

Bluebird biology research is underway with help of DFO grant

by *Jessica Fish*

Denver Field Ornithologists kindly awarded \$400 in grant funding toward my master's research in bluebird biology.

The project is being conducted through Dr. Mike Wunder's lab in the integrative biology department at the University of Colorado Denver.

Project partners include the Evergreen Audubon Society, the Colorado Bluebird Project, and Castle Rock Parks and Recreation, who have contributed nest box sites, volunteer labor, and historical data to the research effort.

The goal of this research project is to investigate trade-offs between investments in immune defense, migration, and reproduction; and 2013 offered the opportunity to observe these trade-offs during the added stress of a drought year.

The breeding season is a very demanding period in the annual cycle of birds, and migratory birds have the compounded strain of migration just prior to the reproductive effort.

Drought conditions and pathogen exposures during this time also create significant physiological stress that could impact breeding success.

Therefore, we are measuring breeding output as a way of quantifying fitness trade-offs between immune defense, migration, and reproduction in the face of limited resources.

Another objective of the study is to determine winter migratory routes and locations for the populations of bluebirds breeding on our study sites.

Birds at these sites are believed to be obligate migrants, but currently there is no evidence to confirm

this. Toward this goal, we deployed geo-loggers on twenty adult birds during the 2012 breeding season.

Loggers are programmed to record solar light data, and once retrieved, can be utilized to geographical coordinates for each day that it was worn by the bird.

In May of 2013, we initiated our second field season obtaining data on mountain and western bluebirds that inhabited breeding sites in Evergreen, Castle Rock, and Larkspur, Colorado.

The field sites have established nest-box trails, and exhibit a gradient in altitude and habitat-type.

Field efforts included nest box observations, banding, and the collection of fecal and blood samples.

To ensure that clutch status was as accurate as possible, nest boxes were visited every other day at the primary sites in Evergreen and Castle Rock.

Breeding data including clutch initiation, clutch size, egg mass, nestling survival, and nestling growth rate were recorded for each occupied box and will be subjected to statistical modeling to quantify reproductive output.

Notable observations this season were that eggs were laid a few weeks later compared to previous years, and most pairs only attempted one clutch rather than the typical two or three clutches.



Taking a blood sample from a female Mountain Bluebird. *Jessica Fish*



Male Western Bluebird. *Jessica Fish*

In addition, all nestlings and captured adults were weighed and banded. For the primary sites, a total of 131 nestlings and 31 new adults were banded. Six previously banded adults were recaptured, three of which returned geo-loggers.

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With additional efforts in Larkspur, a total of seven geo-loggers were retrieved of the original twenty. Another logger was observed on a returning adult male at the Castle Rock site, but unfortunately, the bird went missing before we were able to retrieve it.

We plan to decipher logger data utilizing new software technology; this will be a significant undertaking and we will be working on this for perhaps the next few years.

Fecal and blood samples were also taken from most captured adults. Individuals exhibiting excessive stress were released after standard banding procedures.

Altogether, twenty-two fecal specimens and fourteen blood smears were also obtained and will be subjected to further analysis in the lab.

From these, we will generate data regarding the community structure of the gut microbiota, the presence of avian malaria parasites, and white blood cell counts; all of which will offer insight into the immune status of the birds that were sampled.

DNA extraction is currently in progress with the Miller lab at UC Denver. Thus far, the process has shown promise, and sequencing of the gut microbiome is scheduled to proceed over the next year or so.

Again, generating data from our current samples is a process that will continue for the next one to two years.

Based upon the availability of funding, we would like to extend our field efforts through the 2014 breeding season to strengthen our results.

We certainly appreciate the support of DFO, and will look forward to offering updates as we continue.

(Photographs were provided by Jessica Fish.)



Banded Mountain Bluebird nestling in basket. *Jessica Fish*



Jessica banding a female Mountain Bluebird. *Barbara Spagnuolo*



Mountain Bluebird nestling in hands. *Jessica Fish*



Jessica banding a male Mountain Bluebird. *Barbara Spagnuolo*