

# DUTCH ELM DISEASE IN SASKATOON: SUCCESSSES AND SHORTFALLS



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CITY OF SASKATOON

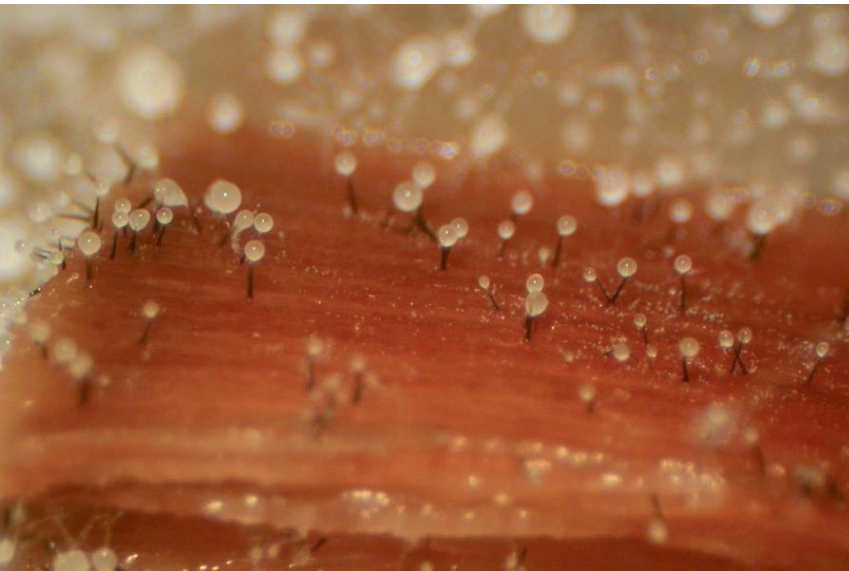


# HISTORY OF DUTCH ELM DISEASE

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Dutch Elm Disease (DED) (*Ophiostoma ulmi* / *novo-ulmi*)

- fungal pathogen originating from Europe in early 1900s
- *O. ulmi* introduced to North America in 1928, *O. novo-ulmi* in 1940s
- cause a tree to plug its own xylem tissue with gum to fight the fungus
- causes limb death and eventually 100% fatal



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- Staini
- Bark b

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amage,



**DED + 2021**

# DUTCH ELM DISEASE VECTORS IN NORTH AMERICA

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3 main vectors:

- *Hylurgopinus rufipes* (Native Elm Bark Beetle)
- *Scolytus multistriatus* (Smaller European Elm Bark Beetle)
- *Scolytus shevyrewi* (Banded Elm Bark Beetle)

Carry fungal spores on their bodies when they exit a DED-positive tree



# NATIVE ELM BARK BEETLE

*[HYLURGOPINUS RUFIPES]*

The “best” vector of DED in North America

Central – maternal gallery

– wiggles → brood galleries

*Against* the grain of the wood



# BANDED ELM BARK BEETLE

*[SCOLYTUS SCHEVYREWI]*

# SMALLER EUROPEAN ELM BARK BEETLE

*[SCOLYTUS MULTISTRIATUS]*

Central - maternal gallery

– wiggles → brood galleries

*With the grain of the wood*



# BANDED ELM BARK BEETLE

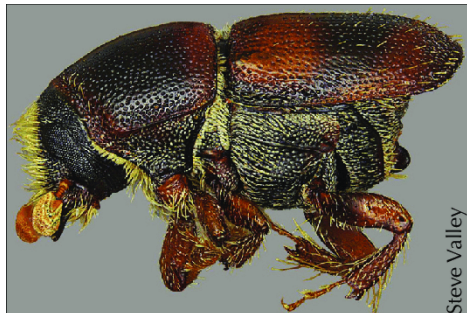
*[SCOLYTUS SCHEVYREWI]*

# SMALLER EUROPEAN ELM BARK BEETLE

*[SCOLYTUS MULTISTRIATUS]*

- Considered “equal” in their ability to vector DED
- S. multistriatus prefers American elm
- S. schevyrewi beetle prefers Siberian elm

→ reduced risk of spread to boulevard trees?



# MONITORING FOR ELM BARK BEETLES

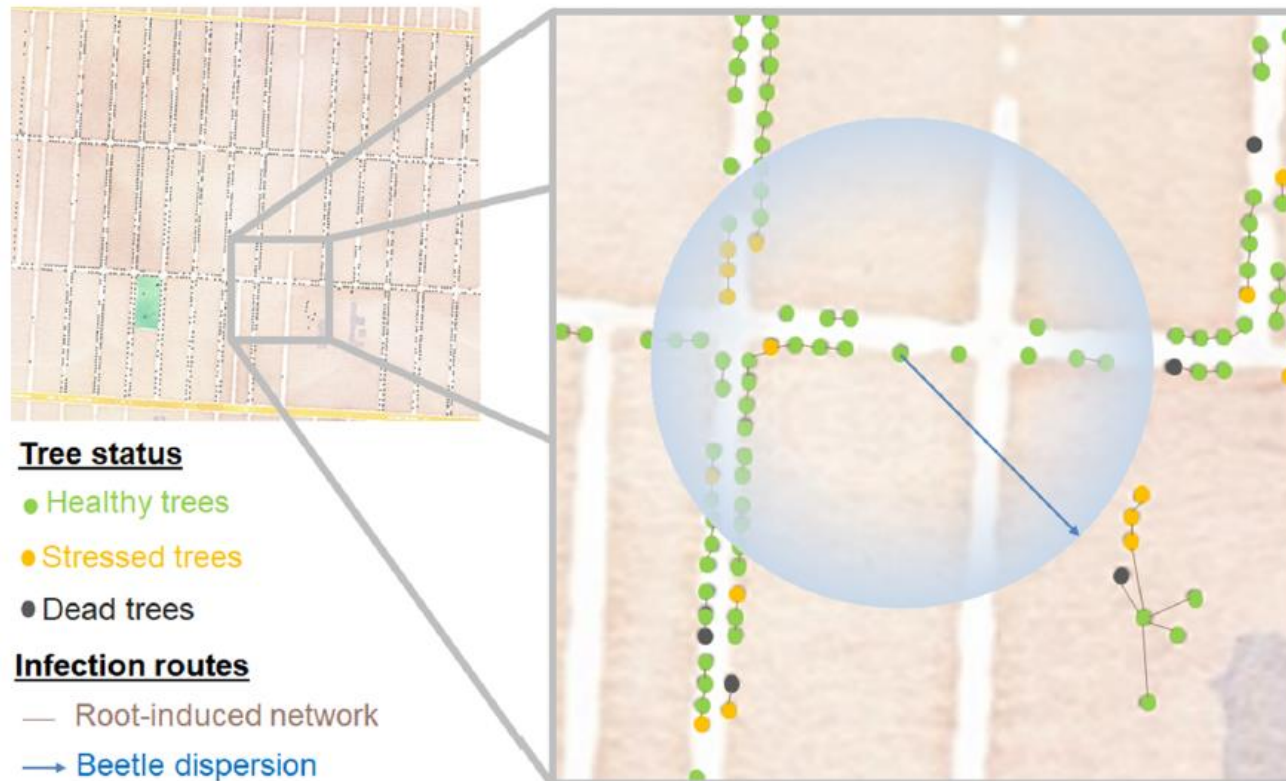
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# DUTCH ELM DISEASE IN NORTH AMERICA

DED also spreads through **root grafting** and **improperly disinfected pruning tools** (saws, chainsaws, pruners).



Potential root grafted trees in Winnipeg elm trees (brown lines)

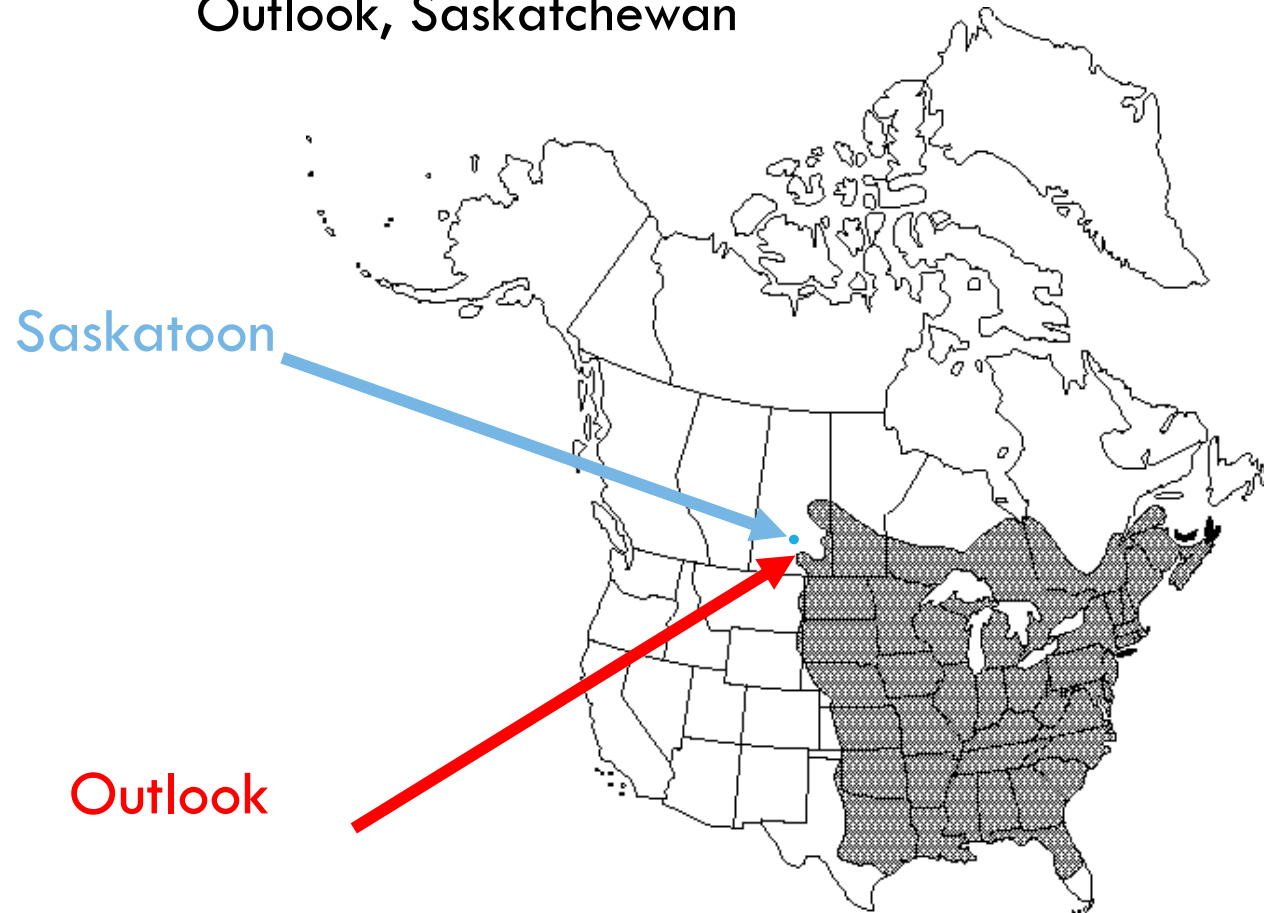
Spread of Dutch elm disease in an urban forest

Nicolas Bajeux<sup>a,\*</sup>, Julien Arino<sup>a,b</sup>, Stéphanie Portet<sup>a,b</sup>, Richard Westwood<sup>c</sup> 9

# AMERICAN ELM *ULMUS AMERICANA* [AKA: WHITE ELM]

Most western native extent in Canada:

Outlook, Saskatchewan



# AMERICAN ELM *ULMUS AMERICANA* [AKA: WHITE ELM]



# SIBERIAN ELM *ULMUS PUMILA* [AKA: CHINESE ELM]

More resistant to DED, but still fatal

More often looks like this



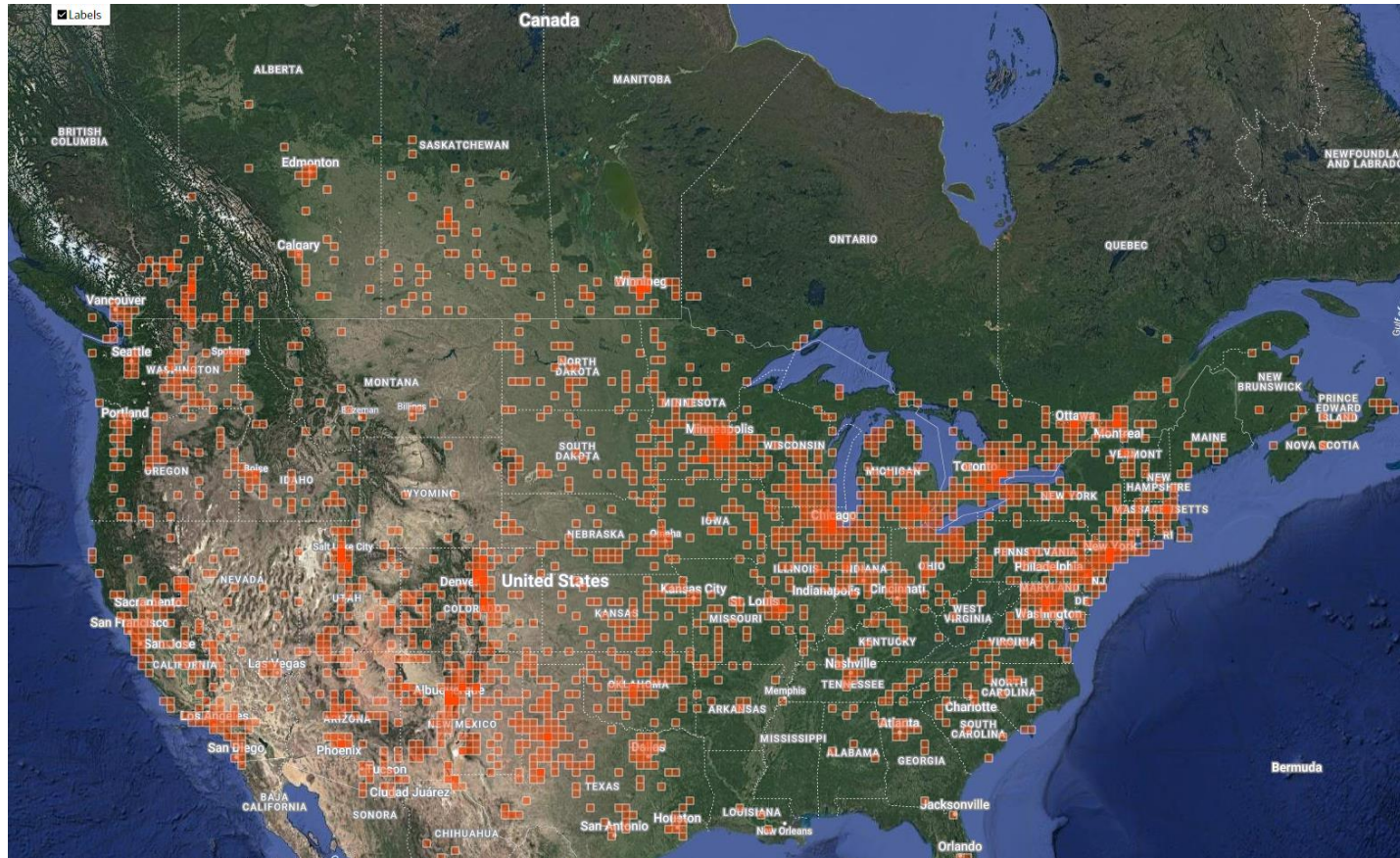
shrubby volunteer



# SIBERIAN ELM *ULMUS PUMILA* [AKA: CHINESE ELM]

Non-native, from Asia

Extent in Canada:



# PRE-2000 – MONITORING

## Dutch Elm Disease program

Monitoring done since 80s (digitized records since 1993)

-Sampling symptomatic trees

-Beetle trapping

-scoring with smiley faces?

DESCRIPTION	DATE	SAMP	PHERE	AMER	EURO	REW	OTHER
across from ent. on pp	17-Jun	MIA	267	\\\\\\\\\\\\	\\\\\\\\\\\\	\\\\\\\\\\\\	\\\\\\\\\\\\
pp on 11th st and Kinash	17-Jun	no activity	266	☺	☺	☺	☺
s of a-4 where pp x's rd	17-Jun	no activity	267	☺	☺	☺	☺
curve before ent to dump	17-Jun	no activity	266	☺	☺	☺	☺
far east end of Cartwright road	17-Jun	MIA	266	\\\\\\\\\\\\	\\\\\\\\\\\\	\\\\\\\\\\\\	\\\\\\\\\\\\
post south of entrance	5-Jun	5	reg	0	0	0	5
cul-de-sac on Cherry rd	17-Jun	no activity	267	☺	☺	☺	☺
Elenor rd off Clarence	17-Jun	no activity	266	☺	☺	☺	☺
Parimeter rd & Meewasin tr	17-Jun	no activity	267	☺	☺	☺	☺
Valley rd e of Instantturf	17-Jun	no activity	266	☺	☺	☺	☺
s end of park	5-Jun	no activity	reg	☺	☺	☺	☺
alley	5-Jun	no activity	reg	☺	☺	☺	☺
alley	5-Jun	no activity	reg	☺	☺	☺	☺
post n of ent	5-Jun	no activity	reg	☺	☺	☺	☺

(1997 data)

# 2005 — REGULATIONS

## Provincial Dutch Elm Disease Regulations (2005, Amendments 2017)

Allowed for a more formal DED  
program:

Gave the program some “teeth” and  
emergency funding.

City created a proper Emergency  
Response Plan

## *The Dutch Elm Disease Regulations, 2005*

*being*

Chapter F-19.1 Reg 5 (effective February 3, 2005) as amended by  
Saskatchewan Regulations 106/2017.

### NOTE:

This consolidation is not official. Amendments have been incorporated for convenience of reference and the original statutes and regulations should be consulted for all purposes of interpretation and application of the law. In order to preserve the integrity of the original statutes and regulations, errors that may have appeared are reproduced in this consolidation.

# 2005 — REGULATIONS

## Provincial Dutch Elm Disease Regulations (2005, Amendments 2017)

### **Made it illegal to:**

- store elm wood (must dispose immediately)
- leave elm stumps
- prune during the pruning ban (April-September)

### **Made it legal for:**

- Provincial DED inspectors to enter onto property for the purposes of elm removal

## *The Dutch Elm Disease Regulations, 2005*

*being*

Chapter F-19.1 Reg 5 (effective February 3, 2005) as amended by  
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Provincial Du  
(2005, Amend

## Problems:

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# TIMELINE

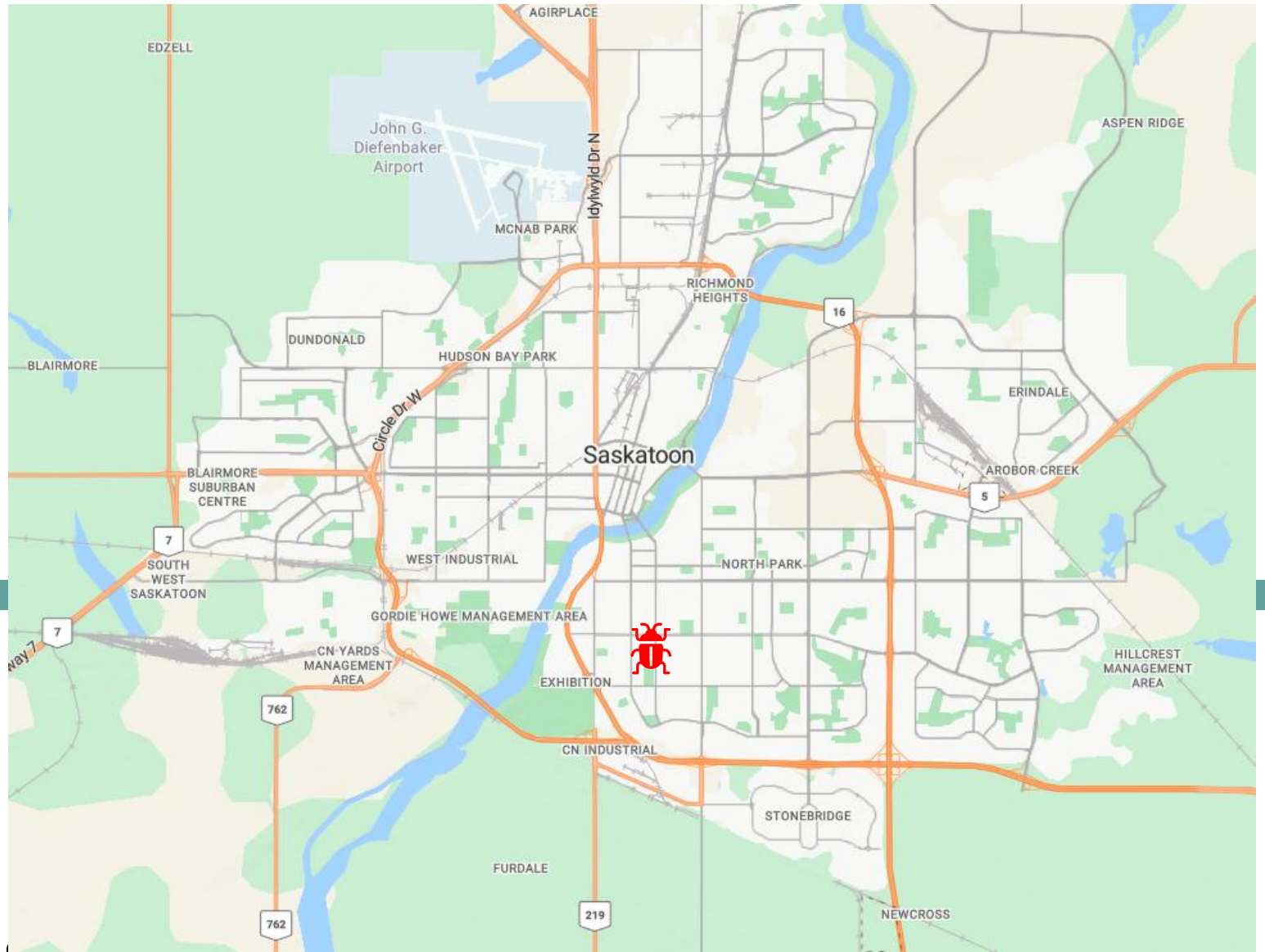
Positive case in a private Siberian elm in the Buena Vista neighbourhood.

Two samples to confirm – one positive, one negative.

2015

Followed our Dutch Elm Disease

- immediate removal of + tree
- firewood sweep in 2 km radius of + tree
- media PSAs



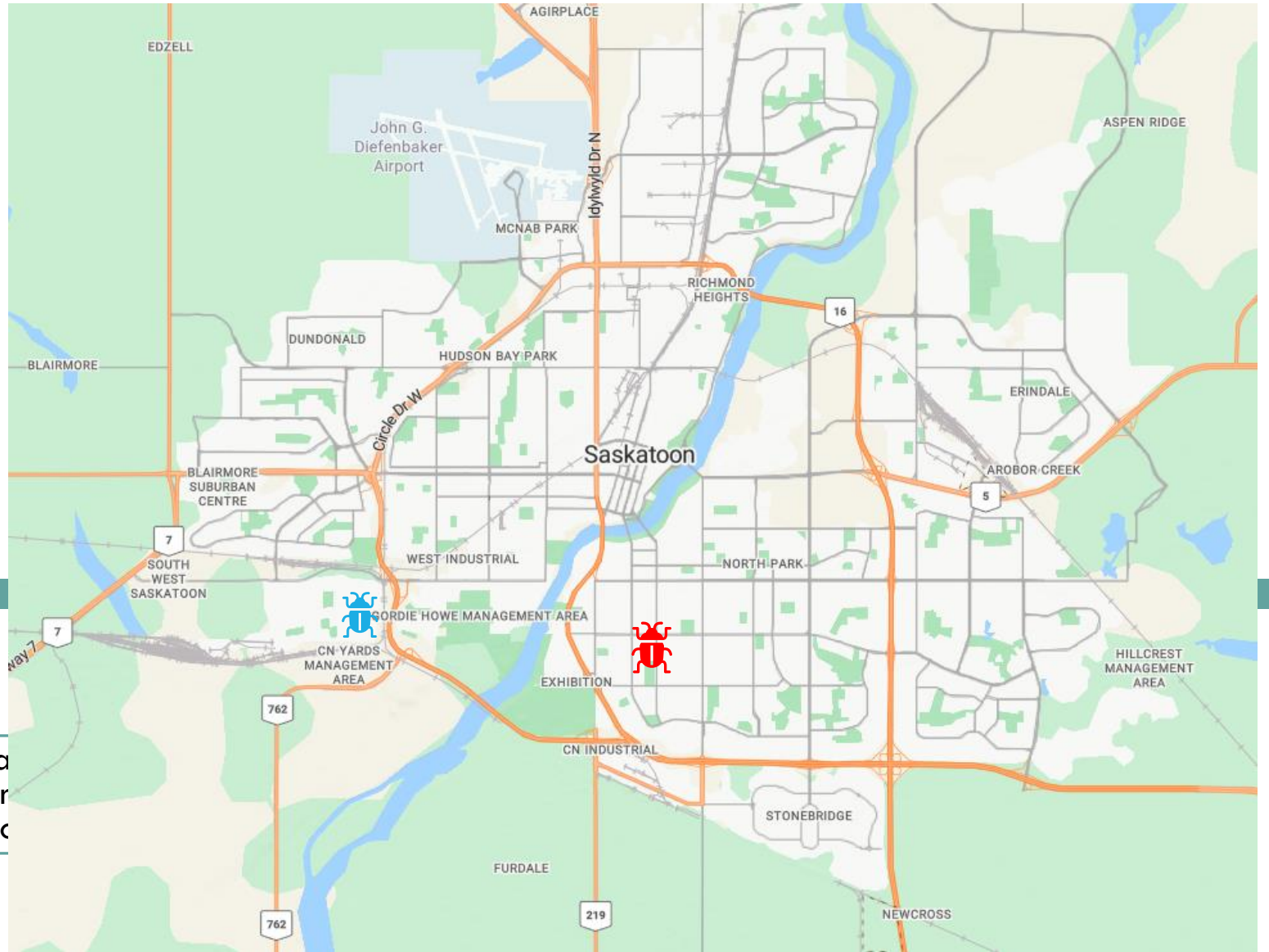
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2015

Positive sa  
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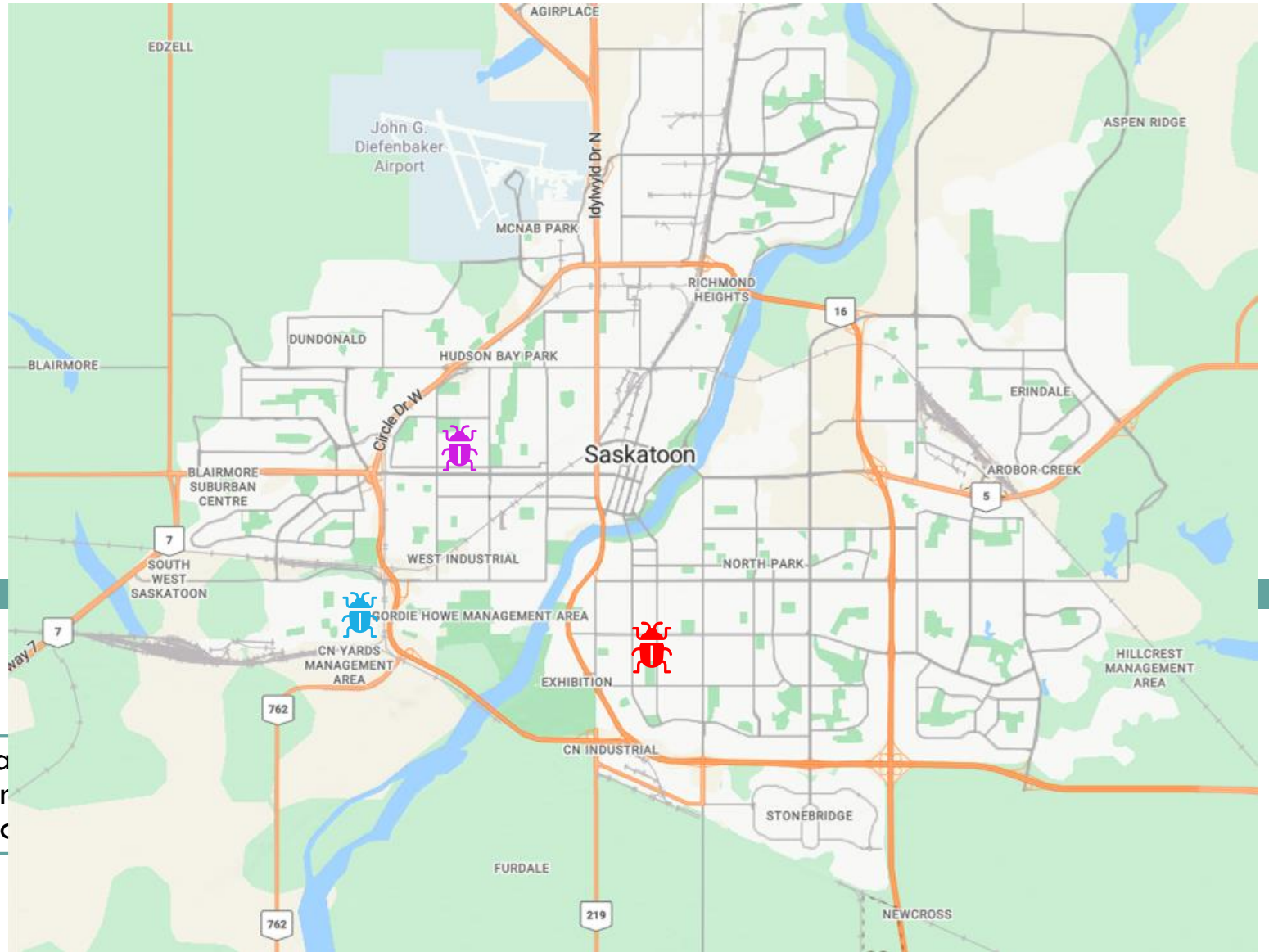
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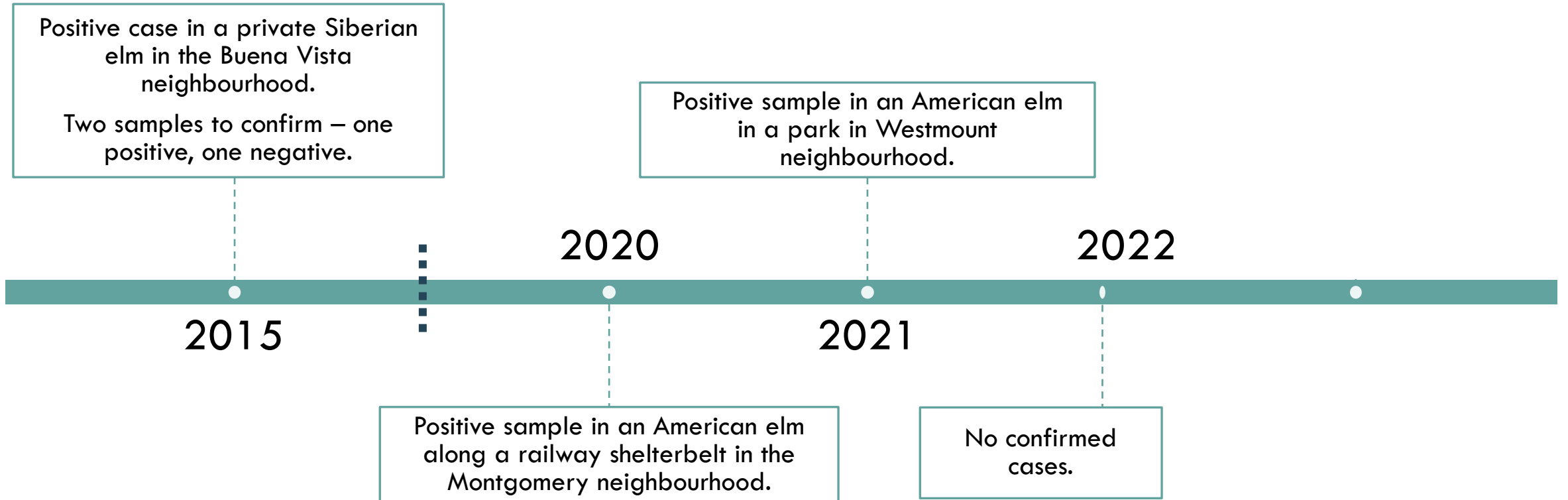
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# TIMELINE



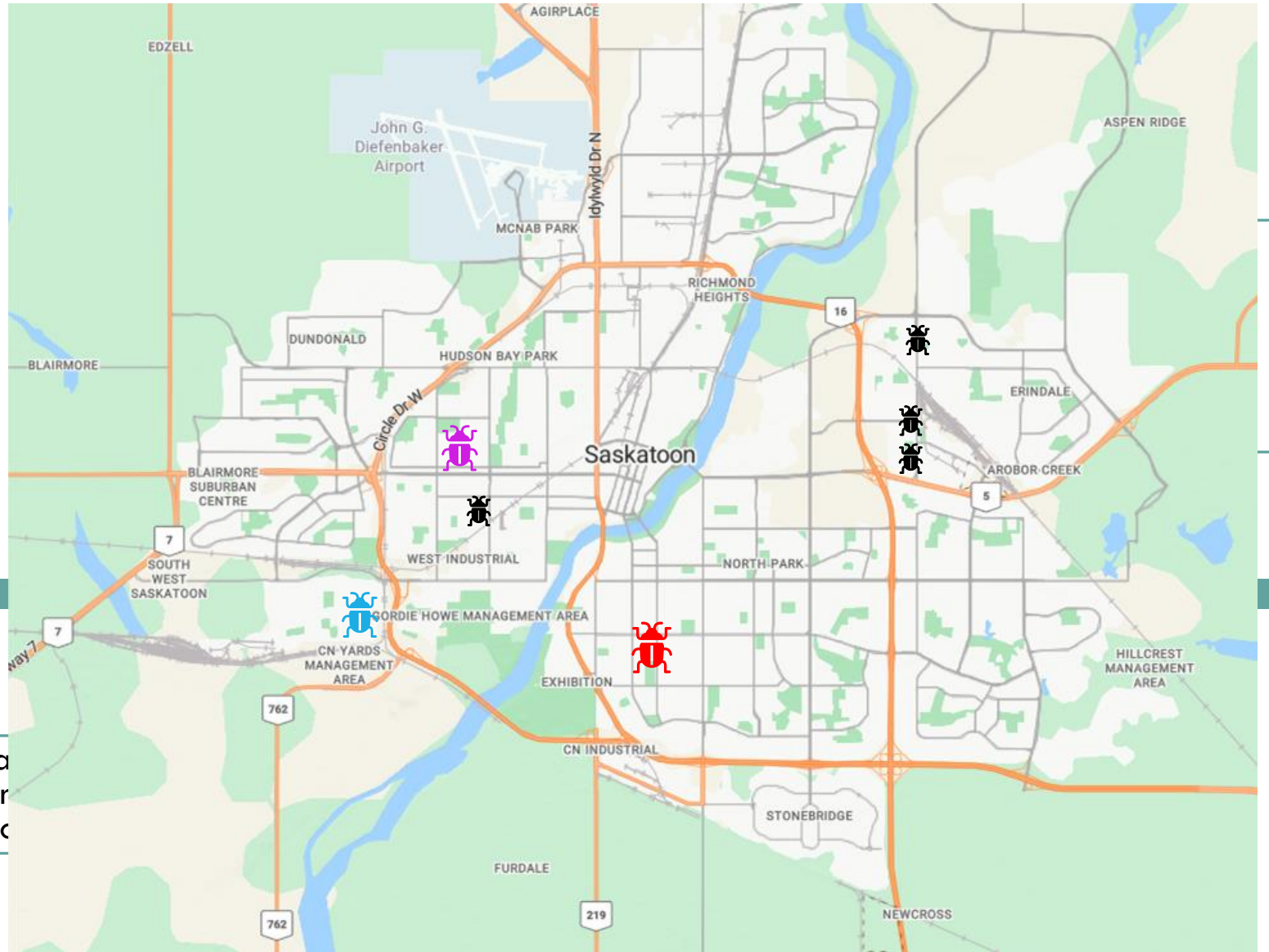
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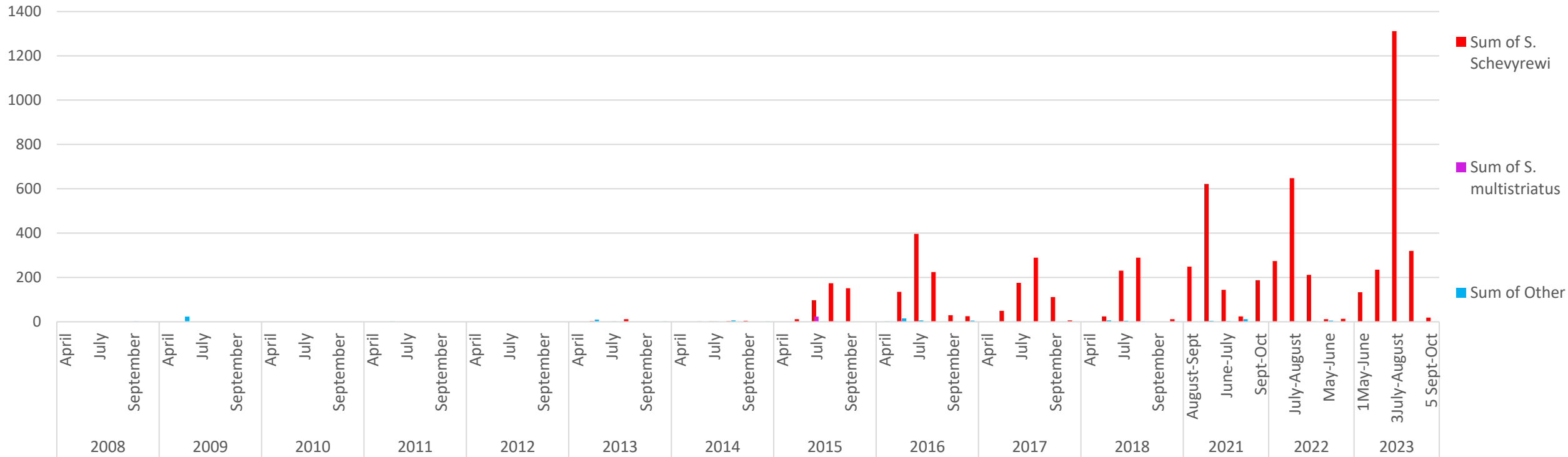
2015

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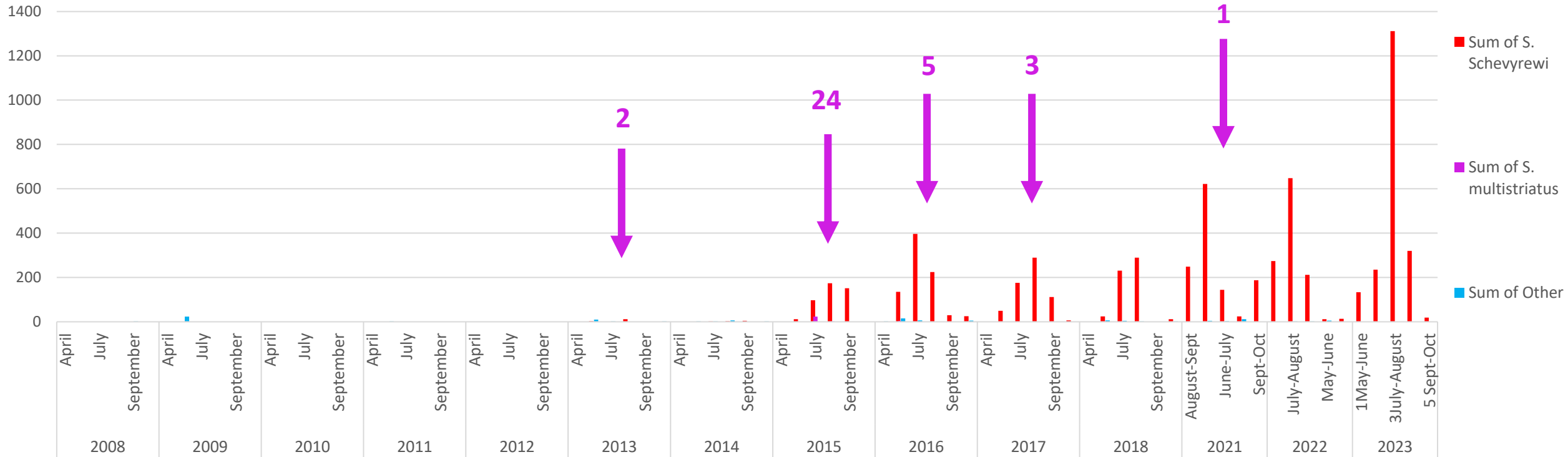


# SCOLYTUS SCHEVYREWI – LEADING THE SPREAD?

The Native Elm Bark Beetle – the “best” vector – has never been recorded in Saskatoon



# SCOLYTUS MULTISTRIATUS – INITIAL VECTOR?





## Host Acceptance and Larval Competition in the Banded and European Elm Bark Beetles, *Scolytus schevyrewi* and *S. multistriatus* (Coleoptera: Scolytidae): Potential Mechanisms for Competitive Displacement between Invasive Species

Jana C. Lee • Steven J. Seybold

Revised: 24 April 2009 / Accepted: 26 June 2009 /  
Published online: 16 July 2009  
© US Government 2009



**Abstract** A recent survey revealed that the newly invasive banded elm bark beetle, *Scolytus schevyrewi*, was much more abundant than the long-established European elm bark beetle, *S. multistriatus*, in areas of Colorado and Wyoming, USA. This study was initiated to determine whether competitive displacement of *S. multistriatus* by *S. schevyrewi* might be mediated by a sequence of behavioral interactions between the species on and below the bark surface. At the first step in the sequence, host acceptance behavior (i.e., time to tunnel into the host) was monitored among female *S. schevyrewi* and *S. multistriatus*. There was no substantial difference in host acceptance behavior when females were offered small cut logs (bolts) of Siberian elm, *Ulmus pumila*, infested with con- or heterospecific females. At the second step, mating and oviposition usually follow after a female has excavated a gallery. Mean oviposition per parental female in 1 wk was not significantly different among treatments: *S. schevyrewi* at medium density of 2.86 parental females per dm<sup>2</sup>, at high density of 5.71 per dm<sup>2</sup>; *S. multistriatus* at medium density, at high density; and mixed species (i.e., *S. schevyrewi* and *S. multistriatus* combined, with each at medium density). At the third step, progeny production and progeny size were monitored among the same density treatments, but the number of parental beetles and size of bolts were doubled. Differences in progeny production would reflect larval competition, since the number of eggs initially laid was not different. Both *S. schevyrewi* and *S. multistriatus* were sensitive to intraspecific competition because size of progeny was smaller in high than medium density treatments, but total progeny production was similar at both densities. *Scolytus schevyrewi* was a stronger interspecific competitor than *S. multistriatus*. Smaller *S. multistriatus* progeny, and four-fold more *S. schevyrewi* progeny were produced when both species developed on the same host. The contributions of these proximal behavioral events toward the mechanism for competitive displacement are described in the context of the host colonization behavior of *Scolytus* spp. The competitive advantage of *S. schevyrewi* larvae established through this study, and the more rapid response of *S. schevyrewi* to elm hosts established through other investigations, may be the key mechanistic components that facilitate the displacement of *S. multistriatus* by *S. schevyrewi*.

# SCOLYTUS SCHEVYREWI — LEADING THE SPREAD?

- Trap monitoring higher after 2021 – sampling bias?
- subsample – what is the actual population in our city?

## However:

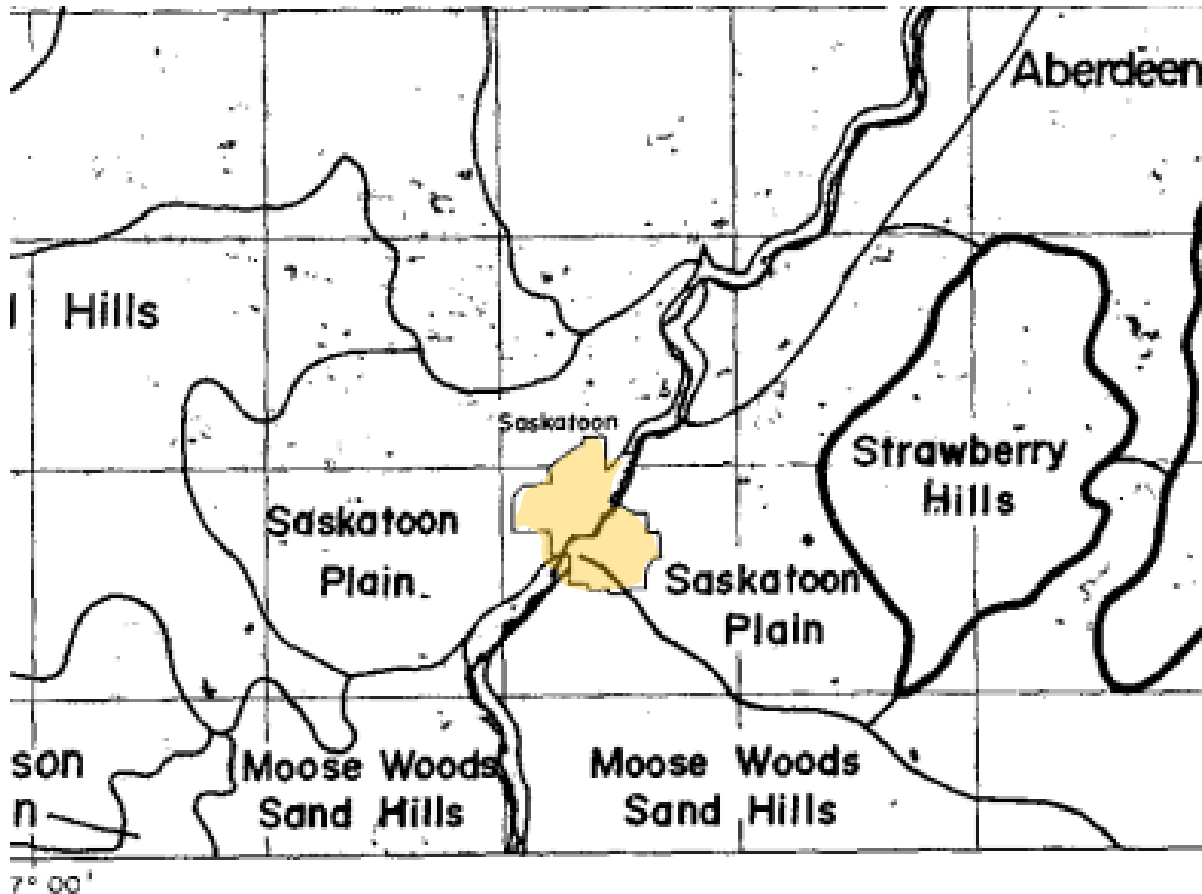
- Elm dense neighborhoods have always been targeted for monitoring
- # of traps was high in 2015 & 2016
- lures have remained consistent



# COMPOUNDING FACTORS - DROUGHT



# COMPOUNDING FACTORS – SOIL QUALITY



“Undulating, sandy to clayey glacio-lacustrine plains”

Moderately / Very Strongly Calcareous

High development, former agricultural land has reduced nutrient content

# COMPOUNDING FACTORS — CONSTRUCTION

Saskatoon

## Builders, Realtors say Saskatoon housing market is falling behind as population booms

Builders call for less red tape and more incentives

CBC News - Posted: Jan 24, 2024 4:35 PM CST | Last Updated: January 25



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Builders and the Saskatchewan Realtors Association say they are concerned about the slow-growing housing market. (Dayne Patterson/CBC)



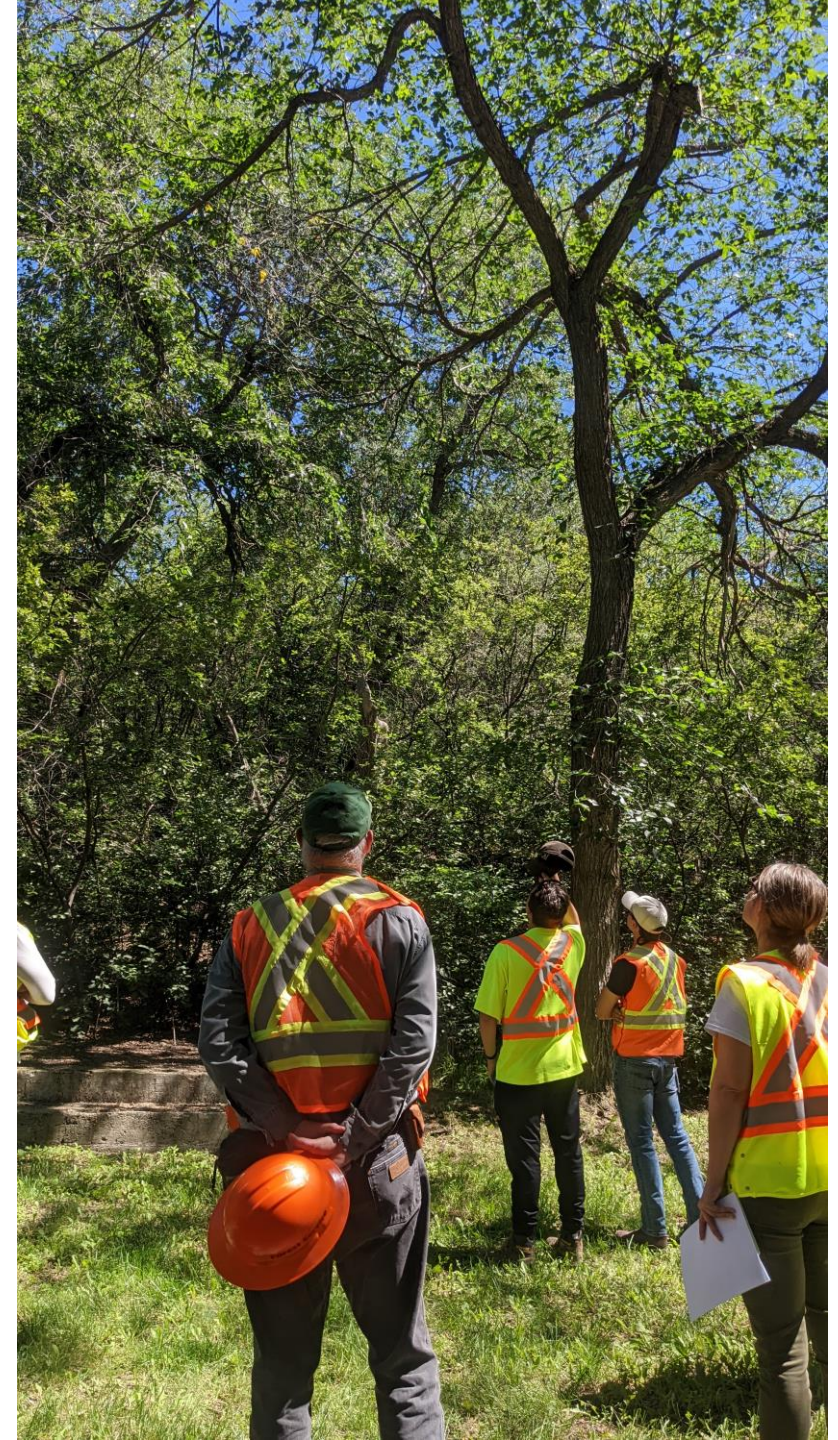
# KEY ASPECTS OF PREVENTION

1. Monitoring & Sampling
2. Training Staff
3. Educating the Public
4. Adequate resources in the preventative stage
5. Healthy trees
6. Enforcement
7. Multi-level collaboration
8. Effective Incident Command System



# WHAT DID WE DO RIGHT?

- Maintained a training / monitoring program even without provincial funding
- Took (almost) annual trips to DED hotspots to train staff
- Interdepartmental cooperation with consistent messaging (landfill, communications, etc.)
- Strong public education campaigns in the 80s-90s
- Maintained historical data
- Increased diversity in street planting (reducing monocultures)
- Inventory of trees in Saskatoon (90s-present)



# WHAT'S IN OUR FUTURE?

- Maintain training / monitoring program
- Continue to follow response plan:
  - Remove + trees immediately
  - Education / Media campaigns
  - Firewood sweeps
  - Monitoring program & data collection
- Better enforcement of penalties with new **Tree Protection Bylaw**
- Tree injections?







LAW





DED “vaccine”

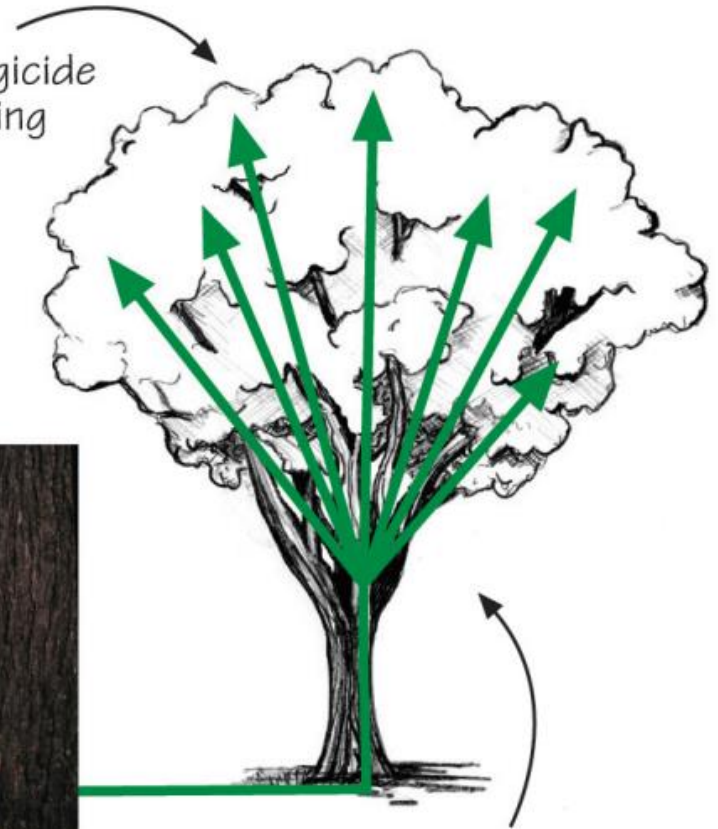
Winnipeg trial unsuccessful & cos



### Dutch elm disease can be prev

The opportunity to protect elm trees from Dutch Elm Disease (DED) available. Municipalities, landscape and arborist companies as well Dutch Elm Disease on their valuable elms using the DutchTrig<sup>®</sup> vaccine.

Arbotect is the only scientifically proven fungicide to provide multiple growing seasons of protection.



Arbotect fungicide alone has the unique ability to move into newly formed sapwood, while resisting degradation resulting from cold, heat, and other adverse conditions.

# THANK YOU



Sydney Worthy

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