

## Work Task C19: Southwestern Willow Flycatcher Feather Colorimetry

FY05 Estimate	FY05 Actual	Cumulative Accomplishment Through FY05	FY06 Approved Estimate	FY07 Proposed Estimate	FY08 Proposed Estimate	FY09 Proposed Estimate
\$21,000	\$20,970	\$20,970	\$0	\$0	\$0	\$0

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**Start Date:** FY05 **Expected Duration:** FY05

**Long-term Goal:** Species research to determine if SWFL can be identified to subspecies in the field by using colorimetry methodology.

**Conservation Measures:** MRM1 and MRM2

**Location:** SWFL life history study sites and Monitoring Avian Productivity and Survivorship (MAPS) stations along the LCR (Work Tasks D2 and D5, respectively). SWFL study sites are located at: (1) Pahrangat NWR in east-central Nevada; (2) along the Virgin River at Mesquite, Nevada; (3) along the Virgin River, near Mormon Mesa, Nevada; and (4) Reach 3, Topock Marsh section of Havasu NWR, Arizona. The MAPS stations are located at: (1) Reach 3, Havasu NWR, Arizona and (2) Reach 4, Cibola NWR, Arizona.

**Purpose:** Evaluate the use of colorimetry as a potential technique to determine subspecies of willow flycatchers encountered while banding during potential migration periods. This technique may enable subsequent surveys to identify subspecies in the field versus testing genetically, thus enabling biologists to distinguish migrating versus resident flycatchers in the field at the moment of capture.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Southwestern Willow Flycatcher Feather Colorimetry Study (C4). This work was completed in conjunction with the Southwestern Willow Flycatcher Presence/Absence Surveys and Life History Studies and MAPS (Work Tasks D2 and D5, respectively).

**Project Description:** The willow flycatcher is a polytypic species, with four subspecies generally recognized. At least two, and possibly three, subspecies utilize the LCR during migration. One subspecies, the SWFL (*Empidonax traillii extimus*), is listed on federal and state endangered or sensitive species lists and is a LCR MSCP covered species.

Distinguishing subspecies in the field has been problematic. Recently, new technology (colorimetry) has been described as a reliable method for characterizing plumage coloration differences in birds and may be useful in distinguishing willow flycatcher subspecies in the field. A colorimeter is a device that measures the color of an object, such as a bird's plumage, and produces a standardized value that can be analyzed statistically.

SWFL arrive on the breeding grounds in late April. Migrant willow flycatchers use the LCR corridor from late April through at least mid-June, often utilizing the same habitat as breeding willow flycatchers. Habitat use may be determined early in the breeding season utilizing colorimetry, thus concentrating survey effort on areas being utilized by SWFL, especially below Parker Dam where nesting has yet to be documented, and within habitat creation sites.

Fall migration begins in late July while breeding SWFL are still present along the LCR. Currently, willow flycatchers detected late in the breeding season for the first time cannot be distinguished between early migrants and resident birds not detected during previous surveys.

This study consists of obtaining multiple samples using a Minolta Colorimeter on captured willow flycatchers, both along the LCR and across the Southwestern states, in cooperation with other researchers. This process is a non-invasive (does not harm the bird) technique that takes a reading of the color of the bird's plumage. Samples will be statistically analyzed to see if the technique can correctly predict the subspecies of willow flycatchers with little error. This technique, if statistically accurate, can then be deployed in future surveys in areas below Parker Dam during migration, to determine where the SWFL is utilizing habitats as residents. This can be done instantaneously in the field without having to complete costly and time consuming genetic analysis. This will help further refine areas of resident versus migrant flycatcher habitat in a timely and more economical manner, and inform the adaptive management process for use in the evaluation criteria for future habitat creation.

**Previous Activities:** Colorimetry studies began in 2004 in cooperation with several agencies and non-profits. Reclamation, through non-LCR MSCP funding, provided a colorimetry unit to begin these studies. Sampling and data was collected using other partner funding. From spring 2004 to December 2005, 464 willow flycatchers were captured and sampled. Samples were obtained at 76 sites in 13 U.S. states and at 24 sites in three Latin American countries. Preliminary analysis revealed that the colorimeter can detect substantial plumage variation between willow flycatcher subspecies. Preliminary modeling suggests colorimeters have the potential to be a powerful tool in assigning subspecies status to individuals of unknown origin.

**FY05 Accomplishments:** Colorimetry samples were collected from birds captured at life history study sites and MAPS stations during spring migration and breeding season along the LCR using LCR MSCP funding. During the summer of 2005, 15 sites in California, Arizona, and Nevada were sampled using colorimetry and data was collected on 160 individual flycatchers. This data was analyzed, with additional data collected collaboratively at sites throughout the willow flycatcher range, to determine the effectiveness of this technology.

**FY06 Activities:** All field work was completed for this study in 2005. A final, peer-reviewed publication is being prepared in 2006, utilizing partner funding, which will evaluate the potential benefits of this new technology.

**Pertinent Reports:** *Assessing Variation of Plumage Coloration within the Willow Flycatcher: A Preliminary Analysis* is posted on the LCR MSCP website. Final report will be posted on LCR MSCP website when available.