

# An Integrated Approach to West Nile Virus Surveillance and Planning in BC



**Sunny Mak, BCCDC**



# Presentation Agenda

Introduction to West Nile Virus

BC's Integrated Plan

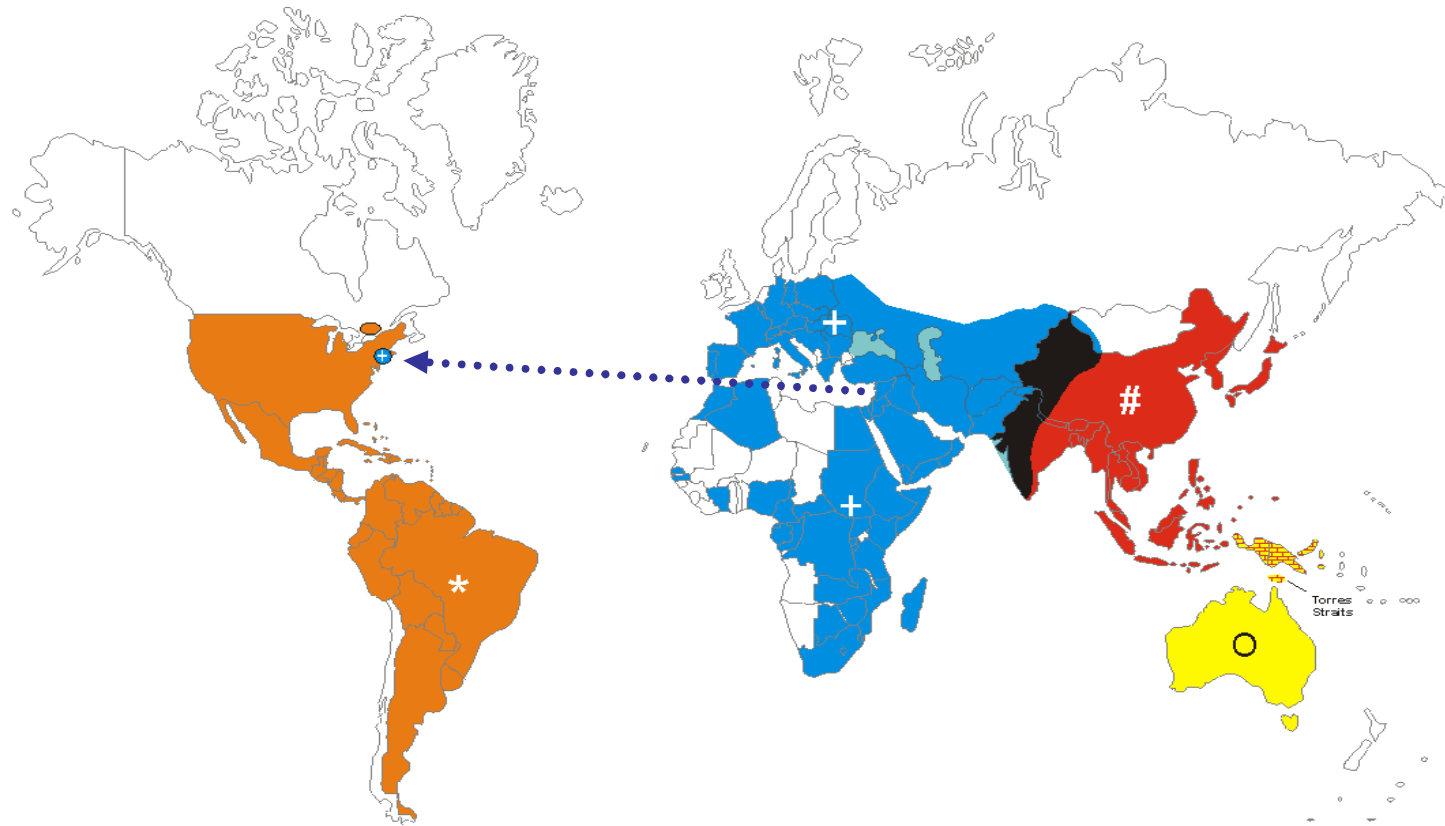
Use of GIS for:

- mapping surveillance results
- surveillance evaluation
- corvid density mapping
- web-based mapping
- degree day modeling
- adulticiding scenarios

Conclusion



# The Geographic Distribution of the Japanese Encephalitis Serocomplex of the Family Flaviridae, 2000.

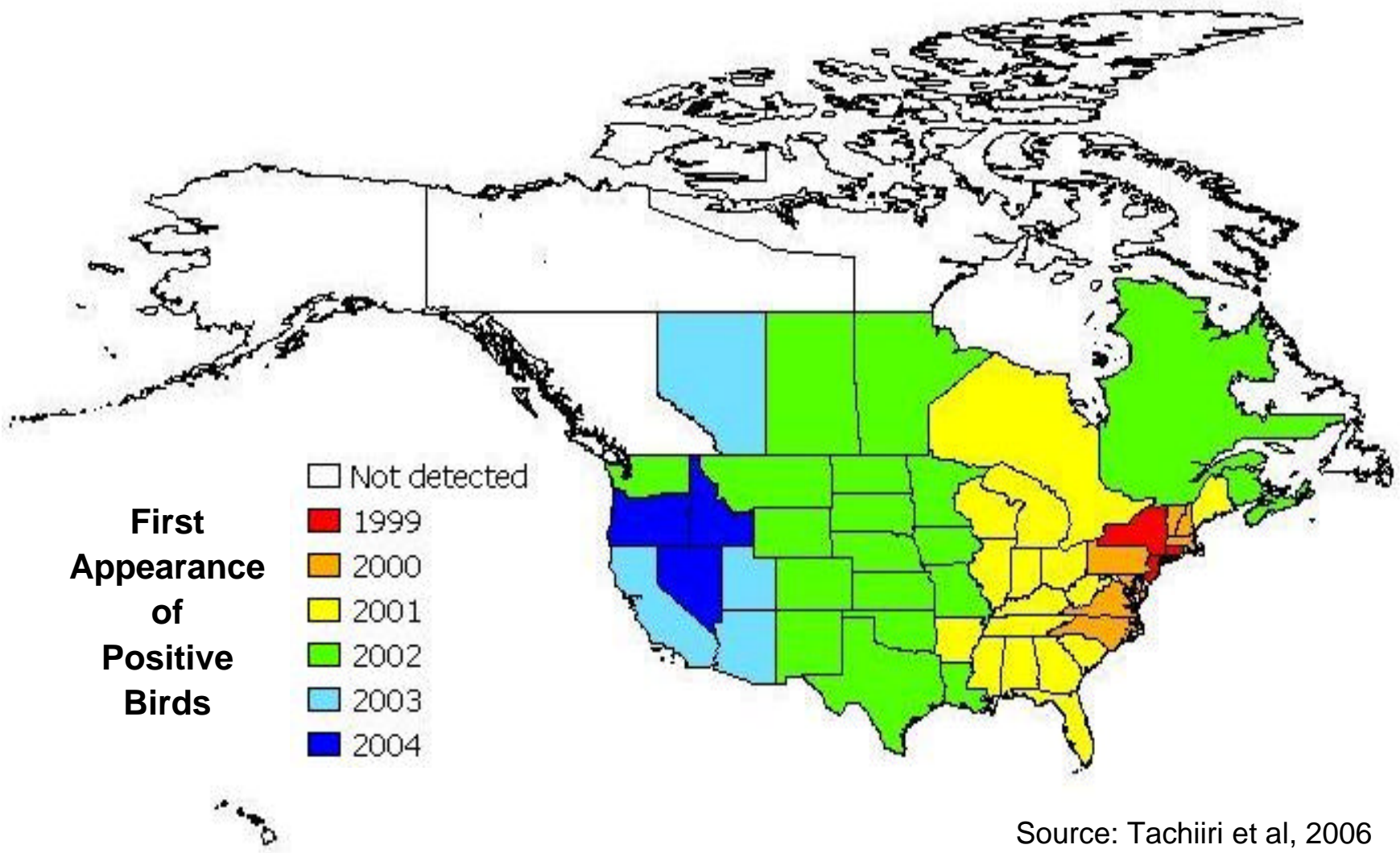


- St. Louis encephalitis
- \* Rocio and St. Louis (Brazil)
- + West Nile virus
- # Japanese encephalitis
- West Nile and Japanese encephalitis
- Japanese and Murray Valley encephalitis
- Murray Valley and Kunjin

Source:



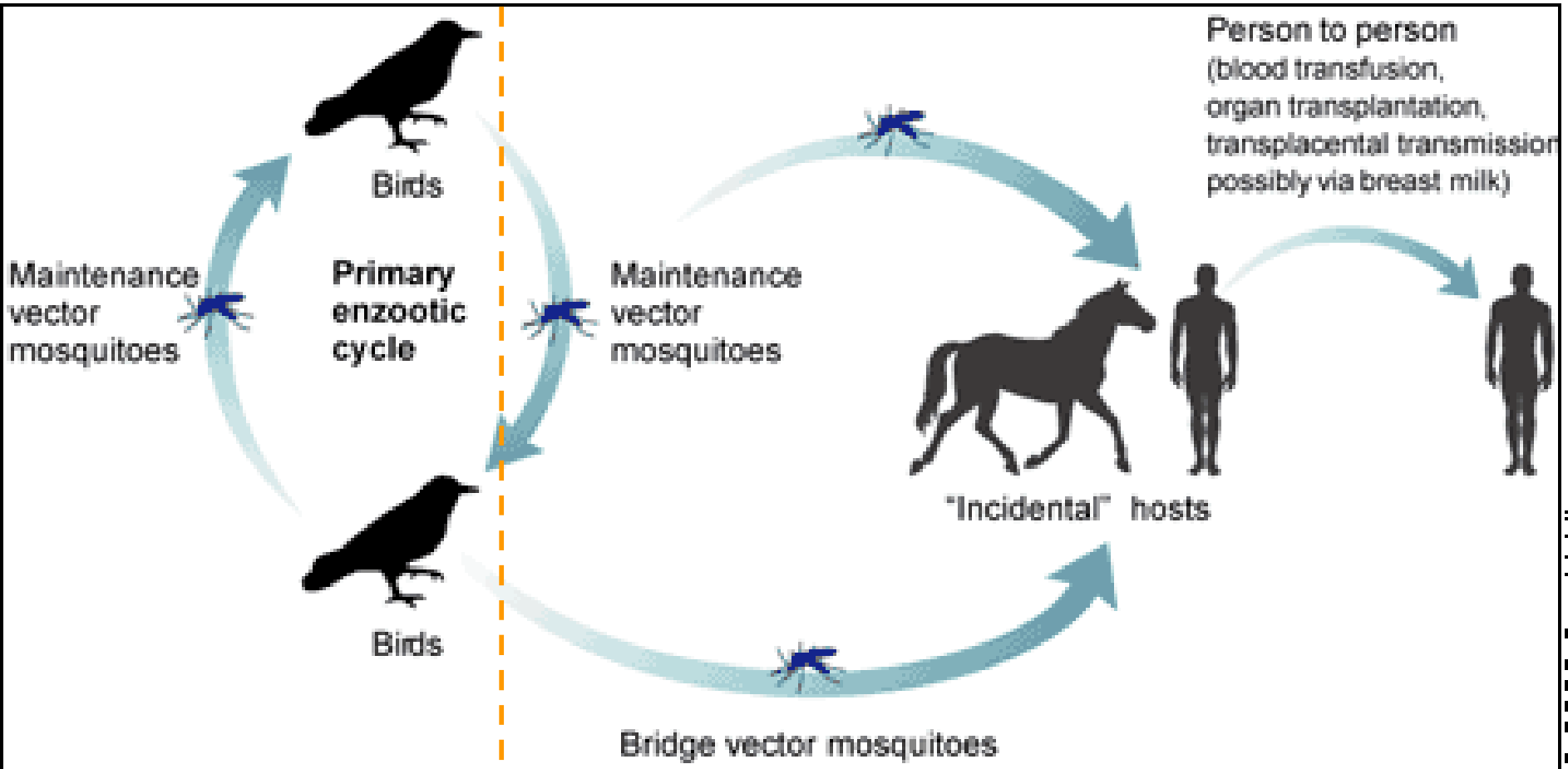
# West Nile Virus Activity in North America



Source: Tachiiri et al, 2006

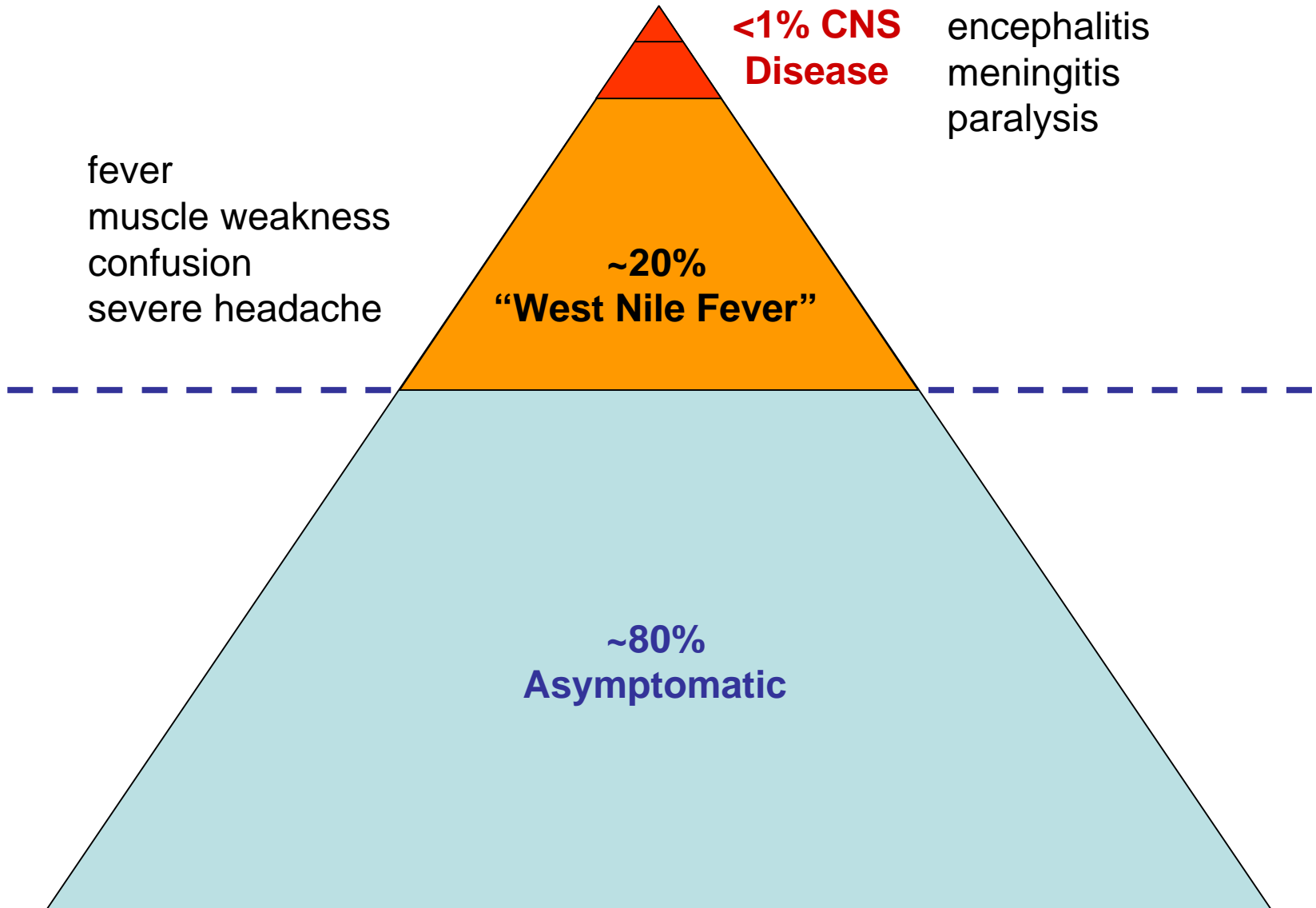
# Primary Route of Transmission

Intervention to break the chain of transmission



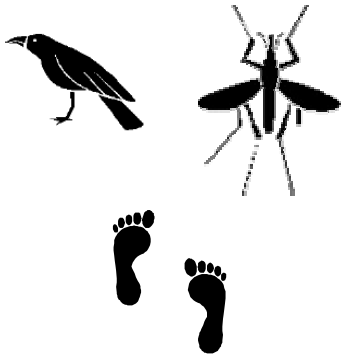
E.g. *Culex tarsalis*

# Human Infection “Iceberg”

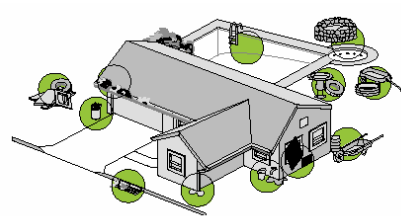


# BC's West Nile Virus Plan

**WNV  
Surveillance**



**Public  
Education**



**Larval  
Monitoring**



**Mosquito  
Control**



# Provincial WNV Steering Committee

	WNV Surveillance	Public Education	Larval Monitoring	Mosquito Control	Research
BC Centre for Disease Control	A	A	C	C	A
Regional Health Authorities	A	A	A	A	A
Local Governments	A	A	A	A	A
Ministry of Health	C	A		C	
First Nations and Inuit Health Branch	A	A			
Ministry of Agriculture and Lands	A	A			
Canadian Blood Services	A	A			
Mosquito Control Contractors			A	A	A
Ministry of Environment			A	C	
Department of Fisheries and Oceans			C	C	
Universities			C		A
Environment Canada				C	A
Provincial Emergency Program				A	
Non-Governmental Organizations				C	

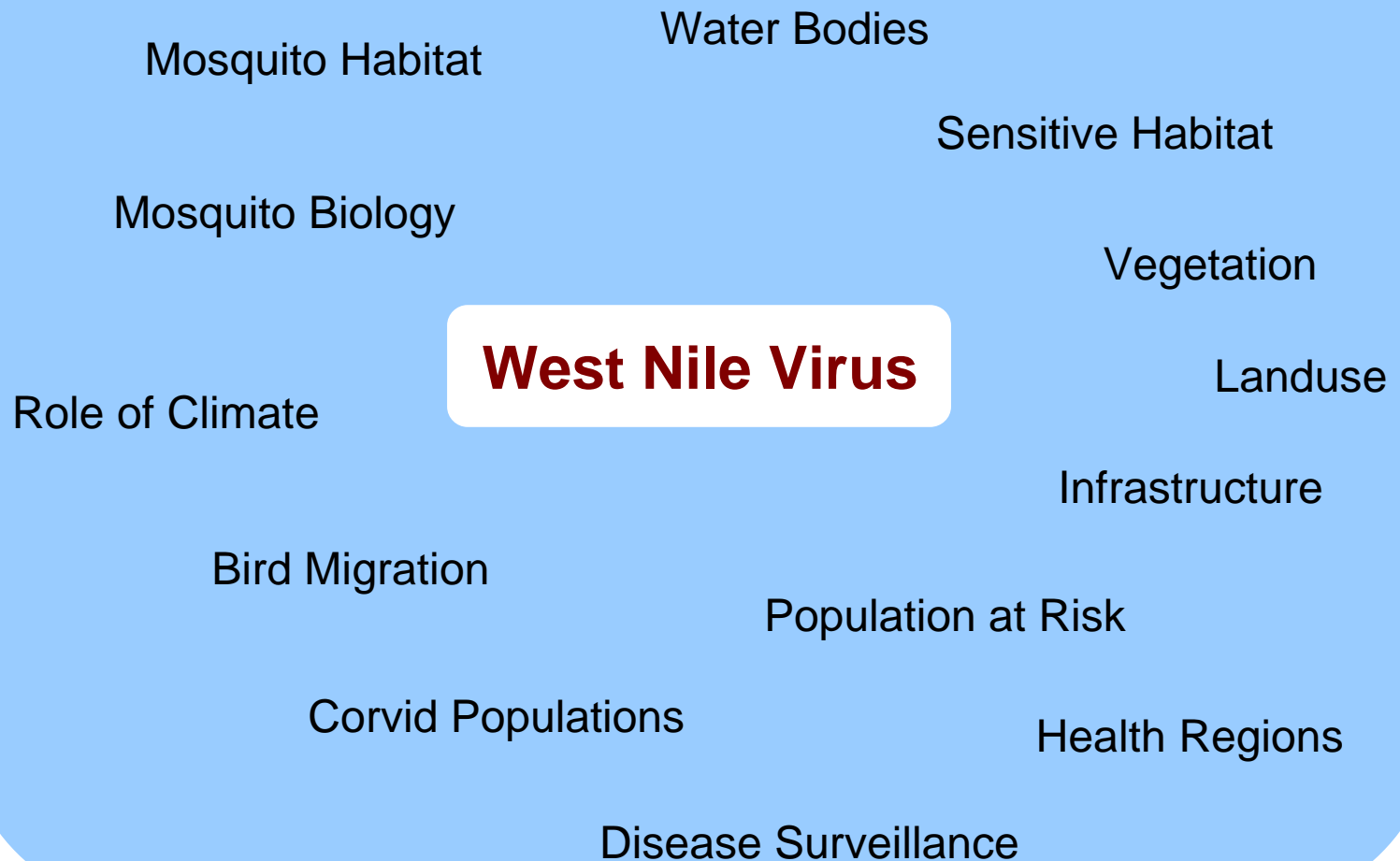
A = Active Role

C = Consultative Role





# Integration of Data: GIS



# Use of GIS for Mapping Surveillance Results

WEST NILE VIRUS In British Columbia - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://www.bccdc.org/content.php?item=183>

PartnerNet log-in HOME DIVISIONS ABOUT THE BCCDC CONTACT US

BC Centre for Disease Control  
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY


→ What's New  
→ Employment Opportunities  
→ Health Topics A - Z  
→ Disease Categories  
→ Monitoring & Response  
→ Prevention & Control  
→ Clinics, Programs & Services  
→ UBC CDC  
→ Statistics and Reports  
→ Resources

→ WEST NILE VIRUS In British Columbia

INFORMATION PAGE

Printer Friendly Version

WNv Activity Data:

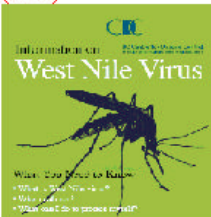


Please click the map or click [here](#) for a large map.

To download the WNv brochure, please click the thumbnail below.

**Surveillance Data (New)**

- [Maps](#)
- [Tables](#)
- [Summary Reports](#)
- [Historical Surveillance Data](#)



The 2005 WNv Surveillance Season Report as of Sep 28th

Description	Human Cases	Corvids Submitted	Corvids Sighted	Mosquito Pools*
# Tested	628	1024	722	6492
# Positive	0	0	NA	0

Internet

# Mosquito Surveillance for West Nile Virus by Health Service Delivery Areas in British Columbia

Cumulative Submissions up to September 24, 2005

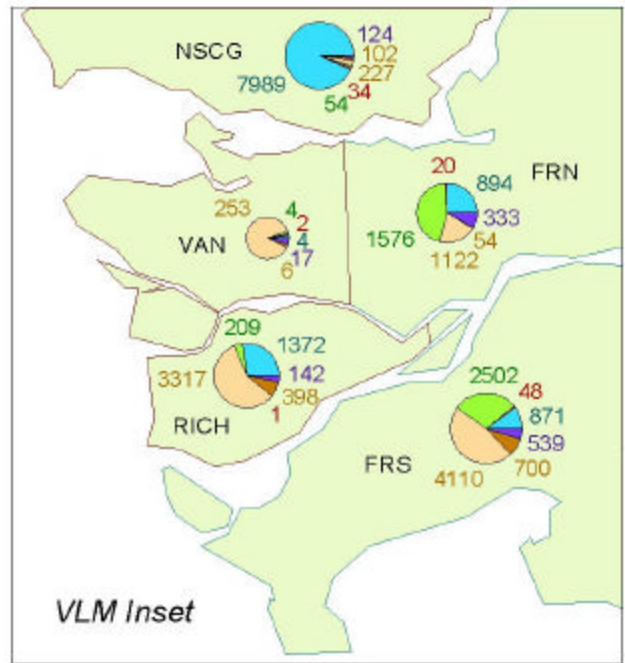
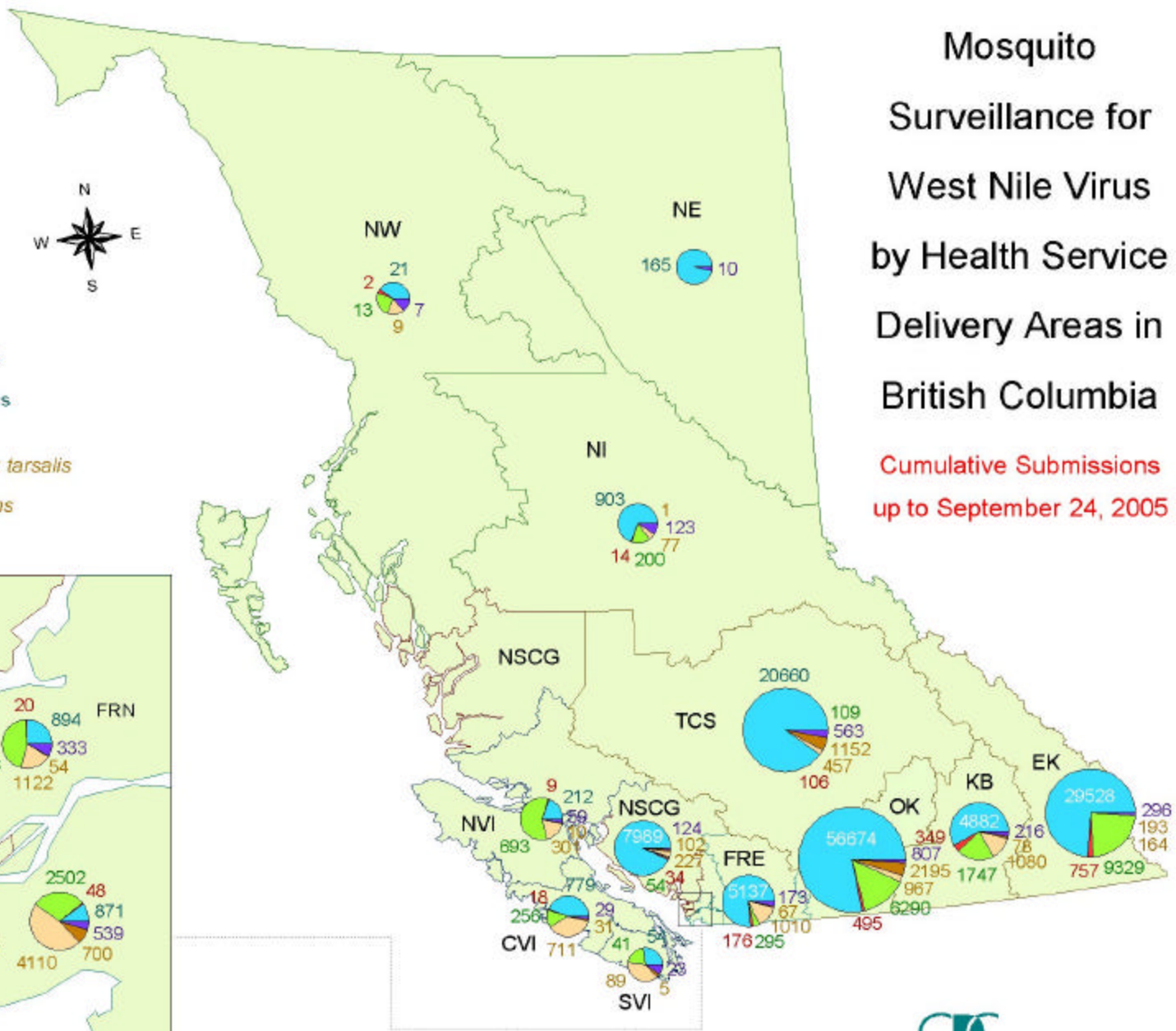
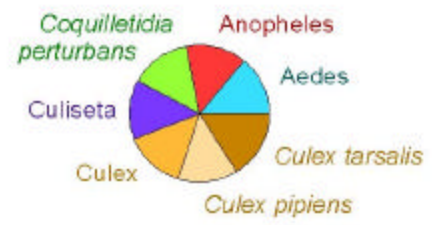
## LEGEND

### WNV Testing



### Mosquito Speciation

(n = number of mosquitoes)



Total number of mosquitoes tested to date = 177,856



BC Centre for Disease Control

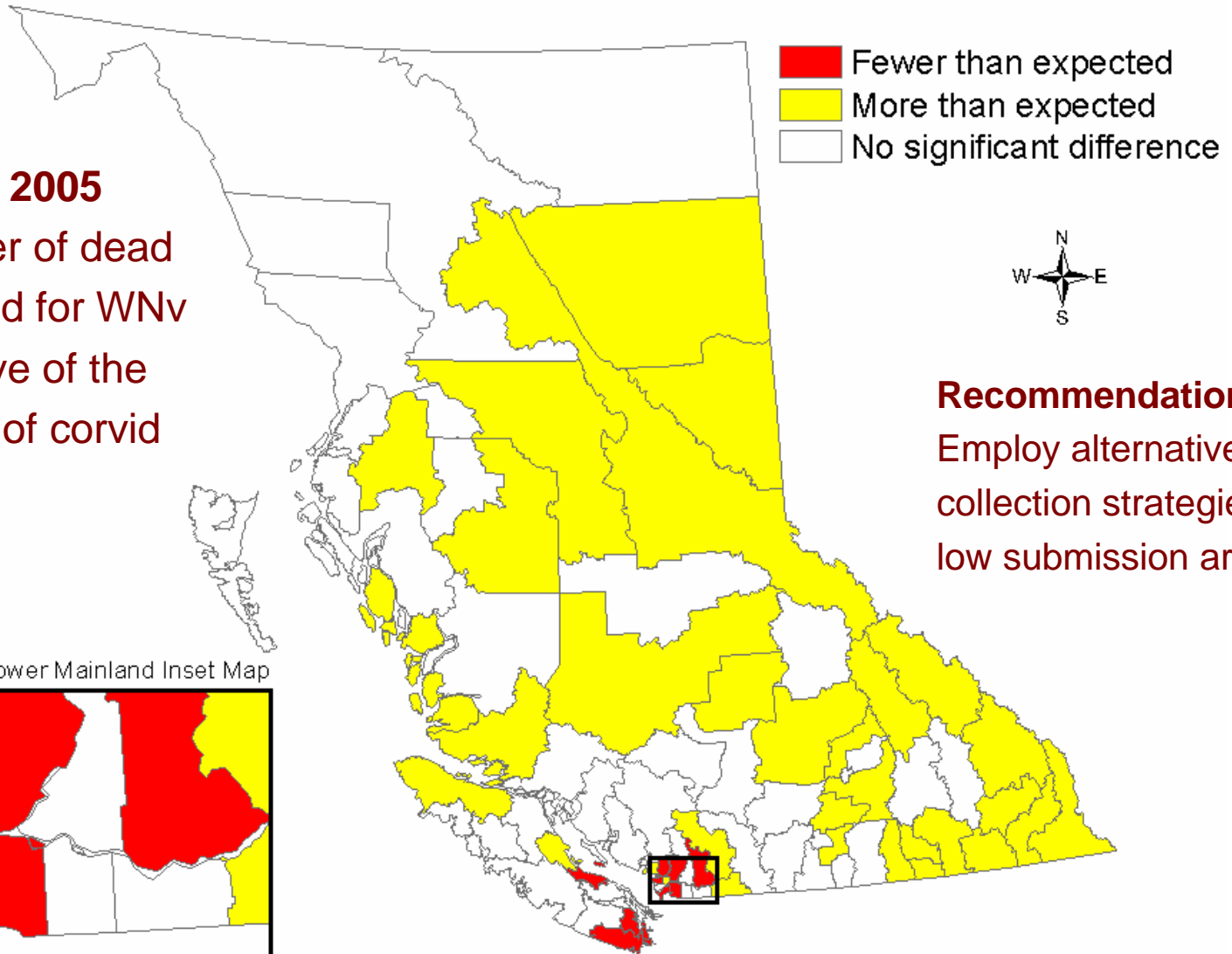
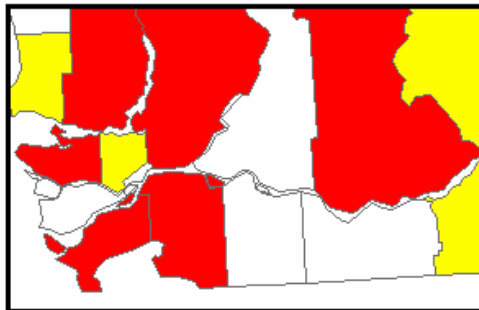


# Use of GIS for Corvid Surveillance Evaluation

**David et al., 2005**

Is the number of dead corvids tested for WNV representative of the true number of corvid deaths?

Vancouver Lower Mainland Inset Map



**Recommendation:**  
Employ alternative bird collection strategies in low submission areas.


# Use of GIS for Dead Corvid Density Mapping

CDC - West Nile Virus - Microsoft Internet Explorer

File Edit View Favorites Tools Help

← Back → Search Favorites History

Address <http://westnile.bccdc.org/> Go



**WEST NILE VIRUS SURVEILLANCE PROGRAM**

DEAD BIRD SIGHTING REPORT FORM, 2005

This form is to be completed by members of the public wishing to report dead crows, ravens, magpies or jays. This information will be used by public health to help assess the risk to human health of West Nile Virus during 2005. Public reports of dead birds are useful and appreciated, however do not mean that a reported bird will be collected or tested. In BC, separate collection and testing programs are in place which operate independently of public reports. For information on how to safely dispose of dead birds, please click [here](#).

Please complete a separate form for each location where dead birds were found.

PLEASE NOTE: To correct information submitted in error, please email [WNVinquiry@bccdc.ca](mailto:WNVinquiry@bccdc.ca). This e-mail caters only to correction requests for data entry errors on "Dead Bird Sighting Report Form".

► **Where were the bird(s) found?**

Municipality (city/town)  (or nearest municipality, if rural)

**Complete either section A or B, as appropriate**

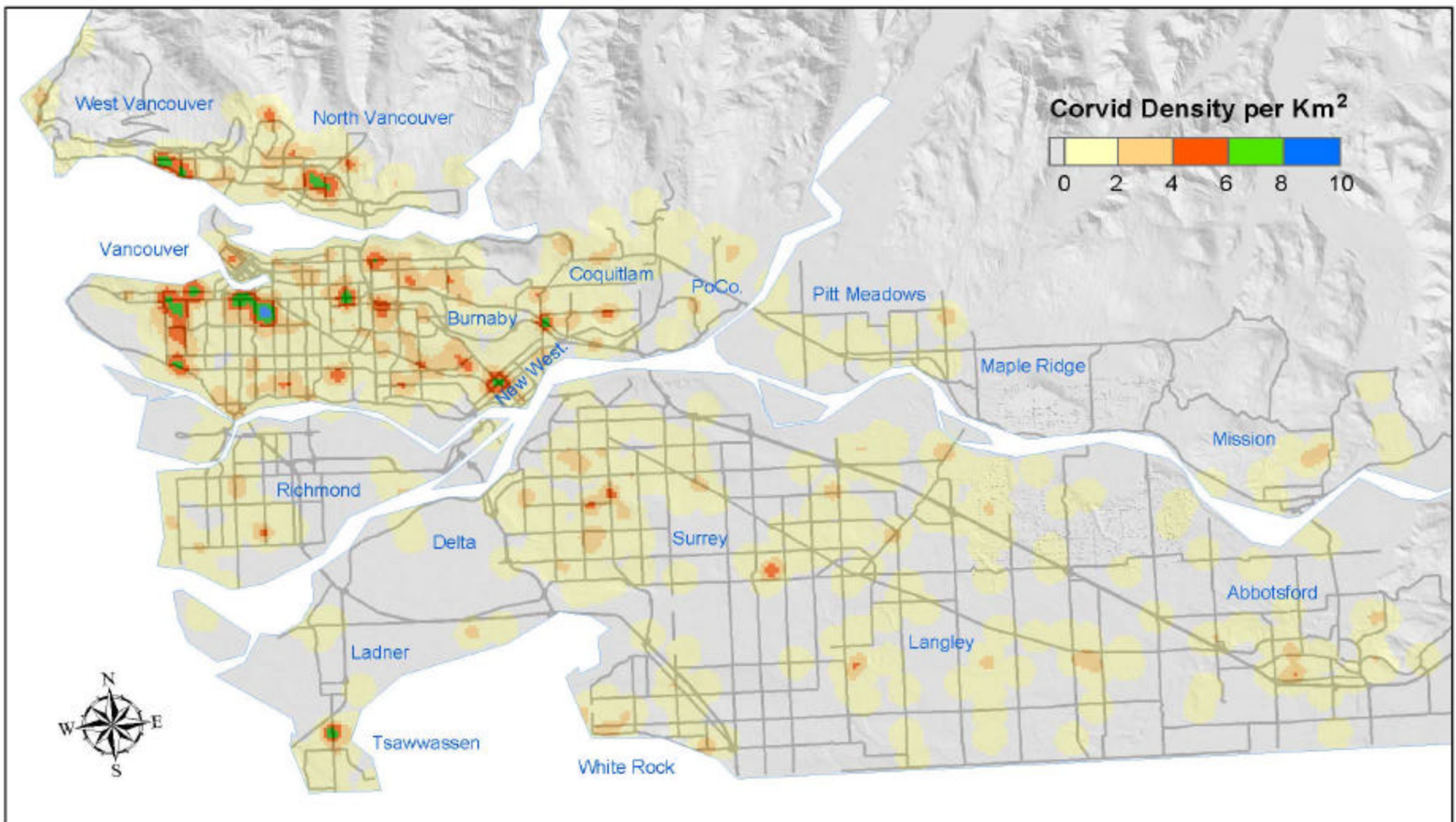
**A) Bird found in urban centre**

Address #	Direction	Street Name	Street Type	Postal Code
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
e.g. 655	e.g. W	e.g. 12th	e.g. Ave	e.g. V5Z 4R4

Or Street intersection  &

e.g. Ash Street e.g. W 12th Ave

Internet

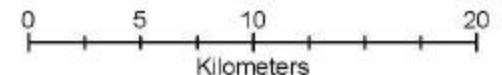


## Density of Dead Bird Submissions and Sightings in the Vancouver Lower Mainland, May 2 - September 15, 2005



BC Centre for Disease Control

Analysis based on geocoded data from 565 birds submitted for WNV testing and 377 dead bird sightings by the public in the Vancouver Lower Mainland; 200 m cell size and 1000 m search radius.




# Interactive Web-based GIS Mapping

British Columbia Centre for Disease Control's (BCCDC) Internet Geographic Information System (G - Microsoft Internet Explorer)

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Address <http://maps.bccdc.org/> Go



**BC Centre for Disease Control**  
*"Promoting and Protecting Public Health"*

[maps.bccdc.org](http://maps.bccdc.org)

Welcome to the British Columbia Centre for Disease Control's (BCCDC) Internet Geographic Information System (GIS). This website provides communicable disease surveillance data in a spatial format to public health officials and members of the general public. You can view, query and print maps for your geographic area of interest.

**Important**  
The data on which this application is based changes frequently. Also, this site is continuously under development and will be modified over time. Human surveillance data contained on this website are aggregated by health administrative units to prevent identification of individuals.


**Last Updated: August 31, 2005**

**Disclaimer**  
The BCCDC is providing these maps and data sets as a public information resource. Every reasonable effort has been made to assure the accuracy of the information. Non-health related map information is believed to be accurate however accuracy is not guaranteed since the BCCDC is not the custodian of these data sets.

### Interactive GIS Mapping for West Nile Virus

West Nile virus (WNV) is expected to arrive in BC in 2005. The BC Centre for Disease Control and its regional health partners have developed a comprehensive strategy to identify WNV and reduce associated human illness. Geographic mapping of dead birds, mosquito breeding habitat, and human cases of WNV is a critical component of this strategy. This mapping application will provide public health officials with the surveillance data needed for decision making in a timely and spatially integrated manner. This mapping application also serves as a communication tool to the general public about which geographic areas and populations are at risk for WNV.





### Interactive Maps

 [Launch Interactive Mapping Tool](#)

New to GIS? Click on our Tutorial and User Manual links for information on using GIS tools and website navigation tips.

[User Manual](#) [Tutorial](#)

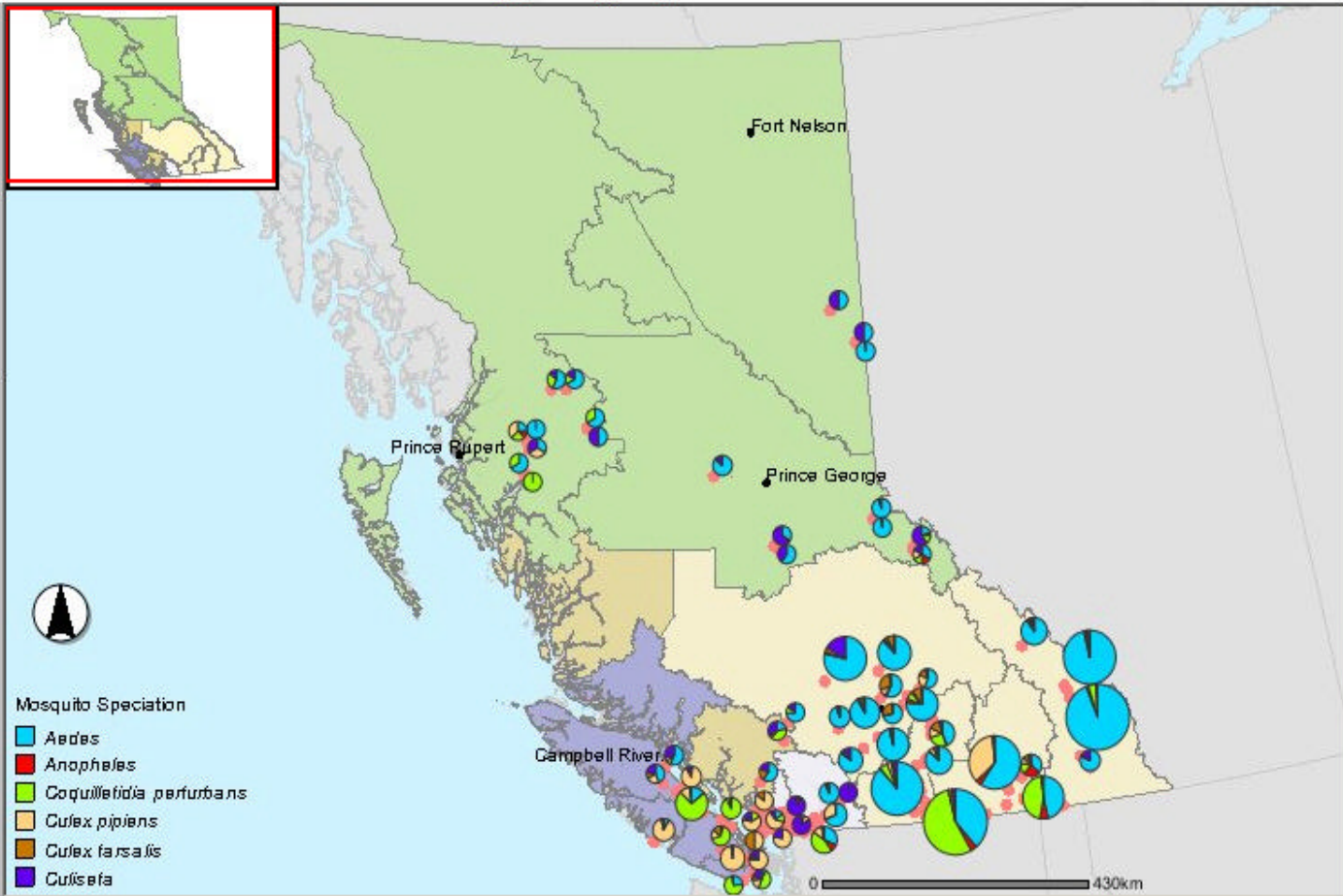
### Static Maps

 <a href="#">Density Maps</a> Density maps of dead bird submissions and sightings	 <a href="#">Degree-Days Maps</a> Climate maps to forecast the number of mosquito generations
 <a href="#">Health Boundaries</a> Reference maps for BC health administrative boundaries	 <a href="#">Seasonal Forecasts</a> Environment Canada temperature and precipitation forecasts

Done Internet



# MHO West Nile Virus Mapping System



**LAYERS**

- All Layers
- Mosquito Surveillance
  - 2005 Mosquito Traps
  - 2005 Larval - Regan
  - 2005 Larval - ACRD
  - 2005 Larval - Culex
  - 2005 Corvid Submissions
  - 2005 Corvid Sightings
- 2004 WNV Surveillance
- Beekeepers
- Organic Farms
- Sensitive Habitat
- Fish Bearing Streams
- Health Care Facilities
- Cities and Towns
- Transportation
- Protected Areas
- Water Bodies
- Census Data
- August 31, 2005 Base 16C DD
- 2004 Base 16C Degree Days
- 30 Yr Base 16C Degree Days
- GVRD/FVRD Photos 1999
- Hillshade Images
- Health Authorities
- Provinces/States

**Refresh Map**

Auto Refresh

Help:

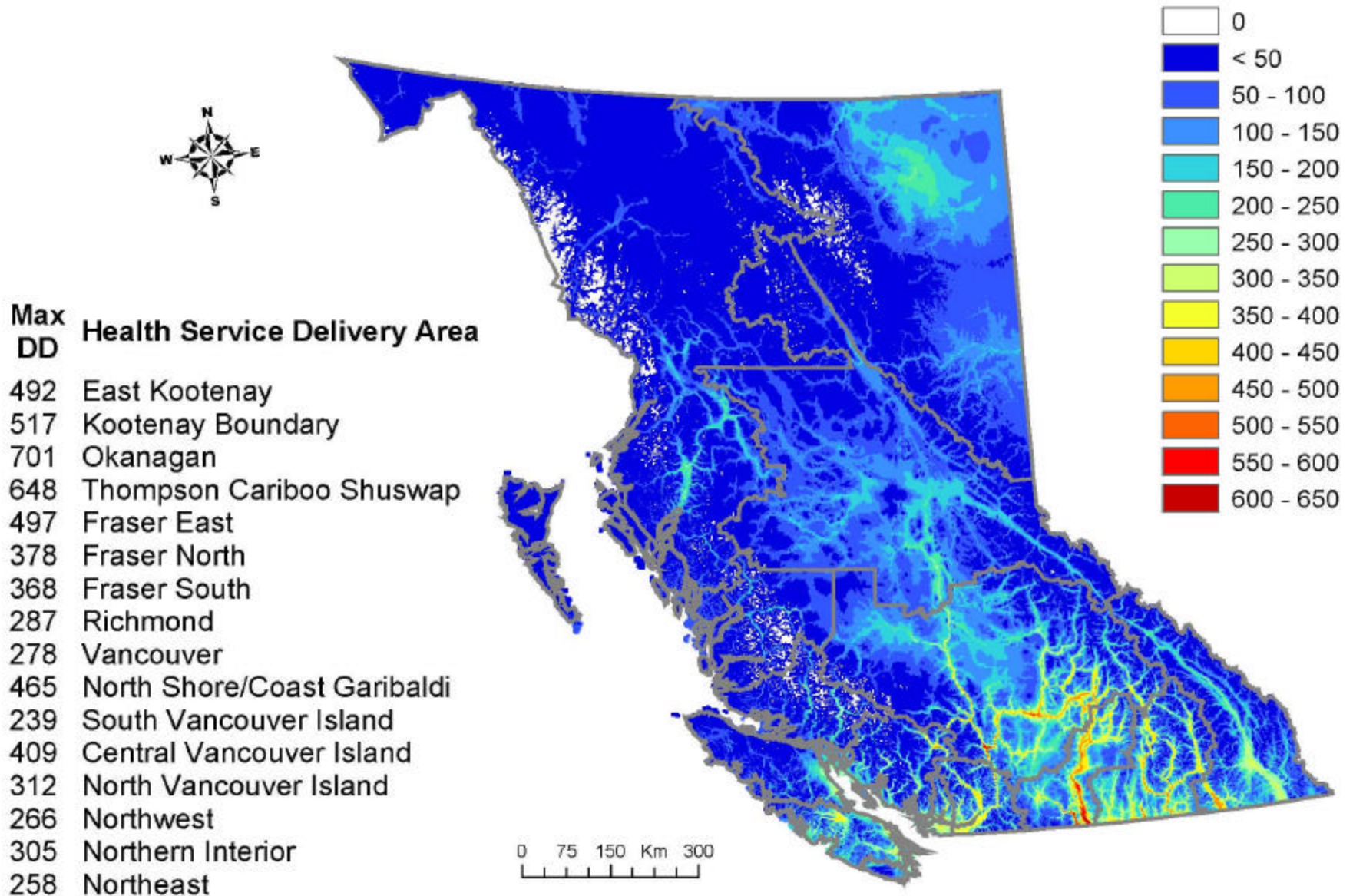
- A closed group, click to open.
- An open group, click to close.

**2005 Mosquito Traps**

Rec	GISID	HSDA	TRAPTYPE	CITY	AEDESAUG20	ANOPHAUG20	COQUIAUG20	CPIPIAUG20	CTARSAUG20	CTERRAUG20	CULISAUG20
1	IHA 21A	KB	CDC Light Trap	Castlegar	1311	72	0	794	11	0	22
2	IHA 19A	KB	CDC Light Trap	Nelson	78	55	35	19	17	1	9

Identify

# Base 16°C Degree Day Model for *Culex tarsalis*

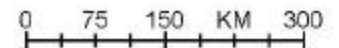
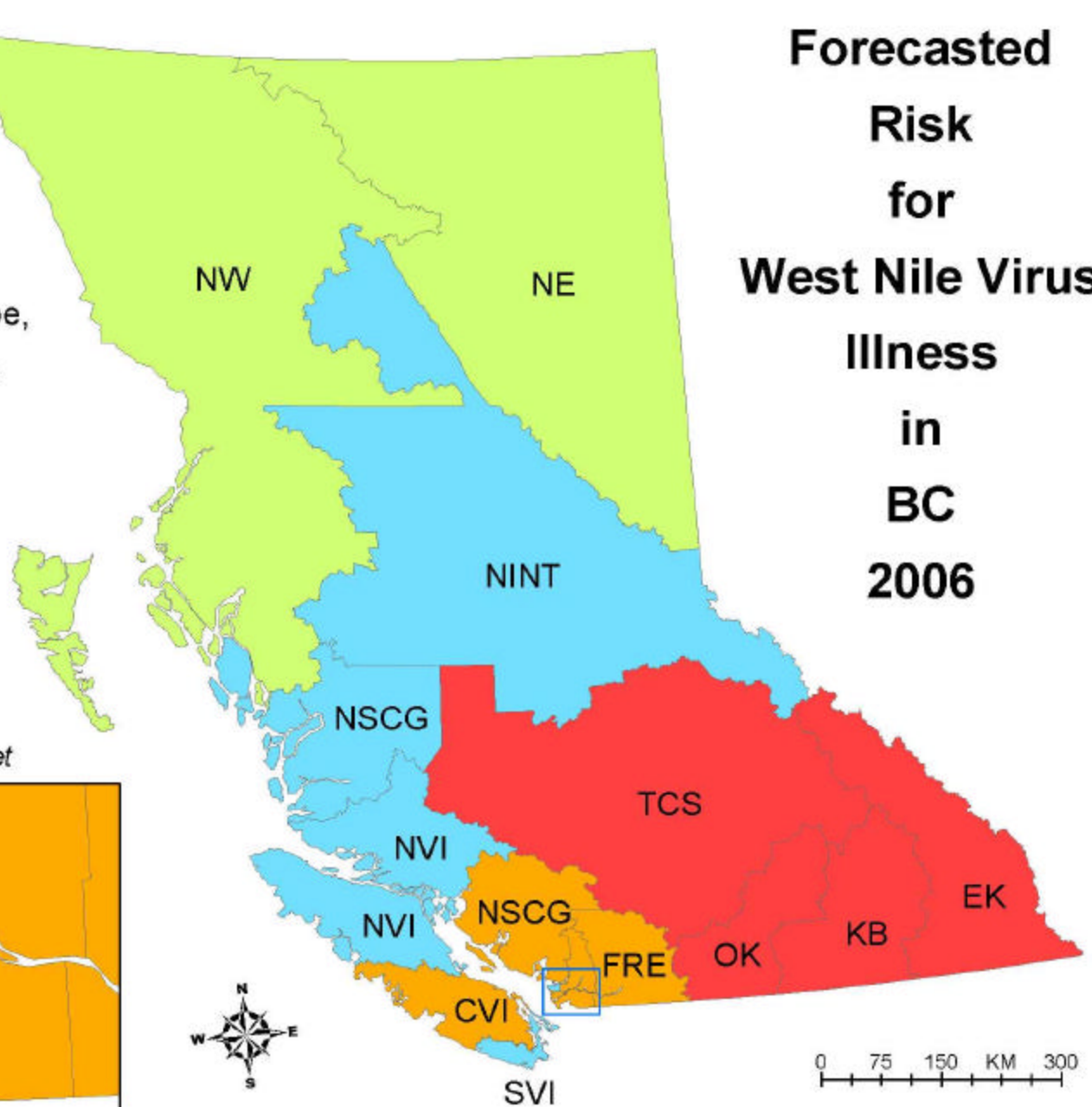


# Forecasted Risk for West Nile Virus Illness in BC 2006

Risk of WNV illness based on the presence of *Culex* mosquitoes, climate and ecosystem type, human population density, and bird migration routes.



Vancouver Lower Mainland Inset



# Use of GIS Mapping for Adulthood Scenarios

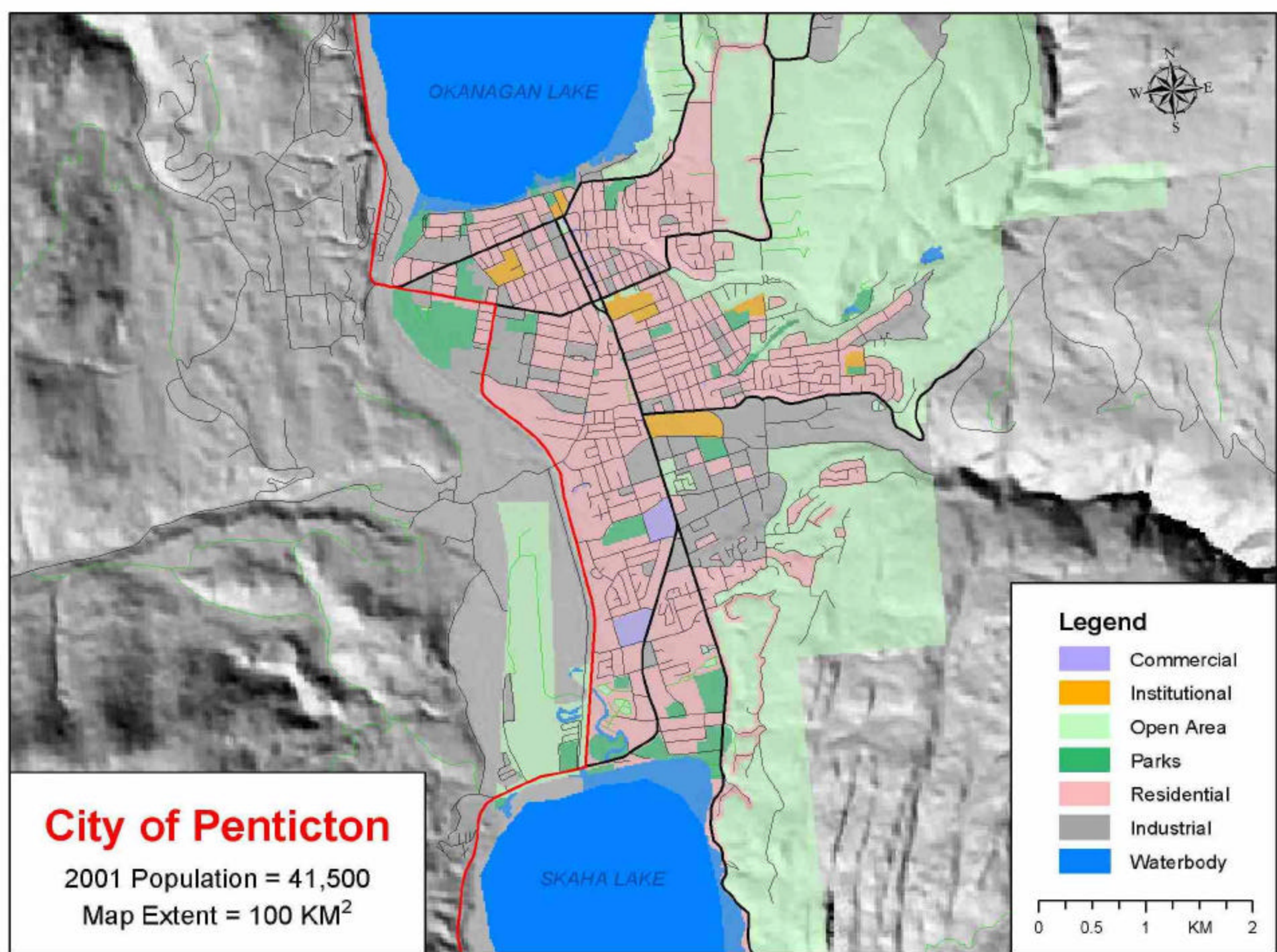
## Purpose

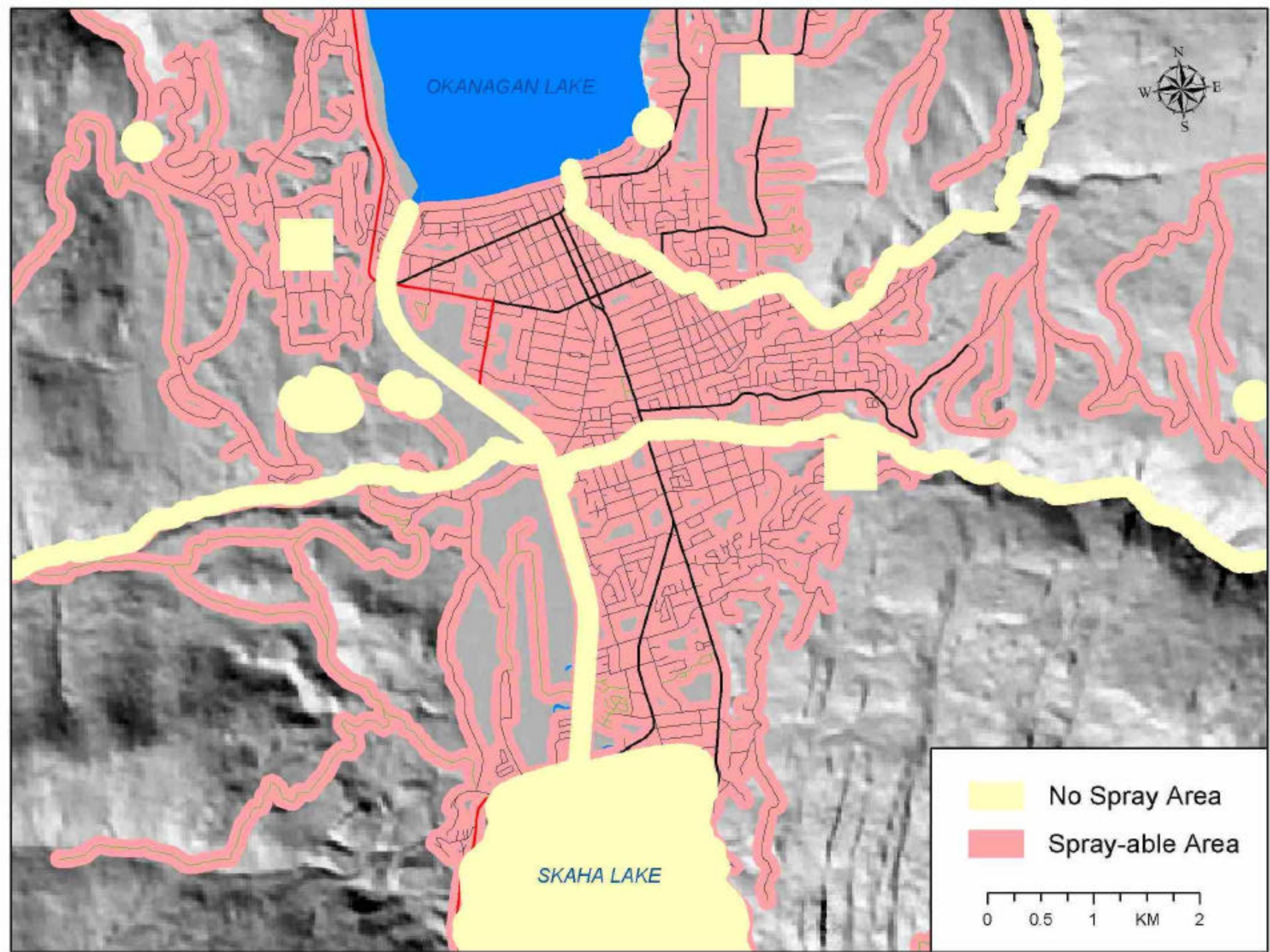
- identify areas to spray and areas to avoid
- assess whether ground-based spraying is feasible

## Scenario

- first week of August: human cases have been reported; mosquito infection rates have been increasing; short-term weather forecast is continued hot and dry spell; MHO has given the order to spray
- BCCDC will work with the regional health authority, local government, mosquito control contractor and the provincial emergency program to determine which areas can and should be sprayed to reduce the risk of human illness







## Conclusion

BC has taken an integrated, multi-disciplinary and multi-agency approach to West Nile virus

- an excellent example of how different levels of government and variety of stakeholders are working together

Use of GIS for WNV surveillance and planning has proven to be an invaluable tool

- enables visualization and integration of data from various sources, evaluation of surveillance programs, and forecasting mosquito populations and risk



# Acknowledgements

## BCCDC WNV Team

- Dr Bonnie Henry
- Dr Muhammad Morshed
- Laura MacDougall
- Allen Furnell
- Mieke Buller
- Min Li
- Ian Roe
- Samara David
- Zoonotics Laboratory
- Evan Zipf (former)

## Provincial WNV Steering Committee

## UBC Geography

- Dr Kaoru Tachiiri
- Dr Brian Klinkenberg

## Environment Canada

- Reg Dunkley
- Peter Blancher

## Saskatchewan Health

- Phil Curry

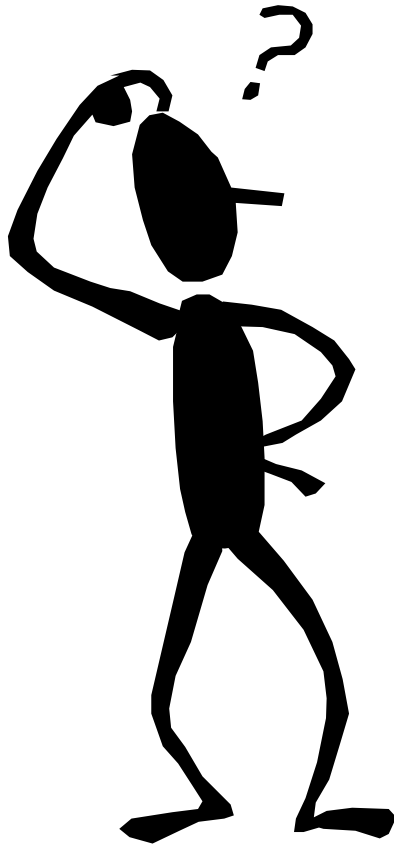
## Prairie Pest Management

- Dr Roy Ellis





## Questions or Comments?



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[maps.bccdc.org](http://maps.bccdc.org)

