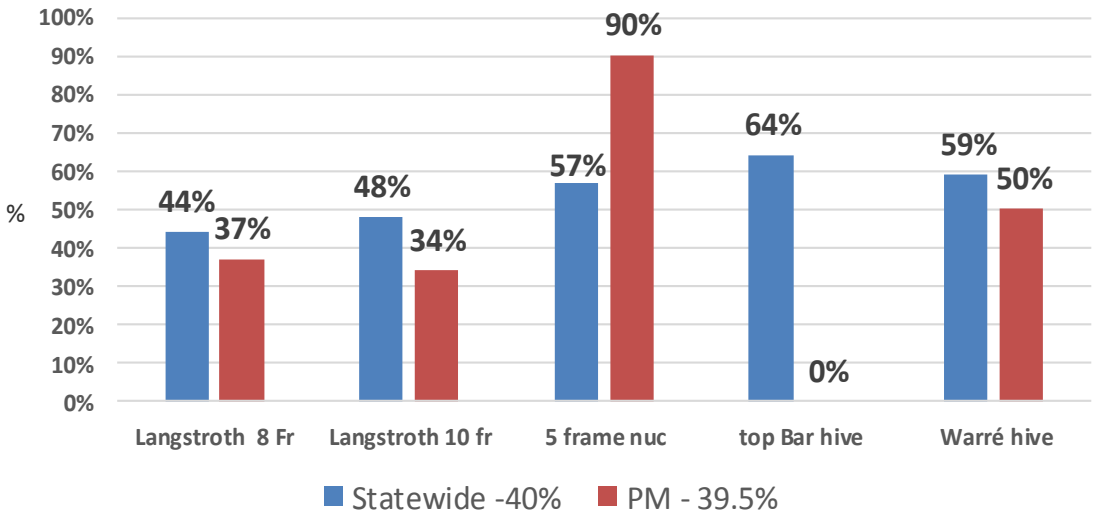
# 2016-17 Portland Metro Winter Loss by Dewey M. Caron

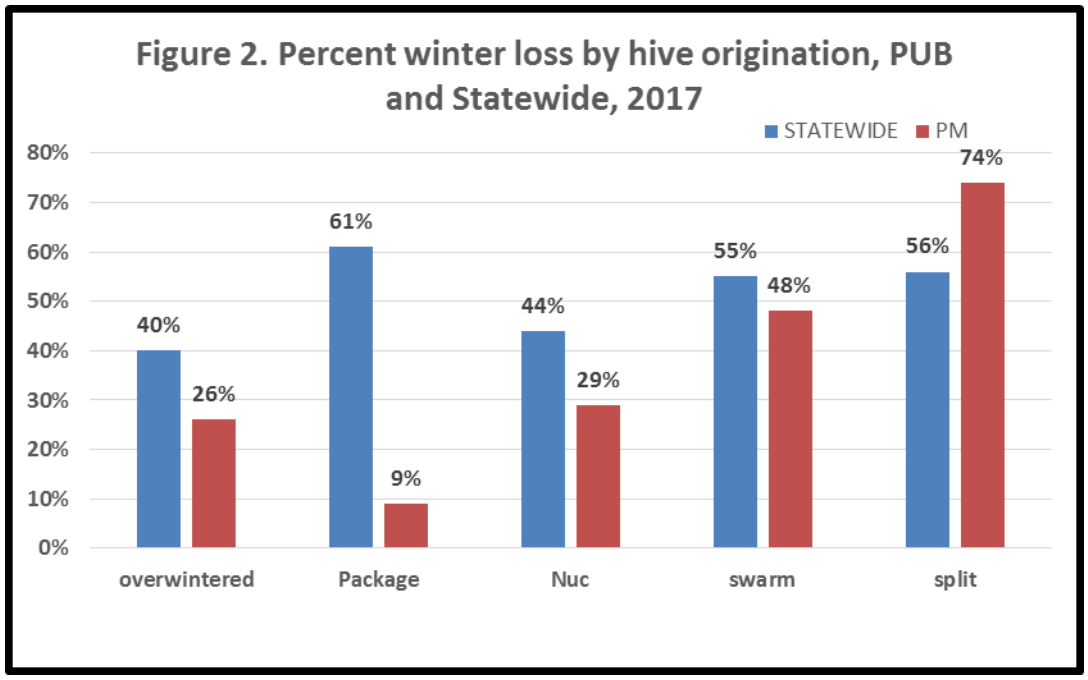
At the April PM meeting members were directed to a web-based survey document in our continuing effort to define overwintering success. This was the 9th year of such survey activity. I received 282 responses from Oregon backyarders and 52 from Washington beekeepers keeping anywhere from 1 to 48 colonies. Portland Metro (PM) members sent in 32 surveys, nine more than last year's survey. PM colony number, 243 in this year's survey, was 99 more than last year.

**Overwintering losses of PM respondents was 96 colonies = 39.5%.** This loss is 8 ½ percentage point lower than the statewide loss of 48% (database of 282 OR backyarders.) Percent losses, determined for 5 hive types, is shown in Figure 1 comparing PM with the statewide backyarders. PM member respondents started winter with 199 Langstroth 10-frame and 19 Langstroth 8-frame hives (92% of total), 20 5-frame nucs (of which only 2 survived), 3 Top bar hives, none of which survived winter and 2 Warré hives, of which one survived. If the 8 frame and 10 frame hives ONLY are considered, the overall loss rate would be 34%

**Figure 1. Percent loss comparison PM with statewide backyarder losses, 2017**



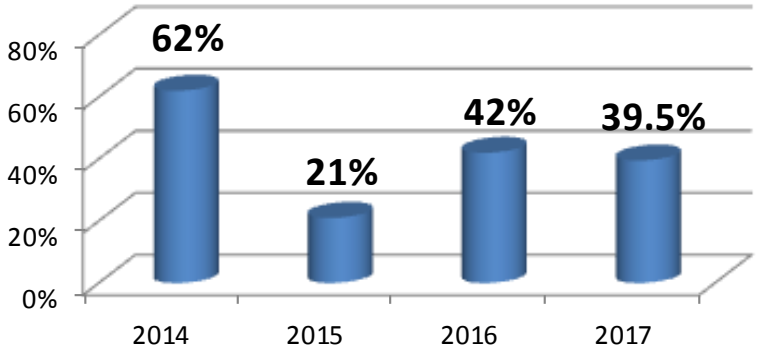

The survey also asked for hive loss by hive origination. Eighty-eight of 119 overwintered PM colonies were alive in the spring (26% loss rate), 14 percentage points better survival than statewide. PM respondents reported package bees and nucs did generally well but splits had heavier losses. See Figure 2 for PM and statewide comparisons.




Losses this past winter for PM beekeepers were slightly higher that losses last year but considerably lower compared to the terribly elevated losses of the 2013-14 winter. See www.pnwhoneybeesurvey.com for last year's individual report for PM beekeepers.

**PMBA OVERWINTER LOSSES 2014-2017.**

**Figure 3**

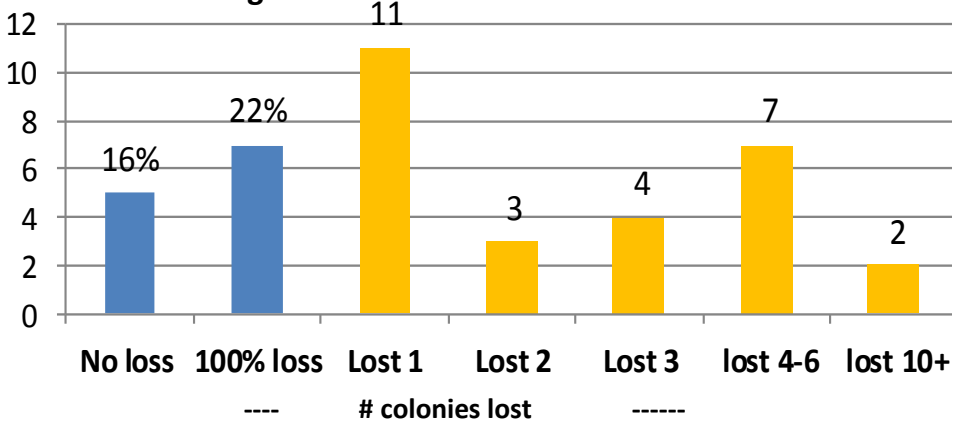



The PM survey respondents were a mixture of single digit colony beekeepers with those with more colonies along with new and more experienced individuals. Three PM respondents had 1 fall colony, 6 had 2 and 5 had 3 colonies (44% of PM respondents), 6 respondents had 4 to 6 colonies 4 individuals had 7-9 colonies while nine individuals had 10 or more colonies (28% of total respondents); the largest number was 32 colonies.

Five individuals had one year of experience, four had two and an equal number had 3 years (total of 1, 2 or 3 years of beekeeping experience=37.5% of total respondents). Nine individuals had 4 to 6 years' experience, 4 respondents had 7 to 9 years of experience and six had 10+ years' experience (19% of total respondents); 30 years was largest.

Not everyone had loss. Five PM individuals (16%) reported total winter survival; unfortunately however, seven individuals lost 100% of their colonies. Eleven individuals lost 1 colony; heaviest loss was 21 colonies. Data is shown graphically below in Figure 4.

**Figure 4. 2017 PM individual loss**




Five individuals had two apiaries; loss at 2nd apiary was slightly heavier than the primary apiary (50%). One individual had bees at 4 apiary sites. Eight individuals moved hives during the season, 4 only short distances (across yard for example) while the other 4 moved greater distances, two for pollination, one to give colony to friend and one for better location.

When asked to indicate where the majority of their beekeeping education was received, 24 PM respondents (75% of total number) listed Bee club meetings followed by 21 individuals listing Bee Mentor and Books, journals and magazines (66% each). Fifteen listed Online including videos and 12 said Master Beekeeper program (37.5%). Seventy-eight percent, compared to 65% percent statewide, said they had a mentor available as they learned beekeeping.

## Reasons for Colony Loss/Acceptable loss

We asked individuals that had colony loss to estimate what the reason might have been for their loss (multiple responses were permitted). Of 276 statewide responses, 79 chose poor wintering conditions and 78 (18% each of respondents) chose varroa, 68 individuals indicated weak in the fall (16%), 57 said starvation and 55 queen failure (13% each). I don't know was indicated by 25 (8%). The 65 Portland Metro responses (2/individual) were led by varroa (47% of total individuals); poor wintering conditions and weak in fall were each chosen by 10 individuals (31% each), 12 checked queen failure and 8 starvation. Under "other" PM individuals indicated CCD, nosema, pesticides, Yellow jackets and absconding (1 each).

| | Varroa mites | Poor wintering conditions | Weak in fall | Queen failure | starvation | I don't know | Other |
|---|---|---|---|---|---|---|---|
| Portland Metro # (%) | 15 (23%) | 10 (15%) | 10 (15%) | 12 (18.5%) | 8 (12%) | 5 (7.5%) | 5 (7.5%) |
| Statewide % | 18% | 18% | 16% | 13% | 13% | 8% | 16% |

Survey individuals are asked to indicate what might be an acceptable loss level. Among PM responses were zero (7 individuals), 10% loss acceptable (also 7 individuals), 25% (14 individuals) and 33% (4 individuals). None selected 50 or 100%.

**Why colonies die?** There is no easy way to verify reason(s) for colony loss. Colonies in the same apiary may die for different reasons. Colony forensics on dead colonies is, at best confusing, and, although some options may be ruled out, we are often left with two or more possible reasons for losses

There is a good deal of variance in opinion as to what might be an acceptable loss level. We are dealing with living animals which are constantly exposed to many different challenges, both in the natural environment and the beekeeper's apiary. Statewide, 47% felt 10% or less was acceptable while 10.5% statewide stated 50% or higher was acceptable. All PM individual choices were 33% or less.

Major factors in colony loss are thought to be mites and their enhancement on viruses especially DWV (deformed wing virus), pesticides, declining nutritional adequacy/forage and diseases, especially viruses and Nosema. Management, especially learning proper bee care in the first years of beekeeping, remains a factor in losses. What effects our changing environment such as global warming, contrails, electromagnetic forces, including human disruption of it, human alteration to the bee's natural environment and other factors, play in colony losses are not at all clear.

**There is no simple answer to explain the levels of current losses nor is it possible to demonstrate that they are necessarily excessive for all the issues facing honey bees in the current environment. Varroa mites and the viruses they transmit are considered a major factor, but by no means the only reason, colonies are not as healthy as they should be.**

## Management selections and losses

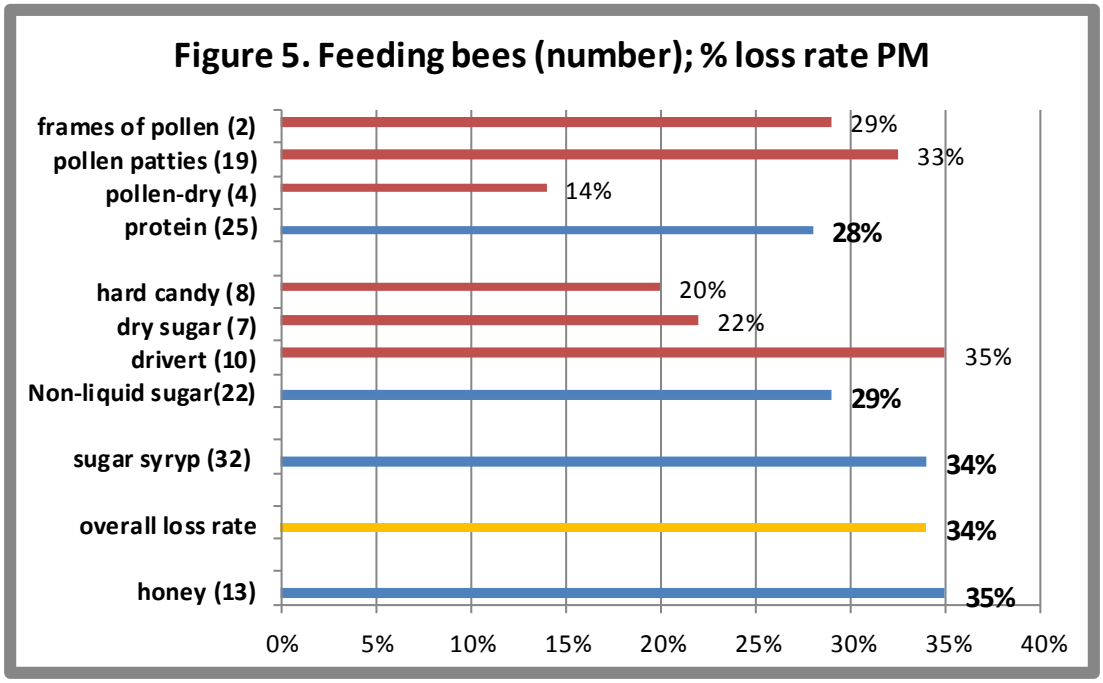
The survey inquired about feeding practices, wintering preparations, sanitation measures utilized, screen bottom board usage, queens, mite monitoring techniques and non-chemical and chemical mite controls used. Individuals could check none or more than one response; most PM and OR beekeepers often do not do just one thing/management to their colony (ies) to control mites. It takes effort to improve overwintering success.

For the larger data base of OR beekeepers, feeding dry sugar or candy board, as well as adding top insulation, a moisture absorbent feature at top of colony and/or an upper entrance resulted in significantly fewer losses. Screen bottom board usage, monitoring with alcohol wash or powdered sugar for mites and use of several of the chemical mite control options did likewise. See this analysis in the OR beekeeper report; www.pnwhoneybeesurvey.com. Comparisons to PMBA data results are included in this narrative.

For Portland Metro, management selections will be analyzed for Langstroth 8 and 10 frame colonies ONLY since 18 of 20 nucs did not survive and none of the three top bar hives survived and only one of the 2 Warré hives survived. Considering only Langstroth 8 and 10 frame hives of PM beekeepers, the overwinter loss rate was 34%.

**FEEDING:** There were 97 total PMBA responses to the inquiry on feeding colonies (3/individual), with every single respondent listing at least one management. Three did list a single selection (all 3 single listings were feeding of sugar syrup), 7 listed 3 choices, 6 listed 4, 5 choices were indicated by 3 individuals and one individual had six listings. Statewide, eighteen (18) individuals (10%) managing Langstroth hives did not do any of the options offered; they had a 75% loss of colonies (compared to 48% overall losses); Top bar hive owners who indicated doing no feedings lost 81% and Warré hive owners who checked no feedings lost all of their Warré hives.

There is general consensus that feeding bees carbohydrate &/or protein can be useful. The selections of PM beekeepers are shown in bar graph below (Figure 5). All but one PM (Langstroth hive only) individuals fed sugar syrup with a 34% loss. Nineteen individuals provided pollen patties and 13 individuals fed frames of honey – none showed improved survivorship. Feeding dry sugar, drivert, and hard sugar candy were done by 7 to 10 individuals each – drivert feeding did not improve survivorship. Feeding protein dry was of benefit to PM beekeepers. **PM individuals feeding hard candy, dry sugar and dry pollen all had greater colony survival (14-22% loss rate).**

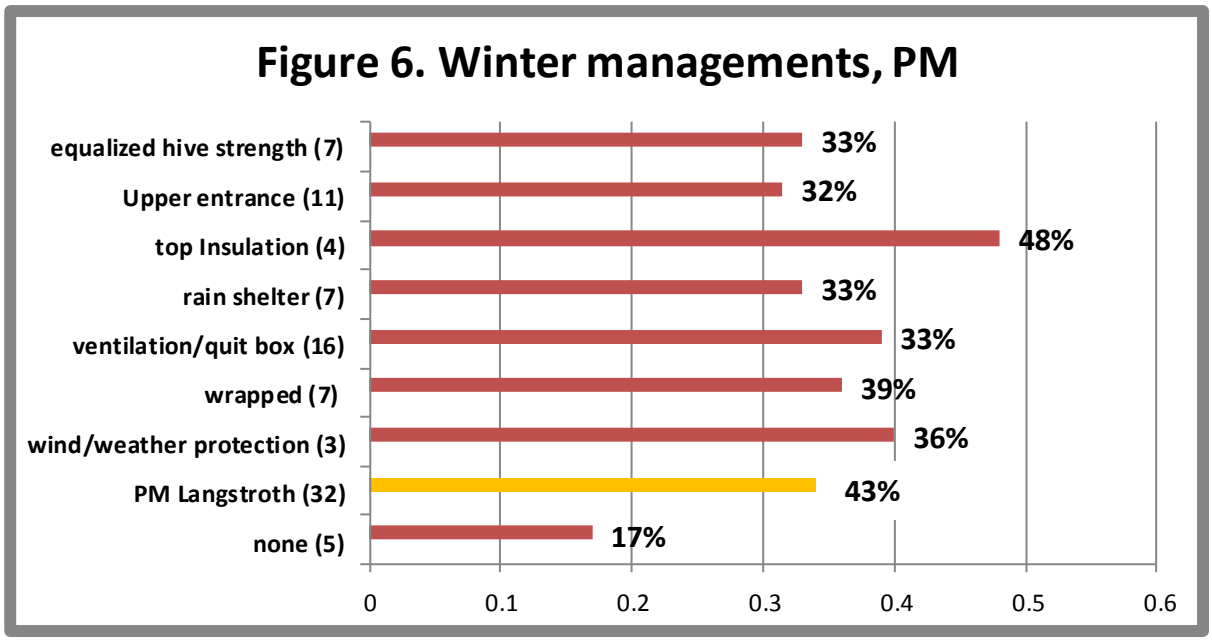



Analysis of results indicates a high level of feeding management by PM beekeeper (3 choices/individual versus 2/individual statewide). **Individuals feeding protein, especially dry (and statewide as pollen patty) showed improved survivorship. Also feeding dry sugar,**

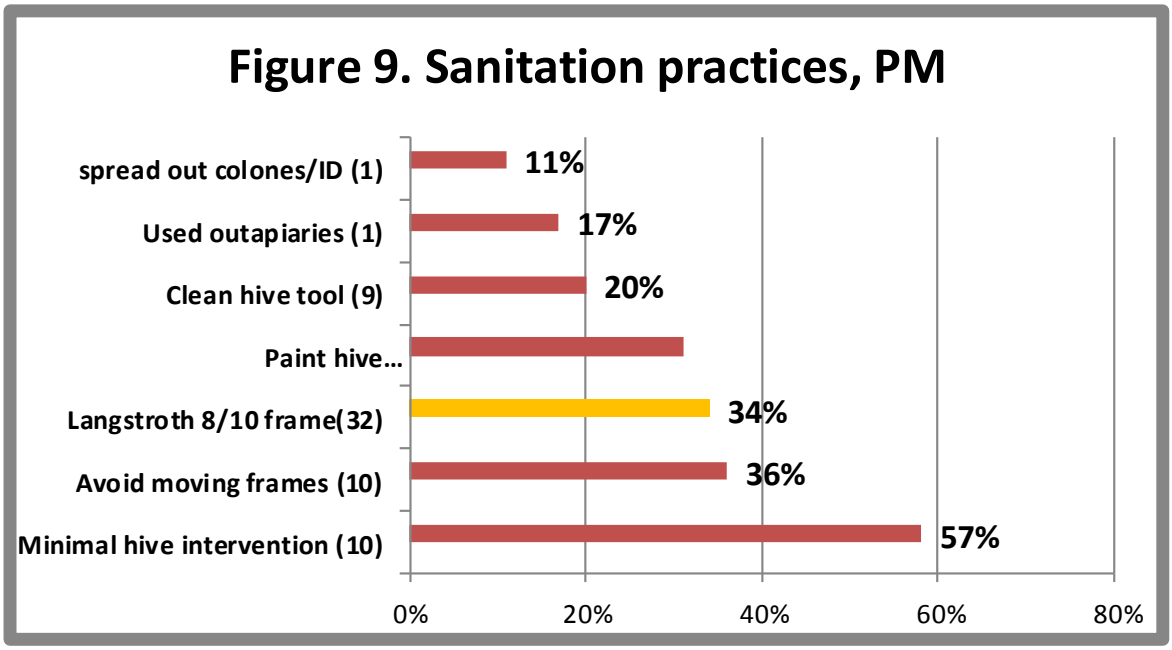
**particularly as hard sugar candy or dry, typically the sugar feeding method most appropriate during later fall or over the winter period, improved survivorship. Statewide and among PM members, individuals feeding their colonies had greater overwinter survival.**

**Wintering Practices**: Statewide, OR beekeepers selected 538 responses about wintering management practices (1.9 average/individual) - more than one option could be chosen. Forty-six individuals, 17.5% of the respondents, indicated not doing any of the several listed wintering practices; these individuals had a 49.5% winter loss compared to overall of 48%. Among the PM respondents there were 55 selections (1.7/individual; two individuals each chose 6 and 5 managements while 8 listed a single selection, of which 5 were ventilation/quilt box). Five PM individuals (15.5%) did NOT do any of the Wintering practices; their loss rate was 17%, only ½ the overall 34% PM loss rate for 8 and 10 frame Langstroth hives. There is no apparent explanation for this contradiction.

**The most common wintering management selected by PM beekeepers was ventilation/use of a quilt box at colony top (16 PM members) followed by upper entrance (11 individuals).** Remaining selections were selected by 7 or fewer PM beekeepers. Statewide, using a quilt/ventilation box slightly improved survival (45% loss rate versus 48% overall) but not for PM beekeepers (39% loss rate). As is evident in Figure 6, number of individuals () and percent loss %, none of the winterizing techniques improved survival (data for Langstroth 8 and 10 frame hives only.)



**SANITATION PRACTICES**: It is critical that we practice some basic sanitation in our bee care. We probably do too little to help insure healthy bees. Seven (22%) of PM survey respondents said they did not practice any of the 8 offered alternatives. The most common selection was painting hives distinctly/other ID measures (13 individuals – 53.5% of total respondents), excluding those who said none, followed by minimal hive intervention and avoiding moving frames (10 individuals each) and cleaned hive tool/washed gloves frequently, 9 individuals.




Apiary site selection and colony configuration within the apiary, although not commonly used by PM or PNW beekeepers, are important sanitation choices because giving colonies distinctive "addresses" has been shown to reduce drifting of adult bees and help to reduce incidence of disease and mites. Thirteen PM individuals selected the choice of painting their hives distinctively/other ID measures and they had a 30.5% loss rate. Although only a single beekeeper, spreading colonies out and using other apiary sites also had better survival as id cleaning hive tool/washing gloves frequently.

**SCREEN BOTTOM BOARDS**: In the survey we asked what percentage of hives had screen bottom boards (SBB) and whether they were blocked during the winter. Statewide 21% said they did not use screened bottoms; for PM members only 2 individuals said they did not use them (loss rate 30.5%). Statewide 66% used them on all their hives while 75% of Portland Metro beekeepers used screen bottom boards on all their hives. The majority statewide (51%) and in PM (43%) left them open over the winter period (never response). 18% statewide and 23% in PM closed them during the winter.

There is no good science on whether open or closed bottoms make a difference in overwintering but some beekeepers "feel" bees do better with them closed overwinter. An open bottom, at least part of the year, can assist the bees in keeping their hive cleaner. When SBB use is correlated with colony losses, a small (5 percentage points) advantage is gained with their use about the same margin of gain as for Portland Metro beekeepers.

**Managements that seem to improve winter success:** It should be emphasized that these comparisons are correlations not causation. They are single comparisons of one item with loss numbers. Individual beekeepers do not necessarily do only one management nor do they necessarily do the same thing to all the colonies in their care. Smaller numbers, as in local associations, are sometimes widely skewed and it is more difficult to show significance of the numbers.

We do know moisture kills bees, not cold, so we recommend hives be located in the sun, out of the wind and, when exposed, providing some extra wind/weather/rain protection might improve survival. Use screened bottom boards leaving them open (or closed) as per your preference for ventilation. Use of insulted tops/quilt box with moisture collector such as burlap, straw, old towels, etc. with extra top ventilation and a top entrance, especially as it may help vent the moisture, is a good idea.

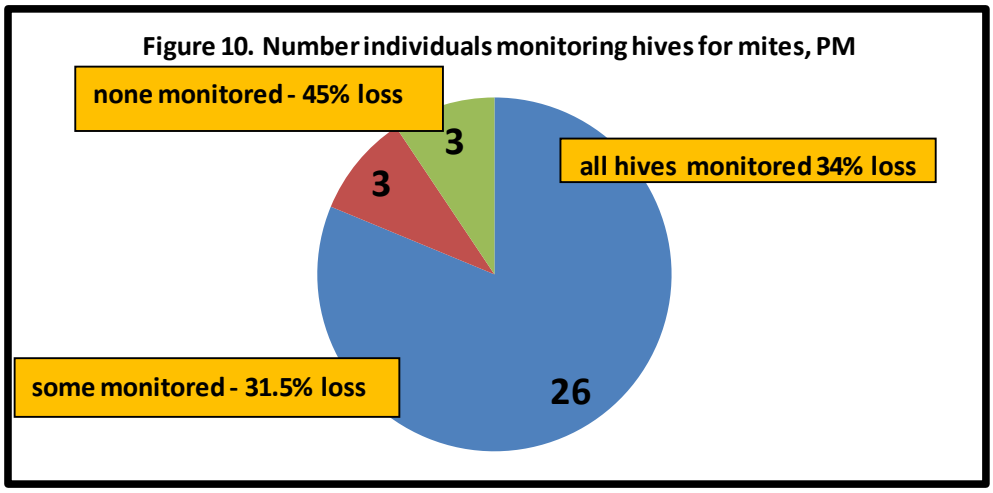
Feeding bees either sugar syrup or honey from other disease-free hives, helps insure enough food stores during early fall management. Once fall rains start, halt syrup feeding and switch to feed dry sugar or a hard sugar candy to avoid adding additional moisture stress to colonies. Finally, it would seem prudent to review basic sanitation measures, as anything we can do to help reduce sick bees and improve colony health, will improve overall survival.

## Mite monitoring/sampling and control management

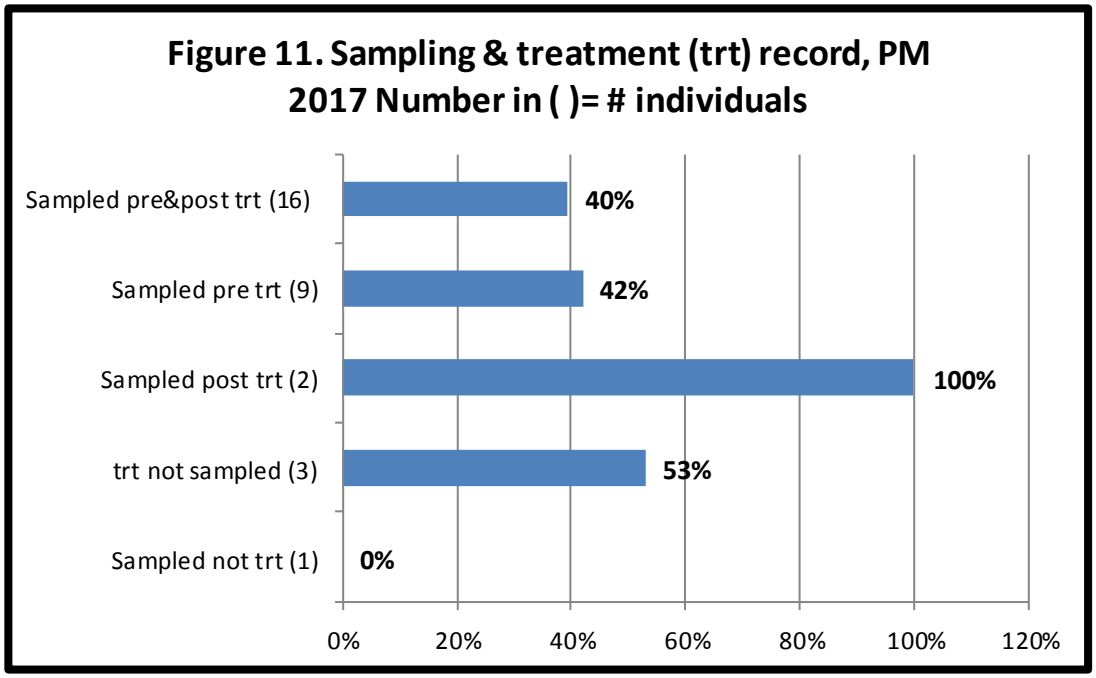
**All OR bee hives have or will have varroa mites**. It is important to know **how many mites are present.** Knowing how many mites provides an estimate of approximate risk of mites elevating colony losses for the time of year the sampling is done and, when sampling is started in July and continued into October, for the overwintering period. Mites are not the only pest/predator/pathogen than can seriously weaken or kill colonies but studies point to their being the most significant.

**MITE MONITORING**: To know how many mites, beekeepers need monitor/sample hives for mites. The PNWhoneybeesurvey asks percentage of OR hives monitored for mites during the 2016 year and/or 2016-17 overwinter, whether sampling was pre- or post-treatment or both and, of the five possible mite sampling methods, when and what method was used. Statewide, 178 individual respondents (63%) said they monitored all their hives and this group had a 43% loss . The 62 individuals (22%) who reported they did no monitoring had the statewide average loss of 48% while the 43 individuals who monitoring some of their colonies had a 60% loss.

The comparable numbers for PM respondents was 26 (81%) monitored all their hives, with a 34% loss rate (for Langstroth hive keepers). Three individuals monitored some of their hives and had 31.5% loss while the three individuals that did NO monitoring had a 45.5% loss rate.




When asked how the hives were monitored, the 29 individuals who indicated they did monitor had five choices. Six individuals selected only a single method. Most popular was powdered sugar (20 individuals 2/3rds of PM beekeepers), followed by sticky boards (12 individuals); three individuals used alcohol wash and 15 said they monitored adults visually for mites while 12 said they looked visually on drone brood. As with statewide, powdered sugar monitoring individuals had lower loss level (29.5%). Sampling both pre- and post-treatment as well as pre-treatment was the most effective with a (slightly) reduced loss rate plus one individual who sampled and did not treat had 0% loss – his/her one hive survived. Figure 11



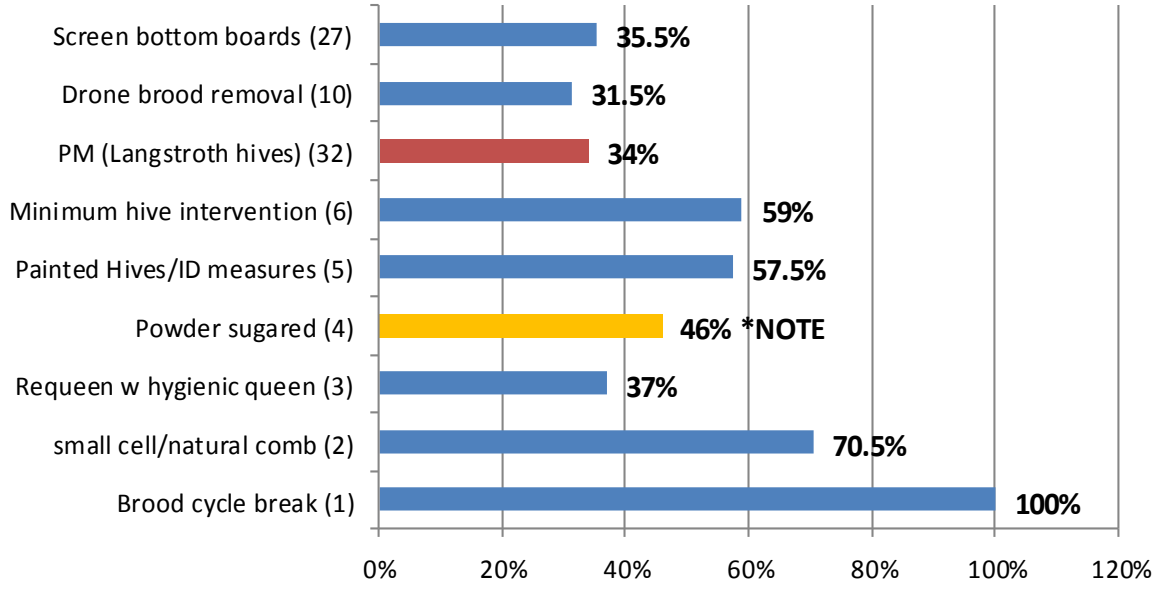
**It is important to KNOW mite numbers.** Less effective mite monitoring methods include sticky (detritus) boards below the colony (often so much detritus drops onto a sticky board that seeing number of mites collected can be difficult). Visual sampling of adults is not accurate: most mites present in the colony are not phoretic on the adult bees, but are reproducing within capped brood cells. Likewise looking at drone brood for mites is not effective to determine how many mites are present but looking at some drones during colony exam can be useful if, when we see mites in drone brood, we then use a more reliable adult washing technique.

See Tools for Varroa Monitoring Guide www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of and videos demonstrating how best to do sugar shake or alcohol wash sampling. The Tools guide also includes suggested mite level to use to base control decisions based on the adult bee sampling. A colony is holding its own against mites if the mite sample is below 2% in spring (i.e. 2 mites/100 adult bees) and below 5% (no more than 5 mites to 100 adults) when at its largest size during nectar flow following buildup. It is critical to not allow mite levels to exceed 2-3% during the fall months when bees are rearing the fat fall bees that will overwinter.

**MITE CONTROL**: The survey asked about use of several non-chemical mite treatments and also about use of chemicals for mite control. Three PM individuals, 9%, did not use a non-chemical control while one of them did not also use a chemical to control mites.

**NON-CHEMICAL CONTROL:** Respondents were offered 7 alternative, non-chemical mite treatments and could use a blank "other' to indicate any additional techniques used. Of these seven non-chemical alternatives offered on the survey, use of screened bottom board was listed by 200 individuals (71%) statewide and these individuals had slightly lower overwinter

## Figure 13. PM Alternative mite controls

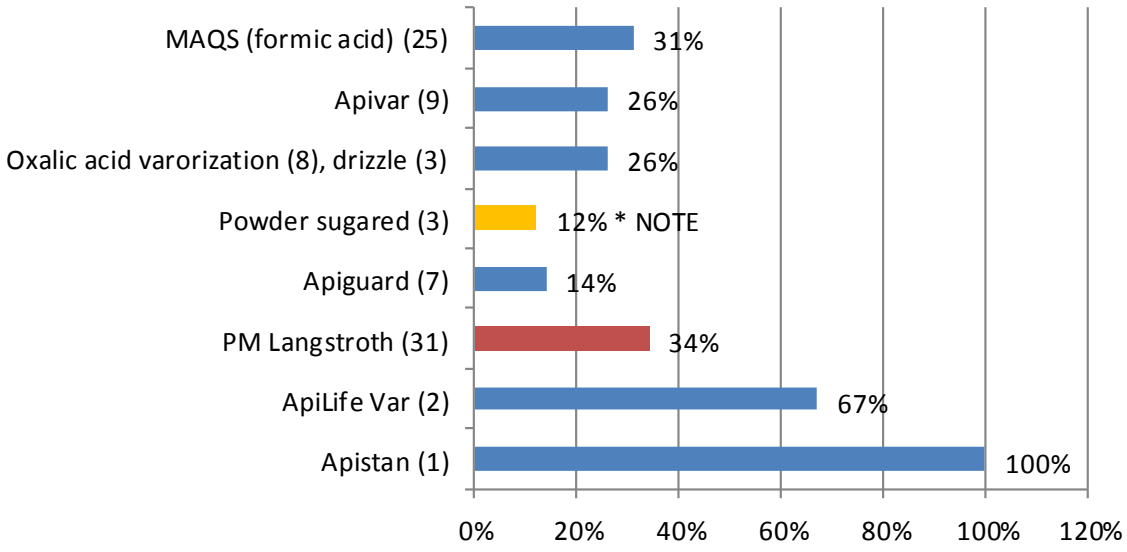


loss (46%). Twenty seven (75%) PM member respondents indicated use of SBB but their loss rate (for Langstroth hive users) of 35.5% was slightly higher than the average of 34%.

PM members checked 58 selections (1.8/individual); Minimal hive intervention/ inspection was indicated by 6 individuals, painting hives a distinctive color/other hive ID measures by 5 members and the remaining selections by 1 to 4 individuals. See Figure 13 for number of individuals () and the loss rate for those with each selection. It is evident NONE of the non-chemical controls improved survival for PM members.

**CHEMICAL CONTROL:** Use of a chemical control was indicated by 215 (76%) statewide OR beekeepers, 31 of them PM members (only one PM respondent, of 32 total, did not treat with a chemical). MAQS (formic acid) was the most common selection both statewide and for PM members. Twenty-five PM beekeepers (25 individuals – 80.5%) indicated use of MAQS with an overall loss rate of 31%, slightly better than the average loss of Langstroth hives by PM respondents. The most effective treatments (i.e. losses below the average loss) were Apiguard (14% loss rate for 7 users, Oxalic acid, 25% loss rate for 11 users and Apivar, 26% loss rate for 9 users.

## Figure 14. PM Chemical mite controls




NOTE: Powder sugar when checked as a chemical (in this survey section) by 3 individuals had a 12% loss rate but when these three are combined with the 4 individuals who indicated powdered sugar as a non-chemical treatment (see Figure 13), the loss rate was 29%, only slightly lower than the average loss.

Two PM individuals treated with fumigillian and one with tea tree extract.

**What works?** The non-chemical alternative of drone brood removal is a non-chemical treatment that can be used during spring buildup and breaking the brood cycle, with requeening, especially if hygienic queen stock or local selected stock is used to replace removed queens, can also keep mite numbers at manageable levels in most bee colonies. Both are a lot of work and new beekeepers should not seek to use such techniques until they have a better understanding of bee colony life cycles and queen event behaviors in colonies. Only drone brood removal resulted in loss rate below the average for PM beekeepers, although the brood cycle break technique was only used by a single individual respondent.

Among the chemical treatments available to treat varroa mites, use of all chemicals except Apilife Var and the older (largely ineffective) Apistan (no PM beekeeper used Hopguard) resulted in lower overwinter losses by PM beekeepers, as they did for OR beekeepers statewide (see www.pnwhoneybeesurvey.com 201 report. Statewide, Apilife Var did lower losses for statewide users (16 individuals, 24% loss rate).

The chemical treatments, to a greater or lesser degree, have limitations that may affect usefulness, just as do the non-chemical treatments. We need to learn how to use such tools more effectively. Materials that can be used effectively include acids such as formic acid (Mite-Away Quick Strips, or MAQS – especially the ½ dose treatment) and Oxalic acid or the Hopguard II product when there is little or no brood present, essential oils Apiguard or ApiLife Var, under narrow temperature conditions and the highly effective synthetic miticide, Apivar (amitraz).

All have possible serious negative effects to the beekeeper applicator and they can contaminate the beeswax and honey of the hive. Only use of MAQS is permitted when supers are on colonies. It is important to follow label directions. There may be significant queen or brood losses with many of the chemicals and post treatment sampling is strongly recommended to insure a mite control, non-chemical as well as chemical, has worked as expected.

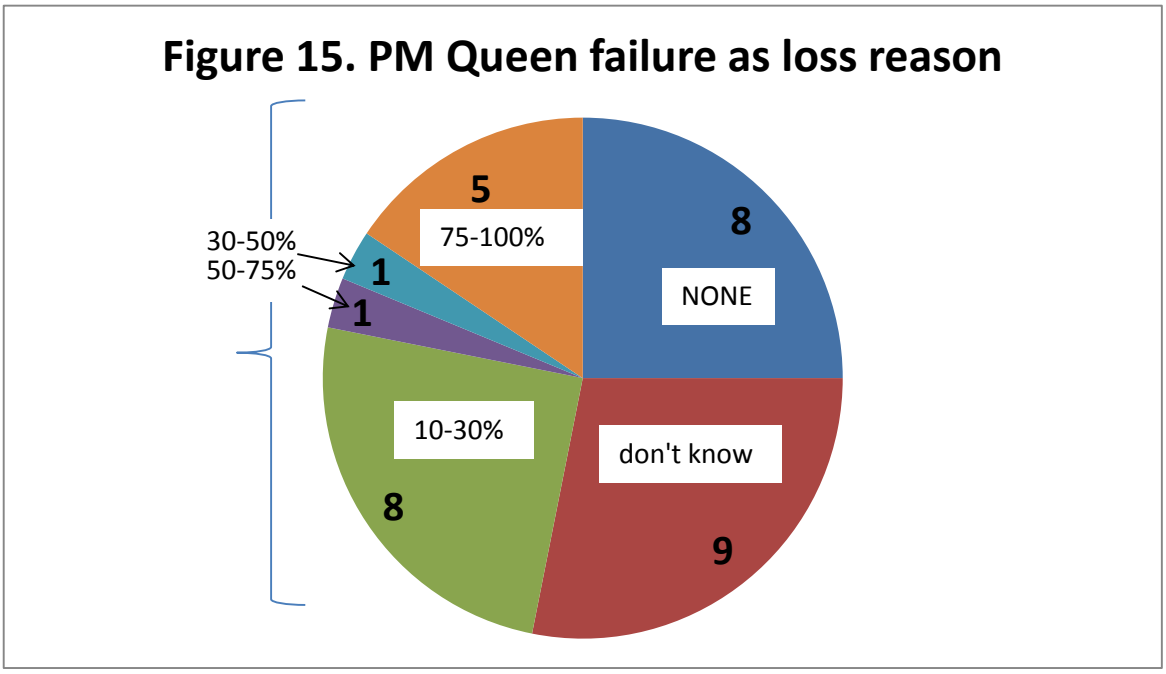
**It is clearly evident that use of several chemical mite control materials reduced overwinter losses and improved survival. The non-chemical techniques may help reduce loses but to a lesser extent. As for using more than one, and which ones to use during a season, there appears to be NO one best combination. Control choices should be driven by monitoring, seasonal considerations and an estimation of size of mite population.**

## Queens

The PNW honey bee survey asks individuals with overwinter loss to what they attribute their loss. Fifty-five of the 282 OR respondents (13%) attribute at least some of the loss of their colonies to queen failure; among PM respondents, 12 individuals (18.5% of total listings) listed queen failure as one of the contributing reasons for their losses.

However, with the health and welfare of the queen (the 'heart of the hive') critical to bee hive development and success, we also have a survey section just covering queens. We ask specifically what percentage of colonies might have been lost to queen related issues. For the total OR respondents, 127 (47%) said none and 66 respondents (24%) checked 'I don't know.' Twenty-nine percent (29%), double the number who listed it as a possible reason for winter loss, responded that queen loss might have been a factor in colony losses.

Among PM respondents, 8 individuals (25%) said none of their losses were likely due to queen failure and 9 (29%) said they did not know. Fifteen PM individuals (47%), 3 more than in previous self-reported reasons for loss, did attribute possible winter losses to queen failure, double the percent statewide. This last response required an estimate of the approximate percent of colony loss that might be attributable to queen failure. Eight individuals (25%) said 10-30%, 1 indicated 30-50%, one said 50-75% and 5 (15.5%) felt 75-100% of their loss could be due to queen failure. See Figure 15




One non-chemical management technique to reduce mite buildup in a colony is to requeen/break the brood cycle so we also asked about how managed colonies are requeened. Seven PM individuals said their colony (ies) did not requeen and 3 said they did not know if their colony (ies) requeened. Thus 21 PM respondents (69%) reported their colony (ies) did requeen. Loss level of this group was 32% compared to a 64% loss rate of those who said NO their colonies did not requeen.

Two individuals said colony queen replacement was via swarming and 2 others said it was via supersedure (4 = 18%). Fourteen individuals (64%) said they requeened by introduction

of a mated queen, 1 via a virgin queen introduction and another via introduced queen cell and two individuals said they split hives to allow the bees to requeen themselves.

**Closing comments:** This survey is designed to 'ground truth' the larger, national Bee Informed loss survey. Some similar information is additionally available on the BeeInformed website www.beeinformed.org and individuals are encouraged to examine that data base as well. Reports for individual bee groups are customized. As they are completed they will be posted by the name of the group. Additionally analysis will be performed and these reports will be posted to pnwhoneybeesurvey as they are completed.

We intend to continue to refine this instrument each season and hope you will join in response next April. If you would like a reminder when survey is open please email us at info@pnwhoneybeesurvey.com with "REMINDER" in the subject line. We have a blog on the pnwhoneybeesurvey.com and will respond to any questions or concerns you might have.

**Thank You to all who participated.** If you find any of this information of value please consider adding your voice to the survey in a subsequent season. Dewey Caron June 2017