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| **Cooperator:** |  | | | | |
| **State**: |  | | | | |
| **Project**: | National Survey of Honey Bee Pests and Diseases | | | | |
| **Project funding source:** | PPA 7721 Survey | | | | |
| **Project Coordinator**: |  | | | | |
| **Agreement Number** |  | | | | |
| **Contact Information:** | **Address:** | |  | | |
|  | **Phone:** |  | | **Fax:** |  |
|  | **Email Address:** | |  | | |

This Work Plan reflects a cooperative relationship between the (the Cooperator) and the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ) under Notice of Cooperative Agreement Award No. xx-xxxx-xxxx. It outlines the mission-related goals, objectives, and anticipated accomplishments as well as the approach for conducting a survey of honey bee pests and pathogens and the related roles and responsibilities of the parties [e.g., mutual roles, APHIS role(s), Cooperator role(s)] as negotiated.

**I**. **OBJECTIVES AND NEED FOR ASSISTANCE**

Honey bees contribute between $15 and $18 billion dollars to the value of the agricultural industry nationally due to their pollination efforts. It is imperative to have a healthy pollinator supply if we wish to continue to produce pollinator dependent fruit, nuts and vegetables in this country. Therefore, USDA-APHIS is funding a national bee survey in an attempt to document which bee diseases /parasites/pests of honey bees are and are not present in the US.

An emphasis of this survey is early detection of certain exotic honey bee pests if they enter the US. Specifically, this survey continues to verify the absence of the parasitic mite *Tropilaelaps* spp. and other exotic threats to honey bee populations (e.g., *Apis cerana*). Early detection would be critical if these serious pests of honey bees are to be contained efficiently, as these exotics will likely cause extensive and severe damage if they become well established. To maximize the information gained from this survey effort, samples will be analyzed for other diseases and parasites known to be present in the US. The resulting data from this effort will be combined with past years data acting as a baseline from which beekeepers and bee health professionals can identify emerging issues, identify risk factors and design bee health mitigation programs.

Honey bee health challenges are attributable to several factors including but not limited to parasites, diseases and environmental toxins. There is real and justifiable concern that the introduction and establishment of another exotic parasite (e.g. the *Tropilaelaps* mite) will have devastating effects on an already injured industry, jeopardizing domestic pollinator dependent food production. A need exists for a continued national honey bee health survey to quickly detect exotic pest introduction in order to prevent spread.

Baseline data on disease and toxin loads in honey bee populations also have utility in helping understand the drivers of colony losses. Broad surveillance data over several years improves the quantity of data needed to help tease apart complex drivers thought to contribute to colony loss and poor colony health.

The 2020 National Honey Bee Survey (NHBS) has three goals, 1) identify potentially invasive pests such as the exotic mite *Tropilaelaps* and problematic *Apis* species such as *A. cerana* 2) continue an epidemiological survey that would meet the goal of developing a long-term overall baseline picture of colony health, and 3) identify risk and protective factors that predict colony health and operational success by connecting honey bee health measures over time and annual colony losses. This survey will also evaluate bee bread from the sampled hives for the presence or exposure to pesticides. This data will be used to act as a reference to compare future pesticide analysis, permit preliminary identification of sub lethal pesticide exposure effect on colony health, and potential synergisms between pesticides and diseases.

**II. RESULTS OR BENEFITS EXPECTED**

A decline in honey bee health has been documented over the past 60 years. Honey bee health is at risk from factors such as parasites, diseases, poor nutrition, stress and environmental toxins. The National Honey Bee Survey data is used to ascertain the scope of parasites, diseases, and pests that may have a negative impact on honey bee populations in the U.S. This nation-wide survey has become the most comprehensive honey bee pest and health survey to date, and provides essential disease and pest load base line information. This information provides additional benefit through informing and guiding the direction of honey bee parasite, disease, and pest research and mitigation recommendations to the US apiculture industry. All of the data collected from the National Survey are included in the nationwide Bee Informed Partnership (BIP) database (programmatic details here: <https://beeinformed.org/aphis/>, diagnostic data provided here: <https://bip2.beeinformed.org/state_reports/> and viral data provided here: <https://bip2.beeinformed.org/state_reports/viruses/>).

**III. APPROACH**

The 2020 NHBS sampling in each participating state will be divided into two sections, 1) longitudinal sampling of 5 beekeepers, and 2) 14 general survey surveillance samples split into 3 or more sampling trips throughout the year. Because the longitudinal sampling will be conducted twice for each of the 5 beekeepers, each state should have a total of 24 samples at the end of sampling season. Hives sampled for the longitudinal study will also have bee bread samples taken to be analyzed for pesticides.

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| **Longitudinal Sampling** | **General Sampling** |
| -Select 5 (preferably at least 2 commercial migratory) beekeepers and their respective apiaries to be sampled. The colonies selected should be easy to locate on the next sampling event.  **First samples (May or June)**  -Regular sampling and pesticide sample  -Mark hives with APHIS survey stickers (provided)  -Have beekeepers 1)fill out pre-sampling survey and 2)sign a commitment to complete next year’s loss and management survey (in April).  **Second sampling (September or October)**---Locate previously marked colonies (complete sample size in case of dead outs)  -Regular sampling  -Have beekeepers fill out new pre-sampling survey  -Remind beekeeper that they must take the Loss and Management survey April of next year | -Select 14 beekeepers and their respective apiaries to be sampled  -Preferentially select beekeepers who have large operations, are queen or package producers  -Plan three (for northern states) or four (for southern states) sampling periods 1)pre-honey flow (May or June), 2)mid-season (July or Aug.), 3)fall (Sep. or Oct.), and for southern states only 4)winter (Dec.-Feb.)  -Randomly assign beekeepers (a mix of different types including migratory, queen producers, and stationary) to one of these sampling groups so that you are approximately sampling the same number of beekeepers per period (~4-5 beekeepers per period in northern states and ~3-4 beekeepers per period in southern states)  -Sampled apiaries should include migratory and stationary practices as well as queen breeders.  -Have beekeepers fill out pre-sampling survey at time of sampling  -Encourage them to take the BIP Loss and Management survey April of next year |

General Requirements for National Honey Bee Survey Sampling

* Apiaries should have at least 10 colonies (8 of which will be sampled, with 2 extra in case inspector encounters dead outs or queen-less colonies during inspection. Dead outs and queen-less colonies should not be included in the survey sampling).
* Prioritize queen producers, package/nuc producers, honey producers, and apiaries used for crop pollination.
* Prioritize apiaries in areas at high risk for exotics invasion (near deep water shipping ports, international airports, high traffic areas for migratory beekeeping).
* Apiaries should be chosen in order to give as close to an equal representation of the entire state as possible.  Ideally, a state will be sectioned into 4 quadrants with apiaries randomly chosen from each quadrant.
* When sampling an apiary, it is critical to select colonies at random, which is different than haphazard or regularly spaced. Colonies should under no circumstances be preferentially selected because they seem “healthy” or “sickly”. To help select colonies as random, we will provide sheets of randomly generated numbers. Instructions on the use of this will be provided with the sampling kit sent to each state.

Example National Honey Bee Survey Sampling Calendar:

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| **May** | **June** | **July** | **Aug.** | **Sep.** | **Oct.** | **Total # Samples** |
| 1st longitudinal sampling trip (n=5) | |  |  | 2nd longitudinal sampling trip (n=5) | | 10 |
| 1st general sampling trip (n=5) | | 2nd general sampling trip (n=4) | | 3rd general sampling trip (n=5) | | 14 |

The samples taken at the apiary and preserved in alcohol will be inspected using visual and microscopic analysis at UMD for the following:

* *Tropilaelaps* presence or absence
* *A. cerana* presence or absence
* *Varroa* loads
* *Nosema* spp. spore count

The live bees taken from the apiary should be immediately mailed to the UMD Honey Bee Lab. There, the honey bees will be frozen at -80C and transported to the USDA-ARS BRL where molecular analyses for viruses will be conducted. The molecular analyses will include the following:

* Lake Sinai virus-2 (LSV-2)
* Acute bee paralysis virus (ABPV)
* Chronic bee paralysis virus (CBPV)
* Deformed wing virus-A (DWV-A)
* Deformed wing virus-B (formerly known as Varroa destructor virus) (DWV-B)
* Kashmir bee virus (KBV)
* Israelí acute paralysis virus (IAPV)
* Moku Virus (MV)
* *Nosema ceranae*

**A. The Cooperator Will:**

1. By function, what work is to be accomplished?

Providing samples toward a national survey of honey bee pests and diseases as well as bee bread samples for pesticide analysis. Five apiaries will be sampled twice as part of the longitudinal survey and 14 apiaries will be sampled as part of the general survey. Bee bread samples will be taken from hives used in the longitudinal survey.

The cooperator will also ask the beekeeper to sign a form agreeing to participate in a management survey.

1. What resources are required to perform the work?

1. What numbers and types of personnel will be needed?

1. At least one State Apiary Specialists to gather and submit samples.
2. Who will hire the personnel, and what mechanism will be used to hire them? They are in place as state employees.

b. How will unemployment payments be handled upon terminating assistance? N/A

2. What equipment will be needed to perform the work? Include major items of equipment with a value of $5,000 or more. Identify information technology equipment, e,g., computers, and their ancillary components.

1. What equipment will be provided by the cooperator?

All vehicles, protective equipment, smokers, tools.

1. What equipment will be provided by APHIS? N/A

c. What equipment will be purchased in whole or in part with APHIS funds? N/A

d. How will the equipment be used? N/A

e. What is the proposed method of disposition of the equipment upon termination of the agreement/project? N/A

3. What supplies will be needed to perform the work? Identify individual supplies with a cumulative value of $5,000 or more as a separate item. All information technology supplies (e.g., small items of equipment, connectivity through air cards or high speed internet access, readers to record animal identification, radios for emergency operations) should be specifically identified.

Sampling kits and vials are to be provided to the state under another agreement with the University of Maryland.

1. What supplies will be provided by the Cooperator?

Vehicle support, travel, salary, and misc. supplies like smokers and hive tools needed to inspect colonies. **State agencies are responsible for postage to send samples back to the diagnostic labs.**

1. What supplies will be provided by APHIS?

Outreach and training.

1. What supplies will be purchased in whole or in part with APHIS funds? N/A

d. How will the supplies be used? N/A

e. What is the proposed method of disposition of the supplies with a cumulative value over $5,000 upon termination of the agreement/project?

Sample kits will all be used and shipped to UMD for analysis

1. 4. What procurements will be made in support of the funded project? N/A

a. Who will handle acquisition needs?

b. What is the method of procurement (e.g., lease, purchase)?

c. Cooperator procurements shall be in accordance with OMB Circulars A-102 or A-110 (Attachment 0), as applicable.

1. 5. What are the travel needs for the project? Travel expenses should be related to sample collection and are not intended for travel to conferences and meetings.

a. Is there any local travel to daily work sites?

Yes, there will be travel to the 19 apiaries being sampled.

b. What extended or overnight travel will be performed (number of trips, their purpose, and approximate dates)?

1. 6. What is the quantitative projection of objectives to be achieved?
2. Collection of samples from 19 apiaries within the state representing thousands of commercial / migratory honey bee colonies.
3. By activity or function, what are the anticipated accomplishments by month, quarter, or other specified intervals?

By the end of the agreement, Apiary Inspectors will be trained on sample protocols and will collect and submit samples.

1. What criteria will be used to evaluate the project? What are the anticipated results and successes?

Results from this survey can provide baseline information on pests and pathogens of honey bee colonies in the United States.

c. What methodology will be used to determine if:

1. Identified needs are met

Needs will be met when all apiaries are sampled for the longitudinal and general survey and results of the analysis are provided to the state.

2. Results and benefits are achieved

When pests, pathogens, and pesticides in the samples are identified.

7. What type of data will be collected and how will it be maintained? Address timelines for collection and recording of data. How will APHIS be provided access to the data?

Data will be collected by local Apiary Specialists and a report will be provided to USDA APHIS annually. Data from all states participating in the survey will be compiled by the USDA APHIS and ARS in collaboration with the University of Maryland. A report of compiled results is provided by UMD and posted on the APHIS website.

8. Are there any other contributing parties who will be working on the project?

University of Maryland will assemble sampling kits and analyze collected samples. USDA AMS will analyze the bee bread samples for pesticide residues. ARS collaborates on methods development and sample analysis.

1. **APHIS Will:**

1. Provide the cooperator with technical assistance as needed

2. Assist in clarifying survey methods and detections, as well as identification resources as needed

3. Support the work and financial plan development by the cooperator

4. Assist in training and outreach

5. Maintain data spreadsheets showing due dates for reports, requests for allocations, forms submitted, tracking by survey specialist

7. Ensures cooperator receives survey supplies as provided by the program

8. Provide general oversight and quality assurance of the program

**IV. In what geographic location is the project to take place?**

1. Is the project statewide or in specific counties, townships, and/or national or state parks? Statewide survey.

B. What type of terrain (e.g., cropland, rangeland, woodland) will be involved in the project? Commercial beekeeping apiaries across the state, mostly wooded or agricultural settings.

How will the work be impacted by this terrain?

There will be no significant impact.

C. Are there any unusual geographic features, such as rivers, lakes, wildlife sanctuaries, commercial beekeepers, etc., that may impact on the project or activity.

Apiary Inspectors will be working with local beekeepers.

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| ADODR: | Date Signed: |
| ROAR: | Date Signed: |

**Detailed Survey Financial Plan**

**COOPERATOR NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**TIME PERIOD: \_Cooperative Agreement Year\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Financial Plan must match the SF-424A, Section B, Budget Categories

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| **ITEM** | **APHIS FUNDS** |  | **COOPERATOR FUNDS**  **(Show even if zero)** |
| **PERSONNEL**: |  |  |  |
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