



Water Rights Arrangements in Australia and Overseas

Annex G *Colorado River Basin*

The views expressed in this annex are those of the staff involved and do not necessarily reflect those of the Productivity Commission.

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Abbreviations

AF	Acre-feet
AOP	Annual Operating Plan
BCPA 1928	Boulder Canyon Project Act 1928
BoR	US Bureau of Reclamation
CRB	Colorado River Basin
CRBPA 1968	Colorado River Basin Project Act 1968
CRC 1922	Colorado River Compact 1922
CWA 1972	US Clean Water Act 1972
DoI	Department of the Interior
EPA	US Environmental Protection Agency
ESA 1973	US Endangered Species Act 1973
FERC	US Federal Energy Regulatory Commission
FWS	US Fish and Wildlife Service
GL	Gigalitre
IBWC	International Boundary and Water Commission
kL	Kilolitre
ML	Megalitre
NEPA 1969	US National Environmental Policy Act 1969
SoI	Secretary of the Interior
UCRBC 1948	Upper Colorado River Basin Compact 1948
UCRC	Upper Colorado River Commission
USACE	US Army Corps of Engineers
US–Mexico Treaty 1944	Utilisation of Waters of the Colorado and Tijuana Rivers and of the Rio Grande Treaty 1944

Preface

Water Rights Arrangements in Australia and Overseas is a study that forms part of the Commission's program of benchmarking the performance of economic infrastructure industries. It continues previous work undertaken into the arrangements for setting drinking water quality standards. The study compares the legal, organisational and regulatory arrangements for managing water rights, against accepted best practice principles.

This annex is one of twelve case studies prepared to assist readers understand the complex legal, organisational and management arrangements of the jurisdictions studied. Case studies were prepared for the Murray–Darling Basin, NSW, Victoria, Queensland, South Australia, the ACT, the Colorado River Basin, California, Colorado, Chile, Mexico and South Africa. These case studies should be read in conjunction with the main report.

Research for the study and each of the annexes was undertaken by the Economic Infrastructure Branch, with Dr Neil Byron as mentoring Commissioner.

Many persons and organisations have assisted in the preparation of this case study. The Productivity Commission would like to thank especially the staff of the US Bureau of Reclamation (Lower Colorado River Commission) and the International Boundary and Water Commission. Further feedback from readers would also be welcome.

1 The water sector

The Colorado River Basin (CRB) stretches across seven western states of the United States — including California and Colorado — and the Republic of Mexico (see figure 1.1). Under agreement, additional areas in southern California — including the Imperial and Coachella valleys — that are outside the natural drainage area are considered part of the basin for the purposes of determining priorities to the use of Colorado River water.

The headwaters of the main Colorado River rise in the Rocky Mountains in Colorado and travel south-west through Utah, Arizona, Nevada and California and into Mexico where it spills out into the Gulf of California (or Sea of Cortez). Several tributaries feed into the Colorado River, the largest of which is Green River that rises in Wyoming and travels south to meet the Colorado in Utah.

The Colorado River's flows are highly variable on an annual and seasonal basis. Records show that annual flows have ranged between 75 000 Gigalitres (GL) and 30 000 GL per year. More than 70 per cent of the Colorado River's flow occurs in May, June and July (Pontius 1997).

Large-scale dams have been built to moderate flows and protect downstream areas from flooding. Largest are the Hoover and Glen Canyon Dams, which can store approximately 35 200 GL and 33 300 GL of water respectively. Total capacity of the reservoirs on the Colorado River is more than four times the average annual flow (Pontius 1997).

Evaporative losses from the Colorado River reservoirs are high, averaging more than 2500 GL a year (Pontius 1997). This equates to around 15 per cent of average annual flow.

Figure 1.1 Colorado River Basin



^a The Compact Point noted is Lee Ferry, the dividing point between the upper and lower basins.

Source: USGS (1997).

A number of diversionary facilities have also been developed, which transport water from the Colorado River and its tributaries to its point of use. There are more diversions in the upper basin, but lower basin diversions are much larger (Pontius 1997). The largest diversions include the:

- Colorado–Big Thompson Project, capable of transporting around 380 GL of water into eastern Colorado;
- Central Utah Project, which can divert up to around 124 GL of water west to supply Salt Lake City, Utah;

-
- San-Juan Chama Project in New Mexico, which has a capacity of around 136 GL and is used to supply Albuquerque, New Mexico;
 - Central Arizona Project, which can divert around 2800 GL to serve Phoenix and Tuscon, Arizona; and
 - Colorado River Aqueduct and All-American Canal, which can divert 1600 GL to supply Los Angeles and southern California.

The construction of dams and reservoirs, and the diversions in the lower basin and Mexico, preclude the Colorado River from flowing to the Gulf of California (or Sea of Cortez) in most years (Pontius 1997).

Approximately 80 per cent of the river's supply is used in agriculture. The Imperial Irrigation District of southern California is the largest user, accounting for almost 20 per cent of the river's average flow. Other major agricultural users are the Palo Verde Irrigation District and Coachella Valley Water District in southern California, the Central Arizona Project and the Central Utah Project (Pontius 1997).

The river's remaining flow is used for urban and industrial purposes and to supply ten Indian tribal reservations located within the CRB. Dams constructed along the river have also been used in the production of hydro-electricity and in flood mitigation programs.

2 Legal framework

The waters of the CRB are governed by a large number of compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the Law of the River. In addition, federal environmental protection legislation also influences the allocation and management of water resources.

2.1 The Law of the River

The key elements of the Law of the River are summarised. Other remaining elements of the Law of the River are listed in table 2.1.

Colorado River Compact 1922

The Colorado River Compact 1922 (CRC 1922) is an agreement between the seven Colorado River Basin states and the US Federal Government to share the waters of the Colorado River. The agreement divides use of Colorado River water between the upper basin and lower basin, with Lee Ferry (just below Glen Canyon Dam) determining the division point between the two (see figure 1.1).¹

The compact aims to expedite the agricultural and industrial development of the CRB, the storage of its waters and the protection of life and property from floods. It also establishes priorities between different types of uses, and requires that the flow, appropriation, consumption and use of the waters of the Colorado River be monitored and reported. It also establishes procedures for the settlement of disputes between the states.

The agreement was formulated because of concerns held by the upper basin states that the construction of the Hoover Dam and other water development projects would, under the Doctrine of Prior Appropriation, deprive them of their ability to

¹ Interestingly, the Compact was sealed in one of the wettest periods on record which saw an average annual flow of 23 000 GL. Since 1922, estimates of the river's average flow have been consistently revised downward, and between 1930 and 1996, the average flow was around 17 000 GL (Pontius 1997).

use the river's flows in the future. At the time, most of the increase in water demand was occurring in the lower basin states.

Table 2.1 Selected documents included in the Law of the River

<i>River and Harbor Act 1899</i>	<i>Consolidated Parker Dam Power Project and Davis Dam Project Act 1954</i>
<i>Reclamation Act 1902</i>	Code of Federal Regulations Title 43 Part 414
<i>Reclamation of Indian Lands in Yuma, Colorado River, and Pyramid Lake Indian Reservations Act 1904</i>	<i>Palo Verde Diversion Dam Act 1954</i>
Yuma Project authorised by the Secretary of the Interior on May 10 1904, pursuant to section 4 of the <i>Reclamation Act 1902</i>	<i>Change Boundaries, Yuma Auxiliary Project Act 1956</i>
<i>Protection of Property Along the Colorado River Act 1910</i>	<i>Water Supply Act 1958</i>
<i>Warren Act 1911</i>	<i>Boulder City Act 1958</i>
<i>Patents and Water right Certificates Acts of 1912</i>	Report of the Special Master, Simon H. Rifkind, <i>Arizona v. California</i> , et al, 1960
<i>Yuma Auxiliary Project Act 1917</i>	<i>International Flood Control Measures, Lower Colorado River Act 1964</i>
<i>Availability of Money for Yuma Auxiliary Project Act 1918</i>	Minute 242 (1973) of the International Boundary and Water Commission
<i>Sale of Water for Miscellaneous Purposes Act 1920</i>	<i>Southern Nevada Water Project Act 1965</i>
<i>Federal Power Act 1920</i>	<i>Supplemental Irrigation Facilities, Yuma Division Act 1970</i>
<i>Colorado River Front Work and Levee Systems Acts of 1925, 1927 and 1946</i>	<i>Colorado River Basin Salinity Control Act 1974</i>
<i>Rivers and Harbors Act 1935</i>	US Supreme Court Supplemental Decree 1984
<i>Parker and Grand Coulee Dams Authorisation Act 1935</i>	<i>Hoover Powerplant Act 1984</i>
<i>Parker Dam Power Project Appropriation Act 1935</i>	Numerous Colorado River Water Delivery and Project Repayment Contracts with the states of Arizona and Nevada, cities, water districts and individuals
<i>Reclamation Project Act 1939</i>	Hoover and Parker-Davis Power Marketing Contracts
<i>Boulder Canyon Project Adjustment Act 1940</i>	<i>Grand Canyon Protection Act 1992</i>
<i>Flood Control Act 1944</i>	<i>Reclamation States Emergency Drought Relief Act 1992, as extended in 2000</i>
<i>Gila Project Act 1947</i>	

Boulder Canyon Project Act 1928

The US federal *Boulder Canyon Project Act 1928* (BCPA 1928) ratifies the CRC 1922 and authorises the construction of the Hoover Dam and related irrigation facilities in the lower basin.

... the Secretary of the Interior, subject to the terms of the Colorado River Compact ..., is authorised to construct, operate and maintain a dam and incidental works in the main

stream of the Colorado River ... of not less than twenty million acre-feet [around 24 700 GL] of water and a main canal and appurtenant structures ... connecting the Laguna Dam ... with the Imperial and Coachella Valleys in California ... (BCPA 1928).

The BCPA 1928 establishes a fund to finance the nominated projects and set out repayment terms and governance arrangements for the fund and repayments.

The BCPA 1928 authorises the Secretary of the Interior (SoI) to operate as the sole contracting authority for water use in the lower Colorado River, and requires water supply and delivery charges to cover all operational and maintenance expenses. Irrigation and domestic water contracts must be on a permanent basis. Water contracts must conform to the arrangements set out in the BCPA 1928 governing the apportionment of the lower basin allocation between the three lower basin states.

California Limitation Act 1929

The *California Limitation Act 1929* holds California's use of the Colorado River to its apportionment under the BCPA 1928. In effect, the Act is a promise by California that the state would limit its annual consumptive use to that provided by the Law of the River and no more than half of any unapportioned surplus water.

California Seven Party Agreement 1931

The California Seven Party Agreement 1931 resolves the long-standing conflict between California agricultural and municipal interests over Colorado River water priorities. The seven principal claimants — Palo Verde Irrigation District, Yuma Project, Imperial Irrigation District, Coachella Valley Irrigation District, Metropolitan Water District, and the City and County of San Diego — reached consensus on the priority of use on an annual basis by each entity. Although the agreement does not resolve all priority issues, these regulations were incorporated into the major California water delivery contracts.

Utilisation of Waters of the Colorado and Tijuana Rivers and of the Rio Grande Treaty 1944

The Utilisation of Waters of the Colorado and Tijuana Rivers and of the Rio Grande Treaty 1944 (the 'US–Mexico Treaty 1944') provides for the allocation of the Colorado River between the United States and the Republic of Mexico.

The treaty permits the construction a diversionary structure in the Colorado River to enable the diversion of Mexico's allotted water. It also provides for the construction at Mexico's expense of such works in the United States as may be needed to protect Mexico from any floods and seepage that may result from the construction and operation of the diversionary structure.

Upper Colorado River Basin Compact 1948

The Upper Colorado River Basin Compact 1948 (UCRBC 1948) apportions the upper basin state's share of the Colorado River between the four upper basin states, and provided that portion of Arizona located within the upper basin with a minimum annual flow.

The Upper Colorado River Commission (UCRC) is established under this compact. The UCRC is charged with administering the compact.

Colorado River Storage Project of 1956

Colorado River Storage Project 1956 provides a comprehensive upper basin-wide water resource development plan and authorises the construction of Glen Canyon, Flaming Gorge, Navajo and Curecanti dams for river regulation and power production, as well as several projects for irrigation and other uses.

***Arizona vs. California* U.S. Supreme Court Decision of 1964 and Supplemental Decree 1979**

In 1963, the US Supreme Court issued a decision settling a dispute between Arizona and California. The dispute stemmed from Arizona's desire to build the Central Arizona Project so that it could use its full Colorado River apportionment.

California objected and argued that Arizona's use of water from the Gila River, a Colorado River tributary, constituted use of Arizona's Colorado River apportionment.

The US Supreme Court rejected California's arguments, ruling that lower basin states have a right to appropriate and use tributary flows within their respective states before the flow from the tributary co-mingles with the Colorado River, and that the doctrine of prior appropriation did not apply to Colorado River apportionments in the lower basin.

In 1964, the US Supreme Court issued a decree that proscribes the SoI from delivering water outside the framework of apportionments defined by the Law of the River, and mandated the preparation of annual reports documenting the uses of water in the three lower basin states.

A Supplemental Decree in 1979 settled controversy concerning the quantification and priority dates of presented perfected rights (see *Arizona v. California* 1964, Art. I(H)) to the use of Colorado River water, and the distribution of water to holders of ‘Miscellaneous Present Perfected Rights’ during times of water shortage.

Colorado River Basin Project Act 1968

The *Colorado River Basin Project Act 1968* (CRBPA 1968) authorised the construction of a number of water development projects in both the upper and lower basins, including the Central Arizona Project. It also makes the priority of the Central Arizona Project water supply subordinate to California’s apportionment in times of shortage, and directs the SoI to prepare the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs, in consultation with the Colorado River Basin states.

Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs 1970

The Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs 1970 provides for the coordinated operation of reservoirs in the upper and lower basins and sets conditions for water releases from Lake Powell and Lake Mead.

Code of Federal Regulations 1972

The Code of Federal Regulations, Title 43, Part 417 1972 requires that any use of Colorado River water in the lower basin by a right-holder must not exceed the volume reasonably required for the beneficial uses authorised by the right.

Interim Surplus Guidelines 2000

Commonly known as the California 4.4 Plan, the Interim Surplus Guidelines allow California to keep using more than its Colorado River entitlement as it reduces its use over the next 15 years subject to the approval of a Quantification Settlement Agreement by the signatories of the California Seven Party Agreement.

Storage and Inter-State Release Agreement 2001

On July 3, 2001, the Arizona Water Banking Authority, the Southern Nevada Water Authority and the Colorado River Commission of the state of Nevada entered into an agreement for Interstate Water Banking. The agreement aimed to create a program of interstate banking of Colorado River water in Arizona for the benefit of the Southern Nevada Water Authority.

Under the program, the Arizona Water Banking Authority acquires and stores main stream Colorado River water in Arizona, creating Long Term Storage Credits for the Southern Nevada Water Authority. The credits are held in an account established by the Arizona Department of Water Resources.

The Southern Nevada Water Authority can at some future date recover the credits and exchange the recovered water with Colorado River water users in Arizona.

2.2 Other compacts and legislation

There are a number of other federal laws, in addition to the Law of the River, that regulate water use. These include the US federal *Clean Water Act 1972*, the *National Environment Policy Act 1969*, the *Endangered Species Act 1973*, the *Wild and Scenic Rivers Act 1968*, and the *Fish and Wildlife Coordination Act 1965*.

US federal *Clean Water Act 1972*

Under section 404 of the US federal *Clean Water Act 1972* (CWA 1972), any applicant seeking to construct or modify water related infrastructure must obtain approval from the US Army Corps of Engineers (USACE) if the dredge and fill material created by the activity might have environmental consequences.

Under the Act, a navigable river is broadly defined to include all rivers in which recreational boating occurs, tributaries and wetlands. Waterworks are defined to be dams, canals and ditches necessary to bring more land under irrigation. Permits are not required for 'normal farming, silviculture and ranching activities' such as minor drainage, the construction of maintenance of farm, stock ponds, irrigation ditches, or the maintenance of ditches (Getches 1997).

US federal *National Environmental Policy Act 1969*

The purpose of the US federal *National Environmental Policy Act 1969* (NEPA 1969) is to promote economic activities while preventing or eliminating the damage to the environment.

All policies, regulations and public laws made by the US Federal Government must include an environmental impact assessment that includes a report on:

- environmental impact of the proposed action;
- any adverse environmental effects that cannot be avoided should the proposal be implemented;
- alternatives to the proposed action;
- the relationship between short-term use of man's environment and the maintenance and enhancement of long-term productivity; and
- any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented (USC s. 4331).

Any agency preparing an environmental impact assessment must also consult with and obtain the comments of any federal agency which has jurisdiction or special expertise. The comments and views of the appropriate federal, state and local agencies must also be accommodated in the study (USC s. 4332).

Finally, all federal agencies must ensure that their statutory authority, administrative regulations, and current policies and procedures are consistent with the intent, purposes and procedures of the NEPA 1969 (USC s. 4333).

US federal *Endangered Species Act 1973*

The purpose of the US federal *Endangered Species Act 1973* (ESA 1973) is to conserve and recover wildlife species listed as 'endangered' or 'threatened' and to conserve 'the ecosystems upon which endangered and threatened species depend' (FWS undated(a)).

The law requires federal agencies to consult with the FWS to ensure that the actions they authorise, fund, or carry out will not jeopardize listed species.

Federal agencies that are required to consult with the FWS must complete a biological assessment whether an endangered species or its critical habitat will be jeopardised by the action (FWS and NMFS 1998). This assessment is to be prepared

in accordance to the principles of an environmental impact assessment and can be prepared concurrently with the EIA requirements of the NEPA 1969.²

On the basis of its review, the FWS (on behalf of the SoI) will, under section 7 of the ESA 1973, provide a biological opinion and an incidental take statement. These state the FWS's view as to whether the proposed action will affect the endangered or threatened species or their critical habitats and the preferred method of addressing these concerns (FWS and NMFS 1998).

Similarly, persons seeking to undertake any activity that might jeopardise an endangered species or its critical habitat, must apply under section 10 of the ESA 1973, for an 'incidental taking' permit. A permit will be issued by the FWS on the grounds that the:

- taking is incidental;
- applicant will to the maximum extent practicable, minimise and mitigate the impacts of such taking;
- applicant will ensure that adequate funding will be provided;
- taking will not appreciably reduce the likelihood of survival or recovery of the species in the wild; and
- measures specified by the SoI will be met (ESA 1973, s. 10).

US federal *Fish and Wildlife Coordination Act 1965*

The US federal *Fish and Wildlife Coordination Act 1965* (FWCA 1965) also provides for the mandatory consultation with the FWS by any department or agency of the United States proposing to impound, divert, deepen a channel or stream for any purpose (16 USC s. 662(a)).

The FWS is required to report and recommend on the wildlife impacts of the proposed action. These reports are mandatory components of the federal agency's studies (such as environmental impact statements) into the proposal (16 USC s. 662(b)).

The Act also requires that adequate provisions must be made by any federal agency to protect wildlife. Federal agencies must give full consideration to the reports of the FWS and may adopt the Service's recommendations in adopting conservation measures and strategies (16 USC s. 662(b)).

² In California, preparation of EIAs and BAs by the BoR are also required under state legislation — *Californian Environmental Quality Act* and the *Californian Endangered Species Act 1973*. Usually the same report is prepared to satisfy the requirements of each legislation.

Finally, the Act also requires that any federal proposal before the US Congress must also specify estimates of:

- estimation of wildlife costs and benefits;
- the cost of providing wildlife benefits;
- the part of such the cost of joint-use facilities allocated to wildlife; and
- the part of such costs to be reimbursed to non-federal interests (16 USC 662 (f)).

US federal *Wild and Scenic Rivers Act 1968*

The US federal *Wild and Scenic Rivers Act 1968* (16 USC s. 1271 et seq.) outlines the procedures which the SoI and the Secretary of Agriculture must follow, to submit to the President and the US Congress rivers to be included onto the list of wild, scenic or recreational rivers.

The Federal Energy Regulatory Commission (FERC) must not license the construction of any infrastructure on or directly affecting the river. Similarly, other US federal agencies, such as the Bureau of Reclamation (BoR), are prevented from recommending or authorising, any water related project that would have a direct and adverse impact on the values of the river (16 USC s. 1278).

3 Organisations

The UCRC, the SoI, the BoR and the International Boundary and Water Commission (IBWC) are the principal agencies responsible for managing the flow and use of waters in the CRB. A number of federal agencies — such as the FWS — also have an active role in regulating the activity of water-related infrastructure in the states of the CRB.

3.1 Upper Colorado River Commission

The UCRC is an interstate administration agency created under the UCRBC 1948. The UCRC oversees the use of the overall allocations given to each upper basin state as determined by the Colorado River Compacts.

The UCRC does not administer water rights to individuals for the use of the Colorado River, water because this remains the preserve of the upper basin states. The UCRBC 1948 stated that the Compact:

... shall not apply to or interfere with the right or power of any [upper basin State] to regulate within its boundaries the appropriation, use and control of water, the consumptive use of which is apportioned and available to such State by this Compact (UCRBC 1948, Art. XV).

The duties of the UCRC are outlined in Article VIII(d) of the UCRBC 1948. Among other things, the UCRC is required to monitor and report on water use by the upper basin states, monitor the volume of water delivered to the lower basin each year, and report on incidences of serious drought or accidents that may prevent the US Federal Government from fulfilling its obligations to Mexico.

The UCRC is also required to determine the necessity for and extent of any curtailment of use by the upper basin states to maintain flows to the lower basin under Article IV.

The UCRC measures the extent of storage losses in the upper Colorado River and determines how these losses will be shared between the seven Basin states. In carrying out this function, the UCRC must observe the provisions of Article V of the UCRBC 1948.

Determinations made by the UCRC are not subject to review in any court, and any information within the possession of the UCRC must be made available to the upper basin State governors and the President of the United States (UCRBC 1948, Art. VIII).

The UCRC is comprised of five commissioners, one each appointed by the governors of Colorado, Wyoming, Utah and New Mexico and one appointed by the President of the United States. It reports annually to the governors of the four upper basin states and the President of the United States covering the activities of the UCRC and its estimated budget for the next year (UCRBC 1948, Art. VIII).

3.2 Secretary of the Interior

The SoI heads the federal Department of the Interior (DoI). Under the *National Reclamation Act 1902*, the SoI is authorised to develop irrigation and hydroelectric projects in 17 western states of the United States, including those in the CRB.

Under the BCPA 1928, the SoI is the watermaster of the lower basin of the Colorado River. Unlike the UCRC, the SoI administers the delivery of water pursuant to those rights. The SoI is responsible for monitoring water use in the lower basin states as well as reporting on consumptive uses and losses of water from the Colorado River system after each successive five year period.

The SoI is also responsible for managing the curtailment of use if available water does not meet the requirements of each of the lower basin states. Further, all users of Colorado River water in the lower basin must enter into water supply contracts with the SoI to be supplied with their water.

The SoI's authority in the upper basin is restricted to the operation of federally-financed dams. The right to use water in the upper Colorado River is administered for the upper basin states by the UCRC.

In 1970, under the requirements of the *Colorado River Basin Project 1968*, the SoI established Coordinated Long Range Operation Criteria for the operation of the storages in the upper basin and of the Hoover Dam in the lower basin. Under the Criteria, the SoI determines annually whether a normal, shortage or surplus water supply condition exists in the Lower Colorado River. This determination governs the sharing arrangements between the lower basin states that share the water apportioned to the Lower Colorado River Basin.

3.3 Bureau of Reclamation

The BoR, an agency within the DoI, was established under the *National Reclamation Act 1902* to distribute federal public land to settlers in the 17 western states. The BoR facilitates land distribution through the construction of dams, hydroelectric power plants, channels and pipelines (USC s. 43-12-390b(a), 421a).

The BoR carries out the functions required of the SoI in the states of the CRB, and is supervised and directed in this by the SoI. As such, the BoR operates as a water wholesaler and is responsible for the construction and operation of federally funded dams and diversionary facilities.

The BoR's mission is:

... to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public (BoR 2000a).

The mission goals and long-term goals of the BoR are framed within the five broad goals of the DoI (see table 3.1). The BoR reports to the Assistant Secretary for Water and Science of the DoI.

The BoR's water resources management activities include:

- encouraging water conservation and environmental restoration through partnerships, incentive programs, and challenge grants;
- meeting increasing water demands through water reclamation, recycling, and reuse, including work at the pilot San Diego Area Water Reclamation Program to help meet Los Angeles' water supply needs;
- maintaining Colorado River water supply for the 20 million people who rely on it;
- supporting self-determination efforts of Native American tribes; and
- minimizing impacts of extreme weather, by providing flood control benefits and drought contingency planning (DoI undated(a)).

Table 3.1 Linkages between the Department of Interior’s goals and the Bureau of Reclamation’s goals

<i>Department of Interior’s goals</i>	<i>Mission goals and long-term goals of the Bureau of Reclamation</i>
Protect the environment and preserve the nation’s natural and cultural resources	<p><i>Mission Goal 1</i></p> <p>Manage, develop and protect water and related resources to meet the needs of current and future generations by:</p> <ul style="list-style-type: none"> • increasing water availability through efficiency and project completion; • protecting water quality; • providing effective delivery of water and power generation • enhancing fish and wildlife habitat; and • protecting project land resources. <p><i>Mission Goal 2</i></p> <p>Operate, maintain and rehabilitate facilities safely, reliably and efficiently to provide project benefits by reducing risk to public safety.</p>
Provide recreation for the United States	Manage, develop and protect water and related resources to meet the needs of current and future generations by providing quality recreation.
Manage natural resources for a healthy environment and a strong economy	Operate, maintain and rehabilitate facilities safely, reliably and efficiently to provide project benefits by: <ul style="list-style-type: none"> • meeting power and water contracts. • ensuring effective operations of facilities; and • achieving cost-effective power production.
Provide science for a changing world	Identified as strategies under the mission goals and long-term goals.
Meet its responsibilities to Indian Tribes and its commitments to Island Communities.	Manage, develop and protect water and related resources to meet the needs of current and future generations by increasing opportunities for tribes to develop, manage and protect their water resources.

Source: BoR (2002a).

The BoR also has responsibility for several environmental restoration and protection activities. These include:

- preserving wetlands and adding to in-stream flows to increase migratory fish populations;
- enhancing fish and wildlife habitat, including endangered species such as salmon;
- championing environmental achievements on rivers such as the controlled flooding of the Grand Canyon, which had a significant restore the natural environment of the Colorado River; and
- bringing competing interests together to find consensus-based approaches to such areas as California’s Sacramento Delta–San Francisco Bay, to improve water quality (DoI undated(a)).

The *National Reclamation Act 1902* and its various amendments govern the BoR's activities. Following completion of the project, the BoR divests the water and land titles to the project partners (individuals, water user associations, municipalities, corporations, districts or states) as well as the daily operation of the water infrastructure, but retains the title of the project (USC ss. 43-12-390b(b), 395 and 421c).

All works undertaken or financed by the BoR are subject to the provisions of the US federal FWCA 1965, the CWA 1972 and the NEPA 1969.

3.4 International Boundary and Water Commission

The IBWC was established under The Convention of 1889 between the US Federal Government and the Republic of Mexico. Originally called the International Boundary Commission, the IBWC was originally charged with settling border disputes arising between the United States and Mexico when the rivers that defined the border changed their course.

The US–Mexico Treaty 1944 changed the Commission's name to the IBWC, and entrusted it with, among other things, the:

- application of the terms of the treaty;
- regulation and exercise of the rights and obligations which the two governments assumed under the treaty; and
- settlement of all disputes to which the treaty's observance and execution may give rise.

The US–Mexico Treaty 1944 also charged the IBWC with studying, investigating and reporting to the United States and Mexican governments on the need for hydroelectric facilities or flood control works along those sections of the River for which the IBWC is responsible. The IBWC provides estimates of the cost of these projects and can recommend which parts of the project the respective governments should be responsible for (IBWC, undated(a)).

The mission of the IBWC is to:

... apply the rights and obligations which the Governments of the United States and Mexico assume under the numerous boundary and water treaties and related agreements, and to do so in a way that benefits the social and economic welfare of the peoples on the two sides of the boundary and improves relations between the two countries (IBWC, undated(a))

The jurisdiction of the IBWC extends to the boundaries of the Colorado River, the land boundary between the two countries and to works located upon their common boundary. Generally, it takes in the Colorado River and its banks upstream to the Imperial Dam on the Californian-Arizona border and downstream to just below the Molares Dam in Mexico (US–Mexico Treaty 1944, Art. 12).

The IBWC’s organisational structure comprises a United States section and a Mexican section. An Engineer Commissioner, who functions under the foreign policy supervision of the Foreign Office of each government, heads each section. Wherever the treaty’s provisions call for joint action or joint agreement between the two governments, such matters are handled by or through the Department of State of the United States and the Secretariat of Foreign Relations of Mexico.

Each section retains jurisdiction over that part of the works located within the limits of its own country. Works located entirely within one country, although they may be international in character, remain under the jurisdiction of the section of the country within which they are located. However, the staff of each section may carry out observations, studies and fieldwork within the territory of the other section (US–Mexico Treaty 1944, Art. 2).

Each government bears the expenses incurred in the maintenance of its section of the IBWC. Joint expenses, which may be incurred as agreed upon by the IBWC, are borne equally by the two governments (US–Mexico Treaty 1944, Art. 2).

3.5 US Fish and Wildlife Service

The US Fish and Wildlife Service (FWS) is an independent agency within the DoI. Its primary responsibility is the conservation of fish, wildlife and plants, in particular migratory birds, endangered species, certain marine mammals and fresh and anadromous fish (FWS 1999).

The mission of the FWS is to work

... with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people (FWS 1999).

The FWS monitors and enforces a number of federal Acts, including the ESA 1973. Its functions include:

- managing the US Federal Government’s 500 national wildlife refuges;
- cooperating with other countries and the states of the United States in the preservation of migratory birds;

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- providing biological advice to other federal agencies, states, industry, Native American tribes and members of the public;
 - assessing the potential effects of projects that require federal funding, such as dams and reservoirs;
 - identifying endangered species and develop recovery plans; and
 - working to achieve landscape-level conservation of fish, wildlife, plants, and their habitats through coordination among all FWS programs and field stations, and through partnerships with other agencies, organizations and individuals (FWS 1999).

3.6 Other federal agencies

Federal Energy Regulatory Commission

The FERC is an independent agency within the Department of Energy, that is responsible for, among other things:

- licensing and inspecting the construction and operation of hydroelectricity projects; and
- implementing federal environmental regulations in its regulation of natural gas, oil, electricity and hydroelectricity projects (FERC undated (a)).

FERC's legal authority comes from the *Federal Power Act 1935*, the *Natural Gas Act 1938*, the *Natural Gas Policy Act 1978*, the *Public Utility Regulatory Policies Act 1978*, and the *Energy Policy Act 1992* (FERC undated (a)).

FERC is composed of five members who are appointed by the President of the United States, with the advice and consent of the Senate. Commissioners serve five-year terms, and have an equal vote on regulatory matters. No more than three members may belong to the same political party. One member is designated by the President to serve as Chair, and FERC's administrative head (FERC undated (a)).

FERC is also subject to federal environmental legislation including the NEPA 1969, the CWA 1972, the FWCA 1965 and the ESA 1973. When issuing licences for hydroelectricity projects, the FERC must take into account and seek to address any adverse impact on the environment. In addition, it must also:

- base its recommendations for mitigating any adverse environmental effects on the recommendations of federal and state fish and wildlife agencies; and

-
- give the same level of consideration to the environment, recreation, fish and wildlife, and other nonpower values that it gives to power and development objectives in making a licensing decision (FERC undated(b)).

United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE) is an agency of the US Department of Defence. In addition to its primary role of providing engineering services to the US military, the USACE is responsible for planning, designing, building and operating water-related infrastructure for navigation, flood control, and environmental protection purposes (USACE undated(a)).

The USACE is also subject to the NEPA 1969, the FWCA 1965 and the ESA 1973. The Corps is responsible for administering Section 404 permits under the federal CWA 1972. Section 404 of the Act seeks to regulate the construction and modification of major water-related infrastructure along navigable rivers in the United States.

4 Definition of water rights

Individual entitlements (rights) to Colorado River water remain the preserve of the states (Federal Code of Regulations, Title 43, Chapter 12, Subchapter 1, s. 383). The Law of the River apportions the available water between the states and establishes certain priorities in use. However, each state's water laws determine how an apportionment is sub-divided between users within the state.

Although rights remain the preserve of the states, users of Colorado River water in the lower Colorado River Basin cannot take water without a supply contract with the BoR (US Supreme Court Decree 1964, Art. II(B)(5)). After obtaining a recommendation from the relevant state-based authority, users must enter into a supply contract with the BoR for the supply of water. Contracts entered into for the supply of irrigation and domestic use are permanent contracts.

A number of US laws and treaties have created water rights that exist outside the water laws of the states of the United States. Federal reserve rights are water rights created by the US Federal Government during the reservation of federal land for particular purposes, such as Indian reservations, parks, wildlife refuges, national forests, military bases or any other land that requires water.

The Reserved Rights Doctrine (or Winters Doctrine) was enunciated by the US Supreme Court in 1908 (in *Winters vs. United States*, US Sup. Ct. 1908) to ensure that 'Indian and public lands set aside by the US government for a particular purpose would have adequate water' (Getches 1997, p. 308). The Supreme Court found that the Native American tribal reservations possessed established rights to water that predated the appropriation dates of settlers in Montana, even though the Indians tribes chose not to divert immediately their water and place it to beneficial use under Montana law. The court found, as the objectives of the federal government were to make the Indians a 'civilised and pastoral people' and because the lands were arid, that water rights existed by 'necessary implication' (Getches 1997, p. 309).

The volume of water reserved under the Winters Doctrine was that necessary for the reservation's specific purposes (Getches 1997). While federal rights are outside the state appropriation system, since the 1952 McCarran Amendment (43 USCA s. 666) applications to activate federal reserve rights must be made to a state's water

administrator to register the priority and determines the volume of water (Hobbs 1997, p. 26).

4.1 Allocations under the Law of the River

The Law of the River allocates 1.5 million acre-feet (AF) (~1850 GL) per year to Mexico, 7.5 million AF (~9250 GL) per year each to the upper and lower basins, and also makes provisions for American Native Tribes and those who perfected rights prior to 1922. The lower basin is also allowed to use an additional 1 million AF (~1200 GL) (CRC 1922) (see table 4.1).

Table 4.1 **Apportionment of Colorado River Basin water between the seven basin states**

	<i>Apportionment per annum</i>	<i>Principal governing Compact or Act</i>
Upper basin	7.5 million AF (~9250 GL) per year	<i>Colorado River Compact 1922</i>
Colorado	51.75 per cent of water available after supplying Arizona	<i>Upper Colorado River Basin Compact 1948</i>
New Mexico	11.25 per cent of water available after supplying Arizona	<i>Upper Colorado River Basin Compact 1948</i>
Utah	23.00 per cent of water available after supplying Arizona	<i>Upper Colorado River Basin Compact 1948</i>
Wyoming	14.00 per cent of water available after supplying Arizona	<i>Upper Colorado River Basin Compact 1948</i>
Lower Basin	7.5 million AF (~9250 GL) per year plus 1 million AF (~1200GL)	<i>Colorado River Compact 1922</i>
Arizona	2.8 million AF (~3500 GL) plus an additional 0.05 million AF (~62 GL)	<i>Boulder Canyon Project Act 1928</i> <i>Supreme Court Decision 1964</i> <i>Upper Colorado River Basin Compact 1948</i>
California	4.4 million AF (~5500 GL)	<i>Boulder Canyon Project Act 1928</i> <i>Supreme Court Decision 1964</i>
Nevada	0.3 million AF (~370 GL)	<i>Boulder Canyon Project Act 1928</i> <i>Supreme Court Decision 1964</i>

Until the Supreme Court Decree of 1964, the volume of water that could be used by the American Native Indian reserves was not quantified. Article II(D) of the Decree limited the rights of five American Native Tribal reserves in the lower basin to the

lesser of either a specific volume stated in the Decree or the volume necessary to irrigate a specified area of land.

Under the CRC 1922, the upper basin is committed to supplying 75 million AF (~92 500 GL) over 10 years to the lower basin. The upper basin cannot withhold water, and the lower basin cannot request water that cannot be reasonably applied to domestic and agricultural uses.

The lower basin states' allocation under the CRC 1922 is divided between the three basin states as follows: Nevada receives 300 000 AF (~370 GL), Arizona 2.8 million AF (~3450 GL) (BCPA 1928) and California 4.4 million AF (~5430 GL) (US Supreme Court Decree) (see table 4.1). No state may hold on to water or call for the delivery of water that cannot be reasonably applied to domestic and agricultural uses (BCPA 1928).

If any of the lower basin states cannot put all their entitlement to beneficial uses, then the SoI may deliver the unused apportionment from one lower-basin state to another lower-basin state. However, no rights to the recurrent use of that water are recognised (Supreme Court Decision 1964, Art. II(B)(6)). This provision has enabled California to use more Colorado River water than it was entitled to under the Law of the River.

The UCRBC 1948 allocates the upper basin states' share of the Colorado River between Arizona and the four upper basin states. The Compact provides for that part of Arizona located within the upper basin to receive 50 000 AF (~62 GL) per year from the upper basin states' share of Colorado River water. The four upper basin states then share the volume of water remaining in the upper basin apportionment according to the following percentages: Colorado about 52 per cent; New Mexico about 11 per cent, Utah 23 per cent and Wyoming 14 per cent (UCRBC 1948).

Shortages

If there is not enough surplus water available to supply Mexico with its share of Colorado River water, then the states of the upper and lower basins must each as a group supply 50 per cent of the deficiency from their own allocation (CRC 1922).

In the lower basin, California and Arizona are required to enter into an agreement over how the lower basin states' share of the deficiency shall be met (BCPA 1928). Upper basin states are required to supply water to meet their share of the deficiency in proportion to their take of Colorado River water (UCRBC 1948). For example,

the State of Colorado receives 51.75 per cent of Colorado River water and therefore must supply 51.75 per cent of any deficiency.

The exception to this, is if any upper basin state has used more than its entitlement during the previous 10 years. In this case, that state must supply a volume of water equal to its overdraft before any call is made upon any of the other states (UCRBC 1948). It should be noted that none of the upper basin states fully use their allocations under the Law of the River.

If the deficiency in Mexico's supply is caused by extraordinary drought or serious accident, then Mexico's share will be reduced in the same proportion as consumptive use in the United States needs to be reduced (US–Mexico Treaty 1944).

If the volume of supply to the lower basin falls below 75 million AF in the 10 year period, the upper basin states must share in the deficiency in the same proportion as the allocation under the UCRBC 1948. The exception is if any state has taken more than its allocation under the Compact.

Surpluses

Surplus is shared among the lower-basin states in the following proportions: 46 per cent for Arizona, 50 per cent for California, and 4 per cent for Nevada (US Supreme Court Decree 1964). Mexico may claim, but not establish title to, any waters that it receives over its allocation under the US–Mexico Treaty 1944. However, it may schedule for delivery of up to 1.7 million AF (~2000 GL) when surplus conditions have been declared on the lower Colorado River (US–Mexico Treaty 1944).

5 Government involvement in water allocation

Water available in the CRB is allocated between the seven basin states and Mexico according to the requirements of the Law of the River.

The Law of the River makes provision for the states to enter into such compacts or agreements that they may deem necessary for the storage, diversion and use of the Colorado River Basin waters. The states may also bring legal action against each other in the US Supreme Court, as the states of California and Arizona did in 1964, and have a third-party decide how water is allocated (CRC 1922, Art. VI and IX).

Generally, each of the respective states appoints a representative or representatives to negotiate any proposed compacts or agreements. Modifications to the operation of the Colorado River or the 'Law of the River' require US Federal Government approval. There are no rules or guidelines set out that govern the procedures used in these negotiations.

5.1 Acquisition programs

The Law of the River does not specifically provide water for environmental purposes other than the federal reserved rights for wildlife refuges in the lower basin specified by the US Supreme Court in *Arizona v. California*, 1964. The allocation of water for environmental purposes is the jurisdiction of each state and Mexico. However, the FWS exerts some influence on the way that water flows in the CRB are managed, under the federal ESA 1973.

In order to meet its obligations under the various federal and state laws, the BoR has entered into a number of cooperative ventures with interested parties and initiated a number of federally-approved recovery and conservation programs. These programs include the Upper Colorado Basin Endangered Species Recover Program, the San Juan Recovery Implementation Program, the Platte River Endangered Species Partnership and the Lower Colorado River Multi-Species Conservation Program.

In general, each recovery or conservation plan includes a number of sub-plans for each river or tributary, and for each endangered species and critical habitat. The

recovery implementation plan for the Upper Colorado River includes a number of smaller sub-plans dealing with:

- improving flow conditions by adding water to rivers when needed by fish;
- improving and developing river habitat;
- reducing non-native fish populations; and
- restocking rivers with endangered fish raised in hatcheries.

Most strategies also require the undertaking of supporting research.

Composition

Each program is managed by a steering committee representing major stakeholders. The precise composition differs across the programs although there tends to be a wide representation of federal, state, Indian, environmental and water user interests. Partners to the:

- Upper Colorado Basin Endangered Species Recover Program include the BoR, FWS, the National Parks Service and the states of Colorado, Wyoming, and Utah, a number of water users and environmental representatives;
- San Juan Recovery Implementation Program include the BoR, the US Bureau of Indian Affairs, FWS, the US Bureau of Land Management, a number of Indian tribes and nations, water users and the states of New Mexico, Colorado, and Utah;
- Platte River Endangered Species Partnership include BoR, the FWS and the states of Colorado, Wyoming and Nebraska, water users and environmental representatives; and
- Lower Colorado River Multi-Species Conservation Program (LCR MSCP) include the BoR, FWS, National Park Service, Bureau of Land Management and Bureau of Indian Affairs, the states of California, Arizona and Nevada, a number of Lower Colorado River Basin Indian Tribes, and hydroelectricity power companies (LCR MSCP undated(a)).

The steering committee is the peak decision making policy for the program. Usually, a policy decision by the committee must have the support either of all its state and federal members or of all its membership. For example, administrative decisions of the Platte River Endangered Species Project must have the support of all state and federal representatives and all but three of the total membership. As a practical matter, the committee operates by consensus.

The steering committees are usually supported by a number of sub-committees. For example, sub-committees for the Platte River Endangered Species Project include the

- Water Management Committee — responsible for conducting basin-wide studies of the potential for water conservation and supply projects;
- Water Action Plan Committee — responsible for implementing the Water Action Plan (and other state projects).
- Land Committee — responsible for developing guidelines for land habitat management, leasing, and acquisition.
- Technical Committee — responsible for developing the framework for habitat and species monitoring and research as well as a peer review process for scientific studies.

Resource assessment

Resource assessments are generally undertaken by the BoR on behalf of the program participants as part of the preparation of its biological assessment. The assessment includes an overview of:

- total water resources, level and timing of diversions and storage releases, types of water use, and the locations of impoundments, diversions and controls to the flow of water; and
- the river and the operations of the storage facility (BoR 1996).

The purpose of the assessments is to determine the volume of water available for reallocation for environmental purposes.

Objectives

The overarching objectives of the recovery programs are to ensure that the program complies with federal endangered species legislation and to ensure the continued development of water resources. For example, the goals of the San Juan Recovery Implementation Program are to:

- conserve populations of the pikeminnow (formerly known as the Colorado squawfish) and razorback sucker in the basin, consistent with recovery goals established under the ESA 1973 (16 USC 1531 *et seq.*); and
- proceed with water development in the basin in compliance with federal and state laws, interstate compacts, Supreme Court decrees, and federal trust

responsibilities to the Southern Utes, Ute Mountain Utes, Jicarillas, and the Navajos.

Conservation and recovery plans also provide for a range of objectives and goals — though the scope and detail varies across the plan and applicable sub-plans. In the case of the LCR MSCP, objectives and goals were specified for each land area and critical habitat, and for each endangered species. The conservation plan of the LCR MSCP also articulated a number of strategies that would be employed to meet these goals and objectives, such as undertaking an acquisition program for environmental flows (SAIC/Jones and Stokes 2002).

Impact assessment

In developing a recovery and conservation plan, three types of impact assessments undertaken are:

- biological assessments — which are undertaken by the BoR;
- biological opinions and incidental take statements — which are undertaken by the FWS; and
- draft and final environmental impact assessments — which are also prepared by the BoR and the parties to the program.

Biological assessments

Biological assessments are generally intended to be a prima facie investigation into whether the proposed action will jeopardise an endangered species or critical habitat. Biological assessments can include a description of:

- the action being considered;
- the specific area that may be affected by the action;
- any listed species and critical habitat that may be affected by the action;
- the manner in which the action may affect the species or habitat and the cumulative effects on that species or habitat;
- the existing conservation program (FWS 1998; BoR 1999).

Biological opinions

In response to the biological assessment, the FWS, under the ESA 1973, must undertake a biological opinion to confirm that the proposed action will jeopardise the endangered species or critical habitat. An opinion includes:

-
- a description of the proposed action;
 - the status of the species or critical habitat;
 - an environmental baseline, describing the species with the area and factors affecting that species;
 - the effects of the action; and
 - a summary of the cumulative effects of the action (FWS 1998).

The FWS must also release an ‘incidental take statement’ outlining the measures that need to be undertaken by the program:

- a description of the volume or extent of the take;
- the effect of the take;
- reasonable and prudent measures, where appropriate; and
- terms and conditions (FWS 1998).

An incidental take statement’s reasonable and prudent measures can form the basis of a conservation or recovery plan (FWS 1998). For example, in the Upper Colorado River Endangered Fishes Recovery Program, the FWS’s programmatic biological opinion, for each of the several Upper Colorado River sub-basins, specified how the program will meet its dual objectives within each sub-basin.

In each of these cases, agreement was reached between the recommendations of the biological opinion and the program’s steering committee. For example, under the San Juan Recovery Implementation Plan, the BoR accepted as reasonable and prudent the alternatives put forward by the biological opinion issued by Region 6 of the FWS on the Animas–La Plata Project.

Environmental impact assessments

As mentioned earlier, the NEPA 1969 requires federal agencies such as the BoR to evaluate and report to decision-makers (such as the SoI) and to the public on the effects of their proposed actions and a range of reasonable alternatives to the action, and the agencies’ preferred alternative.

Thus the BoR must undertake environmental impact assessments as part of regular review of its operations and when seeking to fund and construct new water infrastructure.

According to the Platte River Endangered Species Project, the NEPA 1969 required:

- full evaluation and reporting of the environmental impacts of proposed federal actions;
- opportunities for states, local agencies, and the public to participate in the process; and
- that reasonable alternatives to the proposed program be explored and evaluated so that the decision-maker can make a fully informed decision about the alternative adopted.

Environmental impact assessments consider a wider range of factors than do biological assessments and opinions. They seek in part to achieve the most cost-effective strategy for achieving the dual goal of protecting the endangered species and allowing for the continued development of water resources. For example, in the Platte River Endangered Species Project, a public consultation of the environmental impact assessment canvassed:

- third-party impacts on water users, through changes in water quality and volume resulting from the reallocation of water to the environment;
- economic effects on tourism, flood control benefits, tax earnings;
- environmental benefits and costs to species and habitats;
- cultural impacts, such as hunting of waterfowl; and
- impacts on power generation, such as through changes to the timing of water releases (Platte River EIS Office 1998).

Transparency

There is a high degree of transparency in the processes employed to develop EIAs, biological assessments, biological opinions, incidental take statements, and conservation and recovery plans. In most instances, each of these are publicly available whether from the BoR, the relevant cooperative planning group or the FWS.

Consultation

Consultation is undertaken at two levels. First, under section 7 of the ESA 1973, all federal agencies must consult with the FWS.

Early public consultation is also a requirement of the NEPA 1969 in the preparation of an environmental impact assessment. In the case of the Lower Colorado River Multi-Species Conservation Program, a Public Involvement Plan was developed to provide for public consultation (BoR 1999a).

Second, across all programs, consultations involved both written and oral submissions from the broader community. For example, the Platte River Endangered Species Project held a series of meetings throughout the states of Wyoming, Nebraska, and Colorado to provide information to the public and obtain comments and suggestions.

In the case of the Platte River Endangered Species Project, the purpose of the public consultations were to invite comment on:

- alternative approaches to meeting the needs and purposes of the federal action; and
- impacts of the proposed program and alternatives that should be evaluated and reported (BoR 1998).

Community views are summarised in scoping reports, which are publicly available (see for example BoR 1999b). Scoping reports contribute to the development of a draft environmental impact assessment. Comments are invited on the draft environmental impact assessment before the assessment is finalised.

Review

Each of the programs operate for a defined period, after which they are subject to a review. For example, the Platte River Endangered Species Project is for a 15-year period. In the Lower Colorado River Multiple Species Conservation Program, there is an expectation that the program will last 50 years. In the case of the Upper Colorado River Endangered Fishes Recovery Program, the continued issuance of federal permits for water development projects and the recovery of fish and their habitat depend on the program's continued progress.

All the plans are based on the principle of 'adaptive management' and are therefore subject to an ongoing review of their success. For example, the program of the Platte River Endangered Species Project proposes:

- initial actions are taken to benefit the target species;
- the effects of these actions are closely measured over a period of time; and
- subsequent approaches can be modified or adapted as necessary to meet the overall goals of the program (based on the results of the initial efforts).

In each program described above, water is reallocated to meet the needs of the endangered species. The means by which water is obtained for the environment include:

- investing in new infrastructure and appropriating new environmental water rights;
- leasing or purchasing water from existing users; or
- requiring certain users, such as hydroelectricity utilities under regulation of the Federal Energy Regulatory Commission, to appropriate new water sources.

For example, in the Yampa River Management Plan (part of the Upper Colorado River plan), 3700 AF (~4.5 GL) of water was appropriated from Elkhead Reservoir, 2000 AF (~2.5 GL) of water was leased from Steamboat Lake and water was also leased from the Colorado River Water Conservation District (CWCB 2001).

However, water rights were not expropriated from existing water users. In the case of the San Juan Recovery Implementation Program, it is a policy that nothing in the program should be construed to affect the right to use water under any federal or state law or permit, federal contract, treaty, interstate compact or the right of any party in any adjudication proceeding to determine rights to use water or to contract for water.

6 Administering water rights

As noted in chapter 4, administering water rights to CRB water users remains the preserve of the seven US basin states, the BoR in the lower Colorado River Basin, and the Republic of Mexico. The administration procedures that the US states of California and Colorado and the Republic of Mexico follow are detailed in Productivity Commission (2003a to 2003c).

6.1 Section 404 applications

In many instances, applications for water rights in the 17 western states of the United States (including Colorado and California) must first obtain federal government approval to construct the necessary waterworks. Approval is granted through the issuance of a permit by the USACE. The USACE may issue a permit, recommend conditions on the issue of a permit, or deny the issue of a permit (Hobbs 1997, p. 30).

The Secretary of the Army, acting through the Chief of Engineers, is authorized to issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into waters of the United States at specified disposal sites. Selection of such sites must be in accordance with guidelines developed by the US Environmental Protection Agency (EPA) in conjunction with the USACE (USACE undated(b)).

The process of approving section 404 permits follow three steps: pre-application consultation (for major projects), formal project review and decision making.

Pre-application consultation usually involves one or several meetings between the applicant, the USACE and interested resource agencies (federal, state, or local), and sometimes the interested public. The process is intended to assist the applicant to discuss the project's objectives and to identify other alternatives that would meet the project's objectives and reduce the impacts of the project (USACE undated(b)).

A formal project review begins after the pre-application consultation, in which the USACE prepares a public notice, invites public participation, and evaluates the impacts of the project. The USACE also enters into negotiations for the necessary modifications of the project if required (USACE undated(b)).

At this stage, the USACE undertakes a review of the public interest by considering all the relevant factors including: conservation, economics, aesthetics, wetlands, cultural values, navigation, fish and wildlife values, water supply, water quality, and any other factors judged to be important. The following general criteria are considered in evaluating all applications:

- the relevant extent of public and private needs;
- where unresolved conflicts of resource use exist, the practicability of using reasonable alternative locations and methods to accomplish project purposes; and
- the extent and permanence of the beneficial and detrimental effects when the proposed project may have on public and private uses to which the area is suited (USACE undated(b)).

No permit is granted if the proposal is found to be contrary to the public interest.

The USACE then prepares a final document announcing its decision. The document includes a discussion of the environmental impacts of the project, the findings of the public interest review process, and any terms and conditions required of the proposed application (USACE undated(b)).

As mentioned earlier, the USACE must refer the application to the FWS under the requirements of the FWCA 1965 and the ESA 1973.

7 Distribution management

The distribution of the water of the CRB is governed by the Law of the River. Of particular relevance are the CRC 1922, the BCPA 1928, the UCRBC 1948, the US–Mexico Treaty 1944 and the Supreme Court Decree of 1964.

7.1 Upper basin states

The upper basin states do not engage in a formal process for determining how much water is to be made available to each state each year. None of the upper basin states fully utilise their allocations under the Law of the River. As a result, there is little need for an allocation plan.

Essentially, the upper basin states use as much Colorado River water as they need. What is not used is stored in the Glen Canyon Dam to guarantee deliveries to the lower basin and Mexico. In times of severe drought, the upper basin states will divert as much Colorado River water as they physically can, and the lower basin and Mexico will be supplied from stores in the Glen Canyon Dam (UCRC, pers. com., 7 March 2003).

If and when the upper basin states near their allocations under the Law of the River (expected in the year 2060), then the UCRC may be tasked with planning the allocation of water between the upper basin states (UCRC, pers. com., 7 March 2003).

7.2 Lower basin states

The BoR has the authority every year to determine how much water is to be made available to the lower basin states. This is operationalised through the BoR’s Annual Operating Plan (AOP). The AOP forecasts the availability of Colorado River water in the coming calendar year and sets out how the reservoirs along the Colorado River will be operated to supply each lower basin state and the Republic of Mexico with its apportionment.

The AOP must be consistent with the SoI's Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs. The Criteria requires the AOP to include:

... such detailed rules and quantities as may be necessary and consistent with the criteria ..., and shall reflect appropriate consideration of the uses of the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors (Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs 1970).

The Criteria also sets out a number of requirements for how reservoirs along the Colorado River must be managed (see box 7.1). The AOP must conform to these requirements, and any other requirements under environmental legislation, such as the ESA 1973, that govern dam releases for the preservation of aquatic resources.

Box 7.1 Dam operations in the Colorado River Basin

The BoR must operate the dams in the Colorado River Basin in a way that ensures that storage levels are sufficient to achieve the requirements set out in section 602(a) of the *Colorado River Basin Project Act 1968*. Storage levels must be sufficient to:

- supply one half of any deficiency experienced in supplying Mexico; and
- supply the Law of the River apportionments to the lower basin states.

Any water in the Glen Canyon Dam surplus to these requirements may be released:

- to maintain storage levels in the Hoover Dam (downstream of the Glen Canyon) at a level approximate with that of the Glen Canyon Dam;
- for use in the lower basin states provided that the use is reasonable and storage levels in the Hoover Dam equate to those of the Glen Canyon Dam; or
- to avoid spills from the Glen Canyon Dam.

Source: Colorado River Basin Project Act 1968, s. 602(a).

The stated objectives of the AOP are to determine:

- the operation of Colorado River dams under varying hydrologic and climatic conditions;
- the volume of water that must be in storage at 30 September each year to fulfill the requirements of section 602(a) of the CRBPA 1968 (see box 7.1);
- the water available for delivery pursuant to the US–Mexico Treaty 1944;
- whether normal, surplus or shortage conditions exist and whether reasonable consumptive requirements of main-stream users will be met; and

-
- whether water apportioned to a lower basin state but unused by that state can be used to satisfy beneficial consumptive uses of other lower basin states (AOP 2002).

Three hydrological scenarios are used in the AOP to forecast the availability of Colorado River water — the probable maximum, the most probable and the probable minimum reservoir inflow conditions. The inflows estimated for these three scenarios and the previous year's reservoir storage conditions are fed into the BoR's monthly reservoir simulation model. This model is used to plan reservoir operations for the upcoming 24-month period.

River operations under the plan can be modified during the year as runoff predictions are adjusted to reflect existing snowpack, basin storage and flow conditions. Operational strategies directed at meeting environmental requirements may also be varied.

The AOP is developed by the Colorado River Management Work Group (CRMWG). This Group comprises hydrologists, stream engineers and technical personnel from the seven basin states, federal agencies and conservation and special interest groups. Members are generally appointed by their agency or group head (CRMWG, pers. comm, 25 February 2003).

When developing a new AOP, a draft is prepared and circulated for comment by members of the CRMWG. Several meetings are held to develop and refine the draft, before a final meeting is held between late August and early September to approve the final version of the AOP (CRMWG, pers. comm, 25 February 2003).

Although there is no formal process to involve the general public, entities with an interest often review the document and send representatives to CRMWG meetings (CRMWG, pers. comm, 25 February 2003).

The final AOP is sent to BoR officials in the Washington office and the Assistant Secretary for Water and Science and their staff (including solicitors) for review. In their assessment, the BoR officials and the Assistant Secretary determine the AOP's compliance with the requirements of the Law of the River, including the SoI's Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs (CRMWG, pers. comm, 25 February 2003).

The AOP is then formally signed by the SoI and transmitted to the governors of the seven basin states (CRMWG, pers. comm, 25 February 2003).

Following acceptance of the AOP, the BoR develops a monthly operation plan that sets out how the BoR will operate its reservoirs in order to fulfill the requirements of the AOP.

7.3 Supplying the seven US basin states

In September each year, the 17 contractors in the lower basin petition the BoR for the volume of water that they wish to receive in the coming calendar year. The BoR either accepts or rejects these requests based upon the forecasts made available in the AOP and the requirements of the Long-Term Operating Criteria and the Colorado River Basin Project 1968. Where a petition is rejected, the BoR sets an alternative extraction limit for the contractor that conforms with requirements.

With their extraction limits for the coming year set, the contractors then forward to the BoR a monthly schedule of deliveries. If no schedule is submitted, the BoR will make deliveries according to the previous year's schedule.

7.4 Supplying the Republic of Mexico

Mexico's share of Colorado River water is delivered in accordance with schedules formulated within the rates specified in the treaty. These schedules are delivered to the BoR before 1 January in each calendar year, along with a weekly schedule of daily deliveries not in excess of the monthly volume requested (see box 7.2).

Box 7.2 Delivering Colorado River water to Mexico

The water allocated to Mexico must be delivered in accordance with the following two annual schedules.

Schedule I

Schedule I covers the delivery of 1 million AF (around 1200 GL) of water each year from the date the Davis dam is placed in operation until January 1, 1980, and the delivery of 1.125 million AF (around 1400 GL) of water each year thereafter. The schedule must comply with the following limitations.

The volume of 1 million AF must be delivered at a rate of between:

- 600 cubic feet (17 kL) and 3500 cubic feet (100 kL) per second in January, February, October, November and December; and
- 1000 cubic feet (28 kL) and 3500 cubic feet (100 kL) per second in the remaining months of the year.

Box 7.2 (continued)

The volume of 1.125 million AF must be delivered at a rate of between:

- 675 cubic feet (19 kL) and 4000 cubic feet (113 kL) per second in January, February, October, November and December; and
- 1125 cubic feet (32 kL) and 4000 cubic feet (113 kL) per second in the remainder of the year.

Schedule II

Schedule II covers the annual delivery of 0.5 million AF (620 GL) of water through the All-American Canal in Southern California from the date the Davis dam is placed in operation until January 1, 1980, and the delivery of 0.375 million AF (450 GL) of water each year thereafter. The schedule must comply with the following limitations.

The volume of 0.5 million AF must be delivered at a rate of between:

- 300 cubic feet (8.5 kL) and 2000 cubic feet (57 kL) per second in January, February, October, November and December; and
- 500 cubic feet (14 kL) and 2000 cubic feet (57 kL) per second in the remainder of the year.

The volume of 0.375 million AF must be delivered at a rate of between:

- 225 cubic feet (6 kL) and 1500 cubic feet (42.5 kL) per second in January, February, October, November and December; and
- 375 cubic feet (11 kL) and 1500 cubic feet (42.5 kL) per second in the remainder of the year.

If the volumes of water specified under Schedule II are delivered to Mexico by means other than through the All-American Canal, then Schedule II volumes and rates of delivery must be correspondingly diminished.

Source: US–Mexico Treaty 1944

The BoR makes the necessary releases from storages along the US section of the Colorado River to fulfil the monthly and daily delivery schedule.

Pursuant to the US–Mexico Treaty 1944, Mexico constructed the Morelas Dam and the Alamo Canal in the Colorado River, to enable the country to collect and divert the major part of its allotted waters from the river. Morelos Dam is operated and maintained by Mexico under the supervision of the IBWC.

In matters in which the IBWC may be called upon to make provision for the joint use of international waters, the following order of preferences serve as a guide:

1. domestic and municipal uses;
2. agriculture and stock raising;

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3. electric power;
 4. other industrial uses;
 5. navigation;
 6. fishing and hunting; and
 7. any other beneficial uses which may be determined by the IBWC.

All of the foregoing uses are subject to any sanitary measures or works which may be mutually agreed upon by the two governments, which hereby agree to give preferential attention to the solution of all border sanitation problems (US–Mexico Treaty 1944, Art. 3).

The waters diverted are used to irrigate lands in the Mexicali Valley. The dam is located 1.1 miles (2 km) downstream from the point where the California–Baja California land boundary intersects the river.

8 Monitoring and enforcement

Three institutions have the power to monitor and enforce the Law of the River — the UCRC, the SoI and the IBWC.

Under the CRC 1922, the chief official of each signatory state charged with the administration of water rights, together with the directors of the BoR and the United States Geological Survey shall cooperate, ex officio:

- To promote the systematic determination and coordination of the facts as to flow, appropriation, consumption, and use of water in the CRB, and the interchange of available information in such matters.
- To secure the ascertainment and publication of the annual flow of the Colorado River at Lee Ferry.

The governors of the states affected must appoint commissioners with appropriate powers to resolve disputes arising over the:

- waters of the Colorado River System not covered by the terms of the CRC 1922;
- meaning or performance of any of the terms of the CRC 1922;
- allocation of the burdens incident to the performance of any article of the CRC 1922 or the delivery of waters as herein provided;
- construction or operation of works within the CRB to be situated in two or more states, or to be constructed in one state for the benefit of another state; and
- diversion of water in one state for the benefit of another state (CRC 1922, Art. VI).

Any state may proceed with instituting legal proceedings against another state for the protection of its rights (CRC 1922, Art. IX).

8.1 The Upper Colorado River Commission

The UCRC is required by Article VIII(d) of the UCRBC 1948 to:

- Collect, analyse, correlate, preserve and report on data on stream flows, storage, diversions and use of the waters of the Colorado River and any of its tributaries.
- Make findings on the volume of water in the Upper Colorado River System used each year in the Upper Colorado River Basin and in each of the upper basin states.
- Make findings on the volume of water delivered at Lee Ferry during each water year. This activity is undertaken by the USGS which monitors and reports on the volume of water delivered to Lee Ferry.
- Report on incidences of serious drought or accidents to the irrigation system in the upper basin that may prevent the US Federal Government from fulfilling its obligations to Mexico. The UCRC must advise the governors of the upper basin states, the President of the United States, the US section of the IBWC, and such other federal officials and agencies as it may deem appropriate. To date, the United States has always made its required deliveries to Mexico (UCRC, Utah, pers. comm., 25 March 2003).
- Make and transmit annually to the governors of the signatory states and the President of the United States an estimated budget for the next year of operation and a report on its activities for the preceding water year. The annual report is publicly available.

The UCRC has the power under Article IV of the UCRBC 1948 to curtail the use of water by the upper basin states to maintain flows to the lower basin states and Mexico. As noted, in the event of such a curtailment, any state that has consumed more than its apportionment must supply a volume of water equal to its overdraft before any call is made upon the other upper basin states. To date, this enforcement action has not been required because the upper basin states have not used their full allocation (UCRC, Utah, pers. comm., 7 March 2003).

8.2 Secretary of the Interior

As watermaster for the lower basin states, the SoI monitors and projects the consumptive use of water made by the 17 major contractors (distributors of water) to ensure that annual diversion limits are not being exceeded. These projections are made available to the contractor on a monthly basis so that the contractor can adjust usage to remain within the annual diversion limit.

Currently there are no specific penalties imposed if one of the lower basin states uses more water than its apportionment.³ However, the BoR is investigating an inadvertent overrun and payback policy for contractors and individual diverters.

Under such a policy, a contractor who inadvertently diverts, pumps or receives water in excess of their entitlement for that year would be required to have a payback plan. Similarly, individual diverters who exceed their annual entitlement would be required to reduce their diversions below their annual entitlements in a subsequent year, or over a limited number of subsequent years, in a volume equal to the volume by which they had previously exceeded their entitlement (BoR, Nevada, per. comm., 21 March 2003).

In accordance with Article V of the Decree of the Supreme Court of the United States in *Arizona v. California* dated March 9, 1964, the SoI is required to prepare, maintain records and report annually on:

- Diversions, return flows and the consumptive use of water diverted from the mainstream of the Colorado River. The data must be stated separately for each diverter, each point of diversion and for each of the states of Arizona, California and Nevada.
- Releases of water through federally-controlled dams.
- Releases of water ordered by a party but not diverted by that party, and the volume of such water that is used to meet US–Mexico Treaty 1944 requirements with Mexico or meet the obligations to other users.
- The volume of water delivered to Mexico and any volume that is in excess of US–Mexico Treaty 1944 obligations.
- Diversions from the mainstream of the Gila and San Francisco Rivers and the consumptive use of such water for the benefit of the Gila National Forest.

In addition the SoI is required by section 601 of the CRBPA 1968 to publish a report on annual consumptive uses and losses of water from the Colorado river system every five years.

This 5-year report must include a breakdown of the beneficial consumptive use of water by major types of use, by major tributary streams, and, where possible, by individual states. The report is to be prepared in consultation with the states of the lower basin individually and with the UCRC. It is transmitted to the President, the Congress and to the governors of each state signatory to the CRC 1922.

³ States have apportionments, contractors, individual diverters and water users have entitlements.

If federal officers and agencies fail to comply with the provisions of the CRBPA 1968 — in the storage and release of water or the operation and maintenance of facilities — any affected state can take action in the Supreme Court of the United States. Consent is given to the United States to be party to such suit or suits, as a defendant or otherwise.

8.3 The International Boundary and Water Commission

Deliveries made by the BoR to Mexico are monitored jointly by the US and Mexican sections of the IBWC to ensure compliance with the US–Mexico Treaty 1944 allotments and schedules.

Each country’s section of the IBWC must construct, operate and maintain all necessary gauging stations and other measuring devices for the purpose of keeping a complete record of the waters delivered to Mexico and of the flows of the Colorado River downstream of the Imperial Dam in the United States.

For this purpose, there are six gauging stations operated by the IBWC on the Colorado River. The US section of the IBWC operates and maintains five other stations for treaty purposes. The Operations and Maintenance Division of the Operations Department of the US section of the IBWC collects the hydrological data from the river gauging stations in the United States. The results are fed through to the Water Accounting Division of the Operations Department.

The field data collected are jointly compiled and reviewed by the IBWC. Records of the flows of the Colorado River reaching Mexican points of diversion are published annually in IBWC bulletins entitled, ‘Colorado River and other Western Boundary Streams,’ in English and Spanish.

Copies of the bulletins in English may be obtained from the United States section office in El Paso, Texas.

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