

CALIFORNIA LEGISLATURE

Informational Hearing

Senate Committee on Agriculture Senator Cathleen Galgiani, Chair

The Buzz on Bees: Protecting and Growing California's Bee Population

State Capitol, Sacramento

March 6, 2018

SENATOR CATHLEEN GALGIANI: Good morning ladies and gentlemen, and welcome to the Senate Committee on Agriculture’s informational hearing “The Buzz on Bees: Protecting and Growing California's Bee Population.” California is gearing up for pollination season when billions of bees will be used to pollinate farmers' crops, such as almonds and cherries. We've invited expert witnesses to provide an overview of the programs that are in place for bees and apiaries in California, the threats affecting our bee population, and the issues facing growers and other stakeholders.

Thank you for being here today and thank you to all of our panelists for your participation. As a reminder, if anyone is interested in providing testimony, I need you to fill out a card and please sign it and give it to the sergeants at the back of the room.

At this point, do we have any other members, Vice Chair Wilk or Senator Dodd, that would like to make any remarks before we begin with the panelists?

SENATOR SCOTT WILK: I left my readers in my office, so no.

SENATOR GALGIANI: Okay. I would like to invite our first panelists forward, Bob Wynn, Senior Advisor to the Secretary, California Department of Food and Agriculture; Teresa Marks, Chief Deputy Director, California Department of Pesticide Regulation; and Rick Gurrola, Agricultural Commissioner and Sealer of Weights and Measures from Tehama County. Thank you very much.

MR. BOB WYNN: Good morning, Madam Chair, members. I'm Bob Wynn from CDFA. It's good to see you again. I'm going to have to apologize, apologize up front because it may seem like I'm reading my statement, which is probably going to be true because I don't want to miss any points in my statement, but I've provided the committee with copies of that statement for the record. So . . .

Again, I appreciate the opportunity to speak to you today about what we do at the Department of Food and Ag to help protect bees. Our mission at CDFA, as you know, is to protect and promote California agriculture. I think everyone knows that without bees we wouldn't have much of the agriculture we have today in this state to protect and promote, and also would not be able to continue in its present form -- an ag industry that contributes significantly to

feeding the world. Throughout the hearing today, you will probably hear a common theme, and that is that the cornerstone to success in protecting and growing bee populations is communication, collaboration, and cooperation amongst all who are involved in the bee industry and affiliated industries and agencies.

To that end, in 2013, a Healthy Pollinators Working Group was formed by CDFA and our partners in the bee industry. The group is made up of a wide array of stakeholders, including commercial beekeeping organizations, governmental regulatory bodies, grower organizations, academic research organizations, environmental advocacy groups, and anyone else interested in pollinator health.

The purpose of the working group is to bring these interested parties together to create a shared understanding of the key issues, challenges, and opportunities surrounding pollinator health in California and to generate ideas and strategies that focus on improving pollinator health. The group has had three meetings since 2013, the latest of which was in June of 2015, and I encourage you to access the CDFA website and review the meeting summaries. You will see that the participants in these meetings have and continue to work hard at identifying and increasing foraging opportunities and protecting habitat for pollinators; building and supporting partnerships amongst groups connected to agricultural industries and land managers; exploring outreach

opportunities with stakeholders, commodity groups, and the public; and exploring the potential to fund forage opportunities and an apiary program in the state -- of which we have, but I'll talk a little bit about that later.

CDFA also administers the California Apiary Board. The Apiary Board is legally authorized in statute and has five members who represent the beekeeping industry. It is a board that is advisory to the secretary -- as are many of our advisory boards and many of our programs -- on all matters related to the beekeeping industry. The board may make recommendations on all matters affecting the activities of the department in relation to the beekeeping industry, including an annual review of the department's apiary program.

Topics of discussion have included, for the most part, the CDFA border inspection station, bee inspection border protection station, bee inspection program and processes. So I'll talk a little bit about our apiary program. Unfortunately, the apiary program at CDFA is very limited, as are the resources needed to conduct it. Our most prominent function, again, in the program, is continuing to inspect out-of-state bees entering California -- as Madam Chair mentioned -- through our border protection stations to ensure that these loads do not contain unwanted pests. The apiary shipping season typically occurs annually from September through February, with a significant amount of the total shipments arriving in the first couple months of the calendar year for

pollination of California almonds. This year, we inspected over 4,000 shipments, and out of those, only 343 were rejected for pests. When rejected, the loads are required to return out of state. Most of the loads returned out of state are taken to private facilities to undergo cleaning processes, which allows them the opportunity to reenter the state after the rejectable pests have been removed.

A huge issue with the border protection station inspection process is the delay in moving the bees to their destination and, specifically, for them having to wait to work their way through the border protection station process. This can have a detrimental effect on the health of the bees, given the often harsh environmental conditions at some of the border protection stations, mostly in Southern California.

We continue to work with the bee industry and improve the inspection process to facilitate bee movements into California with minimal delays at the stations. One of the programs already in place is called the Ant-Free Apiary Certification Program, which allows the bees to be certified at states of origin. It facilitates the movement of bees into California while ensuring ant pests are not introduced into the state.

Some of the other ideas we're working on currently to implement to facilitate smooth movement include a pre-shipment clearance pilot project in North Dakota where bee colonies are stored in the wintertime in warehouse

storage locations. The bees would be pre-certified by the North Dakota Department of Agriculture for shipment into California. If successful, this program can possibly be expanded to other states as well.

Also, staffing out-of-state cleaning facilities with CDFA inspectors to address those loads with pest detections that have to return out of state for cleaning and subsequent reentrance into California -- the concept being that our inspectors would be on site to clear the bees and the trucks would not have to wait again for re-inspection at the station itself.

The inspection process at the stations also includes the trucker hauling loads of bees being given what we call, quote unquote, the “warning hold notice” that notifies the local ag commissioners at destination to expect the arrival of the load. The bees are then cleared and released at destination by the ag commissioners, and that . . . Commissioner Gurrola will talk about the processes that they go through at the local level to do that. The only loads that do not require release by the ag commissioners before off-loading at destination are those that are part of the Ant-Free Certification Program.

The final part of our program is the Apiary Brand Program. CDFA continues to offer the Apiary Brand Program, which allows beekeepers to apply to the secretary for a serial number brand for use on apiary equipment which he or she owns. It provides protection for the registered owners of apiary brands from unlawful possession of branded equipment, essentially to guard

against theft of bees and equipment. CDFA still maintains in excess of 1,500 brands for California beekeepers.

I'd like to talk briefly about a program that we've proposed, and it's part of the Governor's proposed budget, and that is, we call the Bee Safe Program. Again, in the Governor's proposed budget, there is an appropriation of \$1.8 million of the General Fund, mostly going to the counties, to fund what we are calling the Bee Safe Program. The proposal will provide resources to fund the development and management of a program designed to promote and protect safe, healthy food supply through protection of bees. It will build on existing partnerships and provide technical resources and data entry tools and ongoing program administration at the local level by the county ag commissioners. Some key points of the program include funding enforcement activities of existing state laws at the local level, including registration of both in- and out-of-state hives. This is critically important because, by law, growers are mandated by county offices to notify beekeepers when there is an intended pesticide treatment within one mile of any hives. For all of our CDFA invasive pest treatment programs, we use that available data from the counties -- as well as, when data is not available, doing intense surveys ourselves of the area to be treated to ensure that there are no hives in the area before we do any treatments at all.

The Food and Ag Code provides authority to the commissioners to enforce the laws requiring a registration, identification, and placement of hives but does not provide funding to reimburse them for their activities. It also, this bill or . . . This proposed program also works to reimburse the county ag commissioners for activities to help prevent theft, development of a statewide tool to identify and track apiary foraging locations on privately owned and managed lands to improve nutritional opportunities for bees. It also provides reimbursement for county ag commissioners to perform pest inspection and abatement activities, development of statewide tool to identify and track locations safe from pesticides harmful to bees to be used for the temporary relocation of hives, and reimbursement to the county for training and outreach for beekeepers regarding movement to safe locations. We are currently working closely with our ag commissioner partners to develop specific activities of the program.

Thank you very much.

SENATOR GALGIANI: Thank you. And now, we will hear from Teresa Marks, Chief Deputy Director, California Department of Pesticide Regulation. Thank you.

MS. TERESA MARKS: Good morning. I'm assuming you can hear me okay. Madam Chair and Senators Dodd and Wilk, I appreciate the opportunity of coming here today and speaking about DPR's efforts to promote the health of

the bee industry and the vital role it plays in California's agricultural production.

I'm going to split my time today with Dr. Marylou Verder-Carlos. She's an assistant director at the Department of Pesticide Regulation and our chief science officer, and she'll speak a little more about some of the research efforts and things that have been going on in the department. I'd like to take a little time to talk to you about the MP3, and I think you all got a copy of it today. It's the Managed Pollinator Protection Plan for California. And it's also on our website.

Honey bees are essential for efficient agricultural production. Recently, there has been increased concern over the health of managed and natural pollinators worldwide. In response to this growing concern, in June 2014, President Barack Obama issued a presidential memorandum entitled "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators." The memorandum called for the establishment of the Pollinator Health Task Force co-chaired by the United States Department of Agriculture and the US Environmental Protection Agency. This task force was charged with creating a national pollinator health strategy that promotes the health of honey bees and other pollinators. US EPA was charged with engaging state agencies and developing state pollinator protection plans as a means of mitigating the risk of pesticides to bees and other managed pollinators. As part of the strategy, US

EPA has been promoting and working with states and tribal agencies through the State-Federal Insecticide, Fungicide, and Rodenticide Act Issues, Research, and Evaluation Group, otherwise known as SFIREG, to develop and implement local pollinator protection plans, known as managed pollinator protection plans or MP3s.

These plans were to include recommendations and practices put in place for the protection of managed pollinators through a collaborative approach, designed to facilitate public and private partnerships. The primary goal of the MP3 is to bring awareness to the issues faced by all parties and find a way for everyone involved to be part of a solution ensuring that growers, pesticide applicators, beekeepers, and other agricultural stakeholders are able to continue to produce our nation's food, fiber, and fuel in a productive and collaborative manner that allows for both crop production and beekeeping to thrive.

The state of California has been at the national forefront in understanding the importance of communication, collaboration, and cooperation between beekeepers and those involved in pesticide applications in protecting managed bees. This fact is reflected in California's laws and regulations and the continued efforts on the part of government agencies; industry organizations; and professional, nongovernmental organizations in providing outreach and training to those involved in producing agricultural

commodities and providing managed bees for pollination as well as those who regulate the use of pesticide and investigate reported bee and pollinator incidents.

You have previously been provided the copy of the MP3 for California. The plan reflects regulations that are currently in place to safeguard the health of managed pollinators as well as showcasing local voluntary efforts, which have been very successful, and best management practices. The success of the MP3 in protecting pollinator health depends largely on the cooperation, communication, and collaboration between regulators, pesticide applicators, and beekeepers.

For instance, as you heard previously, beekeepers are required to register their apiary locations with the local county agricultural commissioner in the county where their hives are located each year. They're also required to provide their contact information by stenciling it on the hives or on a sign where the apiary is located.

By registering their hives and providing the contact information, beekeepers with hives within a one-mile radius of a proposed treatment site can request that they be provided 48 hours advanced notice of proposed applications of pesticides labeled toxic to bees to a blossoming plant. Pesticide applicators that intend to apply a pesticide labeled toxic to bees are required to contact the county agricultural commissioner to see if any such beekeeper has

requested advanced notification and, if so, to provide 48 hours notification prior to the application. This timeframe allows the beekeeper to take steps that they feel necessary to protect their bees, such as netting their hives or moving their hives. It also allows them to discuss with the grower what type of pesticide he's using and perhaps suggest other measures that might be less invasive.

Some of the other BMPs and regulations, just to give you an idea of what the MP3 contains: Applicators are encouraged to understand pollinator visitation habits and time applications accordingly -- California law has actually codified the times when bees are considered inactive. They consider applying pesticide with short residual toxicity to bees -- residual toxicity is that period of time between completion of the pesticide application and the time when the application will have the minimal toxic effects. Avoid applying pesticides to sites where bees are foraging, choose sprayer and nozzle technologies designed to reduce drift, use an integrated pest management approach.

Beekeepers are encouraged to work with the land owner to choose hive locations and the timing of the placement; determine if the field or location was recently treated with a pesticide -- it is recommended that bees not be placed in fields that have been treated with pesticides labeled highly toxic to bees until at least 48 to 72 hours after the application; ensure a clean water source is

available for the bees; and feed the bees during nectar and pollen dearth to prevent long-distance foraging; report suspected pesticide-related loss or harm to bees to the local county agricultural commissioner.

It is our hope that applicators and beekeepers will find our MP3 helpful, and we encourage them to inform us of problems or solutions they may have to some of the issues they encounter so that we may include them in future revisions of the MP3. And now, I'll turn it over to Dr. Verder-Carlos.

SENATOR GALGIANI: Thank you very much. And for our benefit, can you please restate your name and title? Thank you.

DR. MARYLOU VERDER-CARLOS: I'm Marylou Verder-Carlos, Assistant Director for the Department of Pesticide Regulation and Chief Science Advisor for the Department.

Good morning. So like our chief deputy director has said, California has been in the forefront of protecting pollinators for decades. We have several regulations that specifically address pollinator protection, like she mentioned. And those include restrictions of pesticide applications around bees that have the label language "toxic to bees," applying pesticides only when the temperature is below 55 degrees or when bees are inactive, notification of pesticide applications to beekeepers 48 hours before pesticide applications if they choose to be notified and if they are registered with the county agricultural commissioners.

We also have specific regulations that address bee protection in the citrus-growing counties of Fresno, Tulare, and Kern. Those are all available online at our website and are implemented by our county ag commissioners.

In August 2013, US EPA notified pesticide companies or registrants that certain insecticides with the active ingredients imidacloprid, thiamethoxam, clothianidin, and dinotefuran would require new labeling statements intended to protect pollinators. Later, tolfenpyrad and cyantraniliprole were also included. The new language was added to those pesticide labels with outdoor foliar use directions in all formulation types except for granular formulations. (Excuse me.) It also specifically addressed the crops under contracted pollination services and prohibited application of those pesticides while bees are foraging and not to apply the pesticide until flowering is complete and all petals have fallen, unless the beekeeper providing the services is notified no less than 48 hours prior to the application of the pesticide. For DPR, our law requires us to continuously evaluate registered pesticides. So we initiated the reevaluation of the four new neonicotinoid pesticides based on adverse effects data we received on residue studies for imidacloprid use on ornamental plants.

We partnered with US EPA, PMRA Health Canada to join in the assessment of the four “neonics.” Registrants have submitted numerous studies for each of the pesticides; and residues have been measured in the pollen, nectar, and leaves of plants that result from applications to crops

chosen to reflect the potential exposure to foraging bees from specified registered uses of the four neonics. Based on the data received, DPR scientists are developing a better understanding of the effects of specific uses for each of the neonics on pollinator health, which will result in a credible scientific basis for regulatory action if needed.

In January 2016, US EPA released a preliminary pollinator risk assessment for imidacloprid. In January 2017, the following year, US EPA released preliminary pollinator risk assessments for clothianidin, thiamethoxam, and dinotefuran. DPR is on track to release a final pollinator risk assessment for each of the four neonic active ingredients under reevaluation this summer.

Since this reevaluation of the neonics, more attention has been given to the data necessary to evaluate pesticide impacts to bees. In the past, registrants were only required to submit two bee studies to support the registration of new pesticide products. Currently, there are six Tier 1 screening-level studies that must be submitted. If the Tier 1 studies indicate potential for risks, higher-tier studies are required. DPR played a critical role in the development of the new tiered honey bee risk assessment process in collaboration with US EPA and PMRA Health Canada.

On January 3rd of this year, 2018, DPR notified registrants via California Notice 201801 that we will no longer act upon an application for pesticide

registration or application to amend pesticide product labels if we determine that the registration or acceptance would potentially expand the use of an active ingredient or pesticide product currently under reevaluation until the conclusion of the reevaluation.

Examples of new expanded uses for label amendments include new or modified uses such as new crop or new pests, new or modified use patterns, significant formulation changes, increased application rates, or total use amount allowed, or other label additions or changes that may increase pesticide exposure in a manner that is relevant to the basis for reevaluation. The only exception is a pest management or a public health need that could arise, and we will consider these on a case-by-case basis.

One more thing, in 2016, the legislature provided a one-time fund to DPR to research the residues of the four neonics in ornamental plants. We contracted with UC Davis for this research grant. The study focuses on residues found in pollen and nectar of ornament plants treated at labeled application rates. The collected nectar and pollen will be analyzed by the lab at CDFA, and, currently, CDFA is analyzing the samples for 2017 and will be submitting an interim report to DPR. The second year of the study is underway, and UC Davis is planning and prepping for the field portion at the beginning of the spring. A final report of the study will be available once all the data has been analyzed and reviewed.

DPR has been in the forefront of protecting pollinators for decades, and we continue to move forward with those efforts and continue to evaluate the science necessary to make informed decisions to protect the pollinators. Thank you.

SENATOR GALGIANI: Thank you very much.

And our next presenter is Rick Gurrola, Agricultural Commissioner/Sealer of Weights and Measures from Tehama County. Thank you.

MR. RICK GURROLA: Thank you. Thank you for allowing me to be here, and thank you for the committee for allowing me to talk brief (excuse me) on the roles and responsibility and wishes for local county agricultural commissioners. And I'd like to apologize for my voice. I'm getting over the tail end of a cold.

So as the Department of Pesticide Regulation and the California Department of Food and Agriculture have briefly outlined, everything that's in the Food and Ag Code that is tasked with the enforcement of the Food and Ag Code and the Apiary Protection Act falls on the shoulders of the agricultural commissioners. We're required to have our apiary keepers register all hives as of January 1st of each year, for the number of hives and locations of the apiaries in our respective counties.

Additionally, every person who moves bees into the state or comes into possession of apiaries or bee hives after January 1st is required to register within 30 days. We collect the registration fees for those beehives as mandated in the Food and Ag Code; the registration is \$10 per year per apiary.

We maintain the pesticide notification maps for beekeepers that wish to be notified of pesticide applications within a mile. As Bob had mentioned, as far as the hold notice, what we call the “double-O-8s,” we are notified when bee shipments are coming into our counties. We're not only looking for pests for bees, but we also are looking for noxious weeds on pallets, red imported fire ant, presence of Africanized honey bee and also small hive beetle in some counties.

And we also perform colony strength inspections. Those can be requested by almond growers if they want to know the status of the frames and the strength of the apiaries that they've rented and then also if there's been complaints filed as well.

We . . . Other complaints that we investigate concern with pesticide applications; nuisance complaints for counties that have local ordinances, which Tehama County is one of those. That can pertain to hobbyist beekeepers, buffer zones for residential locations, distances from public roads, and distance of residences. And in addition, some counties are looking for Africanized honey bee as well.

As far as the county needs, we have four primary needs as county agricultural commissioners. Number one and first and most important is we need to resuscitate the statewide apiary program. We sent out a survey 10 days ago for all 58 counties, and I was surprised we actually had 45 counties reply in very short notice. And of those 45 counties that replied, only 26 counties have an active apiary program where they're actually doing inspections in the state of California.

Twenty counties perform colony strength inspections, and 39 counties, or 87%, stated they need training. They don't have inspectors that know how to do these inspections. We need a state apiary inspector that's capable of training county inspectors to do surveys for disease, pests, and colony strength inspections. We need a lab test that's rapid, affordable, and reliable for Africanized honey bee. I talked briefly with Dr. Niño this morning, and she's going to be talking about that. It sounds like that's right around the corner for us, and we need a modern survey for Africanized honey bee. We don't know the full extent and location where Africanized honey bees are located in the state of California currently.

As far as funding, fiscal year 2016-17, the most current data from our annual financial statements: Statewide, all counties expended \$1,055,712 on statewide apiary programs. Conversely, of all of the counties that have apiary programs, we received collectively \$76,487 statewide, which means that

\$979,225 were funded by county general funds for doing our statewide apiary programs.

We need registration movement notices. We can't help the bee industry if we don't know where their hives are located. As you heard today, beekeepers are required to register their hives with us, but that's not being done fully. And all counties, again, don't have state apiary programs. We need intrastate movement notices, and we need intracounty movement notices. We need to know where those beehives are located so we can track those and further protect bees.

We are in the process of modernizing our internal mapping system. Currently, in the majority of counties that do have state apiary programs, they're still using pins on paper maps. Currently -- or excuse me -- not currently, but recently, California Ag Commissioners Association authorized funding \$195,000 for a mapping program that we're going to be using in our CalAg Permits program so we can start doing that mapping. So we're hoping to have that GIS mapping system here with in the next year.

And then lastly, we need civil penalty authority action like we have with our weights and measures and our pesticides and our farm-certified producers programs. Currently, it's a violation of law to violate any of the provisions in the Apiary Protection Act, but the only way that that can be enforced is either through the attorney general or through our county -- I've got a blank there --

DA -- thank you, thank you, Bob -- district attorneys. So for the ability for us to be able to levy that through our civil penalty process will greatly enhance our enforcement actions. Thank you.

SENATOR GALGIANI: Thank you very much.

Do we have any questions from members for any of our three panelists?

I did have a question for our first panelist. Approximately what percentage, would you say, of our bee population is brought in from out of state? I don't expect an exact number but just a sense of what that would be.

MR. WYNN: I'm glad you don't expect an exact number, but my understanding is we bring -- it takes about 2 million hives to pollinate, approximately, and we bring about 1.2 to 1.5 a year in. And there are folks in industry that will testify in your last panel that will probably have accurate numbers. So we actually bring in more hives during pollination season that are in-state bees. Is that your understanding?

MR. GURROLA: That's what I've been told as well.

SENATOR GALGIANI: Those that are brought in state, are they moved around, different states throughout the year, different seasons?

MR. WYNN: A lot of them are. Stored in the northern part of the country in the cold weather, and they're moved into Texas and Florida and other states as well. So there are pests of concerns in some of those other states that we're concerned with also. Hence, the inspection process.

SENATOR GALGIANI: Okay. Thank you. You referenced the -- the ant problem --

MR. WYNN: Yes.

SENATOR GALGIANI: -- with bees that are coming in. Can you talk to us a little bit about that?

MR. WYNN: Well, typically, the history is that they set down -- they set bees down for pollination. When they do that in states like Texas and Florida, the red imported fire ants is our predominate concern for ants. So they infest the pallets and the hives and so forth. So we're very concerned about that. There are other species of ants also that we're concerned about, but that's how that happens.

So the Ant-Free Certification Program works to pre-clear those. We have about 16 states that are participating in that, and they pre-clear or pre-certify the loads to be ant free when they come in. When we inspect them at the border protection stations, if we find less than five worker ants, then they're allowed to move on in to -- to destination. If we find more than that, then they have to also return out of state for cleaning.

SENATOR GALGIANI: Is there an issue with heat in the trucks that bring the ants --

MR. WYNN: Absolutely.

SENATOR GALGIANI: -- is that a stressor for bee populations?

MR. WYNN: It absolutely is, especially when they're moving down from the colder states, those hives will heat up. Inside, the hives get very hot. We do provide water to alleviate the problem of the bees trying to get out of the hives and going to search for water. So at the stations, we provide and facilitate for the truckers the water to allow them to treat the bees with water to reduce the heat.

SENATOR GALGIANI: Okay. Thank you. Any other questions?

Senator Wilk?

SENATOR WILK: Yeah, I just have one. So is there any potential disadvantage to us competitively by having so many bees imported? Or is it . . . It doesn't seem like we have that robust of an industry here. Has that always been the model?

MR. GURROLA: It's always been the model since I've been dealing with the apiary programs. Now, the industry can address that probably better than I can, but I can't think of any. So it allows for beekeepers out of state as well as in state -- you know, we're concerned about the health of bees wherever they come from, obviously -- but allow those beekeepers to move into other states; and it facilitates pollination in all those other states as well. But I would defer to the rest of the industry folks.

SENATOR GALGIANI: Senator Pan?

SENATOR RICHARD PAN: Thank you for your presentation. With the bees basically moving around multiple states, what is the nature . . . I mean, we can talk about [inaudible] in California, but clearly the bees are in multiple states. So what kind of work . . . How do our standards compare to other states? What kind of work do we do with those other states? What's the role of the federal government in terms of, someone brings it . . . So I mean, we can inspect at the border and stuff like that, but I was just wondering like, well, how our relations with other states in regards to bee health and how our standards compare to other states. Is there cooperation in terms of trying to maintain high standards across the country?

MR. WYNN: In the sense that there is a significant amount of outreach by CDFA and others in this state to implore upon them that, if you ship your bees into California, please ensure that they're clean to facilitate smooth movement. I can't answer your question about the standards being consistent throughout the states. Again, I'll defer to others on the other panels; the industry, especially, probably knows the answer to that question.

But in terms of when we get ready for pollination season, we do a lot of outreach to the other states to ensure that they know what the standards are here in California.

SENATOR PAN: Okay. So I won't put words in your mouth, but it sounds like there isn't a lot of cooperation. I mean, we tell people what we

have, we hope they will follow it. But it sounds like you . . . I hear the word “implore.” I don't hear, like, oh, you know . . .

MR. WYNN: Well, we do a significant . . . As I mentioned, we had 343 rejections this year. It doesn't help anyone to reject these bees . . .

SENATOR PAN: Right.

MR. WYNN: . . . and turn them around. Sometimes they're delayed for several days because of the processes involved. So that's the reason that, for the health of their bees . . . The outreach is intended to ensure that they ship clean bees to promote bee health because that's the issue we have. The biggest issue we have of getting those bees in this state is the delays at the border stations, just because of the processes involved. Keep in mind, we're doing a lot of other work at the border stations as well.

And these border stations are somewhat antiquated. They were built a long time ago. So we don't have special lanes that we can route bee trucks through and pass all the other traffic. So that's why we're working on all of these processes in terms of process improvement, to facilitate movement. And that's just one of the things that we do is that outreach to other states to ensure that everyone knows what the standards are before you ship your bees into California.

SENATOR PAN: Okay.

SENATOR WILK: You'd think they'd have a national standard, wouldn't you?

SENATOR GALGIANI: So you stated you had 343 rejections this year. Is that a quarter of all coming in or a third or . . .

MR. WYNN: We inspected 4,345 loads of bees, and we had 343 rejections. It's about 7.8% of the total loads that arrived.

SENATOR GALGIANI: That's pretty high.

MR. WYNN: That's pretty high.

SENATOR GALGIANI: Yes. Okay. Thank you.

Any other questions?

Senator Dodd?

SENATOR BILL DODD: Can you outline what the reasons for the rejections, you know, might be and how serious that is?

MR. WYNN: Well, Commissioner Gurrola indicated that what they inspect for at the local level, which is exactly what we inspect for at the border stations -- but keep in mind, we don't offload the bees at the border stations and they're completely covered -- so noxious weeds, ant pests, mites, those types of things; any types of pests -- and bees that are -- that affect the colonies themselves as well. But we're also looking at the equipment, the pallets -- whether or not they have ants on the pallet, ant colonies on the

pallets -- being infested when they set them down in other states. And, again, noxious weeds, soil, that sort of thing. So it can be serious, yes.

We've had issues in the past with red imported fire ants making their way to destinations and infesting almond orchards in California, which increases the cultural practices of that almond grower to get rid of those red imported fire ants. And that program used to be funded by the federal government. We don't have money for red imported fire ant eradication anymore in this state, so we have red imported fire ants in Southern California. But when they set those bees down in almond orchards to pollinate, we have to be careful that they -- that they don't have red imported fire ant colonies. So that's pretty serious to the growers.

SENATOR DODD: And so . . . Go ahead, sir.

MR. GURROLA: I'm sorry to interrupt. I did want to [inaudible]

SENATOR DODD: Oh, please.

MR. GURROLA: And to further complicate that, there's small hive beetle, in which some counties will accept apiaries coming in that contain small hive beetle, and there are counties that will not accept apiaries coming in with small hive beetle. We're one . . .

SENATOR DODD: Small what?

MR. GURROLA: Small hive beetle.

SENATOR GALGIANI: Yes, small hive beetle.

MR. GURROLA: It's a pest, and industry's going to talk about that. It's a serious pest to our queen-breeding industry. So if we have a truck that comes in that contains small hive beetle and it's destined to a county that will not accept that, they're going to have to reroute that truck to a county that needs pollination that will accept small hive beetle. Sorry to cut you off.

SENATOR DODD: No, no, no. That's -- that's kind of unbelievable. I never expected to get so deep into apiaries and things this morning, but it is interesting. So let's just say these 8 and a half percent that are rejected at either the borders or in the counties, is there a way of taking those -- Do the owners of those -- can they take them somewhere and clean them up and then come back in and try it again?

MR. WYNN: Yes. We have -- and this is all privatized. We have private companies, a couple of which; they're concentrated in Southern California for the most part. When these bees are rerouted out of state, these folks run operations out of state, where the trucks go and they actually do the cleaning for the trucker themselves. The trucker pays them. It's a private, you know, business. And then they return to go back through the border protection station and have to go through the same process all over again which -- and I mentioned sometimes they're delayed a couple days. This is why they're delayed.

So we're working with industry to possibly put our inspectors in those cleaning locations out of state. So when they're cleaned, our inspectors can certify them on the spot, and then they can move through the station without having to go back through the inspection process.

SENATOR DODD: Thank you.

SENATOR GALGIANI: Any other questions?

Okay. Thank you to all four of you. We really appreciate your presentations.

And we'll begin with the second panel of bee experts, Neal Williams, Ph.D., Professor of Pollination and Bee Biology at UC Davis; Elina Niño, Ph.D., Assistant Specialist in CE - Apiculture, Department of Entomology and Nematology, UC Davis. Thank you.

DR. NEAL WILLIAMS: I think we're going to try -- we're going to -- if -- Just one moment, we're going to try to load both on so it will facilitate the transition. Apologize for that. Okay. Okay. Is that -- It's working? Okay.

Thank you for the opportunity to speak today and for your patience on letting us load our PowerPoint pictures for you. So Reichel asked that I provide you an update on my, and I guess UC Davis, research to bolster populations of bees in California. In doing so, I also want to speak to what I believe are some of the important priorities for investigating and protecting bees and pollinators and the pollination that they provide to our state.

I first want, in particular, to thank each of you and the state for your support of research on agriculture and pollinators and, I guess, urge you to continue to support specific research that is about bees and pollination. The state, I think, does a good job of funding pollinator research through associated programs related to pest management and general themes, but pollinators themselves, I think -- as we're all probably aware -- warrant specific support within California, where we have such a profound need for healthy populations relative, in fact, to the rest of the nation.

We've actually, in my group, received valuable support both from CDP, CDFA through their Specialty Crops Block Program -- so thanks for that to them -- and we are seeking funding and have a relationship now with California Department of Pesticide Regulation for other -- for other research. So that -- that support that we get -- Oh, my [inaudible]. There. Okay.

That support that we get from the state and from federal grants benefits our stakeholders a number of ways. This just shows some of them: providing guidelines for establishing pollinator habitat; guidelines for pollination of different crops, including almond and vine seed production, which are high-value crops for our state; also working with best-management guidelines developed through commodity groups, the Almond Board of California would be one such group. And we also are able, then, to provide direct information to growers on the impacts of particular actions. And I'll just give an example of

onion pollination. This is work in collaboration with the extension, cooperative extension service. What you're seeing is a graph of the number of insecticide applications prior to onion bloom and, on the axis going up and down, the average honey bee visits. I put a red line in there. It shows you if the number of applications are zero through three prior to bloom, within the weeks prior to bloom, we have pretty good visitation rates. But if you go four and over, what you'll see is there's a dramatic drop. There's almost no visitation to that crop. Onion is traditionally difficult to pollinate anyway. It's a high-value seed crop internationally that California produces. That understanding allowed us to, within one year, reduce pesticide application and promote that pollination health of bees within that pollination system. So a very useful change in the industry for California, particularly in northern counties.

So just to go over things. So our research over the past eight years or so has focused on pollination in California crops and on improving habitat to support a combination of wild and managed pollinator groups, pollinators in agricultural lands. So I think we can all recognize that pollination is important to the production of a wide range of specialty crops. These are some of them for California listed here. Some are less expected than others -- cotton and alfalfa -- but the seed production of those crops, of course, requires pollination to sustain that industry and our milk and meat industries that are associated with it. So that pollination is through a combination of organisms but

primarily two types of bees: managed pollinator *Apis mellifera*, the honey bee, and a variety of native or wild bees that are not, most are not specifically managed but do contribute to pollination, like our native bumble bees. Here's one pollinating tomato, which benefits -- not dependent -- but benefits from pollination.

Ironically, I would say that intensive agriculture in California, as we recognize, part of our best management involves a series of challenges to pollinators, and we've worked to understand those and try to mitigate those intensification challenges. This shows a typical Central Valley landscape and what you will probably see. It's a patchwork of crop fields but not a lot of other habitat that remains. Essentially, what we see is bees are challenged within those landscapes by insufficient forage, insufficient nutritional diversity from a diversity of different forage types, and of course from application of various agricultural chemicals. And we call that . . . I call that the irony of intensive pollination -- or intensive agriculture for pollination. We challenge bees most in the very places that we need their services the most.

And so how do we mitigate that, that situation? I'm going to focus on, really, mostly these two, which are related to improving forage opportunities supporting pollinator communities and populations in agriculture.

So the first research that we've done and others have done, we know from that research that floral resources definitely benefit bees and diverse

resources. We've shown through a variety of studies that more resources available -- these are flowers, pollen, and nectar resources -- within the landscapes lead to increased numbers and growth of colonies of bumble bees and reproduction, as well as other bees. I gave the mason bee as an example. It's another crop pollinator that's being worked on for management.

So what you see here is the average density of flowers, increasing along the bottom axis, and that blue line shows an increase in the number of bumble bees, queens produced by colonies that sustain those populations. Again, bumble bees being one of our most important non-managed pollinators, also managed for greenhouse production of a variety of different crops, including tomatoes and other things.

So that work, showing the relationship between available forage within the landscape and work with our stakeholder partners has led to programs to provide increasing floral resources within those landscapes. Essentially, the planting of wildflowers and hedgerow plantings in the remaining spaces within those very intensive landscapes to diversify them. These are strategies of which California has been one of the leads. Much of the research nationally on this over the last decade has taken place in California and is now informing the rest of the country. Those are widely promoted strategies, and they involve a series of questions: finding out what plant species to plant, how do we choose them, and then evaluating the establishment and performance of the plants

and their functional performance in supporting bees and benefiting crop pollination. And I'll speak to each of those very briefly on what we've been working on.

So what we find is that those plantings when we put them in -- this involves actually physically planting borders with wildflowers or other native plant materials or flowering plants and assessing the impact on bee populations. We see that wildflower borders -- this figure shows, the first top panel -- the species richness, the number of different types of bees. Bottom panel, total number of wild -- this is not honey bees in this particular slide -- the number of wild bees, their abundance at borders that were enhanced. Those are the ones labeled wildflower -- the green dots -- compared to the same type of border that does not have the plant enhancement, business-as-usual crop border. What we see is that the number of species is about 6 times higher when we provide the enhancement. The abundance is over 13 times higher for the number of bees that are using those borders when we provide that resource. So they are used.

In our studies, we found in Yolo County and Colusa County this work showed that we find 47 different species of wild bee in those areas. And 32 of those are unique to those wildflower borders. They're not found in our studies elsewhere, even though those studies are in those landscapes. They are somehow finding them and using them. I add the red dot to show you that

those wildflower plantings where we've enhanced the quality of habitat even increased both abundance and richness of species over natural areas that are nearby, and those are the red dots. So the green dot is higher than the red dot. Okay.

We also find that those plantings do increase the nutritional diversity for honey bees. This shows on the bottom. The names are not important. Each one of those sets of bars is a different plant species in a mix that we've developed. These are the number of honey bee species per plant species. Within the early season, you'll see that there are several species that are heavily used, and they vary year to year. So the lighter bars and the darker bars are one year and the next year.

If we go to the late season, it's a different set of plant species that they're using. And I'm emphasizing here the importance of diversity of different plant species, and the importance of selecting the plant species to support those pollinators is very important, providing that nutritional diversity that benefits the health of the honey bees, helps them to combat the diseases that they face as well as probably pesticide challenges that are associated with part of their management in the agricultural landscape.

Okay. So one of the concerns and as we design plantings within those landscapes is to make sure that we are working with the stakeholders and understanding their barriers to adoption. One of the big ones for growers is

that the plantings, the concern that, well, we put all these wildflowers out there, they're blooming, what about my crop, will they be competing with my crop for bee visits? And so we've been able to show, through research, that that does not occur. This is a wildflower planting associated with a very large almond landscape, almond orchard in the southern part of the growing region with some people sampling it, just to show you we actually do get out there, with your support, and do some stuff from time to time.

Anyway, so this shows the results. These are -- Row 2 is basically edge of the orchard. Row 10 is interior to the orchard. Gray bars are with the enhancement and white bar without the enhancement, showing essentially that there's not a significant difference in the visitation rate to the orchard with and without the wildflowers. So there's not a concern that our wildflowers are taking bees from the orchard so the bees are visiting our flowers and not the crop during bloom. If anything, in fact, what we have seen -- you might see a little bit of a tendency of the gray bar to be higher on the edge -- that the plantings can actually attract bees in and possibly increase yield, and we've shown that that is the case. This shows the effect of plantings to increase crop yield. So it's not only something that I like for wild bees. It actually improves the bottom line in terms of yield for the grower. This shows the production of watermelon, both in terms of watermelon density per area of the crop as well as the mass of watermelon fruits that are produced as a function of distance into

the crop field, with zero over on the one side, heading into 100 meters into the field. You'll see the wildflower plantings. The melon field next to wildflowers is in the orangey-yellow. The one without wildflowers in the gray. And what you see is that the yellow or orangey line is above the gray line. Melon density is significantly improved by the pollination that is resulting from that planting. And fruit mass is a little more variable but tends to be above the gray line there too. So overall, we see yield benefits, not competition that the growers worry about. This sort of thing allows us to work to develop those best management guidelines and actually show the growers that there is some value to actually benefitting the bees with habitat also can benefit their production.

The designing of these mixes has been a primary effort on our group for a number of reasons. Trying to essentially design cost-effective mixes -- right? -- so, growers don't have a lot of additional money to do -- beekeepers don't have additional money to provide these plantings, so they should be as cost-effective as possible. So what we found is that the mixes can be tailored for specific goals. This shows a palette of plant species designed for a particular goal. The questions that we're addressing -- and we've done this analytically and then testing them in a field -- for a given cost, dollar cost, what plant mix supports the greatest bee diversity. If that's a biodiversity conservation goal that's part of some stakeholder's concern. Another one would be what mix supports the greatest number of crop pollinators for a particular part of the sector.

We run cost-benefit analysis using a linear programming optimization algorithms -- that's fancy gobbledygook. But essentially, computers are very good at making very complicated sets of decisions with multiple plants that cost a different amount. One plant supports this bee, another one that bee. Once we're beyond about three plant species and two bees, you know, our brains sort of explode. But the computer is extremely good at figuring out best mix designs, and we've seen dramatic cost savings when we run these algorithms through different plant options. We can achieve 95% of the goal, say, 95% of the bee species supported at about one-sixth the cost if we didn't use the algorithm. So we find that these -- these are really important ways to reduce barriers to adoption for the grower/stakeholder community. That's the primary sort of research that we're doing. Again, it's something we find people can all come around.

I want to speak briefly to the other challenges, one of which is pesticide potential risk that's associated with agricultural production. We feel that our research suggests that we need better information on the potential exposure at field and landscape scales. Essentially, are there particular areas of the state or times of the season that present particular risks to our managed and wild pollinators? This shows a map where . . . What we've done is taken state-level available pesticide-use records from the pure database that's managed by DPR and applied that at the section level. This is Yolo County, showing areas of

higher and lower risk for pesticide, coded by red to lighter color. Here, the idea is we believe that, with a spatially explicit mapping of index of risk, layered with benefits provided by forage, we believed we could target particular areas where we need reduced-risk strategies to be used. And I would use the Almond Board of California as a great example of an industry that's tried to incorporate best-management practices for reduced exposure risk. But others could follow that. It also allows beekeepers to at least have the information, spatially, when they're putting hives out there, where greatest location, risks, and times may be. And, again, these are potential risks.

What is definitely needed in this and what we're proposing to DPR and others -- not yet successfully, but we always hold out hope -- is that these need to be validated by actually taking data on the exposure that colonies that are placed in the landscape are experiencing -- sampling pollen and nectar coming back in, testing levels of various active ingredients -- to understand what the actual risk or exposure is compared to the mapped potential exposure based on application of those chemicals you see in the map. That would allow us to have a validated, predictive index for the state.

We do believe, and we're -- we are beginning to show it -- that these pollinator plantings also have the potential to mitigate that risk. They're essentially islands of clean forage within the landscape, that the availability of that forage that is not applied with pesticides may provide bees a way through

exposure that they get to recover from that, and that's something we're actively working on in projects currently.

I want to end by highlighting the idea that I believe that coordinated strategies for multiple benefits are the way forward in this as an agricultural community of practice. Protecting bees will come from coordinated strategies that capitalize on additional benefits. This is the idea of multifunctionality. I care about bees. Some people care about bees. Growers also care about soil health, long-term sustainability. DPR cares about nitrogen runoff, pesticide runoff, whatever it is. Numbers of these applications that, I think, provide habitat can also mitigate some of these other concerns that we have, that have real financial implications, potentially even dwarfing the concern that I have for bees.

So cover cropping examples -- something we're working on here -- you see cover cropping down almond alleyways of non-bearing orchards that improve soil health, water infiltration, and sustainable orchard production. So I think going forward that is an important thing to recognize.

Thanks for your time. Again, that at least gives you an idea of some of the diversity of research that's going on at the state and with shareholders and partners -- stakeholders and partners within the industry. Again, I'm not -- as you can tell -- I'm not a honey bee biologist, but we have increasingly worked

with the apicultural industry because a lot of this stuff is what's good for one bee is what's good for all bees. So thank you.

SENATOR GALGIANI: Thank you very, very much. And our next panelist is Elina Niño, Ph.D., Assistant Specialist in CE - Apiculture, Department of Entomology and Nematology from UC Davis. Thank you very much.

DR. ELINA NIÑO: Good morning, committee members. Thank you. I'd like to really express my appreciation for the opportunity to speak to you about some of the work that I've been involved with since I've been here in California as an extension specialist for University of California. This is a very short time. It's about 10 minutes. So it's really not enough time to speak to everything that we do, but I just wanted to present with some of the highlights of work that we've been doing and also highlight some of the issues that I have noticed and have seen that the beekeepers have and also honey bees as an organism that we're interested in.

So before I go into the actual research and talking a little bit about bee health, I just wanted to point out the new effort that we just spearheaded, and that is the creation of the California Pollinator Consortium. This is a collaborative effort between the University of California pollinator researchers, and it's sort of going to give us an umbrella on which to work together and better coordinate our research efforts to support pollinator health.

So honey bees -- Dr. Williams obviously spoke to mostly wild bees -- but honey bees are still the most essential managed pollinator, as you are aware; and there are several reasons for that, one of them being that they have high numbers of foraging individuals, so strength in numbers. They also can be easily moved, as you've learned earlier today, from state to state, including into California for pollination of various crops.

Honey bee colonies within the state of California are rented out for over 20 different crops, for pollination of over 20 different crops, and they're estimated about 700,000 colonies in California, and this is directly from the survey that's done by USDA NASS. Those numbers changed -- change as we go throughout the season and through the year. So these are the numbers for July, for example. However, in January, as you've already heard, there are close to two million colonies that are brought in by migratory beekeepers that are necessary for pollination of almonds, which is obviously a huge industry, and it has about \$6 billion value.

One thing that I wanted to stress out here -- and we already talked a little bit about this -- is the need for a more efficient border stations processing. It's extremely important, especially if the bees are sitting there not being able to fan and actually regulate their temperature within the colony, because the heat stress can kill them. So providing either water resources or just the faster way

of getting those bees through the border stations would be tremendously helpful for the bees and the beekeepers, of course.

And, obviously, we might not be sitting here if we didn't know that the native bees and also honey bees are facing tremendous stressors and tremendous pressures. And we have large colony losses that have been reported and that have been documented for about, now, a decade by this coordinated effort of the Bee Informed Partnership, University of Maryland and also USDA. And if we just point to the orange bars, this is the annual loss that have been reported since 2010, 2011. If you look at the overall average, national average losses, it's currently sitting at about 35%, which is, I guess, better than what we've seen in the past at about 45%. So colonies and the beekeepers are still losing these colonies annually.

So what are some of the stressors that are causing these losses? There are many. As you can see, it's complicated. It's a, really, interaction of many stressors that the honey bees face while they go out and forage and provide that valuable crop pollination services to us. Of course, these include what Neal spoke to already a little bit, and that is the need for more diverse and plentiful bee food supply, potential exposure to pesticides, including the acaricides that the beekeepers are needing to use to combat varroa mites. Varroa mites -- and this is just for Senator Dodd . . .

SENATOR GALGIANI: [Inaudible] what?

DR. NIÑO: I don't have a small hive beetle for you. But those are varroa mites.

SENATOR GALGIANI: Those are what?

UNIDENTIFIED FEMALE: Varroa mites.

DR. NIÑO: So varroa mites are a huge problem, and we'll talk a little bit more about what they do to the bees and why they're such a huge problem for us. And of course, some of the -- some of this work also has caught our attention; and some of the work that we do in the lab itself is, really, to continue characterizing these various biotic and abiotic stressors which are affecting colony health and then use that information to develop immediate and long-term solutions, both for bee health and beekeepers.

So I'll focus a little bit on some of the work that we've done so far, specifically on interactions between pesticides, so agro chemicals that the bees might bring in from plants that they go and forage on, and also interaction with some of the miticides that the beekeepers need to use to combat varroa mites. So this is work that was done in my lab by one of my graduate students -- and I'm not going to go through every single detailed thing on there; of course, that would take a long time. But the idea behind it was to take the 12 most commonly used or most widely used pesticides, including herbicides, insecticides, fungicides, and organosilicons which are adjuvants that are added when the pesticides active ingredients are applied to actually improve their

efficacy, and combined that with the Amitraz, which is a chemical that is used to combat varroa mites, and see what that does to bees -- adult bee populations in cages in this case, admittedly.

We did not actually see any negative effects of any of these interactions, any of those combinations. The only negative, or negative effect that we found that actually increased the mortality of these adult bees in the cages was the application of this organosilicon; and this is actually something that's been of concern to the beekeepers and the research community in the more recent past. And there's some work that's being done by Dr. Chris Mullin and also Dr. Diana Cox-Foster showing that some of these organosilicons can have negative impact to the beekeepers.

So this really drives home the point for increased need for better understanding with some of these pesticides or some of these chemicals that might not be considered active ingredients are actually doing to the pollinators, and we're just starting to understand these issues. So there is definitely a need for increasing sort of funding for more comprehensive research to improve pesticide labelling; of course, understanding synergistic effects of pesticides; and all in an effort to optimize best-management practices in pollination of various crops.

This also includes some of the work that we've been doing, and that is to integrate pest management alternatives. So instead of potentially having the

conventional fungicides, for example, that are often used in combatting fungal diseases in almonds, we are now focusing on trying to identify and develop biocontrol agents for control of these fungal pathogens in almonds. And one cool thing about it is that what we're proposing to do is to use the honey bees that are already in orchards to deliver these biocontrol agents. Just by the fact that they have hairs on them, they'll walk across the entrance where this agent is, pick it up on their hairs, and then the idea is that they would deliver it to these individual flowers.

And also, I'm glad the panel before us spoke a lot about providing tools and also educating and providing outreach to various stakeholder groups. So at UC we have partnered with UC IPM; and we have developed this tool for safer pesticide application, which basically you can go online and find the pesticide of interest, and it will spit back out to you whether this pesticide is of high risk or low risk or no risk to honey bees. So it's sort of an interactive tool that beekeepers, growers, and even homeowners can use to quickly assess whether this is something that they should be pouring onto their plants or not.

So moving on, let's talk about that varroa mite. So varroa mites are an ectoparasite. They are tiny. You saw they're really small, but they do a lot of damage to the beekeepers. What they do, they feed on hemolymph for the blood of the honey bee, both adult and developing. Why they're so devastating is that they can transmit viruses. They also suppress the immune gene expression so

the honey bees, when they're stressed out with varroa presence, they actually are not able to deal with other pathogens. So here's the varroa mite on the bee, on the adult bee; and here is a bee that has the deformed wing virus. So that varroa mite has transmitted that deformed wing virus to the bees; and it has caused, obviously, wing damage to the bee, and that bee is essentially useless to the colony. It will never be able to go out and forage and contribute meaningfully. And usually, they actually end up killing them and kicking them out of the colony.

So it's been quite devastating year for us. At least last year, when we monitored our varroa mite infestation levels, we actually found 216 varroa mites on 300 bees. So that's about 72% infestation, and a lot of that is due to drift from neighboring colonies if the beekeepers have not taken care of their problems.

So again, one of the research projects that we have in the lab has been supported by various funding agencies, and it is looking into developing new and improved bio miticides for safety and efficacy of varroa mite. And, again, this is a graph that I'm not going to walk you through every single step of. So far, we have evaluated 13 new bio miticides or improved bio miticides, and we do have some promising both lab data and field data. Of course, we have some winners that have taken care of that varroa mite infestation, and we have some losers, of course, that did not do the job that we were hoping they would.

And, again, going back to the outreach and how important it is to educate the general public -- and there's a lot more increased interest in beekeeping and folks wanting to keep bees in their backyard. However, they don't often know what they're getting themselves into. So we provide those educational opportunities. And in fact, in the past, we've partnered with the CDPR as well to provide these educational opportunities for their apiary inspectors, and that has resulted in the creation of the California Master Beekeeper Program. And we really hope to continue educating the stewards and ambassadors for beekeeping and bees.

And the last thing that I wanted to just follow up on, this is some of the work that we started doing in collaboration with Dr. Neal Williams, and it pertains to providing these foraging opportunities for pollinators. Specifically, I'll talk about some of the work we've done with honey bees.

So honey bees, obviously, need diversity of pollen sources such as -- much like native bees do. This here is really what we often provide to them. So this is an almond orchard. There's not much there other than the almonds, and while they're nutritious, again, it goes back to the availability of diverse nutrition.

This was behind my apartment complex, right? So do you think a honey bee would thrive in there? Probably not. There's really not much for them to eat, especially that they really need something more like this. They need sort of

a buffet of food that actually helps them better deal with those pathogens and actually better be able to detoxify pesticides when they have access to this plentiful forage.

So some of the work that, as I mentioned, we've partnered with Dr. Williams on -- has been supported generously through California Almond Board and also California State Beekeepers Association -- is looking at the value of these forage strips around almond orchards for honey bee health and, specifically, survivorship and growth.

So we've compared the mix that was developed by the Williams lab, and we also compared the mustard mix that is provided by Project Apis m. to growers directly. And what we did, we placed these colonies in 16 different areas. We had four different treatments, four controls, and we had two colonies per treatment. And what we did, we tracked these colonies from before the almond bloom, throughout the almond bloom, and then after the almond bloom, and we took note of their growth, both adult and brood development. We also collected pollen, just to ensure that these bees were, indeed, foraging on what we were expecting them to forage on. And we also collected samples to be processed for pathogen loads, immune gene expression, and we are tracking, still, the survivorship of those colonies.

So just quickly here, the adult bee population, we did, indeed, see, when we compared the control orchards with those that were orchards with mustard

plantings next to them, those bees or those colonies that had access to mustards did grow bigger, basically, than those that were just present in almonds, at least at two time points during the experiment. And then, now, we're still tracking the survivorship of these colonies. But one thing that struck me as interesting is that those colonies that were present and able to feed on mustard, they actually had, at one point during the experiment, the greatest survivorship as compared to the other groups. And also I want to point out, the wildflower -- Unfortunately, last year, we had bad weather so the wildflowers didn't quite bloom as early as the almond blooms. However, the bees did collect wildflowers after the almond bloom. So that could potentially be an option for growers to just have that supplement for beekeepers or bees available after the almond bloom.

And the last thing I just wanted to mention is it's -- While we are trying to sort of augment the agricultural areas, it's also very important not to forget our urban and suburban environments. So one of the projects that we have going on in conjunction with our Haagen-Dazs Honey Bee Haven garden is to look at which commonly sold plants do bees prefer. And this is the information that would then go out to the home gardener, if you will; and they would be able to be knowledgeable about which plants to actually plant in their gardens because every little bit of food for the bees can help.

And I just want to end by saying that providing foraging opportunities really is crucial for honey bee health but also crucial for supporting bees in general. So for example, Assembly Bill No. 1259 deals with leasing of public lands for apiary businesses. Also, supporting and funding research which would explore further foraging options, again, in these different locations throughout the state in different situations, -- maybe even providing incentives for growers to plant forage in their crop -- would be useful. And then all of this is to really support the pollination stability and then improved economic costs, because, currently, the estimate is that it costs about \$300 per year to support a colony. So if you think about it, rental for hives for almond orchard is only about \$200, so if a beekeeper only relies, let's say, on income from almond pollination, that is not necessarily sufficient to actually even support that colony for a year. And this all trickles down to -- it's not just the beekeeper. It trickles down to the cost for the grower and then ultimately could trickle down to the cost for us, the consumer. So that's all I have to say. And thank you again.

SENATOR GALGIANI: Thank you very much to both of you. Do we have any questions from members?

I did have one. You referenced that bees can detoxify pathogens if they have a healthy food supply. Can you talk to us about that for a minute?

DR. NIÑO: They can detoxify pesticides better if they have . . .

SENATOR GALGIANI: Oh, pesticides.

DR. NIÑO: . . . healthy food supplies. So there are a couple of studies that were done. Actually, one of them was done by my colleague Dan Schmell at Penn State, who has fed a variety of diets or variety of pollens to bees and then basically tracked their survivorship after exposure to pesticides. So what he found was that if you feed bees diverse pollen nutrition versus those that get, perhaps, diet from a single pollen source, they are able to live longer. And then when he did the gene expression analysis, he also found that some of the detoxifying enzymes are up-regulated in those bees that were exposed to this diverse diet as well.

SENATOR GALGIANI: That's interesting. Okay. Thank you.

Senator Dodd, any questions? Senator Pan?

SENATOR PAN: Thank you. So one of the questions I had, you know, you talked about several different factors in terms of bee health. In some senses, I guess, you know, we have a . . . Well, I don't know how many variety of bees we have that we actually . . . But we essentially, I think, we have kind of a monoculture on a monoculture, which makes, you know, basically, the bees themselves more -- I presume -- more vulnerable to the variety of different, you know, infections, mites, et cetera. And maybe this is also a question for the bee industry, but I mean, is there . . . What efforts should be

made to . . . Should we try to diversify species, et cetera? So I mean, what's your thoughts about that?

DR. WILLIAMS: You mean species of the pollinators themselves?

SENATOR PAN: Yes. Right. Exactly.

DR. WILLIAMS: Yeah, so well, our group has been working with support from USD and NIFA on a specialty crop block grant that's called Integrated Crop Pollination. You can find it at ICPbees.org if you're interested in that. And that's specifically about diversifying the type of pollinators we're using for crop production. So I think the strategy is, we don't foresee backing away from the use of honey bees. They'll always be a foundational species. But essentially, increasing the stability -- like insurance through diversification, much like you would for a stock portfolio or something like that -- that's combinations of other species that are managed, there are opportunities to manage, like bumble bees, for example; and then just supporting the habitat that brings in the diverse wild bees.

I didn't present it in my research, but one of the most interesting side piece of research done in almonds and in sunflower for seed production shows that even quite modest numbers of other bees placed with honey bees has a synergistic effect on their pollination effectiveness. So rather than it just being additive, saying we have honey bees plus the other bees, the presence of that diverse community of bees increases the quality of honey bee visits themselves.

And so where we have concerns about a lack of sufficient numbers of honey bees, this, indeed, provides a way around that problem, essentially, or another tool for that, to diversification.

SENATOR PAN: I mean, I think . . . So I guess the other part of the question then is that -- and so we can try to diversify and do the synergy. I think you talked about different types of plantings to try to diversify the in base. In terms of the, you know, the honey bees being used as sort of the main bees moved around, is there -- and, again, I'm not familiar enough with the bee industry. I mean, are there opportunities there too? Because, basically, you have a large population of one species, and they're vulnerable to . . . I mean, how do you expand the genetic diversity so that the whole population that, not only just here in California -- we heard it's being shipped around the country -- isn't particularly vulnerable to a new, you know, parasite infection of that sort? How do we make that population more robust and . . .

DR. NIÑO: If we're talking about honey bee populations -- which I'm assuming that's what you're talking about -- honey bee populations, there are definitely efforts around the country to bring in, first of all, genetic diversity from outside of the United States. So Washington State University, for example, they have spearheaded efforts to collect and bring in, basically, semen from drones from outside of the country, again, to increase that genetic diversity and bring in beneficial traits to incorporate into these breeding

programs. Again, there are breeding programs within the different universities, for example, University of Minnesota; and there are breeding programs even within the USDA labs where they're trying to breed honey bees that are resistant to specific pests or pathogens. Varroa mites, of course, are of particular interest; but there's also interest in breeding for viral resistance as well. So there are definitely efforts . . . And part of my research, actually, doesn't directly deal with the breeding programs but understanding sort of the biology and physiology that is behind the mating process and reproductive process of the queens and drones that will ultimately help support the breeding industry. And of course, here, we have in Northern California, around the Chico area, we have a large concentration of breeders that produce over a million queens that are shipped throughout the country. And they actually supply, you know, basically, if you think of it in terms of the colonies that we have, it's like one-third of queens that they supply to the rest of the country. And their stocks, they also work towards selecting these beneficial traits in the stocks that they have. So thank you.

SENATOR PAN: No, that's helpful. I mean, I think the challenges are you select for traits, but then you -- then that becomes the new monoculture and then [inaudible]. So how do you maintain the diversity? I mean, certainly, and I know in terms of it's great that they're trying to look at varieties around the world and so forth. Are we also working to maintain our base diversity in

the bee population so that, you know, we don't end up with essentially the same bee, you know, around the world? Right? And how do we maintain that diversity, genetic diversity?

DR. NIÑO: There is, as I said, there are definitely efforts. And then there are some smaller efforts that are starting now as really, not necessarily breeding, but sort of selecting for local populations of bees that are better able to deal with local challenges too. So there's that effort.

DR. WILLIAMS: The industry is one of homogenization of bee stocks from throughout the country. So it's a -- it's a real challenge, and one you've, I think, articulated very clearly. It's, you know, we're mixing all the bees from everywhere -- right? -- bringing them into California so they're . . . Yeah, it's a perfect storm.

SENATOR GALGIANI: Okay. Thank you to both of you. And we'll welcome our third panel. Our third panel is our stakeholders, starting with Ruthann Anderson, President and CEO of the California Association of Pest Control Advisors; Brett Adee, Adee Honey Farms; Robert Curtis, Director of Agricultural Affairs from the Almond Alliance of California; and Jackie Park-Burris, California State Beekeepers Association.

Did I say that correctly? Brett?

UNIDENTIFIED FEMALE: I think it's "A-dee." He pronounced it A-dee. I don't know.

SENATOR GALGIANI: Thank you.

MS. RUTHANN ANDERSON: So I'm Ruthann Anderson. I'm with CAPCA. We represent about 4,000 of the pest control, agricultural pest control, advisers here for the state of California.

I kind of stumbled upon the project that Rick was talking about a little bit earlier in terms of registration and compliance in terms of the communication that we have out in the field between the grower, the PCA, the applicator, and the beekeeper. And, you know, we were talking just broadly about the movement of bees, right? So we have maybe a half a million bees that are here in the state of California throughout the year, and we bring in another million and a half bees. And the registration numbers currently in terms of registration at a county level are in the single digits in terms of percentage of those bees.

And so where our concern is, if the rest of the stakeholders aren't aware of the location of a bee, then how can we truly protect that bee when we're looking at agricultural applications out in the field. And so in working with DPR and CDFA and CACASA, the agriculture commissioners' association, we started to develop a communication portal that would take us from the pins on a map that Rick talked about a little bit earlier to a more robust system that would integrate into CalAgPermits as well as into various stakeholder interfaces that our PCAs use in order to write recommendations that are then

communicated to applicators. And so we have kind of dubbed the project “Bee Where,” W-H-E-R-E, in order to start really identifying the locations of bees, especially during key times like bloom. And it's been my great pleasure and opportunity to be able to work with stakeholders that are here, as well as others, including Farm Bureau, to be able to start -- to put together the regulations that are already in place into a technology platform that we can utilize next year. And so I know the committee is looking at -- it looks like AB 2468 in terms of adding that requirement to bring in registration at 72 hours and being able to move towards civil penalties; and I think that we would, as CAPCA, be in support of that. I think that that helps reinforce the communication cycle that we really need as well as the registration compliance that I think is required in order for all of us in the field to have better communication. So thank you for the opportunity, and I appreciate it.

SENATOR GALGIANI: Thank you. Our next panelist. And can you pronounce your last name for us, please? Yes.

MR. BRETT ADEE: Yes. Thank you for having me here. The name is Brett Adee of Adee Honey Farms, a commercial beekeeping operation. And I'm always encouraged when I come to meetings and meet sharp people in other parts of the government, in research, even in regulation; but I see a couple of fundamental or strategic flaws that, you know, have to be thought through. Otherwise, you know, you have the unintended consequences. And one of

those strategic flaws was mentioned in the MP3 program and then again in the California codification of the notification of 48 hours. And that flaw is, the beekeeper can move his bees or cover them. And I'd like to give a couple of examples of why this is a flawed idea. This year alone at a location we have south of Kerman to pollinate a family's almond ranch. They wrote me a check for about \$300,000 to put their bees on their almonds, anticipating about probably a \$6 million crop.

Across the street, I have a -- there's a stone fruit grower, and since the 14th of February, I've had six notifications to spray toxic products on his stone fruit. If it takes me a day to move out, two days for him to do the process, a day to move back -- we've lost four days, six times -- 24 days of a pollination window is gone. That's a takings event. We're taking that man's money and not providing a service. The man growing the stone fruit, putting those products on, asking the bees to be moved, is taking that family's crop. And so you've got to look at the whole picture because this becomes a takings event. And you know, he needs to protect his stone fruit, but I think the correct process is not, hey, cover the bees so they're not foraging and pollinating. Move them so they're not foraging and pollinating them. Put them in a safe zone, then move them back. The economics of that alone, if you're talking \$5 in and \$5 out is, you know, \$10 a round trip, six times is 60 bucks. That's way more than the margin on operating a hive is for the year. So anyway,

where's that money coming from? Is that -- are they externalizing the cost of the growing stone fruit on the beekeeper or am I going to have raise the price of pollination to the almond grower so they can externalize that cost on to the almond grower? I mean, who are we going to externalize this cost onto? When we have a real solution is selecting very short RT products and applying them at the right time. If it costs more capital, then that's the cost of growing stone fruit. But have them on during the night when the bees aren't foraged and so they're dry and set on the fruit. Because notification works two ways. You know, they're notifying me that they intend to spray. Well, that's notification that, you know, if my bees are killed, I know what product it is; and it wasn't put on right. And so it leaves open to a lawsuit. And I'm kind of testy about this because I lost about \$800,000 of bees last year on a spray incident. And anyway, you know, we had Bee Informed Partnership pull the bees, the samples, all third party. USDA did the samples at the Guiltinan Lab. And some of the comments we've seen is "we've never seen insecticide levels this high before." And anyway, you know, at the end of it, nothing has happened. The investigation's still ongoing, and that's been a year ago now. And so anyway, I've decided notification is a two-way street. I think they need to understand that notification means they need to put the product on. If it's a blooming plant or weed, like the FIFRA regulations say, "do not apply when bees are present." You have to take it to the next step; you know, make sure

it's completely inactive by the times the bees are there. Because, you know, we have this false argument that, well, the bees trespassed over there. It isn't trespassing. You know, if you have a flower in bloom, that's no different than if the neighbor's kid falls in your pool because you don't have a fence around it. It's an attractant. And to say "the bees trespassed on the stone fruit, I can do what I want to" is wrong. If an eagle comes by and grabs a fish out of your stock pond, you can't shoot him for stealing the fish, you know. We have to look at the big picture.

So anyway, I wanted to comment on these two flaws here and this idea of moving the bees or covering them.

And then also on registration: You know, I register the bees because I want to know when it's being sprayed near to my bees, you know, so I can tell the applicator -- it's like, "Hey, you're not notifying me that to move the bees. I'm notifying you to put the product on correctly and select the correct product and the correct time."

So anyway, I think that's good. But registration, when you get outside of contract pollination, becomes a proprietary issue because families have scouted the mountains, either the coastal or inner mountains, for decades trying to find those sweet spots where the bees could survive all year long, you know, without having to feed them supplements and supplements and supplements to keep them from sliding, because California's a boom and bust

environment. We have all kinds of moisture and then it's a desert, all kinds of moisture and then it's a desert. So these out of the contract production areas, you know -- the Valley and the Salinas Valley, where it's high-intensive agriculture -- those locations are really considered family trade secrets or proprietary. So you have to guard that data if you go into a mandatory registration of all locations. I think that registration in the production area is stupid not to register. I mean, anybody wanting to, you know, protect their economic interest should register bees. When you get out to these out areas in the mountains and either -- any of the mountain ranges here where it's primarily ranching and timber and those, you know, family passed on from generation to generation sweet spots for bees. I don't know -- if it's, you know, really -- if you want to put that much due diligence in to protect those proprietary secrets or not. I think you should look at the situation of where the bees are and where the most risks are and don't make a blanket policy for the whole state when the most intense area and the whole national bee supply is here during this two-month period.

And how the bees leave here is how they'll come back next year, and we left last year with a lot of fungicide on the bees. You know, there's a lot of science that's still unanswered of the inaccuracies and synergisms and everything else. But I do know that we had unprecedented amounts of fungicide sprayed last year, and we had unprecedented amounts of queen

failures this year, later on. And the Bee Informed Partnership that showed, I think, 35% for last year. I think when we get the 2017 statistics all in, it's going to come really close to 50%; and when we cross that 50% threshold, we're to a point where we can't hardly breed the bees as fast as they're dying. So we come to that point where we start getting into that, you know, death spiral. So it's very, very important to have good husbandry and conservation while we're here.

I'm really encouraged by some of the programs that have been presented. And I think, you know, one of the biggest things that's changed since I've been out here -- since, oh, I think it was '88 or '89 -- is the idea of the clean orchard. Before, we used to have a blanket of flowers in the orchard and bees would come out incredibly robust. And then somewhere, there was a shift. It's like the orchards have to be sprayed with Roundup. We can't have anything in them. And I don't know when that mentality shift was. I know part of it was mechanics and water conservation. But there's a lot of good forage that grows that's destroyed that wouldn't hurt the orchard, would feed the substrates and the microbes in the soil and help the bees. But, you know, there's been a shift. And if we can encourage through the departments or the extension and the universities the idea to get that forage back on there, the bees will leave stronger. So anyway, I just want you to consider these ideas and thank you for your time.

SENATOR GALGIANI: Thank you very much. Our third presenter?

MR. ROBERT CURTIS: I guess that's me. I've got . . . Neal [inaudible] you did this before, so I may need your assistance.

DR. WILLIAMS: I can do it for you.

MR. CURTIS: Okay.

DR. WILLIAMS: It's got to go in the back.

MR. CURTIS: Okay. And while Neal is juggling around with my flash drive . . .

I brought three items with me. -- I'm, of course, Bob Curtis with the Almond Board of California on contract with the Almond Alliance. One of them, of course, is the hard copy of what I'm presenting. The other one, you've . . .

DR. WILLIAMS: It's not bringing that up.

MR. CURTIS: Well, here, let's see. I've got to change my glasses. That's what happens when you get old.

DR. WILLIAMS: I've got it. I've got it. Sorry. Excuse me.

MR. CURTIS: Okay.

The other one is -- you've heard people comment about our best-management practices, pamphlet and materials; and then the third thing is this "Growing Good" booklet that we have out. And in particular, I'm going to . . .

MS. ANDERSON: Bob, which presentation would you like?

MR. CURTIS: I want to do the one . . . Where's that . . .

DR. WILLIAMS: You've got to use the track pad.

MR. CURTIS: The track pad. Okay. Let's do date modified. I want to do that one. Okay. Okay. We're good. And I come down here to presentation mode, and we're off and running. Okay.

The third booklet here, the last two pages cover off on our activities and stewardship of bees. A lot of what I'm saying has already been said this morning. Just as a primer, basics -- almonds need bees. Most of our almonds are what we call "south end compatible." You'll notice this time of year, you drive down the road, and you'll see a row of trees that are blooming, say, ahead of or behind the adjacent row. That's because you need two different varieties -- at least two different varieties -- side by side to have the bees carry the pollen from one tree in one row to the tree over in the next row.

I can say also that there is emergence of self-compatible varieties, and those, you can get pollination within the flower. But the morphology of the flower, or the way it's set up, you still need that transfer agent, or the honey bee. So we still need honey bees. And we're going to be doing some work on this -- actually, with Elina -- hopefully this next year, to really document or quantify how many bees you need for these newer, self-compatible varieties. But in general, we need two hives per acre, and we've already talked about the

demand of two million colonies. And of course, our industry has grown quite a bit over the last 10 years, and I always feel like I approach every pollination season with a little bit of cautious optimism. Up until now, ever since the advent of CCD in 2006, we've always had a sufficient supply of honey bees to pollinate our crop and to produce a record crop. And I have to tip my hat off to Brett and Jackie and the other beekeepers. They work very, very hard and diligently to do this for us.

In 2018, we'll see what the outcome is. It hasn't been the greatest pollination weather, and I'll cover off on a little bit more too on the bee side as well. The overall bee population in the United States . . . And, again, I have to tip my hat to the beekeepers; they sustain these losses that you've already seen. Elina and some other people put this chart up. They sustain these losses, but then they work very hard to rebuild and provide us with colonies and bees during the fall and then provide it to us in the bloom period. And you can see there in 2016-17 the hive losses were 33%. As Elina pointed out, that's the second lowest loss rate over the last seven years; but for Pete's sake, historically -- and Brett will tell you this and his family and Jackie's multi-generational -- historical acceptable average has been about 10-15% loss. So we have a ways to go.

We've talked or mentioned that bee keeping is migratory. There's a lot of bees that move all over the United States; and even though we talk about 500-

700 colonies in California, those bees will move out of state as well. In fact, some of my beekeeper friends have two houses, one in California and one in North Dakota. Right?

MR. ADEE: Yes.

MR. CURTIS: But, and I mention the 2018 season, particular stressors were the drought in the Upper Midwest -- and I'll comment on the importance of the Upper Midwest to us -- hurricanes in the south, the fires in California, and then the very low temperatures that we've had for most of the bloom season. And I put in red here in italics a couple of things that have already been mentioned, and that is that a number of people here this morning talked about the critical need for efficient border station clearance. And then we've also had comments, very positive and supportive comments, about the need for forage in California; and for that matter -- when you look at this map, bees are going and going all over the United States -- we need it throughout the United States.

A little bit more about the Almond Board. Obviously, we totally depend on bees and beekeepers, and we have a strong partnership with the beekeeping industry. And we have two key objectives in what we do. One, of course, is to ensure a strong supply of bees for almond pollination. That's patently clear from the statistics that I've shown you. And then the other area that we're very intentional about is to ensure that when the bees are in almonds, the almonds

are a good and safe place for them. This is actually a picture of the last two, one of the last two pages on that booklet, the sustainability booklet. And you'll note just real quickly that we do -- and I'll show you a little bit more about this best-management practice program -- but we have a sustainable self-assessment program that growers engage in. And those people that have filled out the assessments and give -- indicate that we have a pretty good strong uptake in the principles that we've outlined in the best-management practices, and I also . . . From the research standpoint, we have been funding research on bee health since 1995, and we have funded 113 projects.

I'm going to focus on the four, on the three circled areas here. But we've been talking about stressors on mites on bees, and we have funded research in each one of these areas. Varroa mites have been mentioned by Elina. The other one is a Bee Informed Partnership tech teams that are, in effect, pest control advisors for the beekeeping industry. Up until recently, there was not that infrastructure available to the beekeepers to decide to monitor the hives and give guidance on if you needed to treat for varroa mite, for instance, and issues like that.

The third area, that is not circled here, is the lack of genetic diversity. We have been funding work in that area as well and supporting a more complete and expansive genetic base for the queen breeders and the beekeepers to work with.

The last three areas, the pesticide exposure: I did mention the BMPs. There's a whole number of different practices and principles involved in the BMPs. A lot of it focuses around the timing and selection of pesticides. I'm going to mention, in particular, the importance of registration, which has been covered off many times this morning. There's . . . We need another circle. There is circle number 5, the lack of forage and nutrition; and we need to foster and increase that, again, in California and throughout the US.

And then on the fifth point, I've already mentioned, is the slow movement or clearance of bees through the border stations. Here is a snapshot of your BMPs. As I've said, I think we've gotten pretty good uptake. The almond industry has been held up as a role model for other industries in terms of implementing -- developing these programs, incidentally with beekeepers. Jackie was one of the folks that helped write this material with us and for us, and we've also gotten very good support and cooperation, obviously, from the beekeepers.

So a lot of text here that covers communication and pest control. Communication's already been mentioned, in particular, by the CDFA and the California Department of Pesticide Regulation folks this morning. But in particular, I want to focus in on the blue text, blue and red text, and that is that we strongly encourage beekeepers to register their hives with the county ag commissioners and to request -- excuse me -- notifications for pesticide

applications. Ruthann and a whole number of people this morning have mentioned this critical need and the lack of compliance. So in red there, there's a critical need for compliance on registration of honey bees; and that is quite simply for pesticide protection.

Another area that we've covered off and on this morning is supplemental forage. This is the work that we're doing with supplemental forage, supporting with Neal and Elina in almonds. And we have a very good news story here that research, as Neal has shown, is that forage doesn't compete with the bees. Elina has shown that having the additional forage and a more diverse diet improves the performance and health of the bees. And what's particularly exciting is that, actually, contracts are now emerging between beekeepers and growers that give a discount to the growers for planting forage. And this is one of our partners. You've seen Project Apis said many times this morning. They have the Seeds for Bees program. It's really an incentive program for growers. And these are stats from last year. This year, our acreage for forage has gone up over 7,000; and we're going to keep chipping away at this, as Brett has said, we want to have it very widespread and used in almonds and, in particular, as Neal mentioned, we have a new initiative that combines forage and soil health and bee health all in one big package. So we're going to continue to pursue this.

The other thing that I'd just mention is that it's not only California, but forage throughout the US. In particular, that area in the Upper Midwest is critically important for bees and critically important for almonds in the late summer/fall because that's where a large portion of our bees come from that pollinate almonds and there are very important forage resources -- there have been. One of the detriments to this has been the programs encouraging more planting of cotton, and it's taken out the conservation reserve acreage. And you'll see we hit a low or loss of about 24 million acres of what would be or was wonderful, natural forage.

Recently, with the presidential initiative on bee health and the interest of NGOs and government agencies, we're climbing back out of that hole and providing more forage resources for the bees in the Upper Midwest. As far as California's concerned, we're very encouraged by the passage of Assembly Bill 1259. Elena's already mentioned that. One of the comments -- and maybe Jackie will want to speak to this -- is that we'd like to have . . . Well, the AB 59 was the California Department of Fish and Wildlife does allow bees on department-managed lands. There's more to do here. We need to make steps for bee access to government lands easier and more straightforward. And then, of course, Bob Wynn mentioned the initiatives of CDFA to identify and seek out additional forage resources.

The last area I'd like to touch on is the clearance through the border stations. We -- when I say "we," it's almonds and the beekeepers -- have been working with CDFA in partnership with them for the last few years. I think one of the big impediments for that, as Bob Wynn has mentioned, is lack of resources. The problem was particularly heightened this last year in 2018. And, as already mentioned, there were some delays that were experienced of two to three days; and that's no good for the bees. That's no good for the bee health, and it's certainly no good for the pollination potential and the viability of those hives. There's two areas in my mind that stick out -- and it's already been mentioned -- the reconditioning/cleaning is no longer adjacent to the border stations so you didn't have the state inspector go over and sign off and say get out of here. Obviously, that . . . And that's caused a lot of delays. And the other one is stricter logging and compliance for truck drivers. They get the clearance to go; and they can't because they've booked -- they've logged out on their hours. So down below is a shopping list of potential solutions and improvement for consideration. One of them has been mentioned. The CDFA inspectors on site at the reconditioning stations to super . . . -- to provide guidance and get the sign off there so that trucks move through quickly.

Another area -- that I imagine Jackie's going to comment on -- is additional individuals to identify potential insect pests. And there's a whole list of our examples there of things that can be done. Additional individuals to

work nights in January and February when there's a very, very high flow of traffic through the border stations. And I think Jackie will probably want to comment on this. It's more consistent and clear protocols and thresholds for rejections. And then Bob Wynn has mentioned the precertification programs which are good and beneficial, but more could be done to coordinate and collaborate between the states.

So basically, in summary here, the three critical needs: efficient border station clearance, a need for forage in California and throughout the US, and the need for compliance on registration of beehives. With that, I'm going to . . .

MS. JACKIE PARK-BURRIS: Go back to. I want you to stay there in case.

MR. CURTIS: You want that?

MS. PARK-BURRIS: One more. One more. One more.

MR. CURTIS: One more? Okay.

MS. PARK-BURRIS: Just leave that there while I talk. I'm Jackie Park-Burris.

SENATOR GALGIANI: Thank you.

MS. PARK-BURRIS: I'm a queen breeder from Northern California, and I have taken advantage of this diversification. I've made three trips to Italy to bring semen back to inseminate my queens to try to improve the fact that we need more genetic diversity in our bees.

So I look at bee health as a pie. So our problems are a pie, and we chop it up. Some of it is varroa. Some of it's management. Some of it's pests. Some of it's pesticides. Some of it is the forage. I mean, that is what it . . . To me, there really is no CCD. It's that pie. It's a whole plate of problems and harder . . . It is so much harder to be a beekeeper for Brett and I than it was our fathers, when there was unlimited forage out there to access.

You really want me to scream louder? I really don't have a problem with that.

So the border stations, so Bob has a perfect list up there of things that we've discussed with the beekeepers. And the almond growers have -- or Bob from his industry -- has met with CDFA three times in the last year trying to improve that situation. I feel like I've been beating my head against the wall. I'm really looking forward to the fact that there may be a little more funding to help with implementing the inspections at the stations. Because, you know, as CDFA said -- I'm really disappointed that they're not here to hear some of this - - but as they put forth, there was, you know, 4,300 loads went through the border stations and 343 were rejected. So you have to realize that there are probably 3,000 of those trucks that were sitting in lines much longer than they should have been. Those bees are heating up. Those lines were . . . They'll come in, there'll be 10 trucks in line. So before the statistics from CDFA ever

touch anybody, you have to realize that that bee truck was there for two hours before he got any contact with a person.

He talked about water availability. We worked very strongly with the Almond Board to try to provide water at the stations, and all we could do was provide one truck with water. Okay, now there's 10 in line. This year, the fall was very warm. The spring was very warm to begin with. The bees were hot. It wasn't good. So bee health is suffering a lot at those border stations trying to get in here, and it is a huge disservice to the almond industry and to the beekeepers that we can't improve that.

We understand and respect the need to be careful for what we bring into California, that you do need to inspect them. I think it would be awesome if there was some kind of education to some of these people making these rules that . . . If you are from Texas and you have fire ant in your area, what these beekeepers do is layout tarps, put brand new pallets down, and transfer those hives while they're making sure that they're all clean for ants. I mean, they go to a lot of work, and if . . . And every semitruck load has approximately 408 hives on it, so they are doing this for load after load after load. It's a lot of work. They don't take it lightly. And then they get to the border station and they find one ant -- after they've waited an hour, you know, in line for a long time -- and they get told they have to go wash this load. Okay, now the truck driver is out of hours; and, like he said, now what used to take a couple hours,

two or three, is now taking days. Your trucker runs out of hours. This is very, very problematic, and bees are -- the loads are suffering. They may not totally die; but what was on that truck, a 12-frame hive, is now a 6-frame hive. So we're losing a lot, to the almond industry; and it would be very helpful if we could improve that. And, like I said, we've been trying; but we just feel like we're not getting anywhere there on that.

So like, his list there is perfect, you guys. We need, you know, better training. We need more consistent training. All of those things would be really helpful.

As far as research goes, again, I, you know, echo what you've already heard today; but, you know, 90+ percent of the commercial colonies in the United States are in California during the bloom. So whatever is put on the almonds, we need to know what it is and what it can do for our bees. We've learned . . . We've got a very good working relationship with the almond growers now, and it's become politically correct to spray in the evening and at night. It is not law and not everyone follows it, but it is . . . We're getting there. It's improving a great deal. Some of the adjuvants that are going in with the sprays have become problematic because we don't know about them. You don't need them labeled. So research on the fungicides, the pesticides, the herbicides, and the adjuvants that are being put on almonds would be very, very helpful. And I know that that's what we're asking and what we're funding

at CSBA because live-bee testing doesn't go far enough. It needs to be a complete brood cycle because it might not kill the live bee pollinating; but they put them on the truck and they take them back to North Dakota; they're unloading them, and they're just kicking out dead bees left and right from what they've consumed while they were in California.

There's a joke that says if you ask three beekeepers an opinion, you'll get five. So Brett and I will differ a little bit on the registration. It is law in California, and CSBA does support registering your hives. A lot of beekeepers don't do it because they are coming in from out of state. They're not staying very long. We're moving our bees around from area to crop, and so it doesn't get done efficiently. I think the northern part of the state is way better than the latter part here as far as registration goes, and maybe that is because of our queen breeding program. Bob is my best friend and my worst enemy sometimes because I am a queen breeder; and when you bring in two million hives from out of California, they have problems, they have issues. In the southern part, we have ants. We also have hybrid Africanized bees. So now that they're getting moved to pollinate an orchard in Tehama County, that's problematic for the bee breeders.

Africanized drones are the most aggressive drones in nature. Elina will tell you, and that the other people that work on bees have done research and proven that when you're in competition with a European drone and an

Africanized drone, the Africanized drone wins. So that's not good for a bee breeder. Because Northern California is, really, the only place in the United States where we can get and have European stock, that is the gentlest bees. I get calls all the time from beekeepers who have been getting queens from the south that say, "Please, I need some queens that aren't mean. I can't get out of my truck. I'm losing my bee yards." All of that affects the supply to Bob. So that is problematic to us.

There is that small hive beetle, which, if you have a regular-sized colony, is a pest. But it is detriment all over the place when you're a queen breeder because you make a living on a small unit. That's how you start your queens is with a small unit. We call them "mating nucs," and you know, they're not much bigger than this piece of paper. So they are, you know, they're fresh pickings for a small hive beetle. And the Midwest and the southern eastern part have a lot of hive beetles. That's all coming to pollinate the almonds. So that's problematic in the North.

CSBA has a policy that if you find a swarm of bees in an Africanized-known area -- that it should be destroyed. And that's simply public health. We cannot be breeding those or trying to hive them when our hobby community does not understand what they are, and they're getting them too close to people's houses. Everyone wants to save the bees. And I always say, if

you really want to save the bees, plant more forage -- because an uneducated beekeeper is worse than no beekeeper.

The forage is huge. You know, anything we can do to increase the forage and the availability to state lands and public lands. We have passed numerous bills, but again -- as Bob was talking about -- it's a little problematic. The red tape is still too thick. We're still having a hard time actually getting on it.

So one of the things that we talk about all the time at CSBA is that we encourage the beekeepers to work with the farmers that provide the forage that feeds our bees. It does us no good to fight with other entities and other farmers that, you know, always worrying about the pesticides. It has to be a working situation in order to keep the bees healthy and to have food for them. They need the forage from those farms and those crops, and those crops have pests. We understand that. So we need to come in later, leave earlier, work together so that -- because a lot of them don't even need bees that we're getting a meal off of. So you know, we have to be cooperative with them. That goes a long way to, you know . . . Take your neighbor grower out to dinner instead of, you know, confront him at the ag office. That doesn't help you.

So let's see if I've touched everything that I wanted to. It's hard being the last person. We have . . . There is a bill, AB 2062, which has been introduced to help increase forage, bee forage, on landscape in the state; and we appreciate that a lot. The new trucking issues for, you know, the electronic

logging is going to be problematic for bees, you guys. It is because once you get them on the truck and get them moving you've got to keep them moving -- because it could be, you know, 20 degrees outside; but if you're in the middle of that bee load, it's hot, it's warm. And keeping them moving from going to place to place is the best we can do to make it healthy.

So thank you guys very much for allowing us to speak and to say this because some of us have been very frustrated over the policies that we have to live with. So it's interesting to hear people sit here and talk about, you know, we do this and we do that and we do that, when you know in reality what boots on the ground really is.

SENATOR GALGIANI: Thank you very much. And I'd like to follow up with you after the hearing so that we could get some recommendations that can be shared with the stakeholders and CDFA and the like. I think we've all learned a lot of new information here today. And I, too, am sorry that CDFA isn't -- I don't believe they're still present in the room. But I would very much like to follow up and make sure that we have some of your testimony in writing so that we can put forth some recommendations.

MS. PARK-BURRIS: Thank you very much. I appreciate that.

SENATOR GALGIANI: Thank you. Thank you. Yes?

UNIDENTIFIED FEMALE: [Inaudible]

SENATOR GALGIANI: Yes.

So thank you to our third panel, thank you very, very much. And we will open it up now for public comment.

UNIDENTIFIED MALE: You can sit there.

MS. ANDREA DINAPOLI: Do you know how to put this [inaudible].

MR. CURTIS. It's on the back. It's on the back. Thank you, Neal, for your help.

DR. WILLIAMS: I've got your back, Bob.

MS. DINAPOLI: This will be really quick, but it's important.

UNIDENTIFIED MALE: Is that you right there? Okay.

MS. DINAPOLI: Okay. And this is the microphone right here?

UNIDENTIFIED MALE: Yes, ma'am.

MS. DINAPOLI: Hi, everybody. Thank you for staying. This is a topic that a lot of people don't think about, but I wanted to bring to your attention that hobbyist beekeepers in our towns and cities are sometimes on the borders of agricultural areas; and we have an uncontrolled amount of hobbyist beekeepers. They're uneducated, untrained; and they're just able to bring as many bees as they want. They are bringing in disease. There is that one disease -- what's it called? -- that has the zombie fly? There's a technical term for it. But a mite attaches to the bee, makes it attracted to light at night; and it is coming into homes, residential homes, and stinging kids and whatnot. So there's a lot of bizarre things going on in our towns and cities that I wanted to

bring to your attention -- because a lot of the ordinances and stuff that apply to agriculture I think should apply to some of our city hobbyists.

So I'm going to just go ahead and read this. This is a car in my neighborhood. I live across the street from two guys that have beehives. They don't want to move them. So we are in the beeline flight path, and this is what pretty much happens every day. You try to wash it off with a hose. It's waxy. It doesn't come off with the hose. And if you do have your hose out, they all come around you because you've got water. So we have a big, big problem. And I do . . . I just want to address this because right now in San Francisco we don't have regulations. In a town of a million, we never needed it for a long time; but now we have this proliferation of hobbyists. It's become a fad. So I just . . . I want to address this.

So the recent interest in hobbyist beekeeping has caused a proliferation of honey bees in residential areas in California and throughout the US. In some areas, this can be constructive; but it can also have a negative impact for residents and bees. It would seem that even the agricultural areas should be concerned about the nearby residential hobbyist beekeepers bringing so many bees into the area. Cities such as San Francisco have a dense population with apartments and row houses. Many residents who live near hobbyist beehives are experiencing a large amount of honey bees coming into their property. And also, the bee droppings of several thousand bees make it impossible to enjoy

outdoor living. There also has been the side effect of the zombie fly disease, which I just mentioned, making bees attracted to light at night and coming into homes. This is having a negative impact on residents.

Many people who obtain honey bee hives for hobby are not truly educated on the complexity of beekeeping. Many cities and towns do not require training. Towns and cities across California and the US are experiencing an uncontrolled amount of hobbyist honey bees coming into residential neighborhoods. I'm a member of a working group to try to develop some sort of regulation or ordinance for the densely populated city of San Francisco. I am working with the agricultural commissioner right now, advocating for the residents. And we're working with the beekeepers, too, to try to come to some kind of terms. I'm also a victim of living near a large amount of hobbyist beehives.

Hobbyist beekeeping has become a fad, and many bee groups are approaching cities to get them to loosen their policies or to allow unmonitored honey bees into residential neighborhoods. They never mention the bee excrement problem and the possible impact on neighbors or the native bee. Having an uncontrolled amount of hobbyist honey bees on one block is not saving the bee. And I'm going to talk to Jackie to have her maybe come and talk to our group about this because, you know, people are thinking they're saving the bee, and it's just not.

I would like to ask the pertinent people to work with the counties and cities to address this issue to help create policies that will protect the citizens and demand a more responsible way to have hobbyist bees in residential areas. Please take these concerns into consideration when discussing current state of bees in California.

And you can get more info and see more photos of bees swarming into my neighbors' yards at urbanbeeimpact.com, that's urban B-E-E impact.com. I appreciate your time, for taking this into consideration. Thank you.

SENATOR GALGIANI: Thank you very much. And before you close, the disease that you're referring to is Huanglongbing, and it's the Asian citrus psyllid that carries that and spreads that to our bee population. And there are . . . Well, in Florida, for example, more than half of their crops were infected with Huanglongbing; and it nearly destroyed the citrus crop for the whole state. And we're at risk here in California; and there are multiple sets of strategies to try to prevent that from occurring here and for detecting the Asian citrus psyllid, which carries the disease.

MS. DINAPOLI: Is that what that is? Elina, is that . . . The zombie fly, is that the same thing that she's taking about?

DR. NIÑO: It's a different [inaudible] parasite [inaudible].

SENATOR GALGIANI: Different parasite?

DR. NIÑO: [Inaudible]

MS. DINAPOLI: Yeah, that's what's weird.

DR. NIÑO: [Inaudible]

MS. DINAPOLI: Yeah.

DR. NIÑO: I didn't . . . I wasn't under the impression that [inaudible]. I did hear about a couple of incidents.

MS. DINAPOLI: Well, that's the problem, is that people -- towns and cities and people just don't hear about it. Because we feel helpless. Even when I first discovered this, I was like, "Oh, my god. What is this?" You know, we feel helpless. You call 3-1-1. There's no regulation or, you know, you feel so much push back from the Save the Bee Campaign that, you know, most residents do feel helpless. But we did have . . . Like Raj, he has four kids. They couldn't even get into their house because at night the bees were surrounding his porch light. So you know, what are you supposed to do? And then we discovered after talking to John Hafernik, Professor John Hafernik, that he's doing research on the zombie fly, which changes their behavior. Bees usually don't come out at night, but at night they're attracted to light. So not only that, but they've come into people's houses. And there was an incident where they came in, and there was like 60,000 bees in this woman's kid's bedroom, and they stung her kid. And, you know, like I said, most beekeepers will move their hive when they realize it's causing a problem. But without regulations in San Francisco, we're having a problem and other towns are too.

And like I said, I think it's a dirty little secret that hobbyist beehives are keeping. They just want to keep bringing them in and have fun with their hives. It's a hobby. They're not . . . There's no agriculture going on. It's a hobby. So I think it's a serious problem, and I hope somebody will help -- help us and other towns.

SENATOR GALGIANI: Thank you. Thank you.

With that, do we have any other individuals who want to make a comment under public comment?

With that, we will conclude the hearing. And thank you to everyone who has participated and thank you to our attendees as well.

--oOo--