



FEATHER SAMPLING PROTOCOL FOR WEST NILE VIRUS

In an exciting new project, The Institute for Bird Populations (IBP) and UCLA's Center for Tropical Research (CTR) are using feathers to investigate the spread of West Nile Virus (WNV) in birds, the response of WNV to climate change, and the effect of the disease on bird fitness and survival. Accordingly, IBP and UCLA have developed a list of ten target species for feather collection (listed below) thought to be particularly sensitive to WNV infection and/or be principal vectors of the disease.

1. If you intend to collect feathers during the 2009 MAPS season, send your name, address, and MAPS location to Phil Nott (pnott@birdpop.org) so we can have feather sample envelopes sent to you. Also, indicate your preference for shipping the feathers to UCLA at the end of the season: either UPS or FedEx. We will contact the CTR on your behalf to register you for the program and to obtain a UPS or FedEx shipping number so you can ship the samples to UCLA free of charge at the end of the season.

NOTE: You must have specific authorization on your federal banding permit to allow you to collect feathers. It is a simple procedure to add this authorization and IBP is happy to help you do this. If you need help, please contact Danielle Kaschube at 609-625-0767 or dkaschube@birdpop.org.

2. When in the field, please prioritize your local efforts to pull feathers from every individual of the following species whenever possible:

Swainson's Thrush	(SWTH)	Common Yellowthroat	(COYE)
Hermit Thrush	(HETH)	Wilson's Warbler	(WIWA)
American Robin	(AMRO)	Yellow-breasted Chat	(YBCH)
Gray Catbird	(GRCA)	Brown-headed Cowbird	(BHCO)
Yellow Warbler	(YWAR)	House Finch	(HOFI)

3. To collect a sample, pluck **one central and one outer tail feather (e.g., L1 and R6)**. By pulling an inner and an outer rectrix, you increase the likelihood of obtaining at least one feather that was grown on the breeding grounds. To pluck the feathers just hold them close to the base and pull gently. **Please do not touch the newly exposed quill**, as the DNA is extracted from the skin cells attached to it.

4. Place feathers from each individual in a pre-printed envelope provided by CTR. Providing your own envelopes is fine, but please be sure that each envelope contains the following information clearly printed on it:

- Species Name (4-letter code is fine)
- Band Number
- Date (**Please use letters for the month instead of numbers!**)
- Location (Location Code and Station Code; if not a MAPS station, use GPS coordinates, Nearest Town, County, State/Province, Country)
- If possible: Age, Sex, and Breeding Condition (as determined by BP or CP)
- Whether or not the bird was a recapture

5. **Send your samples in a single shipment at the end of your field season.** Feathers are preferably stored refrigerated at 4°C but can be stored at room temperature.

Ship samples to UCLA via UPS or FedEx (not the U.S. Postal Service) to:

EMILY CURD,
RESEARCH ASSOCIATE, CENTER FOR TROPICAL RESEARCH,
UNIVERSITY OF CALIFORNIA, LOS ANGELES,
621 CHARLES E. YOUNG DRIVE,
LOS ANGELES, CA 90095, USA.

Tel: (310) 825 0253 E-mail: eecurd@ucla.edu

DO NOT USE THE U.S. POSTAL SERVICE to send your feathers. The U.S. Postal Service is now irradiating mail with high-power radiation that might damage the DNA in the feather samples. Use the **UPS or FedEx** account number UCLA will have provided you to cover the shipping costs. If you have not received a UPS or FedEx number by the time you are ready to send the feathers please contact Emily Curd at UCLA to obtain an account number.

Note: Please enclose with your samples a sheet of paper indicating location details (MAPS station and location codes, GPS coordinates, Nearest Town, State/Province, and Country) so that the location codes on your feather envelopes can be decoded.

Contact Phil Nott at The Institute for Bird Populations
(pnott@birdpop.org or 415-663-2050) with any questions.

Feather Collection Addendum

In addition to the ten priority species listed above, the CTR accepts feathers from any migratory or resident species, collected during any time of the year, including migration. **Although you should prioritize the West Nile Virus species, feather samples of the following species would also be especially welcome.**

Warbling Vireo	(WAVI)	Black-&-White Warbler	(BAWW)
Veery	(VEER)	American Redstart	(AMRE)
Gray-cheeked Thrush	(GCTH)	Prothonotary Warbler	(PROW)
Wood Thrush	(WOTH)	Ovenbird	(OVEN)
Orange-crowned Warbler	(OCWA)	Northern Waterthrush	(NOWA)
Nashville Warbler	(NAWA)	Louisiana Waterthrush	(LOWA)
Northern Parula	(NOPA)	Kentucky Warbler	(KEWA)
Chestnut-sided Warbler	(CSWA)	Connecticut Warbler	(CONW)
Magnolia Warbler	(MAWA)	Mourning Warbler	(MOWA)
Yellow-rumped Warbler	(YRWA)	Hooded Warbler	(HOWA)
Black-throated Gray War.	(BTYW)	Scarlet Tanager	(SCTA)
Black-throated Green War.	(BTNW)	Chipping Sparrow	(CHSP)
Yellow-throated Warbler	(YTWA)	Dark-eyed Junco	(DEJU)
Pine Warbler	(PIWA)	Painted Bunting	(PABU)
Blackpoll Warbler	(BLPW)	Pine Siskin	(PISI)

More information is available at
http://www.ioe.ucla.edu/ctr/research/neotropical_migrants.html

Feather Collection Information Sheet

Feather collection holds great potential to help us understand pathogen transmission pathways in birds and their consequences for both human health and the health of the bird populations that are our passion. In most cases the extra processing time required to sample feathers is minimal, yet a single feather can hold a lot of important information, not only about past infections, but about overwintering locations, migratory routes, and speciation.

West Nile Virus Infection in North American Migratory Birds:

UCLA, IBP, and other collaborators were recently awarded an EPA research grant to study “The Role of Avian Host Dynamics and Anthropogenic Stressors on the Transmission of West Nile Virus and the Implications for Human Health and Biodiversity”. The project will use the feather collection to examine the ecological correlates of West Nile virus (WNV) infection in migratory birds. This research is aimed at determining: 1) how disease hotspots vary with climate and ecological change, and 2) whether WNV can be detected in birds that were previously infected but have since recovered from the disease. WNV RNA can be extracted from a feather calamus of previously exposed individuals. WNV can then be genetically detected using a technique called real time RT-PCR (reverse transcription-polymerase chain reaction). To date, UCLA researcher Ryan Harrigan has detected WNV in feathers of several American Crows (*Corvus brachyrhynchos*) that were known to have died from the disease. In addition, WNV was detected from 2005 feather collection samples of American Robins (*Turdus migratorius*) from Georgia, Texas, and New Jersey that were suspected of carrying the infection.

The WNV project will target the following ten species (see below) thought to be particularly sensitive to infection and/or principal vectors of the disease:

Swainson's Thrush (*Catharus ustulatus*) is one of the most common birds of the northern spruce-fir forests. It is a Nearctic-Neotropical migrant that breeds as far north as Alaska and northern Canada. It winters mostly in Mexico and northern South America, but is less abundant in Central America. The wide range of this species makes them potentially effective spreaders of WNV across large geographic areas. This species has previously tested seropositive for WNV.

Hermit Thrush (*Catharus guttatus*) is one of the most widely distributed forest-nesting migratory birds in North America. It breeds across most of Canada and the western and northeastern U.S. and overwinters throughout much of the southern U.S. and Mexico as far south as Guatemala.

American Robin (*Turdus migratorius*) is one of the most common North American passerines, and almost all are migratory. Robins are generally suited to a variety of habitats, including deep forests, woodlands, and grasslands, and are flexible in their foraging and feeding habits. They have adapted well to rapidly changing environments, and are often found in close association with all types of human-altered landscapes, from farms to suburban areas. Recent studies have suggested that because of their high population numbers and high susceptibility to flaviviruses, robins may represent a

significant contributor to the spread of WNV in North America. This species has previously tested seropositive for WNV.

Gray Catbird (*Dumetella carolinensis*) is a common, native Nearctic species inhabiting woodland and occasionally suburban environments and adapted well to clearings and anthropogenically altered areas. It breeds in north, central and eastern U.S. and south central and western Canada. Wintering grounds include the southeastern United States, the east coast of Mexico, and occasionally in the Caribbean. This species has previously tested seropositive for WNV.

Yellow Warbler (*Dendroica petechia*) is a common wood warbler that breeds from Alaska and Canada south to the central U.S. and west into Mexico. It also breeds in southern Florida, throughout the Caribbean and Central America coasts, and in northern South America. It winters in Mexico, Central and South America. This species has previously tested seropositive for WNV.

Common Yellowthroat (*Geothlypis trichas*) is one of the most common and widely distributed wood warblers in North America. It breeds across much of Canada and the U.S. and south into Baja California Norte, Oaxaca and Veracruz, Mexico. Common yellowthroats winter along the Atlantic and Gulf Coasts, in southern California, and throughout Mexico and Latin America.

Wilson's Warbler (*Wilsonia pusilla*) is a common wood warbler associated with mesic habitats. It breeds from the boreal forests of eastern Canada west to British Columbia and parts of Alaska, Montana, Idaho, and the Pacific coast of south central California. Its wintering range extends from eastern and western Mexico and parts of southern Louisiana and Texas to Panama.

Yellow-breasted Chat (*Icteria virens*) is the largest wood warbler and is widely distributed across much of eastern and western North America. This species also has a breeding population in Mexico, with most of the population wintering in Middle America from Mexico to Panama. Although common, less is known about the distribution and connectivity of this species as compared to other wood warblers. This species has previously tested seropositive for WNV.

Brown-headed Cowbird (*Molothrus ater*) is a brood parasite that comes into close contact with hundreds of species of migratory birds, allowing for the possibility of interspecific spread of WNV, and is typically associated with agricultural areas in close proximity to humans. Formerly occurring in the central grasslands of the U.S., forest clearing has allowed this species to extend its range across most of North America, and populations have dramatically increased. This species has previously tested seropositive for WNV.

House Finch (*Carpodacus mexicanus*) is a common species found in a variety of habitats in the western U.S., yet is mostly associated with urban and suburban areas in the east. Eastern populations and some western populations migrate to wintering grounds in the southern U.S. Most western populations are sedentary. House Finches frequently form mixed species flocks, making them potential spreaders of WNV across taxa. This species has previously tested seropositive for WNV.



Center for Tropical Research - UCLA

NEOTROPICAL MIGRATORY BIRD CONSERVATION GENETICS PROJECT

Non-destructive Sample Collection

Feather Sampling for Conservation Genetics Analyses

The problem – One of the main obstacles in our attempts to preserve migratory bird populations is our inability to monitor specific populations year-round. While the demography of many populations has been studied in detail, the causes of population change are difficult to interpret because we do not know where the birds from a given population spend the rest of the year. If we could match breeding and wintering areas we would be able to study declining populations year-round and thus effectively identify and reverse the causes behind the declines.

How can genetic analyses help? – At the Center for Tropical Research in UCLA we investigate the genetic structure of migratory bird populations in order to match breeding areas in North America with wintering areas in Latin America and the Caribbean. From a single feather or a small blood sample, we can analyze the DNA of many individual birds and characterize geographic areas in terms of the frequency of alleles or haplotypes. Once we have properly sampled both the breeding and wintering areas, we can then match specific areas in the breeding and wintering grounds by the genetic similarity of their populations.

Collaboration with banders from North and Latin America – The objectives of the CTR's Neotropical Migratory Bird Conservation Genetics project and those of most banders in North and Latin America are complementary and mutually beneficial. If we combine our efforts to match breeding and wintering areas using genetic markers with data on primary demographic parameters (productivity and survivorship) from mist-netting operations, we will make significant progress towards our common goal of identifying the causes behind the population declines. To date, our collaborations with banders in the MAPS program of North America, the MoSI program of Mexico and Central America, and independent banders in both areas, has made possible the collection of thousands of feathers, hundreds of which are currently being analyzed.

How can banders help? – We suggest that as part of the regular bird processing during banding, banders collect two tail feathers from each bird captured and place them in an individual envelope indicating the species name, date and location (see the Feather Collection Protocol for further details). This kind of non-destructive sampling allows us to obtain valuable information on the genetic structure of populations without harming the birds we want to study and conserve. Furthermore, once frozen for long-term storage, the feather samples can be used for other applications such as stable isotope analysis, parasite studies, etc.

For further information on the project contact **Emily Curd, Center for Tropical Research, Institute of the Environment, University of California – Los Angeles, 621 Charles E. Young Drive, Los Angeles, CA 90095, USA; Tel: (310) 825 0253; E-mail: ecurd@ucla.edu.**