



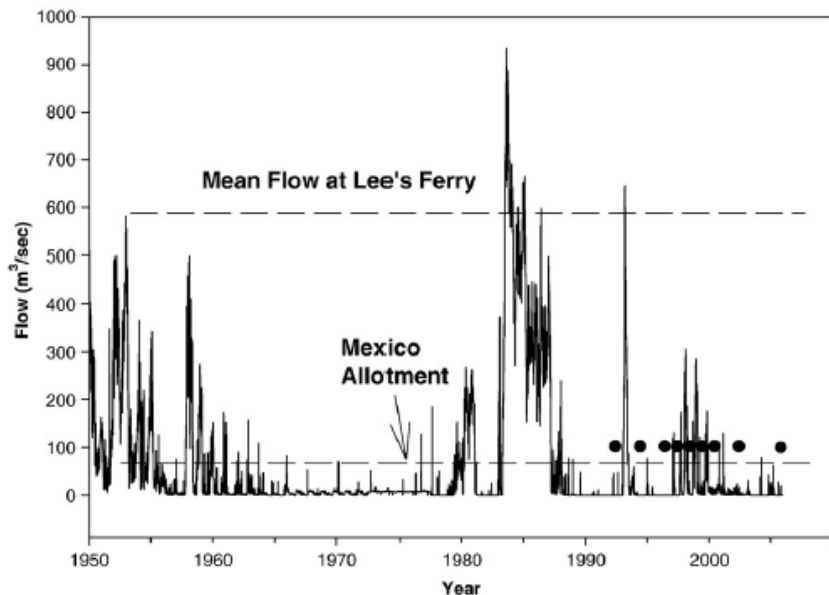
**REMOTE SENSING APPLICATIONS
FOR ECOSYSTEM
MONITORING IN THE COLORADO
RIVER DELTA**

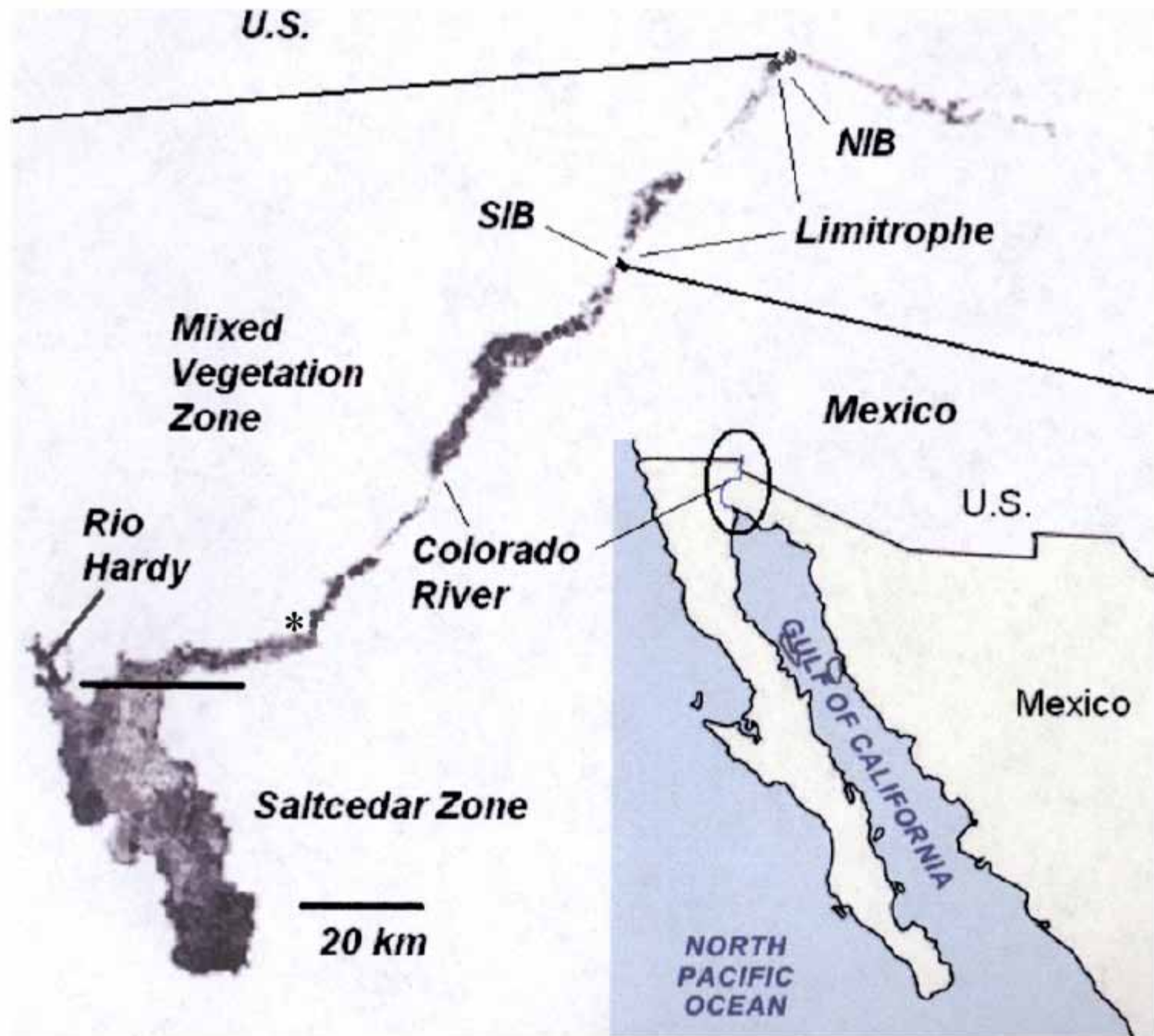
EDWARD GLENN, UNIVERSITY OF ARIZONA



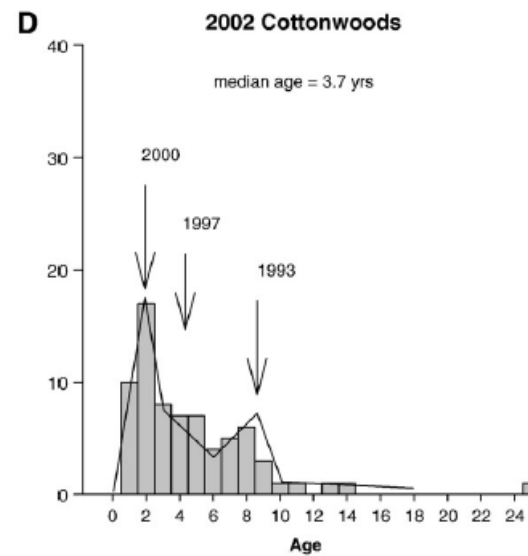
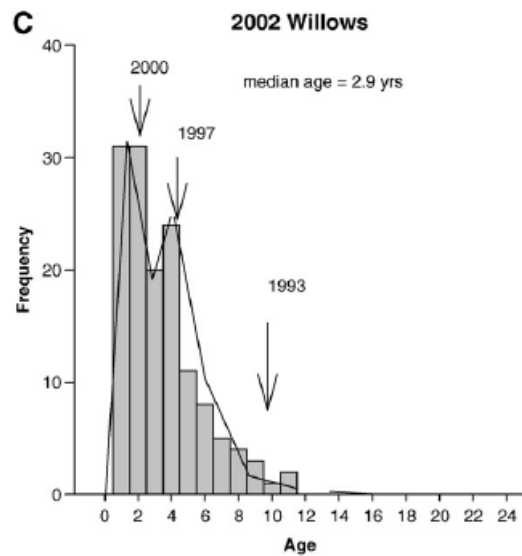
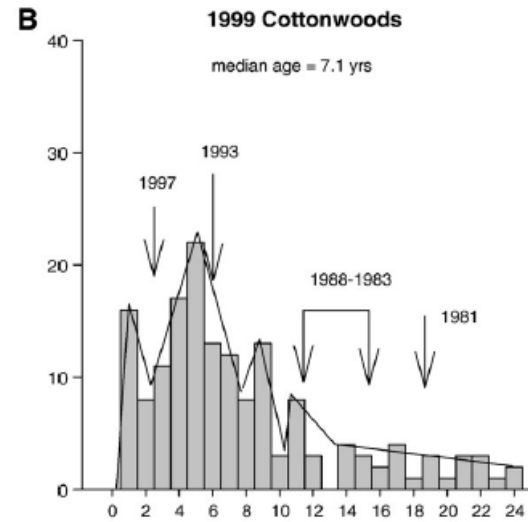
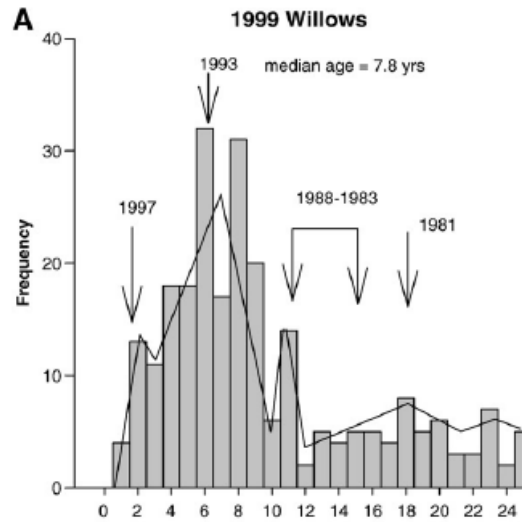
A River No More?

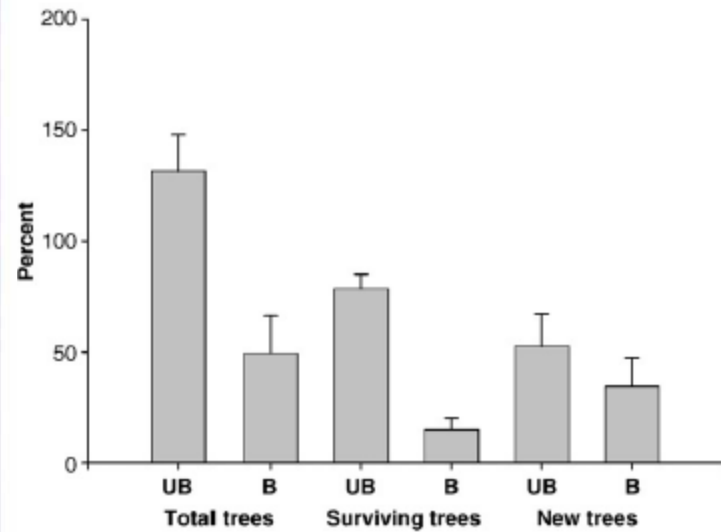
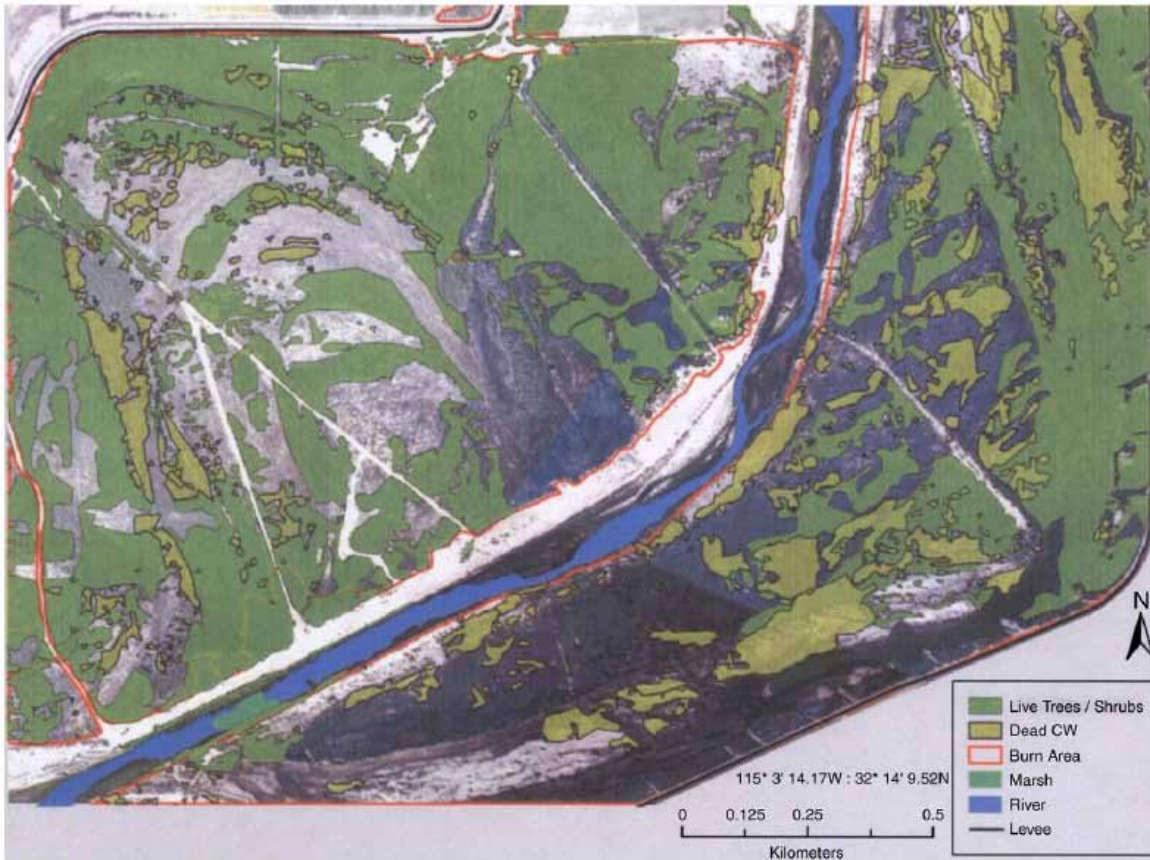
Lots of high-value mixed aquatic habitat in the riparian corridor of the CR in Mexico!





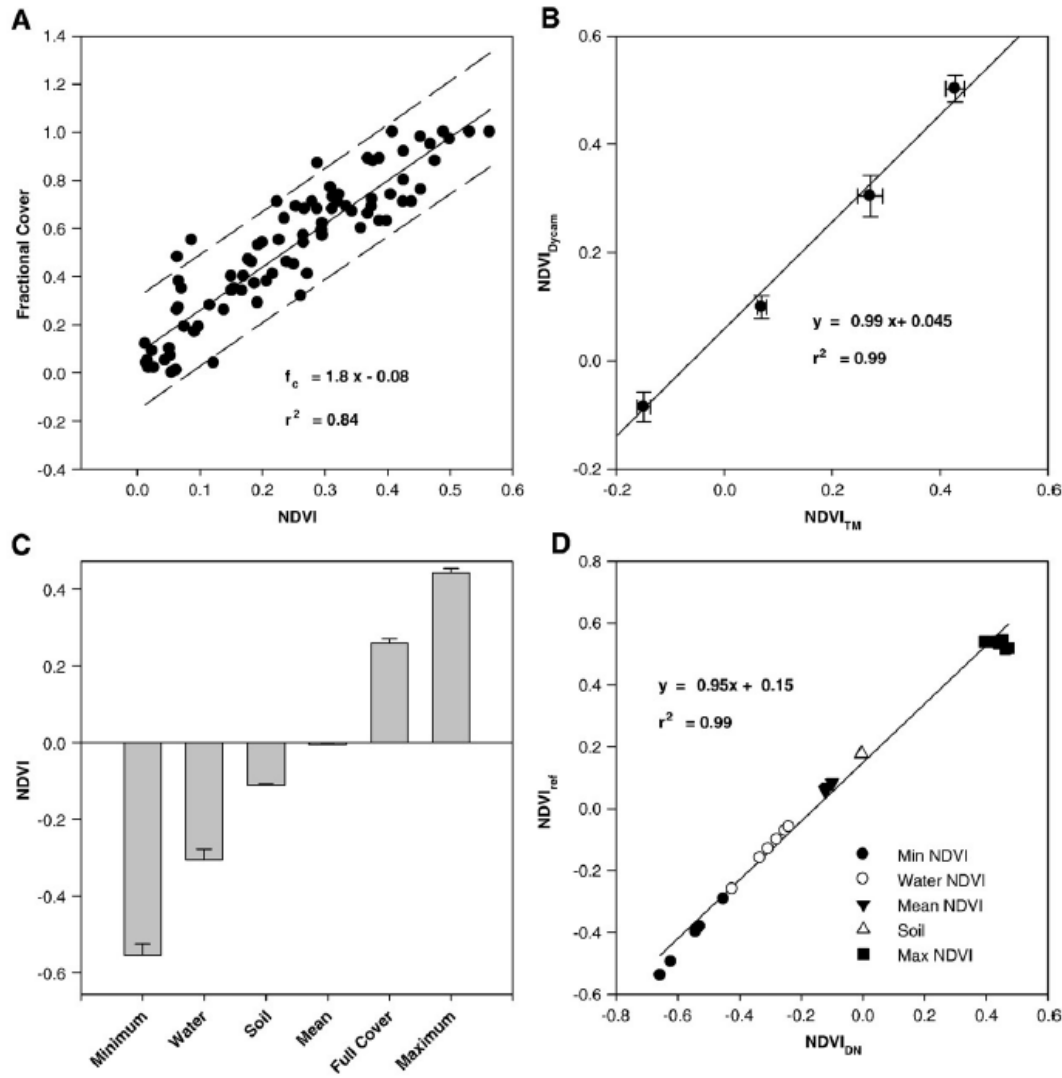
APPLICATION ONE: CASE OF THE MISSING TREES....





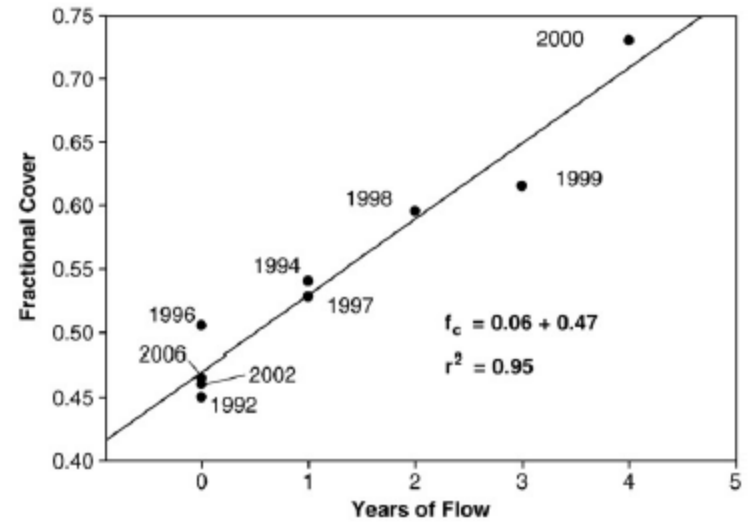
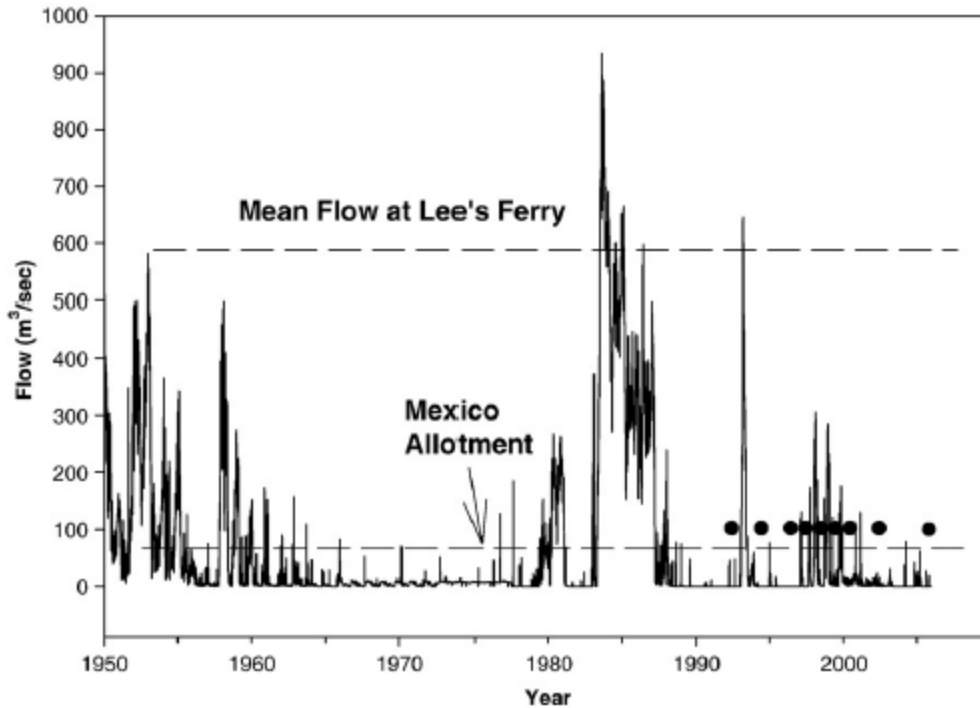
GIS of High-Resolution Aerial Photomosaic Shows Dead Trees Associated with Fire Scars

APPLICATION TWO: HOW MUCH WATER IS NEEDED FROM THE US FOR TREES?



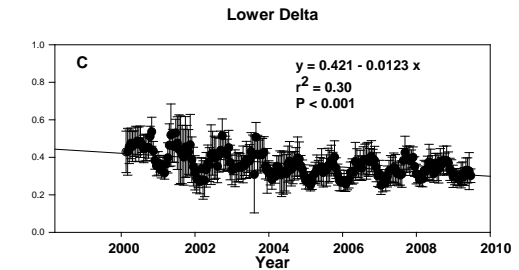
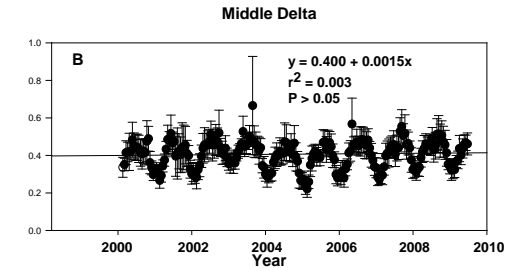
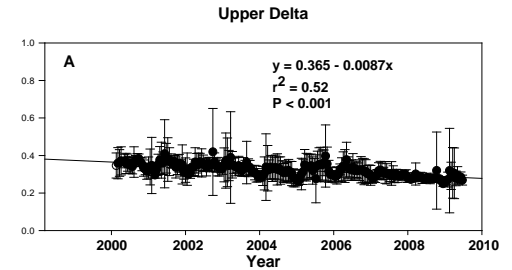
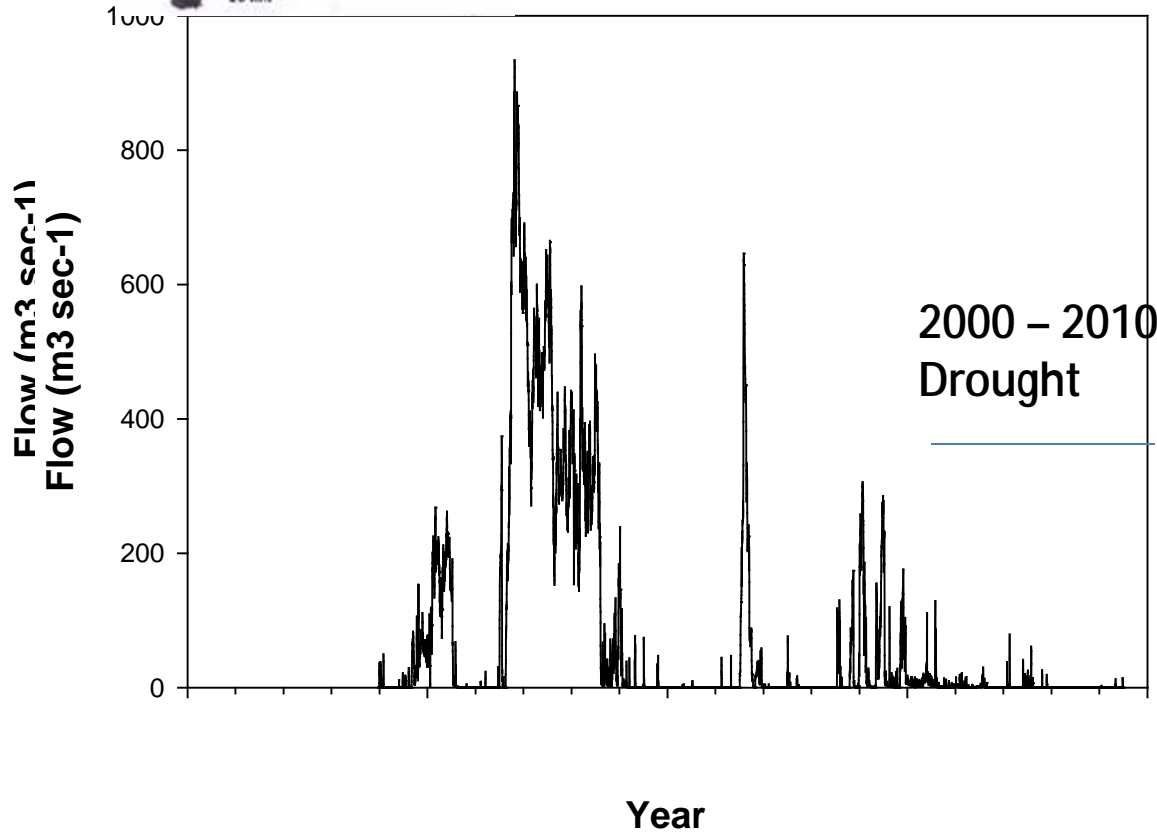
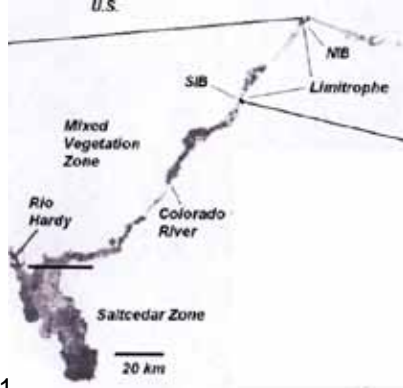
Landsat NDVI strongly correlated with vegetation cover, excellent year-to-year Correspondance between NDVI in time series imagery...

Results:



VEGETATION COVER INCREASES WITH NUMBER OF PREVIOUS YEARS OF OVERBANK FLOODING BUT NOT WITH VOLUME OF FLOWS ABOVE 50 CMS

APPLICATION THREE: WHAT HAPPENS DURING A DROUGHT?

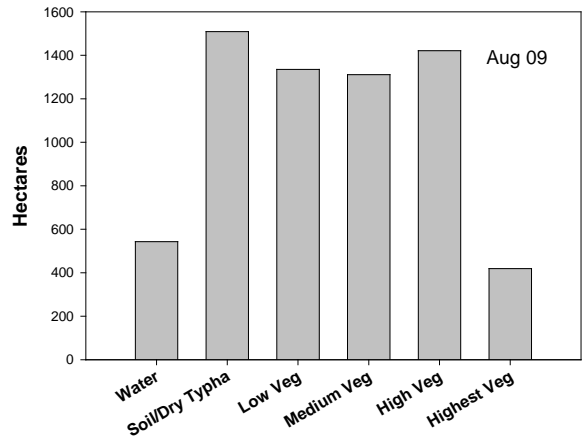
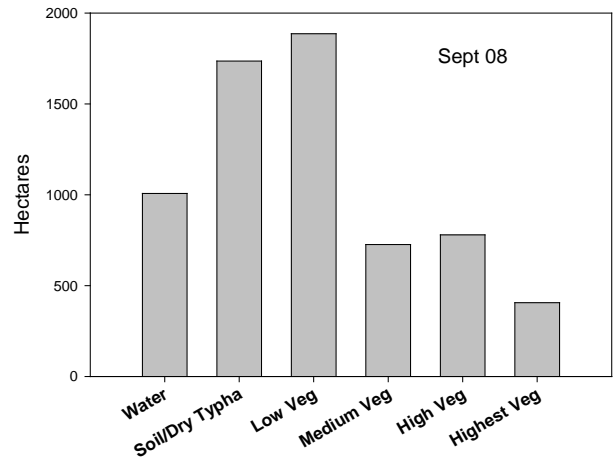
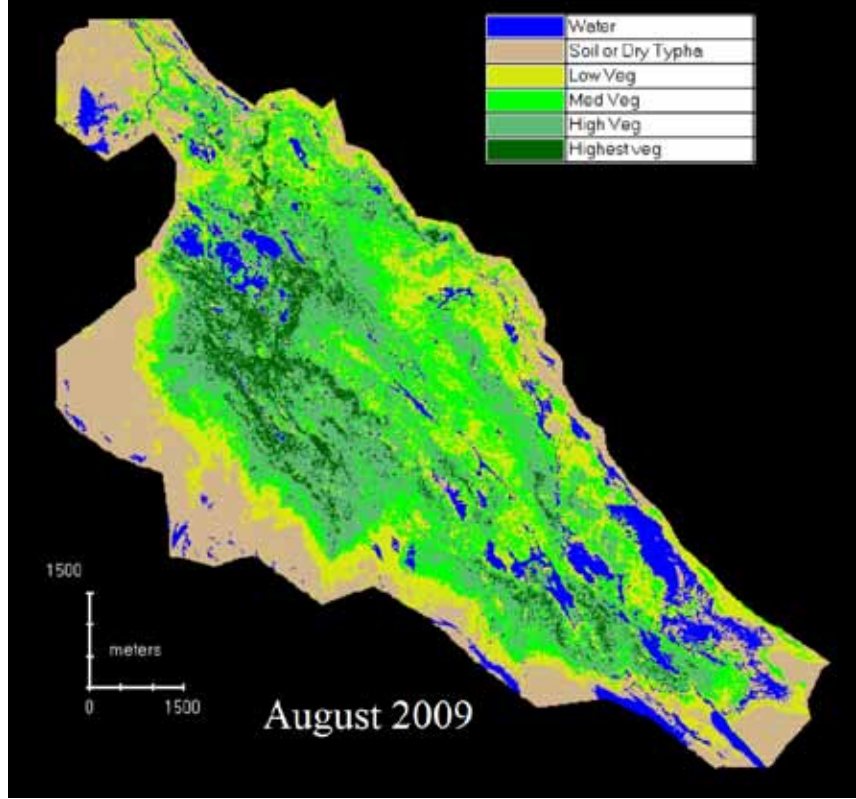
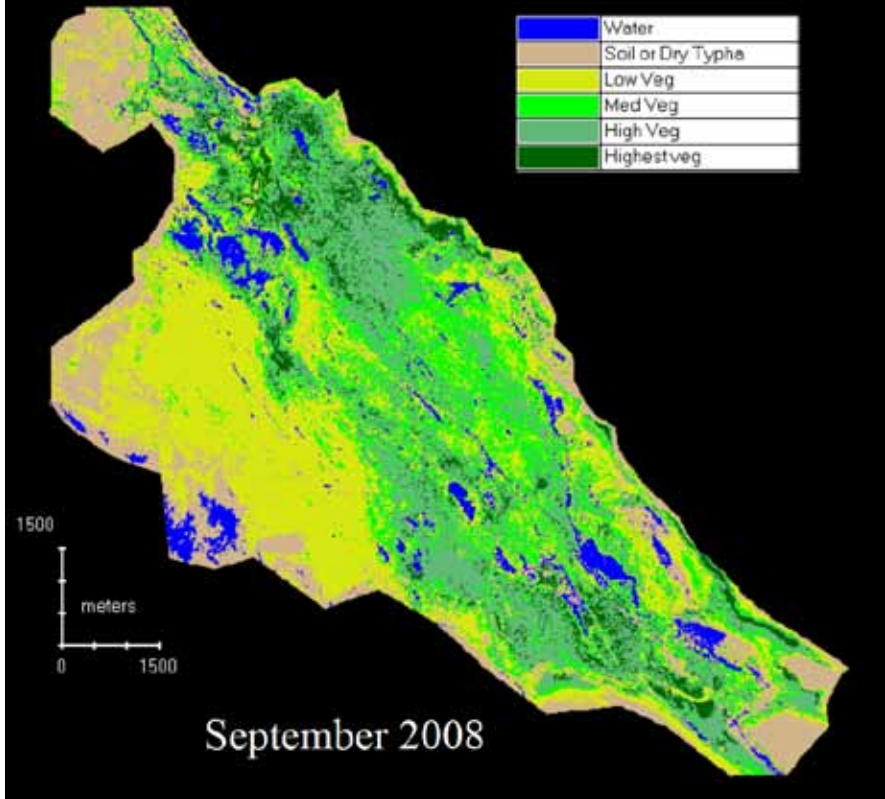


VEGETATION IN THE LIMITROPHE AND SOUTH PART OF THE RIPARIAN ZONE IS GRADUALLY REDUCED BY LACK OF US FLOWS BUT THE MIDDLE SECTION IS A REFUGIUM – UNDER CURRENT HYDROLOGICAL CONDITIONS

APPLICATION 4:

STUDIES IN THE CIENGA DE SANTA CLARA...





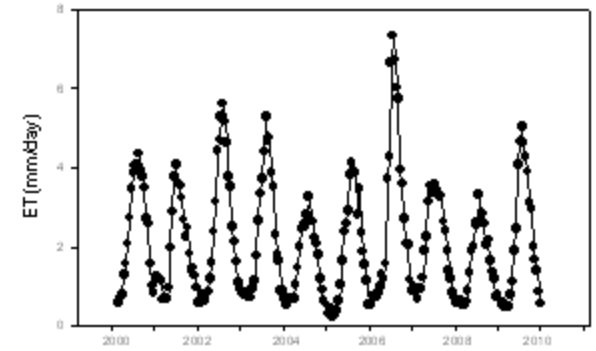
MODERATELY HIGH YEAR TO YEAR VARIABILITY IN VEGETATION DENSITY....

SILTATION IS SHIFTING VEGETATION PATTERNS IN THE CIENEGA...

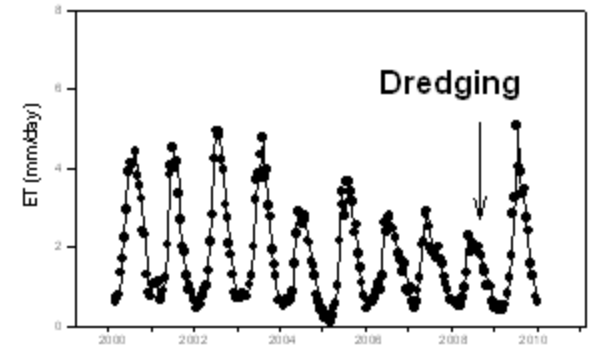




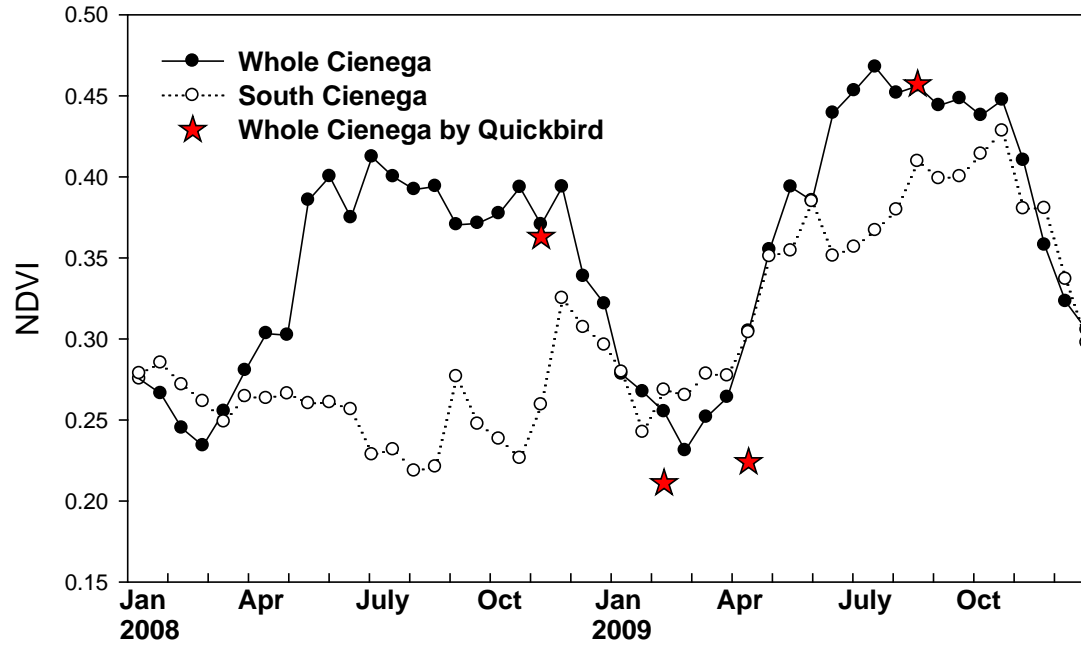
EVAPOTRANSPIRATON WHOLE CIENEGA



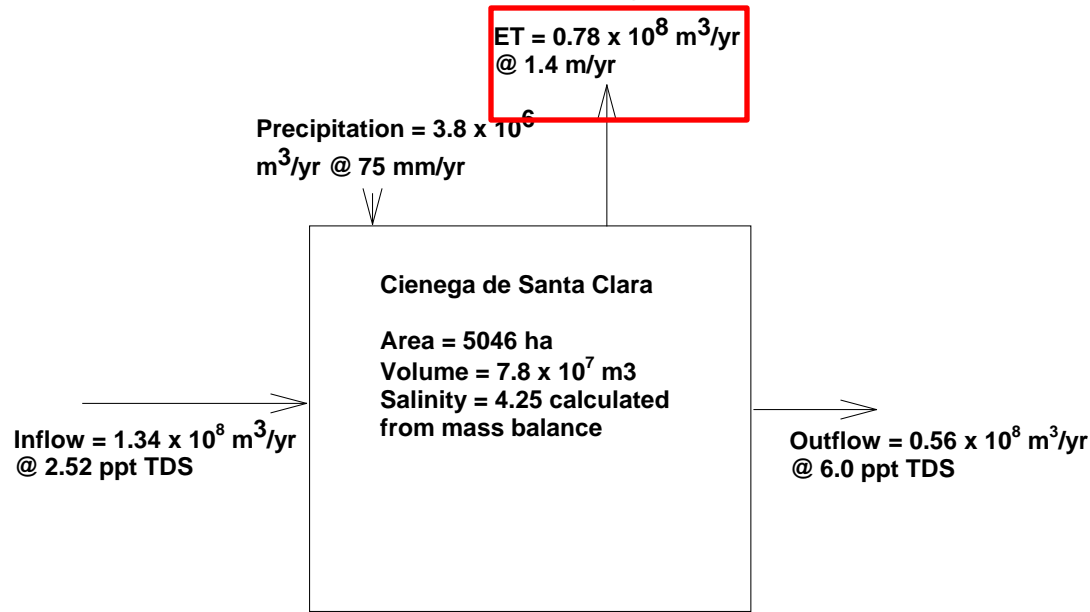
EVAPOTRANSPIRATION SOUTH CIENEGA



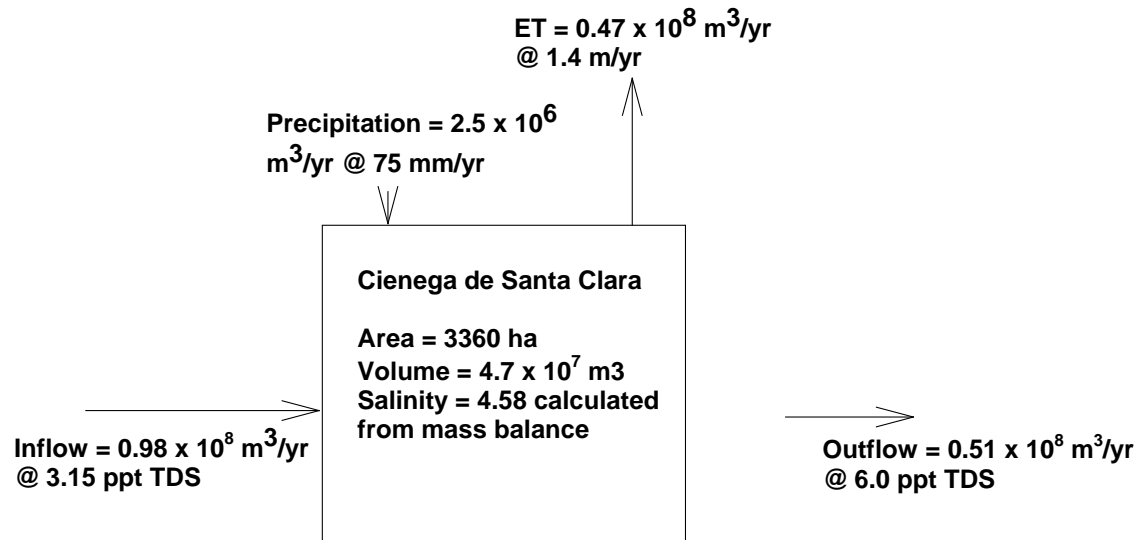
NDVI Values in Cienega de Santa Clara 2008 - 2009



Current Status of Cienega de Santa Clara



Projected Status of Cienega de Santa Clara at 1/3 YDP Operation



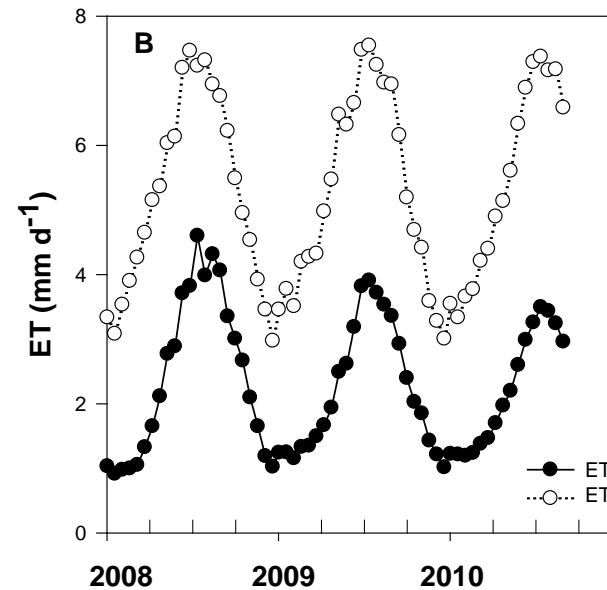
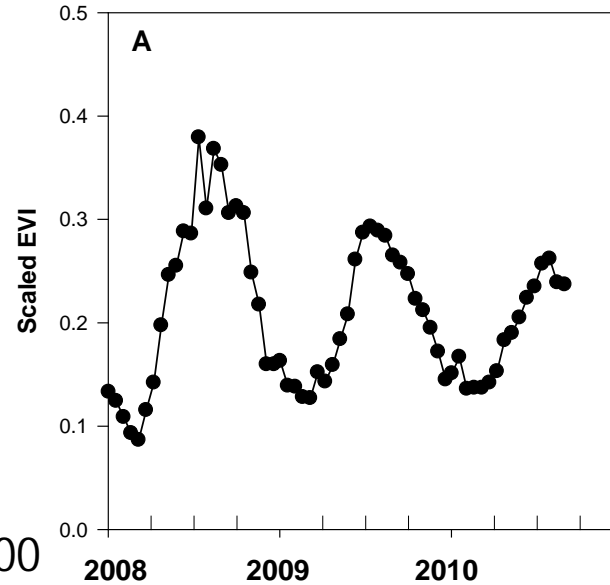
$$T = 1.22(\text{EVI}^*_{\text{veg}})\text{ET}_0$$

$$E = \text{ET}_0$$

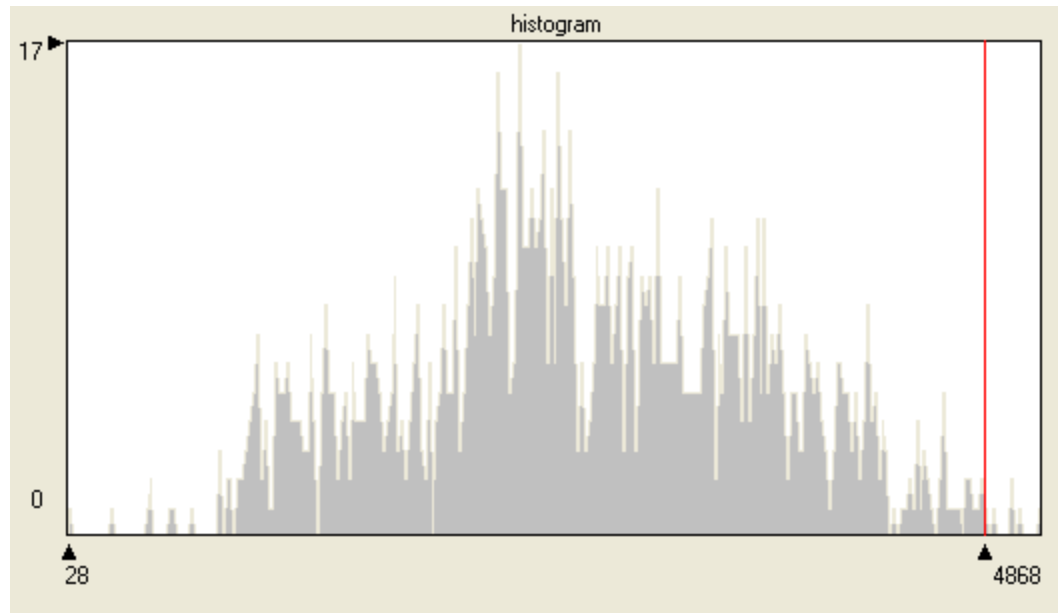
$$\text{ET} = T f_v + E f_w$$

$$\text{ET (m}^3 \text{d}^{-1}) = (T(f_v) + E(f_w)) \times 5613 \text{ ha} \times 10,000 \text{ m}^2/\text{ha}$$

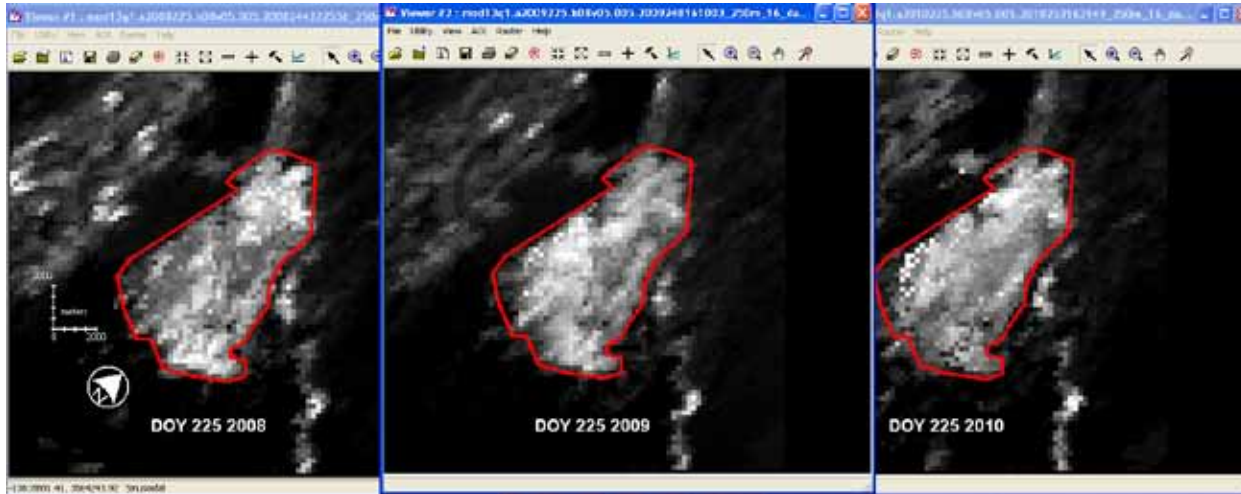
Calculated mean salinity in the Cienega using the ET model was 3632 ppm, close to the measured mean salinity of 3857 ppm



EVI and therefore ET were well below EVI_{\max} or ET_o



Distribution of EVI values (x 10,000) in the Cienega for DOY 225, 2008. The red line indicates the EVI value (0.467) that would produce an ET equal to ET_o .



Year	Evaporation 10 ⁶ m ³	Transpiration 10 ⁶ m ³	ET 10 ⁶ m ³	Inflows 10 ⁶ m ³	Inflow TDS (ppm)	Drainage 10 ⁶ m ³	Drainage Fraction
2008	14.6	34.5	49.1	142	NA	92.9	0.65
2009	16.3	29.1	45.4	130	2489	84.6	0.65
2010*	12.2	19.8	32.0	89.2	2835	57.2	0.64

*Through DOY 257

Revised Model:

ET = 0.77 m/yr

Discharge = 65% of inflow @ 4430 ppm

Means more degrees of freedom for management options...

