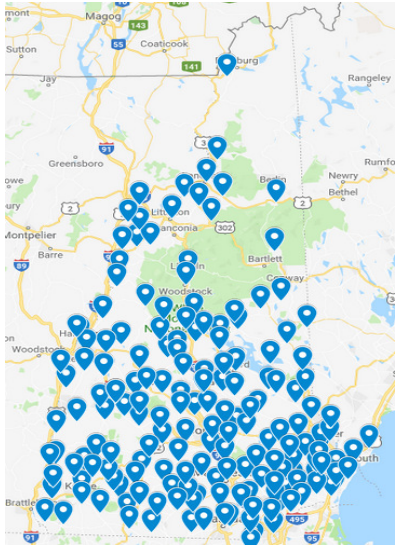


2018-19 NH Winter Hive Loss Results

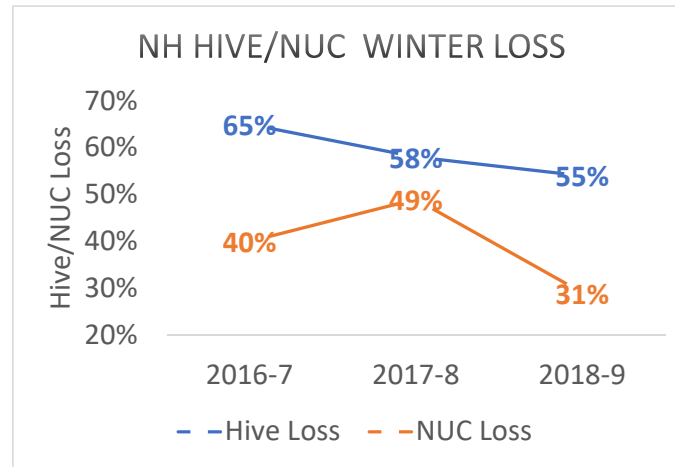
2018-19 Survey Executive Summary

- Survey covered the period from Oct 1, 2018-Mar 31, 2019
- Excellent Survey Response covering 405 Beekeepers, 442 Apiaries, 182 towns, 1445 hives & 530 NUCs
 - Out of state: 2 MA, 2 ME, 4 VT,
 - 1 New Mexico (data removed as an outlier)
- Overall Loss rates continue to decline over the 3 years of the survey
- Observations from the 2017 & 2018 surveys generally hold true for 2019.
- Data indicates beekeepers are using the data from the surveys to influence their management practices.
- Merrimack County continues to have the highest loss rates which we need to investigate further.

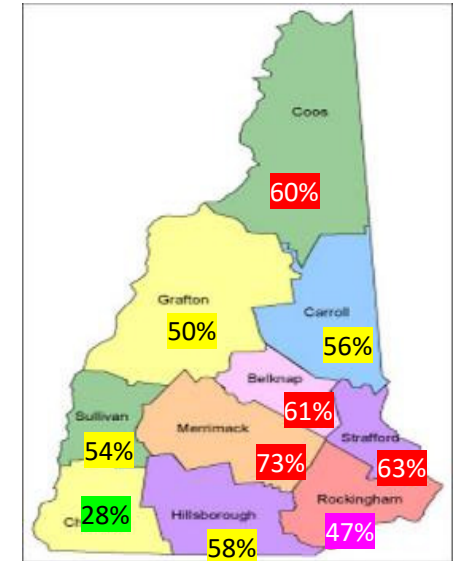
2018-19 NH Winter Hive Survival (Oct 1→Apr 1)



2018-19: 183 towns/442 apiaries

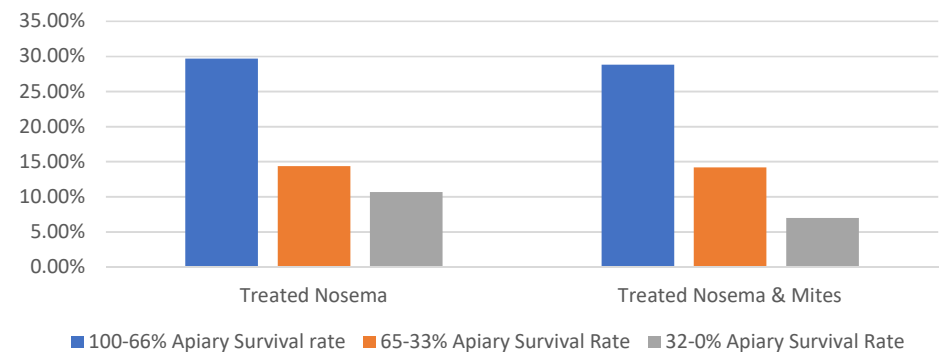
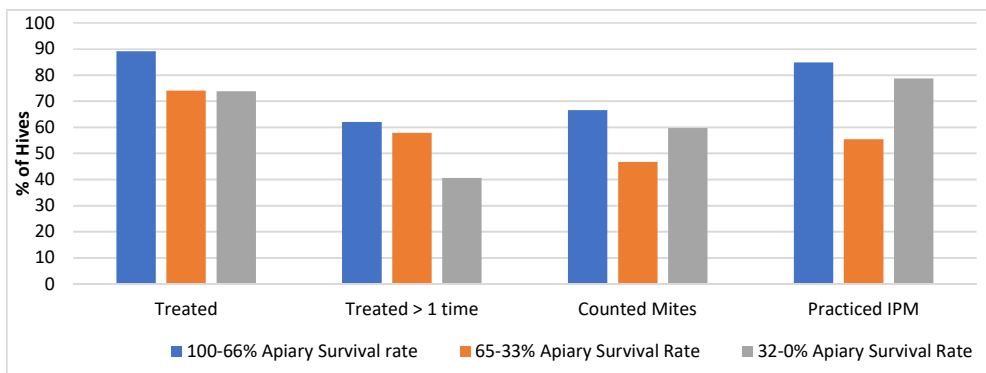


Trend is in the right direction!



2018-19 Loss by County

Survival Rate based on Management Practices



Respondent's Club Affiliations

405 Respondents:

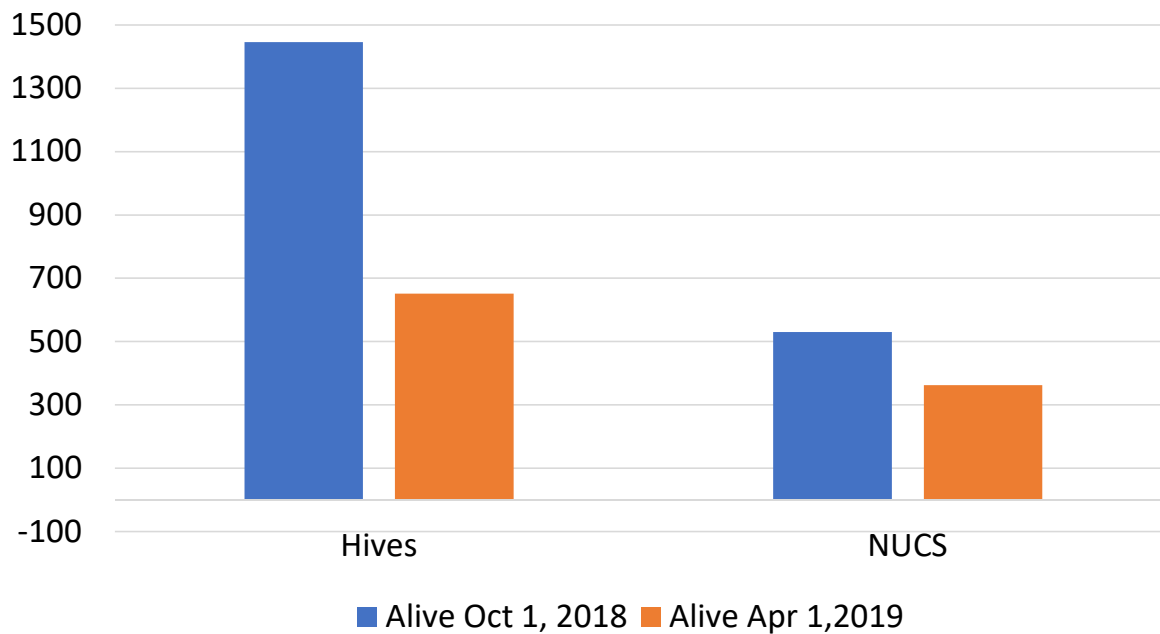
- 79 belong to NO Bee Club (~20%)
- belong to a NH "local" bee club
 - 64 belong to 1 Club + NHBA
 - 8 belong to 1 Club + another state/nat'l club
 - 189 belong to just 1 club & no other bee club affiliations
- 94 belong to NHBA & a NH Local club
- 18 belong only to NHBA

Club	Respondent
NHBA	99
EAS	8
ABF	2
VT Beekeepers	9
MA Beekeepers	5
ME Beekeepers	7

Club	Respondents	Participation Rate
CABA	53	45%
Seacoast	49	64%
Pawtuckaway	43	50%
Monadnock	31	69%
KBA	41	72%
MVBA	48	27%
PBBA	35	34%
Winni	15	-
North Country	14	82%
CT River Valley	6	60%

2018-19 Hive and NUC Winter Loss

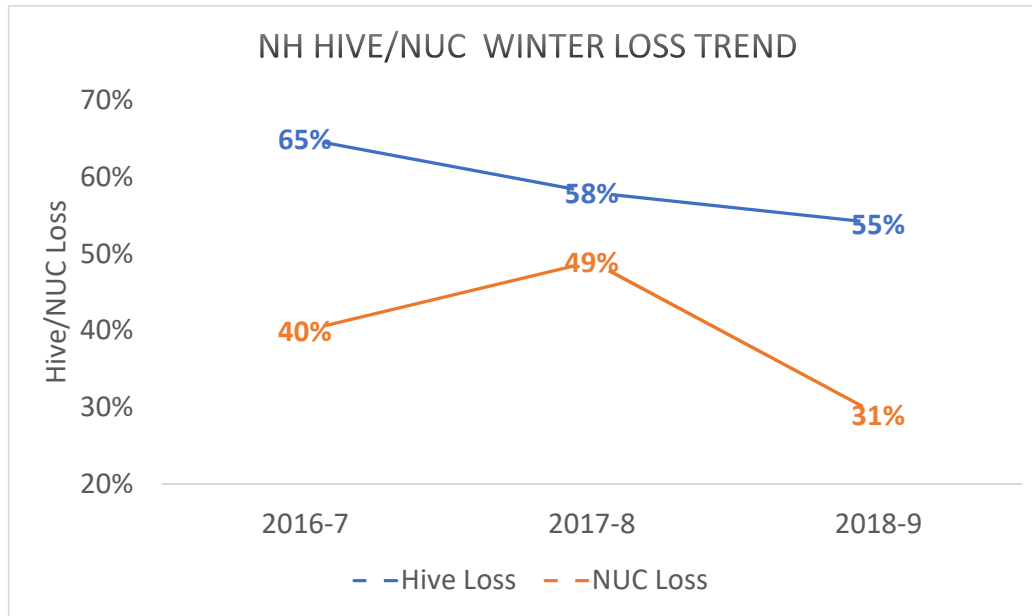
Comparison of Hives/NUCs Alive 10/1/18(Blue) and Alive on 4/1/19 (Orange)



2018-19 Winter Loss:
55% Hive & 31% NUC Loss

	# Hives	#NUCS
Alive Oct 1, 2018	1445	530
Alive April 1, 2019	651	362

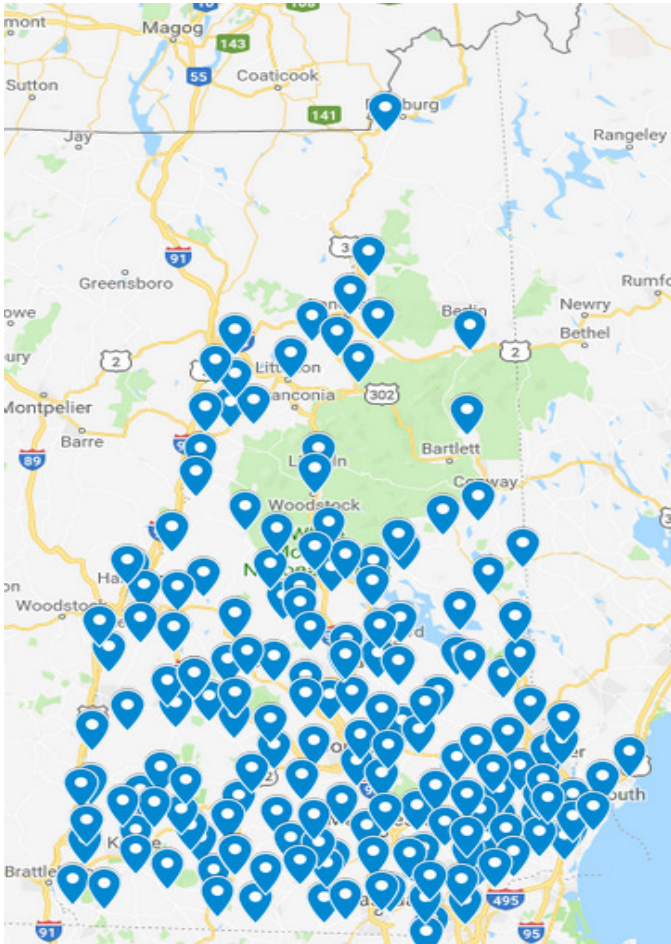
2018-19 Hive and NUC Winter Loss



	# Hives	#NUCS
2016	1007	353
2017	1340	323
2018	1445	530

The trend is going in the right direction!

Reported Hive and NUC Loss by County

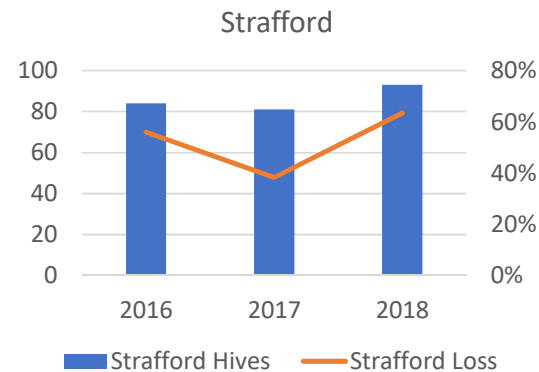
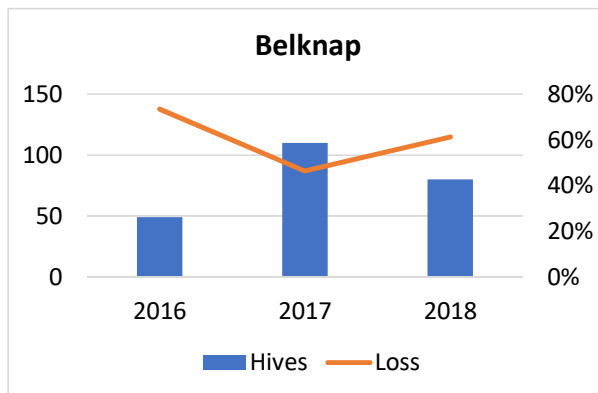
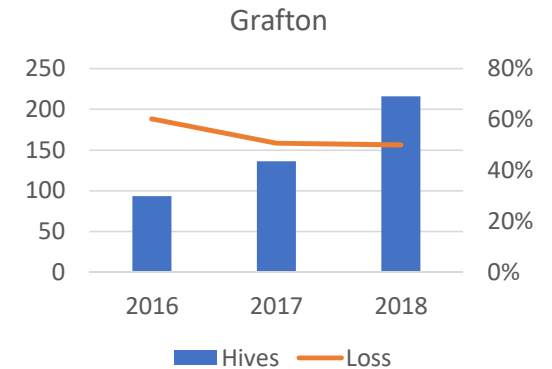
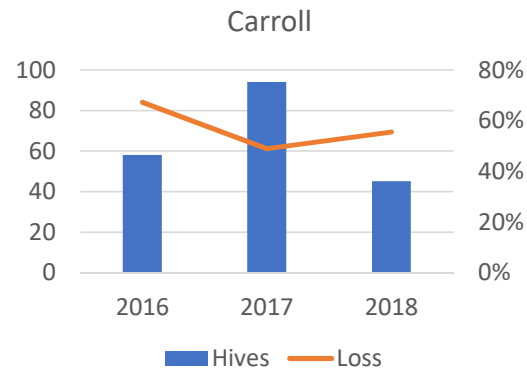
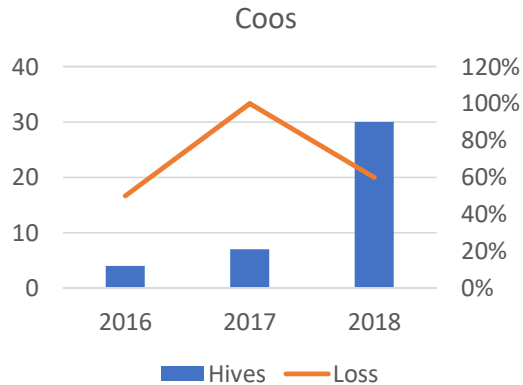


Each pin represents
a town with at least 1 hive

	# Hives Reported	Hive Loss	# NUCs reported	NUC Loss
Merrimack	241	73%	79	59%
Strafford	93	63%	22	64%
Belknap	80	61%	12	92%
Coos	30	60%	6	33%
Hillsborough	226	58%	9	78%
Carroll	45	56%	10	30%
Sullivan	113	54%	285	12%
Grafton	216	50%	48	52%
Rockingham	227	47%	13	69%
Cheshire	121	28%	41	27%

*MA: 15 hives (13% loss); VT: 9 hives (56% loss) ME: 9 hives (100% Loss)

Hives Reported & Loss Rate Year to Year (by County)



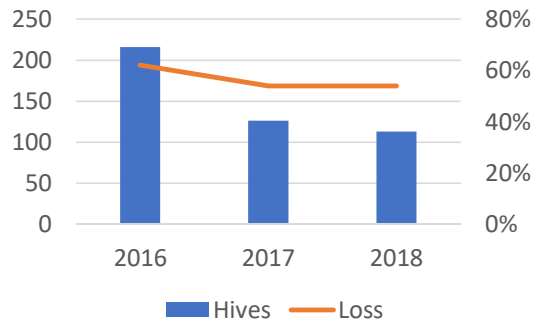
of hives : 

Hive loss : 

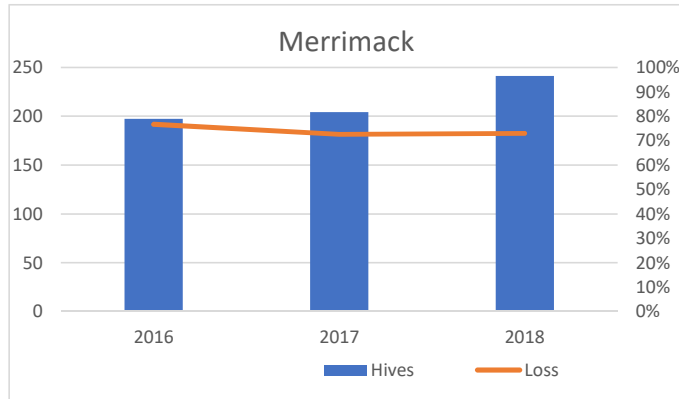


Hives Reported & Loss Rate Year to Year (by County)

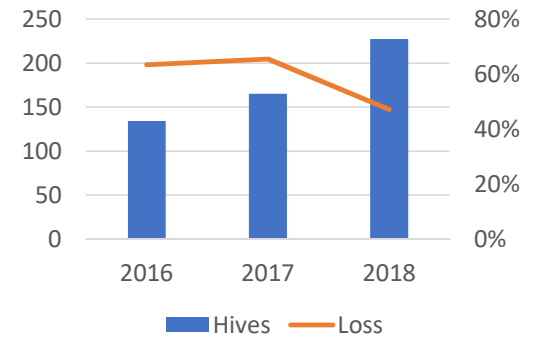
Sullivan



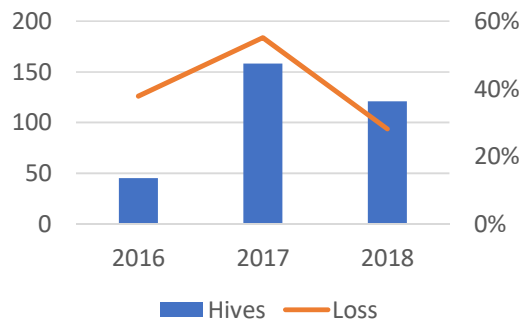
Merrimack



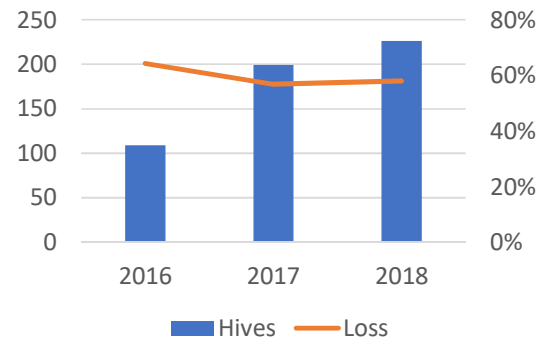
Rockingham



Cheshire



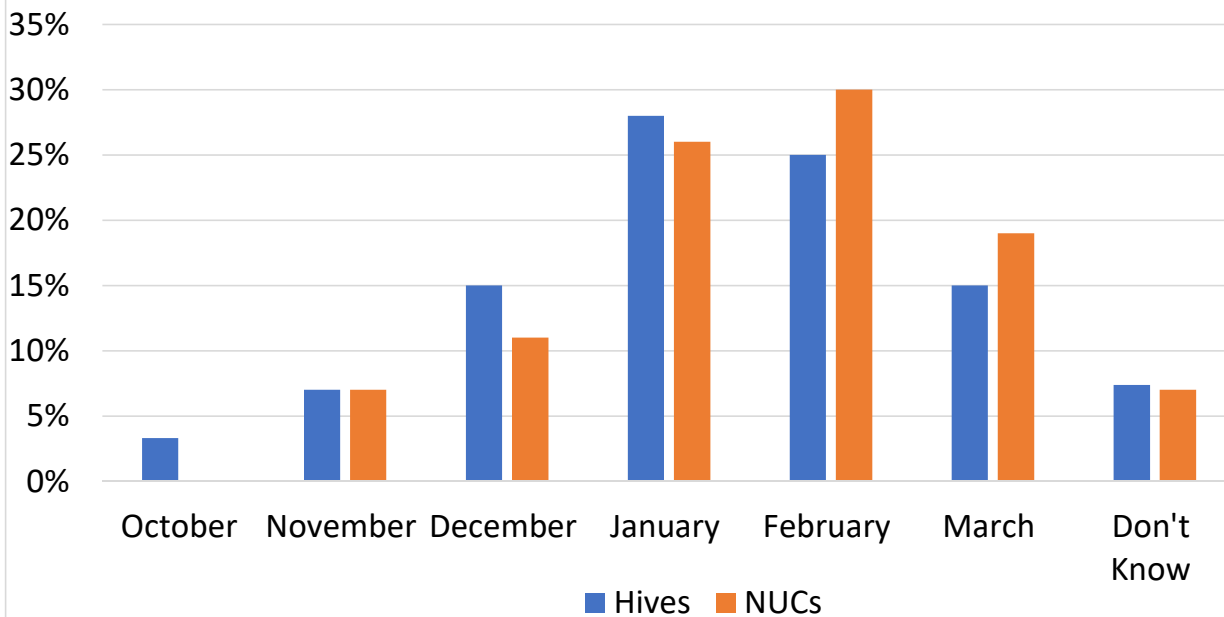
Hillsborough



of hives : 
Hive loss : 

Hive and NUC Loss By Month

2018-19 Loss By Month



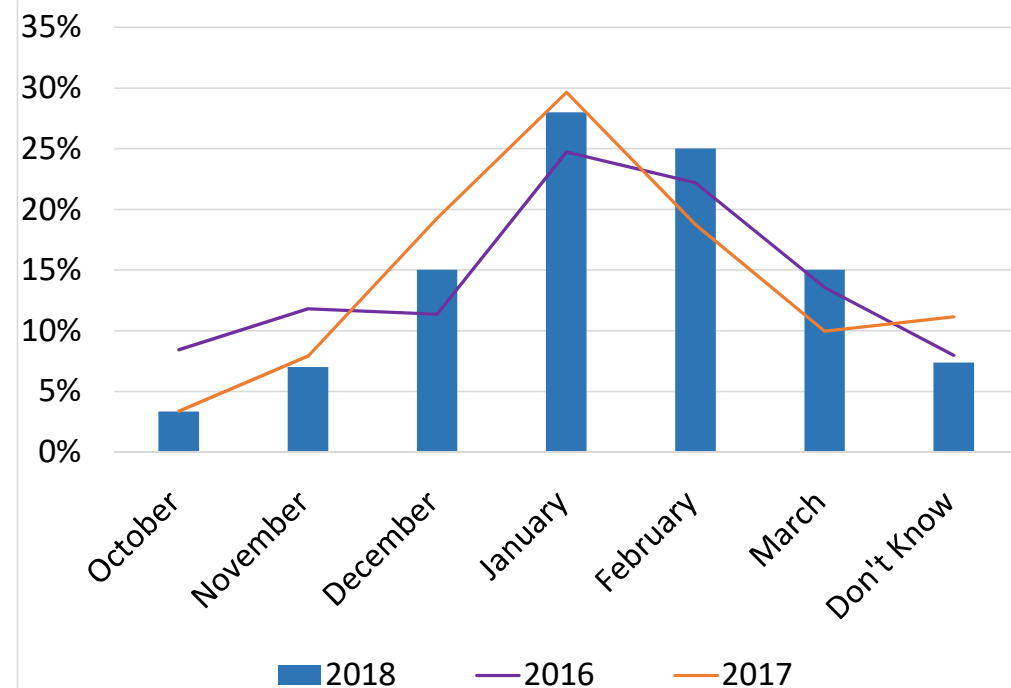
	# Hives Lost	# NUCs Lost
October	25	0
November	58	11
December	120	18
January	223	42
February	197	49
March	117	33
April	55	11
Don't Know	25	0

*note –When multiple months were listed for the loss in the apiary, the number of hives/NUCs lost was divided by the number of months listed & then applied equally to each month's

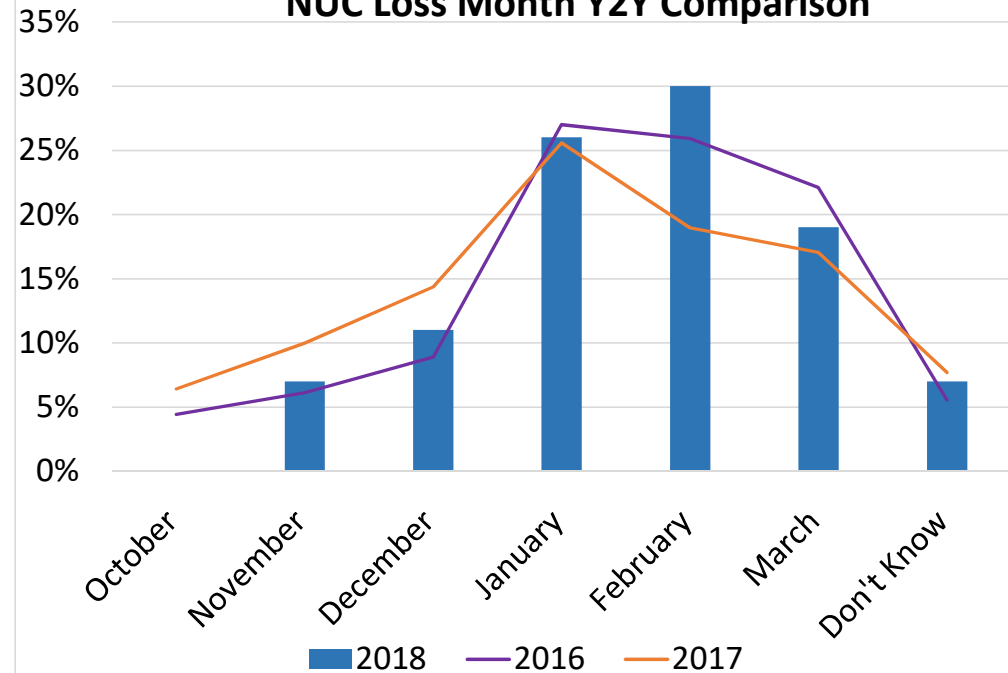
- Jan & Feb were the biggest loss months for Hives
- Highest percentage of NUCs were lost in Feb

Month of Loss – Year over Year

Hive Loss Month Y2Y Comparison

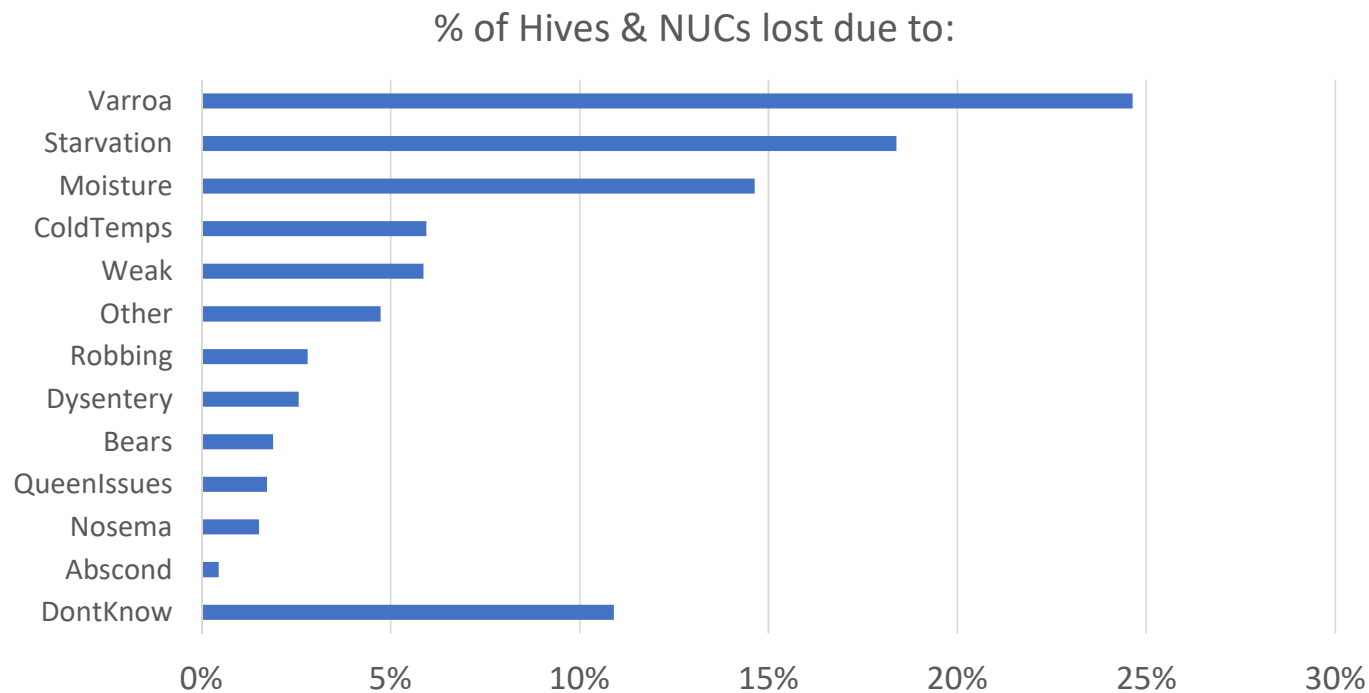


NUC Loss Month Y2Y Comparison



- 25-30% Hive loss in January for last 3 years
- Feb NUC Losses were higher in 2018

Reported Cause of Loss

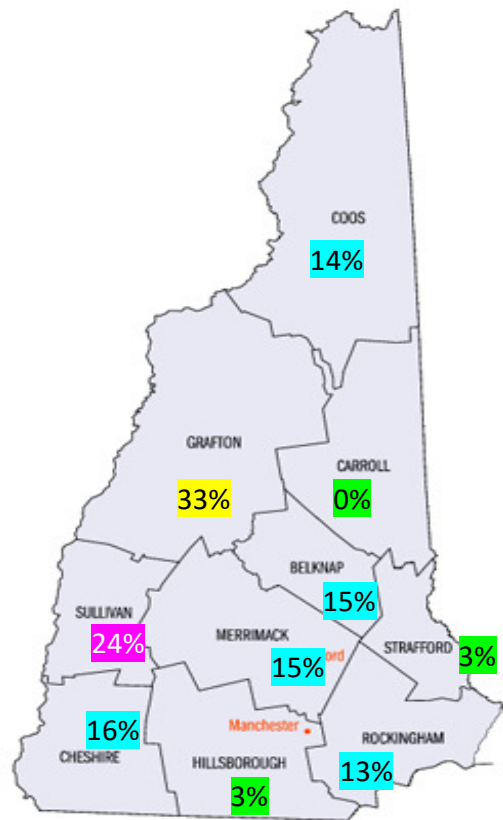


*note –When multiple causes were listed for the loss in the apiary, the number of hives+NUCs lost was divided by the number of causes listed & then applied equally to each cause

“Other”: mice**, chalkbrood, “My fault”, poison, “Lazy beekeeping”, tracheal mites, froze/cover blew off, no pollen

Yellow Jacket/Hornet/Wasp Robbing Issues

	% of hives that had yellow jacket robbing	# hives
Maine	0%	4
Grafton	33%	198
Sullivan	24%	101
Cheshire	16%	106
Merrimack	15%	164
Belknap	15%	53
Coos	14%	29
Rockingham	13%	190
Hillsborough	3%	181
Strafford	3%	77
Carroll	0%	43
MA	93%	15
VT	22%	9



Upper Valley Area had biggest issues with Yellow Jacket, etc. Robbing

Significantly different than 2017:

Strafford was 50% → 3%

Rockingham was 41% → 13%

Hillsborough 31% → 3%

Grafton was 28% → 33%

Sullivan was 0% → 24%

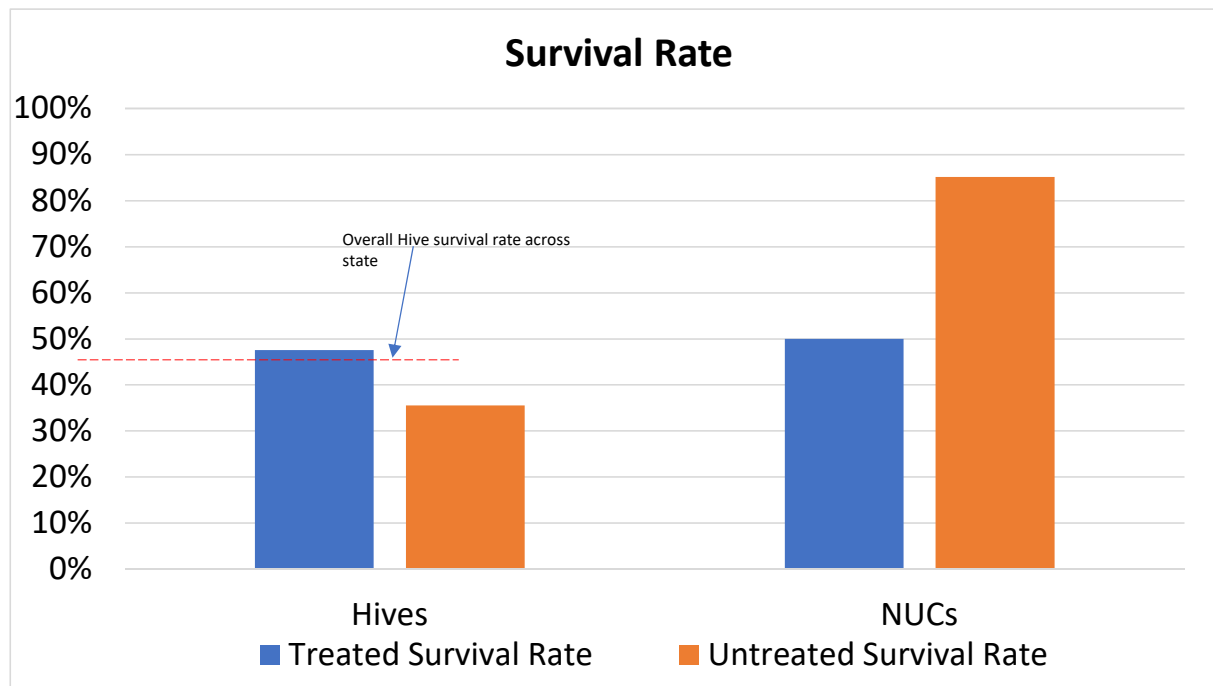
Carroll was 19% → 0 %

reports cover 1170 hives

Next sets of graphs are SURVIVAL
RATES

(Red dash line in graph indicates hive survival rate for state)

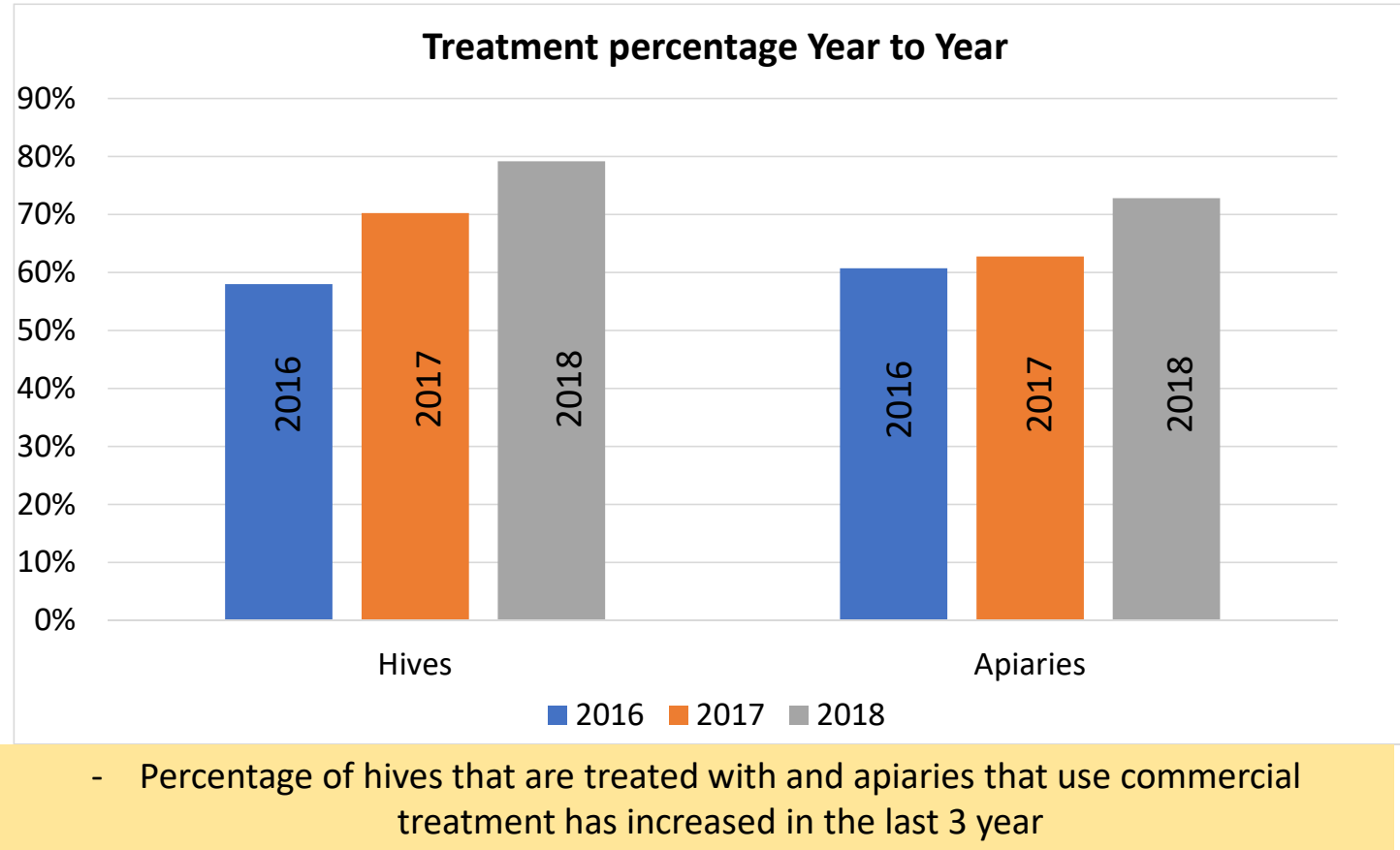
How does treating with commercial treatments affect survival rate?



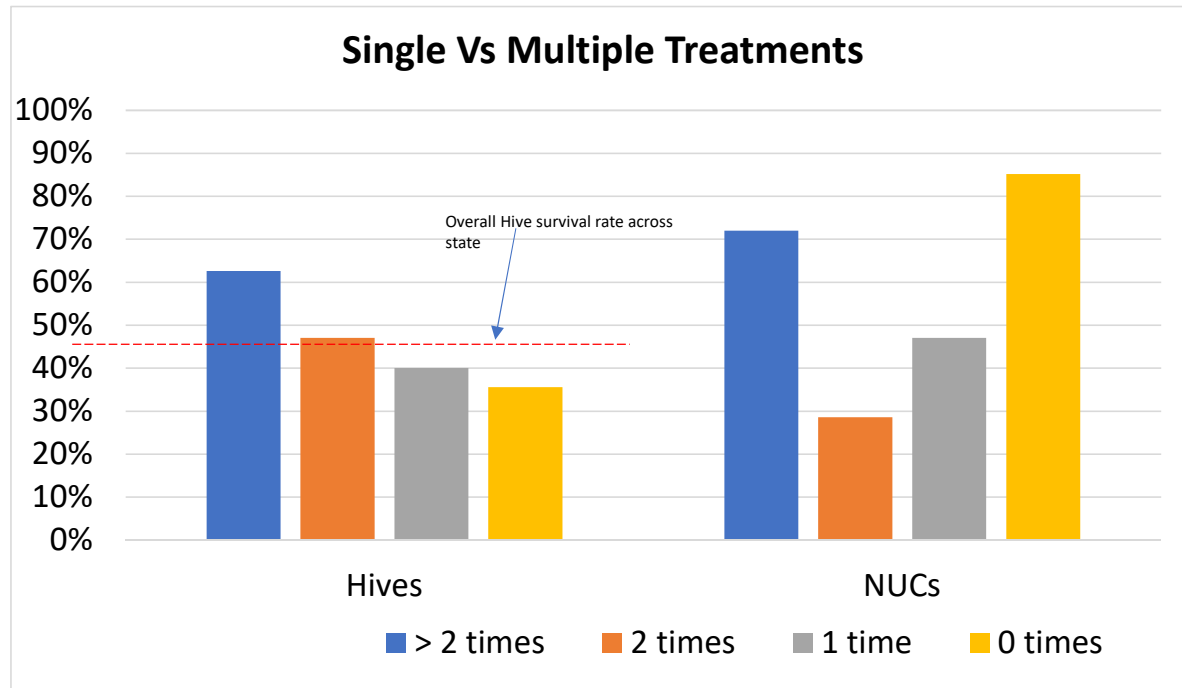
	# Hives on 10/1	# NUCs On 10/1
Treated	1144	254
Untreated	301	276

- Good Success overwintering NUCs
- Hives treated with commercial treatments had a 2X+ better survival rate.

Has the percentage of hives/apiaries using treatments changed?



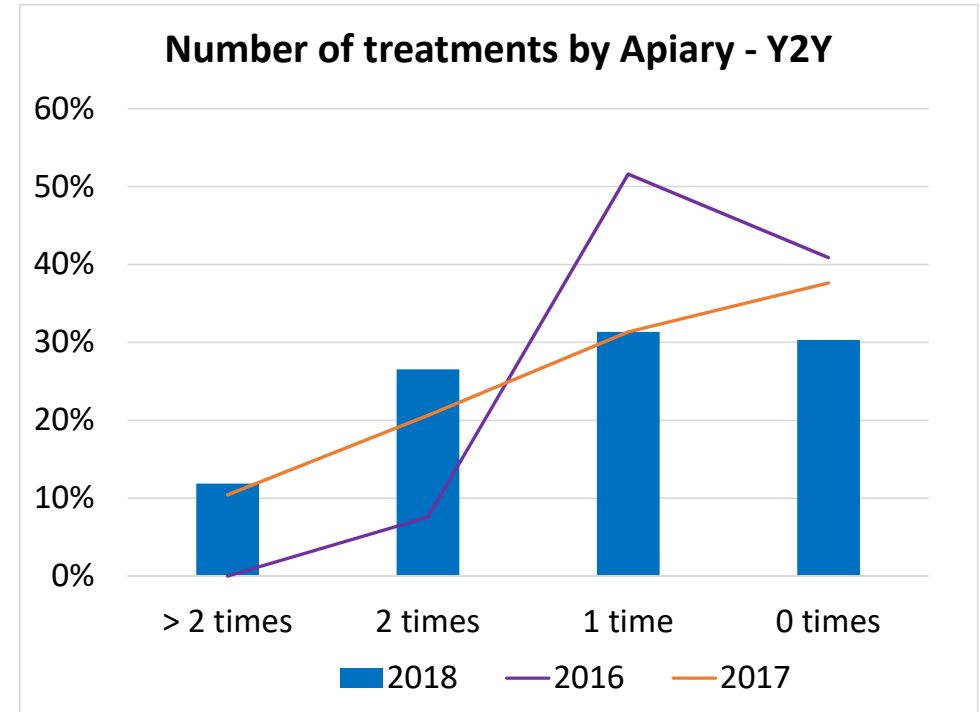
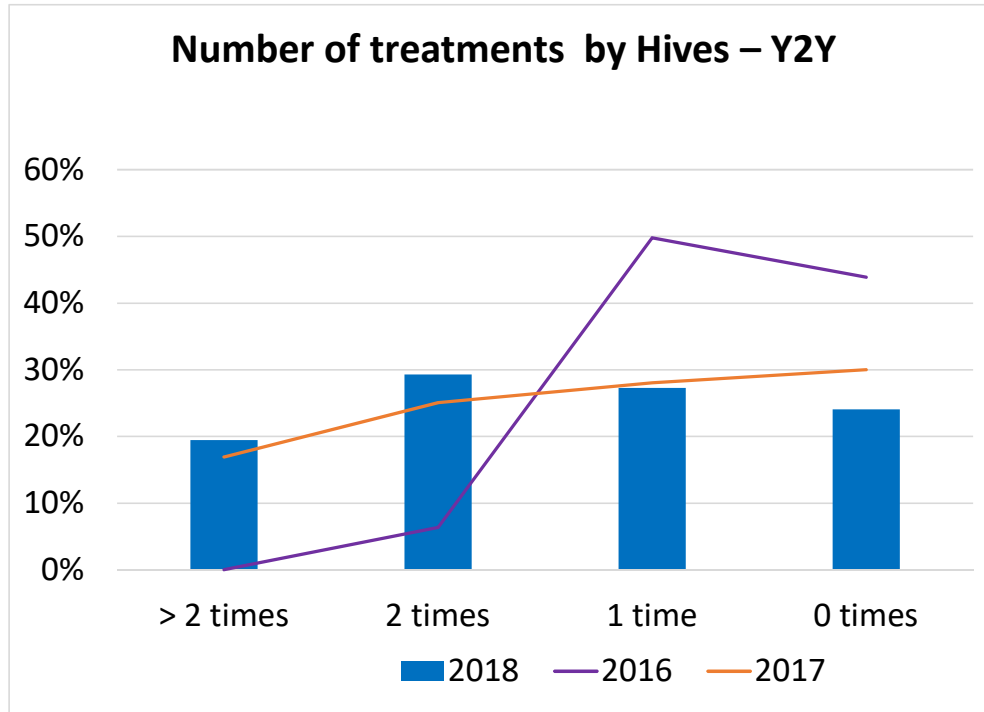
How does the number of times commercial treatments are used affect survival?



	# Hives On 10/1	# NUCs On 10/1
> 2 times	243	50
2 times	366	49
1 time	341	92
No treatments	301	276

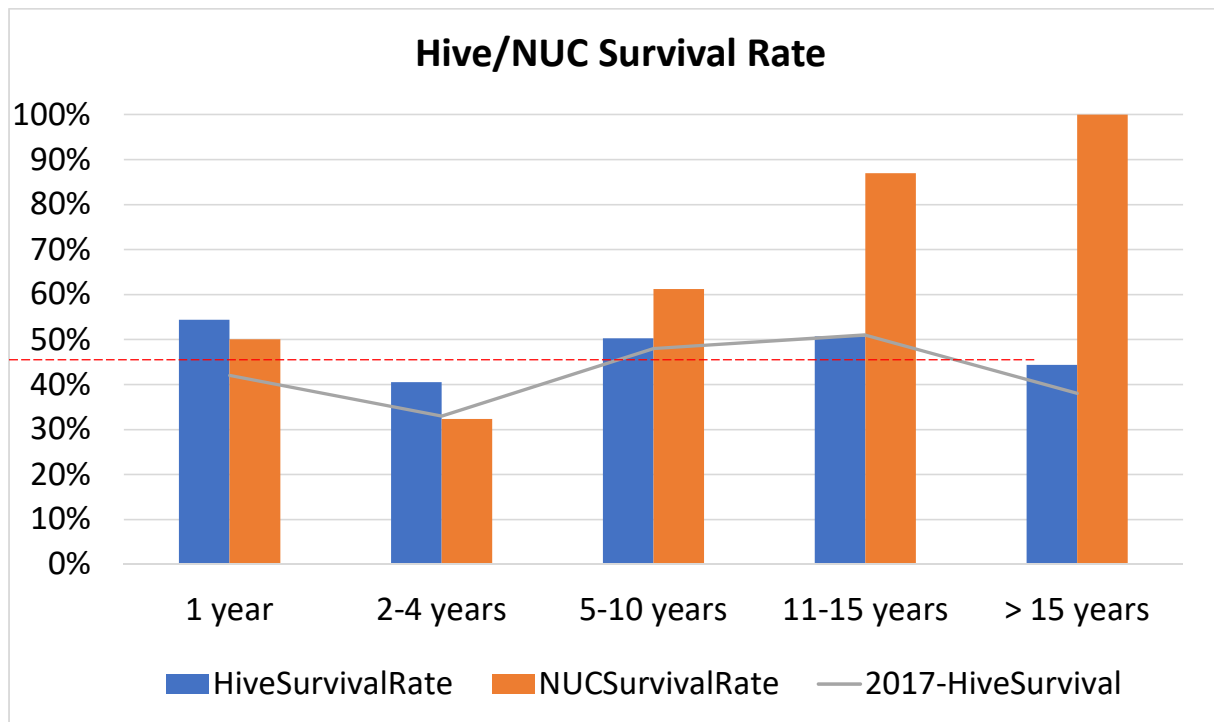
Treating more than 1 time through the season increased survival rates .
(consistent with 2016-17 data)

How Does Number of Treatments Change Year-to-Year?



More apiaries (and hives) are being treated multiple times during the season.

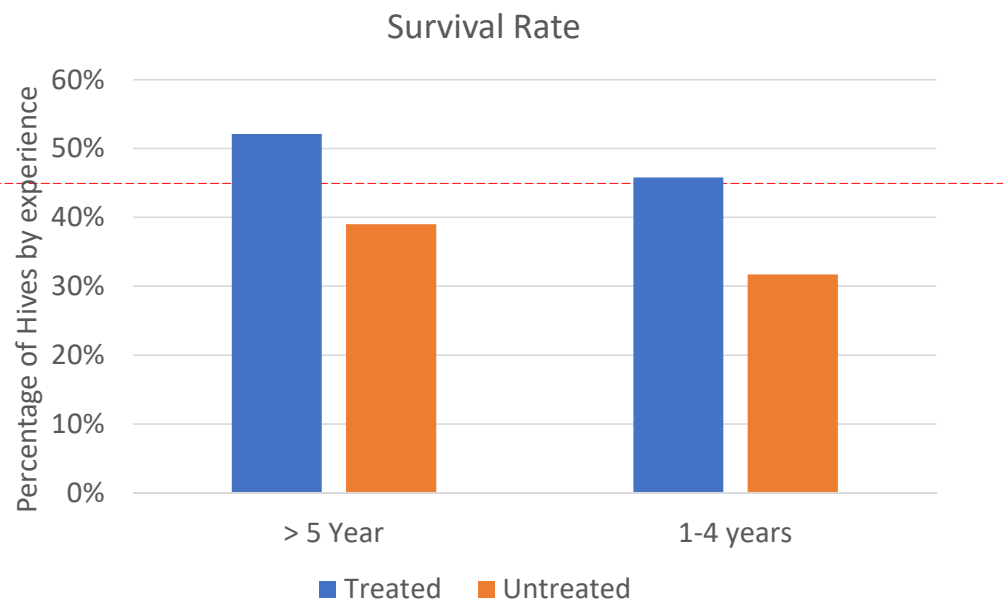
Does the Years of Experience Affect Survival Rate?



	# Hives On 10/1	# NUCs On 10/1
1 Year	92	6
2-4 Years	533	99
5-10 years	478	85
11-15 years	158	283
> 15 years	124	4

5 years experience seems to improve survival rate –
but less of an effect than previous years

Is survival rate for > 5 years experience because a higher percentage treat?



	# of hives for beekeepers with > 5 years experience	# of hives for beekeepers with 1- 4 years experience
Treated	601	483
Didn't Treat	159	142

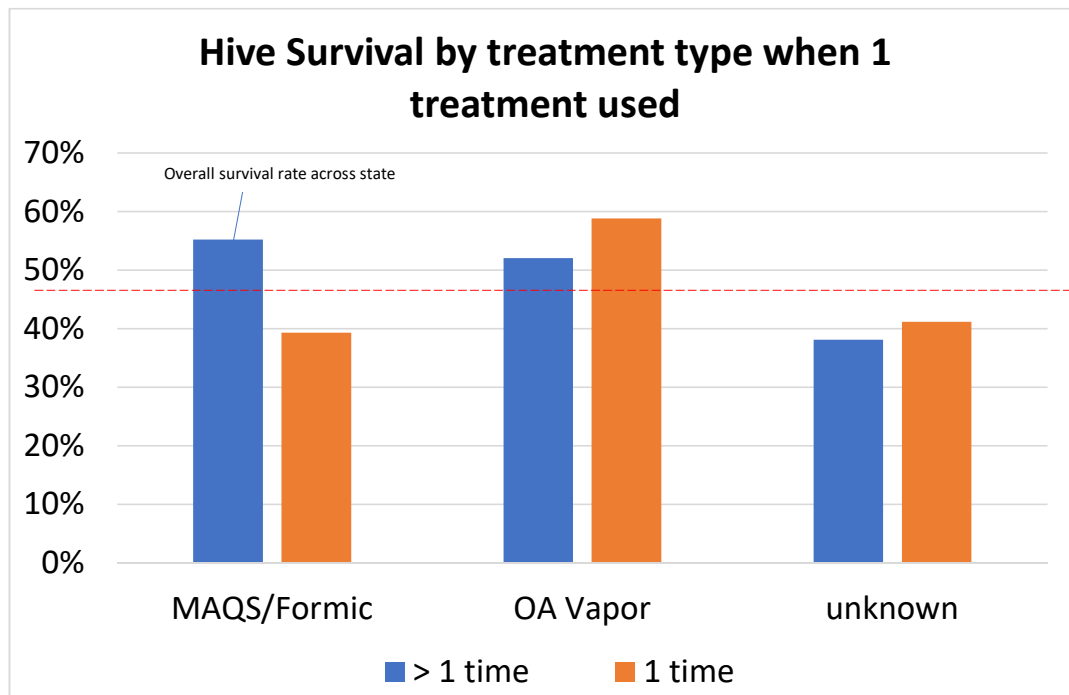
% of hives Treated with At least 1 commercial product:

	5+ years experience	1-4 years experience
2018	79%	77%
2017	75%	63%

No significant difference in % of beekeepers with > 5 years experience that treated for mites

Could this be the reason 2-4 year beekeepers survival rate rose from 33% in 2017 to 41% in 2018?
Could the difference now be related to how often or when hives are treated?

Does one commercial treatment help survival better than others?



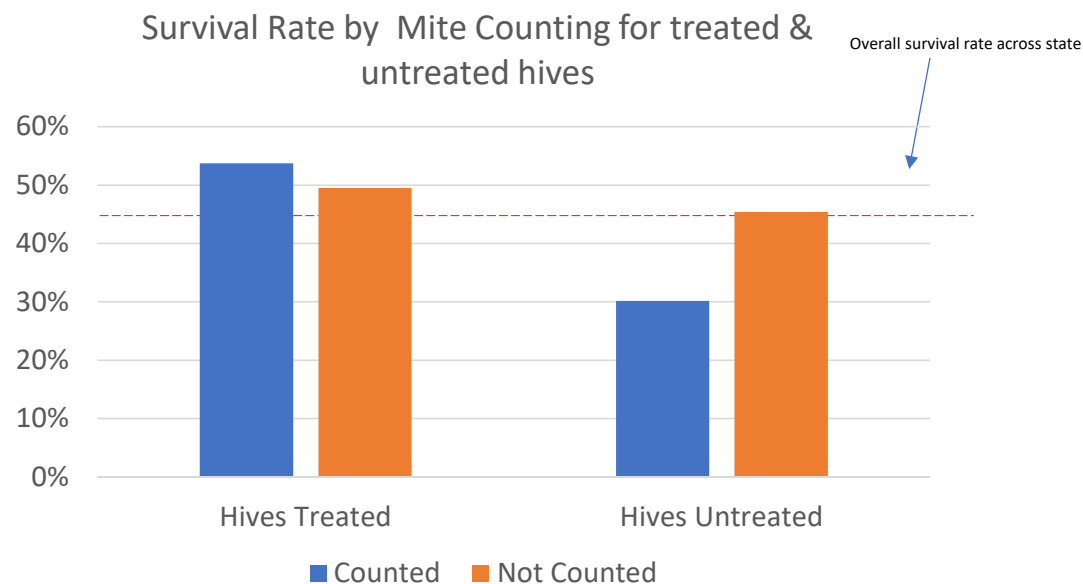
Unclear that a particular product improves survival rate – it is more likely the # of treatments through the year that had an effect.

	# of hives on 10/1 that had > 1 treatment of a single commercial product	# of hives on 10/1 that had 1 treatment of a single commercial product
Apiguard	22	9
ApilifeVar	3	9
Apivar	5	27
Hopguard	5	4
MAQS/Formic	105	145
OA Dribble	6	8
OA Vapor	169	17
Unknown	43	17
Total	358	236

Graph represents apiaries that were treated with only 1 type of commercial product during the year.

We did not include those apiaries that used multiple treatments because we don't know the split of treatments between surviving hives when multiple products were used
 - 687 hives were treated with only 1 commercial product

Was hive survival rate better because mites were counted and hives were treated with commercial treatments?

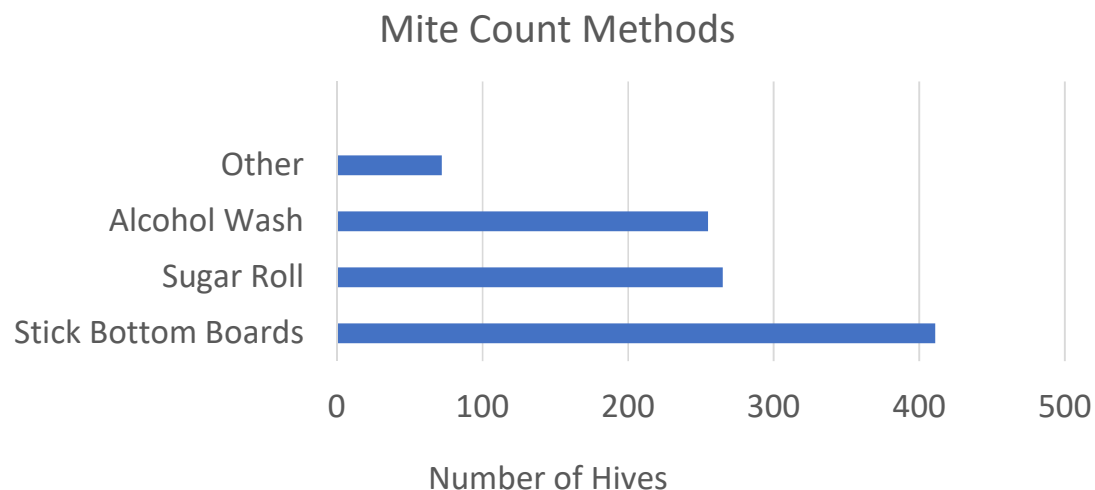


	# Hives Treated by 10/1	# Untreated Hives by 10/1
Counted	650	291
Didn't Count	83	152

- Most hives that were treated counted for mites at least 1 time

Survival Rates appear to improve when both commercial treatments were used & mite counting was done

What mite count methods were most common?



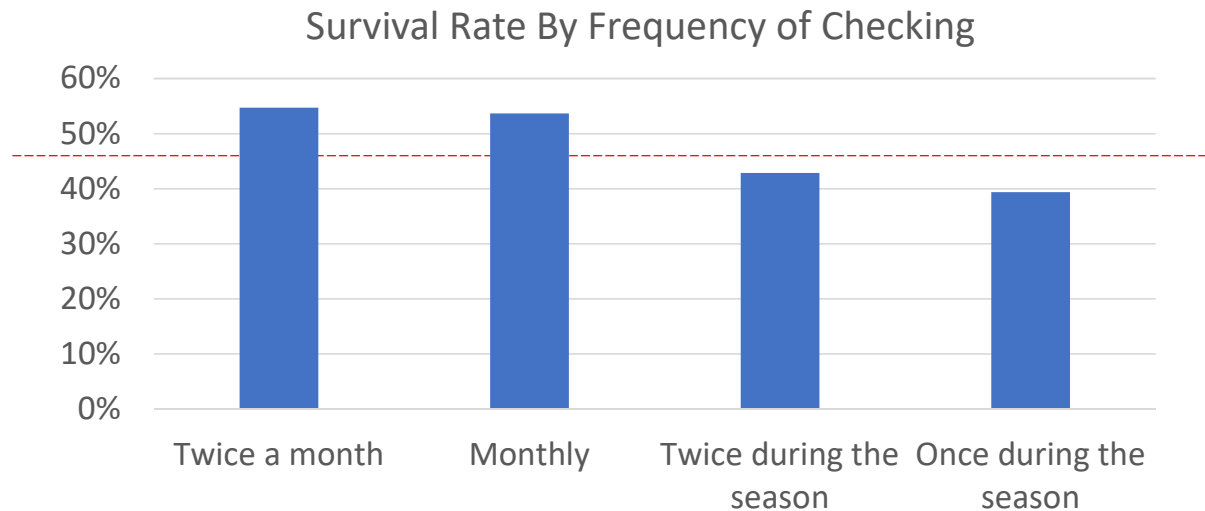
	2018	2017
Sticky Bottom Boards	411	428
Sugar Roll	265	234
Alcohol Wash	255	169
Other	72	131
<i>Total</i>	1003	962

Other methods:

- Drone brood observation (most common “other” - Need to add this as an answer option in the future)

Number of hives tested with Alcohol wash increased significantly in 2018 over 2017
 Number of “Other” methods reduced significantly year-over-year

Survival rate based on the frequency of mite testing

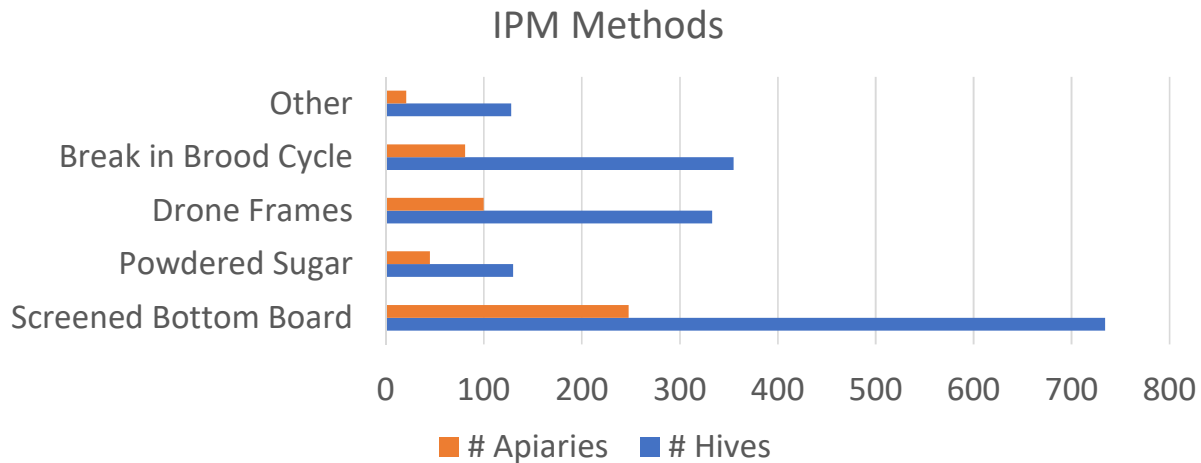


Graph is for methods used on > 50 hives

More frequent testing yielded better survival rates
Hives were tested more frequently in 2018

	2018	2017
Monthly	315	234
Once during the season	178	190
Twice during the season	84	125
Twice a month	64	66
Three times during the season	26	17
drone	15	76
Weekly	12	17
Total	694	725

What IPM Methods were used?

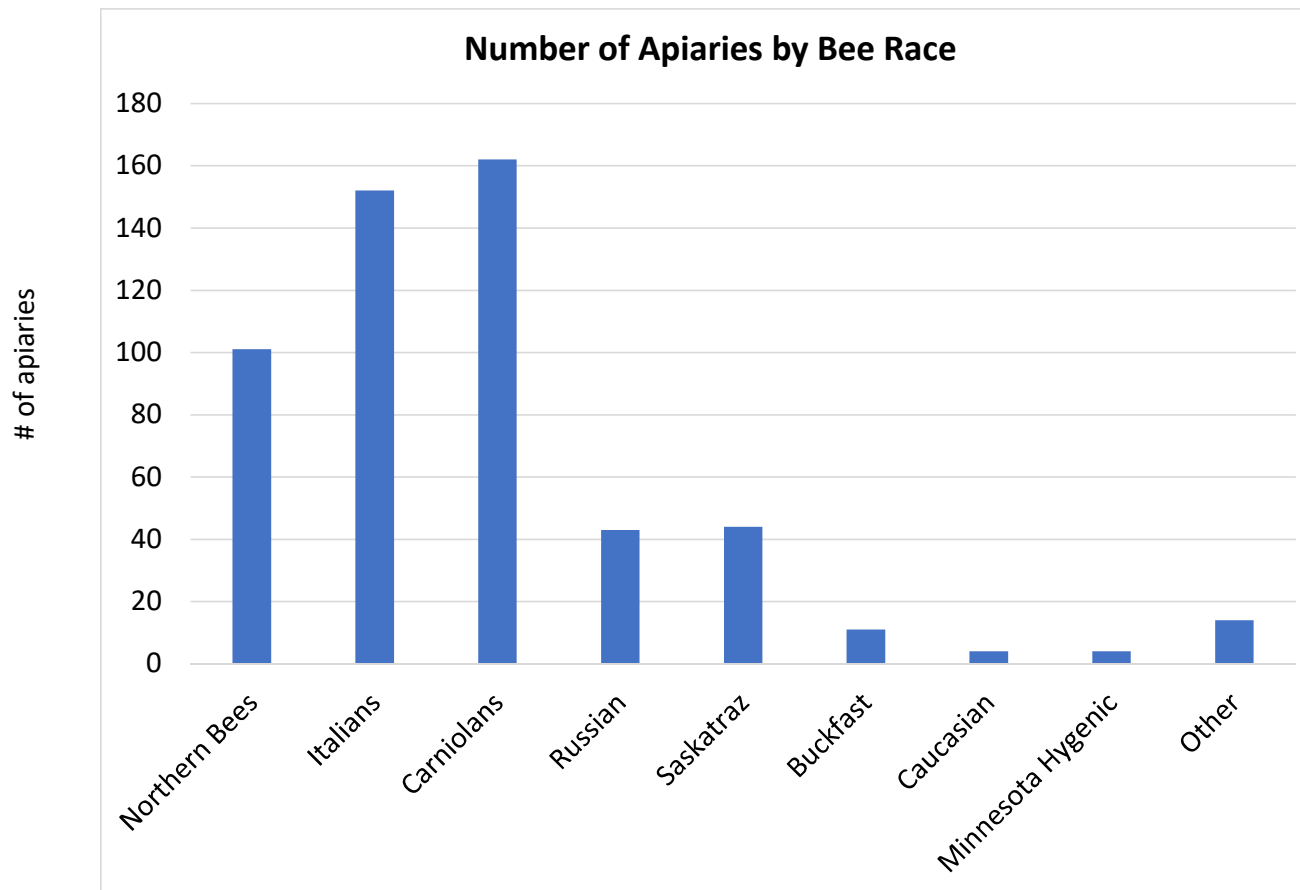


	# Hives	# Apiaries
Screened Bottom Board	734	248
Powdered Sugar	130	45
Drone Frames	333	100
Break in Brood Cycle	355	81
Other	128	21

- **Numbers are similar to 2017**
- **Many apiaries use multiple IPM methods**
- “Other” responses:
 - fed bees with fresh thyme mixed in with sugar water
 - Fogging with mineral oil
 - Split
 - Medium frame in slot #7 of brood boxes
 - Active Slovenian brood nest management, without smoke.
 - rapid propagation of proven stock (queens) back into the apiary via nucleus colonies
 - Rhubarb leaves
- 3 comments that they didn’t know what IPM is

Bee Races

What kinds of bees do our apiaries have?



349 Apiaries

- 210 have 1 race of bees
- 108 have 2 races
- 28 have 3 races
- 3 have 4 races
- 0 has 5 races

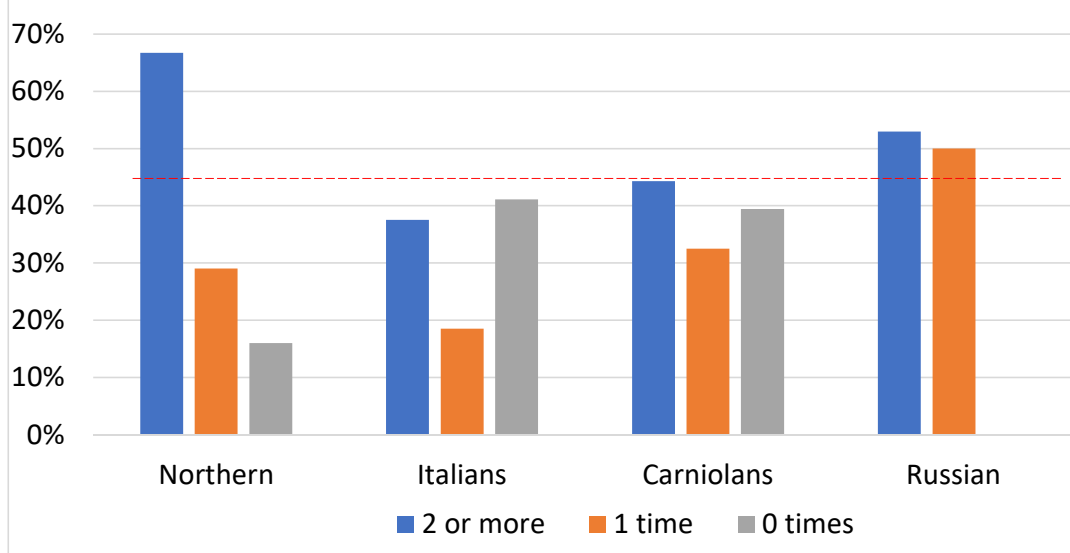
*northern is defined as a hive with a northern mated queen

Does the “race” of bees affect survival rate?

- To answer this question -
 - **Only used data from apiaries that reported only 1 race of bees (194 apiaries of 434)**
 - For apiaries with multiple races, our data was not fine grain enough to understand which races survived and which didn't
- 480 hives
- NUC Sample size is small so only the hive data is presented

How does the race of bees combined with number of mite treatment affect survival?

Survival By Race & Number of Treatments



*Russian/0 treatments not included because only 3 hives

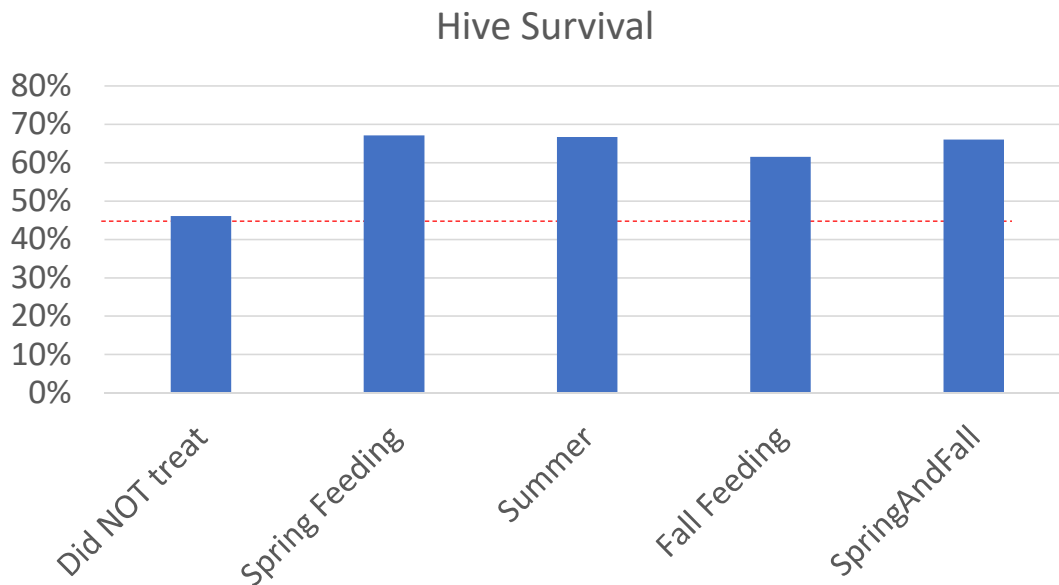
	"Northern" Bees	Italians	Carniolans	Russian	Saskatraz
2 or more treatments	114	56	61	34	12
1 treatment	59	27	40	14	1
0 treatments	17	56	33	3	9

*Small Numbers but some interesting observations

- More than 2 treatments gave higher survival rates for all but Italians
- Carni, Northern and Russian survival with more than 2 treatments is far above the average
- Note 0 treatments for northern bees is low survival

Nosema Treatments

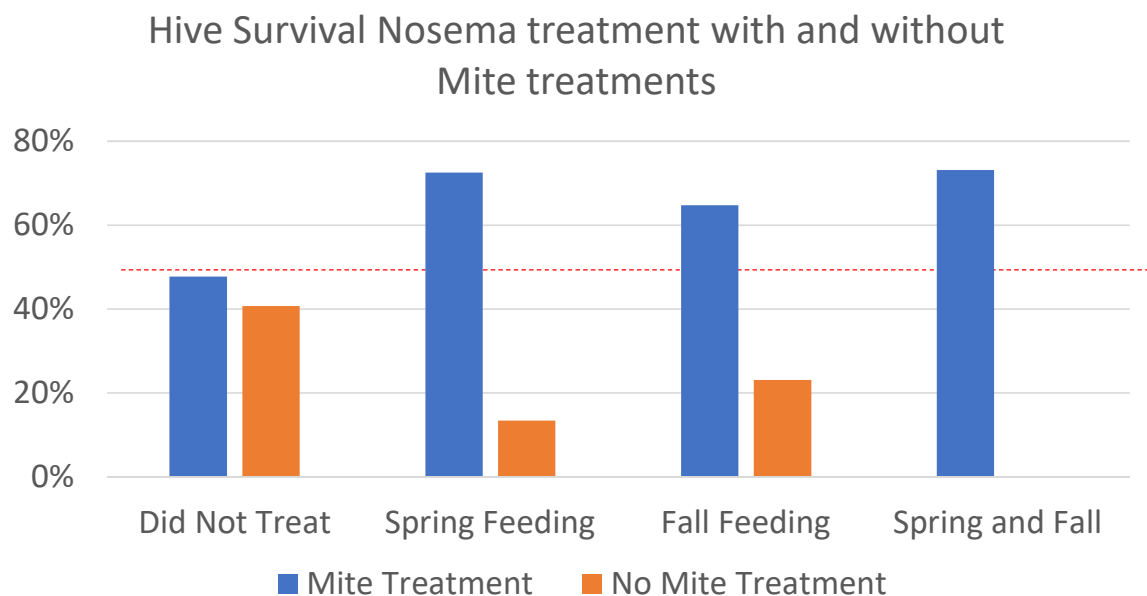
Did Nosema treatment affect survival?



	2018 Hives 10/1	2017 Hives 10/1
Did Not Treat	953	947
Spring Treatment only	164	167
Summer	3	0
Fall Treatment only	166	178
Spring & fall Treatment	103	105
Total	1389	1397

Hives treated for Nosema in 2018 had better survival
 Number of hives treated in 2018 was approximately the same as in 2017

Overlaying mite treatment with Nosema treatment



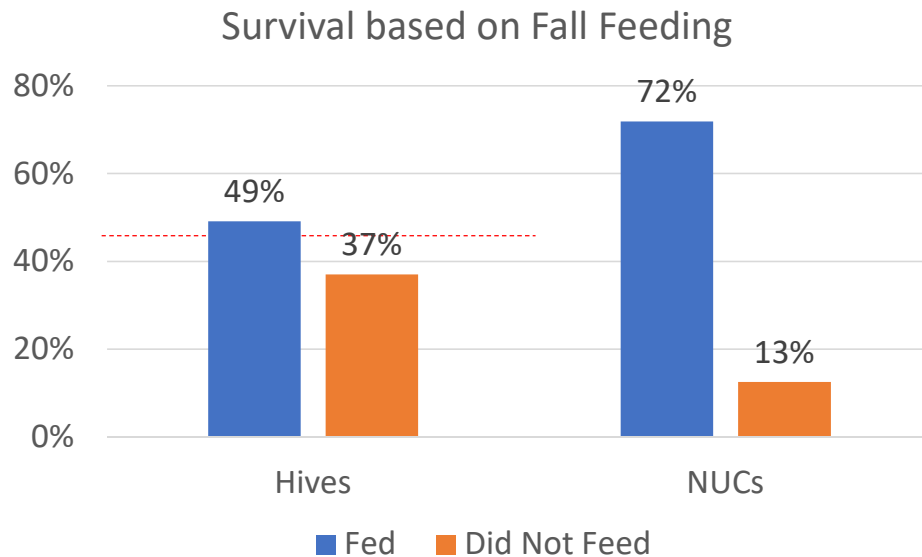
	# hives on 10/1 that had a varroa & Nosema Treatment	# hives on 10/1 that had only Nosema Treatment
Spring Treatment only	149	15
Fall Treatment only	153	13
Spring & fall Treatment	93	10

These are small sample sizes, but:

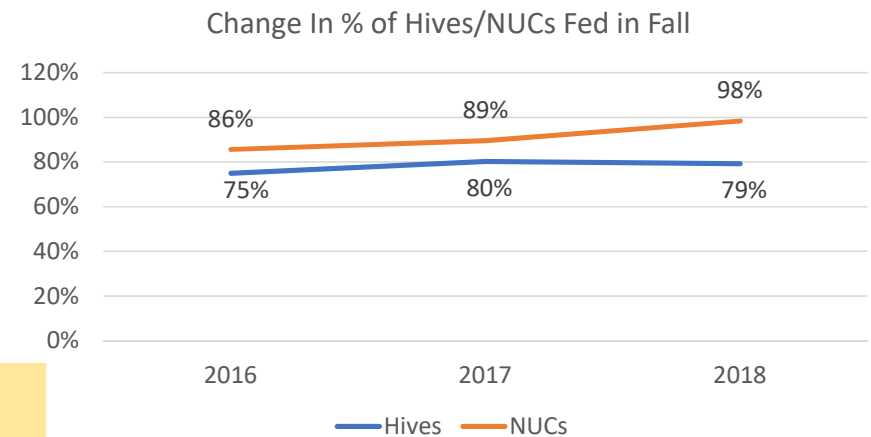
- Treating for Nosema in Spring & Fall as well as at least 1 time for Mites significantly improved survival
- Most hives treated for Nosema were also treated for Mites
- Interesting that hives with only a spring nosema treatment have the same survival rate

Feeding (Fall, Winter & Protein Supplements)

Did fall feeding help survival rate?



	# Hives on 10/1	# NUCs on 10/1
Fed	1083	468
Did Not Feed	284	8



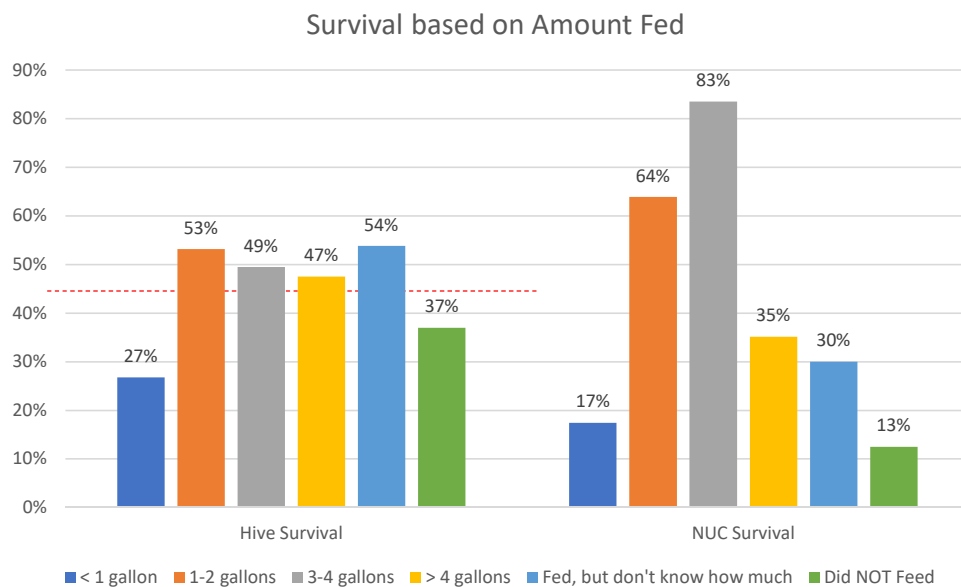
Fall feeding in 2018 appeared to help survival rate

*consistent with 2017 & 2016 findings

% Hives being Fed in the Fall has been steady over the 3 years

% of NUCs being Fed in Fall increased – Why? Weather? – to be investigated

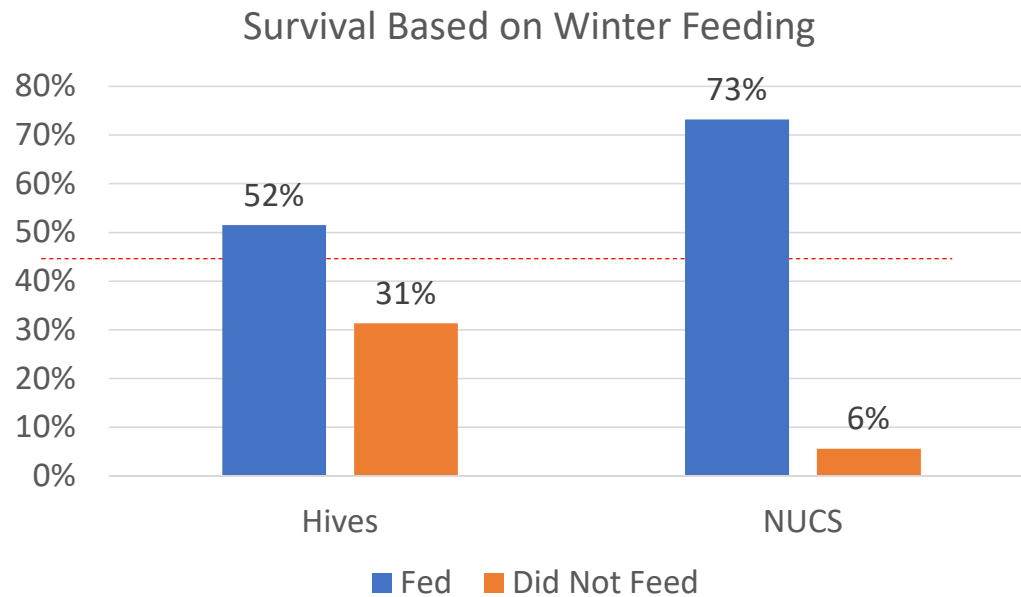
Did the amount of sugar syrup fed affect survival rate?



	# Hives on 10/1	# NUCs on 10/1
Did Not Feed	284	8
< 1 gallon	86	23
1-2 gallons	410	83
3-4 gallons	283	315
> 4 gallons	198	37
Fed but don't know how much	106	10

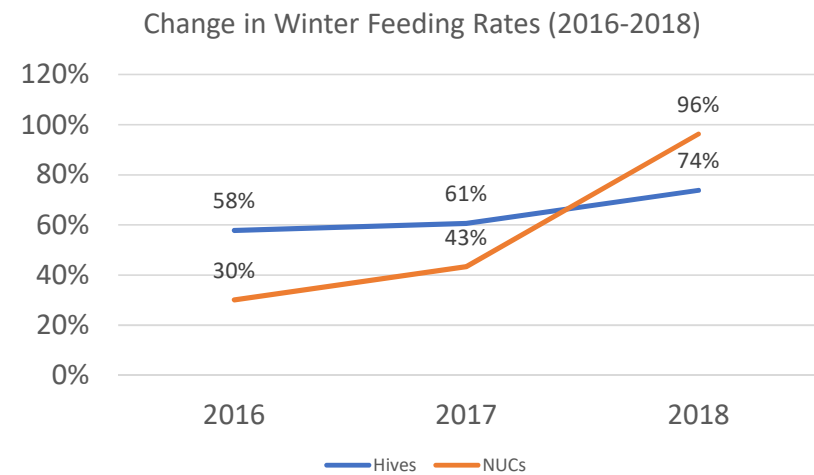
Feeding 1 gallon or more helped survival
 NUCs took a lot of feed this year
 Hives also took more feed than in past years

Did winter feeding help survival rate?

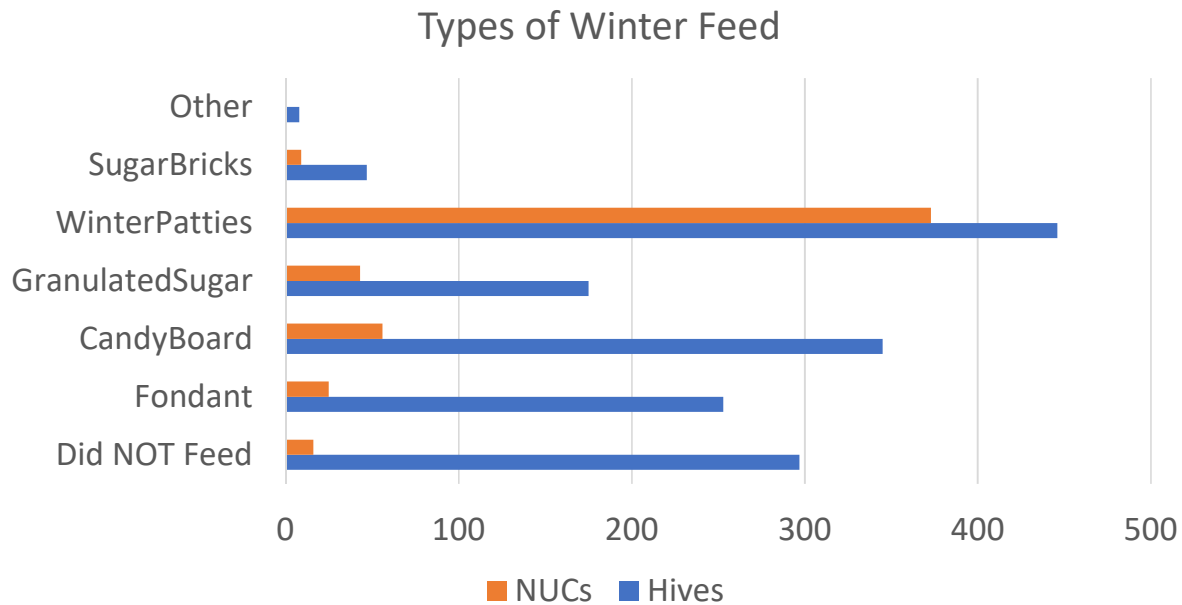


Winter Feeding appears to help survival
% of Hives/NUCs fed has increased each year... Why?
Weather? Awareness?

	# Hives on 10/1	# NUCs on 10/1
Fed	1023	459
Did Not Feed	364	18



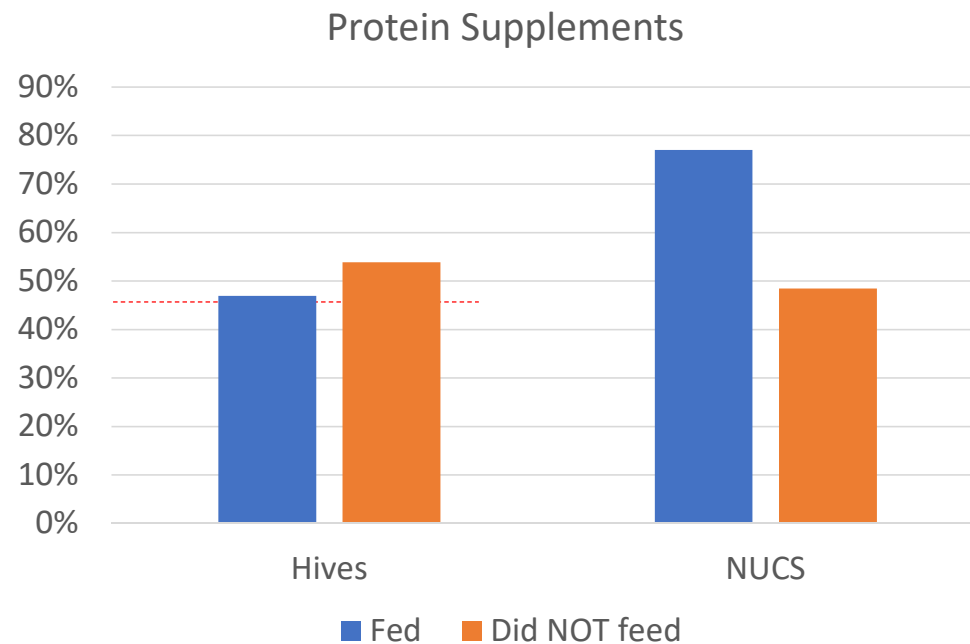
What types of winter feed was used?



	# Apiaries
1 Type of Feed	186
2 types of feed	58
3 types of feed	4

Other includes: sugar syrup and honey added from other sources (not the hives own stores)
Does NOT include pollen patties or a hives own stores

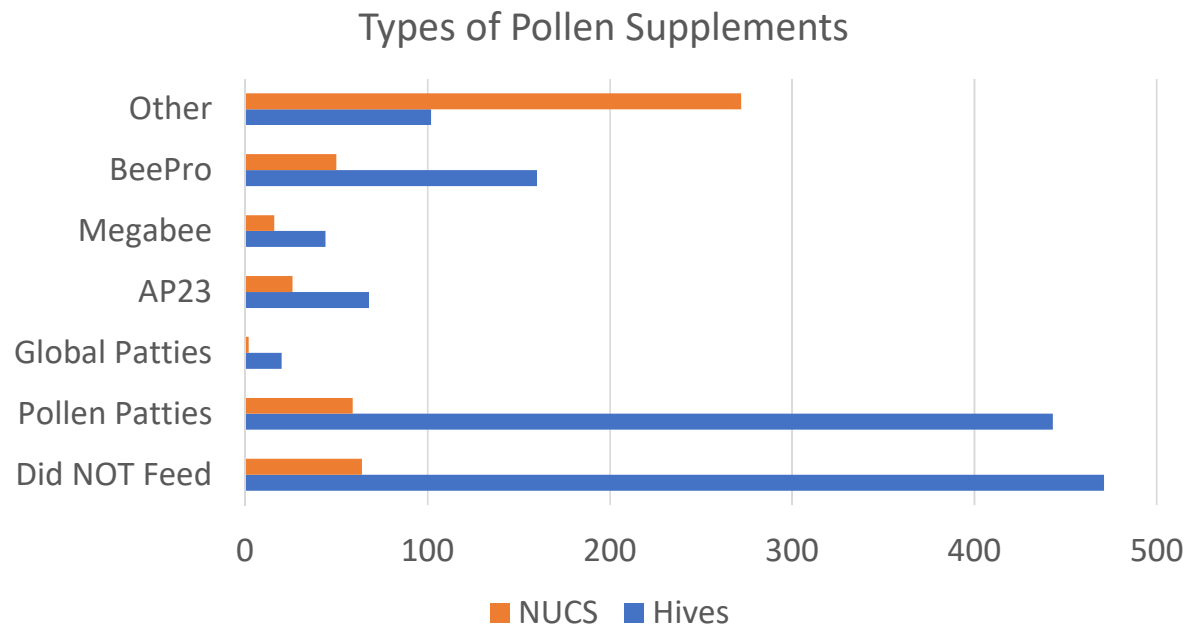
Does feeding protein supplements help survival?



	# Hives on 10/1	# NUCs on 10/1
Fed	708	391
Did Not Feed	470	64

Feeding NUCS pollen supplements in 2018 helped survival.
Interesting that Hives that were fed had a worse survival rate - is it attributable to other factors?

What types of protein supplements were used?

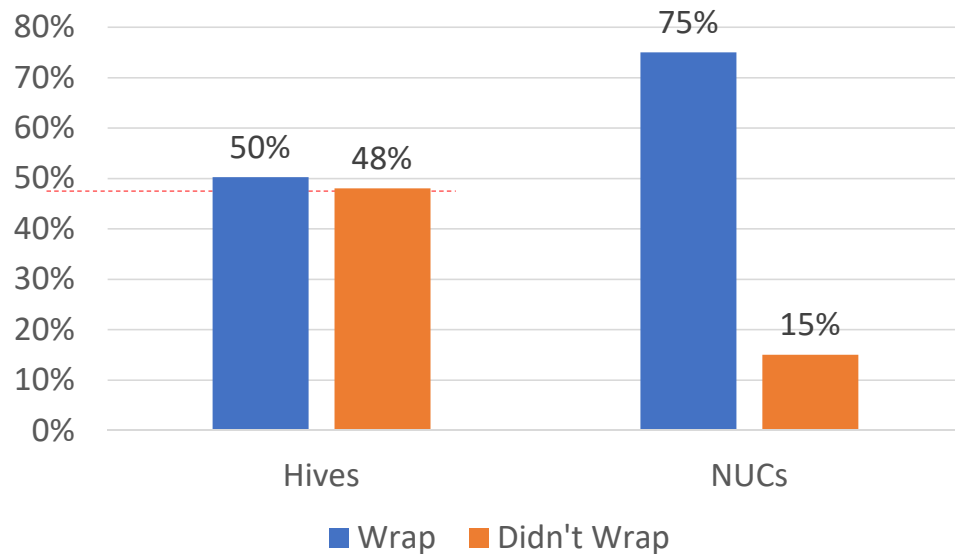


Other included: Ultrabee, powdered/frozen pollen, Hive Alive, Honey-B-Healthy

Wrapping & Moisture Control

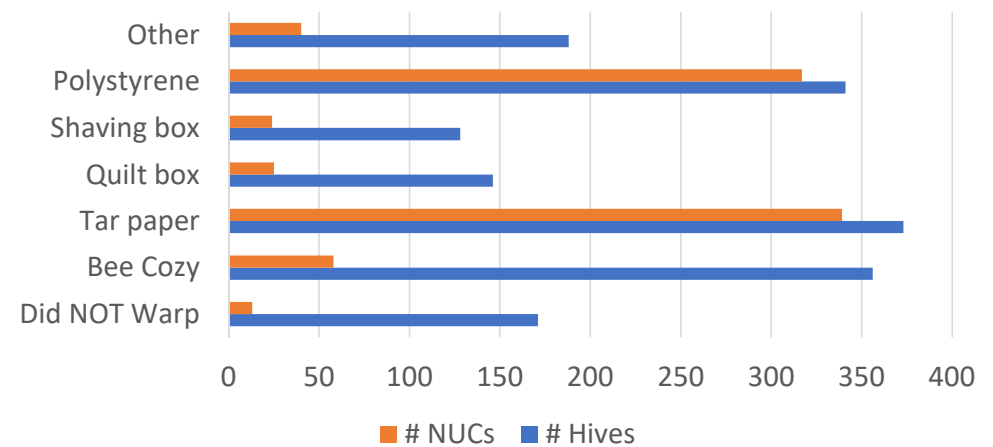
Winterizing Hives

Winter Insulation



86% of hives & 97% of NUCs were winterized in 2018

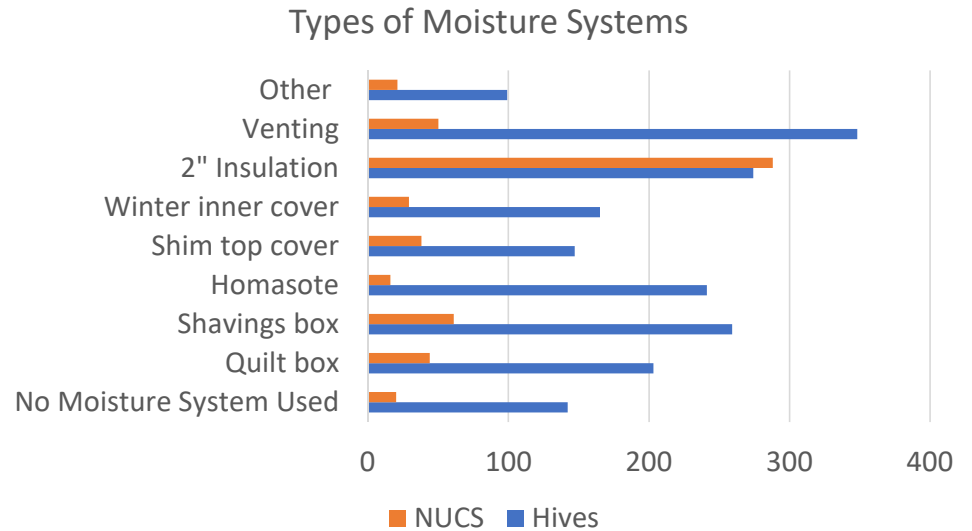
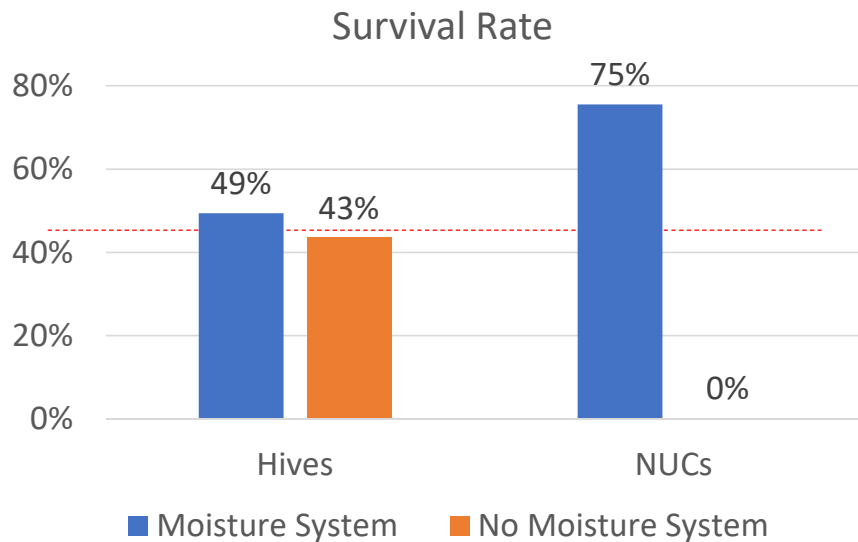
Methods of Winterizing



Other includes:

- Black plastic, ty-par, Tyvek, tarps, landscape fabric
- Various wind breaks= hay bails, banks of leaves, old windows
- Apimaye plastic hives
- bubble wrap variations – aluminized, painted black
- Wool fleece on top
- Water proofed couch pillow on top
- Various sheds/lean-tos/greenhouse
- Hot box winterizer

Winter Moisture Control



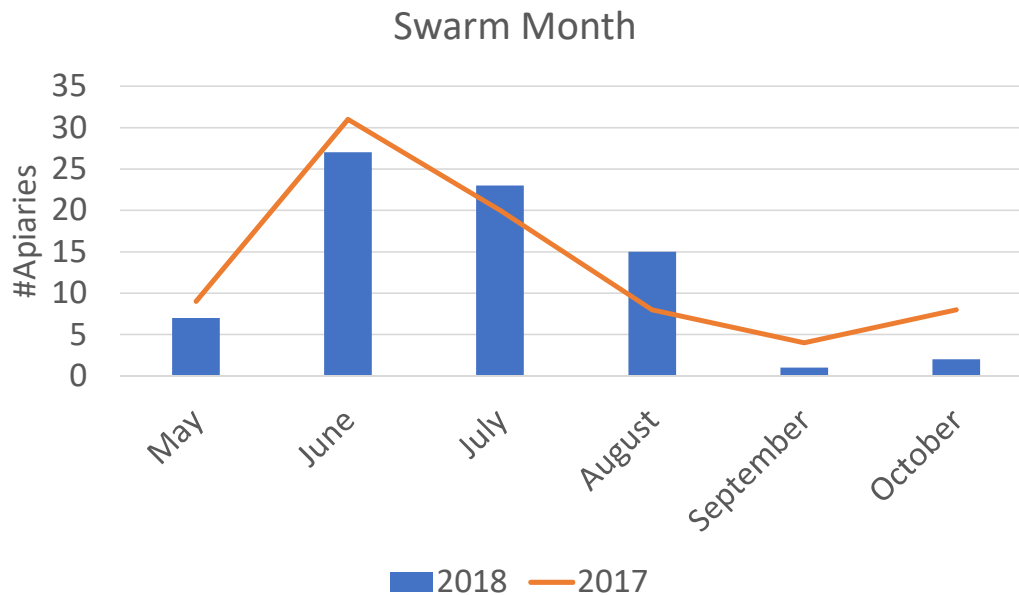
~88% of the reported hives used a moisture system
 ~96% of the reported NUCs used a moisture system

Many apiaries used more than 1 type of moisture control system

- Moisture board includes homasote, sound insulation
- Venting includes vent holes & open screen boards
- Other includes:
 - Wool, hay, pine needles, newspaper, burlap, Vivaldi box, spacer under inner cover, ventilation box, slotted rack below deep, angling hive, reptile heaters

Swarming

Apiaries reporting swarms



- 75 apiaries reported swarms (23.5%)
- 245 apiaries (840 hives) did not have swarms

We do not have granular enough data to tie swarming to survival rate

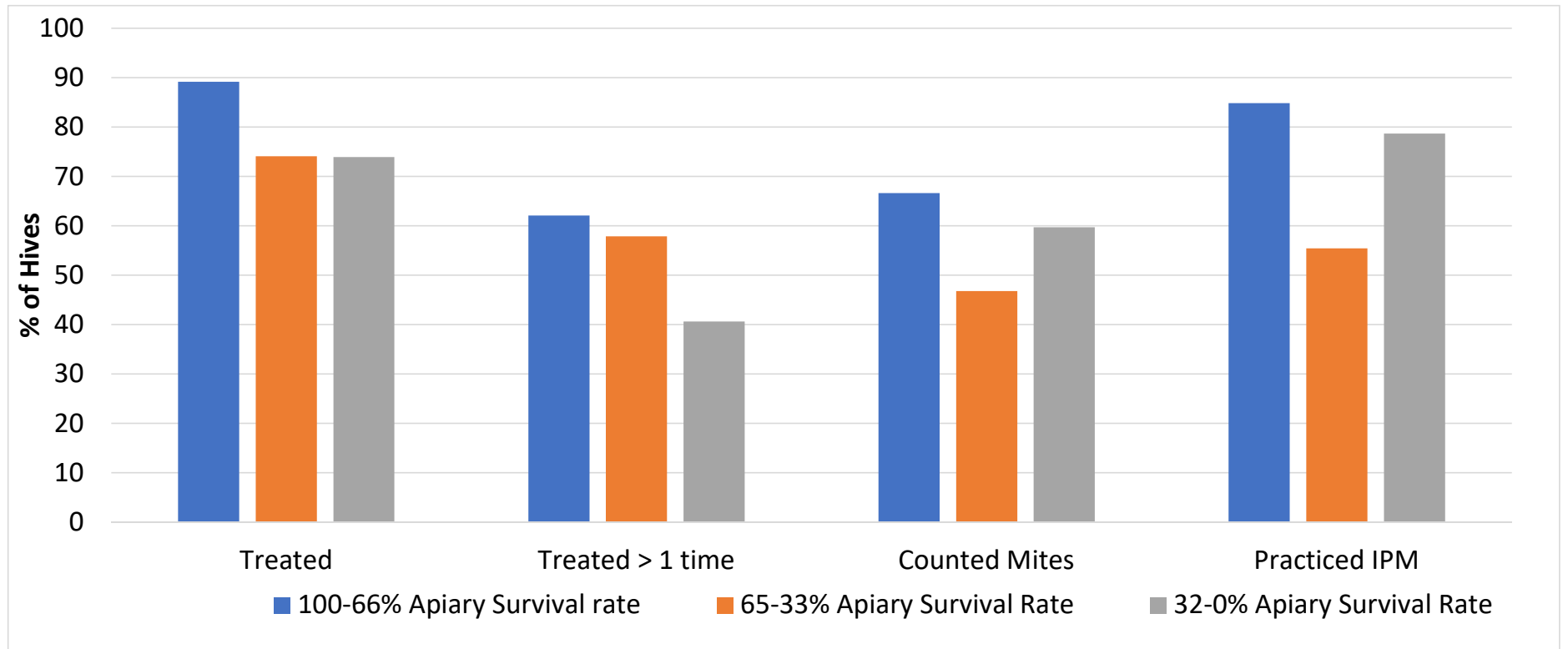
More swarming in August of 2018 than in previous year.

Big Picture: Can we determine “best management” practices from those apiaries that had high survival rate?

Methodology:

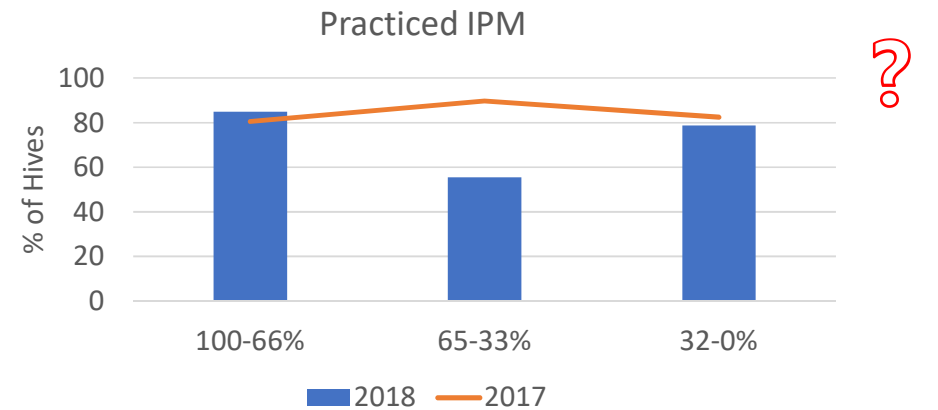
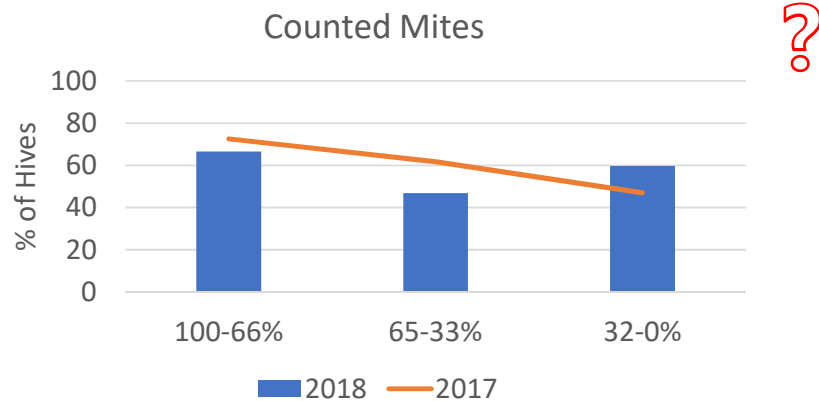
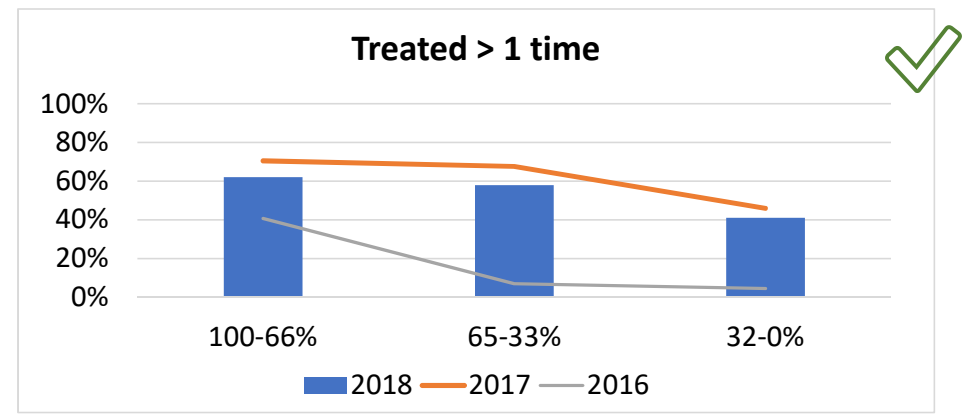
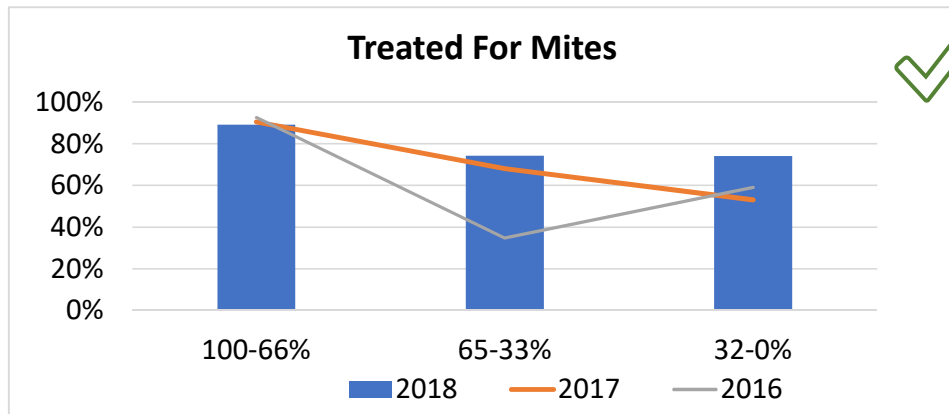
- Divided the apiaries in 3 groups: 0-32% survival; 33-65% survival & 66-100% survival
 - Hive breakdown in these groups was :
 - 0-32% survival: ~37% of hives
 - 33-65% survival: ~28% of hives
 - 66-100% survival: ~35% of hives
- For each major category, report what percentage of the hives were managed using a specific technique:
 - Ex: Report the percentage of the hives in each of the 3 categories that used commercial varroa treatments.
 - Assumption: all hives in an apiary were managed the same way.

Big Picture: Varroa Management

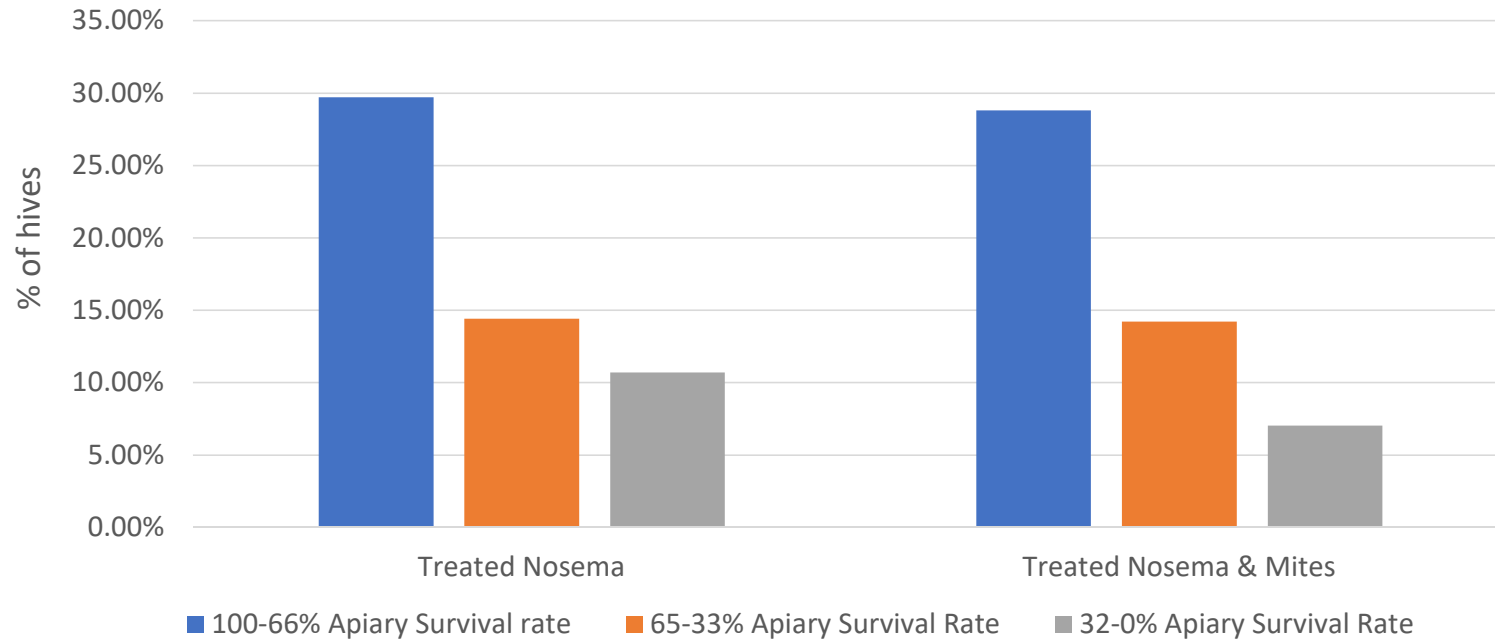


Hives in Apiaries with the best survival rates used a commercial varroa treatment at least one time
~60% of those hives were treated multiple times during the season.

Big Picture: Varroa Management – comparing 2018 & 2017

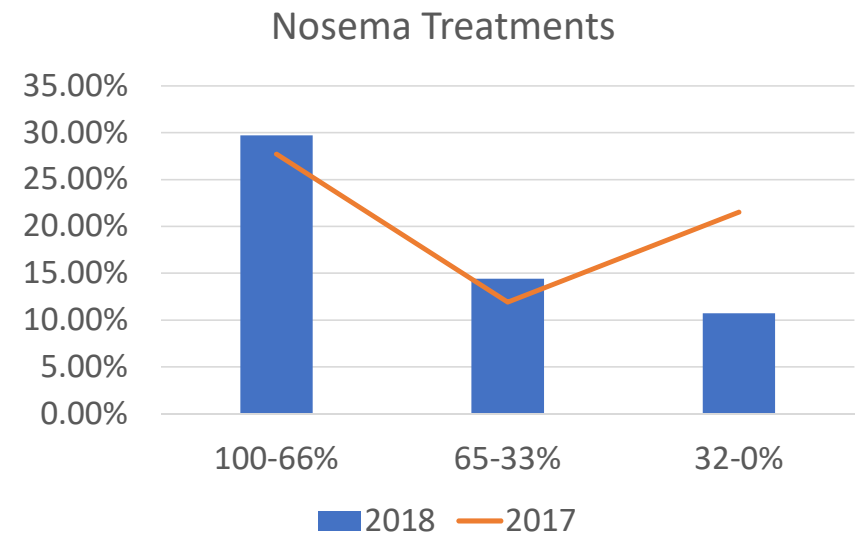
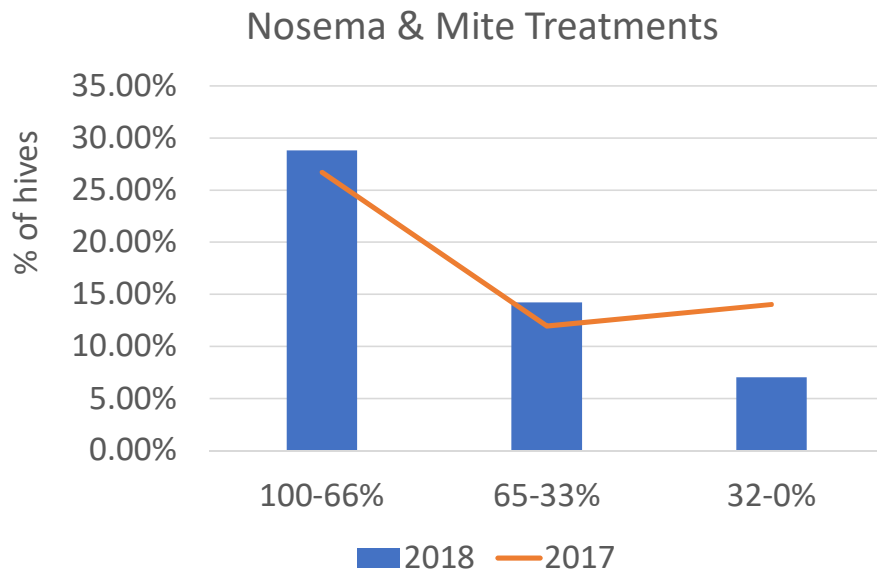


Big Picture: Nosema Management



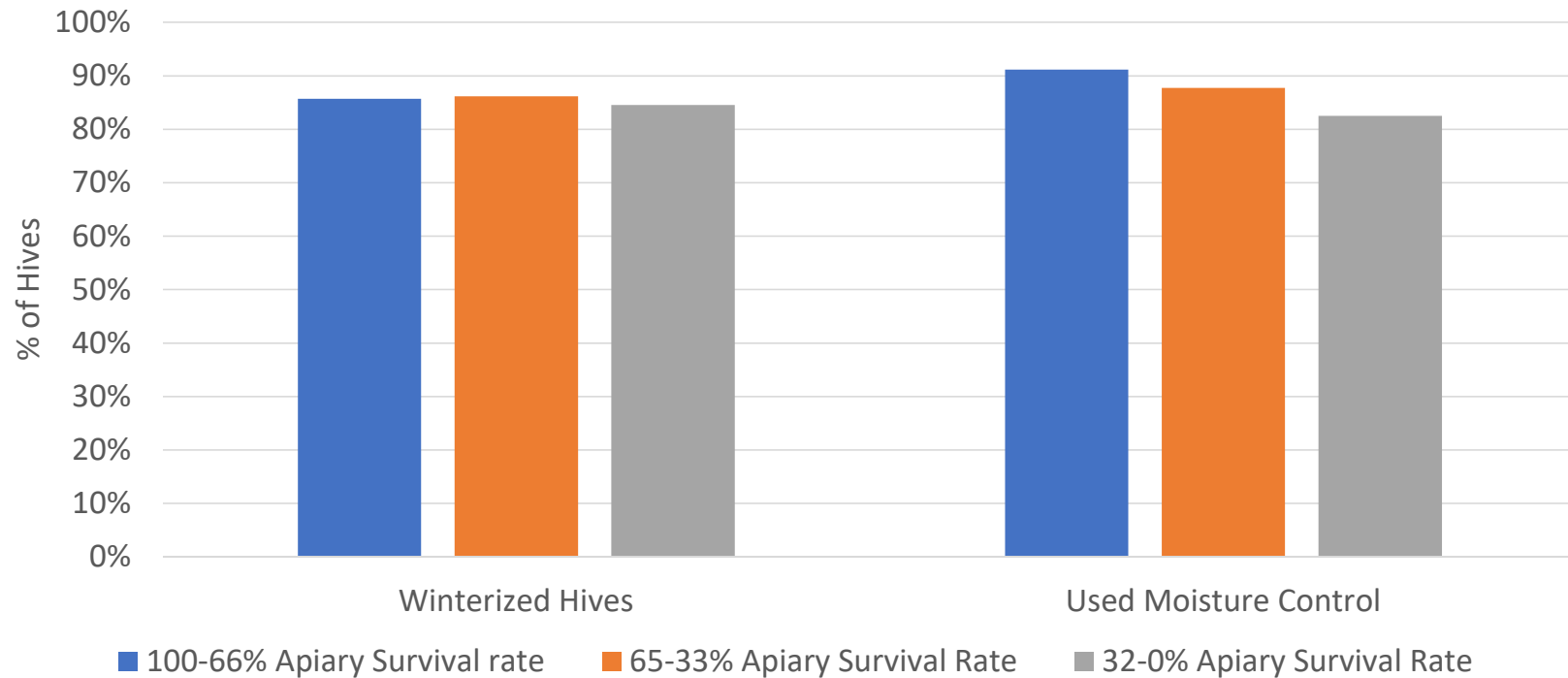
If Hives in the High & Medium survival groups were treated for Nosema they were also treated for mites

Big Picture: Nosema Management – comparing 2017 & 2018



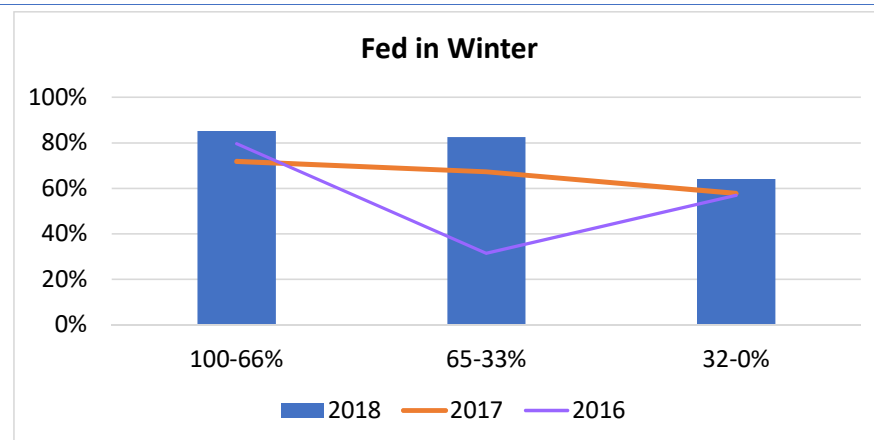
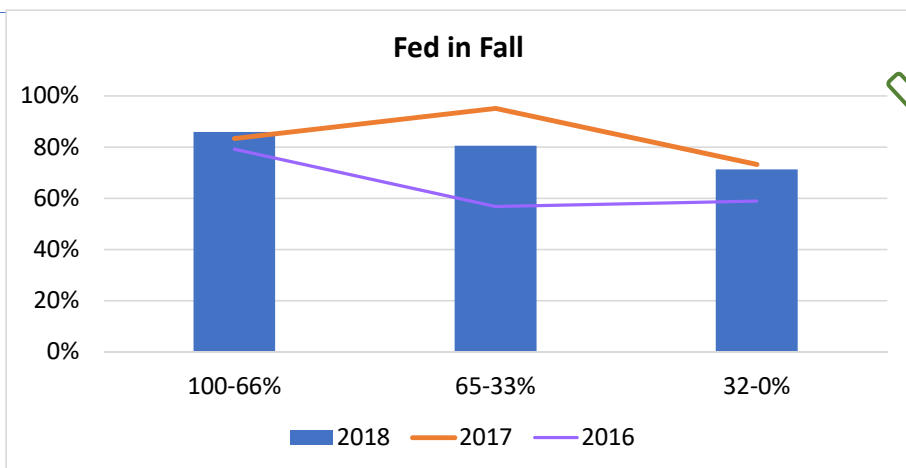
Drop in the % of Hives treated in the Low Survival Group compared to 2017

Feed Management

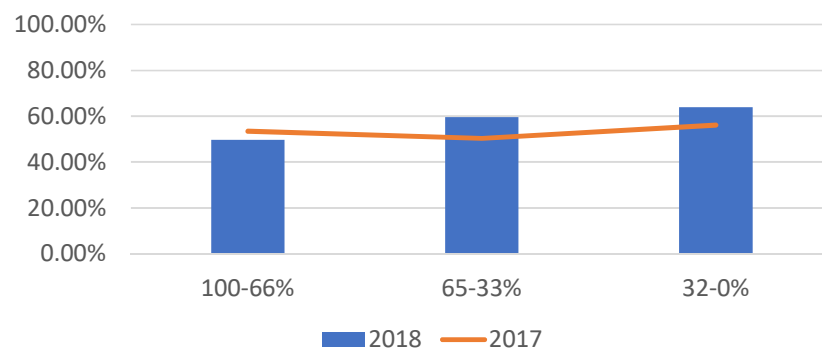


The higher survival groups has slightly higher percentages of winter & fall feeding
Since feeding needs are so hive & region specific, in the future should look at data more regionally

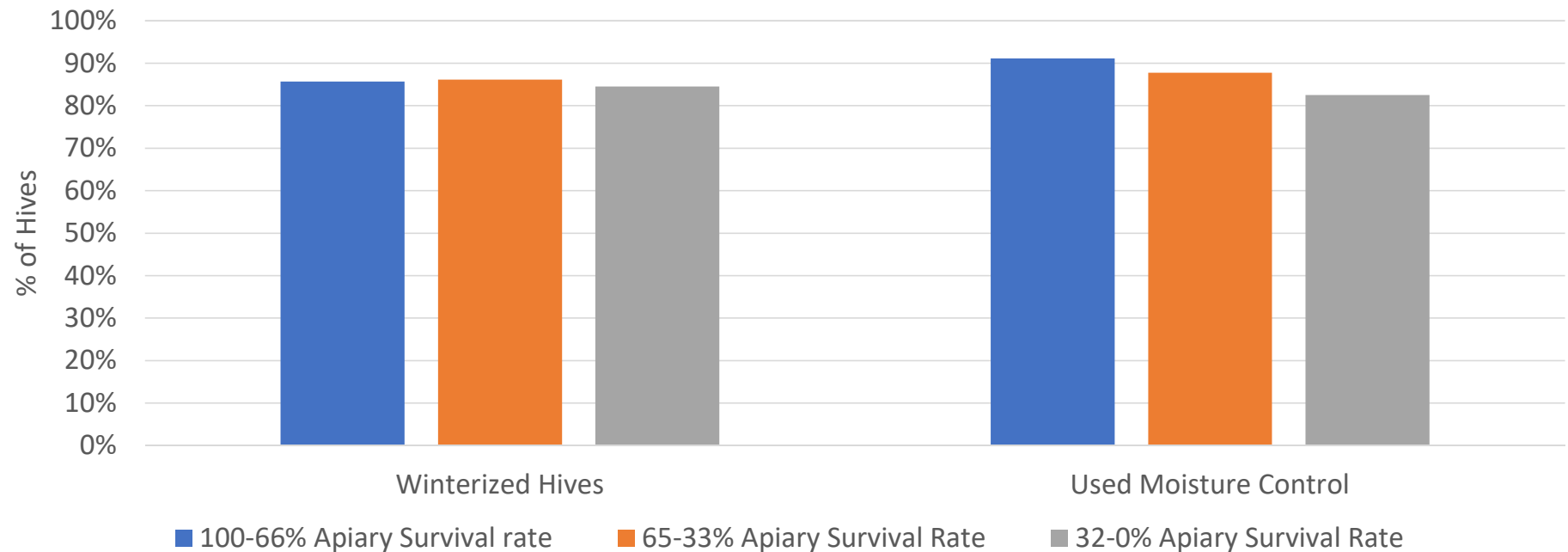
Big Picture: Feed Management – comparing 2018 & 2017



Fed Protein Supplements

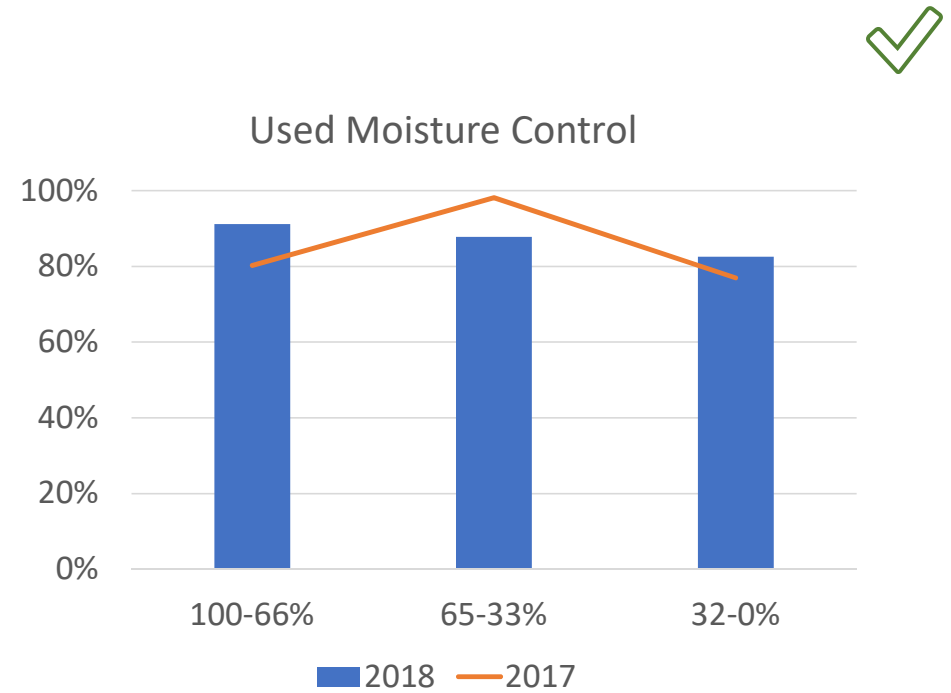
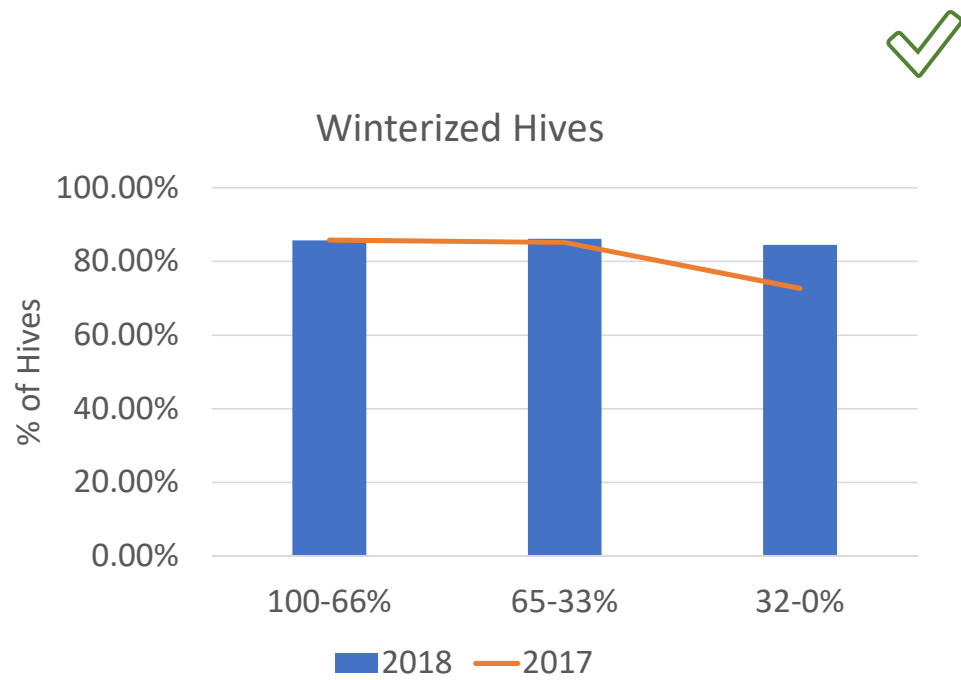


Big Picture: Winter wrapping & moisture control systems



Most Hives were Winterized in 2018. High Survival group had slightly higher percentage of Hives that used Moisture Control
In the future should look at data more regionally to see if there is more impact

Big Picture: Winter Management – comparing 2018 & 2017



2018-19 Hive Loss Survey Summary

- 2018-19 Winter Survey data indicates:
 - 55% Hive Loss & 31% NUC Loss
 - Overall Loss rates continue to decline over the 3 years of the survey
 - Beekeepers are using the data from the surveys to influence their management practices.
 - Merrimack County continues to have the highest loss rates which we need to investigate further.
 - Hives with the highest survival rate are treated for mites and often Nosema.
- We need to continue to collect multiple years of data to really understand trends

2017-18 Hive Loss Survey Recommendations & Request for Approval

- Work with our UNH coop extension colleagues using this data to continue :
 - Support grant applications to further beekeeper education.
 - Help shape future grant requests
- Do additional analysis to determine:
 - Why Merrimack county continues to have such high loss rates
 - Combine with data from the other citizen science projects
 - Add weather and other factors as overlays to gain more insight.
- Make this summary data public on our website
 - Present data at club meetings if the clubs are interested.
 - Email the summary (or a pointer to the info on the website) to :
 - All NHBA Membership
 - All participants that submitted information to the survey
 - Send paper copies of the summary to members who participated via postal mail.
- Submit an article to ABJ and/or Bee Culture describing our findings – both about the loss as well as running surveys for the beekeeping community
- Run this survey in 2020

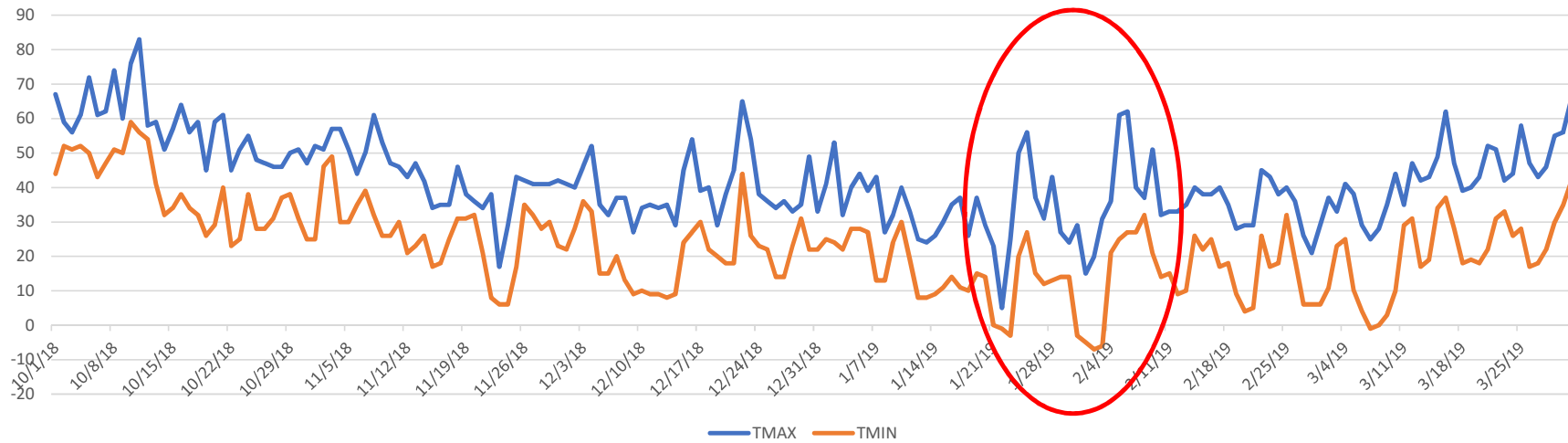
Recommendations & Requests
Approved by NHBA board
6/13/19

Additional Information

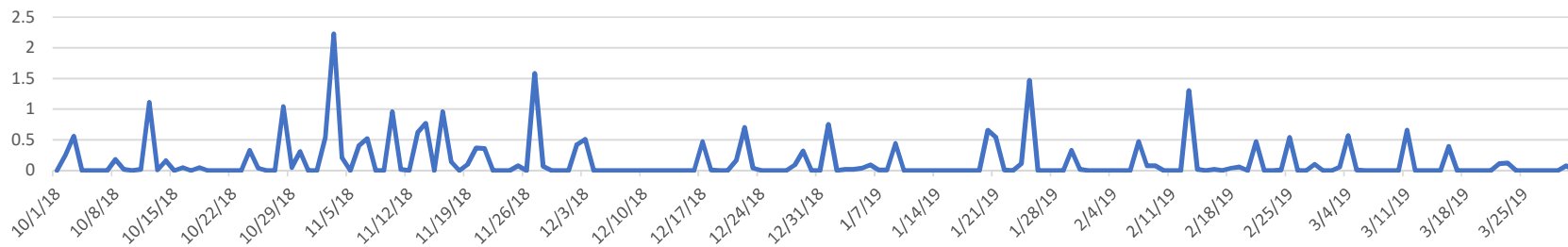
Notes

- Hive & NUC Loss per month – If there was more than 1 month listed, I assume that the hives/NUCs were lost equally across the months.. Ex: If 2 hives were lost & 2 month were listed, I applied 1 hive loss in month1 and 1 hive loss in month 2
- For “survival by Type” graphs, I only used the data for apiaries with 1 race of bees, because I had no way to know the split of which hives survived and which died when there were multiple races reported in a given apiary.
- For “survival by treatment type” graphs, I only used the data for apiaries that used 1 type of commercial treatment because I had no way to know the split of what products were used on which surviving hives in a given apiary

Hudson 2018 2019 Winter
Hillsboro County
Daily Temperature High and Low

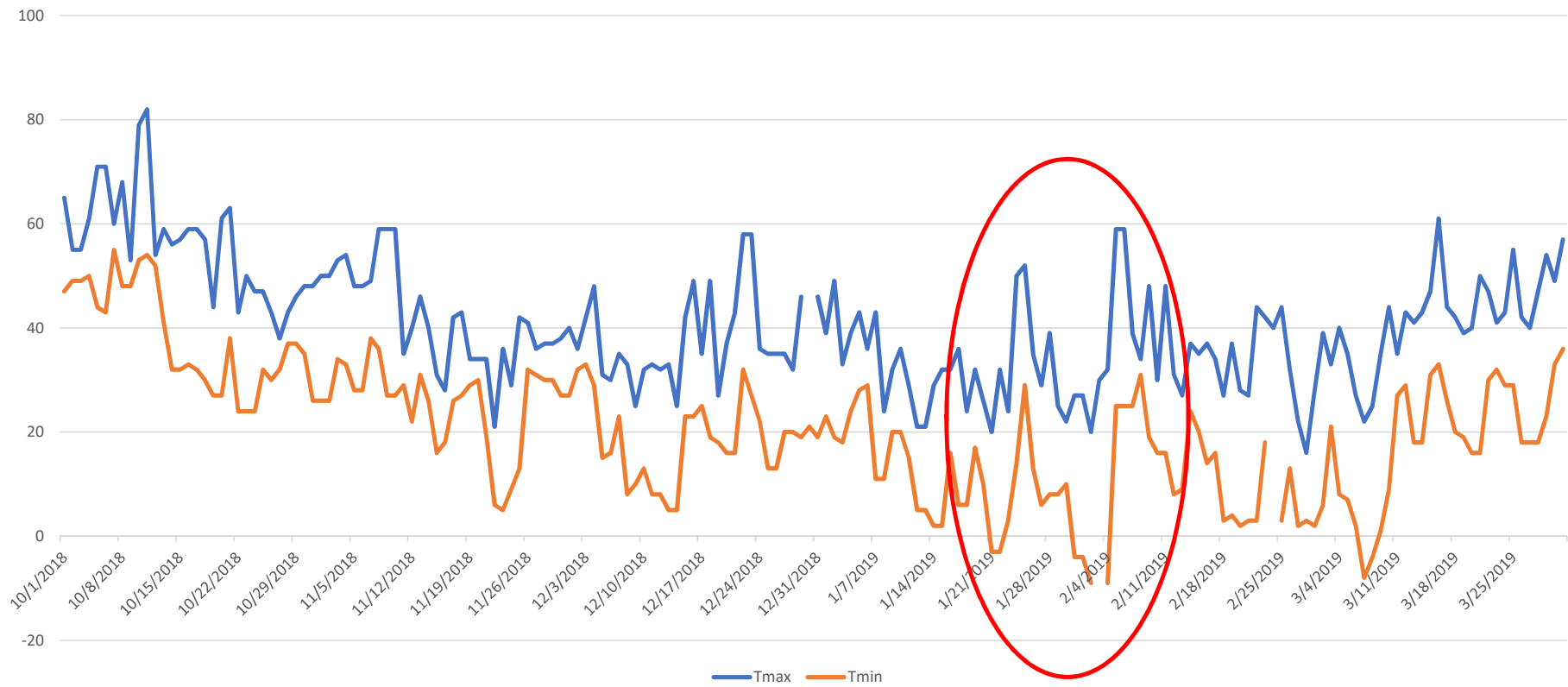


Hudson Daily Precipitation (water inches)
Winter 2018-2019

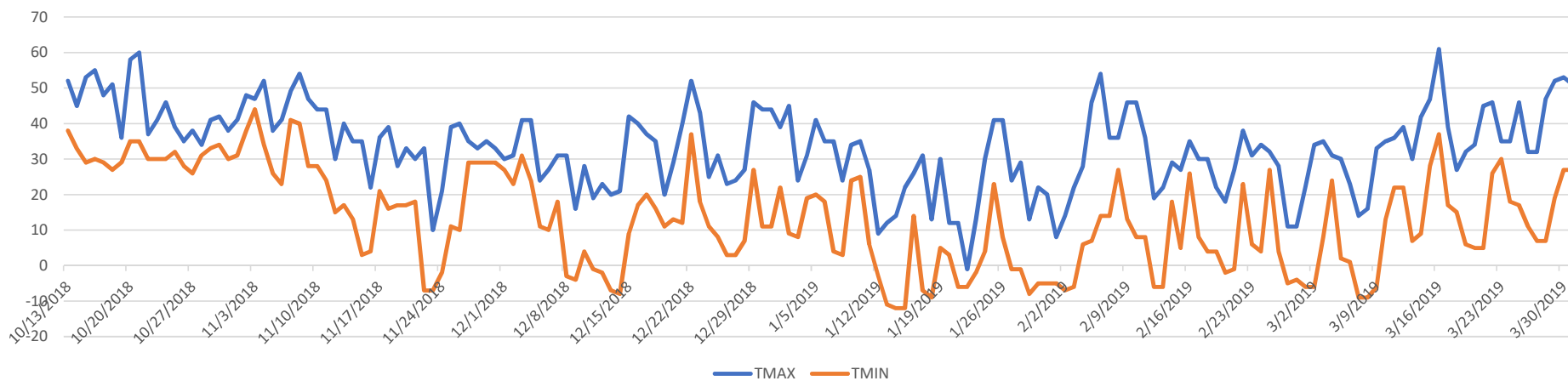


Example of Next Steps in Analysis

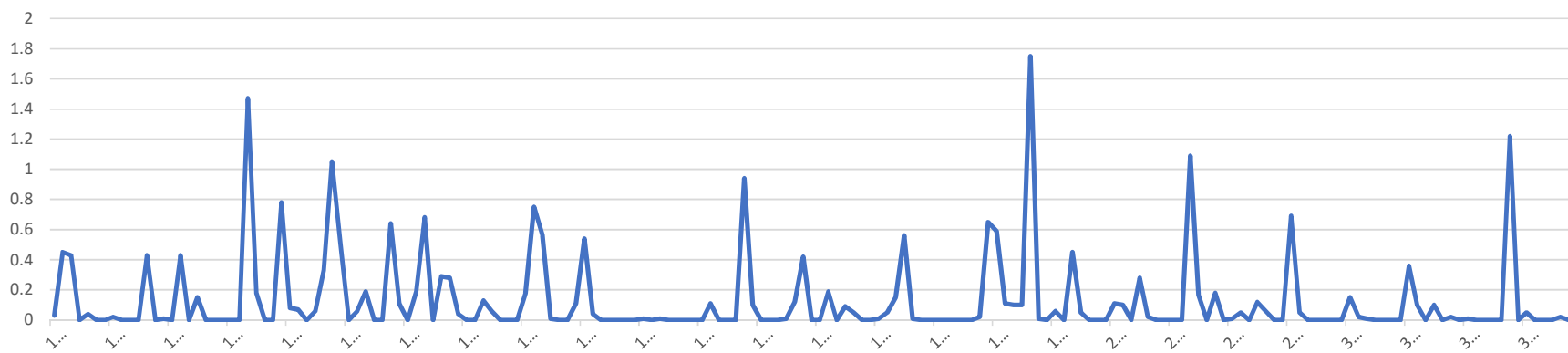
Hopkinton 2018-2019 Winter
Merrimack County
Daily Temperature High and Low



Temperature Differences Winter 2018-2019
Berlin Coos Co



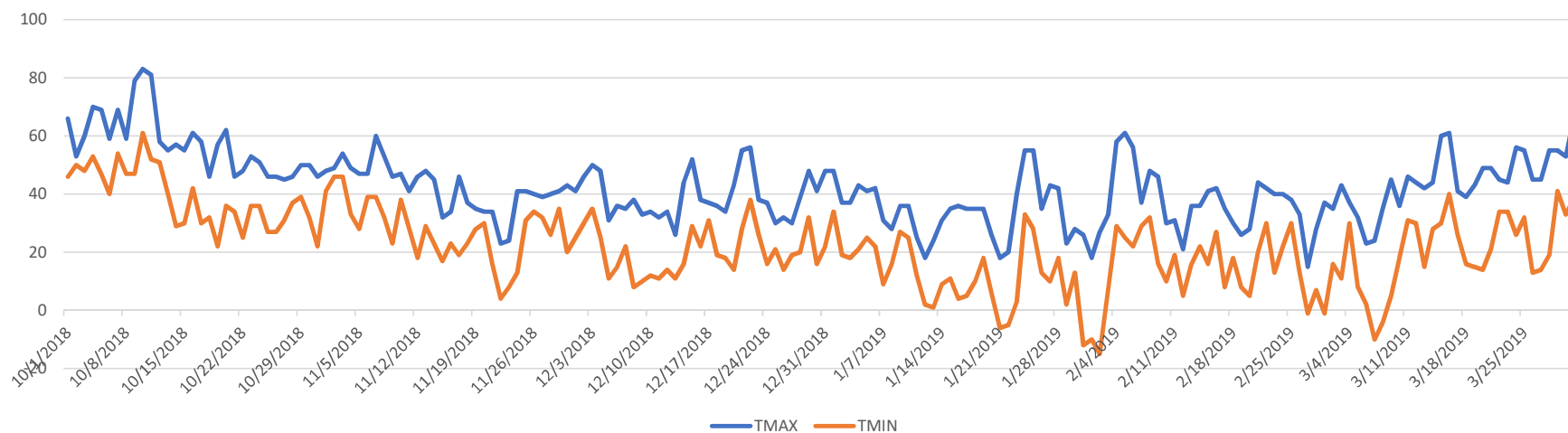
Precipitation Winter 2018-2019
Berlin Coos Co



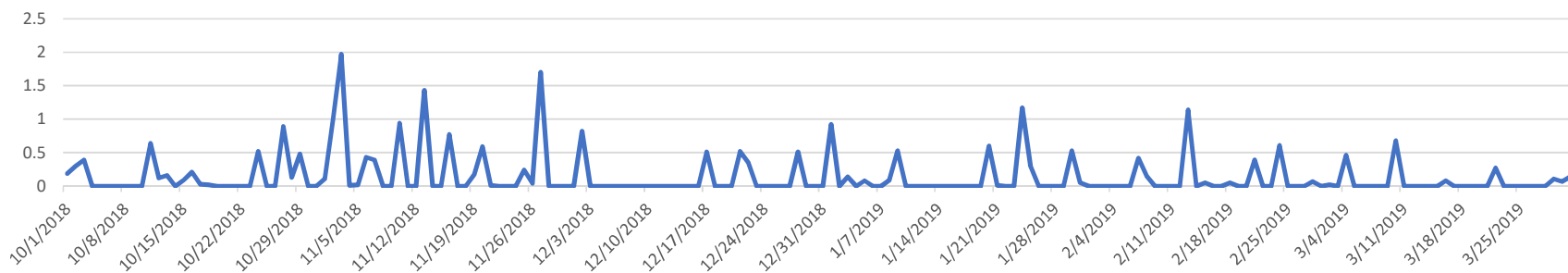
6/18/2019

NH Beekeepers Association

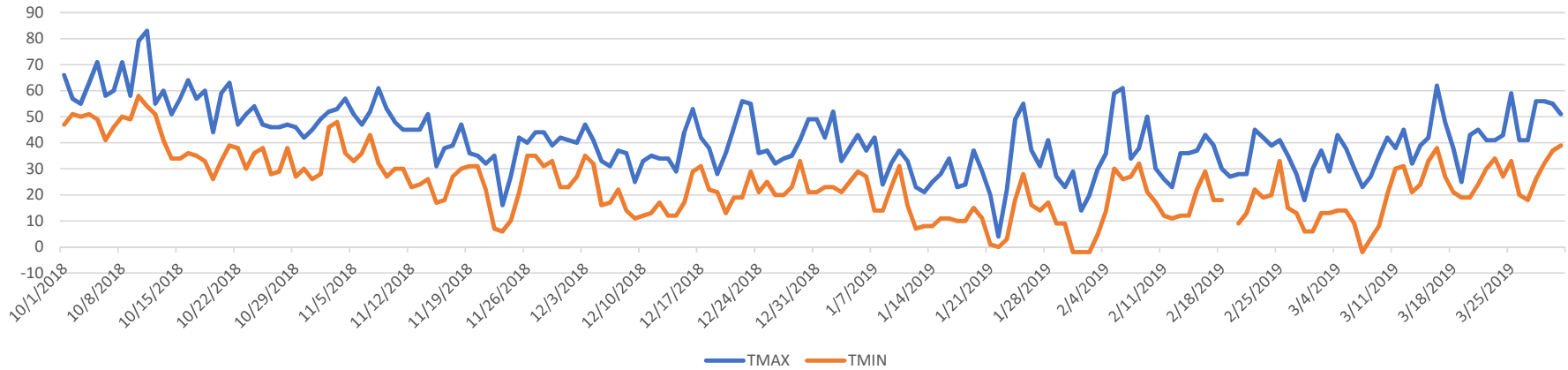
Durham Winter 2018-2019 Temperature Differences Strafford County



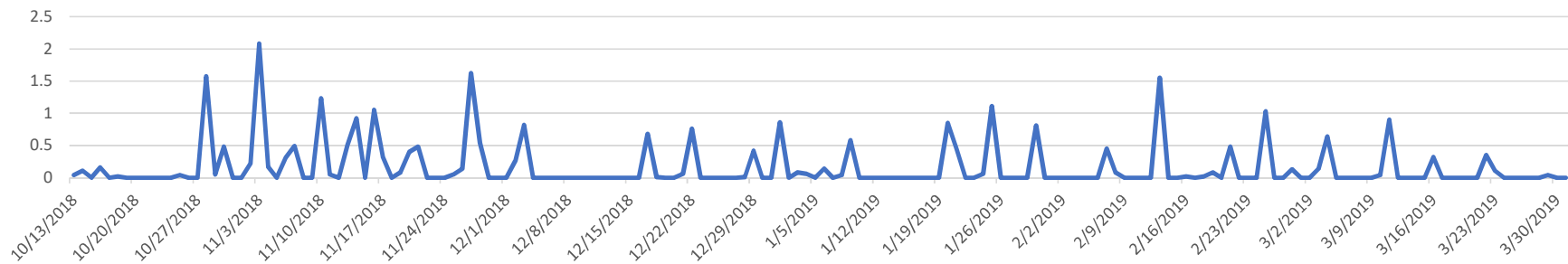
Precipitation Winter 2018-2019 Durham Strafford Co



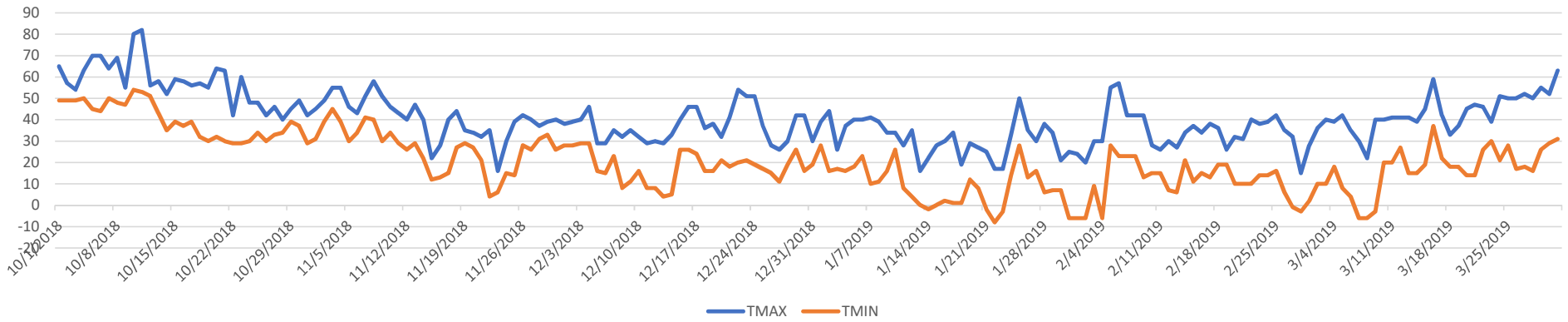
Greenland Winter 2018-2019 Temperature Differences Rockingham County



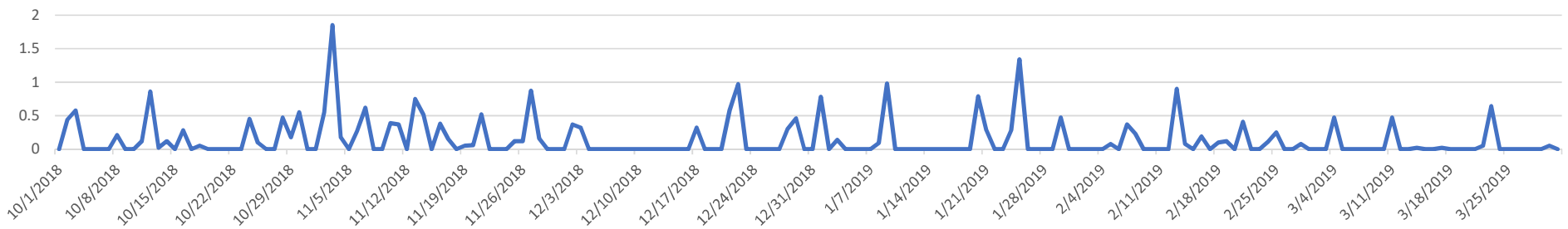
Precipitation Winter 2018-2019 Greenland Rockingham Co



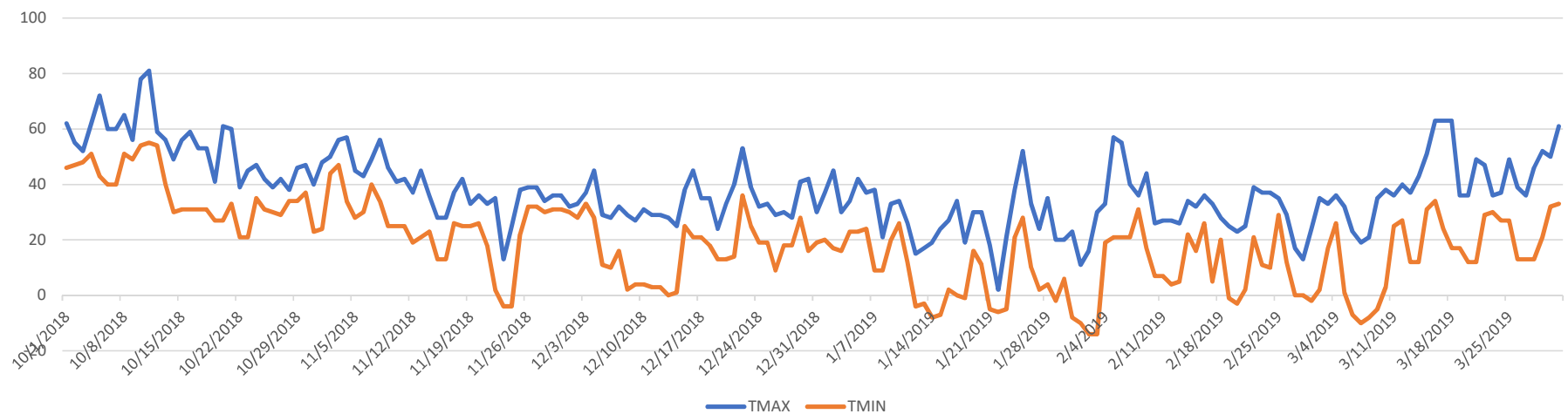
Lakeport Winter 2018-2019 Temperature Differences Belknap County



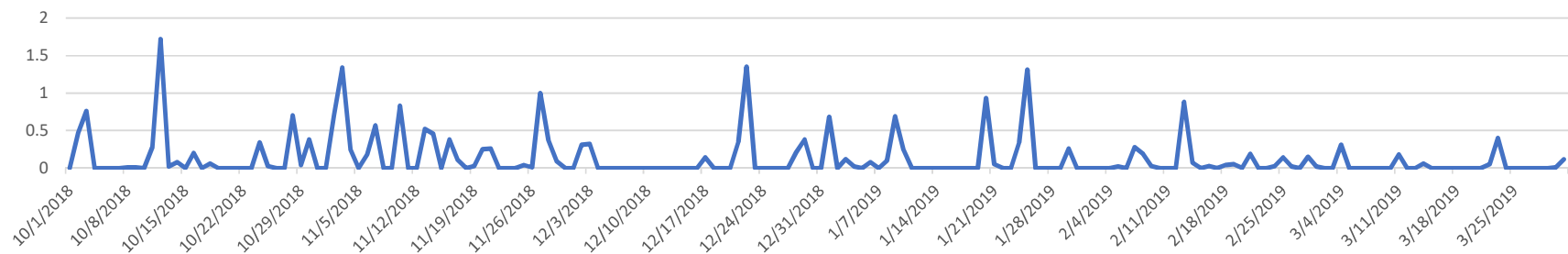
Precipitation Winter 2018-2019 Lakeport Belknap Co



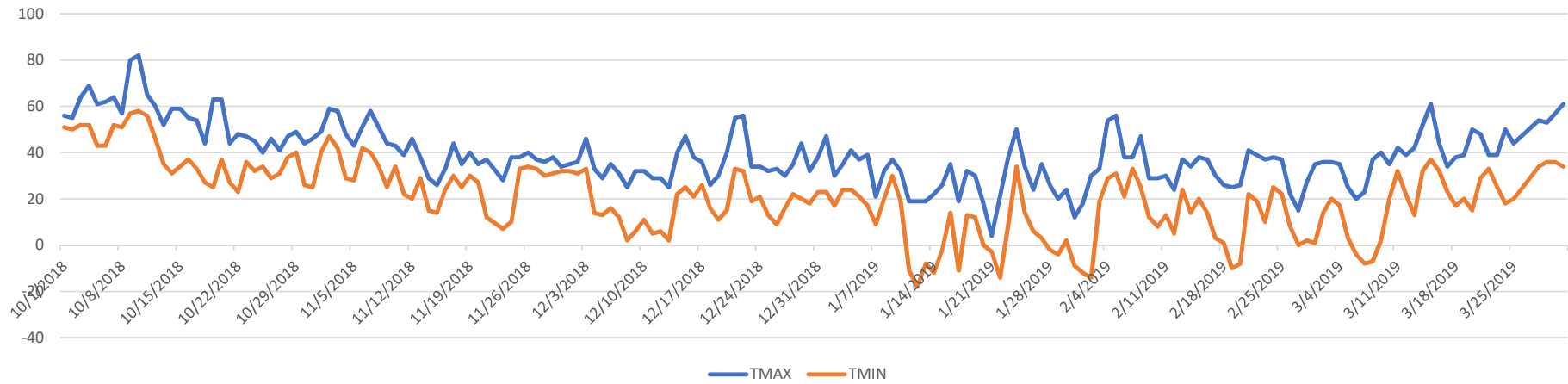
Newport Winter 2018-2019 Temperature Differences Sullivan County



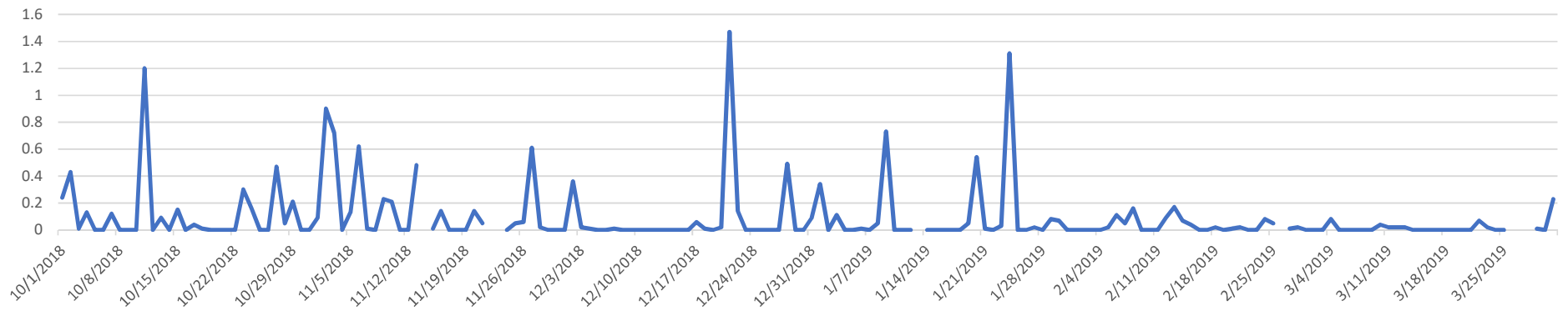
Precipitation Winter 2018-2019 Newport Sullivan Co



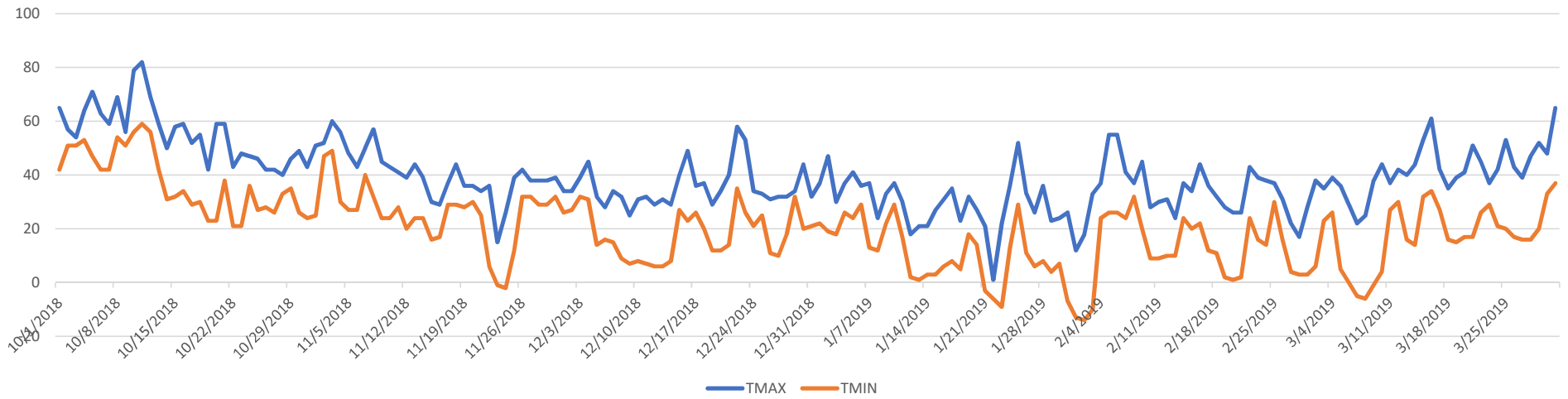
Lebanon Winter 2018-2019
Temperature Differences
Grafton County



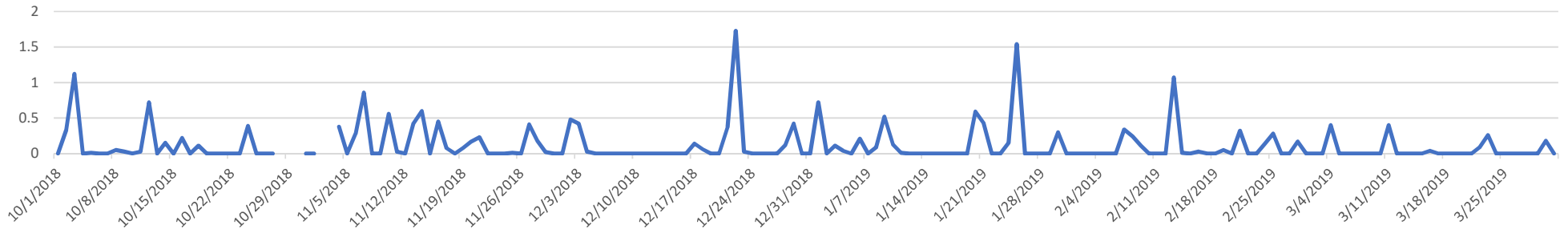
Precipitation Winter 2018-2019



Keene Winter 2018-2019
Cheshire County



Precipitation Winter 2018-2019
Keene, Cheshire Co



White Mountain National Forest Winter 2018-2019
Daily Temperature Differences
Carroll County

