Swarms and Swarm Trapping

Jennifer Lund, Maine State Apiarist
Department of Agriculture, Conservation and Forestry
Division of Animal and Plant Health
Email: jennifer.lund@maine.gov

Honey bee swarms are something that every beekeeper will deal with at some point or another in their beekeeping career. Beekeepers often say that swarming is a sign of bad beekeeping when in fact it is normal and often a sign of a productive and/or strong honey bee colony.

What is swarming and why does it happen?

Honey bees have both internal reproduction (the queen laying eggs) and external reproduction known as swarming. Swarming is honey bee reproduction at the colony level and is necessary for the survival of the species. When a colony swarms, the colony splits into two or more distinct colonies, growing the population of honey bees in the local environment. Genes are exchanged as the new queen in the original colony mates with drones from other colonies in the area.

Honey bee colonies tend to swarm in spring around the time of the first good nectar flow. Several factors can lead to an increased likelihood of swarming including increased nectar and pollen availability, genetic strain of the bees, lengthening daylight, queen age, dilution or loss of queen pheromone and most importantly, congestion.

It is not solely the size or population of the hive that determine whether a hive will swarm but the number of bees in relation to the size of the hive space. So, it is not necessarily that *strong* colonies swarm but rather that *crowded* ones do. Crowding works on increasing the likelihood of swarming in two ways. First when a colony becomes overcrowded, it may be more difficult for workers to detect queen pheromone because it is spread between more individuals and becomes diluted within the hive. This pheromone prevents workers from rearing new queens, developing ovaries, and laying eggs. When this pheromone dilutes, workers begin rearing new queens.

Secondly, overcrowding can cause a lack of open cells for the queen to lay eggs in. As the colony grows, cells fill up with brood and food, forcing the queen to lay fertilized eggs in queen cups. Queen cups are cells that lay vertically in the hive and can be located anywhere on a frame (bottom and on the face). The larva in queen cells are fed royal jelly throughout their life and capped at around 8 days. Capping of queen cells signals to the hive that it is time to swarm.

How does a colony swarm?

Queens are often too heavy to fly, so before swarming the workers reduce the amount of food they feed the queen and "run" her around the frames, causing her to lose weight and reduce egg laying. Workers reduce foraging and gorge on honey. If the beekeeper is listening carefully to the hive, the noise right before a hive swarms will increase dramatically.

At the start of swarming, 50% to 70% of the workers rush out of the hive, herding the old queen to the entrance. At the entrance the old queen takes flight and lands on a nearby structure, often a tree branch or similar object. The workers follow the queen and form a cluster around her. This cluster can remain at this location for a couple of minutes up to a couple of days while scout bees are sent out to find a suitable nesting location. An individual scout returning to the cluster will promotes a location she has found using the waggle dance indicating its direction, distance, and quality to others in the cluster. Other scouts will leave the cluster to inspect the location she found. If they also find the site suitable, they will promote the site upon their return.

At the beginning, several sites may be promoted by different scout bees, but over time a single location gradually emerges as the favorite. Once a new nesting site is being "promoted" by the majority of scouts, the entire cluster flies to the site in mass.

The parent hive is left with a third to half the adult bee population, all the brood, and multiple queens developing in their cells. Each of these new queens are in a race to emerge first. The first queen to emerge will kill the other queen cells in the hive. Sometimes multiple queens will emerge in succession and swarm. This is referred to as an after-swarm, or a cast swarm. Eventually one of the virgin queens will stay in the old colony and become the new queen. A few days after emerging, this virgin queen will fly out to a drone congregation area where she will mate with multiple drones. Once fully mated, the queen will return to the parent hive and begin to lay eggs.

Why do beekeepers want to prevent swarming?

Because 50-70% of the adult bee population leaves the hive with a swarm, honey production can be adversely impacted. Brood rearing is interrupted while the new queen matures, mates, and begins to lay eggs which can slow down colony growth. Finally, the swarm that leaves the colony can become a nuisance if they cluster on a neighbor's property. Not everyone appreciates a tree full of bees.

How can a beekeeper prevent swarming?

There are several things you can do to attempt to prevent swarms. It is important to be able to recognize the signs of swarm preparation in the colony before queen cells are capped. Once queen cells are capped, it is nearly impossible to stop your bees from swarming.

Providing adequate brood space and preventing overcrowding are simple, effective swarm preventive measures. During the winter months, the colony cluster typically moves from the bottom of the hive to the top of the hive as it feeds on honey. As they move up in the hive, they may vacate the boxes below leaving empty space. Often the bee cluster is reluctant to migrate downward in the hive, causing crowding and congestion in the upper parts of the colony. The solution to this dilemma is to reverse the boxes. To reverse hive bodies, simply take the empty boxes from the bottom and insert them above where the bees are clustered. Only do this if there is no brood in the lower box. Otherwise, you will split the brood, and the bee population may not be strong enough to cluster over both areas and the unprotected brood may die. Later in the spring as the bee populations are growing, you may find that all your hive boxes are full and reversing the boxes will not work for alleviating overcrowding. This is when you should super. This is especially important to do once the first real nectar flow begins.

Colony equalization can also be used to reduce swarming. As colonies come out of winter, disease free brood (plus associated nurse bees) and food frames can be removed from strong colonies and placed into weaker overwintered colonies or added to recently installed packages and nucs. Replacing the removed frames with empty drawn comb will give the queen more space to lay eggs.

Creating splits can be another way to relieve colony congestion. Splitting is creating an "artificial swarm". There are several ways to do splits but in general the old queen and several frames of bees, brood, honey and pollen are removed and placed into another set of equipment. The remaining parent colony is given empty drawn frames or foundation and either a new queen, queen cell, or is left to produce its own queen.

Requeening a colony may reduce the likelihood of swarming. Young queens produce more queen pheromone, which in turn inhibits swarm preparation by workers. Ideally it is best to requeen a colony several weeks before the first nectar flow but in Maine it is often difficult to acquire queens in early spring. A good alternative is to requeen colonies in late summer when queens are readily available. The following spring, this younger queen and her increased pheromone production may help to reduce or prevent swarming.

Clipping a queen's wing could also minimize swarming in colonies because it keeps her from being able to leave with the swarm. Clipped queen may still attempt to leave with a swarm, but she will not be able to fly so the swarm will return to the nest or cluster on the ground near the entrance of the hive. These swarms should be collected and put into a new hive. Do not attempt to reintroduce the swarm back into the parent colony, they will often not accept it, or the hive will swarm again shortly after the reintroduction. It should also be noted that colonies that cannot swarm because their queen is unable to fly may kill their queen in an attempt to produce one that can fly.

Finally, cutting or removing queen cells can sometimes help reduce swarming. This method is extremely time consuming, and it often does not work. The idea here is to remove all queen cells every 5-7 days before they are capped. Remember, the old queen leaves with the swarm

just before the new queen cells are capped so it is important to remove them before any are capped. It is important to find the queen in the hive before starting to remove queen cells as she may have already left the hive with a swarm. In this case, cutting queen cells will leave you with a queenless hive. After the queen is located, every frame in the hive is systematically removed and inspected for queen cells. I recommend shaking the bees off each frame into the hive body in order to easily locate queen cells. It is important to make sure you remove every cell. If one queen cell is missed and allowed to be capped, the hive will swarm.

How do you collect a swarm?

Everyone loves free-bees! There are various methods to capture a swarm. A lot of the variation depends on the location and how easy it is to access the swarm. The easiest collections are when the swarm is located on a lower branch or in a small tree. In this case put a white sheet and nuc box or other collection container under the swarm. Vigorously shake the branch to dislodge the cluster. Your goal is to get most of the cluster with the queen into the box. You will know immediately If you get the queen because the remaining bees will start moving towards the box. You will also see bees near the opening of the box, fanning the queen's pheromone. After 15-20 minutes most bees will be inside the box. If all the bees leave the box and fly back up to the limb you did not get the queen into the box. Let the bees settle again on the branch and try again. If the swarm is entangled in its perch or very high above the ground, you may need to use some imaginative techniques to retrieve it. Sometimes a swarm is impossible or too dangerous to collect. It is important to be able to recognize this and walk away if necessary. It is preferential to place newly captured swarms of unknown origin in a holding yard away from your main apiary. This way the new hive can be quarantined until they are determined to be healthy, checked for mites and treated accordingly.

Can you trap swarms?

Yes! Your success will depend on providing a good nesting site for honey bees.

What scout bees look for in a home:

The right size. Honey bees prefer a home that is 10 to 15 gallons or about the size of a single 10 frame deep box or two five frame nuc boxes stacked.

Off the ground. Hanging hives between 12–15 feet off the ground is ideal. This gives the colony protection from both predators and dampness.

A small entrance. Around 2 square inches near the bottom of the box is ideal. Traps with larger entrances are usually ignored because they will be harder for bees to defend from predators.

Well protected from weather. The trap should be well protected from the elements. Hanging the trap with the entrance angled slightly down can help insure the trap remains dry inside.

The smell of previous inhabitants. Installing a couple of frames of dark brood comb or rubbing the inside of the trap with propolis and beeswax can make it more attractive. There are also various "lures" that you can use to make the trap more enticing.

Easy to find. If you hide your swarm traps, the bees will also have a hard time finding them.

Not too close to established hives. Bees like to space themselves out in the environment so traps placed close to the existing colony will not be as attractive to scout bees as one further away. A good trap location would be anywhere from a couple hundred feet to 1 mile away from an existing hive.

Food and water nearby. Scout bees start looking for new nest sites in areas where they were previously foraging for nectar and pollen. Areas with little bee food are less attractive to a swarm. Likewise, if there is no water source nearby, a swarm will ignore the trap.

Some other helpful hints to consider when trapping for swarms: You will be climbing up and down ladders with them, so make sure your traps are lightweight. They should also be easy to hang and remove. You do not want to have to use loud tools or jostle the trap too much to remove it when it is full of bees. You should also make them easy to inspect for signs of inhabitants from the ground and you should check them regularly. The new swarm could outgrow the trap quickly and re-swarm. Also, once the new colony starts building comb, they are harder to install into new equipment. Along the same lines, if you use frames with comb in your traps, it will make it easier to install that new hive into your existing equipment.

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