2. Pests and Beneficial Species in Agricultural Production Systems

Program Area Priority Code – A1112

Program Area Priority Contacts – Dr. Mary Purcell-Miramontes, (202) 401-5168 or mpurcell@nifa.usda.gov and Dr. Jeffrey Steiner, (202) 734-1067 or jeffrey.steiner@nifa.usda.gov

Letter of Intent not required for this Program Area Priority

Application Deadline – July 21, 2016 (5:00 p.m. Eastern Time)

• Pollinator projects should be consistent with at least one of the goals and actions in the

Pollinator Research Action Plan, which is available at

www.whitehouse.gov/sites/default/files/microsites/ostp/Pollinator%20Research%20Actio

n%20Plan%202015.pdf.

Honey Bees: Reduce honey bee colony losses during winter (overwintering mortality) to no

more than 15% within 10 years. This goal is informed by the previously released Bee Informed

Partnership surveys and the newly established quarterly and annual surveys by the USDA

National Agricultural Statistics Service. Based on the robust data anticipated from the national,

statistically-based NASS surveys of beekeepers, the Task Force will develop baseline data and

additional goal metrics for winter, summer, and total annual colony loss.

These action areas are:

1. Setting a Baseline: Assessing the status of pollinator populations requires inventories to

establish baseline conditions, with subsequent monitoring and longitudinal studies to detect

deviations from the baseline, and causes of those deviations. Federal agencies will expand

current surveys of beekeepers to include questions on management practices and hive losses,

and will continue to support ongoing monitoring efforts of honey bee health. By developing

appropriate monitoring and modeling approaches, we will increase our understanding of native

managed bees that offer promising alternatives to honey bee pollination for some crops in

some regions. Research will explore native managed pollinators’ impact on ecosystems, how

the factors driving their population trends are the same as, or different from, the factors driving

population trends of honey bees, and the economic impacts on crop pollination.

Unmanaged native pollinators, representing thousands of species in North America alone, are

the least understood group of pollinators. The first step to setting a baseline for native pollinators

is proper identification. Federal agencies will devote resources to developing better genetic and

taxonomic tools, and to training more taxonomic professionals. Research will assess popula-

tion patterns, interactions with other native and non-native pollinator species, and habitat use.

Federal agencies will also seek better understanding of the environmental stressors impacting

habitat functionality, both now and under future climate and land-use change scenarios.

While many attempts have been made to quantify the issues surrounding honey bee loss (Spivak et al.

2011) and CCD, few have provided longitudinal, statistically-defensible estimates that can be widely used

by government and industry. Equally difficult is the task of quantifying the status and long-term trends

of populations of other managed bees and wild native bees. Generally, the quantification of pollinator

trends has come from comparing current population levels to historical population levels (Cameron et

al. 2011). For honey bees, this is measured in the number of managed hives used in honey production

that are registered; for native bees, assessments of their status rely on disparate historical collection data

and limited contemporary surveys.

Timely, accurate, and useful data are needed to address the following questions:

1. What are honey bee colony loss levels with respect to management level, region, and time of

year, and what are the causes of those losses (such as queen loss, CCD, pest infestation, disease,

or starvation) based on standardized surveys of beekeepers, apiary inspections, and longitudinal

studies of hives?

2. What is the status of native pollinators in the United States, as a whole, in terms of distribution,

abundance, and beneficial impact on the Nation’s managed (e.g., agricultural) ecosystems and

unmanaged ecosystems?

3. What species, genera, or functional groups of pollinators are showing significant trends over

space and time?

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Pollinator Research Action Plan

4. What proximate and ultimate biotic and abiotic factors are driving population changes, and

how do these factors vary over space and time?

5. What impacts are non-native bees having on native communities?

6. How can studies of pollinators conducted in other countries inform our understanding of

declines in the United States?

Key Priority Research Themes

1. Develop the taxonomic capacity to establish a system of surveys and assessments that

provide statistically-defensible estimates of change in range, distribution, abundance,

and health of pollinators. Using standardized methodologies to understand the inter- and

intra-annual cycles of distribution and abundance is critical. Recent innovations in sampling

methodologies (Lebuhn et al. 2013) (e.g., use of coordinated volunteers) can facilitate the collec-

tion of data and information at scales heretofore impossible considering the limited resources

for the research and professional monitoring communities. Accurate assessments of pollinator

status and trends depend on gathering baseline pollinator data in habitats of interest, and cor-

rect identifications of the diverse pollinator communities. The current shortage of practitioners

skilled at bee identification is limiting research and monitoring. Training and employing a new

generation of invertebrate taxonomists is also key. Finally, revisionary studies of common pol-

linator species that are currently difficult or impossible to identify—coupled with Web-accessible

identification tools (e.g., Droege 2015)—are strongly needed.

2. Quantify the status and trends of managed and non-managed pollinator species.

Identifying the historical and current distribution and abundance of species is critical to under-

standing current and future trends. Among managed pollinators, declines in honey bee colonies

(Spivak et al. 2011) are generally well-documented; among non-managed pollinators, some

populations are known as stable (e.g., common Eastern bumble bee (Cameron et al. 2011)), but

the status of most is unknown (e.g., alfalfa leaf-cutter bee (Pitts-Singer and Cane 2011), blue

orchard bee). Documented declines are only known for social species (honey bees and bumble

bees (Spivak et al. 2011; Cameron et al. 2011)); little is known about trends for the solitary bees

that are the majority of pollinators (Winfree et al. 2007; Lebuhn et al. 2013).

3. Identify impacts of specific biotic and abiotic factors on pollinator populations. A variety

of biotic and abiotic factors can impact pollinator status, including climate change (Bartomeus

et al. 2011), land-use changes (Winfree et al. 2007), pathogens (Cameron et al. 2011; Fürst et

al. 2014), parasites, and invasive species (Strange et al. 2011). Understanding the effects of

climate on bees (Bartomeus et al. 2011) is important in predicting which species will be suitably

adapted to pollinate U.S. crops. Understanding the role of land management practices (Winfree

et al. 2007) (including pesticides and crop management practices) and land-use factors on bee

health and abundance can elucidate how we can modify management to benefit pollinators.

Information is needed to understand how, when, and where viral, bacterial, and fungal patho-

gens and parasites—major causes of bee mortality (Cameron et al. 2011; Spivak et al. 2011; Fürst

et al. 2014)—are transmitted across species or among pollinator communities (Fürst et al. 2014).

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Pollinator Research Action Plan

The impacts of expanding ranges of recently arrived exotic solitary bees (Strange et al. 2011) on

native plant and pollinator assemblages are not known and must be evaluated.

Most honey bee colonies in the United States belong to commercial operations (Spivak

et al. 2011). More research is needed on how bee management practices affect bees on

the colony level, especially for hives that are involved in migratory operations and thus

exposed to a variety of agricultural systems. University-led research is being done to

evaluate bee management practices at the colony level; however, this information is

collected by surveying beekeepers, who may provide subjective or conflicting informa-

tion1

. These surveys are valuable in helping researchers formulate testable hypotheses

on practices that potentially influence colony levels.

1. http://beeinformed.org/programs/management-surveys/

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Pollinator Research Action Plan

• Priority Action: Further investments are needed using science-based methods (e.g., replicated

studies with controls and treatments) to confirm which management practices are impacting

honey bee colonies.

• Applicants who wish to submit near-term and implementation-based projects on

pollinators should consider applying to the New Frontiers in Pollinator Health: From

Research to Application program area included in the AFRI RFA for the FY 2016 AFRI

Food Security Challenge Area.

a. Field 7. Project Summary/Abstract - PDF Attachment. Title the attachment as ‘Project Summary’ in the document header and save file as ‘ProjectSummary’.

The summary should also include the relevance of the project to the goals of the Program Area Priorities in this RFA. See Part V., 4.7., of NIFA Grants.gov Application Guide for further instructions and a link to the required form. If relevant, applicants also must state in the last sentence of their application’s Project Summary section that the proposal is submitted in response to a specific commodity board topic.

b. Field 8. Project Narrative - PDF Attachment. Title the attachment as ‘Project Narrative’ in the document header and save file as ‘ProjectNarrative’.

For Sabbatical, Equipment, and Seed Grant applications, the Project Narrative section may not

exceed a total of 7 pages with 12­point font and line spacing not exceeding six lines of text per

vertical inch, including all figures and tables.

(1) Response to Previous Review (if applicable)

(2) Project Narrative

(a) Introduction

Honey bee crisis

Explain causes

Monitoring - What variables? Images, Sound, Temperature, weight, dielectric? - easy to install - noncontact

Others not in widespread use (irish papers - b+wsn)

Inexpensive, wireless, sensor network

Objective: Develop “Bee monitoring network”

Develop one station, then distribute among the florida beekeepers network

(b) Rationale and Significance

1. Concisely present the rationale behind the proposed project;

2. Describe the specific relationship of the project’s objectives to one of the Program Area Priorities.

3. The potential long-range improvement in and sustainability of U.S. agriculture and food systems should be shown clearly. These purposes are described under Purpose and Priorities in Part I, B. Any novel ideas or contributions that the proposed project offers should also be discussed in this section.

Pollinator health

(c) Approach

1. A description of the activities proposed and the sequence in which the activities are to be performed;

Develop

integrate sensors, code

image processing routine for bee id and tracking

audio processing swarm id

develop datalogging format

3g - web integration

web interface

field test

fabricate more and distribute

field test

2. Methods to be used in carrying out the proposed project, including the feasibility of the methods;

Raspbery pi

What sensors

CV techniques -motion, feature extraction, SVM, descriptors

3g shield

web api accuweather

3. Expected outcomes;

Provide a way to track hive status state – nation – wide, online

4. Means by which results will be analyzed, assessed, or interpreted;

First part

reliable data

swarm prediction

behavior/health monitor – correct?

5. How results or products will be used;

Second

Farmers, researchers can access data for alerts wrt to hive health and epidiemiological research and

6. Pitfalls that may be encountered;

Durability

Acceptance – ease of install

Validity of CV

7. Limitations to proposed procedures;

8. A full explanation of any materials, procedures, situations, or activities related to the project that may be hazardous to personnel, along with an outline or precautions to be exercised to avoid or mitigate the effects of such hazards; and

bees!

9. A timeline for attainment of objectives and for production of deliverables that includes annual milestones with specific, measurable outcomes.

1. Review of sensors, etc

2. selection

3. setup

4. CV, audio algorithm with first data

5. Web integration

Fabricate more and distribute

User test

Field 9. Bibliography & References Cited – PDF Attachment. No Page Limit. Title the attachment as ‘Bibliography & References Cited’ in the document header and save file as ‘BibliographyReferencesCited’.

All work cited in the text should be referenced in this section of the application. All references must be complete; include titles and all co-authors; conform to an acceptable journal format; and be listed in alphabetical order using the last name of the first author or listed by number in the order of citation.

d. Field 10. Facilities & Other Resources – PDF Attachment. No Page Limit. Title the attachment as ‘Facilities & Other Resources’ in the document header and save file as ‘FacilitiesOtherResources’.

e. Field 11. Equipment – PDF Attachment. No Page Limit. Title the attachment as ‘Equipment’ in the document header and save file as ‘Equipment’.

Describe available equipment. Items of nonexpendable equipment necessary to conduct and successfully complete the proposed project should be listed in Field C., of the R&R Budget and described in the Budget Justification (see PART IV, C. 6., below).

f. Field 12. Other Attachments

The following instructions are in addition to those noted in Part V, 4.12, of the NIFA Grants.gov Application Guide.

1) Key Personnel Roles – PDF Attachment. 2-Page Limit. Title the attachment as ‘Key Personnel’ and save file as ‘KeyPersonnel’.

☼ For Integrated Grant Applications – state for key personnel an estimate of the percent of time devoted to research, education, and/or extension activities.

2) Logic Model – PDF Attachment. Required for all Integrated Project applications. Encouraged for Research Projects. 2-Page Limit. Title the attachment as ‘Logic Model’ and save file as ‘LogicModel’.

Include the elements of a logic model detailing the activities, outputs, and outcomes of the proposed project. The logic model planning process is a tool that should be used to develop your project before writing your application. This information may be provided as a narrative or formatted into a logic model chart. More information and resources related to the logic model planning process are provided at <http://nifa.usda.gov/resource/integrated-programs-logic-model-planning-process>

3) Management Plan – PDF Attachment. Required for Integrated Project Grants. Encouraged for Research Projects. 3-Page Limit. Title the attachment as ‘Management Plan’ and save file as ‘ManagementPlan’.

The plan is to be clearly articulated and include an organizational chart, administrative timeline, and a description of how the project will be governed, as well as a strategy to enhance coordination, collaboration, communication, and data sharing and reporting among members of the project team and stakeholder groups. The plan must also address how the project will be sustained beyond termination of an award.

The management plan must also include an advisory group of principal stakeholders, partners, and professionals to assess and evaluate the quality, expected measurable outcomes, and potential impacts for the proposed research, education and/or extension. Please include rationale for their role, and how they will function effectively to support the goals and objectives of the project. The plan must demonstrate how partners and stakeholders contribute to project assessment on an annual basis.

4) Data Management Plan (DMP) - PDF Attachment. Required for Research Project and Integrated Project Grants. 2-Page Limit. Title the attachment as ‘Data Management Plan’ and save file as ‘DataManagementPlan’.

The DMP should clearly articulate how the project director (PD) and co-PDs plan to manage and disseminate data generated by the project. NIFA and reviewers will consider the DMP during the merit review process. NIFA is aware of the need to provide flexibility in assessing DMPs. The DMP must not exceed the two-page limit and should contain the following components depending on the type of research being conducted.

a. Expected Data Type

Describe the type of data (e.g. digital, non-digital) and how they will be generated (lab work, field work, surveys, etc.). Are these primary or metadata?

b. Data Format

For scientific data to be readily accessible and usable it is critical to use an appropriate community-recognized standard and machine readable formats when they exist. The data should preferentially be stored in recognized public databases appropriate for the type of research conducted. Regardless of the format used (notebook, samples, images, spreadsheet, etc.), that data set should contain enough information to allow independent investigators to understand, validate, and use the data.

c. Data Storage and Preservation

Scientific data should be stored in a safe environment with adequate measures taken for its long-term preservation. Applicants should describe plans for storing and preserving their data during and after the project and specify the data repositories, if they exist. They should outline strategies, tools, and contingency plans that will be used to avoid data loss, degradation, or damage.

d. Data Sharing and Public Access

Describe your data access and sharing procedures during and after the grant. Provide any restrictions such as copyright, confidentiality, patent, appropriate credit, disclaimers, or conditions for use of the data by other parties.

e. Roles and Responsibilities

Who will ensure DMP implementation? This is particularly important for multi-investigator and multi-institutional projects. Provide a contingency plan in case key personnel leave the project. Also, what resources will be needed for the DMP? If funds are needed, have they been added to the budget request and budget narrative? Projects must budget sufficient resources to develop and implement the proposed DMP.

5) Documentation of Collaboration – PDF Attachment. No Page Limit. Title the attachment as ‘Documentation of Collaboration’ in the document header and save file as ‘Collaboration’.

Evidence, e.g., letter(s) of support, should be provided that the collaborators involved have agreed to render services. The applicant also will be required to provide additional information on consultants and collaborators in the budget portion of the application.

6) Preprints – PDF Attachment. Limited to 2 preprints. Title the attachment as ‘Preprints’ in the document header and save file as ‘Preprints’.

7) Minority-Serving Institution Documentation – PDF Attachment. Title the attachment as ‘Minorityinfo’ in the document header and save file as ‘Minorityinfo’.