

Work Task C37: Hydrology Studies for Avian Riparian Obligate Species

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
\$50,000	\$53,704.86	\$264,811.55	\$10,000	\$0	\$0	0

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Start Date: FY10

Expected Duration: FY12

Long-term Goal: Species Research.

Conservation Measures: MRM1 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: Southwestern willow flycatcher and yellow-billed cuckoo breeding sites and LCR MSCP habitat creation sites.

Purpose: To measure hydrologic conditions such as soil moisture, depth to ground water, and amount of standing water needed underneath habitat for the willow flycatcher and yellow-billed cuckoos in order to duplicate conditions at habitat creation sites.

Connections with Other Work Tasks (past and future): Breeding habitat for willow flycatchers is being determined through studies completed under D2 and breeding habitat for yellow-billed cuckoos is being determined through studies completed under D7. Habitat parameters for other obligate riparian species, such as summer tanagers, yellow warblers, and Bell's vireos that may benefit from these types of studies are being addressed under Work Task D6. This study was initiated under G3 in 2009.

Project Description: Based on information gathered during surveys for southwestern willow flycatchers on the LCR since 1997, it has been noted that within the dense, moist riparian habitats where flycatchers are found, several other LCR MSCP covered species are also commonly encountered. These species include yellow-billed cuckoos, summer tanagers, vermilion flycatchers, yellow warblers, gilded flicker, and Gila woodpecker. Some soil moisture and/or standing water may be an important feature of optimal riparian habitat, but the exact role this water has in habitat use is not known. It may increase vegetation health, which may be related to insect abundance, or it may increase humidity and lower temperatures. It is also not known how long moisture needs to be present or how large an area needs to be kept in this state during the breeding season.

Although much has been determined regarding site conditions needed for breeding southwestern willow flycatchers (flycatchers) and yellow-billed cuckoos (cuckoos), quantification of how much moist soil or standing water within breeding locations, and how to maintain needed hydrological conditions is still undetermined. This study will review hydrological studies that have been completed already within other river systems that have nesting flycatchers and cuckoos. Monitoring will also begin on hydrologic conditions such as ground water, soil moisture and standing water under known breeding flycatcher and cuckoos sites along the Virgin and lower Colorado River systems in order to quantify them.

Previous Activities: In February and March of 2010 sites were selected and random plots were placed in known willow flycatcher and yellow-billed cuckoo habitats at Bill Williams River National Wildlife Refuge, Topock Marsh, Mormon Mesa, and at the Cibola Valley Conservation Area restoration site. Piezometers were placed at each site and transects were established to measure each point for various hydrologic characteristics. The following characteristics were measured at each site: depth to water table, soil texture, soil organic layer, soil moisture and temperature, standing water, and indices for evapotranspiration were created.

FY11 Accomplishments: A second year of data collection was completed starting in April and ending in September. Most of the same locations were sampled in 2011 as were sampled in 2010, with a few exceptions. The sites in Littlefield, Arizona were destroyed by flooding that occurred in late 2010. Sites were added in the Palo Verde Ecological Reserve, due to the high use by yellow-billed cuckoos at this site. A total of eight permanent data loggers were located in a subset of the sites to measure surficial soil measurements every 10 minutes throughout the period of data collection. Gravimetric soil measurement was the only method used to obtain soil moisture data as the use of the AquaTerra M300 Soil Moisture Meter was discontinued after the problems encountered in 2010. Besides the aforementioned changes and additions, the same methods were utilized in 2011 as were used in 2010.

The data was used to compare vegetation and hydrologic characteristics within both SWFL and YBCU habitat separately, and to compare SWFL habitat to YBCU habitat. Logistic regression and correlation analysis were used to compare habitat characteristics. From the final report several conclusions of note were obtained. At both SWFL and YBCU sites, correlations identified a negative relationship between percent sand (soil texture) and percent soil moisture. At SWFL sites correlations identified a positive relationship between distance to flowing water and tree height and between stream discharge and tree height. At the SWFL sites the average percent soil moisture was more than twice as high as YBCU sites and SWFL sites had shallower depths to ground water than YBCU sites. SWFL sites had a higher number of sites with standing water present (29) than YBCUs (4). YBCUs utilized sites much farther from the nearest flowing water (up to 2100 m) than SWFLs (up to 542 m). The logistic regression indicated that depth to ground water was the variable with the highest influence in predicting SWFL versus YBCU sites, followed by soil texture and distance to flowing water.

FY12 Activities: The final report has been delivered to Reclamation and will be posted in early 2012. The agreement will then be closed out and no more work will continue associated with this work task.

Proposed FY 13 Activities: Closed in FY12.

Pertinent Reports: The final report, *Soil Hydrology Conditions in Occupied Southwestern Willow Flycatcher and Yellow-Billed Cuckoo Habitat*, will be posted on the LCR MSCP website.