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SAVING THE LAST GREAT PLACES ON EARTH

"Nature always wears the colors of the spirit"

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Our Mission

To preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.

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Our Story

We achieve lasting results by finding common ground with communities and partners.

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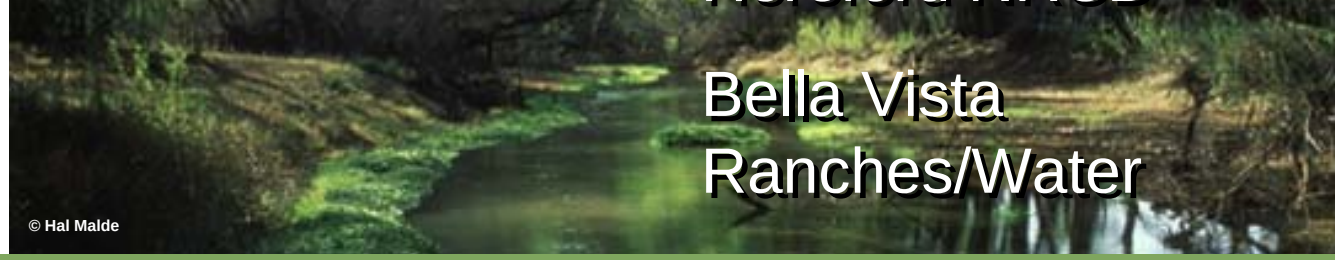

Upper San Pedro Partnership

To meet the long-term needs of the Sierra Vista Subwatershed by achieving sustainable yield of the regional aquifer by 2011

- Bella Vista Ranches/Water
- Bureau of Land Management (BLM)
- U.S. Geological Survey
- Audubon Arizona
- Arizona State Land Department
- U.S.D.A. Agricultural Research Service
- National Park Service
- U.S. Forest Service
- The Nature

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National Defense Authorization Act for 2004–Section 321

"Restore and maintain the sustainable yield of the aquifer by 2011"

Recognizes the Partnership and the importance of collaborative water use management

Requires that measurable annual goals for reduction in overdraft are set

Establishes a mandate, but provides no funding to achieve it

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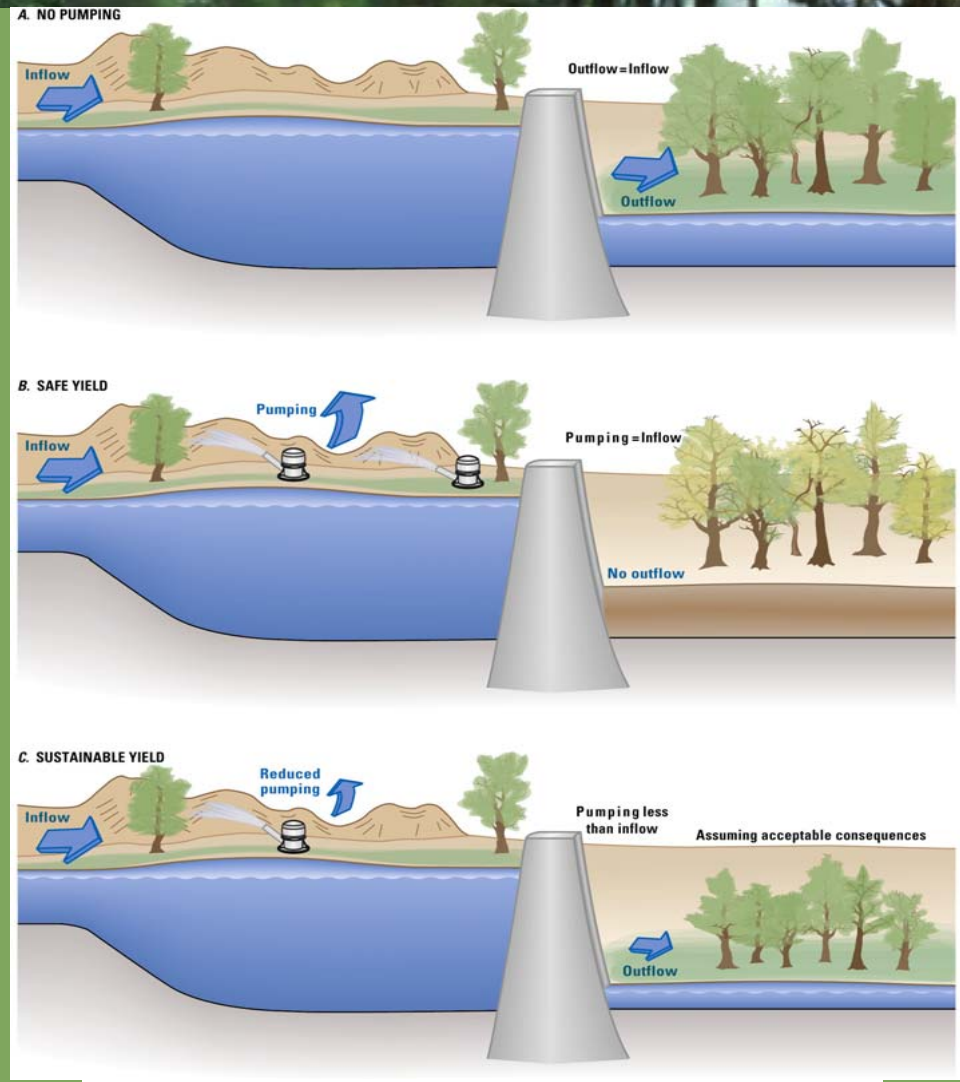
…the development and use of groundwater in a manner that can be maintained for an indefinite time without causing environmental, economic, or social consequences…



U.S. Department of the Interior, 2005

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Criteria for Sustainable Yield

-Ground-water levels in alluvial aquifer maintained

-Stream base flow and flood flows maintained

-Accrete aquifer storage

-Riparian habitat and ecologic diversity maintained

-Water quality sustained

-Overall riparian condition maintained

-Springs in the SPRNCA continue to flow

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Upper San Pedro Partnership Approach: Adaptive Management

-Reduction of the annual water deficit by approximately two thirds

-Establishment of over 100 member agency projects

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Table 2. Planned annual yields and estimates of actual annual yields for 2002 through 2011 of measures planned by Partnership members to reduce aquifer overdraft

[Yields are in acre-feet/year; ---, indicates no yield in year; Numbers compiled in May – June, 2005; Conservation yields in each year are relative to a zero yield in the baseline year of 2002; Recharge yields are total values and are relative to a baseline of zero acre feet]

Description	Measure type	2002 Yield Actual	2003 Yield Actual	2004 Yield Actual	2005 Yield Planned	2006 Yield Planned	2007 Yield Planned	2008 Yield Planned	2009 Yield Planned	2010 Yield Planned	2011 Yield Planned
Fort Huachuca											
Conservation measures[1]	Conservation	---	-60	150	200	280	330	220	270	320	340
Reduced ground-water pumping through effluent reuse[1]	Conservation	---	-25	-90	54	54	54	54	54	54	54
Effluent recharge[2]	Recharge	190	290	440	610	575	540	505	470	435	435
Stormwater detention basins[3]	Recharge	60	30	25	370	370	370	370	430	490	580
Cochise County											
Conservation measures[1]	Conservation	---	---	10	60	110	170	220	270	320	380
Sierra Vista											
Conservation measures[1]	Conservation	---	50	100	290	290	300	300	310	310	320
Effluent recharge[4]	Recharge	930	1,750	1,870	1,970	2,090	2,150	2,220	2,280	2,350	2,420
Stormwater detention basins[3]	Recharge	140	180	290	150	150	180	180	180	180	180
The Nature Conservancy and Fort Huachuca											
Retirement of agricultural pumping[4]	Conservation	---	---	---	---	250	250	500	1,000	1,500	2,000
Bisbee											
Conservation measures[1]	Conservation	---	---	---	---	10	20	30	40	50	60
Reduced ground-water pumping through effluent reuse	Conservation	---	---	---	---	420	420	420	420	420	420
Effluent recharge	Recharge	---	---	---	---	170	180	180	180	190	190
Huachuca City											
Conservation measures[1]	Conservation	---	---	---	---	5	5	10	10	10	20
Effluent recharged at Fort Huachuca	Recharge	---	---	---	---	---	170	180	180	180	180
Tombstone											
Conservation measures[1]	Conservation	---	---	---	---	5	5	10	10	10	20
Bureau of Land Management											
Mesquite reduction[5], and retirement of agricultural ground-water pumping[4]	Conservation	475	475	475	490	580	660	750	830	920	1,000
Urban enhanced ephemeral-stream channel stormwater recharge											
Increase in stormwater recharge in ephemeral channels by urbanization[6]	Recharge	3,100	3,100	3,100	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Total yields											
Total yield[9]		4,900	5,800	6,400	6,500	7,700	8,100	8,400	9,200	10,000	11,000
Total yield projected in original 321 report[10]		6,400	6,800	7,700	8,300	9,100	10,500	11,200	12,300	13,100	13,900

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U.S. Department of the Interior, 2005

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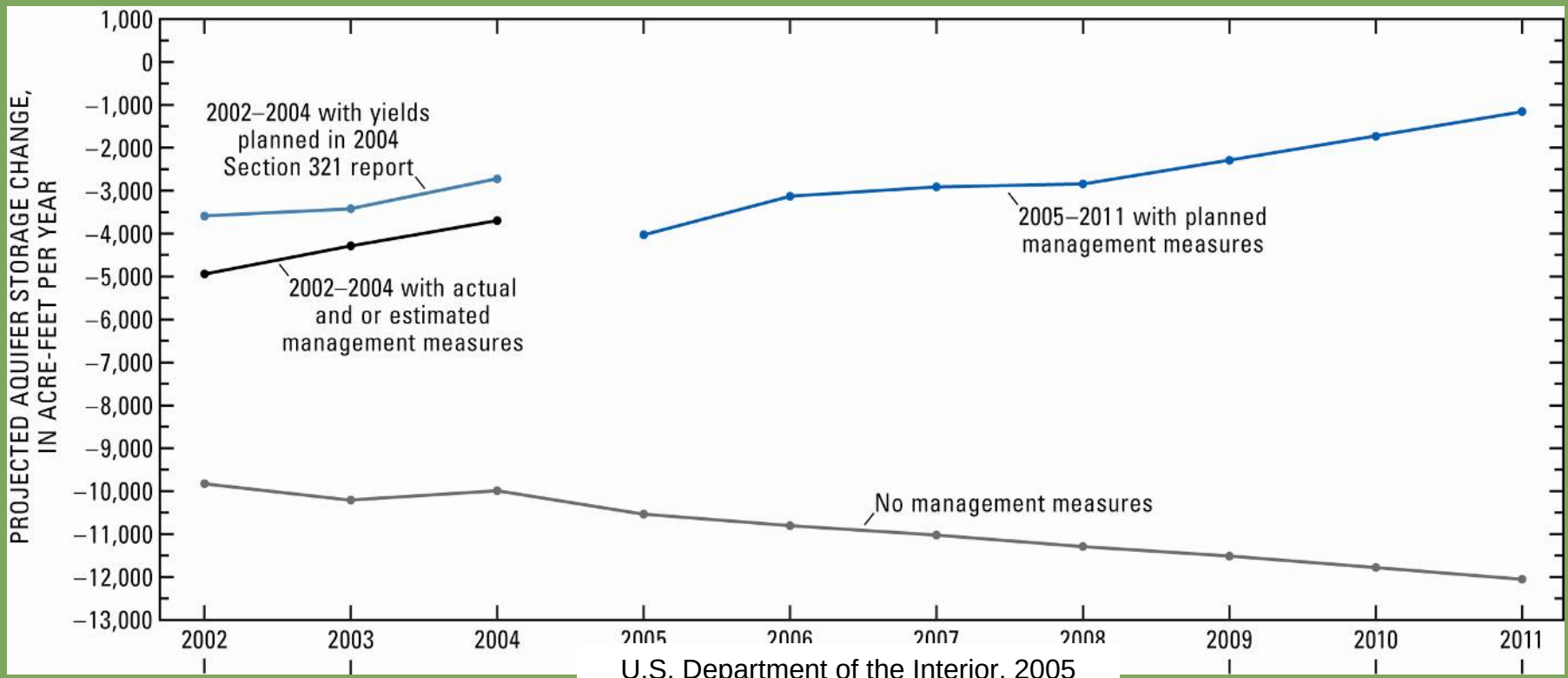
Projected annual aquifer-storage change with/without management measures



U.S. Department of the Interior, 2005

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Adaptive Management

- Inventory/research to develop conceptual and simulation models
- Modeling provides guidance for development of long-term monitoring strategies and implementation of projects/policies
- Monitoring evaluates effectiveness of project and policy implementation

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What about effects of climate?

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Loss of Flow at the Charleston Streamflow-Gaging Station

‘ ...on July 6, 2005, the USGS streamgage at the Charleston bridge was documented to register no streamflow for the first time since 1913. Continuous flows were restored on July 17, 2005.’

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"Lush River Struggles to Survive"

-LA Times July 17th

"Doomed river"

-Phoenix New Times, August 8th

"CAP to Sierra Vista is Studied"

–Arizona Daily Star, July 23rd

"Arizona River Runs Dry"

-Arizona Republic, July 15

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WHY?

Loss of streamflow at Charleston in 2005 was likely caused by an interaction of several factors (human influences and climatic)

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Streamflow trends at Charleston

-Summer baseflows:

Generally < 5 cfs since the 1930's

Frequently < 1 cfs in past decade

-Winter baseflows:

Over past 70 years: 6 out of 10 lowest flows in last 10 years

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Climate: Timing of precipitation

-The start of the 2005 monsoon was the second latest on record (National Weather Service, Tucson).

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Climate: Floodflows are strongly linked to baseflows

Flood flows have a strong influence in maintaining baseflows throughout the year, through their ability to recharge the alluvial aquifer

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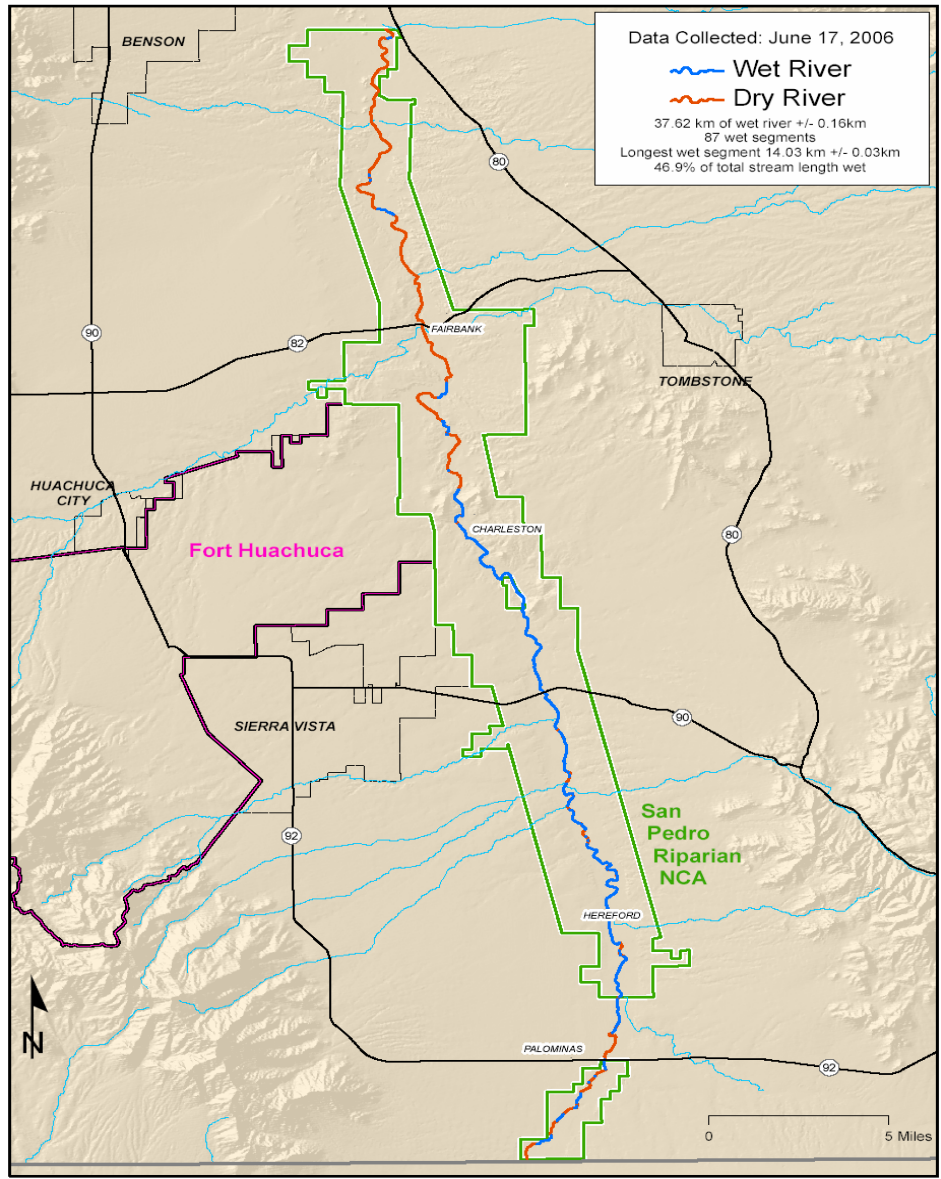
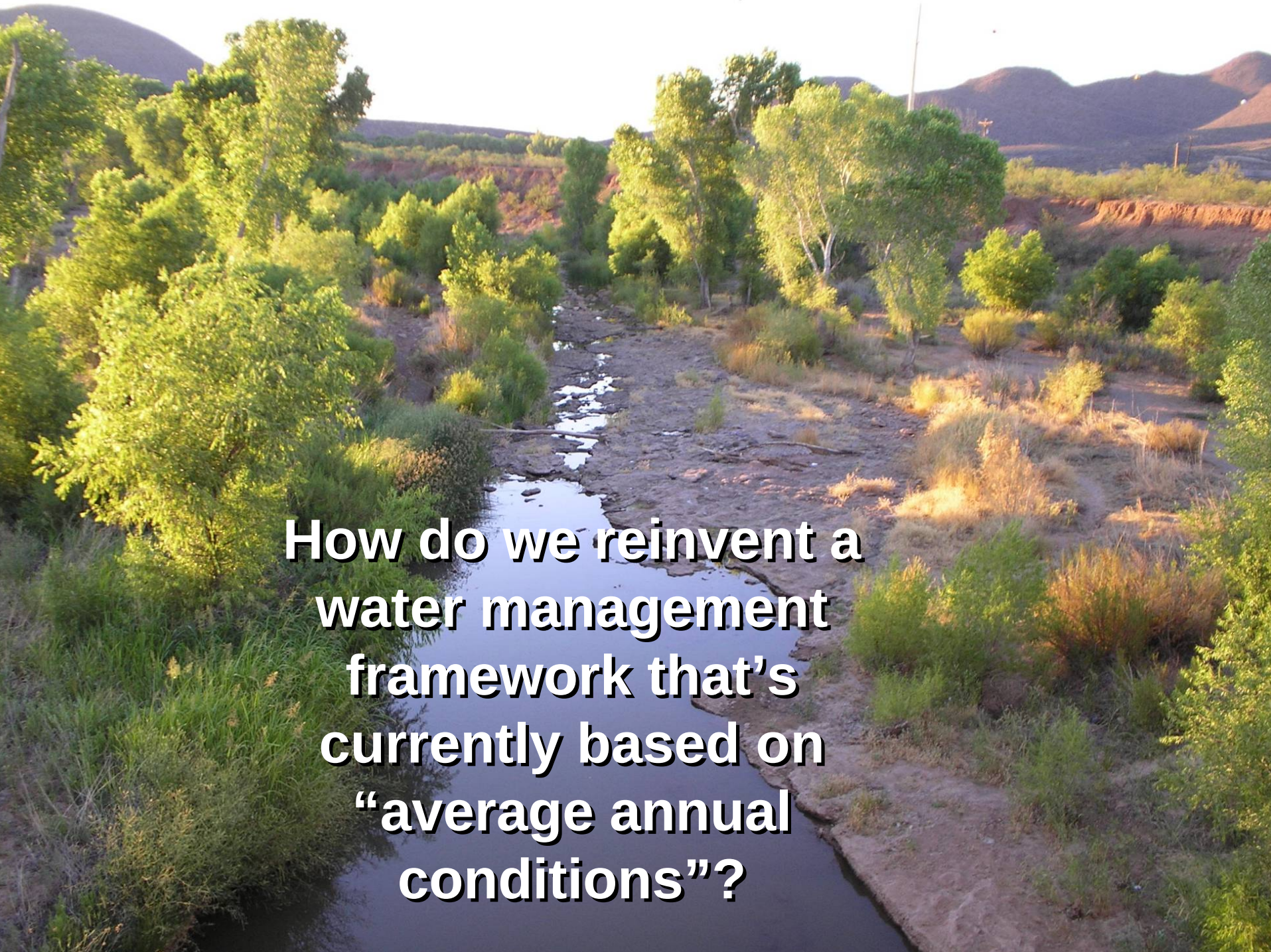
Date	% length of river wet
6/99	52%
6/01	76%
6/04	46%
6/06	47%




How do we reinvent a water management framework that's currently based on "average annual conditions"?

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Managing with Uncertainty and Variability

-Inter-annual climatic variability

-Decadal climatic variability

-Global climate change

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Informed decision-making requires an even broader interdisciplinary approach…