Proposed Management Plan

1. Removal and prevention of Varroa mites and Israeli Acute Paralysis Virus
2. Details

* In October of 2006, beekeepers in the United States started reporting losses of 30 to 90 percent of adult worker bees in their hives. This unusually high disappearance rate came to be known as Colony Collapse Disorder (CCD). Since its discovery in 2006, colony collapse disorder has rapidly spread throughout the world. Cases of CCD have been reported as far as Canada, Europe, Australia, China, and Brazil. (Jacobsen 2008). CCD occurs when low to no adult worker honeybees, a live queen, and no dead honeybee bodies are present in the hive. Honeybees (*Apis mellifera*)are responsible for pollinating over 30% of world crops and over 100 different types of flora. (Agricultural 2012). Though scientists have been researching the causes of colony collapse disorder since it became a problem, no direct cause has been linked to every case of CCD. Varroa mites (*Varroa destructor)* are one of the possible parasites responsible for CCD. Varroa mites are external honeybee parasites that attack both adults and the brood (youth). A female mite will enter the honeybee and lay eggs. The female and her eggs with feed and develop on the maturing bee. The mites suck the blood from the honeybee, weakening and shortening the victim’s life span. Varroa mites spread from colony to colony by being carried by a honeybee (Bessin 2012). Israeli Acute Paralysis Virus is an infection carried by the varroa mite. IAPV presents with honeybees suffering from shivering wings, which then progresses to paralysis, followed by death just outside the hive (Virus 2007).
* The goal of removal of Varroa mites is to eliminate two possible causes for colony collapse disorder (Varroa mites and Israeli Acute Paralysis Virus, which is carried by mites), and hopefully prevent the loss of a great deal of hives.
* Suggested testing will occur on all hives in Southwest Colorado (Montrose to Crested Butte to Pagosa Springs) for Varroa mites through sugar shake, sticky board, and alcohol wash methods.
* For those hives already infested with Varroa mites, a screen will be inserted above the bottom board of the hive to prevent dislodged mites from reattaching to the bees.
* In order to help get rid of Varroa mite infestations, Apistan\* strips will be hung in infested hives (2 per brood chamber). To prevent mites growing resistant to the pesticide on the Apistan\* strips, this treatment will be rotated with Checkmite+ (Cushman 2003).
* Initial treatment strips of each type will be provided by the city. All subsequent treatment will be administered by the beekeepers at their discretion.
* Beginning in the spring of 2013, treatment will occur before the first week of honey season and after the last week of honey season so as not to contaminate the honey.
* Treatment will be changed every six weeks on the honey off-season when the daytime temperatures are above 50°F.
* Testing and treatment will be done by the hives’ respective beekeepers at their own discretion.
* Instructions on how to treat infested hives will be given to all local beekeepers through their local beekeeping association. Testing and treatment will not be mandatory, though it will be suggested in order to maintain healthy hives.
* As there is no treatment for Israeli Acute Paralysis Virus, all efforts will be directed towards the mites who carry the pathogen.

1. Benefits

* Treatment of two possible causes of colony collapse disorder.
* Prevention of future collapse at the hands of Varroa mites or Israeli Acute Paralysis Virus.
* Use of pesticides that are not harmful to bees.

1. Cons

* Should the pesticide treatment be performed at the wrong time, the brood wax that the bees produce could be contaminated, thereby endangering the young bees in the hive.
* The mites could develop resistance to the treatments, leading it to not be effective.
* Some hives that are already infested might be too unhealthy to survive, even with treatment.
* Hives could collapse from a different possible cause for CCD such as poor nutrition or nosema.

1. Continued monitoring of honeybee populations with no further human involvement.
2. Details

* Management and environmental stressors have also been implicated in having a role in Colony Collapse Disorder. Among the management stressors that could be possible contributors are poor nutrition due to apiary overcrowding and increased migratory stress. As a result of declining honeybee population, healthy hives are being transported across greater distances across the country. This amount of transportation can put stress on the honeybees. However, since the 1880s, honeybee population losses have followed a natural cycle of decline, eventually resolving itself with no human involvement (Underwood 2007).
* Continued monitoring of all honeybee colonies in Southwest Colorado will occur to ensure that the overall health of the honeybees is not declining.
* Bi-annual population surveys will occur in Southwest Colorado to plot honeybee population over time. This will optimistically illustrate the growing honeybee population.
* Surveys will be done by all beekeepers currently housing honeybees in Southwest Colorado.
  + The USDA will implement mandatory monitoring and all data collected will be entered into a national and international database.

1. Benefits

* CCD could naturally resolve itself within a couple years and withdrawing human involvement could save millions of dollars in research and resources.
* Human involvement could be disturbing the natural resolution of colony collapse disorder.

1. Cons

* CCD could possibly not be a part of the natural 40-year population cycle of honeybees, and if human involvement is withdrawn, it could be endanger the healthy honeybees.

1. Public Outreach regarding pesticide use and local CCD prevention.
2. Details

* Stress can be caused by pollen and nectar scarcity, lack of diversity in nectar and pollen, and pollen and nectar with low to no nutritional value. Other stressors include limited access to water or access to contaminated water, and accidental or intentional exposure to pesticides (Agriculture 2012). The main class of pesticide currently being thought of as a strong link to CCD is neonicotinoids. Researchers have found that bees exposed to this widely used class of pesticide including imidacloprid, clothianidin, and thiamethoxan were less likely to return to their hives after venturing out to forage. Neonicotinoids, which were introduced in the nineteen-nineties, are neurotoxins that, as the name suggests, chemically resemble nicotine. Neonicotinoids are what are known as systemic pesticides: seeds are treated with the chemicals, which then are taken up by the vascular systems of the growing plants. According to the Pesticide Action Network, at least a hundred and forty million acres were planted with neonicotinoid-treated seeds in 2010. This is an area larger than California and Florida combined. (Kolbert 2012)
* Starting in the spring of 2013, important information about colony collapse disorder will be broadcasted to the public using different methods of advertising: local radio and print.
* Public Service Announcements will be funded by the city. Donations from the public are acceptable, and will be handed by the city and a local beekeepers’ association.
* The purpose of these public service announcements will be to educate the public about safe pesticide use and local prevention of CCD.
* Public Service Announcements will contain information about neonicotoid pesticides and the danger public use of these pesticides causes.
* Advertising will be put in the Durango Herald and other respective local newspapers warning people about the dangers of improper pesticide use.
* Annual public education seminars will be held with a panel of local beekeepers, updating the public on new ways to protect the bees and the population progress on a national scale.

1. Benefits

* By broadcasting in several different mediums, it is almost ensuring that every citizen is aware of the problem
* The public will be educated on ways that they can help prevent the collapse of their local bees.

1. Cons

* The public may choose to ignore the public service announcements and warnings and continue to use toxic pesticides, causing bee populations to remain on a decline.
* The cost for the entirety of the plan could be very expensive.
* This plan requires a lot of planning and cooperation from the public, which can be very difficult.