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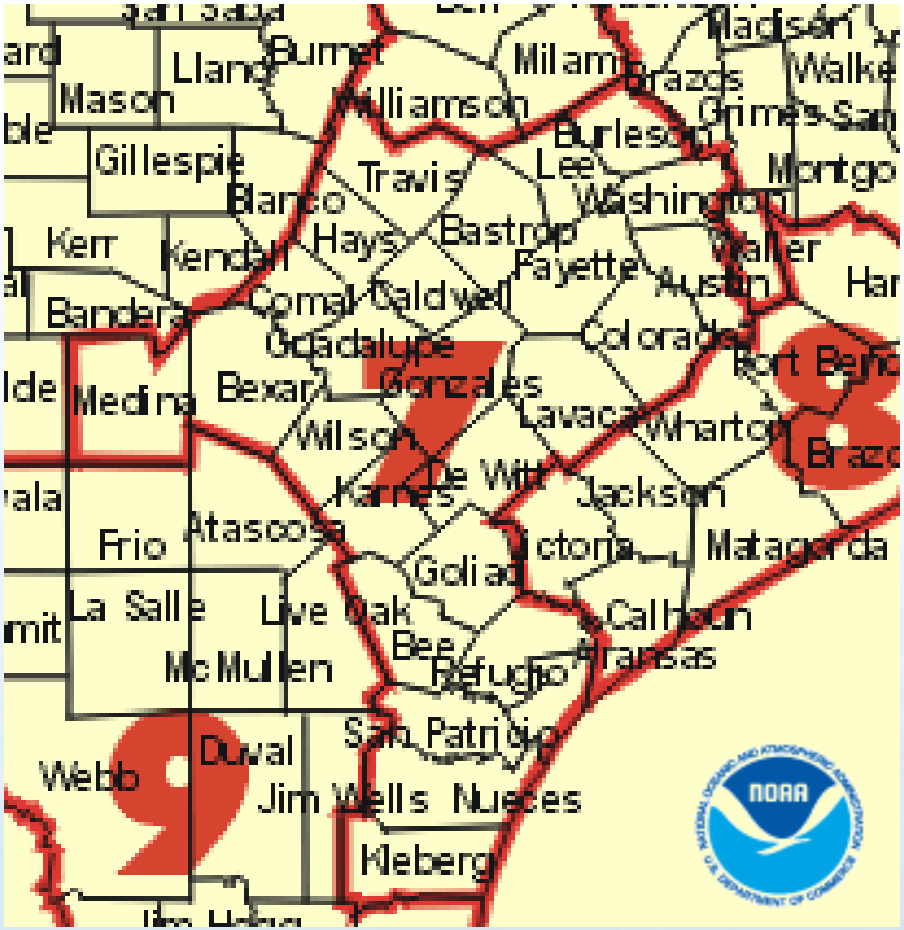
Impact of Drought on the San Antonio River Basin

Steve Raabe

Driest Year in Central Texas



- ***Driest calendar year on record with just 16.66 inches***
- **Previous record was 16.89 inches in 1917**
- ***Normal is 35.66 inches***

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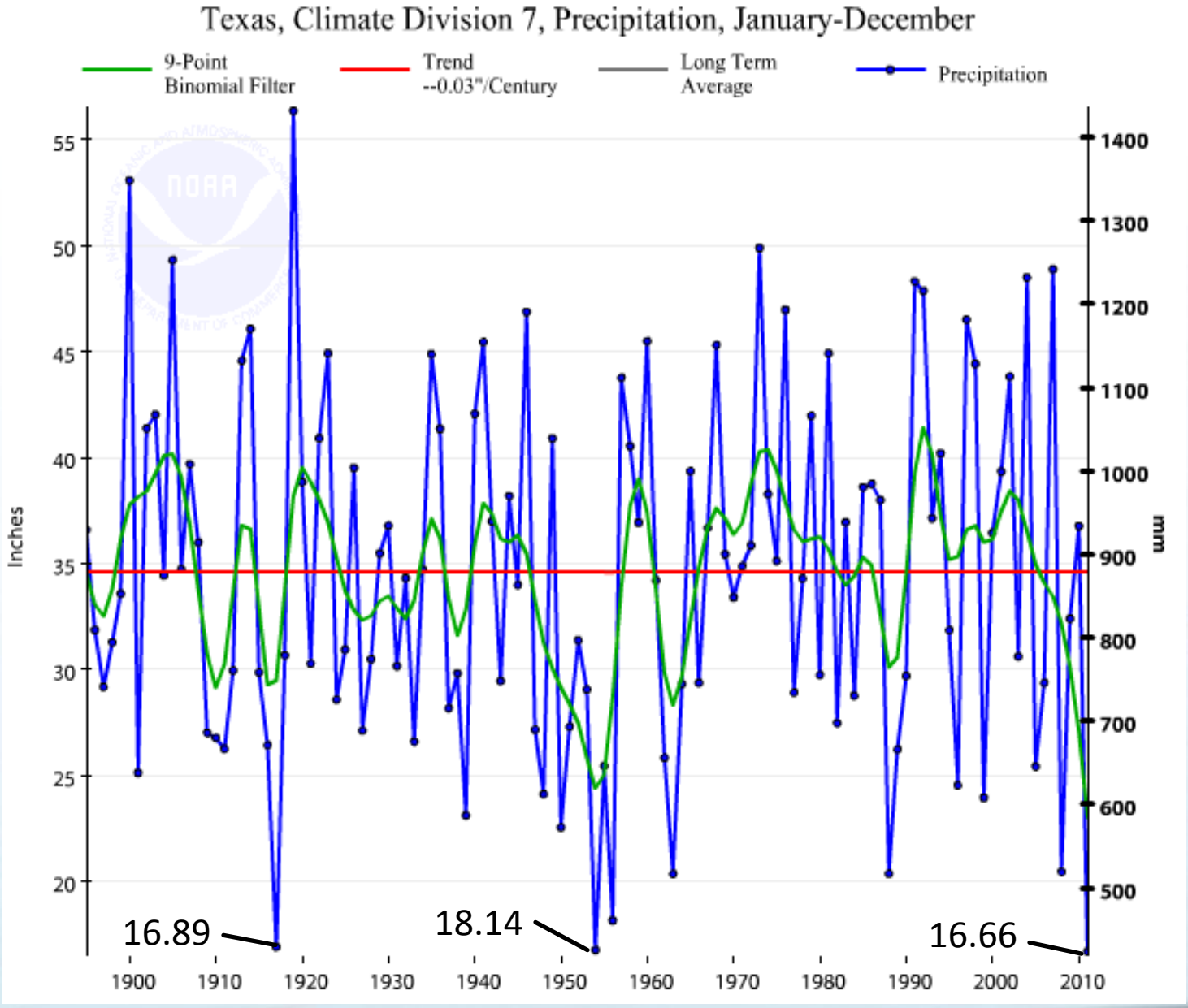
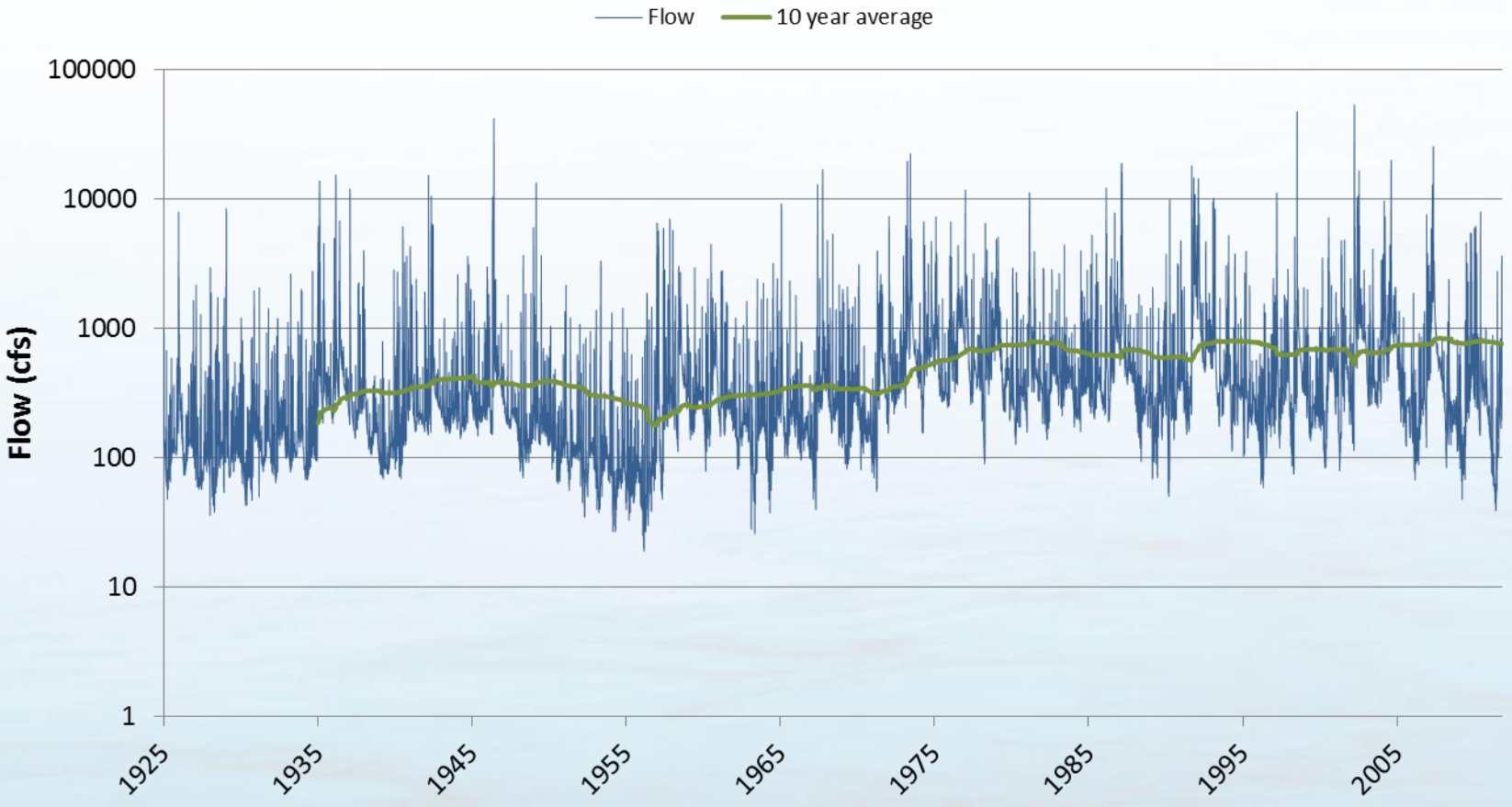

Texas, Climate Division 7, Precipitation, January-December
9-Point Binomial Filter
Trend --0.03"/Century
Long Term Average
Precipitation
Inches
mm
16.89
18.14
16.66

San Antonio River Near Falls City



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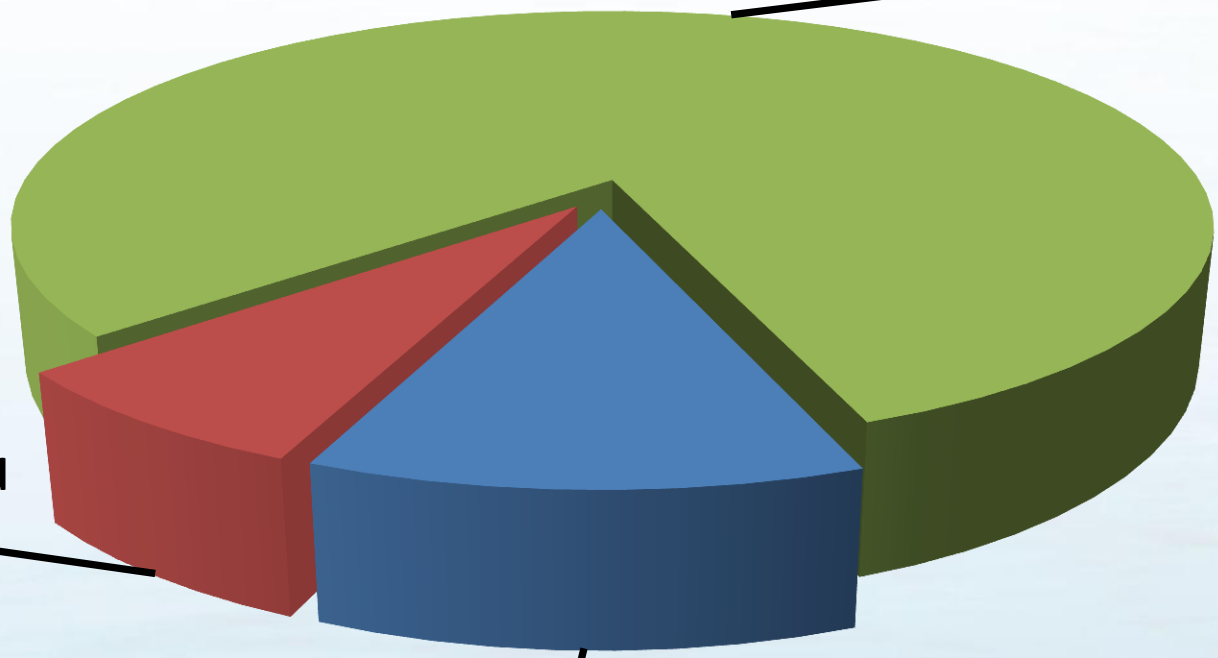
San Antonio River Basin - Streamflow Components at Elmendorf Gage

Wet Year = 1992

Total Flow= 1,212,397 af/yr



Gaged Runoff (Elmendorf) 81% (979,777 af/yr)

San Antonio and San Pedro Springflow 7% (89,753 af/yr)

SAWS Effluent 12% (142,867 af/yr)

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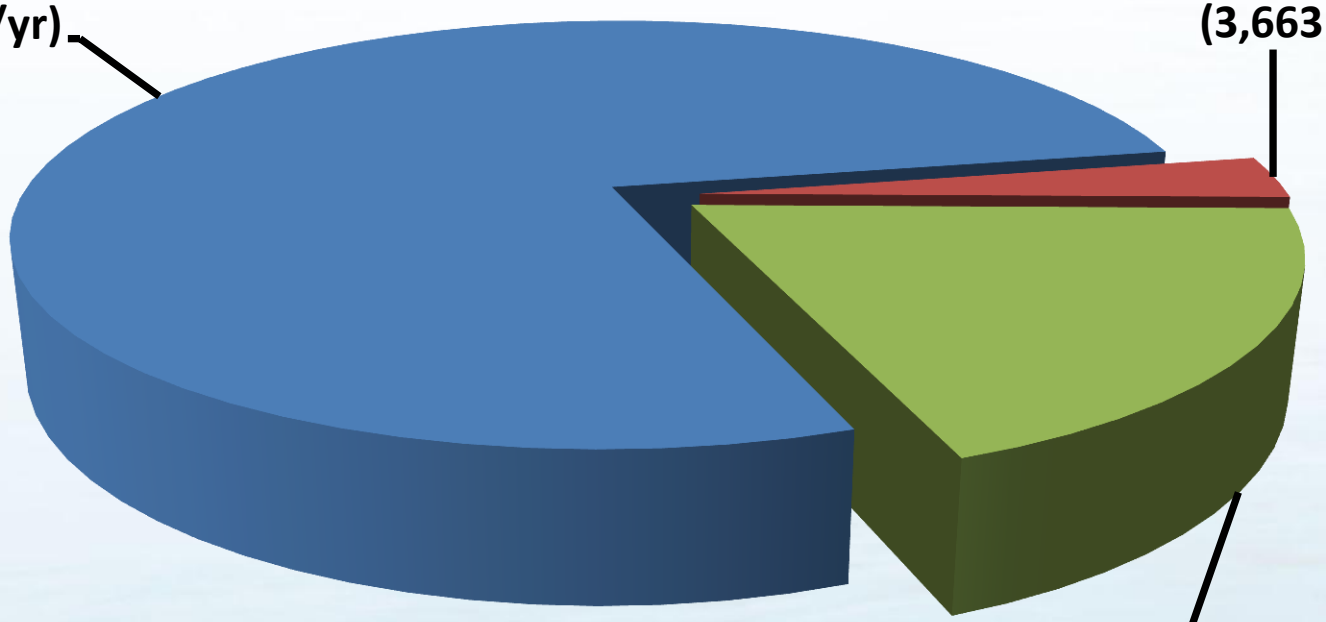
San Antonio River Basin - Streamflow Components at Elmendorf Gage

Dry Year = 1996

Total Flow = 116,669 af/yr



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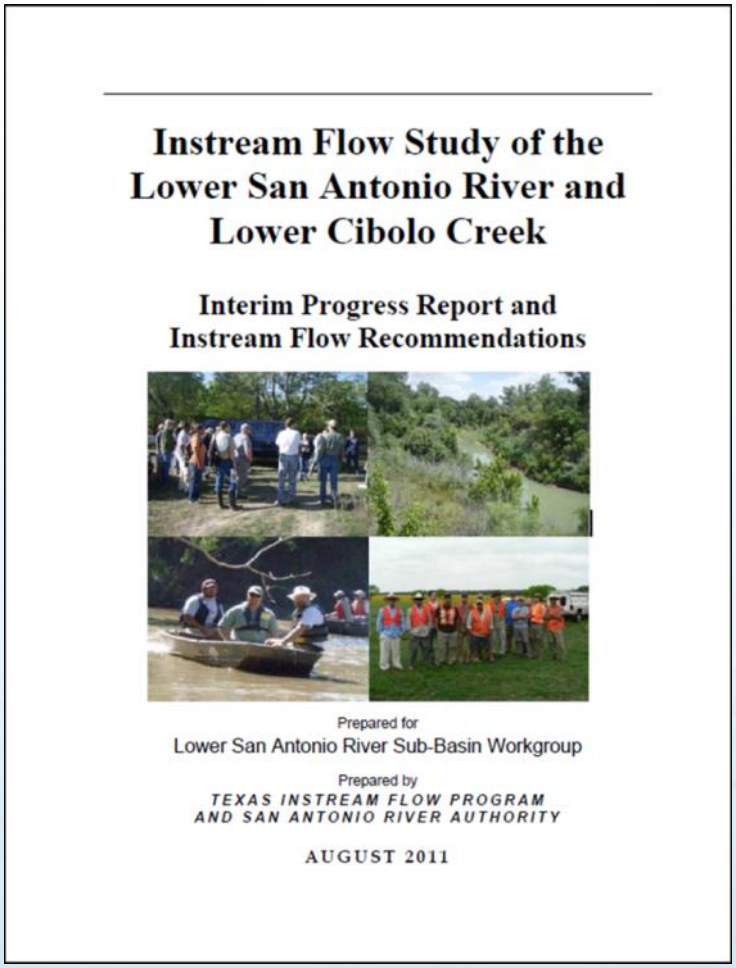
Lower San Antonio River Basin Instream Flows Team



Instream Flow Study of the Lower San Antonio River and Lower Cibolo Creek

Interim Progress Report and Instream Flow Recommendations

Prepared for
Lower San Antonio River Sub-Basin Workgroup

Prepared by
TEXAS INSTREAM FLOW PROGRAM AND SAN ANTONIO RIVER AUTHORITY

AUGUST 2011

TEXAS PARKS & WILDLIFE

TCEQ

TEXAS WATER DEVELOPMENT BOARD

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Instream Flows Study Sites

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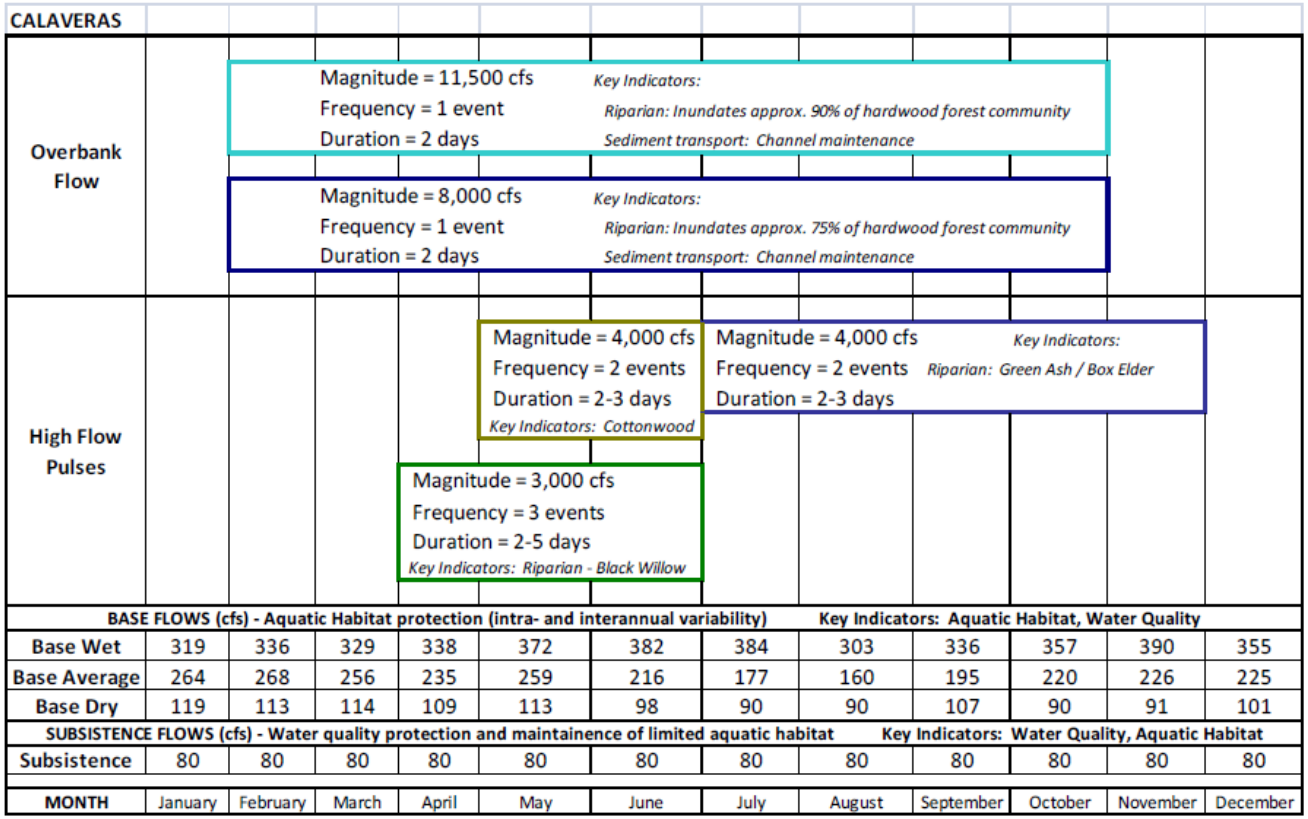
Example of Detailed Interim Instream Flow Recommendation



BASE FLOWS (cfs) - Aquatic Habitat protection (intra- and interannual variability)										Key Indicators: Aquatic Habitat, Water Quality		
Base Wet	319	336	329	338	372	382	384	303	336	357	390	355
Base Average	264	268	256	235	259	216	177	160	195	220	226	225
Base Dry	119	113	114	109	113	98	90	90	107	90	91	101
SUBSISTENCE FLOWS (cfs) - Water quality protection and maintainence of limited aquatic habitat										Key Indicators: Water Quality, Aquatic Habitat		
Subsistence	80	80	80	80	80	80	80	80	80	80	80	80
MONTH	January	February	March	April	May	June	July	August	September	October	November	December

Figure 48. Interim Instream Flow Recommendations for the Calaveras Study Site.

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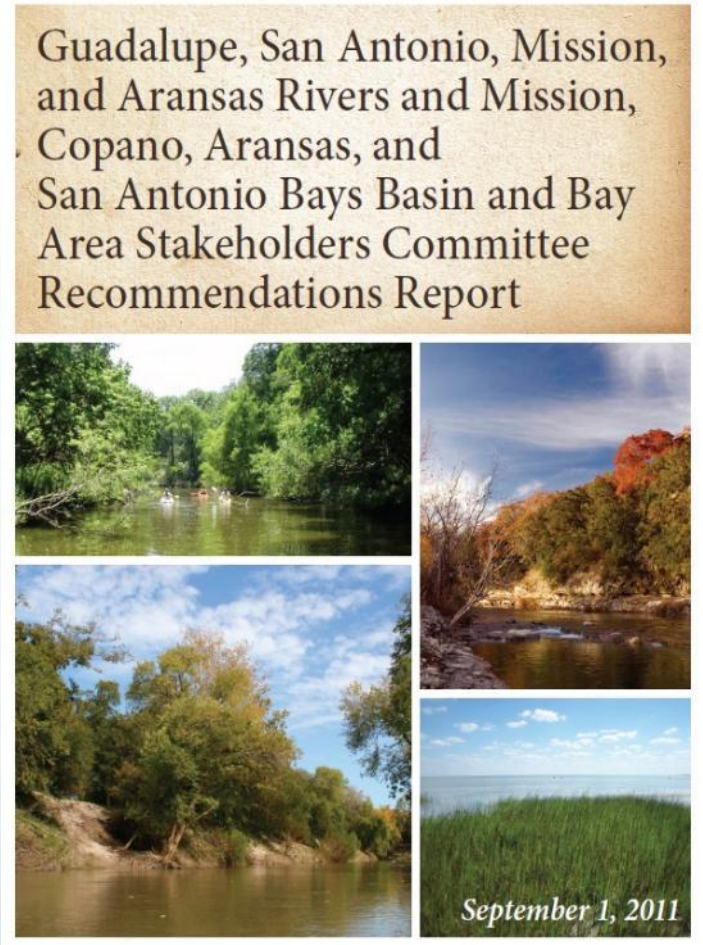
Environmental Flows



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GSA BBASC Environmental Flow Regime Recommendation – San Antonio River near Elmendorf

Overbank Flows		Qp: 11,500 cfs with Frequency 1 per season Duration is 2										
		Qp: 8,000 cfs with Frequency 1 per season Duration is 2										
High Flow Pulses				Qp: 4,000 cfs with Frequency 2 per season Duration is 2			Qp: 4,000 cfs with Frequency 2 per season Duration is 2					
			Qp: 3,000 cfs with Frequency 3 per season Duration is 2									
	Qp: 830 cfs with Average Frequency 1 per season Duration is 14 Regressed Volume is 6,210			Qp: 1560 cfs with Average Frequency 1 per season Duration is 16 Regressed Volume is 10,700			Qp: 1110 cfs with Average Frequency 1 per season Duration is 12 Regressed Volume is 6,460			Qp: 1010 cfs with Average Frequency 1 per season Duration is 13 Regressed Volume is 6,570		
Base Flows (cfs)	328			364			341			367		
	262			237			178			223		
	115			106			87			92		
Subsistence Flows (cfs)	60			60			60			60		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Winter			Spring			Summer			Fall		

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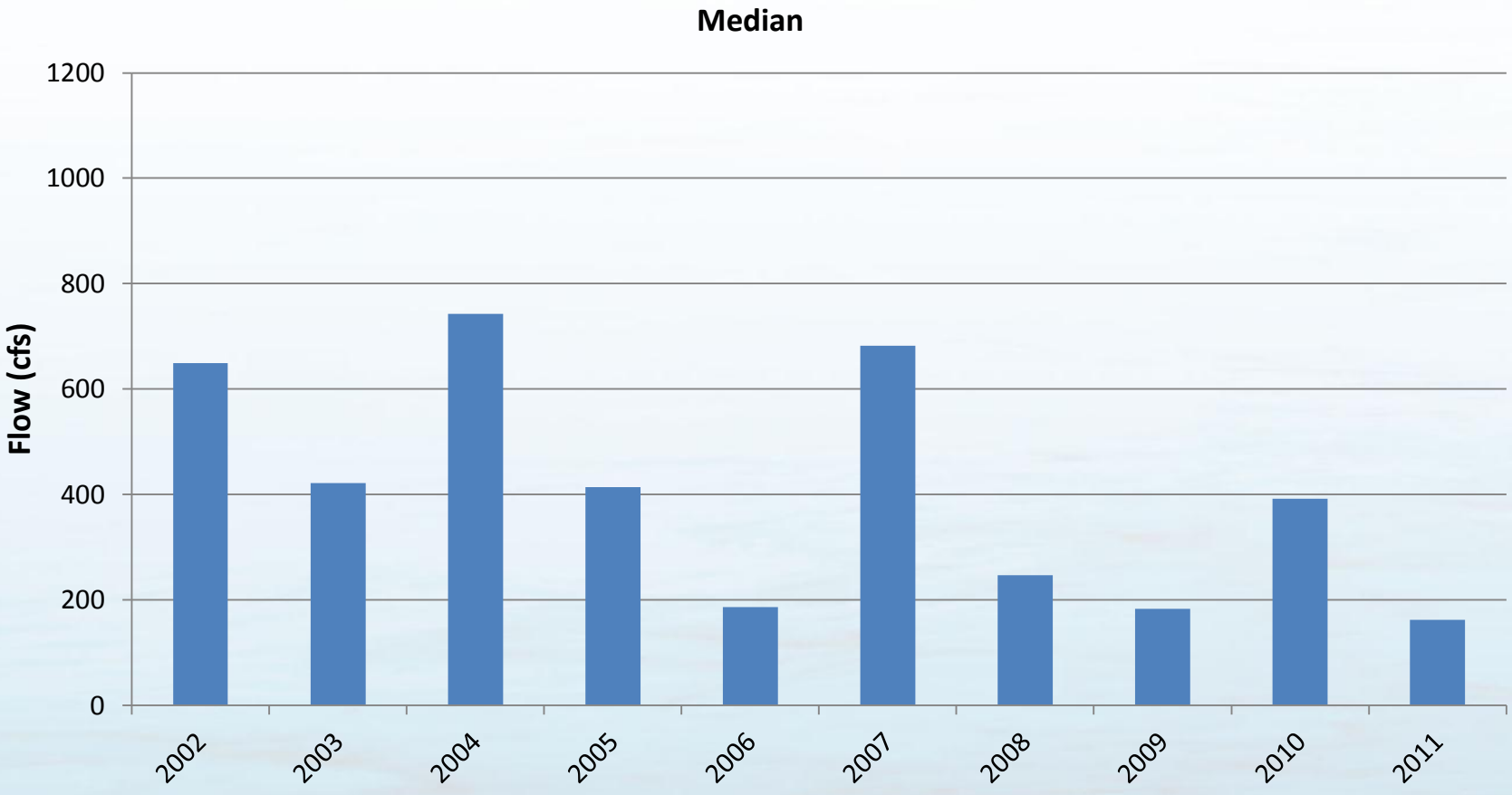
Subsistence Recommendations

Station		Instream Interim (cfs)	BBASC (cfs)
San Antonio River			
	Goliad	80	60
	Falls City	80	60
	Elmendorf	80	60
Cibolo Creek			
	Falls City	7.5	7.5

San Antonio River Near Elmendorf Flow



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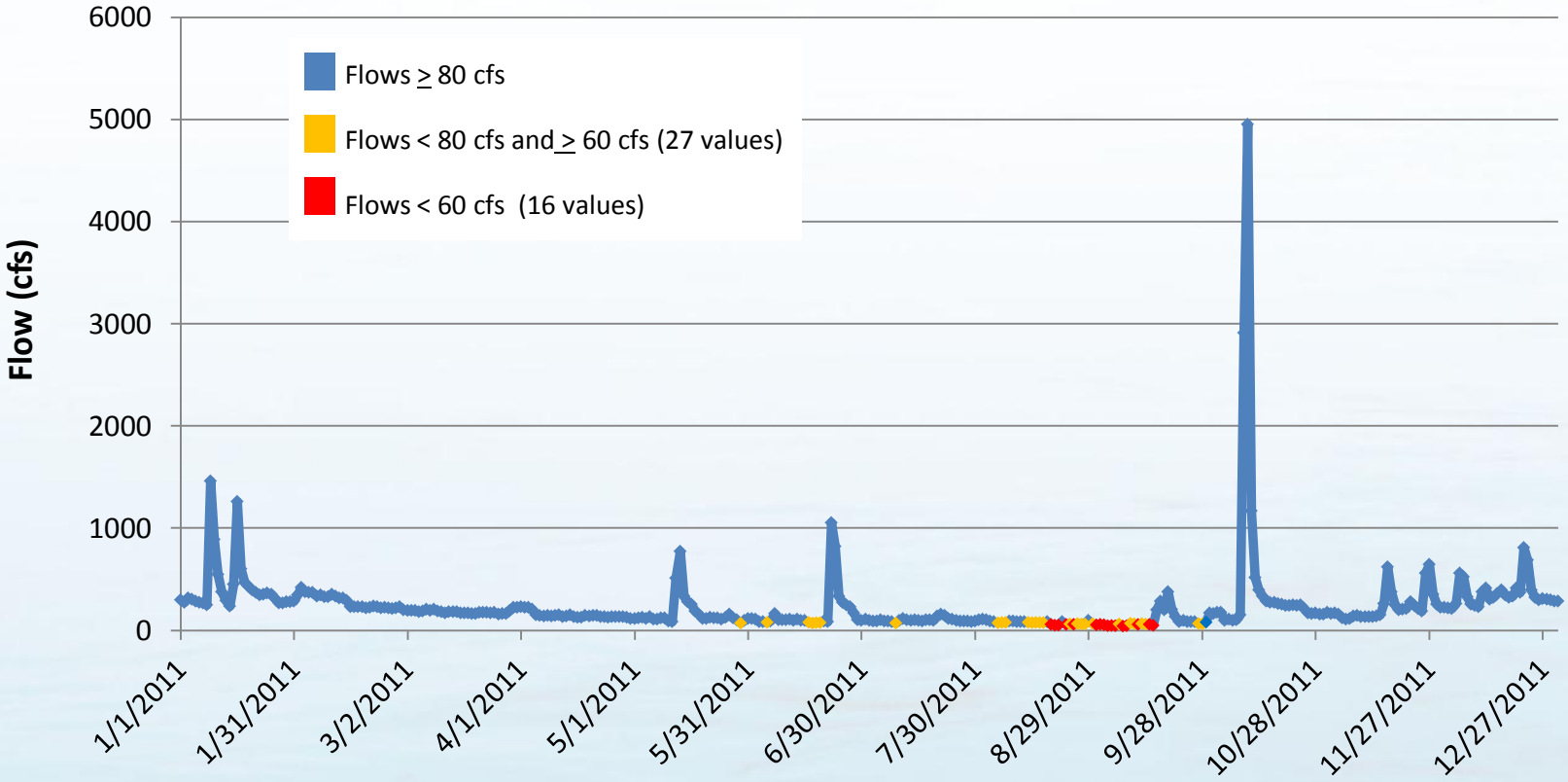
San Antonio River Near Elmendorf Flow



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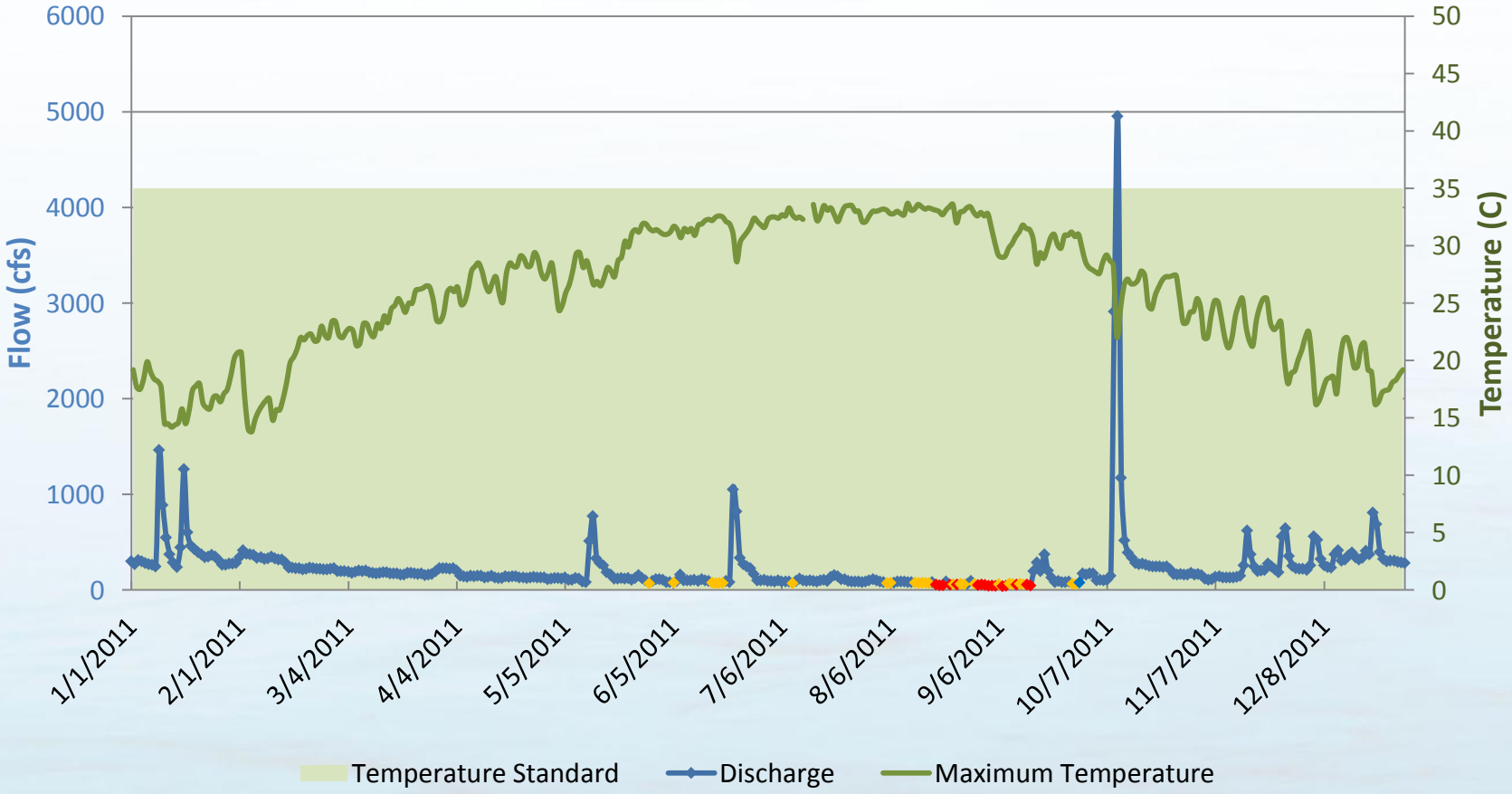
San Antonio River Near Elmendorf Maximum Temperature



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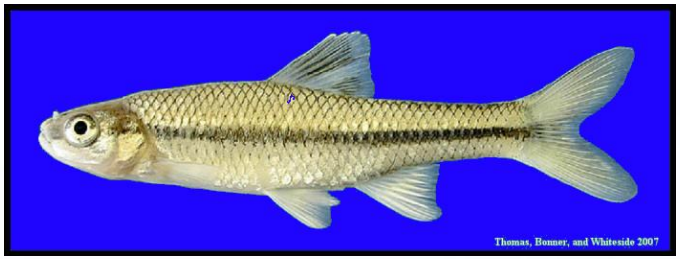
Monitoring

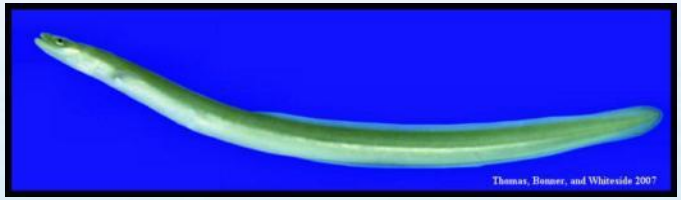
Other Impacts of the Drought

Burrhead Chub

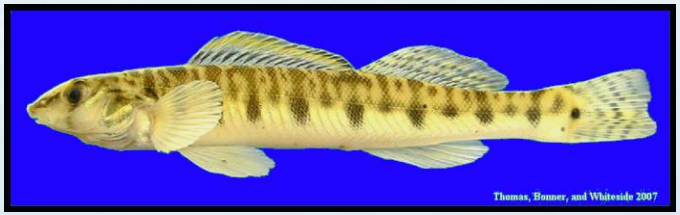


Pugnose Minnow

Golden Orb



American Eel



Darter

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Other Impacts of the Drought

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Other Impacts of the Drought

Other Impacts of the Drought

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Future Actions

- Monitoring/Management
  - Continue to monitor effects on aquatic and riparian species and water quality
  - Coordinating with SAWS and CPS Energy during critical low flow periods to minimize impacts on stream
- Research Needs
  - Riparian Response to Pulse events
  - Linking Geomorphic processes to biological responses
  - Ecological Simulation Modeling
  - Web-based Flow Tool for Watermaster and Diverters for permits subject to new environmental flow criteria