Canola Disease Update

Keith Gabert
Agronomy Specialist, Central Alberta South
Canola Council of Canada

KEEP IT COMING

Red Deer, AB
Agronomy Update
Jan 10, 2018

canolacouncil OF CANADA

canolacouncil OF CANADA

AGRONOMY SPECIALISTS

GREGORY SEKULIC
Peace Region
Sustainability & Beneficial Insects Lead
sekulicg@canolacouncil.org
Cell: (780) 832-2382

DAN ORCHARD
Central Alberta North
Clubroot & Crop Tours Lead
orchardd@canolacouncil.org
Cell: (780) 777-9923

CLINT JURKE
Midwest
Verticillium/New Diseases Lead
jurkec@canolacouncil.org
Cell: (306) 821-2935

IAN EPP
Northwest Saskatchewan
Stand Establishment & Weeds Lead
eppi@canolacouncil.org
Cell: (306) 371-7913

SHAWN SENKO
Northeast Saskatchewan
Machinery, Precision Ag & Big Data Lead
senkos@canolacouncil.org
Cell: (306) 270-9307

JUSTINE CORNELSEN
Western Manitoba
Blackleg Lead
cornelsenj@canolacouncil.org
Cell: (204) 298-4364

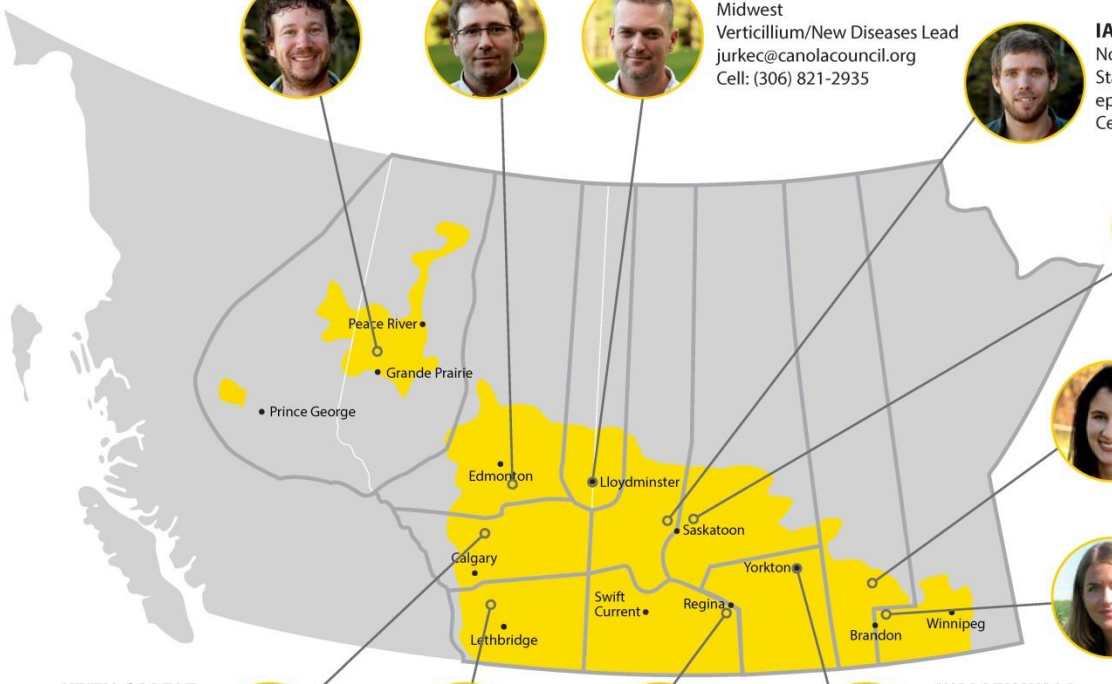
ANGELA BRACKENREED
Eastern Manitoba
Harvest/Storage Management & Economics Lead
brackenreeda@canolacouncil.org
Cell: (204) 720-6923

WARREN WARD
Southeast Saskatchewan
Fertility Lead
wardw@canolacouncil.org
Cell: (306) 621-0630

NICOLE PHILP
Southwest Saskatchewan
UCC & Genetics Lead, CPT Co-Lead
philpn@canolacouncil.org
Cell: (306) 551-4597

BRITTANY HENNIG
Alberta South
Tillage/Residue Management Lead
hennigb@canolacouncil.org
Cell: (403) 360-0206

KEITH GABERT
Central Alberta South
Pest Insects & Sclerotinia Lead
gabertk@canolacouncil.org
Cell: (587) 377-0557



THE BIG 3 CANOLA DISEASES
• SCLEROTINIA
• CLUBROOT
• BLACKLEG

SCLEROTINIA

canolacouncil OF CANADA

The Wet Pants Test

Wet pants at onset of flower

+

Potential for High Yielding Crop

+

Wet June

SPRAY A FUNGICIDE

Sclerotinia: Apothecia and ascospores

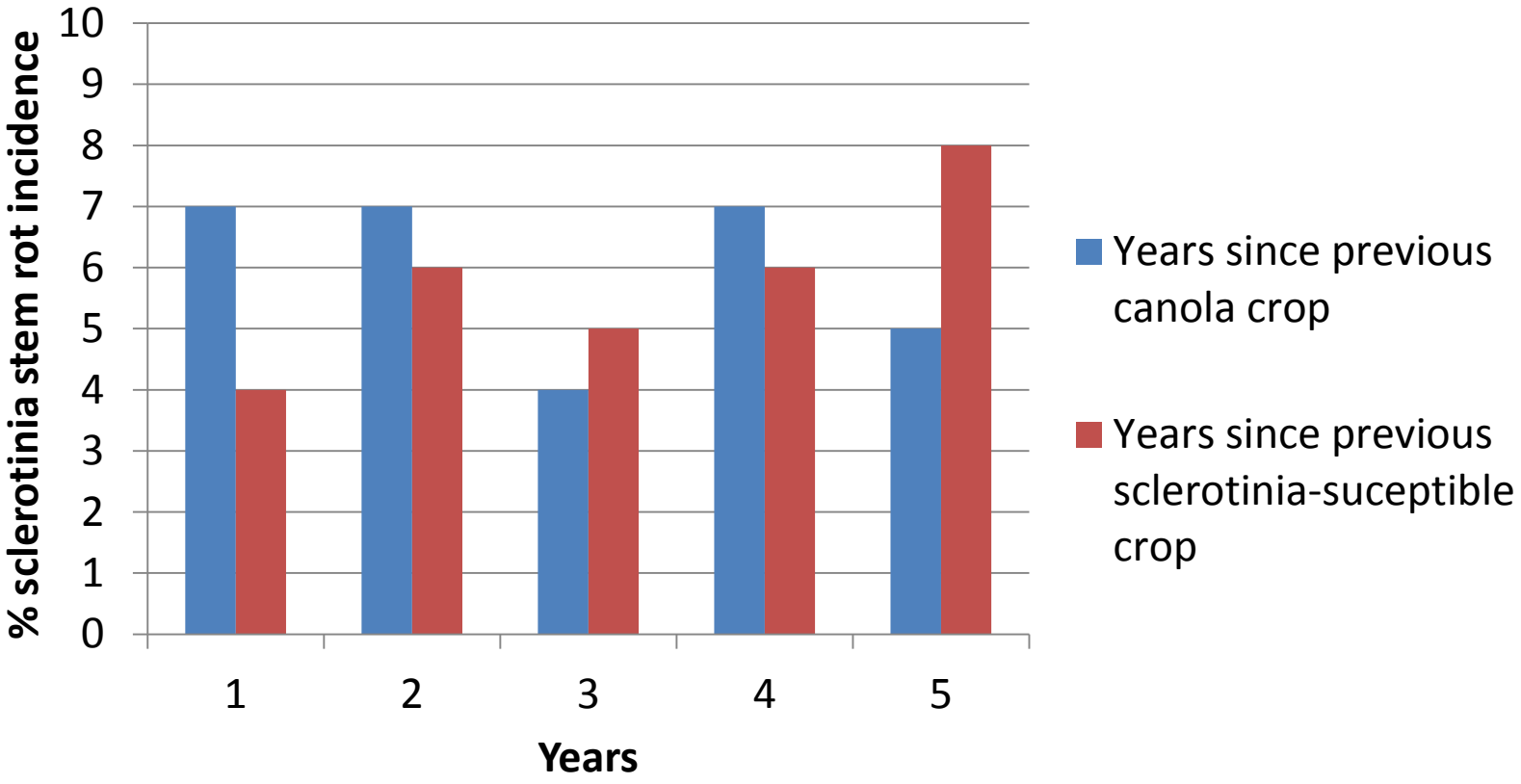
Factors that Contribute to Sclerotinia Stem Rot

1. Amount and availability of moisture
2. Suitable temperature
3. Favorable microenvironment (Within Crop Canopy)
4. Ascospores produced

Sclerotinia Stem Rot – Yield Impact

- Yield Loss
  - Estimated to be 5% annually in Canada
    - Severity in individual fields is the issue
    - Approximately 50% yield loss from each infected plant.

Effect of Rotation on sclerotinia stem rot incidence

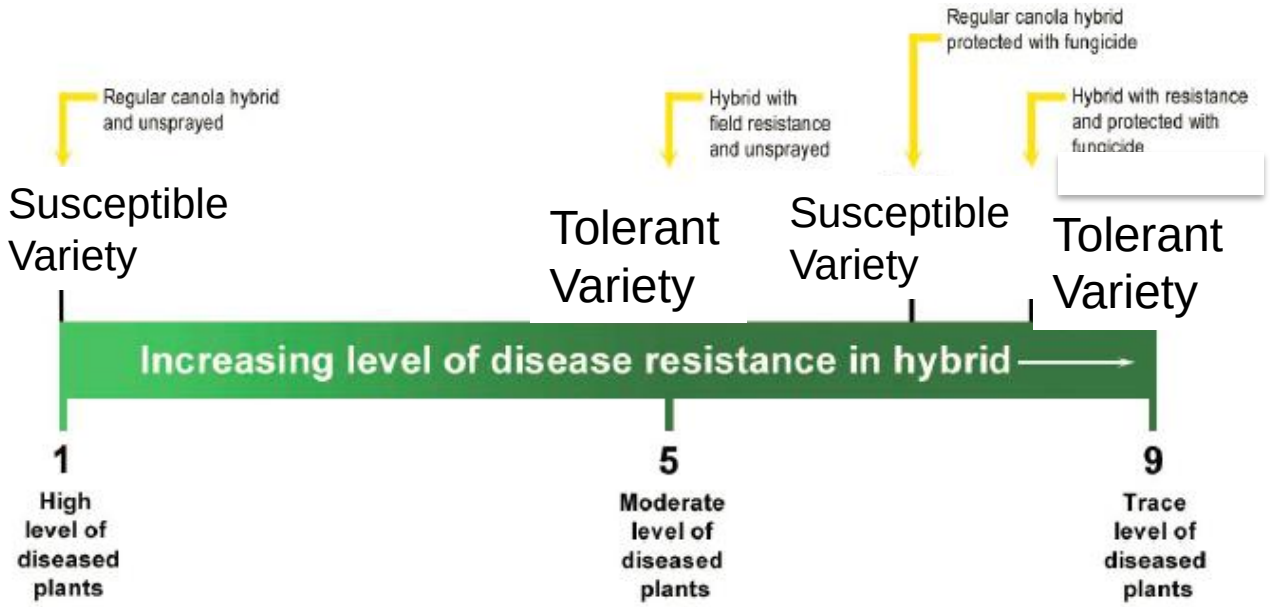


Source: Report on 1997 Western Canada Canola Disease Survey, R.A.A. Morrall et al.

Sclerotinia Tolerant Varieties

Table 1*
Disease resistance of hybrids under different levels of sclerotinia pressure

**This diagram does not account for extreme years when two fungicide applications are recommended by manufacturers.*



Sclerotinia Stem Rot Checklist

(For each risk factor, circle the risk points that apply to your field).

RISK FACTOR	POSSIBLE ANSWERS	RISK POINTS
NUMBER OF YEARS SINCE LAST CANOLA CROP	More than six years	0
	Three to six years	5
	One to two years	10
DISEASE INCIDENCE IN LAST HOST CROP	None	0
	Low (1 to 10%)	5
	Moderate (11 to 30%)	10
	High (31 to 100%)	15
CROP DENSITY	Low	0
	Normal	5
	High	10
RAIN IN THE LAST TWO WEEKS	Less than 10 mm (0.4")	0
	10 to 30 mm (0.4 to 1.2")	5
	More than 30 mm (1.2")	10
WEATHER FORECAST	High pressure	0
	Variable	10
	Low pressure	15
REGIONAL RISK FOR APOTHECIA DEVELOPMENT	None found	0
	Low numbers	10
	High numbers	15

TOTAL RISK POINTS FOR ALL RISK FACTORS =

> 40 points = Spray
< 40 points = Do not spray

Canola petal infection study

- Can we examine canola petals to determine if ascospores are present?
  - The Petal Test Kit developed by the University of Saskatchewan in 1991, used a selected agar plate assay to culture *S. sclerotiorum* fungus from canola petals

In Development – InnoTech Spore Sensor

InnoTech ALBERTA

canolacouncil
OF CANADA

CLUBROOT

ad 7:13 PM 41%
cabi.org

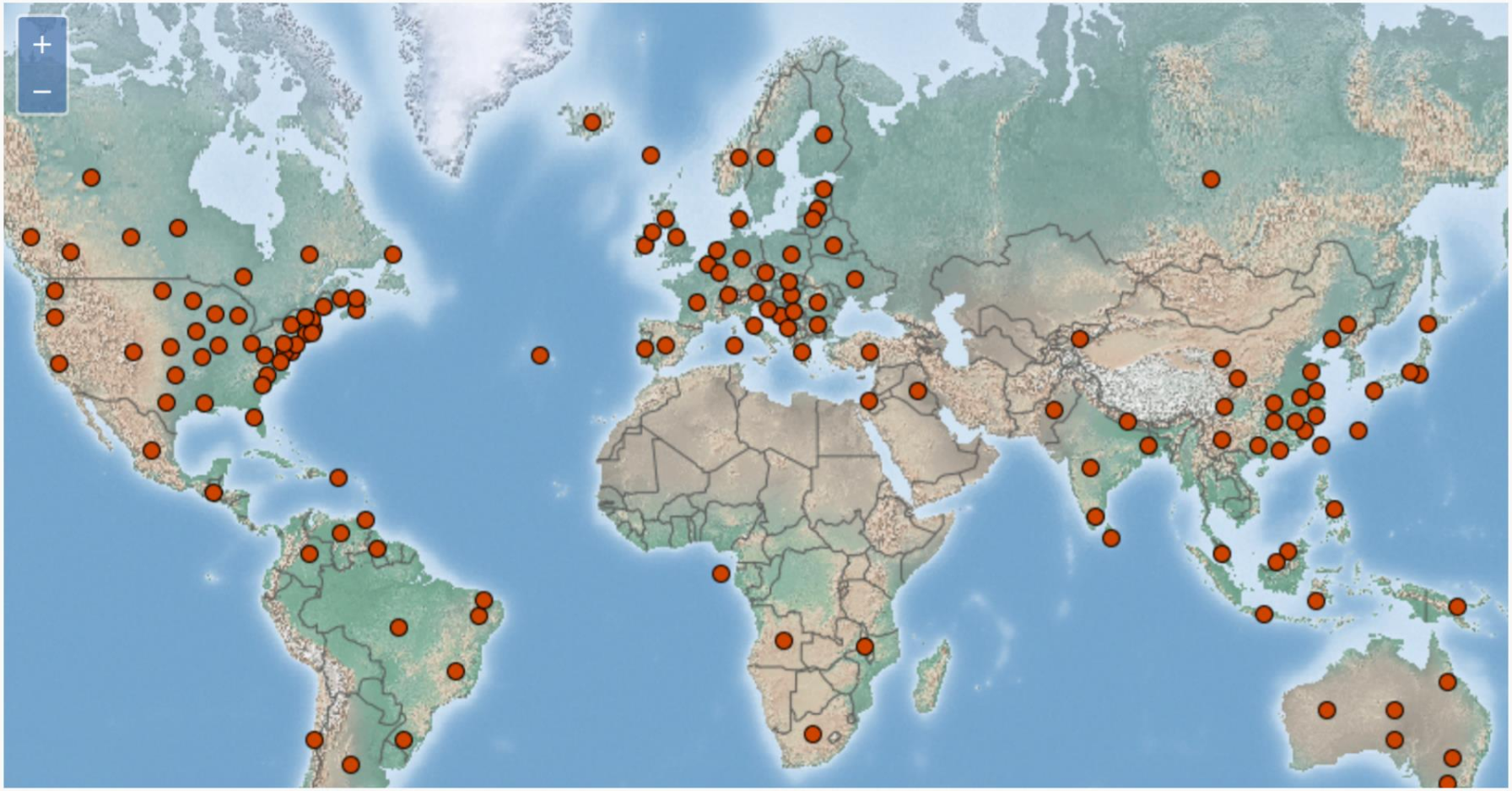
Yoshinari M, Kubota T, Inami S, Fujita T, 1997. Development of a new fungicide, flusulfamide. Journal of Pesticide Science, 22:176-184.

Distribution Maps

Top of page

NEW You can pan and zoom the map

Save map

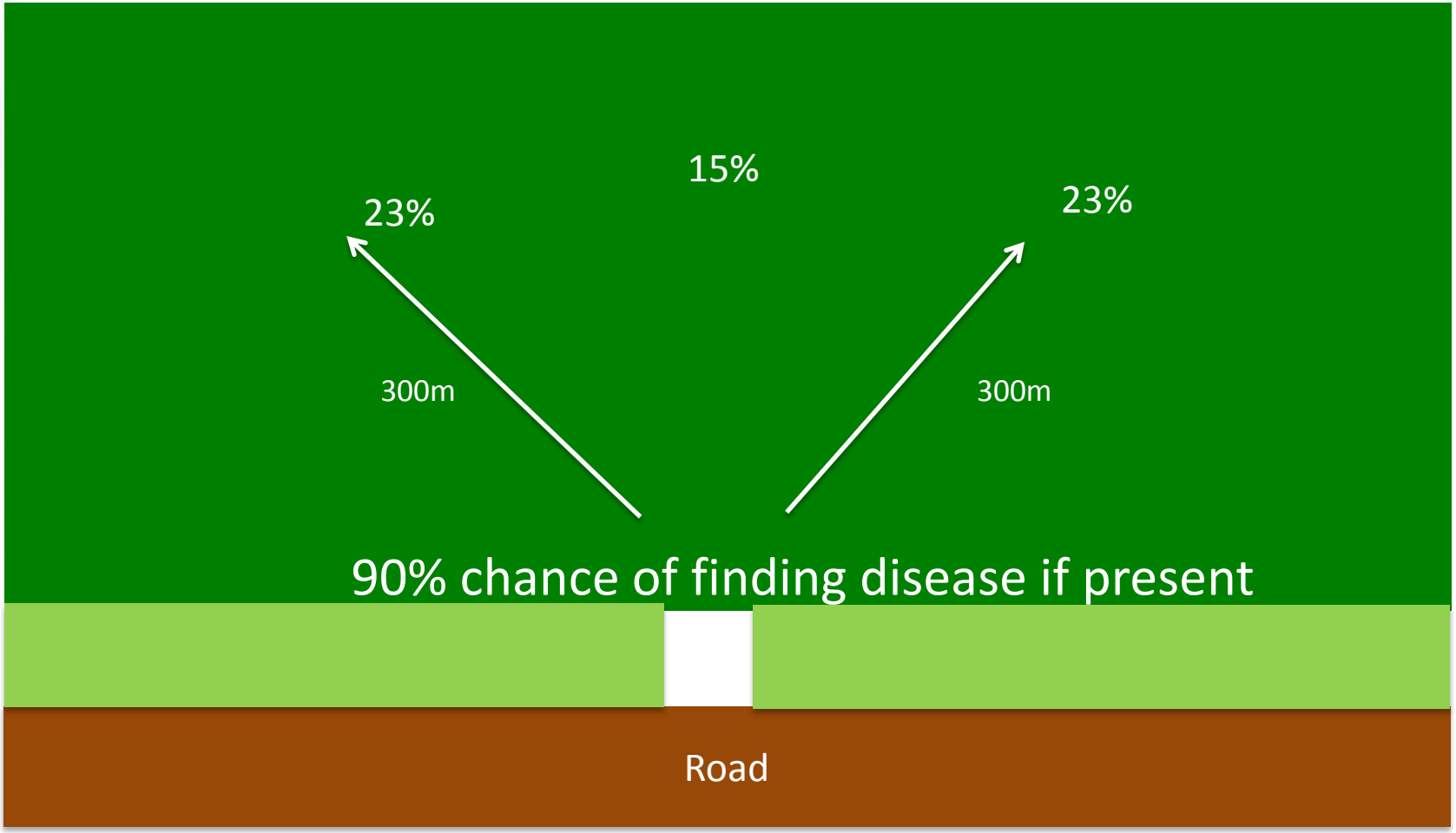


Analyze by: Source
- CABI
- Natural Resources Conservation Service

Analyze by: Invasive
- Not Recorded

Analyze by: Density
- Present, no further details
- Widespread

Entrances and Exits



…Still a challenge with so many spores

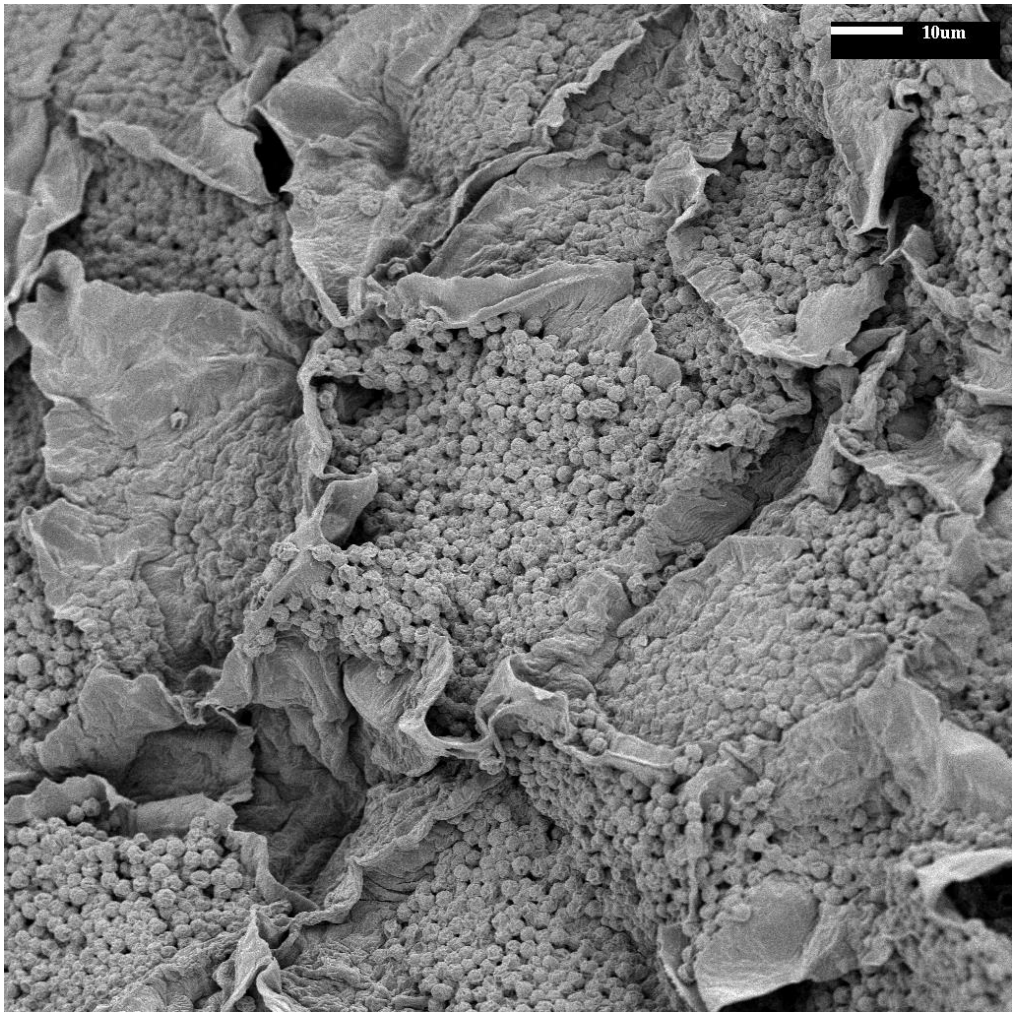
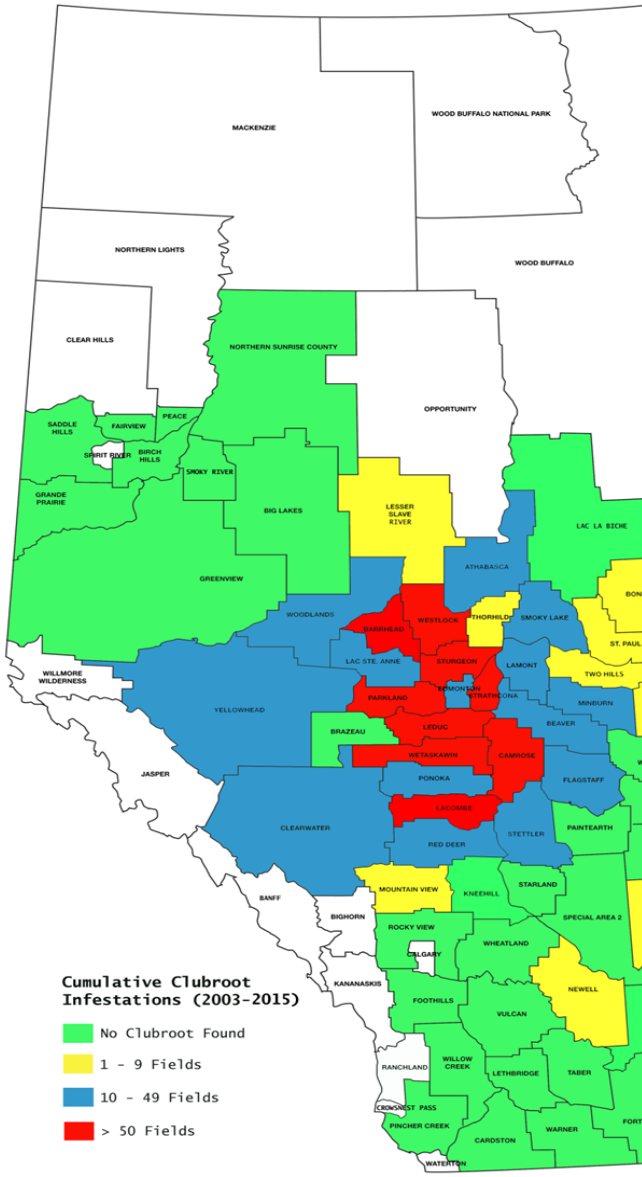


Image credit:
J.P Tewari

canolacouncil OF CANADA

Clubroot by the Numbers

- First cases of clubroot - 2003
- >2,400 clubroot field infestations confirmed by 2016
- BIG year in 2017
- Emergence of new strains of *P. brassicae* capable of overcoming resistance has been an issue since 2013. Targeted survey for cases
- were resistance has been broken/eroded. 19 Strains confirmed in Canada.



2025

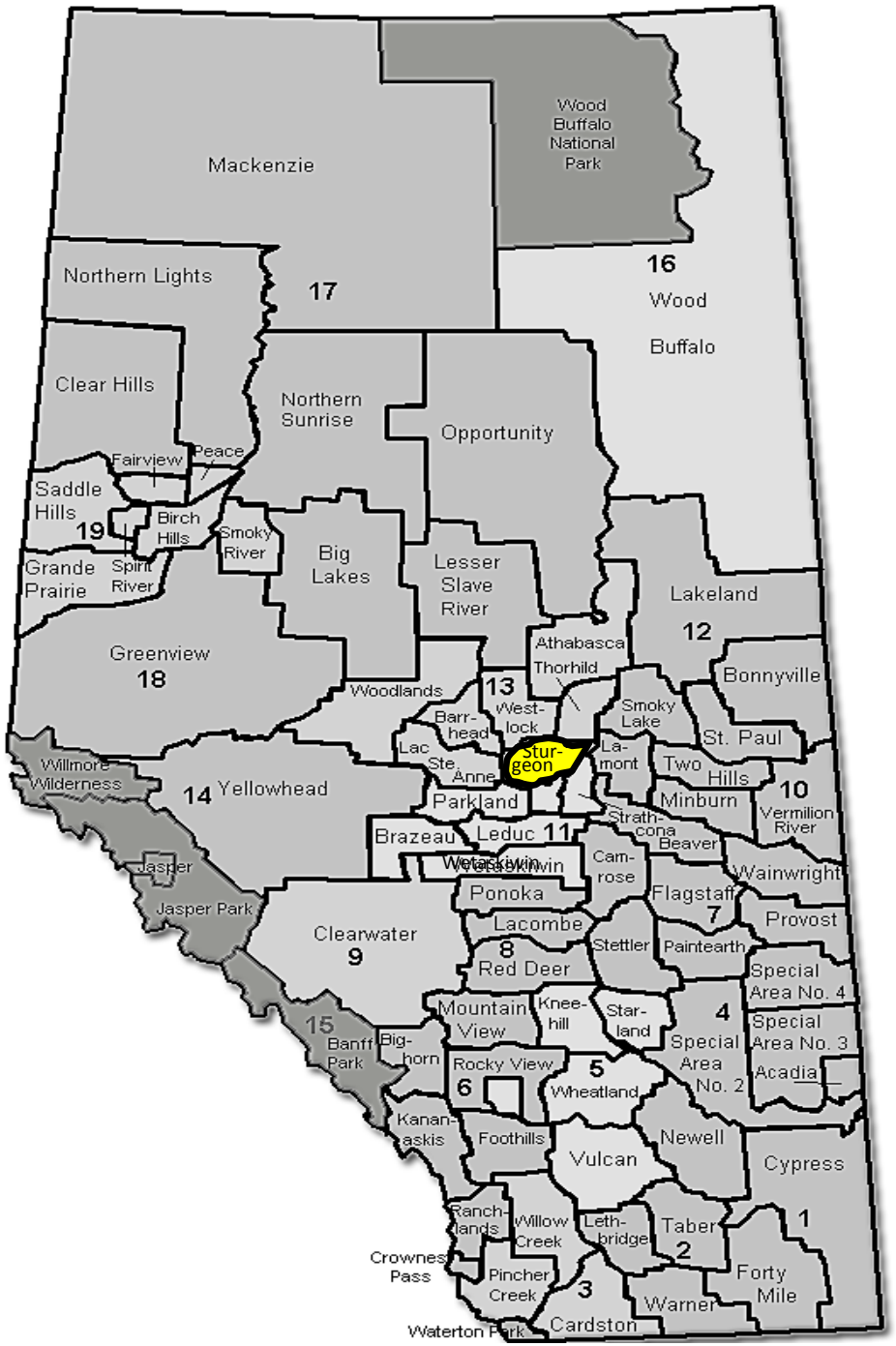
KEEP IT COMING

2003

1-9 Fields

10-49 Fields

50+ Fields

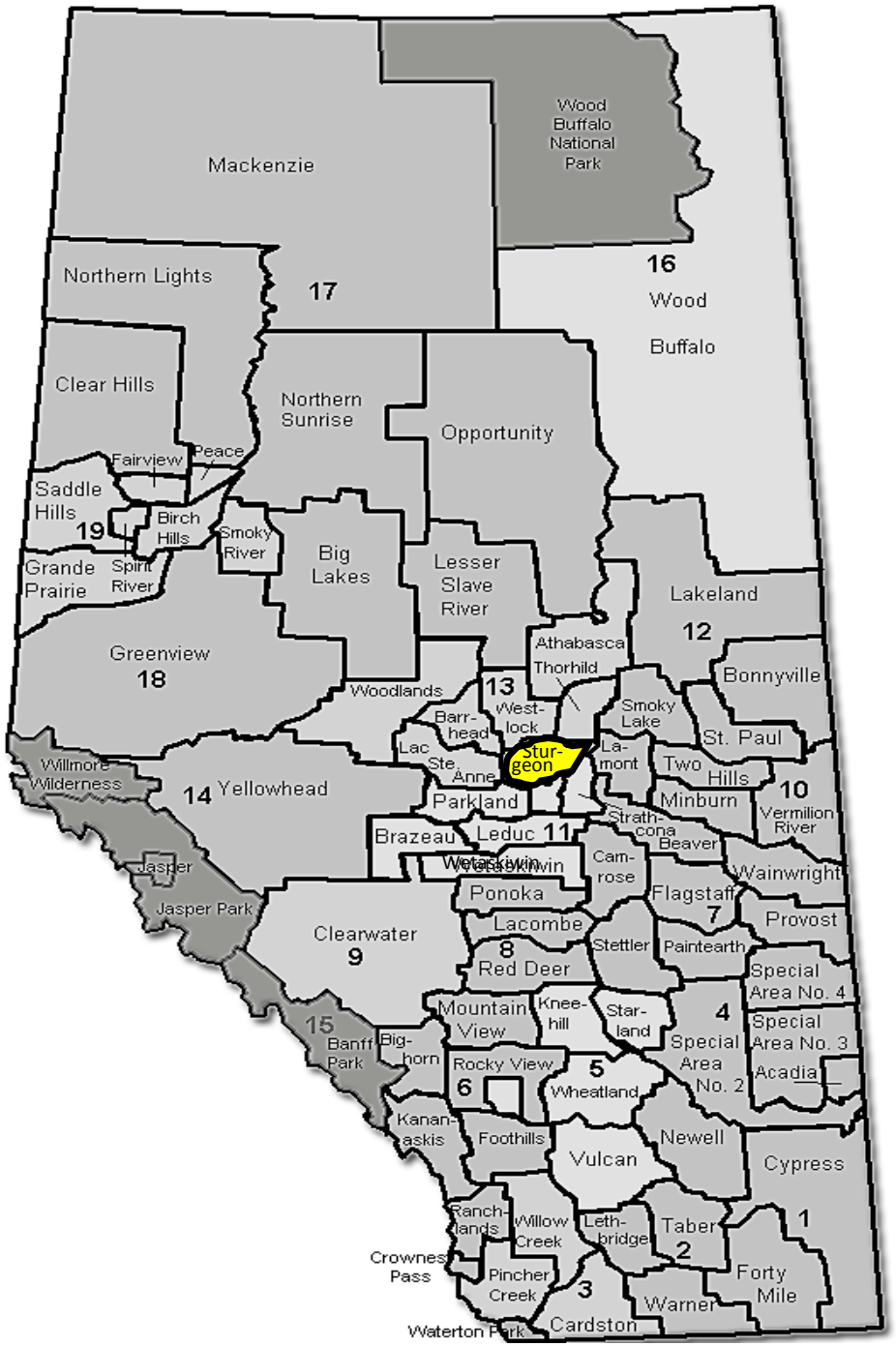


2004

1-9 Fields

10-49 Fields

50+ Fields

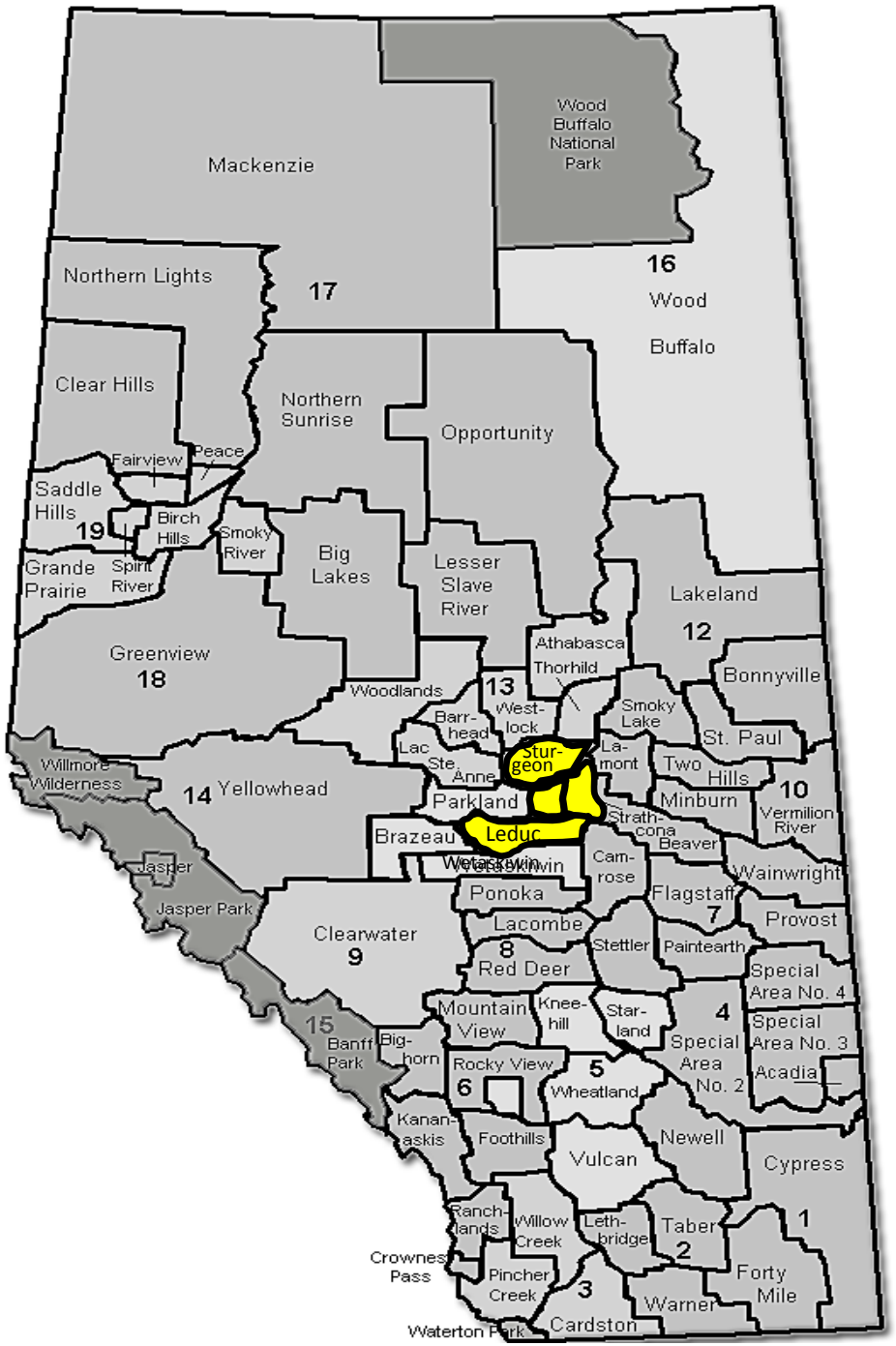


2005

1-9 Fields

10-49 Fields

50+ Fields

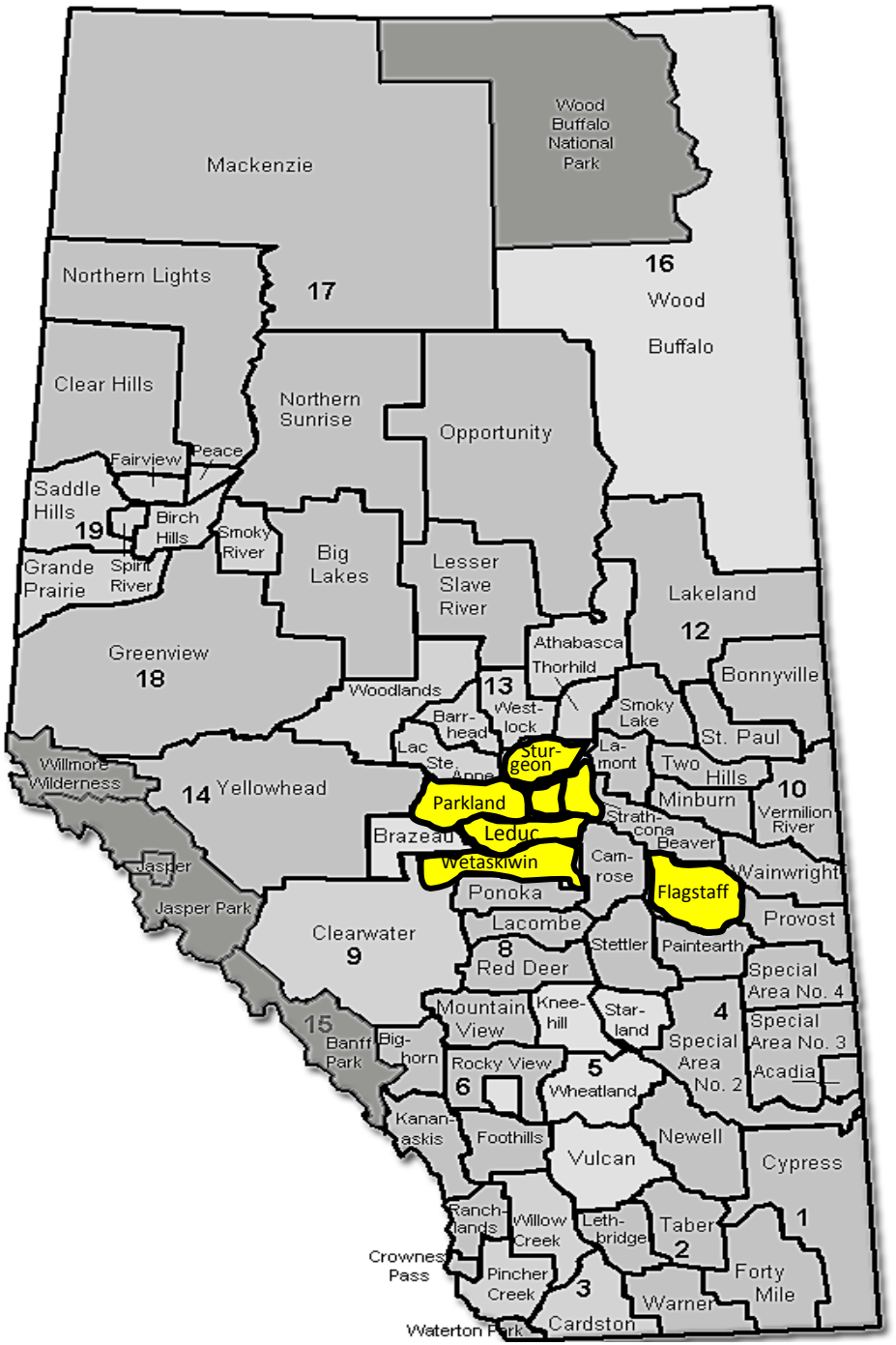


2006

1-9 Fields

10-49 Fields

50+ Fields

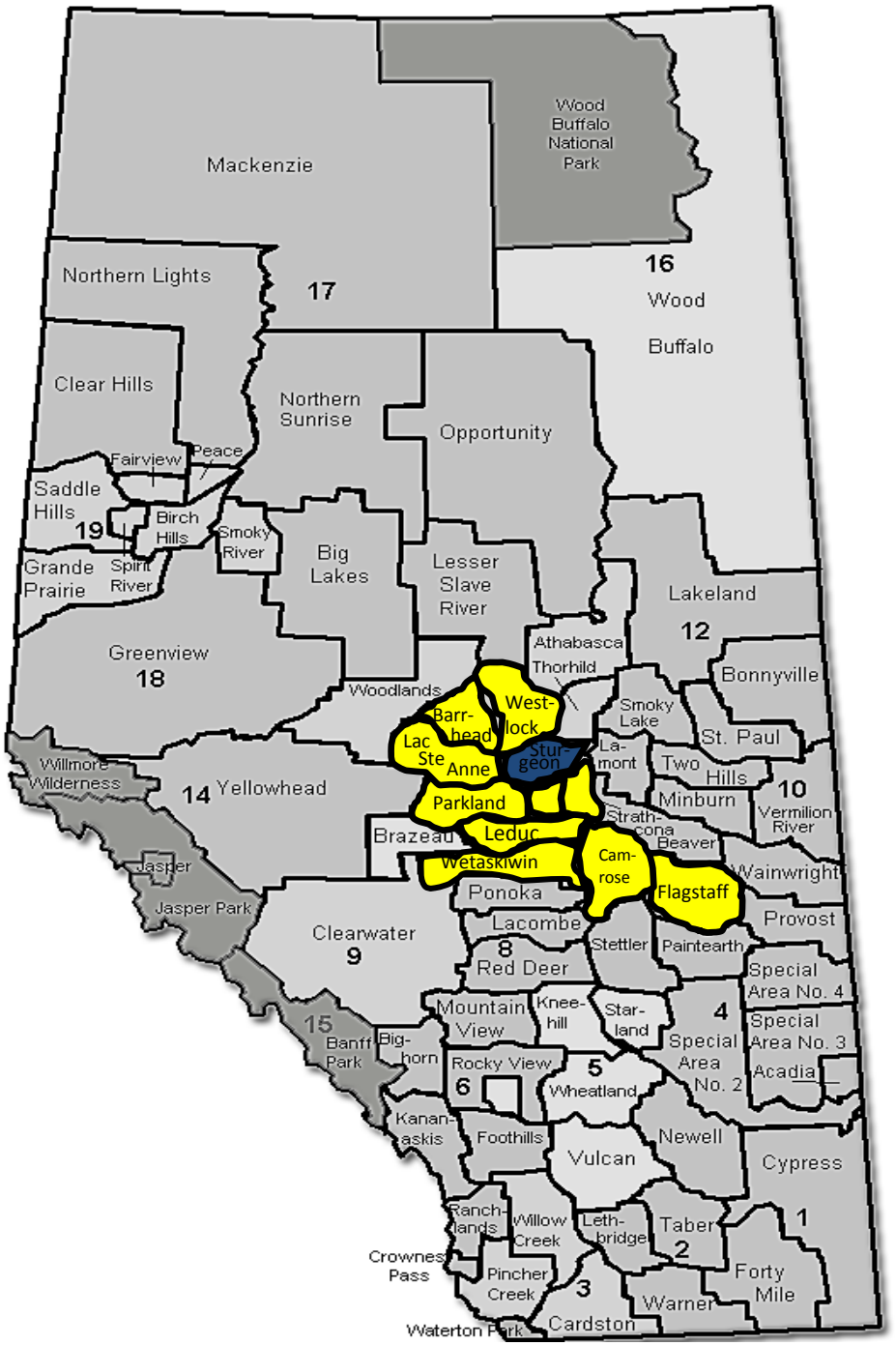


2007

1-9 Fields

10-49 Fields

50+ Fields

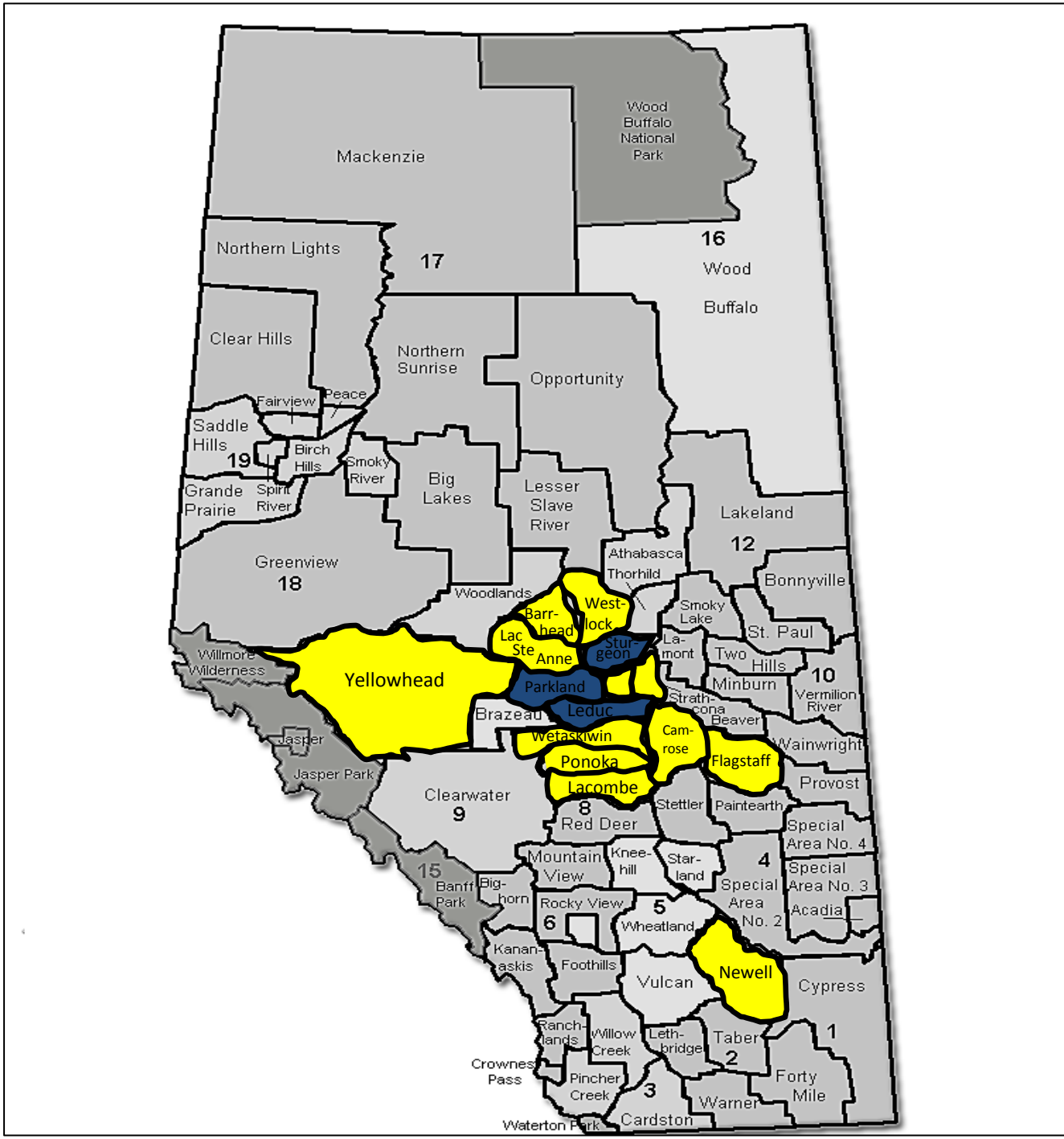


2008

1-9 Fields

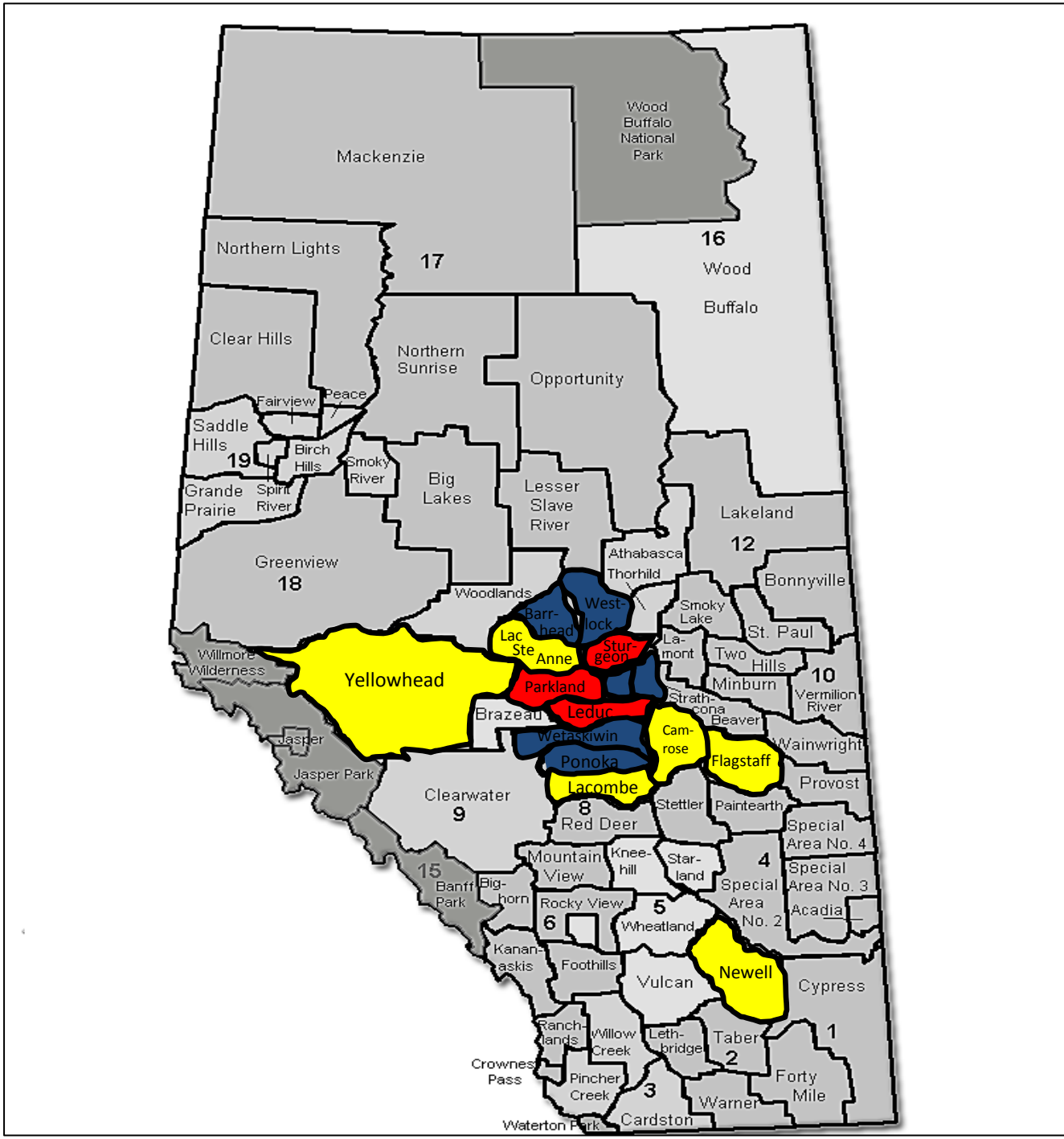
10-49 Fields

50+ Fields



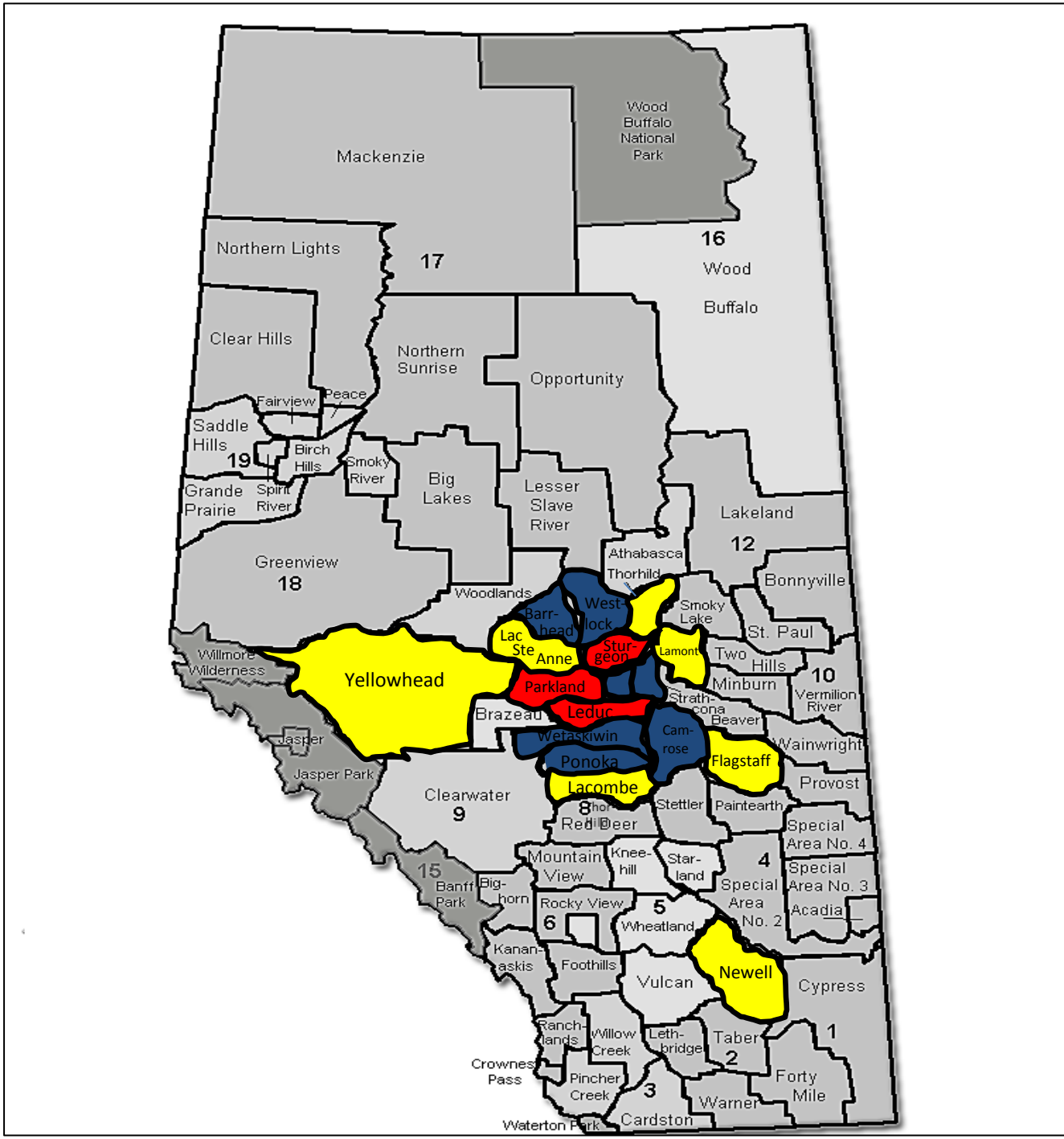
2009

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



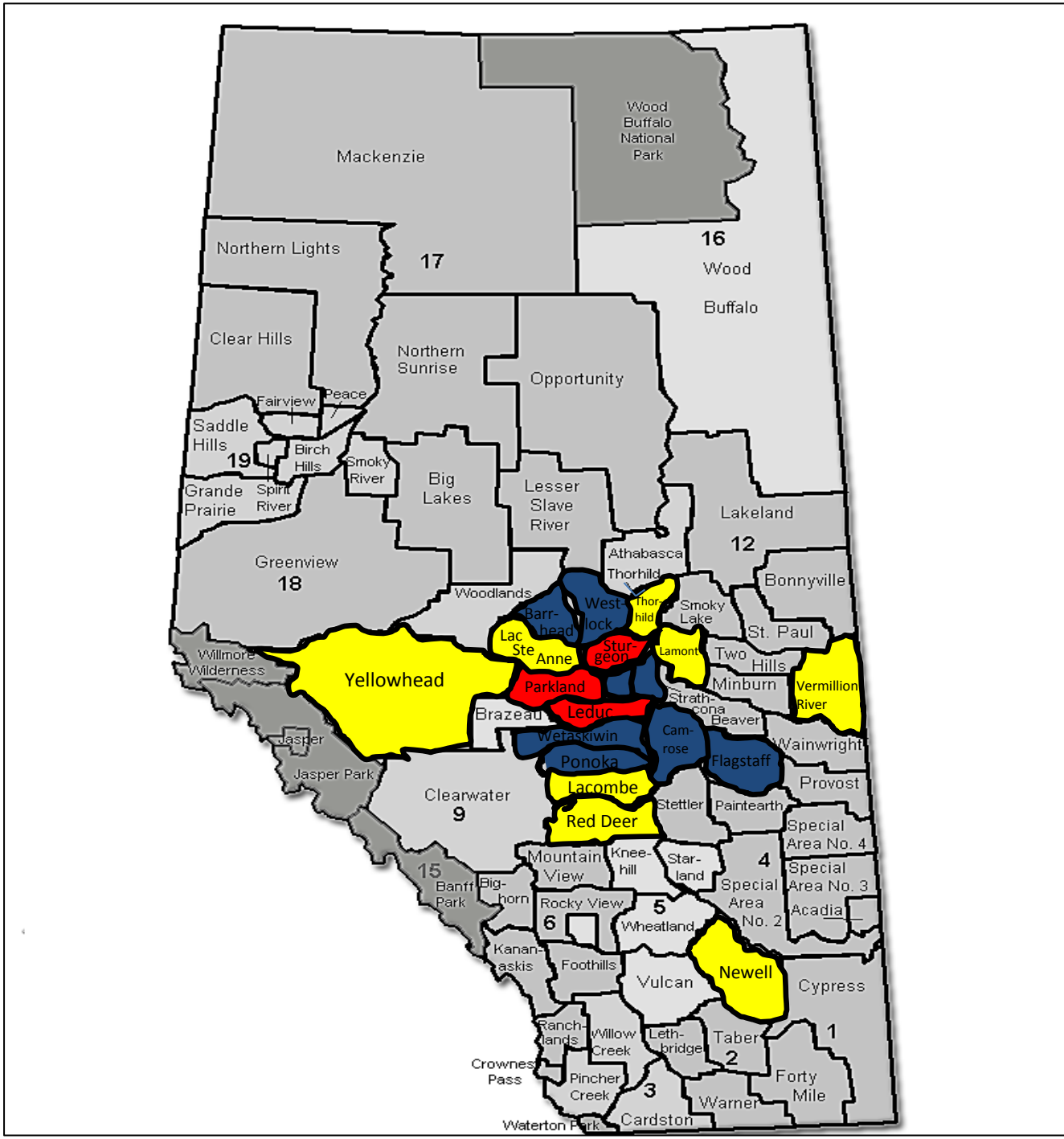
2010

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



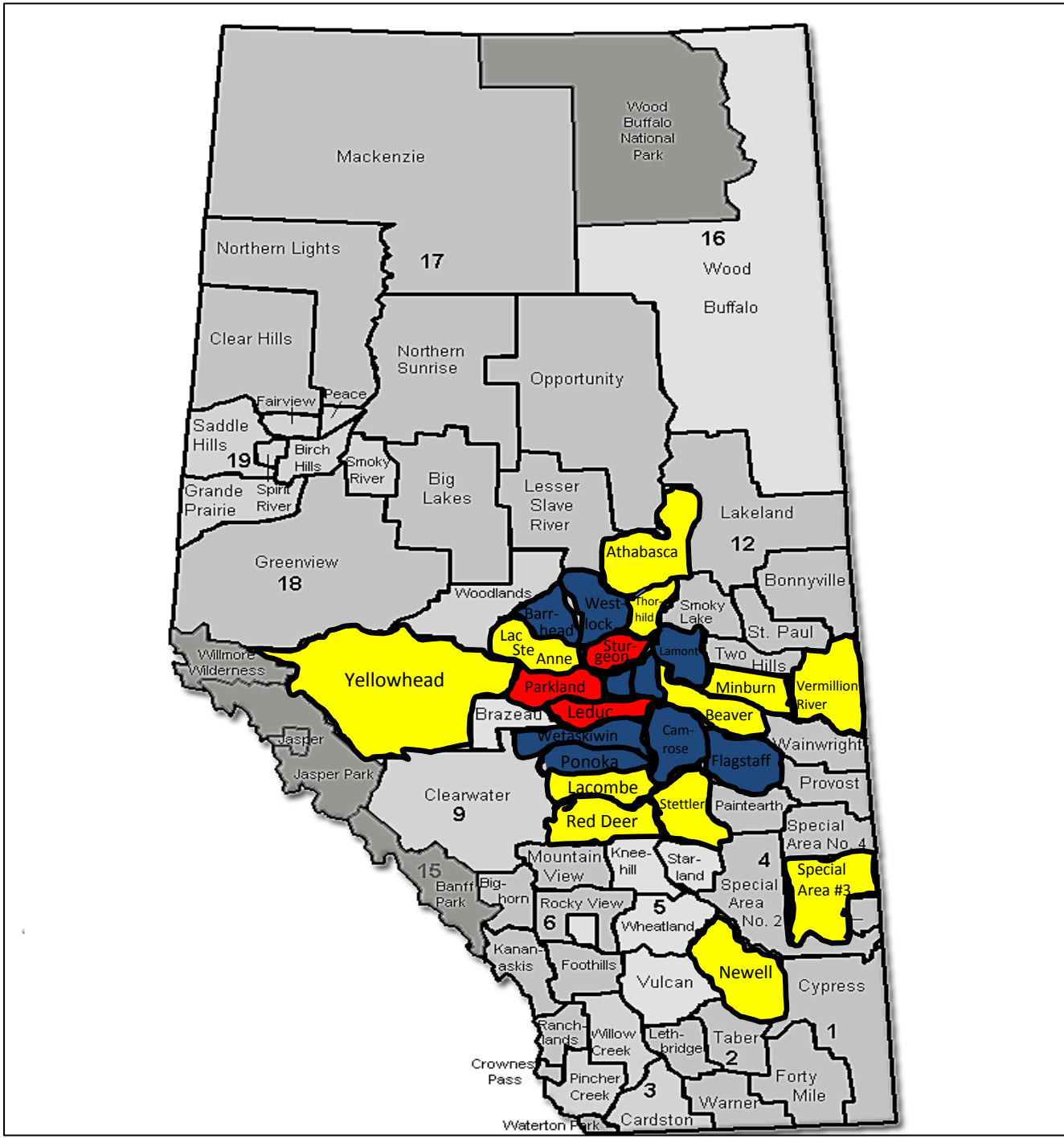
2011

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



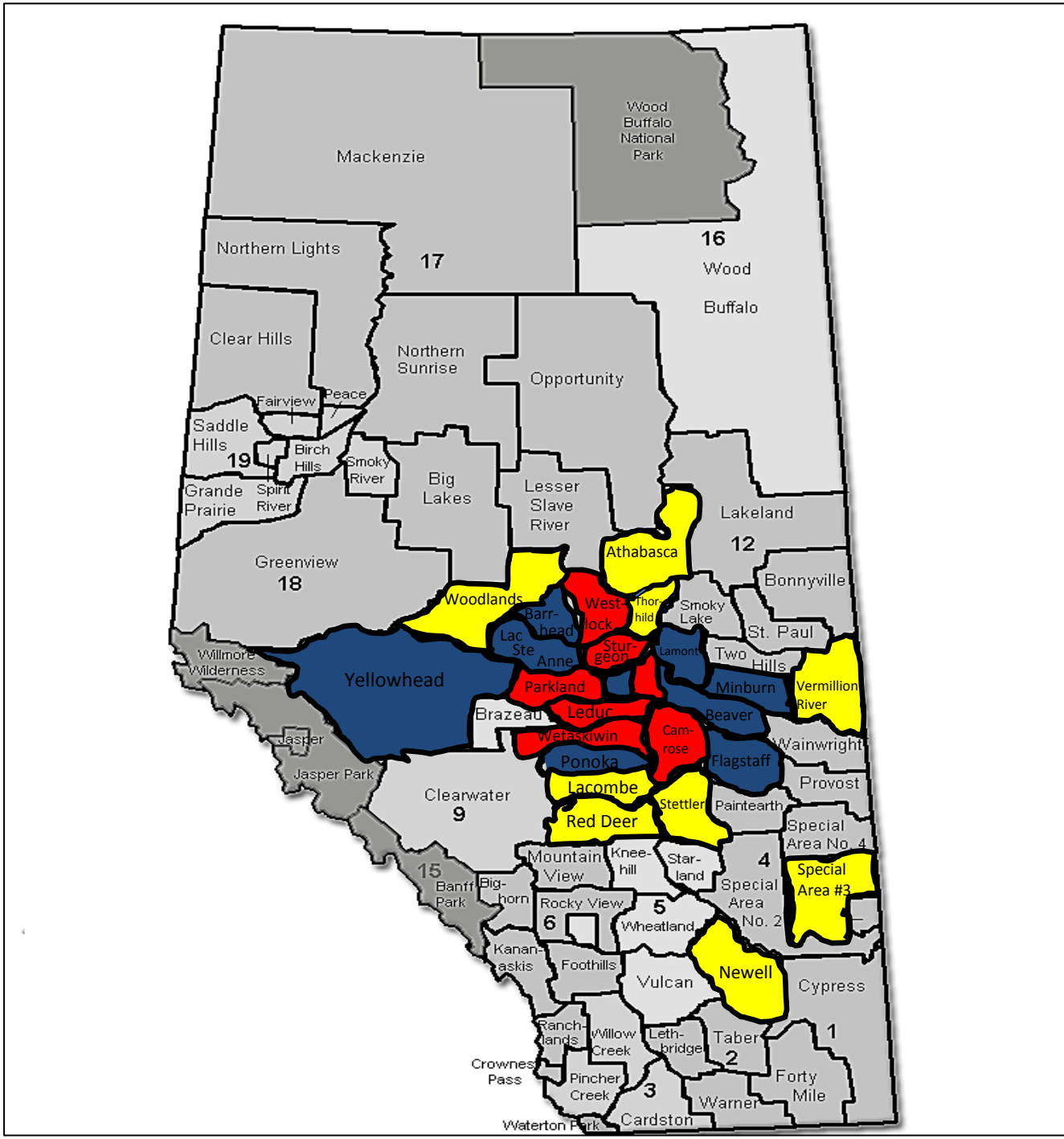
2012

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



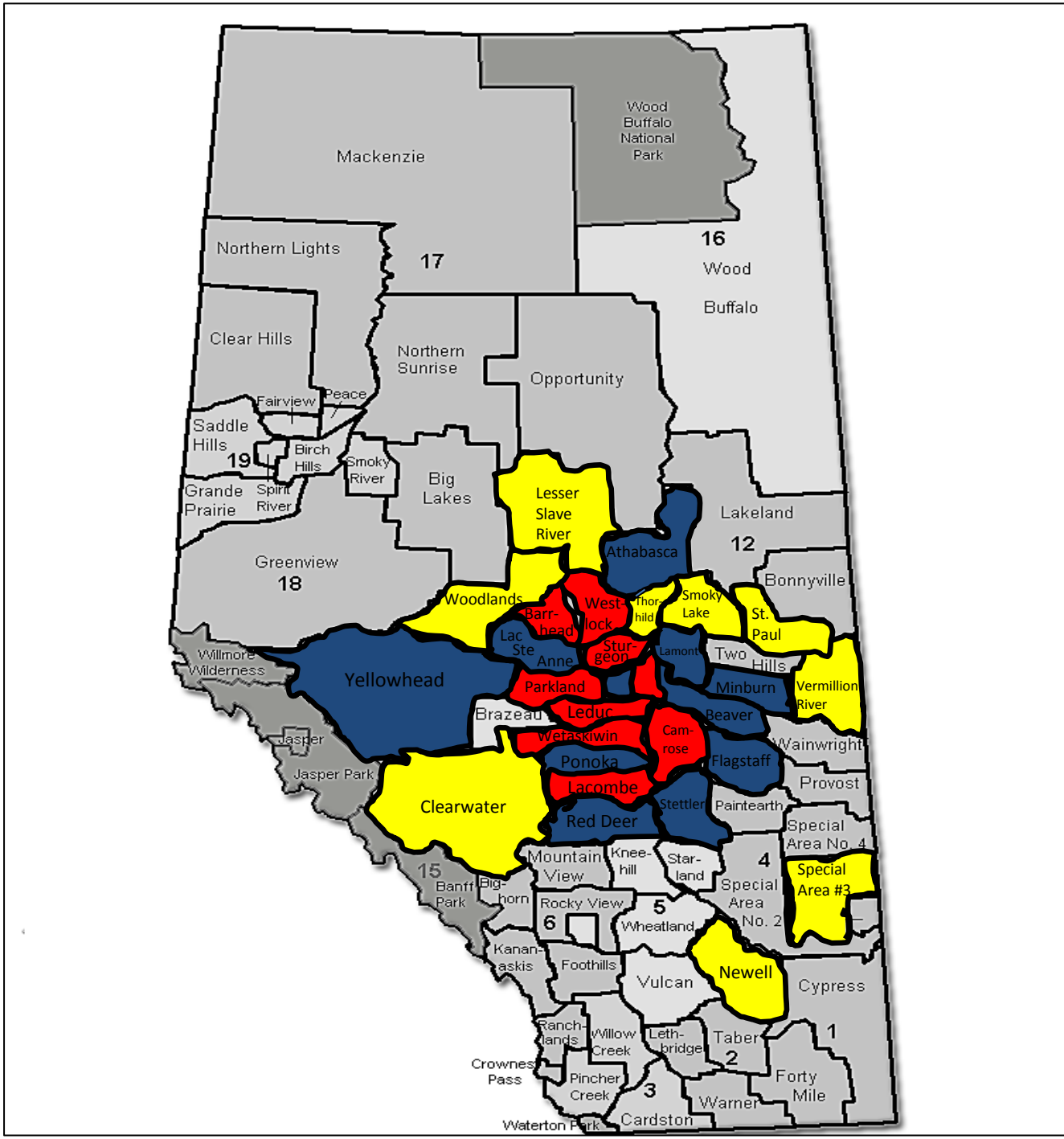
2013

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



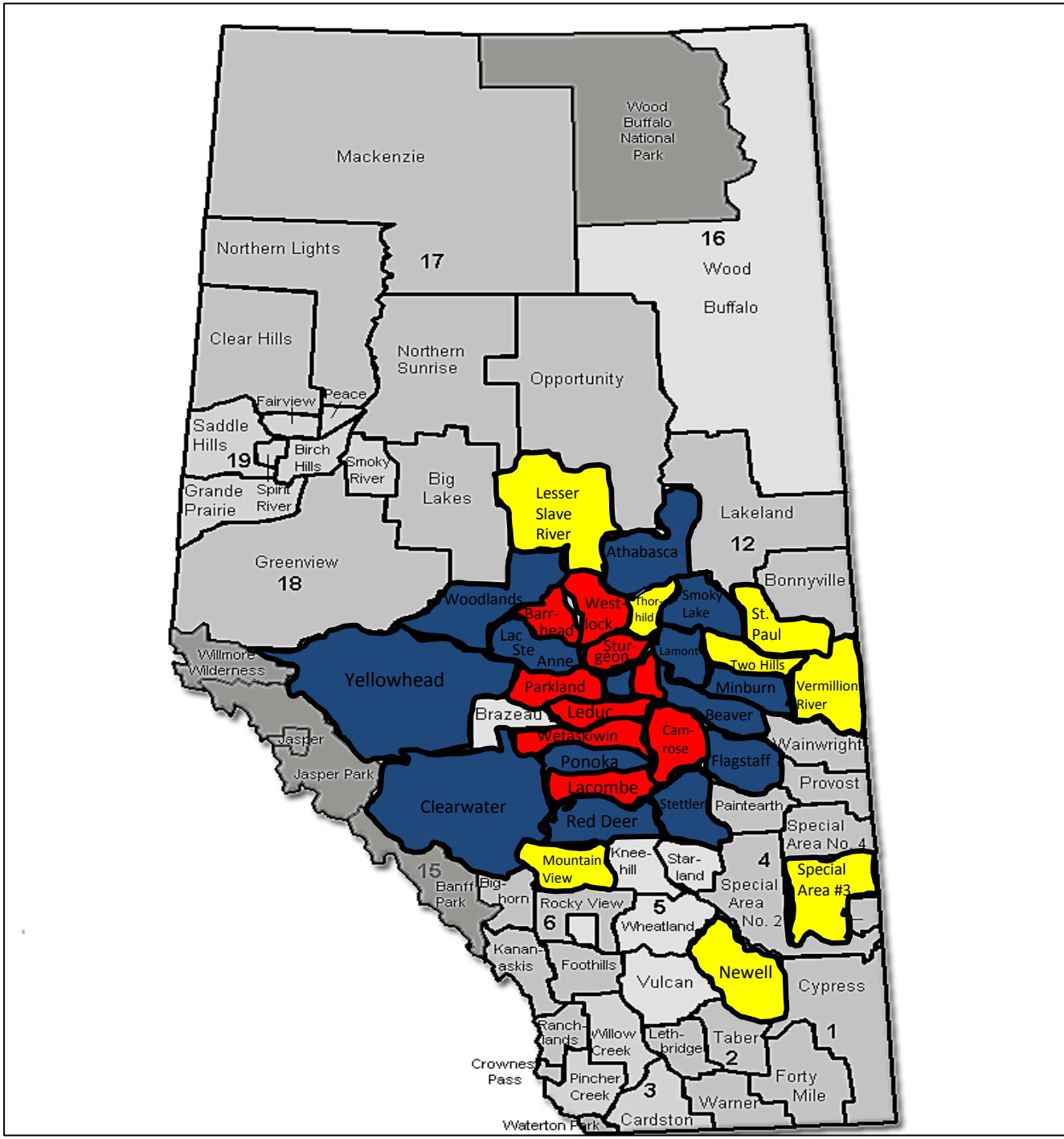
2014

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



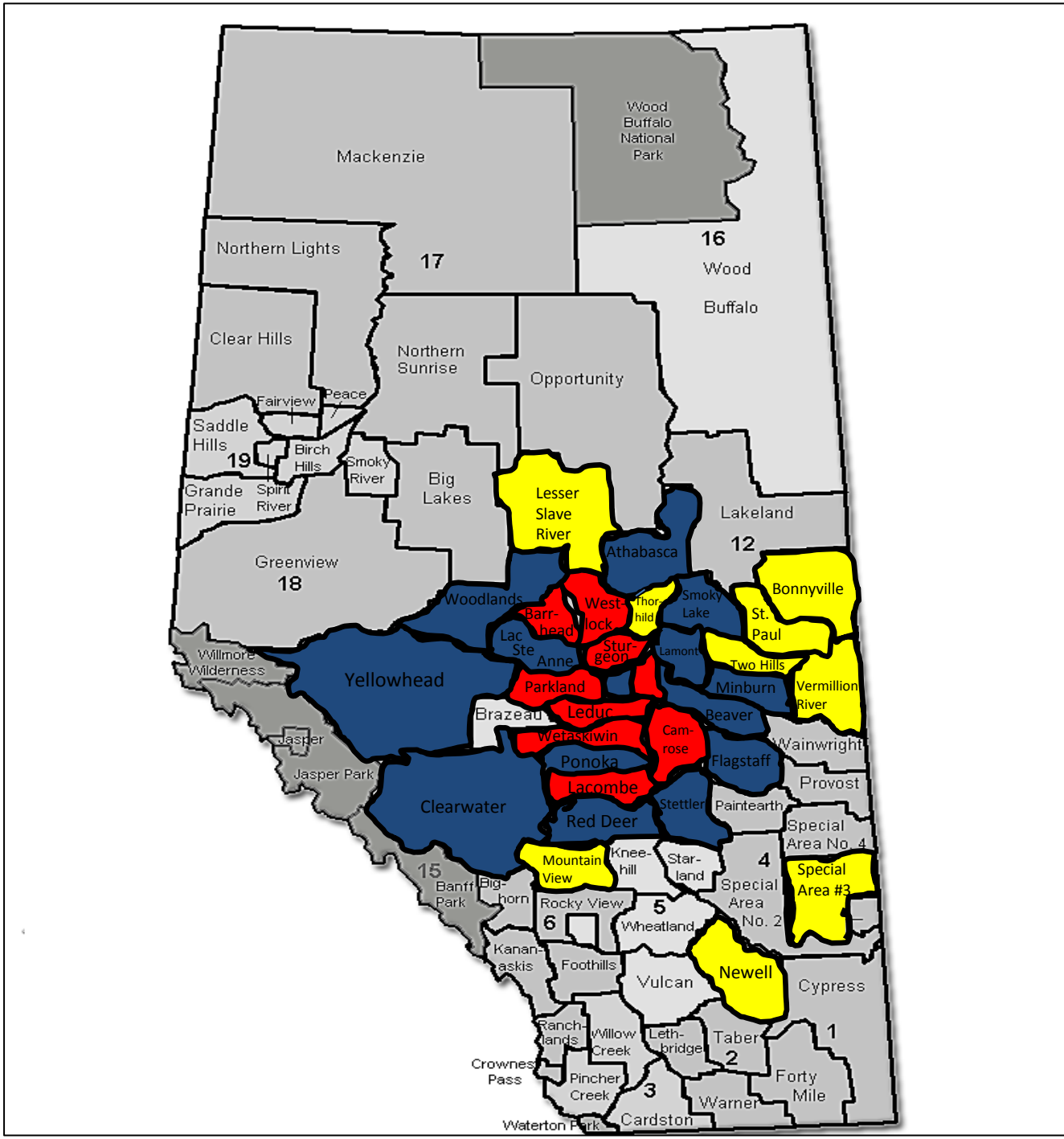
2015

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



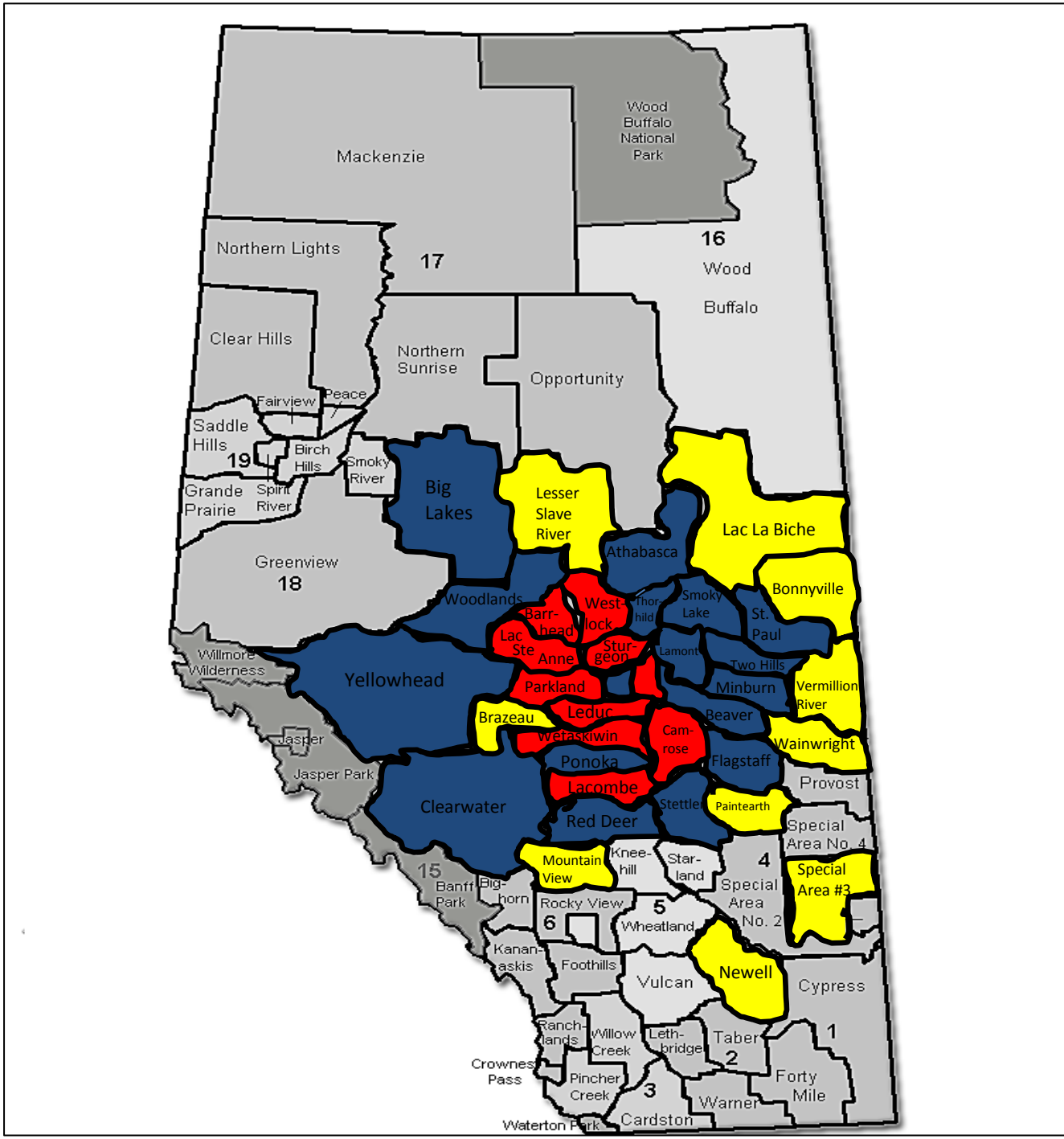
2016

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



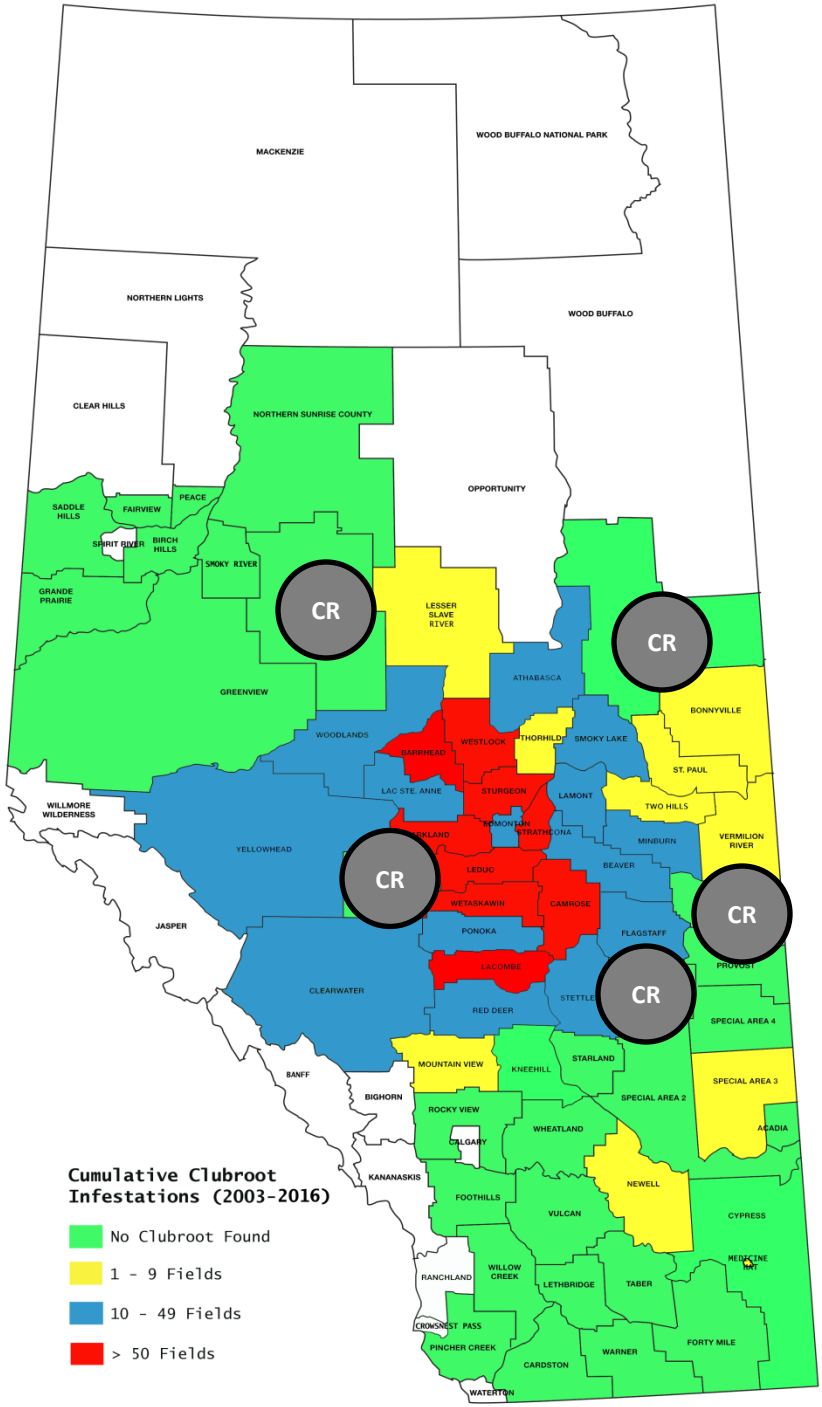
2017

- 1-9 Fields
- 10-49 Fields
- 50+ Fields



2017 Survey

- Clubroot identified for the first time in ~~five~~ six new counties:
  - Big Lakes (Peace Country)
  - Brazeau
  - Lac La Biche
  - Paintearth
  - Wainwright
  - Greenview
- Now confirmed in 37 counties/MDs & 3 urban centers



UNIVERSITY OF ALBERTA
EDMONTON·ALBERTA·CANADA

Alberta Government

Update on New Pathotypes

- **Number of fields where clubroot resistance has been overcome**

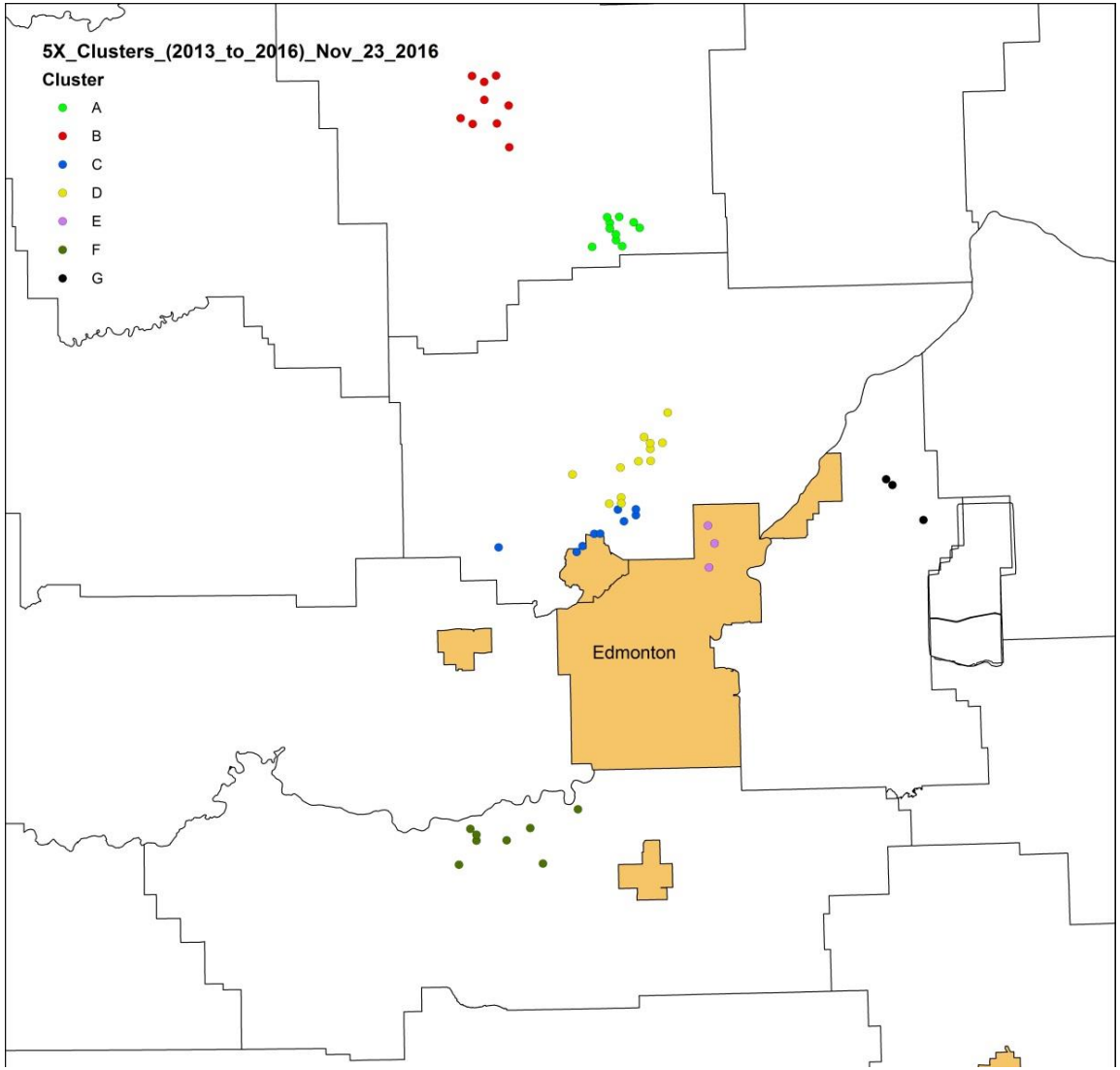
Year	Fields of CR canola with symptoms	Fields in which new strains confirmed
2013	6	2
2014	24	16
2015	37	24
2016	42	22
Total	109	64

+ >30 in 2017

Strelkov et al. Unpublished

Clusters of Fields with New Strains

- Fields with resistance issues appear to occur in clusters
- Suggests independent selection for new strains & dissemination to nearby fields

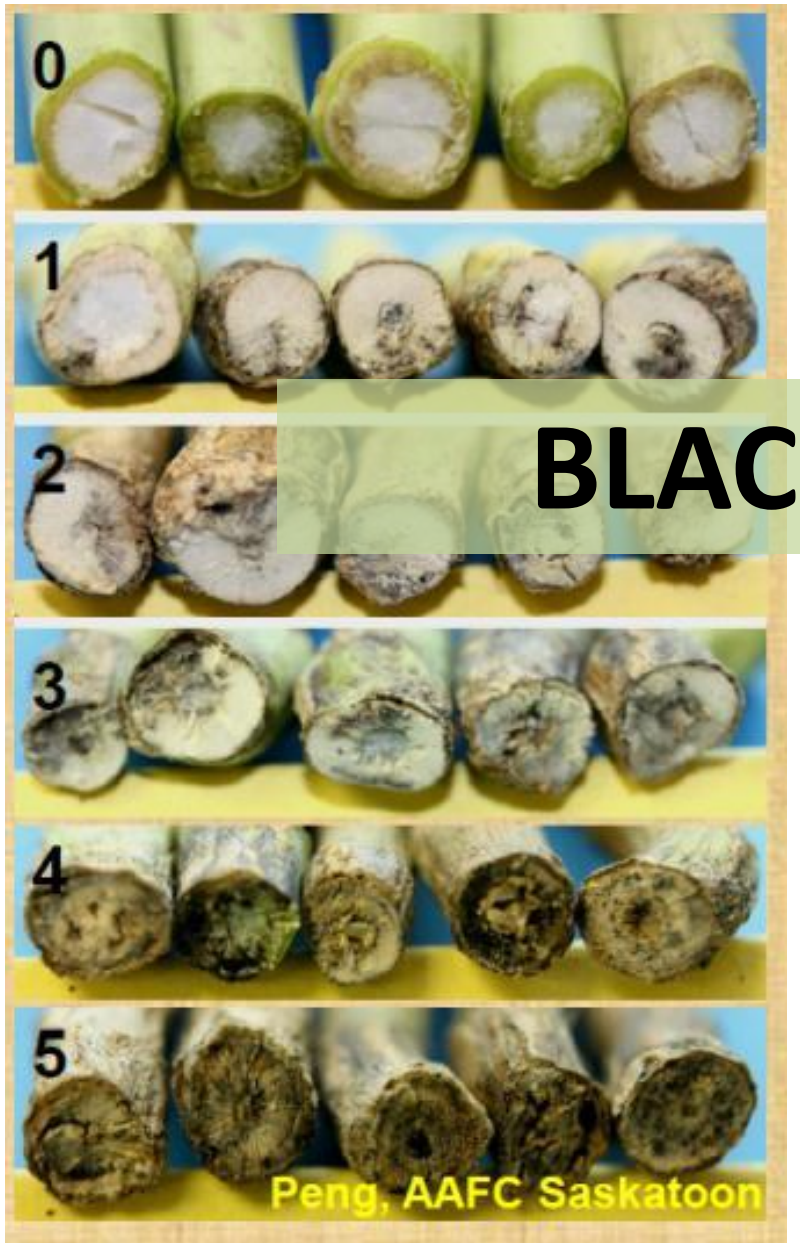


Strelkov & Hwang (Graduate Student Project)

MAINTAINING GENETIC RESISTANCE ?

- Minimize introduction/establishment of clubroot
- Deploy resistant varieties EARLY
- Lengthen your crop rotation
- Practice sanitation – minimize soil movement
- Use additional tools
  - Grassed approach area
  - Revisiting Liming and patch management

canolacouncil
OF CANADA



BLACKLEG

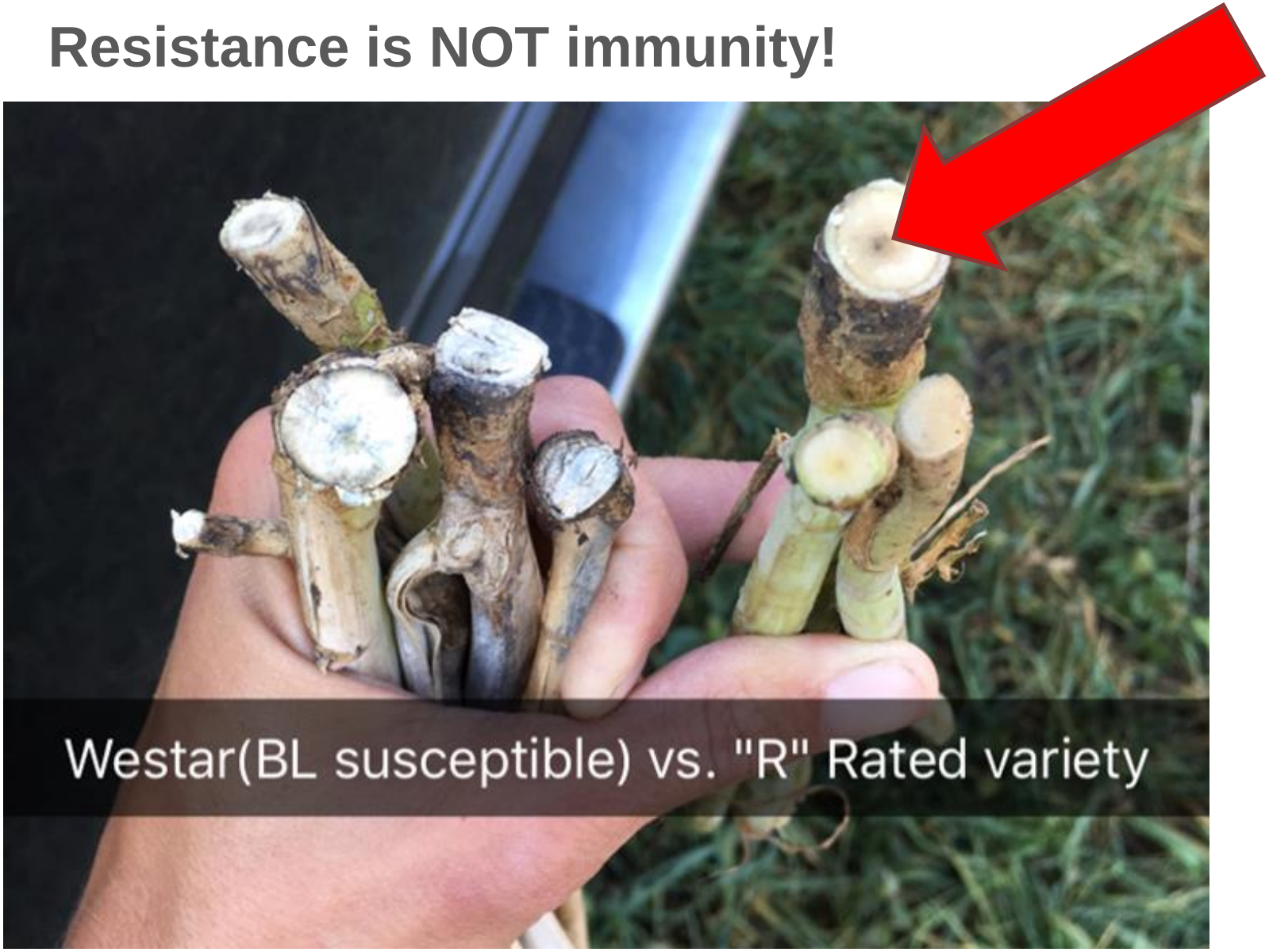
Resistance Identification

Resistance Rating	% of Westar Check
R	**0-29.9**
MR	**30-49.9**
MS	50-69.9
S	70-100

- WCC/RRC field testing protocol

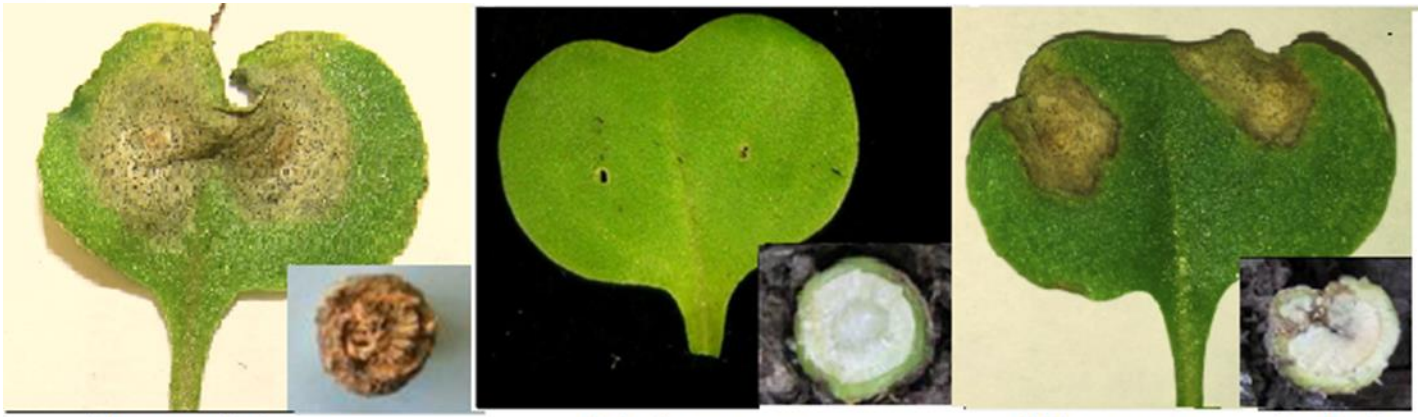
canolacouncil OF CANADA

Resistance is NOT immunity!



Blackleg Resistance

- Resistance Genes
  - **Major gene resistance**: seedling resistance and race specific
  - **Quantitative resistance:** adult plant resistance and broad



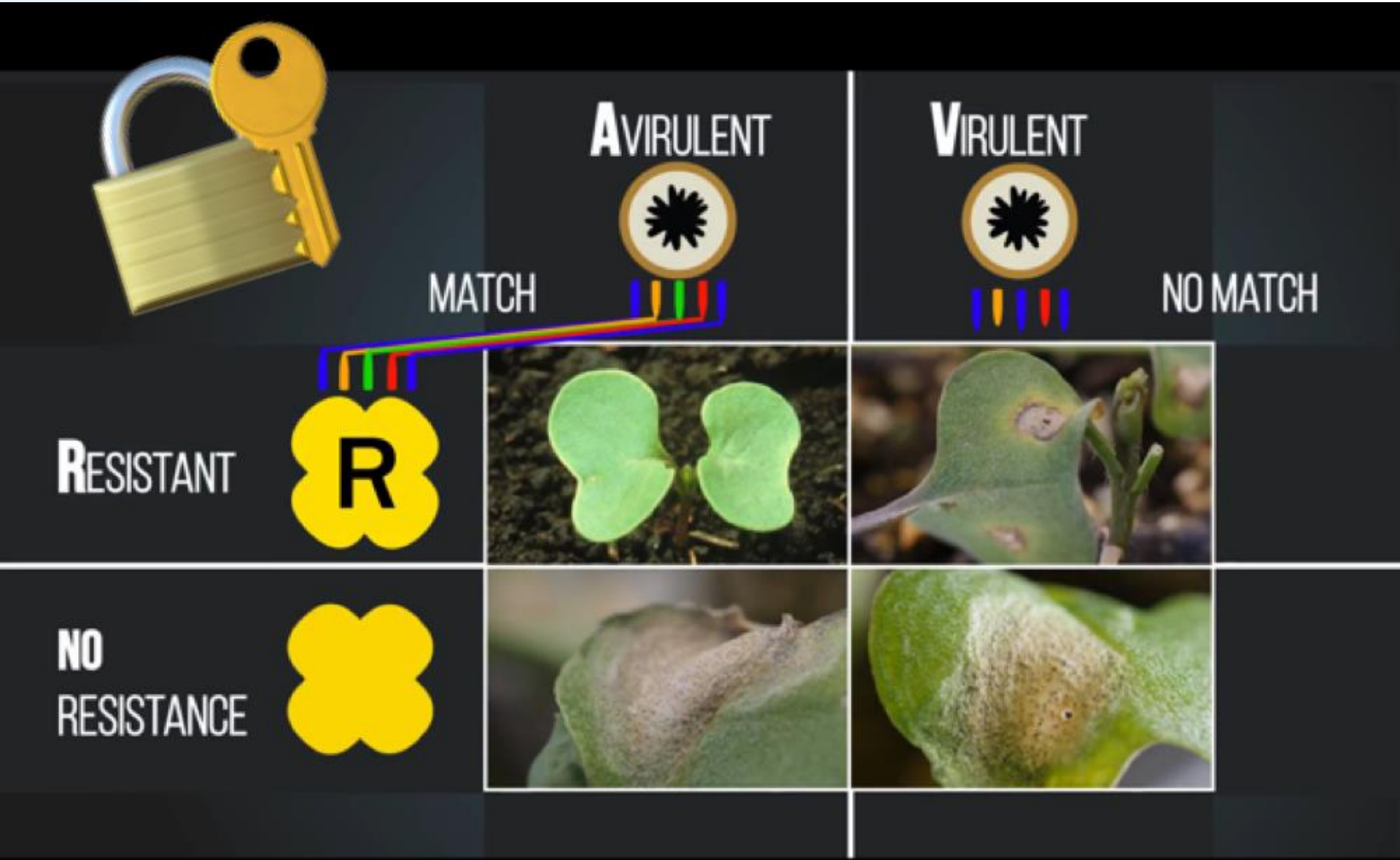
No resistance = disease

Major gene (seedling) resistance = no disease

Minor gene (adult plant) resistance = some disease

canolacouncil OF CANADA

How Major Gene Resistance Works:



New Blackleg Major-Gene Labels

Major R gene resistance grouping (RG)

- RG A = *Rlm1* or *LepR3**
- RG B = *Rlm2*
- RG C = *Rlm3*
- RG D = *LepR1*
- RG E_1 = *Rlm4***
- RG E_2= *Rlm7***
- RG F = *Rlm9*
- RG G = *RlmS*
- RG H = *LepR2*
- RG X = unknown

Rotate to a different R-gene group when blackleg increases substantially in a field

New variety labels:

- R(BC) = resistant rated variety with major genes *Rlm2* and *Rlm3*

- MR(C) = moderately-resistant rated variety with major gene *Rlm3*

canolacouncil OF CANADA

R

R (AB)

R (CX)

canolacouncil OF CANADA

What's a R-gene rotation system?

For blackleg management, this means rotating the major genes being deployed in a field to help match the pathogen population within it.

Blackleg Risk Assessment Matrix

- **Canola in rotation.** Tightened canola rotations allow for blackleg inoculum to build within the field. Extending canola rotations (greater than a two year break from canola) will allow more time for inoculum levels to decline, as old canola stubble decomposes.
- **Scout for the disease**. Look for internal stem blackening at ground level during swathing or straight cutting, and for pseudothecia on previous year's canola residue prior to seeding. The presence of either will help determine the risk of infection in the next canola crop.
- **Field resistance used**. Plant either "Resistant" (R) or "Moderately Resistant" (MR) varieties. Resistant varieties outperform susceptible or bin run seed.
- **Major gene rotation**. Rotate varieties by their major gene. Like herbicide rotation, using a new resistance group can help target the susceptible blackleg races within the field.
- **Fungicide use**. An early season fungicide application will help to protect the crop from yield loss from blackleg. Timing is critical as blackleg causes the most damage when infection occurs during the cotyledon to 6 leaf stage. Later applications (after 6 leaf) can help reduce the amount of inoculum that will return to the field.

canolacouncil OF CANADA

For more info:

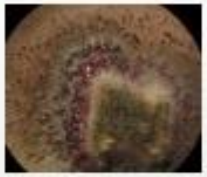
canola council

CE canola ENCYCLOPEDIA

Search the encyclopedia for SEARCH

Canola Encyclopedia > Diseases > Blackleg

ABOUT BLACKLEG



- Best management
- Overview
- Disease Cycle
- Influence of environment

READ MORE

IDENTIFYING BLACKLEG

- Symptoms
- Scouting tips

READ MORE

GENETIC RESISTANCE

- Testing protocols
- Ratings for resistance
- Variety development

READ MORE

BLACKLEG MANAGEMENT

- Disease scouting
- Resistance stewardship
- Crop rotation
- Certified seed

READ MORE

canolacouncil OF CANADA

Clubroot.ca

canolacouncil OF CANADA

Keep informed with these CCC tools

Thank You

Questions?

gabertk@canolacouncil.org

52 BY 2025

KEEP IT COMING

Sclerotinia stem rot summary

- Sclerotinia stem rot of canola is variable year to year and region to region, but related to moisture conditions.
- Many tools to control sclerotinia stem rot have been developed, but fungicides remain the best of these.
- New research, new resistant cultivars, and ability to predict spore release will improve our ability to manage this disease into the future.

canolacouncil OF CANADA

BLACKLEG REMINDERS:

- Need to use an integrated pest management approach to minimize blackleg.
- Resistance does not infer immunity! We CANNOT rely solely on resistance breeding to manage canola diseases.
- Extended crop rotation will help solve many canola disease issues.
- First step is SCOUTING. Assess the problem and what further steps need to be taken.

52 BY 2025
KEEP IT COMING

CLUBROOT
Determine whether or not you have it:

- **Scout, scout, and scout**
  - **Early detection will be most successful**
  - Scout susceptible and resistant varieties
    - You may identify new pathotypes/strains by scouting resistant varieties closely
  - Scouting tips:
    - Look for patches of premature ripening.
    - Check at field entrances
    - Check areas with increased moisture, such as low spots or near sloughs.

canolacouncil OF CANADA

So develop your clubroot plan now

- **Plan should include:**
  - **How will you isolate a field?**
  - **How will you plan your field work?**
  - **When will you sanitize your equipment?**
  - **When will you use resistant varieties?**

canolacouncil OF CANADA

Don’t wait until it’s too late!

canolacouncil
OF CANADA