



Office of Indiana
State Chemist



Dicamba 2019 Off-Target Movement Response & Plans for 2020

Indiana Pesticide Review Board Meeting

November 6, 2019

-Dave Scott-

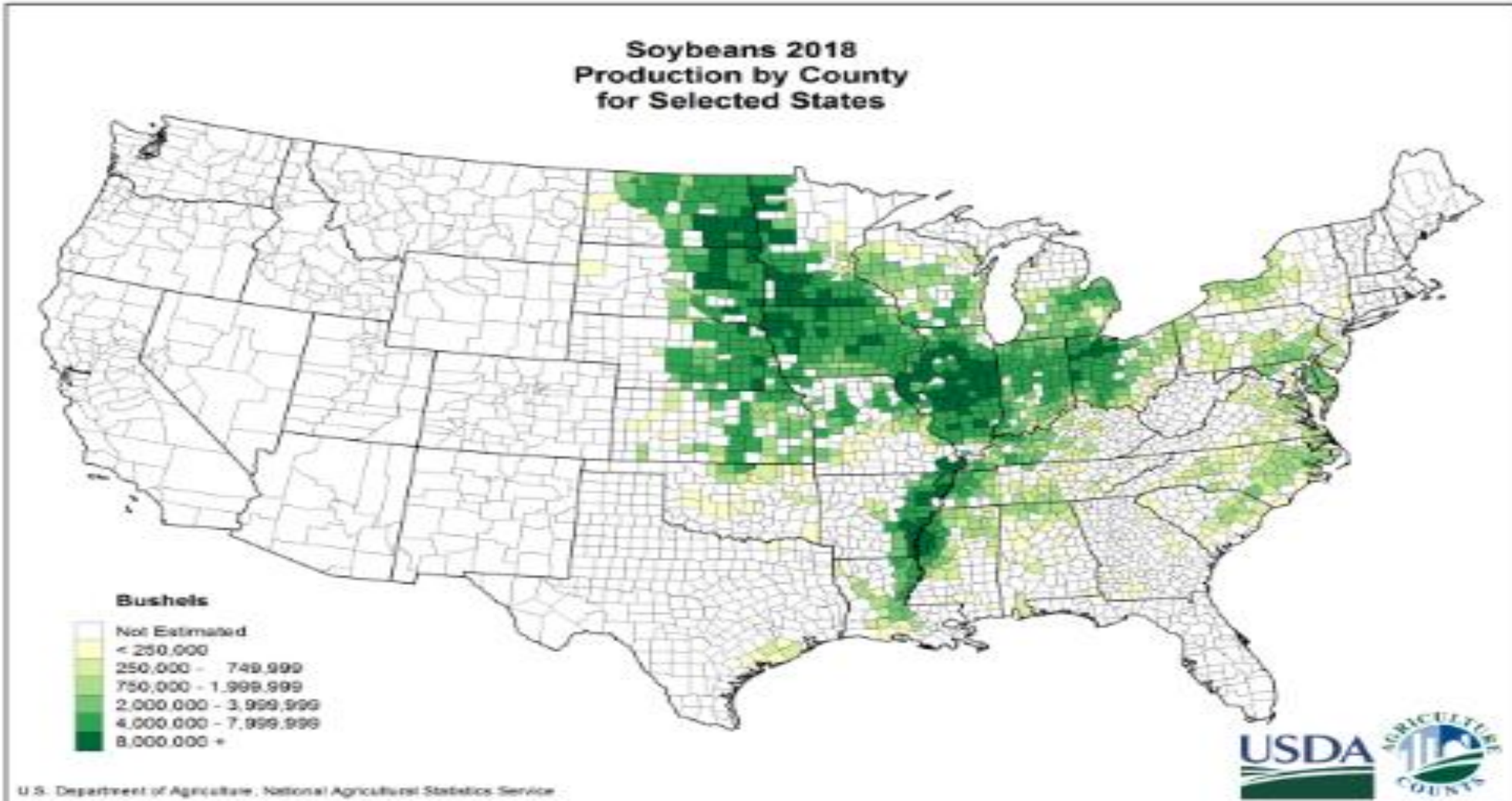
Dicamba Discussion Overview

- Resource expenditures & response strategy
- Investigation statistics & trends
- OISC analysis & plans for 2020

Discussion Objectives

- Identify facts, data & information used in the analysis
- Allow public review & input on data & analysis
- Receive additional relevant data for OISC consideration
- Identify a path forward for 2020
- Not seeking an IPRB vote or determination

Dicamba use on soybeans not a problem for entire nation



But after three years problems still abound & in many states

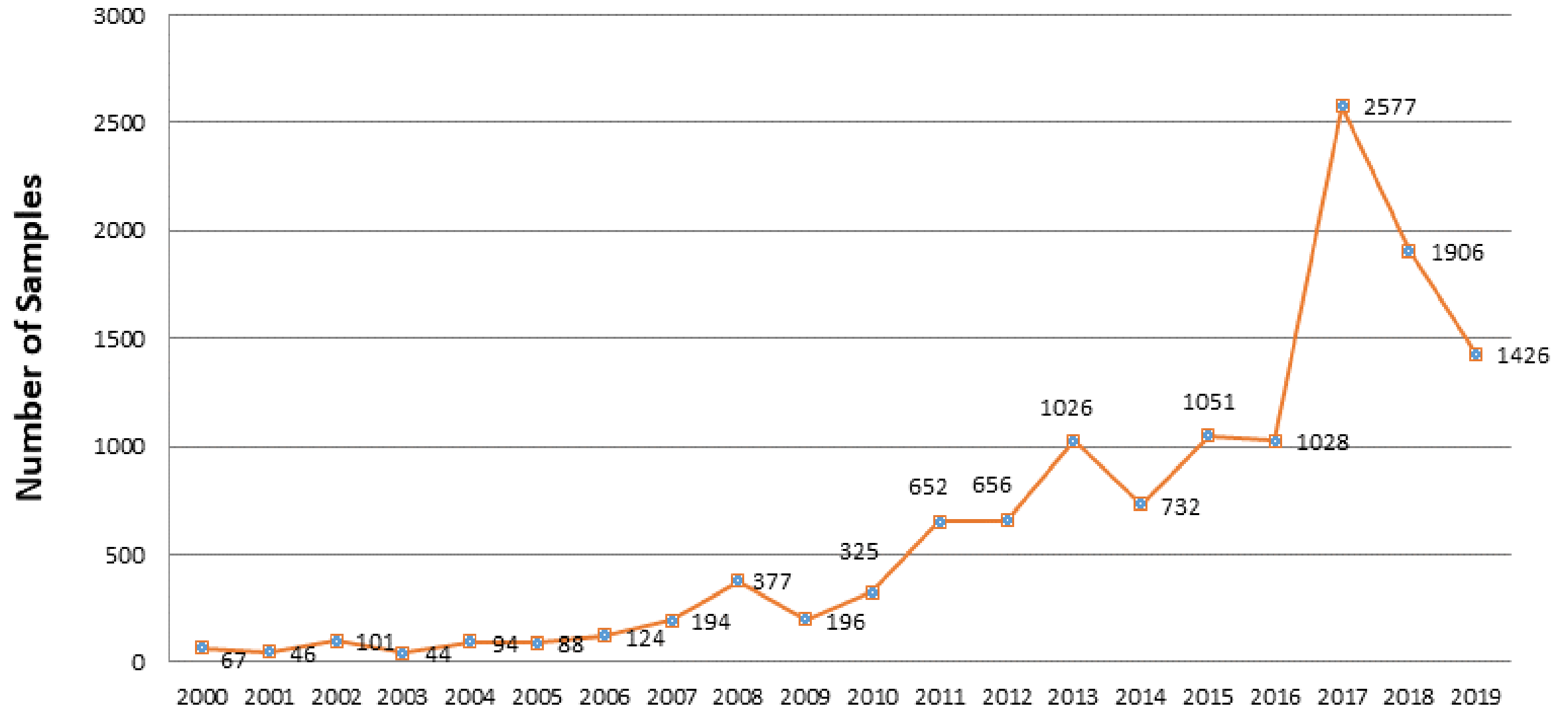


OISC Dicamba Response Expenditures & Strategy

OISC Off-Target Movement (Drift) Investigations -Ground Applications-

Year	Ag Ground	Dicamba	% Dicamba
2017	233	134	58%
2018	231	146	63%
2019	275	178	65%
2020	?	?	?

OISC Pesticide Residue Lab Total Sample Trend



OISC Dicamba Response Expenditures

Following are calculations used to estimate the cost to OISC (only) of providing regulatory response & support to the use of dicamba-containing herbicides labeled for post-emergent use on soybeans.

- No **societal** or potential private **property damage** costs included
- No costs of diverting from **other compliance obligations** included

OISC Dicamba Response Expenditures

Year	OISC funds	EPA funds	Total compliance	Dicamba effort	Dicamba cost to OISC
2017	\$ 2,020,614	\$ 426,000	\$ 2,446,614	50%	\$ 1,223,307
2018	\$ 3,248,599	\$467,479	\$ 3,716,078	60%	\$ 2,229,647
2019	\$ 2,547,807	\$435,000	\$2,982,807	30%	\$ 894,842
2020	\$	\$	\$	%	\$

2019 Dicamba Drift Response Strategy Objectives

1. conserve dicamba response resources
 2. improve turn around time for investigation processing
 3. if misuse, change non-compliant behavior of dicamba users
- Offer investigation options:
 - compliance/enforcement investigations; OR
 - documentary only investigations
 - Analyze samples only if unique tank mix partners are in play
 - Revise enforcement response policy for drift violations

OISC compliance/enforcement investigations

- Historically the focus of all OISC complaint investigations
- Collect defensible forensic evidence
- Attempt to identify source of off-target exposure
 - Increasingly difficult for dicamba with increased use
 - One non-target site, multiple immediate area dicamba users
- Attempt to identify cause of off-target movement
 - Drift, inversion, volatility, equipment contamination, etc...
- Take enforcement action if violation can be documented
 - Drift violation (label or state drift rule)
 - Drift management violation (label)

OISC documentation only investigations

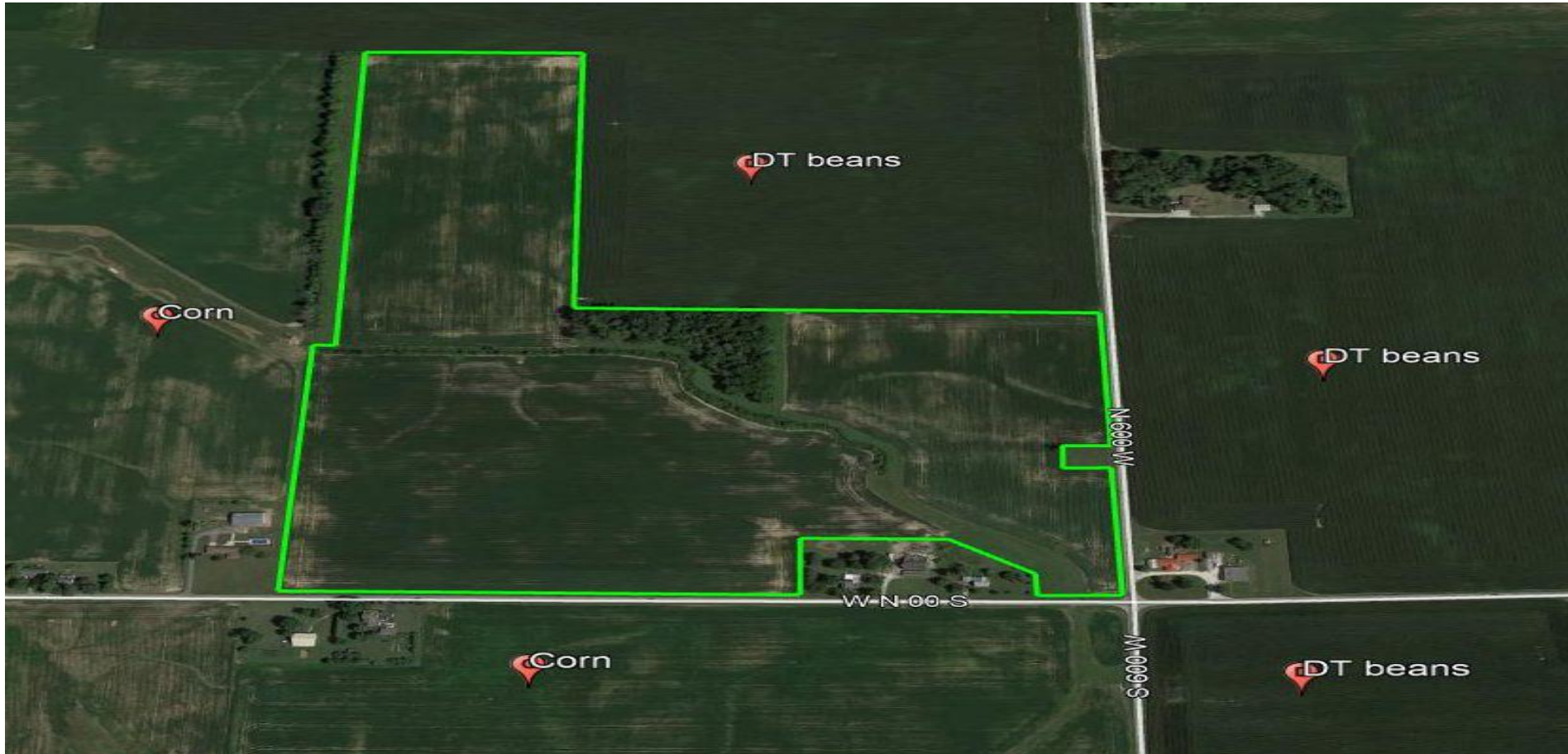
- Previously never conducted by OISC
- No applicator enforcement/compliance objectives, just occurrence
- Complainant's option at start of investigation or once on-site
 - Requires complainant of standing for personal property, but not public sites
- Limited forensic evidence collection, but instead:
 - Site visit
 - Symptomology observations & photos
 - Plant samples for PPPDL diagnosis to rule out other causes & confirm dicamba
 - Generic report documenting findings

2019 Compliance vs. Documentary Dicamba Investigations

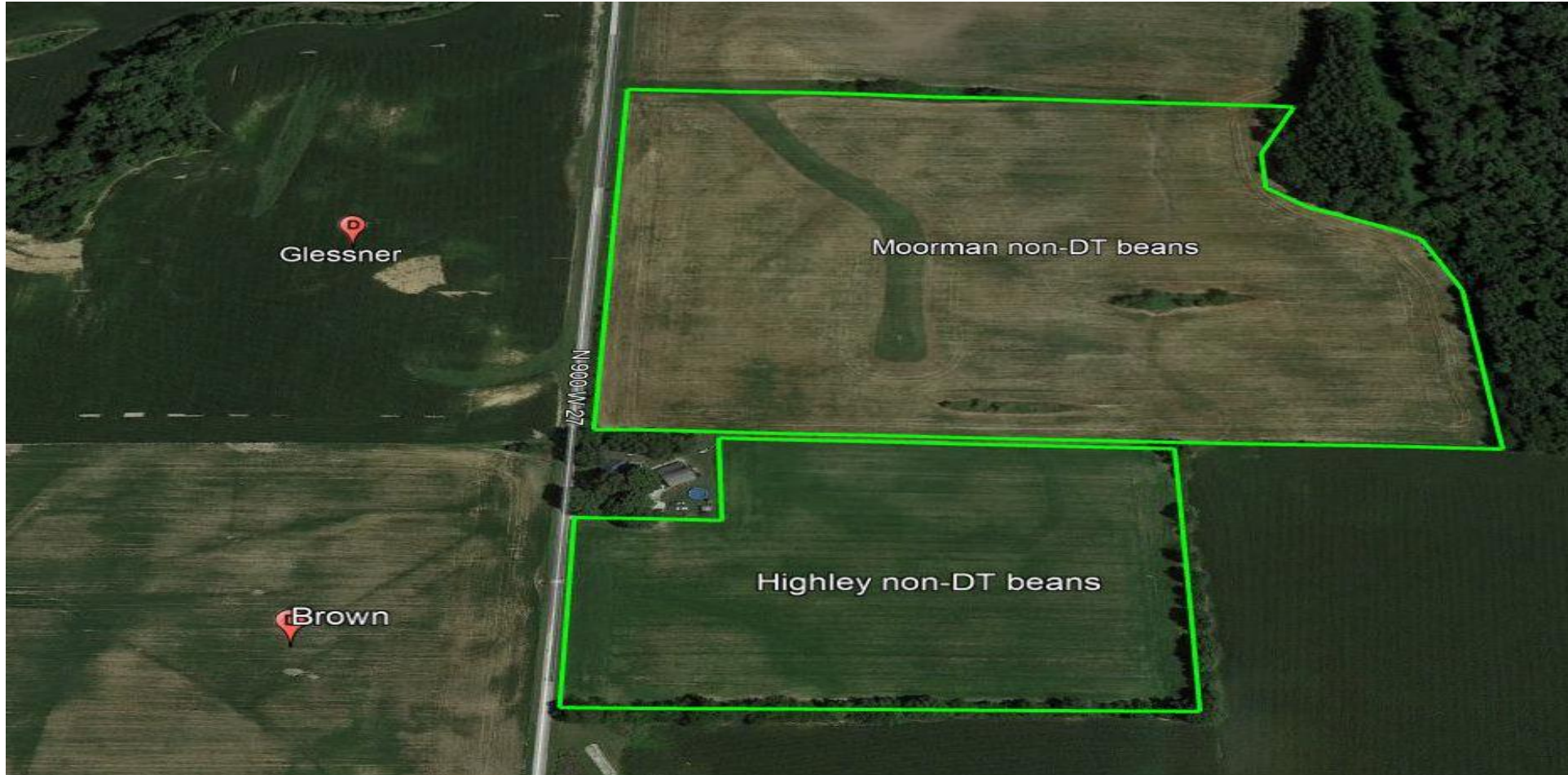
- Alleged dicamba investigations...178
- Compliance/enforcement investigations... 72 (40%)
- Documentary only investigations... 106 (60%)

“I don’t want to get my neighbor in trouble, but someone needs to know about this.”

2019... more dicamba acres, more potential sources, more investigations



2019... more dicamba acres, more potential sources, more investigations to conduct



2019-20 Enforcement Response Policy

- Seeking a meaningful way to change applicator behavior regarding drift & resulting violations.
- Guidance for responding to documented off-target movement violations that are based on non-compliance with pesticide label language and the state pesticide drift rule (357 IAC 1-12).

Current Maximum Penalty Schedule

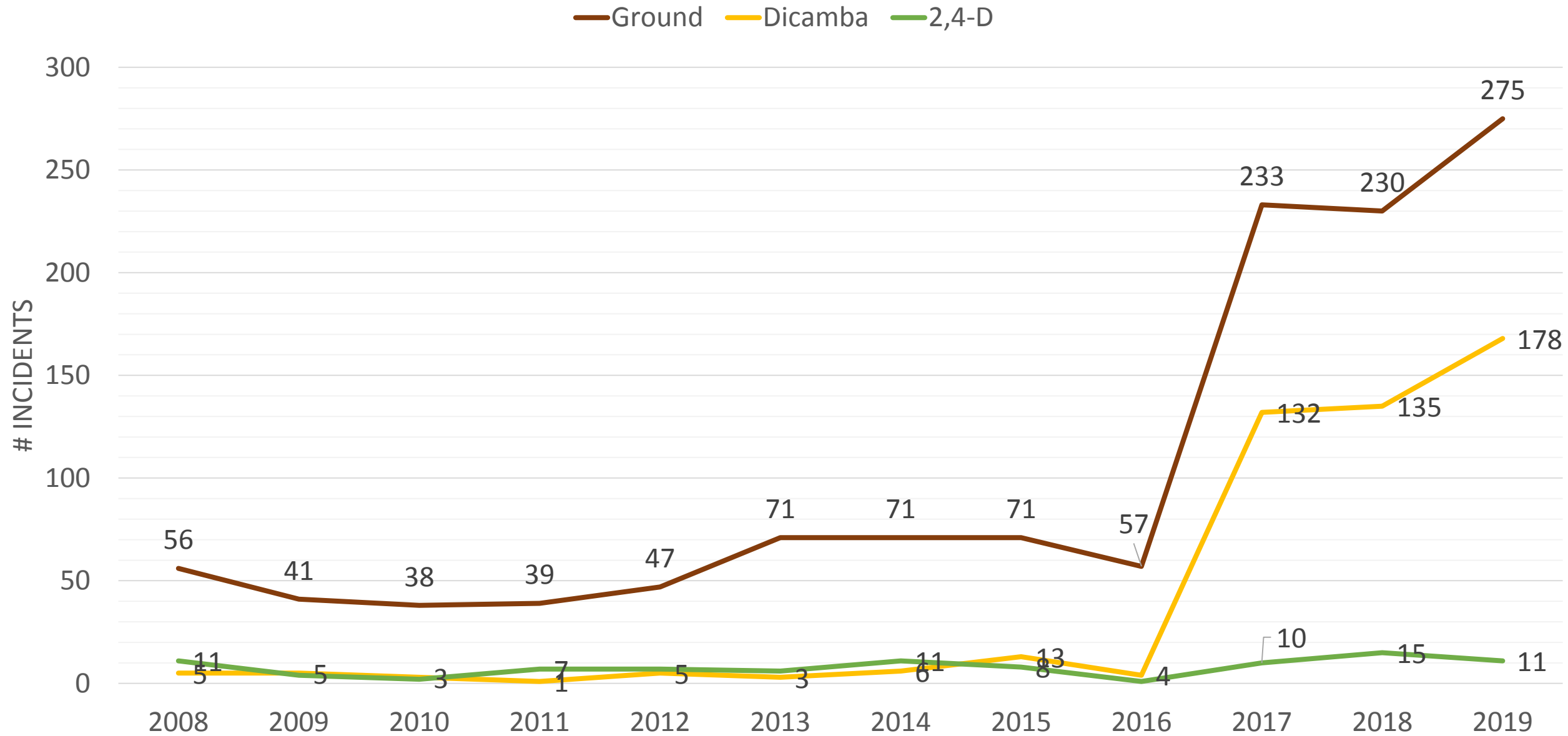
- Five year period
- Private applicators:
 - \$100 any violation
- All other applicators:
 - \$250 first violation
 - \$500 second violation
 - \$1000 third or subsequent
- No fiscal incentive to change behavior

2019-20 Enforcement Response Policy

Violation	1 st	2 nd	3 rd	Subsequent
General Use Pesticide	Warning	Civil Penalty	Civil Penalty	Civil Penalty + 6 Month License Suspension
Restricted Use Pesticide	Civil Penalty	Civil Penalty	Civil Penalty + 6 Month <u>License Suspension</u>	Civil Penalty + 5 Year <u>Certification Revocation</u>
Documented Human Exposure	Civil Penalty	Civil Penalty + 6 Month License Suspension	Civil Penalty + 1 Year Certification Revocation	Civil Penalty + 5 Year Certification Revocation

Statistics, Trends & Data Analysis

OISC Historic Ground Ag Drift Complaints



Site of Off-Target Movement

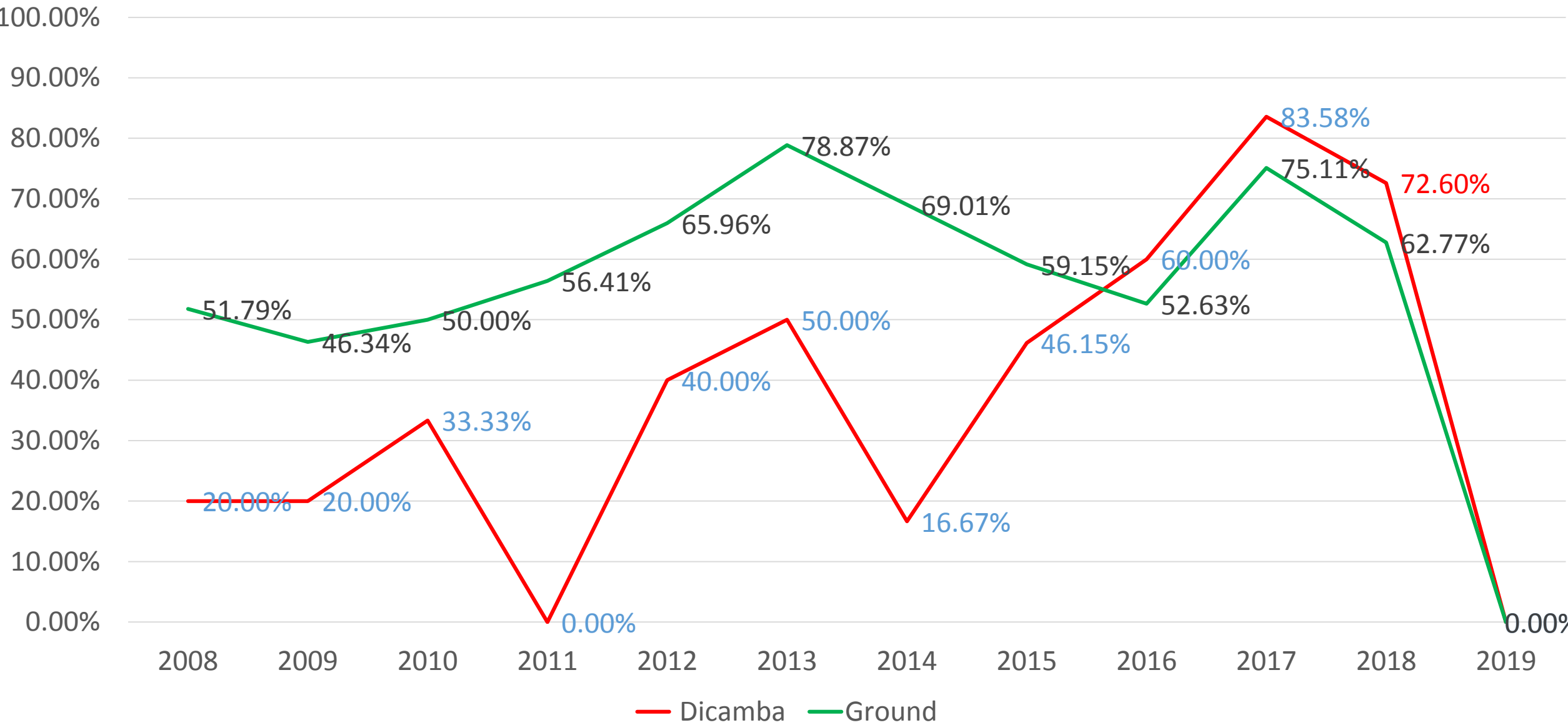
Year	2017	2018	2019*
non-DT soybeans	92%	94%	95%
melons	1%	2%	0%
tomatoes	1%	0%	1%
grapes	0%	0%	1%
garden	2%	1%	0%
ornamentals or trees	3%	2%	2%
other	2%	1%	1%

*data not complete or confirmed

Documentable Cause of Off-Target Movement

Year	2017	2018	2019
Confirmed dicamba exposure	100%	100%	100%
Particle drift	23%	16%	?
Application during inversion	?	?	?
Volatilization	?	?	?
Failure to clean spray equipment	< 1%	< 1%	?
Undeterminable	77%	84%	?

Drift Violation Rate: Ag Ground vs. Dicamba



IPRB Dicamba Work Group Recommendations for 2019 Spray Season

- EPA didn't make federal registration decision until 10-31-18
- Work group recommended to OISC:
 - No application post-emergent to soybeans after **June 20, 2019**
 - based on 2017 & 2018 data could reduce off-target incidents by ~ 50%
 - The terms “neighboring” and “adjacent” used on the labels shall mean:
 - any non-dicamba tolerant soybeans within ¼ mile; and
 - any other sensitive crop or residential plant within ½ mile of the application site.

Industry Feedback on IPRB Recommendations

- Indiana Farm Bureau
- Agribusiness Council of Indiana
- Indiana Soybean Alliance
- Individual growers, custom applicators & seed dealers

OISC & Industry Justifications for No State Restrictions in 2019

1. Give 2019 label changes a chance to work before taking state action.
2. 2nd year of mandatory applicator training should reduce incidents.
3. Products can be used without incident, if labels are strictly followed.
4. If no similar restrictions in other states, IN soybean growers at a competitive disadvantage.
5. No other current viable control options for resistant weeds.
6. Most incidents, soybeans with undocumented yield impacts.

What have we learned since 2018?

1. Give 2019 label changes a chance to work before taking state action.
 2. 2nd year of mandatory applicator training should reduce incidents.
- Reported incidents in most “federal label only “ states increased or dramatically increased in 2019.
 - No significant improvement in OISC-reported incidents.
 - The needle did not move in a positive direction.

2019 Alleged Dicamba Off-Target Movement Complaints as of October 15, 2019 for Top Ten Soybean Producing States*

State	2017 Soybean Production (bu)	# Dicamba Complaints*	2019 Dicamba Cut-off Date	2020 Dicamba Cut-off Date ?
IL	611,900,000	724	June 30/July 15	June 20
IA	561,610,000	127	none	none
MN	380,230,000	22	June 20	?
NE	327,700,000	131	none	none
ND	326,025,000	2	July 10	?
IN	320,760,000	178	none	
MO	289,590,000	94	none	none
OH	251,955,000	25	none	none
SD	241,230,000	14	June 30	June 30
AR	178,500,000	209	May 25	May 25

* Not confirmed

3. Products can be used without incident, if labels are strictly followed.

Label directions are overly restrictive & impractical to implement, based on currently available application technologies & practices, or are inadequate to prevent off-target movement, i.e.

- Ensuring only 3-10 mph wind speeds during entire spray period
- Accurately measuring & ensuring no inversion during entire application
- Preventing movement from volatility not addressed on federal label

2019 OISC Field Staff Observations to Date

- 10 investigators, most in year 3 of dicamba response
- Best guess of cause of off-target deposition based on available evidence & personal experience?
 - **Volatility**...overwhelming first choice... **70%**
 - **Inversion**...can't distinguish from volatility symptoms or prove/disprove, but early or late label prohibitions did not seem to be an issue... **10%**
 - **Physical drift at time of application**...some #1, some #2, but mostly #3... **20%**
 - **Failure to clean equipment** ... **<1%**
- OISC staff survey results matched 2019 Illinois Fertilizer & Chemical Association (IFCA) Dicamba Survey results as top 3, in order.

Recent research shows temperature & glyphosate boost probability of dicamba volatility

- Tom Mueller and Larry Steckel, both professors in the University of Tennessee Department of Plant Sciences, examined dicamba measurements following an application to soil inside a humidome.
- Higher temperatures and mixing glyphosate with dicamba lead to increased atmospheric concentrations of dicamba.
- “Greater dicamba detections at higher temperatures are consistent with previous findings, and also correlate with increased complaints of off-target dicamba injury during late June and July,” Mueller says. “That glyphosate is a contributor to dicamba volatility is not as widely accepted, but our data shows the addition of glyphosate to a dicamba spray solution increased dicamba detection in the atmosphere which would point to increased volatilization.”

What Have We Learned from Four Years of Studying Temperature Inversions?

- University of Missouri
- Published: April 2, 2019
- **Inversions are common**
- **Inversions begin forming prior to sunset**
- **A field's surroundings influence the time inversions form**
- **Cool air is going to find the lowest point of a field**
- **Dicamba can be detected in the air more readily following application during inverted air temperatures.**
- **Mobile apps are still in the validation stages**
- **Smoke bombs are good indicators of inversions forming**

4. If no similar restrictions in other states, IN soybean growers will be at a competitive disadvantage.

- Post-emergent use of dicamba on soybeans is not a national problem, just a problem in major soybean producing states.
- Other top ten soybean producing states had state restriction in 2019 & will or may again in 2020; other than IL complaint #s reduced in those states.
- U.S. EPA has been missing in action since 2018 labeling decision.

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5. No other current viable control options for resistant weeds. *(more options for 2020)*

- Xtendimax soybeans
 - Glyphosate & dicamba tolerant
- Liberty Link soybeans
 - Glyphosate & glufosinate tolerant
- Liberty Link GT27 soybeans
 - Glyphosate, glufosinate & isoxaflutole or ~~mesotrione~~ *(pending EPA registration)* tolerant
- Enlist soybeans
 - Glyphosate & 2,4-D tolerant
- Enlist E3 soybeans
 - Glyphosate, 2,4-D & glufosinate tolerant
- Corn

5. No other current viable control options for resistant weeds. (*Resistance Management*)

- Preserving the technology? *A theme of 2017 CES/OISC mandatory training*

LABEL LANGUAGE

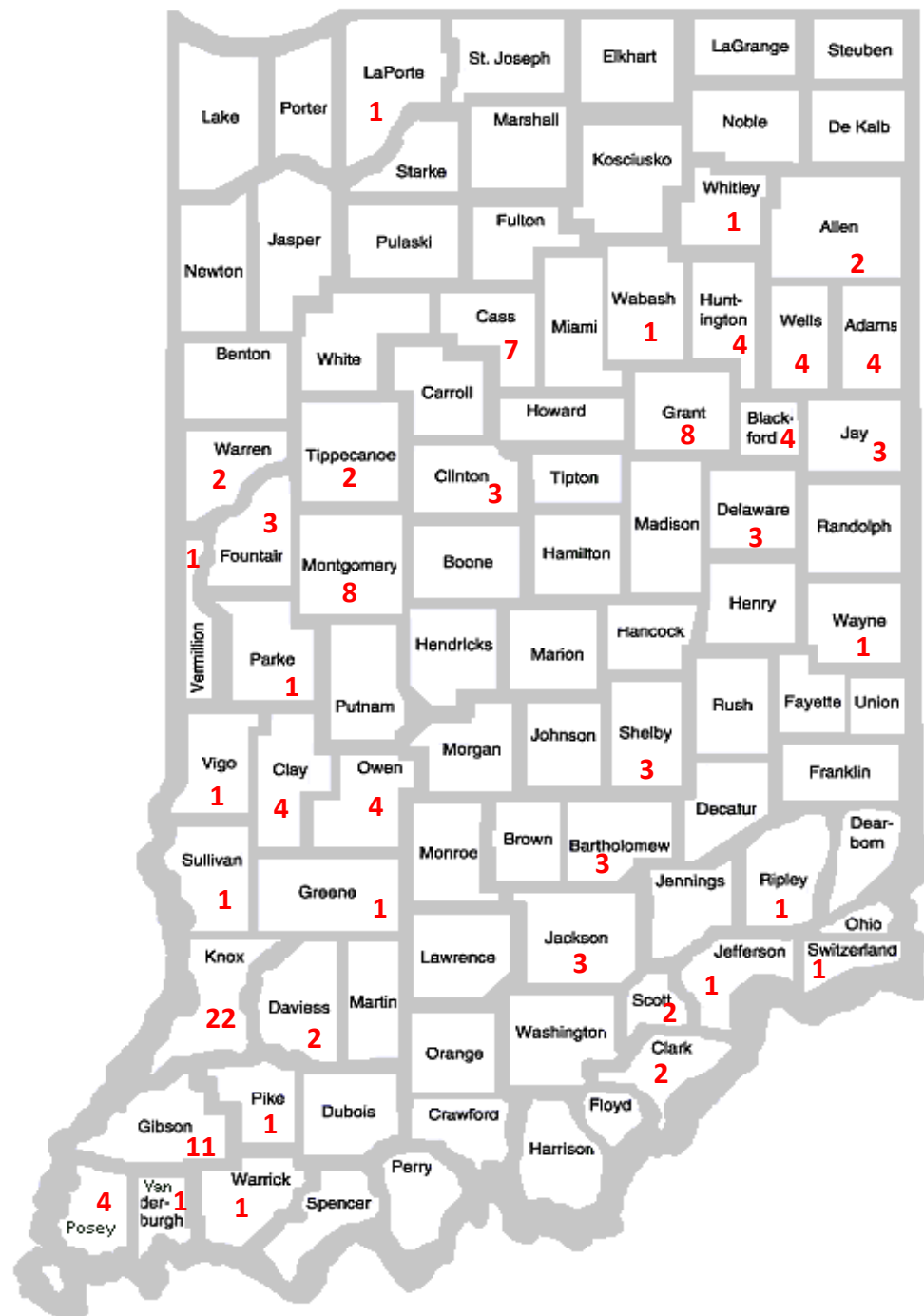
- “Avoid application of herbicides with the same site of action more than twice a season.”
 - “Utilize sequential applications of herbicides with alternative modes of action.”
 - “Rotate the use of this product with non-Group 4 herbicides.”
 - “Apply full labeled rates...to minimize weed escapes.”
-
- How is any of this possible with twice per year & year after year dicamba use, plus low level off-target loading from area (adjacent/neighboring) fields?

6. Most incidents involved soybeans with undocumented yield impacts.

- State drift rule definition of “harm” includes “deformation”.
- No scientifically supported universal and definitive measure of yield impacts has been identified by objective researchers.
- Why do complainants keep calling, if we are in year 3 of symptomology & we are to believe “ it is no big deal”?

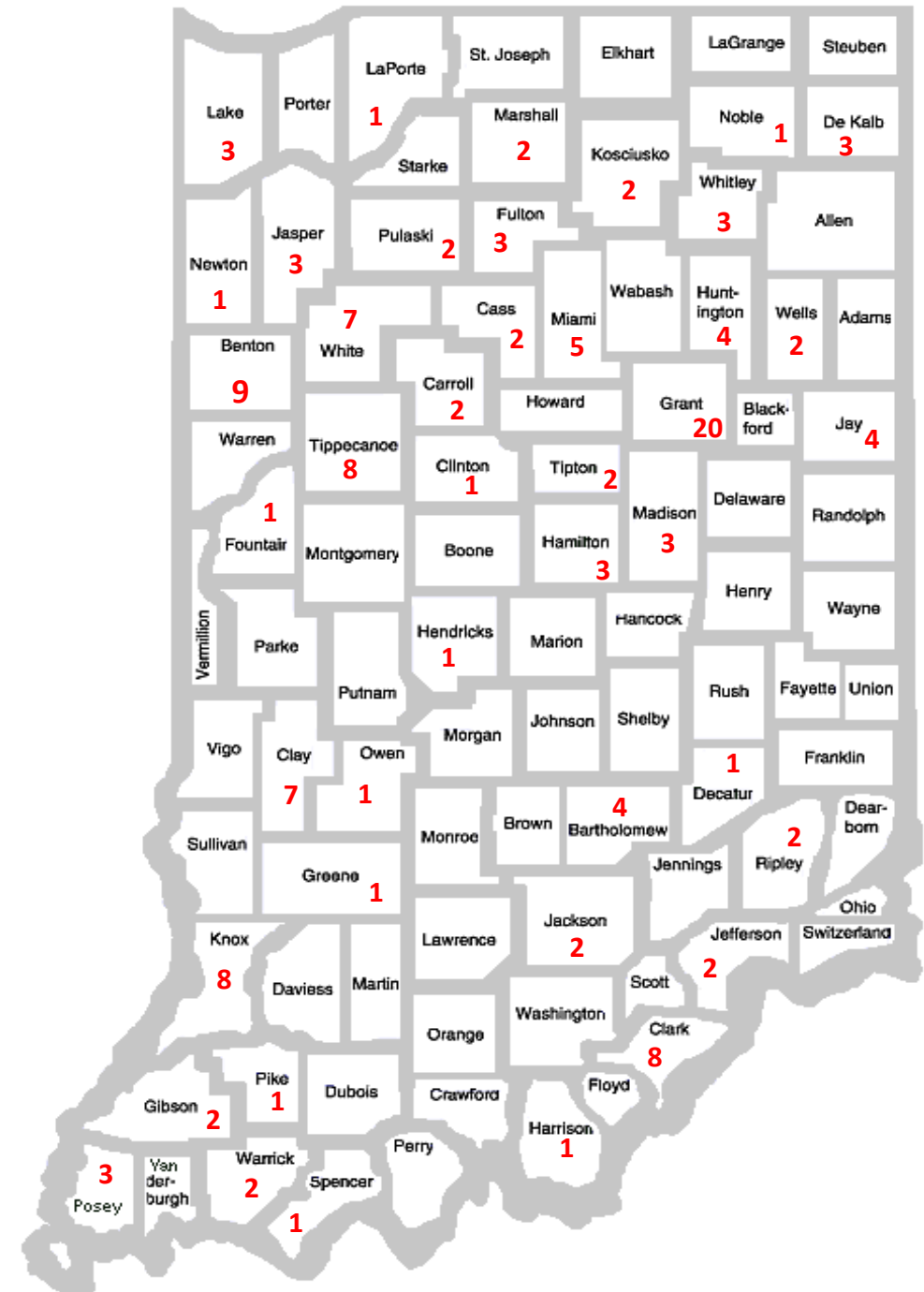
Number of 2017 Investigations by County

County	Investigation
KNOX	22
GIBSON	11
GRANT	8
MONTGOMERY	8
CASS	7
ADAMS	4
BLACKFORD	4
CLAY	4
HUNTINGTON	4
OWEN	4
POSEY	4
WELLS	4
BARTHOLOMEW	3
CLINTON	3
DELAWARE	3
FOUNTAIN	3
JACKSON	3
JAY	3
SHELBY	3
ALLEN	2
CLARK	2
DAVIESS	2
SCOTT	2
TIPPECANOE	2
WARREN	2
GREENE	1
JEFFERSON	1
LA PORTE	1
PARKE	1
PIKE	1
RIPLEY	1
SULLIVAN	1
SWITZERLAND	1
VANDEBURGH	1
VERMILLION	1
VIGO	1
WABASH	1
WARRICK	1
WAYNE	1
WHITLEY	1



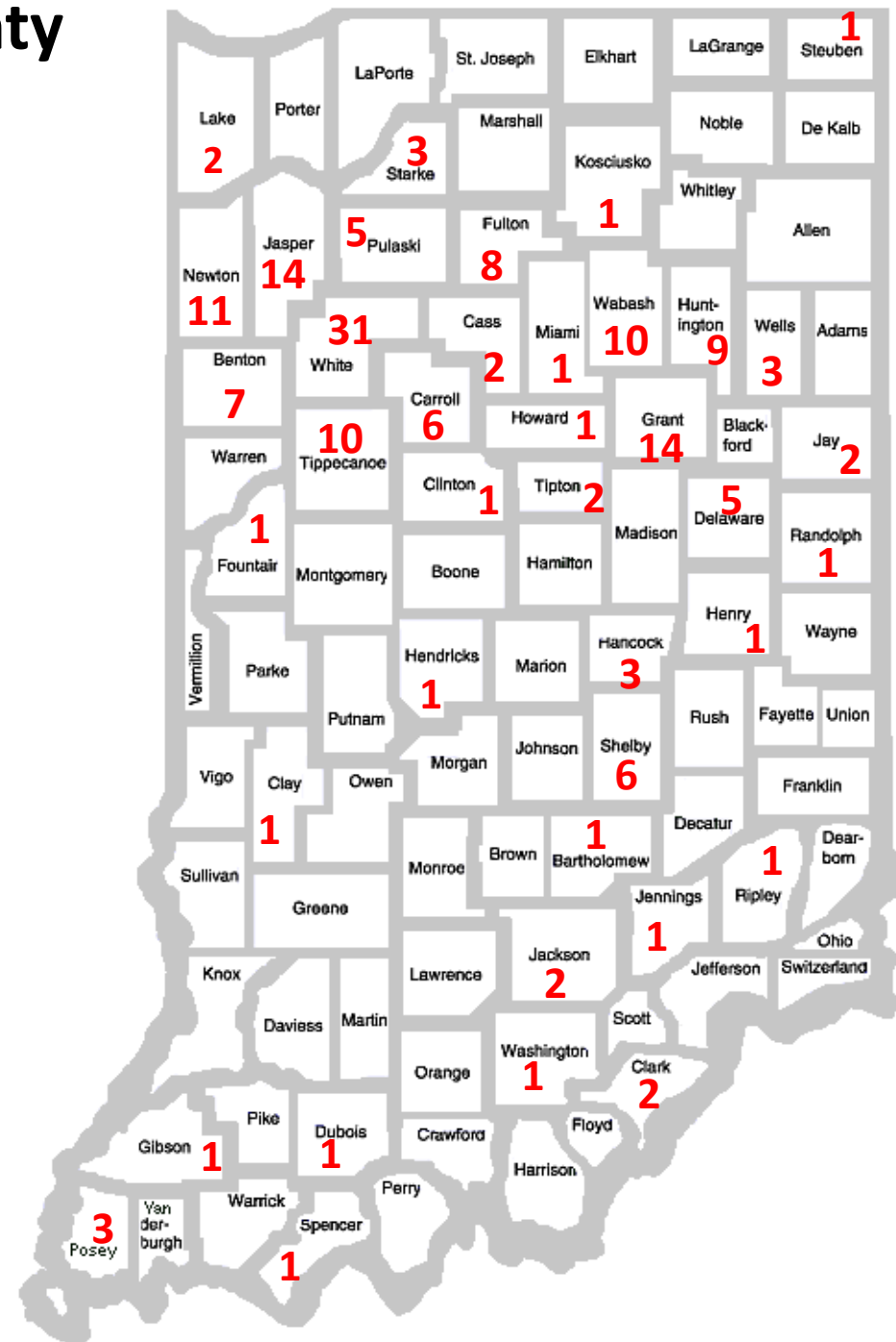
Number of 2018 Investigations by County

County	Investigations
GRANT	20
BENTON	9
CLARK	8
KNOX	8
TIPPECANOE	8
CLAY	7
WHITE	7
MIAMI	5
BARTHOLOMEW	4
HUNTINGTON	4
JAY	4
DE KALB	3
FULTON	3
HAMILTON	3
JASPER	3
LAKE	3
MADISON	3
POSEY	3
WHITLEY	3
CARROLL	2
CASS	2
GIBSON	2
JACKSON	2
JEFFERSON	2
KOSCIUSKO	2
MARSHALL	2
PULASKI	2
RIPLEY	2
TIPTON	2
WARRICK	2
WELLS	2
CLINTON	1
DECATUR	1
FOUNTAIN	1
GREENE	1
HARRISON	1
HENDRICKS	1
LA PORTE	1
NEWTON	1
NOBLE	1
OWEN	1
PIKE	1
SPENCER	1
WABASH	1

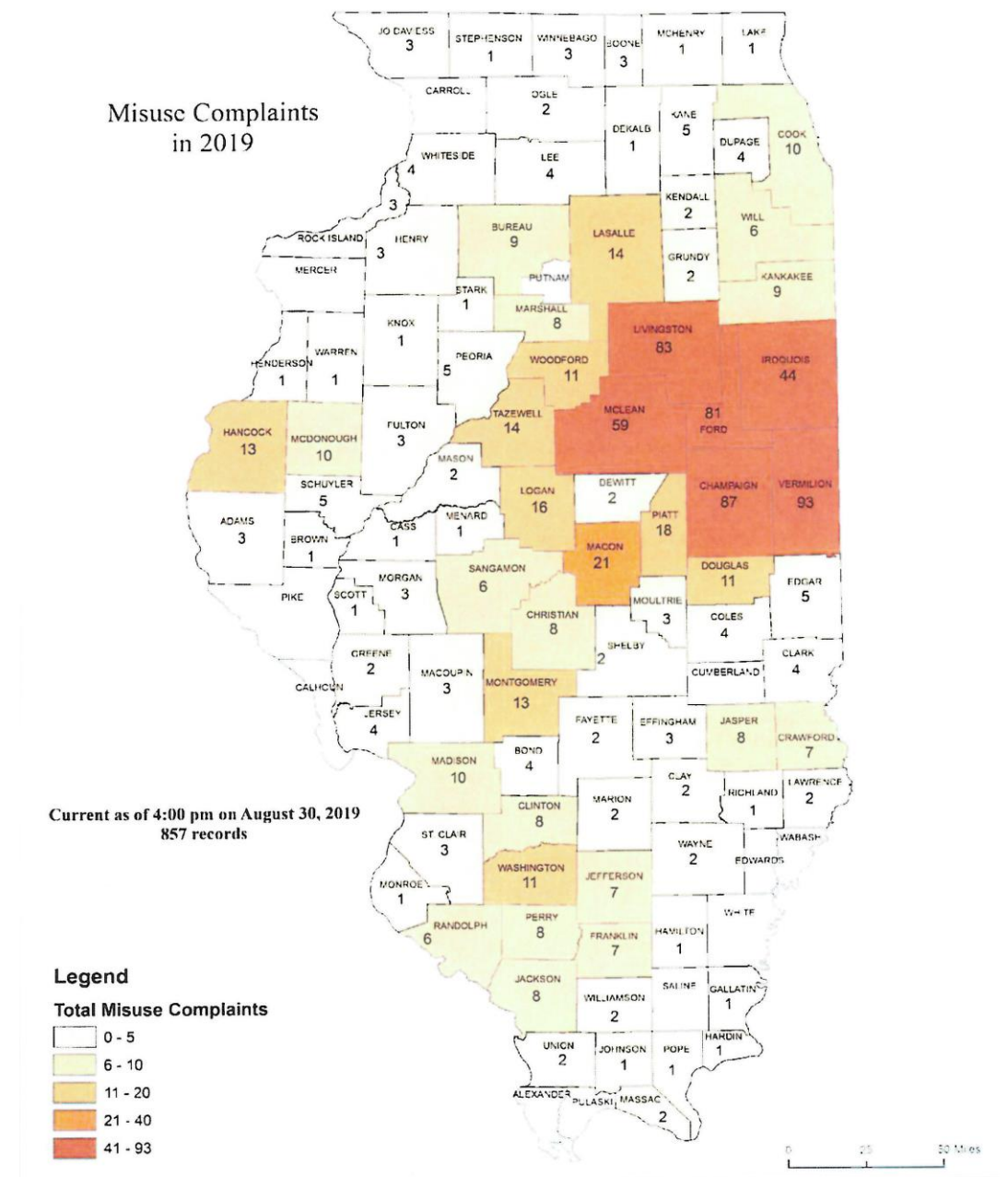


Number of 2019 Investigations by County

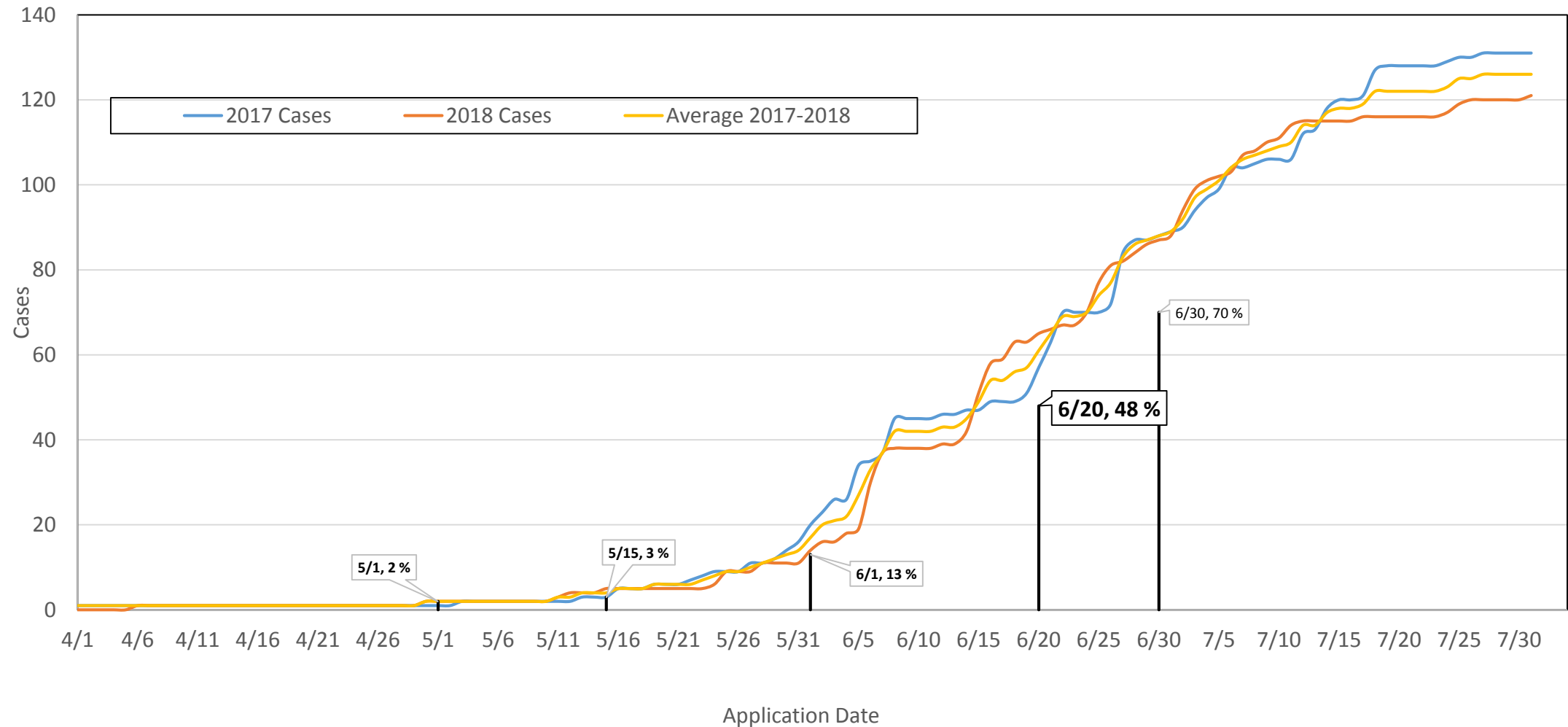
County	Investigations
WHITE, INDIANA	31
GRANT, INDIANA	14
JASPER, INDIANA	14
NEWTON, INDIANA	11
TIPPECANOE, INDIANA	10
WABASH, INDIANA	10
HUNTINGTON, INDIANA	9
FULTON, INDIANA	8
BENTON, INDIANA	7
CARROLL, INDIANA	6
SHELBY, INDIANA	6
DELAWARE, INDIANA	5
PULASKI, INDIANA	5
HANCOCK, INDIANA	3
POSEY, INDIANA	3
STARKE, INDIANA	3
WELLS, INDIANA	3
CASS, INDIANA	2
CLARK, INDIANA	2
JACKSON, INDIANA	2
JAY, INDIANA	2
LAKE, INDIANA	2
TIPTON, INDIANA	2
BARTHOLOMEW, INDIANA	1
CLAY, INDIANA	1
CLINTON, INDIANA	1
DUBOIS, INDIANA	1
FOUNTAIN, INDIANA	1
GIBSON, INDIANA	1
HENDRICKS, INDIANA	1
HENRY, INDIANA	1
HOWARD, INDIANA	1
JENNINGS, INDIANA	1
KOSCIUSKO, INDIANA	1
MIAMI, INDIANA	1
RANDOLPH, INDIANA	1
RIPLEY, INDIANA	1
SPENCER, INDIANA	1
STEBEN, INDIANA	1
WASHINGTON, INDIANA	1



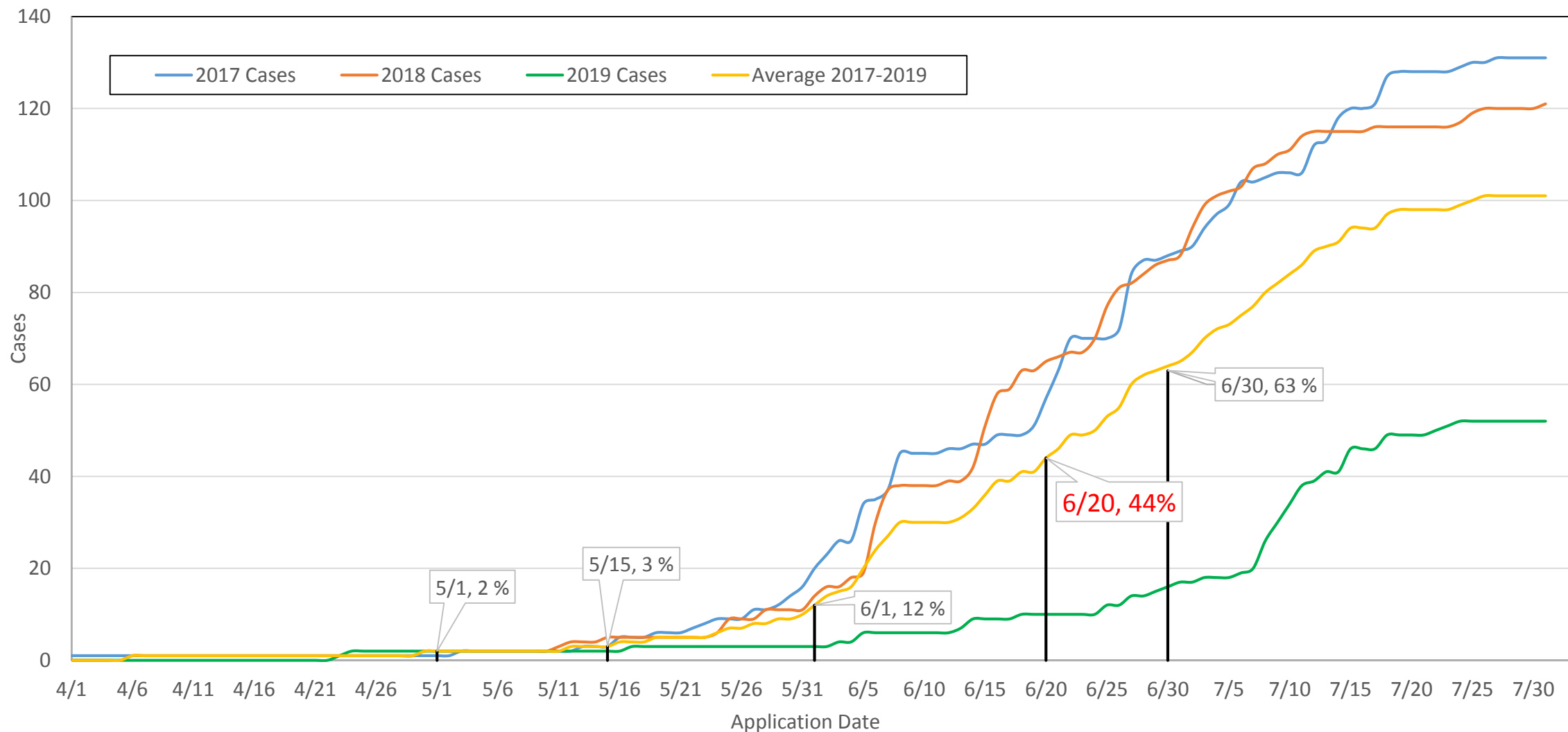
2019 Illinois Misuse Complaints



Dicamba Complaint Application Dates 2017-2018



Dicamba Complaint Application Dates 2017-2019



2020 OISC Proposal

- FIFRA **Sec. 24(c)** special local need, state label for 2020 registration of these products
- Statewide **June 20, 2020** application cut-off date
- Revise Enforcement Response Policy to suggest 6 month credential suspension for any application made after June 20, 2020.

Comments or Questions ?

Thank you !

Dave Scott

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