



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Washington, D.C. 20240



In Reply Refer To:  
WSFR/AIM/FAPO

Dr. Jeffrey J. Buler, Assistant Professor  
University of Delaware – Dept. of Entomology and Wildlife Ecology  
250 Townsend Hall  
Newark, DE 19716

Subject: Notice Cooperative Agreement Award # F13AC00402

Dear Dr. Buler,

Your organization's application for Federal financial assistance titled "Validation of NEXRAD Data and Models of Bird Migration Stopover Sites in the Northeast US" submitted to the U.S. Fish and Wildlife Service's (USFWS) CFDA Program 15.654 is approved. This award has been assigned USFWS FBMS document award number F13AC00402. Funds under this award are to be used to:

Identify important stopover sites as a critical step in the development of a comprehensive regional conservation plan for migratory landbirds. Three major bird conservation plans, the U.S. Shorebird Conservation Plan, the North American Waterbird Conservation Plan, and the Partners In Flight North American Landbird Conservation Plan, recognize the importance of stopover habitat and acknowledge that in many cases habitat use during migration is poorly understood. Recently you mapped important migratory landbird stopover areas for the northeastern US and assessed stopover use at USFWS National Wildlife Refuges using weather surveillance radar (NEXRAD) data. The maps from these models you've developed with Deanna Dawson, research wildlife biologist with USGS Patuxent Wildlife Research Center, to predict stopover site use in portions of the region not sampled by the radars, based on landscape habitat composition, elevation, and geographic location were developed, offer tremendous potential to inform conservation planning. However, calibrating and validating the data and models through ground surveys or supplemental radar observations and further model refinements are needed to improve accuracy and value for conservation purposes.

This project will provide improved landscape-scale data to the Atlantic Coast and Appalachian Joint Ventures, and to the North Atlantic and Appalachian LCCs regarding the spatial distribution of important stopover sites for southbound migrating birds. Project results and products will allow the USFWS and partners to implement Strategic Habitat Conservation, protecting areas and habitats where they are likely to be most effective, and can contribute directly to the Bird Conservation Region plans of the Atlantic coast Joint Venture, Comprehensive Conservation Plans for Region 5 refuges, State Wildlife Action Plans, and to broader region-wide planning for migratory bird conservation.

## SCOPE OF WORK:

The University of Delaware shall furnish the necessary personnel, materials and services, and do all things necessary to accomplish the following project objectives:

1. Calibrate NEXRAD radar data of bird stopover density by collecting ground survey data of bird identities and densities.
2. Improve NEXRAD-based models of important stopover sites for USFWS Region 5 by incorporating two more years of radar data, a more sophisticated modeling method, and better explanatory variables.
3. Validate the updated NEXRAD-based predictive statistical models for USFWS Region 5 using ground survey and (as available) NASA radar observations.
4. Assess habitat use of migrants in relation to food abundance, habitat and landscape features in the Mid-Atlantic Coastal Plain.

Project coordination, implementation and analysis will be conducted at the facilities of the University of Delaware, Newark, DE (Congressional District 1). The following counties are within the radar study site, and field surveys may be conducted in any one of the following areas, depending on bird distribution:

- Virginia, Cong. District 1 – Counties: Gloucester, James City, King and Queen, King William, Matthews, Middlesex, Newport News City, Poquoson City, Williamsburg City, York.
- Virginia, Cong. District 3 – Counties: Charles City, Hampton City, Henrico, New Kent, Newport News City, Norfolk City, Portsmouth City, Richmond City, Surry.
- Virginia, Cong. District 4 – Counties: Amelia, Brunswick, Chesapeake City, Chesterfield, Colonial Heights City, Dinwiddie, Emporia City, Franklin City, Greensville, Hopewell City, Isle of Wight, Petersburg City, Prince George, Southampton, Suffolk City, Sussex.
- Virginia, Cong. District 5 – Counties: Brunswick
- Virginia, Cong. District 7 – Counties: Goochland, Hanover, Richmond City.
- Delaware, Cong. District 1 – Counties: Kent, New Castle, Sussex.
- Maryland, Cong. District 1 – Counties: Caroline, Cecil, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Wicomico, Worcester.

Any deviations from the procedures or objectives specified in this agreement must be presented and approved by the Service's Project Officer and Program Official for specific approval before implementing any such deviations.

## Description of Work:

- A) *Field Surveys:* Field surveys of migrant land birds will be conducted within the NEXRAD radar ranges of KDOX (Dover, DE) and KAKQ (Wakefield, VA). Ten to twelve hardwood forest site (>4 ha) within the region will be sampled. Sites will be stratified to incorporate near and far ranges from the radar, near and far ranges from a major coastline, and gradients from low to high observed radar reflectivity as determined by Buler and Dawson in 2012. Field surveys will be conducted by 2 trained observers at each site. Bird use of each forested site will be quantified along five 100-m

randomly placed (without overlap) transects with distance sampling. Each site will be sampled roughly every three days (sunrise + 4 hours) for 12 weeks (15 Aug – 7 Nov) during 2013 and 2014. Mean seasonal bird density estimates for each site will be determined after accounting for detection probabilities. Understory fruit and insect availability along each transect will be quantified on each visit through visual counts of fruit and branch clipping of vegetation for insects. Vegetation composition and habitat structure will be sampled once per season.

B) *NEXRAD Data Processing and Remodeling*: NEXRAD data collected concurrently with survey data during autumn 2013 & 2014 will be processed using existing software developed by the University of Delaware. Data from all 16 NEXRAD radars within USFWS Region 5 for these two years will be processed. To the extent that time permits, additional years of data from 2010 through 2012 will be processed. Data will be pooled with the previous 2 year (2008 & 2009) dataset, resulting in a final dataset of 4 to 7 years for mapping and modeling autumn bird stopover. For each night, an instantaneous sample of radar reflectivity data collected near the time of evening civil twilight (shortly after the onset of nocturnal migration) will be used to map the stopover locations of birds. This approach capitalizes on the fact that birds initiate nocturnal migratory flights en masse in an abrupt exodus closely synchronized to position of the sun and minimizes the displacement of birds aloft from their ground sources. Bird stopover use across the migration period will be characterized by the mean radar reflectivity (MN) and the mean coefficient of variation of radar reflectivity (CV) across all nights. “Important” stopover sites will be identified as those areas with above-mean ( $\geq 50^{\text{th}}$  percentile) reflectivity, and further categorized as: 1) “consistently high density of emerging migrants” ( $CV \leq 25^{\text{th}}$  percentile and  $MN \geq 85^{\text{th}}$  percentile), or 2) “highly variable migrant density” ( $CV \geq 85^{\text{th}}$  percentile). Sampling for 2 years is necessary to ensure an adequate number of radar samples (typically 15-25% of usable nights in a year depending on frequency of precipitation) and to account for annual variability in migration.

A post-doctoral researcher will be hired to model bird distributions using the combined multi-year radar dataset. Statistical models to predict the median and CV of relative bird density within USFWS Region 5 will be developed using model selection/averaging within an information theoretic approach. Predicted bird stopover use will be classified according to the criteria used for radar-observed data. The relationship of landbirds on migratory stopover with their environment can vary over space. Thus, predictive models will be built using a geographically weighted regression (GWR) framework that implements a geographical weighting scheme producing localized regression coefficients for individual locations. By incorporating spatial variation, GWR can better explain organism-environment relationships than ordinary least-squares regression that applies global regression coefficients. We will incorporate modeling techniques that allow for nonlinear response functions and include more informative model covariates to improve the predictive models similar to our recent NEXRAD analysis for USFWS Region 4.

C) *Validation of Radar Data and Models*: Field bird surveys around the 2 NEXRAD sites will allow for calibration/corroboration of radar reflectivity with migrant bird stopover density within and among radars (20-24 sites). Pending support from other agencies, data from concurrent field sampling around 2 NASA radars along the Lower Delmarva Peninsula (additional 10 – 15 sites) and their radar reflectivity data will also be used as ground-truthing data for calibration of NEXRAD data and validating the predictive bird distribution models. Ground survey data will also be used to assess the accuracy of predictive models both within and outside of NEXRAD coverage areas.

USFWS staff will:

- A) Provide general statistical consultation for project design and data modeling/analysis as requested (I&M coordinator and biometrician).
- B) Provide standardized protocol for assessing berry abundance for use in ground survey (I&M coordinator).
- C) Provide statistical advice regarding conduct of bird surveys (I&M coordinator and biometrician).
- D) Coordinate refuge contributions to bird survey data to validate the RADAR model. Contingent upon refuge staff availability (I&M coordinator and regional DNR staff).
- E) Provide template for project data management plan (I&M data manager).

The performance and budget period of this award is July 2013 through July 2015.

Your organization's SAM registration is set to expire on July 1, 2013. Under the terms and conditions of this award, your organization is required to maintain an active SAM registration throughout the entire approved award period. Please update your registration immediately.

This award is funded as follows:

<b>BUDGET</b>		07/01/13 to 6/30/14	07/01/14 to 6/30/15	Total period
Personnel Salary	Graduate Student (12 months/year)	\$22,000	\$22,000	\$44,000
	Post doc (6 months @ \$42,000/year)	\$0	\$21,000	\$21,000
	Technician (12 weeks/year @ \$11.56/hr)	\$5,550	\$5,550	\$11,100
Fringe Benefits	Grad student 4.5%	\$990	\$990	\$1,980
	Post doc 32.7%	\$0	\$6,867	\$6,867
	Technician 7.9%	\$438	\$438	\$877
<b>Total Salary and Fringe</b>		<b>\$28,978</b>	<b>\$56,845</b>	<b>\$85,823</b>
Travel	Mileage reimbursement (50 mi/day/person * \$0.565/mi)	\$4,746	\$4,746	\$9,492
	Field housing (\$500/mo/person)	\$3,000	\$3,000	\$6,000
	Other	\$0	\$1,500	\$1,500
	<b>Total Travel</b>	<b>\$7,746</b>	<b>\$9,246</b>	<b>\$16,992</b>
Contract with Old Dominion University for field bird surveys	1st 25,000	\$25,000		\$25,000
	over 25,000 (no indirect costs)	\$7,030	\$32,030	\$39,060
<b>Total Contract</b>		<b>\$32,030</b>	<b>\$32,030</b>	<b>\$64,060</b>
<b>Total Direct costs</b>		<b>\$68,754</b>	<b>\$98,121</b>	<b>\$166,875</b>
Modified Direct costs		\$61,724	\$66,091	\$127,815
Indirect costs 17.5%		\$10,802	\$11,566	\$22,368
<b>Total Request</b>		<b>\$79,556</b>	<b>\$109,687</b>	<b>\$189,243</b>

**Budget Justification:**

*Personnel:* One M.S. graduate student will coordinate the project for the entire two year period and process all radar data for analysis. This student will also aid in collection of field data, and share in the data analysis and writing of manuscripts. The total wages and fringe (4.5%) is \$45,980. Work space for the student will be provided by UD.

A temporary research technician will be hired for a total of 24 weeks to work 40 hr./week split among the two field seasons of data collection at a rate of \$11.56/hr. The total wages and fringe (7.9%) during the entire project will be \$11,976.

One post-doctoral researcher will be hired to perform radar data analysis and writing of report/manuscripts in year 2. The post-doc will work 6 months full time at a rate of \$42,000/year. The total wages and fringe (32.7%) for the post-doc will be \$27,867. Work space for the post-doc will be provided by UD or USGS.

*Travel:* Funds are needed for domestic travel of personnel and PIs to regularly meet (at least semi-annually) at UD, USGS Patuxent Research Center, and/or ODU for discussion and interaction on project progress. Personal vehicles will be used by personnel to travel to and from study sites daily during field data collection. Mileage will be reimbursed.

Travel for business meetings	\$ 1,500
Mileage reimbursement (~50 mi/day/person @ \$0.565/mile x 84 days x 2 people x 2 years)	\$ 9,492
Total Travel	\$ 10,992

*Other:* Field housing @ \$500/person/month (\$6,000 total) will be needed for the research technician and graduate student during the 6 months of data collection.

*Contracts:* Dr. Buler is collaborating with Old Dominion University (ODU) and is requesting a single award with a subaward for ODU to be administered by the University of Delaware. ODU will conduct field surveys within the KAKQ radar. The funds requested from ODU to complete their portion of the proposed research totals \$64,060.

*Indirect Costs:* The current indirect cost rate for research at the University of Delaware's College of Agriculture and Natural Resources is 41%. The University will limit the indirect costs to 17.5% as per the CESU (Cooperative Ecosystems Study Unit) agreement.

**Terms of Acceptance:**

Acceptance of a Federal Financial Assistance award from the Department of the Interior (DOI) carries with it the responsibility to be aware of and comply with the terms and conditions of award per [http://www.doi.gov/pam/programs/financial\\_assistance/TermsandConditions.cfm](http://www.doi.gov/pam/programs/financial_assistance/TermsandConditions.cfm). Acceptance is defined as the start of work, drawing down funds, or accepting the award via electronic means. Awards are based on the application submitted to and approved by the USFWS. Awards are subject to the terms and conditions incorporated either directly or by reference in the following:

- Program legislation, regulation, and provisions.

- This agreement is subject to the following administrative requirements, cost principles, and audit requirements:

Requirement	Academic
Admin	2 CFR 215
Cost Principles	2 CFR 220
Audit	OMB Circular A-133

- Amendments and Modifications: Mutual agreement of the parties may amend this agreement. Either party may propose modifications or renewals anytime during performance and shall become effective upon the written approval of both parties.
- Termination: Either party may terminate this agreement following thirty (30) days written notification of its intent to withdraw support. In which case, the parties shall agree upon termination conditions, including the effective date and, in the case of partial termination, the portion to be terminated.

The Service may unilaterally terminate this Agreement in whole or in part if the Recipient materially fails to comply with the terms and conditions of the award, or if a determination is made that it is in the best interest of the Service to terminate.

- Each party agrees that it will be responsible for its own acts and the results thereof and shall not be responsible for the acts of the other party and the results thereof. Each party, therefore, agrees, to the extent authorized by applicable law (as specified below), the Recipient will assume all risks and liability to itself, its agents or employees, for any injury to persons or property resulting from any operations of its agents or employees under this agreement, and for any loss, cost, damage, or expense resulting at any time from any and all causes due to acts, or negligence, or the failure to exercise proper precautions of or by itself or its own agents to the Agreement.

The liability of the Federal Government will be governed by the Federal Tort Claims Act (28 U.S.C. 2761). The liability of the Recipient will be governed by applicable State statutes.

- Spatial Information Sharing: In accordance with the Privacy Act of 1974, permission must be obtained from the cooperator before any personal information can be released. The only information that can be shared is payment information which is authorized by law. Therefore your consent is requested to allow for sharing of spatial information about this project with conservation cooperators.

  X   I consent to having spatial information about this project shared with other conservation cooperators.

       I do not wish to have any spatial information about this project shared with other conservation cooperators.

- This agreement and the obligations of the Service hereunder shall be subject to the availability of funding and nothing herein contained shall be construed as binding the Service to expend in any one fiscal year any sum in excess of appropriations made by Congress or administratively allocated for the purpose of this Agreement for the fiscal year, or to involve the Service in any contract or other obligation for the further expenditure of money in excess of such appropriations or allocations.
- Code of Federal Regulations/Regulatory Requirements [
  - 2 CFR Part 25, Central Contractor Registration (CCR) and Data Universal Numbering System (DUNS)

Recipients must maintain the currency of their information in the CCR until they submit the final financial report required under this award or receive the final payment, whichever is later. This requires that recipients review and update their CCR information at least annually after the initial registration, and more frequently if required by changes in information or another award term.

Recipients authorized to make subawards under this award must notify potential sub-recipients that they may not receive a subaward from you unless they provide their Data Universal Numbering System (DUNS) number to you. A DUNS number is a number established and assigned by Dun and Bradstreet, Inc. (D&B) to uniquely identify business entities. A DUNS number may be obtained from D&B by telephone (currently 866-705-5711) or the Internet (currently at <http://fedgov.dnb.com/webform>). This requirement applies to all sub-recipients except individuals who apply for or receive a subaward as a natural person (i.e., unrelated to any business or nonprofit organization he or she may own or operate in his or her name). Refer to Appendix A to Part 25 for the complete award term.

- 2 CFR Part 170, Reporting Subawards and Executive Compensation

Grant and cooperative agreement recipients are required to report first-tier subaward obligations of \$25,000 or more in the Federal Funding Accountability and Transparency Act (FFATA) Subaward Reporting System (<http://www.fsrs.gov>) when certain conditions apply. In addition, grantees and subgrantees are required to report executive compensation of the five most highly compensated executives for the preceding fiscal year when certain conditions apply. Refer to Appendix A to Part 170 for the complete award term and details. To distinguish between a subgrantee (sub-recipient) versus a vendor (which is not subject to FFATA reporting requirements) under a grant or cooperative agreement, refer to the characteristics of each listed in OMB Circular A-133, Subpart B, .210. More information regarding the Federal funding transparency reporting requirements for prime recipient and subaward reporting is available at <http://www.usaspending.gov/sub-award-documents> and at <http://www.fsrs.gov>.

- 2 CFR Part 1400, Government-wide Debarment and Suspension (Nonprocurement)

- 2 CFR Part 1401, Requirements for Drug-Free Workplace (Financial Assistance)
- 2 CFR Part 175, Trafficking Victims Protection Act of 2000
- 43 CFR 12(A), Administrative and Audit Requirements and Cost Principles for Assistance Programs
- 43 CFR 12(F), Uniform Administrative Requirements for Grants and Cooperative Agreements with Institutions of Higher Education, Hospitals, other Non-Profit and Commercial Organizations
- 43 CFR 18, New Restrictions on Lobbying
- 305 DM 3, Integrity of Scientific and Scholarly Activities and 212 FW 7, Scientific Integrity and Scholarly Conduct. Grant and cooperative agreement recipients must ensure quality project results. Results must consist of unbiased assessments through proper management and enforcement of scientific integrity standards, which includes avoiding conflicts of interest as defined in USFWS policy 212 FW 7 (complete text available at <http://www.fws.gov/policy/212fw7.html>).

**Special Conditions and Provisions:**

Funding under this award will be used to produce a report of results and will be published in peer-reviewed scientific journals and also shared with interested partners for incorporation into conservation planning efforts of migratory birds. The maps produced are intended to be used as decision support tools for conservation planning. Your organization is required to send two copies of all final published products to:

U.S. Department of the Interior  
 Natural Resource Library  
 Division of Information and Library Services-Gifts and Exchanges Section  
 1849 C Street NW  
 Washington, D.C. 20240

Please include the following statement with the report “This report was produced under U.S. Fish and Wildlife Service Award Number F13AC00402 ”. This statement does not need to be included in/on published documents/products, only included with the document/product transmittal for Bureau identification purposes. Do not send financial or performance reports to this address. See the Reporting Requirements section below for where to send financial and performance reports.

Funding under this award will be used to produce a report of results and will be published in peer-reviewed scientific journals and also shared with interested partners for incorporation into conservation planning efforts of migratory birds. The maps produced are intended to be used as decision support tools for conservation planning Your organization is required to send one copy of the final published report to:

National Technical Information Service  
 5301 Shawnee Road  
 Alexandria, Virginia 22312



Please include the following statement with the report “This report was produced under U.S. Fish and Wildlife Service Award Number F13AC00402 ”. This statement does not need to be included in/on the published document, only included with the report transmittal for Bureau identification purposes. Do not send financial or performance reports to this address. See the Reporting Requirements section below for where to send financial and performance reports.

**Payments:**

Recipients are responsible for following the basic payment standard and methods detailed in 43 CFR Part 12, Subpart C (for state, local and Tribal governments) and 43 CFR Part 12, Subpart F (all other recipients).

Your organization has completed enrollment in U.S. Treasury’s Automated Standard Application for Payment (ASAP) system. When requesting payment in ASAP, your Payment Requestor will be required to enter an Account ID. The Award Number assigned to this award is the partial Account ID in ASAP. When entering the Account ID in ASAP, the Payment Requestor should enter the Award Number identified in the subject line on this Notice of Award followed by a percent sign (%). When requesting payment. Refer to the ASAP.gov Help menu for detailed instructions on requesting payments in ASAP.

**REPORTING REQUIREMENTS**

**Financial and Performance Reporting Requirements:**

Annual interim financial and performance reports and final financial performance reports are required under this award. The report periods and due dates under this award are:

<b>Report:</b>	<b>Report Period:</b>	<b>Report Due Date:</b>
Interim financial & performance reports	Time of Signature – September 30, 2013	Due December 29, 2013
Interim financial & performance reports	October 1, 2013 – September 30, 2014	Due December 29, 2014
Final financial & performance reports	October 1, 2014 – December 31, 2015	Due December 29, 2015

Recipients must use the SF-425, Federal Financial Report form for all financial reporting. This form is available at [http://www.whitehouse.gov/omb/grants\\_forms/](http://www.whitehouse.gov/omb/grants_forms/).

Performance reports must contain: 1) a comparison of actual accomplishments with the goals and objectives of the award as detailed in the approved scope of work; 2) a description of reasons why established goals were not met, if appropriate; and 3) any other pertinent information relevant to the project results.

Reporting due dates may be extended by the USFWS upon receipt of a written request addressed to the USFWS Project Officer identifying the type of report to be extended, the requested revised due date, and a justification for the extension. The USFWS Project Officer may, upon receipt of a written request, approve an additional extension if justified by a catastrophe that significantly impairs the recipient’s operations. Requests for reporting due date extensions must be received by the USFWS Project Officer before the original reporting due date.

All financial and performance reports must be sent to the USFWS Project Officer identified below.

**Project Revisions:**

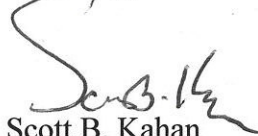
Unless otherwise waived in this section, certain types of post-award programmatic and budget changes require the prior written approval of the USFWS. State, local, or Indian tribal governments should refer to 43 CFR 12.70 for additional information on the types of changes that require prior written approval. All other recipients should refer to 43 CFR 12.925 for additional information on the types of changes that require prior written approval.

**Project Contacts:**

<b>The USFWS Project Officer for this award is:</b>	<b>The Recipient Project Officer for this award is:</b>
<p><u>Project Officer:</u> William L. Thompson Northeast Region I&amp;M Coordinator 300 Westgate Center Drive Hadley, MA 01035 Phone: 413-253-8515 Email: <a href="mailto:bill_thompson@fws.gov">bill_thompson@fws.gov</a></p> <p><u>Program Official:</u> Dean Rhine Assistant Refuge Supervisor NWRS, Regional Office 300 Westgate Center Drive Hadley, MA 01035 Phone: 413-253-8559 Email: <a href="mailto:dean_rhine@fws.gov">dean_rhine@fws.gov</a></p>	<p><u>Recipient Project Officer:</u> Katherine M. Lyons Contract and Grant Specialist Research Office 210 Nullihen Hall Newark, DE 19716 Phone: 302-831-8626 Fax: 302-831-2828 Email: <a href="mailto:kmlyons@udel.edu">kmlyons@udel.edu</a></p> <p><u>Principal Investigator:</u> Dr. Jeffrey J. Buler, Assistant Professor Department of Entomology and Wildlife Ecology University of Delaware 250 Townsend Hall Newark, DE 19716 Phone: 302-831-1306 Email: <a href="mailto:jbuler@udel.edu">jbuler@udel.edu</a></p>

Please contact William L. Thompson with any questions. Please include the assigned USFWS award number in all written communications.

Sincerely,



Scott B. Kahan  
Regional Chief  
National Wildlife Refuge System