Manure Spill Management and Risk Mitigation

Purdue Manure Management and Utilization Technologies series
April 7, 2022

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Manure Spill Management and Risk Mitigation

Considerations

- What are the causes of Manure Spills?
- What can we do to prevent them and reduce the risk?
- What to do when a spill occurs?

Photo: Kevin Erb

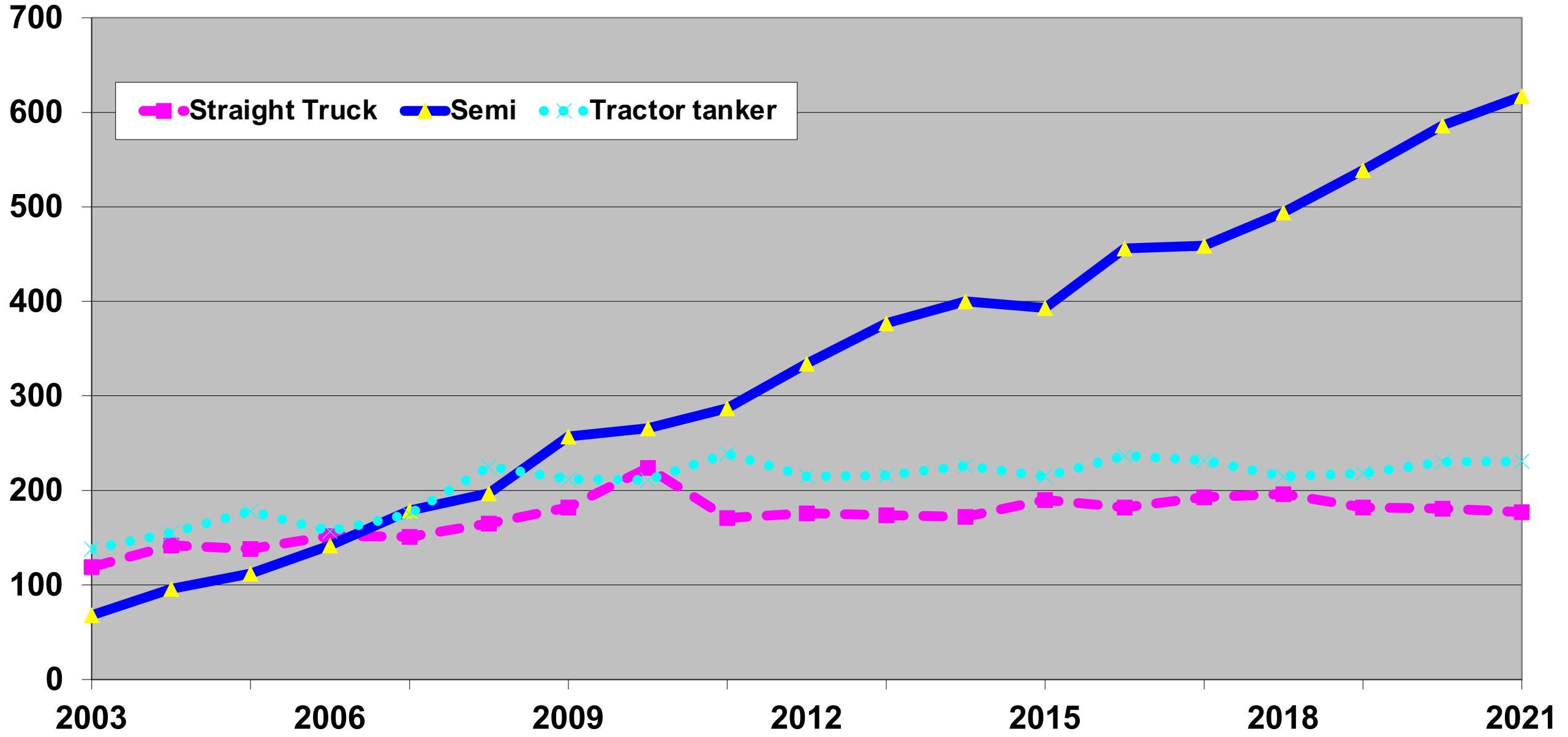
First, understand the equipment the industry is using

Wisconsin has 196 for-hire applicators that move ~7 billion gallons annually (2/3 of the annual dairy manure volume)

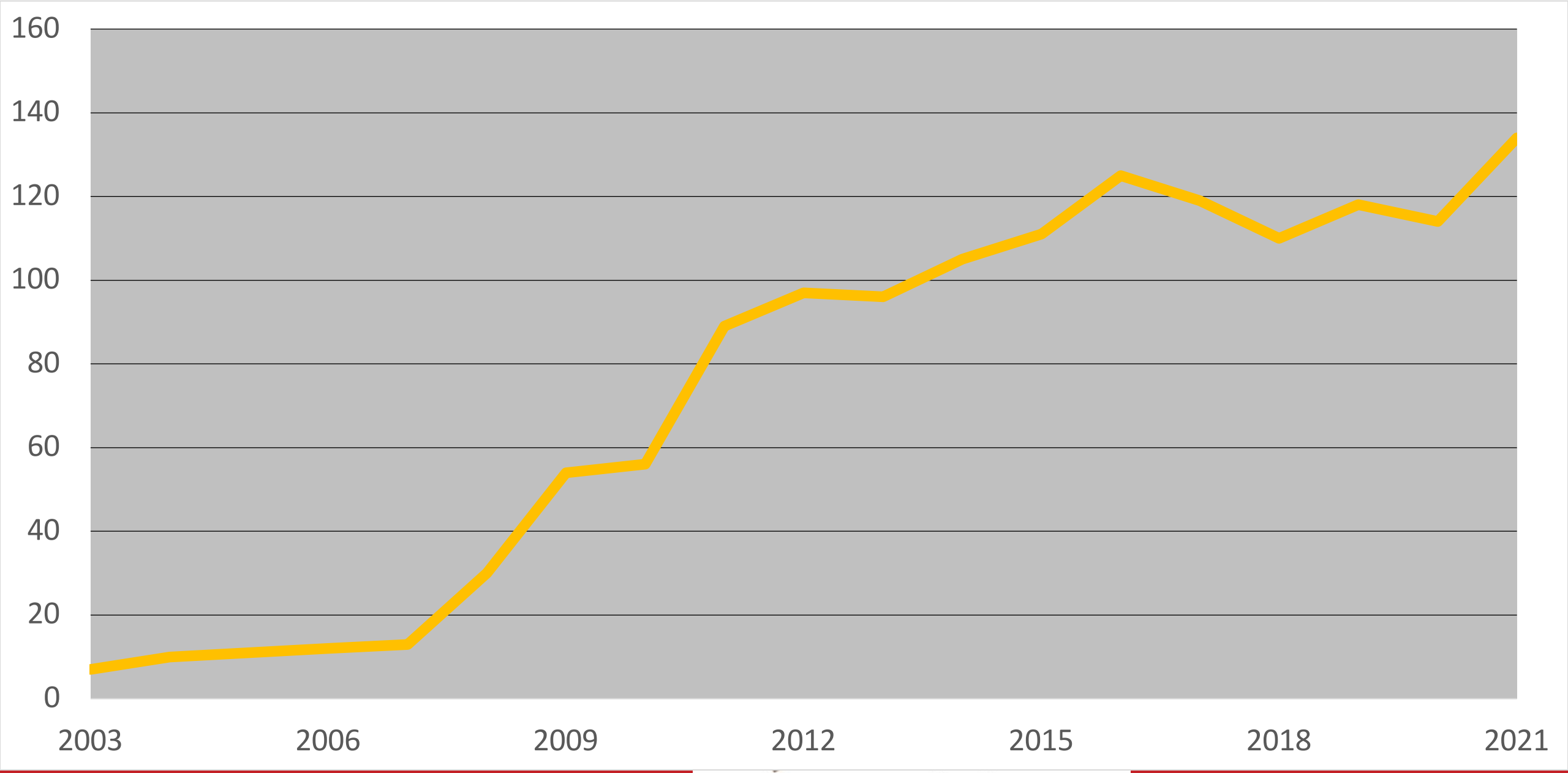
- Covers a football field 2.6 miles deep

Data collected from the annual directory of for-hire applicators, 2003-2021, and does not include farmers hauling their own manure.

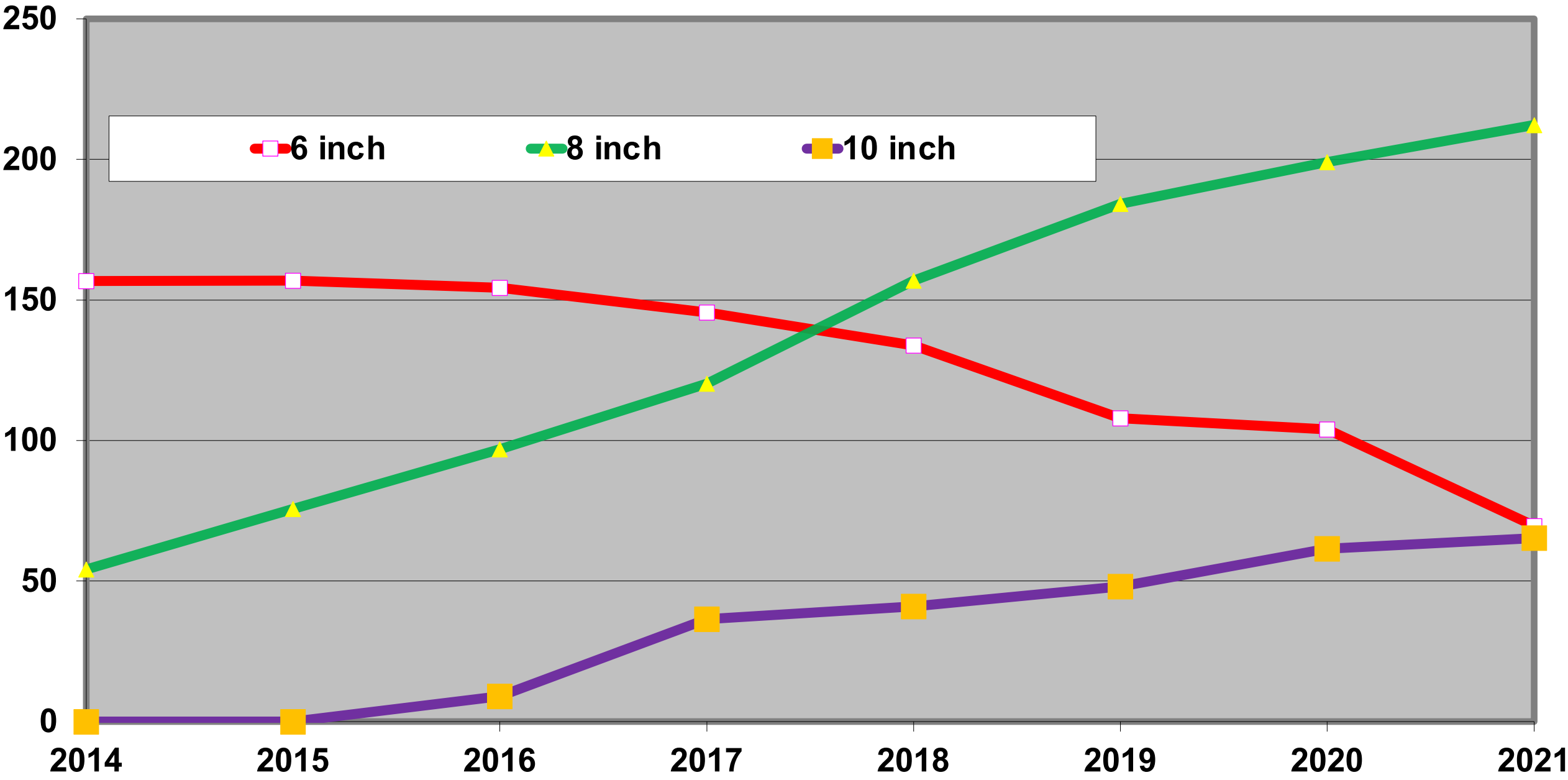
Equipment trends – Liquid tankers/trucks



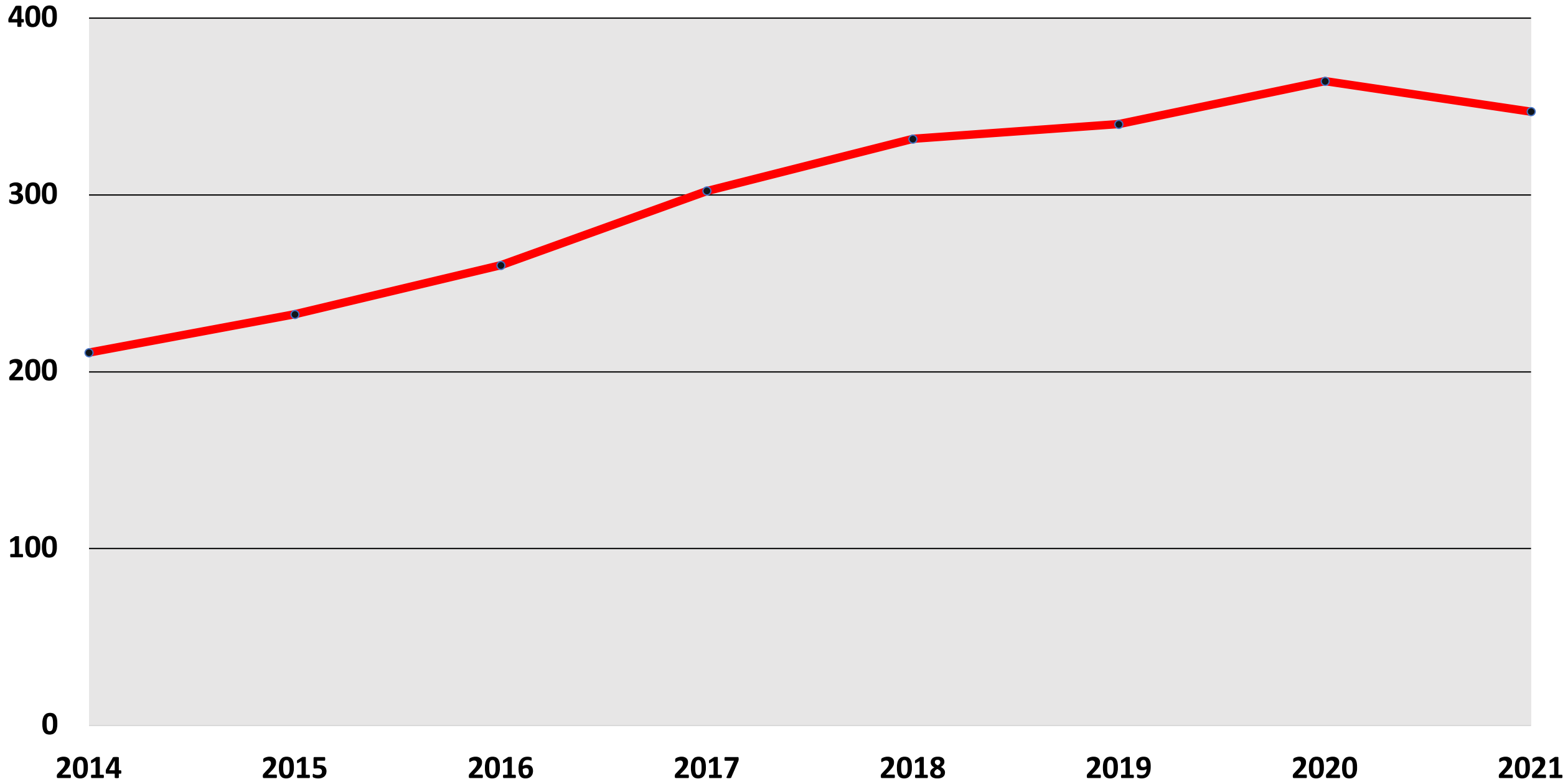
Equipment trends – Solid manure spreaders



Equipment trends – Size trends in hose



Equipment trends – Miles of Hose



Wisconsin Manure Incident Summary 2015-2019

Photos: Manitowoc SWCD

Project Notes

- Funding for this research project provided by PNAAW and UW-Extension.
- Data analysis is preliminary and subject to change
- Base data version 7.28.21 10am (some charts updated after 7/28)
- Wide variation in the amount of information available on a particular incident.
  - For example, some incidents we are unable to determine if it was a CAFO involved or if it was the farmer/custom applicator.

Project Notes

- **Wisconsin DNR and Extension do not believe the total number of incidents is increasing** (although we are less confident than the previous studies)
  - More than half of problems are being reported by farmers or manure haulers, only a small percent by neighbors.
  - A greater number of problems are being documented during inspections by DNR (inspections are increasing)

Data Collection and the paper files gap

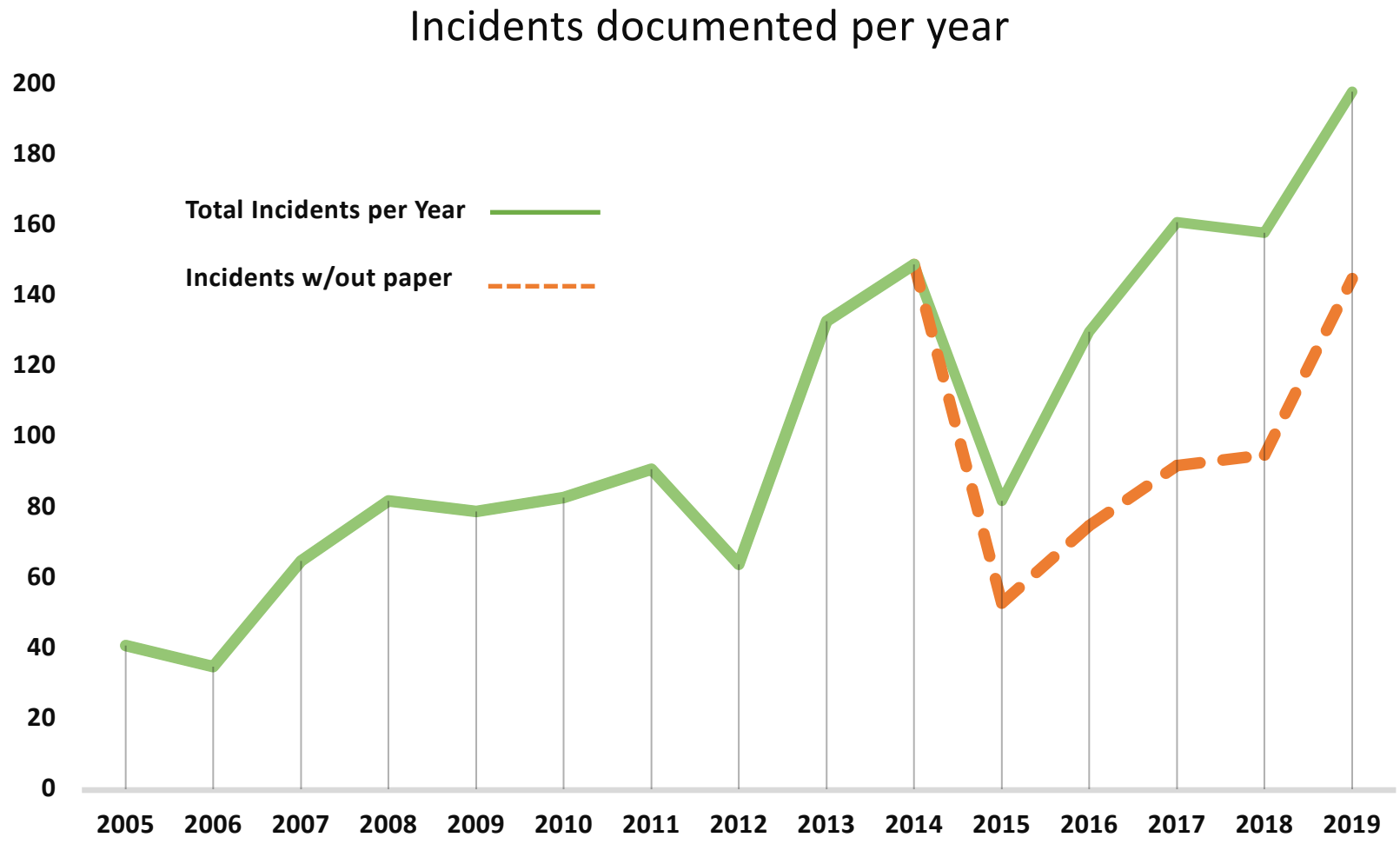
Data has been collected dating back to 2005 in five-year sets. Student leads:

- Eric Ronk 2005-2009
- Kaila Stencil 2010-2014
- Racheal Osterhaus (digital files) Reed Kostelny (paper files and digital) 2015-2019

Data from 2015-2019 was collected over a two-year period due to Covid (lack of access to paper files in 2020)

Dip in 2012 – Drought/low runoff.
Dip in 2015-2016 – DNR staff turnover/recordkeeping

For the 2015-2019 period a total of 729 Incidents were documented.



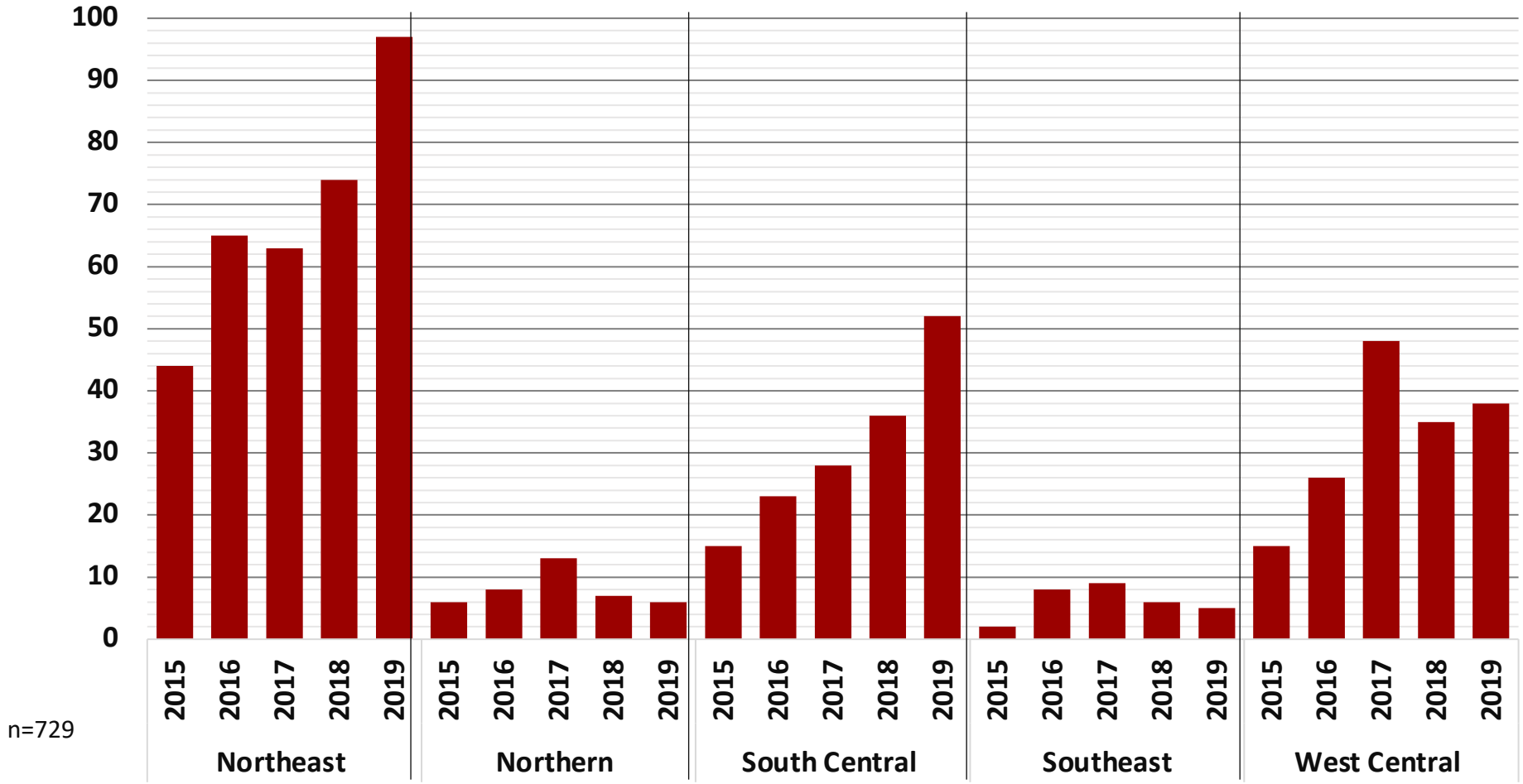
What was included

- **Manure spill or runoff events that met the *Wisconsin* DNR definition: "Potential to impact surface or groundwater"**
  - **Unsubstantiated complaints/incidents that did not meet the definition are *not* included**
  - **"spread too close to a stream" but no impact was *not* included.**
  - **Hose leak close to a stream was included.**

What's not included

- **Manure spills / incidents that were not reported to or documented by an agency**
  - **We know there are a lot of small problems and manure storage overtoppings that are never reported.**
  - **Not all agencies keep documentation or records.**

Incidents Per DNR Region and Year



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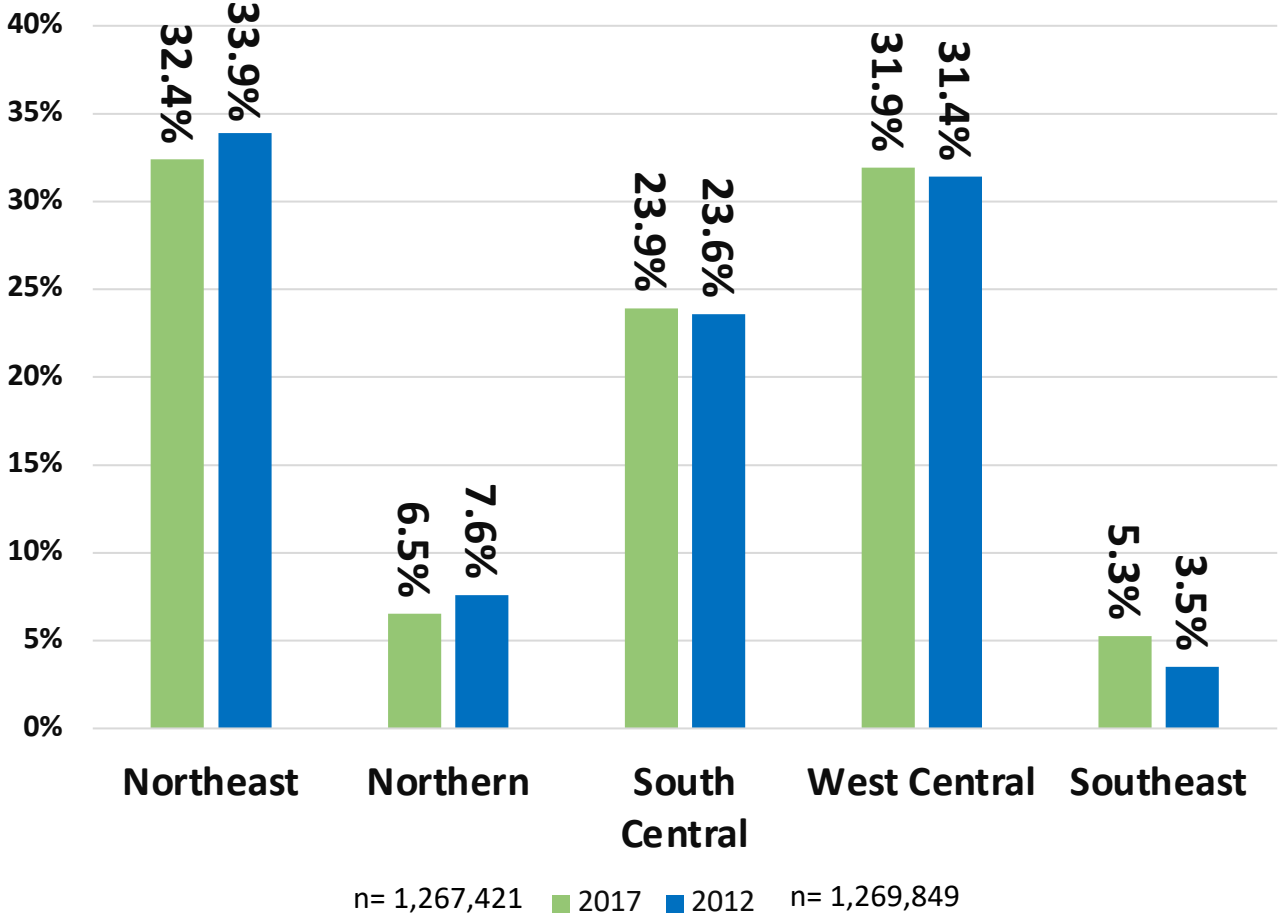
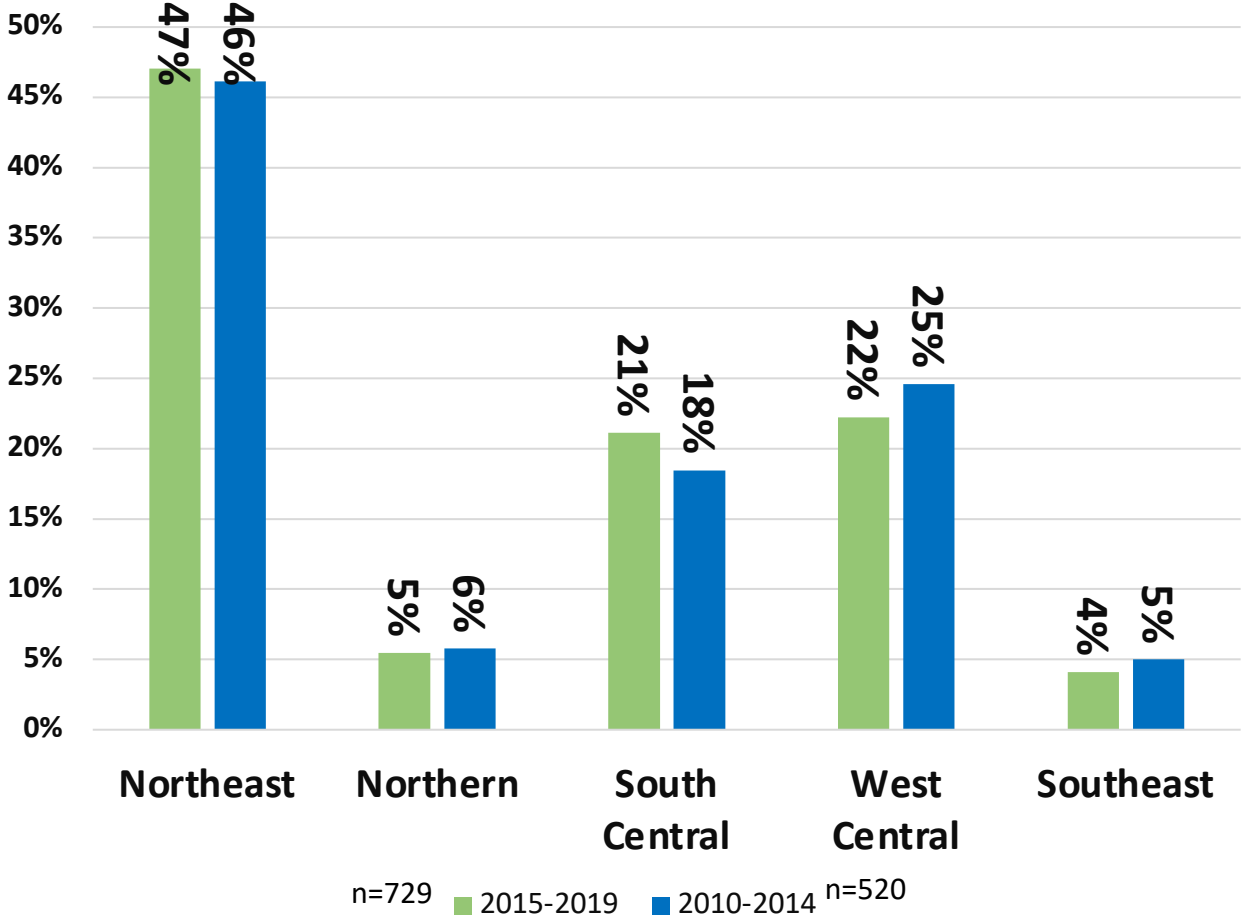
Percentage of Cattle and Incidents by Region: Two 5-year periods



Percent of Dairy Cattle in the State

Percent of Incidents in the State



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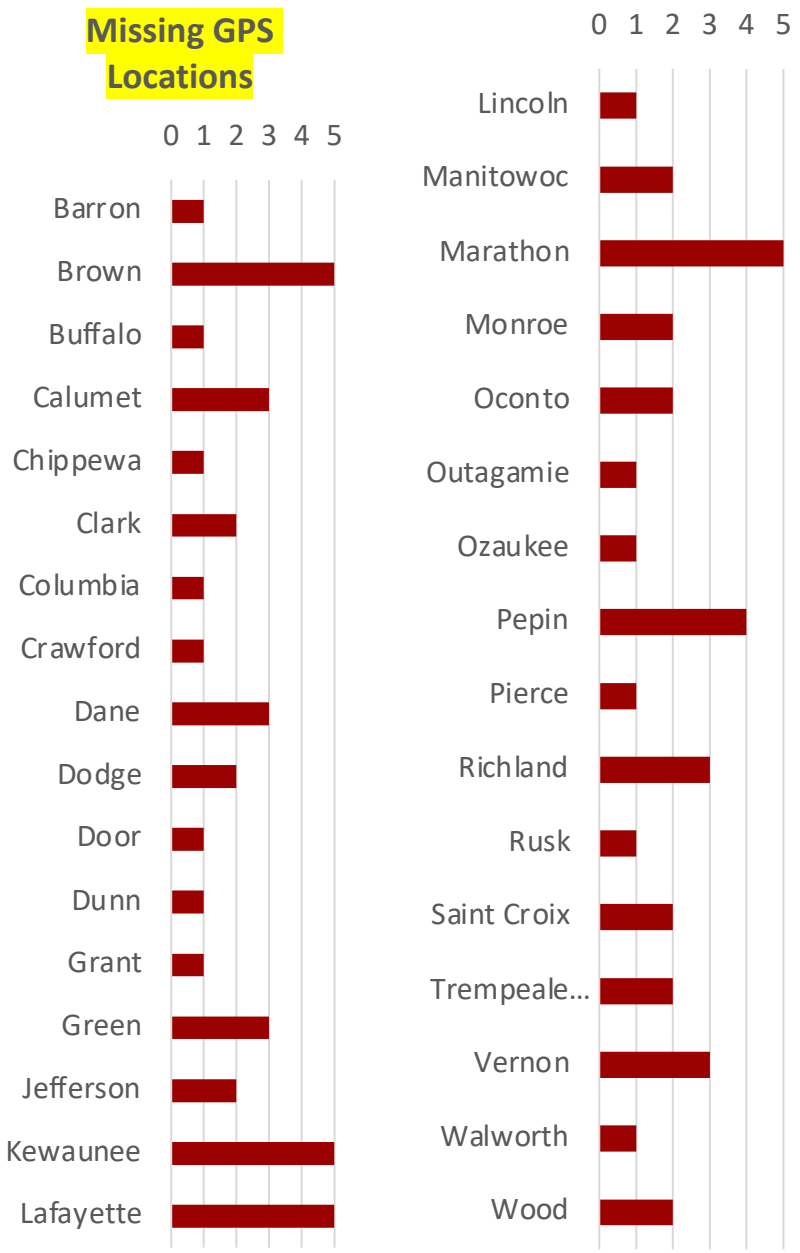
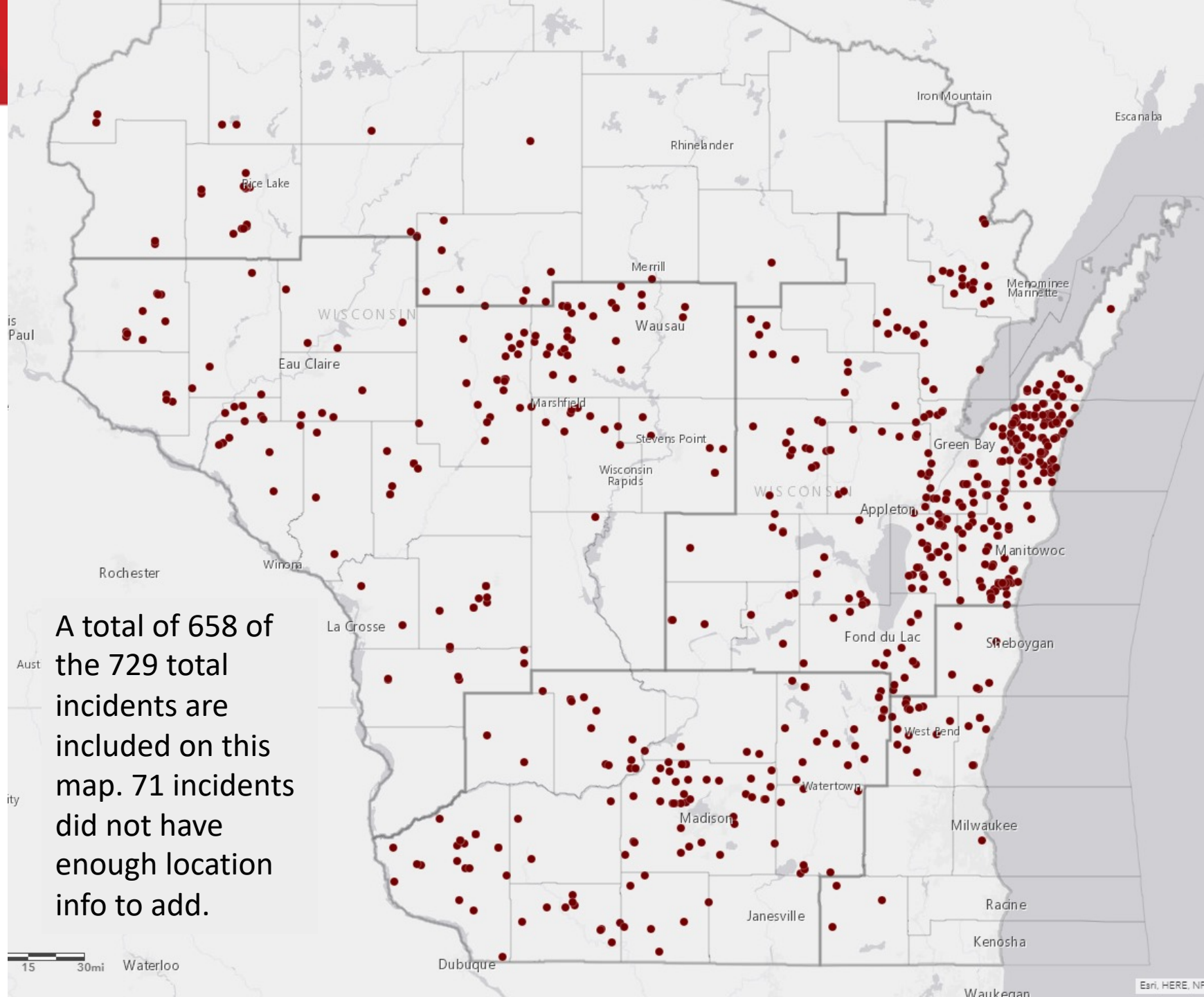
All Incident Locations

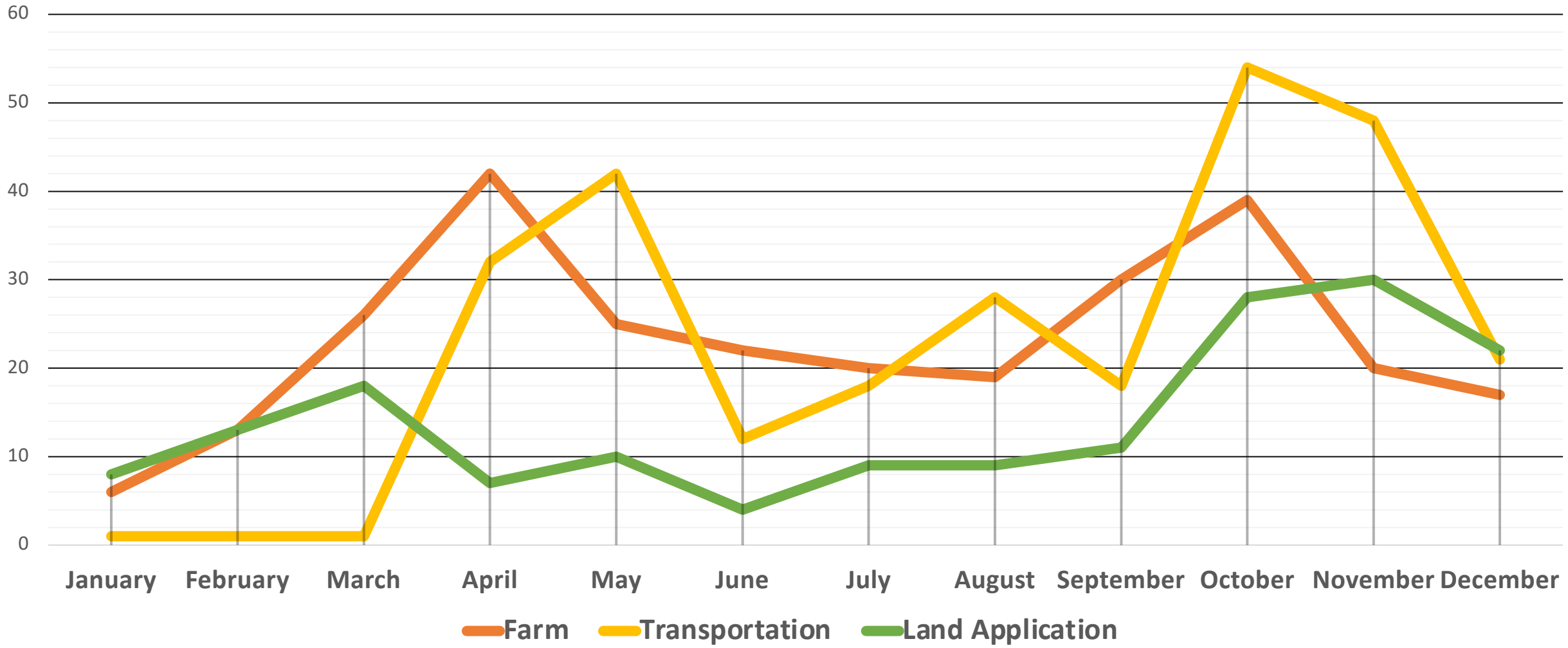
Missing GPS Locations



A total of 658 of the 729 total incidents are included on this map. 71 incidents did not have enough location info to add.



Incident Type by Month 2015-2019



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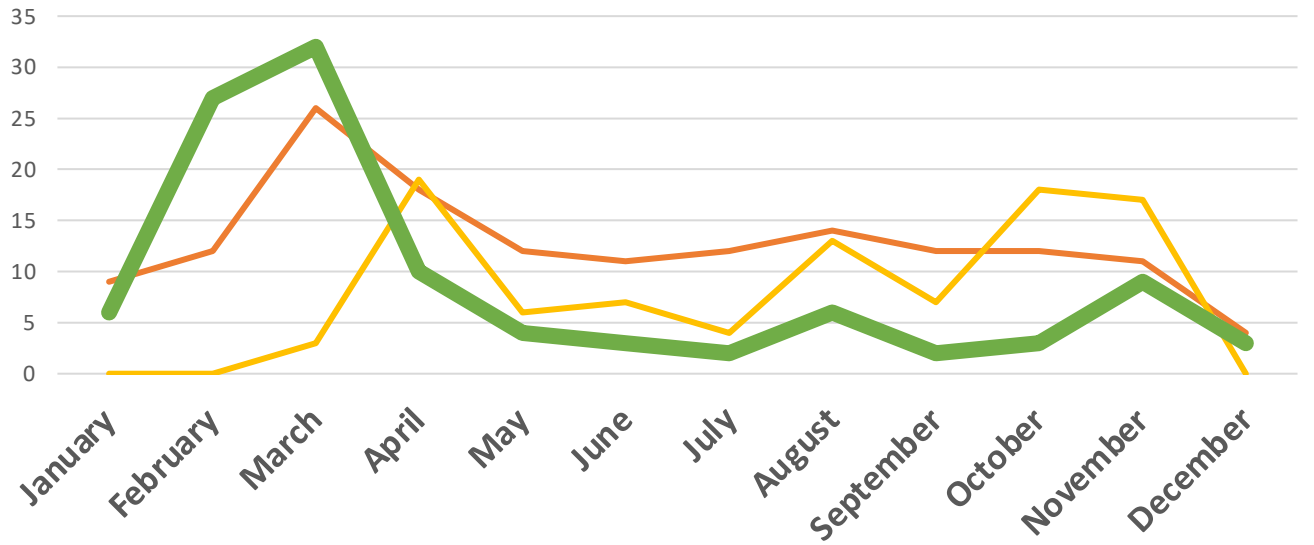
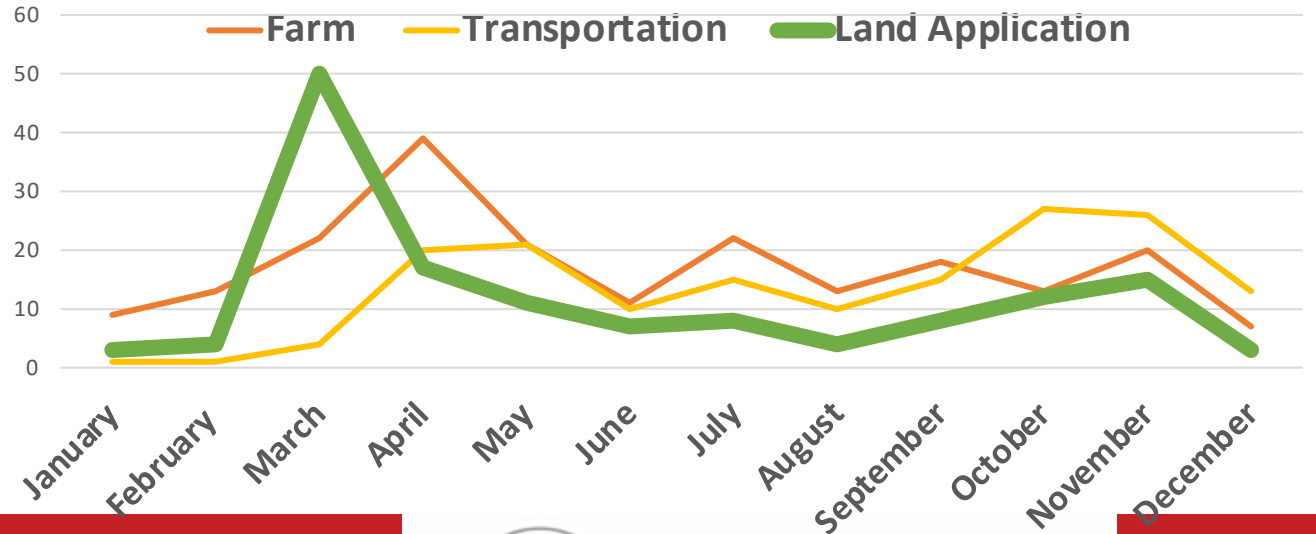
Incident Type by Month: 2005-2009, 2010-2014

Incident Type by Month
2005-2009

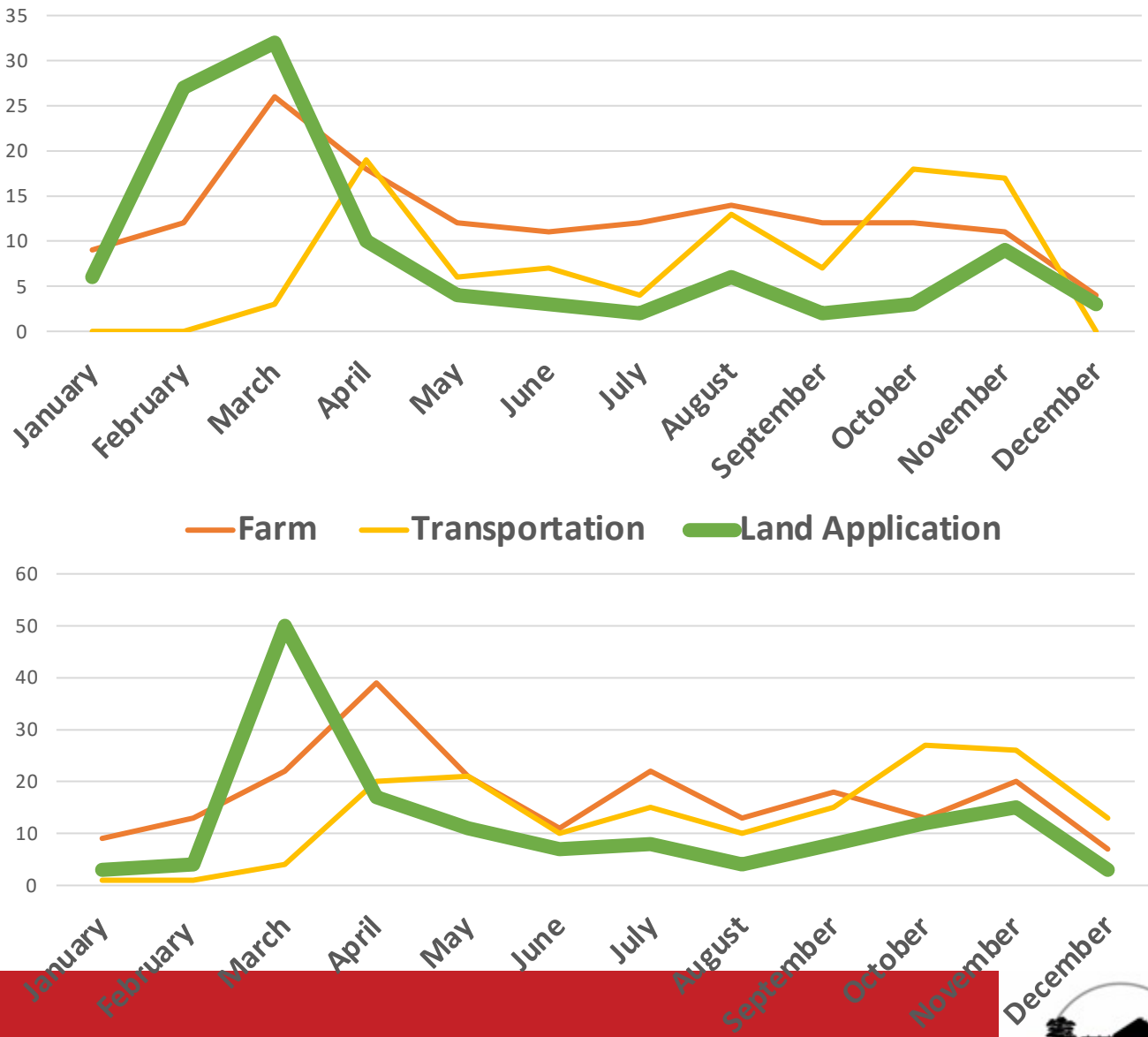


Incident Type by Month
2010-2014

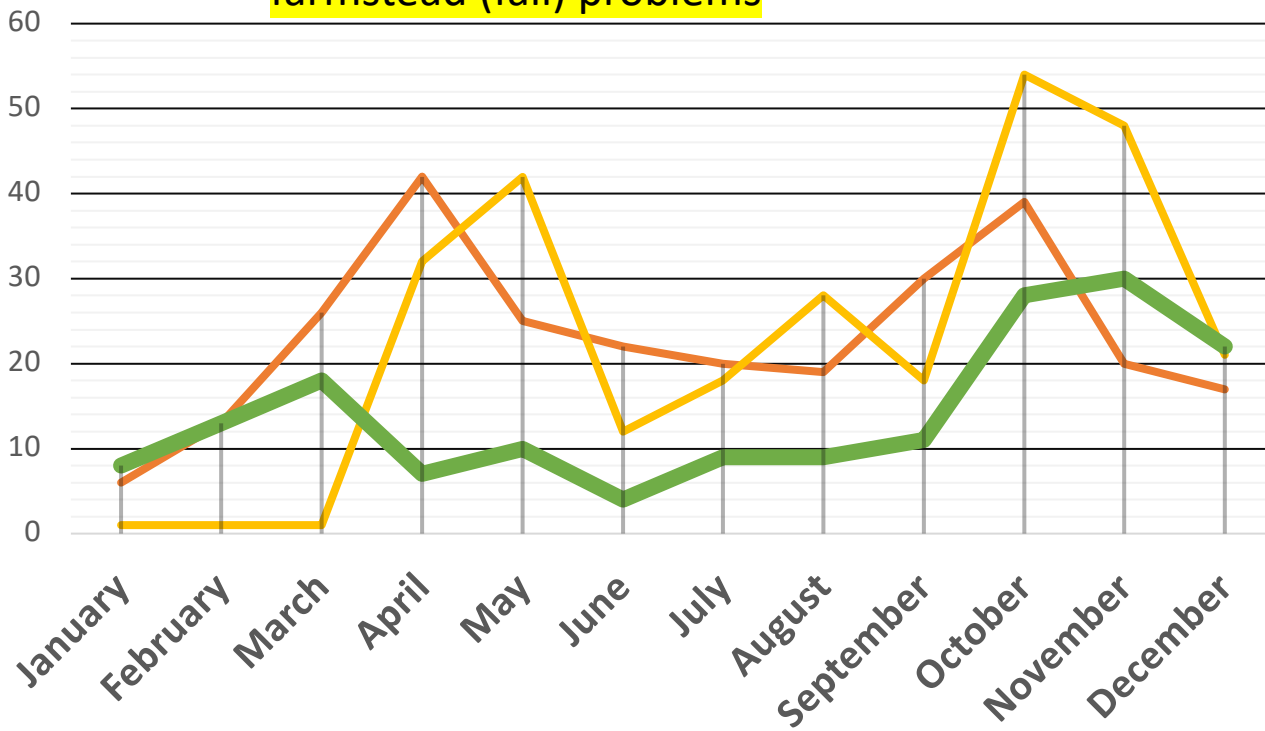
NOTE: scales are different.
(actual not percentages)
Focus on the peaks



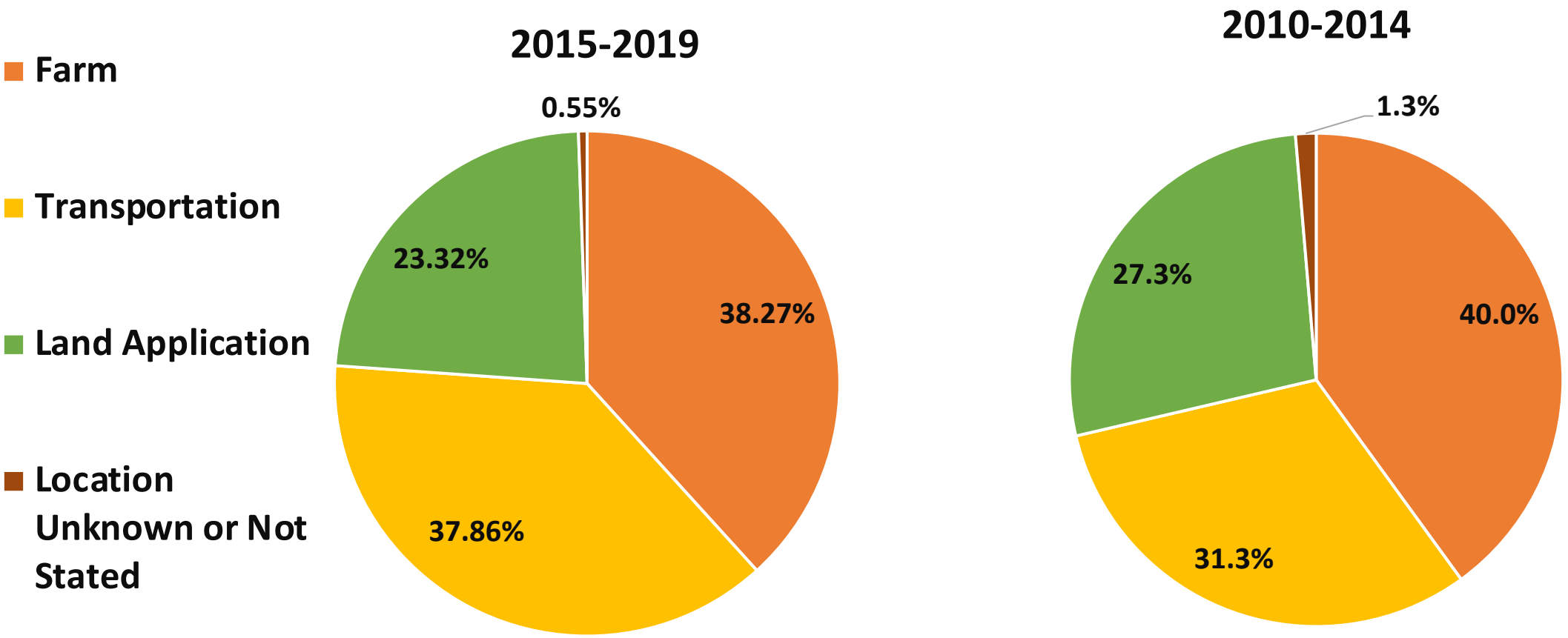
Incident Type by Month: all 15 years



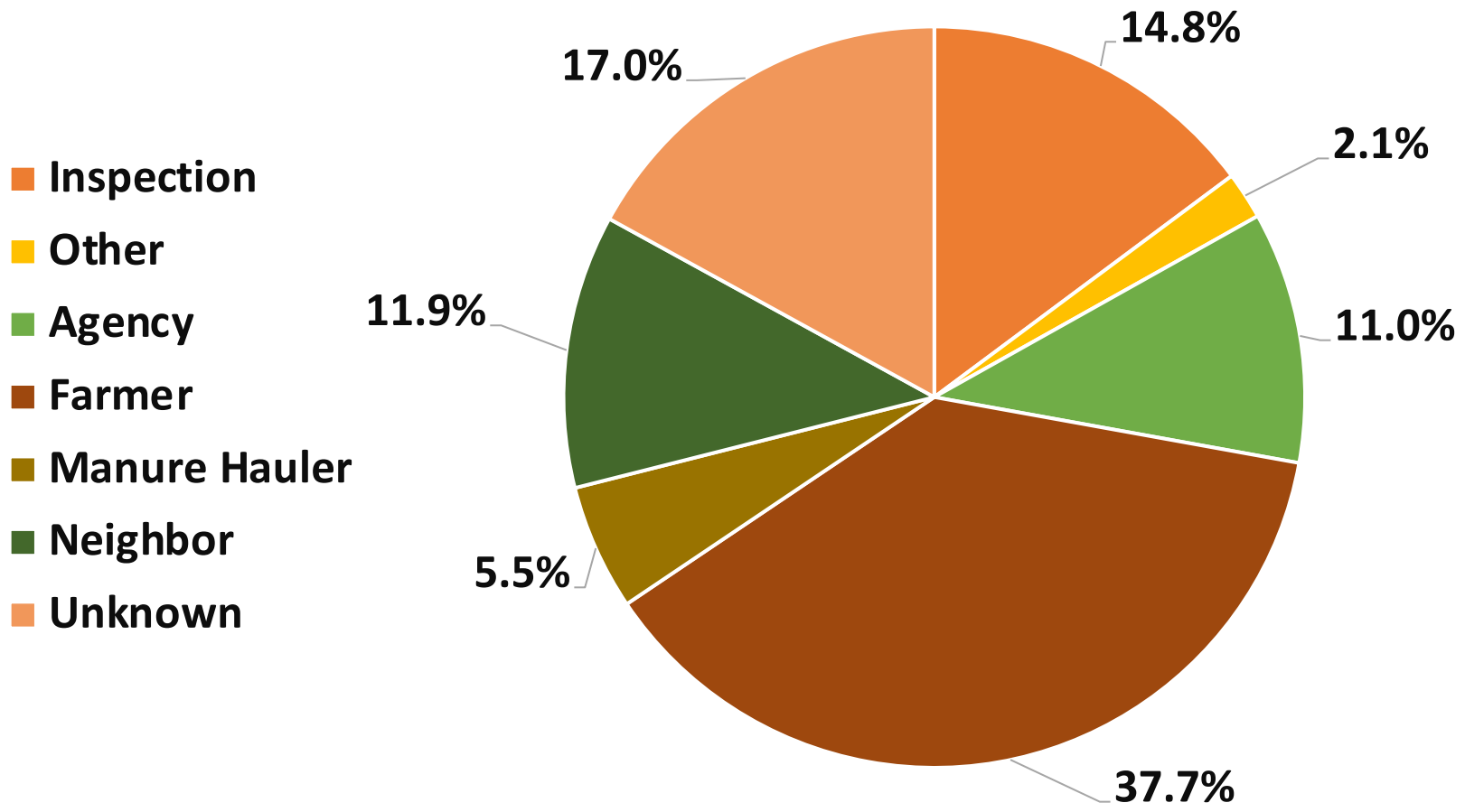
Note reduction in land application issues, but new peaks in transportation (spring/fall) and farmstead (fall) problems



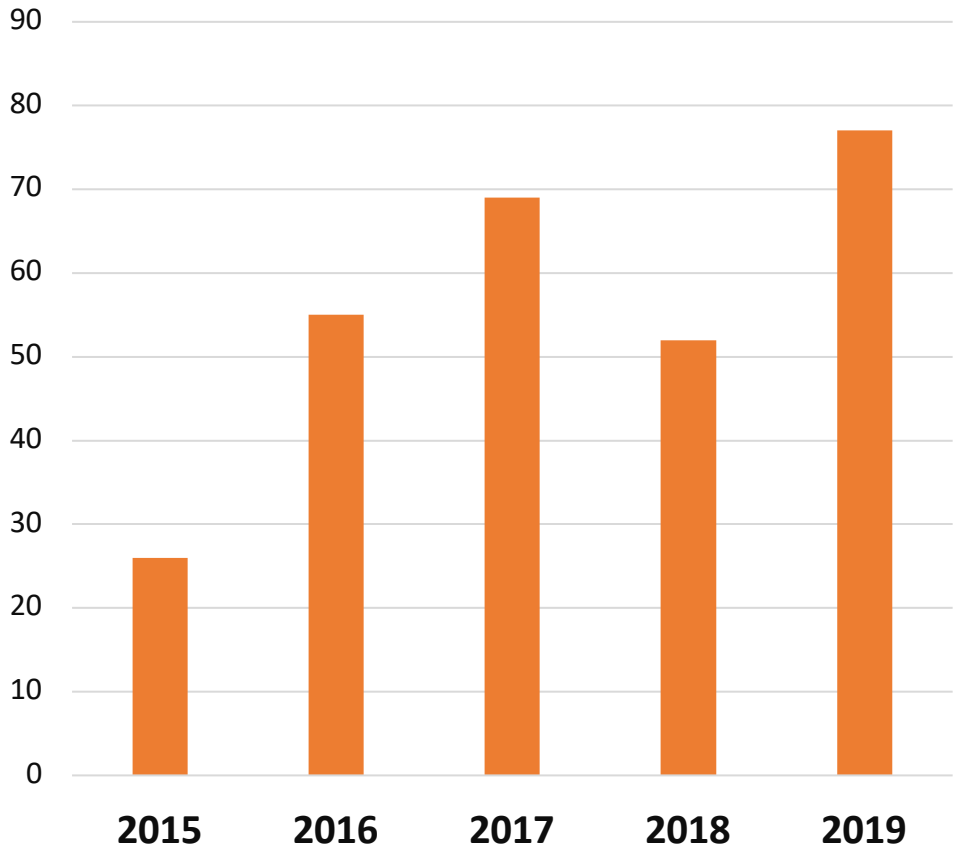
Where problems happen

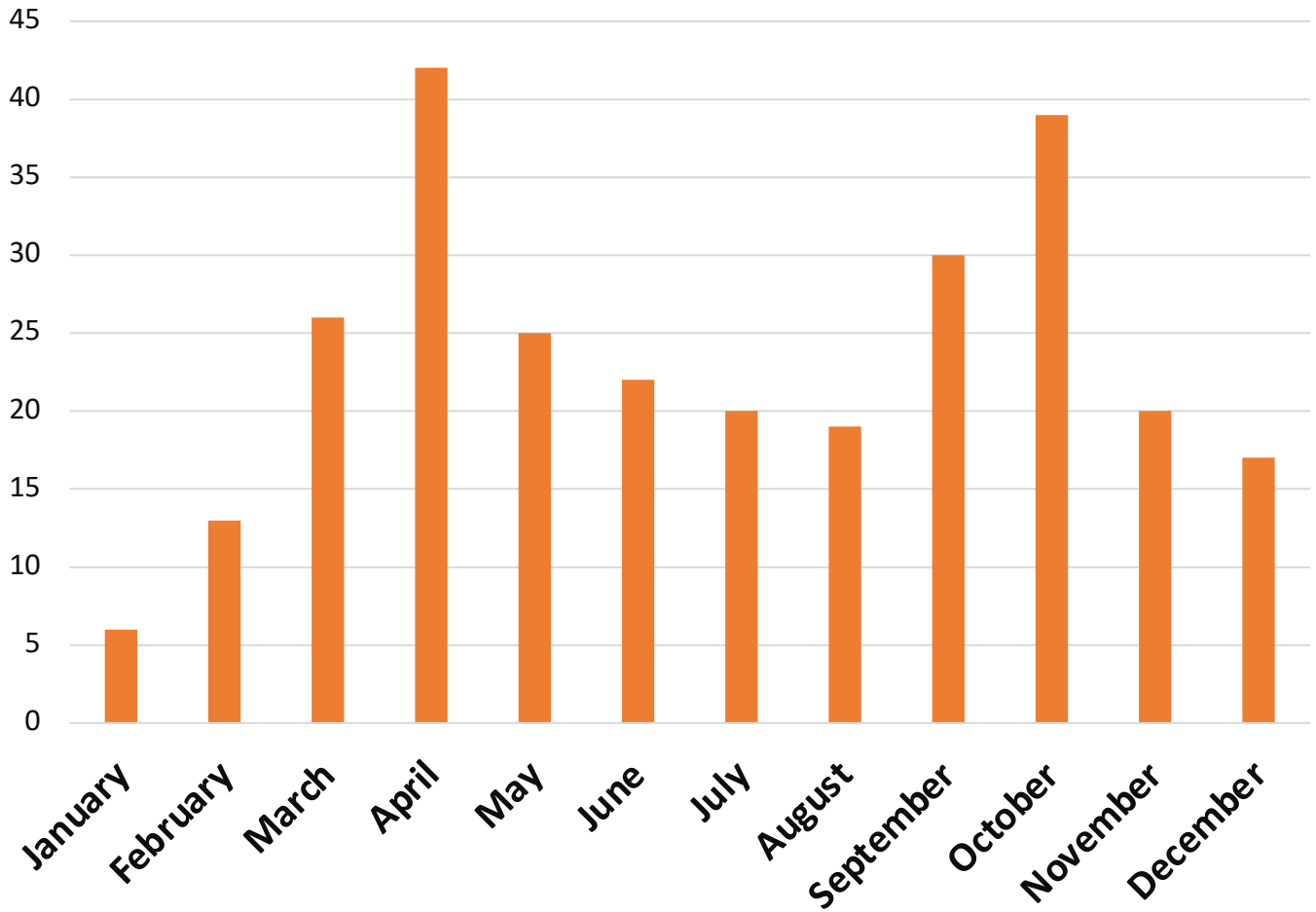


Reporting Party—All Incidents

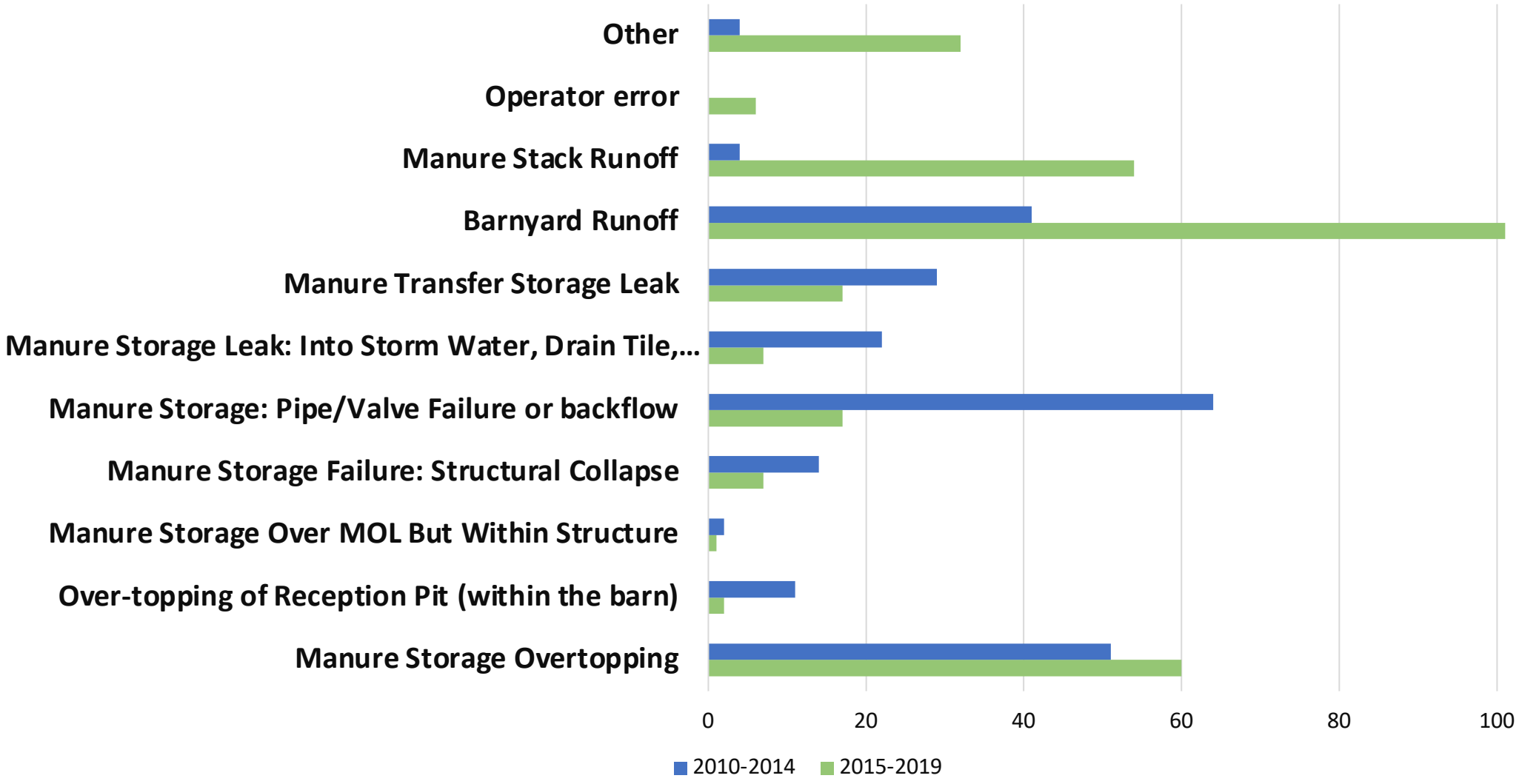


Incidents on the Farm

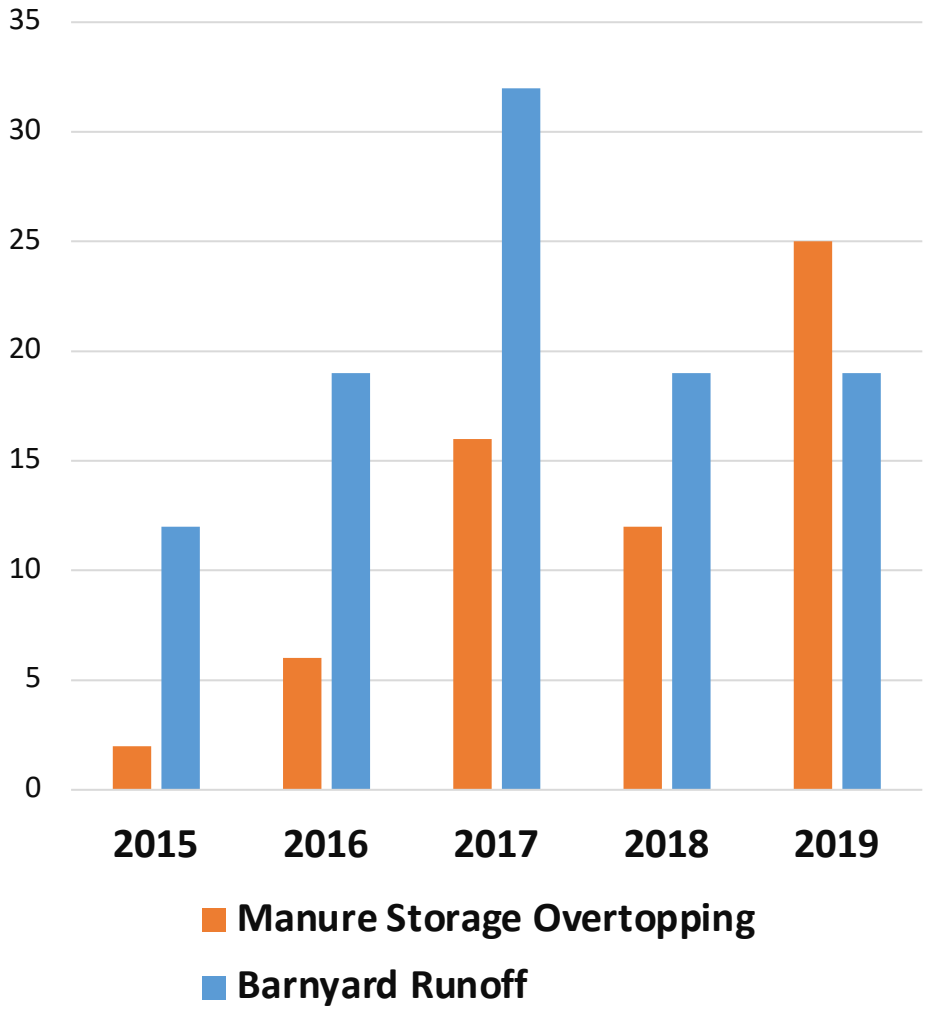


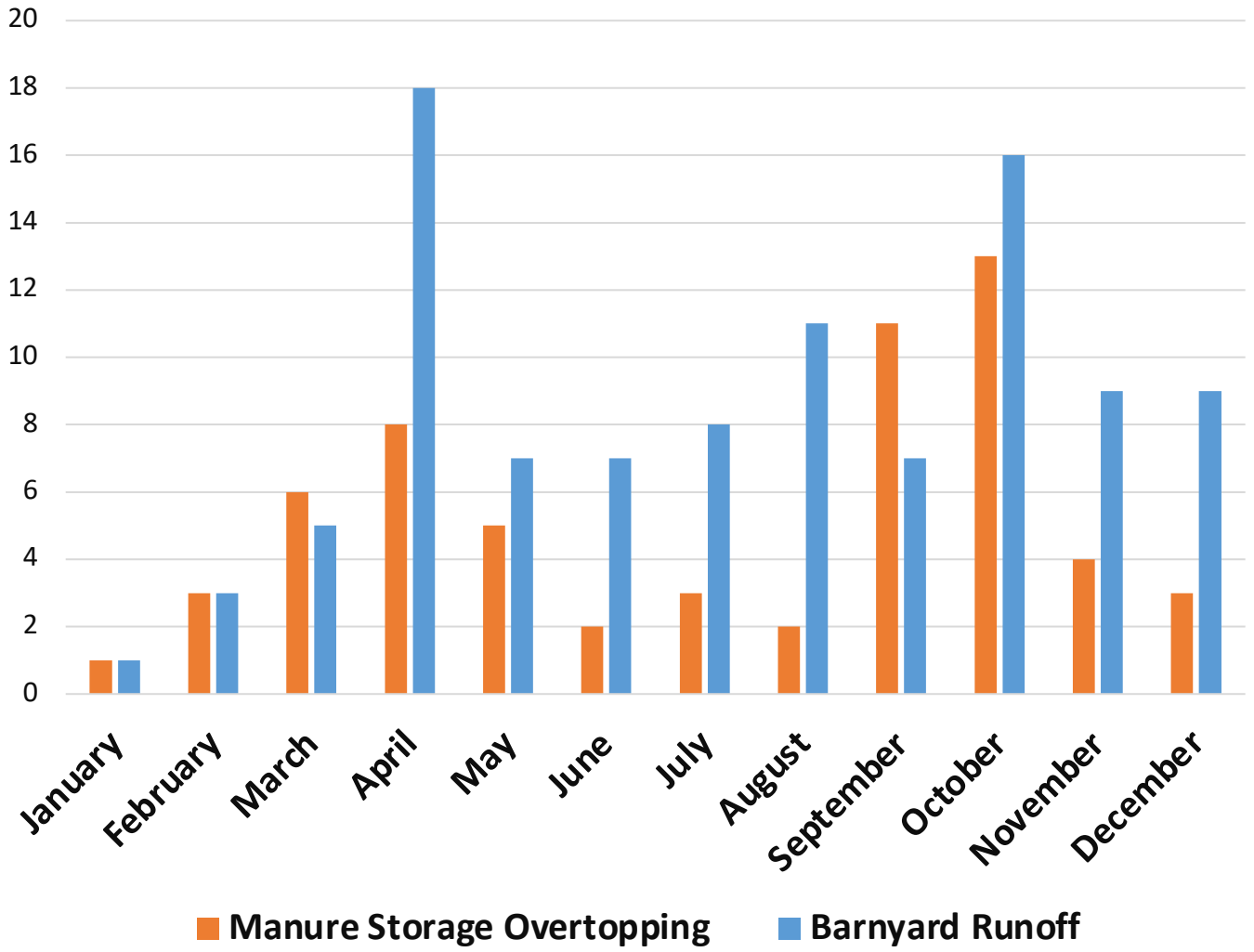


Incidents on the Farm Breakdown



Barnyard issues, Manure Storage Overtopping





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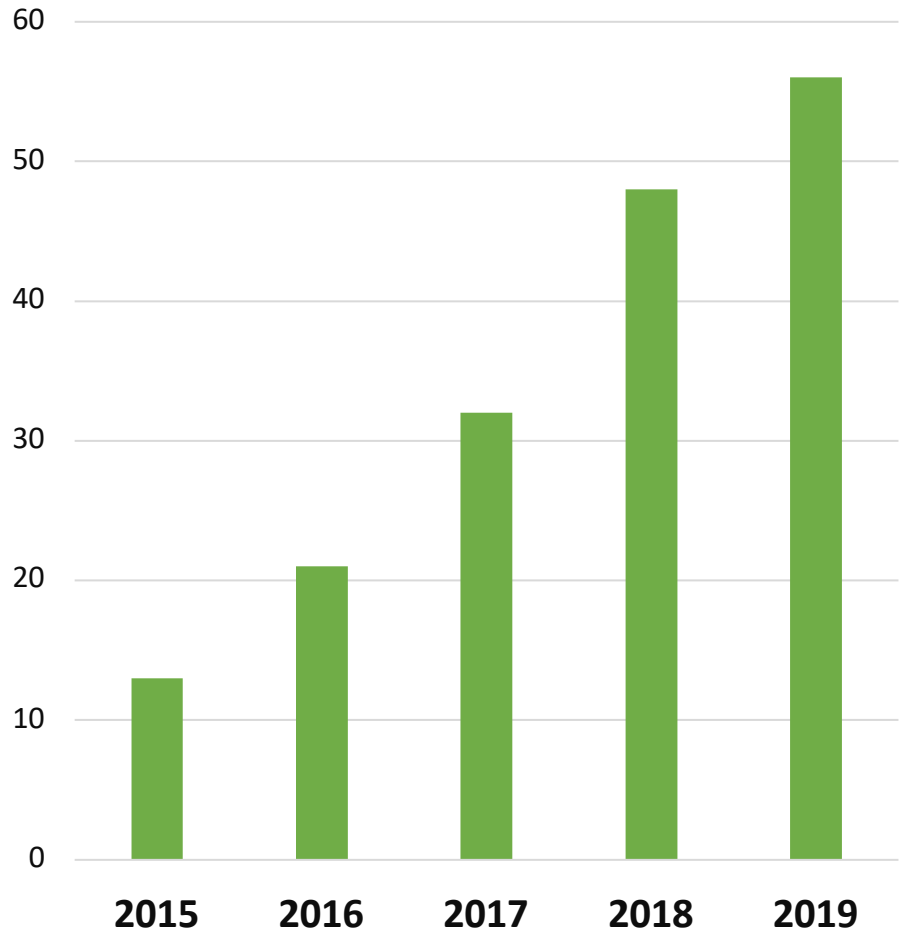
Land Application Incidents



As noted earlier, changes in agency staffing and recordkeeping meant that we are missing some data from 2015-2016. We are not seeing a huge increase in land application incidents.

Land application incidents are usually handled by nonpoint staff, transportation by Spills/R&R

Land Application Issues

Photos: Kevin Erb

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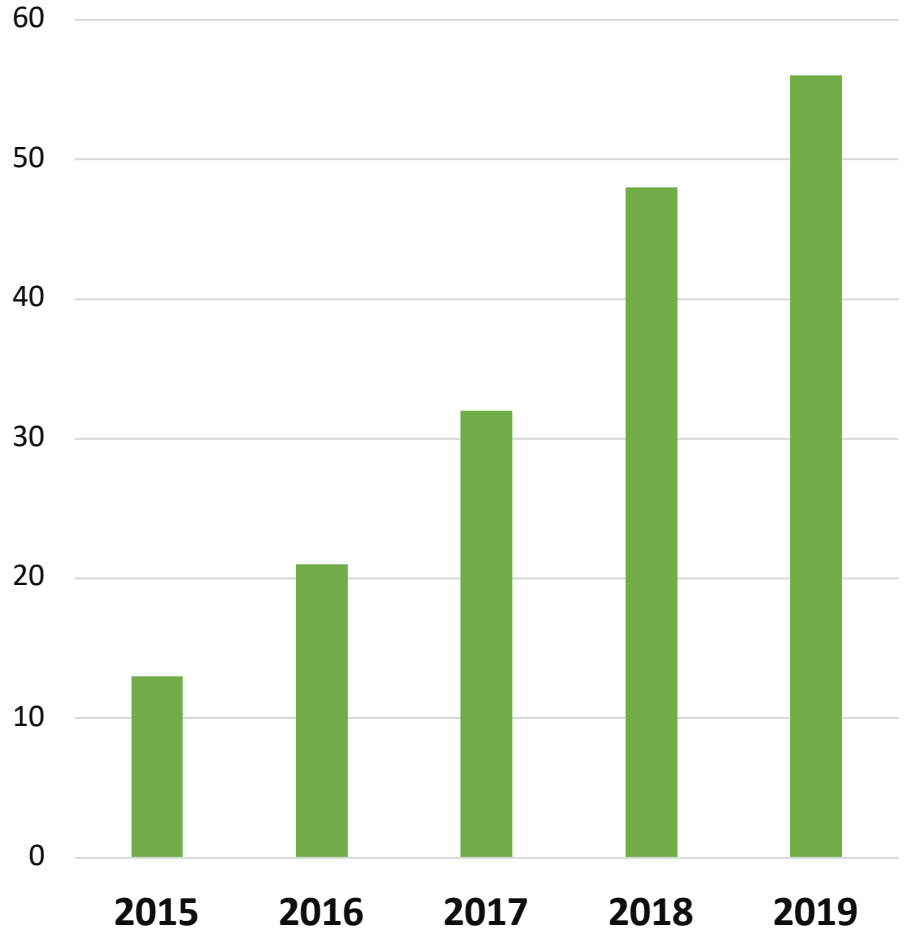
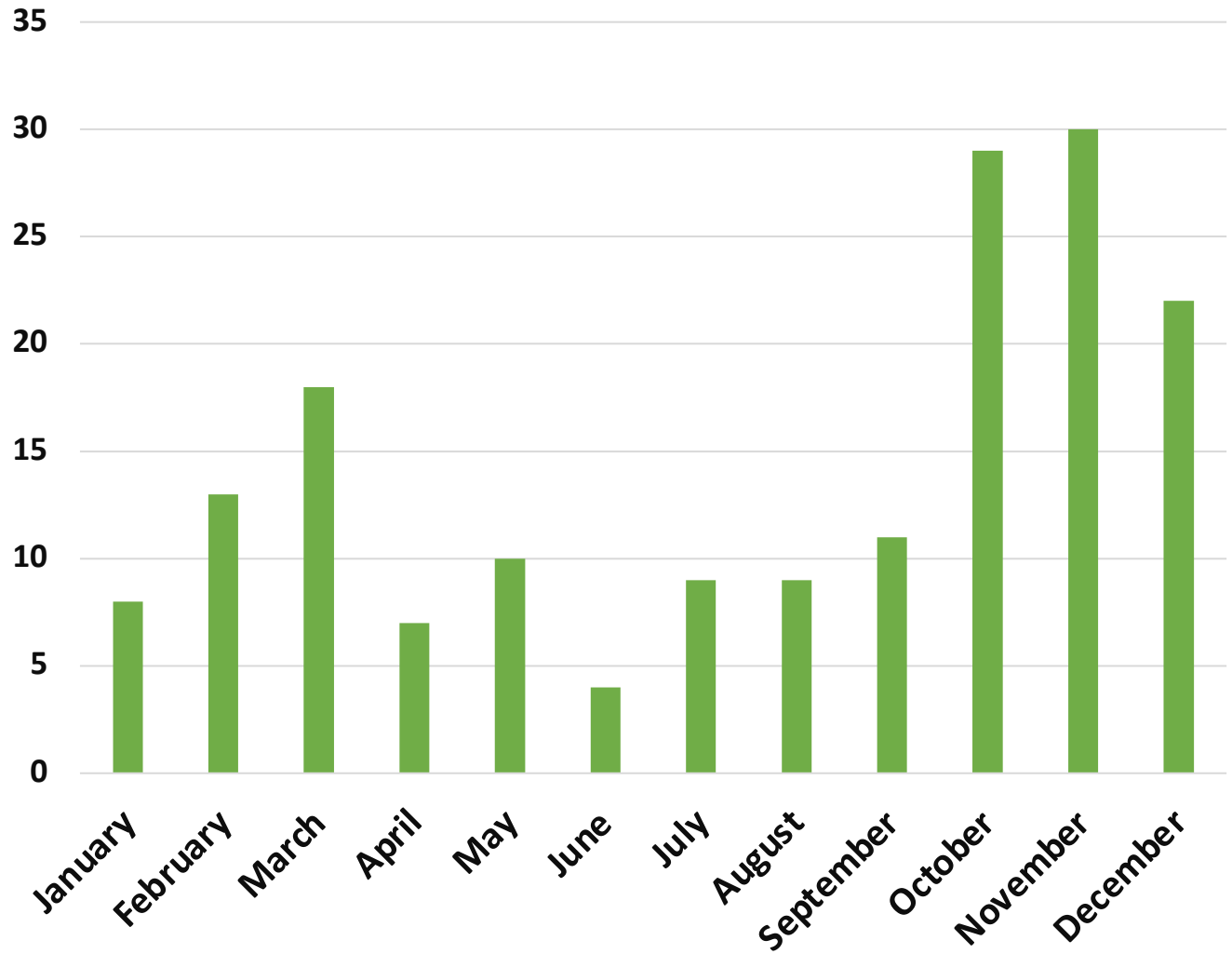
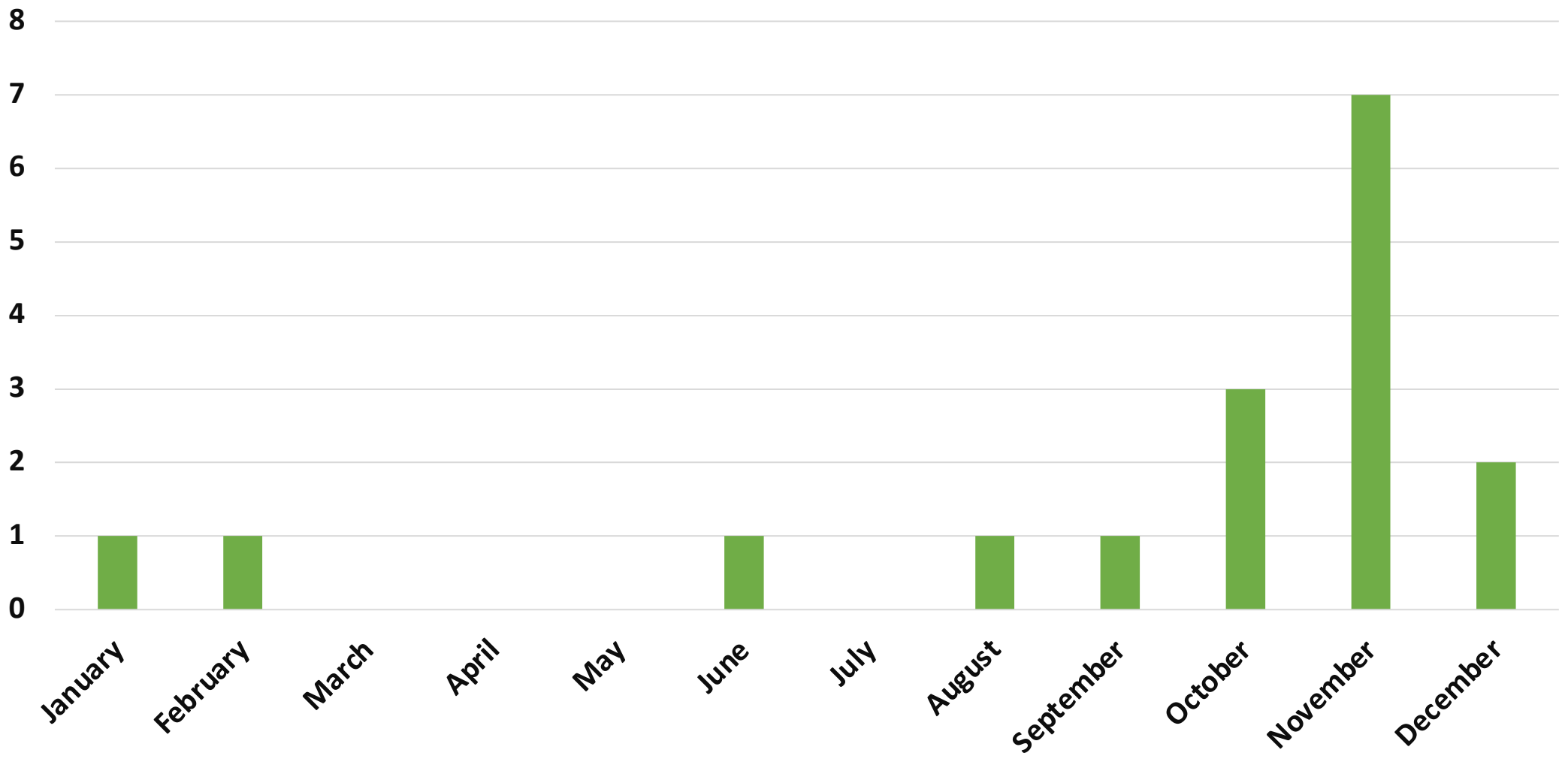
Land Application Incidents

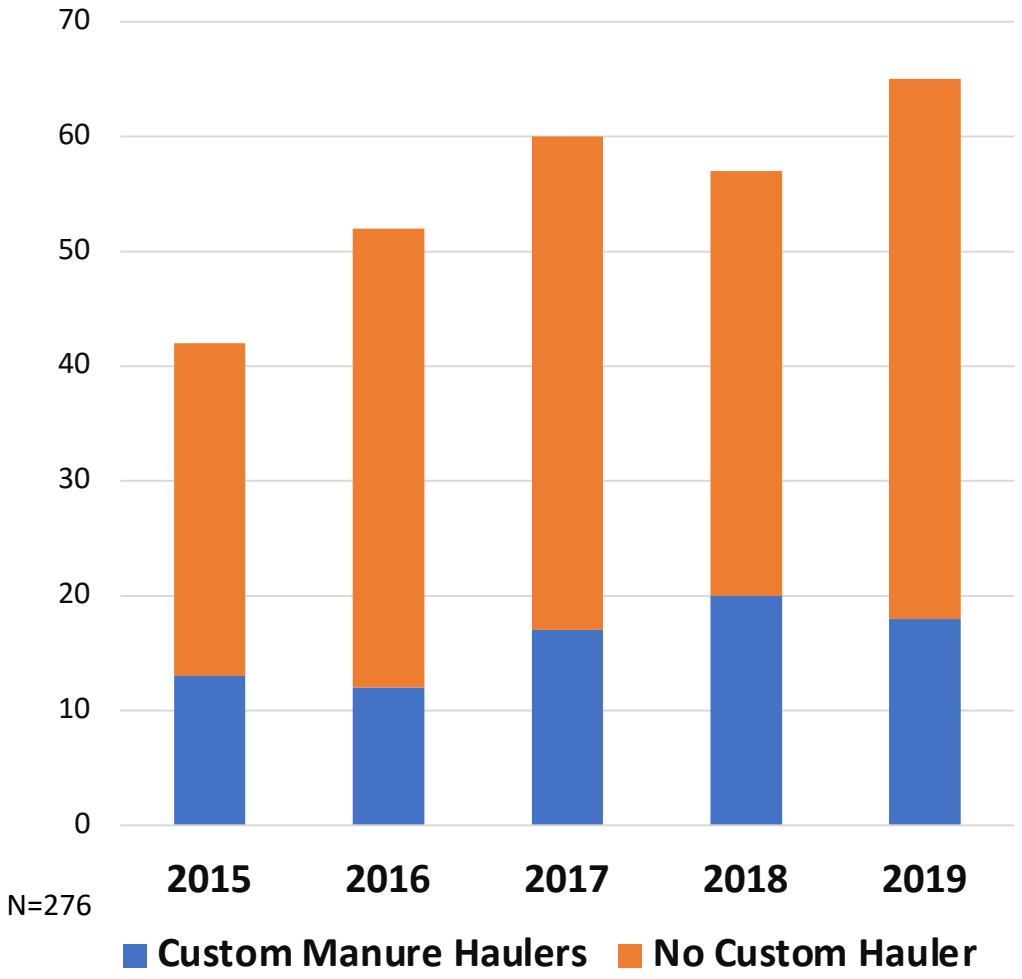


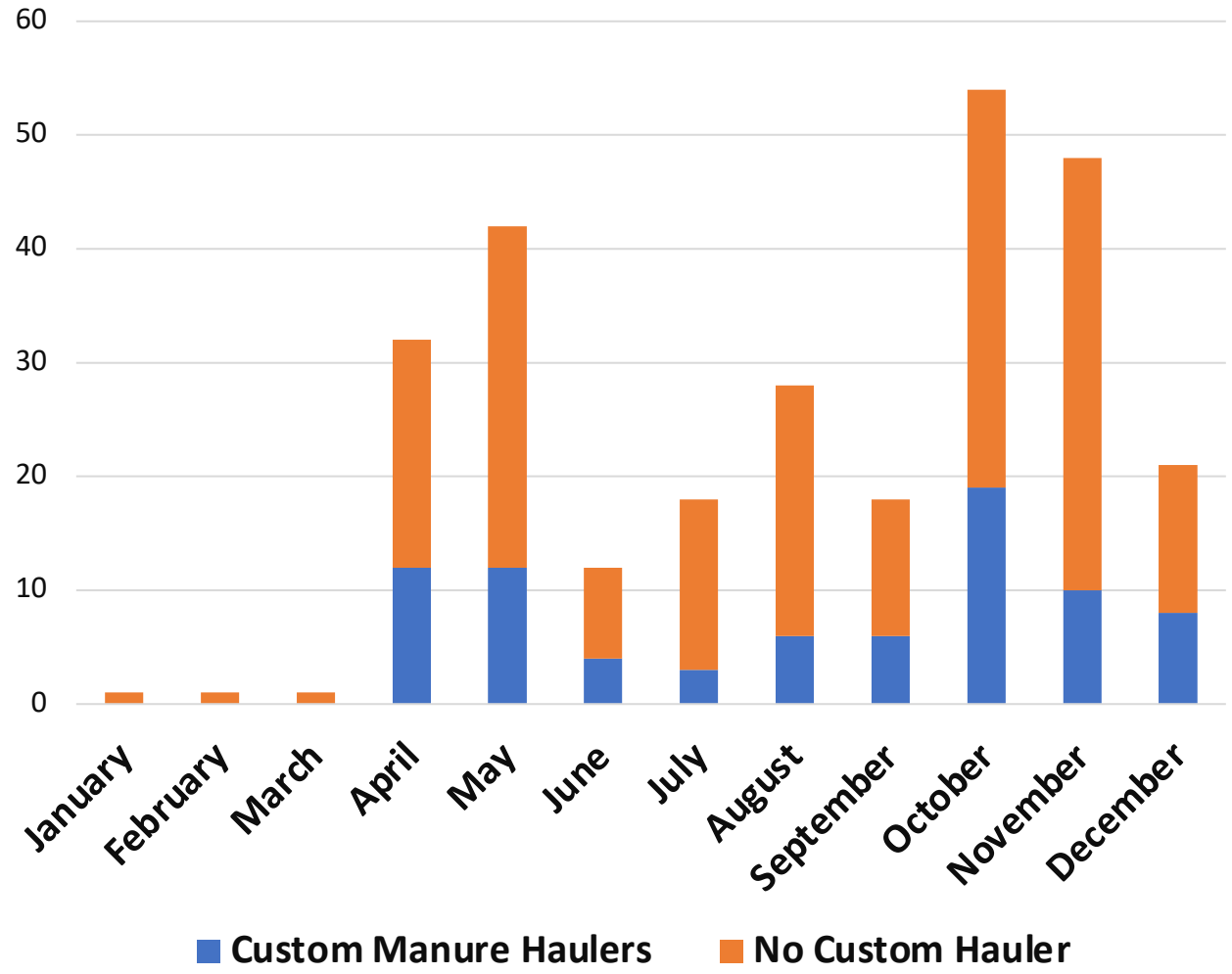


Drain Tile Incidents by Month

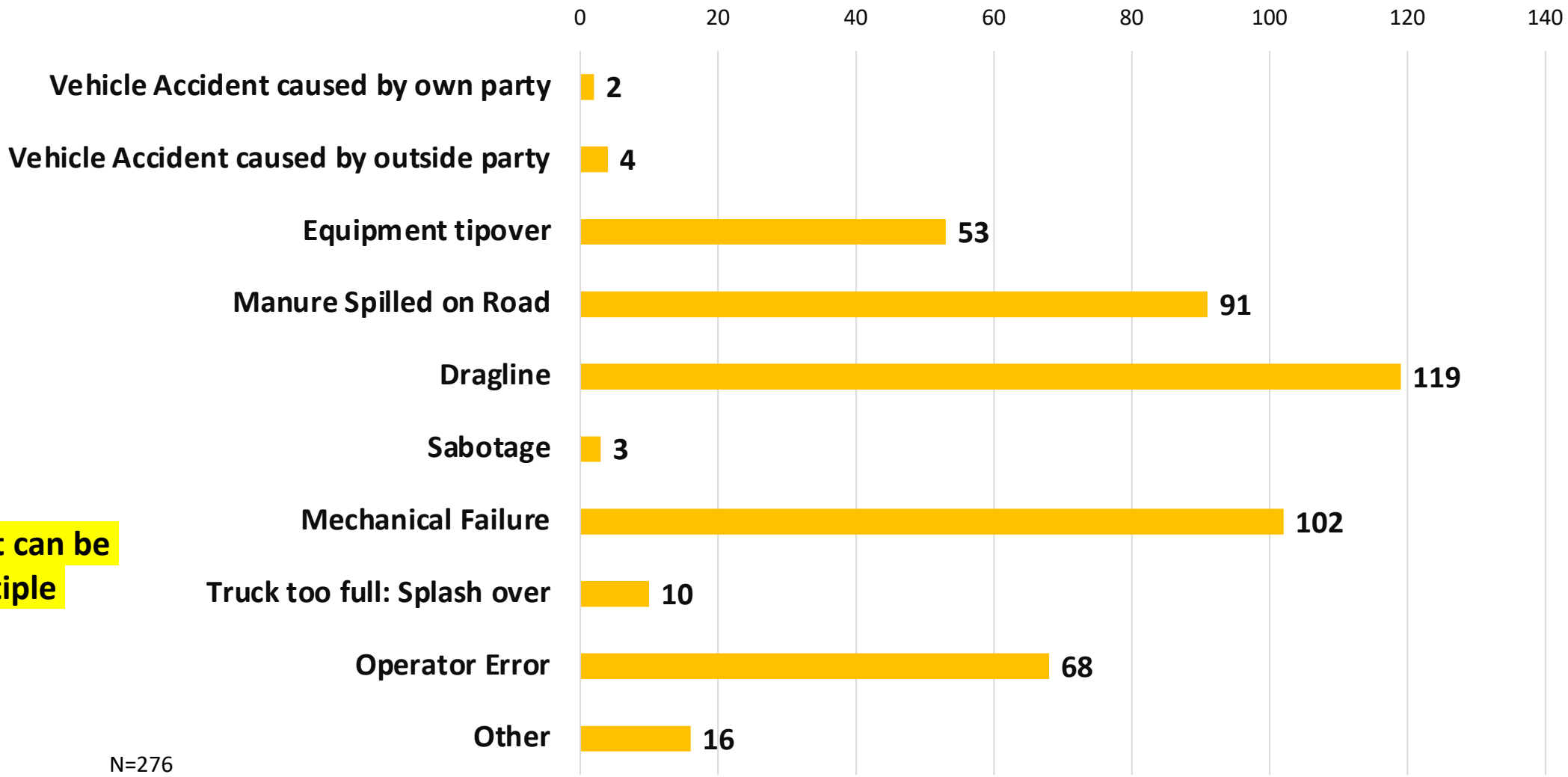


Transportation Incidents





Transportation Incident Breakdown*



*One incident can be a part of multiple categories.

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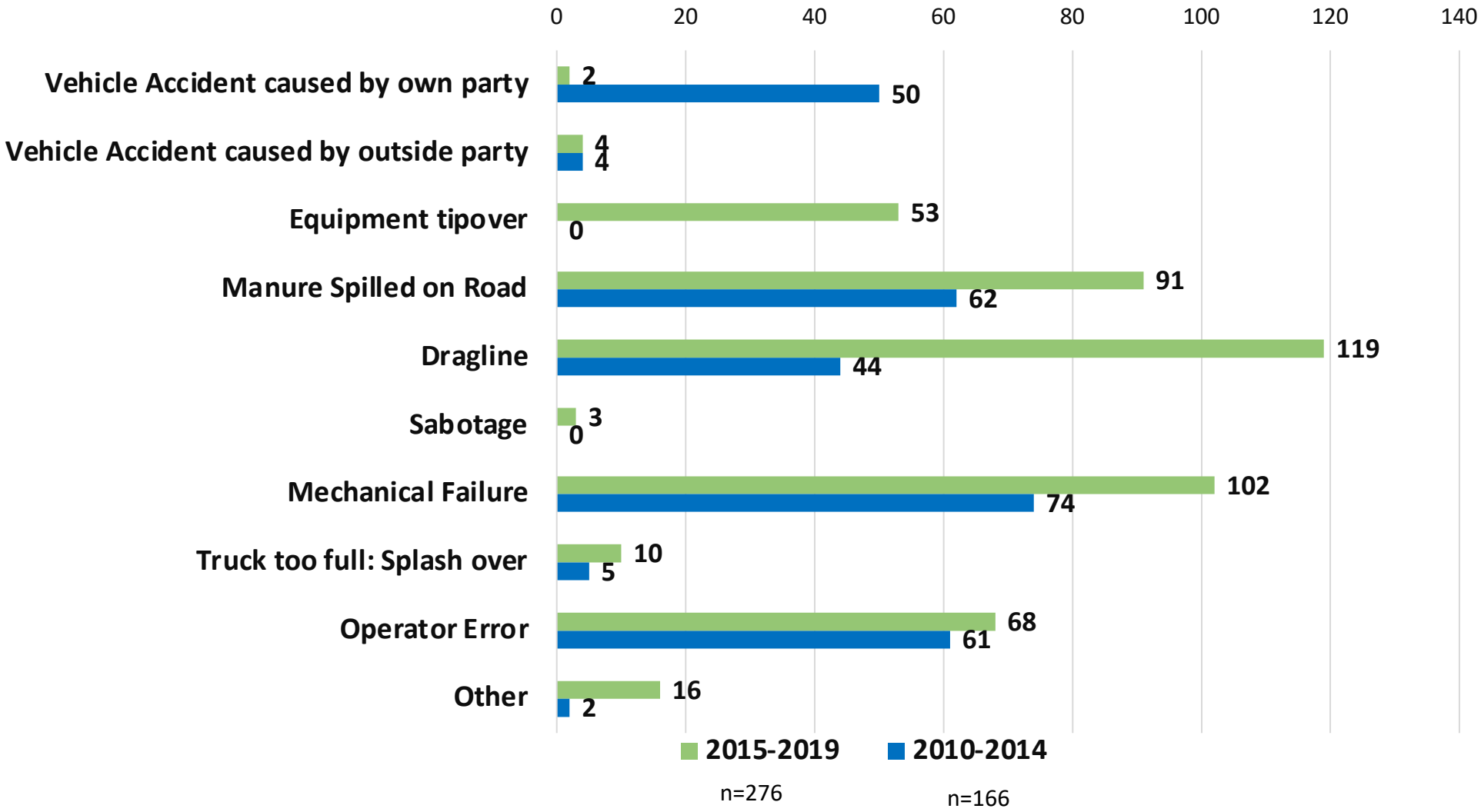
Transportation Incident Breakdown: 2010-2014, 2015-2019



The new category of Equipment tipover accounts for the large decrease in own party accidents.

The large Increase in Dragline related incidents is likely attributed to the increased use of draglines and use under higher pressures.

*One incident can be a part of multiple categories.

Common Transportation Incidents

Draglines: 119 incidents

- 29 leaks/small holes
- 40 hose breaks/ruptures
- 21 couplings/clamps

Photo: Greenhorns of Dragline Facebook group, Kevin Erb

Common Transportation Incidents

On the Road: 156 incidents

- 48 tipovers
- 32 valve issues
  - 9 not fully closed
- 7 frac tank issues

Photo: Greenhorns of Dragline Facebook group

Transportation Issues

48 tipovers with solid data

- **Turning too fast/too wide**
- **Too far onto shoulder**

Unknown: liquid slosh effect.

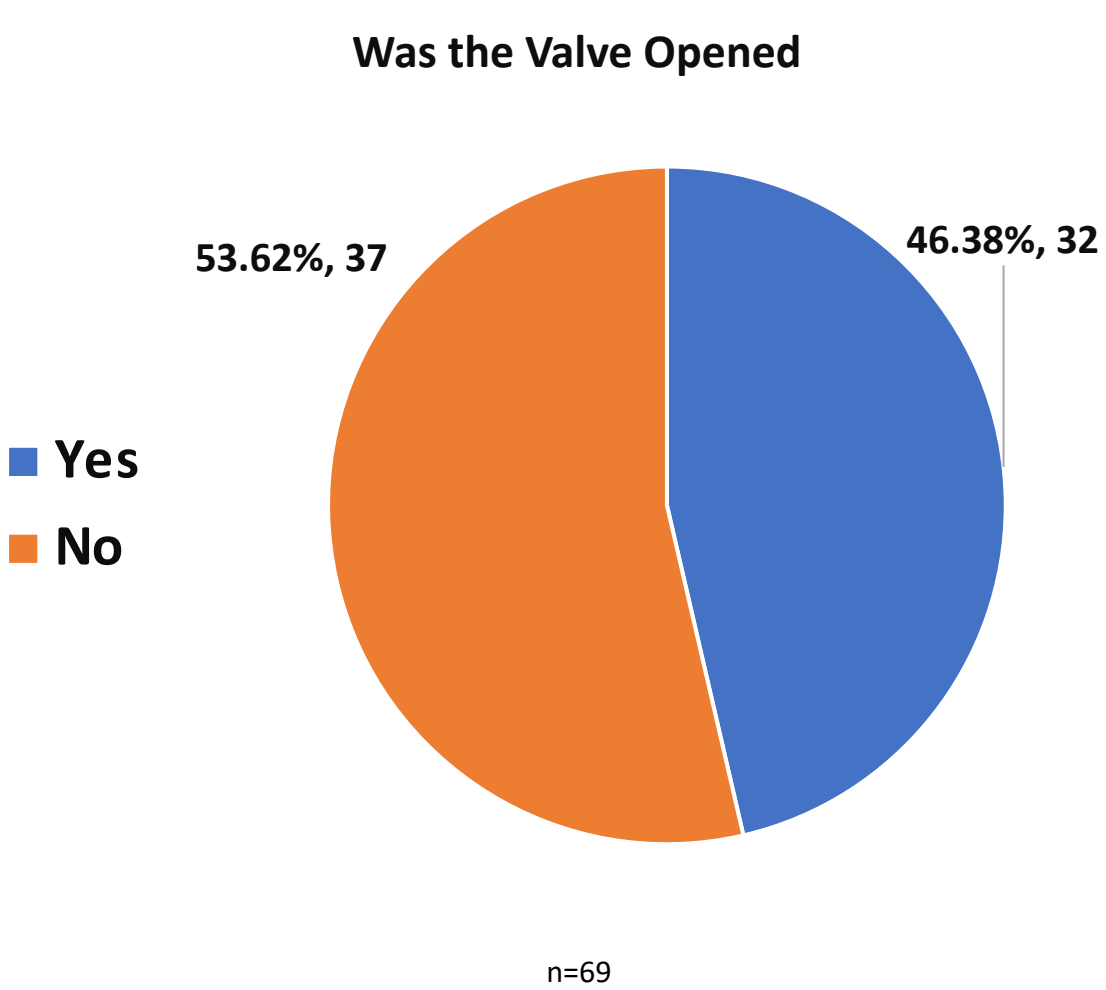
Photos: Wisconsin DNR, Oconto LWCD

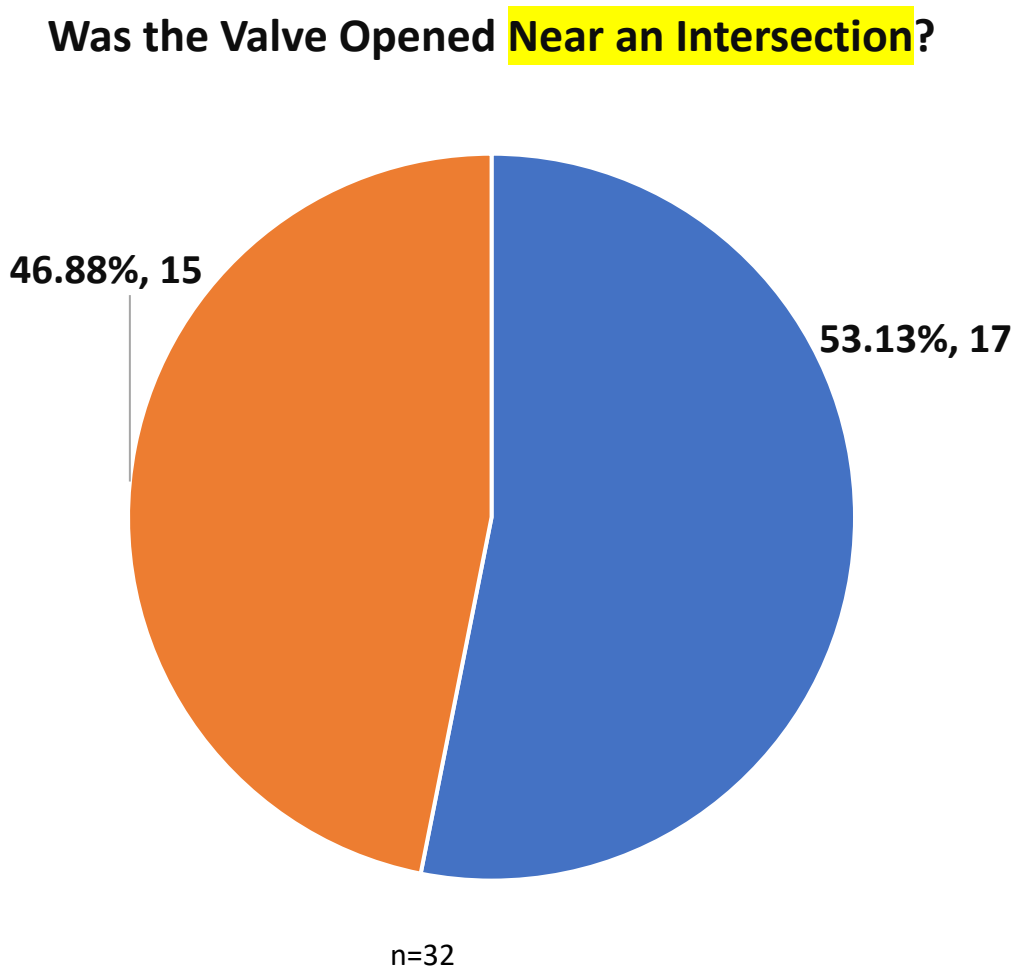
Common Transportation Incidents

Valves are sometimes a problem.

Photo: Bill Iwen

Transportation Incidents Involving Valves





Valves and intersections

Where is the switch?

- **Next to Jake Brake?**
- **On gearshift?**

Driver fatigue

- **Only time they stop is to load, at frac tank and …**

Photo: Bill Iwen

Professional Applicators and Farmer Data

Wisconsin's for-hire applicators move 2/3 of the dairy manure volume

Are they responsible for 2/3 of the problems?

Photo: Kevin Erb

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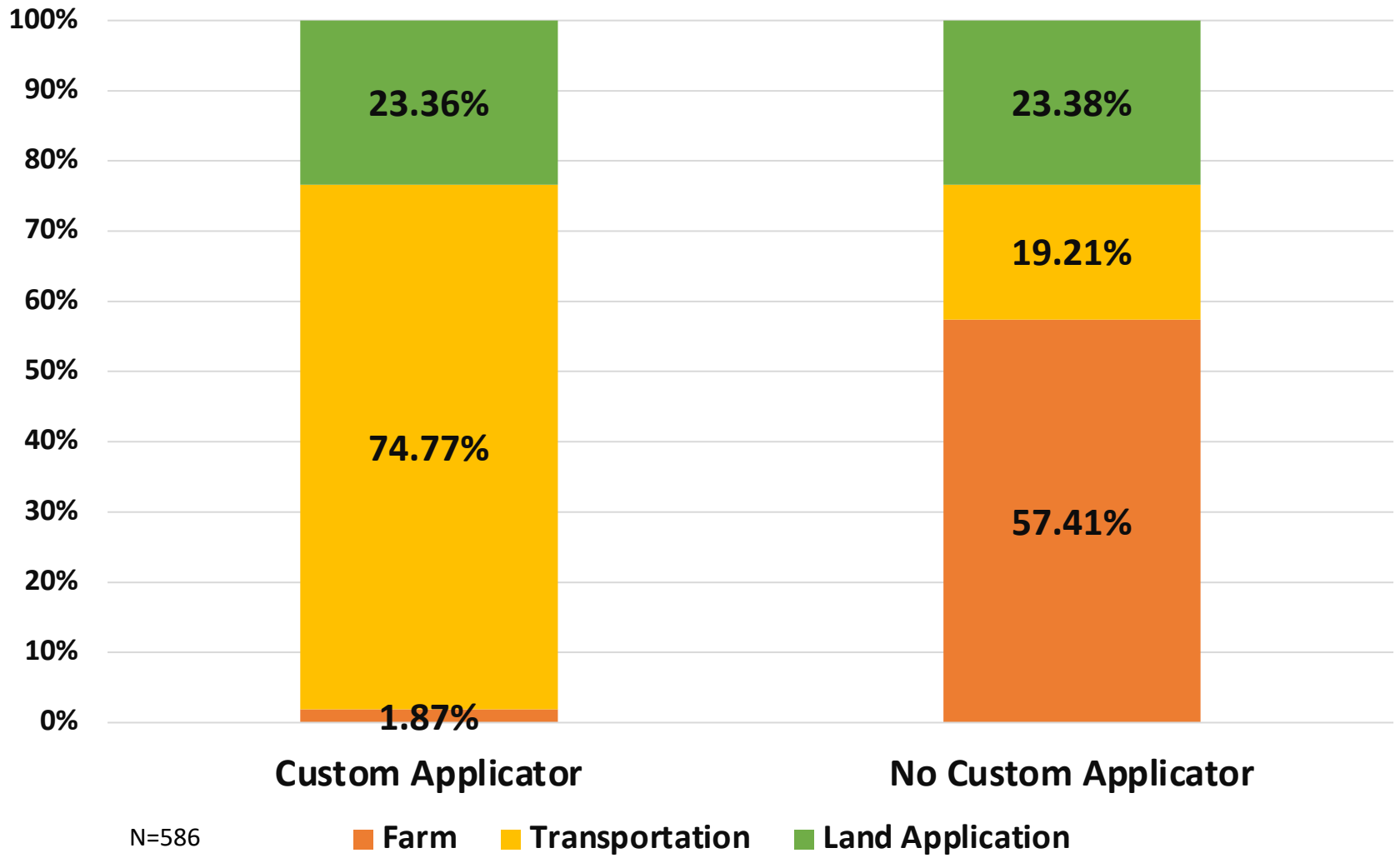
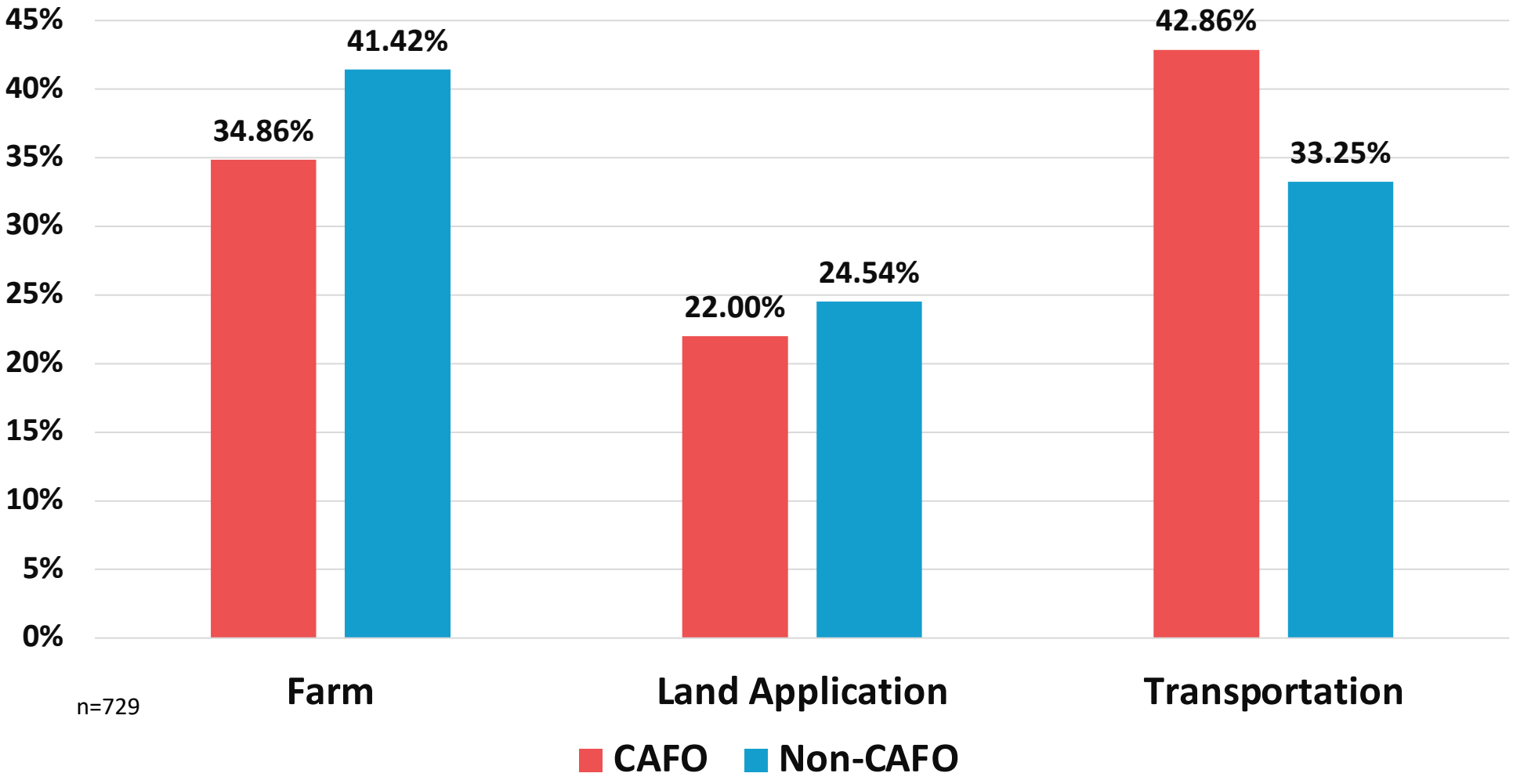
Custom Manure Hauler and Incident Location 2015-2019



*Incidents where the involvement of a custom manure hauler is unknown are not included in this chart.

Custom manure haulers handle 2/3 of the volume in WI, but are involved in <1/3 of the incidents/spills.

Where incidents happen and farm size



Risk Reduction

What can you do to reduce the risk?

- **Driver/operator training**

- **Have a spill response plan**
  - **Make sure all employees are familiar *AND* empowered to act**

Risk Reduction

What can you do to reduce the risk?

- **Safety Checklists: http://go.wisc.edu/s7rpan**

Photo: Kevin Erb

Risk Reduction

Insurance Industry Data: 80%+ reduction in manure-related claimable incidents with:

- **A spill response plan**
- **Operating procedures/checklists**
- **Employee signoff and expectation of follow through.**

→ Result: 7%-38% premium savings in Midwest

NRCS E590-D: Low Cost Hazard Maps

New practice designed to make real-time maps (no data collection) available so farmers know where they are in relation to setbacks.

Photo: Kevin Erb

Spill Response Steps

- Have a plan that is workable
  - A chisel plow or backhoe do no good if they are in the back corner of the shed behind the corn and soybean head, 6 wagons and the planter.

Accidents will happen. What will you do when one does?

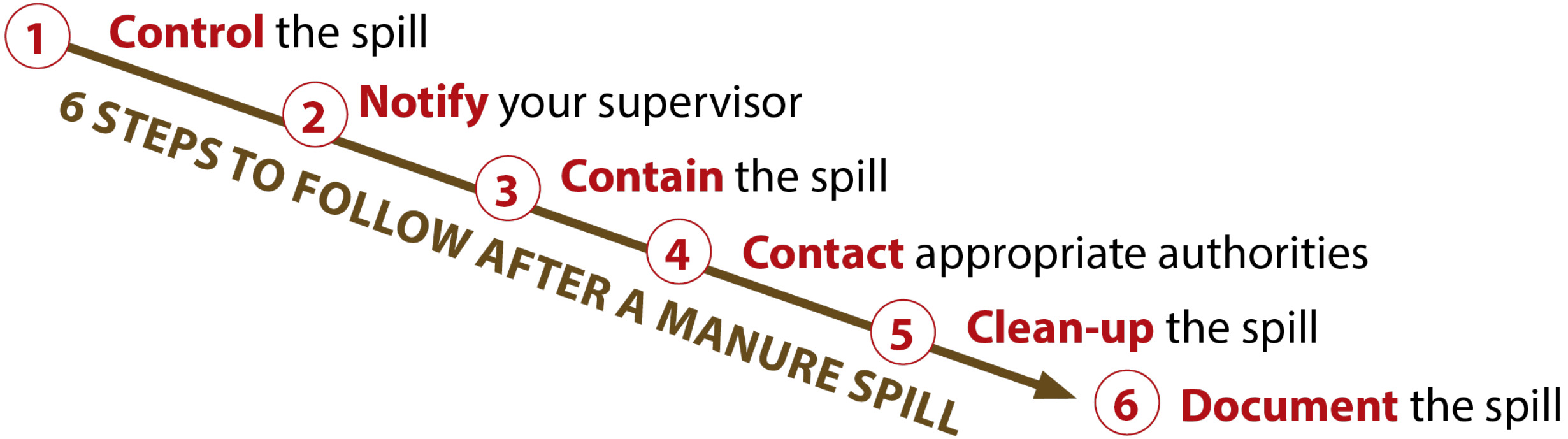
Photo: Iowa State University

First Step: Human Safety

- **911 may be your first call**

Photo: Aspirus Health/UW Madison

Second Step: Environmental Safety



Step 1: Stop Application/Turn off pumps

Photo: Kevin Erb

Step 2: Notify your supervisor

Photo: Jerry Clark

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Step 3: Contain the spill

Clamp hose or park tractor on the hose

Work up ground ahead of the flow

Turn off valves

Create a dam (or dams)

Photos: Kevin Erb, Oconto LWCD

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Step 3: Contain the spill: Protect wells, tile inlets/vents

Photo: Kevin Erb

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Step 4: Report the spill

Depending upon the severity of the spill, environmental risk, and who the neighbors are, REPORTING may need to come before, during, and/or after clean-up.

Photo: Wisconsin DNR

Step 5: Begin the Cleanup

- Pump out manure and remove solids
- Scrape, flush, or pressure wash the surface, trying not to disturb existing vegetation or sod
- Remove sod/soil only as a last resort

Step 6: Documentation

Fill out documentation and paperwork.

Include:

- **What happened**
- **What you did**
- **When you did it**
- **Who you called & when**
- **Site restoration**

Take your own photos

Photo: Kevin Erb

Acknowledgements

For help in planning, organization, office access, record access, data collection and data organization.

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