Mapping the Corn Rootworm Variant

The Southeast Wisconsin Variant Trapping Network

UW Extension

The Problem:

Variant Strain of Western CRW
Behavioral adaptation to the
corn-soybean Rotation.

Western CRW females can lay
heavy populations of eggs in soybean
in anticipation of corn the following year.

Extreme southeast Wisconsin. Also found in eastern Illinois, Indiana, southern Michigan, and western Ohio.

First year corn

Economic root damage
3.0 node-injury rating

Lodging from
WCR root feeding

WCR Variant
Wisconsin Trapping Network

Project Goals

Delineate the variant's range in Wisconsin and monitor changes over time, defining the:

"Affected Area"

Communicate findings to WI corn and soybean growers, delineate where control action should and should not be considered for 1st year corn.

UWEX Research Team

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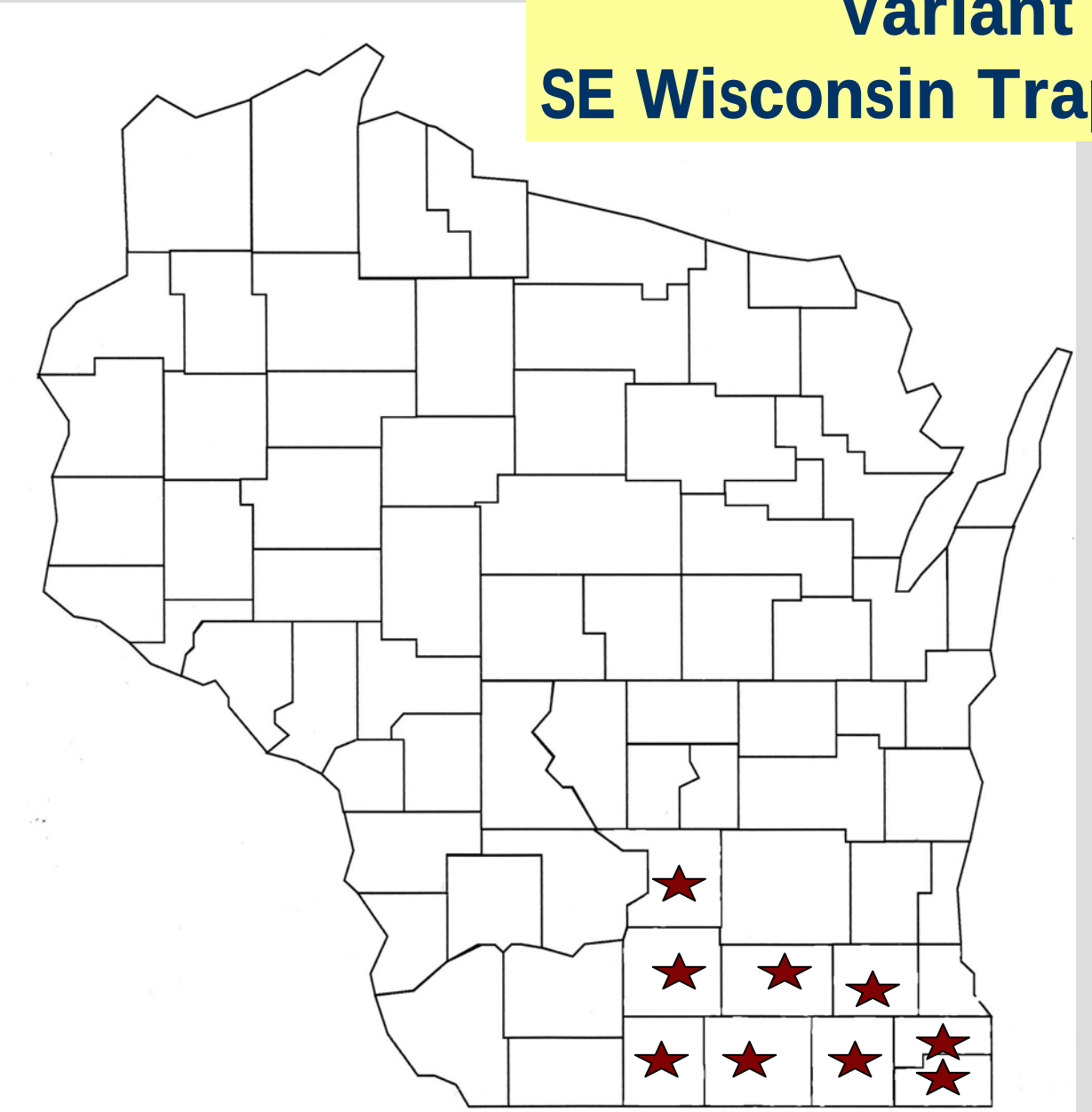
Variant WCR
SE Wisconsin Trapping Network



2003, 2004, …

Approach to Delineate the "Affected Area"

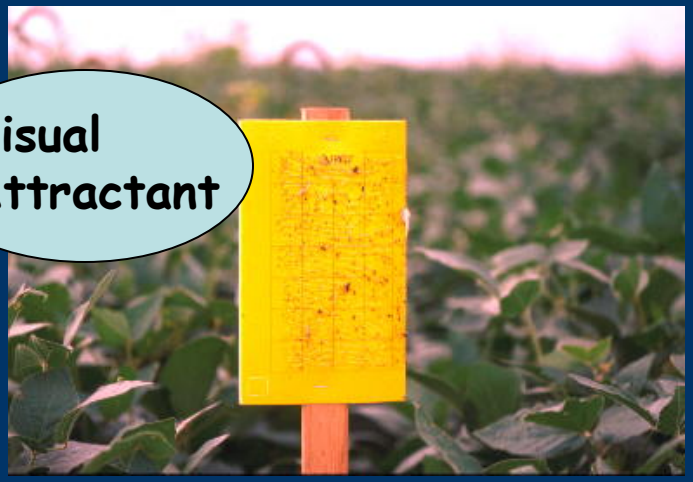
Monitor beetle abundance in random soybean fields

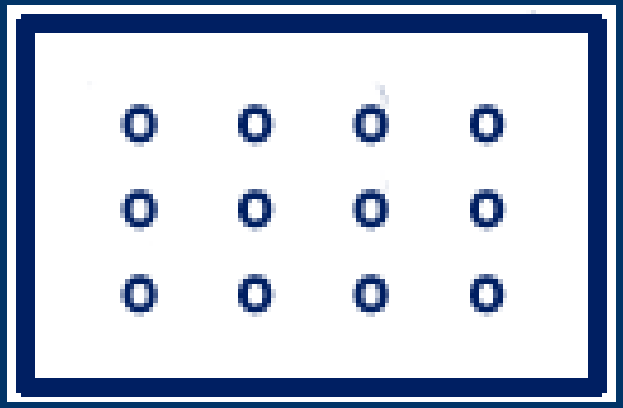
- suspect counties
- surrounding counties to establish safety zone

Rate corn roots for damage the following year

- confirms beetles are the variant

Soybean Trapping Protocol





Distribution of Pherocon® AM Traps in a soybean field

Trap grid courtesy of UIUC

Beetle thresholds in soybean to determine need for root protection in next year's corn

University of Illinois – Urbana Champaign

Trap during adult WCR beetle emergence and egg-laying period (late July through late August, 4-6 weeks)

12 trap grid per soybean field Pherocon® AM yellow sticky trap

Each week count all WCR males and females. Replace traps every 7-10 days.

Count Western Corn Rootworm Beetles on Pherocon AM Yellow Sticky Traps

Female

Male

Don’t Count These!
Not part of the threshold
(however, will show up on traps)

Northern Corn Rootworm

Bean Leaf Beetle: tan & crimson color forms

WCR Threshold Calculation in Soybean

Equation:

Beetles caught / # traps in field / # days

Example:

- 1680 western corn rootworm beetles trapped
- Trapping Period was Aug. 8 to Sept. 6
- 12 traps/field

[1680 (number of beetles)/12 (traps)] /28 (days) =

5 beetles/trap/day

5 B/T/D Threshold

Correlates to 0.75 root damage score on ISU 0 to 3 rating scale

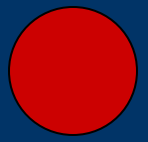
- economic root damage

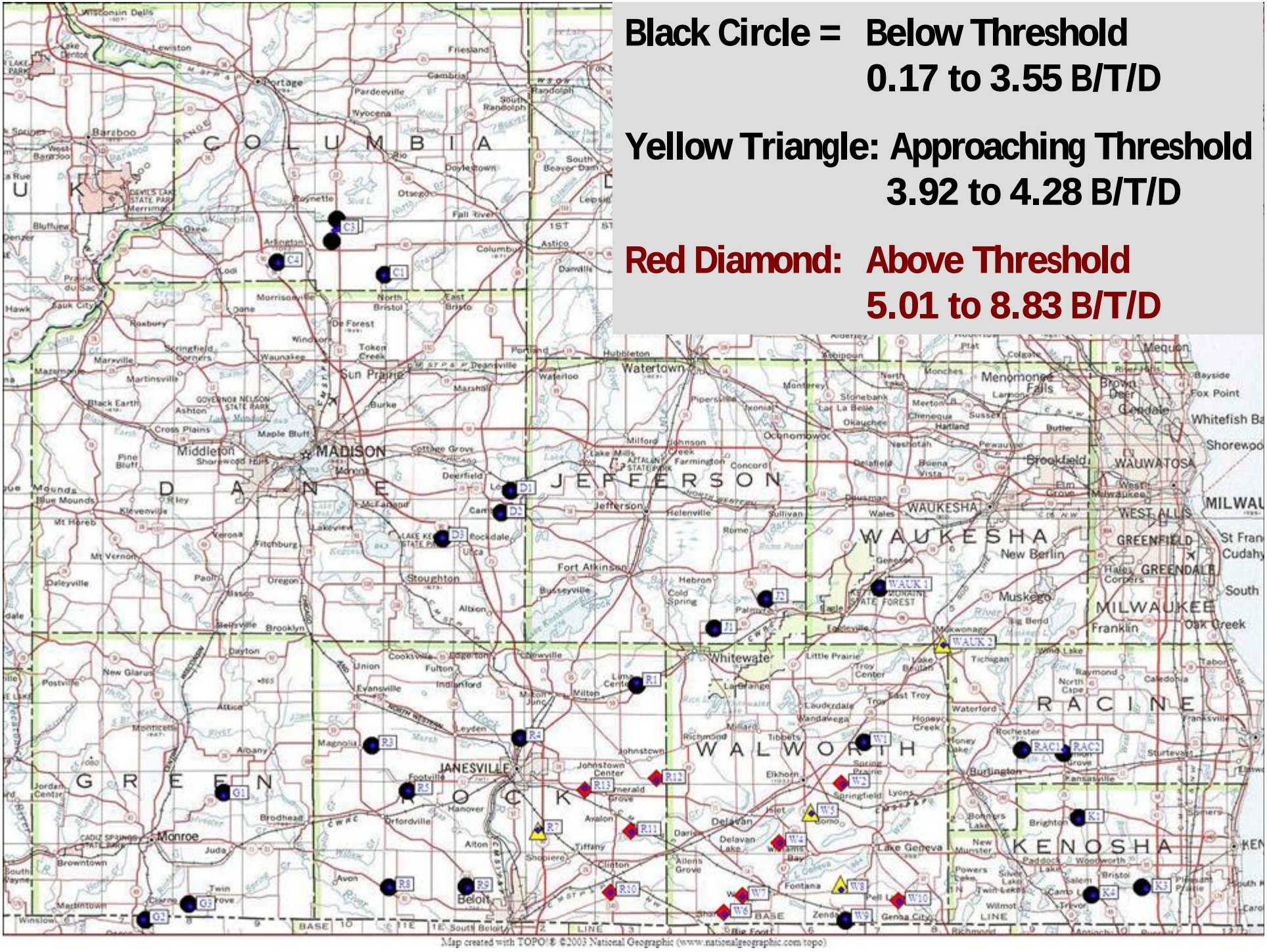
Sub-threshold populations may cause damage

- less than cost of treatment

Defining the “Affected Area”

B/T/D Score

0.0 to 3.5	No detect	
3.51 to 4.99	Sub-threshold	
5.0 or more	Exceeds threshold	


Black Circle = Below Threshold
0.17 to 3.55 B/T/D
Yellow Triangle: Approaching Threshold
3.92 to 4.28 B/T/D
Red Diamond: Above Threshold
5.01 to 8.83 B/T/D
COLUMBIA
DANE
JEFFERSON
WAUKESHA
WALWORTH
RACINE
KENOSHA
GREEN
ROCK
MADISON
JANESVILLE
Beloit
Watertown
Whitewater
Fort Atkinson
Stoughton
Monroe
Portage
Baraboo
Sun Prairie
Middleton
New Berlin
Brookfield
Menomonee Falls
Mequon
Oconomowoc
Lake Geneva
Delavan
Elkhorn
Burlington
Muskego
Oak Creek
Franklin
Greenfield
West Allis
Wauwatosa
Milwaukee
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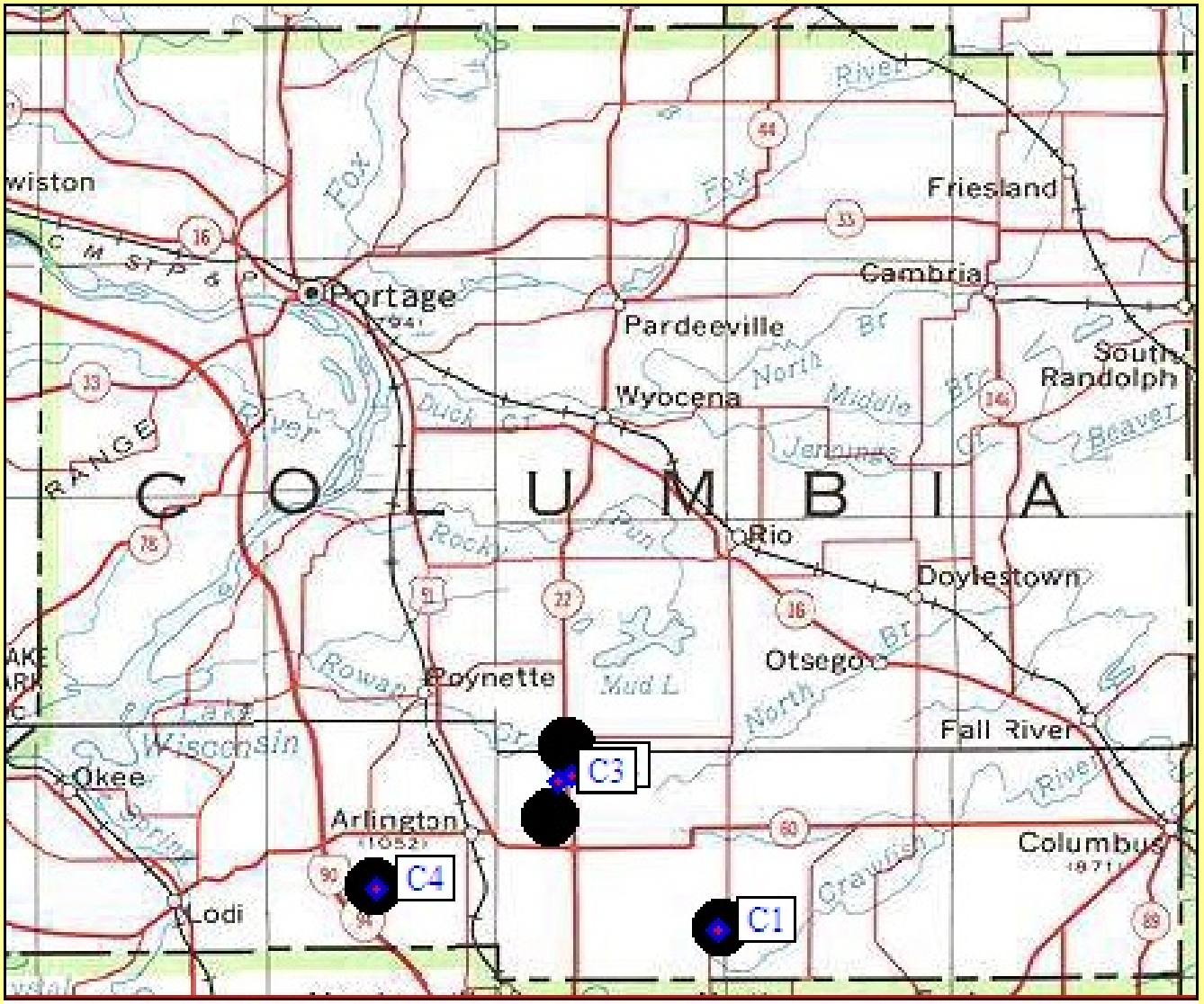
Columbia Co. [4 Fields] 0.17 to 0.78 B/T/D



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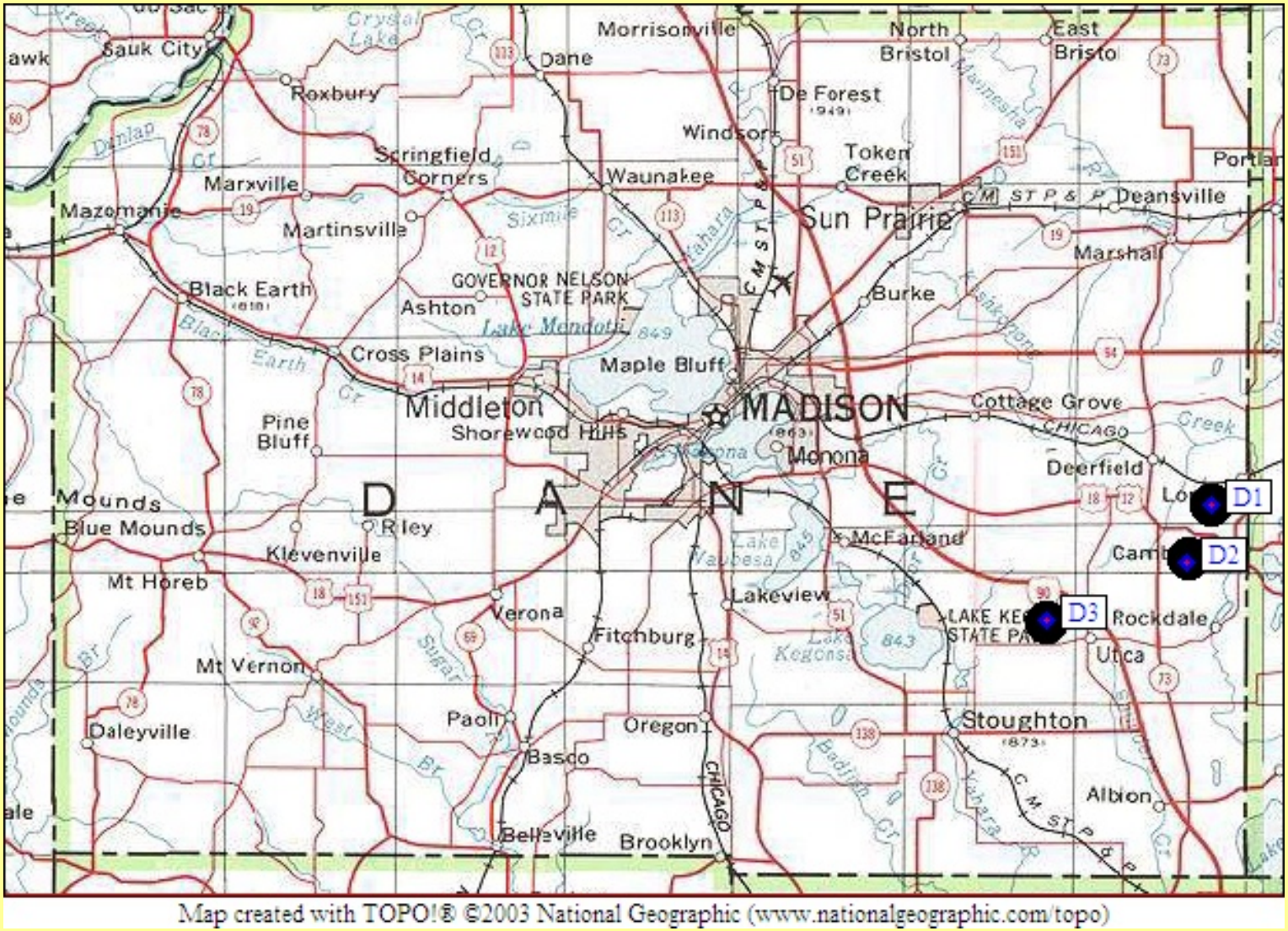
Dane Co. [3 Fields] 0.42 to 0.67 B/T/D



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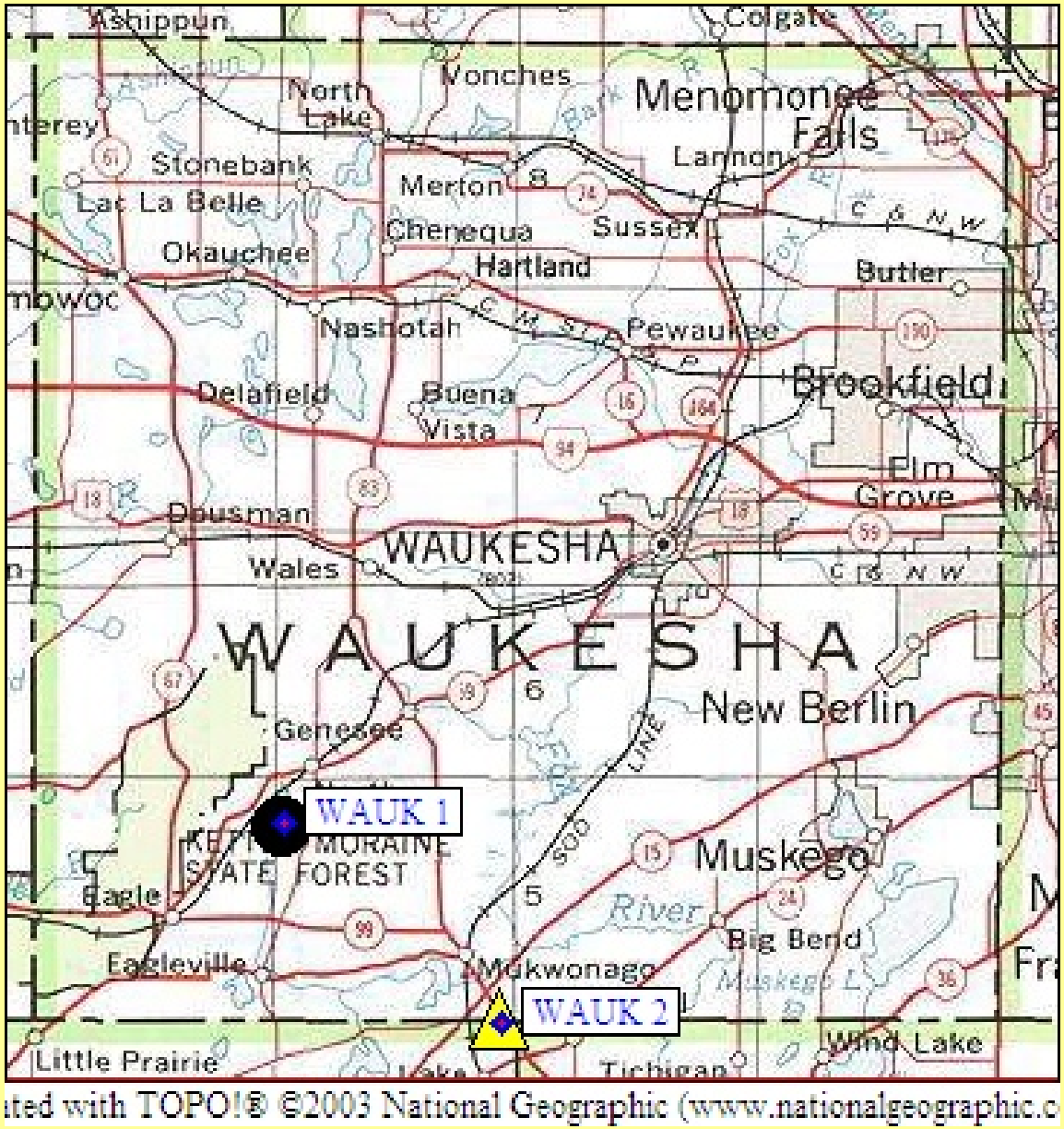
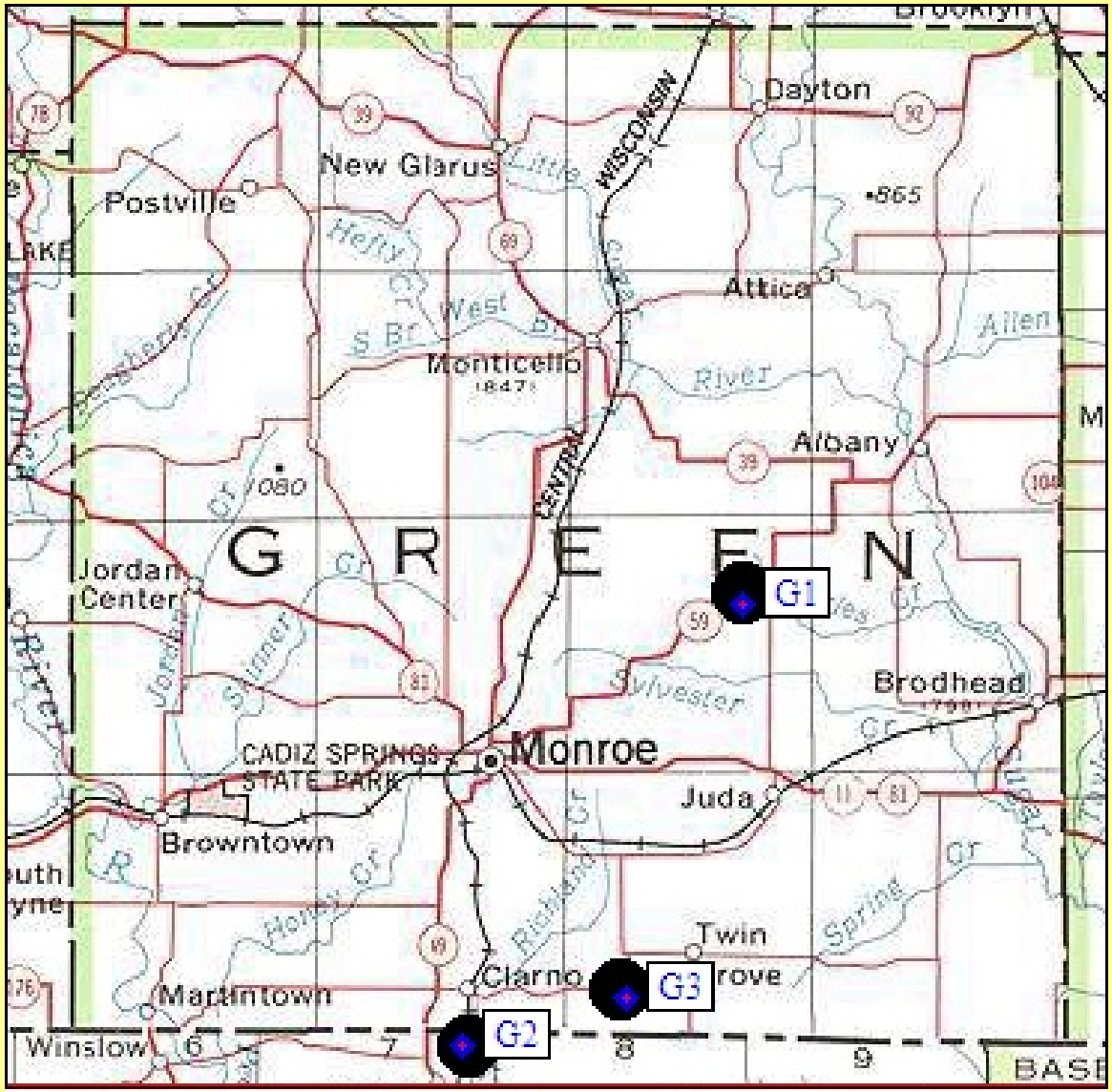
Jefferson Co. [2 Fields] 1.13 to 1.16 B/T/D

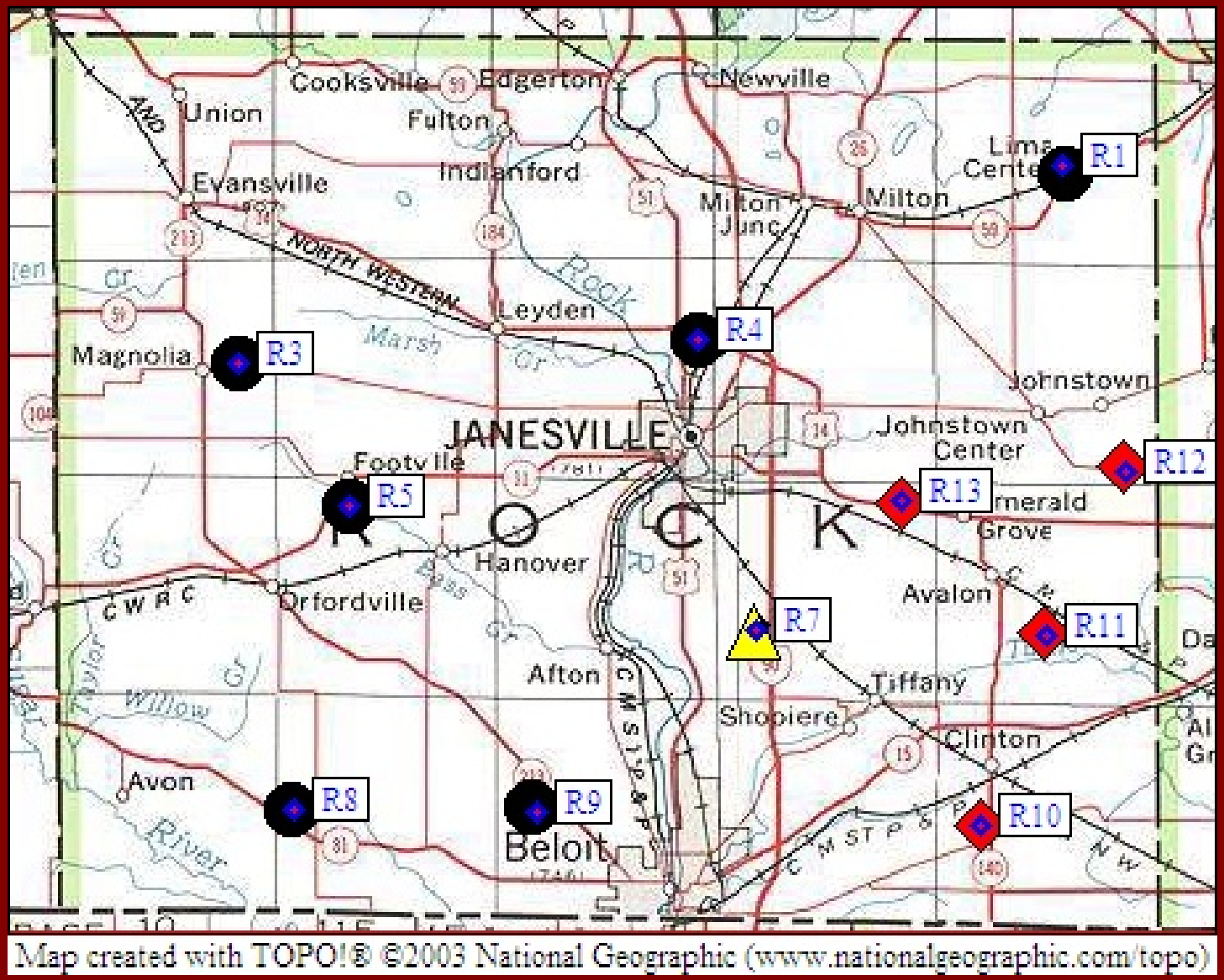
Waukesha Co. [2 Fields] 1.55 to 4.28 B/T/D



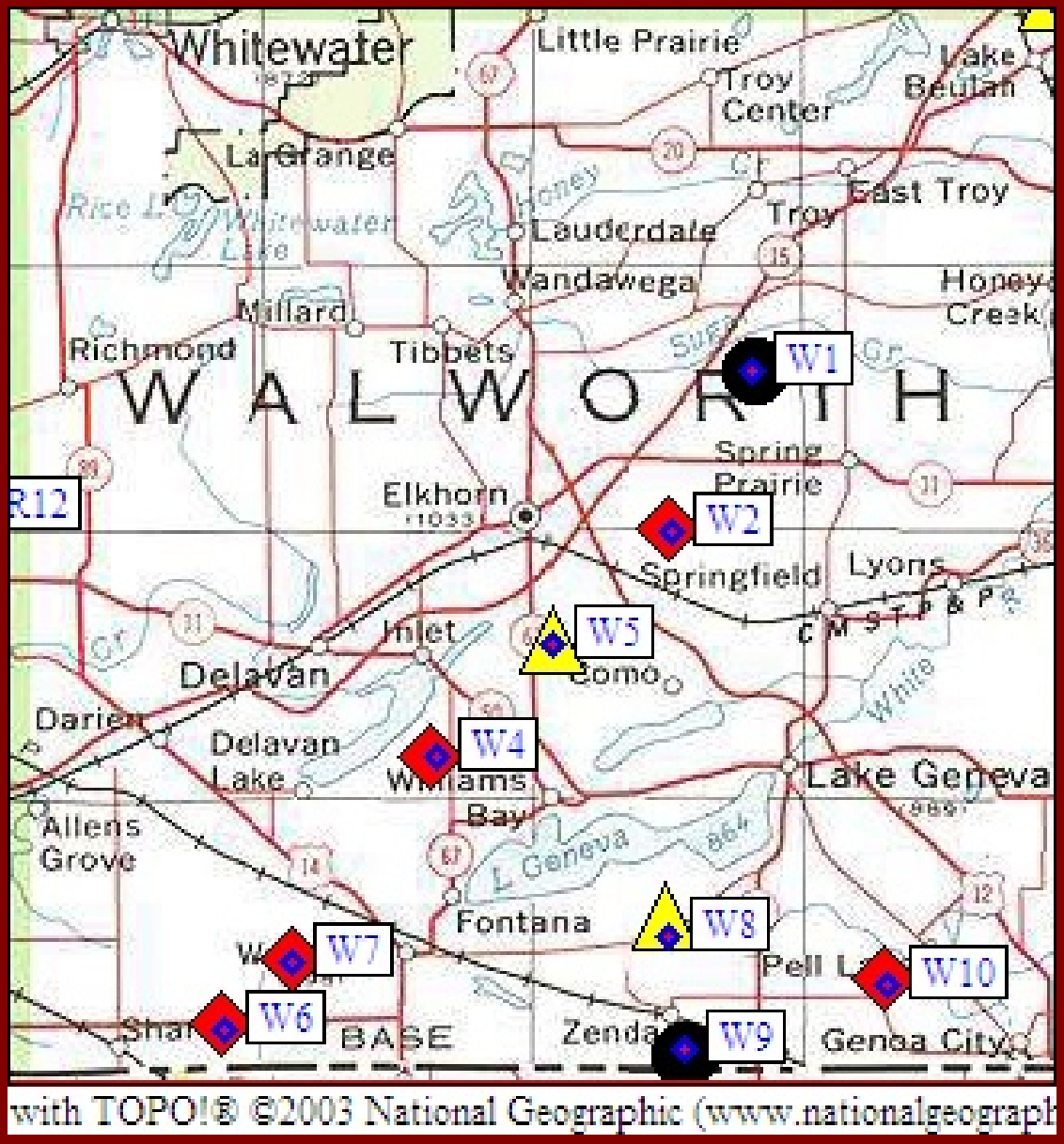
Green Co. [3 Fields] 0.38 to 0.60 B/T/D



Rock Co. [11 Fields] 0.97 to 8.30 B/T/D

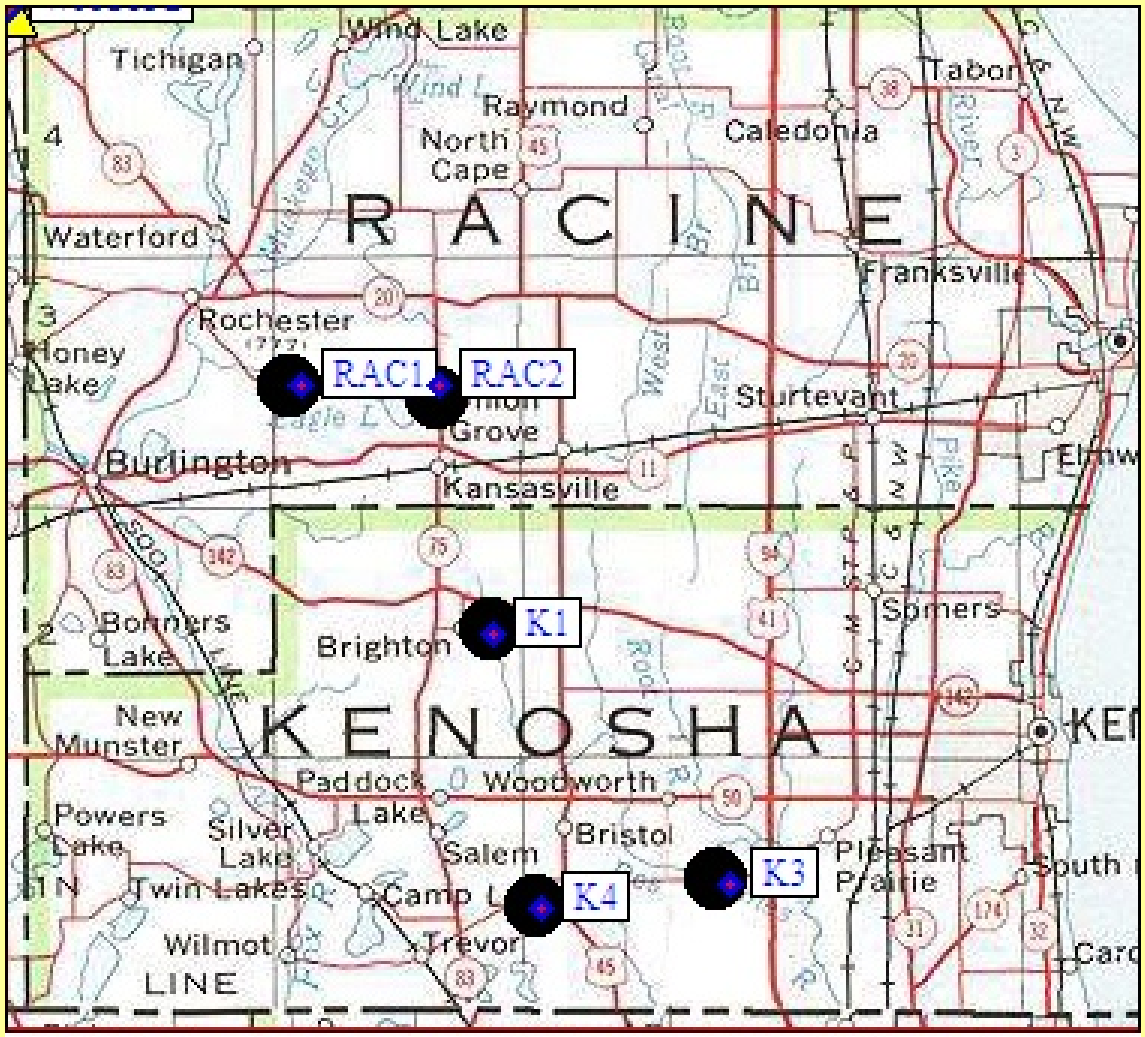


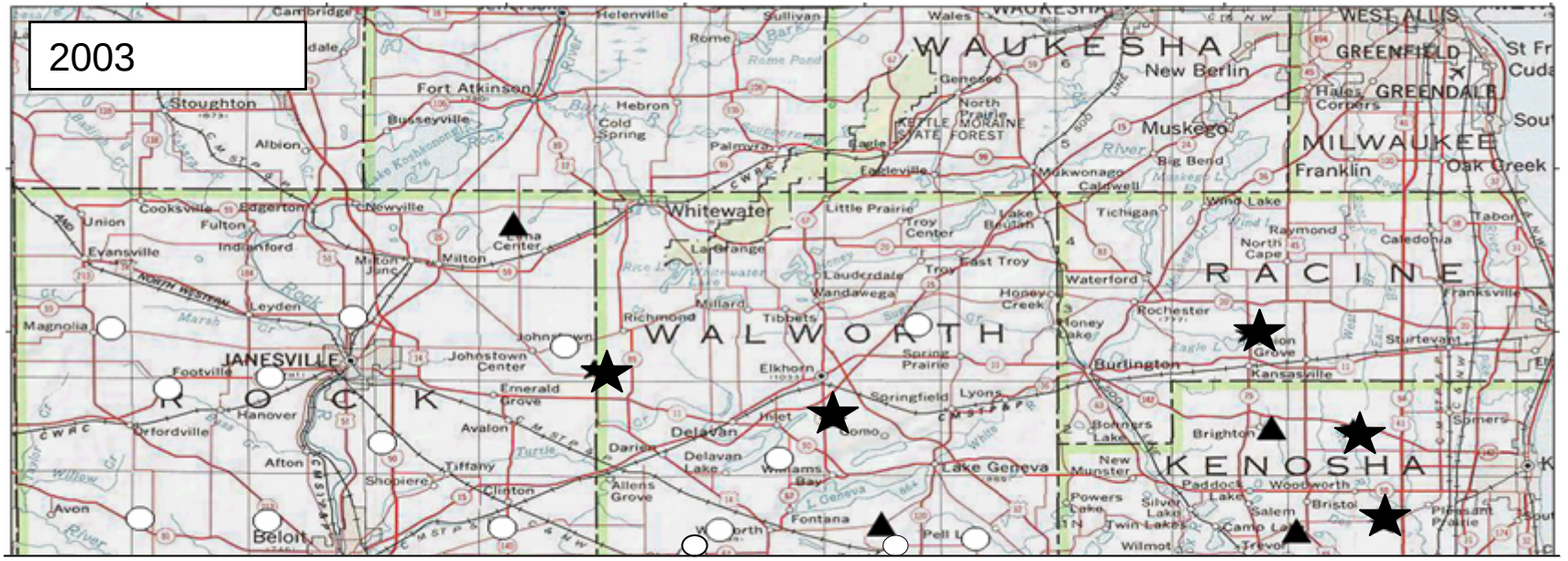
Walworth Co. [9 Fields] 1.78 to 8.83 B/T/D

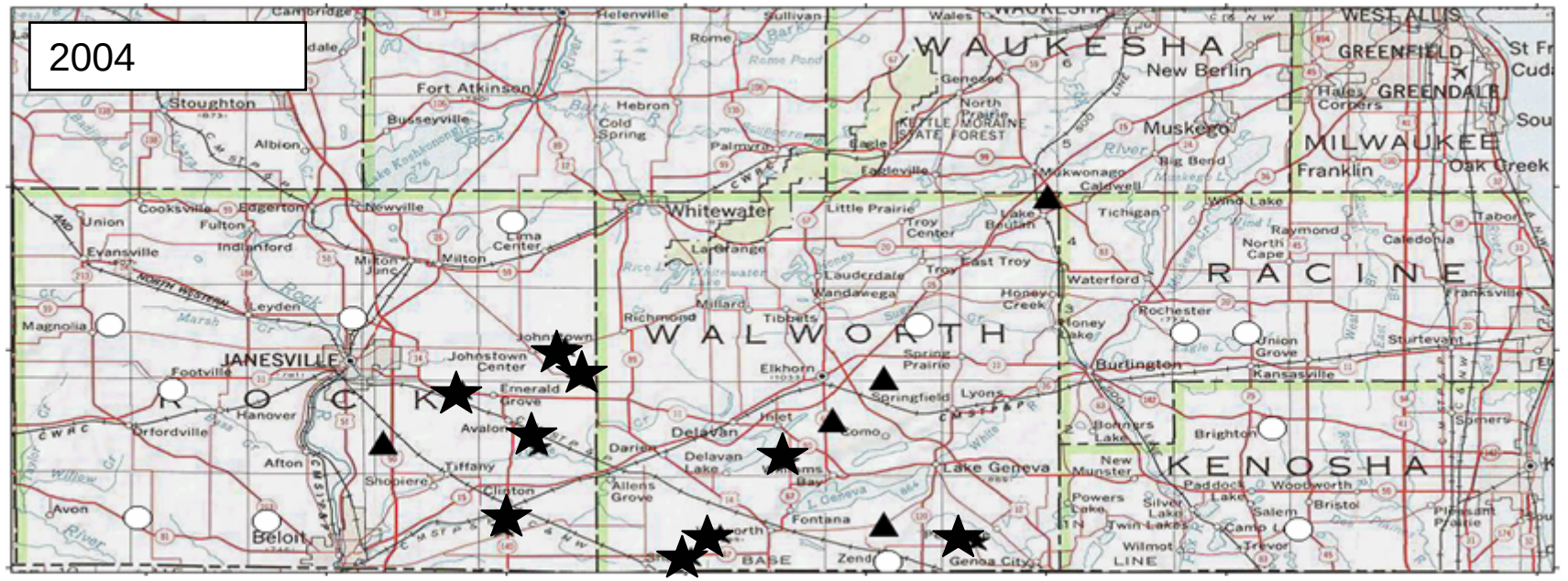


Racine Co. [2 Fields] 1.65 to 1.96 B/T/D

Kenosha Co. [3 Fields] 2.34 to 2.68 B/T/D




2003
WAUKESHA
WALWORTH
RACINE
KENOSHA
ROCK
MILWAUKEE
JANESVILLE
Beloit
Whitewater
Lake Geneva
Elkhorn
Burlington
New Berlin
Oconomowoc
Fort Atkinson
Stoughton
Edgerton
Evansville
Milton
Delavan
Darien
Fontana
Williams Bay
Brighton
Kansasville
Union Grove
Waterford
Franklin
Oak Creek
GREENFIELD
GREENDALE
WEST ALLIS


2004
WAUKESHA
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Stoughton
Edgerton
Evansville
Milton
Delavan
Darien
Fontana
Williams Bay
Brighton
Kansasville
Union Grove
Waterford
Franklin
Oak Creek
GREENFIELD
GREENDALE
WEST ALLIS

Monitoring Efforts Show

The range shifts rapidly

Great Variability within the “Affected Area” indicated by:

- Beetle abundance
- Corn root damage the following year

Beetles monitored in 2003: below threshold

Minimal root damage observed in 2004

Significant damage observed in 2004

Town of Clinton,
Rock County

Table 1. Node-Injury Results in First Year Corn, 2004

County	No. of Fields	Node-Injury County Avg.	% Roots 0.50-0.75	Node-Injury Range
Dane	5	0.00	0%	0.00 – 0.10
Columbia	7	0.01	0%	0.00 – 0.20
Green	6	0.03	0%	0.00 – 0.30
Rock	10	0.12	8%	0.00 – 1.30
Kenosha	3	0.15	13%	0.00 – 1.25
Racine	2	0.04	0%	0.00 – 0.40
Walworth	11	0.52	20%	0.00 – 3.00
Jefferson	3	0.03	0%	0.00 – 0.20
Waukesha	1	0.00	0%	0.00 – 0.00

Scouting Essential for Determining Local Damage Potential

Maps give a general idea of affected area

- Indicate whether scouting should be considered

Too coarse for making treatment decision

- One or two fields per township
- Annual “pulsation” within affected area
- Wide variation between field populations is possible

Monitoring beetle populations in individual fields with sticky traps

- Only way to determine the potential for economic damage
- Estimates **population** and change over time
- Established thresholds based on experience from University of Illinois

Seeing Beetles is Not Enough

Some beetles will naturally occur in fields

- Border effect
- May be there to feed
- Survive after laying eggs
- May not be the variant

Can’t measure population

Trapping Costs

Materials ~ $48.00 per field

- per acre cost based on field size

Labor

- 4 hours total for a 50 acre field
- August (few priority alternatives)

Potential returns high compared to “blind treatment” if control unnecessary

Cost and return of monitoring variant WCR populations versus routine treatment.

Field Size (acres)	Total Labor (hours)	Cost			Difference Between Routine Treatment and Scouting		Return to Mgt. If Tmt Unnecessary ($/hour)
		Labor ($/acre)	Traps and Materials ($/acre)	Total ($/acre)	($/acre)	($/field)	
50	4.00	1.20	0.92	2.12	14.88	744.10	186.03
100							
150							
200							
250							
300							

Cost and return of monitoring variant WCR populations versus routine treatment.

Field Size (acres)	Total Labor (hours)	Cost			Difference Between Routine Treatment and Scouting		Return to Mgt. If Tmt Unnecessary ($/hour)
		Labor ($/acre)	Traps and Materials ($/acre)	Total ($/acre)	($/acre)	($/field)	
50	4.00	1.20	0.92	2.12	14.88	744.10	186.03
100	4.68	0.70	0.46	1.16	15.84	1583.90	338.44
150	5.36	0.54	0.31	0.84	16.16	2423.70	452.18
200	6.04	0.45	0.23	0.68	16.32	3263.40	540.30
250	6.72	0.40	0.18	0.59	16.41	4103.25	610.60
300	7.40	0.37	0.15	0.52	16.48	4943.10	667.99

WCR Variant Network Summary 2004

Threshold reached (> 5 B/T/D) trapping in network soybean fields in extreme southeast WI

2003: Racine Co., Kenosha Co., Walworth Co.

2004: Walworth Co., Eastern Rock Co.

Consider root protection in first-year corn, IF:

~ Extreme southeastern location

~ Threshold B/T/D is determined in soybeans, previous year

~ UWEX Variant WCR Trapping Network Updates

Options: Expand rotation (alfalfa, wheat); soil insecticide; Bt CRW hybrid; Insecticidal seed treatment at rootworm rate.

Current research does NOT support spraying soybeans for adult beetles (Univ. of Illinois, Urbana-Champaign)

Recommendations for 2005

In “Affected Area”

If treating “blindly”, leave untreated strip to determine effectiveness of treatment

(contact *UWEX* for root rating)

In “Affected” and Adjacent Areas

Monitor soybean fields for beetle abundance in August following U of I protocol

- 2006 treatment decisions based on 2005 results

Pherocon AM Yellow Sticky Traps

- GEMPLER'S, Inc.
  1210 Fourier Drive, Suite 150
  Madison, WI 53744
  Tel: 1-800-382-8473
  Fax:1-800-551-1128
  www.gemplers.com
- Great Lakes IPM
  7563 North Crystal Road
  Vestaburg, MI 48891
  Tel: 1-989-268-5693 or 1-989-268-5911
  Fax: 1-989-268-5311
  www.greatlakesipm.com

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