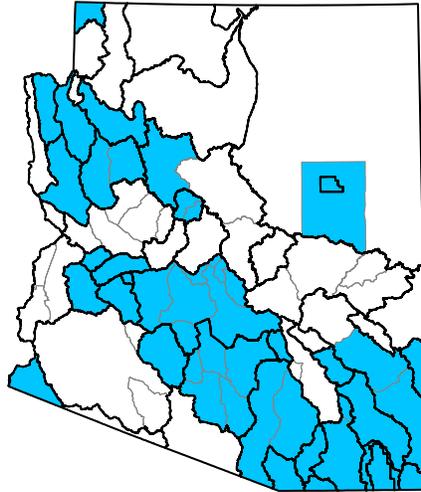


**Arizona Department of Water Resources
Hydrology Division
Field Services Section**



**Hydrologic Map Series (HMS), Water Level Change Map
Series (WLCMS), and Basin Sweep Assessment Report
ADWR Basins and Sub-Basins**

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by

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Introduction

An assessment of relevant hydrologic activities within Arizona Department of Water Resources (ADWR) basins and sub-basins was completed to determine areas within the state for proposed basin sweeps, Hydrologic Map Series (HMS) reports, and Water Level Change Map Series (WLCMS) reports to be completed during the 2009-2010 field season. Basins and Sub-basins in need of basin sweeps, HMS reports, and WLCMS reports were identified as being high, medium, and low priority. Previous basin sweeps, HMS reports, WLCMS reports, and all other ADWR and recent USGS reports were used to help assess the priority within each basin and sub-basin.

In addition, input from ADWR Divisions (Hydrology, Statewide Planning, Water Management and others) was considered to identify critical areas for basins and sub-basins throughout Arizona. These critical areas are basins in which groundwater information is needed for the growing water resources needs of Arizona and upcoming work being conducted by ADWR. A critical basin evaluation done in 2008 (shown in Table 1) identified the Hualapai, Detrital, Sacramento, Upper San Pedro, Verde River, and Willcox Basins as well as the Pinal AMA and Prescott AMA as highly critical basins. The basin selection criteria used in this evaluation of groundwater basins throughout Arizona are based on the following categories:

- Areas of rapid development or projected rapid development
- Large water level changes
- Projected 100 year basin de-watering
- Drought sensitive
- Near recharge sites or river/streams
- Subsidence: active or potential
- Groundwater modeling data needs
- Water quality concern
- Riparian, water rights, or other concerns, and
- Endangered species or environmental concerns

Some of the other critical areas identified by ADWR included the Safford Region (Safford, Morenci, Duncan Valley, and Bonita Creek Basins), the Arizona Strip region (Paria, Kanab Plateau, Coconino Plateau, Shivwits Plateau, Virgin River, Grand Wash, and Peach Springs Basins), southwestern Arizona (Lower Gila, Yuma, and Parker Basins), and the Little Colorado River Plateau Basin.

In 2008, a review of the population and area was compared with the number of index wells currently located within each basin and sub-basin to identify basins and sub-basins that may need additional Index Wells for future basin sweeps and data requirements. The population per Index Well and area per Index Well maps are shown in Figures 1 and 2 respectively. Areas with greater than 100 square miles per Index Well and 100 people per Index Well were identified and used with the additional basin sweep data and critical areas developed to identify future basin needs. This type of review is simply intended to

provide a different perspective and should not be considered a single or sole factor for Index Well expansion within a basin.

Field Services 2008-2009 Activities

During the 2008-2009 field season the field services section collected water levels (basin sweeps) throughout the Phoenix AMA (Water Management and Modeling), all three sub-basins of the Verde River Basin (Statewide Planning), and the Prescott AMA in order to meet the needs addressed in the previous status report. In addition to these basin sweeps, field services collected water levels for as many index wells throughout the state as accessible based on owner permissions.

In 2008, the field services section published the first WLCMS report on the Willcox Basin to identify areas of water level declines throughout the basin between the last two basin sweeps (1999 and 2005). In 2009, field services completed an additional four WLCMS reports on the Big Chino sub-basin, Upper San Pedro Basin, McMullen Valley Basin, and the Verde Valley sub-basin (currently under external review prior to publication). No HMS reports were published in the 2008-2009 fiscal year.

Current Status on Basins and Sub-basins

A compilation of information for basins and sub-basins was collected to assess the need for basin sweeps, HMS reports, and WLCMS reports throughout Arizona along with areas identified as critical areas. A current status of all previous basins sweep years, HMS reports, WLCMS reports, other ADWR reports, and recent USGS reports for all ADWR groundwater basins and sub-basins is included in Table 2.

Completed HMS Reports

The current list of ADWR HMS reports was reviewed and updated to help determine basins that may be considered for future basin sweeps, HMS reports, or WLCMS reports. Figure 3 shows the basins and sub-basins that have a previous published HMS report and indicates the number of the report(s). Basins that have no published HMS Report or have not had an HMS done recently were considered along with other factors such as basin sweeps, number of wells, other reports, and critical areas identified within ADWR and other agencies. A list of all HMS Reports arranged by basin is included in Table 2 and a chronological list of HMS reports to date is included as Appendix A.

Proposed Basin Sweeps (Basins and Sub-basins)

Based on the previous basin sweeps (Table 2) for each basin and sub-basin as well as other factors including other factors such as critical areas, basins and sub-basins in need of a basin sweep are shown in Figure 4 based on the priority of need. One area identified as critical areas for basin sweeps to be conducted and listed as a high priority is the Safford Region (Safford, Morenci, Duncan Valley, and Bonita Creek Basins). This

region was scheduled to have a basin sweep conducted during the 2008-2009 field season but was unable to be completed due to certain limitations. The San Simon Valley sub-basin (Safford Basin) had a recent basin sweep in 2007 but the Gila Valley and San Carlos sub-basins as well as Duncan Valley Basin have not had a basin sweep completed since 1987. Morenci and Bonita Creek Basins have no previous basin sweeps. Another area listed as a high priority is the Tucson and Santa Cruz AMA's which have not had a basin sweep conducted since 2005. Basin sweeps within ADWR for AMA's have historically been requested approximately every five years and therefore the Tucson and Santa Cruz AMA's would require a basin sweep within the next year.

Several other basins that have not had basin sweeps conducted recently or at all and were identified as moderately critical areas for basin sweeps were listed as high and medium priority based on requests from various ADWR divisions. High priority basins include the Arizona Strip area (Kanab Plateau, Coconino Plateau, and Paria, Shivwits Plateau, Virgin River, Grand Wash, and Peach Springs) and southwestern Arizona (Lower Gila and Yuma Basins). Medium priority basins include the Little Colorado River Plateau Basin, western Arizona (Bill Williams, Parker, Harquahala INA, Tiger Wash, McMullen Valley, Butler Valley, and Ranegras Plain Basins), and portions of southeastern Arizona (Willcox Basin and Douglas INA/Basin). Dependent on future circumstances and based on requested areas, approximately only half of the high priority basins will be able to have basin sweeps completed during the 2009-2010 field season. The medium priority basins will be considered for basin sweeps if they are determined to be highly critical areas within the next year (replacing another high priority basin) or will be considered in the following field season.

Several Basins that had recent basin sweeps (within the last several years) but were determined to be critical areas were also given a low priority and include northwestern Arizona (Detrital Valley, Hualapai Valley, Sacramento Valley, and Meadview Basins) and portions of southeastern Arizona (Upper San Pedro, Lower San Pedro, Cienega Creek, and San Rafael Basins). Additionally, basins that have not had a recent basin sweep (within the several years) or have never had a basin sweep conducted but were not identified as present critical areas were given a low priority for basin sweeps (Dripping Springs Wash, Aravaipa Canyon, Donnelly Wash, San Simon Wash, Western Mexican Drainage, Lake Havasu, and Lake Mohave, and Salt River Basins). All other basins and sub-basins not identified as high, medium, or low priority (except AMAs) have had basin sweeps conducted within recent years. The Pinal AMA was given a low priority since basin sweeps are conducted more frequently for an AMA (scheduled for 2012). Table 3 lists the basins and sub-basins in need of a basin sweep in order of priority for high, medium, and low priority basins and sub-basins.

Proposed HMS Basins and Sub-basins

Currently several HMS reports are being completed but have not been published for basins and sub-basins in need of an HMS report. The HMS reports currently in progress include the Tucson AMA, Lower San Pedro Basin, Dripping Springs Wash Basin, and the southwestern portion of the Little Colorado Plateau Basin located in Coconino

County. The Basins and Sub-Basins that are in progress and in need of a HMS report to be completed are shown in Figure 5 based on the priority of need.

The highly critical areas of the Phoenix AMA, Prescott AMA, and Verde River Basin had basin sweeps completed during the 2008-2009 field season and have been identified as a high priority for HMS reports based on the most recent data. In addition, basins in moderately critical areas which have had basin sweeps conducted recently and no previous HMS Report completed were identified as a high priority for a proposed HMS Report to be completed. These basins include Upper Hassayampa (Basin sweep in 2004), Tonto Creek (Basin sweep in 2008), and Agua Fria (Basin sweep in 2008). The high priority basins will be assigned to ADWR personnel when possible for completion of a HMS report.

Several basins in eastern Arizona (Safford, Duncan Valley, Morenci, and Bonita Creek Basins) that were identified to have a high priority for basin sweeps to be conducted within the next year were identified as having a medium priority for a proposed HMS report to be completed once the basin sweeps have been conducted. Additional areas listed as critical areas which include the Upper San Pedro Basin and Pinal AMA, were also identified as having a medium priority for HMS reports. The Pinal AMA was listed as medium priority for an HMS based on the 2007 basin sweep data if a WLCMS Report is not completed for the AMA. Some of the basins with high or medium priority for basin sweeps or those having a recent basin sweep conducted but no recent HMS or no HMS ever completed were identified as a low priority for an HMS report (Lower Gila, Yuma Bill Williams, and Big Sandy Basins as well as the Santa Cruz AMA based on 2005 data). Table 4 lists the basins and sub-basins in need of a HMS reports in order of priority for high, medium, low priority basins and sub-basins.

Proposed WLCMS Basins and Sub-basins

The WLCMS reports recently introduced by ADWR are intended to show water level changes within a basin or sub-basin between the years of the two most recent basin sweeps. WLCMS reports are typically chosen for basins or sub-basins in which a basin sweep has recently been conducted but an HMS is not recommended at this time. The WLCMS report is done to gain an understanding of recent groundwater levels without completing a full HMS report. The first WLCMS report was published in May 2008 for the Willcox Basin (WLCMS No 1) for water levels changes from 1999 to 2005.

Based on previous basins sweeps, HMS reports, critical areas, and other information several basins or sub-basins have been completed in 2009 presently. As of July 2009, four of the basin or sub-basin listed as high priority in the 2008 report have been completed. The Big Chino sub-basin (WLCMS No. 2) and Verde Valley sub-basin (WLCMS No. 5 currently under review for publication) for water levels from the years 1999 to 2004 were completed in April 2009 and July 2009 respectively. Also the Upper San Pedro Basin (WLCMS No 3; 2001 to 2006) and McMullen Valley Basin (WLCMS No 4; 1994 to 2004) were completed in June 2009. Completed basins as well as basins that have been identified as having a high, medium, or low priority for WLCMS reports

to be completed are shown in Figure 6 and Table 5. Six basins with recent basin sweeps that have been identified as a high priority for WLCMS reports include Gila Bend Basin (1993 to 2008); Ranegras Plains, Harquahala INA, and Tiger Wash Basins (1998 to 2004); Butler Valley Basin (1991 to 2004); and San Simon Valley sub-basin (1997 to 2007). Several of the high priority basins or sub-basins have been assigned to field services staff and are currently in progress. Medium priority for WLCMS reports to be completed were given to Sacramento Valley, Detrital Valley, Hualapai Valley, and Meadview Basins (1995 to 2006) and Douglas INA/Basin (1998 to 2004) since they were identified as critical areas with large water level change but recent work has been completed (Geophysical/Survey unit) or similar work may currently be under way by other agencies (USGS). The Pinal AMA was also listed as a medium priority basin for a WLCMS report if an HMS report is not completed for the 2007 basin sweep data. Both the high and medium priority basins and sub-basins were identified as basins having a large water level change (Table 1) and will be assigned to ADWR personnel for completion of a WLCMS report when possible. A low priority was given to San Bernardino Valley (1991 to 2007), San Rafael (1988 to 2005), and Cienega Creek (1988 to 2005), and Big Sandy (1995 to 2008) Basins. All other basins were not recommended for a WLCMS report to be completed at this time due to insufficient data or are unneeded due to a recent HMS report or proposed HMS to be completed. A list of completed WLCMS reports is listed in Appendix B.

Conclusions and Recommendations

The assessment for ADWR basins and sub-basins provides information that will help in the planning of projects within ADWR and identify gaps in our data collection and reporting efforts. The completion of needed basin sweeps, HMS reports, and WLCMS reports has been prioritized and displayed in Figures 4, 5, and 6 respectively. Further information on the status and priority for these basins and sub-basins in regards to basin sweeps, HMS reports, and WLCMS reports is included in Tables 3, 4, and 5 respectively. The recommended priority for the completion of the basin sweeps, HMS reports, and WLCMS reports will be used in planning these activities within ADWR for the 2009-2010 fiscal year. These recommendations are subject to change dependent on future activities and conditions as well as comments on this report from ADWR statewide monitoring meetings and other personnel within ADWR.

Figure 1 - Population Per Index Well Arizona Basins and Subbasins

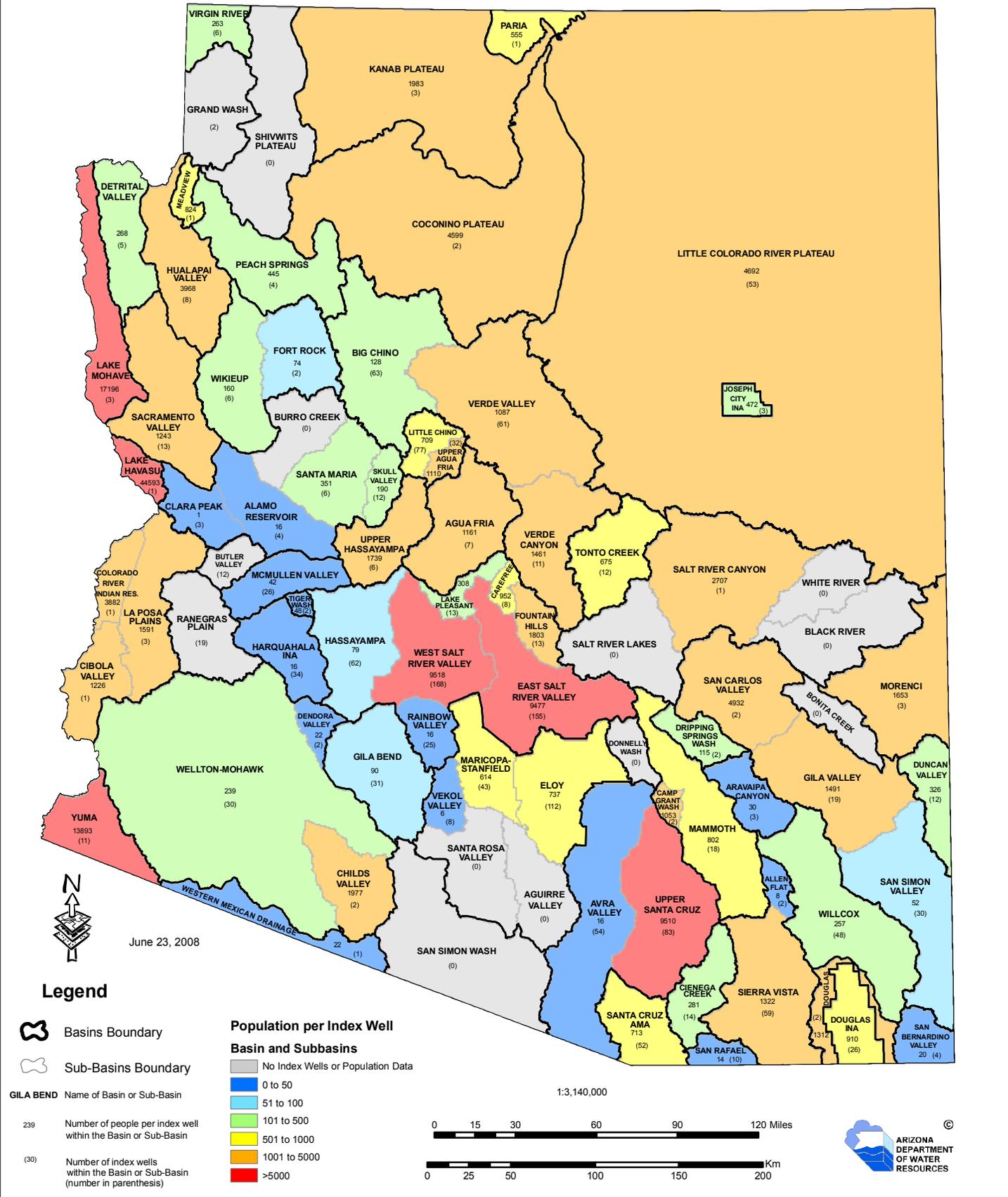


Figure 2 - Area (square miles) Per Index Well Arizona Basins and Subbasins

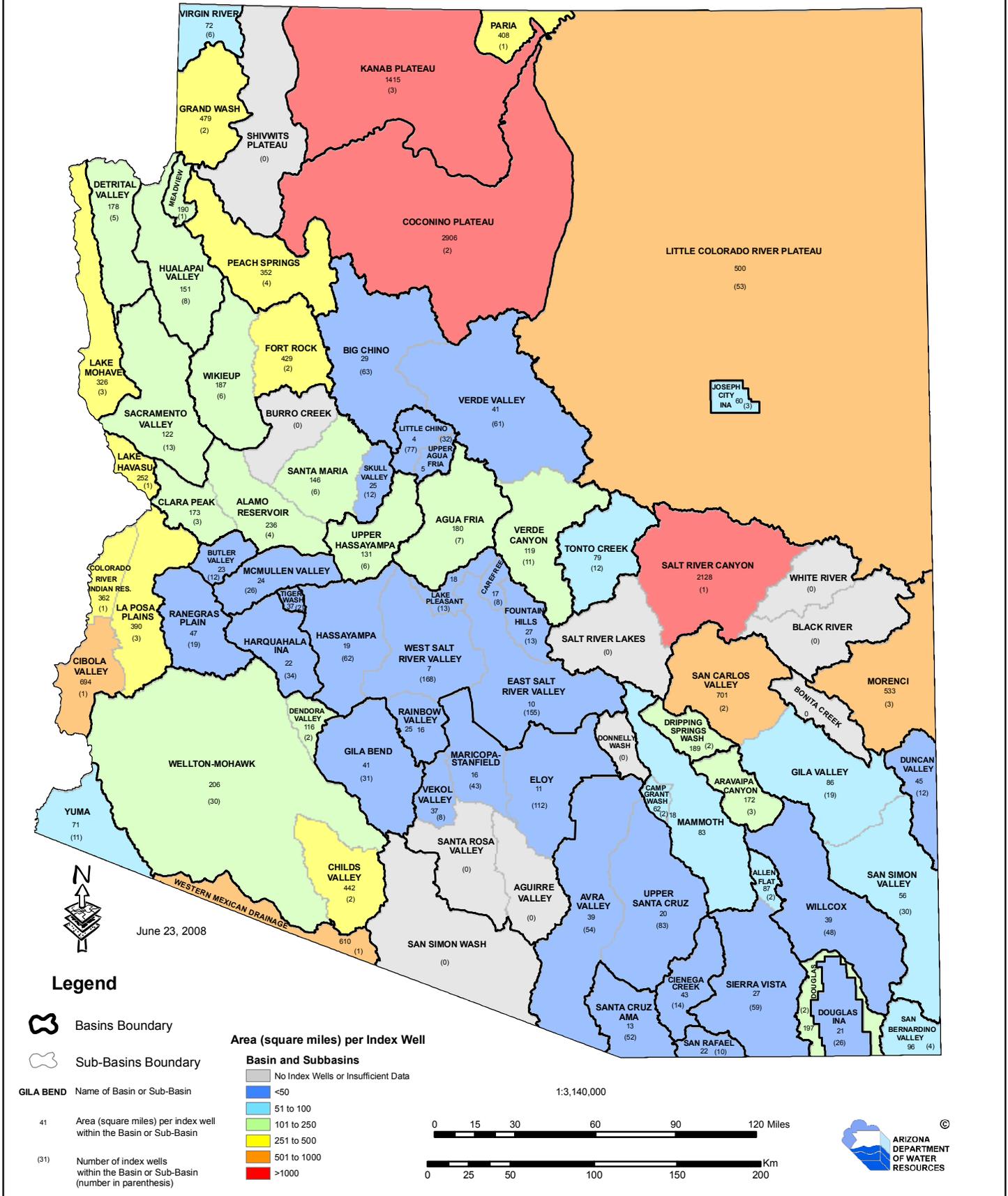
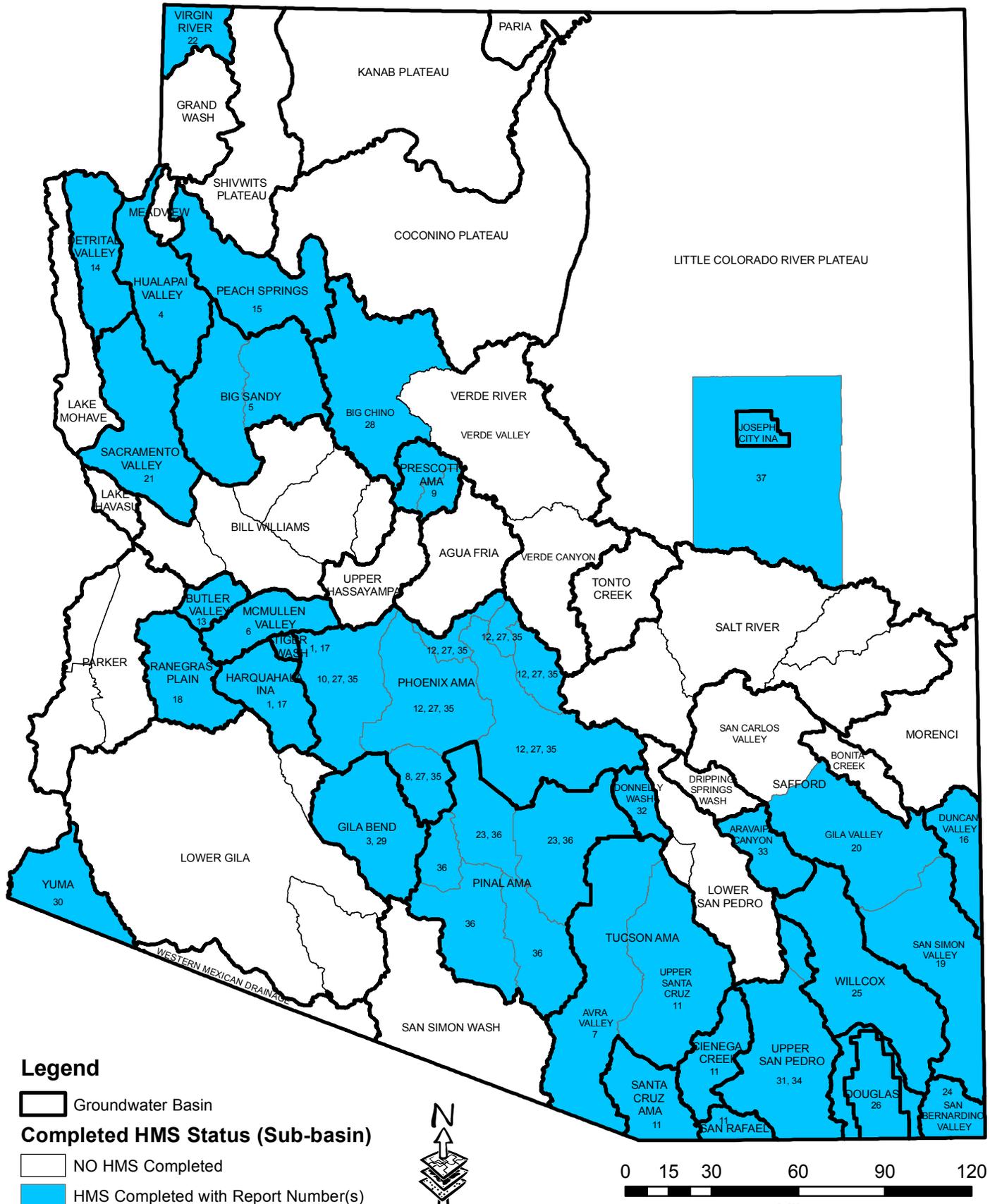


Figure 3 - Arizona Groundwater Basins Completed Hydrologic Map Series (HMS) Reports



July 24, 2009

Figure 4 - Arizona Groundwater Basins Proposed Basin Sweeps

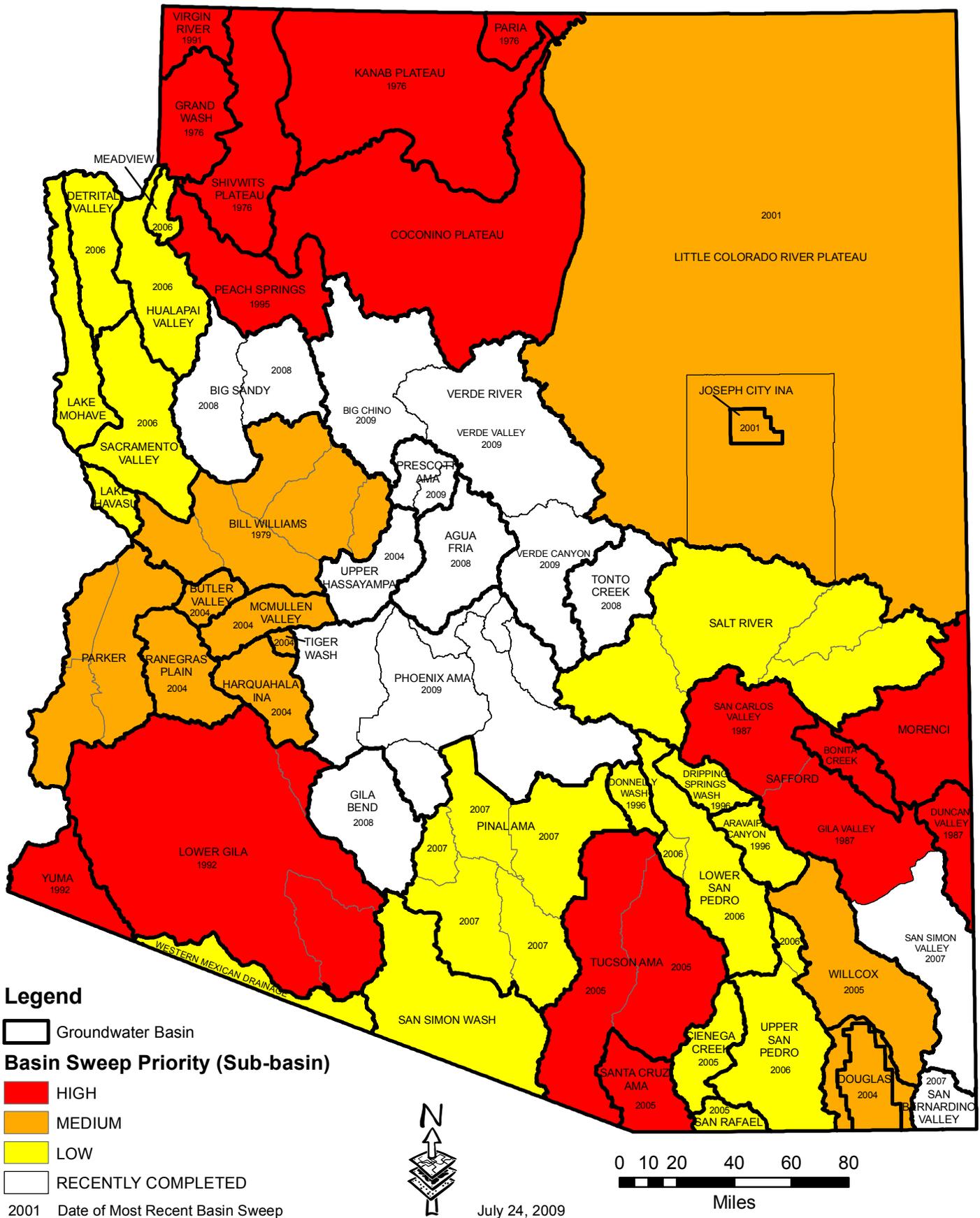


Figure 6 - Arizona Groundwater Basins Proposed Water Level Change Map Series (WLCMS) Reports

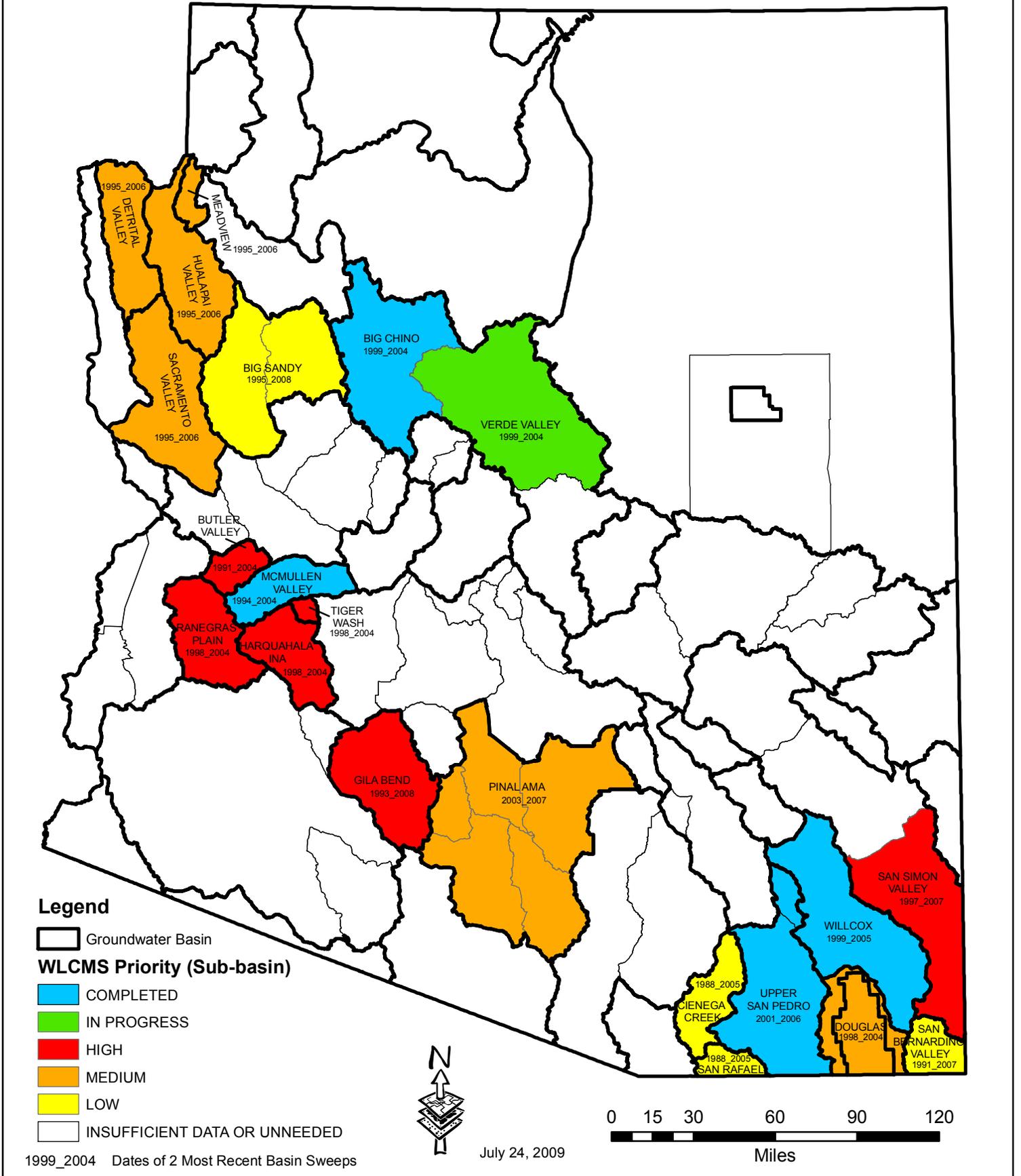


Table 1 - Critical Arizona Groundwater Basin Criteria

ADWR 2007

CRITICAL GROUNDWATER BASINS										
27-Sep-07										
GROUND WATER BASINS	BASIN SELECTION CRITERIA*									
	Area Of Rapid Development or Projected Rapid Development	Large Water Level Changes	Projected 100 Year Basin De-watering	Drought Sensitive	Near Recharge Sites or River/Streams	Subsidence: Active or Potential	Groundwater Modeling Data Needs	Water Quality Concern	Riparian, Water Rights, or Other Concerns	Endangered Species or Environmental Concerns
Priority Basins										
Detrital	X		X			X	X		X	
Hualapai	X	X	X			X	X			
Sacramento	X		X			X	X			
Upper San Pedro	X	X	X	X	X		X		X	X
Verde	X	X		X	X		X		X	X
Willcox		X		X		X	X			
Non-AMA/INA Basins										
Agua Fria				X					X	
Aravaipa Canyon				X						
Big Sandy									X	
Bill Williams									X	
Bonita Creek									X	
Butler Valley		X								
Cienega Creek				X					X	
Coconino Plateau	X		X				X		X	
Donnelly Wash										
Douglas		X				X				
Dripping Springs Wash										
Duncan Valley					X					X
Gila Bend		X			X			X		
Grand Wash										
Kanab Plateau					X					
Lake Havasu					X				X	X
Lake Mojave					X				X	X
Little Colorado River Plateau				X	X		X	X	X	X
Lower Gila		X						X		
Lower San Pedro				X	X				X	X
McMullen Valley		X				X				
Meadview										
Morenci					X				X	X
Paria										
Parker					X				X	X
Peach Springs					X					
Ranegras Plain		X						X		
Safford	X	X			X					X
Salt River										
San Bernardino				X						
San Rafael										
San Simon Wash										
Shivwits Plateau										
Tiger Wash										
Tonto Creek					X				X	
Upper Hassayampa	X								X	
Virgin River					X			X	X	X
Western Mexican Drainage										
Yuma	X				X			X	X	X

GROUND WATER BASINS	Area Of Rapid Development or Projected Rapid Development	Large Water Level Changes	Projected 100 Year Basin De-watering	Drought Sensitive	Near Recharge Sites or River/Streams	Subsidence: Active or Potential	Groundwater Modeling Data Needs	Water Quality Concern	Riparian, Water Rights, or Other Concerns	Endangered Species or Environmental Concerns
AMAs/INAs										
Phoenix AMA	X	X		X	X	X	X	X	X	X
Pinal AMA	X	X	X	X	X	X	X	X	X	
Prescott AMA	X	X					X		X	X
Santa Cruz AMA	X			X	X				X	X
Tucson AMA	X	X			X				X	X
Joseph City INA								X		
Douglas INA		X				X				
Harquahala INA		X			X	X				

*** Criteria are based on the current or potential effects of groundwater withdrawals.**

The Upper San Pedro Basin has both drought and water supply concerns as well as sensitive riparian areas. Rapid development in the Benson area is expected. Fort Huachuca is an important economic engine for the area and there is great sensitivity to the hydrologic and environmental consequences caused by the population that services the Fort.

The Detrital Valley, Hualapai and Sacramento Basins have concerns for potential aquifer depletion by rapid development. Only rough estimates of aquifer storage are available. For Detrital Wash the estimate is about 3 million acre-ft, while recent AWS applications have exceeded requests for 1 million acre-ft. Depth to groundwater also exceeds the state standard of 1200 feet in some areas.

The Verde Valley population has more than doubled in the last 20 years and is projected to more than double again within the next 50 years. Municipal water usage has increased by more than 39 percent over the last eight years and at the present rate of growth will increase by more than 400 percent over the next 50 years. The need exists to for a sufficient groundwater-monitoring network that will reflect changes to the hydrologic system including riparian concerns in this valley. Development concerns include downstream water rights and environmental effects on streamflow, as well as high water level decline rates in parts of the Prescott AMA.

Water levels in the Willcox Basin have declined at one of the most drastic rates seen in the state. Over 50 foot declines have been observed in recent measurements from the last five years. It is believed that a combination of drought conditions, lack of recharge and continued agricultural pumpage are factors contributing to this rapid water level decline. Additionally, given the geology in the basin and declining water levels, this basin has great potential for subsidence activity to occur.

The Pinal AMA has concerns arising from rapid development, including declining water levels over half of the measured area within the AMA, known subsidence, water quality concerns, and drought issues. From 1998 to 2003 water level declines on the order of 60 plus feet have occurred in the Coolidge/Florence and Casa Grande areas. This AMA is in great need of an adequate groundwater-monitoring network that will monitor a multitude of factors affecting the hydrologic system and groundwater availability.

Table 2 - Current Status of Basins and Sub-basins

BASIN	SUB-BASIN	BASIN SWEEP YEARS	HMS	WLCMS	Other ADWR Reports	Recent USGS Reports
AGUA FRIA		1979, 2008	High		BLT – (5)	
ARAVAIPA CANYON		1991, 1996, Low	2003 (No 33)			
BIG SANDY	FORT ROCK	1980, 1995, 2008	1981 (No 5), Low	Low	WCBLT – 1973 (6)	
	WIKIEUP	1980, 1995, 2008	1981 (No 5), Low	Low	WCBLT – 1973 (6)	
BILL WILLIAMS	ALAMO RESERVOIR	1979, Medium	Low			
	BURRO CREEK	1979, Medium	Low			
	CLARA PEAK	1979, Medium	Low			WRIR 02-4214
	SANTA MARIA	1979, Medium	Low			
	SKULL VALLEY	1979, Medium	Low			
BONITA CREEK		High	Medium		OFR – 1986 (1)	
BUTLER VALLEY		1986, 1991, 2004, Medium	1987 (No 13)	High		
CIENEGA CREEK		1987-88, 2005, Low	1984 (No 11)	Low		
COCONINO PLATEAU					BLT – (4)	FS 113-02, 159-00 SIR 2005-5222, 2005-5280, 2005-5277, 2004-5294
		High			OFR – 2007 (9)	FS 2006-3008 SIR 2007-5182
DETRITAL VALLEY		1987, 1995, 2006, Low	1987 (No 14)	Medium		
DONNELLY WASH		1996, Low	2000 (No 32)			
DOUGLAS		1990, 1998, 2004, Medium	1993 (No 26)	Medium		FS 2006-3055, In Progress
DOUGLAS INA		1990, 1998, 2004, Medium	1993 (No 26)	Medium		FS 2006-3055, In Progress
DRIPPING SPRING WASH		1996, Low	In Progress			
DUNCAN VALLEY		1987, High	1989 (No 16), Medium			
GILA BEND		1979, 1993, 2008	1981 (No 3), 1996 (No 29)	High		
GRAND WASH		1976, High				
HARQUAHALA INA		1980, 1989, 1998, 2004	1980 (No 1), 1990 (No 17)	High		
HUALAPAI VALLEY		1980, 1991, 1995, 2006	1981 (No 4)	Medium		FS 2006-3008 SIR 2007-5182
JOSEPH CITY INA		1975, 2001, High	2005 (No 37)			
KANAB PLATEAU		1976, High				
LAKE HAVASU		Low				
LAKE MOHAVE		Low				
LITTLE COLORADO RIVER PLATEAU		1975, 2001, Medium	2005 (No 37 – partial), In Progress 2008 (partial)		BLT – 1983 (1), (4) WCBLT – 1976 (10)	FS 159-00 OFR 2007-1041, 2006-05, 2003-1080, 2002-03, 2001-02 WRIR 02-4211, 02-4026, 00-4122

Table 2 - Current Status of Basins and Sub-basins (continued)

BASIN	SUB-BASIN	BASIN SWEEP YEARS	HMS	WLCMS	ADWR Reports	Recent USGS Reports	
LOWER GILA	CHILDS VALLEY	1992, High	Low				
	DENDORA VALLEY	1992, High	Low				
	WELLTON - MOHAWK	1992, High	Low				
LOWER SAN PEDRO	CAMP GRANT WASH	1990, 1994, 2006, Low	In Progress 2008			FS 2006-3034	
	MAMMOTH	1990, 1994, 2006, Low	In Progress 2008			FS 2006-3034	
MCMULLEN VALLEY		1981, 1990, 1994, 2004, Medium	1981 (No 6)	2009 (No 4)			
MEADVIEW		1995, 2006, Low		Low			
MORENCI		High	Medium				
PARIA		1975-76, High					
PARKER	CIBOLA VALLEY	Medium					
	COLORADO RIVER IND RES	Medium					
	LA POSA PLAINS	Medium					
PEACH SPRINGS		1987, 1995, High	1987 (No 15)				
PHOENIX AMA	CAREFREE	1983, 1987, 1992, 1997, 2002, 2009	1986 (No 12), 1995 (No 27), 2005 (No 35)		HMR – 2002, 2003		
					MDR – 2008 (In Progress)		
	EAST SALT RIVER	1983, 1987, 1992, 1997, 2002, 2009	1986 (No 12), 1995 (No 27), 2005 (No 35)			HMR – 2002, 2003	
						MDR – 1992 (3), 1993 (6), 1994 (8), 1996 (11), 2006 (16), 2007 (17), 2008 (In Progress)	
	FOUNTAIN HILLS	1983, 1987, 1992, 1997, 2002, 2009	1986 (No 12), 1995 (No 27), 2005 (No 35)			HMR – 2002, 2003	
						MDR – 2008 (In Progress)	
	HASSAYAMPA	1983, 1987, 1992, 1997, 2002, 2009	1983 (No 10), 1995 (No 27), 2005 (No 35)			HMR – 2002, 2003	
LAKE PLEASANT	1983, 1987, 1992, 1997, 2002, 2009	1986 (No 12), 1995 (No 27), 2005 (No 35)			HMR – 2002, 2003		
					MDR – 2008 (In Progress)		
RAINBOW VALLEY	1983, 1987, 1992, 1997, 2002, 2009	1983 (No 8), 1995 (No 27), 2005 (No 35)			HMR – 2002, 2003		
					MDR – 2008 (In Progress)		
WEST SALT RIVER	1983, 1987, 1992, 1997, 2002, 2009	1986 (No 12), 1995 (No 27), 2005 (No 35)			HMR – 2002, 2003		
					MDR – 1992 (3), 1992 (5), 1993 (6), 1994 (8), 1996 (11), 2006 (16), 2008 (In Progress)		
					OFR – 1987 (3)		

Table 2 - Current Status of Basins and Sub-basins (continued)

BASIN	SUB-BASIN	BASIN SWEEP YEARS	HMS	WLCMS	ADWR Reports	Recent USGS Reports
PINAL AMA	AGUIRRE VALLEY	1984, 1989, 1993, 1998, 2003, 2007, Low	2005 (No 36)	Medium		
	ELOY	1984, 1989, 1993, 1998, 2003, 2007, Low	1992 (No 23), 2005 (No 36)	Medium	MDR – 1989 (1), 1990 (2), 1992 (4)	WRIR 00-4277
	MARICOPA - STANFIELD	1984, 1989, 1993, 1998, 2003, 2007, Low	1992 (No 23), 2005 (No 36)	Medium	MDR – 1989 (1), 1990 (2), 1992 (4)	
	SANTA ROSA	1984, 1989, 1993, 1998, 2003, 2007, Low	2005 (No 36)	Medium		
	VEKOL VALLEY	1984, 1989, 1993, 1998, 2003, 2007, Low	2005 (No 36)	Medium		
PRESCOTT AMA					HMR – 2001, 2002, 2003, 2004	FS 059-02
					MDR – 1995 (9), 2002 (12)	SIR 2005-5198
					OFR – 2004	
					BLT – 1983 (2) Verde River Study (2000)	
UPPER AGUA FRIA		1982, 1991, 1999, 2009	1983 (No 9), High		HMR – 2001, 2002, 2003, 2004	
					MDR – 1995 (9), 2002 (12) BLT - (5)	
RANEGRAS PLAIN		1988, 1998, 2004, Medium	1990 (No 18)	High		
SACRAMENTO VALLEY		1991, 1995, 2006, Low	1991 (No 21)	Medium	OFR – 2008 (10)	FS 2006-3008 SIR 2007-5182
SAFFORD	GILA VALLEY	1987, High	1991 (No 20), Medium			
	SAN CARLOS VALLEY	1987, High	Medium			
	SAN SIMON VALLEY	1987, 1992, 1997, 2007	1991 (No 19), Medium	Medium		
SALT RIVER	BLACK RIVER	Low				
	SALT RIVER CANYON	Low				FS 159-00
	SALT RIVER LAKES	Low				
	WHITE RIVER	Low				
SAN BERNADINO VALLEY		1991, 2007	1992 (No 24)	Low		
SAN RAFAEL		1987-88, 2005, Low	1984 (No 11)	Low		
SAN SIMON WASH		Low				
SANTA CRUZ AMA		1982, 1990, 1994-1995, 2000, 2005, High	1984 (No 11), Low		HMR - 2001 MDR - 1984, 2007(14), 2007 (15), 2007 (18) OFR – 1995 (8)	

Table 2 - Current Status of Basins and Sub-basins (continued)

BASIN	SUB-BASIN	BASIN SWEEP YEARS	HMS	WLCMS	ADWR Reports	Recent USGS Reports
SHIVWITS PLATEAU		1976, High				
TIGER WASH		1980, 1989, 1998, 2004, Medium	1980 (No 1), 1990 (No 17)	High		
TONTO CREEK		1975, 2008	High			FS 159-00
TUCSON AMA	AVRA VALLEY	1981-82, 1988, 1994-95, 2000, 2005, High	1982 (No 7),		MDR – 1984, 2006 (13)	FS 084-00
			In Progress 2008		OFR – 1995 (8)	SIR 2007-5190
	UPPER SANTA CRUZ	1981-82, 1988, 1994-95, 2000, 2005, High	1984 (No 11),		MDR – 1984, 2006 (13)	FS 084-00
			In Progress 2008		OFR – 1988 (5), 1995 (8)	SIR 2007-5190, 2004-5286
UPPER HASSAYAMPA		1978, 2004	High			
UPPER SAN PEDRO	ALLEN FLAT	1990, 1998, 1999, 2001-02, 2006, Low	1997 (No 31), 2003 (No 34), Medium	2009 (No 3)		FS 2006-3034
	SIERRA VISTA	1990, 1998, 1999, 2001-02, 2006, Low	1997 (No 31), 2003 (No 34), Medium	2009 (No 3)	MDR – 1996 (10)	FS 2006-3034 SIR 2006-5228 WRIR 99-4197
VERDE RIVER					OFR – 2004	FS 059-02
					BLT – 1983 (2,3)	SIR 2005-5198
					Verde River Study (2000)	
	BIG CHINO	1992, 1999, 2004, 2009	1995 (No 28) High	2009 (No 2)	Verde River Study (2000)	FS 159-00
	VERDE CANYON	1975-76, 2009	High			
VERDE VALLEY	1994, 1999, 2004, 2009	High	In Progress		OFR – 2004 BLT – (4) WCBLT – (11) Verde River Study (2000)	FS 059-02, 159-00 SIR 2005-5198, 2004-5294
VIRGIN RIVER		1991, High	1991 (No 22)			
WESTERN MEXICAN DRAINAGE		Low				
WILLCOX		1990, 1994, 1999, 2005, Medium	1993 (No 25)	2008 (No 1)		FS 2006-3055
YUMA		1992, High	1997 (No 30)		MDR – 1993 (7) OFR – 1988 (6)	SIR 2007-5135

ADWR and USGS Report Abbreviations

HMS = Hydrologic Map Series, **WLCMS** = Water Level Change Map Series, **MDR** = Modeling Report, **HMR** = Hydrologic Monitoring Report

OFR = Open File Report, **BLT** = Bulletin, **WCBLT** = Water Commission Bulletin, **HSR** = Hydrologic Survey Reports

FS = Fact Sheet, **OFR** = Open File Report, **SIR** = Scientific Investigation Report, **WRIR** = Water Resources Investigations Report

Note: Basin Sweeps, HMS, and WLCMS Priority and Status are shown in Red (bold)

Table 3 - Basin Sweep Priority

Basin	Last Basin Sweep	Current Hydrologic Map Series (HMS) Reports	Total GWSI Non Index Wells*	Total GWSI Index Wells*	Current Status/Priority	Supporting Program
Tucson AMA	2005	HMS in progress	4711	143	High	AMA/AWS/WM/HMU
Santa Cruz AMA	2005	HMS 1984	654	53	High	
Safford	2007 (San Simon), 1987 (Gila Valley and San Carlos needed)	HMS for entire Safford Basin needed after basin sweep HMS 1991 (Gila Valley)	3241	58	High	SWP/Rural
Duncan Valley	1987	HMS 1989	310	9	High	SWP/Rural
Morenci	None	No HMS	66	3	High	
Bonita Creek	None	No HMS	4	0	High	
Lower Gila	1992	No HMS	1288	39	High	SWP/Rural/HMU
Yuma	1992	HMS 1997	115	7	High	
Coconino Plateau	None	No HMS	148	4	High	SWP/Rural
Kanab Plateau	1976	No HMS	220	7	High	
Paria	1976	No HMS	25	1	High	
Virgin	1991	HMS 1991	1754	13	High	
Peach Springs	1995	HMS 1987	76	6	High	
Shivwits Plateau	1976	No HMS	33	0	High	
Grand Wash	1976	No HMS	21	2	High	
Little Colorado River Plateau	2001	HMS 2005 and in progress	2851	58	Medium	SWP/Rural
Bill Williams	1979	No HMS	414	26	Medium	
Parker	1976	No HMS	232	7	Medium	
Harquahala INA	2004	HMS 1980 and 1990	298	35	Medium	SWP/Rural
Tiger Wash	2004	HMS 1980 and 1990	4	2	Medium	
McMullen Valley	2004	HMS 1981	364	27	Medium	
Butler Valley	2004	HMS 1987	34	13	Medium	
Ranegras Plain	2004	HMS 1990	300	21	Medium	
Willcox	2005	HMS 1993	2373	51	Medium	SWP/Rural
Douglas INA/Douglas	2004	HMS 1993	1457	3	Medium	

Table 3 - Basin Sweep Priority (continued)

Basin	Last Basin Sweep	Current Hydrologic Map Series (HMS) Reports	Total GWSI Non Index Wells*	Total GWSI Index Wells*	Current Status/Priority	Supporting Program
Pinal AMA	2007	HMS 2005	3787	173	Low	AMA/AWS/WM/HMU
Detrital Valley	2006	HMS 1987	129	5	Low	SWP/Rural
Hualapai Valley	2006	HMS 1981	313	10	Low	
Sacramento Valley	2006	HMS 1991	470	14	Low	
Meadview	2006	No HMS	34	2	Low	
Upper San Pedro	2006	HMS 1997 and 2004	1903	66	Low	SWP/Rural/HMU
Lower San Pedro	2006	HMS in progress	868	22	Low	
Cienega Creek	2005	HMS 1984	360	15	Low	
San Rafael	2005	HMS 1984	92	11	Low	
Donnelly Wash	1996	HMS 2000	33	0	Low	SWP/Rural
Dripping Springs Wash	1996	HMS in progress (1996 data)	49	2	Low	
Aravaipa Canyon	1996	HMS 2003	133	4	Low	
Salt River	None	No HMS	97	2	Low	SWP/Rural
Lake Mohave	None	No HMS	242	6	Low	SWP/Rural
Lake Havasu	None	No HMS	14	2	Low	
San Simon Wash	None	No HMS	221	0	Low	SWP/Rural
Western Mexican Drainage	None	No HMS	27	2	Low	

Note: Basins are arranged in order of priority which was based on number of years since previous basin sweep, number of wells in the basin, and years since HMS done. The basin sweep priority was also based on the critical basin ranking (Table 1) which was developed based on recommendations made from Statewide Planning (SWP) - Rural Programs (Rural), Water Management (WM) - Active Management Areas (AMA) and Assured Water Supply (AWS), and Hydrology - Modeling Unit (HMU) within ADWR to determine critical areas.

*Total number of GWSI Index and Non-Index wells as of May 6 2008.

Table 4 - Status and Priority of Proposed HMS Reports

Basin	Sub-Basin	Previous HMS	Recent Basin Sweep	Status/Priority
Tucson AMA	Avra Valley	1982	2005	In Progress
	Upper Santa Cruz	1984		
Lower San Pedro		none	2006	In Progress
Little Colorado River (Southwestern Portion Coconino County)		none	2001	In Progress
Dripping Springs Wash		none	1996	In Progress
Phoenix AMA		2005	2009	High
Prescott AMA		1983	2009	High
Verde River	Big Chino	1995	2009	High
	Verde Canyon	none	2009	High
	Verde Valley	none	2009	High
Upper Hassayampa		none	2004	High
Tonto Creek		none	2008	High
Agua Fria		none	2008	High
Safford	Gila Valley	1991	1987	Medium
	San Carlos Valley	none	1987	Medium
	San Simon Valley	1991	2007	Medium
Duncan Valley		1989	1987	Medium
Morenci		none	none	Medium
Bonita Creek		none	none	Medium
Upper San Pedro		2003	2006	Medium
Pinal AMA		2005	2007	Medium
Bill Williams		none	1979	Low
Lower Gila		none	1992	Low
Yuma		1997	1992	Low
Big Sandy		1981	2008	Low
Santa Cruz AMA		1984	2005	Low

Note: Basins are listed in order of priority of HMS Reports needed throughout Arizona which was based on number of years since previous HMS, and recent or highly needed basin sweeps. The HMS priority was also based on the critical basin ranking (shown in Table 1) which was developed based on recommendations made from Statewide Planning, Water Management, Hydrology, Rural Programs, Active Management Areas, and other Programs within ADWR to determine critical areas.

 indicates that a Basin Sweep is needed prior to HMS Report

Table 5 - Status and Priority of Proposed WLCMS Reports

Basin (Sub-Basin)	Basin Sweep Year (Start)	Basin Sweep Year (End)	Status/Priority
Willcox Basin	1999	2005	Completed
Verde River (Big Chino)	1999	2004	Completed
Upper San Pedro	2001	2006	Completed
McMullen Valley	1994	2004	Completed
Verde River (Verde Valley)	1999	2004	In Progress
Gila Bend	1999	2004	High
Harquahala INA and Tiger Wash	1998	2004	High
Renegras Plain	1998	2004	High
Butler Valley	1997	2004	High
Safford (San Simon Valley)	1997	2007	High
Hualapai Valley	1995	2006	Medium
Detrital Valley	1995	2006	Medium
Sacramento Valley	1995	2006	Medium
Meadview	1995	2006	Medium
Pinal AMA	2003	2007	Medium
Douglas	1998	2004	Medium
San Bernardino Valley	1991	2007	Low
San Rafael	1988	2005	Low
Cienega Creek	1998	2005	Low
Big Sandy	1995	2008	Low

Note: Basins are listed in order of priority of WLCMS Reports needed throughout Arizona. Priority for WLCMS was based on recent basin sweeps, and years since previous HMS. The WLCMS priority was also based on the critical basin ranking (shown in Table 1) which was developed based on recommendations made from Statewide Planning, Water Management, Hydrology, Rural Programs, Active Management Areas, and other Programs within ADWR to determine critical areas.

Appendix A

Chronological List of ADWR Hydrologic Map Series (HMS) Reports

HMS No. 01

Maps showing groundwater conditions in the Harquahala Plains Area, Maricopa and Yuma Counties, Arizona 1980, C.G. GRAF 1980.

HMS No. 02

Maps showing Total Dissolved Solids of Groundwater in Arizona 1980, D.L. Daniel 1981.

HMS No. 03

Maps showing groundwater conditions in the Gila Bend Area, Maricopa County, Arizona 1979, P.G. Sebenik 1981.

HMS No. 04

Maps showing groundwater conditions in the Hualapai Basin Area, Mohave, Coconino, and Yavapai Counties, Arizona 1980, W.H. Remick 1981.

HMS No. 05

Maps showing groundwater conditions in the Big Sandy Area, Yavapai and Mohave Counties, Arizona 1980, C.V. Cady 1981.

HMS No. 06

Maps showing groundwater conditions in the McMullen Valley Area, Maricopa, Yavapai and Yuma Counties, Arizona 1981, W.H. Remick 1981.

HMS No. 07

Maps showing Groundwater conditions in the Avra/Altar Valley Area, Pima, and Santa Cruz Counties, Arizona 1981, R.W. Reeter and C.V. Cady 1982.

HMS No. 08

Maps showing groundwater conditions in the Waterman Wash Area, Maricopa and Pinal Counties, Arizona 1982, W.H. Remick 1983.

HMS No. 09

Maps showing groundwater conditions in the Prescott Active Management Area, Yavapai County, Arizona 1982, W.H. Remick 1983.

HMS No. 10

Maps showing groundwater conditions in the Hassayampa sub-basin of the Phoenix Active Management Area, Maricopa and Yavapai Counties, Arizona 1982, M.R. Long 1983.

HMS No. 11

Maps showing groundwater conditions in the Upper Santa Cruz Basin Area, Pima, Santa Cruz, Pinal, and Cochise Counties, Arizona 1982, B.A. Murphy and J.D. Hedley 1984.

HMS No. 12

Maps showing groundwater conditions in the West Salt River, East Salt River, Lake Pleasant, Carefree, and Fountain Hills sub-basins of the Phoenix Active Management Area, Maricopa, Pinal, and Yavapai Counties, Arizona 1983, W.H. Remick, and R.W. Reeter 1986.

HMS No. 13

Maps showing groundwater conditions in the Butler Valley Basin, La Paz County, Arizona 1986, P. Oram 1987.

HMS No. 14

Maps showing groundwater conditions in the Detrital Wash Basin, Mohave County, Arizona 1987, R.A. Dillenberg 1987.

HMS No. 15

Maps showing groundwater conditions in the Peach Springs Basin, Mohave County, Arizona 1987, S.M. Myers 1987.

HMS No. 16

Maps showing groundwater conditions in the Duncan-Virden Valley Basin, Greenlee and Cochise Counties, Arizona and Hidalgo and Grant Counties, New Mexico 1987, W.H. Remick 1989.

HMS No. 17

Maps showing groundwater conditions in the Harquahala Irrigation and Non-Expansion Area and Tiger Wash Basin, Maricopa and La Paz Counties, Arizona 1989, J.D. Hedley 1990.

HMS No. 18

Maps showing groundwater conditions in the Ranegras Plain Basin, La Paz and Yuma Counties, Arizona 1988, B.J. Johnson 1990.

HMS No. 19

Maps showing groundwater conditions in the San Simon sub-basin of the Safford Basin, Graham and Cochise Counties, Arizona and Hidalgo County, New Mexico 1987, R.L. Barnes 1991.

HMS No. 20

Maps showing groundwater conditions in the Gila Valley sub-basin of the Safford Basin, Graham and Greenlee Counties, Arizona 1987, K.R. Black 1991.

HMS No. 21

Maps showing groundwater conditions in the Sacramento Valley Basin, Mohave County, Arizona 1991, S.J. Rascona 1991.

HMS No. 22

Maps showing groundwater conditions in the Virgin River Basin, Mohave County, Arizona and Lincoln and Clark Counties, Nevada 1991, K.R. Black and S.J. Rascona 1991.

HMS No. 23

Maps showing groundwater conditions in the Eloy and Maricopa-Stanfield sub-basins of the Pinal Active Management Area, Pinal, Pima, and Maricopa Counties, Arizona 1989, B.A. Hammett 1992.

HMS No. 24

Maps showing groundwater conditions in the San Bernadino Valley Basin, Cochise County, Arizona and Hidalgo County, New Mexico 1991, K.J. Schwab 1992.

HMS No. 25

Maps showing groundwater conditions in the Wilcox Basin, Cochise and Graham Counties, Arizona 1989, P. Oram III 1993.

HMS No. 26

Maps showing groundwater conditions in the Douglas Basin, Cochise County, Arizona 1989, S.J. Rascona 1993.

HMS No. 27

Maps showing groundwater conditions in the Phoenix Active Management Area, Maricopa, Pinal and Yavapai Counties, Arizona 1992, B.A. Hammett and R.L. Herther 1995.

HMS No. 28

Maps showing groundwater conditions in the Big Chino sub-basin of the Verde River Basin, Coconino and Yavapai Counties, Arizona 1992, K.J. Schwab 1995.

HMS No. 29

Maps showing groundwater conditions in the Gila Bend Basin, Maricopa County, Arizona 1993, S.J. Rascona 1996.

HMS No. 30

Maps showing groundwater conditions in the Yuma Basin, Yuma County, Arizona 1992, Andrew Overby 1977.

HMS No. 31

Maps showing groundwater conditions in the Upper San Pedro Basin, Cochise, Graham, and Santa Cruz Counties, Arizona 1990, R.L. Barnes 1997.

HMS No. 32

Maps showing groundwater conditions in the Donnelly Wash Basin, Pinal County, Arizona 1996-1997, Overby, Andrew 2000.

HMS No. 33

Maps showing Groundwater Conditions in Aravaipa Canyon Basin, Pinal and Graham Counties, Arizona 1996. Holmes, Mark A., 2003.

HMS No. 34

Maps showing groundwater conditions in the Upper San Pedro Basin, Cochise, Graham and Santa Cruz counties, Arizona, Dec. 2001-Jan 2002, R.L. Barnes and F. Putman.

HMS No. 35

Maps showing groundwater conditions in the Phoenix Active Management Area, Maricopa, Pinal and Yavapai Counties, AZ - Nov. 2002-Feb 2003. S. J. Rascona, 2005.

HMS No. 36

Maps showing groundwater conditions in the Pinal Active Management Area, Maricopa, Pinal, and Pima Counties, Arizona-Nov. 2002-Feb 2003. S.J. Rascona.

HMS No. 37

Maps showing groundwater conditions in the Southern Navajo County, Arizona: April-August 2001, A.E. Overby. Also available on CD

Appendix B

Chronological List of ADWR Water Level Change Map Series (WLCMS) Reports

WLCMS No. 01

Water Level Changes in Willcox Basin, Arizona, 1999-2005. J Jacobson, T Davis, A. Hinckley, D. Schmerge, and S. Flora, May 2008

WLCMS No. 02

Water Level Changes in Big Chino Sub-Basin, Arizona, 1999-2004. Stephen Flora and Teri Davis, April 2009.

WLCMS No. 03

Water Level Conditions in the Upper San Pedro Basin, Arizona, 2006. David Schmerge, Frank Corkhill, and Stephen Flora, June 2009. (3 sheets - Change in Water Level, 2001-2006; Hydrographs of Selected Wells; and Water Level Elevation, 2006)

WLCMS No. 04

Water Level Conditions From 1994 to 2004 and Land Subsidence from 1992 to 2009 in McMullen Valley Basin, Arizona. David Schmerge, Brian Conway, and Stephen Flora, June 2009.

WLCMS No. 05 (Currently in progress)

Water Level Changes in Verde Valley Sub-Basin, Arizona, 1999-2004. Stephen Flora, July 2009.