


"The Single Moms of the Bee World"

REPORT TO THE OBA on Blue Orchard Bees in Arizona Project



BLUE ORCHARD BEES IN ARIZONA PROJECT

"The Single Moms of the Bee World"

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BlueOrchardBeesInArizonaProject is non-profit, basic research on solitary bees, specifically, the Osmia lignaria species: Blue Orchard Bees (BOB).

There is a world wide environmental crisis that is severely impacting honeybees. Solitary bees, such as Blue Orchard Bees and Leaf Cutter Bees, can help out their cousins, the honeybee in the critical task of plant pollination.

Our Research Project will put 5,000 BOBs in four locations in Arizona to study and report their propagation. We encourage educational (K through 12) and other non-profit organizations to build on our efforts using our results and data. You can review the Objectives of our Project, Costs and original Research Proposal.


Final Report Issued

RESULTS			15-Nov-2019
Metric	CurrentValue	MaxValue	% Complete
Bees Placed / Max Value	5060	5000	101.2%
Sites Populated / All Sites	7	7	100.0%
Habitats Deployed	50	49	102.0%
Tubes Filled / Tubes Placed	10	3202	0.3%
Harvested /Deployed	0	5000	0.0%




Final Report Issued!

0 Write a comment




The Arizona Honey Bee Festival


16 Write a comment 3



Completing the Harvest of the Site4 Habitat

8 Write a comment





Michelle Sarina, Gene DeBons, Jim Sarina

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AGENDA

1. Cover Sheet

2. Agenda (this page)

3. Who Are We?

4. Proposal, Objectives, Methodology, Deliverables

5. Implementation

6. Results

7. Future Plans

8. Questions

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Who Are We?

- **Michelle Sarina**
 - **Founder ECAB Properties, LLC; [SEAIT, LLC](#) ; Dana Landing Suites, LLC; Tempe Palms, LLC; Goldfinch Offices, LLC; [Ahwatukee Health Care, LLC dba Ahwatukee Health and Recovery](#)**
 - **Gardener**
- **Gene DeBons**
 - **Retired Businessman from the IT industry sector**
- **Jim Sarina**
 - **BS/Physics, Stanford University MS/Electrical Engineering, UCLA**
 - **Founder and President of [SEAIT, LLC](#); satellite engineering for NASA**
 - **Blogs at [TheMonopolyProject](#) on acquisition of Single Family Homes in the Phoenix area.**

[BlueOrchardBeesInArizonaProject](#) is non-profit, basic research on solitary bees, specifically, the [Osmia lignaria](#) species: Blue Orchard Bees (BOB).



Members of the OBA – [Orchard Bee Association](#)

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Proposal, Objective, Methodology, Deliverables

- **We Submitted Our Research Proposal in January 2019**
 - **Requesting 5000 Blue Orchard Bee (BOB) for research on propagation.**
 - **The BOBs were donated by the OBA**
- **The objective is to study the propagation of BOBs in a set of diverse Arizona environments**
 - **Most studies and information on BOBs are in relatively cold and moist climates**
- **Methodology**
 - **Place the bees/cocoons and applicable habitats at four geographically and environmentally diverse sites in Arizona**
 - **Key Metric: R_s = Replication Rate per Site = cocoons harvested per site divided by cocoons placed**
- **Deliverables**
 - **Final Report**
 - **Presentation to the OBA (this document)**
 - **An open source website capturing all the activities and data of the project augmented with all of the files generated in a file tree structure**

RESEARCH PROPOSAL

by Gene DeBons, Michelle Sarina, Jim Sarina

Rationale for conducting this research

- Study the propagation of Blue Orchard Bees (BOBs) in several different environments in Arizona.

Where will the study be conducted and why these sites were specifically chosen?

Four locations in the state of Arizona (chosen for):

1. Phoenix Metro Area, 1200 ft elevation; two sites: a lakeside residential site with a mixture of landscape and decorative plants; and a commercial orange orchard (different plant fauna).
2. Cottonwood, AZ, 3200 ft elevation; two sites: a 6-acre apple orchard and a 5-acre pear orchard (different bloom times).
3. Payson, AZ riparian region (on the East Verde River), 4600 ft elevation; two sites: a one acre, master garden located 1/8 mile from the river and two residential lots (totaling 1.5 acres) on the river with minimal plant coverage (plant density).
4. Sedona, AZ, 4350 ft elevation; master garden location(s); specific sites, approximately 1 acre each, to be determined upon visiting the sites (different plant fauna).

These sites provide a diversity of climate, elevation, bloom time, plant species, plant mixture and hydrology.

Methodology

- Several models of BOB housing nesting kits will be obtained from "Watts Solitary Bees" and placed as appropriate for each environment.
- The bees (roughly 1000 per acre/location) will be released on a timeline consistent with the flowering of plants in that area.
- The primary study methodology will be regular visual observation and data collection of bee activity and habitat and real-time environmental conditions.
- After the completion of season, the cocoons will be counted and evaluated for general quality (e.g., health, male/female ratio, size) by established BOB experts.

Who will conduct the study?

- The study will be organized and conducted by Gene DeBons, Michelle Sarina, and Jim Sarina. Gene has previously conducted a smaller scale, similar study in Gilbert, AZ in 2018.
- Expert advice will be provided by Jim Watts and Steve Peterson and other associates of the Orchard Bee Association on an as necessary basis.
- Regular, on-site inspection, review and documentation (photos, notes, videos) will be conducted by local personnel.

What outcomes are expected?

- Measurable and verifiable data collection methods and analytics within diverse Arizona environments to determine BOB behavior, ideal habitats and population sustainability.
- Understanding and development of best practices to insure BOB propagation in these diverse environments.

What deliverables will be provided?

Three deliverables:

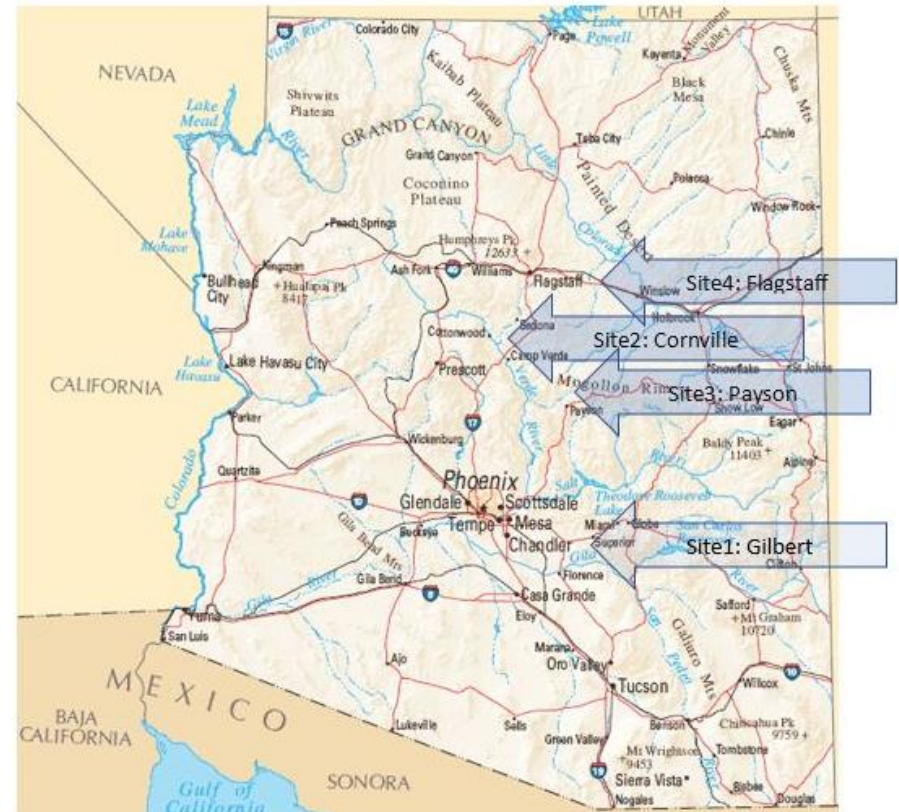
- one: a thorough report in a publishable format encompassing all the activities of the study,
- two, a presentation that summarizes the results of the study to be delivered at the December meeting of the OBA,
- three, a website (<https://www.blueorchardbeesinazionaproject.com/>) which captures the week-to-week activities and results of the study for educational and reporting purposes.

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Implementation

- **Phase 1: From March to May 2019 We Placed the Cocoons and Habitats at Four Diverse Locations**
 - **Gilbert, 1,237 ft altitude: Sonoran Desert, Two Residential Man-Made Lakeside Lots – 800 Cocoons, 8 Habitats, 514 tubes: early/mid March**
 - **Cornville, 3,235 ft altitude: Agricultural, Riparian (Oak Creek), Two “Family Farms” of 5 acres each – 2000 Cocoons, 28 Habitats, 1920 tubes each: late March**
 - **Payson, 4,606 ft altitude: Pine Forest, Riparian (East Verde River), 1 acre Master Garden and 0.8 acre riverside residential lot– 1900/300 Cocoons, 9/4 Habitats, 480/48 tubes respectively: late March**
 - **Flagstaff, 6,910 ft altitude: High Desert, Residential, One 0.28 acre Master Garden – 60 Cocoons, 1 Habitat, 48 tubes: early May**
- **Phase 2: We monitored the sites regularly to observe bee activity.**
 - **We placed sensors to continuously record temperature and humidity**
 - **Activities are documented on the website blog**
 - **All statistics are captured in the “Master Site Characteristics, Data and Summary Results” spreadsheet available on the website.**
- **Phase 3: We retrieved and harvested the habitats at the appropriate time for each location.**

Appendix E – Site Maps



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Results

- **We placed the 5000 nominal OBA supplied cocoons at the four locations.**
 - In addition we acquired 60 cocoons for the Flagstaff site.
 - We placed the 50 habitats totaling 3202 tubes at the four locations.
 - All data captured in Master Spreadsheet, File Structure and Website/Blog
- **The propagation of BOBs was sporadic:**
 - The R_s rate was effectively zero at all sites, no differentiation.
- **With N = 1 as our sample size, there are too many free variables to reach many definitive conclusions. We have a number of concerns/hypotheses for these results.**
 - We had concerns about the viability of some of the cocoons supplied by the different labs and suppliers.
 - We had concerns about the dispersal of BOBs at all locations.
 - **We did reach the conclusion that the common wisdom of "place the habitats facing south/southeast to get morning sun" is not applicable to the hot Arizona environment.**
 - We had concerns about the dispersal of BOBs at all locations. Where did they go after release?
 - Was the release timing appropriate for the different locations?
 - Placing and monitoring is time and labor intensive.

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Site	City (AZ)	Location	Lat/Long	Elevation (ft)	Description	Size (acres)	# of Bees	# of Habitats	# of Tubes	# of Tubes Filled	# of Cocoons Harvested
1a1	Gilbert	Val Vista Lakes	33.250425,-111.709547	3,227	Lake Side Residential Lot	0.41	225	3	176	7	
1a2	Gilbert	Val Vista Lakes	33.250404,-111.709390	3,227	Lake Side Residential Lot	0.27	580	5	338	3	
2a	Cottonwood	Cottonville	34.293273,-111.889803	3,203	Family Farm	5	1000	14	960	0	
2b	Cottonwood	Cottonville	34.293224,-111.889802	3,203	Family Farm	5	1000	14	960	0	
3a	Payson	Flaming Springs	34.556523,-111.339812	4,806	Master Garden	1	1900	9	528	0	
3b	Payson	Flaming Springs	34.554505,-111.335720	4,806	Riverside Residential Lot	0.8	300	4	192	0	
4a	Flagstaff		35.247587,-111.687048	5,700	Residential Lot	0.26	60	1	48	0	
Total							5060	50	3202	10	0
Date	7-Dec-19					Max Value	5000	49	3154	3154	

Name	Size	Allocated	Files	Folders	% of Parent	Last Modified
63.5 GB - C:\ProgramData\BlueOrchardBees\	63.5 GB	63.5 GB	1,965	75	100.0%	12/7/2019
63.2 GB - Photos	63.2 GB	63.2 GB	1,639	34	99.6%	12/7/2019
97.1 MB - articles	97.1 MB	97.1 MB	50	5	0.1%	11/1/2019
89.5 MB - Text Sites	89.5 MB	89.5 MB	122	7	0.1%	11/1/2019
23.4 MB - (26 Files)	18.6 MB	23.4 MB	58	0	0.0%	11/20/2019
23.1 MB - Blog Entries	21.4 MB	23.1 MB	19	0	0.0%	12/2/2019
17.0 MB - OBA	13.0 MB	17.0 MB	29	2	0.0%	12/7/2019
14.0 MB - Proposal	12.4 MB	14.0 MB	24	0	0.0%	11/20/2019
2.0 MB - Files	1.5 MB	2.0 MB	4	0	0.0%	4/22/2019

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Future Plans

- **We Are Considering Our Activities for Next Year:**
 1. **Extend the successful aspects of this study. Besides the [Site1a1b propagation](#) of seven tubes, we have anecdotal evidence of successful native BOB propagation in the Phoenix area.**
 2. **Explore a study of BOB propagation and effect on pollination in Arizona citrus farms.**
 3. **Explore a study of native bee (BOB or Leaf Cutter) pollinators at the [Butterfly Wonderland](#) in Scottsdale, AZ**
 4. **Explore the use of Leaf Cutter Bees which are better acclimated to the hot Arizona environments. [We have extensive evidence of native Leaf Cutter Bee population in Arizona.](#)**
- **We request feedback from the members of the OBA on these or other possible paths' forward.**



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QUESTIONS on Blue Orchard Bees in Arizona Project

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