Rio Grande Basin

US Army Corps
of Engineers ®
Albuquerque District

Report of Civil Works Activities

2011

REPORT ON THE CIVIL WORKS ACTIVITIES OF THE ALBUQUERQUE DISTRICT U.S. ARMY CORPS OF ENGINEERS IN THE RIO GRANDE BASIN DURING CALENDAR YEAR 2011

1. General

During calendar year 2011, the U.S. Army Corps of Engineers (Corps), Albuquerque District, undertook a wide range of activities in the Rio Grande Basin. These activities consisted of routine reservoir regulation and monitoring of streamflow conditions; deviations; flood risk management studies; ecosystem restoration, design and construction; operation and maintenance of flood risk management structures; planning assistance; floodplain management services; emergency rehabilitation assistance; and the regulation of dredged or fill materials into waterways.

2. Water Control Operations

This section characterizes river flows in 2011 and describes Corps actions to manage flood flows and non-flood flows throughout the year.

A. River Flows in 2011

In 2011, the Rio Grande Basin snowmelt runoff was below average. The table below shows the May 1st forecasts, ordered from north to south within the Rio Grande watershed.

Rio Grande Basin Coordinated May 1st Forecasts
Most Probable Snowmelt Runoff
(50% Exceedance)

Location	Snowmelt Runoff (x 1,000 acre-feet)		Percent of Average	
	Forecast	Actual	Forecast	Actual
Rio Grande at Del Norte	410	415	77	78
Platoro Reservoir Inflow	57	63	80	89
Conejos River at Mogote	160	166	80	83
El Vado Reservoir Inflow	178	175	75	74
Rio Grande at Otowi	380	330	50	44
Jemez Canyon Reservoir Inflow	6.2	4.4	14	10

B. Flood Operations

With below average spring runoff in the Rio Grande Basin, the Corps did not engage in any flood operations in 2011. However, the Corps remained engaged in external coordination activities with stakeholders up and down the Rio Grande from Alamosa, Colorado, to San Marcial, New Mexico.

C. Non-Flood Water Control Operations

Non-flood water control operations include activities such as emergency deviations to facilitate search and rescue and other activities that temporarily alter flow from dams, lakes and reservoirs along the Rio Grande.

i. Jemez Canyon Reservoir Operations

No storage occurred at Jemez Canyon Reservoir in 2011. The Corps continued to closely coordinate mitigation activities with the Pueblo of Santa Ana relating to the 2001 drawdown of the pool. In 2011, these mitigation activities included:

a. Sediment Transport and Gate Design Alternative Studies

The Corps completed the sediment risk assessment to identify any risks associated with mobilizing sediment into the Rio Grande. The project delivery team continued development of the environmental assessment (EA)/implementation document which is scheduled to be completed in 2012, subject to the availability of funding.

b. Trash Rack Cleaning

The trash rack was cleaned prior to spring runoff to allow improved flow through the dam.

c. Tamaya Drainage Project

The Corps finalized alternative formulations for mitigating the nuisance created by ponded groundwater behind the Tamaya levee along the Jemez River. The alternatives were presented to the Pueblo of Santa Ana in May 2011. The project delivery team began development of the EA and implementation document for the selected alternative and is scheduled to be finalized in 2012.

d. Long-Term Management Plan

The Corps initiated the development of a long-term management plan for the lands associated with the Jemez Canyon Dam and Santa Ana Pueblo. It is anticipated that this plan will be completed in early 2012 and will lead to resource management activities, including the management of invasive species, if funding is available.

e. Jemez Canyon Weir

After the Jemez Canyon Reservoir was drained in 2000, the Jemez River quickly re-established a channel in the reservoir sediments, almost immediately forming a headcut. In 2003, a small weir was emplaced within the Jemez Canyon Reservoir to stabilize upstream channel elevations and control the location of the reservoir-channel headcut. Since that time, bed elevations within the reservoir have continued to lower, creating a greatly incised channel. Additions to the initial weir have also continued, including additions to the main weir structure and adding a large-rock apron downstream of the main weir. In 2011, a hydraulic and sediment transport study was undertaken to assess current and future channel stability. Findings were that additional downstream incision is expected. A new study in 2012 will assess future weir stability and new design accommodations for the continued incision.

ii. Cochiti Dam and Lake Operations

The Corps continued to work with the Pueblo de Cochiti to characterize the impact of operations at Cochiti Lake on tribal resources. In addition, changes were made to the Cochiti Canal. These activities are detailed in this section.

a. Cochiti Baseline Study

The Cochiti Baseline Study was initiated in 2004 to support a series of subordinate research projects that characterize the impact of Corps activities at Cochiti Dam and Lake on Pueblo de Cochiti tribal resources. The study is being developed in consultation with Pueblo de Cochiti and other interested stakeholders. The Pueblo de Cochiti and the Corps signed a Cooperative Agreement in February 2010 supporting continuing work on this study.

Operations at Cochiti Lake have become crucial to addressing regional water management and environmental issues. Increased flexibility in the operations of Cochiti Dam and Lake would greatly expand the range of options available to water and natural resource managers in the Middle Rio Grande Valley. The major roadblock to altering Cochiti operations is the incomplete understanding

of the potential ecosystem impacts to date and those that might result due to potential future changes. Because of the Pueblo's physical proximity to the dam, and their ownership of adjacent lands, the Pueblo could potentially suffer immediate and irreversible adverse effects to tribal resources due to changes in reservoir operations. Lands and resources managed by other agencies would also be significantly affected by operational changes at Cochiti Lake. A thorough knowledge of these potential impacts is of paramount importance to the Pueblo de Cochiti, the Corps, and other agencies. The Cochiti Baseline Study is scheduled to be completed in December 2012.

When completed, the study will provide a baseline against which the impacts of future operational changes at the lake may be evaluated. Issues addressed in the study include: surface and subsurface hydrological analyses; water and sediment quality analyses; and biological, cultural, and economic impact analyses.

b. Effects of Las Conchas Fire on Cochiti Lake

On the afternoon of 26 June 2011 a tree fell on a power line on private property in the Jemez Mountains west of the Rio Grande, igniting the Las Conchas fire. The fire rapidly burned eastward, causing extensive damage to the headwaters of numerous streams tributary to the Rio Grande in the vicinity of Cochiti Lake. The fire eventually burned more than 150,000 acres, including areas in the headwaters of the Jemez River, and is the largest wildfire in New Mexico's history. While the loss of private homes and businesses was minimal when compared to the Cerro Grande Fire of May 2000, the headwaters of many drainage basins tributary to the Rio Grande above Cochiti Lake were intensively burned. Due to the severity of the burn, large portions of these headwaters have experienced near-total vegetation loss, and soil properties have been altered in ways that reduce infiltration and facilitate erosion. These changes have, in turn, significantly altered the local hydrology, allowing small storm events to produce larger flood events than they did historically. Given the arid nature of the regional climate, vegetation recovery is anticipated to be slow and flooding problems are expected to persist for many years.

Because of the heightened flooding danger, four emergency warning systems were emplaced in the burn areas that drain into Cochiti Lake. Hydrologic models have been developed predict peak flow magnitudes given a range of rainfall events from 1 inch to 5 inches. LiDAR data that covers the lower portions of these watersheds were collected in October 2011; these data are being used to develop hydraulic models for several tributaries that drain

directly into Cochiti Lake. The hydraulic models will be used to assess potential for flooding and long-term sediment accumulation in the lake in CY 12.

Debris in Cochiti Lake: After the fire, several storms in August 2011 delivered large volumes of woody debris into the Rio Grande and Cochiti Lake. Cochiti Lake Office contracted with Corps' San Francisco office to remove a significant portion of this woody debris. Cochiti Lake office staff continued the effort into early winter. The organic loading also affected the water quality in the Lake. Dissolved oxygen (DO) levels were measured throughout the summer and fall. Significant decreases in the DO level were documented after large storm events delivered organic/woody debris to the lake. In Fall 2011, a log-boom was installed in the headwater of Cochiti Lake with the goal of catching the material in the headwaters area, before it can float into the main lake or near the intake tower. Woody debris and organic matter loading is expected to continue to be a problem for years to come.

c. Cochiti Lake Sediment Yield Study

In September 2011, a climate-sediment study was completed for Cochiti Lake. This study was a collaborative U.S. Bureau of Reclamation (USBR)-Corps study that assessed how average sediment loading in the reservoir might be affected by future changes in stream flow due to climate change. The study considered only changes to temperature, precipitation and evapotranspiration as drivers; the effects of fire and vegetation change in the watershed were not modeled. Under all five modeled future climate scenarios, mid-21st Century water inflow to Cochiti Lake decreased and spring runoff was shifted to earlier in the spring compared to the historical baseline (1975-2005). As a result of decreasing runoff, the study projected declines in sediment deposition in Cochiti Lake relative to the historical baseline.

D. Endangered Species Act (ESA) Special Operations

Special operations in the Rio Grande Basin below Cochiti Lake for the Federally endangered Rio Grande silvery minnow (RGSM) and the Federally endangered Southwestern Willow Flycatcher (SWFL) continued. Monitoring of irrigation deliveries and flows below San Acacia Diversion Dam resulted in extensive communications between the Middle Rio Grande Conservancy District (MRGCD), New Mexico Interstate Stream Commission (NMISC), USBR, the U.S. Fish and Wildlife Service (USFWS), the City of Albuquerque, the Bureau of Indian Affairs, and the Corps.

Additional activities benefiting endangered species included:

i. Cochiti Lake Deviation – Bridging Strategy

The Corps is pursuing approval for the final two years of a five-year water operations strategy to manipulate spring storage and release from Cochiti Lake and Jemez Canyon Reservoir in order to mimic river flows that facilitate Rio Grande silvery minnow spawning and recruitment, and to provide overbank flooding necessary to create and maintain ideal habitat for the Southwestern Willow Flycatcher.

The decision as to which deviation action (spawning and recruitment versus overbanking) to implement during the spring runoff of any given year is made on an annual basis. The decision is based primarily on the March forecast, and is made with the concurrence of the Engineer Advisors to the Rio Grande Compact, as well as with written approval from the Pueblo de Cochiti, the Pueblo of Santa Ana (if Jemez Canyon Reservoir is involved), and the Rio Grande Compact Commission. The decision is also made in consultation with the USFWS and USBR.

The Corps received approval from South Pacific Division for a temporary three-year deviation from the approved water control plan for Cochiti Lake and Jemez Canyon Reservoir in March 2009 that ended following the 2011 runoff season. The Corps has requested an extension to the deviation of an additional two years that would include the 2012 and 2013 runoff seasons and end following the 2013 runoff season.

A deviation for silvery minnow recruitment water operations was planned and requested in 2011. However, the deviation was not executed due to the insufficient runoff volume to accommodate demand and deviation storage.

ii. Los Lunas Habitat Restoration Project

The Corps provided staff and funding to continue ecological monitoring at the Los Lunas Habitat Restoration Project as part of the Effectiveness Monitoring Plan under development by the Middle Rio Grande Endangered Species Collaborative Program. River flows were not sufficient in 2011 to inundate the habitat restoration features at this site. Therefore, silvery minnow were not surveyed. Vegetation and geomorphology monitoring were conducted in late summer by USBR staff, funded through the Corps' Collaborative Program funds..

iii. Other Restoration and Recovery Activities

The Corps continued to implement pertinent elements of the Reasonable and Prudent Alternative in the 2003 Biological Opinion issued by the USFWS. These activities included:

a. Coordination

Continued coordination was pursued among Federal and local authorities.

b. Habitat restoration

Corps projects include 614 acres of habitat restoration to date.

c. Overbanking Opportunities

The Corps initiated a study to identify overbanking opportunities in the Middle Rio Grande Valley and prioritize areas of concern when high flows occur. The report is scheduled for completion in 2011.

d. Galisteo Saltcedar Extraction

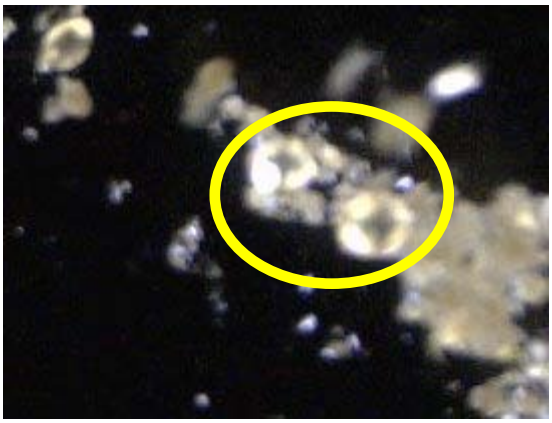
The Corps continued maintenance of the Galisteo Creek saltcedar extraction project by treating resprouts on the Phase I and Phase II locations. Phase III is scheduled to be complete in 2012, pending availability of funds.

e. ESA Section 7 Consultation – Middle Rio Grande Operations Consultation

The Corps submitted a Biological Assessment (BA) to the U.S. Fish and Wildlife Service on October 31, 2011, to reinitiate Endangered Species Act consultation. The BA addresses the operation of the four Corps reservoirs along the Rio Grande in New Mexico for: flood control; sediment control; storage of San Juan-Chama Project water in Abiquiu Lake; continuation of the temporary deviation in the detention schedule at Cochiti and Jemez Canyon Reservoirs to facilitate silvery minnow spawning until July 2013; and minor maintenance requirements. The Service has stated that they would not initiate consultation until the Bureau of Reclamation submits a Biological Assessment for their respective reservoir operations. The Corps has requested the assistance of the Department of Interior solicitor's office to resolve this delay.

iv. Zebra and Quagga Mussel Monitoring

Corps personnel at Abiquiu Reservoir and Cochiti Lake conducted plankton sampling from June through September 2011. Samples were collected using a 65-micron (µm) mesh net to filter a 1,000-liter volume at four sites at each lake. The monitoring was conducted in association with monthly water quality monitoring to optimize data collection. The monthly water quality parameters (temperature, dissolved oxygen, conductivity, pH, secchi disk) provide useful information for understanding ecosystem dynamics in each lake. The Corps shipped preserved plankton samples to the USBR Environmental Applications and Research Laboratory (Denver, CO) for microscopy and PCR (Polymerase Chain Reaction) analysis. PCR amplifies (makes large numbers of copies of) DNA fragments, which allows researchers to search for the presence of invasive species by evidence present in tissue fragments and waste products. None of the 2011 Cochiti Lake or Abiquiu Reservoir samples tested positive for zebra or quagga mussels. Current protocol requires positive identification of veligers (larvae) using microscopy in combination with PCR analysis to declare a water body infested.



Quagga mussel veligers from a Lake Mead sample used to evaluate digital microscopy as a screening tool for plankton samples.

E. Power Generation

The Corps does not regulate stream flows for the purpose of power generation. However, the construction of new power generation facilities, and alterations to existing facilities, can impact river flows. Therefore, changes to power generation capacity at Corps facilities along the Rio Grande and its tributaries are noted in this section.

i. Abiquiu Reservoir Low-Flow Turbine

Los Alamos County completed installation of a low-flow turbine generator to the existing power plant at Abiquiu Reservoir to take advantage of reservoir releases between 75 to 250 cfs. The licensee, Los Alamos County, installed the new 3.0 megawatt low-flow-turbine-generator unit in the existing powerhouse. The low-flow unit allows the project to more efficiently use available flows that are outside of the operating range of the existing units. Construction on the project started in November 2009, and the low-flow turbine entered service 21 April 2011.

3. Civil Works Authorities and Programs

This section describes projects for ecosystem restoration, flood risk management, and environmental infrastructure in Colorado, New Mexico and Texas.

A. New Mexico Investigation Studies

i. Española Valley, Rio Grande and Tributaries, New Mexico

The Corps initiated a reconnaissance investigation for the Española Valley study area in fiscal year 1991. Work on a detailed feasibility study began in 1993, but was terminated at the request of the local sponsor, the City of Española, in September 1996.

In December 2004, a reconnaissance study was completed in response to a request from Ohkay Owingeh and the Pueblos of Santa Clara and San Ildefonso, for a valley-wide general investigation study to address the potential for river restoration in the Española Valley. In December 2005, the three Pueblos signed a Feasibility Cost Sharing Agreement with the Corps to initiate a feasibility study to address river restoration projects, including sediment and water management, ecosystem restoration, recreation, and flood risk management. Feasibility study efforts are ongoing with a scheduled completion date in 2014, pending funding availability.

Rio Grande downstream of Arroyo Seco in the Española Valley

ii. Santa Fe, New Mexico

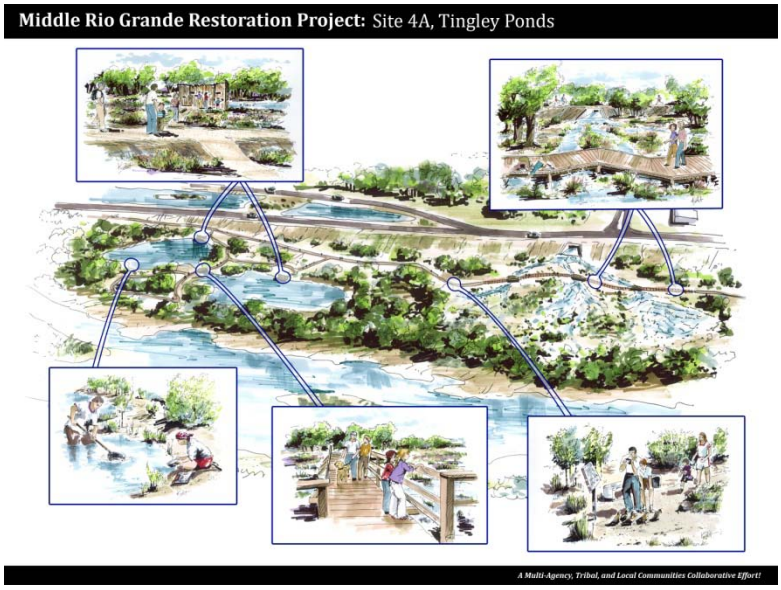
This watershed study is a cooperative effort between the Corps, the City of Santa Fe, and Santa Fe County. The study will result in a management plan for the Santa Fe River that will identify recommendations for potential "spin off" projects in the Santa Fe River watershed to address flood risk management, erosion, sedimentation, and ecosystem restoration. A feasibility cost sharing agreement was executed in August 2006, and the Corps evaluated existing baseline conditions for the original study area as delineated in 2006. At the request of the city and the county, the Corps expanded the study to incorporate the lower portion of the Santa Fe River to correspond to the existing reach of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. In 2011, work continued on the expanded watershed study, which is scheduled for completion in 2012.

Santa Fe River through the City of Santa Fe, New Mexico

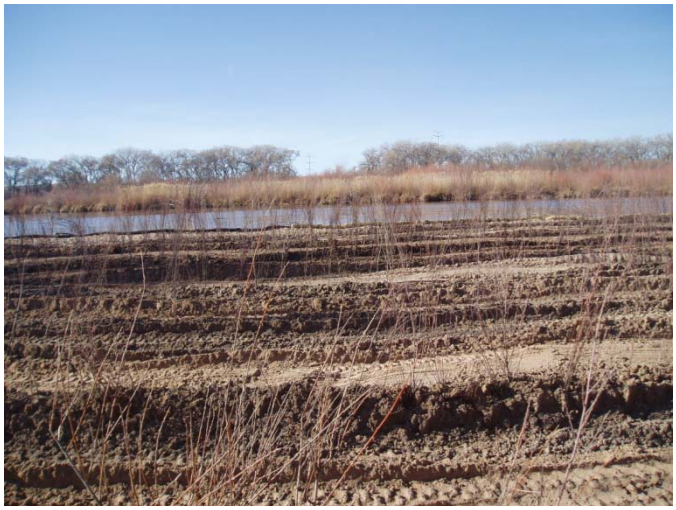
iii. Middle Rio Grande Restoration, New Mexico

This project was authorized for construction in Section 3118 of the Water Resources Development Act of 2007 (WRDA 2007), as amended. Project features incorporate ecosystem restoration management measures including the removal of unnecessary jetty jacks, removal of non-native plant species, creation of wetlands and high-flow side channels for Rio Grande silvery minnow habitat, and planting of native grasses, shrubs, and trees. Proposed recreation features include trails, interpretive kiosks, and canoe launches.

This project is located in Albuquerque, extending from the north end of the village of Corrales downstream to the Pueblo of Isleta, a distance of approximately 20 miles. The project addresses ecosystem restoration and recreation needs across 916 acres of the bosque. The reconnaissance study was completed in 2002. Work on the feasibility study, which was cost-shared with the MRGCD, began in September 2004. The draft feasibility report was completed in 2010 and the final report was completed in 2011. Construction of Phase I (approximately 600 acres) began in November 2011 and will continue until June 2013.



Middle Rio Grande Restoration Project artist rendering of restoration to be performed within the bosque along Tingley Drive.



Middle Rio Grande Restoration Project willow swale under construction in the bosque.

iv. New Mexico Tribal Partnership Program (Section 203)

Under the authority of this program, the Corps provides technical or planning assistance to Federally recognized Native American Tribes to address water resource challenges on tribal lands. Six new reconnaissance studies were initiated in fiscal year 2011, and a watershed assessment cost share agreement was executed with Santa Clara Pueblo, making it the first tribe in the nation to move into the assessment phase under the Tribal Partnership Program.

- Pueblo of Santa Clara Watershed Assessment: The Pueblo of Santa Clara in northern New Mexico is the sponsor for the study. The purpose of the study is to fully characterize flooding, erosion, and environmental restoration challenges within the Pueblo of Santa Clara watershed, including long-term planning for recovery from the state's largest wildfire, the Las Conchas Fire, that burned over 80% of the Pueblo's watershed in 2011. The Corps completed the reconnaissance study in 2010 and executed the watershed assessment cost sharing agreement in September 2011.

- Pueblo of Santa Ana Watershed Assessment: The Pueblo of Santa Ana is the sponsor of the study. The purpose of the study is to examine flooding, erosion, and environmental restoration challenges within the Jemez River and the Rio Grande watersheds as they pass through tribal lands, and to develop a comprehensive watershed management plan. The reconnaissance study will be completed in 2012.

- Pueblo of Santo Domingo Watershed Assessment: The Pueblo of Santo Domingo is the sponsor for the study. The purpose of the study is to examine flooding, erosion, and environmental restoration challenges and to develop a comprehensive watershed management plan. The reconnaissance study will be completed in 2012.

- Pueblo of Acoma Watershed Assessment: The Pueblo of Acoma in western New Mexico is the sponsor for the study. The purposes of the study are to fully characterize flooding, erosion, and environmental restoration challenges within the Pueblo of Acoma watershed, particularly along the Rio San Jose, in order to develop a comprehensive watershed management plan; and to examine the connectivity of the groundwater to mining activities in the upper watershed outside Pueblo boundaries. The initial watershed assessment was completed in 2010; a watershed assessment cost sharing agreement may be executed in 2012, dependent on funding availability.

- Picuris Pueblo Watershed Assessment: Picuris Pueblo, just south of Taos in northern New Mexico, is the sponsor for the study. The purposes of the study are to examine flooding, erosion, and environmental restoration challenges and to develop a comprehensive watershed management plan. The reconnaissance study will be completed in 2012.

- Navajo Nation – Rio Puerco (Arroyo Chico Sub-Basin); Navajo Nation – Little Colorado (Upper Puerco); and, Navajo Nation – San Juan (Chinle): The Navajo Nation is the sponsor for these three projects. The purposes of these studies are to examine flooding, erosion, and environmental restoration challenges, and to develop a comprehensive watershed management plan for each watershed. The reconnaissance studies will be completed in 2012.

View of Beaver Pond at the wetland on the Pueblo of Santo Domingo.

An example of environmental degradation from off-road vehicles on Santa Ana Pueblo.

Illegal dumping on Picuris Pueblo.

The Rio San Jose on the Pueblo of Acoma.

Santa Clara Creek on the Pueblo of Santa Clara.

v. Planning Assistance to the States Program

The Planning Assistance to the States Program is authorized under Section 22 of the Water Resources Development Act of 1974, as amended. The PAS State-wide Mapping project – in partnership with the State of New Mexico, and the PAS Grants Drainage Management Plan – in partnership with Cibola County, NM, both initiated in 2009, were completed in 2011.

B. New Mexico Construction Activities

i. Rio Grande Nature Center Habitat Restoration Project, New Mexico

Construction of this project was completed in March 2008. The Corps constructed the project to partially fulfill the requirement of habitat restoration under the 2003 Middle Rio Grande Biological Opinion, Reasonable and Prudent Alternative (RPA) Element S, which proposes "to conduct habitat/ecosystem restoration projects in the Middle Rio Grande to increase backwaters and oxbows, widen the river channel, and/or lower river banks to produce shallow water habitats, overbank flooding, and regenerating stands of willows and cottonwood to benefit the silvery minnow and flycatcher or their habitats." The Corps constructed the project to rehabilitate floodplain areas and reconnect an old channel to the river to create habitat for the Rio Grande silvery minnow. Additionally, the project will facilitate the regeneration of native vegetation suitable for the Southwestern Willow Flycatcher. Project monitoring documented the presence of Rio Grande silvery minnow in 2008 (n=268), 2009 (n=427) and 2010 (n=224) during the spring runoff and their subsequent escapement during channel drying. The data have been submitted to the USFWS. In 2011, the Corps monitored for flow through the channel in the project area. River flow was not sufficient to inundate the channel feature, with fish monitoring conducted in the river channel.

ii. Acequias Irrigation System, New Mexico

The Acequias Irrigation System Program addresses the rehabilitation of historically and culturally significant acequia community ditch systems throughout the state of New Mexico. The state of New Mexico is the local sponsor for the program. No acequias were constructed in 2011.

iii. Southwest Valley Flood Damage Reduction, Albuquerque, New Mexico

The project is located in the southwest valley of Albuquerque. The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) and Bernalillo County are the local sponsors for this project. The project consists of channel improvements and drains and includes local detention ponds and outlet structures. Construction of the first phase, the Los Padillas outfall, was initiated in 2010 and was completed in February 2012. Construction of the remainder of the project will be scheduled when funding becomes available.

Flooding in the southwest valley of Albuquerque, New Mexico

iv. Middle Rio Grande Flood Protection, Bernalillo to Belen, New Mexico

The primary feature is the construction of approximately 55.4 miles of levees to replace the existing spoil-banks along six unit segments of the Rio Grande (Corrales, Mountain View, Isleta East, Isleta West, Belen East, and Belen West) north and south of Albuquerque. The Middle Rio Grande Conservancy District (MRGCD) is the project sponsor. The project was authorized for construction in 1986 and construction of the first phase (Corrales Unit) was completed in 1997. Because of the long interval between plan formulation and construction, a General Reevaluation Report is underway for the Belen, Isleta, and Mountain View Units, which together extend south from the South Diversion Channel to the Belen Bridge in Belen, New Mexico. In 2011, work continued on the General Reevaluation Report, which is scheduled for completion in 2013, pending availability of funds.

v. Rio Grande Floodway, San Acacia to Bosque del Apache, New Mexico

The project extends along the Rio Grande from the San Acacia Diversion Dam, located north of the City of Socorro, New Mexico, downstream to approximately three miles north of the Burlington, Northern, and Santa Fe Railway Company (BNSF) railroad bridge that crosses the Rio Grande at San Marcial, New Mexico. This 43-mile reach is located in the southern-most section of the 150-mile-long Middle Rio Grande Valley. The primary feature of the proposed plan is the construction of a levee to replace the existing spoil-banks along the west bank of the Rio Grande to improve flood risk management for adjacent properties. The proposed levee will be located between the existing low-flow conveyance channel and the Rio Grande floodway. The MRGCD and the state of New Mexico are the project sponsors.

In 2011, work continued on a reevaluation report that included detailed formulation of alternative levee designs to identify the preferred alternative. The Reevaluation Report is scheduled for completion in 2012. Construction is scheduled to begin in 2012.

vi. Albuquerque Risk and Uncertainty Study

In 2011, a risk and uncertainty analysis (RUA) was completed for the Albuquerque Levees. This study assessed the current conditional non-exceedance probabilities (CNP) above 0.9 for all events up to and including the 0.4% chance event based on existing condition levee height. This included the (CNP) for the 1% chance flood event. Results found that throughout the Albuquerque area (with only a few exceptions), nearly all of the current levee heights are sufficient to convey both the 0.4% chance flow and the 1% chance

flood. In areas that the results did not show sufficient levee height, more detailed modeling and data are needed.

It should also be noted that the CNP considers levee height only and does not consider geotechnical deficiencies. When fragility curves are developed that account for geotechnical performance, this analysis can be updated. This is an important consideration since these levees have exceeded their design life, and this RUA only applies to top of existing levee heights and does not answer the larger question of levee reliability. These levees could potentially fail by means other than overtopping, due to issues related to seepage or slope stability.

vii. Hatch, New Mexico (Section 205)

The Section 205 feasibility study for Hatch, New Mexico, investigates alternatives to reduce flooding impacts in the Village of Hatch, New Mexico. The proposed project involves the construction of a small dam on Spring Canyon Arroyo. The study was suspended in 2010 due to nation-wide revocation of funding for the CAP program. The study is scheduled for completion in September 2013 pending availability of funding.

2006 Flooding at Hatch, Dona Ana County, New Mexico

viii. Las Cruces Dam, Environmental Restoration, Doña Ana County, New Mexico (Section 1135)

The project is located in the City of Las Cruces in the reservoir pool area formed behind the existing Las Cruces Flood Control Dam, which was constructed by the Corps in the 1970s. The purpose of the proposed project is to provide ecosystem restoration features that are consistent with established City of Las Cruces open-space policies and that reflect the needs and preferences of the citizens of Las Cruces. The proposed ecosystem improvements include the restoration of arroyo riparian and native Chihuahuan desert vegetation, creation of seasonal wetlands using reclaimed grey water, and construction of designated scenic overlooks, wildlife observation areas, and interpretive trails. The feasibility study was completed in 2011. Project construction is scheduled for 2012 pending available funding.

ix. Bernalillo, New Mexico (Section 205)

This project will investigate the replacement of the existing spoil banks with engineered levees along the Rio Grande at the town of Bernalillo to provide flood risk management for adjacent property. Initiation of this project is scheduled for 2012 pending availability of funding.

x. Central New Mexico Environmental Infrastructure Program (Section 593)

This program allows the Corps of Engineers to provide design and construction assistance to non-Federal interests in Bernalillo, Sandoval and Valencia Counties, New Mexico, for publically-owned, water-related, environmental infrastructure, and resource protection and development projects. No projects were constructed under the authority in 2011.

xi. New Mexico Environmental Infrastructure Program (Section 595)

This program allows the Corps of Engineers to provide design and construction assistance to non-Federal interests in the State of New Mexico for publically-owned, water-related, environmental infrastructure, and resource protection and development projects.

- West Mesa Industrial Park, New Mexico: The West Mesa Industrial Park Project is located west of the City of Las Cruces, New Mexico, and will protect local groundwater quality. The project sponsor is the City of Las Cruces. The project included construction of a sewer line extending under Interstate Highway 10 to connect to an existing sanitary sewer line

extension on the south side of the industrial park. The project replaced the septic tank systems for the airport and the National Guard Armory. Construction began in March 2010 and was completed in June of 2011.

- City of Santa Fe Canyon Road Water Treatment Plant Upgrades: The Canyon Road Water Treatment Plant is a surface water treatment plant for which the City of Santa Fe is upgrading out-dated equipment. Construction by the City of Santa Fe is expected to be completed in 2012.

- Village of Questa Water Line Improvements: The purpose of this project was to provide design and construction assistance for the replacement of the existing water line as well as air release valves, gate valves, and appurtenances. The Village of Questa completed Phase 1 of the project in 2009 and Phase 2 was completed in May of 2011.

C. Texas Investigation Studies

i. Northwest El Paso, Texas

In 1998, the Corps completed a reconnaissance study for Northwest El Paso in a reach extending from Canutillo to the New Mexico border. The study identified flooding problems resulting from tributary arroyos near Canutillo and recommended a potential flood risk management project and a floodplain management plan to minimize flood-related impacts to the area's growth. The Corps suspended the feasibility study to evaluate the reconnaissance alternatives in response to a June 2004 letter from the City of El Paso, the study sponsor. In 2005, the sponsor requested that the study be placed on hold while the City reevaluated their needs. In 2009, the El Paso Water Utilities Public Service Board, which has assumed the role of sponsor, requested that work on this project be resumed. Coordination with International Boundary and Water Commission (USIBWC) is currently underway for this project. The schedule for completion of the study is pending availability of funding.

ii. Sparks Arroyo Colonia, El Paso County, Texas

The study is located along Sparks Arroyo in El Paso County, Texas, near the Rio Grande and southeast of the City of El Paso. The feasibility study investigates measures to lessen the potential of flooding contributed from the uncontrolled Sparks Arroyo drainage area. The most recent flooding events occurred in August and September 2006 and again in July and September 2008.

2006 flood damage on Sparks Arroyo in El Paso County, Texas

In July 2005, the Corps noted that flooding in the valley below Sparks Arroyo might be attributed to the arroyos in adjacent sub-basins as well as from Sparks Arroyo. The Corps concluded that these sub-basins should be included in the study to assess their impact on the Socorro Valley south of the Sparks Arroyo Colonia and downstream of Interstate Highway 10. The sponsor, El Paso County, agreed to expand the study to include the two adjacent sub-basins. Evaluations showed that the proposed detention basin would not be sufficient to capture all of the flood waters that pond in the valley between Sparks Arroyo and the Rio Grande. In 2007, the Corps proposed additional detention structures in the valley to intercept the flood water. These structures were located in El Paso County and the City of Socorro.

In March 2008, the Corps placed the study on hold while the City of Socorro and El Paso County worked to resolve issues regarding the proposed location of project structures. At the request of the sponsor, the Corps resumed the study in 2009. The study is currently scheduled for completion in January 2015, pending availability of funds.

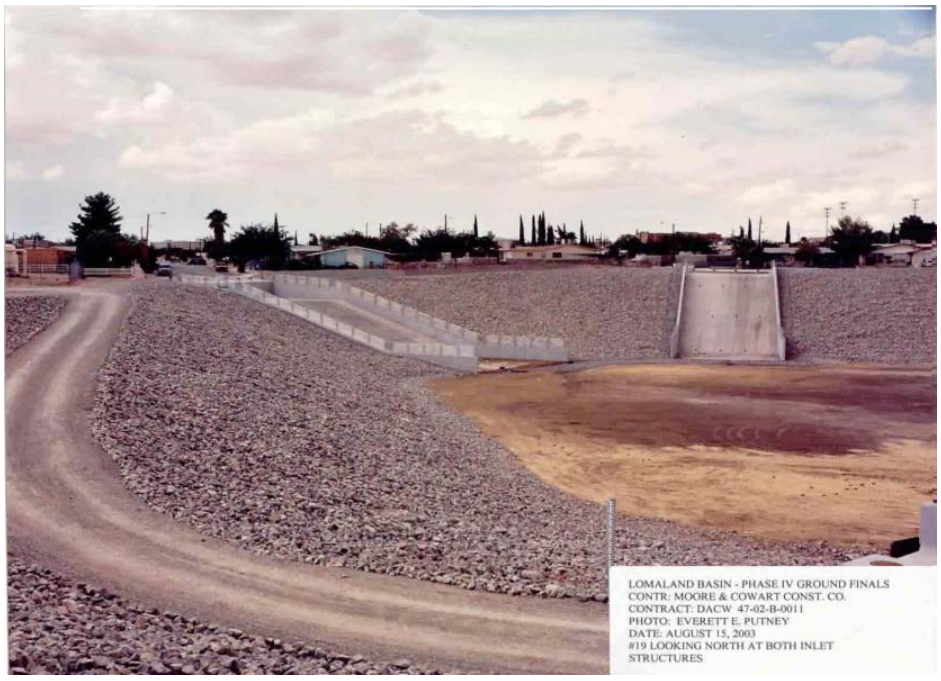
iii. Planning Assistance to the States Program

Planning Assistance to the States Program is authorized under Section 22 of the Water Resources Development Act of 1974, as amended. No projects were undertaken in Texas under this program in 2011.

D. Texas Construction Projects

i. El Paso, Texas

Runoff from the tributary arroyos on the eastern, southern, and western slopes of the Franklin Mountains often inundates sections of the City of El Paso and outlying suburban developments. The most recent flooding occurred in August and September 2006. The El Paso, Texas, flood risk management project consists of a single-purpose flood risk management system of detention dams, diversion dikes, conduits, and channels to collect, regulate, and discharge arroyo runoff into the Rio Grande. The El Paso project includes three independent elements: the Northwest Area, the Central Area, and the Southeast Area. The Corps completed the project features of the Northwest Area in 1986, and the design and construction of the Central Area projects were completed in 1987. The Corps completed most of the Southeast Area projects by 2003. However, the proposed Chevron Basin in the Southeast Area was not constructed due to environmental concerns at the site. A General Reevaluation Report needs to be prepared to determine alternatives to Chevron Basin to control residual flooding in the Southeast and Central Areas of the city. No funding was available for the work in 2011.



Carolina Basin (Lomaland System), Southeast El Paso, Texas

ii. El Paso County Environmental Infrastructure (Section 219)

The Water Resources Development Act of 2007 (WRDA 2007) authorized a program for water-related infrastructure and resource protection in El Paso County, Texas. Fiscal year 2011 funds were used to prepare construction bidding packages for water line replacement projects in the City of El Paso.

iii. Sun Valley, El Paso, Texas (Section 205)

Work resumed on the Sun Valley, El Paso, feasibility study in 2011. A feasibility cost sharing agreement was executed with the local sponsor, the El Paso Public Utilities Board, in September 2010. The project focused on evaluating flood risk management measures for the Sun Valley area in northeastern El Paso which is subject to flooding from the Castner Range at Fort Bliss. The study evaluation has found that recent drainage improvements by the City of El Paso will provide a high degree of flood protection for the area. No additional economically justified improvements have been identified so the study is being terminated.

E. Multi-State Studies

i. Rio Grande Basin, Colorado, New Mexico, and Texas (Section 729)

In 2008, in cooperation with the State of New Mexico (the sponsor), the Corps initiated a study focused on salinity management within the reach of the Rio Grande from San Acacia, New Mexico, to Fort Quitman, Texas. The U.S. Geological Survey (USGS) is currently preparing a report that will document existing salinity data, develop a baseline salinity budget, identify critical data gaps, develop management alternatives, and conduct an assessment of economic damages. The USGS is also developing a geospatial salinity database, and geographic data will be organized into the singular comprehensive salinity database. Part 1 of the study was completed in 2009, and work on Part 2 of the study began in 2010 and is scheduled for completion in 2012. Initial watershed assessments for the Broad Canyon State Park and Pecos Salinity Study were commenced in 2011.

ii. Rio Grande Environmental Management Program, Colorado, New Mexico, and Texas

The Water Resources Development Act of 2007 (WRDA 2007) provided authorization for Rio Grande Environmental Management Program. This program includes the entire Rio Grande Basin and all tributaries from the headwaters in Colorado to the Gulf of Mexico. The program includes two basic parts: (1) a program for planning, construction, and evaluation of measures for fish and

wildlife habitat rehabilitation and enhancements and (2) implementation of a long-term monitoring plan, computerized data inventory and analysis, applied research, and an adaptive management program. The program was not funded in 2011. The authorization for this program expired in September 2011. Congressional action is needed to extend this authority.

4. Regulatory Program (Section 404 of the Clean Water Act)

Under Section 404 of the Clean Water Act, a permit is required from the Corps prior to discharging dredged or fill materials into waters of the United States (U.S.), including adjacent wetlands. The Corps' responsibility under Section 10 is to regulate any work in, or affecting, navigable waters of the U.S. In 2011, the Albuquerque District Regulatory Division issued no standard individual permits in the Rio Grande Basin. However, 238 activities in the basin were reviewed during the period, and most were covered under Nationwide Permits. Nationwide Permits are activity-specific general permits, issued by the Chief of Engineers in Washington D.C., for projects that have minimal impact on the aquatic environment. Nationwide Permits are designed to regulate these minimal impacts with little, if any, delay or paperwork. The Nationwide Permits were authorized March 18, 2007, and are valid for five years from that date. The new Nationwide Permits will be reauthorized on March 18, 2012. Persons or agencies who are planning to conduct fill or excavation activities in any waterway are advised to contact the U.S. Army Corps of Engineers, Albuquerque District, Regulatory Division, 4101 Jefferson Plaza NE, Albuquerque, New Mexico 87109-3435 or telephone 505-342-3678.

5. Other Programs

This section of the report details activity on programs specific to the Rio Grande Basin.

A. Upper Rio Grande Water Operations Model

The Upper Rio Grande Water Operations Model (URGWOM) is a computational model developed through an interagency effort and is used to simulate processes and operations of facilities in the Rio Grande Basin in New Mexico as well as to complete accounting calculations for tracking the delivery of water allocated to specific users. The primary purpose of URGWOM is to facilitate more efficient and effective flood risk management operations, forecasting, accounting, and management of water in the Upper Rio Grande Basin. It is also used as a planning tool for analyzing future scenarios and solutions to meeting the growing water needs in the basin. URGWOM performs multi-contractor accounting and forecasting to simulate daily storage and delivery operations in the Rio Grande Basin. The water operations module of URGWOM is used to complete forecasting of operations for an

upcoming year for preparing an Annual Operations Plan (AOP) and the planning module of URGWOM is used to complete long-term planning studies.

Water management decisions are becoming even more complex and difficult because of the broad range of interests and issues that must be addressed. With the limited water supply, higher levels of precision and reliability in water accounting and forecasting are required while also allowing for analyses to be completed as efficiently as possible. A fundamental need to be addressed through continued computational modeling with URGWOM is assisting managers in delivering supplies to water users with minimum conflict. URGWOM is used to provide the community of water managers and water users with a clear, consistent, and common set of data to formulate, evaluate, and support decisions.

In 2011, RiverWare developers created a new version of RiverWare that will run on computers with 64-bit processers and eventually allow for larger URGWOM applications to be created and for model runs with longer simulation periods. Also, the Planning Model continued to be used as a key tool by the Middle Rio Grande Endangered Species Collaborative Program for analyzing water management scenarios for preparing new Biological Assessments being developed by the Corps and USBR.

Vegetated area surveys are completed periodically by NMISC, and a survey was completed in 2011. Work continued on stakeholder outreach of all activities involving URGWOM. Meetings with the Technical Team, Executive Committee and Advisory (formally Steering) Committee meetings were held periodically, and the URGWOM website was updated with details on recent activities, postings of the latest documentation, and meeting notes.

Tasks that were initiated in 2011 and are continuing in 2012 include development of the Lower Valley portion of URGWOM to represent physical processes and greater detail of the physical system below Caballo Dam. Significant work has also been completed to develop a test model for the Colorado portion of the basin that includes an approach for representing delivery of available water to the adjudicated water rights holders with consideration for curtailments for Compact deliveries. Work has begun to develop watershed models for the basin on two parallel tracks with the Corps leading work on individual HEC-HMS models for separate sub-basins, and Riverside Technologies Inc. completing development of watershed models to be used by the National Weather Service for providing forecasted flows. Watershed models are being developed to link to a real-time water operations module of URGWOM. The Tech Team has been completing reviews of data provided by the ET Toolbox and provided recommendations to USBR for further data reviews and enhancements to the information provided by the Toolbox. Support for ET Toolbox development and quality assurance/quality control (QA/QC) of ET Toolbox products

will continue to be provided to help assure the ET Toolbox provides information needed as part of continued work to enhance the Middle Rio Grande portion of URGWOM. Significant work is already underway to consolidate the data requirements for representing crop irrigation consumption. Work has also begun to incorporate needed capabilities in RiverWare for simulating water quality as water quality is expected to be an indicator of increased interest for future studies completed with URGWOM. The technical team is currently working on a plan for enhancing the procedure for database administration and updates.

B. Middle Rio Grande Endangered Species Collaborative Program

The Corps is actively participating in the Middle Rio Grande Endangered Species Collaborative Program. The Corps participates in all workgroups in addition to serving on the Executive Committee, the Coordination Committee, and the Program Management Team. The collaborative process among stakeholders is the key to solving the serious water resource challenges in the Middle Rio Grande Valley.

The Corps received $2.47 million in fiscal year 2011, of which approximately $870,000 funded Corps staff support for this program and the remainder funded work directly in the program area, including:

- In-field data collection to monitor habitat restoration projects for the Rio Grande silvery minnow and Southwestern Willow Flycatcher.
- Operational funding for three USGS sediment gages: Rio Grande at San Marcial, Rio Grande at San Acacia, and Rio Puerco near Bernardo.
- Operational funding for USGS stage gage at the Rio Grande Nature Center and for a temperature probe at the Alameda Bridge, Albuquerque.
- Initiation of a USGS study, similar to the study completed in the Big Bend National Park, to map aquatic mesohabitat in the Rio Grande between Cochiti and Elephant Butte Lakes, NM in support of minnow recovery efforts by the Program and the U.S. Fish and Wildlife Service.
- Completion of the Los Lunas Habitat Restoration Hydraulic Analysis Study.
- Funding of the Los Lunas Habitat Restoration Project Vegetation Mapping (completed by USBR staff).
- Funding of the Bosque Ecosystem Management Program (BEMP).
- Funding of Southwestern Willow Flycatcher surveys in the Middle Rio Grande bosque.
- Funding of design of interpretive displays for the Rio Grande Nature Center Habitat Restoration Project.
- Initiation of a Geomorphic/Hydrodynamic Monitoring Plan to analyze various ecosystem restoration projects along the Rio Grande in Albuquerque.

REPORT ON THE CIVIL WORKS ACTIVITIES OF THE ALBUQUERQUE DISTRICT U.S. ARMY CORPS OF ENGINEERS IN THE RIO GRANDE BASIN DURING CALENDAR YEAR 2011

March 21, 2012

6. Flood Plain Management Services Program

The Flood Plain Management Services (FPMS) Program was authorized by Section 206 of the Flood Control Act of 1960 (PL 86-645), as amended. The objective of the FPMS Program is to support comprehensive floodplain management planning with technical services and planning guidance at all appropriate governmental and community levels. These services are provided to state, regional, and local governments and to Indian tribes at no cost. Section 321 of WRDA 1990 requires recovering the cost of services provided to Federal agencies and to private entities. A fee schedule has been established. Section 202 of WRDA 1999 (PL 106-53) authorizes the Secretary of the Army to collect funds contributed voluntarily from state, regional, and local governments, Indian tribes, and other non-Federal public agencies for the purpose of recovering the cost of providing services pursuant to Section 206.

Services available include assistance in interpretation and evaluation of basic flood-hazard data, including the FEMA Flood Insurance Rate Maps; guidance in preparation of floodplain regulations; advice on the use of data regarding possible alternative developments in flood-prone areas; guidance on structural and nonstructural measures that might be employed to reduce flood hazard; and, in some cases, development of basic flood-hazard data.

One FPMS study was started by the Corps in the Rio Grande Basin during 2011, the Anthony, New Mexico, Drainage Management Plan. The Corps responded to approximately 11 requests for technical services and flood-hazard evaluations of specific sites in the Rio Grande Basin. Governmental agencies or persons having a need for floodplain management services should contact the U.S. Army Corps of Engineers, Albuquerque District, Hydrology and Hydraulics Section, Planning Branch, Planning, Programs, and Project Management Division, 4101 Jefferson Plaza NE, Albuquerque, New Mexico 87109-3435 or telephone 505-342-3471.

7. Rio Grande Levee Task Force

In response to Senate Memorial 18, which passed by unanimous vote of the New Mexico State Senate on March 3, 2009, a task force was convened by the MRGCD and the Mid-Region Council of Governments, working closely with the Corps, to evaluate the condition and status of levees in the Middle Rio Grande Valley. The initial task force meeting was conducted in April 2009. The task force continued to meet throughout 2011. Representatives of local and tribal governments, flood control authorities, irrigation districts, and state and Federal agencies attended the task force meetings. Speakers at task force meetings included representatives from the Corps, FEMA, and the Congressional delegation.

The task force presented a report to the Water and Natural Resources Committee of the New Mexico Legislature in 2009. The report recommended continuing the task force in 2010 to evaluate ongoing and potential future levee construction projects, determine priorities and long-term strategies for levee construction, and identify sources and opportunities for levee projects funding. A second task force report to the legislature was presented in November 2010 to address questions raised by the legislature in response to the 2009 report. A third report was presented to the legislature on October 11, 2011. A follow-on session was held on November 7, 2011 to address questions raised during the October briefing regarding cost sharing requirements for the Rio Grande Floodway, San Acacia to Bosque del Apache project to be addressed during the New Mexico State Legislature's 2012 session.

8. Flood Risk Management Program

The Corps established the National Flood Risk Management Program (FRMP) in May 2006 to integrate and synchronize Corps activities, both internally and with counterpart activities of the Department of Homeland Security, FEMA, other Federal agencies, state organizations, and regional and local partners and stakeholders.

One component of the FRMP is the Levee Safety Program. The Corps Levee Safety Program was established as a result of the National Levee Safety Act of 2007, which was authorized in WRDA 2007. The program entails a robust inspection program akin to the Corps Dam Safety Program and has consolidated current Corps guidance on levee evaluation into one Engineering Technical Letter (ETL), which was finalized in 2009. The final ETL 1110-2-571, "Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures" was issued April 10, 2009, to provide vegetation standards. This document is available via the "Guidance & Policy" link at the national FRMP website http://www.iwr.usace.army.mil/nfrmp/. Levee certification by the sponsor is required before levees can be accredited by FEMA to provide base flood protection.

Another component of the FRMP is the Inspection of Completed Works/ Rehabilitation and Inspection Program (ICW/RIP). The ICW/RIP is the Corps program that provides for the inspection and rehabilitation of Federal and non-Federal flood risk management projects. Historically, the purpose of the Corps inspections was to verify that the projects were operated and maintained in accordance with guidance specifically identified in the project's Operations and Maintenance (O&M) Manual. Starting in mid-2006, the purpose of the Corps inspections changed, and these inspections now verify that projects are being maintained and, when necessary, upgraded to meet current Corps standards. During 2011, five (5) Levee Periodic Inspections in the Rio Grande Basin were conducted by an AE contract using Inspection of Completed Works (ICW) funding. The inspection ratings for the Levee Periodic Inspections have not been finalized.

Also during 2011, the Corps inspected forty-one (41) other flood risk management projects in the Rio Grande Basin. Twenty-two (22) projects received "Acceptable" ratings, and nineteen (19) projects received "Minimally Acceptable" ratings (indicating maintenance is required). The projects found to have a Minimally Acceptable rating have existing vegetation growth on the embankments, a condition which does not meet the latest Corps criteria that address vegetation, moderate to severe erosion, encroachments, unauthorized vehicle or pedestrian access, animal burrows, and other miscellaneous deficiencies. Fifty (50) projects are scheduled for routine inspection in 2012 and five (5) are scheduled for Levee Periodic Inspection in 2012.

Information regarding the Levee Safety Program and the ICW/RIP can be obtained by contacting the Levee Safety Program Manager, U.S. Army Corps of Engineers, Albuquerque District, Geotechnical and Environmental Engineering Branch, Engineering and Construction Division, 4101 Jefferson Plaza NE, Albuquerque, New Mexico 87109-3435 or telephone 505-342-3487.

An additional component of the FRMP is the Albuquerque District FRMP Manager. The FRMP Manager focuses on the building of relationships at the local level to maximize both human and capital resources to solve water resources problems. Partnerships at Federal, state, and local levels are essential for creating risk-informed, watershed-based solutions for reducing overall flood risks while maintaining environmental sustainability. In 2011, the FRMP Manager played an active role in the Middle Rio Grande Levee Task Force (LTF). The FRMP Manager was active in the preparation of the LTF's report to the New Mexico Legislature.

The New Mexico Silver Jackets (NMSJ) Program was active in 2011 in response to the flood risk created by the severe Las Conchas fire that burned on the Pajarito Plateau on the eastern flanks of the Jemez Mountains. The NM Silver Jackets team coordinated funding resources for the placement of 6 precipitation and flow gauges. One precipitation gauge each was placed in the headwaters of Bland, Capulin, Cochiti and Peralta Canyons. One precipitation and one discharge gauge remain to be placed in the watersheds when conditions allow. The current initiative of the NMSJ Team is to concentrate its efforts on watershed planning for emergencies.

Any questions concerning the activities of the Albuquerque District FRMP Manager, the LTF, or the New Mexico Silver Jackets Program should be addressed to the U.S. Army Corps of Engineers, Albuquerque District, Hydrology & Hydraulics Section, Planning Branch, Planning, Programs and Project Management Division, 4101 Jefferson Plaza NE, Albuquerque, New Mexico 87109-3435 or telephone 505-342-3471.

9. Emergency Management Coordination

Public Law 84-99 provides the Corps with the authority to assist state and local governments before, during, and after flood events. The State can request these services by contacting the U.S. Army Corps of Engineers, Albuquerque District, Readiness and Contingency Operations Office, 4101 Jefferson Plaza NE, Albuquerque, New Mexico 87109-3435 or telephone 505-342-3686.

In regions receiving significant spring snowmelt runoff, or in the event of major rainfall flooding, and upon request of the state governor's office, the Corps Readiness and Contingency Operations Office is prepared to assist in urban areas with flood fighting activities that exceed the capabilities of local and state authorities.

The Albuquerque District's Readiness and Contingency Operations Office began monitoring the Las Conchas Fire on 27 June. We offered assistance to the Pueblos (recognized by the Corps as independent governmental entities) and continue involvement in technical assistance as well as limited direct assistance to several Indian Pueblos affected by the burn area runoff threats. The Corps also provided a total of 2 evaluations, one for Santa Clara Pueblo and one for Cochiti Pueblo with recommendations passed along to the appropriate Pueblo government representatives. Additionally, the debris from the fire continues to be transported along flow paths into the Rio Grande and will for years to come. This is expected to affect the water quality, downstream flood control and irrigation works for years to come. Mitigation measures have been and will be identified and addressed in a number of ways by a number of Federal, state and local entities. On 23 Nov 2011 President Obama issued Major Disaster Declaration, FEMA DR-4047. The FEMA funding is expected to implement some or all recommendations made by the Corps.