



# 2025 Maine Spruce Budworm Update

Allison Kanoti, Director & State Entomologist  
Forest Health & Monitoring, Maine Forest Service

Amanda E. Beal  
Commissioner

Patty Cormier  
State Forester

18 Elkins Lane  
Augusta, ME 04333

(207) 287-3200  
[www.maine.gov/dacf](http://www.maine.gov/dacf)

# Spruce Budworm

A **native** moth that feeds on **spruce** and **fir**

## Spruce Budworm Life Cycle in Maine

Adult moth (July-August)



Egg mass on needle (July-August)



Reddened foliage (July)



Pupa on branches (June-July)



**Spruce Budworm**  
a native moth

Feeding larva (May-June)



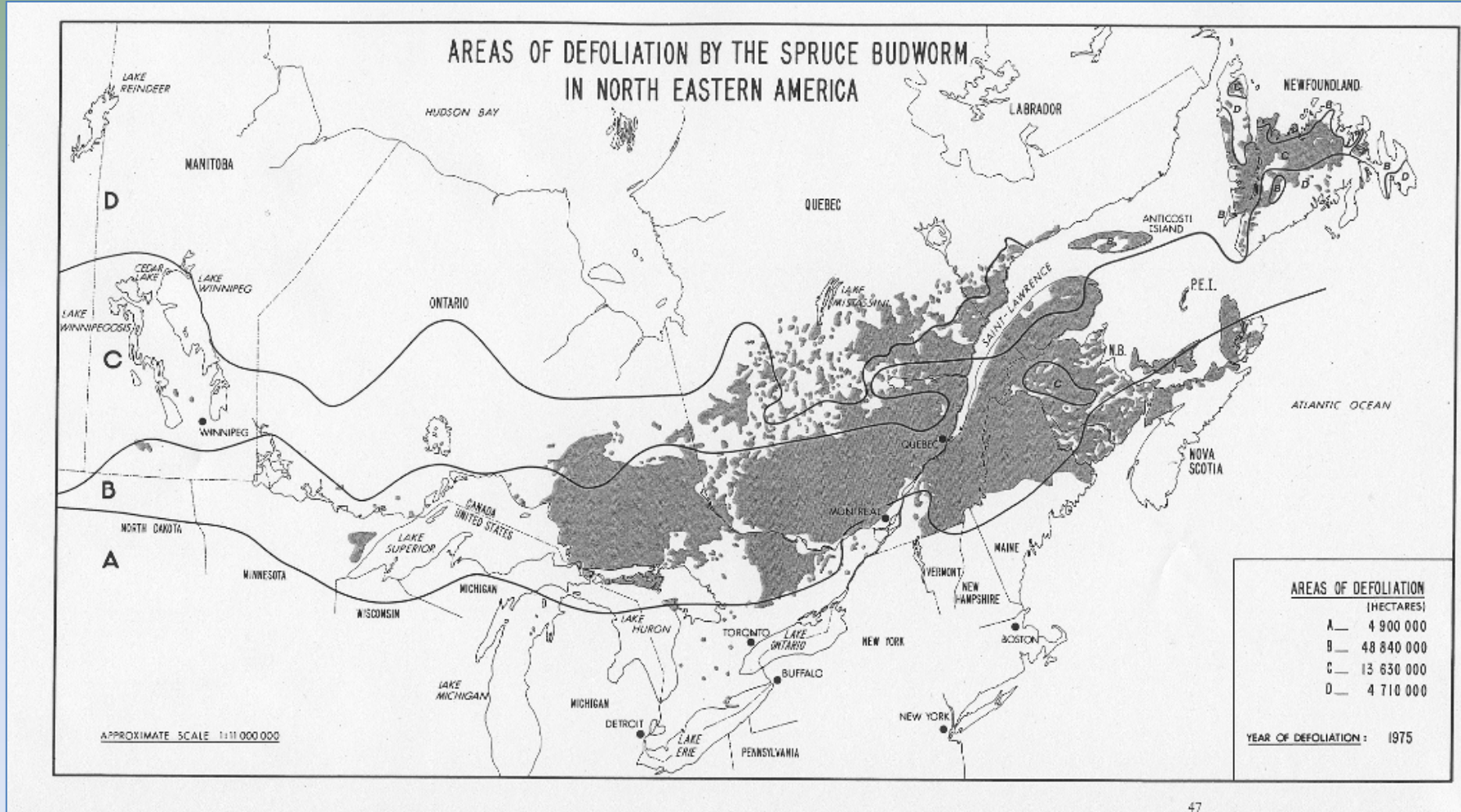
Overwintering Larva in hibernaculum (August-May)



Photos: Egg mass, Natural Resources Canada, Canadian Forest Service (FS); Hibernaculum, USDA FS- Region 2, Bugwood.org; Larva, D. Gordon Mott; Pupa, Maine FS; Adult, Brian Roth, CFRU; Defoliated trees, Maine FS

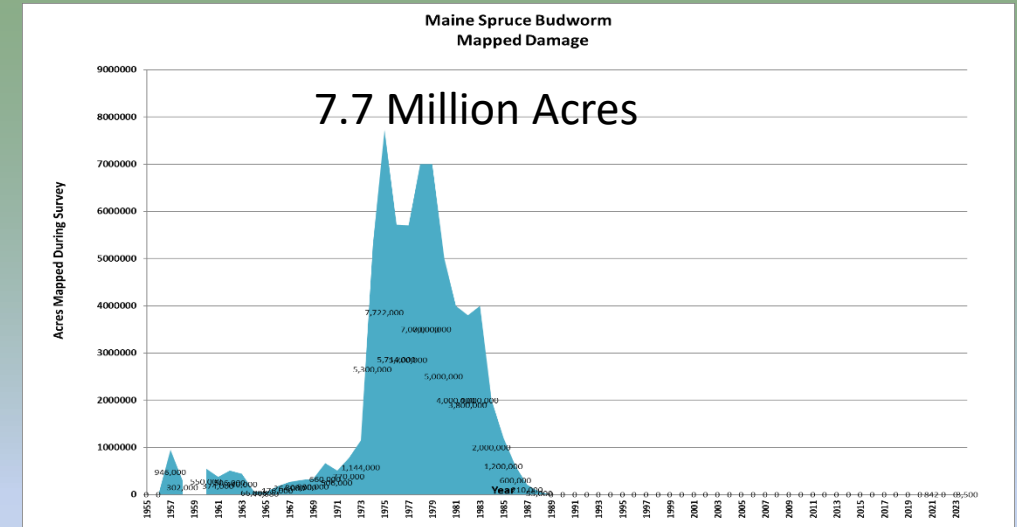
# Regional Outbreaks

1970s-1980s regional outbreak covered ~136 million acres across eastern Canada and Northern Maine

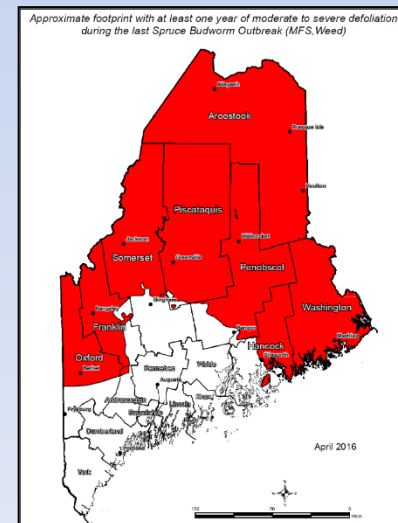


# 1970s-1980s Outbreak in Maine

- Millions of acres of insecticide treatment
- Mortality in areas without budworm population control (Osawa et al., 1986): Balsam Fir 83-96% / Red Spruce 25-45%
  - Estimated 20-25 million cords of spruce-fir mortality statewide
  - Hundreds of millions of dollars lost revenue to forest industry
  - Forest structure and composition, riparian areas, wildlife habitat, recreation, tourism, forest policies and practices also impacted



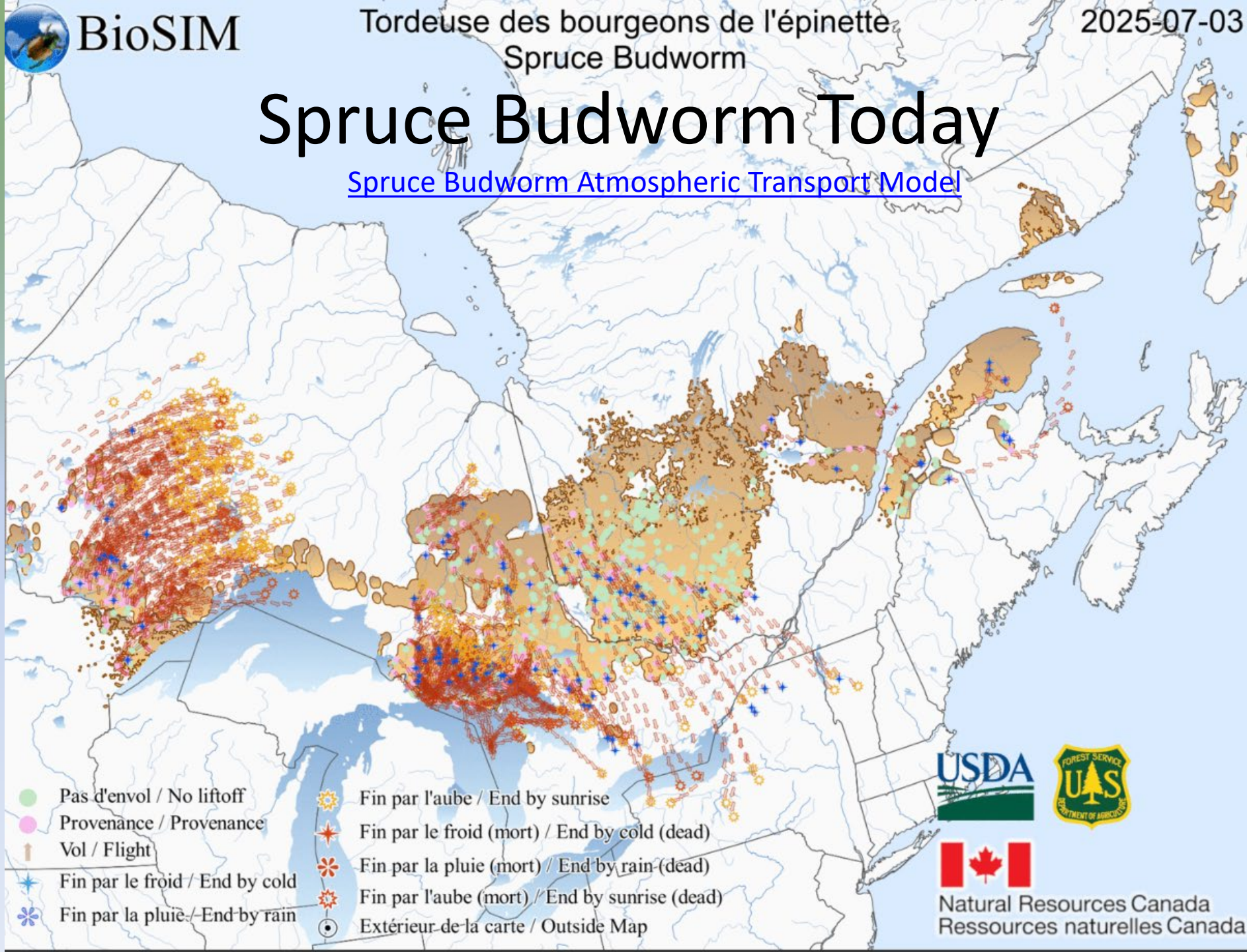
Acres Damaged in Maine 1955-Present





# Spruce Budworm Today

[Spruce Budworm Atmospheric Transport Model](#)



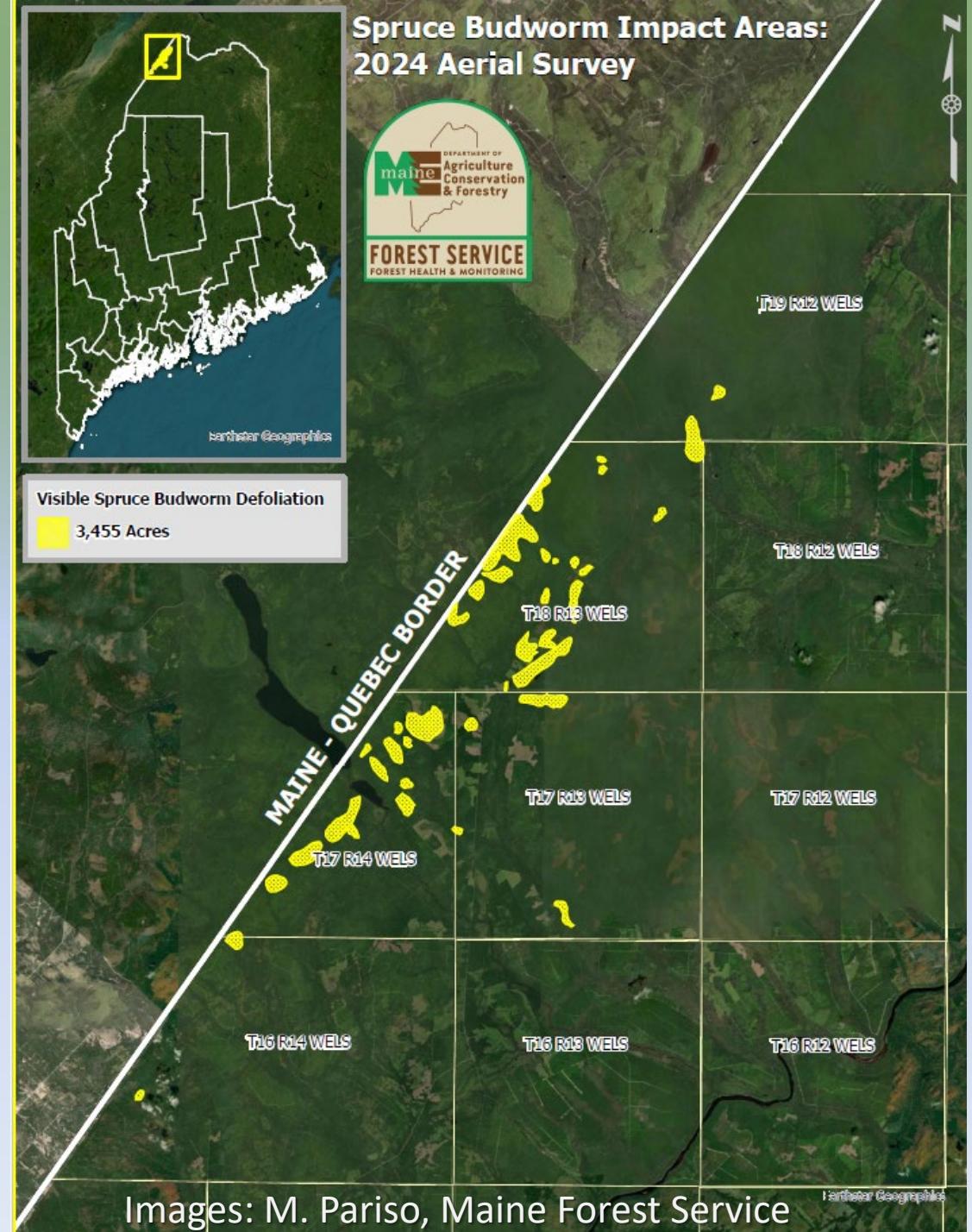
- Pas d'envol / No liftoff
- Provenance / Provenance
- ↑ Vol / Flight
- ✦ Fin par le froid / End by cold
- ✧ Fin par la pluie / End by rain
- ✪ Fin par l'aube / End by sunrise
- ✦ Fin par le froid (mort) / End by cold (dead)
- ✪ Fin par la pluie (mort) / End by rain (dead)
- ✧ Fin par l'aube (mort) / End by sunrise (dead)
- Extérieur de la carte / Outside Map



Natural Resources Canada  
Ressources naturelles Canada

# Maine Recent History

- 2020: Later instar larvae observed in forest
- 2021: First Damage mapped (light ~840 acres)
- 2021-2024 Early Intervention Strategy (EIS) treatments applied by private company across a total of about 12,000 acres
- 2024: ~3500 acres of visible damage mapped



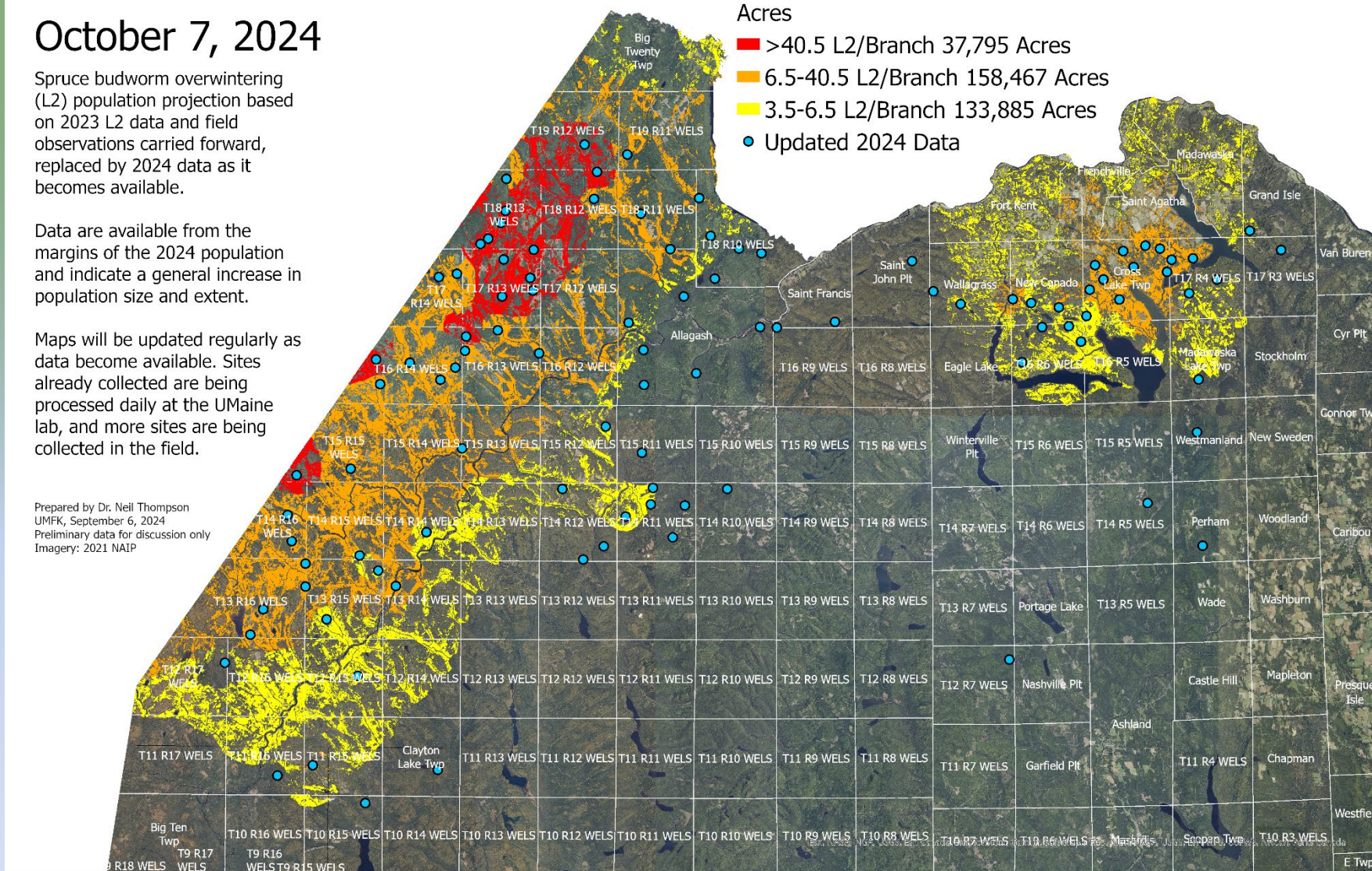
# October 7, 2024

Spruce budworm overwintering (L2) population projection based on 2023 L2 data and field observations carried forward, replaced by 2024 data as it becomes available.

Data are available from the margins of the 2024 population and indicate a general increase in population size and extent.

Maps will be updated regularly as data become available. Sites already collected are being processed daily at the UMaine lab, and more sites are being collected in the field.

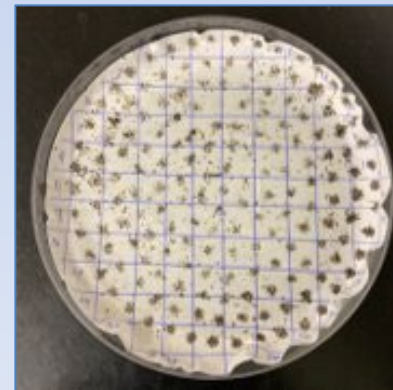
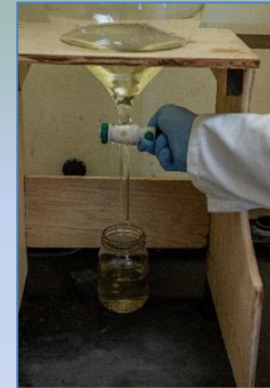
Prepared by Dr. Neil Thompson  
UMFK, September 6, 2024  
Preliminary data for discussion only  
Imagery: 2021 NAIP



**Fall 2024: Early Models Indicate that around 300,000 acres meet the Early Intervention Strategy (EIS) management thresholds. Landowners form Maine Budworm Response Coalition to implement EIS across multiple ownerships.**

# Early Intervention Strategy

- Precise annual population monitoring (L2, second instar overwintering larvae)
- Targeted biorational insecticide (additive mortality, conserving natural enemies)
  - *Bacillus thuringiensis kurstaki* (Btk) (Soil microbe derived)
  - Tebufenozide (molting hormone mimic)
- Landscape scale keeps budworm outbreak from developing and trees healthy



# 2024 SBW L2 Monitoring: 307,051 Acres (Final)

April 17, 2025

Site Average Overwintering L2/Branch

- 0
- 0.1 - 3.5
- 3.51 - 6.5
- 6.51 - 20.5
- 20.51 - 40.5
- 40.51 - 60.5
- 60.51 - 90.5
- 90.51 - 132.33

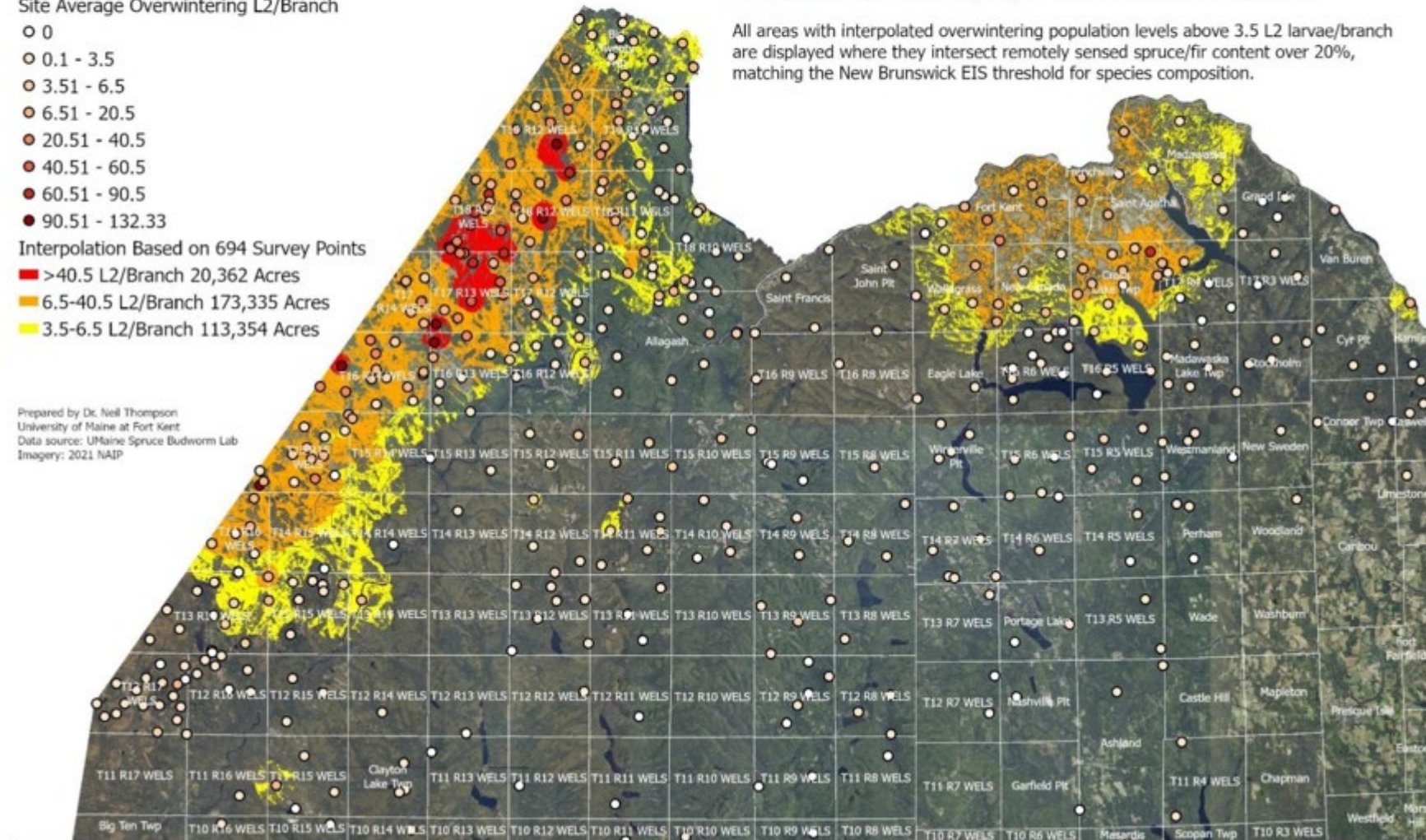
Interpolation Based on 694 Survey Points

- >40.5 L2/Branch 20,362 Acres
- 6.5-40.5 L2/Branch 173,335 Acres
- 3.5-6.5 L2/Branch 113,354 Acres

Prepared by Dr. Neil Thompson  
University of Maine at Fort Kent  
Data source: UMaine Spruce Budworm Lab  
Imagery: 2021 NAIP

This map should be used as a landscape-scale reference only; any operational planning should be based on internal inventory data. Refer to <https://www.sprucebudwormmaine.org/map/> for an interactive version of this map.

All areas with interpolated overwintering population levels above 3.5 L2 larvae/branch are displayed where they intersect remotely sensed spruce/fir content over 20%, matching the New Brunswick EIS threshold for species composition.



# Requirements for Success

Land a short-lived insecticide on one living thing in the hopes that another living thing will eat enough of it to become sick or die.

- Application timed to the surface area of new foliage.
- Caterpillar stage also impacts efficacy.

Conserve natural enemies





N. P. Thompson,  
Umaine Fort Kent

May 5



N. P. Thompson,  
Umaine Fort Kent

May 19



N. P. Thompson,  
Umaine Fort Kent

May 21 ↑ May 27 ↓



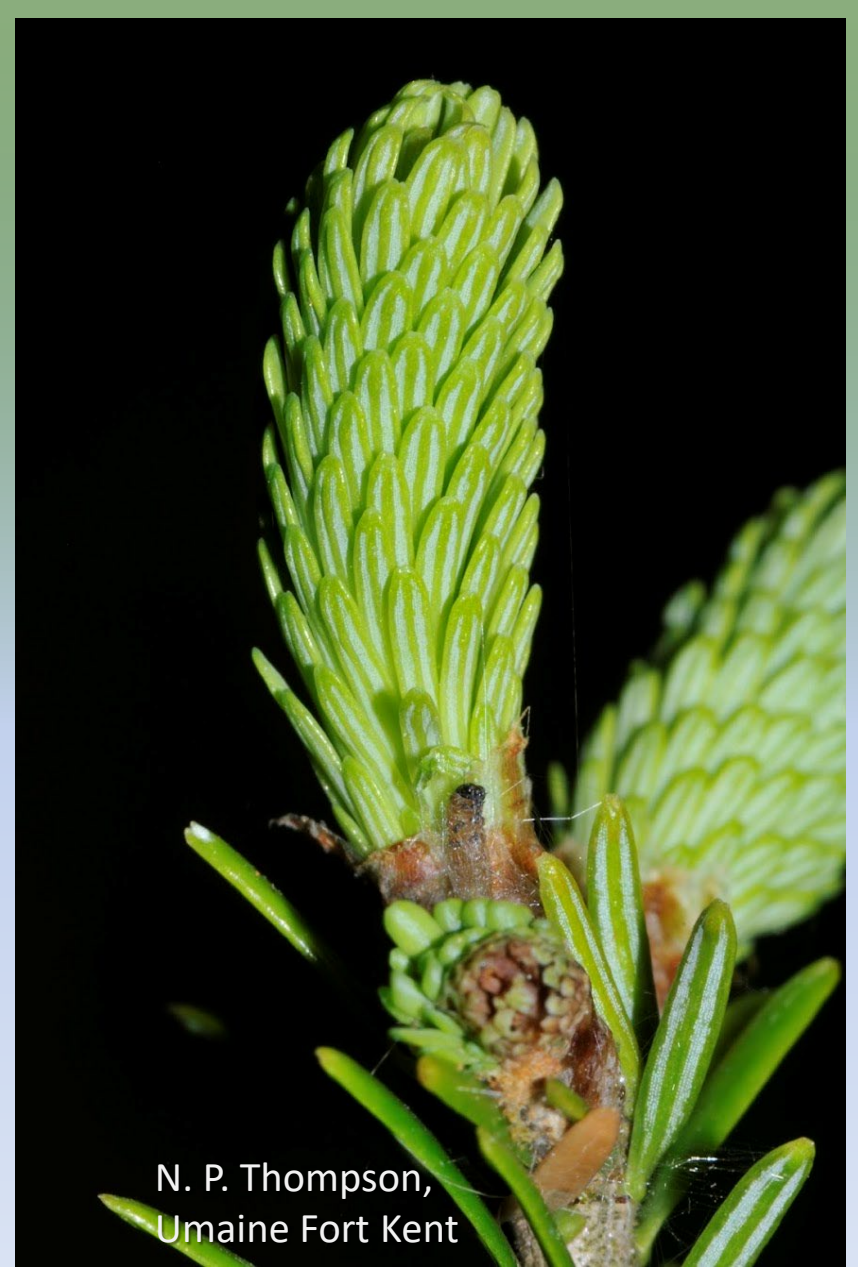
N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent

May 30



- 8 spray planes
- Observer plane
- 3 Helicopters
- Pilots/Ground Crew



N. P. Thompson,  
Umaine Fort Kent

N. P. Thompson,  
Umaine Fort Kent

# 2025 EIS Treatments in Maine



## 2024 SBW L2 Monitoring: 307,051 Acres (Final) ~240,000 acres treated in May - June 2025

April 17, 2025

Site Average Overwintering L2/Branch

- 0
- 0.1 - 3.5
- 3.51 - 6.5
- 6.51 - 20.5
- 20.51 - 40.5
- 40.51 - 60.5
- 60.51 - 90.5
- 90.51 - 132.33

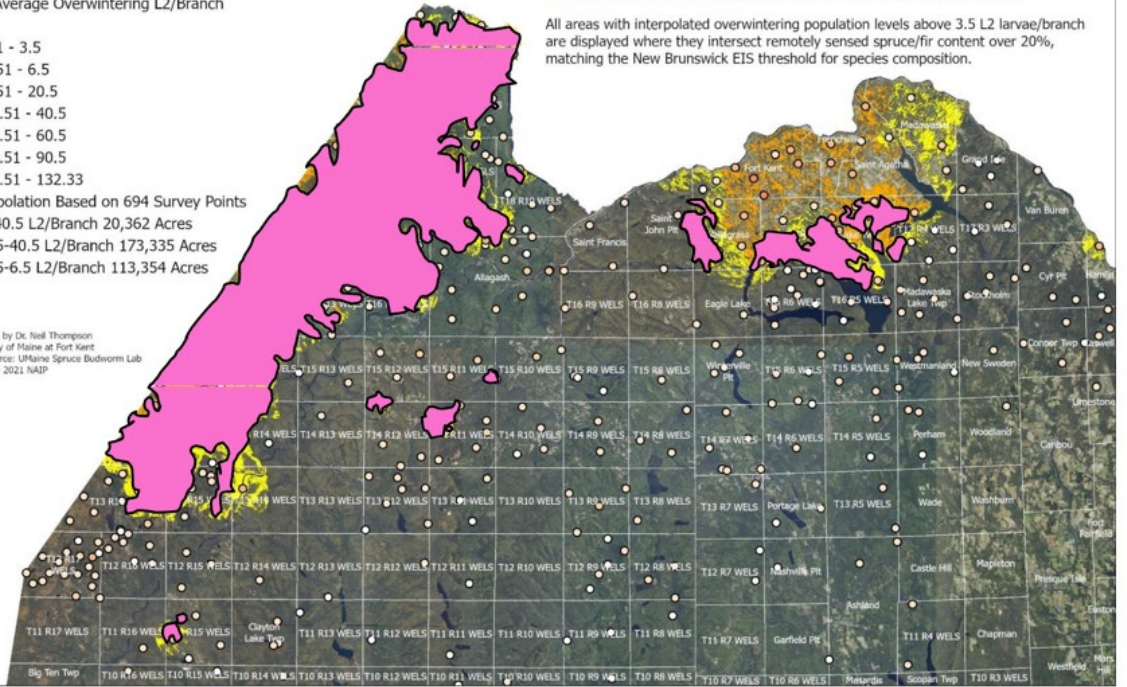
Interpolation Based on 694 Survey Points

- >40.5 L2/Branch 20,362 Acres
- 6.5-40.5 L2/Branch 173,335 Acres
- 3.5-6.5 L2/Branch 113,354 Acres

Prepared by Dr. Neil Thompson  
University of Maine at Fort Kent  
Data source: UMaine Spruce Budworm Lab  
Imagery: 2021 NAIP

This map should be used as a landscape-scale reference only; any operational planning should be based on internal inventory data. Refer to <https://www.sprucebudwormmaine.org/map/> for an interactive version of this map.

All areas with interpolated overwintering population levels above 3.5 L2 larvae/branch are displayed where they intersect remotely sensed spruce/fir content over 20%, matching the New Brunswick EIS threshold for species composition.





N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent

## Insecticide Activity Early to Mid-June

## Natural Enemies Mid-Late June

## Healthy Nontarget Blackheaded Budworm (Photos June 25)



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



N. P. Thompson,  
Umaine Fort Kent



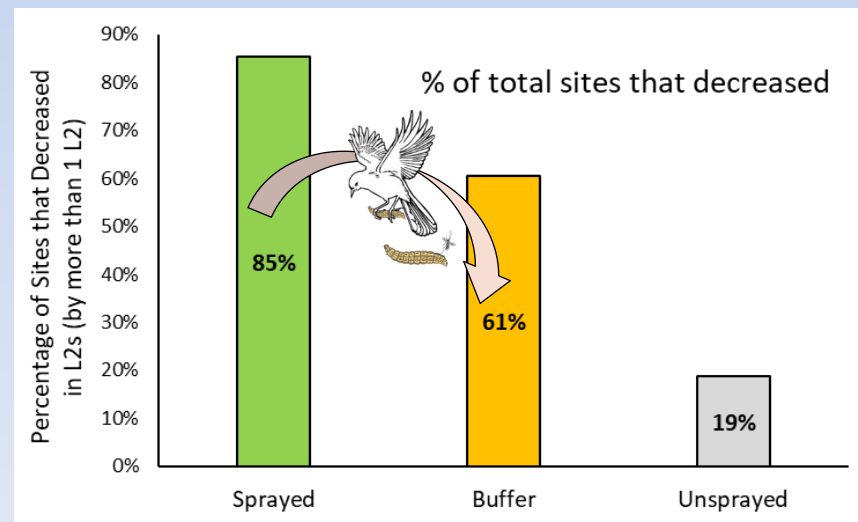
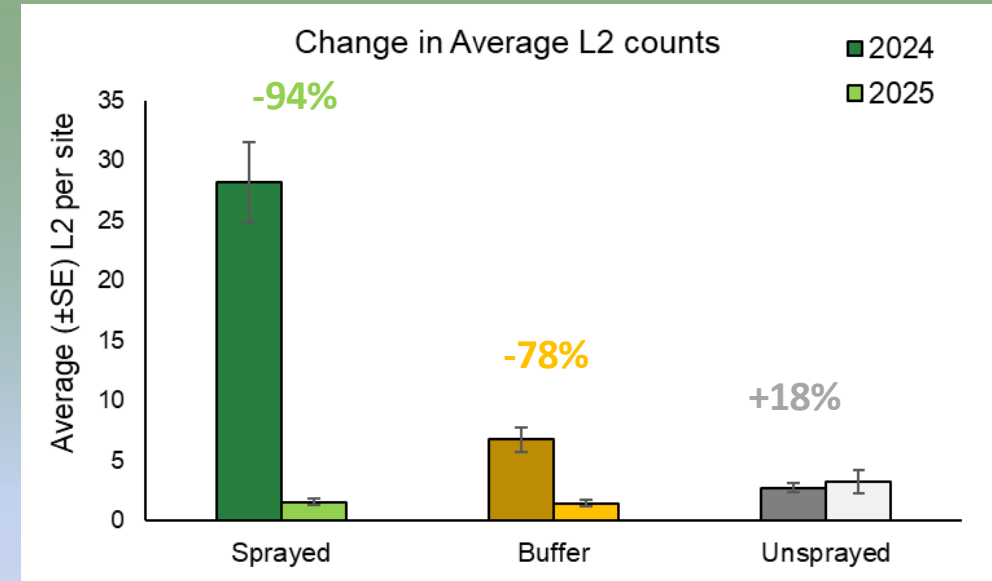
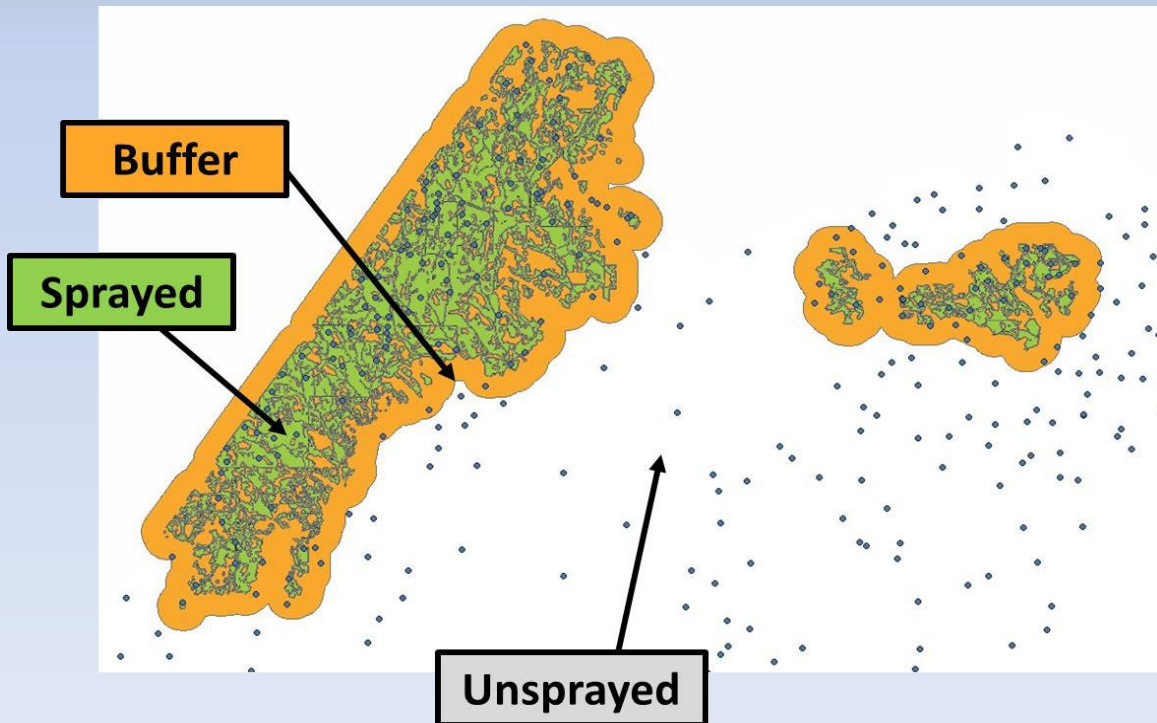
N. P. Thompson,  
Umaine Fort Kent

# Effect of insecticide treatment on L2 counts

**Preliminary** Data as of Oct 2025 Courtesy Dr. Angela Mech

$n = 193$  sites that had both 2024 and 2025 L2 data

- 75 Sprayed sites
- 38 Buffer sites (< 3km)
- 80 Unsprayed sites



“It was very easy to find parasites in the buffer areas, much harder in the untreated areas around Fort Kent”  
– Neil Thompson

# Looking Ahead in Maine

## October 27, 2025: Subject to Update Spruce Budworm 2025 L2

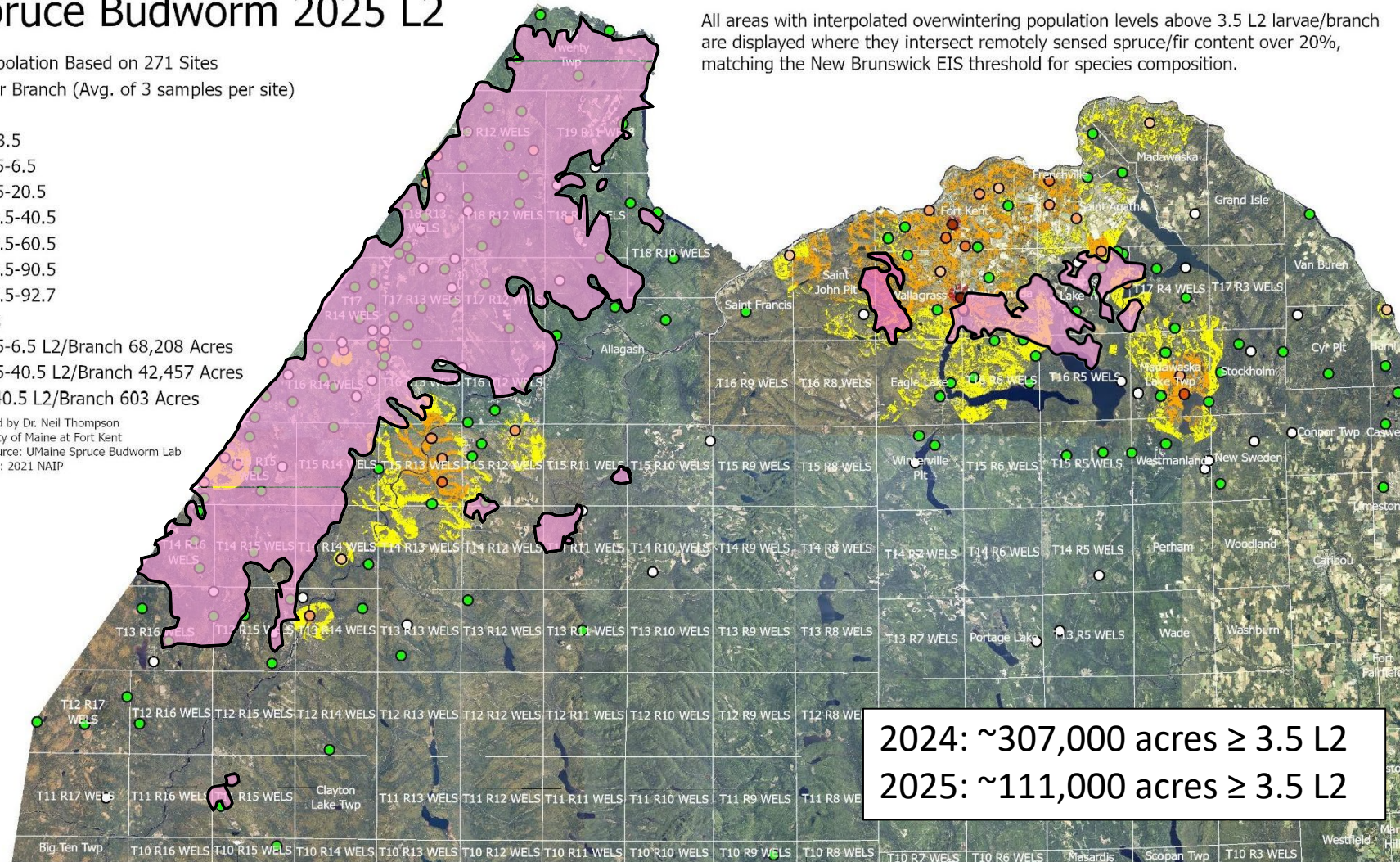
Interpolation Based on 271 Sites  
L2 Per Branch (Avg. of 3 samples per site)

- 0
- 0-3.5
- 3.5-6.5
- 6.5-20.5
- 20.5-40.5
- 40.5-60.5
- 60.5-90.5
- 90.5-92.7

Acres

- 3.5-6.5 L2/Branch 68,208 Acres
- 6.5-40.5 L2/Branch 42,457 Acres
- >40.5 L2/Branch 603 Acres

Prepared by Dr. Neil Thompson  
University of Maine at Fort Kent  
Data source: UMaine Spruce Budworm Lab  
Imagery: 2021 NAIP



This map should be used as a landscape-scale reference only; any operational planning should be based on internal inventory data. Refer to <https://www.sprucebudwormmaine.org/map/> for an interactive version of this map.

All areas with interpolated overwintering population levels above 3.5 L2 larvae/branch are displayed where they intersect remotely sensed spruce/fir content over 20%, matching the New Brunswick EIS threshold for species composition.

2024: ~307,000 acres  $\geq$  3.5 L2  
2025: ~111,000 acres  $\geq$  3.5 L2

- Smaller, more dispersed footprint of impact.
- Persistent populations around the untreated, settled area.
- 2026 pilot settled area small woodlot inclusion (Is it achievable? At what scale?)
- Expect continued hotspots as the outbreak moves through ON and QC
- Expect impacts from local movement from untreatable areas

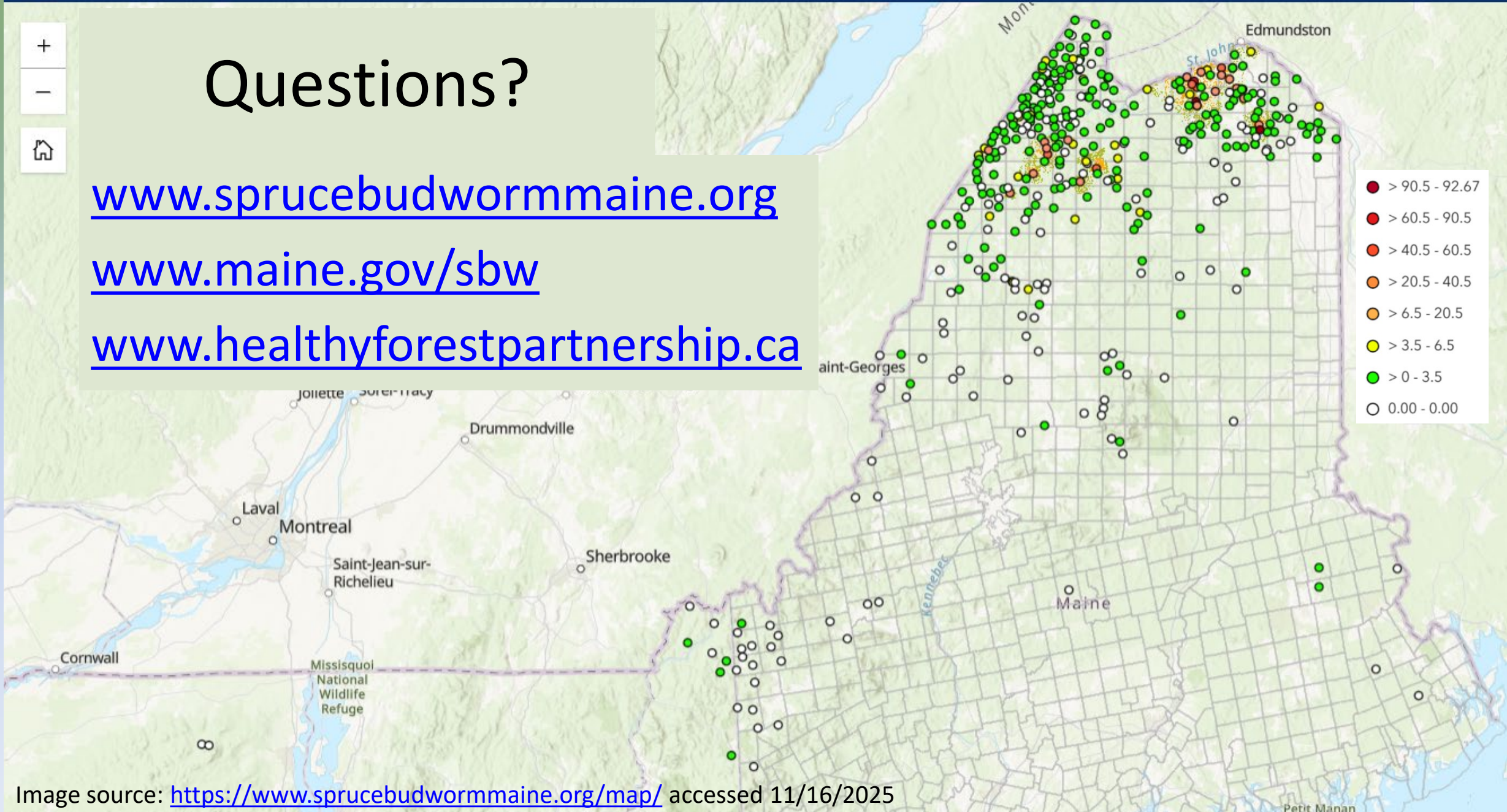


# Questions?

[www.sprucebudwormmaine.org](http://www.sprucebudwormmaine.org)

[www.maine.gov/sbw](http://www.maine.gov/sbw)

[www.healthyforestpartnership.ca](http://www.healthyforestpartnership.ca)



# “Asking if you can, asking if you should”

- “Why manage a native insect?” is a common & good question
  - “It’s just a timber concern” is a common follow-up
  - “Climate change and fragmentation are sufficient to prevent outbreak”
- Native species vs. historical conditions & disturbance regime
  - Species composition shifted from red spruce to balsam fir
  - Serious drought stress in the recent past + high density in many stands
- Without (successful) EIS, FPS, presalvage, and salvage follow
- Fire risk, carbon sequestration, aesthetics
- Set back the landscape that is recovering from 1970s & 80s

# Early Intervention vs. Foliage Protection

- Prevent spread of outbreak
- Spray before damage occurs
- Landscape-scale strategy
  - Manage population growth
- Fewer acres sprayed overall
- New Brunswick first, then Newfoundland, Nova Scotia\* and Maine since 2021
- Keep trees alive during outbreak
- Spray after damage observed
- Stand-scale strategy
  - Protect economic values
- Treating later = treating larger
- Quebec's current strategy
  - Maine in the 1970s & 80s
  - Paired with salvage/presalvage

**Both strategies currently use caterpillar-specific BtK bacterial/Tebufenozide synthetic molting hormone—broad-spectrum chemical insecticides are history.**