

# *Fighting for Flowers*

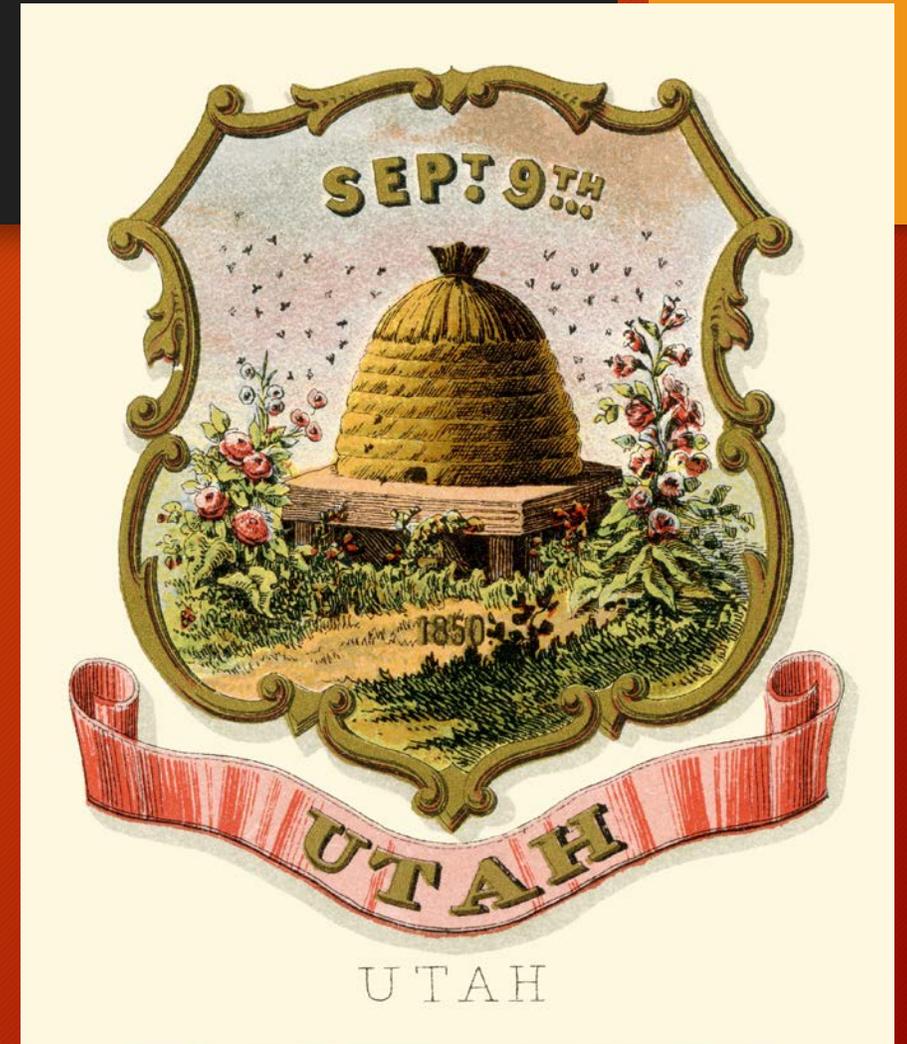
*Native Bee Conservation and  
the Dangers of Honeybee Permitting on Public Lands*



Thomas Meinzen, Utah Forests Program Pollinator Fellow  
Grand Canyon Trust

# Utah: *The Beehive State?*

- Although honeybee hives adorn Utah's flag, honeybees (*Apis mellifera*) are a **European species, non-native to Utah**
- European honeybees are a managed species that lives in large colonies of **10,000-60,000+ bees**
- Currently, some public land managers are allowing commercial beekeepers to park their hives on national forests and BLM land



1876 Utah territory coat of arms, Henry Mitchell



Utah has 1,100 species of native bees:  
>25% of the 4,000 native bee species in the lower 48

# Native Bee Diversity

- The arid American southwest (UT, AZ, CA) has the highest diversity of native bees in U.S.
- Most native bee species in Utah are solitary; some live in small colonies
- Native bees have evolved to pollinate native plants



*Credit: Joe Wilson/Olivia Messinger Carril*

# Many native bees specialize on specific native plants



*Diadasia* bees on *Sphaeralcea*



*Osmia mason* bees on *Penstemon*



*Peponapis pruinosa* on cucurbits

Honeybee on spotted knapweed  
(*Centaurea maculosa*)

# Honeybees are generalists

- Unlike many native bees, honeybees are **generalists** and live in **huge colonies**
- Honeybees focus on the **most abundant** floral resources
  - whichever flowers are most densely-distributed and nectar-rich<sup>1</sup>
  - this often includes invasive species<sup>2</sup> →
- Honeybees often ignore range-restricted plants and specialized flowers

<sup>1</sup> Hung *et al.* 2019

<sup>2</sup> Barthell *et al.* 2001



# Why are honeybees a problem for native bees?



# Competition



*Bombus occidentalis*, Douglas Alder, Flickr

- In a single summer, ONE honeybee hive consumes enough pollen to raise 33,000 native bees!<sup>1</sup>
- Lower native bee biomass in proximity to honeybee hives<sup>1</sup>
- Lower rates of reproduction in native bees<sup>2</sup>
- Lower native bee diversity<sup>3</sup>
- Lower nectar foraging success and occurrence of native bees<sup>4</sup>
- Imperiled Western bumblebee (*Bombus occidentalis*) exhibits reduced reproduction success and lower ratio of pollen foraging near honeybees hives<sup>5</sup>

<sup>1</sup>Cane & Tepedino 2017    <sup>2</sup>Paini and Roberts 2005    <sup>3</sup>Badano and Vergara 2011    <sup>4</sup>Henry and Rodet 2018    <sup>5</sup>Thomson 2004

# Disease Transmission

- After pollinating almond orchards, honeybees bring a host of pathogens into summer production areas.<sup>1</sup> >24 honeybee viruses have been identified.<sup>2</sup>
- Already, some of these pathogens have been transmitted to native bees and caused debilitating effects<sup>2</sup>
- So far, scientists have demonstrated replication and pathogenicity of honeybee viruses in at least six genera of native bees<sup>3,4</sup>
- *Black Queen Cell Virus, Deformed Wing Virus, Small Hive Beetle, Sac Brood Virus, Acute Bee Paralysis Virus, Slow Bee Paralysis Virus, Macula-like Virus, Lake Sinai Virus*

- <sup>1</sup> Cavigli *et al.* 2016, <sup>2</sup> Tehel *et al.* 2016  
<sup>3</sup> McMahon *et al.* 2015, <sup>4</sup> Radzevičiūtė *et al.* 2017



*Bombus terrestris* bumblebee with deformed wing virus (Photo: Jacqueline Hartwright)

# Impacts to Plant Communities

- Honeybees can displace native pollinators that specialize on **rare, range-restricted plants**, leaving these plants unpollinated<sup>1</sup>
- Honeybees have been shown to preferentially pollinate **invasive plants** (such as yellow star thistle, at right)<sup>2</sup> →
- By changing which plants are pollinated, favoring common plants and displacing pollinators of rare plants, honeybees can **decrease biodiversity** and **endanger rare plants**



<sup>1</sup>Norfolk *et al.* 2018

<sup>2</sup>Barthell *et al.* 2001

ORIGINAL PAPER

## Local extinction of a rare plant pollinator in Southern Utah (USA) associated with invasion by Africanized honey bees

Zachary M. Portman · Vincent J. Tepedino · Amber D. Tripodi ·  
Allen L. Szalanski · Susan L. Durham



*Perdita muconis*

*Federally-listed endangered  
Dwarf bear-poppy  
(*Arctomecon humilis*)*



Thank you, Dr. Susan Meyer!

# Holmgren (!) milkvetch (*Astragalus holmgreniorum*)

*Federally-listed endangered*

Honeybees generally avoid *Astragalus*, however, they compete with other *A. porterae* food sources

**FLORAL BIOLOGY.**— Pollinator exclusion trials carried out in 1993 provide preliminary evidence that *A. holmgreniorum* is an obligate outcrosser. No fruits formed when pollinators were excluded. The primary pollinator for the species appears to be *Anthophora porterae* Cockrell (Hymenoptera, Anthophoridae), although other small bees also probably pollinate the flowers (Vincent J. Tepedino, Bee Biology and Systematics Lab, USDA-ARS, Logan, UT, personal communication). The anthophorid



*Anthophora porterae*  
on *Astragalus*



Source: Buren & Harper 2003

Photo: Daniela Roth / USFWS

# Shivwits milkvetch (*Astragalus ampullaroides*)

*Federally-listed endangered, endemic to Washington Co., UT*

Like *A. ampullaroides*, depends solely on pollinators for reproduction<sup>1</sup>

Hartmut Wisch



*Osmia clarens*



<sup>1</sup>Buren & Harper 2003

# Last Chance townsendia (*Townsendia aprica*)

*Federally-listed threatened*



*Eucera fulvitaris* male



*Osmia* sp.



*E. fulvitaris* female

# Ute ladies-tresses (*Spiranthes diluvialis*)



*Bombus sp.*

*Anthophora sp.*



# Jones Cycladenia

## Pollinator Lost? Reproduction by the Enigmatic Jones Cycladenia, *Cycladenia humilis* var. *jonesii* (Apocynaceae)

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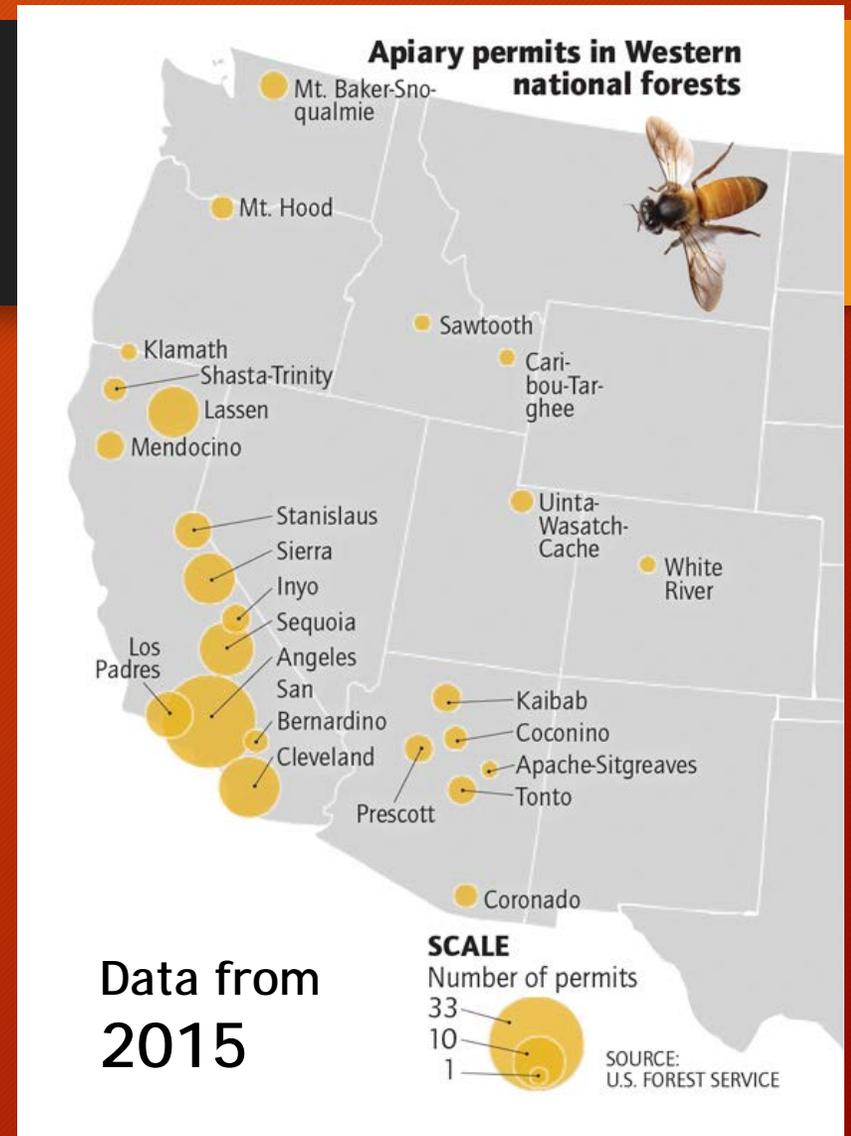
**Abstract:** We studied the pollination and reproduction of the rare Jones cycladenia (*Cycladenia humilis* Benth. var. *jonesii* (Eastw.) Welsh & Atwood. Preliminary evidence suggests that Jones cycladenia is self-compatible, although it requires a pollen vector. Fruit production was low under both hand-pollinated and natural conditions, and in both cases, we observed frequent fruit abortion. The reasons for low fruit set are presently unclear. Insect visitors to Jones cycladenia flowers were uncommon, and varied greatly among years. The paucity of pollinators suggests pollinator-limited fruit production. Conversely, the frequent abortion of fruit, and a decrease in fruit set over the flowering season, suggests that resources may limit fruit production. However, water emendation did not increase fruit set. Excessive inbreeding appears to be ruled out by a companion study of the population genetics and clonal structure of Jones cycladenia. It may be that the original pollinator of Jones cycladenia has become dissociated from its host, or that pollinator visits and fruit production are episodic.



?

# So why are honeybees on public lands?

- Migratory beekeeping operations want somewhere cheap and safe to put their hives in summer
- Inexpensive permits given by Forest Service and BLM land managers = food for honeybees AND \$\$\$ for commercial beekeeping companies





Adee Honey Farms,  
the largest beekeeping company in the U.S.,  
has requested to place at least

10,500 hives  
*~370 million honeybees*

on four of Utah's National Forests

*Uinta-Wasatch-Cache*

*Dixie*

*Fishlake*

*Manti-La Sal*

# What are we doing about it?



GRAND CANYON  
TRUST

- 1. Determining number and location of permits
  - Freedom of Information Act requests
  - Communication with journalists
- 2. Researching and amassing evidence
  - What evidence is there that honeybees will cause harm?
  - How can we convey this to land managers?
- 3. Communicating directly with local land managers
  - Letter with science overview
  - Letter with policy and Best Management Practices critique
- 4. Informing the public
  - Flyer, alternatives, bibliography, and contact sheet
  - Outreach to NGOs, scientists, beekeepers, and others

**NATIVE BEES** Need Your Help  
Industrial honeybee operations are threatening pollinators on our public lands



**NATIVE BEE DIVERSITY**

- ⇒ America's arid Southwest is home to an astonishing number of native bee species: **1,300 species live in Arizona** alone, and over 1,100 in Utah.<sup>1</sup> They come in all manner of sizes, shapes, and colors. Most are solitary or live in small colonies.
- ⇒ Native bees provide **important pollination services**, keeping our lands healthy, biodiverse, and full of blooms. Some species are also important crop pollinators.
- ⇒ Already imperiled by habitat loss, pesticides, and climate change, our native bees are **now threatened on public lands** by a species we know and love—**HONEYBEES**.

**HONEYBEES OUTCOMPETE NATIVE BEES**

- ⇒ Introduced to North America from Europe in the 1600's, honeybees (*Apis mellifera*) are a **managed, non-native**, Eurasian species with hives 10,000-40,000 bees strong.<sup>2</sup>
- ⇒ Honeybees consume **pollen and nectar** needed by native pollinators. In a **single summer, one honeybee hive consumes enough pollen to raise 33,000 native bees!**<sup>3</sup>
- ⇒ Scientists have shown that honeybee competition **negatively impacts** native bee foraging and **reproduction success**.<sup>4,5</sup>

**HONEYBEES TRANSMIT DISEASES and PARASITES**

- ⇒ Honeybees can also **transmit deadly diseases** to native bees.
- ⇒ **Deformed wing virus**,<sup>6</sup> **black queen cell virus**,<sup>7</sup> and other **harmful pathogens and parasites** have been transmitted.<sup>8</sup>
- ⇒ In turn, honeybees can be vulnerable to native bee diseases.<sup>9</sup>



Deformed Wing Virus  
Credit: [University of Utah](#)

**BAD NEWS for NATIVE PLANTS**

- ⇒ Honeybee presence alters wildflower communities. Some wildflower species require **specific native bee pollination skills** (such as buzz-pollination) for reproduction.
- ⇒ When honeybees outcompete native bees, they can **negatively affect the reproduction of native plants**.<sup>10</sup> Worse yet, honeybees have been shown to **preferentially pollinate** (and thus increase) abundant, non-native, invasive plants.<sup>11</sup>

# What should agency officials do?

- Deny honeybee apiary permit requests on the grounds of their **demonstrated significant impacts** to native bee populations and endangered plants (and/or encourage others on their staff to do so)
  - Consider that apiaries should **not** qualify for categorical exclusions due to their high potential for significant impact
  - Read up on the science! Follow links in our flyer or simply search “Honeybees Grand Canyon Trust” online (or find your own source for articles)
  - Follow precedents set by other managers (Ex: Uncompahgre National Forest)



# What can YOU do?

- Take a flyer on your way out! (agency manager contact info is included via a link on the back)
- Call (or email) your local District Ranger (FS) and/or Field Manager (BLM), ask them for their stance on apiaries, and urge them not to permit honeybee apiaries on their Forest
  - Tell them why this issue is important!
  - If you or they have questions or feedback, contact us: [thomasmeinzen@gmail.com](mailto:thomasmeinzen@gmail.com) or Mary O'Brien at [mobrien@grandcanyontrust.org](mailto:mobrien@grandcanyontrust.org).

A close-up photograph of a bumblebee on a yellow flower. The bee is positioned at the top of the flower, facing downwards. The flower is a cluster of small yellow blossoms. The background is a soft, out-of-focus green, suggesting a natural outdoor setting.

Make just *one call*  
to help protect our native bees  
and public lands!

# Thank you!



Utah Native Plant Society  
Rare Plant Meeting Organizers

Partners:

- Mary O'Brien, Grand Canyon Trust
- Vince Tepedino, Bee biologist, retired
- Tara Corneliesse, Center for Biological Diversity



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# Apiary Permit Numbers on the CO Plateau

Agency	State	Current Total Permitted Hives with documented permits up to 2019-2020	Total Permitted Hives likely to be current, including those not documented all the way to 2019/2020	Additional Potential/Pending Hives
USFS	AZ (northern)	528 hives	912 hives	
USFS	CO (western)	0 hives	0 hives	
USFS	UT	444+ hives	444 + unknown # from Cox Honey	10,000+ hives - pending permits from Adee Honey
BLM	AZ (northern)	2500 hives	2500 hives	
BLM	CO (western)	112 hives	112 hives	
BLM	UT	Unknown # of hives (1 permittee/one 2-acre site)	Unknown # of hives (1 permittee/one 2-acre site)	
Grand Total:		3584 hives (+ unknown number)	3968 hives (+ unknown number)	

2500 hives!



^ Arizona  
hedgehog  
cactus  
(*Echinocereus  
arizonicus*)

< Acuña  
cactus  
(*Echinomastus  
erectocentrus  
acunensis*)

Fickeisen >  
plains cactus  
(*Pediocactus  
peeblesianus  
fickeiseniae*)



# Why are honeybees a problem for native bees?

- Overwhelming numbers
  - Tens of thousands of bees per hive
- Competition for pollen and nectar
  - one honeybee hive consumes enough pollen in a single summer to raise 33,000 native bees!<sup>1</sup>
- Disease and parasite transmission
  - 24 viruses have been identified in managed honeybees<sup>2</sup>
  - deadly **deformed wing virus**<sup>3</sup> and **black queen cell virus**<sup>4</sup> have already been transmitted from honeybees to native bees



<sup>1</sup> Cane & Tepedino 2017

<sup>2</sup> Tehel *et al.* 2016

<sup>3</sup> Fürst *et al.* 2014

<sup>4</sup> Peng *et al.* 2011

# What can YOU do?

*As a concerned scientist / citizen...*

- Take a flyer and a contact slip (or two)
  - Call (or email) the person on your slip, ask them for their stance on apiaries, and urge them not to permit honeybee apiaries on their Forest  
(use the facts on the flyer to help you; you can begin by asking their stance on apiaries)
- Tell them why this issue is important!
- If you or they have questions or feedback, contact us: [thomasmeinzen@gmail.com](mailto:thomasmeinzen@gmail.com) or Mary O'Brien at [mobrien@grandcanyontrust.org](mailto:mobrien@grandcanyontrust.org).



Make just *one call*  
and help protect our native bees  
and public lands!



If we don't advocate for the native plants and pollinators in our area, who will?