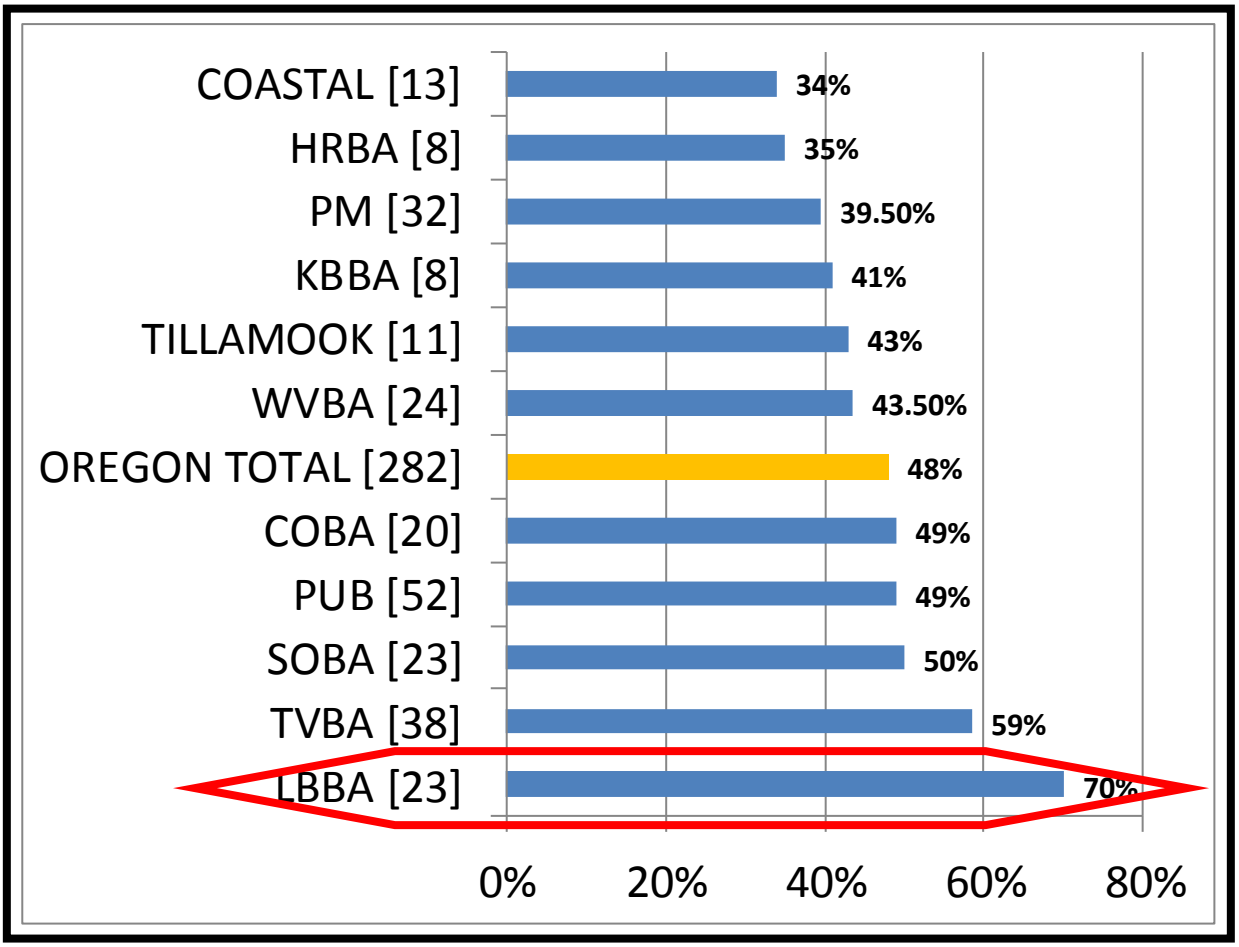
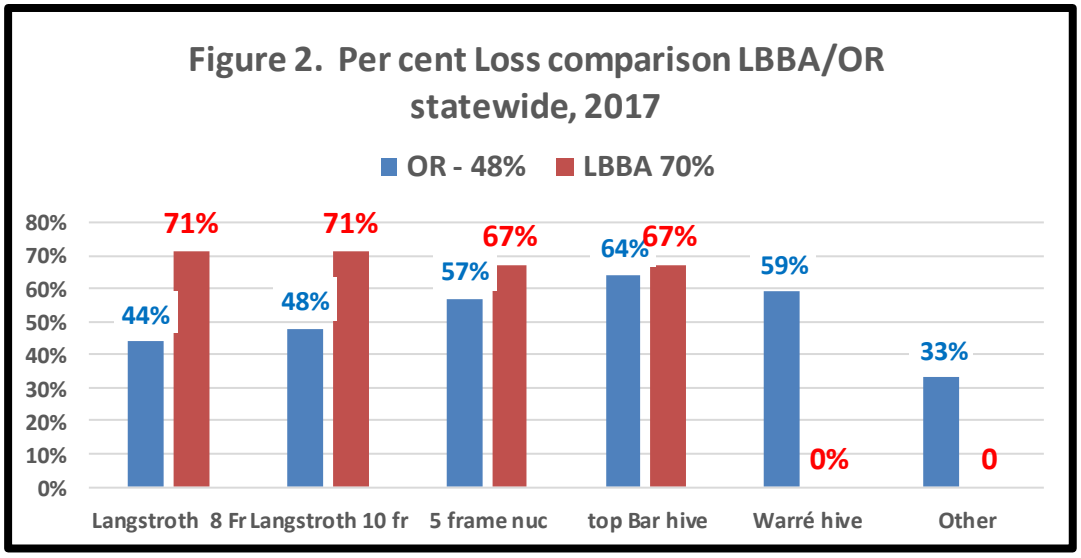
2016-17 LBBA Winter Loss Report by Dewey M. Caron

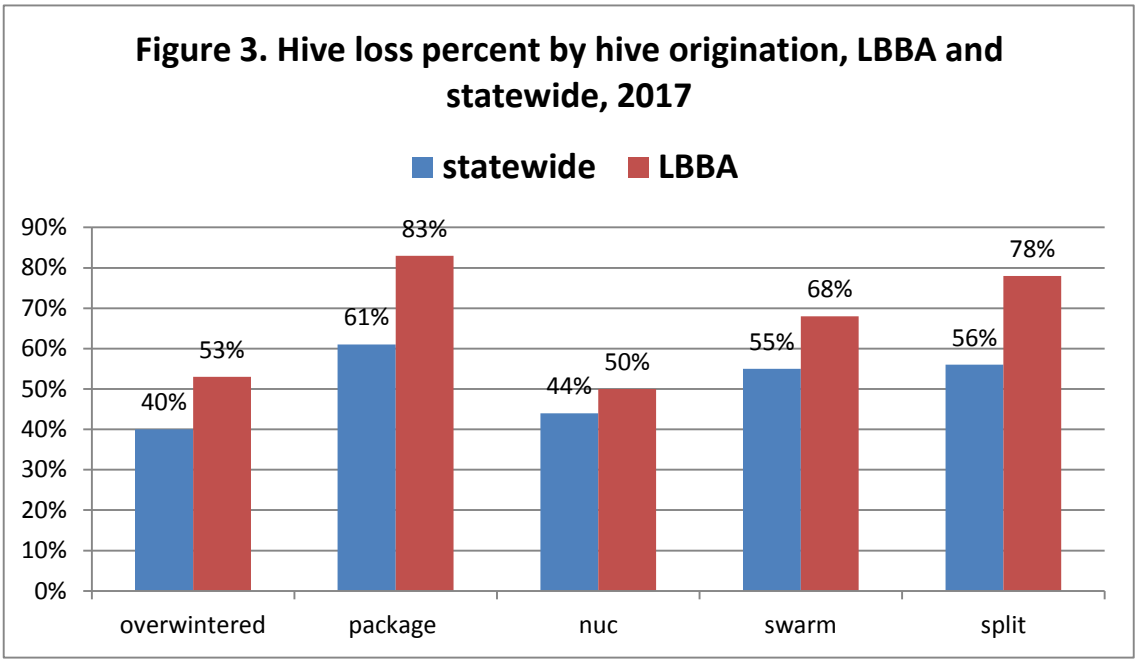
Oregon beekeepers were directed to a web-based survey document in a continuing effort to define overwintering losses/successes. This was the 9th year of such survey activity and the third to include a 10+ beekeeper response from Linn Benton Beekeepers. I received 282 responses from Oregon backyarders and 52 from Washington beekeepers keeping anywhere from 1 to 48 colonies. Twenty-three LBBA Association members completed a survey (last year 14 LBBA responses were tallied and 17 the year before so this is the "best" response rate for LBBA to date). The BAD NEWS……. of a dozen associations, LBBA beekeepers had the HEAVIEST winter loss, 70%, as shown in Figure 1 below.



Overwintering losses of LBBA respondents, as for total OR beekeepers, was determined for number of fall colonies minus number of spring survivors by 5 hive types. Data are shown in Figure 2 comparing LBBA with the statewide backyarders. LBBA member respondents started winter with 86 Langstroth 10-frame and 31 Langstroth 8-frame hives, 3 5-frame nucs, 3 Top bar hives and a single Warré hive. Loss of Langstroth hives was 71% and 67% for the Top bar and Nucs - the single Warré hive survived (0% loss). No "other" hive types were included from LBBA respondents. Statewide, the Langstroth 8 and 10 frame loss rate was 44% (8 frame) and 48% (10 frame) and from 57% for 5 frame nucs to 64% for top bar hives. See Figure 2.

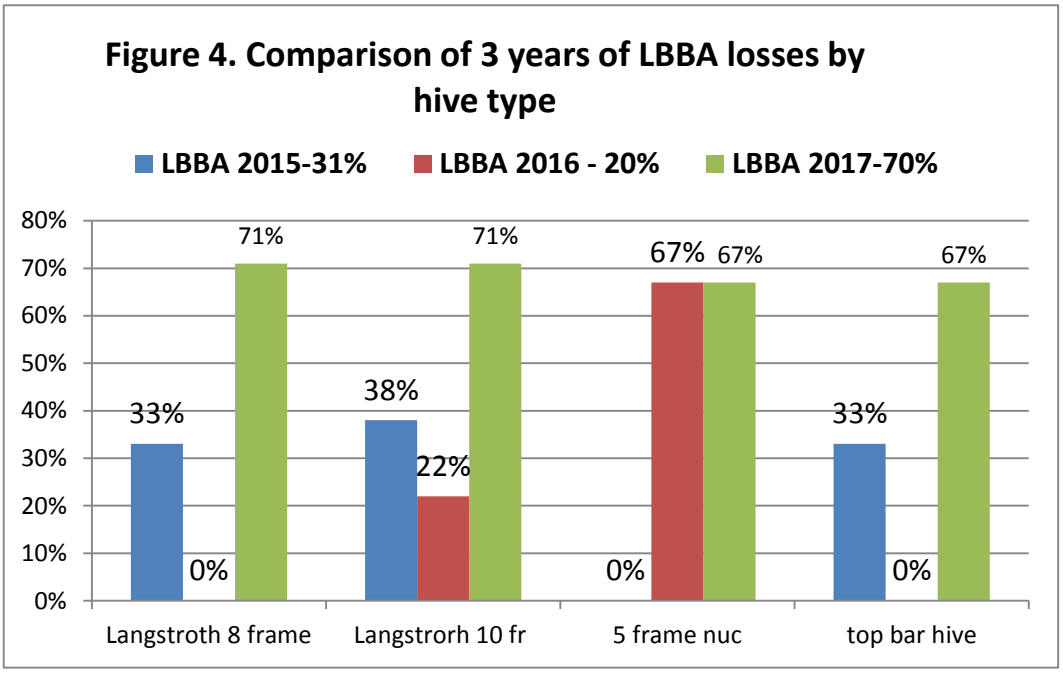


The survey also asked for hive loss by hive origination. Twenty-nine of 62 overwintered LBBA colonies were alive in the spring (53% loss rate), 13 percentage points higher than statewide. Three of 18 packages (83%loss), 2 of 4 nucs (50% loss), 7 of 22 swarm captures (68% loss) and four of 18 splits (78% loss) were survivors. See Figure 4 for LBBA and Statewide comparisons.



In the previous season (2015-16), 14 LBBA association member respondent colony losses were 20% - the lowest colony loss percentage of all OR associations and ½ the loss level (40%) of 249 OR beekeepers. And in the year before that (2014-15), LBBA losses of 17 member

respondents were 31%, about the same as statewide loss of 29% (230 OR beekeepers). The three years of LBBA losses by hive type (excluding Warré hives) are shown in Figure 4.

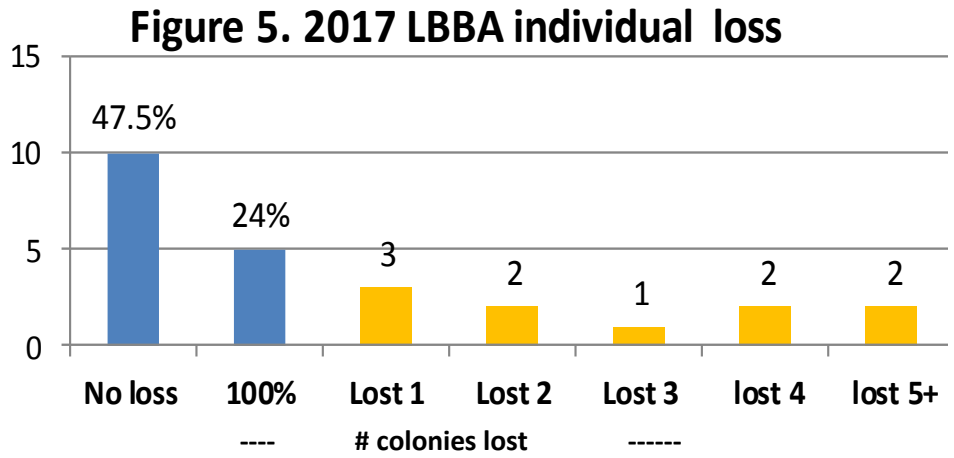


SO WHAT HAPPENED?? The GOOD NEWS…..

Why did LBBA beekeeper losses flip from 20%, lowest of last spring, to 70%, largest this spring? The reasons include a small number of club respondents and returns from 2 individuals who had extremely heavy losses. In one instance the owner of 20 colonies (mixture of 8 and 10 frame colonies)(had a 100% loss and a second individual also had a 100% loss of 28 Langstroth 10-frame colonies. Both individuals had 9+ years bee experience and both listed an address outside of Linn or Benton counties (but indicated LBBA as their primary membership). If these two are considered 'outliers' (for LBBA association but not for statewide statistical purposes), losses of LBBA beekeepers would have been 48.5%, the statewide 2017 average.

Minus the two 'outliers' the remaining 21 LBBA Coastal survey respondents were all single digit beekeepers and a mixture of new beekeepers and older, more experienced individuals. Five LBBA respondents had 1 fall colony, 4 had 2 and another 4 had 3 colonies (62% of individuals), 4 had 4-6 colonies, and 4 had 7-9 colonies (the largest number, minus the 'outliers'). Seven individuals had 1-3 years' experience, 8 individuals had 4-6 years' experience and 6 had 7+ years' experience with two listing 20 years' experience, the largest number.

Not everyone had loss. Ten LBBA respondents had NO LOSS (47.5%) while ½ that number had 100% loss. Three individuals lost 1 colony, two individuals lost 2 colonies, one lost 3 colonies and 2 lost 4 colonies. One individual lost 5 colonies and another 9 colonies, the heaviest loss. See Figure 5 for graphic of loss rates.



Two LBBA individuals moved colonies 4 and six miles for different forage conditions and a split, one moved 18 miles for a change of residence while the fourth individual moved a further distance to blackberry. One individual had two apiaries; loss at 2nd apiary was heavier (100%) than at the primary apiary (67%).

When asked to indicate the importance/majority of how they obtained their beekeeping education, 13 LBBA respondents (62%) said Bee club meetings, another 13 listed Books, journals and magazines, and an additional 13 also listed Online sources, including videos. Nine respondents listed Bee mentors and 6 listed the OR Master Beekeeper program. 10 (of 21 individuals – 47.5%) had a bee mentor available their first years of beekeeping, well below the 65% statewide response.

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. Sixty-eight individuals (16%) indicated weak in the fall, 57 said starvation and 55 queen failure (13% each). I don't know was indicated by 25 (8%). The 21 LBBA beekeeper responses (total =29) were 6 each of varroa and weak in fall (20.5% of total responses), queen failure was 5, I don' know 4, with starvation 3 which was also same number listing yellow jackets. LBBA and statewide comparison in Table below.

	Varroa mites	Poor wintering conditions	Weak in fall	Queen failure	starvation	I don't know	Other
LBBA # (%)	6 - (20.5%)	1 (3.5%)	6 (20.5%)	5 (17%)	3 (10%)	4 (14%)	3 yj
Statewide %	18%	18%	16%	13%	13%	8%	16%

Survey individuals are asked to indicate what might be an acceptable loss level. Among LBBA responses were zero (7 individuals), 10% loss acceptable (5 individuals), 25% (6 individuals) and 33%, 50% and 100% loss level as acceptable (1 individual each). These, and subsequent summaries, exclude the two 'outliers'.

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. Forensics on dead colonies is, at best, confusing and, although some options may be ruled out, we are often still left with two or more possible reasons for possible reasons why a colony (ies) died.

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. Seventy-one and half percent of LBBA individual choices (15 individuals) indicated 10% or less as acceptable.

Major factors in colony loss are thought to be mites and their enhancement of viruses such as DWV (deformed wing virus), pesticides, declining nutritional adequacy/forage and diseases, especially viruses and Nosema. Management, especially learning proper bee care and how to best use chemicals for varroa control, remain 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, may 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 are the only reason colonies are not as healthy as they should be.

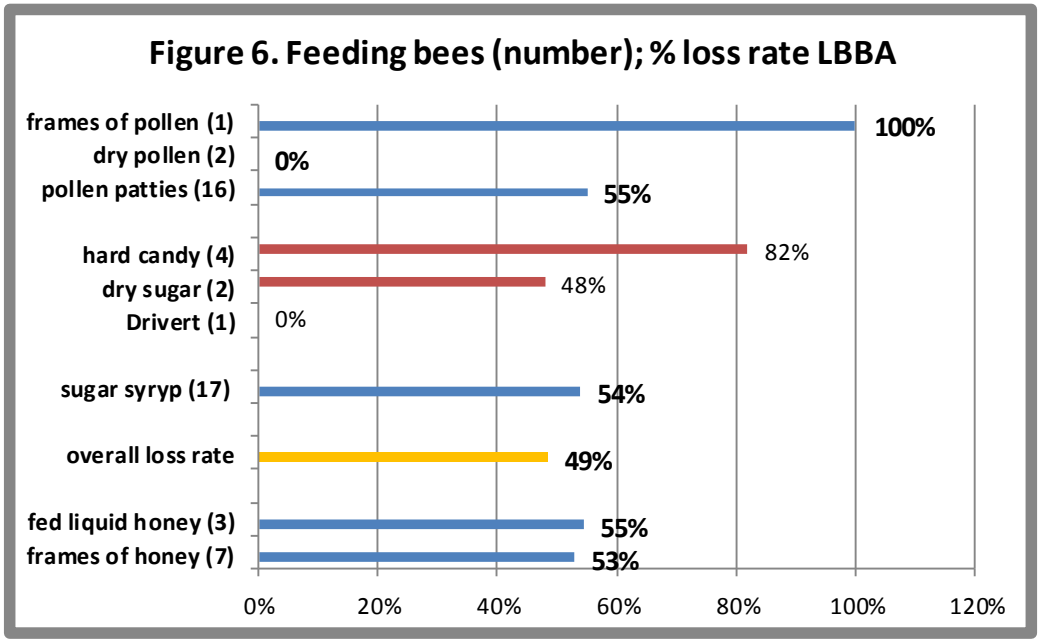
Management selections and losses

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 beekeepers often do not do just one thing/management to their colony (ies) to control mites/improve bee health. 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

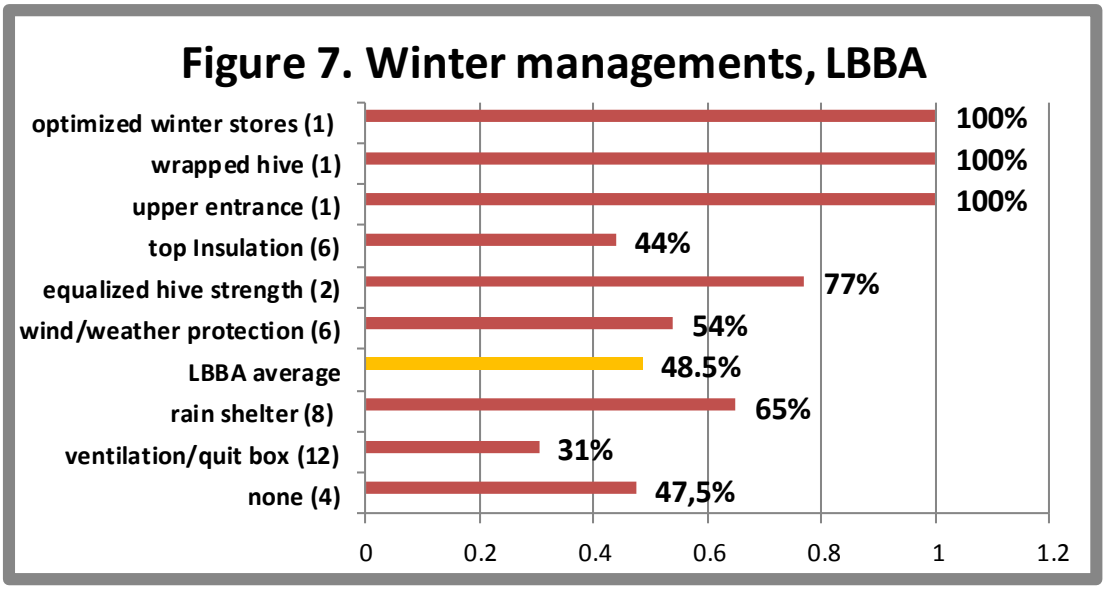
FEEDING: There were 58 total LBBA responses (2.8/individual) to the inquiry on feeding colonies with all beekeepers listing at least one management. Two listed 5 selections, one listed 4, 10 indicated 3 and only 2 listed one management (both feeding sugar syrup). Statewide, eighteen (18) individuals (10%) managing Langstroth hives did not do any of the options offered; they had a 75% loss of colonies (compared to 48% overall losses).

There is general consensus that feeding bees carbohydrate and protein can be useful. The choices of LBBA beekeepers are shown in bar graph below (Figure 6). Sugar syrup (17 of 21 individuals – 81%) and feeding bees pollen patties (16 individuals-76%) were the most common choices. Only 2 managements showed losses below the average (adjusted with the 2 'outliers' removed) – one individual feeding fondant to their 4 colonies had no loss and 2 individuals using dry sugar, each with one colony, also had no colony loss. See Figure 6.

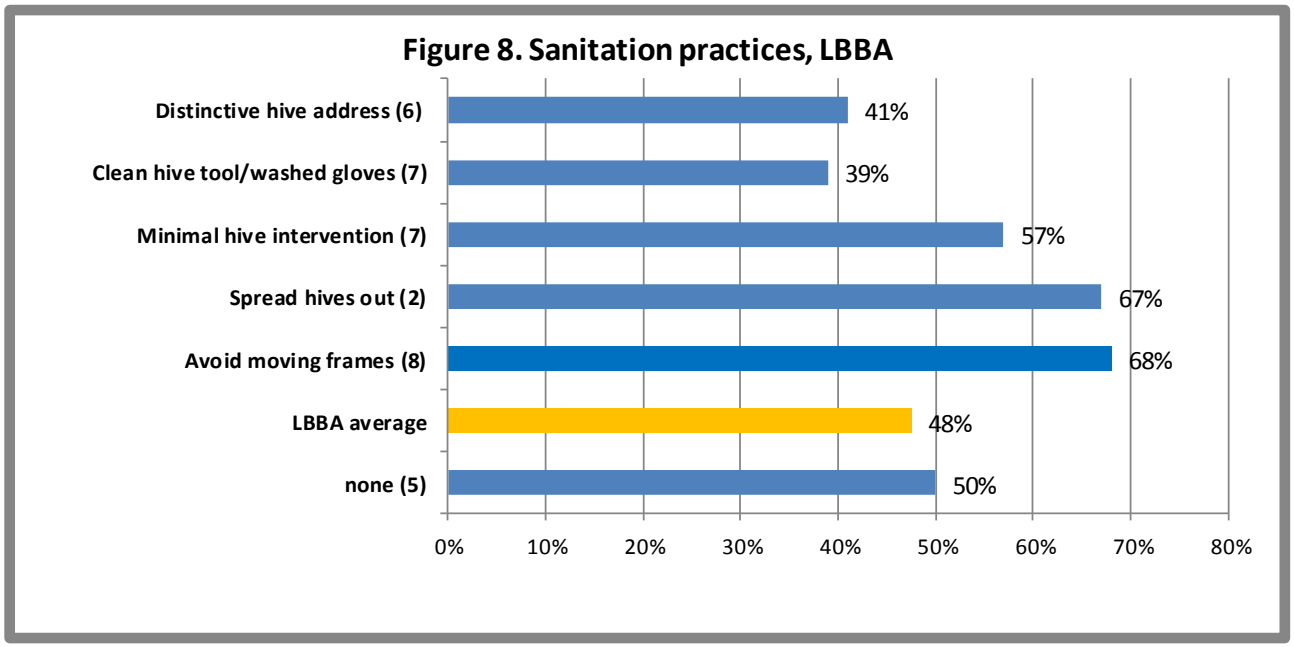


WINTERING PRACTICES: Statewide, OR beekeepers selected 538 responses about wintering management practices (1.9 average/individual) - more than one option could be chosen. Forty-six individuals, 17.5% of the respondents, indicated NOT doing any of the several listed wintering practices; these individuals had a 49.5% winter loss compared to overall of 48%. Four LBBA individuals did NOT do any of the Wintering practices; their loss rate was 47.5%. Among the LBBA respondents there were 36 selections (1.7/individual); three individuals chose 4 and another 3 had 3 selections; 5 individuals had a single selection, 3 were rain shelter and 2 were ventilation/quilt box used.

The most common wintering management selected by LBBA beekeepers was ventilation/quilt box (12 members) and they had a better survival rate than average (30.5% loss rate). Six individual who checked top insulation also had better than average survival (44% loss). None of the other winterizing measures improved overwintering success. Figure 7. Note the one person who indicated wrapping of hives lost their 4 colonies (100% loss), the one person who used upper entrance lost their single colony and the single individual who optimized winter stores and their hives lost all 9 of their colonies.



SANITATION MEASURES/PRACTICES: Although critical that we practice some basic sanitation in our bee care, we probably do too little to help insure healthy bees. Five LBBA survey respondents said they did not practice any of the several alternatives and had average loss level. There were29 total choices selected (1.8 individuals); four individuals chose 3 each and 7 made only a single selection. The most common election was avoid moving frames (8 individuals) followed by minimal hive intervention and clean hive tools/wash gloves frequently (7 each). These two sanitation measures showed slightly better hive survival. Figure 8.



Apiary site selection and colony configuration within the apiary, although not commonly used, are additional important sanitation choices. Anything we might do to give colonies distinctive "addresses" has been shown to reduce drifting of adult bees and helps to reduce incidence of disease and mites.

SCREEN BOTTOM BOARDS: In the survey we asked what percentage of hives had screen bottom boards and whether they were blocked during the winter. Statewide 21% said they did not use screened bottoms; only a single LBBA beekeeper said they did not use them (individual was maintaining a top bar hive) and lost both colonies (loss rate 100%). Statewide 66% used them on all their hives while all individual LBBA beekeepers used screen bottom boards on all their hives (excepting of course the one not using SBB). The majority statewide (51%) and among LBBA beekeepers (50%) left them open over the winter period (never response). 18% statewide and 8 LBBA beekeepers closed them during the winter (and had 29% loss, very different from statewide) and 2 sometimes closed them (43% loss).

There is no good science on whether open or closed bottoms make a difference in overwintering success 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 but this did not occur for LBBA beekeeper respondents.

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 frequently do only a single 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 different 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, provided with some extra wind/weather/rain protection to improve survival. Using screened bottom boards and leaving them open (or closed as per your preference) for ventilation helps too. Use of insulted tops/quilt box with moisture collector such as burlap, straw, old towels, etc. with extra top ventilation and a top entrance may help vent excess moisture. The one LBBA beekeeper using top entrance did not improve his/her success.

Feeding bees either sugar syrup or honey from other disease-free hives, helps insure enough food stores during early fall management and is useful spring stimulation. Once fall rains start, we should halt syrup feeding and switch to feed dry sugar or a hard sugar candy to avoid adding additional moisture stress to colonies. Again this was not shown for LBBA beekeepers, except the single individual feeding drivert. Feeding dry pollen seemed to help two individuals; statewide feeding pollen patties helped survival.

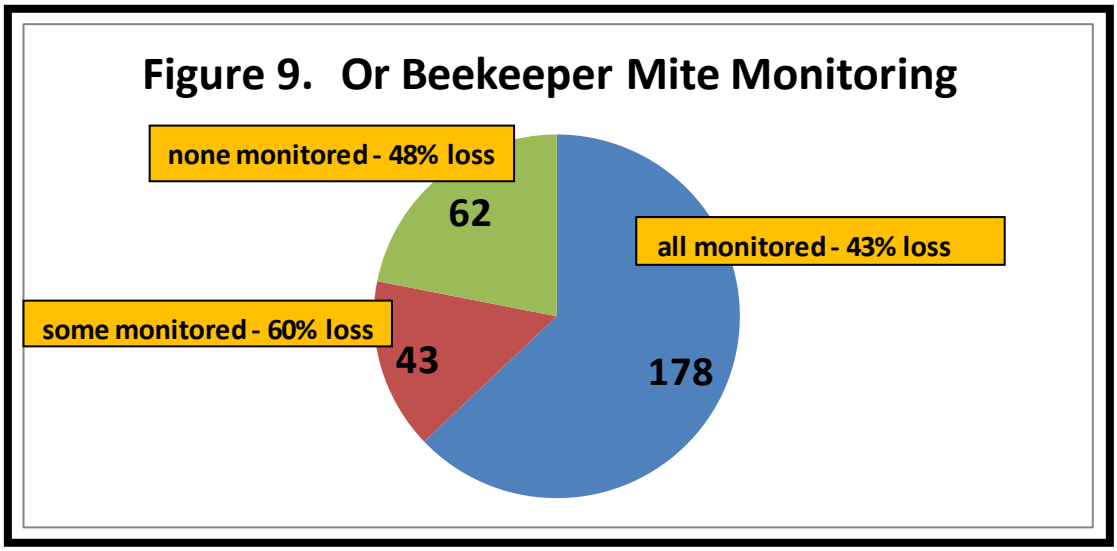
Finally, it would seem prudent to review basic sanitation measures, as anything we can do to help reduce sick bees and improve colony health, will improve overall survival.

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, what method was used, including when (month) it was employed. Statewide, 178 individual respondents (63%) said they monitored all their hives. Comparing losses of those individuals monitoring all their hives, alongside those not monitoring, as well as those who indicated they monitored some of their hives, reveals a 43% loss of those 178 individuals monitoring all their hives, the 62 individuals (22%) who reported they did no monitoring had the statewide average loss of 48% loss while the 43 individuals who monitored some of their colonies had a 60% loss. **Monitoring helps!**

The comparable numbers for LBBA respondents was 18 individuals (86%) monitored all their hives and had a 49% loss rate. Two individuals monitored some of their hives and had 67% loss while the one individual that did NO monitoring had a 100% loss rate. Figure 9 below illustrates the statewide data.



When asked how they monitored hives, the 20 LBBA individuals who indicated they did monitor had five choices. Three individuals said they monitored only with Sticky board, and another3 only with alcohol wash; 2 monitored only using powdered sugar. The remaining 12 selected more than a single method.

Most popular monitoring method was sticky boards (10 individuals, 52.5% of total monitoring beekeepers), followed by 7 individuals who visually looked at drone brood. Powdered sugar (6 individuals) and alcohol wash (by 5 individuals) were next followed by visual examination of adults, by 4 members. Statewide, individuals who used powdered sugar to monitor had lower loss level (30%) and those using alcohol even lower losses (20%). For LBBA members, the 10 individuals monitoring with sticky boards had only a 6% loss but those using alcohol wash and powdered sugar did not show reduction in loss – 50% and 53.5% respectively. I am not sure why those using sticky boards had such success – this was not the case statewide.

Sampling both pre- and post-treatment (12 individuals) was the most common response. These individuals had a 48% loss rate. Two individuals indicating they treated but did not sample had a 40% loss and the six individual who said they sampled only pre-treatment, lost 59% of their colonies. I am not sure why those who did a post-treatment sampling had only average results – this sample should indicate treatment effectiveness and in cases where the number of mites is not below recommended levels, should trigger another control effort.

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 although looking at some drones during colony inspection can be useful if, when we see mites in drone brood, it triggers use of a more reliable adult washing technique.

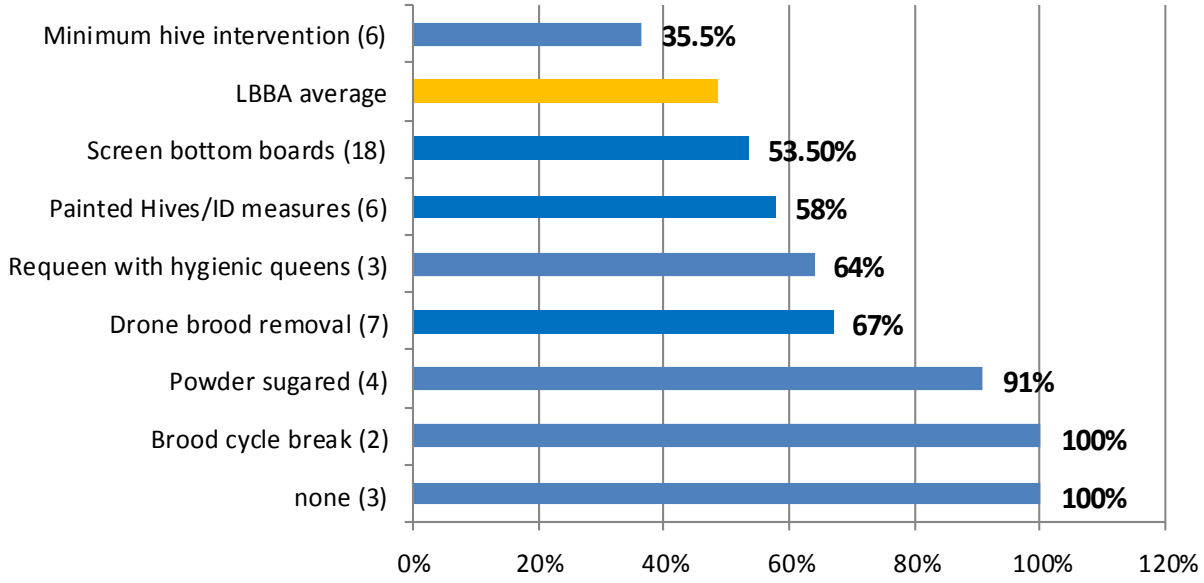
See Tools for Varroa Monitoring Guide www.honeybeehealthcoalition.org/varroa on the Honey Bee Health Coalition website for a description of and videos demonstrating how best to do sugar shake and alcohol wash sampling. The Tools guide also includes suggested mite level to use to base control decisions keyed to adult bee sampling numbers. 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 most 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. A single LBBA individual did not use either a non-chemical nor chemical control and lost the single top bar hive. Another individual did not use a non-chemical technique to control mites and lost 2 colonies (100% loss).

NON-CHEMICAL CONTROL: Respondents were offered 7 alternative, non-chemical mite treatments and could check more than one choice and could use a blank "other" to indicate any additional techniques used. Of these seven control alternatives on the survey, use of screened bottom board was listed by 200 individuals (71%) statewide and these individuals had slightly lower overwinter loss (46%). All but one LBBA member respondent indicated use of SBB; their loss rate was 53.5%, slightly higher than the average of 48.5%.

LBBA members checked 47 selections (2.5/individual excluding the 2 who said none and the two 'outliers'); five individuals made 4 selections, and 5 had a single selection, all SBB. Drone brood removal (7 individuals), painting hives a distinctive color/other hive ID measures and minimal hive intervention, both by 6 members, were the most common choices. As shown in Figure 10 only minimal hive intervention practioners had a loss below the LBBA average.

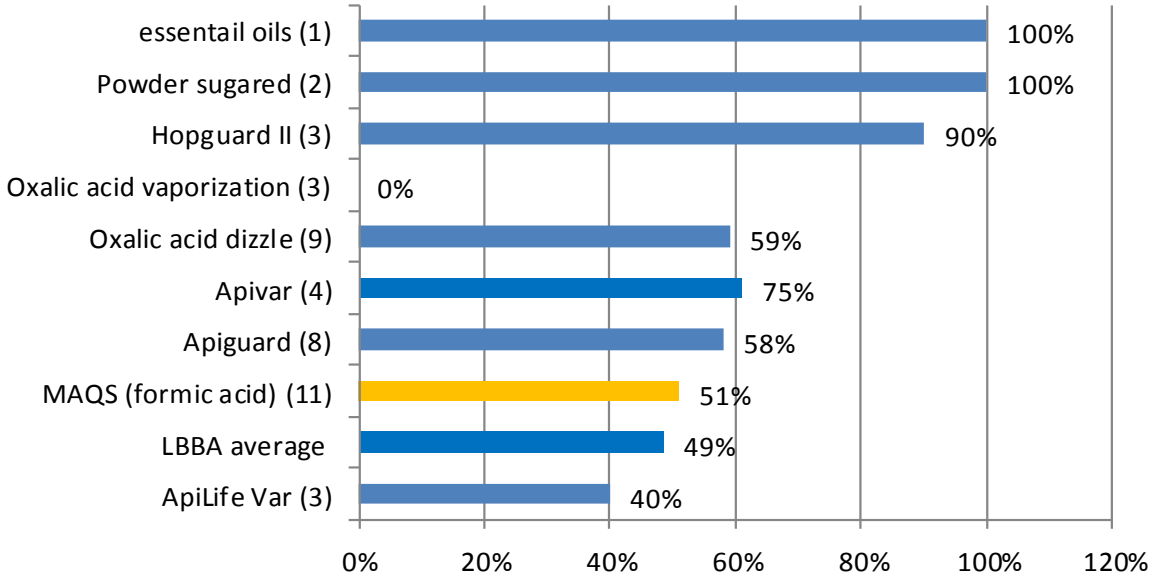
Figure 10. LBBA beekeeper Alternative mite controls



Statewide doing nothing resulted in higher survivorship, but other than use of screen bottom boards, none of the alternatives was, by itself, especially helpful in helping reduce losses as was the case also with LBBA members, except for the minimal hive intervention. The highly interventive techniques of drone brood removal and brood cycle break or requeening with hygienic queen stock may be useful but they are difficult to do and unless done correctly with proper timing may cause more overall loss rather than reducing losses. These techniques could be useful in combination with each other or with chemical use.

CHEMICAL CONTROL: Use of a chemical control was indicted by 215 statewide OR beekeepers (76% of total individual respondents), 20 of them LBBA beekeepers (only one LBBA respondent did not treat (their top bar hive) with a chemical). Seven individuals had a single selection and 1 used 5 materials, another 4 chemicals and 3 used three materials. MAQS (formic acid), Apiguard and Oxalic acid (drizzle) were the most popular choices.

Figure 11. LBBA beekeeper Chemical mite controls



Statewide, beekeepers using both Apivar and ApiLife Var had greater survival. Figure 11 shows the number of users, in ( ), and the loss rate for users for 8 materials by LBBA members. Users of oxalic acid (3 individuals) had total survival but 9 users of oxalic drizzle had heavier losses (59%). The 3 users of ApiLife Var, like those statewide (16 total), had better survival.

What works? The non-chemical alternative of drone brood removal 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, also keeps 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. Neither resulted in loss rate below the average for LBBA beekeepers.

Among the chemical treatments available to treat varroa mites, use of ApiLife Var resulted in lower overwinter losses by LBBA beekeepers as its use did for OR beekeepers statewide (see www.pnwhoneybeesurvey.com 2017 report). Oxalic acid vaporization statewide showed some improvement of survival and worked spectacularly well for 3 LBBA beekeepers

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.

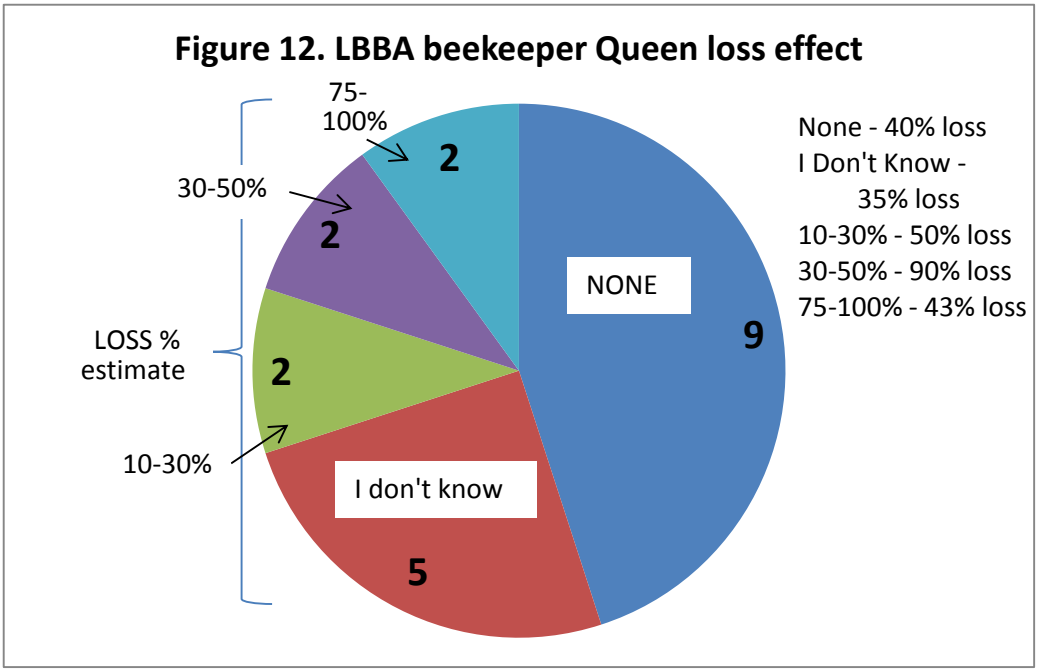
It is clearly evident that use of several chemical mite control materials reduced overwinter losses and improved survival. The non-chemical techniques may help reduce loses but to a lesser extent. There appears to be NO one best combination for use of more than one, and which ones to combine in use during a season, 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 LBBA respondents, 5 individuals (17% 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 reason for winter loss, responded that queen loss might have been a factor in colony losses.

Among LBBA respondents, 9 individuals (45%) said none of their losses were likely due to queen failure and 5 (25%) said they did not know. Six individuals (30%), 1 more than in previous self-reported reasons for loss, did attribute possible winter losses to queen failure, similar to the percent statewide. This last response required an estimate of the approximate percent of colony loss that might be attributable to queen failure; two individuals (33%) each said 10-30%, 30-50%, and 75-100% of their loss could be due to queen failure.



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. Three IBBA beekeepers said their colony (ies) did not requeen and 2 said they did not know if their colony (ies) requeened. Thus 16 individuals reported their colony (ies) did requeen. Loss level of this group was 50%.

One individual said colony queen replacement was via supersedure and three individuals said their colonies requeened by swarming. Twelve introduced a mated queen. Six of these beekeepers had marked queens.

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 July 2017