owns the Washington Aqueduct, which supplies water to Washington, D.C.

### **16.4.1 Long-term Operational Strategy**

There is no specific long-term operational strategy for the Potomac River, though the Interstate

Compact Commission on the Potomac River Basin (“ICPRB”) prepares strategy documents on water supply issues, monitors trends in withdrawals from the river, and coordinates activities among the basin’s water supply agencies.

#### **16.4.2 Short-term Operational Strategy**

##### **The Low Flow Allocation Agreement**

The “1978 Potomac River Low Flow Allocation Agreement” was signed by the United States, Maryland, Virginia, the District of Columbia, the Fairfax County Water Authority and the Washington Suburban Sanitation Commission. The ICPRB facilitated the accord but was not a signatory to the agreement. The primary purpose of the agreement was to protect the water supply of the District of Columbia (served by the Corps of Engineers’ Washington Aqueduct) by allocating water during shortages. The agreement established criteria for alert, restriction and emergency stages in a drought. The agreement called for the parties to appoint an independent “Moderator” to resolve disputes.

##### **The Water Supply Coordination Agreement**

The “1982 Water Supply Coordination Agreement” was developed by the ICPRB in cooperation with the Corps of Engineers’ Washington Aqueduct Division, the Fairfax County Water Authority (“FCWA”) and the Washington Suburban Sanitary Commission (“WSSC”).

The agreement designated a section of the ICPRB, called the CO-OP, to coordinate flows during normal and drought conditions. The ICPRB was a signatory of the agreement.

The goal of the Water Supply Coordination Agreement is to minimize the chances that the stringent provisions of the Low Flow Allocation Agreement will need to be invoked. Reservoir releases are scheduled to meet regional demands, as if the reservoirs were owned by a single entity.

The water suppliers have established an Operations Committee to oversee implementation. When a drought occurs, an agreed-upon manual establishes criteria for managing the Potomac River.

Five dams owned by three agencies (the Corps of Engineers, FCWA and WSSC) are affected by the Water Supply Coordination Agreement.<sup>155</sup>

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<sup>155</sup>For details, see Erik R. Hagen, et al., “Benefits of Iterative Water Supply Forecasting in the Washington, D.C., Metropolitan Area,” *Journal of American Water Resources Association* (December 2005).

- Jennings Randolph Dam

The Corps of Engineers' Jennings Randolph Dam has the largest reservoir in the Potomac River Basin. The reservoir straddles the border between West Virginia and Maryland.

There are three water management "accounts" at the dam, each with its own purpose: 1) water quality; 2) water quantity; and 3) flood control.

Water is released during normal conditions for water quality ("the water quality account"). The Corps of Engineers operates the dam to maximize the minimum downstream summer-time flow. The effect of the guidelines is to dilute discharges from a downstream pulp and paper mill in Maryland.

In drought years, the CO-OP (a section of the ICPRB) coordinates the releases for downstream municipal use ("the water supply account"). The three downstream water agencies (the Washington Suburban Sanitary Commission, the Fairfax County Water Authority and the Corps of Engineers' Washington Aqueduct Division) have purchased storage rights that allow them to obtain additional water from Jennings Randolph Dam in a drought.

During floods, the Corps of Engineers operates the reservoir for flood control and releases water ("the flood control account") based on recommendations by the ICPRB.

- Little Seneca Reservoir

This reservoir, located in Maryland, is operated by the WSSC, and is used to "fine tune" the Jennings Randolph releases. Without Little Seneca, the Corps of Engineers would have to make large releases to assure adequate water supply for the downstream water agencies.

- Patuxent Reservoirs

The two reservoirs, Triadelphia (Brighton Dam) and Duckett (Rocky Gorge Dam), are also owned by the WSSC. The dams are on the Patuxent River, which is not a tributary of the Potomac. The WSSC, however, coordinates its releases from the reservoirs as part of the Water Supply Coordination Agreement.

- Occoquan Reservoir

Owned by the FCWA in Virginia, the reservoir is on the Occoquan River, a tributary to the Potomac River.

**Interagency Agreement on Savage Reservoir**

Savage Reservoir is owned by the Upper Potomac River Commission, a state agency in Maryland, but operated by the Corps of Engineers. The three downstream water supply agencies (the Corps, WSSC and FCWA) pay 80% of the maintenance and operation at the dam in exchange for the right to obtain water during drought, pursuant to the terms of an interagency agreement with the Upper Potomac River Commission

In normal conditions, however, Savage Reservoir is operated in tandem with Jennings Randolph Dam for water quality. In the 1980s, water from Jennings Randolph Dam was considered too acidic to release in large quantities and was therefore offset by “sweet” water releases from Savage Reservoir. The acidity problem has been solved at Jennings Randolph Dam with the addition of lime. The Corps of Engineers releases water from Savage Reservoir when Jennings Randolph releases water in drought conditions for water supply.

**16.4.3 River Accounting Mechanisms**

The ICPRB publishes general information about withdrawals. [www.potomacriver.org](http://www.potomacriver.org)

**Table 22** shows the population and daily water use in the Potomac River Basin in 2000. The total – 864.4 MGD – is equivalent to approximately 1 MAF per year.

**TABLE 22.** Potomac River Basin, population and water use (2000). [Source: ICPRB Report, “Water Supply Demands and Resources Analysis in the Potomac River Basin”]

<b>Jurisdiction</b>	<b>Population (thousands)</b>	<b>Daily Water Use (MGD)</b>
Maryland	2,036	338.3
Virginia	2,135	303.7
District of Columbia	518	130.4
West Virginia	208	62.3
Pennsylvania	180	29.7
<b>TOTAL</b>	<b>5,077</b>	<b>864.4</b>

#### **16.4.4 The Role of Interstate Compacts**

There are two interstate compacts on the Potomac River:<sup>156</sup>

##### ***The Potomac River Fisheries Commission of 1958***

The 1785 Compact between Virginia and Maryland, as amended in 1958, created the Potomac River Fisheries Commission, which regulates recreational and commercial fishing, crabbing, oystering and clamming in the main stem tidal Potomac River, and issues licenses for those activities. [www.prfc.state.va.us](http://www.prfc.state.va.us)

##### ***The Potomac River Compact of 1970 (Amended)***

The 1940 Potomac River Basin Compact created the Interstate Commission on the Potomac River Basin (“ICPRB”) to serve as an advisory body on the river and a forum for cooperation between the states and the District of Columbia to maintain adequate water quality.

As amended in 1970, the ICPRB has the power to address water supply issues. The creation of a section of the commission, called the “CO-OP,” allows participating water suppliers to coordinate operations and reduce the risk of water shortages. See 1982 Water Supply Coordination Agreement. [www.potomacriver.org](http://www.potomacriver.org)

The ICPRB is composed of three members from Maryland, Pennsylvania, Virginia, West Virginia and the District of Columbia, and three members appointed by the President (18 members total). Pub. L. No. 91-407, 84 Stat. 856 at Article I. The federal representatives vote on the Commission. Unlike the commissions created by interstate compacts on the Delaware and Susquehanna rivers, the ICPRB has no regulatory authority.<sup>157</sup> Any signatory can withdraw from the Compact by giving one-year’s notice. Article VII.

#### **16.4.5 International Treaties and Agreements**

None. The Potomac is a domestic not an international river.

#### **16.4.6 The Role of Native American Tribes**

Native American tribes do not currently play a major role in the management and/or operation of the Potomac River.

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<sup>156</sup>A third compact addresses boating and recreational activities at Jennings Randolph Lake but has no affect on interstate river operations. Congress consented to the compact, the Jennings Randolph Lake Project Compact between West Virginia and Maryland, in 1996. Pub. L. No. 104-706.

<sup>157</sup>The federal government has not contributed funds to the Commission since the mid-1990s.

#### **16.4.7 The Role of Federal Courts**

The federal courts do not currently play a role in the management and/or operation of the Potomac River.

### **16.5 CURRENT ISSUES AND CONFLICTS ON THE POTOMAC RIVER**

During normal flows, the Potomac River can meet demands for municipal water supply. The river is now operated according to a regional agreement that requires water supply agencies and the federal government to coordinate operations. Nonetheless, continued population growth in the Washington, D.C., area may strain the existing infrastructure and arrangements.

#### **16.5.1 Water Supply and Allocation**

Water supplies appear adequate until 2025, according to most scenarios published by the ICPRB.

#### **16.5.2 Power Supply and Allocation**

The federal government does not generate significant power in the Potomac River Basin, and there are currently no major conflicts over power allocation on the Potomac.

#### **16.5.3 Environmental Issues**

Pollution problems in several tributaries of the Potomac River contribute to the degradation of Chesapeake Bay. Sewer overflows into the Anacostia River, a tributary in the southern part of the District of Columbia, are partially to blame. The U.S. Environmental Protection Agency (“EPA”) has identified the Anacostia as one of the 10 most contaminated rivers in the country.

### **16.6 CONFLICT RESOLUTION**

#### **16.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power from the Potomac River.

#### **16.6.2 Administrative Allocation of Water or Power**

There is no federal mechanism to allocate water or power from the Potomac, except for the interstate compact and the interagency and multi-party agreements relating to low flow and drought conditions. See discussion below.

#### **16.6.3 Judicial Allocation of Water or Power**

Not applicable. The courts have not allocated water or power on the Potomac River.

#### **16.6.4 Arbitration or Mediation**

Formal arbitration and mediation have not been used to resolve disputes. The Interstate Commission on the Potomac River Basin (“ICPRB”) provides an interstate forum for negotiating solutions to potential conflicts relating to water supply.

#### **16.6.5 Litigation**

There is no major pending litigation affecting management of the Potomac River Basin or the boundaries between states. The most recent boundary decision was the U.S. Supreme Court’s opinion in *Virginia v. Maryland*, 540 U.S. 56 (2003). The decision has no immediate legal impact on the operation of the river or the role of the ICPRB.

#### **16.6.6 Infrastructure Improvements and Environmental Restoration**

To restore Chesapeake Bay, the federal government and environmental groups have turned their attention to the tributaries of the Potomac River, such as the Anascostia River, which runs through the southern part of the District of Columbia. Sewer overflows in the Anascostia River, along with contaminated sediments from industrial and other users, are among the environmental problems. These problems, however, do not directly impact water allocation issues.

#### **16.6.7 Interagency and Multi-Party Agreements**

There are two significant interagency agreements that address how the Potomac River is managed during drought:

##### **The Potomac River Low Flow Allocation Agreement**

The Potomac River Low Flow Allocation Agreement of 1978 allows for the regional water supply agencies to allocate available flows during drought. The Agreement allows an unbiased “Moderator” to enforce regulations that allocate water to different water supply agencies.

##### **The Water Supply Coordination Agreement**

The Water Supply Coordination Agreement of 1982 vested authority in a section of the Interstate Commission on the Potomac River Basin (the CO-OP) to cooperatively manage the water supply agencies’ respective systems during drought.

A third interagency agreement – the “Chesapeake 2000” accord – addresses environmental problems in Chesapeake Bay, the largest estuary in the United States. The agreement is between Maryland, Virginia, Pennsylvania, the District of Columbia, the EPA and the Chesapeake Bay Commission.<sup>158</sup>

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<sup>158</sup>The Chesapeake Bay Commission is a tri-state commission created in 1980 to advise the legislatures of Maryland, Virginia and Pennsylvania on common matters concerning the Bay and to promote uniformity of legislation. Past

The purpose of the Chesapeake 2000 effort is to help restore the bay's natural ecosystem and the oyster and fishery industry. Specific goals are to reduce nitrogen, phosphorous and contaminated sediments in the bay and tributaries. The main water quality problem in Chesapeake Bay is low dissolved oxygen, the result in part of upstream overflows and discharges from sewage treatment plants. Runoff from poultry farms in Virginia is also a contributing factor. [www.chesapeakebay.net](http://www.chesapeakebay.net). See the Chesapeake Bay Foundation web site. [www.cbf.org](http://www.cbf.org).

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efforts included a voluntary partnership between various states, the Chesapeake Bay Agreement, signed in 1983 and revised in 1987.

## 17.0 THE CONNECTICUT RIVER

### 17.1 INTRODUCTION

The first European to see the Connecticut River was the Dutch explorer and fur trader Adriaen Block in 1614. Within a decade, a settlement was established at what is now Hartford, Connecticut, then a trading post known as the House of Hope. By the mid-1700s, there were a number of settlements along the river, some as far north as New Hampshire. In the late 1700s and early 1800s, a system of canals was built along the river – the first in the nation – to bypass rapids.

The 410-mile Connecticut River is the longest waterway in New England. From its source in New Hampshire, a few miles from the Canadian border, the Connecticut River flows south, forming the border between New Hampshire and Vermont. The river then bisects Massachusetts and Connecticut, emptying into Long Island Sound between New Haven and New London, Connecticut.

The river is one of the few interstate waterways on the East Coast without large cities or industrial development at its mouth. Eighty percent of the Connecticut River Basin is forested and contains rich farmland.

The Connecticut River drains 11,250 square miles, and has an average annual flow of 11.6 MAF at its mouth. Tributaries to the river include the: Ashuelot, White, Ompompanoosuc, Ottauquechee, and Otter Brook – all in Vermont; the Westfield, Deerfield, Chicopee, and the Swift and Ware Rivers (both of which have been mostly diverted to Quabbin Reservoir for Boston’s domestic water supply) – all in Massachusetts; and the Mad, Farmington (and its tributaries, including the Nepaug River) and Millers Rivers – all in Connecticut.

The basin has a population of about 500,000 people. Cities adjacent to the river include: Lebanon (NH); Brattleboro (VT); Holyoke (MA); Springfield (MA); and Hartford (CT).



**FIGURE 28.** The Connecticut River, Massachusetts. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Image:Dscn3099\\_connecticut\\_river\\_french\\_king\\_bridge.jpg](http://en.wikipedia.org/wiki/Image:Dscn3099_connecticut_river_french_king_bridge.jpg)]

## 17.2 USES OF THE CONNECTICUT RIVER

The Connecticut River Basin is home to hundreds of very small dams, many of which were built years ago for mills and other early industrial uses. In addition, there are 14 dams owned by the U.S. Army Corps of Engineers (“Corps of Engineers”), built primarily for flood control and located on tributaries of the Connecticut River. There are private power company dams on the main stem of the river, though the New England region as a whole depends on thermal power plants for most of its electricity. The Corps of Engineers maintains the river for navigation between Hartford, Connecticut, and the mouth at Long Island Sound.

### 17.2.1 Hydropower

The Corps of Engineers’ dams in the Connecticut River Basin do not generate power with two exceptions: a small turbine-generator (4 MW capacity) owned by a private company at North Hartland Dam in Vermont; and another small generator (1 MW capacity) owned by the Metropolitan Development Commission at Colebrook Dam in Connecticut.

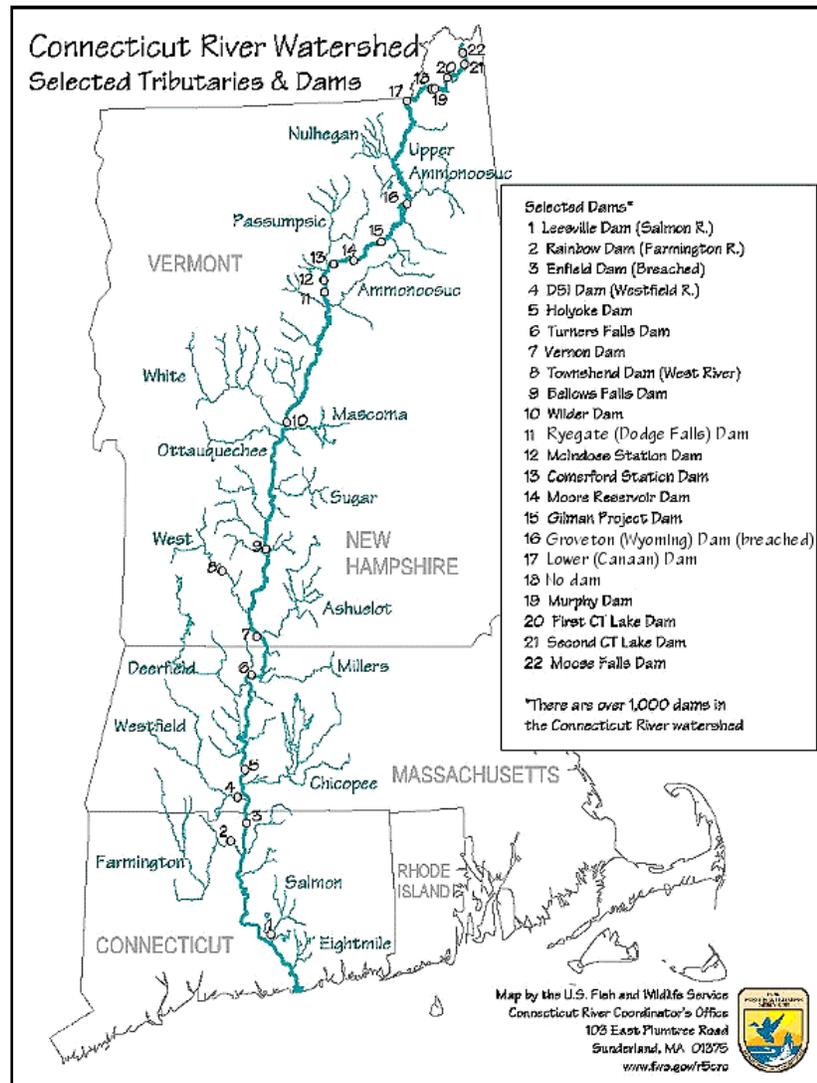
There is no federal power marketing infrastructure. Private dams on the main stem have the ability to generate approximately 1,615 MW of hydropower. Almost two-thirds of the generating capacity comes from Northfield Mountain, a pumped storage facility in Connecticut. See **Appendix B** for details.

### 17.2.2 Navigation

The Connecticut River is a navigable river for 38 miles from its mouth in Long Island Sound to Hartford, Connecticut.

### 17.2.3 Water Supply

Reservoirs in the Connecticut River system have a total storage capacity of approximately 2.8 MAF. About 2.5 million people depend on the river for their water supply, of which 80%



**FIGURE 29.** The Connecticut River watershed showing selected tributaries and dams. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Connecticut\\_River](http://en.wikipedia.org/wiki/Connecticut_River)]

live in the Boston metropolitan area. Boston diverts water out of two tributaries of the Connecticut River – the Swift and the Ware – into Quabbin Reservoir, which can hold 412 billion gallons of water (1.26 MAF). The Massachusetts Department of Conservation and Recreation manages the reservoir. Water is transported by aqueduct to the Boston area.

Two other large cities in the basin also depend on Connecticut River Basin water for their municipal supply: Springfield, Massachusetts; and Hartford, Connecticut. Springfield owns Cobble Mountain dam and reservoir. Hartford and surrounding areas receive their domestic supply from two reservoirs: Barkhamsted and Nepaug, both owned by the Metropolitan District Commission (“MDC”).

#### **17.2.4 Flood Control**

The Corps of Engineers owns 14 dams – all built on tributaries, primarily for flood control. The dams were built to protect cities and towns on the main stem of the Connecticut River.

### **17.3 THE LEGAL REGIME**

In chronological order, the major “laws of the river” in the Connecticut River Basin are:

1. In 1931, the U.S. Supreme Court rejected Connecticut’s request to enjoin Massachusetts from diverting water from two tributaries of the Connecticut River, the Swift and Ware Rivers. *Connecticut v. Massachusetts*, 282 U.S. 660 (1931).

Massachusetts proposed to move water out of the Connecticut River Basin and into a reservoir (Quabbin) to supply the rapidly-growing Boston area. Connecticut, the downstream state, alleged that Massachusetts’ proposed diversion would impair navigability, increase the concentration of harmful effluent, and reduce the water needed for a planned hydropower project in Connecticut. The Court rejected those arguments as too speculative, and found that the Secretary of War (now the Secretary of Defense) had properly permitted the diversion.

2. In 1947, Congress consented to formation of an interstate pollution control compact and creation of the New England Interstate Water Pollution Control Commission to adopt water quality standards in seven states: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont. Pub. L. No. 80-292, 61 Stat. 682. The Connecticut River was among the waterways under the Commission’s jurisdiction.

The Commission predated the creation of the U.S. Environmental Protection Agency by 25 years and still has a limited role in establishing water quality standards for non-point pollution, regulating underground storage tanks, and regulating waste water treatment plants.

3. In 1953, Congress consented to a second compact affecting the Connecticut River. It approved the Connecticut River Flood Control Compact between

Connecticut, Massachusetts, New Hampshire and Vermont. Pub. L. No. 83-52, 67 Stat. 45.

The Compact was intended to assure adequate water storage on the Connecticut River and its tributaries. The Compact created a Connecticut River Flood Control Commission, a forum for the states to cooperate on flood control problems. In the Compact, the states consented to the construction by the federal government (Corps of Engineers) of 12 dams in the Connecticut River Basin. The states agreed to compensate each other for taxes lost as a result of the construction of the dams and reservoirs (which flooded limited areas in various states).

4. In 1976, Congress consented to a third compact affecting the Connecticut River, the New Hampshire-Vermont Interstate Sewage and Waste Disposal Compact, which authorized municipalities (i.e., cities and towns) in either state to build sewer and waste disposal facilities together to take advantage of economies of scale and to avoid duplication. Pub. L. No. 94-403, 90 Stat. 1221.
5. In 1983, Congress consented to a fourth compact affecting the Connecticut River. It approved a 20-year Connecticut River Basin Atlantic Salmon Compact between the four states: Connecticut; Massachusetts, New Hampshire and Vermont. Pub. L. No. 98-138, 97 Stat. 866. The Compact created a Connecticut River Basin Salmon Commission to preserve and restore Atlantic Salmon and other migratory fish in the river basin.
6. In 2002, Congress reauthorized the Connecticut River Basin Atlantic Salmon Compact for another 20 years. The agreement expires in 2023.

## **17.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers is the key federal agency even though its dams were built on tributaries of the Connecticut River that drain only 14% of the total basin.

### **17.4.1 Long-term Operational Strategy**

There is no comprehensive, long-term operational strategy for the Connecticut River.

### **17.4.2 Short-term Operational Strategy**

The federal government's role in "running" the Connecticut River is limited because the dams were built primarily for flood control, not power or navigation. Instead, the main stem of the upper Connecticut River is "run" by TransCanada, a utility that owns dams on the river where it forms the boundary between New Hampshire and Vermont. The primary purpose of the dams is power generation. In 1983, the Corps of Engineers prepared a "Master Manual of Regulation" for the Connecticut River Dams. The document has not been revised. Individual dams have their own operating plans but most were written in the 1980s and 1990s and have not been updated.

### **17.4.3 River Accounting Mechanisms**

Withdrawals are monitored by each state. There is no central clearinghouse for withdrawals and consumption on the Connecticut River.

### **17.4.4 The Role of Interstate Compacts**

There are four interstate compacts that affect the Connecticut River. All of the compacts are limited in scope. There is no interstate compact that addresses water allocation and comprehensive river management issues.

#### ***The New England Interstate Water Pollution Control Compact (1947), Pub. L. No. 80-292, 61 Stat. 682***

The Compact is between Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont. The Commission's original responsibility to develop water quality standards predates the 1972 establishment of the Environmental Protection Agency. The Commission still regulates certain non-point pollution sources as well as underground storage tanks and waste water treatment plants. The Connecticut River is among the interstate waterways under the Commission's jurisdiction. [www.neiwpcc.org](http://www.neiwpcc.org)

#### ***The Connecticut River Flood Control Compact (1953), Pub. L. No. 83-52, 67 Stat. 45***

The Compact is between Connecticut, Massachusetts, New Hampshire and Vermont, and was designed to resolve tax issues among basin towns. The Compact created a Connecticut River Flood Control Commission, a forum for states to cooperate on flood control problems. In the Compact, the states consented to the construction by the federal government (Corps of Engineers) of dams in the Connecticut River Basin. The states agreed to compensate each other for taxes lost as a result of the construction of the dams and reservoirs (which flooded limited areas in various states). Now that the dams are built, the Commission role is limited to the disbursement of tax receipts. [www.crvfcc.org](http://www.crvfcc.org)

#### ***The New Hampshire-Vermont Interstate Sewage and Waste Disposal Compact (1976), Pub. L. No. 94-403, 90 Stat. 1221***

The Compact authorized municipalities (i.e., cities and towns) in New Hampshire and Vermont to build sewer and waste disposal facilities together to take advantage of economies of scale and to avoid duplication. Although the Compact did not mention the Connecticut River, which forms the boundary line between New Hampshire and Vermont, the effect of the Compact was to allow towns on either state to build facilities with municipalities in the other state. The Compact authorized the state water pollution agency in which the plant was proposed to regulate the facility (whether or not the plant was owned by a municipality in the other state).

#### ***The Connecticut River Basin Atlantic Salmon Compact (1983), Pub. L. No. 98-138, 97 Stat. 866***

The Compact is between Connecticut, Massachusetts, New Hampshire and Vermont. The

Commission is composed of representatives from state and federal agencies and the public. The purpose is to coordinate efforts to restore salmon, shad and other migratory fish runs in the river basin. The U.S. Fish and Wildlife Service has established a “Connecticut River Coordinator’s Office” in Sunderland, Massachusetts. The Commission has no separate funding from Congress and relies on the participation and coordination of member agencies. [www.fws.gov/r5src/about\\_us.htm](http://www.fws.gov/r5src/about_us.htm)

#### **17.4.5 International Treaties and Agreements**

The Connecticut is a domestic, not an international, river.

#### **17.4.6 The Role of Native American Tribes**

Native American Tribes do not play a significant role in managing the Connecticut River.

#### **17.4.7 The Role of Federal Courts**

Federal courts have not assumed a role in the day-to-day management of the Connecticut River.

### **17.5 CURRENT ISSUES AND CONFLICTS ON THE CONNECTICUT RIVER**

In the upper Connecticut River Basin, minimum flow requirements for fish and recreation are a large issue. Farther downstream, pollution discharges and the accumulation of contaminants in sediments are a concern.

#### **17.5.1 Water Supply and Allocation**

Water supply and allocation are not significant issues on the Connecticut River at the present time.

#### **17.5.2 Power Supply and Allocation**

There are no significant power supply conflicts over the operations of the Connecticut River. Electricity in the New England region is generated primarily from thermal power plants. Two companies, TransCanada (New Hampshire and Vermont) and Northeast Utilities (Massachusetts), own dams in the basin. Dams owned by Corps of Engineers do not produce power, except for North Hartland (Vermont) and Colebrook (Connecticut), where non-federal entities own generators with a total capacity of only 5 MW.

#### **17.5.3 Environmental Issues**

##### **Endangered Species Act Compliance**

The U.S. Fish and Wildlife Service (“USFWS”) has identified 10 species of birds, fish, invertebrates and plants that are either threatened or endangered in the Connecticut River Basin. **Table 23** on the following page lists the species.

**TABLE 23.** Threatened or endangered species in the Connecticut River Basin.

<b>Birds</b>
<ul style="list-style-type: none"><li>• Piping Plover</li><li>• Peregrine Falcon</li><li>• American Bald Eagle</li></ul>
<b>Fish</b>
<ul style="list-style-type: none"><li>• Shortnose sturgeon</li></ul>
<b>Invertebrates</b>
<ul style="list-style-type: none"><li>• Puritan tiger beetle</li><li>• Dwarf wedgemussel</li></ul>
<b>Plants</b>
<ul style="list-style-type: none"><li>• Small whorled pogonia</li><li>• Jesup's milkvetch</li><li>• Robbins' cinquefoil</li><li>• Northern bulrush</li></ul>

**Invasive Species**

There are two invasive species that pose problems on the Connecticut River. The first is the zebra mussel (also found on the Great Lakes and Mississippi River). The second is water chestnut, an aquatic plant that can effectively choke a small waterway, making boating, fishing and swimming difficult.

**Flows for Habitat and Recreation**

Several environmental groups led an effort to increase in-stream flows in the upper Connecticut River when dams come up for relicensing (i.e., TransCanada's Moore and Comerford dams on the New Hampshire-Vermont border.) The Corps of Engineers and the Vermont Agency for Natural Resources consult each other over the amount and timing of flows for salmon and other fish. There is pressure to restore the upper Connecticut River to its natural hydrograph.

**Environmental Restoration**

There is an extensive effort, funded primarily by the federal and state agencies, to restore Atlantic salmon runs, which disappeared from the Connecticut River at the turn of the 19th century. These efforts include adding salmon fry to tributaries of the Connecticut River and building fish ladders on small dams in the basin. The Connecticut River Atlantic Salmon Commission coordinates the restoration effort. The Commission was created by an interstate compact in 1983.

There are a large number of other environmental restoration projects underway in the Connecticut River Basin. Over the years, mercury, PCBs and other contaminants have accumulated in sediments on some stretches of the Connecticut River and its tributaries. At the present time, however, these cleanup efforts have not affected interstate river operations in the basin.

## **17.6 CONFLICT RESOLUTION**

### **17.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water or power from the Connecticut River.

### **17.6.2 Administrative Allocation of Water or Power**

The Corps of Engineers' dams do not produce power, except for two small facilities as noted above.

### **17.6.3 Judicial Allocation of Water or Power**

Courts have not allocated water or power on the Connecticut River.

### **17.6.4 Arbitration or Mediation**

Not used.

### **17.6.5 Litigation**

There is no major pending litigation that would significantly affect Connecticut River operations.

### **17.6.6 Infrastructure Improvements and Environmental Restoration**

Most environmental restoration activities on the upper Connecticut River focus on flow requirements (i.e., increasing water in the river at certain times of year to help spawning fish).

### **17.6.7 Interagency and Multi-Party Agreements**

New Hampshire and Vermont have established the Connecticut River Joint Commissions ("CRJC"), an advisory group composed of the New Hampshire Connecticut River Valley Resource Commission and the Vermont Connecticut River Watershed Advisory Commission. The CRJC does not have regulatory authority but seeks to share information and develop cooperative approaches for resolving issues on the upper Connecticut River, the boundary between the two states. [www.crjc.org](http://www.crjc.org)

## 18.0 THE GREAT LAKES AND ST. LAWRENCE RIVER

### 18.1 INTRODUCTION

The Great Lakes – Superior, Michigan, Huron, Erie and Ontario – stretch 750 miles from Minnesota to New York. The Great Lakes are the largest body of freshwater lakes in the world and contain 18% of the earth’s supply of surface fresh water.

For purposes of this report, the Great Lakes and the St. Lawrence River, the outlet for the lakes, are analyzed together, as an interstate and international system.

The Great Lakes drain parts of eight states -- Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin – and two Canadian provinces, Ontario and Quebec.<sup>159</sup>



**FIGURE 30.** Map of the Great Lakes - St. Lawrence River System.

[Source: Great Lakes Information Network, found at: <http://www.great-lakes.net/gis/maps/>]

<sup>159</sup>Four of the five lakes straddle the United States-Canada border. Lake Michigan is the only Great Lake entirely within the United States.

Tables 24 through 28 provide additional physical facts about the Great Lakes.

**TABLE 24.** Basic data on the Great Lakes. [Source: U.S. Environmental Protection Agency, “Great Lakes Atlas.”]

	<b>Superior</b>	<b>Michigan</b>	<b>Huron</b>	<b>Erie</b>	<b>Ontario</b>
<b>Elevation:</b> (feet)	600	577	577	569	243
<b>Length:</b> (miles)	350	307	206	241	193
<b>Depth:</b> (feet)	483	279	195	62	283
<b>Maximum Depth:</b> (feet)	1,332	925	750	210	802
<b>Volume:</b> (cubic miles)	2,900	1,180	850	116	393
<b>Retention Time:</b> (years)	191	99	22	3	6
<b>Outlet</b>	St. Mary’s River	Straits of Mackinac	St. Clair River	Niagara River & Well and Canal	Saint Lawrence River

**TABLE 25.** Percent of land area in the Great Lakes Basin by state and province.

<b>State</b>	<b>Percent (%)</b>
Michigan	100
New York	32
Wisconsin	32
Ohio	29
Ontario*	21
Minnesota	7
Indiana	3
Pennsylvania	1
Illinois	<1

\* The Canadian province of Quebec borders on the St. Lawrence River but not the Great Lakes. New York borders on both the Great Lakes and the St. Lawrence River. The percent above for New York represents the Great Lakes portion only.

**TABLE 26.** Land uses in the Great Lakes Basin, United States and Canada. (Percent by usage.) [Source: U.S. Environmental Protection Agency, “Great Lakes Atlas.”]

	<b>Superior</b>	<b>Michigan</b>	<b>Huron</b>	<b>Erie</b>	<b>Ontario</b>
Agricultural	3	44	27	67	39
Residential	1	9	2	10	7
Forest	91	41	68	21	49
Other	5	6	3	2	5
<b>TOTAL (100%)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**TABLE 27.** Great Lakes average annual water withdrawals, United States and Canada. (Cubic feet per second.) [Source: U.S. Environmental Protection Agency, “Great Lakes Atlas.”]

	<b>Superior</b>	<b>Michigan</b>	<b>Huron</b>	<b>Erie</b>	<b>Ontario</b>	<b>Total</b>
Municipal (domestic)	110	2,940	430	3,010	1,040	7,530
Manufact.	1,270	9,650	2,420	11,010	3,290	27,640
Power Production	830	13,600	5,440	14,340	14,890	49,100
<b>TOTAL (cfs)</b>	<b>2,210</b>	<b>26,190</b>	<b>8,290</b>	<b>28,360</b>	<b>19,220</b>	<b>84,270</b>

**TABLE 28.** Major Great Lakes out-of-basin diversions. (Cubic feet per second.) [Source: International Joint Commission, “Protection of the Waters of the Great Lakes, Three-Year Review” (2002).]

<b>Name</b>	<b>Date Began</b>	<b>In/Out?</b>	<b>Lake</b>	<b>Annual Flows (cfs)</b>
Ogoki, Ontario	1943	In	Superior	3,990
Chicago	1848	Out	Michigan	3,200
Long Lac, Ontario	1939	In	Superior	1,490
Forestport, NY	1825	Out	Ontario	50
Portage Canal, WI	1860	In	Michigan	40
Erie Canal, NY	1847	In	Erie	12
Pleasant Prairie, WI	1990	Out	Michigan	5

The Saint Lawrence River begins on the eastern shores of Lake Ontario and forms the boundary line between New York and Quebec, Canada. The river then continues its journey entirely in Canada and empties into the Gulf of St. Lawrence, the largest estuary in the world.

The French explorer Jacques Cartier was the first European to navigate the river. In 1534, he claimed the St. Lawrence and the land it drained for France. Samuel de Champlain and his party

were probably the first Europeans to see the Great Lakes. By 1688, the area, known as New France, was mapped. British traders soon penetrated the Great Lakes – St. Lawrence Basin, too. The British capture of Quebec in 1759 led to their control of the Great Lakes area.

By the mid-1800s, logging, fishing, agriculture and commercial development was underway, precipitated in large part by the construction of canals and waterways linking the Great Lakes with each other and with other rivers.

The first of these structures was the Erie Canal, which opened in 1825. It linked the southern end of Lake Erie at Buffalo, New York, with the Hudson River, 360 miles to the south. The same year, the British government opened Lachine Canal in Montreal, bypassing Lachine Rapids. The canal became obsolete in 1959 when the St. Lawrence Seaway was finished.

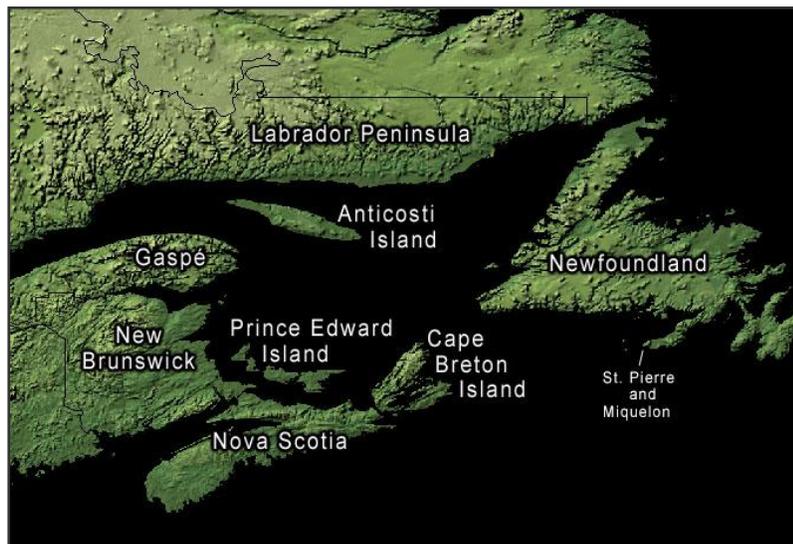
In 1829, the British government completed the Welland Canal linking Lake Erie and Lake Ontario.

In 1848, work on the Illinois and Michigan Ship Canal in Chicago was finished, allowing boats to sail between Lake Michigan and the Illinois River, which empties into the Mississippi River.

Then, in 1914, the Corps of Engineers completed work on a lock and canal linking Lake Superior with Lake Huron across St. Mary's River. The infrastructure, now with additional locks and improvements, is called "Soo Locks."

The most recent and ambitious infrastructure project was the 189-mile St. Lawrence Seaway Project, which allowed modern ocean-going vessels to travel between Montreal and Lake Erie.

The distance between the western tip of Lake Superior to the Gulf of St. Lawrence (Atlantic Ocean) is 2,340 miles. Included in the 398,000 square-mile basin are 37 tributaries.<sup>160</sup> The average



**FIGURE 31.** Map of the Gulf of St. Lawrence. [Source: Wikipedia, [http://en.wikipedia.org/wiki/Gulf\\_of\\_St.\\_Lawrence](http://en.wikipedia.org/wiki/Gulf_of_St._Lawrence)]

<sup>160</sup>Major tributaries of the St. Lawrence River include: the Champlain River in Vermont; and the Ottawa, Richelieu, and Saguenay Rivers in Canada. The following major rivers empty into the Great Lakes from the United States: the St. Louis and Menominee Rivers in Minnesota; the Escanaba, Grand, St. Joseph, Muskegon, Manistee, Au Sable, Saginaw, and Detroit Rivers in Michigan; the St. Mary's River, which connects Lake Superior and Lake Huron (Michigan/Ontario border); the Chicago River in Illinois; the Grand Calumet River in Indiana; the Cuyahoga and Sandusky Rivers in Ohio; and the Niagara, Genessee, Oswego and Black Rivers in New York. The following major rivers empty into the Great Lakes from Canada: the Dog, Npignon, Pic, White, Magpie, Montreal, Mississagi, Spanish, Wanapiei, French, Muskoka, and Trent Rivers, all in Ontario.

annual flow of the St. Lawrence River into the Gulf of St. Lawrence is 260 MAF per year. A total of 37 million people live in the basin, including 27 million in the U.S., and 10 million in Canada.

Major U.S. cities adjacent to the Great Lakes and St. Lawrence River include: Duluth (MN), Green Bay (WI), Milwaukee (WI), Chicago (IL), Gary (IN), Detroit (MI), Toledo (OH), Cleveland (OH), Erie (PA), Buffalo (NY), and Rochester (NY).<sup>161</sup> In Canada, major cities adjacent to the Great Lakes and St. Lawrence River include: Thunder Bay, Sault Ste. Marie, Windsor, Hamilton, and Toronto in Ontario; and Montreal and Quebec City in Quebec.

In some areas, the drainage area of the Great Lakes Basin is little more than a thin band several miles wide. Parts of Chicago, for example, are in the basin while suburbs to the west and south are in the Mississippi River Basin.

## **18.2 USES OF THE GREAT LAKES AND SAINT LAWRENCE RIVER**

The Great Lakes and St. Lawrence River are the hub of an interconnected transportation system linking points as far west as Minnesota with the Atlantic Ocean and consisting of 15 major ports. In effect, the St. Lawrence-Great Lakes System represents a “fourth seacoast” for both the United States and Canada.

The Great Lakes region accounts for about 29% of the total U.S. gross domestic product and 60% of all U.S. manufacturing output. The GDP of the region is the third largest in the world, exceeded only by the entire U.S. itself and Japan.

Eleven nuclear power plants in the United States and three in Canada depend on the Great Lakes for their water supply. Several dozen coal and gas-fired plants also rely on Great Lakes water.

Modern-day proposals to divert or export water from the Great Lakes have produced a significant amount of controversy and are now made more difficult in the United States by federal statute, which requires the governors of all eight states to approve before such an action can occur.

### **18.2.1 Hydropower**

The U.S. Army Corps of Engineers (“Corps of Engineers”) owns one dam (part of Soo Locks) located on the St. Mary’s River between Lake Superior and Lake Huron. The generating capacity of this structure is 18 MW. The power is used to operate the locks, with the surplus going to a private corporation. The Corps of Engineers does not own any transmission infrastructure in the area.

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<sup>161</sup>Other large U.S. cities are located in the Great Lakes Basin but are not adjacent to the lakes themselves. E.g. Syracuse, NY, and cities on the Michigan lower peninsula, such as Ann Arbor. In total, there are 25 cities with a population of 100,000 or more within 100 miles of the Great Lakes.

The New York Power Authority, a state agency, owns dams at Niagara Falls and on the St. Lawrence River. The dams have a total generating capacity of 3,200 MW.<sup>162</sup> See **Appendix B** for details.

The Ludington Pumped Storage facility, jointly owned by Consumers Energy and Detroit Edison Company, is located on the shores of Lake Michigan and has a generating capacity of 1,872 MW. Water from Lake Michigan is pumped during off-peak hours 363 feet uphill to a reservoir from which water then flows by gravity through the turbine generators during peak times.

There are hundreds of smaller dams on tributary rivers in the Great Lakes Basin. A survey of those structures was beyond the scope of this report.

Outside of the U.S. there are two Canadian dams on the international border of Lake Superior and Lake Huron: Edison Sault has the capacity to generate 30 MW; and Francis Clergue had the capacity to generate 48 MW. The Ontario Power Generation (“OPG”), a publicly-owned corporation supervised by the Province of Ontario, also owns DeCew Fall Hydro (165 MW), Sir Adam Beck Dam (1,780 MW) and Robert H. Saunders Dam (950) MW.

### **18.2.2 Navigation**

The Great Lakes - St. Lawrence River Waterway allows commercial ships and barges to travel 2,340 miles (3,700 km) between Duluth, Minnesota, and the Atlantic Ocean. In 2003, about 43 million tons of cargo were shipped on the St. Lawrence Seaway. There are 15 major ports along the lakes in both the United States and Canada. There are six major canals, as shown in **Table 29**.

**TABLE 29.** Major canals in the Great Lakes-St. Lawrence River Basin.

<b>Canal</b>	<b>Name of Locks</b>	<b>Location</b>
South Shore	St. Lambert and Cote Ste. Catherine	Canada
Beauharnois	Lower and Upper Beauharnois	Canada
Wiley-Dondero	Snell and Eisenhower	U.S.
Iroquois	Iroquois	U.S.
Welland	Locks 1-8 (no name)	Canada
St. Mary’s	Soo Lock	U.S.

### **18.2.3 Water Supply**

The Great Lakes are a source of drinking water for approximately 8.2 million people. The Great Lakes Basin, including tributary rivers, is a source of drinking water for 33 million people. There is no federal water supply infrastructure. There is approximately 3 MAF of storage at the New York Power Authority dams on the St. Lawrence River and at Niagara Falls.

<sup>162</sup>The St. Lawrence-FDR Project (U.S.) has a generating capacity of 800 MW. The Niagara Project (U.S.) has a generating capacity of 2,400 MW, and consists of the Robert Moses Niagara plant (1,950 MW) and the Lewiston Pump-Generating plant (450 MW).

The largest single municipal user is Chicago. The State of Illinois and the Corps of Engineers may divert up to 3,200 cfs of water (approximately 2.32 MAF per year) from Lake Michigan for use by Chicago and its suburbs, as well as for the Chicago Sanitary and Ship Canal.

In addition, the Great Lakes and St. Lawrence River supply water to coal and nuclear power plants located in both the United States and Canada. Ontario Power Generation owns three nuclear power plants in the Toronto area with a capacity of 7,400 MW, and 8,400 MW of coal plants elsewhere that rely on Great Lakes water.

#### **18.2.4 Flood Control**

The Corps of Engineers' investments for flood control are relatively small in the Great Lakes Basin, with the exception of some infrastructure on rivers, such as the Grand Calumet River in Indiana) that empty into the lakes. There is no significant federal flood control infrastructure on the St. Lawrence River.

#### **18.2.5 Other Uses**

The Great Lakes are home to a 4.2 million recreational (pleasure) boats in the United States, one-third of all the registered vessels in the country. In addition, there are 1.2 million recreational boats in Ontario.

### **18.3 THE LEGAL REGIME**

In chronological order, the major “laws of the Great Lakes and St. Lawrence River Basin” are:

1. In 1817, the United States and Great Britain signed the Rush-Bagot Treaty that demilitarized the Great Lakes and Lake Champlain in Vermont in the aftermath of the War of 1812. The Treaty laid the groundwork for the Treaty of Washington, signed 54 years later.
2. In 1871, the United States and Great Britain signed the Treaty of Washington, which established the boundary lines between the two countries and created rules of navigation for the Great Lakes. 1 *Treaties, Conventions, International Acts, 1776-1909*, 700 (Malloy)(1910). In the treaty, Canada granted free navigation on the St. Lawrence River to the United States. The treaty also addressed grievances stemming from the Civil War, and marked the independence of the newly-formed Dominion of Canada.
3. In 1892, Congress passed a resolution introduced by a Minnesota Congressman calling for a joint United States – Canada investigation into building a deep-water route linking Lake Superior with the Atlantic Ocean. The resolution passed and led to the creation of a Deep Waterway Commission, which concluded that a commercial waterway was feasible. No further action was taken. It was not until 1954 that Congress finally passed the St. Lawrence Seaway Development Corporation.

4. In 1905, the United States and Canada agreed to form an International Waterways Commission to regulate the levels of the Great Lakes. The Commission expired in 1913, though some work continued for another six years. The Commission recommended a stronger institution to deal with cross-border issues. As a result, the U.S. and Canada negotiated for what became the Boundary Waters Treaty, 33 Stat. 2448.
5. In 1909, the United States and Great Britain (on behalf of the Dominion of Canada) signed the Boundary Waters Treaty that established the International Joint Commission with authority to prevent and resolve disputes between the two countries over rivers and lakes that cross the international boundary line. The Treaty mandated that navigation on all boundary waters “shall forever continue free and open for the purposes of commerce.” Article I.

The Treaty also addressed diversions and water quality. “It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other.” Article IV.

Under the Boundary Waters Treaty, the IJC was given three specific responsibilities:

- To approve obstructions and diversions on boundary waters that affected the natural level or flow on either side of the international border;<sup>163</sup>
- To conduct studies of specific problems at the request of the U.S. and/or Canadian governments; and
- To arbitrate specific disputes over boundary waters. This procedure requires the approval of both the U.S. and the Canadian government and has never been invoked.

The Treaty also restricted diversions at Niagara Falls – a provision that was ultimately amended in 1950 by the Niagara Diversion Treaty allowing for dam construction in New York and Ontario.

6. In 1912, the IJC completed its first cross-boundary pollution study and recommended that water quality problems required a new treaty between the United States and Canada to control pollution.
7. In 1925, the U.S. Supreme Court limited Illinois’ water diversions from Lake Michigan. *Sanitary District of Chicago v. United States*, 266 U.S. 405 (1925). The Corps of Engineers had issued a permit for 250,000 cubic feet per minute (“cfm”) in diversions from the lake. The sanitary district sought to increase that amount to between 400,000 and 600,000 cfm. The federal government said Chicago’s increased demands would impermissibly lower Lake Michigan and create an

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<sup>163</sup>The prohibition did not apply to Lake Michigan, the only Great Lake entirely in the United States.

- obstruction to navigable waters. The Supreme Court enjoined the district from increasing its diversions. “This is not a controversy between equals. The United States is asserting its sovereign power to regulate commerce and control navigable waters within its jurisdiction.” *Id.* at 425.
8. In 1931, Governor Franklin Roosevelt of New York signed the Power Authority Act to create a state agency to tap the power potential of the St. Lawrence River in upstate New York. The Authority had limited funding, however, and major projects were not built until the 1950s. The Act is codified in amended form at NY. Pub. Auth. 1000-17.
  9. In 1932, the United States and Canada signed the Great Lakes – St. Lawrence Deep Waterway Treaty (also called the Hoover-Bennett Treaty) calling for both countries to build the St. Lawrence Seaway to allow commercial ships to travel upstream between the Great Lakes and Lake Ontario. Congress, under pressure from railroad interests and others, refused to ratify the agreement.
  10. In 1950, the United States and Canada signed the Niagara River Water Diversion Treaty, 1 U.S.T. 695. The Niagara treaty amended the Boundary Waters Treaty of 1909 to allow for diversions for hydropower projects. The Treaty called for the U.S. and Canada to cooperate in building dams and other infrastructure at or near Niagara Falls, New York. At the same time, the Treaty preserved the aesthetics of Niagara Falls by requiring releases of water at certain times of the day and year (the tourist season). All water, not reserved for scenic purposes, could be diverted for power generation. Article V. The power would be divided equally between the United States and Canada. Article VI.
  11. In 1952, the International Joint Commission granted permits to the New York Power Authority and Ontario Hydro to build dams spanning the St. Lawrence River between Massena, New York, and Cornwall, Ontario.
  12. In 1954, Congress enacted legislation creating the Saint Lawrence Seaway Development Corporation to build, operate and maintain locks, dams and related facilities between Montreal, Canada, and Lake Erie. Pub. L. No. 83-358, 68 Stat. 92 (also referred to as the Wiley-Dondero Act). The Canadian Parliament enacted a similar law to create a companion Canadian corporation (“Le Reseau Grands Lacs Voie Maritime du St. Laurent”).
  13. In 1955, the United States and Canada signed a convention on Great Lakes Fisheries. 6 U.S.T. 2836. The agreement created the Great Lakes Fishery Commission to coordinate cross-border fisheries research, control invasive sea lamprey and facilitate cooperation between state, provincial, tribal and federal management agencies.
  14. In 1957, Congress enacted the Niagara Redevelopment Act, which directed the Federal Power Commission (now the Federal Energy Regulatory Commission) to issue a construction license to the New York Power Authority (“NYPA”) to build dams near Niagara Falls. 16 U.S.C. § 836.

The Act required that at least 50% of the power be allocated to “domestic and rural consumers” of preference customers (i.e., public agencies and cooperatives) at the lowest rates “reasonably possible,” with no more than 20% of that allocation going to neighboring states. 16 U.S.C. § 836(b)(2). In addition, the Act specifically set aside 445 MW of power for industries or their successors as replacement power previously obtained from the Schoellkopf plant, owned by Niagara Mohawk Company, which had washed away in a rockslide in 1956. 16 U.S.C. § 836(b)(3).

15. In 1967, the U.S. Supreme Court approved a Consent Decree limiting diversions by Illinois and others from Lake Michigan. *Wisconsin v. Illinois*, 388 U.S. 426 (1967). The issue was precipitated by Chicago’s construction in the 19th century of a canal which, beginning in 1900, had reversed the flow of the Chicago River. In its natural state, the river emptied into Lake Michigan. The canal allowed Illinois to redirect the Chicago River to flow into a ship canal that eventually flowed into the Illinois River and the Mississippi River. The 1967 Consent Decree limited Illinois’ diversions to 3,200 cfs.
16. In 1968, Congress consented to the Great Lakes Basin Compact, which remains to this day the only interstate compact affecting all eight basin states (Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York and Wisconsin). Pub. L. No. 90-419, 82 Stat. 414.

The Compact created a Great Lakes Basin Commission, where each of the basin states has three votes.<sup>164</sup> The primary purpose of the Compact was to provide for collection of data and to recommend laws and agreements furthering interstate cooperation. The Commission has an advocacy role but no regulatory authority. The Compact expressly forbid the Commission from taking an action that has the force of law or would bind a state. Article VI (14).

17. In 1972, the United States and Canada signed the first Great Lakes Water Quality Agreement, 23 U.S.T. 301. The 1972 Agreement sought to reduce the level of phosphorous, particularly in Lake Erie. The Agreement also called for joint research on cross-border environmental problems, and established a system of surveillance to identify problems and measure progress.
18. In 1978, the United States and Canada signed the second Great Lakes Water Quality Agreement, 30 U.S.T. 1383, which called for restoring and maintaining the chemical, physical and biological integrity of the Great Lakes Basin. The 1978 Agreement proposed the virtual elimination of the discharge of toxic chemicals.
19. In 1980, the U.S. Supreme Court modified the 1967 Decree regarding diversions by the City of Chicago from Lake Michigan. *Wisconsin v. Illinois*, 449 U.S. 48

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<sup>164</sup>The Commission was established in 1955. Illinois, Indiana, Michigan, Minnesota and Wisconsin ratified a compact agreement that year. Pennsylvania became a commission member in 1956, New York in 1960, and Ohio in 1963.

(1980). The supplemental decree allowed Illinois to extend domestic use of water for additional cities and towns, and modified the methodology for calculating Illinois' diversions.<sup>165</sup>

20. In 1985, the governors of the eight states and the premiers of the two Canadian provinces (Ontario and Quebec) that border on the lakes signed the Great Lakes Charter to coordinate management issues, such as large water diversions and in-basin uses, and to address cross-border environmental problems.

The Great Lakes Charter was a voluntary, non-binding international accord. The Charter called for the creation of a uniform database on Great Lakes water withdrawals, diversions and consumptive uses. The signatories agreed they would not approve new or increased diversions or consumptive uses of Great Lakes water in excess of five million gallons per day without notifying, consulting and seeking the consent of other states and provinces.

21. In 1986, Congress amended the Water Resources Development Act of 1974 to prohibit new diversions from the Great Lakes without unanimous approval of all eight governors of Great Lakes states.

The Water Resources Development Act said:

No water shall be diverted from any portion of the Great Lakes within the United States, from any tributary within the United States of any of the Great Lakes, for the use outside of the Great Lakes basin unless such diversion is approved by the Governor of each of the Great Lakes States. 42 U.S.C. § 1962d-20(d).

22. In 1987, the United States and Canada signed the third Great Lakes Water Quality Agreement. The 1987 Agreement called for the development of ecosystem indicators to measure nonpoint sources of pollution. The Agreement also required states to prepare remedial action plans and establish benchmarks for contaminated sediments and airborne toxic substances.
23. In 1990, Congress enacted the Great Lakes Critical Programs Act, 33 U.S.C. § 1268, which requires EPA to enforce the Great Lakes Water Quality Agreement of 1978 and the Water Quality Agreement of 1987. The Act, among other things, establishes a Great Lakes system-wide surveillance network to monitor the quality in the lakes.
24. In 1992, the United States and Canada signed an Air Quality Agreement, which, among other things, called for the exchange of technical information and set specific goals for certain air pollutants.

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<sup>165</sup>The Corps of Engineers subsequently estimated that more water was being withdrawn (3,439 cfs). The parties signed a Memorandum of Understanding in 1996 in which Illinois agreed to restore the "water deficit" by 2019.

25. In 1997, the United States and Canada signed another environmental agreement, this one to establish a Binational Toxics Strategy. The Strategy, drafted in response to a report from the International Joint Commission, called for both countries to increase their data collection, identify cost-effective solutions and take steps toward the goal of eliminating toxic discharges into the Great Lakes.
26. In 2000, Congress amended the Water Resources Development Act of 1986 to prohibit diversions and exports of Great Lakes water by a federal, state or private entity for use outside the Great Lakes Basin, unless the governor of each of the Great Lakes states approved. The amendment prohibited a federal agency from studying diversions or exports. 42 U.S.C. § 1962d-20. The amendment also encouraged the states in the Great Lakes Basin, in consultation with Ontario and Quebec, to develop and implement a common conservation standard “embodying the principles of water conservation and resource improvement for making decisions concerning the withdrawal and use of water from the Great Lakes Basin.”
27. In 2001, the U.S. governors and Canadian premiers signed a Supplementary Agreement to the Great Lakes Charter that reaffirmed the collective commitment of the governors and premiers in the Great Lakes Basin to broad principles of environmental protection and restoration, and agreed to develop a new set of binding agreements, such as an interstate compact. The primary issues: diversions; withdrawals; and increased consumptive use of water in the Great Lakes Basin. The Supplementary Agreement called for the governors and premiers to adopt a common “decision-making standard” for both states and provinces to review water withdrawal proposals.
28. In 2002, the Canadian Parliament amended the Boundary Waters Treaty Act of 1909 by prohibiting most diversions and the bulk removal of boundary waters without obtaining a license from the Ministry of Foreign Affairs. Bill C-6, 2002 session.
29. In December 2005, after years of negotiation, the Great Lakes governors and premiers of Ontario and Quebec signed the “Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement,” which included a ban on new or increased water diversions, with limited exceptions for cities or counties that straddle the basin or for intra-basin transfers (i.e., diversions from two watersheds within the Great Lakes Basin).

At the same time, the Great Lakes governors proposed a new interstate compact, the “Great Lakes - St. Lawrence River Basin Water Resources Compact,” to implement the agreement. The proposed Compact must be approved by the legislatures of all eight states and consented to by Congress.

The agreements implement the 2001 Supplementary Annex to the Great Lakes Charter.

## **18.4 MANAGEMENT AND OPERATIONAL STRATEGIES**

The Corps of Engineers has a key role in the management of the Soo Locks linking Lake Superior and Lake Huron. Because water quality problems in the Great Lakes – St. Lawrence River are such a significant concern, the U.S. Environmental Protection Agency (“EPA”) is also a key agency. The EPA is the lead agency under the 1972, 1978 and 1987 Water Quality Agreements. In 2004, the Bush Administration signed an executive order creating a Great Lakes inter-agency federal task force under EPA’s direction. Exec. Order No. 13340, 69 Fed. Reg. 29043 (May 20, 2004).

### **18.4.1 Long-term Operational Strategy**

There is no comprehensive, long-term operational strategy for either the Great Lakes or the Saint Lawrence River. There are, however, numerous commissions, advisory groups and other entities (some with just U.S. membership, others with Canadian participation) that address environmental protection and restoration issues. In 2005, the Great Lakes Regional Collaboration, responding to the Bush Administration’s executive order, released a strategy for restoring and protecting the Great Lakes. [www.glrc.us](http://www.glrc.us)

### **18.4.2 Short-term Operational Strategy**

The International Joint Commission (“IJC”) retains the ultimate authority for determining the level of flows between the Great Lakes and the St. Lawrence River. The IJC has delegated much of this authority to several “Boards of Control” – appointed by the Commission, each with members from the United States and Canada. The Boards, in turn, have developed criteria for operating the locks and other infrastructure. See discussion below on “institutions created by international treaties.”

### **18.4.3 River Accounting Mechanisms**

The Great Lakes Commission, created by the 1968 interstate compact, publishes annual reports on regional water use. The latest document, released in 2005, contains data on withdrawals in 2002. [www.glc.org](http://www.glc.org). The Michigan Department of Environmental Quality (“DEQ”) also publishes information on water diversions in the Great Lakes Basin. [www.michigan.gov/deq](http://www.michigan.gov/deq)

### **18.4.4 The Role of Interstate Compacts**

There is only one operating interstate compact for the Great Lakes Basin, the Great Lakes Basin Compact, consented to by Congress in 1968. Pub. L. No. 90-419, 82 Stat. 414. The agreement is a voluntary, non-regulatory compact.

The Compact created the Great Lakes Commission, but its decisions do not have the force of law. Article VI (14). The Compact, however, has an advocacy role and has recommended additional laws and agreements that further interstate cooperation. The Commission has created the Great Lakes Information Network (“GLIN”). [www.great-lakes.net](http://www.great-lakes.net)

In 1999, the Commission granted associate member status to the Canadian provinces of Ontario and Quebec. See the “1999 Declaration of Partnership.” The Commission is located in Ann Arbor, Michigan. [www.glc.org](http://www.glc.org)

In December 2005, eight U.S. governors and two Canadian premiers proposed two companion agreements: 1) the good faith state and provincial Great Lakes - St. Lawrence River Basin Sustainable Water Resources Agreement; and 2) an interstate compact, the Great Lakes - St. Lawrence River Basin Water Resources Compact, to implement the state-provincial agreement. All eight states in the basin and Congress must approve the Compact before it takes effect.

If approved, the Compact would:

- Create an eight-member “Great Lakes - St. Lawrence River Basin Water Resources Council” composed of the governors or their representatives;
- Ban new water diversions from the Great Lakes Basin, with limited exceptions;
- Establish a common decision-making standard for certain proposed new or increased withdrawals of Great Lakes water;
- Address the status of “straddling communities” that lie partially in the Great Lakes Basin and partially in another river basin;
- Require the collection of technical data, including water withdrawals by state;
- Create a water efficiency and conservation program in each state;
- Allow the Council and/or the states to compel compliance by seeking an action in court; and
- Create a private cause of action in very limited circumstances to enforce the compact.

Although Congress had enacted restrictions on diversions, there were concerns among some of the states that the provision was so vague it was vulnerable to legal challenge. The proposed Compact language is designed to overcome those deficiencies.

#### **18.4.5 International Treaties and Agreements**

##### **The International Joint Commission**

The International Joint Commission (“IJC”) was established by the Boundary Waters Treaty of 1909. The IJC consists of a six-member commission (three from the U.S. and three from Canada) to prevent and resolve water disputes between the two countries. The IJC has offices in Washington, D.C., and in Ottawa and Windsor, Ontario. [www.ijc.org](http://www.ijc.org)

Because the Treaty addressed both diversions and water quality, the potential scope of the IJC’s authority is broad.<sup>166</sup> As a practical matter, however, the IJC’s authority has been

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<sup>166</sup>Article IV of the Treaty stated: “It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other.”

exercised when the governments of the United States and Canada *both* direct the IJC to address an issue.

The IJC has appointed several “Boards of Control” to implement the treaty and other agreements concerning the Great Lakes and St. Lawrence River:

***The International Lake Superior Board of Control***

The Board was established by the IJC in 1914 to monitor and implement an IJC order granting permission for increased hydropower development of the St. Mary’s River linking Lake Superior and Lake Huron.

***The International St. Lawrence River Board of Control***

The Board was established by the IJC in 1952 to monitor outflows from Lake Ontario into the St. Lawrence River. [www.islrbc.org](http://www.islrbc.org)

***The International Niagara Board of Control***

The Board was established by the IJC in 1953 to provide advice on matters relating to the flows in the Niagara River and to monitor the operations of dams at Niagara Falls.

***The Great Lakes Water Quality Board***

The Board enforces the U.S. - Canada Water Quality Agreements signed initially in 1972.

In addition, the IJC has established a number of advisory and research boards, including the Great Lakes Science Advisory Board, the International Air Quality Advisory Board and the Council of Great Lakes Research Managers. Unlike the Boards of Control, which have specific regulatory authority, the advisory and research boards only provide assistance and offer recommendations.

***The International Lake Ontario - St. Lawrence River Study***

The five-year study, scheduled for completion in 2006, will examine the impacts of changing water levels on shoreline communities, domestic and industrial users, commercial navigation, hydropower production, the environment, recreation and tourism. [www.losl.org](http://www.losl.org)

***The Great Lakes Fishery Commission***

The 1955 Great Lakes Fisheries Convention between the United States and Canada created the Great Lakes Fishery Commission to coordinate fisheries research, control the invasive sea lamprey, and facilitate cooperative fishery management among state, provincial, tribal and federal management agencies. Each country appoints four commissioners. The commission is located in Ann Arbor, Michigan. [www.glfc.org](http://www.glfc.org)

The Commission used chemical lampricides to kill fish larvae and installed barriers to prevent sea lamprey from spawning. The lamprey, indigenous to the Atlantic Ocean, entered the Great Lakes in the 1900s after the construction of the Welland and other canals flooded the rapids between lakes that had served as a natural barrier. Sea lampreys caused great damage to lake trout in the Great Lakes. Control efforts have succeeded in reducing their populations.

### ***The Great Lakes Charter***

The Great Lakes Charter, signed in 1985, is not an international treaty nor is it a binding agreement, but it called for the eight governors in the United States and the two Canadian premiers to work together on agreements to reduce or limit water diversions, control invasive species, etc. See, “The Great Lakes Charter: Principles for the Management of Great Lakes Water Resources” (“La Charte des Grands Lacs: Principes de gestion des ressources en eau des Grands Lacs”). [www.cglg.org](http://www.cglg.org)

The 2001 Annex called for stronger agreements, which in turn led to the proposed 2005 state-provincial water resources agreement and interstate compact.

### **18.4.6 The Role of Native American Tribes**

There are 35 federally-recognized Native American Tribes in the United States whose reservations are located within the Great Lakes Basin and/or who retain treaty-guaranteed rights to hunt or fish in the basin. Membership in these tribes numbers approximately 175,000.

Some tribal nations have formed inter-tribal agencies to protect and implement their rights. See, for example, the Chippewa Ottawa Resource Authority (“CORA”) in Michigan, and the Great Lakes Indian Fish and Wildlife Commission (“GLIFWC”), which assists 11 tribes in Michigan, Minnesota and Wisconsin. [www.1836cora.org](http://www.1836cora.org) and [www.glifwc.org](http://www.glifwc.org)

In Canada, the “First Nations” have their own organizations and interests. See, for instance, the Chiefs of Ontario organization, a coordinating body for 134 First Nation communities. [www.chiefs-of-ontario.org](http://www.chiefs-of-ontario.org)

### **18.4.7 The Role of Federal Courts**

Federal courts have not assumed a role in the day-to-day management of the Great Lakes – St. Lawrence River Basin.

## **18.5 CURRENT ISSUES AND CONFLICTS ON THE GREAT LAKES AND SAINT LAWRENCE RIVER**

Water quality is the most pressing issue facing the Great Lakes. A number of cooperative agreements seek to address environmental problems ranging from the accumulation of toxic materials in sediments and the damage caused by invasive species. Water diversions outside of the basin are also an issue. A proposed interstate water resources compact and companion agreement with the provinces of Ontario and Quebec, unveiled in December 2005, are designed

in part to rectify the fragmented approach to regional problems. Congress and the states must approve the compact before it goes into effect.

### **18.5.1 Water Supply and Allocation**

Water supply issues are not significant except for out-of-basin diversions, which are the subject of a proposed interstate compact.<sup>167</sup>

### **18.5.2 Power Supply and Allocation**

Power supply issues are not significant in most of the Great Lakes Basin, but they do arise at Niagara Falls under competing interpretations of the Niagara Redevelopment Act of 1957, 16 U.S.C. § 836. The New York Power Authority's dams (Robert Moses and Lewiston) have the capacity to produce 2,400 MW.

At present, power from the Niagara dams owned by the NYPA is allocated four different ways, according to federal statute, state statute and a 1988 settlement agreement: 1) preference power; 2) replacement power; 3) expansion power; and 4) contract sales to three upstate investor-owned utilities in upstate New York.

State statutes in New York create additional classes of customers who are eligible to buy power from the New York Power Authority. There has been extensive litigation over the terms of the federal and state power supply allocation formulas. **Table 30** below shows the amount of the current allocations, reflecting both federal and state statutes.

**TABLE 30.** Current firm power allocations, Niagara Power Plant.

<b>Customer</b>	<b>Allocated Power (MW of capacity)</b>	<b>% of Total</b>
Investor-owned Utilities	245	13.0
In-State (NY) Preference	752	40.0
Out-of-State Preference	188	10.0
Replacement (Industrial) Power	445	23.7
Expansion (Industrial) Power	250	13.3
<b>TOTAL</b>	<b>1,880 MW</b>	<b>100.0%</b>

### **18.5.3 Environmental Issues**

The most serious conflicts in the St. Lawrence-Great Lakes Basin are over water quality. The problems, as described by the U.S. EPA, are summarized below:

<sup>167</sup>Occasional proposals to divert water from the basin have generated public controversy. In the late 1990s, for instance, the Nova Group initially obtained a permit from the provincial government in Ontario to withdraw 159 million gallons per year and ship it by tanker to Asia. Ontario subsequently cancelled the permit after public opposition.

### **Industrial pollution and toxic contaminants**

This problem, first noticed in the 1940s is still an area of concern. Mercury, polychlorinated biphenyls (PCBs) and dioxins are among the identified pollutants. Migration of these substances through groundwater into the Great Lakes is a related problem.

In addition, the U.S. EPA has identified “non-point sources” (i.e., from pesticides in agricultural runoff) as a continuing cause of degradation in Great Lakes water quality.

### **Eutrophication (oxygen depletion)**

Runoff from urban and agricultural activities along the Great Lakes shore and tributaries has contributed to reduced oxygen concentrations in the lakes and produced a significant rise in algae, which, in turn, is harmful to certain native plants and adversely affects the food chain of fish. This process, first noticed on Lake Erie, the shallowest of the Great Lakes, is now a problem in other Great Lakes.

### **Habitat loss (native species)**

Nearly all of the native forests that once lined most of the Great Lakes have been cut at least once. The U.S. EPA estimates that between 70-80% of the original wetlands along the southern shore of Ontario (Canada) have been lost, and the figure is as high as 92% on the northern shore of Ohio (Lake Erie). The loss of genetic diversity is accompanied by an influx of species that are non-native.

### **Invasive (non-native) species**

The increase of non-native species (sometimes called “exotic” species) is another problem. Sea lamprey, now controlled to a large extent, were one of the first invasive species to cause serious harm. Their populations had exploded by the 1940s, causing millions of dollars in damage in indigenous Great Lakes fisheries. Zebra mussels, a problem on the Mississippi River, are now a problem in the Great Lakes. In total, about 160 invasive species have been introduced – mostly by ship traffic into the Great Lakes since the 1800s.

## **18.6 CONFLICT RESOLUTION**

### **18.6.1 Congressional Allocation of Water or Power**

Congress has not allocated water from the Great Lakes or the St. Lawrence River. However, Congress will be asked to consent to the proposed 2005 interstate compact that would limit and restrict diversions. See “Laws of the River” chronology.

Congress allocated power from Niagara Falls in 1957, with the passage of the Niagara Redevelopment Act, 16 U.S.C. § 836, but has not done so since that time. There are no other federal statutes that allocate power from the Great Lakes - St. Lawrence River Basin. Congress, however, has provided the governors of states in the Great Lakes Basin with authority to approve or disapprove of diversions under the Water Resources Development Act.

### **18.6.2 Administrative Allocation of Water or Power**

There is no administrative mechanism to allocate water or power in the Great Lakes Basin. The Corps of Engineers owns a small dam on the St. Mary's River connecting Lake Michigan with Lake Huron ("U.S. Government Plant"). Power is sold to a private company. The federal government does not own any dams on the St. Lawrence River.

### **18.6.3 Judicial Allocation of Water or Power**

Courts have not allocated water or power on the St. Lawrence River or on the Great Lakes.

### **18.6.4 Arbitration or Mediation**

Arbitration and mediation are not regularly used to resolve conflicts. The Boundary Waters Treaty of 1909, however, gave the International Joint Commission ("IJC") the responsibility of arbitrating a dispute if both countries asked it to do so. 36 Stat. 2448 at Article X. To date, this procedure has not been invoked.

A professional mediator was retained by the parties to develop the 1996 Memorandum of Understanding ("MOU") between the states and the federal government regarding Chicago's diversions from Lake Michigan. The MOU helped resolve long-standing issues that had been before the U.S. Supreme Court on two occasions. *Wisconsin v. Illinois*, 388 U.S. 426 (1967), and 449 U.S. 48 (1980)(Modified Decree). The MOU, among other things, called for Illinois to restore to Lake Michigan the excess waters it has withdrawn.

### **18.6.5 Litigation**

There is no major litigation now pending which addresses water or power allocation issues in the Great Lakes River Basin.

### **18.6.6 Infrastructure Improvements and Environmental Restoration**

Seven of the eight basin states have established and funded the Great Lakes Protection Fund, a non-profit corporation created in 1989 as a permanent environmental endowment with \$80 million in public funds. One member from each of the seven participating states sits on the Board of Directors. The Fund gives grants to other non-profit entities for restoration projects. As of 2006, the fund had spent \$46 million in regional projects. [www.glpf.org](http://www.glpf.org)

In addition, the eight basin states have undertaken environmental cleanup work under the review of the U.S. EPA, which has identified "areas of concern." See, for instance, a description of the "Cuyahoga River Area of Concern," which is the subject of a "Remedial Action Plan" ("RAP").<sup>168</sup>

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<sup>168</sup>The Cuyahoga River runs through Cleveland and empties into Lake Erie. Oil and debris on the Cuyahoga caught fire in 1969, an event that helped spur water pollution control initiatives, including enactment of the Federal Water Pollution Control Act ("Clean Water Act"), the Great Lakes Water Quality Agreement and the creation of the USEPA itself.

### **18.6.7 Interagency and Multi-Party Agreements**

#### **The Council of Great Lakes Governors**

The Council of Great Lakes Governors, established in the early 1980s, is one of the most influential entities in the basin. It is a nonprofit corporation, created by the eight basin states. Duties include implementing the non-binding Great Lakes Charter of 1985, signed by the governors and the two Canadian premiers. The Council facilitated the negotiation of the 2005 state-provincial water resources agreement and the proposed interstate compact. [www.cglg.org](http://www.cglg.org)

#### **The Great Lakes Regional Collaboration**

This effort, coordinated by the U.S. Environmental Protection Agency, seeks to bring together federal and state agencies, local governments, Tribes and others to address environmental and restoration efforts. In 2005, the group released a strategy and action plan. [www.glrc.us](http://www.glrc.us)

#### **The Great Lakes and St. Lawrence Cities Initiative**

This effort involves the mayors and local officials in the United States and Canada to advocate for policies and programs that would protect the economy and environment.

#### **Great Ships Initiative**

The Northeast - Midwest Institute in Washington, D.C., is coordinating a Great Ships Initiative to combat the intrusion of invasive species in the Great Lakes and St. Lawrence River Basin. The initiative, proposed by the American Great Lakes Ports Association, would help monitor ports for new invasive species intrusions, and develop a set of treatment tools to stop the spread of unwanted species. The initiative will function as a partnership between industry, state and federal officials.

## **APPENDICES**

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## **APPENDIX A: ANNUAL WATER USAGE IN THE UNITED STATES**

The U.S. Geological Survey (“USGS”) estimates that the nation withdraws about 408 billion gallons of water per day (bgd) for a variety of domestic, agriculture, power plant and other uses.<sup>169</sup> That amount of water is equivalent to 456 million acre feet (“MAF”) per year, roughly the same amount as the annual flows of the Mississippi River into the Gulf of Mexico.

Of the 408 bgd, about 64% comes from fresh surface water (i.e., rivers and lakes); 21% from ground water aquifers; and 15% from saline surface water supplies.

**Table A-1** shows the total water uses (all sources) in the United States, based on USGS data in 2000, the latest year available. “Thermal power plants” refers to nuclear, gas and oil-fired plants that use water for cooling. The majority of this water will be returned to the river or lake from where it was withdrawn.

**TABLE A-1.** Annual uses of water from all sources, United States (2000). (Billions of gallons per day.)

<b>Use</b>	<b>Bgd</b>	<b>% of Total</b>
Thermal Power Plants	195	48
Irrigation	137	34
Public Supply	43	11
Industrial*	20	5
Domestic Wells	3	<1
Livestock	2	<1
Aquaculture	4	<1
Mining	4	<1
<b>TOTAL</b>	<b>408</b>	<b>100%</b>

\*Industrial “self-supply” —withdrawals apart from public (municipal) supply.

The picture changes if one examines only fresh surface water, a distinction that is important for this report, which does not analyze ground water or saline supplies.

**Table A-2** on the next page shows total fresh surface water withdrawals by use in 2000, measured in billions of gallons a day (bgd).

The use of river water for thermal power plant operations is concentrated in the Midwest and parts of the South, as **Table A-3** shows. The table lists the top ten states that withdraw surface water for thermal power plant operations, measured in millions of gallons per day (MGD).

<sup>169</sup>U.S. Geological Survey, “Estimated Use of Water in the United States in 2000,” USGS Survey Circular 1268 (2004).

**TABLE A-2.** Annual surface water withdrawals – fresh water only, United States (2000).  
(Billions of gallons per day.)

<b>Use</b>	<b>BGD</b>	<b>% of Total</b>
Thermal Power Plants	135	52
Irrigation	80	31
Public Supply	27	10
Industrial*	15	6
Domestic Wells	<1	<1
Livestock	<1	<1
Aquaculture	3	<1
Mining	1	<1
<b>TOTAL</b>	<b>262**</b>	<b>100%</b>

\*Industrial “self-supply”—withdrawals apart from public (municipal) supply.

\*\*Numbers may not add because of rounding.

**TABLE A-3.** Surface water withdrawals for thermal power plant operations, top ten states. (Million gallons per day.)

<b>State</b>	<b>MGD</b>
Illinois	11,300
Texas	9,760
Tennessee	9,040
Ohio	8,510
Alabama	8,190
North Carolina	7,850
Michigan	7,710
Pennsylvania	6,970
Indiana	6,700
Wisconsin	6,090
<b>TOTAL</b>	<b>82,120</b>

A different picture emerges on agricultural withdrawals. **Table A-4** shows the 10 states that withdraw the most surface water for agriculture, measured in millions of gallons per day. As expected, states in the arid West dominate this chart.

**TABLE A-4.** Surface water withdrawals for irrigation, top ten states.  
(Million gallons per day).

<b>State</b>	<b>MGD</b>
California	18,900
Idaho	13,300
Colorado	9,260
Montana	7,870
Oregon	5,290
Wyoming	4,090
Utah	3,390
Arizona	2,660
Washington	2,290
Texas	2,130
<b>TOTAL</b>	<b>69,180</b>

The two tables set the stage for a discussion of the issues and conflicts on interstate rivers across the nation. In the West, water is used primarily for irrigation. In the Midwest and East, water is used primarily for thermal power plant cooling. These two dominant uses consume 83% of all surface water withdrawals.

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## **APPENDIX B: MAJOR INFRASTRUCTURE ON INTERSTATE RIVERS**

The following fact sheets include information on each of the fourteen interstate river systems examined in this report. The fact sheets include major dams and storage reservoirs built by the federal government, other (i.e., state or local) government agencies or private parties.

For each dam, the following information is provided:

- Name of dam
- Year built
- State in which it is located
- River
- Owner
- Generation (measured in megawatts, MW, of capacity)
- Name of reservoir
- Volume of storage (in acre-feet)

Storage – the amount of water held in a reservoir behind a dam – can be measured in different ways. The National Inventory of Dams, compiled by the U.S. Army Corps of Engineers (“Corps of Engineers or “USACE”), includes data on the maximum storage (the physical capacity of the reservoir) and normal storage (the average amount of water behind the dam *excluding* flood control).

For purposes of this report, normal storage numbers have been used because they serve as the best proxy for typical conditions at multi-purpose dams. There are, however, three exceptions: on the Delaware, Susquehanna and Delaware Rivers, the Corps of Engineers built dams primarily for flood control. Use of normal storage numbers would not reflect the size of the reservoir and the importance of the dams in protecting downstream cities and industry. On those rivers, maximum storage numbers are used. The text notes this distinction. On all other rivers, normal storage is used.

### **B.1 Federal Government Dams**

There are three federal “dam-building” agencies: 1) the Corps of Engineers; 2) the Bureau of Reclamation; and 3) the Tennessee Valley Authority (“TVA”). See discussion in Chapter 4 in the main text of this report for details.

### **B.2 Other Government Dams**

Most state and local agencies do not build or own dams, and this section is often blank. But there are exceptions. Three public utility districts in Washington own large dams on the Columbia River, for example, and the New Mexico Interstate Stream Commission owns a dam on the Canadian River in that state. Other examples are noted on the fact sheets.

### **B.3 Private Dams**

Private power utilities own numerous dams on interstate rivers. The major dams are listed on the fact sheets.

### **B.4 Dams Outside of the United States**

This section identifies the dams that straddle the international border (i.e., on the Rio Grande and St. Lawrence River) or that are located upstream in Canada and have a major downstream impact in the United States.

Each fact sheet also contains summary information on how much money has been spent on federal infrastructure in each river basin. ***This data reflects cumulative expenditures, measured in real dollars and not adjusted for inflation or the time value of money.*** The costs figures do not indicate what the asset (i.e., the federal dam) would likely fetch on the market if the federal government decided to sell it.

Data for the Corps of Engineers' infrastructure was taken from its *2004 Annual Report for Civil Works Activities* and reflects totals spent up to September 30, 2004. Data for the Bureau of Reclamation's infrastructure was obtained from the Denver headquarters by email.

In a few instances, meaningful numbers were not available. In those instances, the fact sheets notes that the data is "not available."

**THE COLUMBIA RIVER** - The U.S. Army Corps of Engineers (“USACE”) has spent \$7.2 billion to build and maintain its dams in the Columbia River Basin. The U.S. Bureau of Reclamation has spent \$3.1 billion to build dams and infrastructure for irrigation in the Columbia River Basin. The Bonneville Power Administration has invested \$6 billion in federal transmission lines. In total, the federal government has invested \$16.3 billion in the Columbia River Basin.

**Federal Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)*	Reservoir	Storage (MAF)
Bonneville	1938	WA-OR	Columbia	USACE	1,093	Bonneville	0.277
Grand Coulee	1941	WA	Columbia	USBR	6,779	Franklin D. Roosevelt Lake	5.185
Hungry Horse	1952	MT	Flathead	USBR	428	Hungry Horse	3.000
McNary	1953	WA-OR	Columbia	USACE	980	Lake Wallula	1.350
Chief Joseph	1955	WA	Columbia	USACE	2,458	Rufus Woods Lake	0.516
The Dalles	1957	WA-OR	Columbia	USACE	1,808	Lake Celilo	0.277
Ice Harbor	1961	WA	Snake	USACE	603	Lake Sacajawea	0.406
John Day	1968	WA-OR	Columbia	USACE	2,160	Lake Umatilla	0.530
Lower Monumental	1969	WA	Snake	USACE	810	Lake Herbert G. West	0.377
Little Goose	1970	WA	Snake	USACE	810	Lake Bryan	0.565
Dworshak	1974	ID	Clearwater	USACE	400	Dworshak	3.468
Lower Granite	1975	WA	Snake	USACE	810	Lower Granite	0.485
Libby	1975	MT	Kootenai	USACE	525	Lake Koocanusa	5.809

\*Nameplate rating. Source: BPA 2004 Pacific Northwest Loads and Resources Study ("the White Book"). The generating capacity of the federal dams in the Columbia River Basin is 20,445 MW, including 18 small federal dams not listed above. Federal reservoir storage is 22.2 MAF.

**Other Government Dams in excess of 100 MW capacity**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Storage (MAF)
Skagit**	1929	WA	Skagit	Seattle City Light	653	1.493
Rock Island	1933	WA	Columbia	Chelan County PUD	620	0.13
Priest Rapids	1959	WA	Columbia	Grant County PUD	788	0.191
Rocky Reach	1961	WA	Columbia	Chelan County PUD	1,212	0.382
Wanapum	1963	WA	Columbia	Grant County PUD	831	0.59
Mayfield	1963	WA	Cowlitz	Tacoma Power	162	0.134
Wells	1967	WA	Columbia	Douglas County	774	0.331
Boundary	1967	WA	Pend Oreille	Seattle City Light	1,033	0.095
Mossyrock	1968	WA	Cowlitz	Tacoma Power	300	1.685
Henry M. Jackson	1983	WA	Sultan	Snohomish PUD	110	0.153

\*\*The Skagit project includes Diablo, Ross, and Gorge Dams built between 1929 and 1961. Irrigation districts also own and operate small dams and facilities on tributaries in eastern Washington. **The generating capacity of the non-federal dams with a capacity in excess of 100 MW is 6,883 MW. Non-federal reservoir storage is approximately 4.5 MAF.**

**Private Dams in excess of 100 MW capacity**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Storage (MAF)
Merwin	1933	WA	Lewis	PacifiCorp	136	0.422
Kerr	1939	MT	Flathead	Montana Power Co.	168	1.22
Cabinet Gorge	1952	ID	Clark Fork	Avista	200	0.105
Yale	1953	WA	Lewis	PacifiCorp	108	0.402
Pelton	1957	OR	Deschutes	Portland General Elec.	110	0.032
Swift No. 1	1958	WA	Lewis	PacifiCorp	204	0.755
Brownlee	1958	ID	Snake	Idaho Power Co.	585	1.42
Noxon Rapids	1959	MT	Clark Fork	Avista	467	0.4
Oxbow	1961	ID	Snake	Idaho Power Co.	190	None
Round Butte	1964	OR	Deschutes	Portland General Elec.	247	0.535
Hells Canyon	1967	ID	Snake	Idaho Power Co.	392	0.183

**The generating capacity of the private dams in excess of 100 MW is 2807 MW. Private dam reservoir storage is 5.5 MAF**

**Dams Outside of the United States**

Name of Dam	Year Built	Generation Capacity (MW)	Reservoir	Storage (MAF)
Duncan	1967	None	Duncan	1.400
Keenleyside	1968	185	Arrow	7.100
Mica	1973	1,736	Kinbasket	20.000

**The generating capacity of dams in Canada is 1,921 MW. Reservoir storage in Canada is 28.5 MAF.**

**THE COLORADO RIVER** - The Bureau of Reclamation spent \$3.2 billion to build dams and irrigation infrastructure in the Upper Colorado River Basin. The Bureau spent about \$4.6 billion to build dams and related infrastructure in the Lower Basin of the Colorado River. In total, the Bureau spent approximately \$7.8 billion in the Colorado River Basin. Other water supply infrastructure has been built by state and local funds, not federal monies. (e.g. the Colorado River Aqueduct.) The Western Area Power Administration has spent about \$950 million to build high-voltage power lines and related infrastructure to move power to customers in the Colorado River Basin and for its share of the Pacific Northwest-Pacific Southwest Intertie. The Army Corps of Engineers spent \$8.3 million to build Alamo and Painted Rock Dams in Arizona (the only major tributaries of the Colorado River with Army Corps dams).

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Laguna	1908	AZ-CA	Colorado	USBR	None	N/A	None <sup>1</sup>
Hoover*	1935	AZ-NV	Colorado	USBR	2,100	Lake Mead	28.255
Taylor Park	1937	CO	Taylor	USBR	None	Taylor Park	0.106
Imperial	1937	AZ-CA	Colorado	USBR	None	None	None <sup>2</sup>
Parker**	1938	AZ-CA	Colorado	USBR	108	Lake Havasu	0.646
Headgate Rock	1942	AZ-CA	Colorado	BIA	None	Moovalya Lake	None
Davis	1954	AZ-CA	Colorado	USBR	240	Lake Mojave	1.800
Palo Verde***	1957	AZ-CA	Colorado	USBR	None	None	None
Painted Rock	1960	AZ	Gila	USACE	None	Painted Rock	None <sup>3</sup>
Navajo	1962	NM	San Juan	USBR	None	Lake Navajo	1.700
Flaming Gorge	1963	UT	Green	USBR	153	Flaming Gorge	3.800
Glen Canyon	1964	AZ	Colorado	USBR	1,288	Lake Powell	24.300
Fontenelle	1964	WY	Green	USBR	10	Fontenelle	0.345
Alamo	1968	AZ	Bill Williams	USACE	None	Alamo	None <sup>4</sup>
Wayne N. Aspinall****	1976	CO	Gunnison	USBR	287	Blue Mesa, Morrow Point & Crystal	0.965

Only two dams—Alamo and Painted Rock, both on tributaries—are owned by the Army Corps of Engineers. The Army Corps dams are not regarded as part of the Colorado River system. The Bureau of Indian Affairs (BIA) owns a small dam on the lower river. The rest of the structures, including Hoover and Glen Canyon dams, were built by the Bureau of Reclamation. The Bureau of Reclamation also built dams-not listed above-on various tributaries.

**The total generating capacity of all federal dams on the Colorado River is 4,200 MW. Normal reservoir storage in the dams is 60 MAF, of which about half is available in the Upper and Lower Basins.**

\*Originally named Boulder Dam.

\*\*Parker Dam was built partly with funds advanced by the Metropolitan Water District of Southern California. MWD delivers water from Lake Havasu and transports it in the Colorado River Aqueduct to the greater Los Angeles area. MWD receives half of the generating capacity and energy from the dam.

\*\*\*In 1957, the Bureau of Reclamation turned over the operation of Palo Verde Diversion Dam to the Palo Verde Irrigation District.

\*\*\*\*Originally named Curecanti Storage Unit. It consists of three units.

<sup>1</sup> Laguna Dam had an original generation capacity of 1.6 MW. The dam has not been used as a diversion dam since 1948.

<sup>2</sup> Imperial Dam initially had 85,000 af of storage available, but this is no longer available due to sediment accrual.

<sup>3</sup> "None" refers to normal storage (i.e. without flood control). Painted Rock Dam was built primarily for flood control and has a maximum storage capacity of 4,831,500 af.

<sup>4</sup> "None" refers to normal storage (i.e. without flood control). Alamo Dam was built primarily for flood control and has a maximum storage capacity of 1,409,000 af.

#### Other Government Dams

None on the main stem, though the Palo Verde Irrigation District now maintains Palo Verde Diversion Dam, originally built by the Bureau of Reclamation.

The Salt River Project manages 8 dams on the Salt and Verde Rivers. [www.srpnet.com](http://www.srpnet.com). The dams are not regarded as part of the Colorado River system.

#### Private Dams

None on the main stem.

#### Dams Outside of the United States

Name of Dam	Year Built	Generation Capacity (MW)	Owner
Morelos Diversion Dam	1950	None	International Boundary and Water Commission

Morelos Dam is near the intersecting boundaries of Arizona, California, and Baja California, and was built after the U.S.-Mexican Water Treaty of 1944, which guaranteed Mexico 1.5 MAF per year from the Colorado River. The dam diverts water for agricultural use in the Mexicali and San Luis valleys of Mexico.

**THE RIO GRANDE** - The U.S. Bureau of Reclamation has invested \$400 million in dams and related infrastructure in the Rio Grande Basin. The U.S. Army Corps of Engineers ("USACE") has spent \$350 million to build and maintain its dams in the Rio Grande Basin. The federal share of the construction cost to build the Falcon-Amistad Dams on the lower Rio Grande was \$107 million. The USACE has spent about \$200 million in flood control infrastructure, primarily around El Paso, Texas.

**Federal Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Avalon	1906	NM	Pecos	USBR	None	Lake Avalon	0.004
Elephant Butte	1916	NM	Rio Grande	USBR	28	Elephant Butte	2.065
Mesilla Diversion*	1916	NM	Rio Grande	USBR	None	None	None
Leasburg Diversion*	1919	NM	Rio Grande	USBR	None	None	None
Angostura Diversion**	1934	NM	Rio Grande	USBR	None	None	None
Isleta Diversion**	1934	NM	Rio Grande	USBR	None	None	None
San Acacia Diversion**	1934	NM	Rio Grande	USBR	None	None	None
El Vado**	1934	NM	Rio Chama	USBR	8 (1998)	El Vado	0.220
Caballo	1937	NM	Rio Grande	USBR	None	Caballo	0.232
Sumner	1938	NM	Pecos	USBR	None	Lake Sumner	0.061
Percha Diversion*	1938	NM	Rio Grande	USBR	None	None	None
American Diversion***	1947	TX	Rio Grande	USBR	None	None	None
Platoro Dam****	1950	CO	Conejos	USBR	None	Platoro	0.054
Jemez Canyon	1953	NM	Jemez	USACE	None	Jemez Canyon	0.320
Abiquiu*****	1963	NM	Rio Chama	USACE	13 (1990)	Abiquiu	1.200
Two River Dam	1963	NM	Rio Hondo	USACE	None	Two River	None
Galisteo	1970	NM	Galisteo Creek	USACE	None	Galisteo	0.090
Heron	1970	NM	Willow Creek	USBR	None	Heron	0.400
Cochiti	1975	NM	Rio Grande	USACE	None	Cochiti Lake	0.722
Santa Rosa Dam	1979	NM	Pecos	USACE	None	Santa Rosa Lake	0.200
Brantley	1989	NM	Pecos	USBR	None	Brantley Lake	0.349

**The generating capacity at federal dams on the Rio Grande is 49 MW. Federal reservoir storage is 6 MAF.**

\*Owned by the Bureau of Reclamation but operated and maintained by the Elephant Butte Irrigation District.

\*\*These structures were built by the Middle Rio Grande Conservancy District and transferred to the Bureau of Reclamation in 1951. The District now operates the structures as the Bureau's agent. Legal title is in dispute. The Middle Rio Grande Conservancy District claims ownership. The county of Los Alamos owns the generators at El Vado Dam.

\*\*\*Built and owned by the Bureau of Reclamation but operated in cooperation with the International Boundary and Water Commission, which diverts water from the dam for Mexico.

\*\*\*\*Now operated by the Conejos Water Conservancy District in Colorado.

\*\*\*\*\*The county of Los Alamos owns the generators at Abiquiu Dam.

**Other Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Red Bluff	1936	NM	Pecos	Red Bluff Irrig. Dist.	None		0.308

**Private Dams**

None

**International Dams Providing Power and Reservoir Storage to the U.S. and Mexico**

Name of Dam	Year Built	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Falcon Diversion	1953	Rio Grande	IBWC	64	Falcon	2.653
Amistad Diversion	1969	Rio Grande	IBWC	132	Amistad	3.151

The two dams listed above straddle the Rio Grande between the United States and Mexico and are owned by the International Boundary and Water Commission ("IBWC"). The power generated is split between the two countries; the amounts above represent the total capacity. (Note: The U.S. government owns 56% of the storage capacity at Amistad; the Mexican government owns the remaining 44%).

The IBWC also owns International Dam, which diverts Mexico's annual 60,000 AF allocation under a 1906 treaty with the United States. In addition to the dams listed above, the government of Mexico owns 14 dams on tributaries of the Rio Grande: La Boquilla (1914); Venustianza Carranza (1930); Laguna de Salinillas (1931); Centario and San Miguel (1934); Marte R. Gomez (1943); Francisco Madero (1948); Chihuahua (1961); Rodrigo Gomez (1963); Luis Leon (1968); San Gabriel (1990); La Fragua (1991); Pico Del Aguila (1993); El Cuchillo (1994); Las Blancas (2001). Four of the dams (La Boquilla, Venustiano Carranza, El Cuchillo, and Gomez) account for 84% of the storage capacity. Total reservoir storage in Mexico is 6.14 MAF.

**Total reservoir storage in both countries is 18.25 MAF.**

**THE MISSISSIPPI RIVER** - There are no federal dams with reservoir storage on the main stem of the Mississippi River. The 29 locks and dams - essential for navigation - cannot store water. There is no federal transmission infrastructure, nor is there any federal water supply infrastructure. Water supply is a local responsibility. The U.S. Army Corps of Engineers ("USACE") has spent a total of \$7.6 billion on flood control from Cape Girardeau, Missouri, to the Gulf of Mexico as part of the Mississippi River and Tributaries Project, authorized by Congress in 1928. Additionally, the Corps has spent about \$3.5 billion to build and maintain the 29 federal locks and dams in the Upper Basin; and about \$6.1 billion for navigation improvements in the Lower Basin as part of the Mississippi River and Tributaries Project. In total, the Army Corps of Engineers has spent \$17.2 billion on infrastructure in the Mississippi Basin.

#### **Federal Government Dams**

The Army Corps of Engineers owns 29 locks and dams on the main stem of the Mississippi River: the Upper Mississippi River Navigation System. The locks and dams allow for barge and tow traffic to move up the river. Only a few dams produce power - and they generate only very small amounts.

#### **Other Government Dams**

Three small structures at locks on the main stem of the Mississippi River produce a total of 20 MW. Power goes to nearby towns or industry.

#### **Private Dams**

Ameren Corp. of St. Louis, Missouri owns the dam at Keokuk Lock and Dam in Iowa, with a capacity of 125 MW. The power plant is the largest on the river.

#### **Dams Outside of the United States**

There are no dams outside of the United States. The Mississippi River is a domestic river.

<sup>1</sup> Army Corps of Engineers 2004 Annual Report, Civil Works Activities, "Mississippi River Between the Missouri River and Minneapolis," page 17-5. For data on the Lower Basin, see Mississippi River Commission, page 41-43. The figures for the Lower Basin also include certain tributary improvements, such as dams in the St. Francis and Yazoo Basin.

**THE MISSOURI RIVER** - The U.S. Army Corps of Engineers (“USACE”) has spent \$2.5 billion to build and maintain six dams in the main stem of the Upper Missouri River Basin. The U.S. Bureau of Reclamation has spent \$1.2 billion for its dams and infrastructure in the Missouri River Basin (almost all on tributaries). The Western Area Power Administration has spent \$1.4 billion on transmission infrastructure to deliver power from federal dams on the main stem in the Upper Missouri River Basin. The USACE has also spent \$360 million for flood control infrastructure (i.e. levees, etc.); and \$943 million to build and maintain the commercial navigation channel and related infrastructure between St. Louis, MO and Sioux City, IA.

**Federal Government Dams on the Main Stem**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Fort Peck	1943	MT	Missouri	USACE	185	Fort Peck Lake	18.688
Garrison	1953	ND	Missouri	USACE	518	Lake Sakakawea	23.821
Canyon Ferry	1953	MT	Missouri	USBR	50	Canyon Ferry Lake	1.507
Fort Randall	1954	SD	Missouri	USACE	320	Lake Francis Case	5.418
Gavins Point	1958	SD-NE	Missouri	USACE	132	Lewis and Clark Lake	0.470
Big Bend	1963	SD	Missouri	USACE	494	Lake Sharpe	1.859
Oahe	1966	SD	Missouri	USACE	786	Lake Oahe	23.137

Source: USACE "Master Water Control Manual," pages F-2 and Plates 11-1 and 11-2.

**The total generating capacity of federal dams on the main stem of the Missouri River is 2,485 MW. The total reservoir storage on the main stem is approximately 75 MAF. In addition, there are about 3,100 multiple purpose reservoirs and 14,100 single-purpose reservoirs on tributaries.**

**In total, the Missouri River has the capacity to store 141 MAF.**

**Other Government Dams**

None on the main stem of the Missouri River.

**Private Dams**

None on the main stem of the Missouri River.

**Dams Outside of the United States**

None.

**THE ARKANSAS RIVER** - The U.S. Bureau of Reclamation spent approximately \$461 million on the Fryingpan-Arkansas Project (which includes Ruedi Dam, Pueblo Dam, Mt. Elbert, Twin Lakes and Sugar Loaf). In addition, the U.S. Bureau of Reclamation spent \$103 million to build Sanford Dam, the heart of the Canadian River Project, in the Texas Panhandle. The U.S. Army Corps of Engineers ("USACE") spent about \$85 million to build John Martin, Trinidad and Conchas Dams on the Arkansas River in Colorado, and \$746 million on the lower river dams (without locks) in Oklahoma and Arkansas. The Southwestern Power Administration has spent \$222 million on federal transmission infrastructure. The Western Area Power Administration has spent \$3 million on transmission infrastructure for the Fryingpan-Arkansas Project.

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Conchas*	1940	NM	Canadian	USACE	None	Conchas Lake	0.062
John Martin	1948	CO	Arkansas	USACE	None	John Martin	0.345
Fort Gibson	1949	OK	Grand-Neosho	USACE	45	Fort Gibson Lake	0.365
Tenkiller	1952	OK	Illinois	USACE	39	Ferry Lake	0.654
Toronto	1960	KS	Verdigris	USACE	None	Toronto	0.021
Oologah	1963	OK	Verdigris	USACE	None	Oologah Lake	0.552
Norman	1964	OK	Little	USBR	None	Thunderbird Lake	0.120
Eufaula	1964	OK	Canadian	USACE	90	Eufaula Lake	2.314
Keystone	1964	OK	Cimarron	USACE	70	Keystone Lake	0.506
Sanford	1965	TX	Canadian	USBR	None	Lake Meredith	1.400
Ozark-Jeta Taylor**	1969	AR	Arkansas	USACE	100	Ozark Lake	0.129
Dardanelle**	1969	AR	Arkansas	USACE	124	Dardanelle	0.421
Webbers Falls**	1970	OK	Arkansas	USACE	60	Webbers Lake	0.170
Robert S. Kerr**	1970	OK	Arkansas	USACE	110	Robert S. Kerr	0.526
Pueblo***	1975	CO	Arkansas	USBR	None	Pueblo	0.358
Kaw	1976	AR	Arkansas	USACE	None	Kaw Lake	0.407
Trinidad	1976	CO	Purgatoire	USACE	None	Trinidad	0.072
Mt. Elbert***	1981	CO	Twin Lakes	USBR	200	Mt. Elbert Forebay	None
Twin Lakes***	1981	CO	Lake Creek	USBR	None	Twin Lakes	0.141
Sugar Loaf***	1986	CO	Lake Fork Creek	USBR	None	Turquoise Lake	0.130

**The total federal generating capacity on the Arkansas River is 838 MW. Federal reservoir storage is 8,693 MAF.**

\* The U.S. Bureau of Reclamation built canals and a distribution system from Conchas Dam. The project was finished in 1976.

\*\* These USACE dams are also equipped with locks for navigation and are part of the McClellan-Kerr Arkansas River Navigation System. If the lock and dam has no hydroelectric capacity, it is not listed above.

\*\*\* Pueblo Dam, Mt. Elbert, Twin Lakes and Sugar Loaf are part of the U.S. Bureau of Reclamation's Fryingpan-Arkansas Project, which consists of diversion tunnels and infrastructure to move water from the western side of the Rocky Mountains (Colorado River Basin) across the Continental Divide to the Arkansas River Basin. The project, begun in 1964, was finished in 1990. In total, the project can store 640,000 AF in the Arkansas River Basin. Mt. Elbert is a pumping storage unit.

#### Other Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Storage (MAF)
Spavinaw	1922	OK	Spavinaw Creek	City of Tulsa	None	0.038
Fort Smith	1936	AR	Frog Bayou	City of Fort Smith	None	0.012
Pensacola	1940	OK	Neosho	GRDA*	125	1.680
Eucha	1952	OK	Spavinaw Creek	City of Tulsa	None	0.080
Maumelle	1957	AR	Maumelle Creek	City of Little Rock	None	0.221
Stanley Draper	1962	OK	East Elm Creek	Oklahoma City	None	0.100
Ute	1963	NM	Canadian	NM ISC*	None	0.240
Kerr-Markham Ferry	1964	OK	Neosho	GRDA**	114	0.200

\* NM ISC refers to the New Mexico Interstate Stream Commission.

\*\* GRDA refers to the Grand River Dam Authority, a state agency in Oklahoma.

**The total non-federal generating capacity on the Arkansas River is 239 MW. Non-federal reservoir storage is 2.57 MAF.**

#### Private Dams

There is only one large dam - Eagle Nest in New Mexico - owned by a private entity on Cimmaron Creek in the Canadian River Basin (normal storage: 90,000 AF). There are several dozen small dams with storage of less than 10,000 AF.

#### Dams Outside of the United States

There are no dams outside of the United States. The Arkansas River is a domestic, not an international, river.

**The total generating capacity of all dams in the Arkansas River Basin is 1,077 MW.**

**THE TENNESSEE-CUMBERLAND RIVERS** - Tennessee Valley Authority ("TVA") has total assets of \$35 billion. Information on the construction cost of the dams (and not coal, nuclear and other plants) is not readily available. The U.S. Army Corps of Engineers ("USACE") has spent about \$1 billion on the Cumberland River dams. Although the Tennessee River is used for domestic water supply, the federal government does not own any infrastructure to move water within the Tennessee River Basin.

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Wilson*	1924	AL	Tennessee	TVA	667	Wilson Lake	0.634
Wheeler	1936	AL	Tennessee	TVA	381	Wheeler Lake	1.050
Pickwick Landing	1938	TN	Tennessee	TVA	246	Pickwick Lake	0.924
Guntersville	1939	AL	Tennessee	TVA	121	Guntersville Lake	1.052
Chickamauga	1940	TN	Tennessee	TVA	131	Chickamauga Lake	0.628
Watts Bar	1942	TN	Tennessee	TVA	186	Watts Bar Lake	1.050
Fort Loudon	1943	TN	Tennessee	TVA	165	Fort Loudon	0.363
Dale Hollow	1943	TN	Obey	USACE	54	Dale Hollow Lake	0.857
Kentucky**	1944	KY	Tennessee	TVA	192	Kentucky Lake	1.839
Wolf Creek	1951	KY	Cumberland	USACE	270	Lake Cumberland	2.142
Center Hill	1951	TN	Caney Fork	USACE	135	Center Hill Lake	1.330
Cheatham	1954	TN	Cumberland	USACE	36	Cheatham	0.084
Old Hickory	1954	TN	Cumberland	USACE	100	Old Hickory Lake	0.420
Barkley**	1966	KY	Cumberland	USACE	140	Barkley Lake	0.869
Percy Priest	1967	TN	Stones	USACE	30	Percy Priest	0.202
Nickajack	1967	TN	Tennessee	TVA	104	Nickajack Lake	0.241
Cordell Hull	1973	TN	Cumberland	USACE	100	Cordell Hull Lake	0.258
Laurel	1973	KY	Cumberland	USACE	61	Laurel Lake	0.185
Raccoon Mtn.***	1978	TN	Tennessee	TVA	1,618	Raccoon	None

Source: TVA

**The combined generating capacity of TVA dams on the main stem of the Tennessee River and U.S. Army Corps of Engineers ("USACE") dams on the Cumberland River is 4,737 MW. Reservoir storage at TVA dams on the main stem of the Tennessee River and USACE dams on the Cumberland River is 14.1 MAF. TVA also owns 20 additional dams on tributaries with the capacity to produce 1,496 MW and store 9 MAF. Thus, the total federal hydro generating capacity in the Tennessee River Basin at both TVA and USACE dams is 6,233 MW. Total reservoir storage at both TVA and USACE dams is 23.1 MAF.**

\*Built by the Army Corps of Engineers during World War I to provide power to nitrate (explosives) plants. TVA acquired Wilson Dam in 1933.

\*\*Kentucky Dam (TVA) and Barkley Dam (Corps of Engineers) are the farthest downstream on the Tennessee and Cumberland Rivers, respectively. The reservoirs are connected by the Tennessee-Cumberland Canal and coordinated for flood control. Kentucky Dam has more storage than any other structure in the TVA system.

\*\*\* Raccoon Mtn. is a pumped storage facility.

#### Other Government Dams

None on the main stem.

#### Private Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
There are no private dams on the main stem of the river. TAPOCO, Inc., a subsidiary of Alcoa (the nation's largest aluminum company), owns four dams on the Little Tennessee River and Cheoah Rivers, both tributaries of the Tennessee River. The dams are:							
Cheoah	1919	TN	Little Tennessee	Alcoa	362*	Cheoah	0.035
Santeetlah	1928	TN	Cheoah	Alcoa	362*	Santeetlah	0.153
Calderwood	1930	TN	Little Tennessee	Alcoa	362*	Calderwood	0.041
Chilhowee	1957	TN	Little Tennessee	Alcoa	362*	Chilhowee	0.049

\*In total, the four dams have the capacity to produce 362 MW. Alcoa's first dam, Cheoah, predates TVA by 14 years. Total storage is 278,000 AF.

#### Dams Outside of the United States

There are no dams outside of the United States. The Tennessee River is a domestic not an international, river.

**In total, the dams in the Tennessee-Cumberland River Basin (including Alcoa's dams) can generate about 6,595 MW and store 23.4 MAF.**

**THE APALACHICOLA-CHATTAHOOCHEE-FLINT (ACF) RIVER BASIN** - The U.S. Army Corps of Engineers ("USACE") has spent about \$1.1 billion on the locks and dams in the ACF River Basin. The dams were built for multiple purposes, including flood control. The Southeastern Power Administration does not own transmission infrastructure in the ACF River Basin, nor is there any federal water supply infrastructure in the basin. Water supply is a local responsibility.

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Jim Woodruff	1952	AL	Apalachicola	USACE	36	Lake Seminole	0.406
Buford	1958	GA	Chattahoochee	USACE	100	Lake Sidney Lanier	1.917
George	1962	GA	Chattahoochee	USACE	160	Lake Walter F. George	0.934
Andrews	1963	GA	Chattahoochee	USACE	None	Lake George Andrews	0.018
West Point	1974	GA	Chattahoochee	USACE	82	West Point Lake	0.605

The federal dams in the ACF River Basin have the capacity to generate 378 MW and can store about 3.9 MAF.

#### Other Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Storage (MAF)
Warwick	1930	GA	Flint	Crisp Co. Power Comm'n	13	0.145

Note: The City of Mills, Georgia also owns a dam on the Chattahoochee River but it has a generating capacity of less than 1 MW and no storage.

#### Private Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
North Highlands	1898	GA	Chattahoochee	GPC*	36	North Highlands Lake	None
Morgan Falls	1903	GA	Chattahoochee	GPC*	17	Bull Sluice Lake	None
Goat Rock	1912	GA	Chattahoochee	GPC*	26	Goat Rock Lake	0.008
Flint River	1921	GA	Flint	GPC*	5	Lake Worth	0.008
Bartlett's Ferry	1926	GA	Chattahoochee	GPC*	192	Lake Harding	0.183
Oliver	1959	GA	Chattahoochee	GPC*	60	Lake Oliver	0.032

\* Georgia Power Company

Note: Georgia Power Company also owns two small dams (Langdale and Riverview) on the Chattahoochee River above Columbus, Georgia. In addition, Consolidated Hydro owns the Eagle-Phenix Dam, also on the Chattahoochee River above Columbus. In total, the generating capacity of these dams is less than 5 MW, and they have virtually no storage capacity.

The private owner dams have the capacity to generate 336 MW and can store 231,500 AF.

#### Dams Outside of the United States

There are no dams outside of the United States. The rivers in the ACF Basin are domestic, not international.

The total generating capacity of all the dams in the ACF River Basin is 728 MW. The total reservoir storage is 4.26 MAF.

**THE ALABAMA-COOSA-TALLAPOOSA (ACT) RIVER BASIN** - The U.S. Army Corps of Engineers ("USACE") has spent about \$877 million on the federal dams and locks. The dams were built for multiple purposes, including power and flood control. The Southeastern Power Administration does not own transmission infrastructure, nor is there any federal water supply infrastructure in the ACT River Basin (water supply is a local responsibility).

**Federal Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Allatoona	1949	GA	Etowah	USACE	80	Allatoona Lake	0.670
Claiborne	1969	AL	Alabama	USACE	None	Claiborne Lake	0.096
Millers Ferry	1970	AL	Alabama	USACE	75	William "Bill" Dannelly	0.332
Robert F. Henry	1971	AL	Alabama	USACE	68	R.E. "Bob" Woodruff Lake	0.234
Carters*	1974	GA	Coosawatte	USACE	575	Carters Lake	0.473
Carters Rereg.*	1974	GA	Coosawatte	USACE	None	None	0.019

The federal dams in the ACT River Basin can generate 798 MW and store 1.8 MAF.

\* Carters and Carters Reregulation Dams are operated as a single system.

**Other Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Purdy	1964	AL	Little Cahaba	BWWB*	None	Purdy Lake	0.024

\* Birmingham Water Works Board

**Private Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Yates	1900	AL	Tallapoosa	Alabama Power Co.	33	Yates Lake	0.054
Thurlow	1900	AL	Tallapoosa	Alabama Power Co.	54	Thurlow Lake	0.018
Lay	1914	AL	Coosa	Alabama Power Co.	164	Lay Lake	0.265
Mitchell	1923	AL	Coosa	Alabama Power Co.	156	Mitchell Lake	0.170
Martin*	1926	AL	Tallapoosa	Alabama Power Co.	150	Lake Martin***	1.625
Jordan**	1928	AL	Coosa	Alabama Power Co.	116	Jordan Lake	0.306
Weiss	1961	AL	Coosa	Alabama Power Co.	88	Weiss Lake	0.273
Logan Martin	1964	AL	Coosa	Alabama Power Co.	143	Logan Martin Lake	0.121
H. Neely Henry	1966	AL	Coosa	Alabama Power Co.	98	H. Neely Henry Lake	0.235
Bouldin	1967	AL	Coosa	Alabama Power Co.	226	Jordan Lake**	0.426
R.L. Harris	1983	AL	Tallapoosa	Alabama Power Co.	126	Harris Lake	

The private power dams in the ACT River Basin can generate 1,354 MW and can store 3.5 MAF.

\* Martin Dam contains 30% of all the storage in the ACT River Basin.

\*\* Jordan Lake supplies water to both, Jordan and Bouldin Dams (which is built on a canal).

\*\*\* Shares a common reservoir with Bouldin Dam and Lake.

**Dams Outside of the United States**

There are no dams outside of the United States. The ACT River Basin lies entirely within the United States.

The total generating capacity of all dams in the ACT Basin is 2,152 MW. Total reservoir storage is 5.3 MAF.

**THE DELAWARE RIVER** - The U.S. Army Corps of Engineers dams on the tributaries cost \$210 million to build and maintain. There is no federal transmission infrastructure on the river, nor is there any federal water supply infrastructure. Water supply is a local responsibility.

**Federal Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage* (MAF)
General Jadwin	1960	PA	Dyberry Creek	USACE	None	Jadwin	0.047
Francis E. Walter	1961	PA	Lehigh	USACE	None	Francis E. Walter	0.160
Prompton	1961	PA	Lackawaxen	USACE	None	Prompton Lake	0.073
Beltzville	1969	PA	Pohopoco	USACE	None	Beltzville	0.104
Blue Marsh	1977	PA	Tulpehocken	USACE	None	Blue Marsh	0.129

**Total federal reservoir storage is 513,000 af.**

\*The storage numbers above are the "maximum" the reservoirs can hold.

**Other Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Neversink	1953	NY	Neversink River	City of New York	None	Neversink	0.142
Downsville	1955	NY	East Branch	City of New York	None	Pepacton	0.411
Cannonsville	1964	NY	West Branch	City of New York	None	Cannonsville	0.301
Nockamixon-Tohickon	1973	PA	Tohickon Creek	DCNR*	None	Nockamixon	0.040
Marsh Creek	1973	PA	Marsh Creek	DCNR*	None	Marsh Creek	0.024

\*Department of Conservation and Natural Resources, a state agency in Pennsylvania.

Reservoir storage in non-federal (other) dams is 918,000 AF.

**Private Dams**

Several corporations own hydroelectric dams on tributaries. The combined generation capacity of the dams is 66 MW. The largest of these is Lake Wallenpaupack, Pennsylvania, owned by PPL, with the capacity to produce 44 MW. The Merrill Creek Reservoir in New Jersey, owned by a consortium of utilities, has a significant impact on river operations. The reservoir, built pursuant to the terms of the 1983 Good Faith Report adopted by the Delaware River Basin Commission, allows utilities to store water during drought to offset consumption downstream by power plants built after the interstate compact was signed in 1961. Merrill Creek has a usable storage of approximately 48,159 AF.

**Dams Outside of the United States**

There are no dams outside of the United States. The Delaware River is a domestic not an international river.

**THE SUSQUEHANNA RIVER** - The U.S. Army Corps of Engineers ("USACE") has spent approximately \$770 million to build and maintain its dams in the Susquehanna River Basin. There is no federal transmission infrastructure in the basin, nor is there any water supply infrastructure. Water supply is a local responsibility. The USACE has also spent about \$150 million on levees and other infrastructure on tributaries of the Susquehanna River for flood control.

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage* (MAF)
Whitney Point	1942	NY	Otselic	USACE	None	Whitney Point Lake	0.176
Arkport	N/A	NY	Canisteo	USACE	None	Arkport Lake	None
York Indian Rock	1942	PA	Codorus Creek	USACE	None	York Indian Rock	0.048
Almond	1949	NY	Canacadea Creek	USACE	None	Almond Lake	0.023
East Sidney	1950	NY	Oulcouth Creek	USACE	None	East Sidney Lake	0.034
Stillwater	1960	PA	Lackawanna	USACE	None	Stillwater Lake	0.017
Alvin R. Bush	1962	PA	Kettle Creek	USACE	None	Bush	0.117
Curwensville	1965	PA	West Branch	USACE	None	Curwensville Lake	0.209
Foster Sayers	1969	PA	Bald Eagle Creek	USACE	None	Sayers Lake	0.186
Aylesworth	1970	PA	Aylesworth	USACE	None	Aylesworth	0.030
Raystown	1973	PA	Juniata	USACE	None	Raystown	0.871
Tioga	1979	PA	Tioga	USACE	None	Tioga Lake	0.143
Hammond	1979	PA	Crooked Creek	USACE	None	Hammond	0.136
Cowanessque	1980	PA	Cowanessque	USACE	None	Cowanessque	0.171

Total federal reservoir storage is approximately 2.2 MAF.

\*The storage numbers above are the "maximum" that the reservoirs can hold.

#### Other Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Little Pine	1950	PA	Little Pine Creek	DCNR*	None	Little Pine	0.001
George Stevenson	1956	PA	Sinnemahoning Creek	DCNR*	None	Stevenson	0.002
Adam T. Bower*	1969	PA	Susquehanna	DCNR*	None	None	0.014

\*Formerly known as Sunbury-Fabridam. "DCNR" is the Department of Conservation and Natural Resources, a state agency in Pennsylvania.

#### Private Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
York Haven	1904	PA	Susquehanna	First Energy	None	York Haven	0.008
Holtwood	1910	PA	Susquehanna	PPL Holtwood	109	Lake Aldred	0.019
Conowingo	1928	MD-PA	Susquehanna	Exelon	548	Conowingo	0.301
Safe Harbor	1932	PA	Susquehanna	Constellation/PPL	420	Lake Clark	0.144
Muddy Run*	1967	PA	Susquehanna	Exelon	1,071	None	0.061

\*Pumped storage reservoir. At the time the Muddy Run was finished in 1967, it was the largest pumped storage in the world.

#### Dams Outside of the United States

There are no dams outside of the United States. The Susquehanna River is a domestic, not an international river.

**THE POTOMAC RIVER** - The U.S. Army Corps of Engineers (“USACE”) has spent \$215 million to build and maintain Jennings Randolph Dam. There is no federal transmission infrastructure on the Potomac River. Information regarding cost of federal water supply infrastructure is not available. The USACE does not publish data on the cost of constructing the Washington Aqueduct that supplies water to Washington, D.C. The USACE's duties in operating the aqueduct date back to 1869.

**Federal Government Dams**

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Jennings Randolph	1981	MD-WV	Potomac	USACE	None	Jennings Randolph	0.128 <sup>1</sup>

Note: Jennings Randolph Dam was formerly known as Bloomington Dam. The reservoir straddles the Maryland and West Virginia border. There are no other federal dams on the Potomac, except for two very small dams on the C&O Canal owned by the National Park Service.

<sup>1</sup> Total reservoir storage (all uses).

**Other Government Dams**

Name of Dam	Year Built	State	River	Owner*	Generation Capacity (MW)	Reservoir	Storage (MAF)
Brighton Dam**	1943	MD	Patuxent	WSSC	None	Triadelphia	0.019
Savage River***	1952	MD	Savage	UPRC	None	Savage	0.019
Rocky Gorge**	1953	MD	Patuxent	WSSC	None	Duckett	0.017
Occoquan	1955	VA	Occoquan/Potomac	FCWA	None	Occoquan	0.024
Little Seneca	1984	MD	Little Seneca Creek	WSSC	None	Little Seneca	0.012

\* "WSSC" refers to the Washington Suburban Sanitary Commission, a regional water and sewer agency in Maryland. "FCWA" refers to the Fairfax County Water Authority in Virginia. "UPRC" refers to the Upper Potomac River Commission, a state agency in Maryland.

\*\* The dams, located on the Patuxent River, are outside the Potomac River Basin but are included in this chart because the WSSC manages water releases pursuant to the Water Supply Coordination Agreement of 1982.

\*\*\* Savage Reservoir is not normally operated to supply domestic and industrial water. But the three water supply agencies (WSSC, FCWA, and the USACE's Washington Aqueduct Division) have agreed to pay 80% of the maintenance and operation costs of Savage Dam in exchange for the ability to make releases from the reservoir during droughts.

**Private Dams**

There are no private dams on the main stem of the Potomac River. But three tributary river dams and two dams on the Patuxent River (outside the basin) are managed as part of a coordinated interstate water supply strategy.

**Dams Outside of the United States**

There are no dams outside of the United States. The Potomac River is a domestic not an international river.

**THE CONNECTICUT RIVER** - The U.S. Army Corps of Engineers ("USACE") has spent \$250 million to build and maintain 14 dams on the Connecticut River. The dams are operated primarily for flood control. There is no federal transmission infrastructure on the Connecticut River, nor is there any federal water supply infrastructure. Water supply is a local responsibility. The USACE has spent about \$75 million for flood control levees and related infrastructure, most in the area of Hartford, Connecticut.

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage* (MAF)
Surry Mountain	1941	NH	Ashuelot	USACE	None	Surry Mountain	0.044
Knightville	1941	MA	Westfield	USACE	None	Knightville	0.064
Birch Hill	1942	MA	Millers	USACE	None	Birch Hill	0.076
Tully	1949	MA	Tully	USACE	None	Tully	0.036
Union Village	1950	VT	Ompompanoosuc	USACE	None	Dry Reservoir	0.050
Otter Brook	1958	VT	Otter Brook	USACE	None	Otter Brook Lake	0.025
Barre Falls	1958	MA	Ware	USACE	None	Barre Falls	0.063
North Springfield	1960	VT	Black	USACE	None	North Springfield	0.076
Ball Mountain	1961	VT	West	USACE	None	Blue Mountain Lake	0.084
North Hartland	1961	VT	Ottauquechee	USACE	4**	North Hartland Lake	0.095
Townshend Lake	1961	VT	West	USACE	None	Townshend Lake	0.054
Littleville	1965	MA	Westfield	USACE	None	Littleville	0.041
Conant Brook	1966	MA	Conant Brook	USACE	None	Conant Brook	0.005
Colebrook	1969	CT	Farmington	USACE	1**	Colebrook	0.137

**Total federal reservoir storage on the Connecticut River is 850,000 AF.**

\* The storage numbers above are the "maximum" that the reservoirs can hold.

\*\* The turbine-generators at North Hartland Dam are owned by the Essex Corporation. The turbine-generators at Colebrook Dam are owned by the Metropolitan District Commission ("MDC") in Hartford, Connecticut.

#### Other Government Dams

Name of Dam	Year Built	State	River	Owner*	Generation Capacity (MW)	Reservoir	Storage (MAF)
Holyoke	1900	MA	Connecticut	City of Holyoke	2	Holyoke	0.026
Cobble Mountain	1931	MA	Little	SWSB	None	Cobble Mountain	0.070
Phelps	1916	CT	Nepaug	MDC	None	Nepaug	0.034
Saville	N/A	CT	Nepaug	MDC	None	Barkhamsted	0.113
Mad River	1963	CT	Mad	CDEP	None	Mad River	0.011
Sucker Brook	1970	CT	Sucker Brook	CDEP	None	Sucker Brook	0.002

\* "CDEP" refers to the Connecticut Department of Environmental Protection, a state agency. "MDC" refers to the Metropolitan District Commission in Hartford, Connecticut. "SWSB" refers to the Springfield Water and Sewer Board in Massachusetts.

#### Private Dams on the Main Stem - Note: Dams with generating capacity of less than 10 MW are not included.

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Bellows Falls	1907	VT	Connecticut	TransCanada	49	Bellows Falls	0.030
Vernon	1909	NH-VT	Connecticut	TransCanada	22	Vernon	0.018
Cabot	1916	CT	Turner Falls Canal	NU	53	Cabot	0.016
Comerford	1930	NH-VT	Connecticut	TransCanada	164	Comerford	0.032
McIndoes	1931	NH-VT	Connecticut	TransCanada	13	McIndoes	0.006
Wilder	1950	NH-VT	Connecticut	TransCanada	42	Wilder	0.055
Moore	1957	NH-VT	Connecticut	TransCanada	192	Moore Lake	0.224
Northfield Mtn.*	1972	CT	Connecticut	NU	1,080	None	0.017

Note: TransCanada Hydro is a Canadian corporation with headquarters in Calgary, Alberta. Northwest Utilities ("NU"), based in Berlin, Connecticut, owns two dams, plus a large pumped storage hydroelectric project. "NH-VT" indicates the dam spans the river between New Hampshire and Vermont.

\*Underground pumped storage. The plant uses energy generated by NU's nuclear and fossil-fuel plants to pump water to a reservoir where it is released during high demand.

#### Dams Outside of the United States

There are no dams outside of the United States. The Connecticut River is a domestic not an international river. The dams listed above can store 1.5 MAF. The reservoir storage capacity of Quabbin Reservoir (Boston water supply) adds 1.26 MAF for a total of about 2.8 MAF.

**THE GREAT LAKES - ST. LAWRENCE RIVER BASIN** - The federal government owns only one dam ("US Government Plant," part of Soo Locks) located on the St. Mary's River between Lake Superior and Lake Huron. There is no federal transmission infrastructure in the Great Lakes-St. Lawrence River Basin, nor is there any federal water supply infrastructure. Water supply is a local responsibility. The U.S. Army Corps of Engineers' investments in flood control infrastructure in the Great Lakes Basin are comparatively minor. The major investments are for commercial navigation. The USACE has spent about \$650 million on locks and other navigation infrastructure on the St. Mary's River (including the Soo Locks) that link Lake Superior with Lake Huron. Other significant expenditures include about \$263 million to maintain navigation on the Detroit River in Michigan; \$250 million to maintain the harbor in Cleveland, Ohio; \$155 million to maintain the harbor in Toledo, Ohio; and \$118 million to maintain the Duluth Harbor in Minnesota. The St. Lawrence Seaway—built jointly with Canada—cost approximately \$470 million. About 71% was paid by Canada.

#### Federal Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
U.S. Government Plant (at Soo Locks)	N/A	MI	St. Mary's River	USACE	18	None	None

#### Other Government Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
St. Lawrence-FDR*	1958	NY	St. Lawrence	NYPA	800	Robert Moses	0.803
Niagara**	1961	NY	Niagara River	NYPA	2,400	Moses & Lewiston	2.227

\*The dam (sometimes called the Robert H. Moses Dam) spans the U.S. portion of the St. Lawrence River and joins with the Robert H. Saunders Dam, built across the Canadian portion of the river.

\*\*The U.S. share of the Niagara Project consists of the Robert Moses Niagara plant (1,950 MW) and the Lewiston Pump-Generating plant (450 MW) at Niagara Falls.

#### Private Dams

Name of Dam	Year Built	State	River	Owner	Generation Capacity (MW)	Reservoir	Storage (MAF)
Ludington PS	1973	MI	Lake Michigan	Consumers/Detroit	1,872	Ludington	0.054

Ludington Pumped Storage ("PS"). Water from Lake Michigan is pumped during off-peak hours 363 feet uphill to a reservoir from which water then flows by gravity through the turbine generators during peak times. The plant is jointly owned by Consumers Energy and Detroit Edison Company. Ludington is located on the shores of Lake Michigan, northwest of Grand Rapids, Michigan.

There are hundreds of smaller dams (i.e., typically less than 25 feet high) on tributary rivers in the Great Lakes Basin. A survey of those structures is beyond the scope of this report. There are no private dams on the main stem of the St. Lawrence River.

#### Dams Outside of the United States

1. There are two Canadian Dams on the border of Lake Superior and Lake Huron: Edison Sault has the capacity to generate 30 MW; and Francis Clergue had the capacity to generate 48 MW.
2. On the west side of the Welland Canal, linking Lake Ontario and Lake Erie, the Ontario Power Generation ("OPG") owns DeCew Falls Hydro (165 MW). OPG is a publicly-owned corporation supervised by the Province of Ontario. OPG assumed and now manages the assets formerly owned by Ontario Hydro.
3. Near Niagara Falls, OPG and the New York Power Authority jointly own the International Control Dam, which regulates the flow of water above Niagara Falls into the United States and Canadian dams.
4. At Niagara Falls, OPG owns the Sir Adam Beck Dam (1,780 MW).
5. OPG also owns the Robert H. Saunders dam (950 MW), which spans the Canadian portion of the St. Lawrence River and is a companion dam to the St. Lawrence-FDR Project owned by the New York Power Authority.