



The Environmental Synopsis

A Monthly Update from the Joint Legislative Air and Water Pollution Control and Conservation Committee

JUNE 2015



The Chairman's Corner

**Senator Scott E. Hutchinson,
Chairman**

One of the most popular summertime purchases of many rural Pennsylvanians is locally-produced honey.

Driving up to State College for this month's Legislative Forestry Task Force meeting, I saw two or three signs along the highway advertising the sale of this sweet homemade treat.

Despite honey's popularity, however, there is a serious threat facing honey bees across the nation, and scientists are still unsure exactly what is causing a strange phenomenon known as Colony Collapse Disorder, or CCD.

Honey bees play a critical role in agricultural production. A single honey bee visits more than 1,000 flowers and plants each day, pollinating \$15 billion worth of crops in the U.S. annually. On a global scale, 87 of the leading 115 food crops are reliant on animal pollinators, such as honey bees, which contribute to 35 percent of all global food production.

The benefits provided by honey bees aren't limited to the pollination of crops. Honey is also a valuable product with people around the world consuming 2.2 billion pounds of it each year. Honey is also used in wax, cosmetics and food. Some people even attribute medicinal properties to local honey as a remedy for

allergies, a digestive aid or even as a topical salve.

Unfortunately, like most of our important agricultural producers, honey bees are not immune to pressures posed by nature and human development, and have endured several setbacks during the course of their history here in the United States.

The mysterious Colony Collapse Disorder has been attributed to a third of all annual honey bee colony losses since 2007 without a single identifiable cause

One of the most notable threats to honey bees came from certain species of mites that originally devastated the population in Europe beginning in the early 20th century. To prevent the mites from spreading to the U.S., Congress passed the Honey Bee Restriction Act in 1922, which banned the importation of honey bees, and temporarily saved domestic honey bees from the terrible plight.

The federal importation ban continued to prevent the spread of mites to the U.S. until the 1980s, when the pests were first documented in Florida. Once introduced, the pests spread quickly, eventually costing beekeepers across the nation anywhere between 50-80 percent of their colonies. A loss of that magnitude crippled honey productions for many years, and the mites still continue to be a problem today, although effective strategies have emerged for mitigating new infestations.

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Notes from the Director

Tony M. Guerrieri, Executive Director

Arguments against the harmful effects of smoking are pervasive. We typically focus on health risks – lung cancer, heart disease, or the dangers of secondhand smoke. However, people are often unaware of the environmental impact and harm of cigarette filter waste.

Cigarette litter has grown as smoking has been banned from more and more places, and as cars have stopped including ashtrays as standard features. Used filters pile up in what are known as transition points. Transition points are those locations where a person must discontinue smoking before entering a smoke-free zone such as outside of doorways of public buildings, at retail sites and outside restaurants.

Cigarette filters are toxic, non-biodegradable, waste that create environmental health risks and an economic burden. Litter experts say cigarettes are, by far, the country's most tossed object, outpacing fast-food wrappers, caps and lids, and beverage containers, which come in a distant 2nd, 3rd and 4th, respectively.

According to one estimate, about 135 million pounds of cigarette filters annually get tossed on roadways, thrown in the trash or put in public ashtrays. Most of these filters littered on streets, sidewalks, and in storm drains are washed away by rain and end up in lakes, rivers and the ocean.

A 2012 report by the U.S. National Oceanic and Atmospheric Administration asserted that many marine animals mistake small plastics – such as cigarette butts – for food and choke on the plastic or starve to death because they can't properly digest it.

Cigarette filters are made from a high-grade synthetic plastic, known as cellulose acetate. Though filters may

look like cotton, the synthetic material is very durable and long-lasting.

Though small in size, filters also contain several hazardous chemicals. The tar and nicotine that is filtered out of the cigarette smoke tops the list of byproducts left behind once they are discarded.



Since 2012, TerraCycle, a company based out of New Jersey, has recycled more than 13.5 million discarded cigarette filters from nearly 5,000 collection locations

Studies done by Clean Virginia Waterways has determined that one filter in a gallon of water can kill small crustaceans, important food for the bottom of the aquatic food chain. This is especially disturbing considering that beaches are littered with cigarette filters.

A New Jersey-based recycling company, TerraCycle, is one of a handful of companies that is working to collect and recycle spent cigarette filters. Through TerraCycle's national "Cigarette Waste Brigade" program, organizations as well as people over the age of 21 can collect cigarette waste and send it to TerraCycle through a prepaid shipping label. Once received, participants will get credits that will be donated to Keep America Beautiful, a

nonprofit community action and education organization. They will receive about \$1 per pound of litter, which equals about 1,000 cigarette filters.

TerraCycle took nearly two years to develop the process to recycle cigarette filters. The collected filters are turned into a variety of products, primarily plastic pellets used to make items such as plastic shipping pallets, railroad ties and park benches. Because they've been exposed to nicotine, the pellets are not used to make household products. Any remaining tobacco or paper is recycled as compost.

The Cigarette Waste Brigade accepts extinguished cigarettes, cigarette filters, loose tobacco pouches, outer plastic packaging, inner foil packaging, rolling paper, and ash. TerraCycle does not accept the cardboard packaging of cigarette boxes since they can usually be recycled through traditional municipal recycling programs.

Since 2012, TerraCycle has collected more than 13.5 million units of cigarette filters from 4,801 collection locations.

Founded in 2001, TerraCycle works with hundreds of major brands in the U.S. and in dozens of other countries to collect and repurpose materials that would otherwise end up in landfills. In addition to cigarette filters, the company said it is working on transforming other harder-to-recycle items. For example, the company has recently turned its attention to the small, air-tight plastic coffee brewing capsules, best known by the brand name K-Cup. TerraCycle began the coffee capsule-recycling program about 18 months ago and has already recycled 2,481 pounds of the cups through its "Zero Waste Box" program.

For more information on TerraCycle visit: www.terracycle.com.

Research Briefs

Each month, the Committee's staff researches and prepares a number of "briefs" on several topics relevant to the Committee's mission. Very often, these briefs include references to reports and further research on the topics so that readers may pursue issues on their own. Please note that the information and opinions expressed in the Research Brief articles do not necessarily represent the opinions or positions of the Joint Legislative Air and Water Pollution Control and Conservation Committee, nor those of the Pennsylvania General Assembly.

Households Unclear on Where Their Energy is Going

Coleen P. Engvall,
Research Analyst

There are several reasons that the average American household is trying to cut back on energy usage. Cost savings and environmental consciousness appear to be the biggest drivers. But just because someone wants to save energy doesn't mean they know the best way to make their home more efficient. Some experts believe that the continued drain of power from homes is not due to irresponsibility nor apathy, but rather from a misunderstanding for what consumes the most significant portion of their month's energy bill.

Researchers at Ohio State University attempted to explain this disconnect in their report entitled, *Cognitive Accessibility in Judgments of Household Energy Consumption*, published in the *Journal of Environmental Psychology*.

The report looked at why people assumed that things like lights, computers and appliances were the culprits for high energy bills when on average, home heating, water heating and air conditioning are where the bulk of energy usage comes from. If personal vehicles are included in the listing, they come out on top.

So what is it that makes people blame their lights and computers before their water heater? The report argues that people tend to pay more attention to the devices that they interact with the most frequently. For example, lighting is a highly visible form of energy use that requires the user to directly

activate and deactivate each time they use it. This makes the act and the appliance foremost in the user's mind. However, something like a water heater is always on, and as a consequence, often forgotten about. In other words, people think that the devices they actively operate the most are the ones consuming the most energy.

The report's writers call this "cognitive accessibility." It is a similar principle to the availability heuristic, which is a mental shortcut that people use when trying to understand or evaluate new or confusing concepts. People tend to use examples that they recall immediately, but is not necessarily representative information. In both cases, people take immediately available assumptions in order to make broader generalizations.

The researchers concluded that a mental shortcut, known as cognitive accessibility, explains why people equate frequency of use with actual energy usage

In the study, the participants were asked not only to judge what they thought accounted for the most energy usage, but also to estimate what percentage each appliance accounted for. The results showed that people not only got the order wrong, but they misunderstood how much energy things like home heating consumed. The study also asked people to estimate how often they interacted with the device. The researchers then compared the discrepancies to

these numbers of interactions, to see if it was really affecting people's perceptions. In each of the studies detailed in the report, this appeared to be the case.

While there are consumers who are educated on how to best save energy, many others use their own perceptions of what is wasteful to try to curtail their energy use. As this report and others have shown, this results in ineffective energy conservation strategies.

So how can appliances that are wasteful grab people's attention more effectively? First, the report recommends that the correct information continue to be disseminated to consumers. However, they note that this has already been tried to a large extent and has failed to produce any changes in behavior. They point to the fact that on Google, searches pertaining to saving electricity are more likely to produce results about lighting than heating and cooling.

Aside from external sources of information, the authors mention adding feedback that is immediately available to the consumer in their home. For example, adding a display to appliances such as refrigerators or air conditioning units that track how much they are used, or the amount of electricity expended over time. This con-



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stant reminder, coupled with separating the single device from the total bill can help curtail use and realize savings.

The full report, Cognitive Accessibility in Judgments of Household Energy Consumption, is available at: www.sciencedirect.com/science/article/pii/S0272494415300049#.

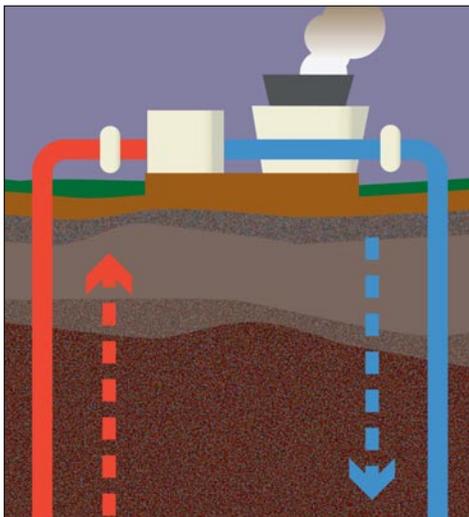
Geothermal Energy May Be Gaining Steam

Adam J. Banks,
Legislative Intern

The technological world around us is growing larger every day, and with that growth comes a constant need for more energy to keep producing goods and meet demands. As these consumer demands and energy prices rise through traditional resources such as coal and oil, some companies have chosen to search for different power outlets, such as the renewable option of geothermal energy.

The production of geothermal energy occurs as water flowing deep into the Earth's crust is heated by the Earth's core and evaporates into steam. That steam is then used to spin turbines, creating electric power from an essentially unlimited energy source.

Although mainly popular in Western



states and hotter climates, a 2006 Massachusetts Institute of Technology study on geothermal energy showed that only two things are really necessary to create geothermal energy production: a location to drill a reservoir, and enough water flowing through highly permeable rock that can sustain the life of the reservoir. These reservoirs are discovered through methods similar to oil and gas drilling and are ideally full of hot, natural liquids that are contained in underground aquifers hot enough to allow for prolonged steam creation and extraction.

New techniques utilizing a similar technology are becoming more widespread across Pennsylvania as some homeowners have invested in geothermal heating and cooling systems that provide constant inflow or outflow of air from the Earth's crust.

The study also showed that this method of obtaining energy may also be among the most efficient sources known today as the process will continue day and night, regardless of exposure to sunlight or other sources of natural energy.

According to the Geothermal Energy Association's (GEA) yearly study, entitled the 2015 Annual U.S. & Global Geothermal Power Production Report, geothermal energy production is on the rise around the world.

The report shows that, globally, overall geothermal energy production has risen to 12.8 gigawatts (GW), with 3.5 GW alone being produced by the United States. These numbers are forecasted to keep growing in the future, reaching 17.6 GW globally by 2020, and an announced goal of over 5 GW in the U.S. by 2032.

The report goes on to further estimate that as many as 40 countries may have the geothermal underground resources necessary to produce a large proportion of their electrical demand.

The annual report showed that overall geothermal production is still on the rise

in the U.S, but has hit a slow point in its growth as much of the market is undergoing consolidation and restructuring. These changes have occurred due to the fact that many larger businesses are waiting for the technology to gain greater support among federal and state officials.

According to the Geothermal Energy Association's annual report, of the 200 GW of identified geothermal power available globally, only 6.5 percent is currently being used or will be used in the near future

There may be legislative support in the near future, however, as the U.S. Environmental Protection Agency (EPA) begins implementation of its Clean Power Plan. This plan is set to create state-based regulations on carbon pollution in energy production. If properly implemented, the new policy could attract more geothermal energy production due to its significantly smaller carbon footprint, especially when compared to that of natural gas or coal.

Geothermal production is currently focused in Western states where there is much higher heat flow underground. The report shows that these leading states include California with 2,760 Megawatts (MW), Nevada with 580 MW, and Oregon with 35 MW. All three states are planning significant rises in geothermal electric production at increases of 855 MW (California), 168 MW (Nevada), and 99 MW (Oregon). Other states included in the report with growing geothermal production include Utah (77 MW), Hawaii (47 MW), and Idaho (18 MW).

Overall, the technology of the geothermal industry still continues to grow and may soon become a reliable source of energy in Eastern states, such as Pennsylvania, but in a much smaller energy producing capacity.

To view the GEA's annual report, entitled 2015 Annual U.S. & Global Geothermal Power Production Report, visit: <http://geo-energy.org/reports.aspx>.

EPA Releases Preliminary Results on Hydraulic Fracturing

Coleen P. Engvall,
Research Analyst

In the early 2000s, the world experienced a veritable energy revolution when new techniques were developed that allowed for the extraction of natural gas reserves long-considered unreachable. These techniques are known as hydraulic fracturing and directional drilling. In the United States alone, gross natural gas withdrawals from shale formations increased by over 500 percent from 2007 to 2012.

However, hydraulic fracturing has sparked controversy in many places, including here in Pennsylvania. Opponents worry that the chemicals used in hydraulic fracturing can be dangerous for underground water supplies and eventually lead to the contamination of drinking water.

In response to these concerns, the U.S. Environmental Protection Agency (EPA) began a study that followed the use of water in hydraulic fracturing to see its effects on water both locally and from a broader perspective. They released their findings earlier this month in their report entitled Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources.

The publication, they clarify, is only a draft assessment, and will undergo a peer-review process as well as a com-

ment period that is open to the public. Because these steps have yet to be taken, they state that it is not meant to be used to inform policy decisions or to assess human health.

With that in mind, they present the preliminary results of their study. They followed the "water cycle," which consisted of water removal, the adding of chemicals and proppants, the actual injection of the water into the well, the flow back of this water, and finally the reuse, treatment and disposal of the wastewater byproduct.

After identifying potential threats to drinking water and examining current data, the EPA concluded that there is no widespread, systemic damage being caused by hydraulic fracturing



At each of these stages, the EPA examined reports and data from various sources, such as state and national reports, scientific journals, non-governmental organizations, and industry data and publications. Using these sources, they determined how

water sources were impacted, both in terms of quality and quantity.

After scrutinizing data in each of these stages, they identified a potential for drinking water contamination in a certain circumstances. Namely, withdrawing water from areas with low water availability, chemical spills, conducting fracturing directly within a water source, migration of liquids and gases and the release of inadequately treated wastewater.

Looking into these specific threats, the report concluded that the industry has not been the cause of any widespread, systemic impacts to drinking water supplies.

They note that reports of incidents where drinking water was impacted tend to be anecdotal, rather than studies done over time, due to a lack of data about the water sources before the fracturing began. Therefore, based on the anecdotes alone, the incidents of water quality impacts are very low compared to the activity of the industry as a whole.

However, they do note that at a localized level, there are still risks. They point to reports that detailed wells being contaminated by hydraulic fracturing in the past, via gas migration or chemical spills. This, they state, requires further study, and they express the hope that both scientists and industry researchers will work to fill this gap in data in the future.

The report closes by acknowledging that the data is still limited for a number of reasons. Looking to future reports, they hope to overcome limitations such as shortages of long-term data and the relatively small pool of systematic studies to draw from. The EPA will continue to monitor the industry as it continues to grow and more information is gathered.

To read Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, go to: <http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651>.

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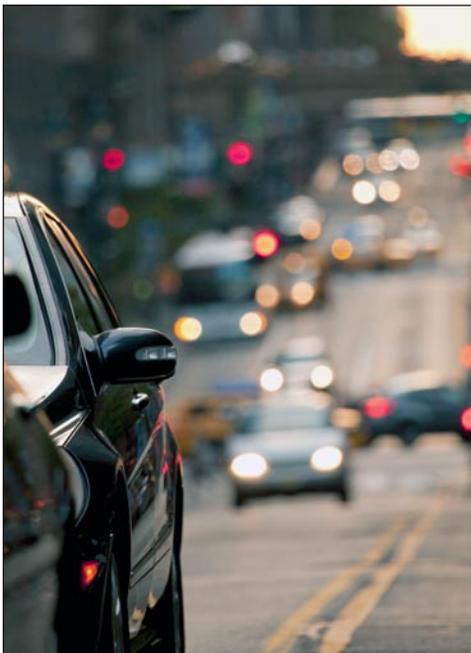
Who Uses Zipcars? Urban Boomers, That's Who

Tony M. Guerrieri,
Executive Director

If you or your spouse is over 50 years of age, and you live in the city, you may want the access to a car and the freedom it offers, without having to own one. Zipcar, the world's largest car sharing network initially designed for Millennials, has found that "Urban Boomers," or members of the baby boomer generation who have moved to the city, are a prime demographic for adopting new mobility solutions such as car sharing.

Zipcar is an alternative to a traditional car rental service that aims to be easier, more cost-effective, and has the ultimate goal of rivaling car ownership. Because it recently began noticing an uptick in memberships and reservations from adults ages 50 to 69 who live in urban areas, Zipcar commissioned a study through KRC Research to determine whether boomers are really sharing the ride.

The Urban Boomer is, according to the study, "tech-savvy, highly active, and



while many still own a car, they are driving less after moving to the city" and open to the concept of car sharing, making it a target for transportation alternatives like Zipcar. KRC polled over 1,004 Urban Boomers from coast to coast as part of the study.

Nearly 8-in-10 so-called "Urban Boomers" own at least one car, but they reported using it far less frequently once they moved into the city, making them a prime target for car sharing initiatives

When a person applies for a membership, their driving record is reviewed and they are usually able to share a car within a few days. Their "Zipcard" is their membership "key," so to speak. It allows them to lock and unlock the car and identifies them as a Zipcar member. Zipcar allows members of its sharing network to reserve cars for personal use by the hour or the day.

Car sharing is just one of the amenities that Urban Boomers seek when they consider moving to a city, according to the Zipcar study. An overwhelming 90 percent said that amenities, such as restaurants, shopping and the arts are the number one factor for moving to a city. And since only 32 percent are retired, it makes good sense that 87 percent are drawn to the shorter commute that city life affords. An additional 65 percent say that they like the fact that living in the city allows them to get around without a car.

Beyond access and convenience, Urban Boomers are looking to optimize, not just simplify, their lives. Sixty-nine percent say that mobile apps make their lives easier, and a whopping 81 percent of Urban Boomers use Facebook.

But it is not just Urban Boomers' motivations, migrations, and mobile actions that are making waves; as their locations change, so do their lifestyles, habits and even emotions. Living in the city makes 55 percent of Urban Boomers feel like their life is more exciting and carefree, with 23 percent taking on a new hobby. And the renewed zest for life extends beyond each Urban Boomer – 61 percent feel closer to their significant other.

Car sharing has increasingly become an alternative for the Urban Boomers who indicate they do not need a car or even have a license, however a driver's license is required to join a car sharing service. Nearly eight-in-ten Urban Boomers do own at least one car, but they have used it less since moving to the city. Nearly one-third of Urban Boomer car owners do not use it every day. The survey finds that members of this demographic would be more upset if they lost their laptop than if they lost their car.

In Pennsylvania, Zipcar has 15 locations, including Philadelphia, Pittsburgh and several college communities such as State College and Carlisle.

Based on the European model of car sharing, Zipcar was founded in 2000 as a way to reduce the number of cars on the road – and subsequently lessen congestion and pollution. According to Zipcar data, each of its vehicles has the potential to take 15 privately owned cars off the road.

Currently, Zipcar has more than 900,000 members, spanning millennials, young professionals, and Urban Boomers, and provides more than 10,000 vehicles throughout the world, including Canada, Spain, France and more. Zipcar also recently has added locations in Ottawa and has launched in Turkey.

For more details from Zipcar's Urban Boomer Study, click on www.slideshare.net/Zipcar_PR/zipcar-urban-boomersstudyfinal.

This Month in Conservation History....

A look back at the evolution of environmental stewardship

25 Years of Ozone Protections

In 1990, Congress took time to address revisions proposed by President George H.W. Bush on the Clean Air Act.



The President's overall intentions of the revisions were to overcome three major problems in the nation's environment at the time: acid rain, urban air pollution, and toxic air emissions.

In June, revisions were made to the act in terms of Stratospheric Ozone and Global Climate Protection. The Title VI revision updated the act to the then EPA current regulations by phasing out production of any substance depleting the ozone layer. This included complete phase-out of chlorofluorocarbon (CFC) and halons.

Water Conservation Efforts Arise 50 Years Ago

The daily use of water became a topic of discussion for Pennsylvania farmers in June of 1965. The concerning statistics, cited in a Titusville Herald article, showed that 255 billion gallons of water were being used in the U.S. each day. This number was nearing the 315 billion fresh water supply limit, becoming a concern for Pennsylvanians who needed fresh water for farming. The concern led to discussion on emphasis for conversation and pollution control within county farmers' associations.

Committee Chronicles...

A review of some memorable Committee events

On June 11, the committee convened the first meeting of the 2015-16 Legislative Forestry Task Force at Celebration Hall in State College. The guest presenter for the first meeting was Mr. Ryan Szuch, forest planner with the Pennsylvania Department of Conservation and Natural Resources' Bureau of Forestry. Ryan discussed the preliminary draft of the bureau's revised State Forest Resource Management Plan, a document which guides development of the state's 2.2 million acres of state forest land.

State Representatives Jaret Gibbons and Kathy Rapp (pictured at right) discuss the potential impacts of DCNR's revised State Forest Resource Management Plan with Dave Miller of Allegheny Forestry, Inc. and Peter Yaffe, representing Glatfelter paper products.



State Senator Scott Hutchinson (pictured above, left), chairman of the Joint Legislative Conservation Committee, welcomed Mr. Ryan Szuch from the DCNR's Bureau of Forestry as the guest presenter for the first meeting of the Legislative Forestry Task Force. Ryan is one of the principal forest planners involved in revising the State Forest Resource Management Plan and offered task force members a look at the bureau's preliminary draft.



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The Chairman's Corner

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In the mid-1990s, while honey bees were coping with mite infestations, a mysterious new disease began affecting bee colonies in certain regions of the country, including Pennsylvania.

Beekeepers were reporting that entire colonies had simply vanished, with the exception of the queen and a few immature bees. No dead bees remained and the honey was largely still intact. Pennsylvania beekeepers were hit especially hard, losing over 50 percent of their colonies in 1995-96 without a single identifiable cause.

The strange disappearance of bee colonies largely faded from memory until more cases of what is now known as CCD began to resurface in 2006 and 2007. Some beekeepers began reporting colony losses as high as 90 percent, which baffled scientists and first brought the new phenomenon into the public spotlight. Since that time, the U.S. Department of Agriculture (USDA) has consistently tracked annual colony losses at over 30 percent, with nearly a third of those losses attributed to CCD over the last eight years.

The potential economic impact of CCD is concerning. If such sizable losses from CCD were to continue indefinitely, honey bees wouldn't necessarily go extinct, but the cost of honey bee pollination would increase substantially. This would ultimately be passed on to the consumer in the form of higher food prices.

Scientists at the USDA are still searching for the exact cause of the disorder, and they are currently conducting research on four main possibilities. One of the potential causes are pathogens, such as viruses or bacteria, which have infected worker bees and caused them to vacate the hives. Two of the main culprits could be Nosema, a gut fungi, or the Israeli Acute Paralysis virus, but ex-

perts believe it is more likely a mix of several pathogens within a hive, rather than a single virus.

Another possibility is that the invasive mites could be correlated with the onset of CCD. Evidence is limited, but some scientists believe CCD could be caused by a virus carried by the mites which is transmitted to the worker bees, similar to a mosquito carrying the malaria virus.



The remaining possibilities are the result of management and environmental stressors, or a combination thereof. Poor nutrition, colony overcrowding, the introduction of pesticides, scarcity of pollen and nectar, and other conditions have all been identified as potential causes of CCD. A common misconception is that cell phone or cellular towers are causing CCD by impacting honey bee homing systems, but the USDA has ruled out this possibility.

In the meantime, the agency recommends beekeepers continue to focus on overall honey bee health by using industry best management techniques. The public can help protect colonies as well by minimizing the use of pesticides and planting pollinator-friendly plants such as red clover and foxglove.

Through continued research, the USDA hopes that trends will emerge in CCD and the disorder can be mitigated. Otherwise, the disorder will continue to threaten our nation's valuable apiculture industry.