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About this draft: This is an initial draft, an expanded outline for the regional report. This very preliminary presentation contains placeholders and editorial comments in highlighted text. **It is meant to solicit your comments.** This is the first of several drafts to be circulated in 2008 before the public review draft is distributed in December.

Chapter 10 South Lahontan Hydrologic Region

Setting

Although the South Lahontan Hydrologic Region brings to mind images of desert with Joshua trees, sand dunes, and dry lakes, it also contains the glacier-carved topography of the eastern slopes of the Sierra Nevada and the eastern slopes of the San Gabriel and San Bernardino mountains. The northern half of the region includes Mono Lake, Owens Valley, Panamint Valley, Death Valley, and the Amargosa River Valley. The Mojave Desert occupies the southern half of the region and is characterized by many small mountain ranges and valleys with playas, or dry lakes. The region has the highest and lowest elevation points in the continental United States: Mount Whitney with an elevation of 14,495 feet and Death Valley at 282 feet below sea level. The region includes all of Inyo County and parts of Mono, San Bernardino, Kern, and Los Angeles counties (Figure 10-1).

PLACEHOLDER: Figure 10-1 South Lahontan Hydrologic Region (map)

The South Lahontan region has fewer permanent rivers and streams due to the drier hydrology on the east side of the Sierra Nevada. The largest river in this region is the Owens River, which flows from north to south over the length of Owens Valley. This river drains both the east side of the Sierra Nevada and the western slopes of the White Mountain range. It flowed into Owens Lake until 1913, when most of its flow was diverted for use in Los Angeles. Another important river in the region is the Mojave River. Although seldom seen flowing on the surface, it has significant underground flow that supports nearly all the groundwater-supplied agriculture and urban population in the Mojave River Valley. The Amargosa River is the only other significant river in the region, but it only generates surface flows during flash floods and does not serve any significant agricultural areas. The floodwaters eventually flow south to a low-lying area near Silver Lake and Soda Lake, which is also the terminus for the Mojave River. [From CWP 2005]

PLACEHOLDER Box 10-xx Acronyms and Abbreviations Used in this Chapter

Watersheds

[Text from SWRCB and RWQCB Impaired and Priority Watersheds]

Mojave

The Mojave watershed encompasses approximately 4,500 square miles and is located entirely within San Bernardino County (see Figure 10-xx) Total population in the watershed is increasing every year and is expected to grow to nearly one-half million by the year 2015. Much of the

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existing and projected future population is concentrated in Victor Valley, which includes the incorporated cities of Victorville, Hesperia, Apple Valley, and Adelanto.

PLACEHOLDER: Figure 10-xx Mojave watershed

The primary geographic and hydrologic feature of the watershed is the Mojave River. The headwaters of the Mojave River are in the San Bernardino Mountains, which annually receives greater than 40 inches of precipitation at its highest elevations. Much of the winter precipitation in the San Bernardino Mountains falls in the form of snow that provides spring recharge to the Mojave River system. Historically, the annual recharge from the headwaters is approximately 75,000 acre-feet. The Mojave River channel, through both surface and subsurface flow, transects the watershed a linear distance of approximately 120 miles to its terminus at Silver Dry Lake near the Community of Baker. Aside from intense storm events, the Mojave River channel is typically dry downstream of the Mojave Forks Dam except in select locations where groundwater is forced to the surface by geologic structures.

The Mojave River has been selected as a priority or "focus" watershed because of numerous water quality and quantity issues. Historically known for its agricultural, industrial, and military land uses, Victor Valley has significantly changed during the last several decades into a satellite of Southern California's urbanization. Urban growth has significantly modified the arena of waste discharges that could potentially affect water quality, including storm water and wastewater treatment. There are also numerous water quality issues associated with past and current agricultural, industrial, and military land uses throughout the watershed. Because of water quality degradation associated with past industrial activities, some waters in the Mojave River watershed are listed as a water quality limited segment for priority organics on the federal Section 303(d) list of impaired water bodies.

Typical of southwestern arid environments, the Mojave watershed has limited water resources. Surface water from the headwaters in the San Bernardino Mountains quickly percolates into the porous sands of the young Mojave River alluvium. Thus, groundwater is the primary source of water supply in most of the watershed. In a constant state of overdraft since the 1950s, the groundwater resources of the Mojave watershed were formally adjudicated in 1996 through a stipulated judgment. The stipulated judgment was appealed shortly thereafter. The California Supreme Court issued a decision in the case on August 22, 2000 that affirmed water rights priority in cases of competing water apportionment (Box 10-2 Mojave River Adjudication).

PLACEHOLDER: Box 10-2 Mojave River Adjudication

http://www.swrcb.ca.gov/rwqcb6/WMI/final_02_MR25.pdf

Mono Basin

Mono Basin is bounded by the Bodie Hills, Cowtrack Mountain, Long Valley Caldera, and the Sierra Nevada on the north, east, south, and west. From a structural geology perspective, the Mono Basin is a down-warped structural basin bounded by flexures on the north, east, and west, and bounded by the Sierra Nevada frontal fault on the west. Structural development of the basin has occurred largely in the last 3 million years and is still in progress.

From a hydrographic perspective, the Mono Basin is defined by all streams that drain into Mono Lake. On the north, east, and south, the hydrographic basin coincides roughly with the structural basin. However, on the west, the Mono Basin extends west of the Sierra Nevada frontal fault to

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the Sierra crest. Thus Tioga Pass, Mount Dana, and Mount Conness are all on the western boundary of the Mono Basin. Major streams in the Mono Basin that originate in the high Sierra are Rush Creek, with tributaries Parker Creek and Walker Creek, Lee Vining Creek, and Mill Creek. http://www.schweich.com/geoCAMnoMonoBasin.html

Owens River

The Owens River watershed has been selected as a priority watershed because of the high resource value of its waters. The entire Owens River watershed is designated as a "Category 1" Priority under the California Unified Watershed Assessment prepared in accordance with the federal Clean Water Action Plan. For purposes of the Watershed Management Initiative (WMI), the upper reaches of the Owens River system known as the Long Hydrologic Area has been selected as a target subwatershed. The Regional Water Quality Control Board may apply watershed management strategies developed for the Long Valley subwatershed to the entire Owens/Mono watershed in the future. The Long Hydrologic Area overlies the geographic area where the two regional board offices (Victorville and South Lake Tahoe) generally divide responsibility.

The Long Hydrologic Area is in Mono County and encompasses approximately 380 square miles. It includes the upper reaches of the Owens River above Crowley Reservoir. Within the watershed are numerous alpine lakes at the higher elevations of the eastern Sierra Mountains. A few peaks in this watershed are at elevations of over 12,000 feet above mean sea level. Within the watershed, numerous streams flow eastward to the Owens River; the principal of which are Mammoth, Deadman, Glass, Hot, McGee, Convict and Hilton Creeks. The headwaters of the Owens River is considered the "Big Springs." An ancient volcano, known as the Long Valley Caldera, forms the topographical shape of the Long Hydrologic Unit into an elongated oval. Volcanic activity in the area is recent. Crowley Reservoir, constructed in 1941, forms the low point in the watershed. Its spillway elevation is 8,781 feet above mean sea level. The following major landowners within the watershed manage more than 90 percent of the land area:

- US Forest Service (USFS), Inyo National Forest;
- US Bureau of Land Management (BLM), Bishop Resources Area; and
- City of Los Angeles, Department of Water and Power (LADWP).

The Inyo National Forest includes the John Muir trail and several federal wilderness areas. The LADWP owns several reservoirs, which also receive heavy recreational use. A variety of unique species and subspecies of fish, wildlife, and aquatic invertebrates exist in the Owens River watershed, including the endangered Owens tui chub. The California Department of Fish and Game (DFG) has identified a number of "Significant Natural Areas," with unique biological attributes, in the watershed. The University of California operates the Sierra Nevada Aquatic Research Laboratory near Convict Lake.

The Town of Mammoth Lakes is the only incorporated community in the Long Hydrologic Area, which also includes a number of small unincorporated communities. The Town of Mammoth Lakes, with a permanent population of about 5,000, accounts for 3.7-million visitor-days annually and serves as a gateway for increasing recreational use of federal lands in the area. The Town of Mammoth Lakes has been growing rapidly with new residential, commercial, industrial (e.g., geothermal energy) and recreational (e.g., golf course and ski area) developments.

Hot Creek Hatchery, operated by DFG, supports a large regional recreational fishery by providing fish stock for planting in other rivers and lakes. Other private hatcheries also provide excellent

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stock for planting. Crowley Lake is one of the largest and most used trout fisheries in California. Livestock grazing occurs on both public and private lands.

After construction of the Los Angeles Aqueduct in 1913, the waters of the Owens River have been transported out of the Owens River watershed further downstream. From 1941 to 1989, streams from the Mono Lake Basin have been diverted by the LADWP from Grant Reservoir through a tunnel into the Owens River. A water rights decision by the State Water Resources Control Board partially restored flows in Rush Creek, Lee Vining Creek, and other tributaries to Mono Lake. Limited diversions still occur and may increase as Mono Lake reaches levels established by the SWRCB. These changes in flows will in turn impact flows in the upper Owens watershed. Together with the tributaries to Mono Lake, the entire Owens River watershed provides significant domestic water supplies to the Los Angeles metropolitan area. http://www.waterboards.ca.gov/rwqcb6/WMI/final_02_OR24.pdf

[Text to be added by flood team:]

- Introduction of principal streams of the region.
  - **Subject:** Mohave R at Afton, Mohave R near Victorville
  - **Source:** (DWR1980), (USGS 2001) General Knowledge (GK).
- Origin of floods in the region.**:**
  - **Subject:** Rainfall, Snowmelt
  - **Source:** (DWR 1980), GK.
- **Table**, "Flood Parameters for Principal Streams" outlined in *General Instructions.doc* (GI).
  - **Source:** (USGS 2001).
- Early flooding history:
  - **Subject: 1938, 1943**
  - **Source:** (DWR 1980).
- Significant historic floods:

Floods of Importance: 1969 (DWR 1980); **1981-82** (DWR 1983), **1980** (DWR 1980), **1995** (DWR 2003), **1996-97?** (Flood Center), **2000-05?** (Flood Center

Ecosystems

[Will collect information and develop text for later drafts.]

Climate

The climate of the South Lahontan region is generally arid. Annual average precipitation is less than 10 inches, except for the higher mountains. Annual average precipitation in the higher elevations of the Sierra Nevada ranges from 25 to 50 inches, which can generate significant snow accumulations for spring runoff. Some of the central and eastern portions of the Mojave Desert average 4 inches of precipitation annually. Death Valley receives a little less than 2 inches of rain on the average, but just a few tenths of an inch falls in some years. Daytime temperatures in the winter are generally cold in the mountains and mild in the desert valleys. Precipitation for the region is summarized as part of regional water uses and supplies for recent years 1998 through 2005 (Table 10-1). (From CWP 2005; update.)

PLACEHOLDER: Table 10-1 South Lahontan Hydrologic Region water balance summary (taf)

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Demographics

Although the South Lahontan Region covers 16.9 percent of the land mass of the state, total population in 2005 was 810,000, or approximately ___ percent of California's total population. Nearly 90 percent of the population resides in the southern portion of the region, specifically the Antelope, Apple, and Victor valleys. The cities of Palmdale and Lancaster were among the fastest-growing cities in the state between 1990 and 2000. Population growth is projected to continue in these areas over the next 25 years, based on projections from the State department of Finance. Populations in the other parts of the region are expected to increase only slightly over the same period. Possible exceptions could be the City of Ridgecrest in the Indian Wells Planning Area and Mammoth Lakes in the Owens-Mono Planning Area.

Figure 10-2 provides a graphical depiction of the South Lahontan Region's total population from 1960 through 2005, with current projections to 2050. (From CWP 2005; update.)

PLACEHOLDER: Figure 10-2 South Lahontan Hydrologic Region population, 1960 to projected 2050

[Develop tribal content: Include, enumerate (somehow acknowledge tribal communities). All federally recognized tribes have sovereign governments. BIA map indicates locations of landless tribes, which may be in process of acquiring land. Many non-federally recognized tribes are petitioning for federal status, but may be harder to identify and locate. Contact the California Native American Heritage Commission for a list of tribal governments in a given area (county, zip codes, etc.).]

Land Use Patterns

The region supports a variety of urban and agricultural uses, including a moderate amount of agricultural acreage and several growing cities. However, much of the land in the region remains undeveloped and is under protected- or managed-status for recreational, scenic, environmental, or military purposes. The urban areas in the Antelope Valley and Victor Valley areas continue to expand. Other than these two valleys, and the cities of Bishop, Mammoth Lakes, and Ridgecrest, the rest of the region is rural and generally consists of widely scattered small- to medium-sized cities and towns with populations of less than 10,000.

[Updated from CWP 2005. Additional information will be collected and included in the later drafts.]

Agricultural land uses occur in the Antelope and Owens valleys and along the Mojave River. A majority of the acres falls into the alfalfa and pasture grass (improved and improved native) categories. Most of the truck crop acres are in the Antelope Valley Planning Area. All crops in the region are irrigated. From 2001, the total acres of crops planted and harvested rose slightly, from 62,500 to 71,200 (in 2005?). Of the total acres in 2005, alfalfa and pasture grass constituted about 65 percent of the total acreage, while truck crops, mostly carrots and onions, represent about 7 percent.

[Updated from CWP 2005. Additional information will be collected and included in the later drafts.]

[Develop tribal content—under Land Use Patterns or under Setting: total sq-miles of federal tribal trust lands. Large reservations (e.g, Tule River, Round Valley, Hoopa, and the Riverside/San Diego area tribes) should be noted. This info can come from the Bureau of Indian Affairs GIS data which we have, or by contacting the nearest BIA office. BLM also maps these and other categories of federal lands.]

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Regional Water Conditions

Water in the Environment

Most of the quantified environmental water demands are in the northern part of this hydrologic region and involve the restoration of the water surface elevation for Mono Lake. The required inflows are the result of several years of court litigation and have resulted in improving water surface elevations in recent years. Another identified environmental water demand involves current and proposed, releases into the Owens River to restore flows that were previously intercepted for use in Los Angeles after 1913, and for use in restoring surface water to Owens Lake. Environmental water use for 2005 is about ____ taf. [From CWP 2005. Additional information will be collected and included in the later drafts.]

Water Supplies

[Develop tribal content: Is this where pending water rights issues would be discussed? BIA knows what tribal water rights proceedings are in progress, for example Cahuilla Band of Mission Indians (Riverside County.]

The Los Angeles Aqueduct is the region's major water development feature. In 1913, the initial 223-mile-long aqueduct was completed by the LADWP and began transporting water from Owens Valley to the city of Los Angeles. The aqueduct was extended 115 miles north into the Mono Basin in 1940, and additional water was diverted. A second, 137-mile-long pipeline was completed in 1970. More recently, exports have been modified and reduced as a result of litigation to preserve Mono Lake and to mitigate the dust problems that resulted from the diversion of water from Owens Lake.

There are eight small reservoirs in the Los Angeles Aqueduct system with a combined storage capacity of about 323,000 acre-feet. These reservoirs were built to store and regulate flows in the aqueduct. The northernmost reservoir is Grant Lake in Mono County. Six of the eight reservoirs are in the South Lahontan region. Bouquet and Los Angeles Reservoirs are in the South Coast region. Water from the aqueduct system passes through 12 hydropower plants on its way to Los Angeles. The annual energy generated is more than 1 billion kilowatt-hours, enough to supply the needs of 220,000 homes. (From CWP 2005; update.)

The only dam on the Mojave River, at the base of the San Bernardino Mountains, is the Mojave River Forks Dam. This U.S. Corps of Engineers flood control facility provides a maximum reservoir storage capacity of 179,400 acre-feet. The lower Mojave River is seldom seen flowing on the earth's surface. Instead, it exists as groundwater underflow which supports much of the agriculture crops and urban population in the Mojave River Valley. (From CWP 2005; update.)

Groundwater provides about ____ percent of the average annual water supply in the region. Groundwater is used conjunctively with surface water in the more heavily pumped basins. Seventy-six groundwater basins underlie about 55 percent of this hydrologic region. The total estimated demand met by groundwater in the region is about _____ acre-feet, according to the 2003 update of DWR Bulletin 118 California's Groundwater. Most of the groundwater production is concentrated, along with the population, in basins in the southern and western parts of this hydrologic region. Many other areas of this hydrologic region are designated as public land and have low population density. As such, many of the groundwater basins have not been

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significantly used, and there is thus little data available about groundwater volume and quality. (From CWP 2005; update.)

Five water agencies in the southwest portion of this region have contracts with the State Water Project for a total of about 250,000 acre-feet of surface water annually. The East Branch of the SWP California Aqueduct brings imported water into the region. Some of this SWP water is used to recharge groundwater in the Mojave River Valley. The Mojave Water Agency (MWA) has taken little of its SWP contract entitlement to date, although that may change in the near future as the water agency seeks ways to reduce the over-pumping of the groundwater basin. (Fom CWP 2005; update.)

The Mojave Water Agency is developing a Regional Water Management Plan Update that will provide a regional framework for managing water resources and ensuring reliable water for the future of the MWA desert region. While customers within the MWA rely predominately on groundwater, water supplies are also received from the California Aqueduct as one of 29 SWP contractors. The RWMP Update will address population growth, water demand projections, stakeholder needs and issues, facilities needed to replenish groundwater supplies, and revenue alternatives. (From CWP 2005; update.)

Antelope Valley-East Kern Water Agency (AVEK) is the largest SWP water contractor in this region and one of the largest in the state. AVEK provides water to five major municipal agencies, 16 smaller water service agencies, Edwards Air Force Base, Palmdale Air Force Plant 42, the U.S. Borax and Chemical Facilities, and some agricultural customers. AVEK was formed to bring imported surface water from the SWP into this region. (From CWP 2005; update.)

The 2,700 acre-feet capacity Littlerock Reservoir provides water to Littlerock Creek Irrigation District and to Palmdale Water District (PWD). PWD recently funded most of a seismic rehabilitation of the original dam (constructed in 1924) in exchange for control of the water supply for the next 50 years. Water from Littlerock Reservoir is released into a canal that conveys flows to PWD's Lake Palmdale, a 42,000 acre-foot storage reservoir. (From CWP 2005; update.)

In the San Bernardino Mountains, Lake Arrowhead, owned by the Arrowhead Lake Association, is a 48,000 acre-foot reservoir providing recreational opportunities and water for Arrowhead Woods property owners**.** (From CWP 2005; update.) In the northern part of the South Lahontan region, the town of Mammoth Lakes provides water from surface and groundwater sources to a permanent population of about 5,000, an average daily population of about 13,000, and a peak weekend and holiday period population of up to 30,000 people per day. In communities that are popular tourist destinations, this pattern of peak population and water use that is several times the permanent base level is a common water supply and distribution problem. Figure 10-3 provides a graphical summary of all the water supply sources that are used to meet the developed water resources in this hydrologic region for years 1998 through 2005. The water balance data shown in Table 10-1 and Table 10-2 summarize the detailed regional water accounting contained in the water portfolio data sets for years 1998 through 2005. These tabulated water supplies and uses provide a comparison of how the patterns of water use and distribution can change from a very wet year to a dryer year, and for an average water year. [From CWP 2005; update.]

PLACEHOLDER: Table 10-2 South Lahontan Hydrologic Region water use and distribution of dedicated supplies (taf), 1998–2005

PLACEHOLDER: Figure 10-3 South Lahontan Hydrologic Region water balance for water years 1998–2005

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Alfalfa produced in the region uses groundwater as the primary source of irrigation water. In the Mono and Owens valleys, water supplies from the Los Angeles Aqueduct are sometimes used for flood irrigation of fields of improved production of native pasture grass. Ground and surface water is not the only source of water available to grow alfalfa. In the Antelope Valley region of Los Angeles County, 680 acres of alfalfa have been irrigated for the past 14 years with municipal effluent water. The treated water comes from the Lancaster Water Reclamation Plant owned and operated by County Sanitation District No. 14 of Los Angeles County. (From CWP 2005; update.)

Water Uses

Urban water demands in the South Lahontan Region were _____ taf in 2005. About ____ percent of this demand occurred in the Antelope Valley and Mojave River Planning Areas. This is a slight increase in demands from 2001 which was 236.5 taf. Groundwater supplies meet ___ percent of the demand, with SWP and surface water supplies meeting the remainder.

Agricultural water demands for the region were ____ taf in 2005. This is a slight increase from 2001 which had demands of _____ taf. Almost half of the demands occurred in the Owens-Mono Planning Area.

[Updated from CWP 2005. Additional information will be collected and included in the later drafts.]

Water Quality

Overarching Water Quality Issues: The quality of the limited surface water is excellent in the South Lahontan region, greatly influenced by snowmelt from the eastern Sierra Nevada. At lower elevations, though, groundwater and surface water quality can be degraded, both naturally (from geothermal activity) and through human activities (e.g. recreation, grazing).

As stated above, there are water quality issues in the various watersheds within the South Lahontan Region. This section is intended to identify the highest priority water quality issues and watersheds within this Region. Some of the regional specific issues and watersheds which have been identified but not prioritized are:

- Arsenic
- Groundwater Quality
- Owens River

[More text from WQ team for next draft.]

Project Operations

[Will collect information and develop text for later drafts.]

Water Governance

[Will collect information and develop text for later drafts.]

Flood Management

[Will collect information and develop text for later drafts.]

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Historic Floods

[Text to be added by flood team:]

- Early flooding history:
  - **Subject: 1938, 1943**
  - **Source:** (DWR 1980).
- Significant historic floods:

Floods of Importance: 1969 (DWR 1980); **1981-82** (DWR 1983), **1980** (DWR 1980), **1995** (DWR 2003), **1996-97?** (Flood Center), **2000-05?** (Flood Center

Flood Hazards

[Text to be added by flood team:]

- Flood Hazard List:
  - **Source:** GK, Local Government Staff (LGS).
- List of Flood Management Challenges.
  - **Subject:** gauging, Urban protection, Non-urban protection, floodplain regulation, mapping, uncontrolled runoff, bridge failure, alluvial fans
  - **Source:** (DWR 1980) Tabulated text on p. 229, GK.

Institutions

[Text to be added by flood team:]

- Flood Control Types
  - **Subject:** Structural works, hydromet networks, emergency response, recovery
  - **Source:** (DWR1980) pp. 194-200, DFM Hydrology staff, GK.
- Ownership, Sponsorship, Participation and Maintenance of Major Projects
  - **Subject:** Agency list summarizing role in ownership (project initiation), financial participation, and maintenance
  - **Source:** (DWR 1980), GK.
- Emergency Response
  - **Subject:** Responsibility of SEMS, Flood Center, Corps of Engineers, FEMA
  - **Source:** Flood Center, GK, reference to SS.

Existing Flood Damage Reduction Measures

[Text to be added by flood team:]

- Type of facilities found in the Region
  - **Source:** Author, (DWR 1980).

<u>Constructed Flood Protection Facilities</u>

[Text to be added by flood team:]

- Flood Control Projects
  - **Subject:** Oro Grande Wash Project, Conejo Creek Project, Walnut Canyon Creek. **Need to verify post-1980, post-1995 for USACE.**
  - Source: (DWR 1980, pp. 228-229), (USACE 1995). LGS.
- **Table**, "Flood Control Reservoirs", outlined in General Instructions.doc (GI).
  - **Subject:** Mojave River Dam. **Need to verify post-1980, post-1995 for USACE.**
  - **Source:** (DWR 1980, pp. 228-229.) (USACE 1995).

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- Hydromet Systems and Stations.
  - **Subject:** Stream gages as listed in Setting other stream gages, rain gages, snow gages. Adequacy of existing gage network.
  - **Source:** DFM Hydrology Staff, LGS, (USGS 2001)

Flood Governance

[Text to be added by flood team:]

- List of Governance Methods
  - **Subject:** Floodplain zoning ordinances, designated floodways (CVFCB), county floodplain management programs
  - **Source:** (DWR 1980), LGS.
- Status of Floodplain Mapping and FIRMs.
  - **Subject:** Mapped and unmapped areas, planned mapping projects
  - **Source:** DFM Staff (Tom Christensen, 574-1407)
- Local Government Participation in the NFIP Community Rating System.
  - **Subject:** Participating counties as listed in Appendices A and B to GI.
  - **Source:** DFM staff, reference to SS, GI.
- **Table**, "Community Ratings for NFIP" outlined in *General Instructions.doc* (GI).
  - **Subject:** None listed at this time.

Operating Procedures

[Text to be added by flood team:]

- General Reservoir Operating Rules.
  - **Subject:** Mojave River Dam.
- Forecast-coordinated Operations Agreements
  - **Source:** DFM Staff (Sacramento Region in talking stage-verify not in region)
- Status of Response Agreements (See GI for description)
  - **Source: Flood Center,** LGS (Sacramento Region in talking stage-verify not in region)
- Available H&H models.
  - **Subject:** Streams outlined in "Setting"
  - **Source:** DFM Hydrology staff, LGS, reference to SS for Comp Study.

Emergency Procedures

[Text to be added by flood team:]

- Formal Emergency Management Organization.
  - **Subject:** Agency participation and responsibility
  - **Source:** reference to SS **(provided in this work)**
- **Table,** "Response Organizations", headings as listed in GI.
  - **Source:** DFM Staff, (DWR 2007), LGS.
- Recovery Resources
  - **Subject:** Agency participation and responsibility
  - **Source:** reference to SS **(provided in this work)**

Relationship with Other Regions

While most of Mojave Water Agency's service area is in the South Lahontan region, a portion of its service area does extend into the Colorado River Hydrologic Region (Lucerne and Johnson valleys and the Morongo Basin). This includes the community of Yucca Valley, which has an

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allocation for up to 7,200 acre-feet of MWA's surface water from the SWP. (From CWP 2005; update.)

As described in previous sections, imported State Water Project water is used to recharge groundwater supplies in the Mojave River Valley basins. Some of these surface water and groundwater supplies are also exported from the Owens and Mono portions of South Lahontan Hydrologic Region to the South Coast Hydrologic Region by the Los Angeles Department of Water and Power, using the Los Angeles Aqueduct. Recent exports through these facilities to the South Coast region were _____ taf in 2002, _____ taf in year 2003, _____ taf in 2004, and _____ taf in 2005. (Updated from CWP 2005; update.)

PLACEHOLDER:

[Flood text to be added:]

- inter-regional flood management coordination(Omit if none).
  - **Subject:** None listed at this time
  - **Source:** DFM Staff, LGS, reference to SS.

Regional Water and Flood Planning and Management

[Develop tribal content: Major issues that involve tribes may already be included, e.g, TROA, Mono Lake, and Klamath River, etc. Name tribal governments involved, as involved agencies also are named.]

Rosamond-Semitropic Water Bank (Water News11/03/07)

Three partners are participating in the bank – Rosamond Community Services District, Semitropic and Western Development on property formerly owned by Van Dam Farms. The site runs from 150th to 170th streets west, between Avenue A and Holiday Avenue, and is estimated to be able to store 500,000 acre-feet of water.

The partners formed a joint powers authority, giving them decision-making rights. In accordance with the Rosamond-Semitropic agreement, if North California experiences a dry year, that region can benefit from this water bank Likewise, if Southern California goes through a dry year, assistance from water banks up north can help.

The bank will also will serve as a backup if the Aqueduct supply is interrupted by something such as an earthquake on the San Andreas Fault or failure of the levees in the Sacramento-San Joaquin Bay Delta.

Each partner brings a specific quality to the project. Western brings development experience and the land, Semitropic has been operating a water bank and the community services district adds "a local face."

Integrated Regional Water Management

[Generally describe the portions of area covered by IRWMs in this HR. Name the IRWM efforts and give short status. Discuss objectives and main water management strategies to meet objectives and then summarize to the HR level. In this HR, these are the main objectives; these are the water management strategies to meet those objectives.]

There are three Integrated Regional Water Management Plans (IRWMPs) in the South Lahontan Hydrologic Region at varying stages of function and development. These IRWMs are located in

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mainly in the southern portion of the hydrologic region leaving the majority of the region void of IRWM planning. The IRWMPs in the region are:

- Mojave Water Agency IRWMP
- Antelope Valley IRWMP
- Owens Valley

The Mojave Water Agency IRWM is located in the southern portion of the South Lahontan HR and extends into the Colorado River Hydrologic Region. It is a developed IRWM that is implementing projects. The Antelope Valley IRWM is a recently developed IRWM that is ready to begin implementation of the plan. [Future text to have more on plan status.]

[Discuss objectives and water management strategies in the region]

PLACEHOLDER: Figure 10-xx Areas within South Lahontan Hydrologic Region covered by IRWM planning efforts (map)

[Text to be added by flood team:]

Flood Management provisions in IRWMPs

- **Subject:** Inyo IRWMP, Antelope Valley IRWMP, Mojave Water Agency IRWMP, Owens Valley IRWMP,
- **Source:** DFM Staff (Chris Adams), Map of IRWMPs.pdf.

Accomplishments

The Los Angeles Department of Water and Power is involved with many restoration projects for the Owens River and Mono Basin. In 1993, LADWP began final flow releases to restore Mono Lake to a water surface elevation of 6,392 feet. By 2003, Mono Lake elevation had reached 6,382, a level where LADWP can export 16,000 acre-feet per year. LADWP has developed plans to help ranchers manage grazing practices in the Crowley Lake tributary area. The Owens Gorge Rewatering Project and the Lower Owens River Project are two other significant restoration programs being implemented by LADWP to restore the river after 50 years of dewatering.

[Updated from CWP 2005. Additional information will be collected and included in later drafts. Reference: www.inyowater.org/LORP/default.htm.]

The Mojave River groundwater basin was in overdraft since the early 1950s, which led to court adjudication in 1996 and the appointment of the Mojave Water Agency as the basin watermaster

[Updated from CWP 2005. Additional information will be collected and included in later drafts. Reference – Mojave Water Agency – www.mojavewater.com].

In 1997, MWA began construction of another 61-mile Mojave River Pipeline with 67,900 acre-feet per year capacity to bring imported water to the Barstow area and neighboring communities downstream to the Newberry Springs area. This 61-mile pipeline has been built to a recharge facility along the river near the community of Daggett. Recharge facilities have also been built along the river near the communities of Hodge and Lenwood. The project was completed in 2006 with the final reaches of the pipeline extending to a groundwater recharge facility in the Newberry Springs area. [Mojave Water Agency – www.mojavewater.org]

Additional studies on the condition of the groundwater basin in the Mojave Water Agency service area include the Transition Zone Final Report – Phases I and II, Este Sub-basin Hydrogeologic Investigation.

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[Additional information to be collected and included in later drafts. Reference - Mojave Water Agency – www.mojavewater.org.]

[Text to be added by flood team:]

- Brief descriptions of significant flood management accomplishments, particularly recent accomplishments. Include years of completion or establishment.
  - **Source:** Text, reference to SS.

Challenges

[Text to be added by flood team]

- Challenges in ameliorating the hazards listed above.

Source: DFM Staff, Author.

Palmdale Water District - U.S. District Court Judge issued his final word in December 2007 concerning a slowdown in pumping operation at the Harvey O. Banks facility, the starting point of the 444-mile California Aqueduct, which furnishes drinking and agricultural water to the Antelope Valley and much of Southern California and the order is to remain in effect through mid-September 2008. As far as how severely the Delta problems will affect the Antelope Valley's water supply that depends on what transpires during the interim. Approximately 60 percent of the district's supply comes from surface water and the rest from wells. In wet years, when supplies are plentiful and the water district can take 100 percent of its entitlement from the State Water Project that amounts to 21,300 acre-feet. Water from the aqueduct is stored in Palmdale Lake. Other surface water is collected in Littlerock Reservoir from rainfall and runoff of melting snow from the San Gabriel Mountains.

The adjudication of the groundwater basin of the Antelope Valley is moving forward. In ____, the Superior Court of Los Angeles County established the boundaries of the groundwater basin. (Needs update – Southern District). (Updated from CWP 2005; update.)

Strategic planning is now under way by local agencies in the Antelope Valley to implement the recommendations identified in the Antelope Valley Integrated Regional Water Management Plan. The document proposes solutions to increase water supplies and strategies on how to increase of efficiencies of use. It recommends that the proposed recommendations and strategies be implemented in a timely manner as that supplies may not be sufficient to meet projected demands.

New proposals to mitigate the gap between future demands and supplies include identifying new more-reliable water supply sources and increasing the efficiencies of uses of the current supplies. For example, proposals would have developers of new construction projects installing evapotranspiration-based controllers for landscape projects and offering financial rebates to existing water customers for converting from conventional sprinklers to the ET controllers.

IRWM Plan examined and made recommendations for regional water supplies, water quality, flood management, environmental management, land use management, water supply shortages and emergencies, and recycled.

[Reference - Water News 2/5/08. The IRWM Plan will be examined and pertinent information from the document will be extracted and summarized for later drafts. Source – Antelope Valley Integrated Regional Water Management Plan - www.avplan.org.]

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One of the main arguments Mojave Water Agency made for funding the remaining nine finalists was that the state was required to give an equal amount of money to both Northern and Southern California regions and had not done so in the first place. Other projects the MWA is hoping to fund are replenishing the Oro Grande Wash, removal of thirsty, invasive species from the area, and a water conservation incentive program.

Drought and Flood Planning

[Text to be added by flood team:]

- Regional Flood Plans or Flood Planning Agencies
  - **Subject:** Antelope Valley Stormwater Conservation and Flood Control District, LA Department of Public Works.
  - **Source:** LGS, (DWR 1980).
- FloodSAFE regional flood management plans.
  - **Source:** Reference to SS
- Multi-county projects.
  - **Source:** LGS, (DWR 1980).
  -
- Brief descriptions of significant flood management accomplishments, particularly recent accomplishments. Include years of completion or establishment.
  - **Source:** Text, reference to SS.

Looking to the Future

To address the needs of expanding urban areas in the southern portion of the region, many water districts have taken a proactive approach to the water reliability problems by initiating studies and projects that could provide partial or complete solutions. These include water conservation programs, water recycling projects, groundwater exchanges and recovery, water marketing, and other water supply augmentation strategies. Agricultural practices and water uses in rural areas are anticipated to remain at current levels for the near future. (From CWP 2005; update.)

[Will collect information and develop text for later drafts.]

[Develop tribal content: Mention if something pending in tribal water rights. Tribal water rights that have not been quantified could be the sleeping giant throughout the western states. As tribes look to the future of their communities, their own economic survival may be played out in water rights proceedings. Some may simply buy from wholesale or retail water agencies.]

Future Scenarios

[Will collect information and develop text for later drafts.]

Climate Change

[Text to be added by flood team:]

- **Subject:** Precipitation Studies
- **Source:** DFM Hydrology Staff (Tom Christiansen), reference to SS, (USACE 2001).

Response Strategies

[Text to be added by flood team:]

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- **Subject:** Studies to be developed
- **Source:** DFM Staff, Text ("Flood Hazards", "Challenges"), Author.

Implementation Next Steps

[Text to be added by flood team]

- Steps to improve any aspect of flood management in the region.
- **Source:** DFM Staff, Text ("Flood Hazards", "Challenges", and "Response Strategies"), Author.

Water Portfolios from 1998–2005

[Will collect information and develop text for later drafts.]

PLACEHOLDER: Table 10-3 South Lahontan Hydrologic Region water portfolio (taf)

PLACEHOLDER: Figure 10-4 South Lahontan Hydrologic Region—illustrated water flow diagram

PLACEHOLDER: Figure 10-5 South Lahontan Hydrologic Region —schematic flow diagram

Selected References

Water Quality

2002 California 305(b) Report on Water Quality, State Water Resources Control Board

Nonpoint Source Program Strategy and Implementation Plan, 1998-2013, State Water Resources Control Board, California Coastal Commission, January 2000

Strategic Plan, State Water Resources Control Board, Regional Water Quality Control Boards, November 15, 2001

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(DWR 1980) California Department of Water Resources, *California Flood Management: An Evaluation of Flood Damage Prevention Programs*, Bulletin 199, Sacramento, California, September 1980.

(DWR 1983) California Department of Water Resources, *California High Water*, Bulletin 69-82, Sacramento California, August 1983.

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(USACE 1995) United States Army Corps of Engineers. *Water Resources Development in California*, 1995. South Pacific Division, 1995.

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