Investigating Ecological Impacts from AltEn Pollution

July 12 2022
Society of American Military Engineers

A little background…

BS in Zoology (Humboldt State Univ.) Arcata, California

-2005-6: Student Conservation Association (Americorp) Intern
(USDA APHIS Fort Lauderdale, Florida)

-2007-10: MS (Washington State Univ.) *Pesticide residue accumulation in brood comb and potential impacts on colony development in honey bees*

-2010-15: PhD (Univ. Minnesota): *Neonicotinoid insecticide exposure on honey bee and bumble bee queens and effects on egg-laying behavior & inhibition of colony functions*

Started at UNL October 2015
University of Nebraska-Lincoln
Appointment: 50% Research 50% Extension

N EXTENSION

Potential effects of pesticides vary

individual

colony

Acute Lethal Exposure

Direct effects

Individual Bee Deaths

Colonies of Bees

Chronic Sub-Lethal Exposure

Direct effects & Indirect effects

Behavior

Foraging

Learning

Memory

Orientation

Grooming

Development

Inability to grow

More susceptible to disease

Shorter lifespan

Reproduction

Improper mating

Reduced sperm viability

Reduced egg-laying

Queen/Drone development

Habitat

Reduced resource availability

Reduced diversity

Poor nutrition

Estimating risk is difficult

Challenges: Estimating “field-relevant” exposure is quite difficult

Where are bees getting exposed?

Are they bringing contaminates back to the hive?

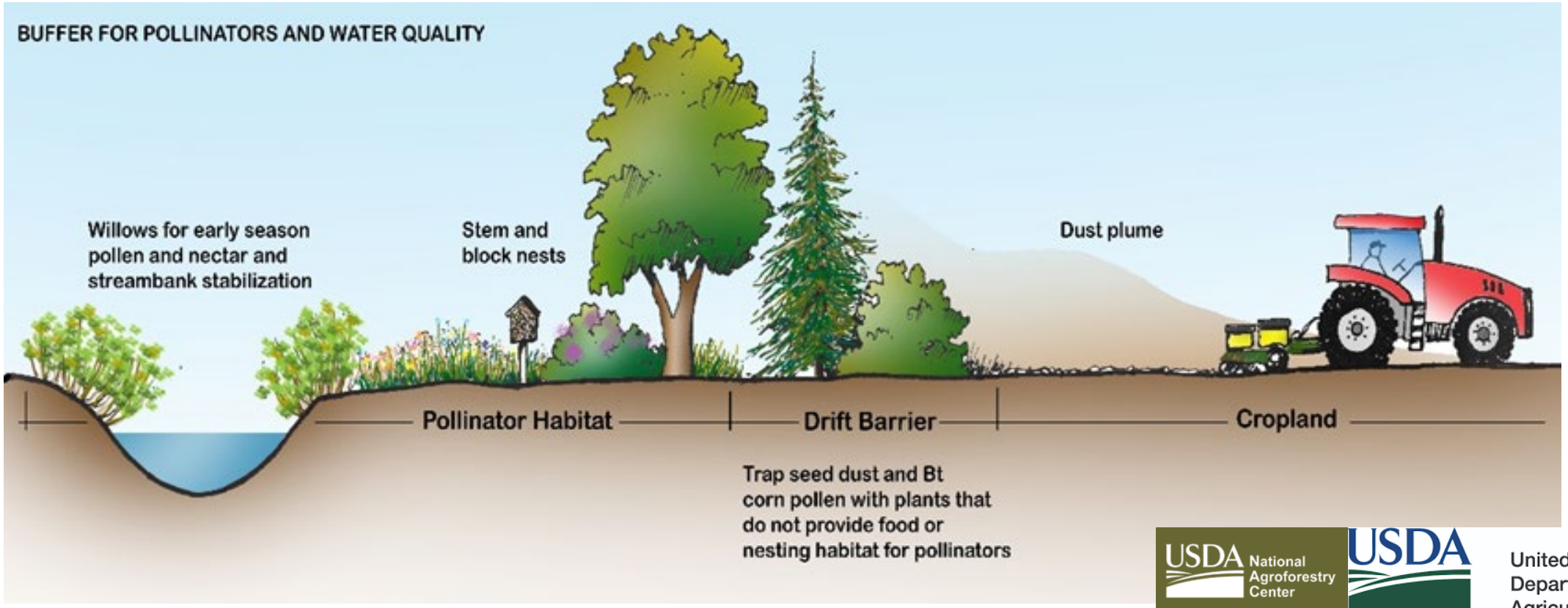
Risk to individual bees will depend on role (Rortais et al 2005)

Which bees consume pollen?
“Nurse bees” that feed and care for offspring

Landscape enhancements to reduce pesticide drift & increase forage for pollinators in agricultural fields

Drift from:
Neonicotinoid insecticides (Spring)
Bacillus thuringiensis (Bt toxins) embedded corn pollen (Fall)

Surabhi Vakil,
PhD student



Supported by the Nebraska Agricultural Experiment Station with funding from the Hatch Multistate Research capacity funding program (Accession Number 1011128) from the USDA National Institute of Food and Agriculture and the USDA National Agroforestry Center.

USDA National Agroforestry Center
USDA United States Department of Agriculture
National Institute of Food and Agriculture

Dr. Marion Ellis retired in 2013/14

I began in Fall of 2015

Spring 2017
4-6 colonies died out

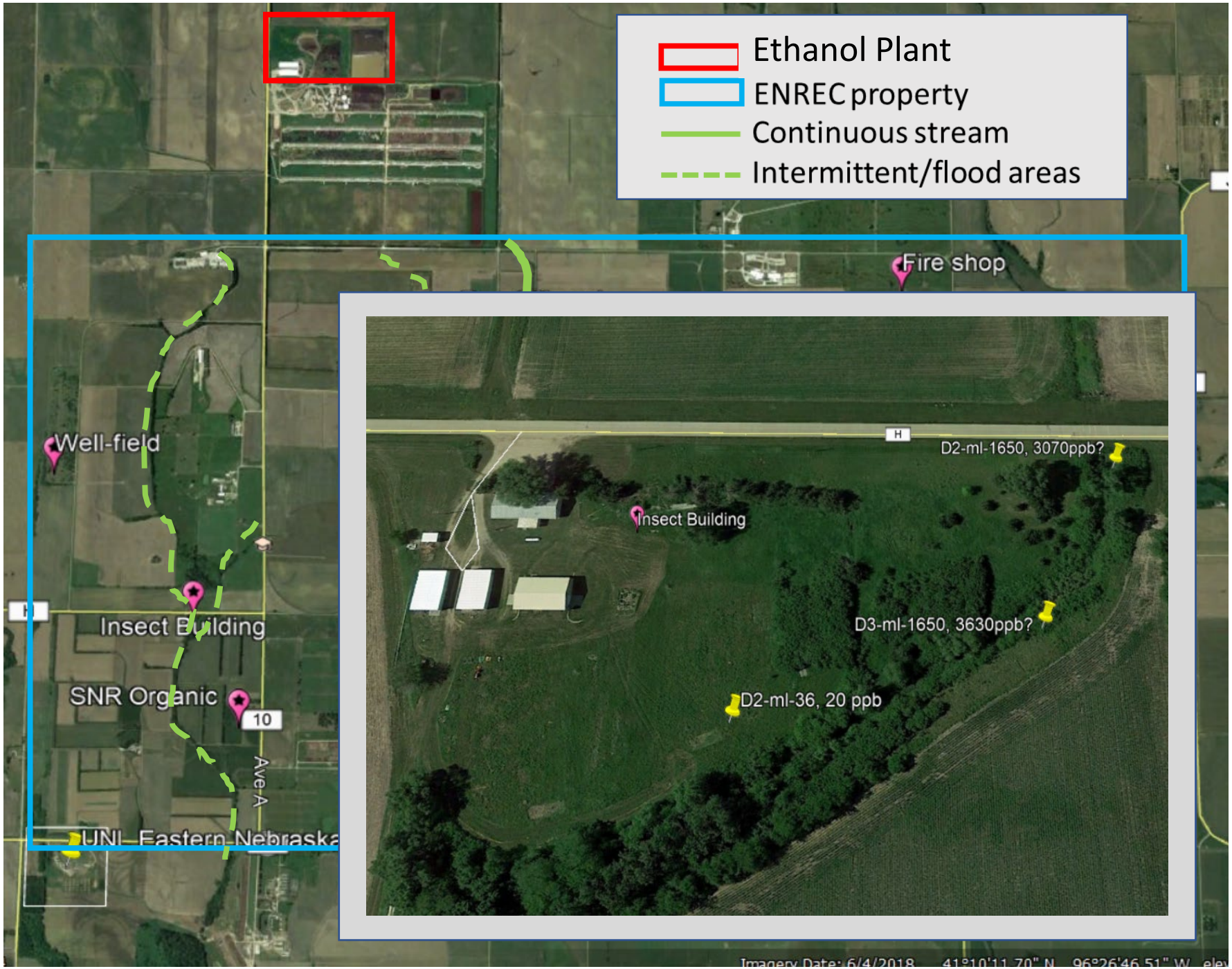
Spring 2018
4 hives at 3 locations at ENREC
All 12 dead by end of summer

Collected on Monday, May 18, 2020

Summer 2019
Dead Bee Trap Study
Hive deployed in July (to avoid planting exposure)
All colonies dead again by fall

Spring 2020
Hives deployed May 12th shortly after planting
Trying to access time frame of when losses begin
Only 4 hives, due to previous losses

Tuesday, May 19, 2020



Bee losses and preliminary pesticide results indicate that there's high systemic pesticide pollution and leaching of contaminates into nearby plants

Milkweed plant leaves ~3,000 to 5,000+ ppb clothianidin

Results contested at first

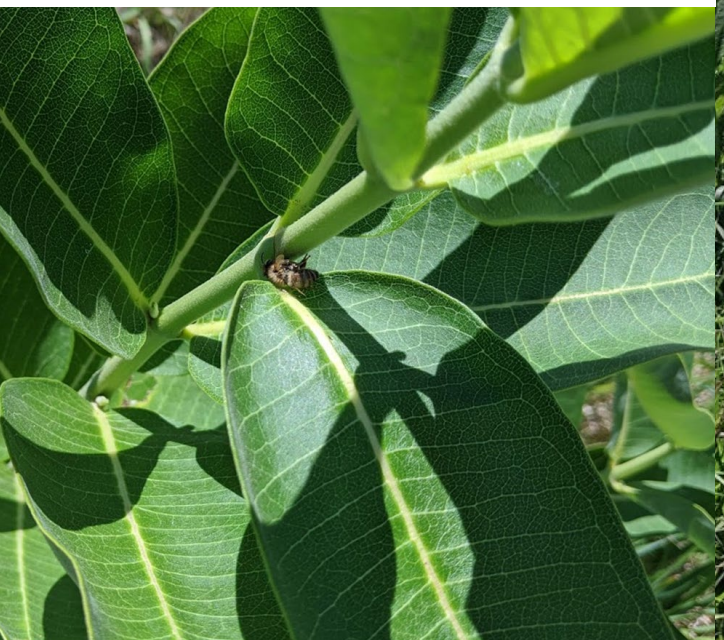
Ethanol plant ~ 1.8 miles from Honey house processing pesticide-treated seeds to produce ethanol

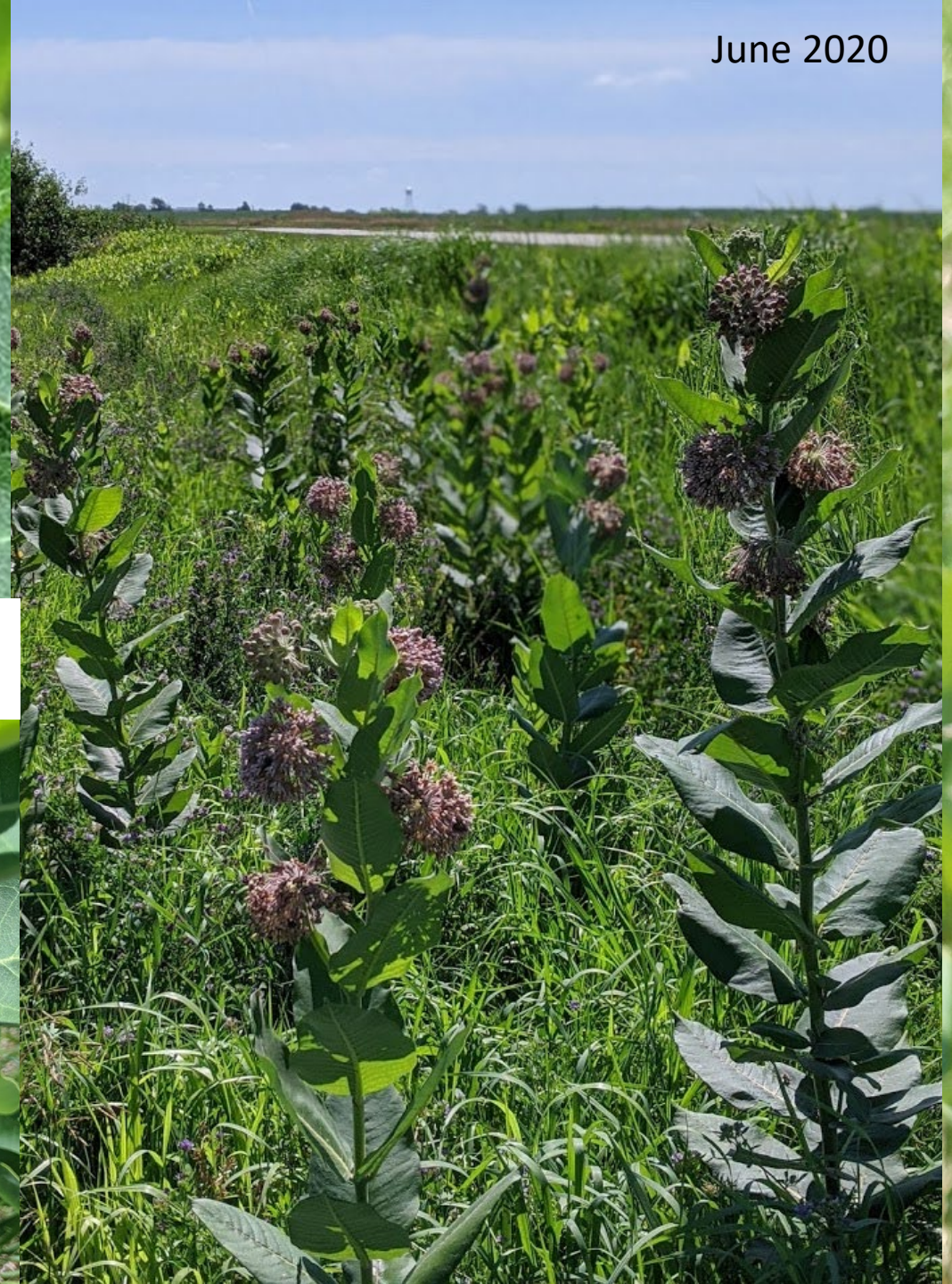
Within a week we begin observing high losses of newly placed hives at all ENREC sites

Total of 6 apiaries, 16 hives
1-3 miles away (South/SE of facility)
All dead by August/Sept

Low losses at all our other apiaries
East campus (Lincoln)
Stock seeds property (Murdock)
Loreal property (Omaha)
Private farm (Davey)
Kimmel Orchard (Nebraska City)

Dead water forager bee collecting plant guttation from milkweeds



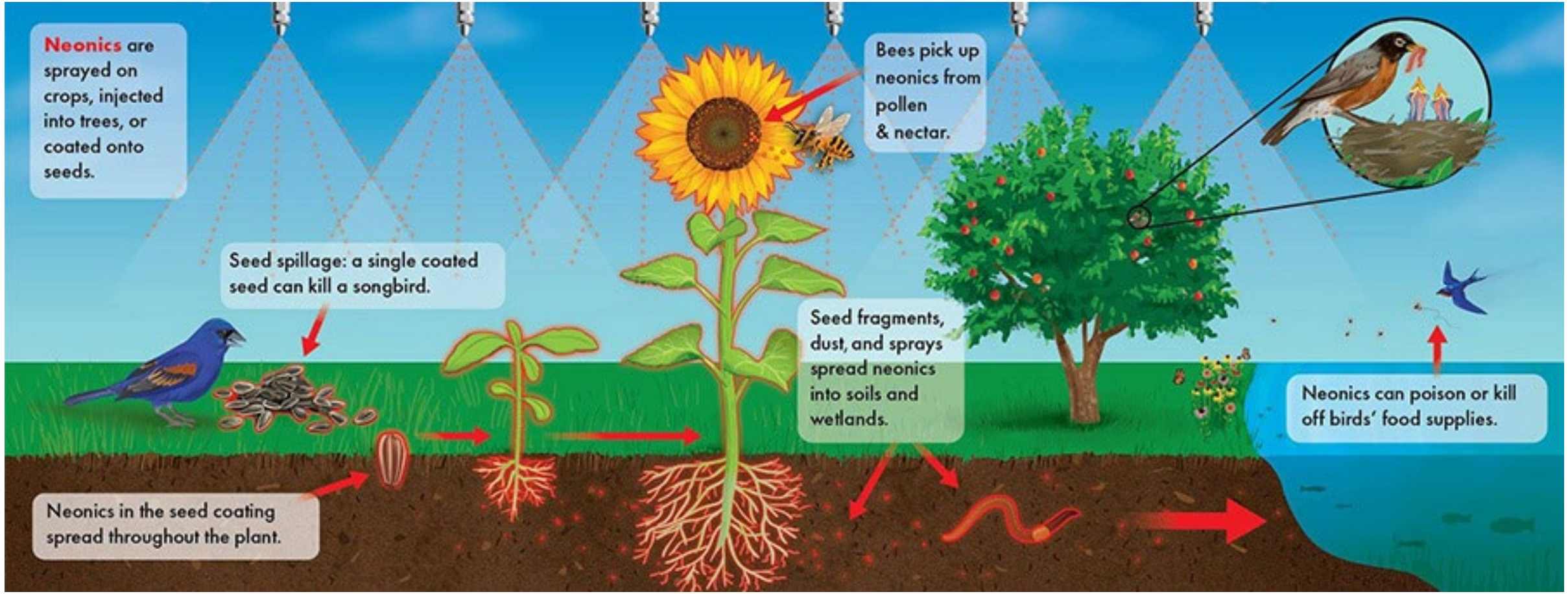


June 2020

What's the exposure risk?

Systemic pesticide pollution: (neonicotinoids and several kinds of fungicides) may move from water into soil and through plants. Systemic pesticides may be expressed in leaves, nectar, and pollen, where wildlife may become exposed.

No regulatory division at EPA to address this kind of pollution but internal discussions are occurring



ABCbirds.org

Read how COVID-19 is impacting our activities.

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AltEn crisis

This page is devoted to the ongoing environmental crisis at the AltEn ethanol plant in Mead, NE

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NEBRASKA WILDLIFE FEDERATION

XERCES SOCIETY for Invertebrate Conservation

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POLLINATOR STEWARDSHIP COUNCIL

ABF EST. 1943 AMERICAN BEEKEEPING FEDERATION

American Honey Producers Association

Sarah Hoyle

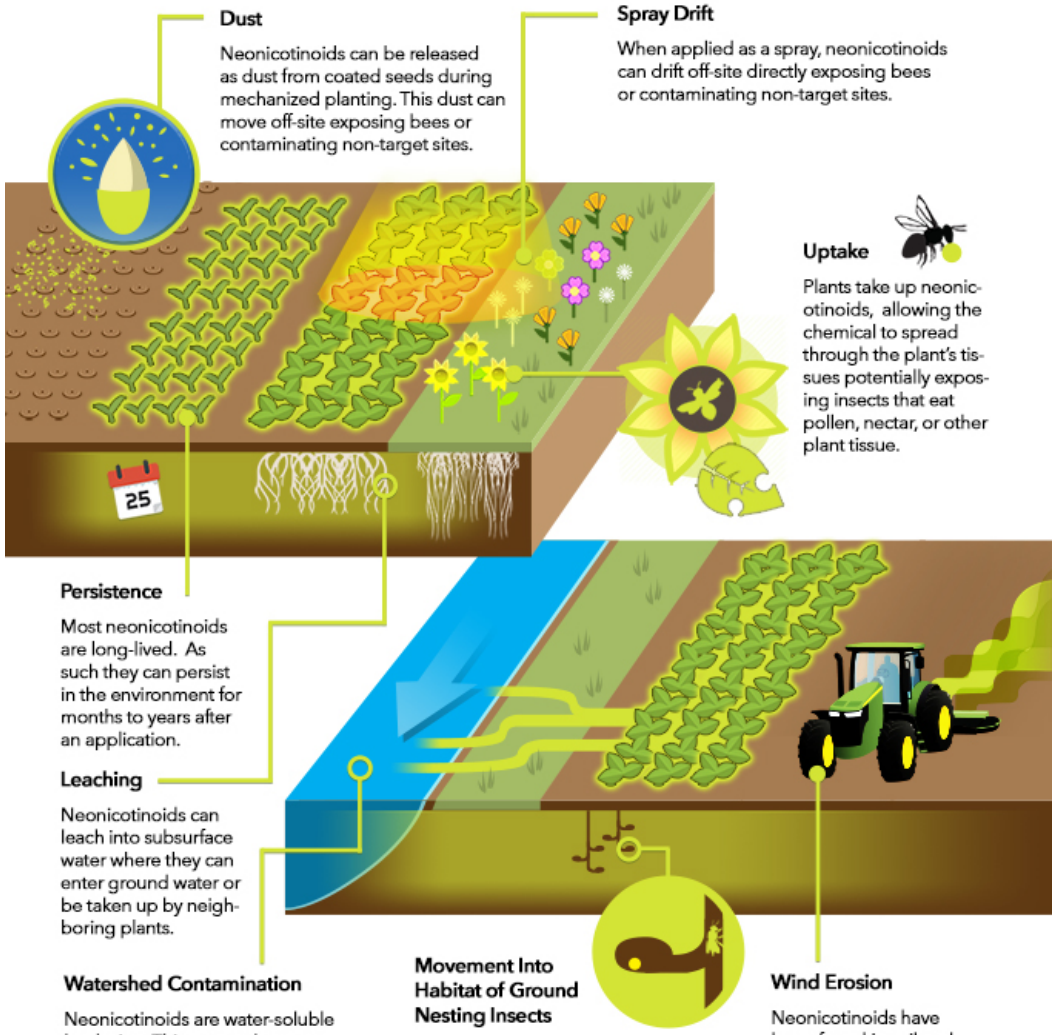
Pesticide Program Specialist

sarah.hoyle@xerces.org

NRDC NATURAL RESOURCES DEFENSE COUNCIL

Pesticide Action Network NORTH AMERICA

U.S. FISH & WILDLIFE SERVICE DEPARTMENT OF THE INTERIOR

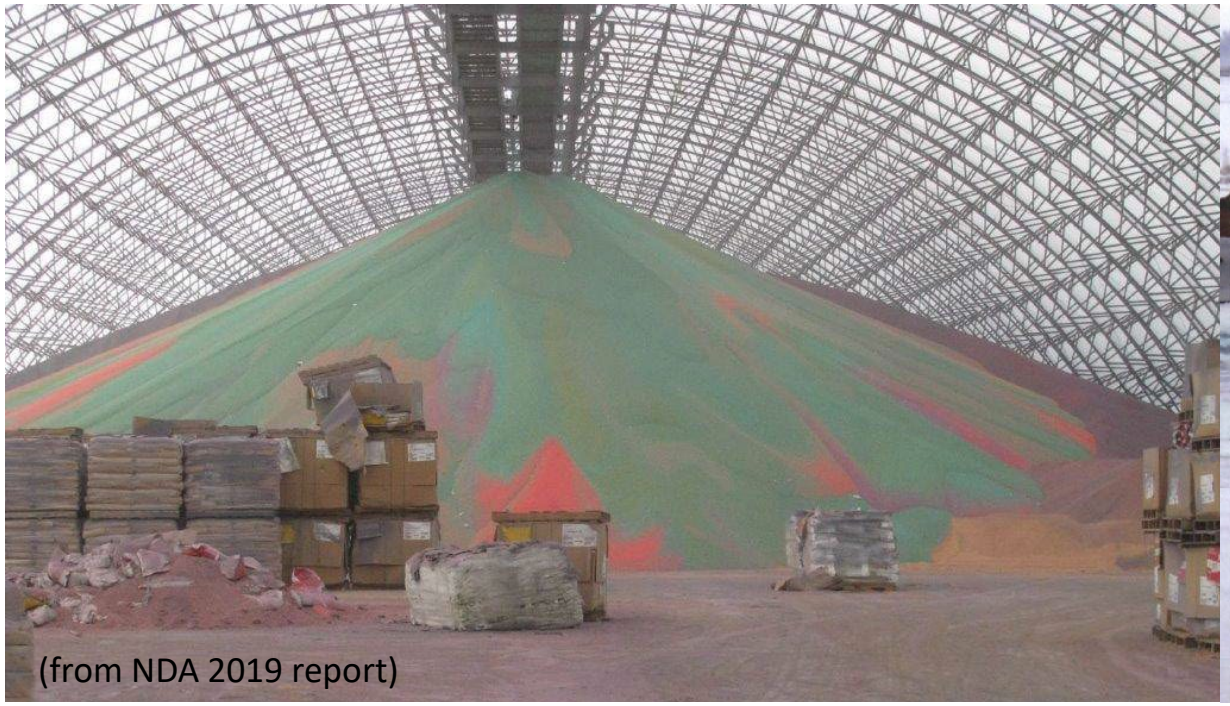


XERCES SOCIETY for Invertebrate Conservation

Illustration by the Xerces Society / Justin Wheeler

xerces.org/pesticides

This pesticide-laden effluent along with wetcake waste was applied to farms as soil conditioners from 2018-2019 without farmer's knowledge of pesticides because of the unclear language and classification surrounding treated articles.



(from NDA 2019 report)

from NDEE Feb 2021 report

Photo Left: Image inside white hoop structures storing a large pile of discarded pesticide treated crop seeds which was received from seed companies. The colorant added to seeds indicates the presence of pesticides on seed coats.

Photo Right: Image of lagoon which is estimated to have released 100,000 gallons of pesticide-laden effluent per day.

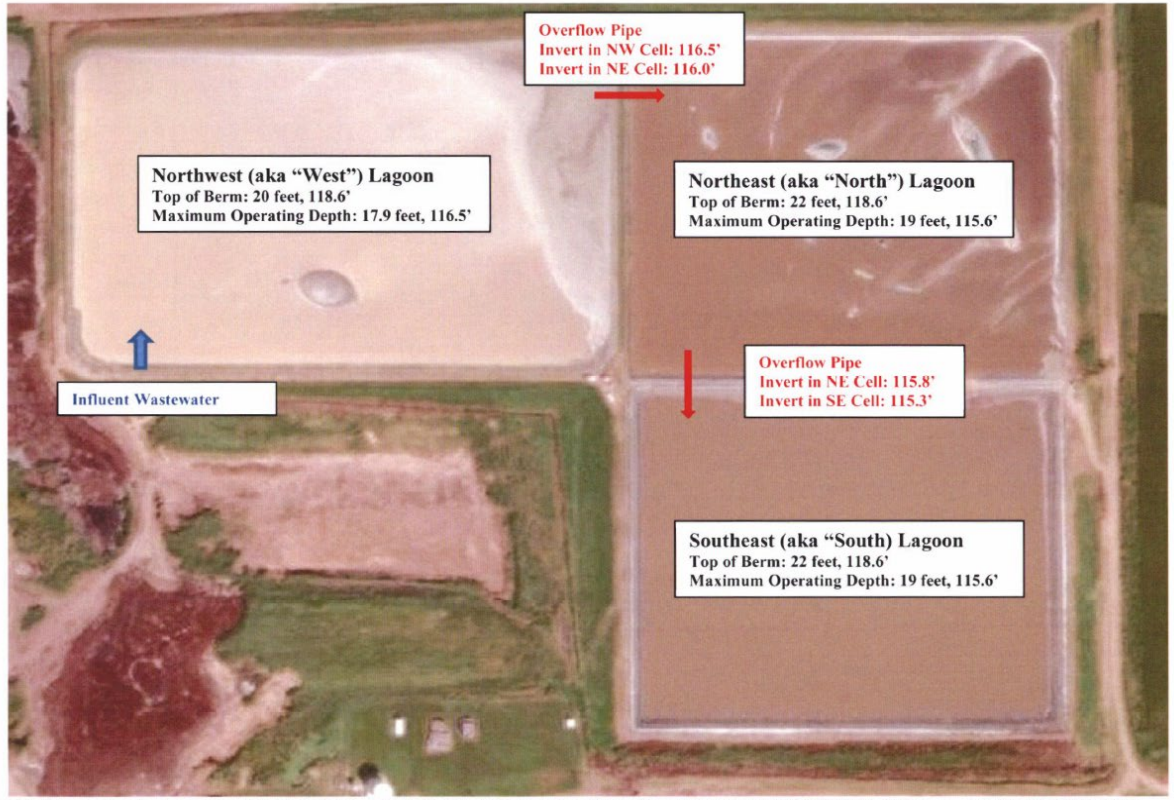
Photo Left: Drone image shows pesticide-laden wetcake piles located near several waste lagoons with visible pieces of the damaged protective liners floating up indicating leaching of pesticides into the ground below.

Photo Right: Drone image shows large areas of blooming flowers that have likely taken up harmful levels of systemic pesticides and may be lethal to visiting pollinators.

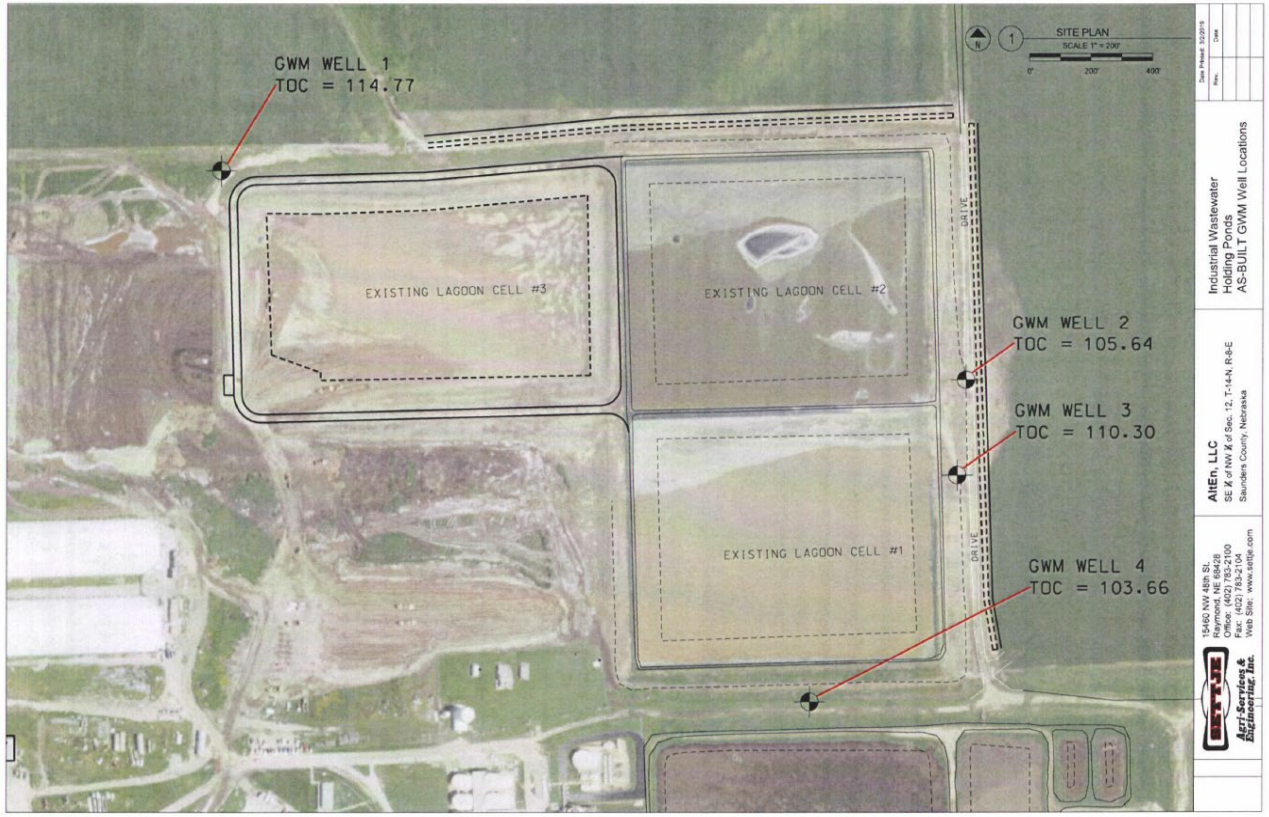
~ 430 ft x 300 ft

March 2020

Map



*All information included in this map is based on design information from Document ID 20180025019 & Document ID 20180034184.



Ground water report from January 19, 2021
MW4 well at ~28 ft --> thiamethoxam at 22.6 ppb

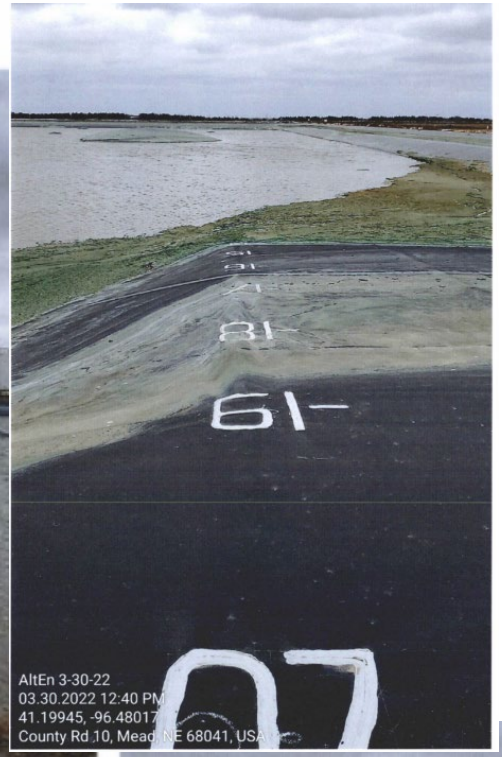
Ground water report from March 28, 2022
SP-2 well at ~48 ft --> thiamethoxam at 2000 ppb

For more information regarding AltEn site inspections, non-compliance, and violation notices:
https://ecmp.nebraska.gov/publicaccess/viewer.aspx?&MyQueryID=340

AltEn's facility ID #: 84069

NEBRASKA
DEPT. OF ENVIRONMENT AND ENERGY

NW lagoon leakage?



Lagoon has a 20’ depth capacity.

October 25, 2021: 20’ (FULL)

January 4, 2022: 15’

February 28, 2022: 14.5’

March 23, 2022: 14’

-new whale present (yellow)

-existing whales unchanged

Photos: 12
Site Visit Report
Date Taken3/30/2022
Photographer: Randol Wehrbein
Facility Name/ Project Name: AltEn LLC
Facility IIS number / Project identifier: IIS: 84069 / NE0137634
Location: Northwest lagoon.
Direction Facing: West
Description: The photo shows northwest lagoon’s northwest corner water level indicator lines painted by Clean Harbors on 3/3/2022 (red arrow) and 3/5/2022 (yellow arrow).

Photo taken in April 2020

(Photos taken by NDA)

~ 33,400 tons (or 66,800,000 lbs) of wetcake soil amendments were distributed to local farms in 2018-2019

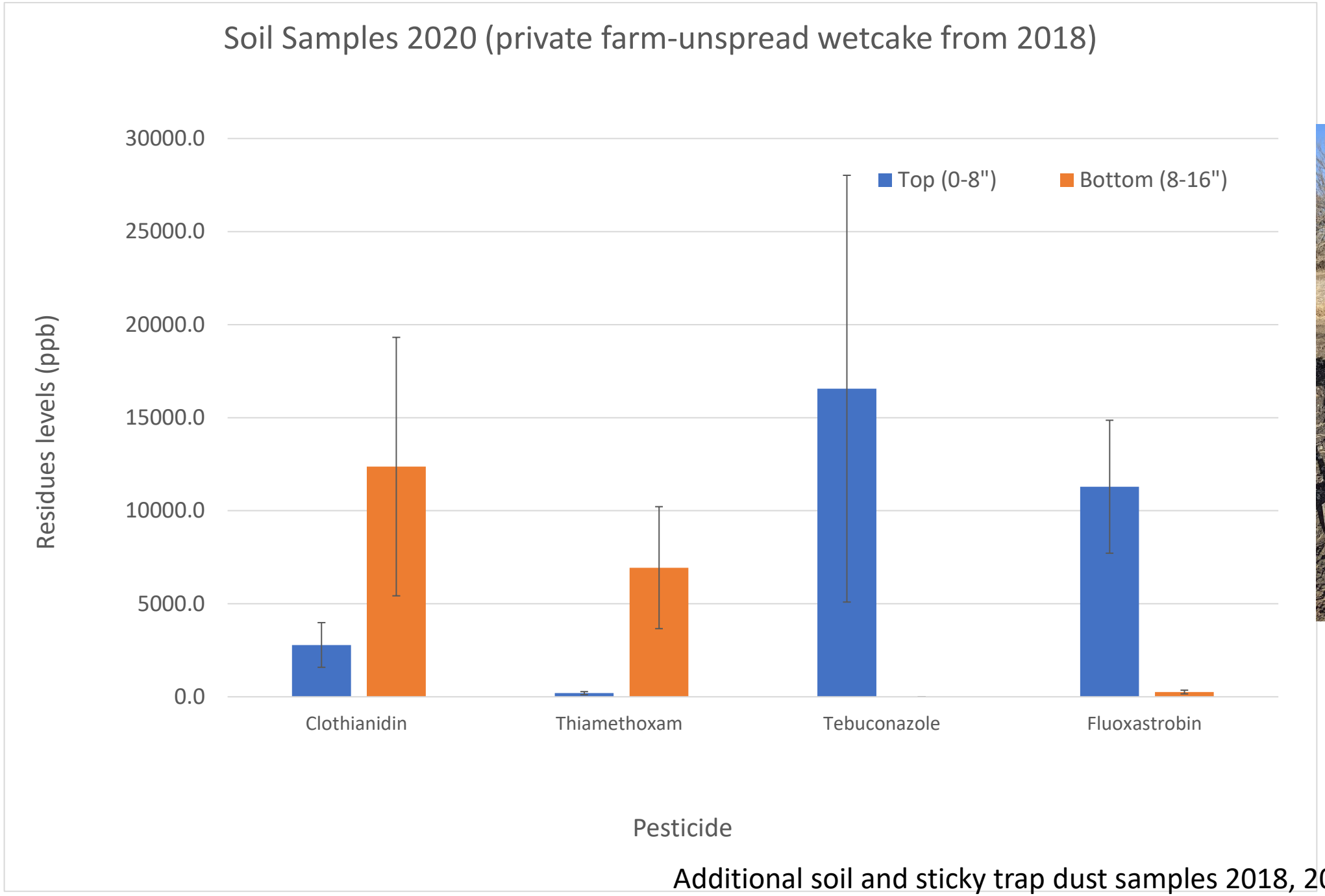
STOP Use Issued May 2019 “20 tons per acre as recommended would be 85 times higher than the maximum annual field load allowed by a typical registered pesticide label”

Toxicity & impacts of these chemical mixtures unknown

Several fungicides & herbicides also present

ANALYTE	FOUND
Acetamprid	ND ppb
Azoxystrobin	2,430 ppb
Bifenthrin	ND ppb
Chlorpyrifos-ethyl	ND ppb
Chlorpyrifos-methyl	ND ppb
Clothianidin	554,000 ppb
Cyfluthrin	ND ppb
Cypermethrin	ND ppb
Deltamethrin	ND ppb
Dimoxystrobin	ND ppb
Dinotefuron	ND ppb
Fludioxonil	2,940 ppb
Fluoxastrobin	35,400 ppb
Imidacloprid	309.00 ppb
Lambda-cyhalothrin	ND ppb
Metalaxyl	12,900 ppb
Nitenpyram	ND ppb
Orysastrobin	ND ppb
Permethrin	ND ppb
Picoxystrobin	ND ppb
Pyraclostrobin	ND ppb
Thiacloprid	ND ppb
Thiamethoxam	5,590 ppb

NDA pesticide report: Wetcake sampled June 2019



Additional soil and sticky trap dust samples 2018, 2019, 2020 sent to WSL

Mead AltEn Ethanol plant

A burst pipe late last week in a 4 million gallon digester tank at the AltEn Ethanol plant near Mead sent liquid manure and thin stillage, a byproduct of the ethanol manufacturing process, into waterways and culverts up to 4 miles from the plant.

COURTESY PHOTO

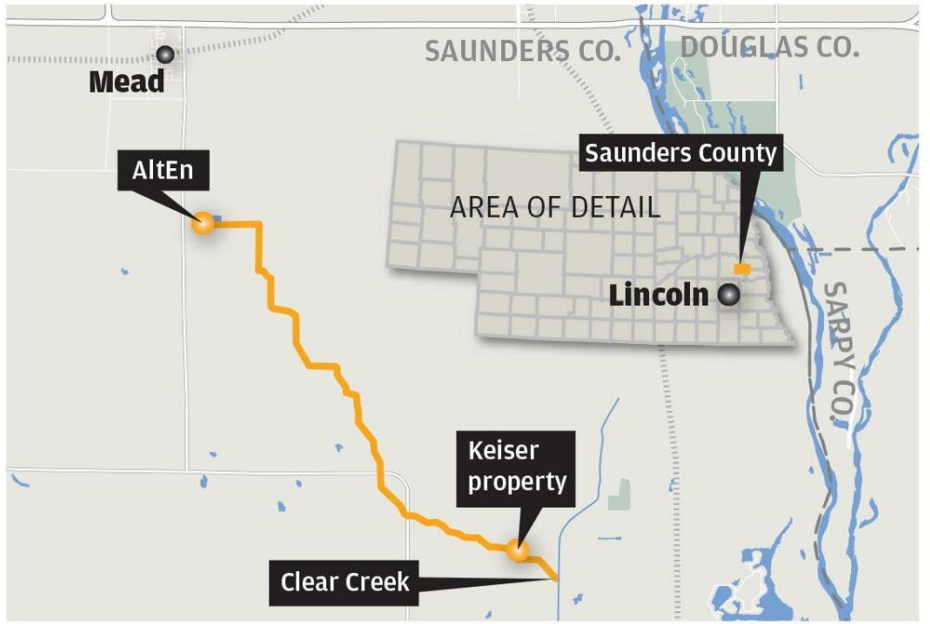
Mead AltEn Ethanol plant

Mead AltEn Ethanol plant. COURTESY PHOTO

COURTESY PHOTO

Stormwater runoff path

Stormwater running off of pesticide-contaminated wet distiller's grains at AltEn flowed downstream 6 miles to Stan and Evelyn Keiser's property.



maps4news.com/©HERE, Lee Enterprises graphic

2021

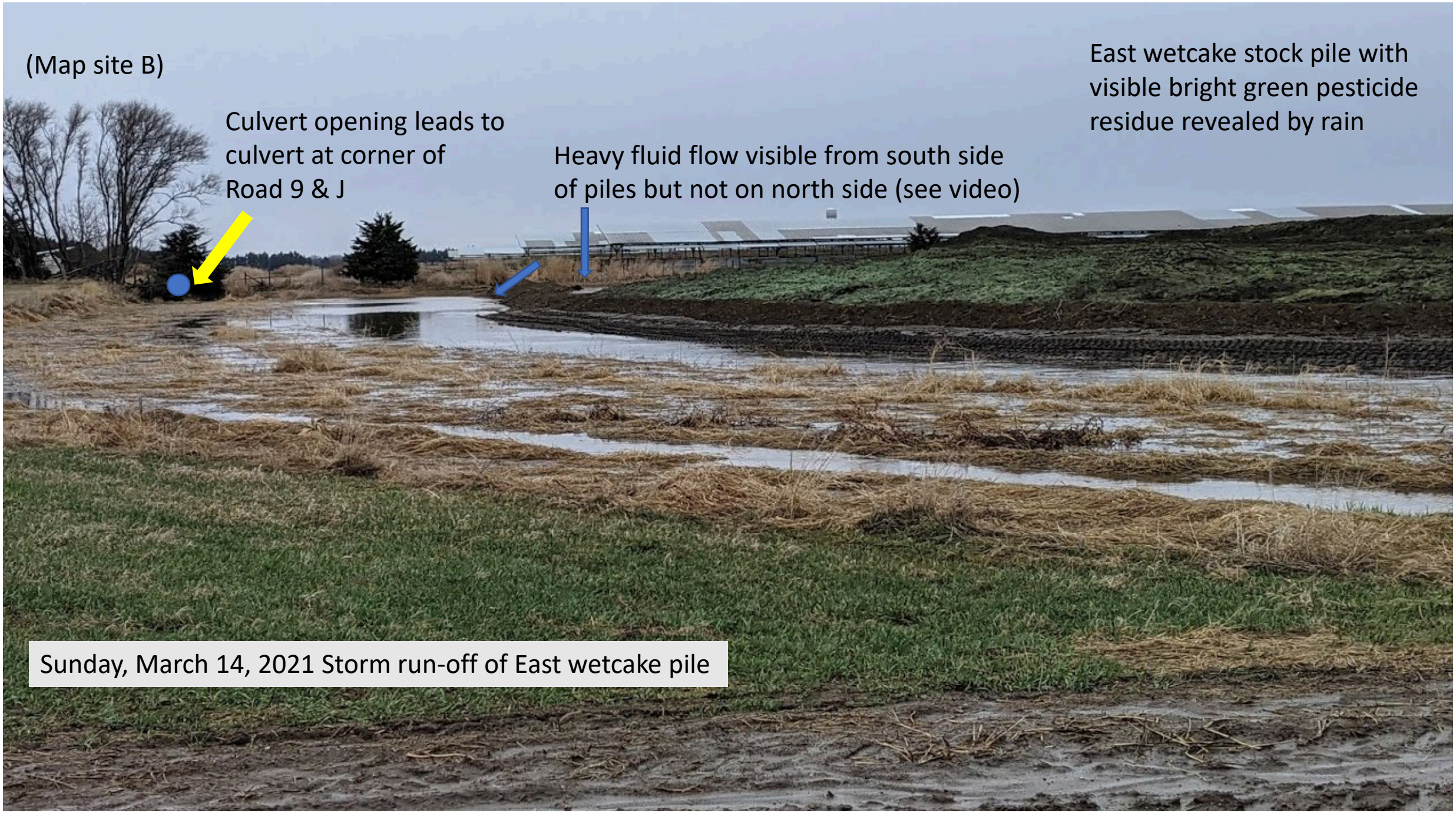
Jan 9: Guardian article reported this story

Feb 10: Plant shut down due to outstanding violations

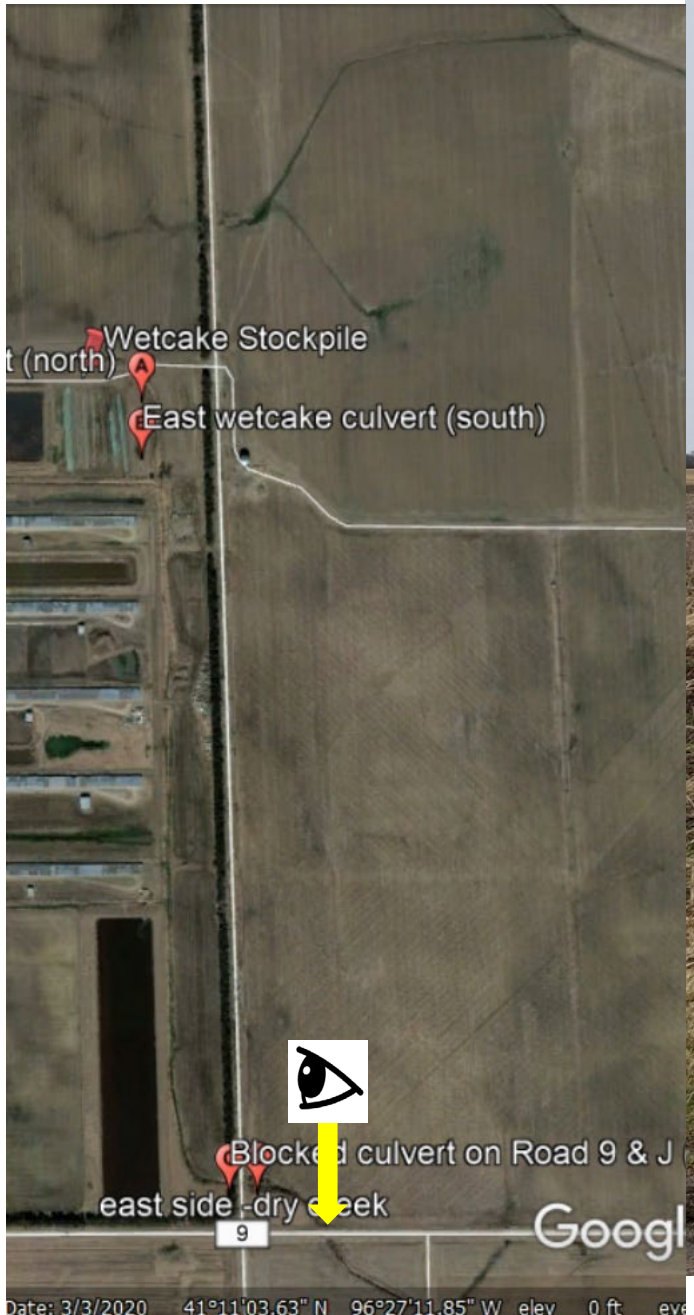
Feb 17: Ruptured digestor released 4 mil gallons of waste

~4 miles downstream

June 10: AltEn Facility Response Group (coalition of seed companies formally takes lead on clean-up efforts


(Map site B)
Culvert opening leads to culvert at corner of Road 9 & J
Heavy fluid flow visible from south side of piles but not on north side (see video)
East wetcake stock pile with visible bright green pesticide residue revealed by rain
Sunday, March 14, 2021 Storm run-off of East wetcake pile

Sunday March 14, 2021 Overflow Culvert near Corner of Rd 9+ J facing south (south of Road J on Map site D)



May 17, 2021
Drone images (NDEE)

How functional are soil berms?

How easily are they breached during heavy rain/flooding?

How are these keeping residues from leaching into soil?

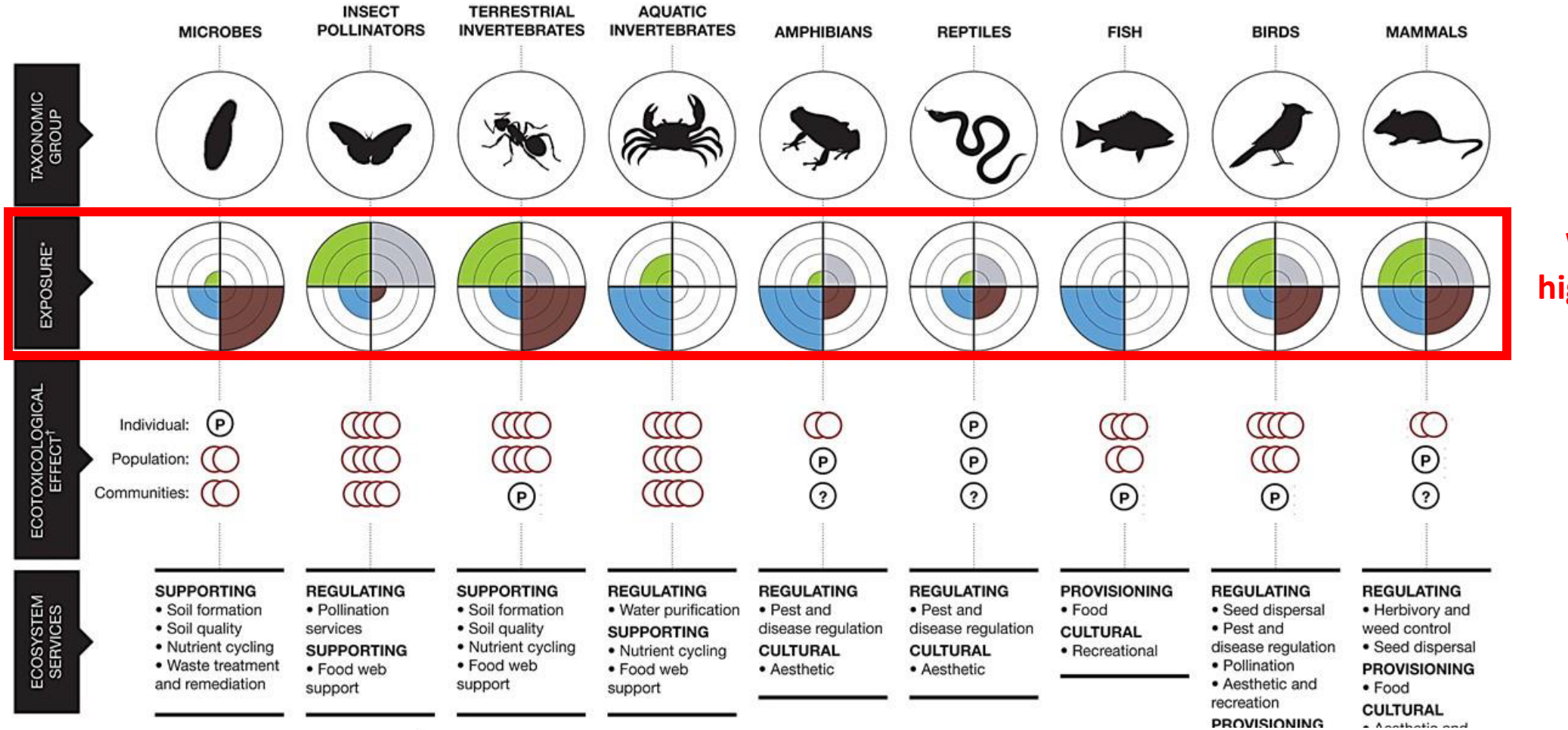
And into nearby plants?

Need to explain who's at risk and how do we know?

Figure 2: Infographic summarizing the main findings of the WIA study on the state of knowledge on impacts of neonic insecticides on biodiversity and ecosystem services (Pisa et al., 2017:36).

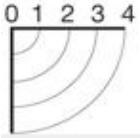
Where's the highest exposure risk?

Who's at highest risk?



***EXPOSURE**

0: No route of exposure
1: Potential route of exposure assumed negligible
2: Relevant route of exposure low
3: Relevant route of exposure moderate
4: Relevant route of exposure high



Plants
Air
Soil
Water

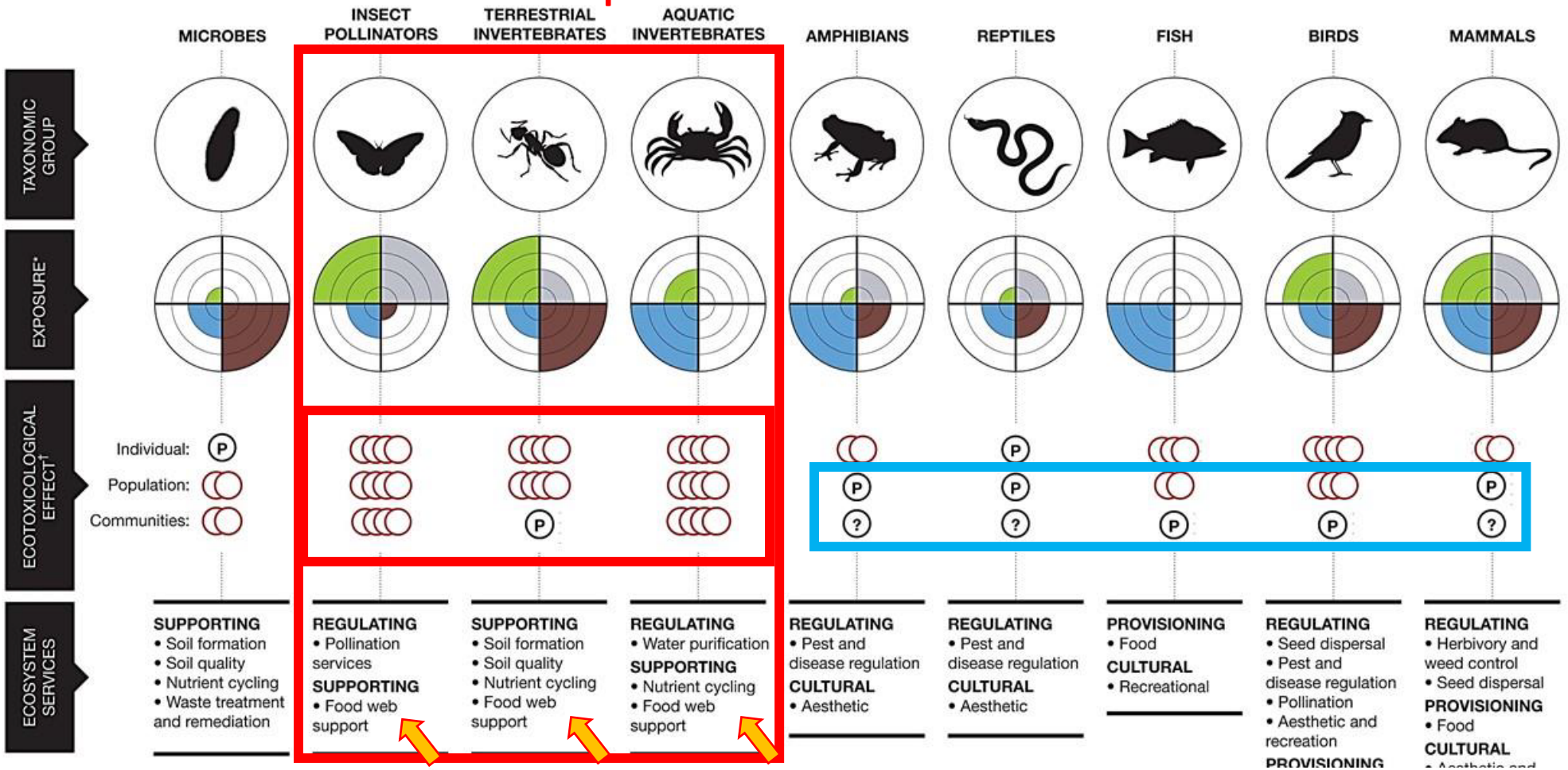
†ECOTOXICOLOGICAL EFFECT

1: Potential effects assumed negligible under normal exposure conditions
2: Evidence effects can occur but at high doses or after prolonged exposure
3: Evidence effects can occur at moderate doses
4: Evidence effects can occur at low doses or after acute exposure
Unknown: in situations where no judgement could be made because of lack of evidence, e.g. data unavailable
Probable: no accurate judgement could be made due to incomplete evidence, but data suggests a potential effect level above (1)

Which allows for targeted action steps & solutions

Figure 2: Infographic summarizing the main findings of the WIA study on the state of knowledge on impacts of neonic insecticides on biodiversity and ecosystem services (Pisa et al., 2017:36).

Bioindicator species



More sensitive

Loss of food support may impact a suite of animals

↓

Requires long-term monitoring

***EXPOSURE**
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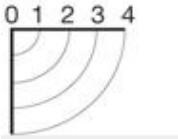

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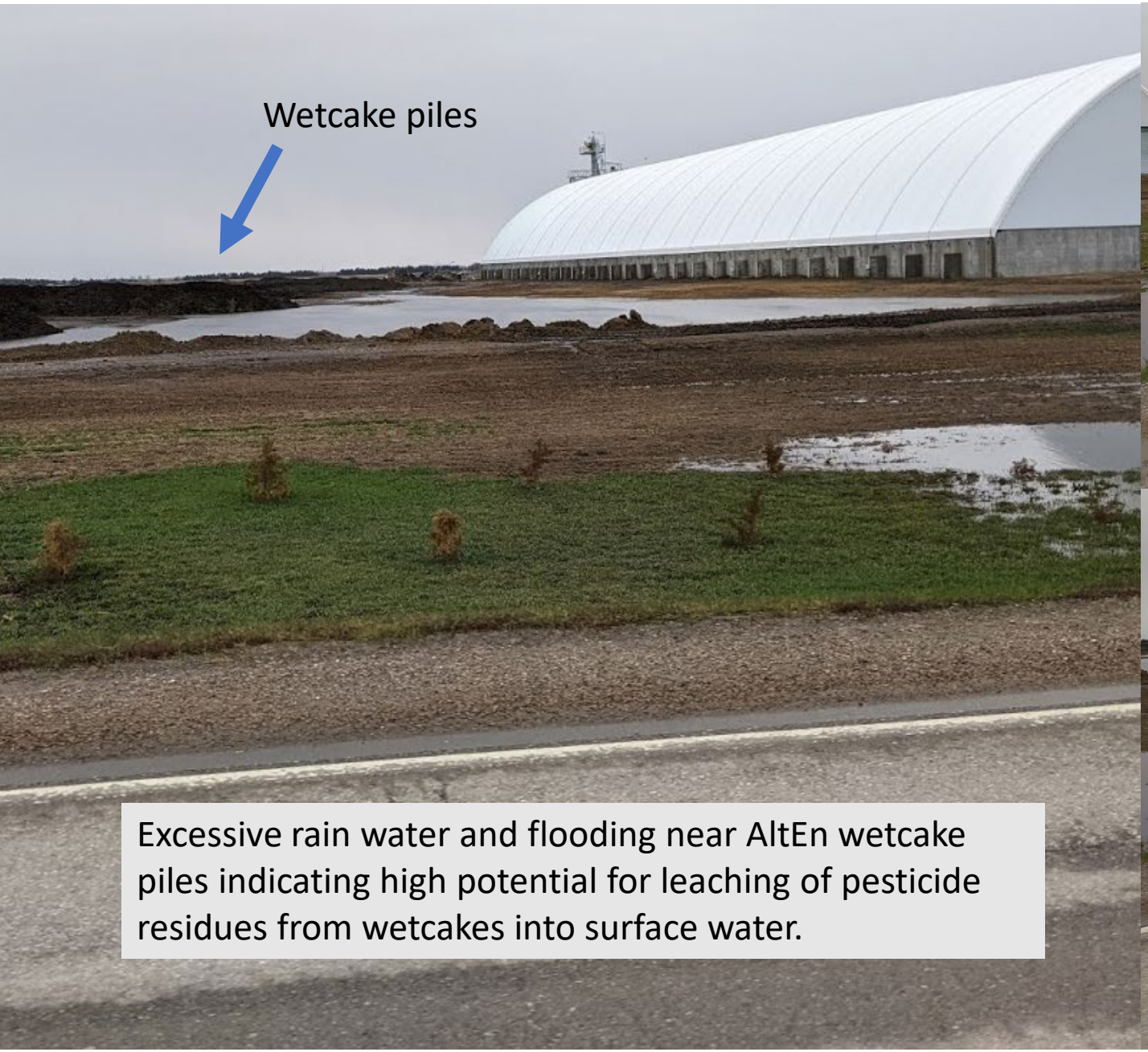
It's not just about the bees….

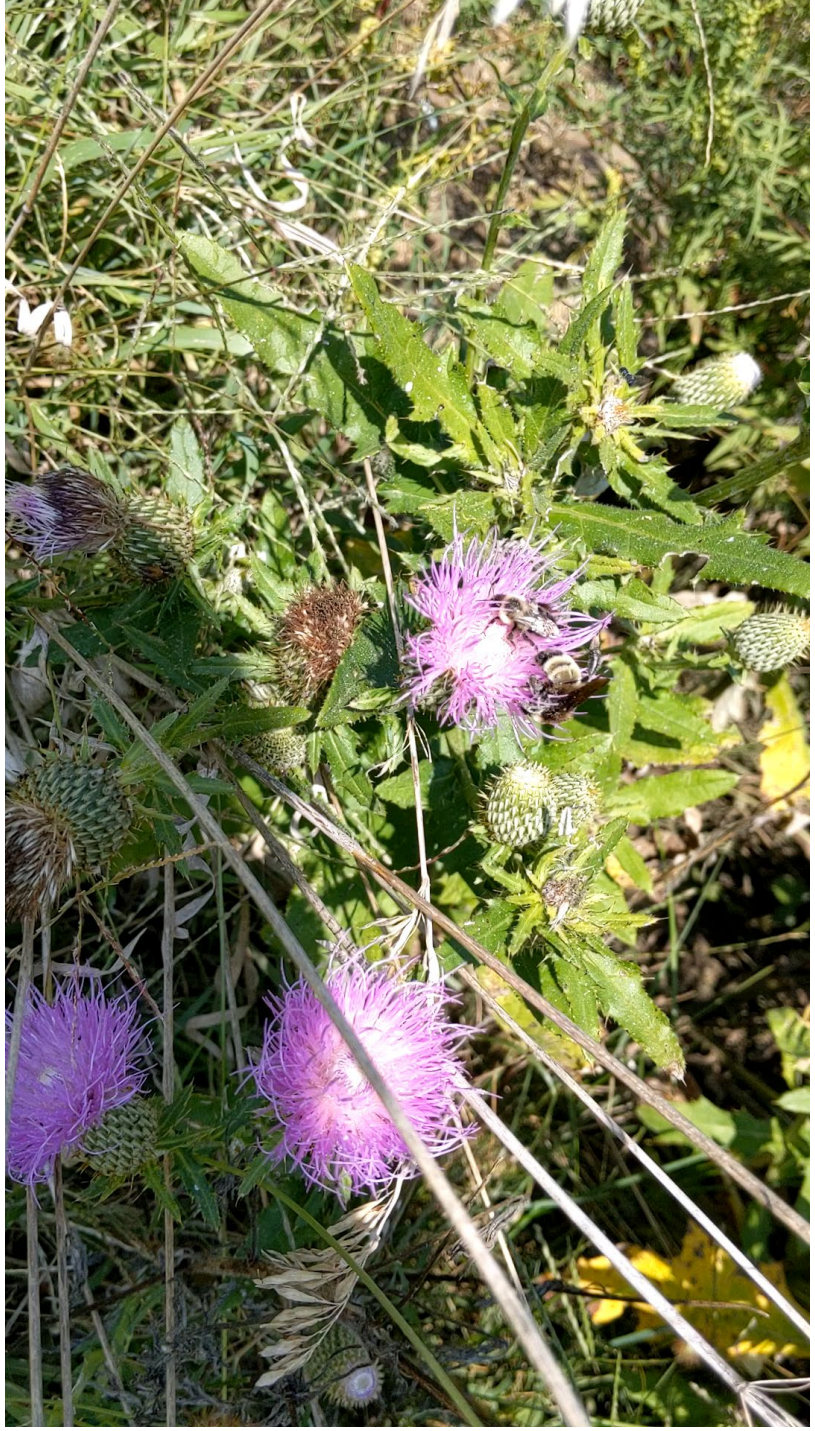
Sunday March 14, 2021 Road 10 (AltEn North wetcake piles)

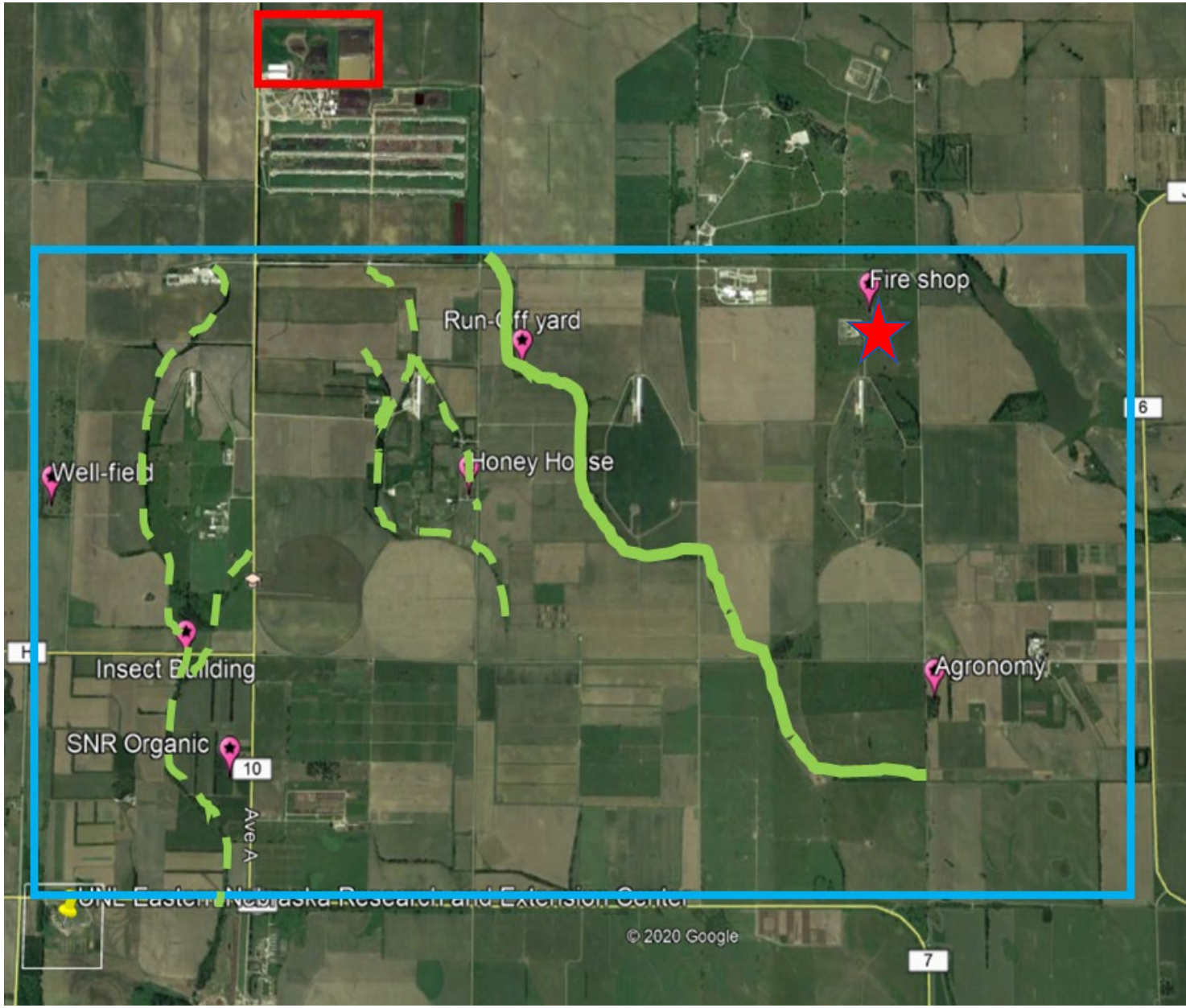


Excessive rain water and flooding near AltEn wetcake piles indicating high potential for leaching of pesticide residues from wetcakes into surface water.


March 14th heavy rain
May blooms

May 17, 2021
Drone images




Fire shop
Run-Off yard
Well-field
Honey House
Insect Building
Agronomy
SNR Organic
10
Ave A
6
7
© 2020 Google

Hive Setup

Clothianidin (ug/L or ppb)

2020 Samples	high	average	n
Wildflowers	42.8	13.3	6
In-Hive Pollen	284.5	109.2	10
In-Hive Nectar	1.8	0.2	8

COLONY SURVIVAL (# alive/total)

	WL	OR	HH	AG	FS	IB	Farm W (West)	Farm D (North)	Farm M (East)	Farm K (SouthE)	Lincoln	NE City
2019	0/4	0/4	0/4	0/4	0/4	0/4	-	-	-	-	4/4	4/4
2020	-	-	-	0/4	0/4	0/4	-	-	-	-	4/4	3/4
2021	-	-	0/2	1/4	1/4	1/4	0/2	1/2	1/3	2/2	3/4	2/4
2022	-	-	-	2 old 4 new	2 old 4 new	2 old 4 new	2 new	2 old 2 new	2 old 2 new	2 old 2 new	4 new	4 new

Weekly dead bee trap counts continuing
Colony health measures (Adult & brood populations, mite loads)

Need to assess environmental and ecological impacts observed off-site (potential impacts cover 6 miles radius)

-How much farther has the contaminates spread?

-To what extent and where (water, soil, air, vegetation)?

-High costs, limited funds

-Project Apis m provided critical gap funding support for 2021 sampling

Pair of beavers found dead July 2021

Mead, NE Investigation Team

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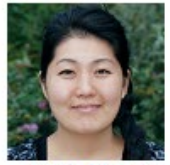

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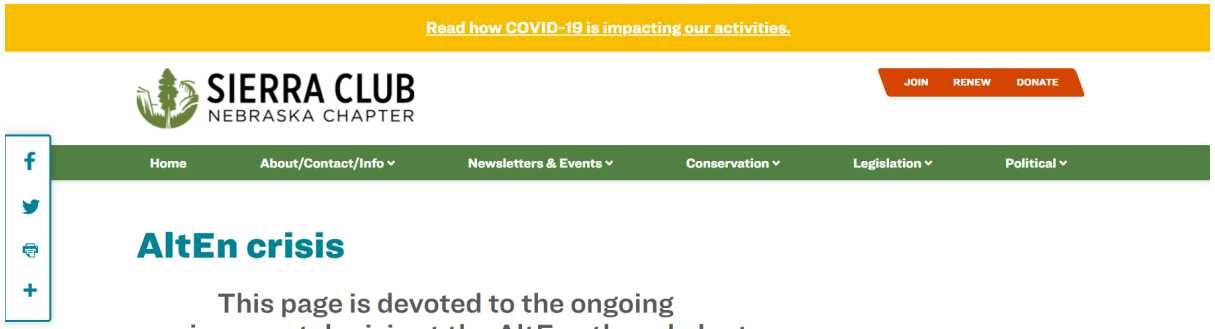
AltEn Environmental Pollution

For more information regarding research efforts and updates:

MEAD research team website
https://www.unmc.edu/publichealth/departments/environmental/mead/

Donate to research efforts here:
https://fundraise.nufoundation.org/campaign/mead-ne-health-and-environmental-campaign/c333090



NEBRASKA GAME PARKS

NEBRASKA WILDLIFE FEDERATION

BOLD Nebraska

Perivallon Group is a coalition of community leaders that have come together to investigate the unfolding environmental disaster in Mead, NE
https://www.sierraclub.org/nebraska/alten-crisis

"Perivallon" from the ancient Greek word that means "**what surrounds us**"

Janece Mollhoff
(Member of the Omaha Public Power District Board of Directors)

Leesa Zalesky
(Freelance journalist, local resident)

Al Davis
(Former NE Senator, Nebraska Chapter Sierra Club lobbyist)

Mark Hefflinger
(Bold Nebraska)

Thanks for your attention

For more information about workshops, research, & upcoming beekeeping programs

Visit our website or follow us

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