The
Barefoot Beekeeper's Guide
to
Swarming and Swarm Management

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You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.

R. Buckminster Fuller

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Introduction

If there is one subject that occupies the minds of beekeepers and keeps them awake at night during the early summer, it is swarming and what to do about it.

Commercial beekeepers in particular – as well as those amateurs who are keen to maximize honey production – hate to see their bees swarming and will do almost anything to prevent them from doing so. As often as not, their efforts to repress the bees' natural urge fails, but this does not seem to stop them carrying out the same unsuccessful procedures next season.

From the perspective of the 'natural beekeeper', swarming is far from being a disaster, but rather an opportunity to increase stocks, or to make a contribution to the re-stocking of the much-depleted, wild-living bee population.

This booklet describes the swarming process, explains why bees swarm and gives some suggestions about how the natural beekeeper may choose to manage the process, or leave it to the bees.

Why Bees Swarm

There are several types of swarm, which occur for different reasons.

Reproductive swarming is is an expansive, optimistic act, by which honeybees create new colonies and spread to new territory.

When they feel prosperous, and the weather is set fair, and plentiful food is coming in, that is when the colony divides and half of it moves away to a new location. The laying queen - the mother of the colony - takes off with about half of the mature, flying bees and they go off in

search of a new home, usually a mile or two away from their current location. They leave behind them some special cells containing new queens, one of which, after mating, will become the new mother of the old colony.
Swarming is driven by the all-powerful urge to reproduce, present in all species. Swarming is the honeybees' most important survival strategy, and without it, they could not have survived for the last 50 million years and spread themselves across Africa, Europe and Asia. It has enabled them to avoid local disasters and climate change, and to cover promising, new territory quickly and efficiently.

You can really feel the bees' excitement building up as swarming day approaches. When they leave the hive, they stream out and whirl around in a cloud, like a bee tornado, and in a few minutes, settle on a nearby branch, gathered around their queen to protect her. Often, in an apiary with a number of hives, when one swarm emerges, another will come out from a nearby hive very soon after the first - as if the excitement has spread from one hive to the next.

Reproductive warming is far from being a spontaneous event, however. Preparations begin several weeks before it actually takes place, and there are several indicators to look out for that will tell you whether and approximately when your bees are going to swarm.

The term 'swarming' is correctly used only in the context of a significant number of bees in search of a new home: a dozen or so bees going about their business on a patch of flowers is not swarming; neither is a handful of bees investigating a promising-looking hole in your shed wall, although this activity may well indicate the presence of a swarm nearby.

Swarm Triggers

By far the most important 'trigger' for swarm preparations must be the basic, genetically-programmed urge to reproduce the colony, but other factors may also play a part. The most commonly cited of these is overcrowding: an assumed perception by the bees that they are running out of space. It is, therefore, logical to conclude that by increasing the amount of space available to the bees, swarming may be prevented, or. at least, delayed.

In conventional beekeeping with framed hives, this is usually achieved by adding a super or two early in the season, or sometimes by adding a second brood box.

Warré beekeepers start the season with two or more empty boxes below the one occupied by the wintered bees, which expand their nest downwards as needed.

With a top bar hive, you can expand the brood area simply by sliding a follower board away and adding empty top bars in between combs of brood. The bees will immediately get busy building fresh comb, and within a week the queen will be laying eggs in it. Some conventional beekeepers do the same thing using frames, when it is called 'checkerboarding'. Unlike the TBH version, however, this does create an immediate barrier between one brood comb and the next, which I feel must make things more difficult for the bees.

Incidentally, adding empty bars in between frames of brood comb is a 'non-violent' way to populate a top bar hive from a framed colony – see 'The Barefoot Beekeeper's Guide to Converting to Top Bars' for details of this technique.

Another trigger for swarming may be that of too much interference by the beekeeper. I cannot believe that the

regime of weekly inspections widely recommended to beginners is not a provocative, hostile act in the perception of the bees themselves and that this relentless interference in their lives must try their patience, even to the point of triggering their swarming instinct. The natural – or 'barefoot' beekeeper – aims to interfere as little as possible in their lives, and so avoids provoking unnecessary swarming.

There is also a phenomenon that we may call an 'emergency swarm', triggered by a sudden and unexpected absence of food, such that it could also be called a 'starvation swarm'.

This may be brought about by unseasonal weather, such as seen during the 'summer' of 2009 in the UK, when a promising start to the year ended suddenly in early July with a period of cool, wet weather that lasted right through August. Colonies – especially of Italian bees – grew very strong during a fine, warm spring and reached their peak populations just as the weather turned bad, confining them to their hives.

They spent the next six weeks eating their way through their stores, reaching September with almost nothing left, and no prospect of filling their combs for winter, as the main flowering season was long over. Beekeepers who failed quickly to get feed into their hives found their bees starving, and there were reports of smallish swarms emerging into October – much later than is normal for this region. These swarms were often unusually defensive and seemed desperate to move to a new location, presumably in a last-ditch attempt at provisioning themselves for winter. As it turned out, the winter that followed was the longest and coldest for over 30 years, and there were many casualties among ill-fed stocks.

Swarm Preparations

The first visible indicator of potential swarm preparations is the presence of drone cells in a hive. Drones take longer to emerge from their cells than worker bees - 24 days from egg to adult - and about another two weeks to reach reproductive maturity, and so because - under normal conditions - a colony will not swarm without mature drones being present, the minimum time from eggs being laid in the first drone cells to emerging swarm is around 5 weeks. Once you see capped drone cells, that comes down to 4 weeks, since the drones spend 14 days sealed in their cells, followed by a further 14 or so until they are ready to mate. So when you first see sealed drone brood in those

domed cells, you know that your colony may be within 28 days of swarming.

Queen cells built on the edge of natural comb

I don't think it can be a coincidence that this is equivalent to a complete lunar cycle. I don't know of any research that demonstrates a clear relationship between actual phases of the moon and brood development, but this sounds to me like an interesting line of investigation.

The next sign to look for is queen cells being built around the edges of combs. In a conventional, framed hive, the only way to see these developing cells is by removing each frame in turn and looking carefully, especially in the lower corners, where the bees are often able to hide them. The cells are usually covered with bees and are easy to miss. If you have a top bar hive with an observation window along one side, they can often be seen clearly, as there is no frame in the way. If combs have to be removed in order to examine a top bar colony, any developing queen cells are generally easy to spot as there are no dark corners for bees to hide them in. In fixed-comb hives, such as the Warré, you will probably have to turn the boxes on their sides in order to see queen cells, although such interference is frowned upon by these 'minimum maintenance' beekeepers.

If the bees are serious about swarming, you will see five, six, or more queen cells in various stages of development, and if there is a growing larva in at least one of them, you can be pretty sure that a swarm will fly within a week, if the weather conditions are right and the colony is building up well. This is your last chance to take action, if you intend to exert any control over this process. Simply cutting out queen cells is not an answer: you may well miss one, and the bees will just carry on with their plan; or you will have to go back and do the same again after a week, as the bees will certainly build more. If you go on removing cells like this in an effort to suppress their natural instincts, the bees will become demoralized and may not thrive. Thwarting natural instincts is never a good idea.

The Swarm Calendar

For the beekeeper, swarming may come as a surprise, but for the bees, it is very much a planned process. Just how much planning goes into it, we may never know, but there are certain things we can observe that appear to form part of that process. The calendar below shows how these events fit together, and what signs you may be able to see that can tell you where they are in their preparations.

Day 0 is taken as the day on which the queen begins to lay unfertilized eggs in drone cells. Whether or not this represents to the bees themselves the actual start of the swarm cycle, it is impossible to tell, but it does give us a fixed point from which we can map out the rest of the timeline.

Of course, there is variability in this timeline, and events can occur a day or two either side of what is shown here, but it does give us a general picture of what we can expect to be happening in our hives over this period.

Day		Current queen	New queen
0	First eggs laid in drone cells		
10	First drone brood capped		
24	First drones emerge		Queen cells started
28		Queen prepared for swarming	First egg laid in queen cell
35		Last eggs laid	
36	First drones reach maturity	SWARM EMERGES day 36-40	First queen cell capped
44		Possible cast swarm(s)	First virgin queen emerges
50			Queen mated
56	Last workers from old queen emerge	[2 lunar months from first drone eggs being laid]	New queen begins to lay
59	Last drones from old queen emerge		
77	Last workers from old queen fly		First workers from new queen emerge
80			First possible drones from new queen emerge
98	Last workers from old queen die		First workers from new queen fly
100			Colony entirely under new management

Swarming Time

If you do nothing, most likely a swarm will emerge between mid morning and mid afternoon, on a warm, sunny day, at around the time the first queen cell is capped. This is 8 days from the time when an egg was laid in her cell, and up to 8 days before she will leave her cell as a fully-developed queen.

Another week will pass from that date until she emerges; 6 to 12 days while she mates and starts laying; another three weeks before her first brood emerges; and yet another three weeks before they fly. So the total time between the day on which a new queen's egg is laid and the day her daughters first take to the air is between nine and ten weeks. She will begin laying by the time the last of the old queen's brood emerge from their cells.

When the swarm bees leave, they will take with them in their stomachs enough honey to tide them over for up to three or four days, during which time they will be looking for a new home. They need these stores, not only for survival, but also to provide them with enough energy to start building combs in their new quarters - a process that requires them to generate heat and extrude wax from glands in their abdomens.

A prime swarm at a convenient height

For the conventional beekeeper, who is mainly interested in harvesting the maximum quantity of honey, half their bees disappearing over the horizon is bad enough, but the fact that they take with them a considerable amount of potential honey only makes it worse - and explains why they are so very keen to prevent swarming taking place.

Swarm Prevention

The crudest technique in common use for preventing swarming is that of cutting out swarm cells as they are seen during routine inspections. This is the basis for the general advice issued to beginners that hives should be thoroughly inspected every 9 days during the spring and early summer for signs of swarm cells, on the gounds that swarming is the worst possible thing that can happen to your colonies.

The natural beekeeper's attitude to swarming is rather different, in that part of our philosophy is about contributing to the stocks of feral bees, in the hope and expectation that enough of them will survive to propagate the species without our 'help'. Even so, we may not want all our stocks to swarm willy-nilly, so we can consider possible ways to intervene in the swarming process in ways that cause least disruption to the natural lives of the bees.

One of the primary techniques commercial beekeepers use to suppress the swarming urge is to replace their queens every year with fresh ones - a bit like buying a new car every year to prevent breakdowns. The reasoning is that queens rarely leave with a swarm during their first year, so if you replace all queens every year, you should have very few swarms.

This results in the needless killing of thousands of viable queens and the mass importation of artificially

inseminated queens, which have never experienced the local climate. I cannot believe this is a sane or necessary practice, and I have already spoken elsewhere of the risk of importing yet more diseases and parasites to add to the ones we have already imported. The stupidity and short-sightedness of such practices beggars belief in a time when bees are already under threat from pesticides, mites and viruses.

What makes this nonsense even worse is that queens don't even reach their peak performance until their second year, so these beekeepers are missing out on her best laying times, as well as interfering needlessly in the life of the colony. In the normal course of events, a good queen may continue to head her colony for four, five or even six years, until she is finally superseded.

For far too long, in my opinion, amateur beekeepers have been taught to emulate the commercial men and replace queens every year. They are also routinely taught to clip her wings and to mark her with paint - both barbaric and quite unnecessary practices that frequently cause queens to be killed or rapidly superseded by their daughters.

If you care more for the bees' welfare than for the loss of honey, you can see swarming not as a disaster, but as an opportunity for the bees fully to express their natural inclinations, and the natural beekeeper will not be sorry to see the occasional swarm take off - hopefully to set up home in some sheltered place and become a future source of locally-adapted, wild-living bees.

Swarm Behaviour

Usually, the swarm of perhaps 25,000 bees will gather on a branch or shrub quite near to the hive from which they emerged. Here they will form a tight cluster around their queen, who has been hustled from the hive - somewhat, it

often seems, against her will - and scouts will be sent out to find a suitable home. They fly out and investigate suitable premises and check them for weather protection, defensibility and other conditions that bees desire, and then fly back to the swarm cluster to persuade other bees to check out their discoveries. After a time, which can vary from a couple of hours to several days, they reach a consensus and the entire swarm takes off once more, and moves directly into its new home without further ado. They gather at the highest point of their chosen cavity, and get busy building comb so their mother will have a place to lay her eggs.

Often they are so keen to start comb-building, that they leave traces of wax behind on the tree branch - and if they have been there for a day or two, may even have built sections of comb there.

A busy scene in a medieval French apiary

Swarm Management

As a beekeeper, what - if anything - you do about swarming depends on your motives for keeping bees in the first place, and to what extent you want to 'manage' them.

If you just want bees to do what comes naturally, then leaving them alone and watching the swarm fly off is the first option. The swarm may find themselves a nice home and establish themselves as a feral colony, and if they survive, may become a useful resource by throwing new swarms from time to time in future seasons, thus adding to the depleted stocks of truly wild bees.

However, if you live in a built-up area, allowing a swarm to escape may not make you popular with your neighbours, who may not share your love and understanding of bees. Many people regard the sight of ten thousand stinging insects with horror, and may be panicked into attempts to destroy them, or they may act in such a way as to make the bees defensive and start stinging people. You need to be ready and willing to retrieve the swarm if there is a danger of this kind of response.

So the next option is to allow the swarm to escape, and to be ready to catch it immediately and put it into another hive.

This presupposes two things: first, that you can predict the day of swarming with some accuracy, and second, that you can be around when it happens - or very soon after. If neither of these apply, you may need to take further action, such as positioning some suitably baited containers at a distance of between 100 metres and a kilometer or so from your hives. To position enough bait boxes to be reasonably sure of catching your swarms is going to prove somewhat challenging to most people, and

quite impossible if you live in a town, so we have to start thinking about ways - if not to prevent swarming - then at least to anticipate it and, perhaps, to take some kind of action that gives the bees the feeling that they have swarmed, but without them actually having to fly off and be re-captured.

This brings us to what is known to beekeepers as 'artificial swarming'.

Artificial Swarming

There are many ways to artificially swarm a colony, and just about all of them are designed to be used on conventional, framed hives, and they all involve quite a bit of box-shifting and frame-shuffling, so they really don't have much application in what we call 'natural beekeeping'.

Artificial swarming in a horizontal top bar hive is easy by comparison, and requires no heavy lifting and no extra equipment or boxes - unless you want to increase your colonies.
If you are using my type of top bar hive, with sliding follower boards - as shown on my website at biobees.com, you can make an artificial swarm very easily, without lifting anything heavier than the roof of your hive.

Here's how you can do it:

I'm assuming that we are heading into swarm season - whenever that occurs in your area - and you have reason to suppose that your colony is planning on swarming very soon. The colony is strong, the weather is warm and there is no more than a light breeze. You have seen - and heard - flying drones.

Your first step is to locate the first comb of brood, by

moving back the follower board on the brood side of the colony - which will normally be the side nearest the entrance holes. The first comb in there may well be covered with sealed brood - it often is - but if not, pull back the first bar - checking first to see if there are any attachments to the side walls, and cutting them if so - and check the next bar.

The first bar you find with brood on it, lift it carefully and check around the sides for queen cells. Do the same with the next two bars, and if none of them have queen cells, they probably don't intend to swarm in the near future. In this case - and assuming all the other signs are good: the colony is strong, there are no obvious disease symptoms, and bees are foraging well - you don't need to do anything else at this end.

You should do a quick check at the other end of the colony to make sure they have enough room to expand their stores, and to ensure that the queen has room to lay. If necessary, add top bars by making two gaps between three combs of brood, so they can build new comb and the hive doesn't become honey-bound.
If you do find queen cells, you can do one of two things, depending on how good you are at finding queens.

The easy way does not require you to find the queen, so let's look at that one first.

Method 1: Starting at the first comb of brood, if you find one or more queen cells that have a larva inside - you need to hold the comb high and look up into the queen cell to see this - gently place that comb - with all its bees - the other side of the follower, in the empty end of the hive. To avoid the risk of chilling the brood, it is a good idea to place a comb of stores - pollen and nectar - against the end of the hive, and then place the brood comb next to it.

Continue this process with all the combs that have developing queen cells - you need to take at least three combs, even if they don't all have queen cells - and place them in the same order with the first brood comb, bringing all attached bees along. As you do so, check that you don't have the queen on any of those combs - this is important. You don't actually have to find the queen - just make sure you don't remove her.

Now you need to add another comb of stores to the new, queenless colony you have just created, then add another follower (borrow the follower from the far end if you don't have a spare) and close up carefully. If you borrowed a follower, fill the space at the far end with top bars, so both colonies are completely enclosed.

Finally, open the single entrance hole at the back of the hive, so bees in the new colony can come and go.

Job done.

So you now have the original colony, in the same position as before, with foraging bees flying in and out, but with a reduced population of nurse bees and brood. The queen is still present, and will continue to lay. They no longer have developing queen cells, and so are very unlikely to swarm, unless you were very late in your inspection and they were on the point of swarming anyway.

If you suspect this may be the case, you can ask a friend to help you and turn the whole hive through 180 degrees. This is a useful trick, as it confuses a number of flying bees into joining the new colony, because its entrance will now be facing the same direction as the main entrance was before you turned the hive. Some of the flying bees will still find their old entrance, but because their numbers will be depleted, they will give up any thought of swarming. Meanwhile, the new colony has acquired a

useful number of foragers to bring in pollen and nectar in readiness for when the new queen begins to lay.

The first queen to emerge in the new colony, 8 days after her cell was sealed, will go off on her mating flight and return as the mother of the next generation in that colony. In the original colony, life will continue as before.

Method 2: This is really the mirror image of the above: the only real difference being that you need to find the queen, and place her, on comb that has no developing queen cells, in the empty end of the hive, and then add more combs of bees and stores. This time, you need to leave behind all combs that have developing queen cells. Finish by rotating the hive through 180 degrees as before, and most of the flying bees will re-join their queen, just as if they had swarmed for real.

The second method is more like a real swarming process, and I recommend it for that reason, but you do need to be able to find the queen for it to work.

Combining and Making Increase

Regardless of whether the colony is preparing to swarm, you can make a split at any time during the build-up period, using either of the above methods, and place the new colony into a new hive or nucleus box, depending on what you intend to do with it.

Now - you may be wondering - what do you do with two colonies in one top bar hive? Are they not both going to grow and start running out of space?

Yes indeed - this is not the end of the story.

You have a couple of options: either you can re-combine the two colonies into one, after the swarming period is

over, or you can separate them into different hives.

There is a good general principle in beekeeping, which says that one strong colony is always better than two weak ones, and this is particularly true of colonies going into winter. So, by the end of the season, if your two colonies are not as strong as they might be - perhaps as a result of a poor summer following a promising Spring - then you can re-combine them simply by removing the followers and closing up the gap between them. The two queens will most likely fight it out, and the victor may also be injured, which may well lead to a late-season supersedure as the bees will not tolerate a less-than-perfect queen to carry them through winter. A less risky technique would be to remove the older of the two queens.

If all this manipulation of bees and combs is too much for you, or you would rather let nature take its course, then it would be as well to pay close attention to your colonies' development during the early part of the season, and learn to recognize the visible and audible clues that show when swarming may be imminent.

It might also be a good idea to learn how to catch or retrieve swarms that have escaped, and are hanging from a nearby tree.

Cast Swarms

Once the prime swarm has emerged with their mother, there is a short period of about a week when the colony has no laying queen, which extends to another week or so while the new queen is mated and begins to lay. During this period, five, six or more other queens will be raised, and the first emerging virgin may stake her claim by summarily murdering her competitors. In this case, matters will proceed as shown in the table, and she will

inherit the role of egg-provider.

Another possibility is that, as other queens emerge, they will fly off with small 'cast' swarms, which are barely viable as potential colonies, but which provide an opportunity for the attentive beekeeper to increase stocks by gathering them up and combining two or more to form stronger colonies. One of the virgin queens may be removed for use elsewhere, or nature can be allowed to run her course.

A small cast swarm - useful for re-queening or starting a nuc

Swarm Catching

Swarm catching is one of the most fun jobs for the beekeeper, and the experience never palls. Non-beekeepers generally view the spectacle of an enormous ball of twenty thousand stinging insects with horror and

fear, while a knowledgeable bee-person will see it as a great opportunity to increase their stocks at no cost.

Apart from your usual bee-proof suit - or at least a hat and veil - all you need is a basket or box and perhaps a ladder - and occasionally a saw or pair of secuteurs to cut through branches. No two swarm-retrievals are the same, so I could not possibly cover all the variations here, but you will find videos on my web site at biobees.com showing some examples, and there are plenty more on YouTube. Typically, the bees can be dropped or lowered into a basket by thumping or cutting a branch. It is not always that easy, of course, and when ladders are involved, you need to take sensible precautions to ensure your own and other people's safety.

Bees settling into a basket after having been removed from a branch.

My favourite tree swarm-catching process is to cut the branch both sides of the swarm and to lower it into my well-used and propolis-lined basket. I then place top bars directly over them, right across the width of the basket, leaving a small gap by which flying bees can re-join their siblings. I leave it like this until dusk, close up the gap with another bar, and drive the basket of bees to where I intend to hive them. I leave them in the basket on the spot where their hive will be located for a few days, during which time they will get busy building comb on the bars. Then, on a fine day, I move the basket to one side, place their new hive on the same spot, and lift each bar into the hive with as little disturbance as possible. Having built comb and the queen having begun to lay, they will in almost every case just carry on as before, building new comb and expanding into the space provided.

Of course, it is not always that easy. One of the swarms I was called to last year was in a post box that was mounted in a stone wall. The bees had been there for four or five days when I was called, and they had built football-sized comb already and were in no mood to move house. The engineer told me that if I couldn't get them out they would be destroyed, so I accepted the challenge. In pouring rain, I had to put my unprotected hand and arm through a small opening in the wire cage that was welded across the post box, reach up to the top of the box - unable to see a thing, and working entirely by feel - and as gently as I could, tear combs and bees away and let them fall onto a cloth in the bottom of the box. I had at least a dozen stings by the time I had finished, but I completed the job and retrieved most of the bees, including the queen, and after I hived them, that colony came through the winter in good shape.

So, whether you leave bees to swarm freely, or capture them after swarming, or practice some form of simulated or artificial swarming, the swarm season is an exciting

time for the natural beekeeper. Whichever way you go, we should learn to welcome swarming as an entirely natural expression of the bees' optimism about life and their future, and be thankful that we still have colonies strong enough to swarm.

Looking up at the bees gathered on the ceiling of the post box.

THE BAREFOOT BEEKEEPER

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