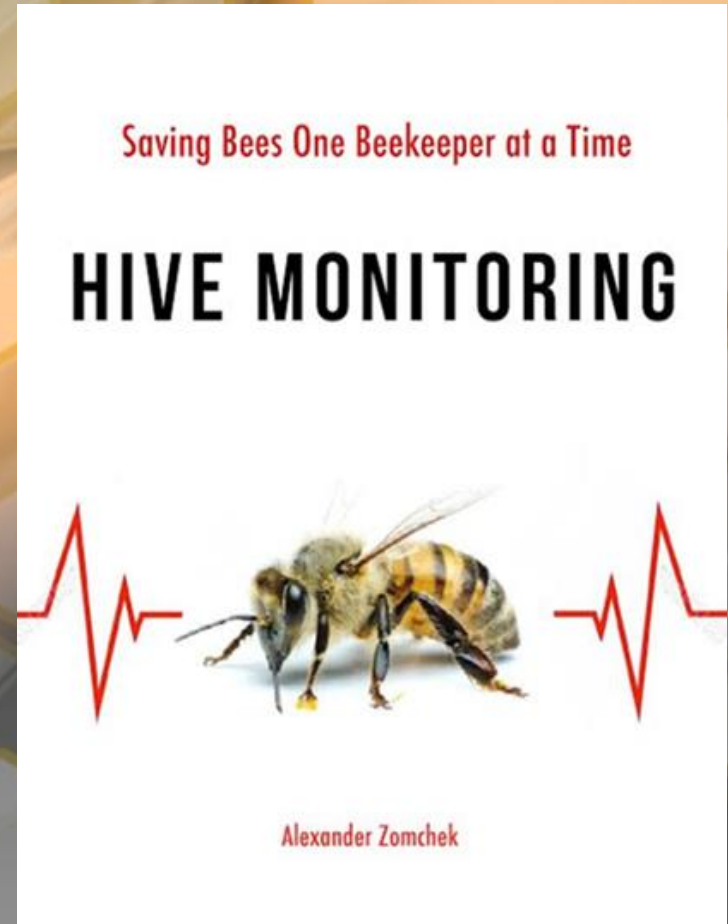


Reduce Colony Losses through "Monitoring"

(What you don't know can hurt your bees...)



Ecology Research Center at Miami University



- ERC Home
- About Us
- Research
- Faculty
- Education/Outreach
- Facilities
- Weather
- Related Links

Ecology Research Center at Miami University

Education/Outreach

The ERC provides exceptional educational opportunities for students of all ages. There is a large weather station, a bird-watching area, numerous beehives, and nature trails. Visitors can take a guided tour of the center facilities or participate in exciting field research projects. The ERC is a



Miami University College of Arts & Science

Ann Rypstra
(rypstral@MiamiOH.edu)
ERC Director &
Professor of Zoology
Miami University
Oxford, Ohio 45056
(513) 785-3238
(513) 529-3176

Events

Transportation Open House
(March 18)

Lecture by Madeline Rogero, Mayor, Urban Planner, Knoxville



Current areas of interest/research

- **Honey Bee biology**
- **Hive Management...RM...Monitoring...**
- **Instrumental Insemination**
- **Cryogenic drone sperm banking**
- **Honey bee pollination for soy beans**
- **At-scale Cave/Winter nuc storage to promote local, seasonally timed, genetics.**
- **Bioinformatics...The Crystal Hive Project.**



Pre-OVERVIEW

- **Monitoring...beekeeping as it should be...**
- **What is Monitoring...defined...**
- **Yesteryear beekeeping...background**
- **Today's high mortality...**
- **Why is beekeeping so hard?**
- **Evolutionary...Revolutionary?**
- **"Bond Method" ...wrong direction for Most...**
- **Examples of monitoring...varroa...SHB...**
- **Secrets, tips, and tricks of the pros...**
- **Of nucs, packages, and queens...**
- **Monitoring...wrap up...**

“Natural” Variability...





Can "push" bees to reduce variability

Yester-Year Beekeeping Resource Management (RM)

- Resource Management
- Boxes and Bees
- Little pests & diseases problems
- No feed, maybe box swaps
- Capture swarms...moderate swarm control...
- Formulaic...recipe...passive
beekeeping...bragging rights: #honey.

Yester-Year Typical Bee Season w/ RM

- Order package(s)...mail...3 - 4lb...<\$...
- Install packages...on foundation...drawn comb...
- Feed 1:1 sugar water
- Watch the “magic” unfold
- Supering up... per nectar flow
- Extract honey...supering down...
- Tuck bees away...wrap?
- Done/Repeat...semi rigid dates...



Yester-Year Typical Bee Season w/ RM+Disease

- Order package(s)...3 lb...<\$...
- Install packages...on foundation...drawn comb...
- Feed 1:1 sugar water
- Watch the “magic” unfold
- Supering up... per nectar flow
- Extract honey...supering down...
- **Treat for AFB, EFB...prophylactic...terramycin**
- Tuck bees away...wrap?
- Done/Repeat...rigid dates...



Yester-Year Typical Bee Season w/ RM+Disease+Pests

- Order package(s)...3lb ...\$...
- Install packages...on foundation...drawn comb...
- Feed 1:1 sugar water
- Watch the “magic” unfold
- Supering up... per nectar flow
- Extract honey...supering down...
- Treat for AFB, EFB...prophylactic...terrามัยซิน
- Varroa mites (Pest) ...prophylactic...arcacide(s)
- Tuck bees away...wrap?
- Done/Repeat...semi rigid dates...



Yester-Year Typical Bee Season w/ RM+Diseases+Pests+IPM

- Order package(s)...3 lb...\$\$...
- Install packages...on foundation...drawn comb...
- Feed 1:1 sugar water...**more fall feeding...2:1...**
- Watch the “magic” unfold
- Supering up... per nectar flow
- Extract honey...supering down...
- Treat for AFB, EFB...prophylactic...**terramycin**
- **Varroa mites (Pest) ...prophylactic...arcacide(s)**
- **IPM...Integrated Pest Management...**
- Tuck bees away...wrap?
- Done/Repeat



Yester-Year Typical Bee Season w/ RM+Diseases+Pests+IPM

- **So, why the current mortality rates? With all the information out there...not working for many.**



Real Story - 1: Beekeeper “X”

- Typical hands-off beekeeping...**resource manager...**
- 10 nucs went into the spring...
- Hodge podge of missed opportunities and missteps...
- Leading to little honey...varroa(!)...SHB...lost colonies...expenses...frustration...
- (Bad genetics...nucs...assumptions and *misrepresentations*).
- Year ended...6 dead...3 stragglers...1 ok.
- **So, beekeeping has to includes keeping your bees alive...**



Real Story - 2:



Same apiary...two different hives...one week ago...

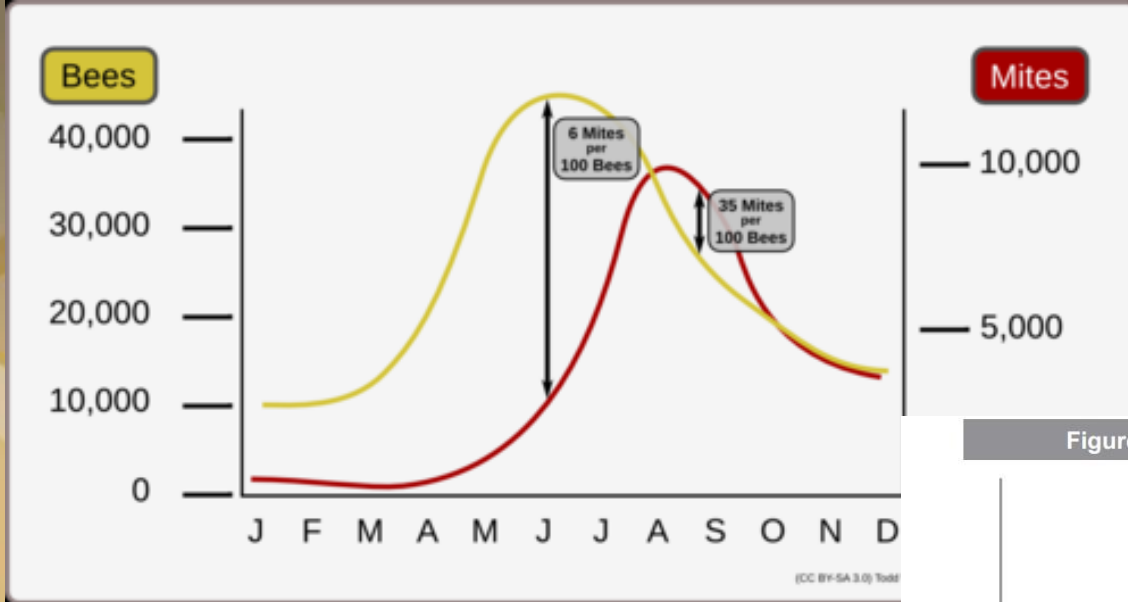
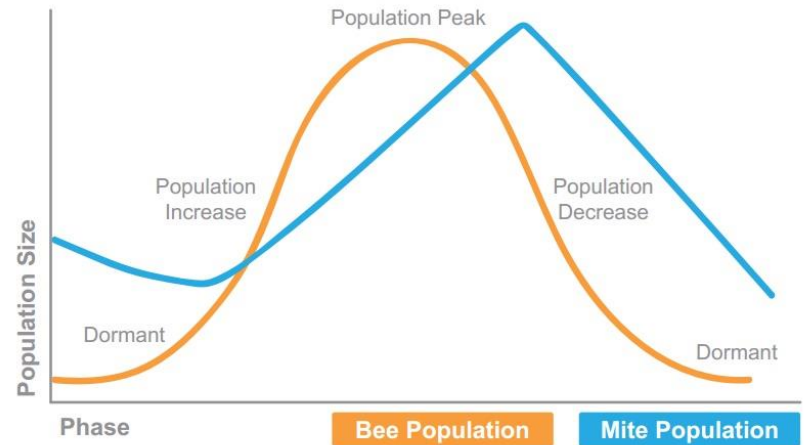
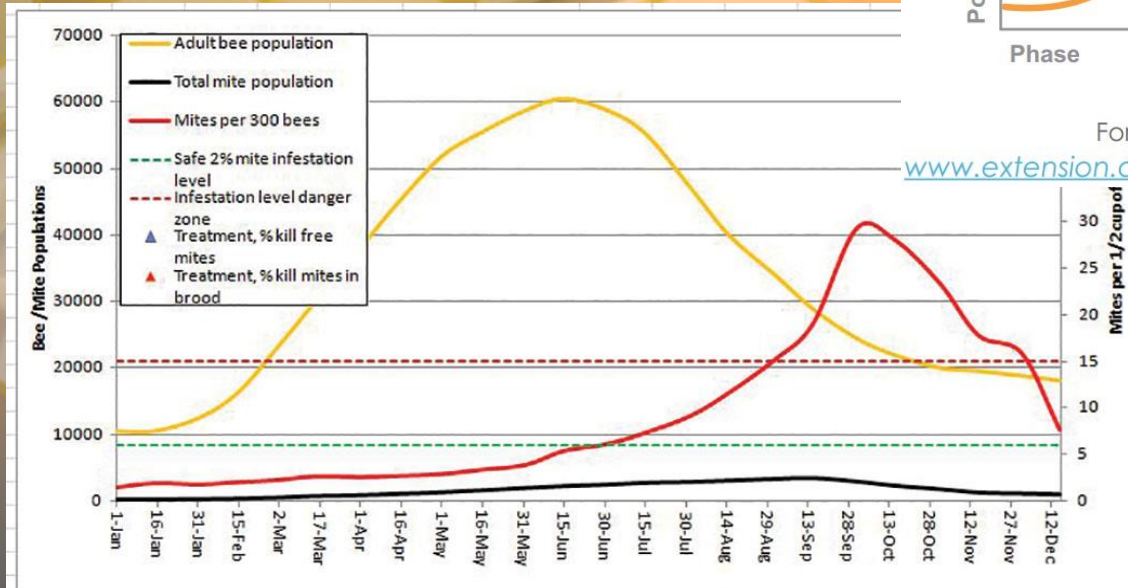


Figure 1: Honey Bee & Varroa Mite Seasonal Phases



For details on the Varroa Life Cycle consult:

www.extension.org/pages/65450/varroa-mite-reproductive-biology

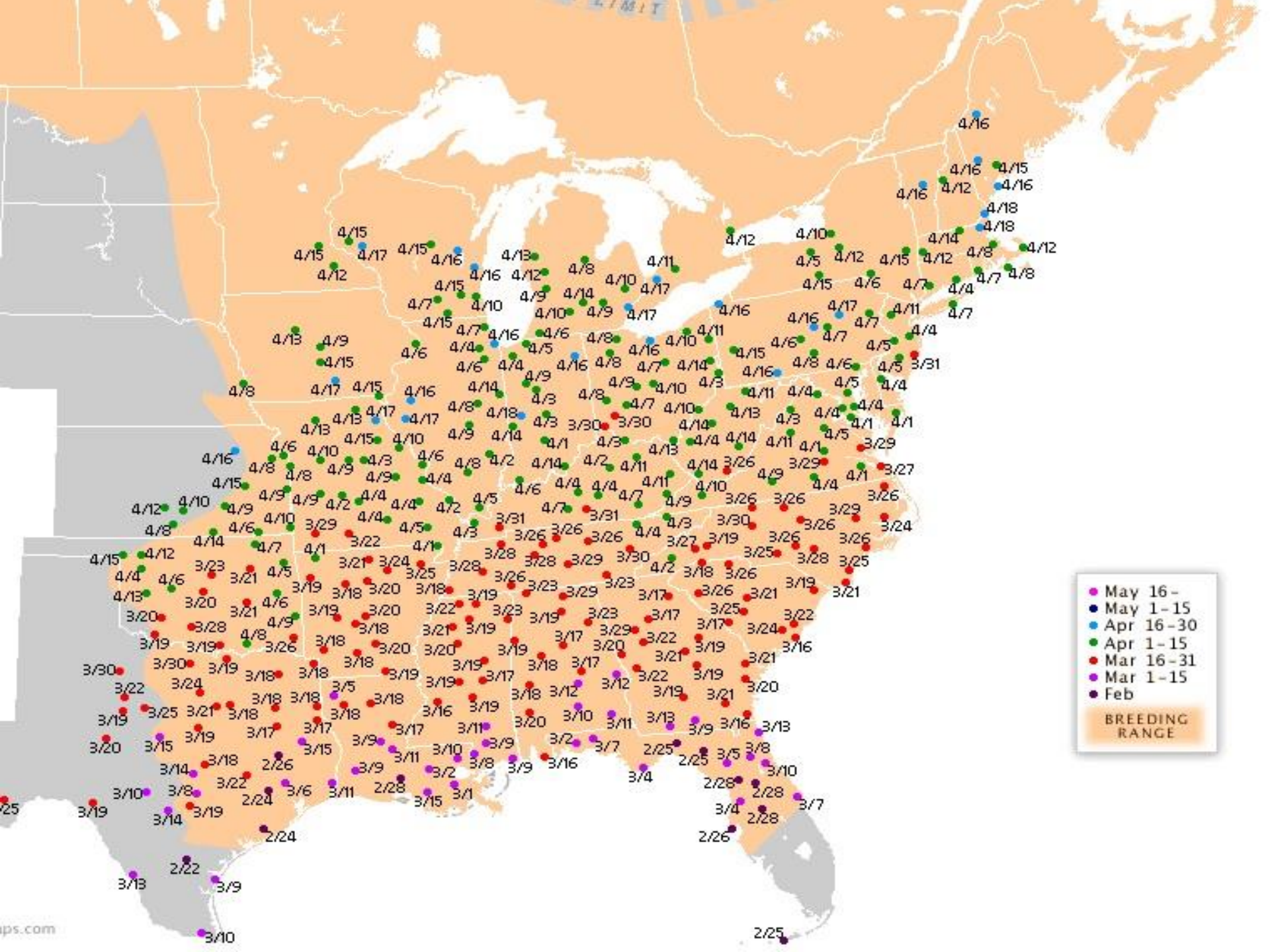


Step back... New Approach...



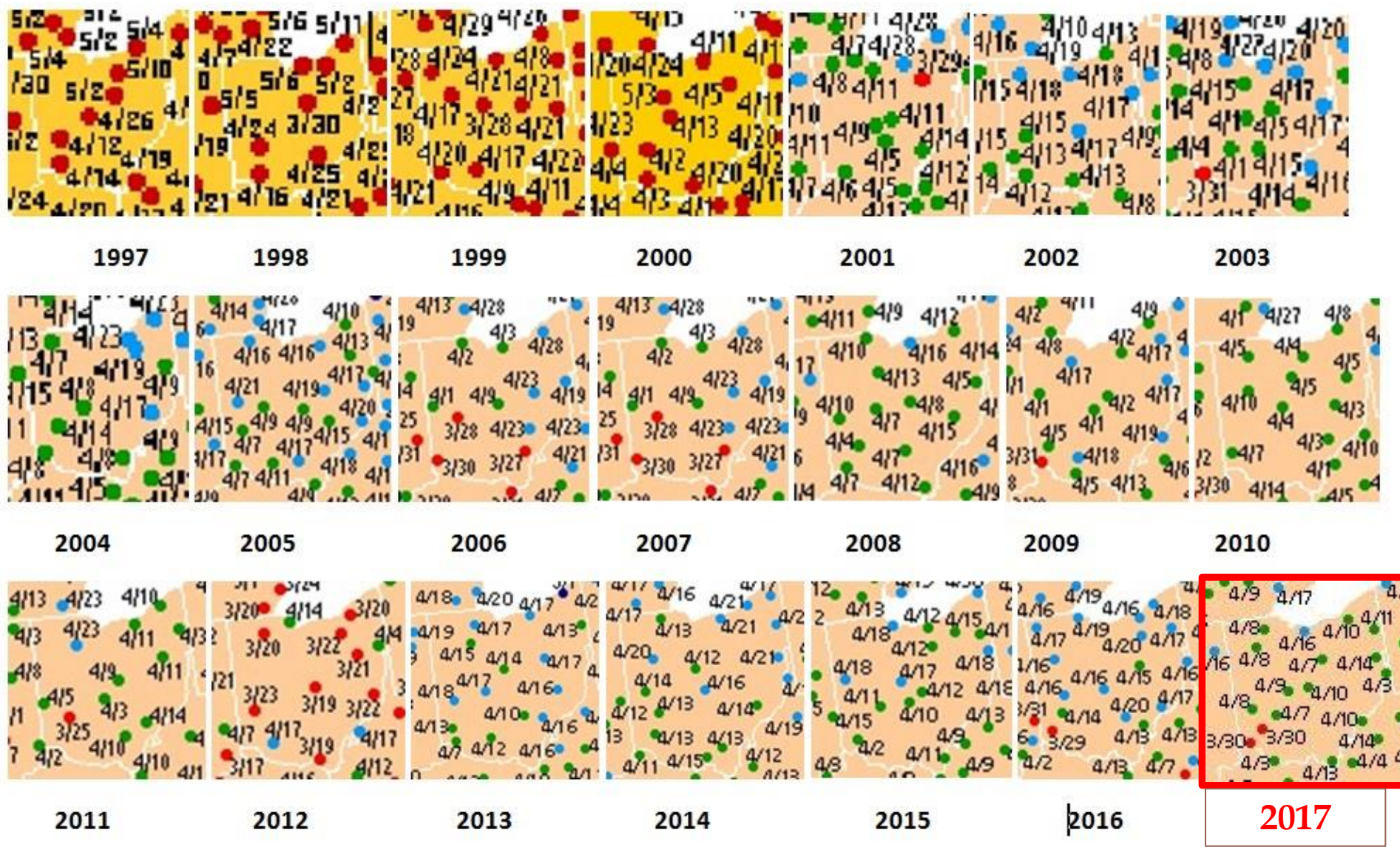


- * **From Observing to Measuring**
- * **From Measuring to Monitoring**
- * **Why Monitoring?**
- * **“Monitoring” Defined**
- * **Monitoring examples**
- * **When to Monitor doppler!**
- * **Monitoring to specifically reduce hive losses**
- * **Monitoring & YOU...the future of beekeeping!**



“On what exact date do I ...”?

Seasonal Variability
~ 3 weeks







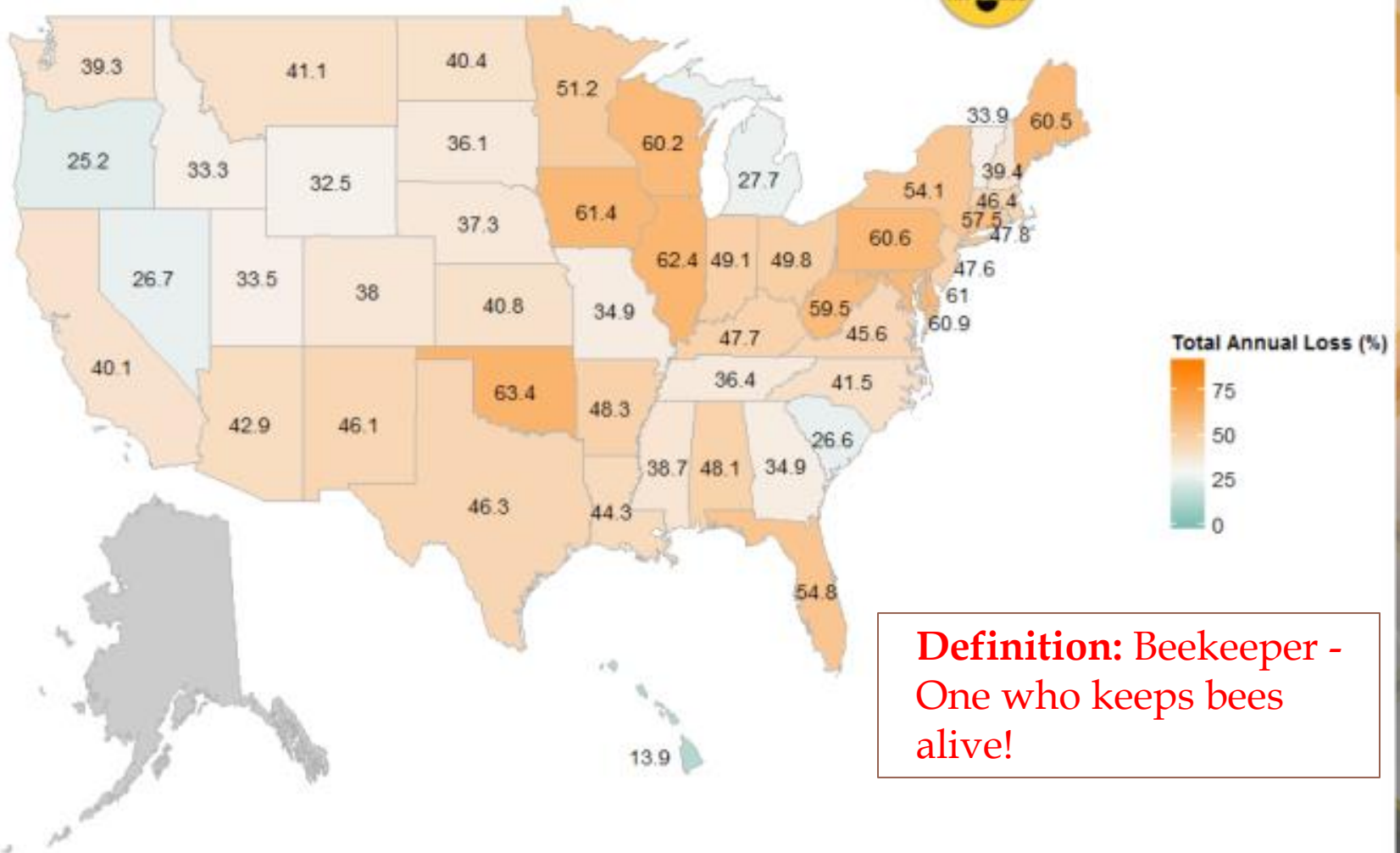




Why the *need* for Monitoring?

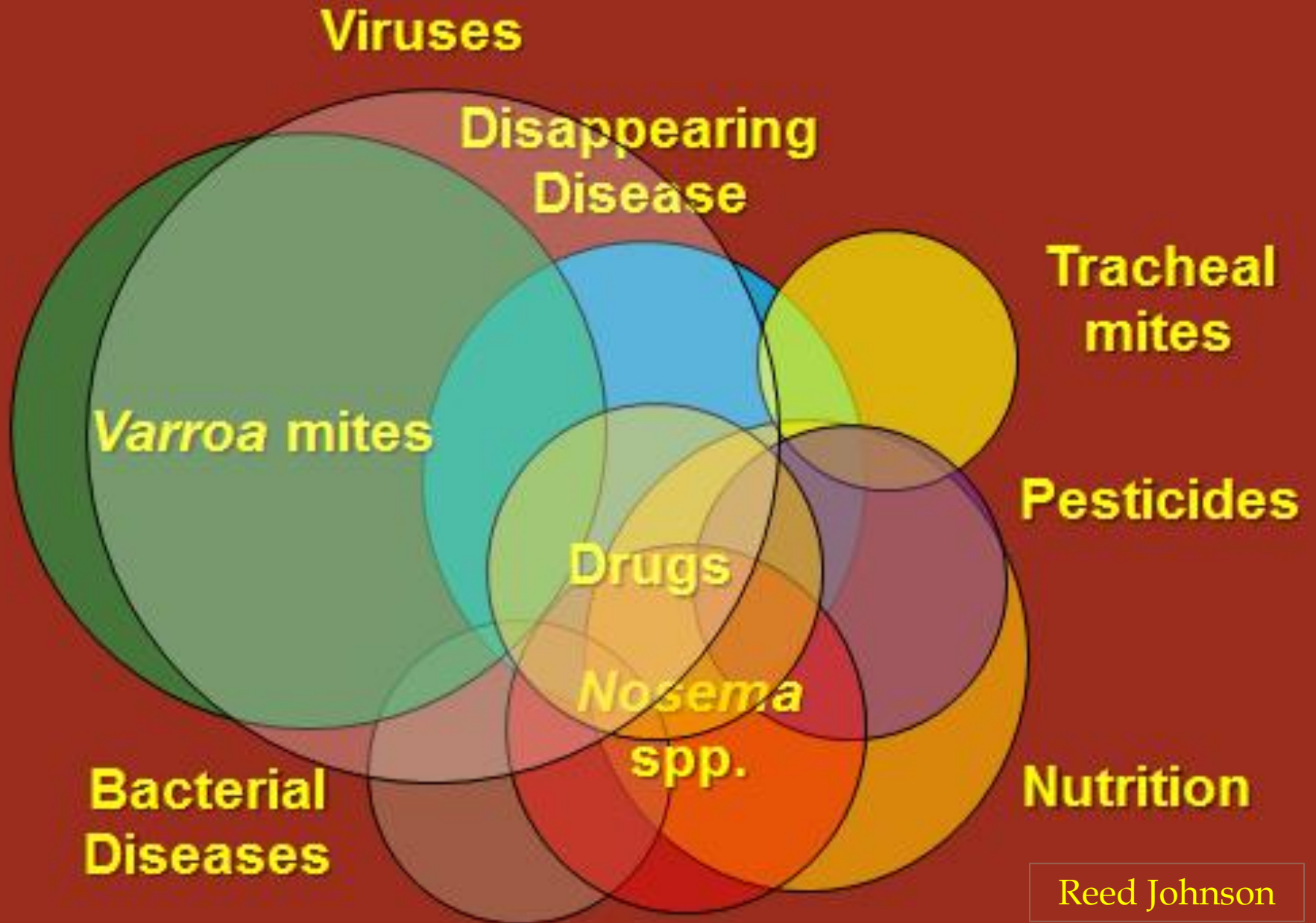
...not working...doing the same things over and over...

Total Annual Loss by State - Loss Survey 2014-2015

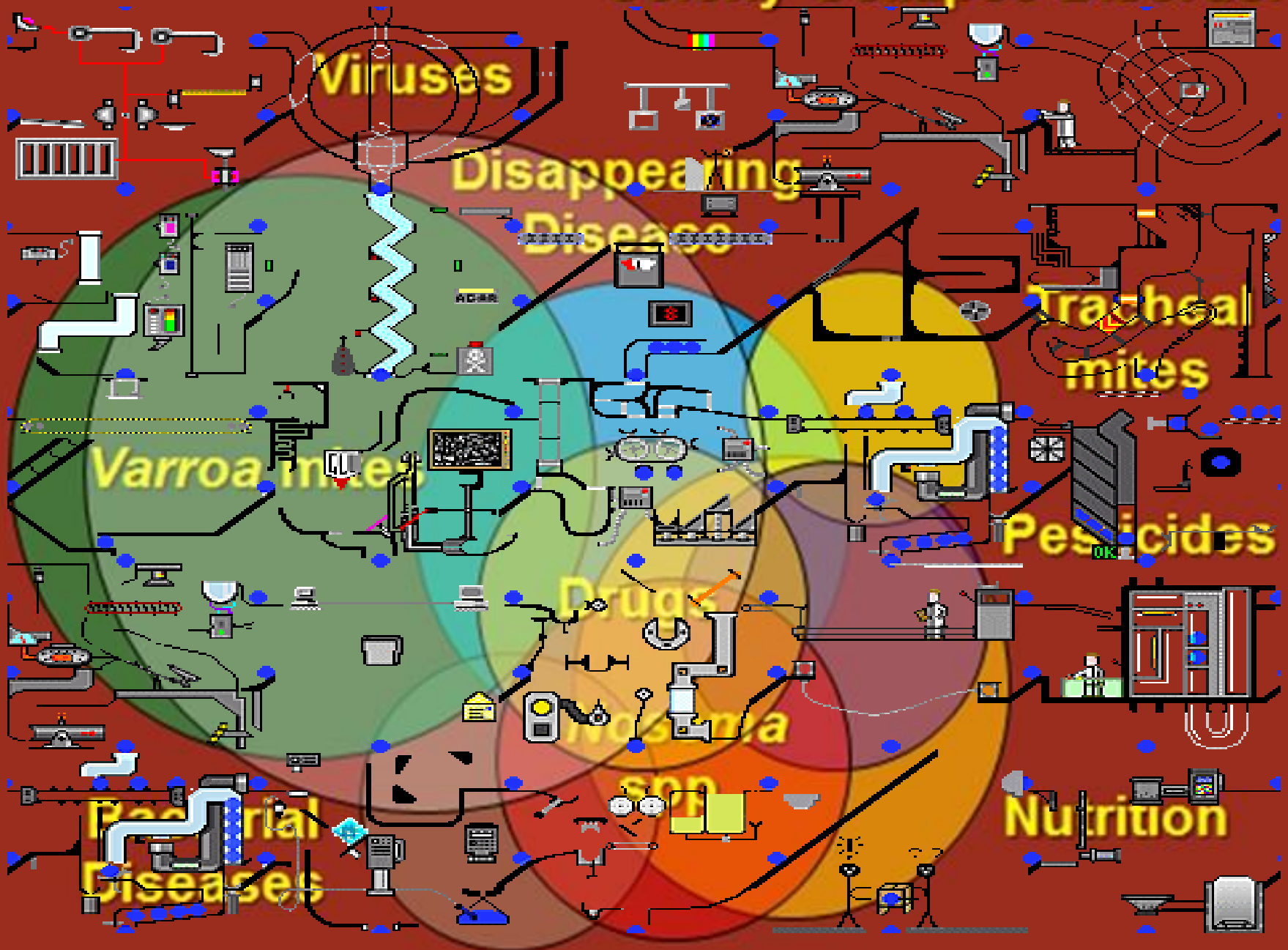


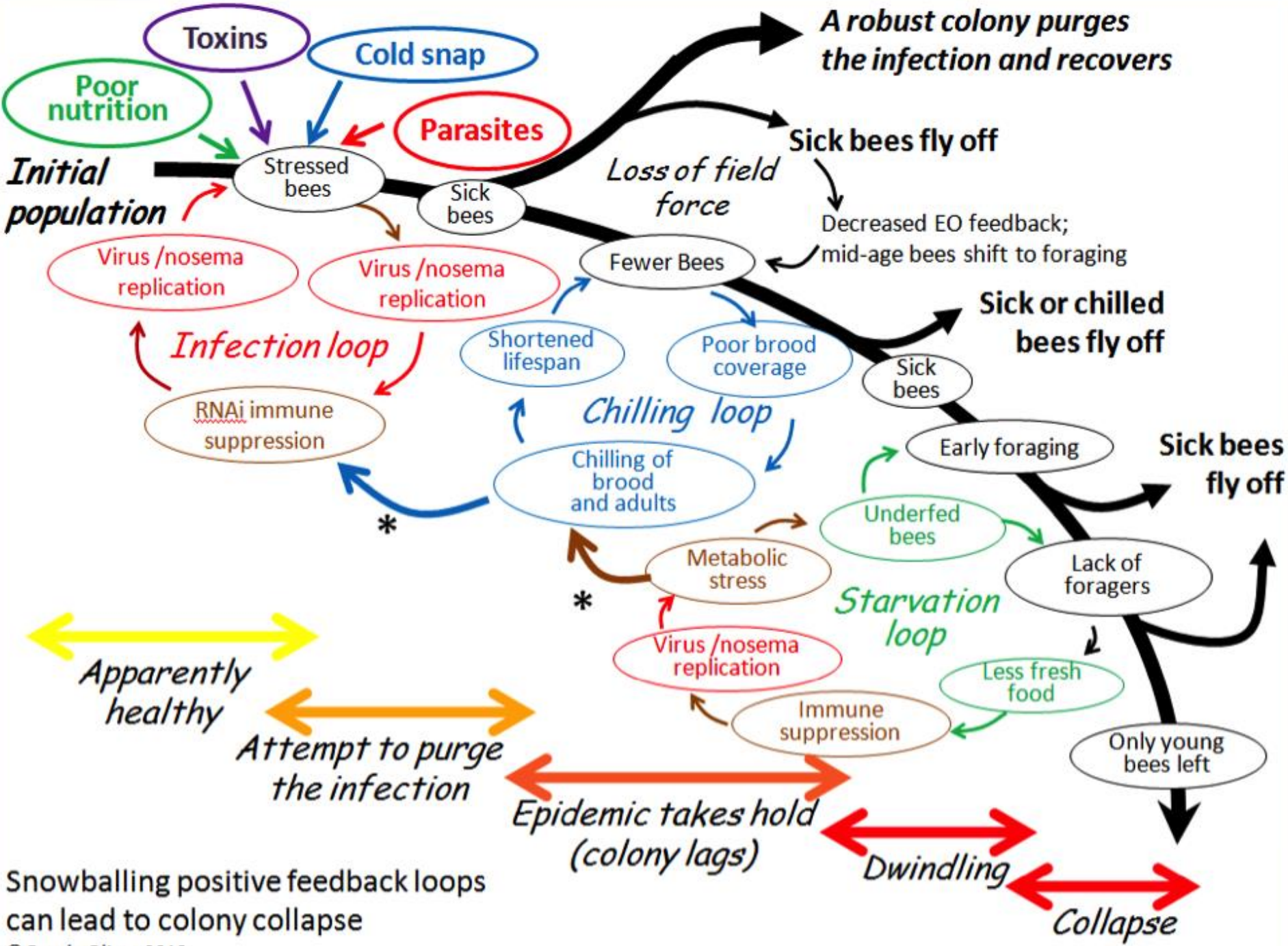
Definition: Beekeeper -
One who keeps bees
alive!

“Colony Collapse Disorder”



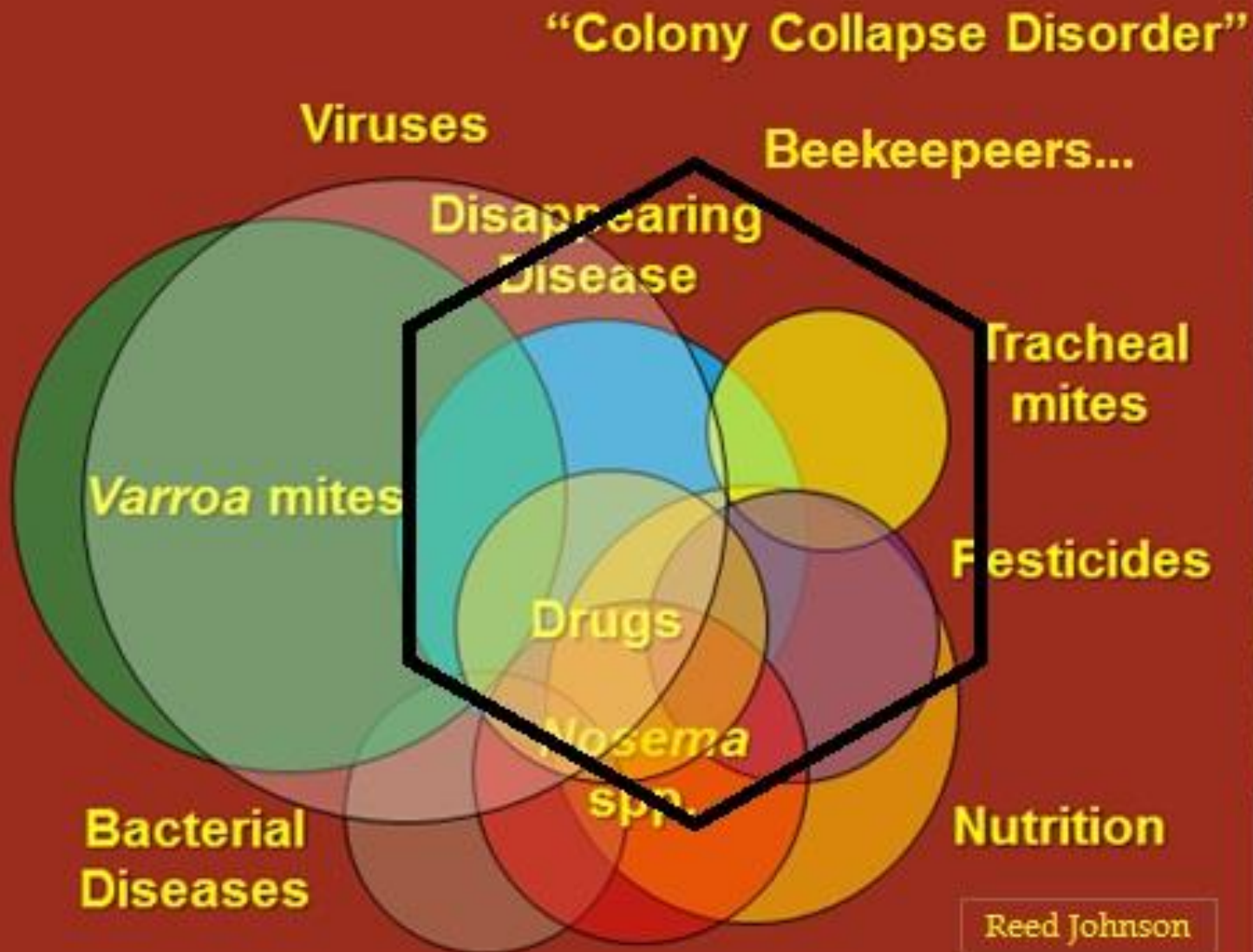
“Colony Collapse Disorder”





Snowballing positive feedback loops can lead to colony collapse

Operator errors... "P.P.B." ...



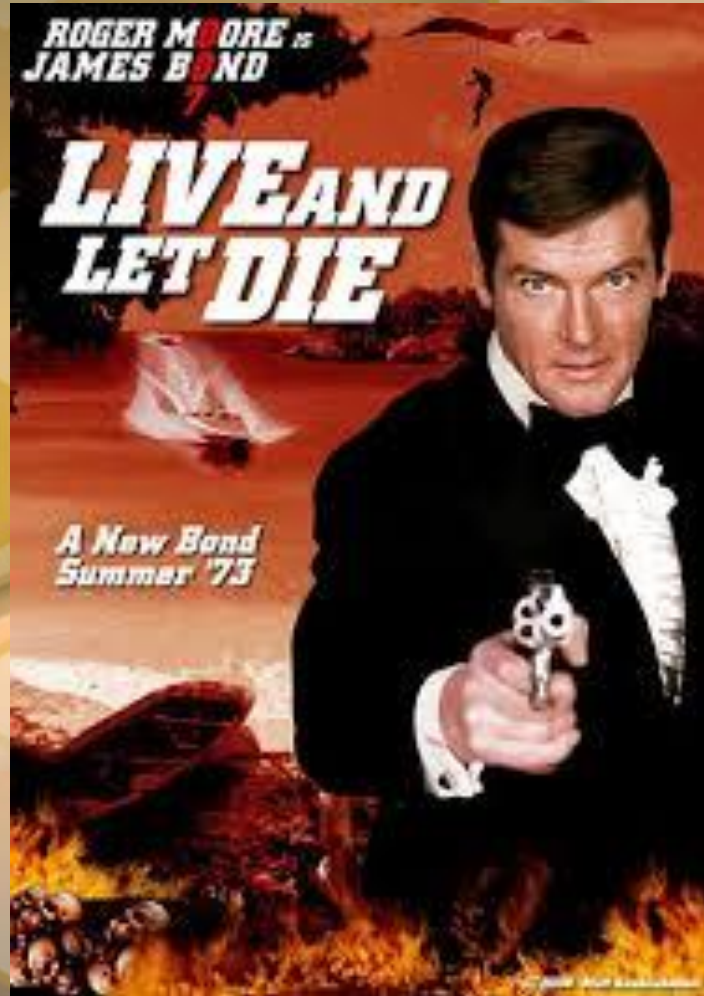
So, what's a Beekeeper to do?

- **Nothing...place it and forget it beekeeping...**
- **Too little...**
- **Too late...(timing often critical)...**
- **Results: beekeeping has become hard on bees and beekeepers...unsustainable?**
- **Same 'ol, same'ol is NOT working...**



Responses to high mortality rates

The blame game...



“P.P.B. ...

The “Bond” Method of Beekeeping



You can go Organic...

You can go Green...

LICENSE TO KILL

LICENSE#
007

BIRTH DATE
08-25-1930

EXPIRES
08-25-2015

RESTRICTION
KGB



SECRET AGENT

JAMES BOND
(Sean Connery)
c/o Scotland Yard Dept. MI6
London, England

SEX	HEIGHT	WEIGHT	HAIR	EYES
M	6'2"	180	BROWN	BROWN

James Bond (Sean Connery)

**STOP
GETTING
BOND
WRONG**

Of Mites and Dandelions



Artificially evolved “short stemmed”

If stop “treating” ...



Pet Parents...Bee Parents?

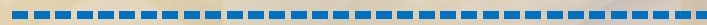


Breathe!

After all is said and done:

Just a handful of pests and diseases (Ps & Ds)

Just a handful of treatment options



Timely *monitoring* for the major culprits

Treatment and Verify



**“Monitoring” is
“Beekeeping2.0”,
but in today’s rapidly
changing environment...**



Monitoring...all around us!



Bee specific “Monitoring”...

10,000 foot view - Monitoring tells you:

- *What to look for...*
- *When to look... and how often...*
- *What to do about colony issues...*

...Monitoring is more...

- A conscious, purposeful, focused and timed methodology of hive inspections and treatments
- A *feedback loop* tool...
- Skeptical...Evidence based...prove it!
- An Approach...detective...doctor...

Bee Monitoring (cont.)

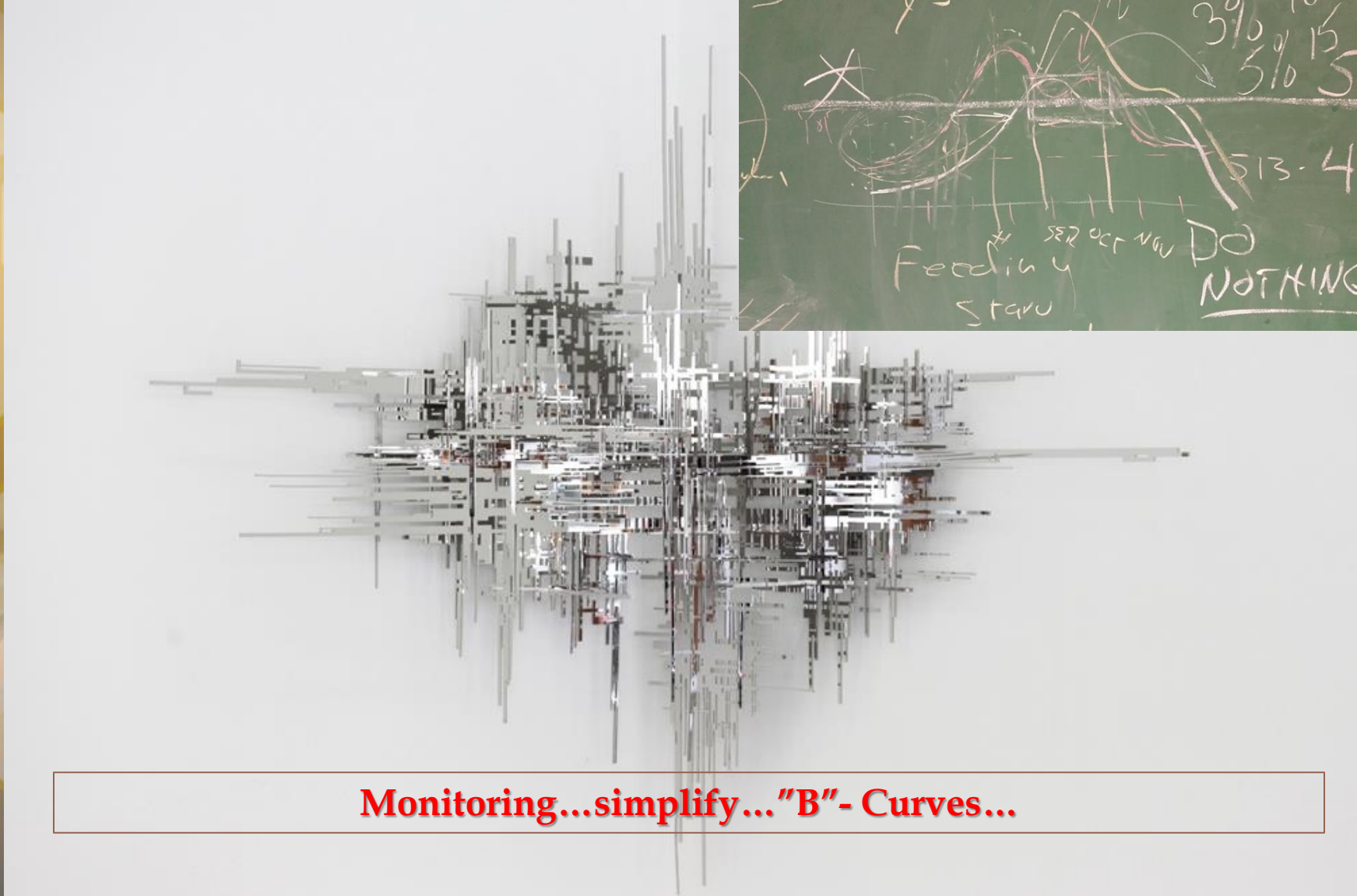
- **Monitoring is Tuning...Refining...**
- **Installing TODAY's pkg, nuc, queen is no longer a place it a forget it...**
- **We have learned a lot over the years...**
 - **Colony management...**
 - **Feeding...**
 - **Pests & Diseases (Ps & Ds)...**
 - **Treatments & Treating...**

Aside: What Monitoring is NOT!

- Flow Hive...anathema to Monitoring...

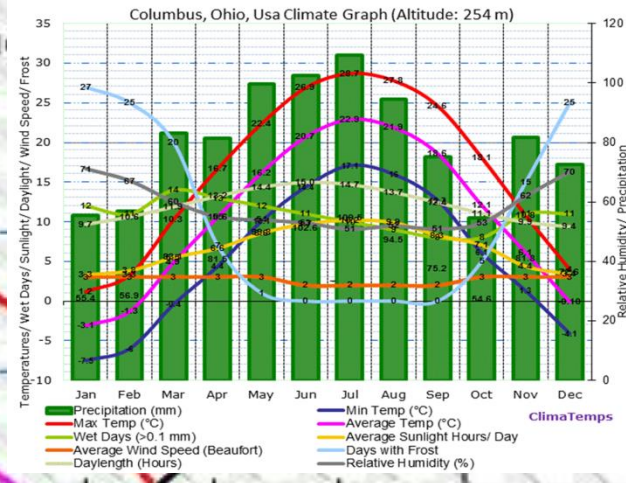
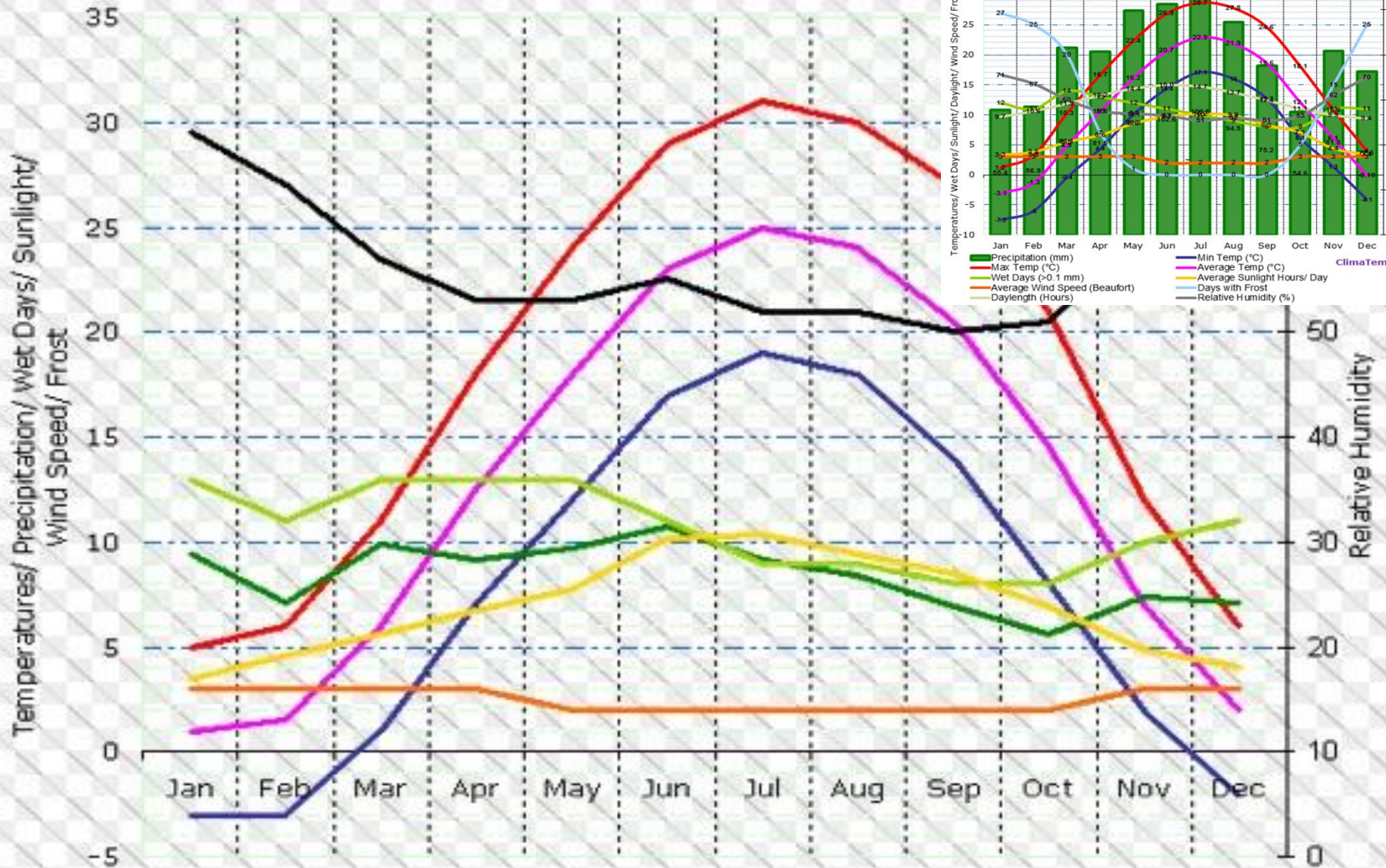


Lots of *beekeeping* "noise" out there...



Monitoring...simplify..."B"- Curves...

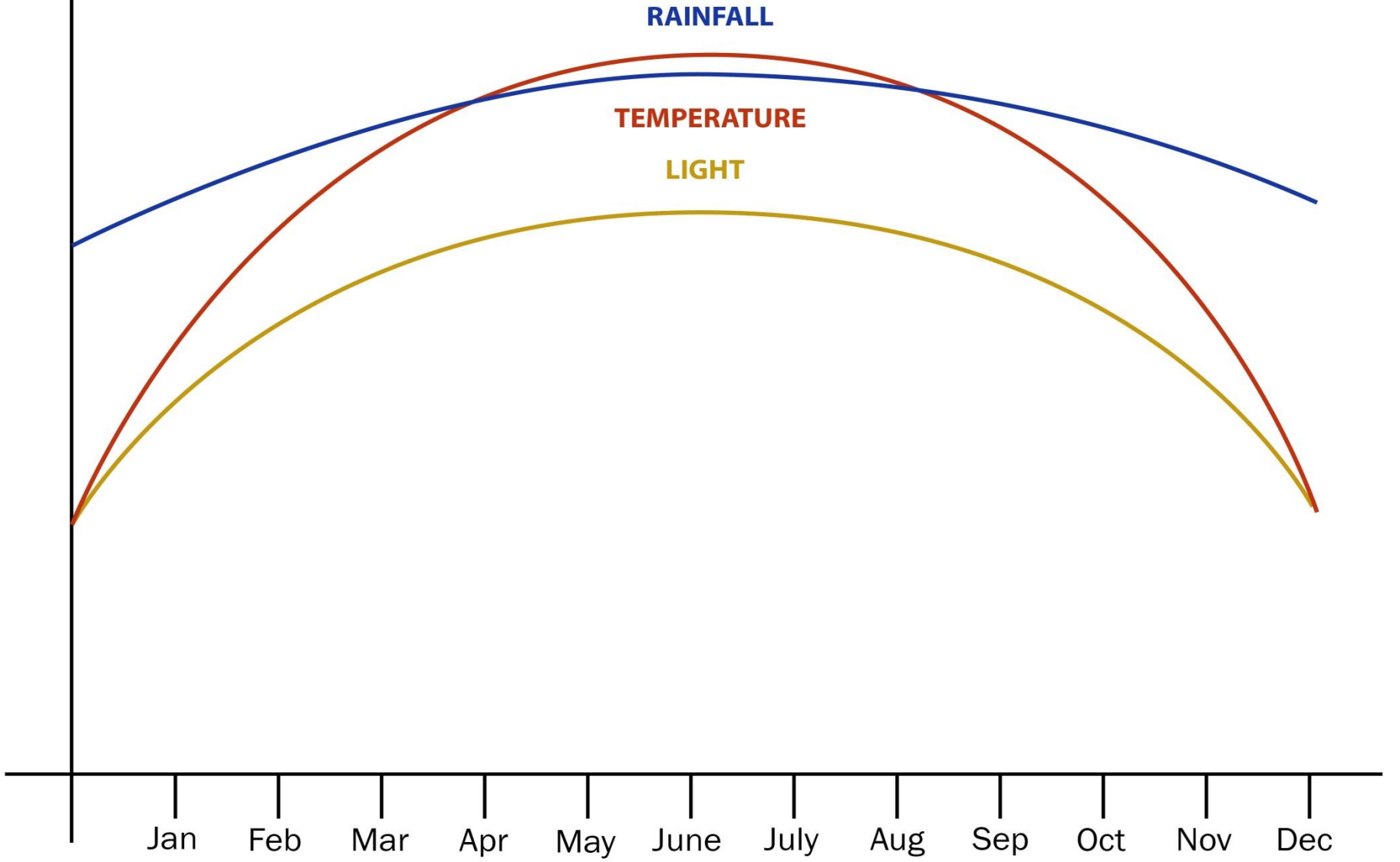
Cincinnati, Ohio, Usa Climate Graph (Altitude: 254 m)



- Min Temp (°C)
- Max Temp (°C)
- Average Temp (°C)
- Precipitation (cm)
- Wet Days (>0.1 mm)
- Average Sunlight Hours/ Day
- Average Wind Speed (Beaufort)
- Relative Humidity (%)

ClimateTemp.info

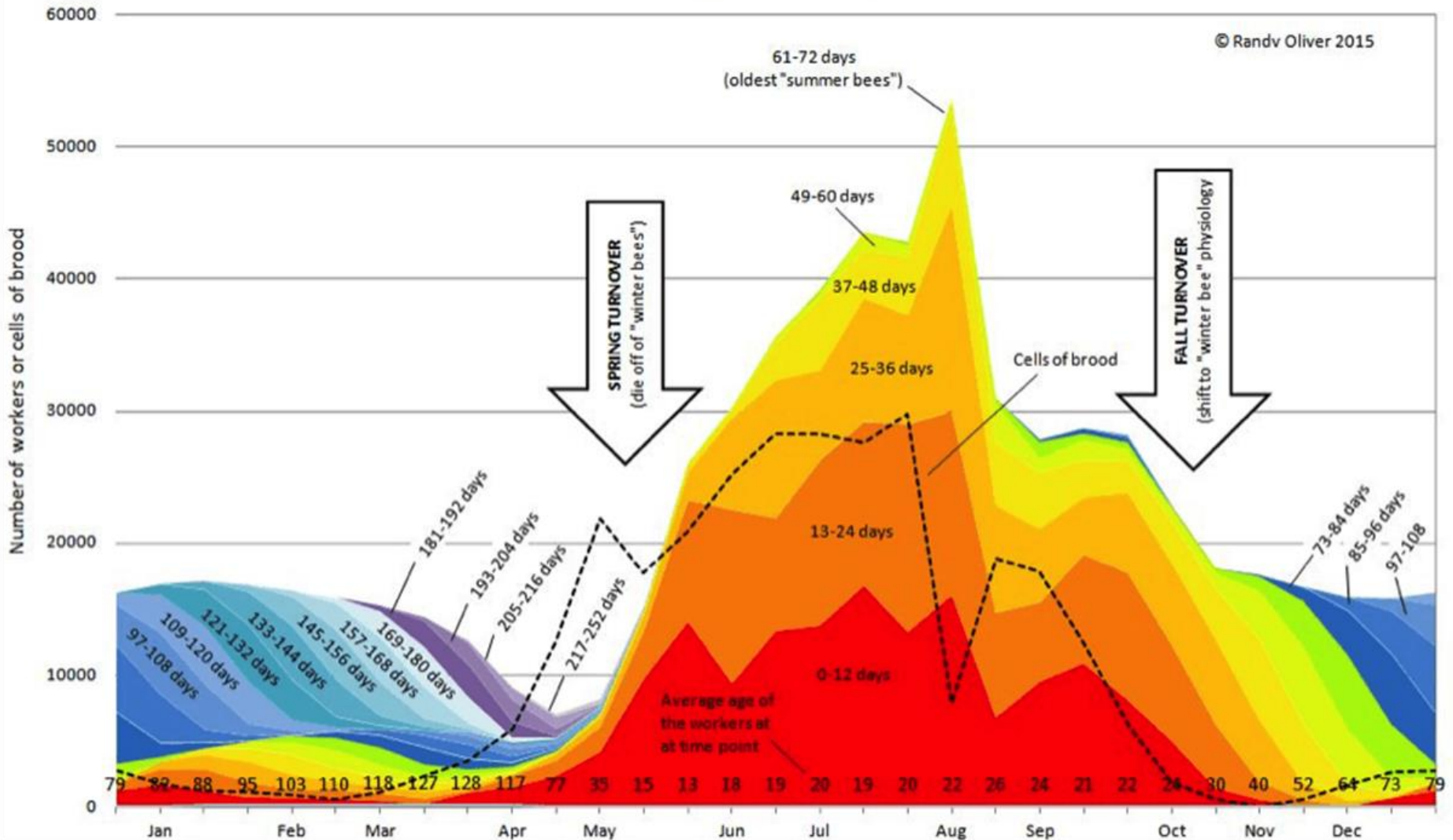
Monitoring to simplify the clutter...



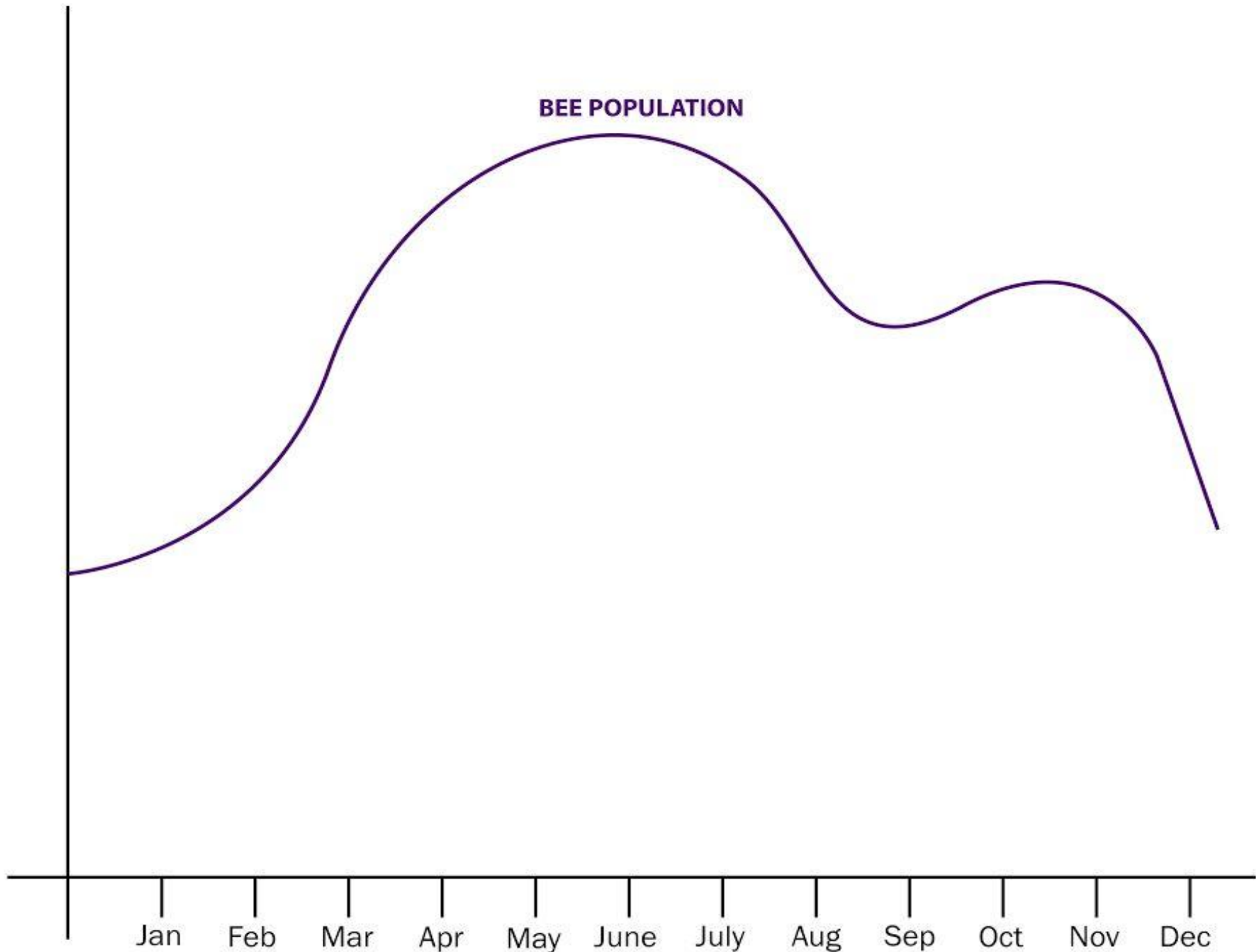
Internal hive populations

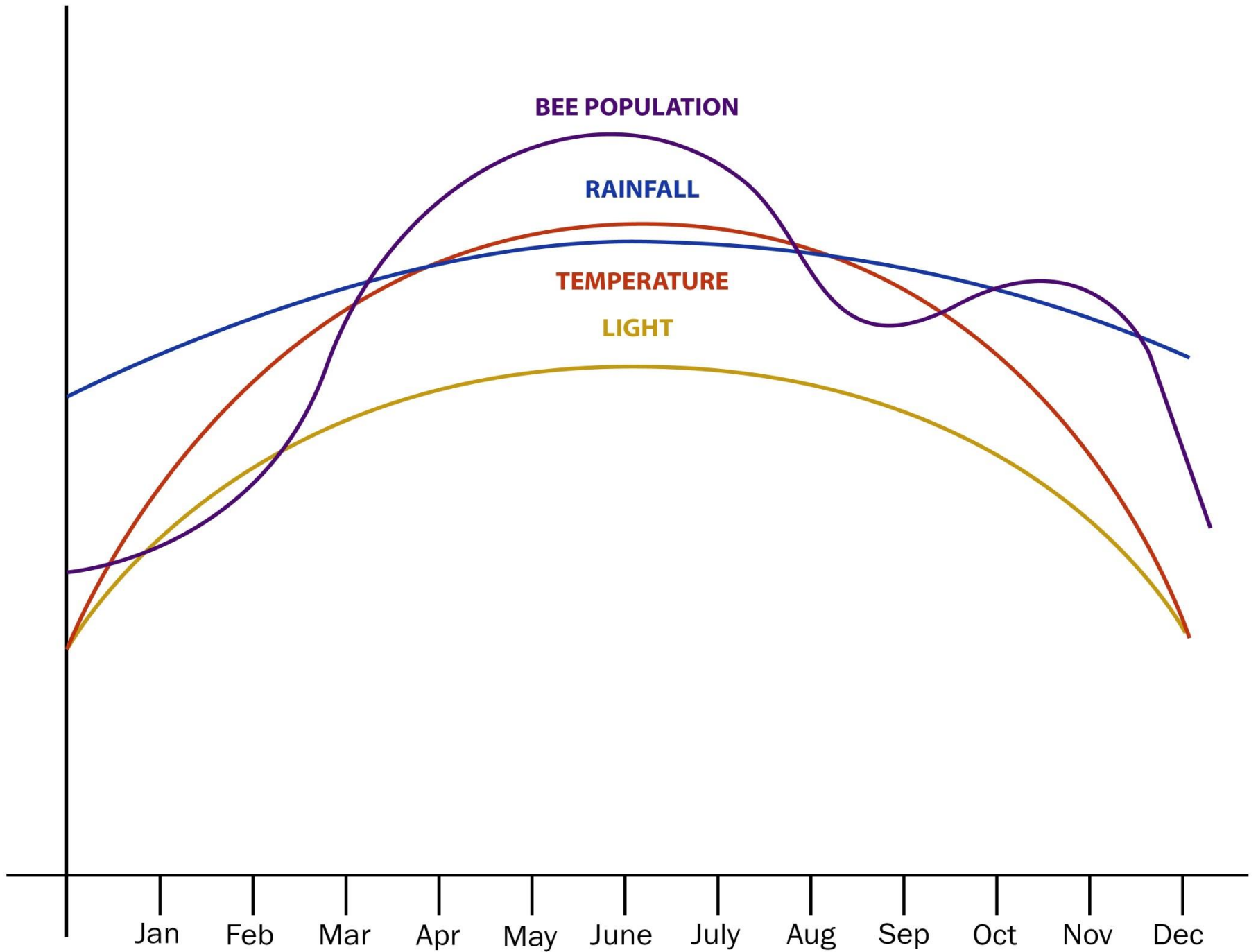
Age Class Distribution of Workers Over the Year
Manitoba, Shed Wintered

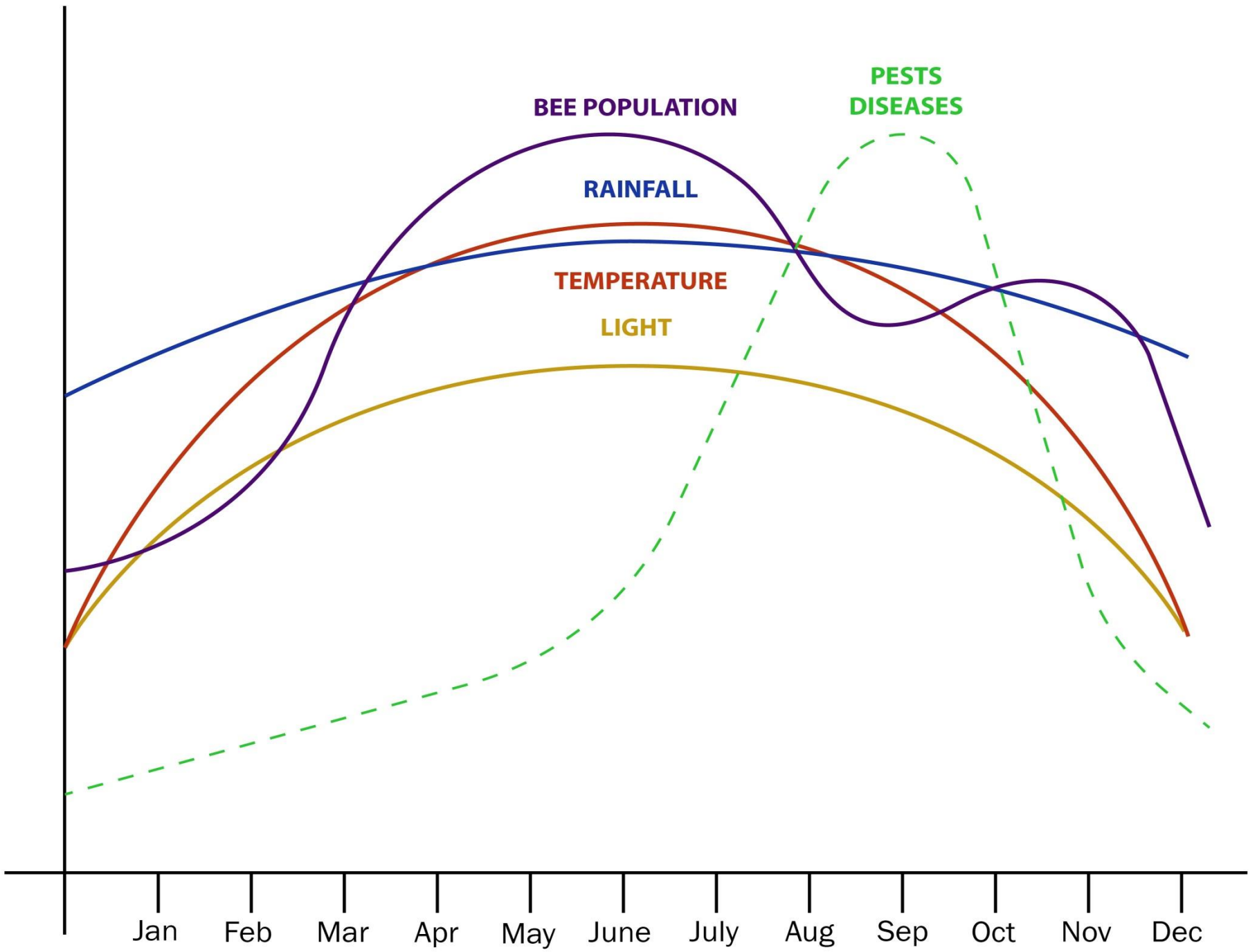
© Randv Oliver 2015



BEE POPULATION







BEE POPULATION

**PESTS
DISEASES**

RAINFALL

TEMPERATURE

LIGHT

Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec

Typically beekeeping learning curve “layered” approach

- STATICS:
- Basic hive mechanics...Resource Management...
- Basic bee biology...
- Seasonal understanding...what happens when...
 - “B-Curves” ...seasonal & colony variabilities...
- DYNAMICS: MONITORING...



Learn “Good” to know “Bad” (...train your brain...)





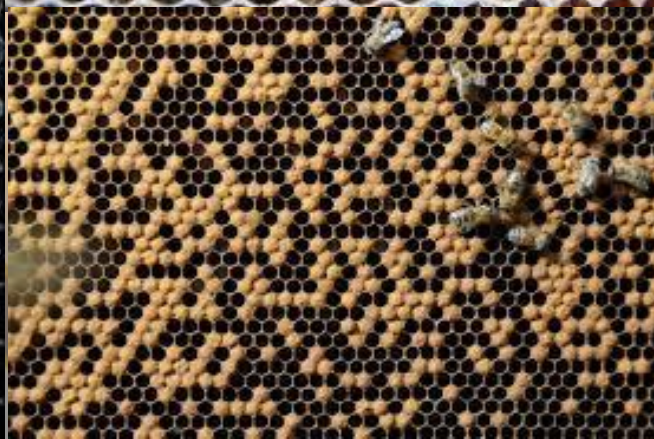
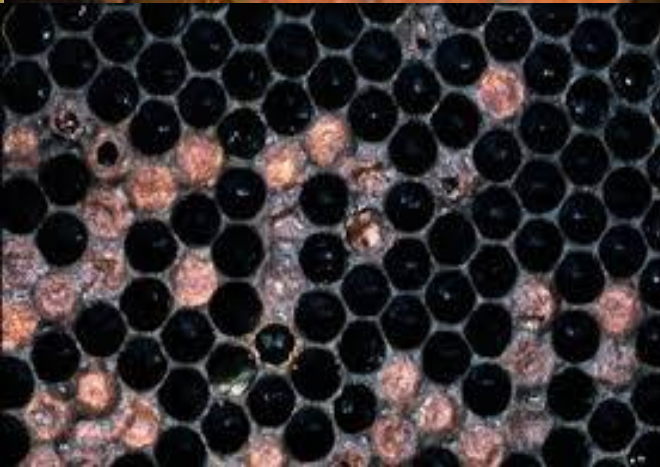
Dry brood

Compare/Contrast...

Learn "good" from "bad"

Visual inspection

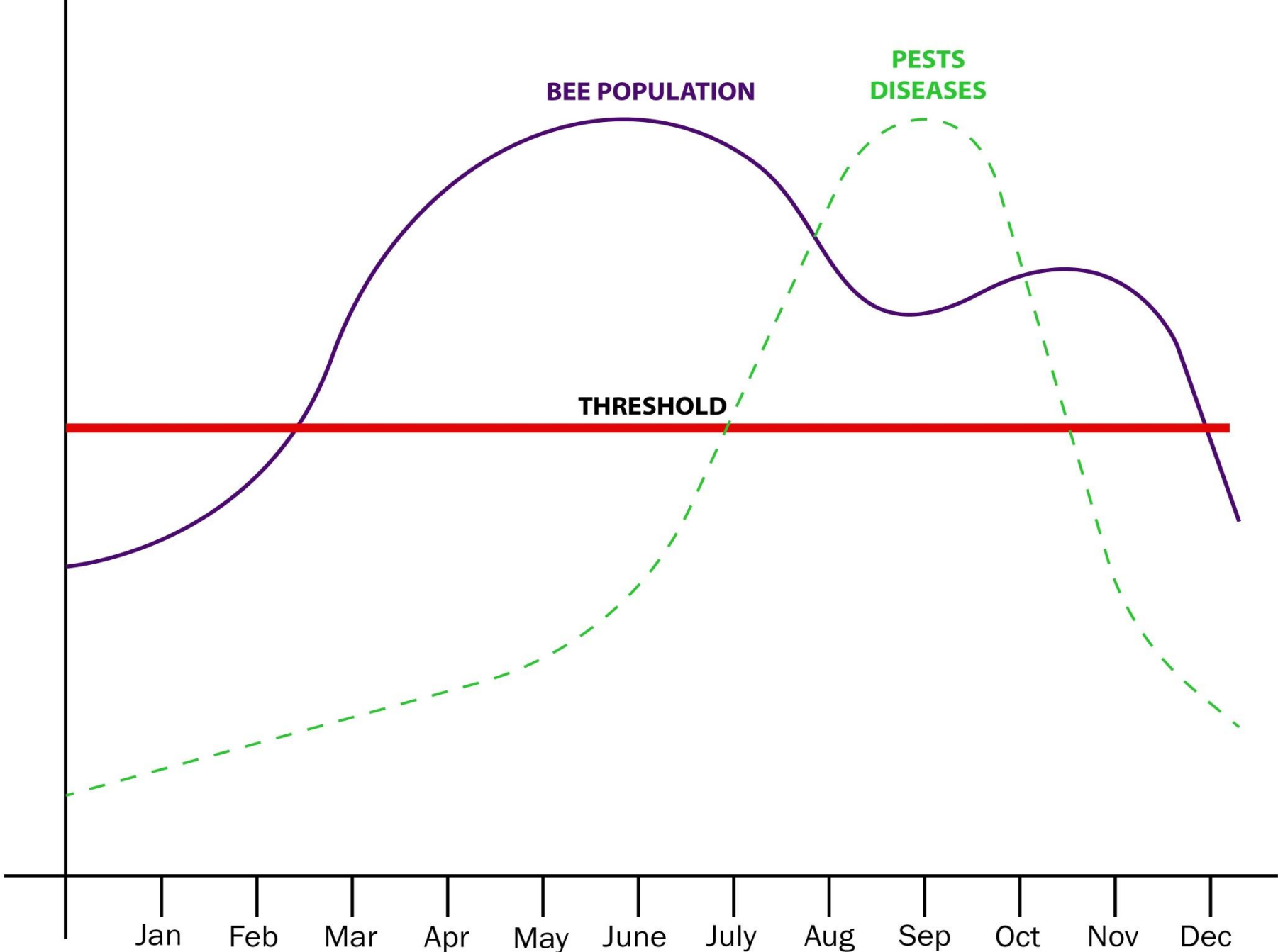




Now throw in changing B- biology...genetics...

- **Varroa or genetics...**
- **Pathogens...bacterial & viruses...Bees with “holes”...**

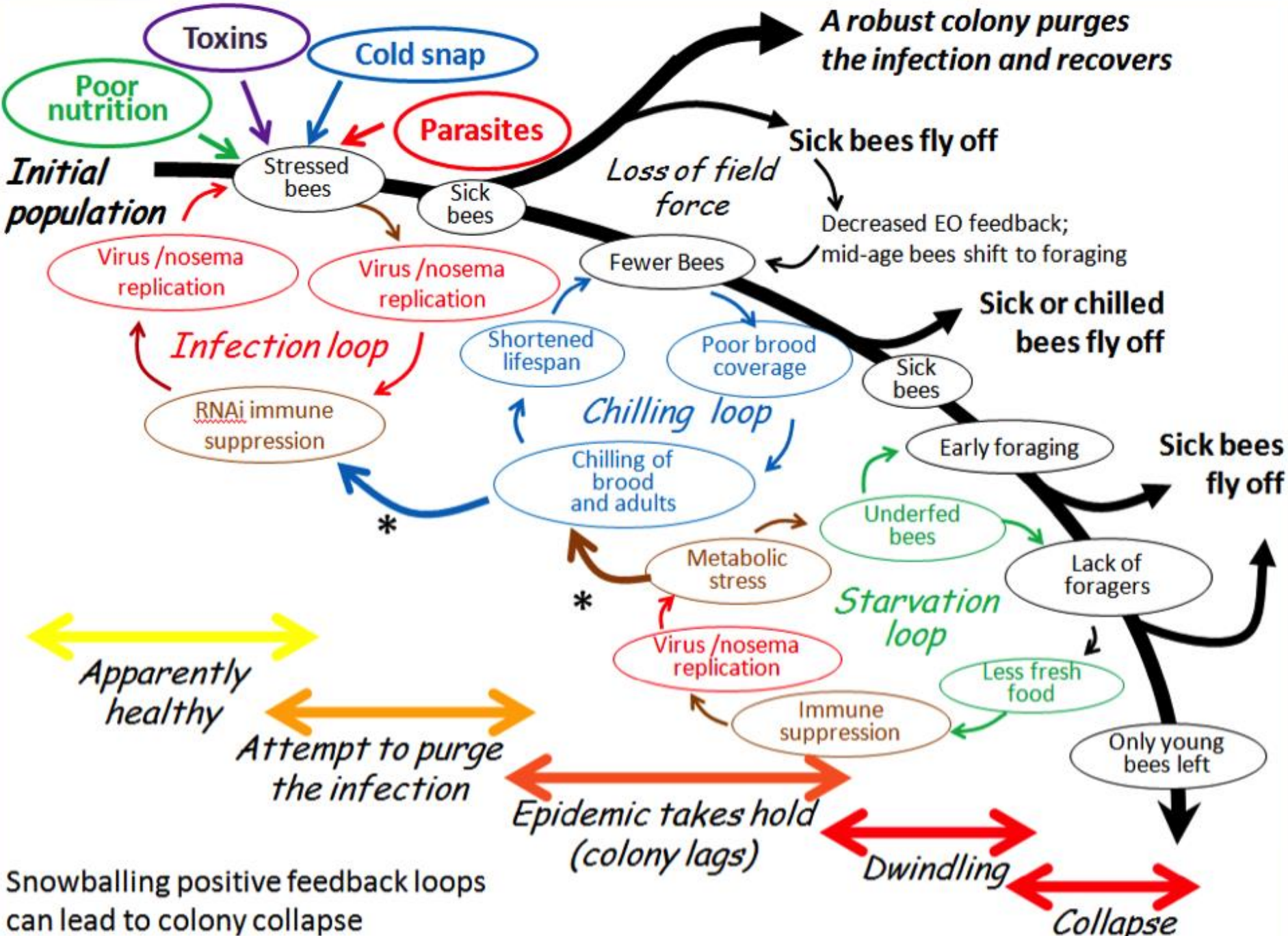




What are we Monitoring? (some % examples)

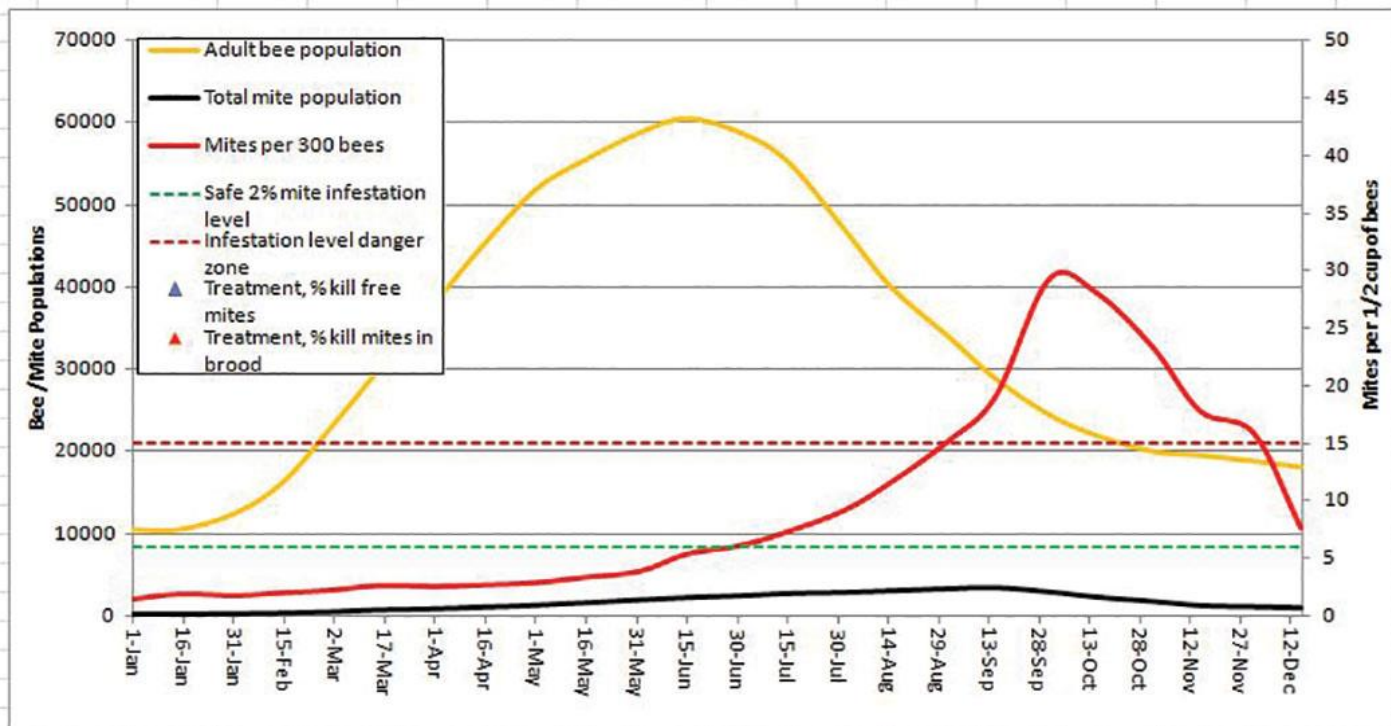
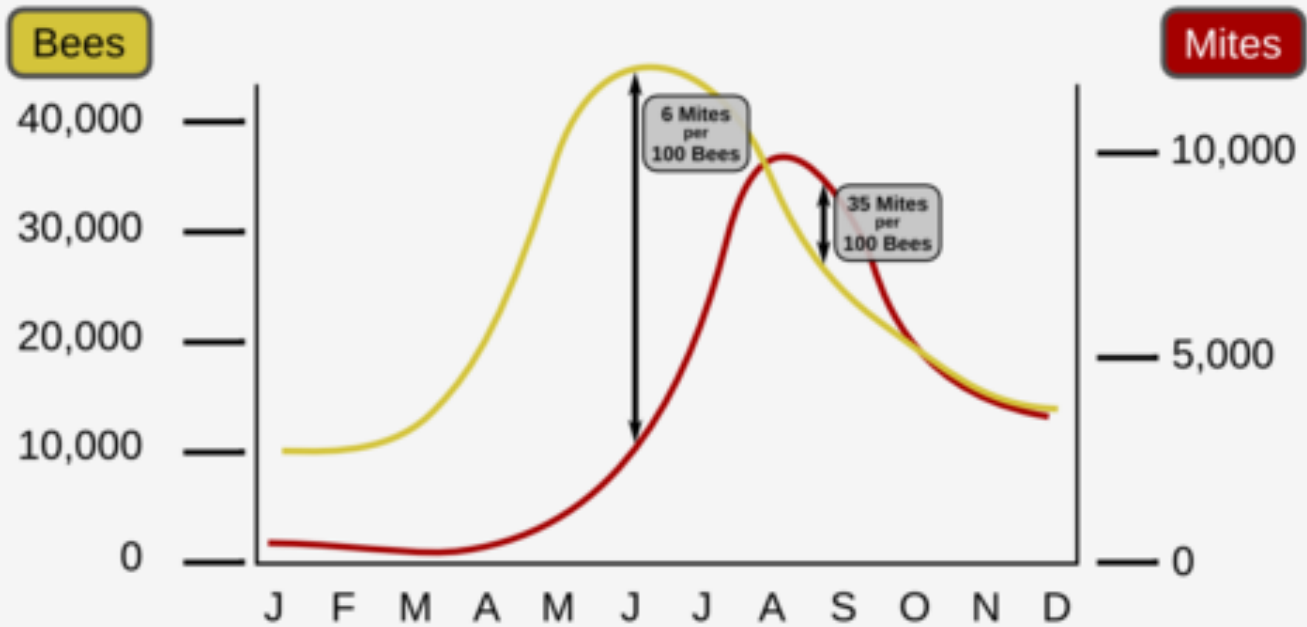
- **Pests... Varroa, SHB, wax moths, others...**
- **Diseases... AFB, EFB, nosema, sac brood, chalk brood, others...**
- **Resources... queen viability, "space", honey, pollen, water, others...**





Snowballing positive feedback loops can lead to colony collapse

© Randy Oliver 2010



Monitoring for Varroa... “Stethoscope” (...how are you measuring mite loads?)



Refining the Sugar Shake

- Formerly
 - 1/2 cup of bees ~300
 - 3T powdered sugar
 - “shake” bees w/ sugar...shake sugar/mites onto coffee filter
 - 1 cup water, pour over sugar/mite mixture to dissolve sugar
 - Count mites...divide 300 bees by Count...get % of varroa.
- 2.0...
 - 1/2 cup of bees...
 - 3 T powdered sugar
 - “shake” bees w/sugar *consistently*... pour onto coffee filter.
 - *Dispatch first sample of 300ish bees with alcohol... COUNT HOW MANY Bees and Mites...gives you a future slop factor.*
 - 1 cup *warm/hot* water, pour over sugar/mite mixture using friendly funnel container.
 - Count mites... divide actual bee count by mite count + slop factor...*gives you a more accurate* % of varroa.



SHB...



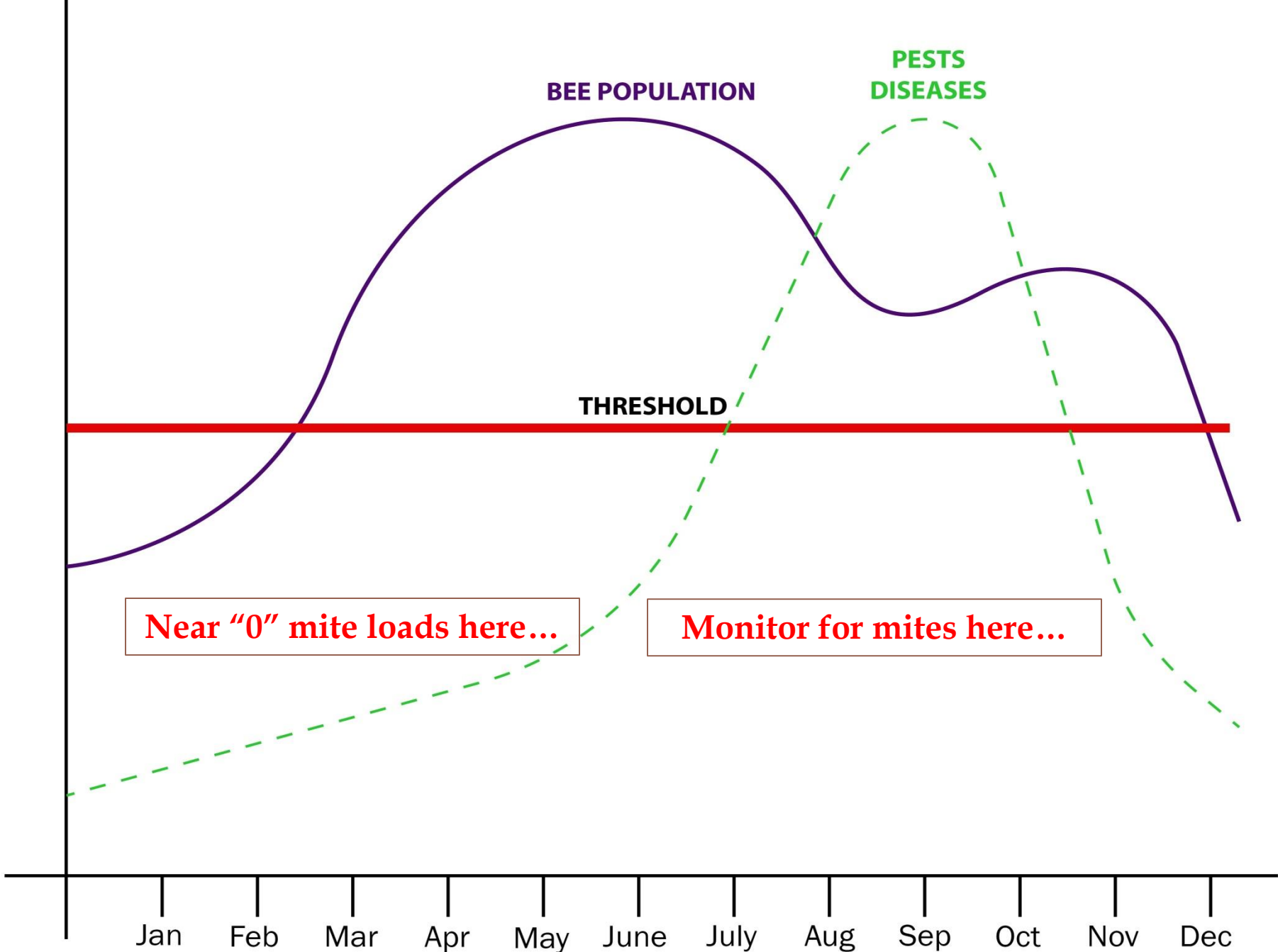
When to "Monitor"

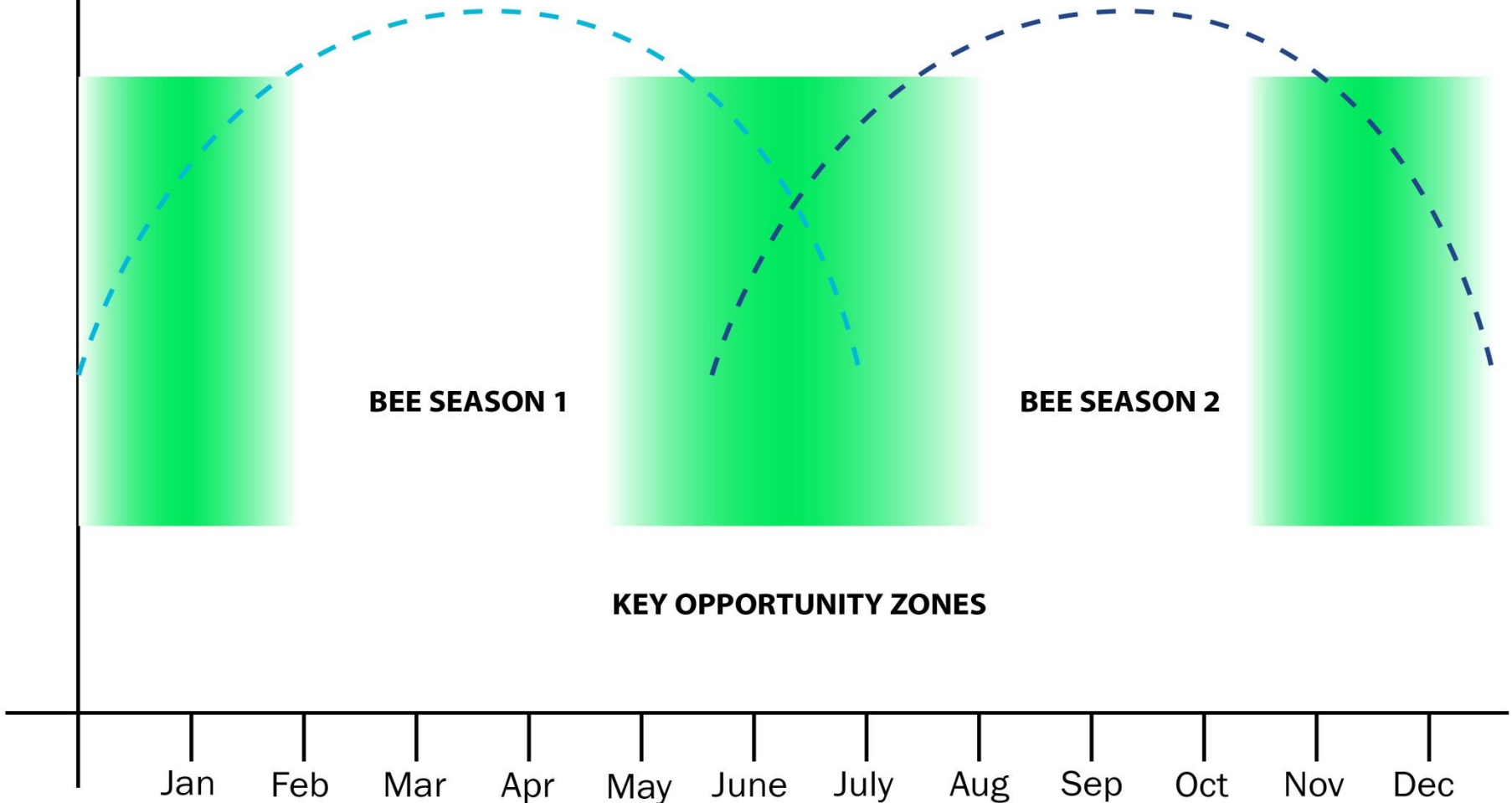


- Intra Seasonally...when things "typically" happen
- Inter Seasonally...year over year variations
- Intra Hive...
- Inter Hives...
- As needed...
- Not linear...doppler-like...
- **Monitoring is self correcting...**
feedback loop...

FEEDING TIMES

8:00 AM
11:00 AM
2:00 PM
5:00 PM
8:00 PM
11:00 PM



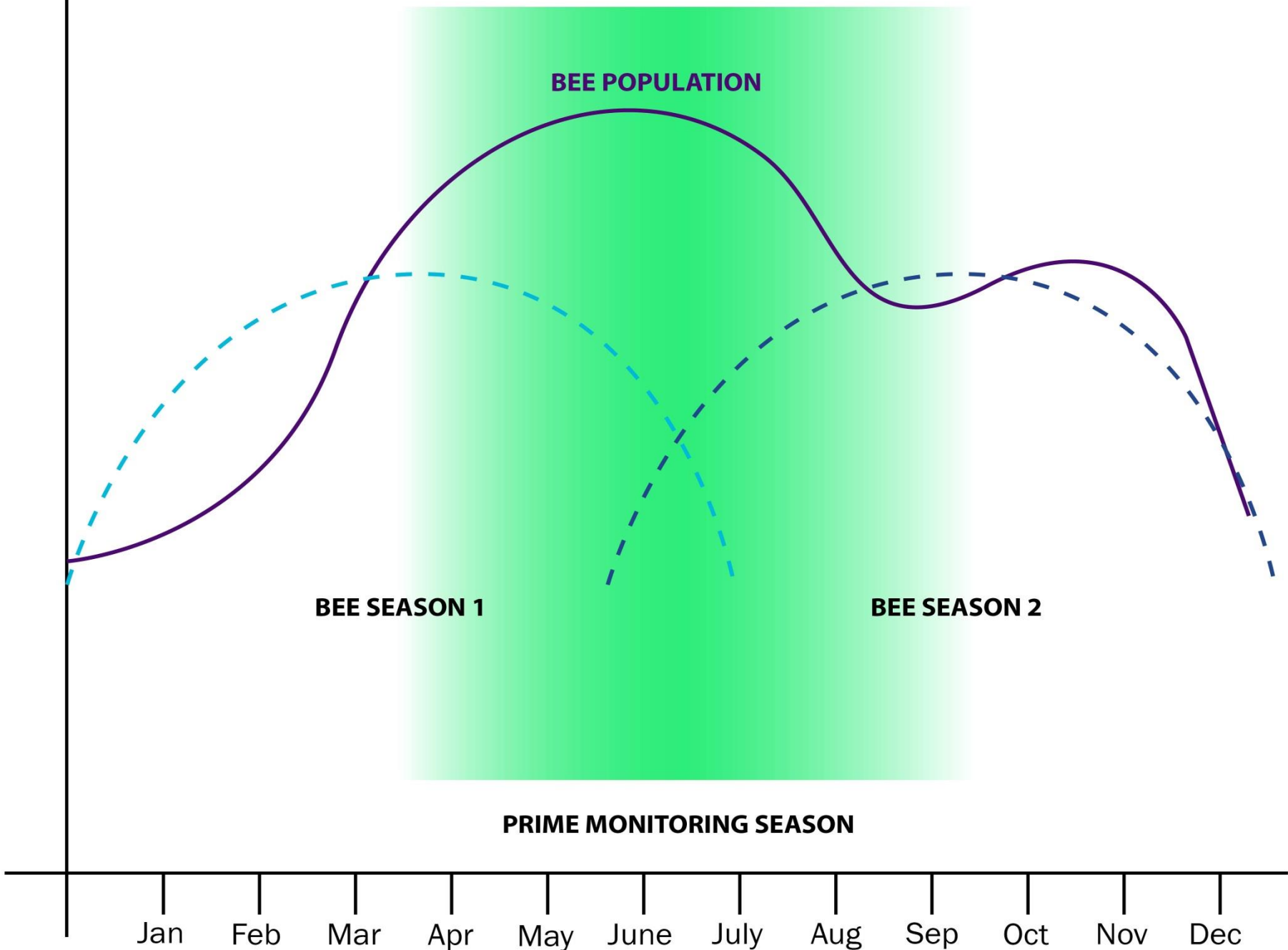


BEE SEASON 1

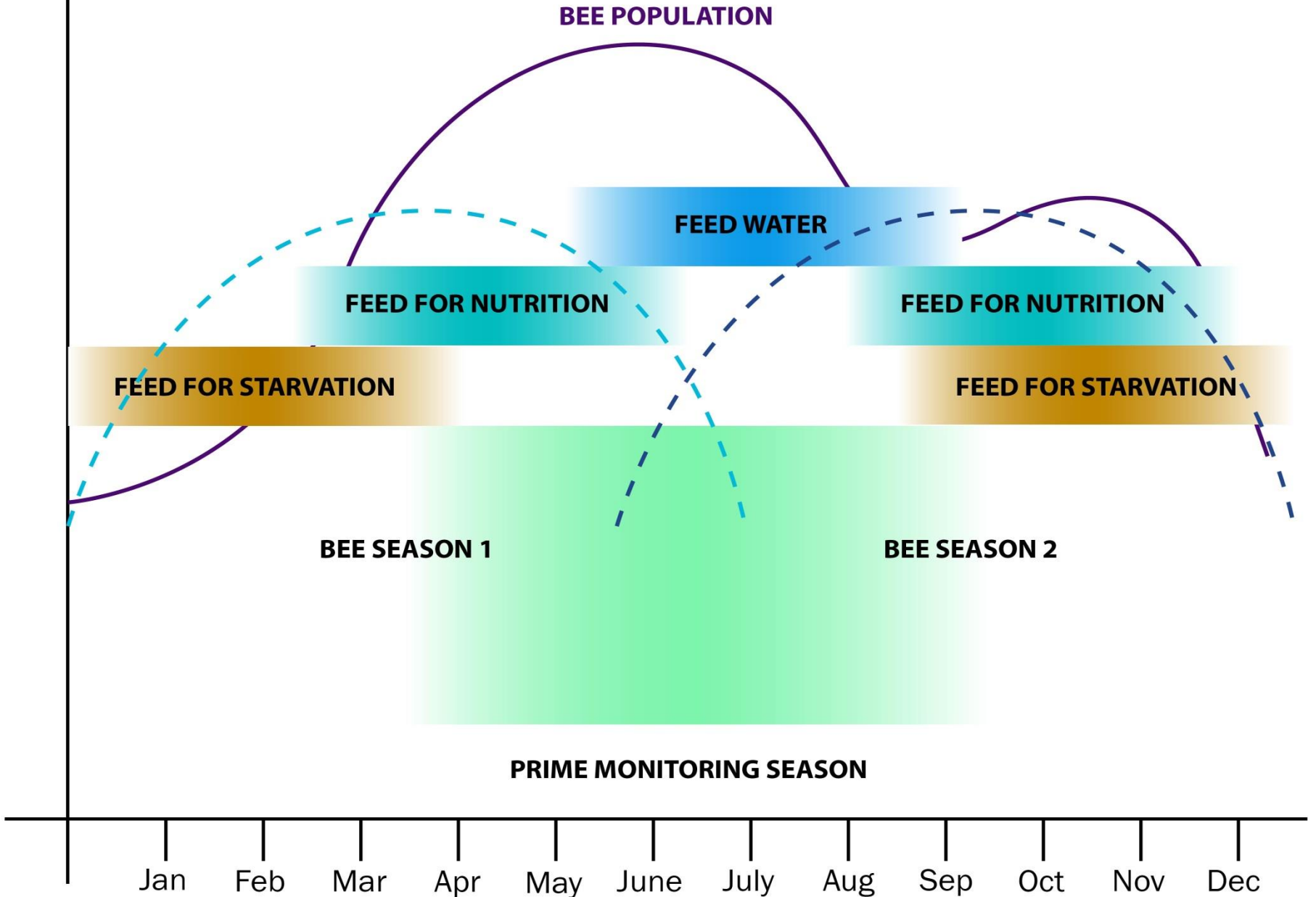
BEE SEASON 2

KEY OPPORTUNITY ZONES

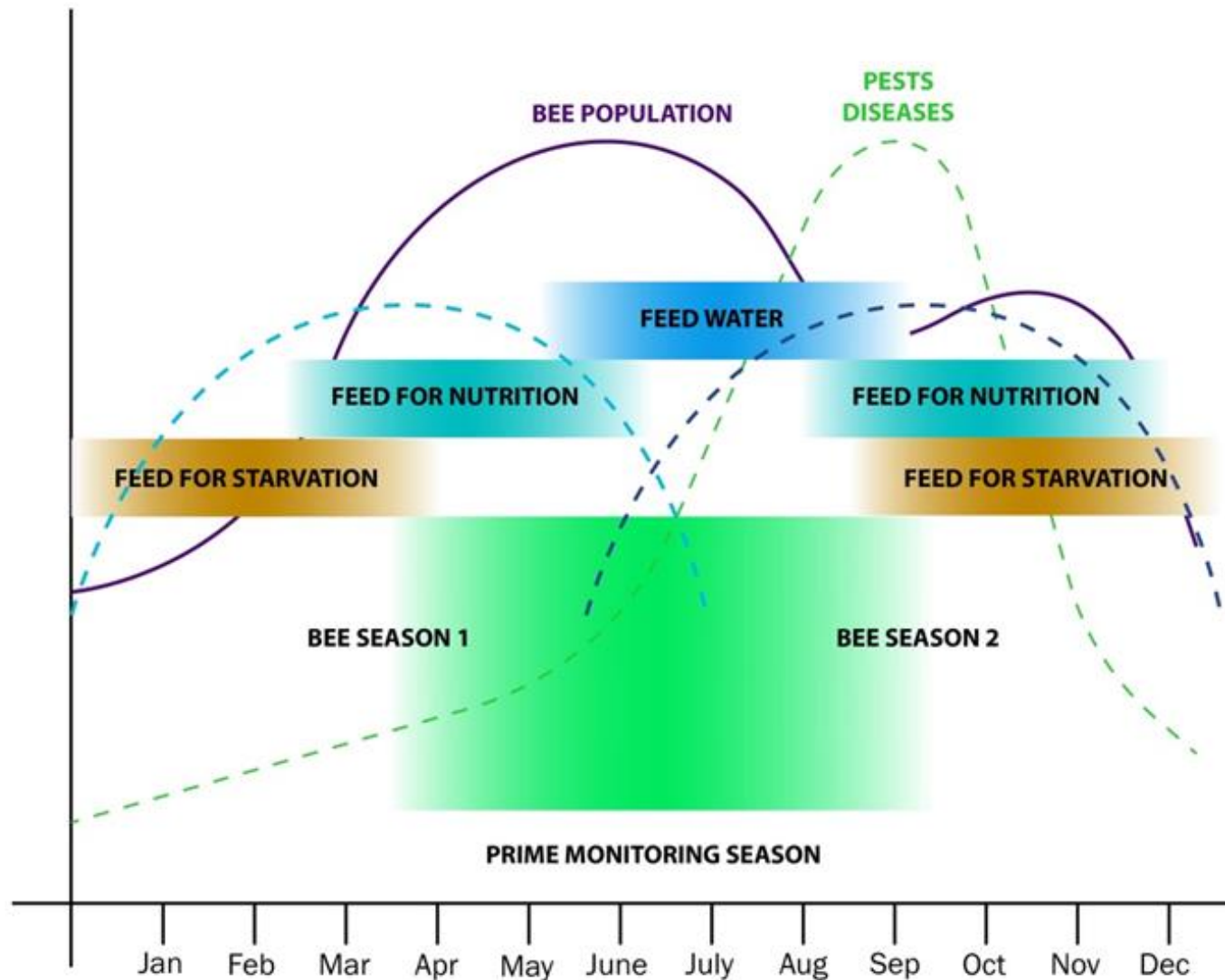
Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec



Nutritional Monitoring



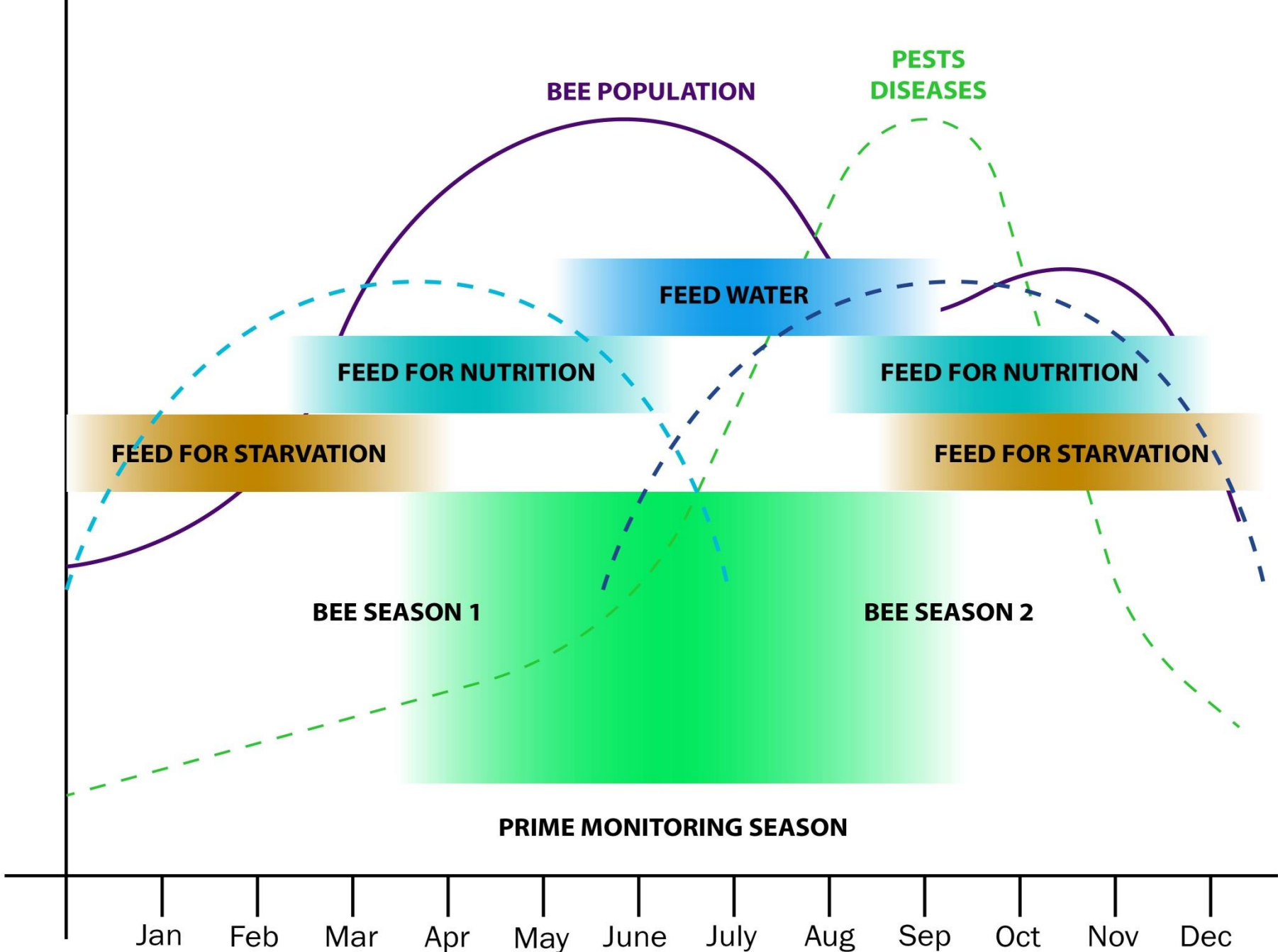
Once you understand “B” Curves you can *PUSH* your Bees!

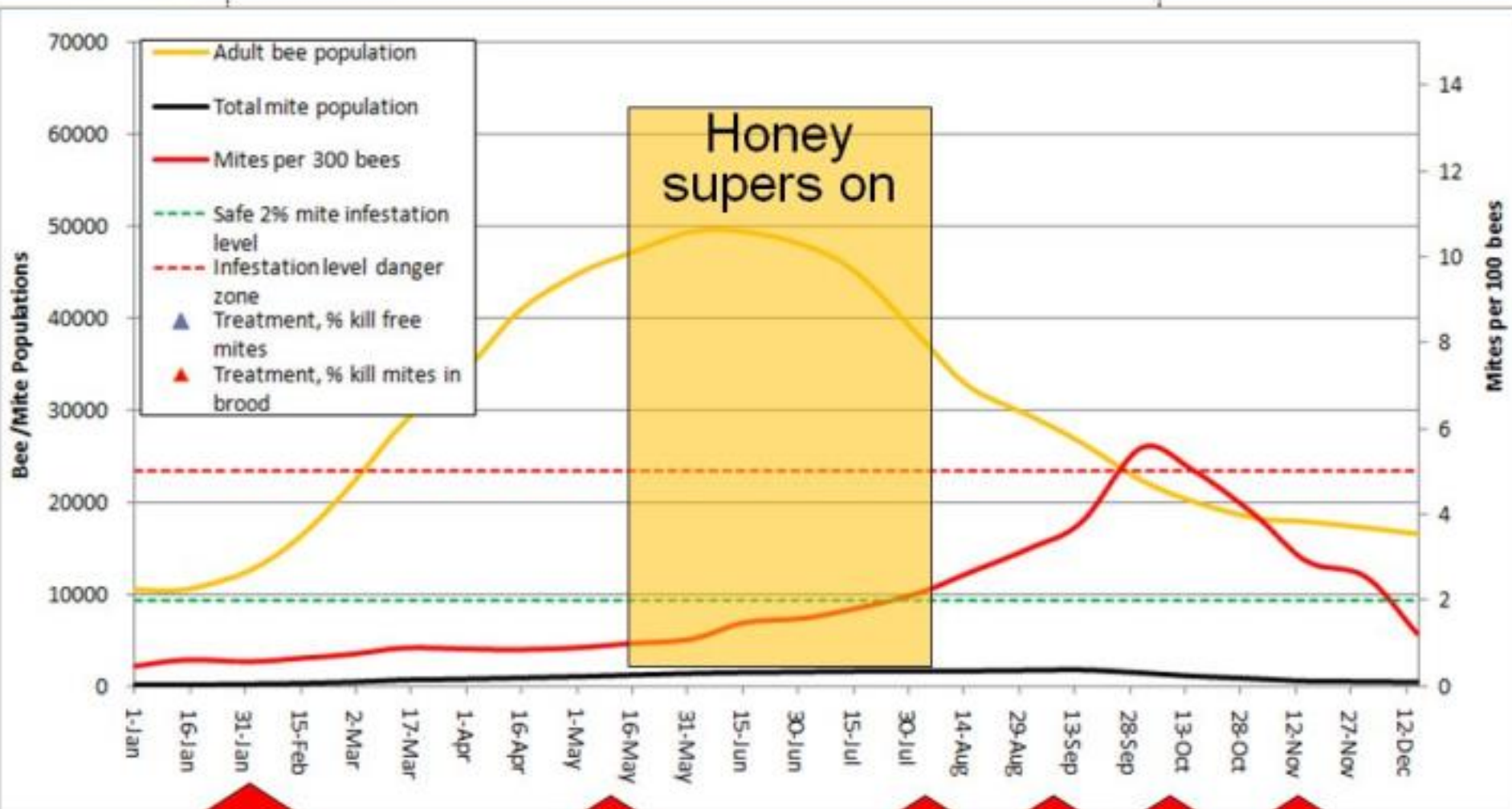


The nutritional monitoring facts!

- 1 colony ~ 200 pounds of honey...100 for them and 100 for you.
- 1 pound of honey takes the nectar from 2,000,000 flowers.
- So, 200 lbs of honey takes 400,000,000 flowers!
- An apiary of 10 colonies: 4,000,000,000 flowers!
- **Monitor for light colonies and nectar and pollen dearths to promote hive health...**







Bees curves...doppler curves...

Times to monitor

The time to Monitor is NOW!

- Does not take a lot of time...fire drills...“Heart of Darkness”



- Takes *timing*...

Near-"0" Hive Loss through Monitoring

Adopt a Monitoring approach for:

- **Queen genetics.** Look for & promote "survivor" stock...
- **Timely queen replacement.** Monitor quality & quantity of egg laying.
- **Nutrition.** Timely feed for starvation, stimulation, and nutrition.
- **Pests monitoring.** Accurate monitoring of varroa (3% rule), SHB, WM
- **Diseases monitoring.** AFB, EFB, nosema, chalk brood, and sac brood
- **Seasonal and Threshold Timing...**B-curves...ounces of prevention...
- **Effectiveness.** Are your manipulations & treatments working?
- **Treatments.** Just a handful...know them...timely use them...
- **Adopt a monitoring approach...**
- **Resource management...**boxes, queens, treatments, etc. on shelf.
- **Record keeping...**regular notes...seasonal calendar...

Breathe!

Just a handful of pests and diseases

Just a handful of treatment options

Timely monitoring for the major culprits (Ps & Ds)

Treatment and Verify

Beekeeping takes little time; but it does take timing

The Human side of Monitoring

- * **Ignorance...what am I looking at?**
- * **Overwhelmed “Cloud” of information, misinformation, disinformation**
- * **Cognitive Dissonance...**
- * **Absentee beekeeper...**
- * **Unorganized...**
- * **Unprepared/unequipped for treating...**
- * **Reactive...often too little; too late...**



You are the key to **Monitoring**

**“Big difference between knowing the paths
(B-curves) and following the curves...”**

! Stay ahead of the B-Curves !

Be proactive, consistent...paranoid?

**Go Negative...ALL is NOT right until proven
otherwise.**



**I have developed into an optimistic
“Bee Contrarian”...you?**



Monitoring is here to stay...the future...more to come!

Queen monitoring...

Drone monitoring...

Enhanced Nutrition...

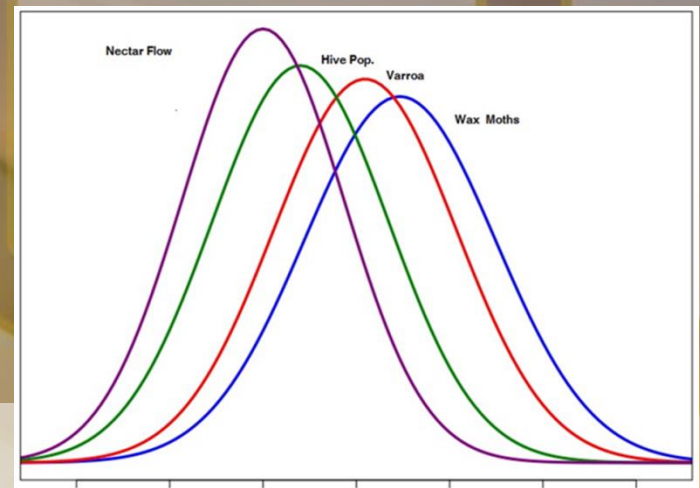
Wireless...remote...

New treatments

Self medicating...

More!





Know External/Internal hive events

Know your seasonal B-Curves

Monitor for Ps & Ds

Stay ahead of the Ps & Ds Curves

Treat if/when necessary & verify

Feeding Opportunities

Appreciate your proactive roll in monitoring

Again, Breathe!



Just a handful of pests and diseases

Just a handful of treatment options

Timely *monitoring* for the major culprits (Ps & Ds)

Treatment(s) if/when needed *and Verify*

Beekeeping still only takes a little time; but it does take *timing*

We have evolving tools...

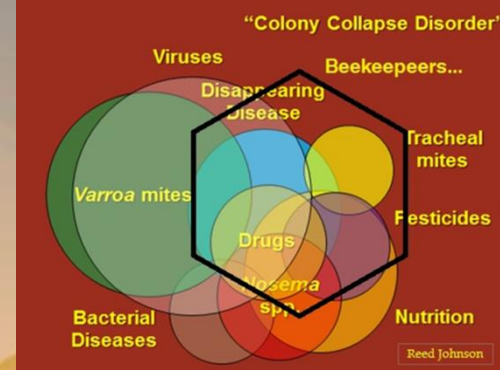
We know the path...monitoring...

Monitoring Recipe for Seasonal Beekeeping

- Monitor throughout season...takes *timing*; not time...
- Order package(s)...3lb ...nucs...\$\$\$...
- Hive location ... install bees...on foundation...drawn comb...
- **Build your bees:** feeding for starvation, stimulation and nutrition...more **SUMMER**, fall feeding ... nutritional patties...spring, summer, and fall...
- Monitor & Treat (?)...before honey flow...SHB...Queen viability...
- Watch the “magic” unfold...
- Supering up for swarm control and nectar flow(s)...
- Extract honey...supering down...
- Monitor & treat diseases (if necessary) primarily AFB, EFB...**NOT** prophylactic treating...terramycin...?
- Monitor pests...Treat(?)...primarily Varroa mites, SHB ...prophylactic...**NOT** arcacide(s)
- Use Integrated Pest Management (IPM) approach...Monitor for effectiveness...
- Build bees for fall health into winter...*feeding*...Queen viability...
- Tuck bees away...wrap?
- Done/Repeat...bragging rights #colonies alive...



In Closing



Monitoring is Beekeeping 2.0
Monitoring is improving...

Implementing a MONITORING PROGRAM can reduce current high mortality levels by some 60 - 80%. No other "silver bullet" cure will have such a profound affect.

The future belongs to the Monitors...

Monitoring...one last definition

See things...train your brain

Catch things earlyenough

Treat, if needed

Treat early enough

Verify treatments are working

P.S. Monitoring...does not stop at the beehive...





*...for there is a fresh wind blowing;
we may yet again do things
like mountains,
and music and beekeeping
because
they are hard, and clean,
and clear
in the morning!*

- Philip Gillett

Questions?

***That the powerful play goes on, and
you will contribute a verse.***

-Walt Whitman

Contact Information:

Alexander Zomchek

zomchea@miamioh.edu

513.280.3476