

Dendrochronological Applications for Riparian Conservation

~~~~~  
Amy McCoy

*Sonoran Institute*

*University of Arizona, Arid Lands Resource Sciences*

~~~~~  
Santa Cruz River Researcher's Day
March 27, 2009

Today's Presentation

Dendroecohydrology: Going Beyond Stream Gages

Dendrochemistry: Detecting the Influence of Effluent in Tree-Rings



Riparian Dendrochronology

Dendrochronology: The Study of Tree-Rings

4 Key Factors:

- One ring per growing season;
- One dominant limiting growth factor;
- The limiting factor must vary annually;
- The limiting factor must be effective over a large region.



Netleaf Hackberry: A Window into the Past?

What can hackberry trees tell us about:

- Historical streamflow patterns?
- Riparian response to drought?
- Riparian response to lowered groundwater tables?
- Influence of effluent on riparian tree growth?

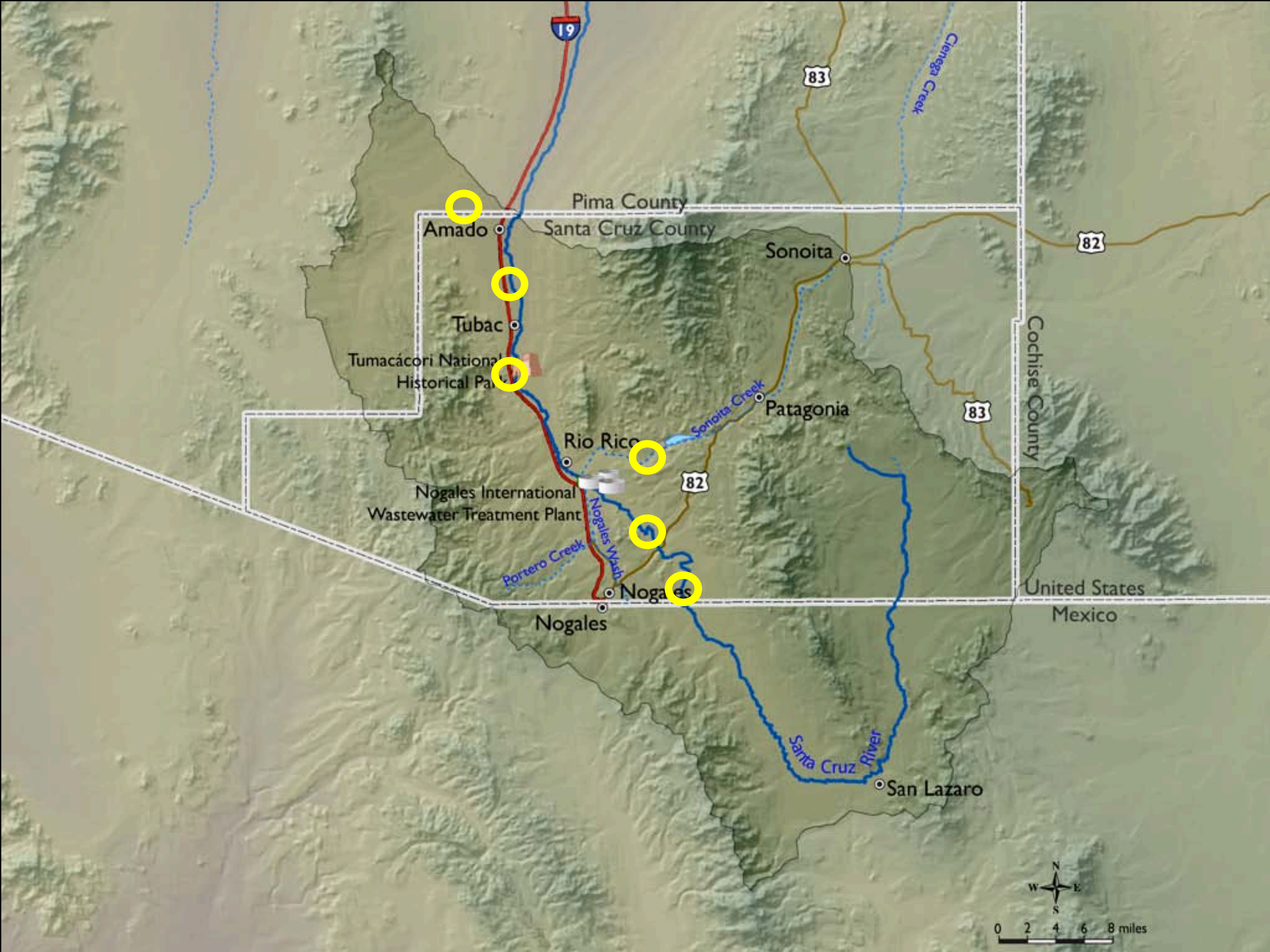


Pine

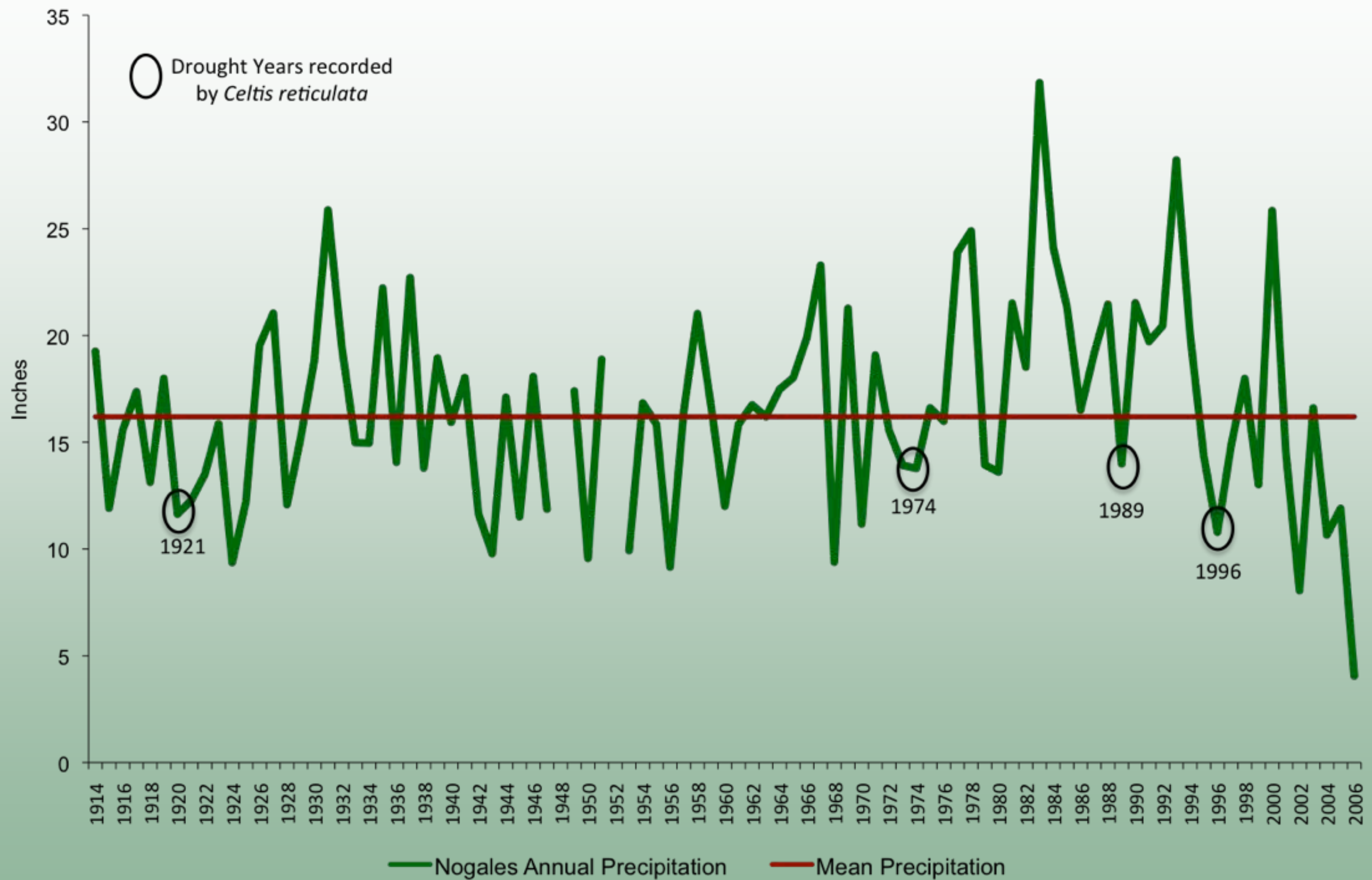


Hackberry

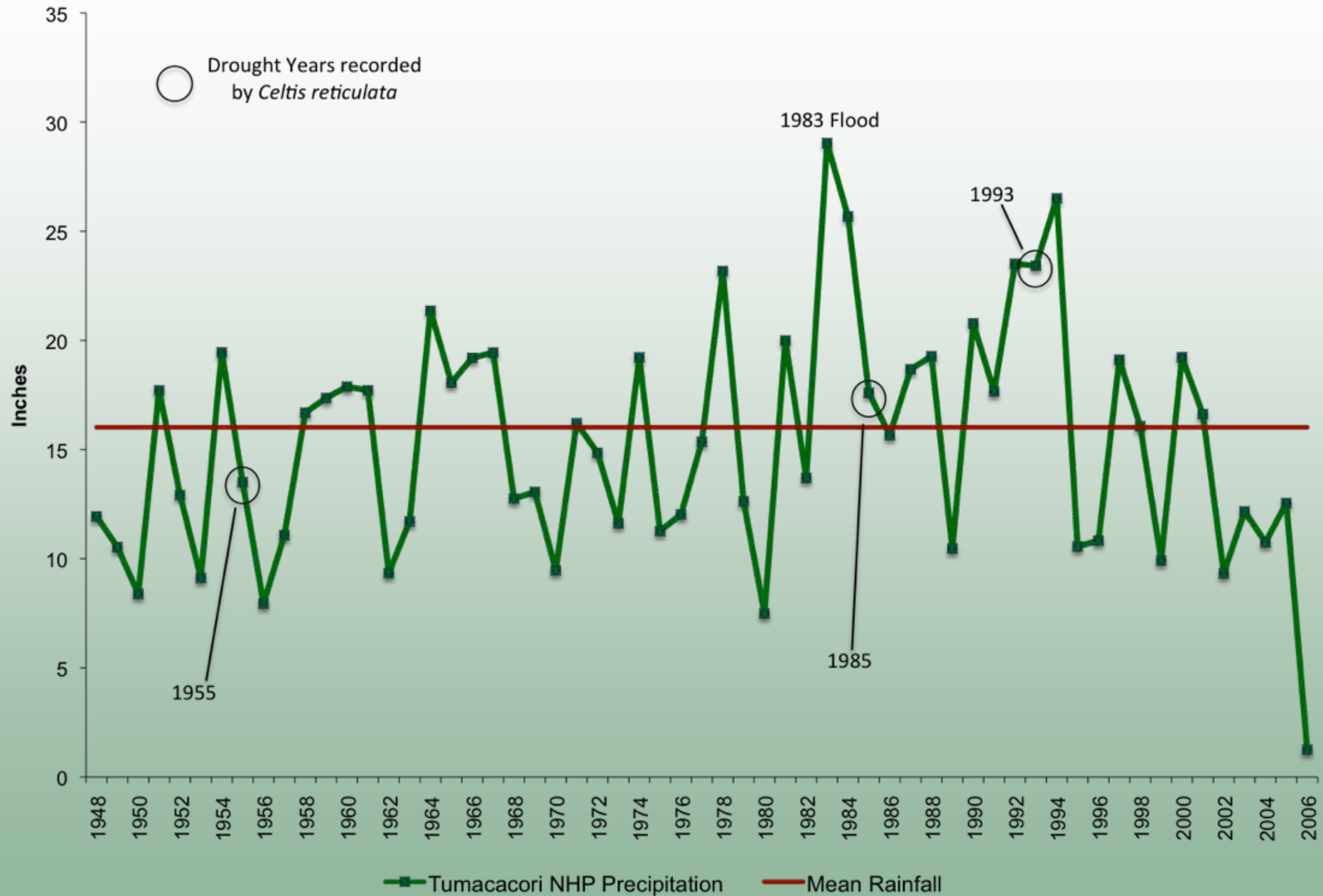


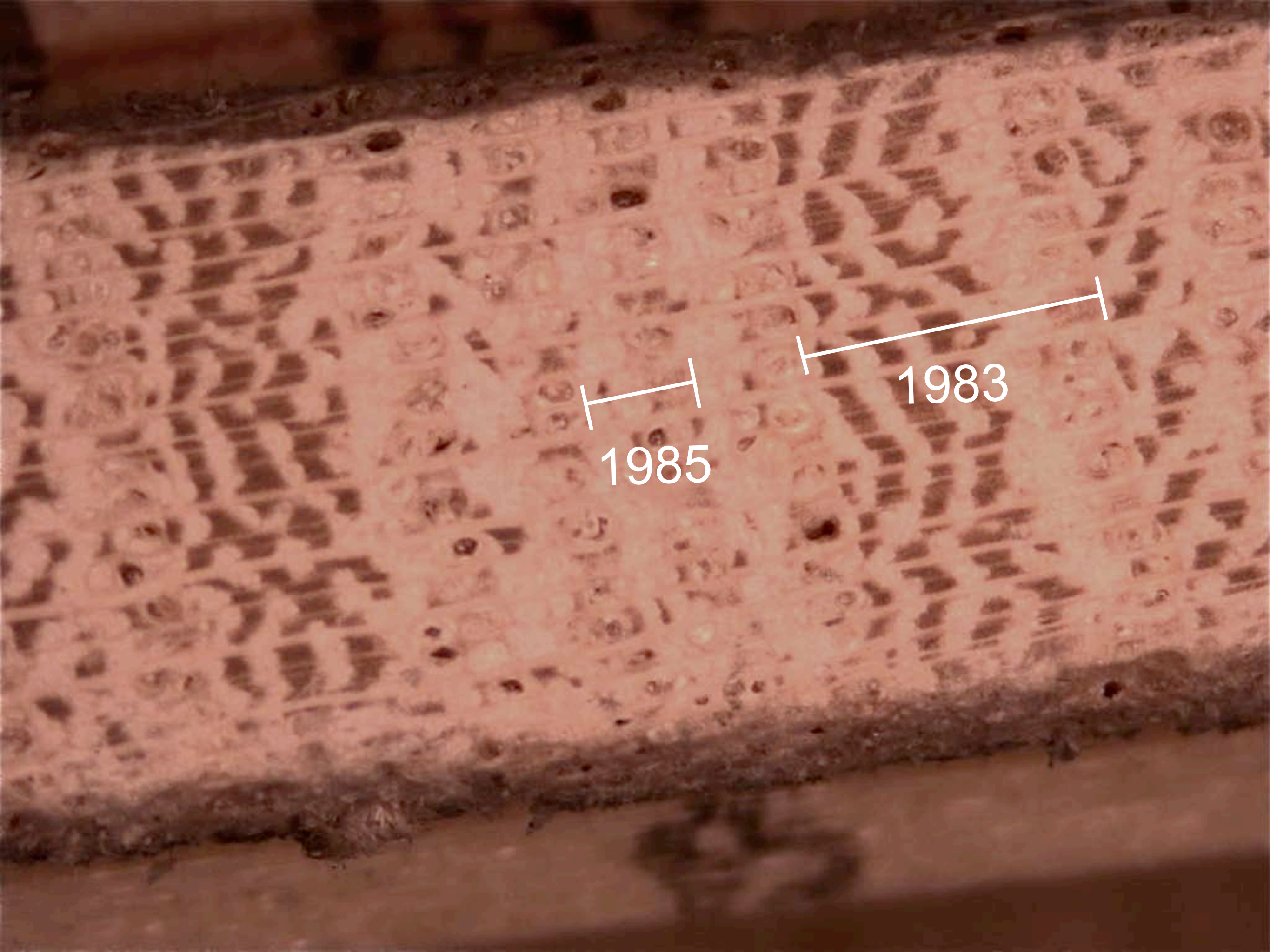


Nogales, Arizona - Annual Precipitation



Tumacácori NHP -- Annual Precipitation

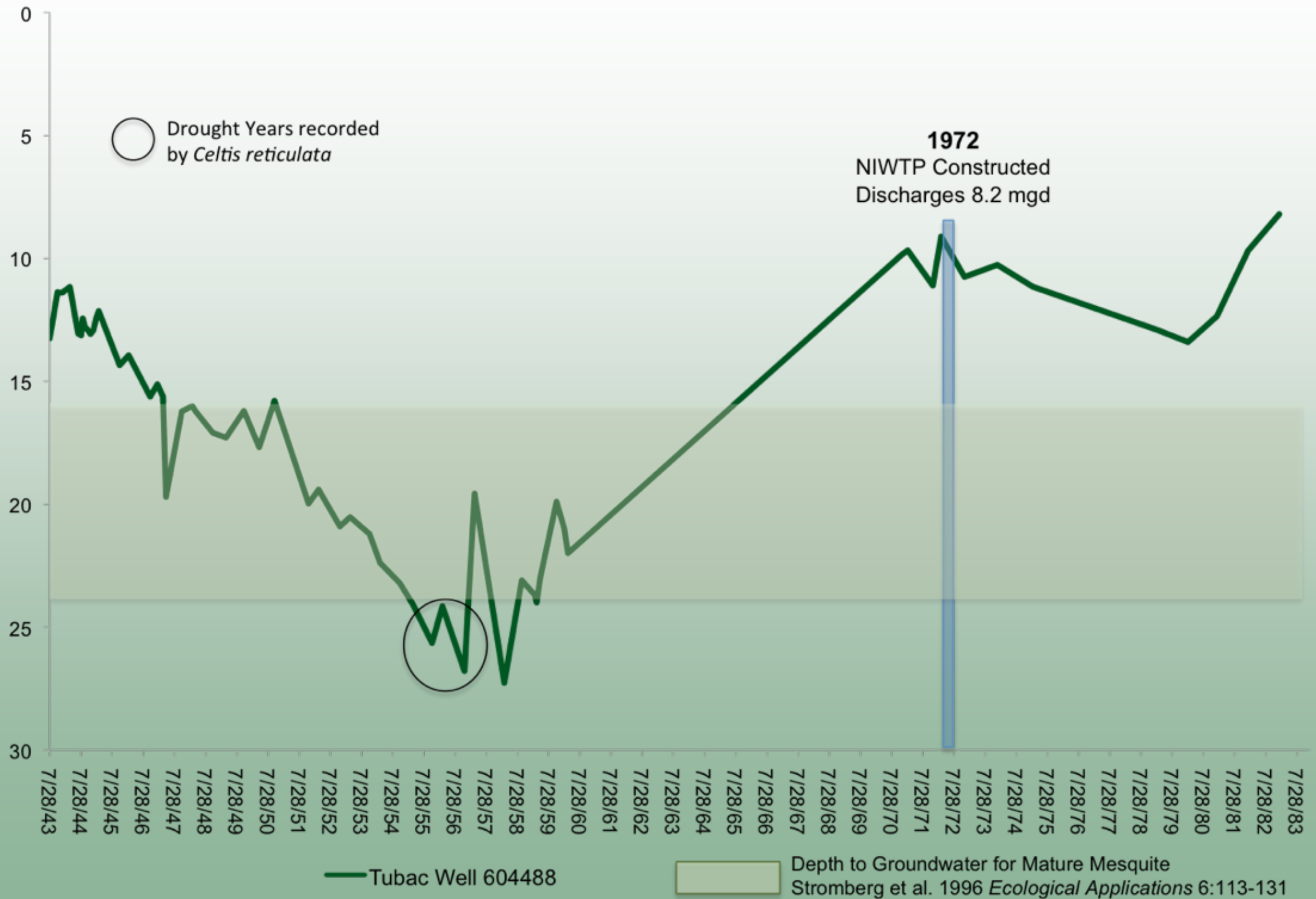




1985

1983

Groundwater Levels in Tubac



Continued Analysis

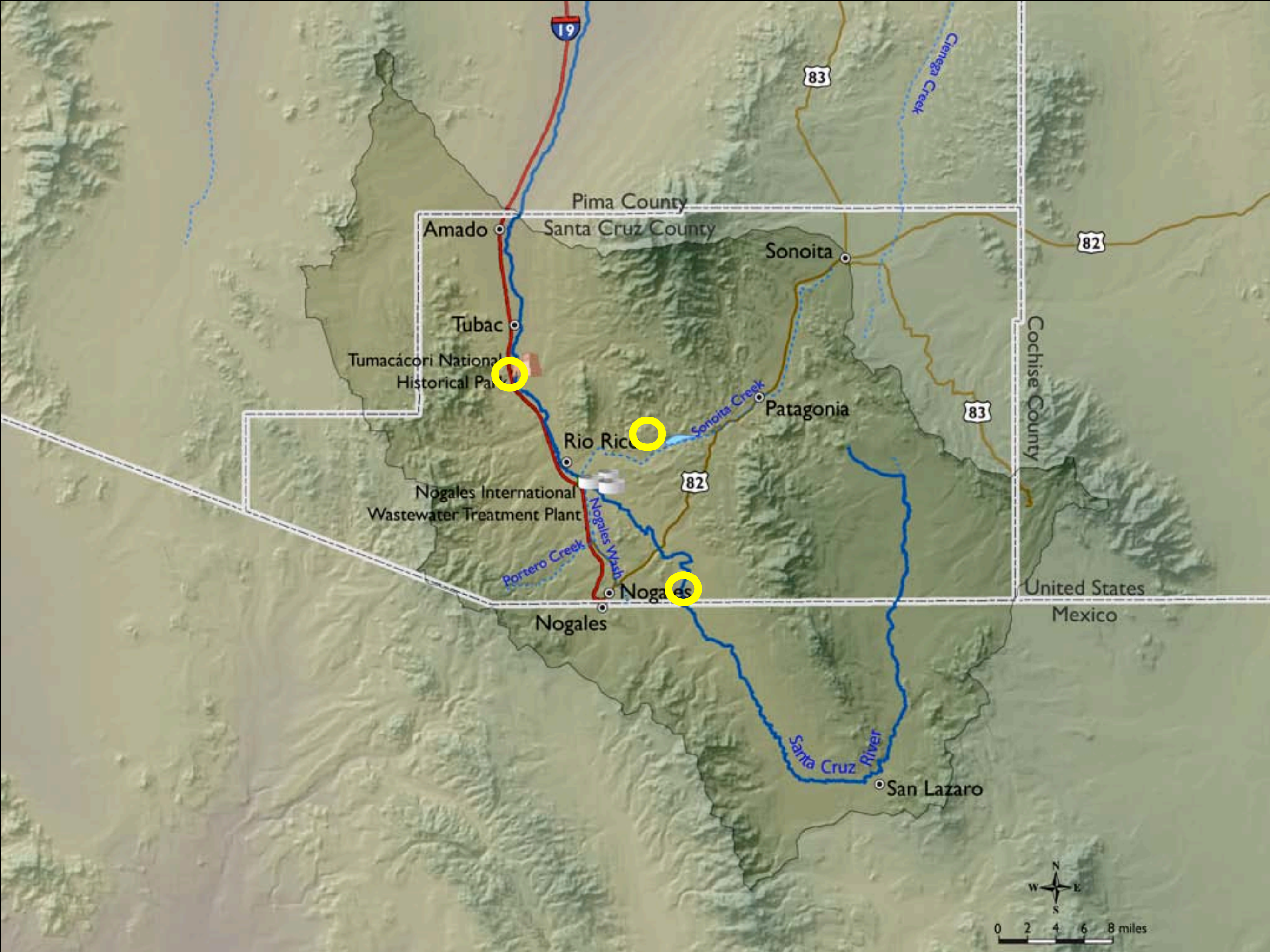
- Correlation of groundwater data, effluent flows, precipitation, and temperature.
- Correlation between sites.
- Correlation between early wood, late wood, and climate data.



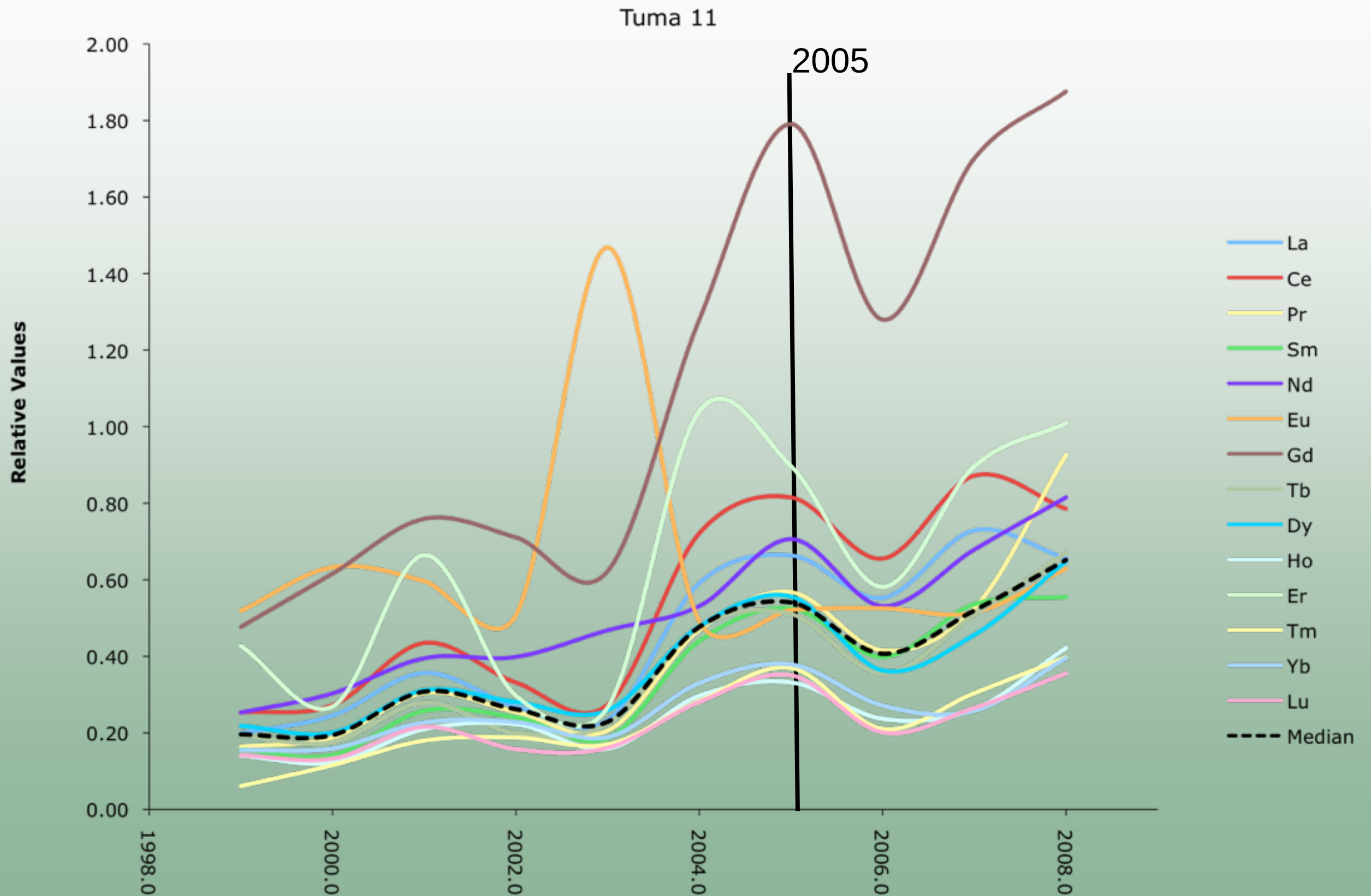
Effluent & Tree-Rings

Periodic Table of the Elements																	
hydrogen		alkali metals		alkali earth metals		transition metals		poor metals		nonmetals		noble gases		rare earth metals			
1 H	2 He	3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Unq	105 Unp	106 Unh	107 Uns	108 Uno	109 Une	110 Unn								

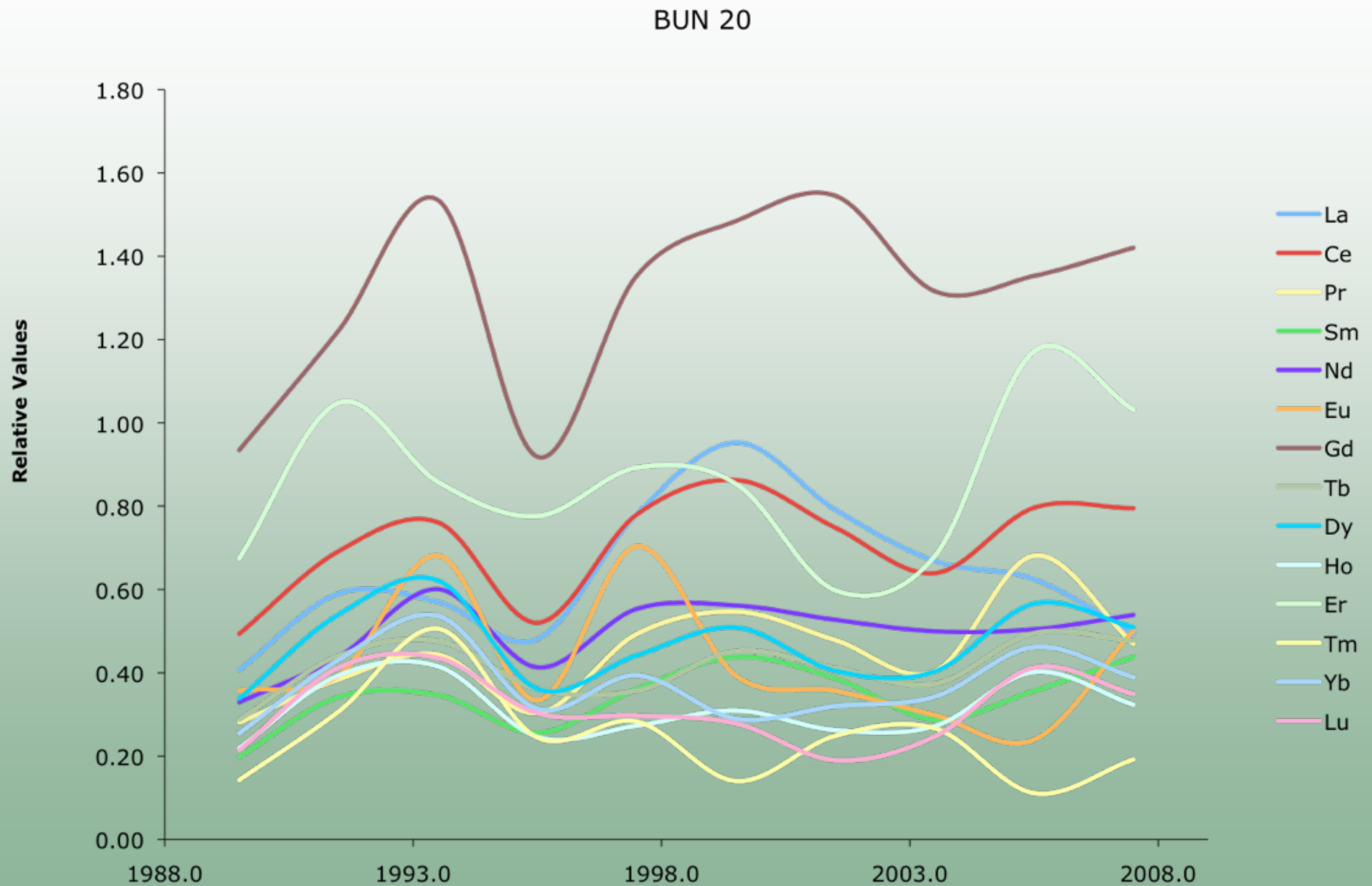
58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr



Elevated Gd Levels - Confirming



Elevated Gd Levels - Confounding



Continued Analysis

- Trees are not passive recorders of the environment - might the tree itself be influencing patterns of Gd?
- Are there other sources of Gd?
- Is there Gd in the soil?



A Word of Thanks!

Generous Funding Provided by:

Garden Club of America

NPS Desert Cooperative Ecosystem Studies Unit (DCESU)

University of Arizona Technology and Research Initiative Fund (TRIF)

University of Arizona Water Sustainability Graduate Fellowship

Generous Advice and Assistance provided by:

Dr. David Meko

Dr. Tom Meixner

Dr. Paul Sheppard

Dr. Barron Orr

Troy Knight

Julie Wong

Questions?

