

WRDC Environmental Workgroup

Tasks

1.3.1 – Identify current environmental resources

1.3.2 – ID conditions necessary to support

1.3.3 – Findings, recommendations, needed studies

WRDC Environmental Workgroup

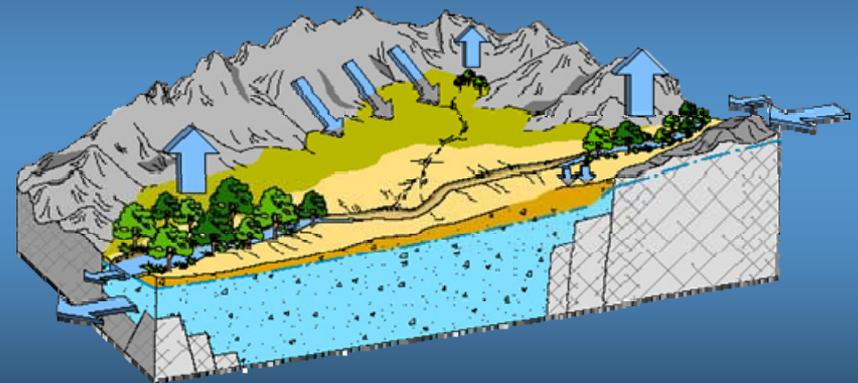
Task 1.3.2 Supporting Conditions

- Components of environmental flows
- Quantifying environmental flows
- Data sources

Components of Environmental Flow

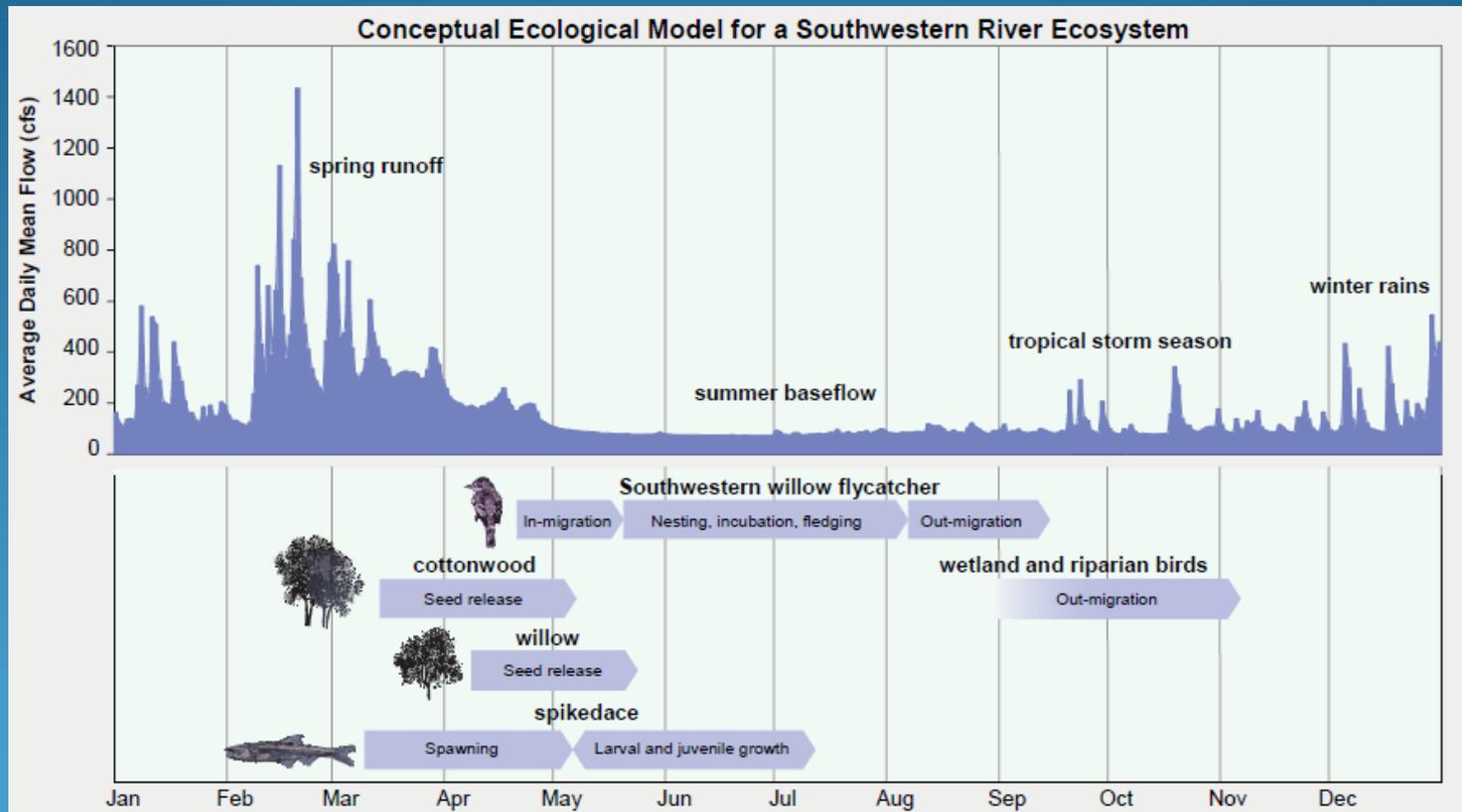
- River baseflow
- Groundwater/underflow
- Evapotranspiration
- High flows

Basin Recharge (inflow) and Discharge (outflow) Components



Source: Montgomery & Associates

Role of Flood Flows

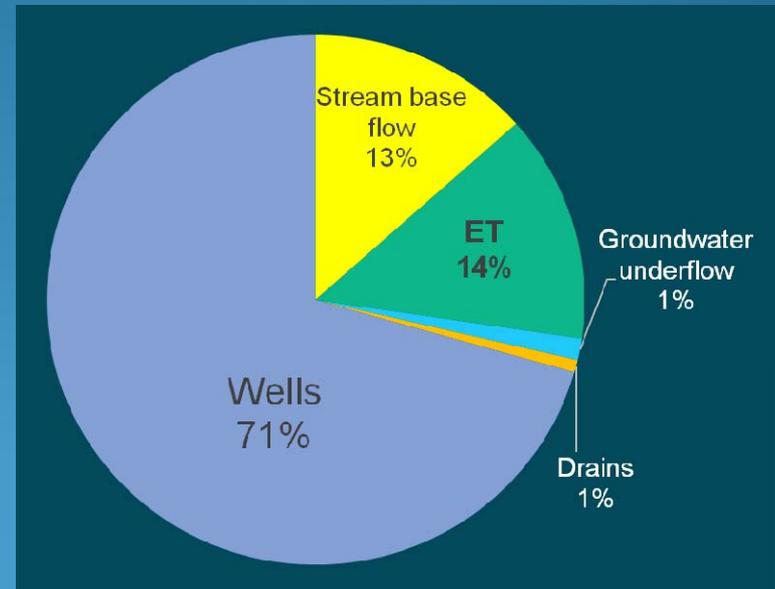


Example – Upper San Pedro River

Simulated groundwater budget 2002 -2003

Water budget component	Average Annual	
	Inflow	Outflow
Natural recharge	58,000	0
Artificial recharge	6,500	0
<i>Stream base flow</i>	17,000	26,600
<i>Evapotranspiration</i>	0	27,600
<i>Groundwater underflow</i>	0	2,600
<i>Drains</i>	0	1,500
<i>Wells</i>	7,200	140,000

Outflows



Source: Pool and Dickinson 2007

Data Availability

- Baseflow – *available for subset of state's rivers*
- Riparian extent – *AGFD, ReGap, Pima County*
- Evapotranspiration – *13 studies in J. Nadeau's review*
- Shallow groundwater – *Pima County, other?*
- Riparian & aquatic habitat values – *AGFD*

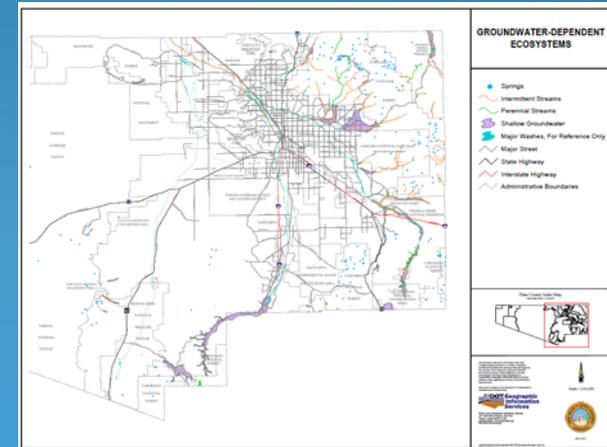
Local and Regional Studies

- Historic riparian vegetation in Verde Valley (S. Masek-Lopez)

Table 7. Historic riparian vegetation densities along the Verde River above, at and below the Town of Cottonwood, Assessment of Human Influence on Riparian Change in the Verde Valley, Arizona (Masek Lopez and Sprunger 2002)

	RIPARIAN VEGETATION									
	Mesquite					Cottonwood/Wilow				
	Low Density	Medium Density	High Density	Total	Low Density	Medium Density	High Density	Total		
	acres	% of total	acres	% of total	acres	% of total	acres	% of total	acres	% of total
NORTH FRINGE										
1940	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1954	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1968	28.69	37.1	27.12	30.7	21.56	27.9	77.36	0.89	33.9	1.33
1977	16.67	24.3	29.90	22.2	22.90	33.4	66.47	1.11	83.5	0.22
1989	3.78	9.9	13.57	28.8	15.78	27.3	36.73	1.11	109.0	0.30
1995	6.00	12.8	27.52	44.0	27.12	43.3	52.68	0.67	30.0	0.57
CORE AREA										
1940	540.36	37.3	564.01	57.9	181.83	16.7	1386.00	57.80	27.4	84.26
1954	351.48	35.7	487.31	48.7	63.62	10.2	1072.41	22.45	6.8	111.38
1960	422.55	47.9	370.33	27.5	109.29	20.7	1305.07	34.90	5.6	130.50
1977	284.55	30.5	390.38	25.2	208.98	24.2	883.91	37.68	8.0	129.61
1989	317.91	37.9	381.27	39.2	200.79	20.9	597.97	33.57	7.7	131.61
1995	274.34	25.8	397.72	37.4	391.05	36.8	1063.11	26.46	6.9	145.30
SOUTH FRINGE										
1940	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1954	63.80	26.8	125.39	52.7	48.91	20.5	230.10	17.78	33.6	27.01
1960	50.09	37.7	74.70	46.7	34.46	27.6	159.95	6.45	19.5	16.23
1977	42.98	29.9	93.32	27.0	58.89	30.7	194.24	12.86	29.0	26.40
1989	47.88	22.3	92.76	23.6	71.31	33.9	211.65	16.75	30.4	18.25
1995	25.81	32.7	86.91	37.0	70.25	30.3	231.87	13.56	25.3	13.12

- Shallow groundwater mapped by Pima County



Characterizing River & Riparian Values

AGFD's Species Conservation Guide

- Distribution of native and sport fish
- Threatened and Endangered species
- Critical habitat
- Obligate aquatic and riparian species
- Designated recreational areas
- Hunting and fishing

Making the Data Clear and Accessible

	River/Water Feature & Map Reference No.	Environmental Resource Values	Environmental Flow Needs (annual acre-feet)	Other Environmental Attributes	Source Data
1.	Upper San Pedro River Sierra Vista Sub-Watershed Cochise Co. Map Ref: A1	<ul style="list-style-type: none"> • 40 mi. of river and 57,000 acres designated for conservation of desert riparian system. • Extensive cottonwood-willow and other riparian habitat types • Important state watchable wildlife area with habitat for 84 mammal species, 41 amphibians & reptiles, 14 fish and over 350 bird species. • internationally recognized area for recreational bird watching. • 3 federal ESA listed and candidate species. • Hunting and fishing permitted. 	<p>baseflow = 26,600 ET = 27,600 groundwater = 2,600</p> <p>Total = 56,800</p>	<p>shallow groundwater levels of x ft. or less on primary and secondary floodplain terraces</p> <p>2002 riparian assessment identified xx,xxx ac cottonwood-willow, xx,xxx ac mixed broadleaf deciduous, xx,xxx ac mesquite bosque</p>	<p>Pool and Dickensen (2007) BLM AGFD ADWR USGS Stromberg and others (2002)</p>
2.					
3.					
4.					

Summary

Environmental flow needs can be quantified

Rich information available to characterize resource values

Opportunity to develop rich compendium for natural resources

Feasible within timeframe if we narrow down and focus tasks