



Soil Hydrology Conditions in Occupied SWFL and YBCU Habitat

Colorado River Terrestrial and Riparian Meeting
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YB06 Bill Williams River
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Research Purpose

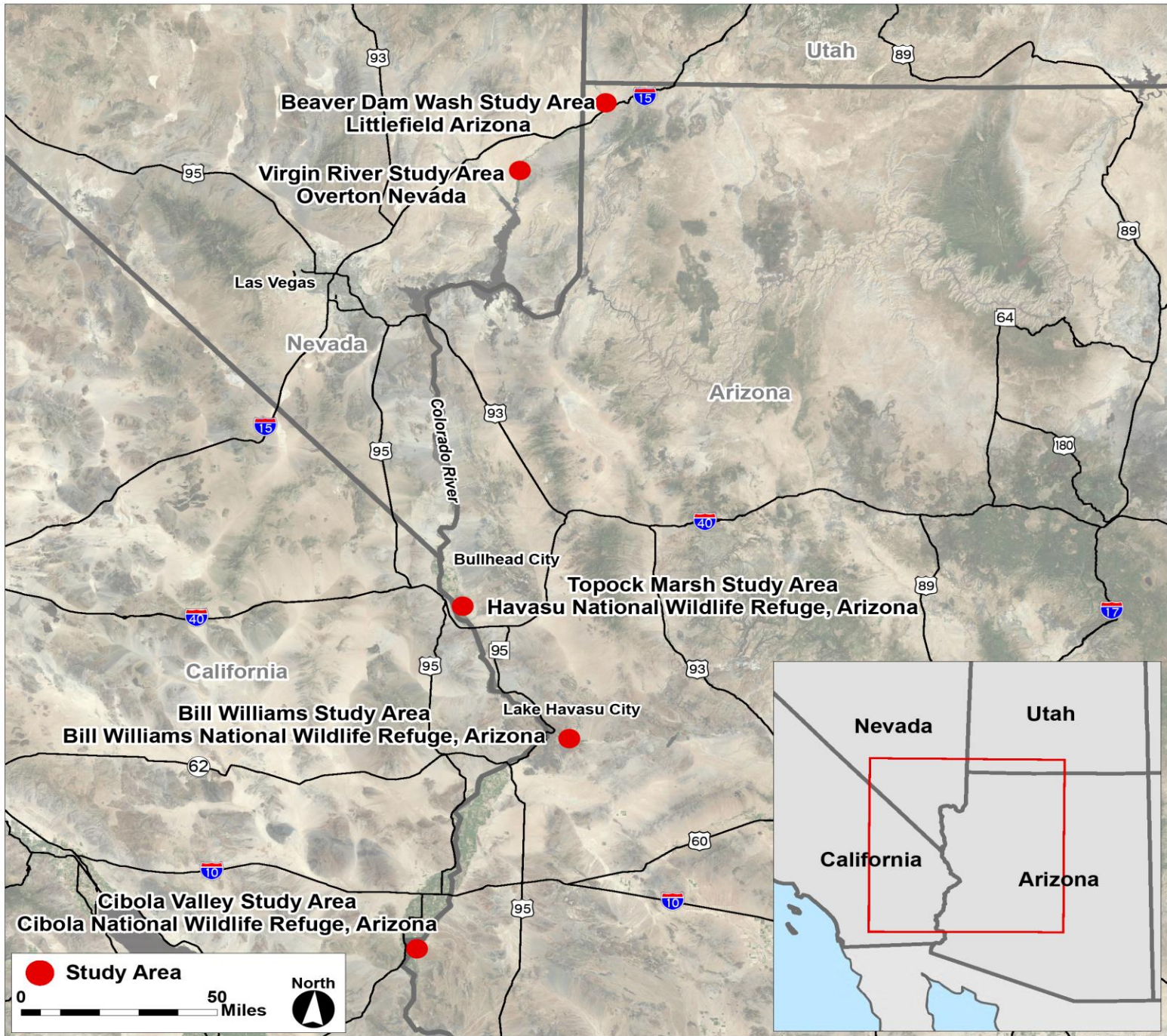
- ID and describe the range of soil hydrology conditions that are present in occupied SWFL and YBCU habitat
- Provide information to aid Reclamation in the creation of breeding habitat



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Methods

- Measurements Taken at subplots:
 - Soil Moisture
 - Litter Depth
 - Soil Texture
 - Air Temp
 - Relative Humidity



Methods, Con't.



- Measurements taken within site:
 - Standing water (depth and area)
 - Depth to water table (select sites)
- Data collected electronically for analysis:
 - Distance of each site to flowing water
 - vegetation data
 - River discharge from nearest recording station

SWFL Results



**WF03 Virgin
River**

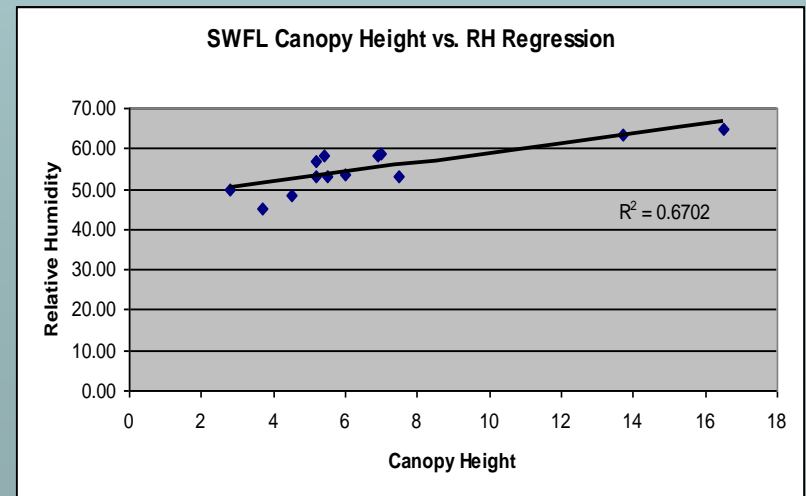
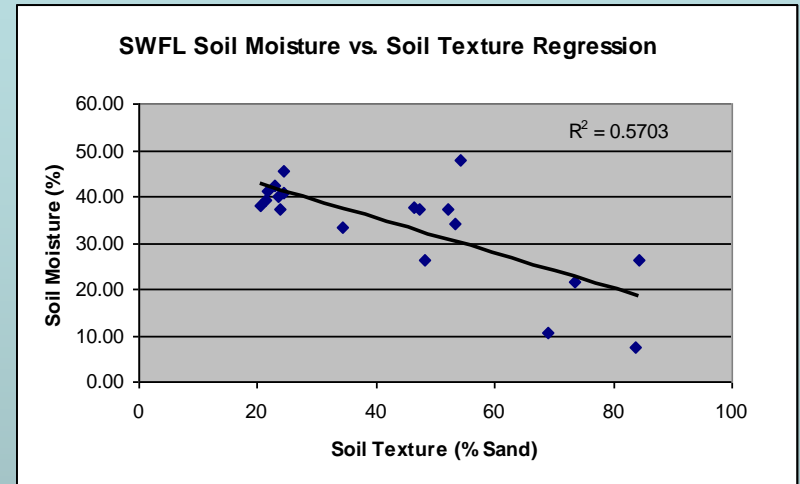
**WF16
BWRNWR**



- Standing Water: 84% (16 sites)
- Depth to groundwater: 0m to 2.8m
- Soil moisture: 4%-57% ($\mu=34\%$)
- Percent sand (texture): 21%-84% ($\mu=43\%$)
- Distance to flowing water: 0m-446m

SWFL Regression Results

- Soil moisture vs. texture
 - $R^2=0.57$, $p<0.01$
- Soil moisture vs. distance to flowing water
 - $R^2=0.27$, $p=0.02$
- Canopy height vs. relative humidity
 - $R^2=0.67$, $p<0.01$



YBCU Results



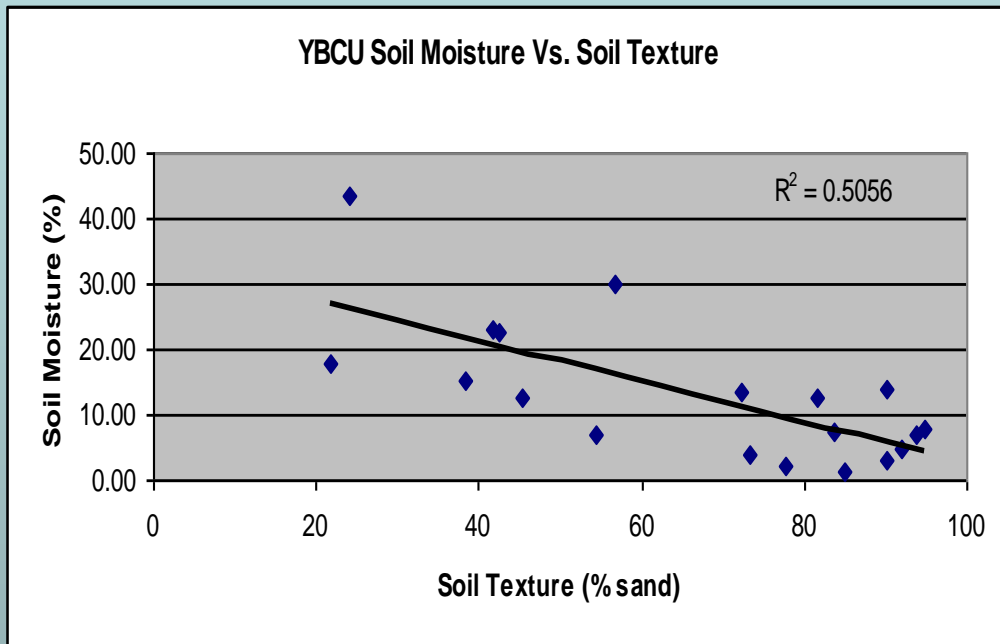
YB19
CNWR

YB07
BWRNWR



- Standing water: 16% (3 sites [2 irrigated]); 6 sites had flood irrigation
- Depth to ground water: 0m-4.7m
- Soil moisture: 1.2%-53.5% ($\mu=13\%$)
- Percent sand (texture): 22%-95% ($\mu=66\%$)
- Distance to flowing water: 5m-2200m

YBCU Regression Results



- Soil moisture vs. soil texture
 - $R^2=0.51$, $p<0.01$
- Other variables had either $p\text{-value}<0.05$ and low R^2 or $p\text{-value}>0.05$
- No significant relationship between temp/Rh and vegetation

Comparison of SWFL and YBCU Sites

- Two-Sample T-tests
- Significant differences were identified in all areas except:
 - Distance of sites to flowing water
 - Canopy height
 - Ground cover

Soil Moisture

- SWFL sites had significantly higher levels of soil moisture than YBCU
 - Saturated soils increase difference
- Soil moisture related to soil texture
 - YBCU sites sandier
 - Microhabitat conditions
 - Importance to SWFL versus YBCU site selection



WF02
Beaver
Dam Wash



YB04
BWRNWR

Depth to Groundwater



- YBCU sites had generally deeper groundwater than SWFL sites
 - Some YBCU restoration sites more than 1,000m from flowing water

Standing Water

- More observed standing water in SWFL sites than at YBCU sites
 - 16 sites vs 3 sites (observed standing water)
 - 16 sites vs 7 sites (including unobserved irrigation)
- Supports previous research of SWFL soil hydrology needs

Air Temp and RH

- YBCU sites had higher air temp than SWFL
 - Measurement bias
- SWFL sites had higher RH than YBCU
 - Likely related to differences in standing/flowing water



Vegetation

- No significant differences in canopy height or ground cover
- Percent canopy cover higher at SWFL sites than at YBCU
 - Mean of 70% for YBCU and 90% for SWFL
 - YBCU more likely to utilize less dense canopies than SWFL



WF21
BWR
NWR



YB09
BWRNWR

Summary

- **SWFL and YBCU site differences.**
SWFL has:
 - **Denser Canopy cover**
 - **More Saturated soil**
 - **Higher soil moisture**
- **Data collection to continue in 2011**



Thank You!

- Bureau of Reclamation
 - Chris Dodge, Barbara Raulston, Theresa Olsen
- USFWS
 - Dick Gilbert, Andrew Hautzinger, Mike Oldham, Linda Miller, Brenda Zaun
- ADWR and NDWR
- SSRS and SWCA

Beaver Pond near YB05 and WF15
along the Bill Williams River