

Work Task C6: Insect Population Biology in Riparian Restoration Sites

| FY07 Estimates | FY07 Actual | Cumulative Accomplishment Through FY07 | FY08 Approved Estimate | FY09 Proposed Estimate | FY10 Proposed Estimate | FY11 Proposed Estimate |
|----------------|-------------|--|------------------------|------------------------|------------------------|------------------------|
| \$30,000 | \$26,676 | \$103,551 | \$0 | \$0 | \$0 | \$0 |

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Start Date: FY06

Expected Duration: Closed in FY07

Long-term Goal: Species research.

Conservation Measures: WIFL1, WIFL2, YBCU1, YBCU2, GIFL1, GIWO1, VEFL1, BEV11, YWAR1, SUTA1, WRBA2, WYBA3, CLNB2, PTBB2.

Location: Topock Marsh, Havasu NWR, AZ; Beal Lake, Havasu NWR, AZ; and Cibola Valley Conservation Area, AZ.

Purpose: Eight species of birds and four species of bats included in the LCR MSCP eat insects. Creating and maintaining habitat for these species requires providing an adequate supply of insects for food. Growing plants will not by itself guarantee insect abundances large enough to feed and support bird and bat populations. In addition, earlier work has found that riparian birds feed on insects that have emigrated from non-riparian habitats such as marshland. Providing an adequate food supply for riparian birds and bats will require determining insect sources, developing techniques for increasing insect abundances, and developing methods for monitoring insect populations.

Connections with Other Work Tasks (past and future): This work task developed from Southwestern Willow Flycatcher Prey Base Study (C20). Work task C20, completed in July 2006, identifies insects and spiders eaten by the southwestern willow flycatcher. This work task, C6, parallels work task Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites (C5).

Project Description: The initial objectives of this project are to: 1) determine sources of insects eaten by LCR MSCP vertebrates, 2) recommend activities for increasing insect abundances, and 3) develop a method for monitoring insect populations. Sources of insects will be determined by sampling and identifying populations. Activities for increasing insect populations will be recommended by locating information on their biological requirements in the literature. A monitoring method will be developed by testing different trap designs at LCR MSCP habitat creation sites, with the objective of developing a monitoring method that is specific to insect species eaten by LCR MSCP-covered birds and bats and is simple to use.

Previous Activities: We identified insects collected from tamarisk (*Tamarix ramosissima*) flowers during FY06 at Topock Marsh, Arizona, where earlier work identified insects eaten by southwestern willow flycatchers. We also estimated specificities of insects to tamarisk flowers by determining proportions of pollen carried comprised of tamarisk pollen. We collected four genera of wasps including sand wasps (*Bembix* spp.) paper wasps (*Polistes fuscatus*), and tiphiid wasps (*Myzinum* spp. and *Paratiphia* spp.), and five genera of bees including halictid bees (*Agapostemon melliventris* and *Lasioglossum* spp.), leaf-cutting bees (*Megachile frugalis*), a native bee species (*Melissodes tepida*), and nonnative western honey bees (*Apis mellifera*). We also collected three genera of flower flies (Syrphidae) including *Palpada alhambra*, *Copestylum pallens*, and *Syrirta pipiens*, a species native to Europe. Flower flies were most-frequently collected followed by western honey bees. All insects collected were specific to tamarisk flowers, with pollen loads comprising greater than 86% tamarisk pollen on leaf-cutting bees and *M. tepida*, and greater than 95% on other insects. Larvae of insects collected are dependent on a variety of food. Immatures of collected wasps eat other insects, and larvae of collected bees eat pollen and nectar. Immatures of collected flower flies eat detritus, most likely rotting cattails. Although western honey bees were abundant on tamarisk flowers, they are not eaten by southwestern willow flycatchers, probably due to their stings. Flycatchers at Topock Marsh eat flower flies that develop as larvae on rotting marsh plants and are maintained as adults by tamarisk flower nectar.

FY07 Accomplishments: The FY06 Annual Report, summarized above, was rewritten and accepted for publication in the Journal of the Kansas Entomological Society. The paper is coauthored by Steve Heydon and Ken Lorenzen at the Bohart Entomology Museum, U.C. Davis, and is scheduled to be published in January 2008. The study is titled, *Pollen Loads on Adult Insects from Tamarisk Flowers and Inferences about Larval Habitats at Topock Marsh, Arizona*.

FY08 Activities: Closed in FY07. Activities in this work task during FY08 will be transferred to Work Task C5: Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites.

Proposed FY09 Activities: Closed in FY07.

Pertinent Reports: 2006 Annual Report for LCR MSCP Work Task C6: Insect Population Biology in Riparian Restoration Sites; and Wiesenborn, W.D. and S.L. Heydon, 2007, *Diets of Breeding Southwestern Willow Flycatchers in Different Habitats*, Wilson Journal of Ornithology, In press.