

Nat Shambaugh

Employed at VAAFM for 30 years.

Responsible for analytical chemistry in support of pesticide regulation in Vermont.

Interested in and concerned about levels and risk assessment of
pesticides in the environment

Member of the Vermont Pesticide Network

PESTICIDE USE IN VERMONT:

CURRENT TRENDS AND PROSPECTS FOR THE FUTURE

PRESENTATION TO:

LAKE CHAMPLAIN BASIN PROGRAM

VERMONT CITIZENS ADVISORY COUNCIL

JANUARY 11, 2021

NATHANIEL SHAMBAUGH

Vermont Department of Agriculture, Food & Markets



VAAFM: responsible for regulating pesticide use in Vermont

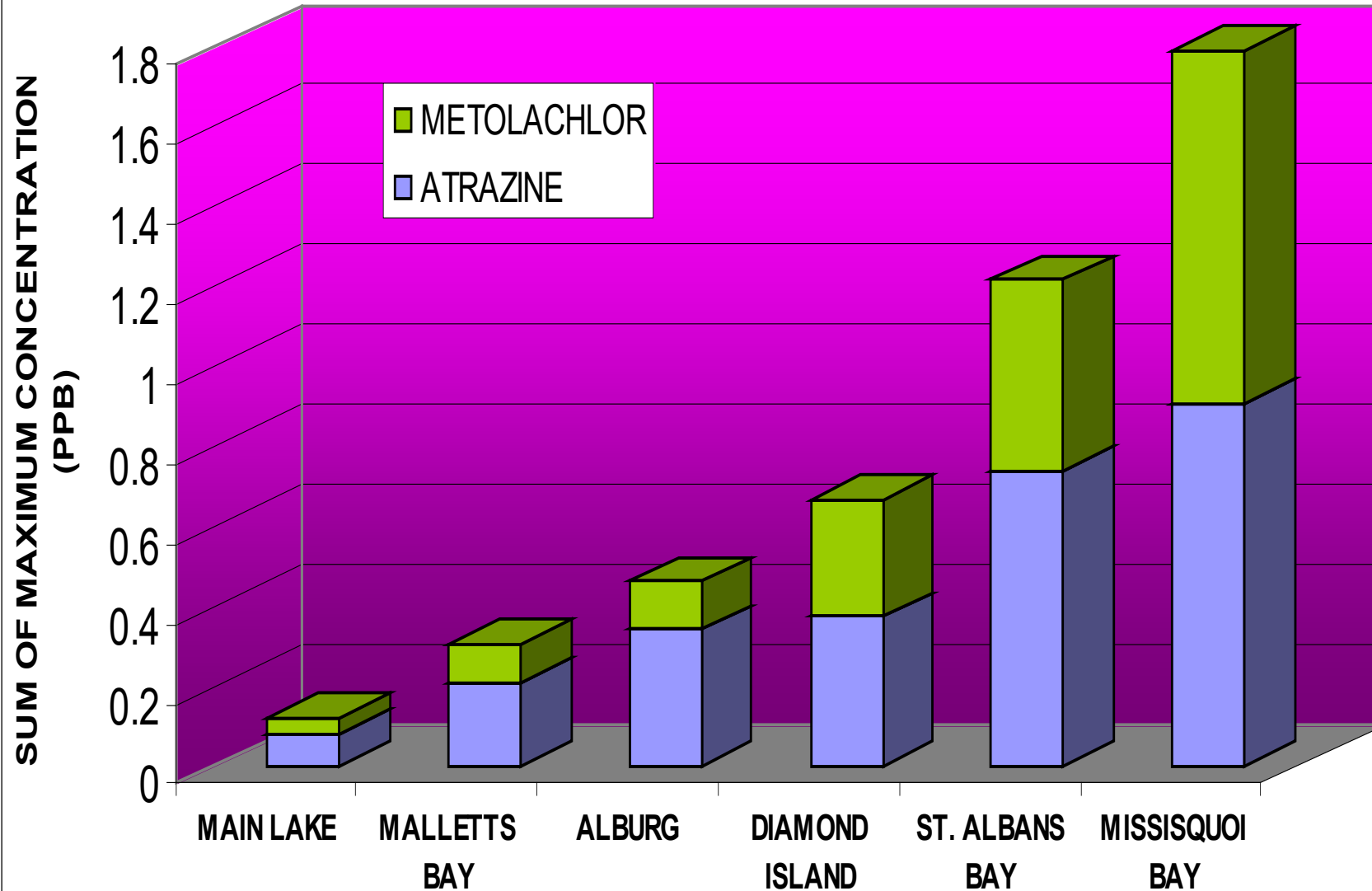
VERMONT PESTICIDE ADVISORY COUNCIL (VPAC)

Responsible for advising VAAFM, The Governor, The Legislature, and the
Public on issues relative to pesticide use and hazards in Vermont

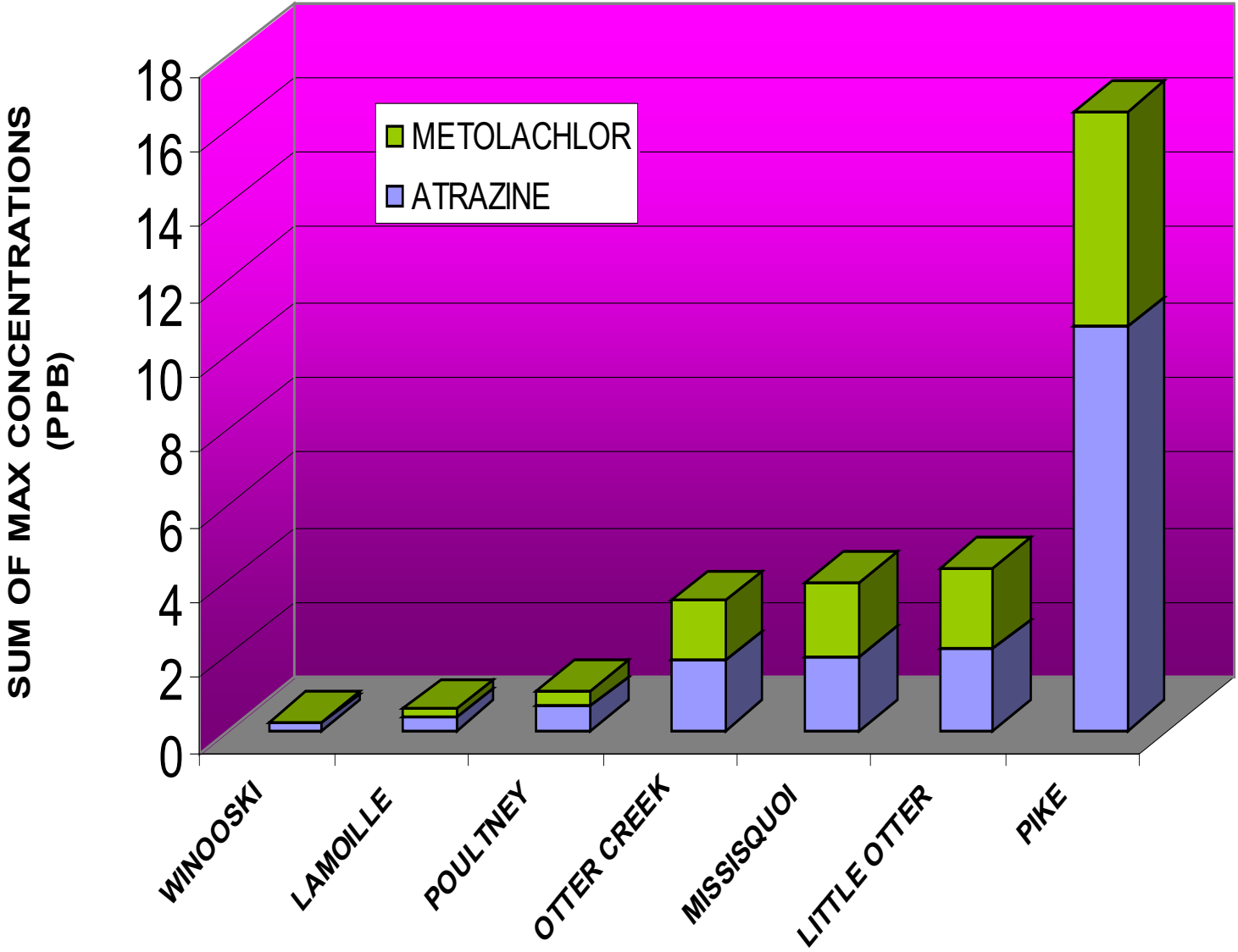
VAAFM HAS BEEN LOOKING AT PESTICIDES IN SURFACE
AND GROUNDWATER FOR ALMOST 40 YEARS.

FIELD CORN IS MAJOR AG CROP IN VERMONT THEREFORE
MOST WATER MONITORING HAS BEEN RELATED TO CORN
HERBICIDE USE SUCH AS
ATRAZINE AND METOLACHLOR

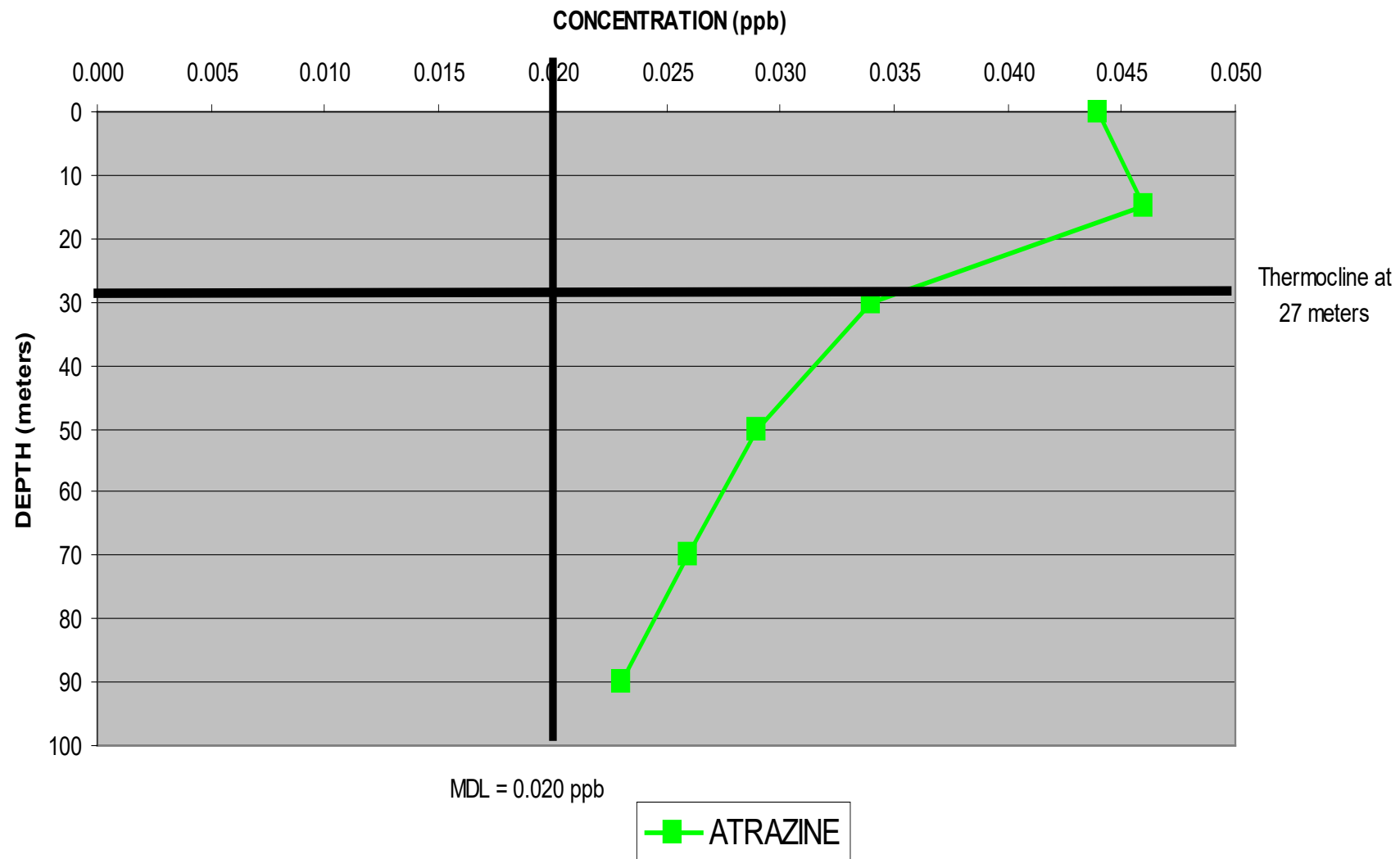
MAXIMUM LAKE SEGMENT CONCENTRATIONS



MAXIMUM RIVER CONCENTRATIONS



CHANGE IN PESTICIDE CONCENTRATION WITH DEPTH 8/28/02



CONCLUSIONS

- SOME PESTICIDE RUNOFF IS AN INEVITABLE EFFECT OF PESTICIDE USE
- WORST 'PROBLEM' LEVELS OCCUR IN SMALL WATERBODIES WHEN LARGE RAINSTORMS OCCUR SHORTLY AFTER APPLICATION

**Organic Contaminants of Emerging Concern in the Lake
Champlain Basin:
A Review of Current Knowledge, 2016.**

Nathaniel Shambaugh
natsh@myfairpoint.net

December 29, 2016

***Lake Champlain Basin Program Technical Report # 85.**
<http://www.lcbp.org/media-center/publications-library/technical-reports/>
Funded by Lake Champlain Basin Program and NEWIPCC

163 COMPOUNDS WITH QUANTIFIABLE RESULTS:

SO WHAT??????

ARE ANY OF THESE 163 ACTUALLY A PROBLEM FOR THE AQUATIC PLANTS
OR ANIMALS IN OUR SURFACE WATERS?

ACUTE AQUATIC RISK QUOTIENT (RQ)

*(POTENTIAL ACUTE RISK OF TOXICITY TO AT LEAST ONE SPECIES
OF AQUATIC PLANT OR ANIMAL)*

RQ =

MAXIMUM DETECTED (in CSO, WWTFE, stream, river, lake)

Divided by

LOWEST LC50 or EC50

R.Q. ≥ 10 (max detected $\geq 10\times$ LC50/EC50)

<u>CONTAMINANT</u>	<u>LOWEST</u> <u>EC50/LC50(ug/L)</u>	<u>R.Q.</u>	<u>LOCATION</u>
DIURON	0.00026	318462	DITCH BY RR TRACKS
<u>ATRAZINE</u>	<u>0.001</u>	<u>114000</u>	<u>JEWETT BROOK</u>
PHENANTHRENE	0.0002	1300	STEVENS BROOK
CAFFEINE	0.068	176	BURLINGTON MAIN CSO
METSULFURON METHYL	0.06	43	DITCH BY RR TRACKS
4-NONYLPHENOL	0.34	41	BURLINGTON NORTH WWTF (effluent)
17a-ETHINYLESTRADIOL	0.0009	31	BELLOWS FALLS WWTF (effluent)
17b-ESTRADIOL	0.002	30	BURLINGTON MAIN WWTF (effluent)
CHLOROTHALONIL	0.5	13	GOLF COURSE POND

FOUR OF NINE COMPOUNDS FOUND AT $\geq 10\times$ TOXICITY VALUE WERE PESTICIDES

EPA CHRONIC AQUATIC LIFE BENCHMARK:

“an aquatic life benchmark can be helpful in interpreting monitoring data and in identifying and prioritizing sites and pesticides that may require further investigation.” *

(*not a regulatory level)

NEONICOTINOID INSECTICIDES IN JEWETT BROOK

- USED AS SEED TREATMENTS ON ALMOST ALL CORN AND SOY IN U.S.
- OF CONCERN RELATIVE TO HONEYBEES AND OTHER POLLINATORS
- HIGHLY WATER SOLUBLE
- PERSISTENT
- HIGHLY TOXIC TO AQUATIC INSECTS (and pollinators)

NEONICS IN JEWETT BROOK 2015*

*all neonicotinoids bind irreversibly to same “nicotine” receptor therefore effect may be additive and cumulative!

<u>DATE</u>	<u>CLOTHIANIDIN</u>
5/13/15 JEWETT BROOK-USGS (#1)	ND
5/19/15 JEWETT BROOK-USGS (#1)	ND
5/31/15 JEWETT BROOK-USGS (#1)	0.03
6/1/15 JEWETT BROOK-USGS (#1)	0.33
6/2/15 JEWETT BROOK-USGS (#1)	0.29
6/10/15 JEWETT BROOK-USGS (#1)	0.08
6/10/15 JEWETT BROOK-USGS (#1)	0.13
6/17/15 JEWETT BROOK-USGS (#1)	0.05
6/22/15 JEWETT BROOK-USGS (#1)	0.03
7/1/15 JEWETT BROOK-USGS (#1)	0.12
7/2/2015 JEWETT BROOK-USGS (#1)	0.14

EPA CHRONIC AQUATIC LIFE BENCHMARK (2021)

0.05ppb



JEWETT BROOK WATERSHED

(06/06/16)

<u>COMPOUND</u>	<u>EPA BENCHMARK</u> (ppb, chronic / acute)	<u>TILE DRAIN #8*</u>	<u>JEWETT BROOK #1</u>
• ATRAZINE	< 1.0/4.6	37 ug/L	114 ug/L
• METOLACHLOR	1.0/8.0	31 ug/L	64 ug/L
• CLOTHIANIDIN	0.05/11	4.2 ug/L	0.49 ug/L
• THIAMETHOXAM	0.74/17.5	1.3 ug/L	1.1 ug/L
• NITRATE-N:		32 mg/L	17 mg/L
• TOTAL-P:		57 ug/L	420 ug/L

*TILE #8 FLOW = **294** L/minute

NEONICS USED ON TREATED CORN

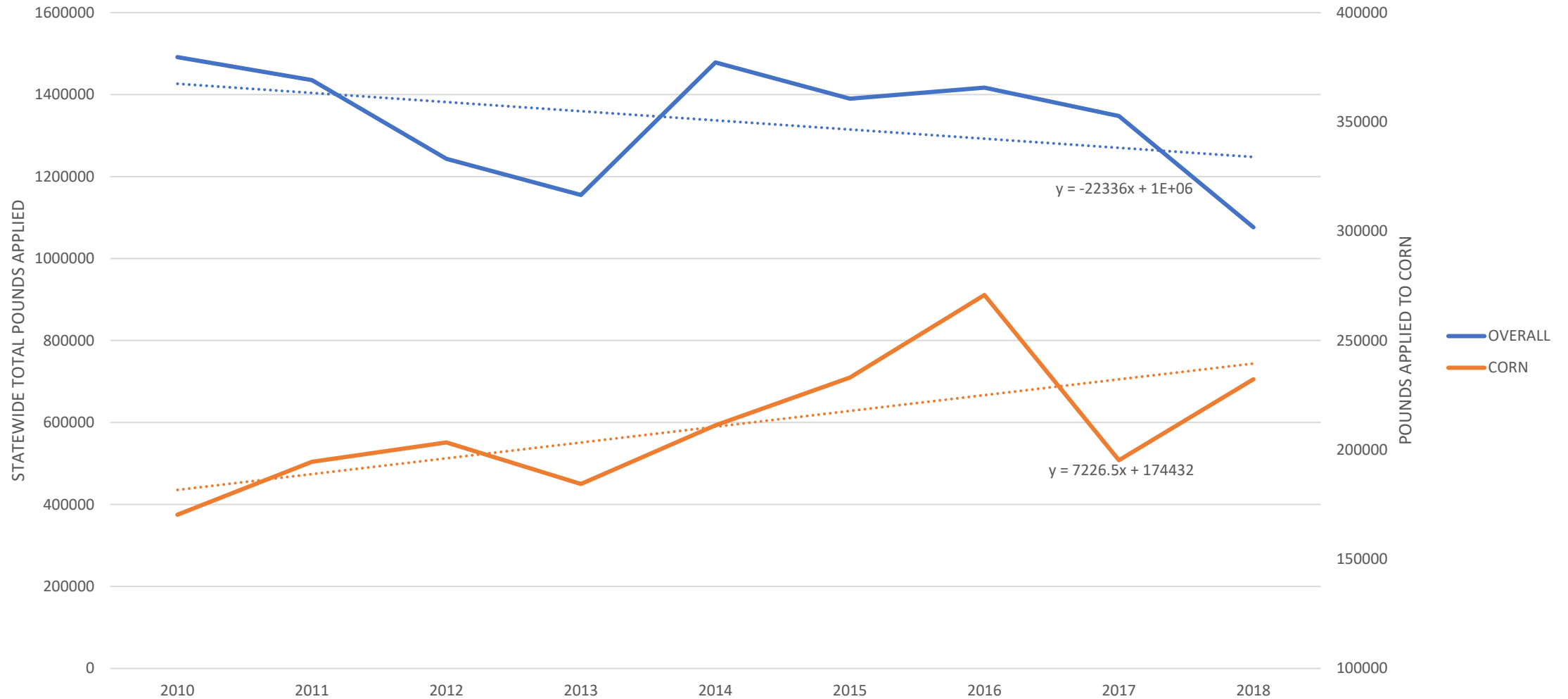
WHEN SHOULD WE WORRY?



TRENDS IN PESTICIDE USE IN VERMONT

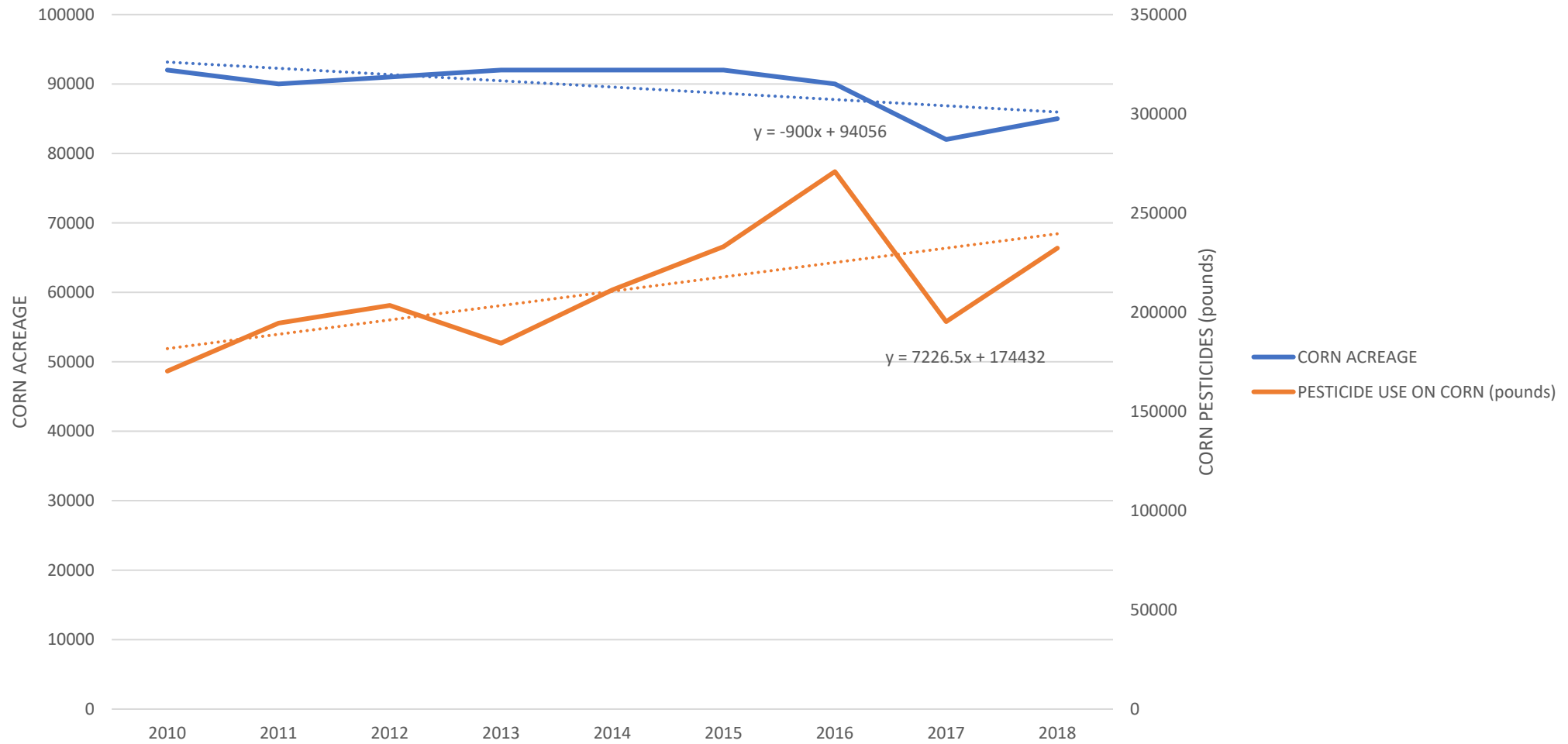
- Based on data submitted annually by commercial pesticide users to VAAFM
- Data reliability over the years has been variable.
- Currently 2010-2018 is available on the web
- **Over a million pounds of pesticides used in Vermont in 2018**
- **Approx. a quarter of that is used on corn to feed dairy cows**
- **DOES NOT INCLUDE HOMEOWNER USE!**

Fig. 2. POUNDS OF PESTICIDES USED PER YEAR



OVERALL PESTICIDE USE IN VERMONT IS DECLINING BUT USE ON CORN IS INCREASING.

Fig. 1. VERMONT ACRES OF CORN vs. PESTICIDE USE

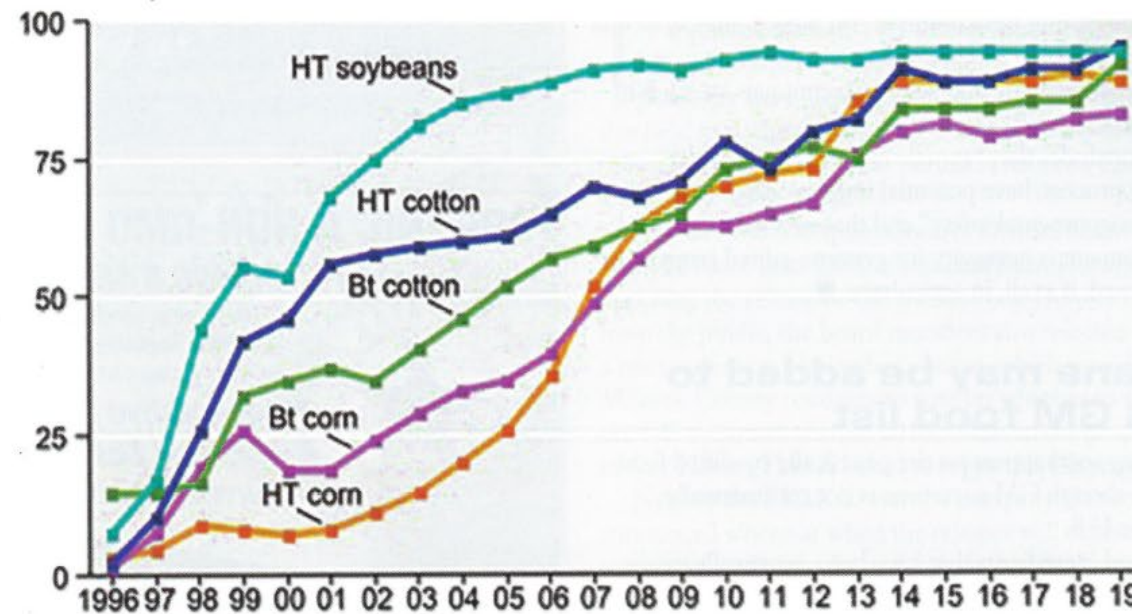


ACRES OF CORN IS GRADUALLY DECLINING BUT PESTICIDE USE ON CORN IS INCREASING.

***WHY IS PESTICIDE USE ON CORN INCREASING
WHILE OVERALL PESTICIDE USE AND
LAND PLANTED TO CORN IS DECREASING???***

Adoption of genetically engineered crops in the United States, 1995-2019

Percent of planted acres



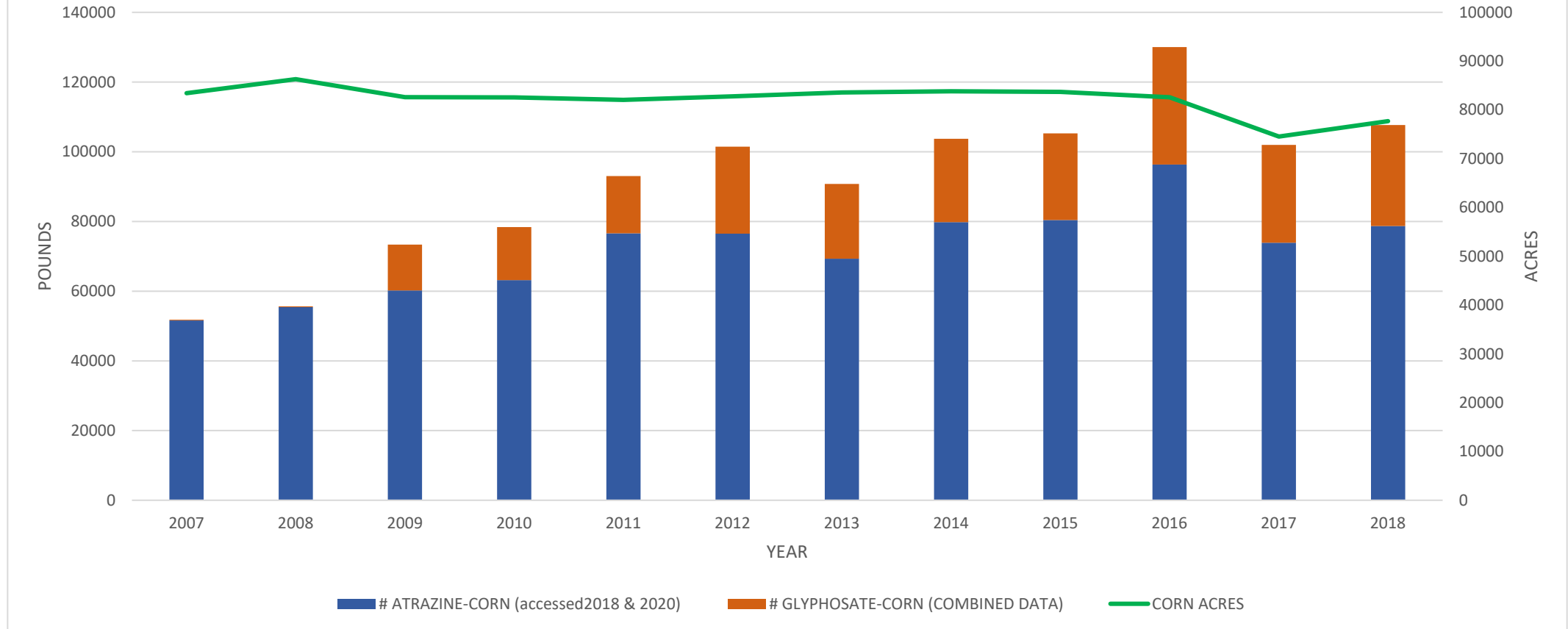
Note: HT indicates herbicide-tolerant varieties; Bt indicates insect-resistant varieties (containing genes from the soil bacterium *Bacillus thuringiensis*). Data for each crop category include varieties with both HT and Bt (stacked) traits.

Source: USDA, Economic Research Service using data from the 2002 ERES report. Adoption of Bioengineered Crops (AER-810) for the years 1996-99 and National Agricultural Statistics Service, (annual) June Agricultural Survey for the years 2000-19.

“ROUNDUP READY” CORN AND SOY

- DESIGNED TO NOT BE KILLED WHEN SPRAYED WITH GLYPHOSATE (“ROUNDUP”)
- DESIGNED TO REPLACE MORE TOXIC WEED KILLERS SUCH AS ATRAZINE

Fig. 4. CORN ATRAZINE & GLYPHOSATE USE 2007-2018



COMBINED USE OF ATRAZINE AND GLYPHOSATE HAS DOUBLED SINCE 2007.

***WHY IS ATRAZINE USE INCREASING
WHEN IT IS “SUPPOSED” TO BE GETTING
REPLACED BY GLYPHOSATE????***

WHERE DO WE GO FROM HERE?????

A FEW THINGS TO THINK ABOUT....

VERMONT REGULATIONS FOR CONTROL OF PESTICIDES
IN ACCORDANCE WITH 6 V.S.A. CHAPTER 87

EFFECTIVE: August 2, 1991



VAAFM is proposing to put revised pesticide regs out for review in 2021.

PREAMBLE:

The goal of these pesticide regulations is to encourage the use of the most environmentally responsible approach to effective pesticide management. The Department of Agriculture, Food and Markets believes that with the knowledge and use of **integrated pest management (IPM)** skills and soil/water conservation techniques currently available this goal will be achieved.

NOTE:

Integrated Pest Management: EPA: “Before taking any pest control action, IPM first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken”

“**soil and water conservation techniques**”: This implies taking into consideration soil health when regulating pesticides

PLANTING VIRTUALLY ALL CONVENTIONAL CORN AND SOY
SEEDS TREATED WITH NEONICOTINOIDS AND FUNGICIDES

IS NOT CONSISTANT WITH IPM

VPAC

Vermont Pesticide Advisory Council

- Created by legislature
- Appointed by the governor
- Members of the public and/or qualified individuals knowledgeable in one or more areas associated with pest control
- Functions:
 - To advise the executive branch
 - To advise state agencies
 - To review pest control programs
 - To suggest policies for wise pesticide use
 - To recommend benchmarks for overall reduction in pesticide use
 - To recommend studies necessary for the performance of its functions

VERMONT PESTICIDE MANAGEMENT SHOULD BE GUIDED BY:

- VAAFM:
 - REGULATE PESTICIDES IN AN ENVIRONMENTALLY RESPONSIBLE WAY UTILIZING INTEGRATED PEST MANAGEMENT
- VPAC:
 - ADVOCATE WISE PESTICIDE USE AND AN OVERALL REDUCTION IN PESTICIDE USE

UNFORTUNATELY...

**IN THE LAST 20 YEARS, VAAFM and VPAC HAVE
ALLOWED RAILROADS TO INCREASE THE WIDTH
OF PESTICIDE SPRAY FROM 16' TO 24' WHILE
TREATING TRAIN TRACKS.**

A 50% increase in pesticide use on railroad tracks in Vermont, even though the amount of tracks has not increased

**WITHIN THE PAST THREE YEARS, VAAFM
HAS ELIMINATED PUBLIC AND VPAC INPUT
INTO GOLF COURSE PESTICIDE PERMITTING.**

Changes made after discussions with golf course managers, but without public input and contrary to current Regs.

AND...

RESPONSIBLE MANAGEMENT DECISIONS
REQUIRE RELIABLE PESTICIDE USE DATA

UNFORTUNATELY THAT DOESN'T EXIST IN VERMONT

PESTICIDE USAGE REPORTED

Data Limitations

The data collected is self-reported by applicators. Reporting errors have been found and corrected in usage amount, EPA number, product name and county of application.

The usage data was reviewed:

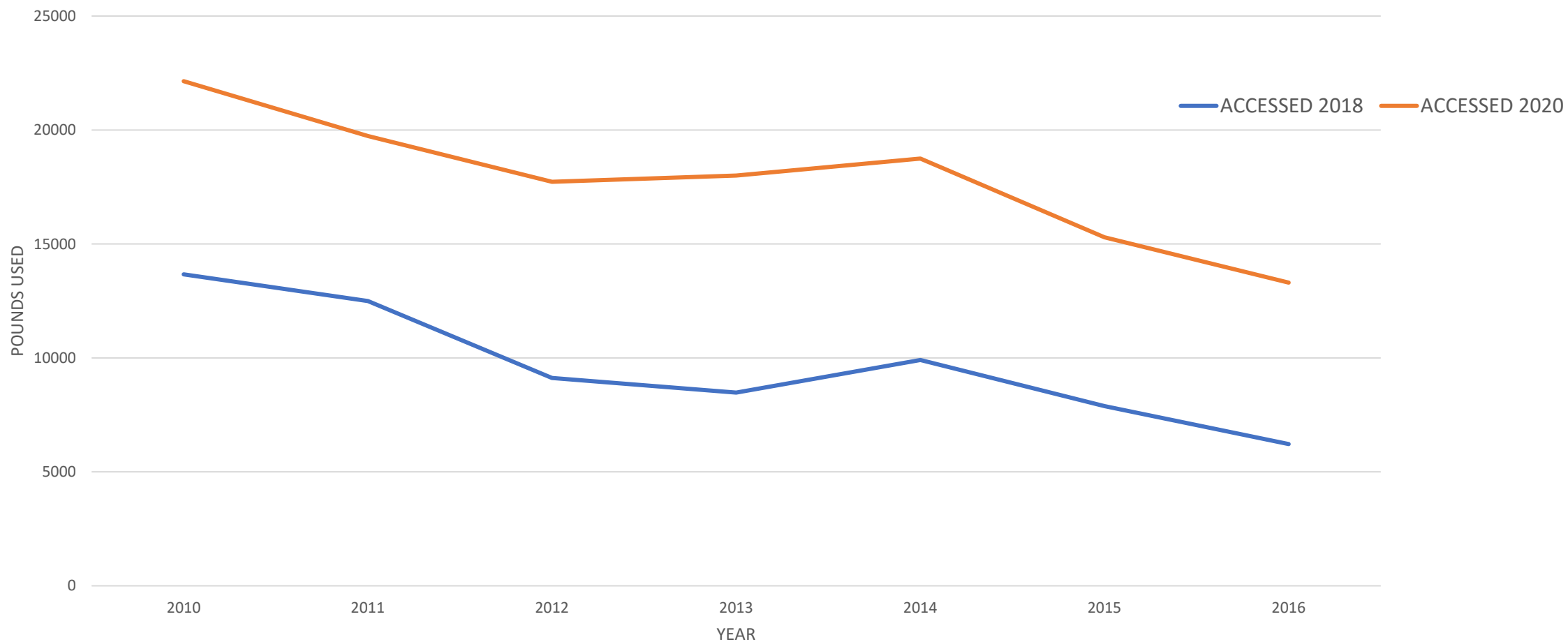
- 2018 = 100% *
- 2011, 2015-2017 = 40%
- 2010, 2012-2014 = 25%

* with complete secondary review

Summary Data: 2010-2018

- [2018](#)
- [2017](#)
- [2016](#)
- [2015](#)
- [2014](#)
- [2013](#)
- [2012](#)
- [2011](#)
- [2010](#)

Figure 4. CHLOROTHALONIL GOLF COURSE USE



CHLOROTHALONIL USE ACCORDING TO VAAFM WEBPAGE 2018 vs. 2020

VAAFM IS PROPOSING TO REPLACE VPAC WITH “AGRICULTURAL INNOVATION BOARD”

Title 6 : Agriculture

Chapter 087 : Control Of Pesticides

(Cite as: 6 V.S.A. § 1102)

§ 1102. Agricultural Innovation Board

a. Creation

(1) There is created the Agricultural Innovation Board that shall:

A. Recommend farming principles and practices that increases biodiversity, enriches soils, improve watersheds, and enhances ecosystem services. Practices and principals must include:

- (i) The ability to capture carbon in soil and aboveground biomass, reversing current global trends of atmospheric accumulation;
- (ii) The intent of increasing yields;
- (iii) Resilience with regard to climate instability; and
- (iv) Increased health and vitality for farming and ranching communities.

SOUNDS LIKE WHAT UVM EXTENSION CENTER FOR SUSTAINABLE AGRICULTURE
IS ALREADY DOING

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- (iv) Increased health and vitality for farming and ranching communities.

SOME GOOD IDEAS, BUT SHOULD NOT REPLACE VPAC.

MORE EMPHASIS SHOULD BE PUT ON PESTICIDE MINIMIZATION IN VERMONT, NOT LESS.

GLOBAL WARMING SOLUTIONS ACT

- IMPROVE SOIL HEALTH; MINIMIZE PESTICIDE USE
- DECREASE ON FARM CARBON FOOTPRINT; MINIMIZE PESTICIDE USE
- INCREASE RESILIENCY; MINIMIZE NEED TO IMPORT CHEMICALS;
MINIMIZE PESTICIDE USE
- REDUCE OVERALL FOOTPRINT OF VERMONT TRANSPORTATION SECTOR;
MINIMIZE PESTICIDE USE

CONCLUSIONS:

- PESTICIDES ARE UBIQUITOUS IN THE WATERS OF VERMONT, ESPECIALLY IN SMALLER STREAMS NEAR AGRICULTURE
- SPENDING A LOT OF MONEY RESEARCHING AND REGULATING NUTRIENT RUNOFF, SHOULD BE PAYING ATTENTION TO PESTICIDES AS WELL.

CONCLUSIONS:

- VAAFM AND VPAC ARE NOT ADHERING TO THEIR MANDATES TO WORK TOWARDS MINIMIZING ENVIRONMENTAL HARM
- VAAFM NEEDS TO INCORPORATE **IPM**, **SOIL HEALTH**, **PESTICIDE MINIMIZATION** INTO NEW REGS AND **INCREASED TRANSPARENCY** INTO DAY TO DAY ACTIVITIES and POLICY.

CONCLUSIONS:

- VPAC NEEDS TO BE REVITALIZED (**not replaced**) TO BECOME MORE INDEPENDENT FROM VAAFM AND TO EMPHASIZE THEIR ORIGINAL MISSION OF WORKING TO REDUCE PESTICIDE USE AND RISK IN VERMONT.

INDIVIDUAL OPPORTUNITIES:

- READ AND COMMENT ON REVISED PESTICIDE REGS.
- READ AND COMMENT ON PROPOSED REPLACEMENT TO VPAC
- IMPRESS ON VAAFM and THE LEGISLATURE THE IMPORTANCE OF MINIMIZING PESTICIDE RISK/USE

VT CAC OPPORTUNITIES: ADVOCATE FOR:

- INCORPORATE PESTICIDE ANALYSIS IN “EDGE OF FIELD” RUNOFF AND OTHER STUDIES FUNDED BY LCBP, VAAFM, VTDEC, USGS, etc.
- INCORPORATE PESTICIDES INTO TMDL, TILE DRAIN AND OTHER NUTRIENT LEGISLATION AND RULES.
- FORMALIZE INCORPORATION OF PESTICIDE TESTING INTO LCBP LONG TERM MONITORING PROGRAM

OPPORTUNITIES:

- ADVOCATE FOR VAAFM TO PUT NECESSARY RESOURCES INTO MAINTAINING THEIR DATABASES ADEQUATELY (how do we make sure it actually happens?)
- ADVOCATE FOR VAAFM TO MAKE WATER MONITORING DATA AVAILABLE ON THE WEB....INCREASE TRANSPARENCY!!!
- ADVOCATE FOR VAAFM TO FIND A WAY TO COLLECT INFORMATION ON HOMEOWNER PESTICIDE USE



“JEWETT BROOK”