

# Assessment of Bat Roost Potential in New England Bridges

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New England  
Transportation Consortium

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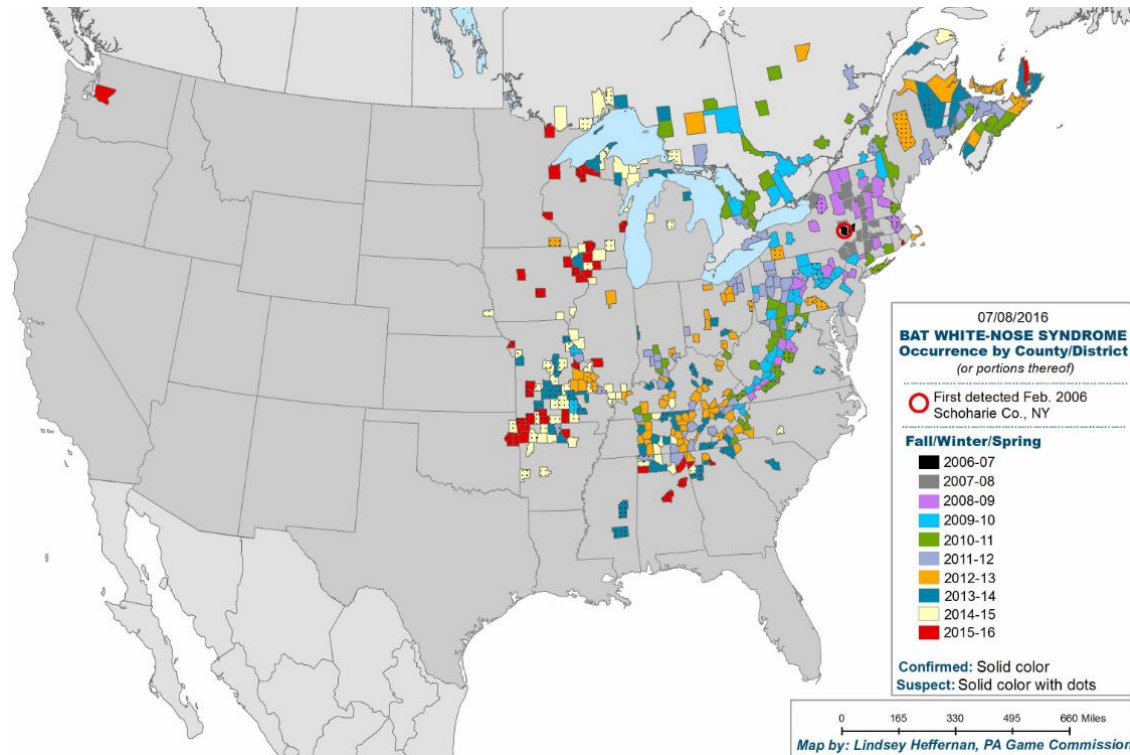
# New England Transportation Consortium Project 14-2

## ■ White-Nose Syndrome

- Fungal disease affecting winter hibernating bats
- Regional population declines by 90%+



Little Brown Bat with White-Nose Syndrome



Spread of White-Nose Syndrome since detected in NY in 2006

Photo and map: [whitenosesyndrome.org](http://whitenosesyndrome.org)

## New England Transportation Consortium Project 14-2

### NETC 14-2: "Investigation of Northern Long-Eared Bat Roosting Sites on Bridges" (2014) – Project motivation



Photo from [www.fws.gov](http://www.fws.gov)

- Northern Long-Eared Bat (*Myotis septentrionalis*)
- Other species considered
  - Little Brown Bat (*Myotis lucifugus*)
  - Tricolored Bat (*Perimyotis subflavus*)
  - Indiana Bat (*Myotis sodalis*)
  - Big Brown Bat (*Eptesicus fuscus*)
- Bats documented roosting in bridges
  - Limited knowledge base in New England

## New England Transportation Consortium Project 14-2

### ■ Tasks

- Literature search/knowledge summary
- Regional habitat requirements and bridge roosting
- Interviews at regional and national level
- Field instrumentation and observations
- Protocol survey of bridges

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## Active Bat Roosts in the Literature

- Expansion joints
- Crevices between wood components
- Narrow spaces in high bridge beams
- Areas within pipe collars
- Areas behind/above insulation boards
- Cracks and spalls in concrete
- Cave-like environments
- Inside box girders
- Masonry cracks
- Cracks in abutments
- Fillets in precast girders





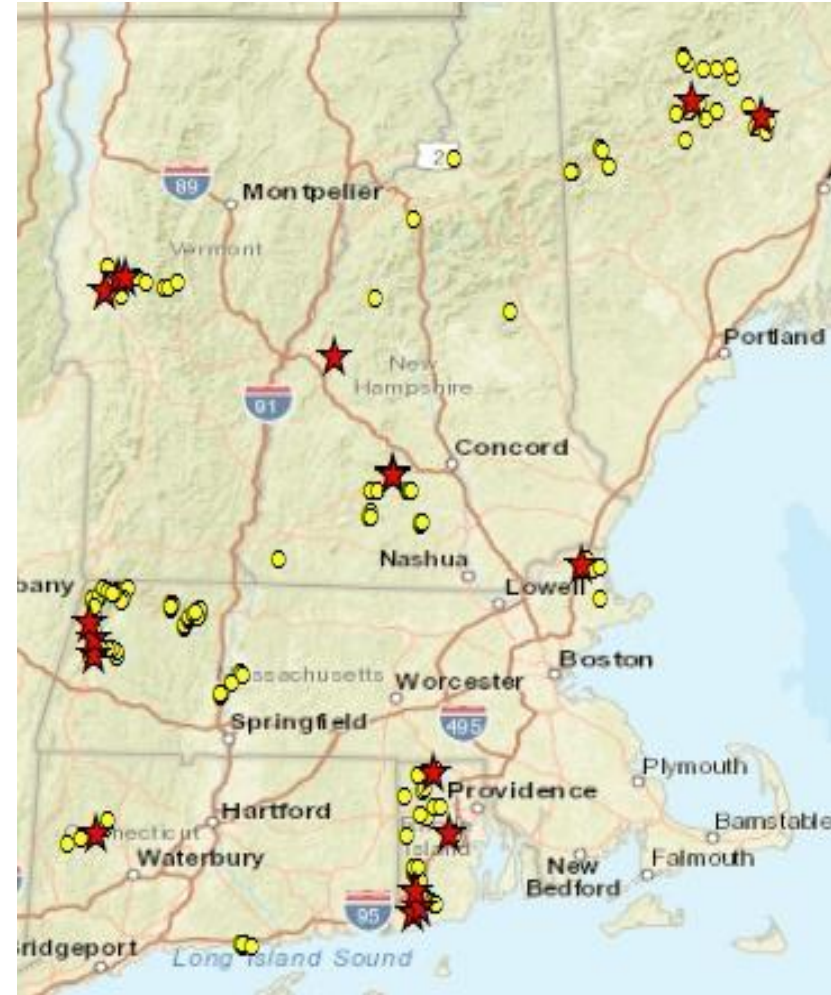
# Active Bat Roosts in the Literature

- Expansion joints
- Crevices between wood components
- Narrow spaces in high bridge beams
- Areas within pipe collars
- **Crevices 3/8" to 1-1/2" wide**
- Cracks and spalls in concrete
- Cave-like environments
- Inside box girders
- Masonry cracks
- Cracks in abutments
- Fillets in precast girders



# Field Instrumentation and Observation

- Visual inspections and acoustic monitoring
  - Rapid visual screenings of 191 New England bridges (yellow dot)
  - Monitored 3 regions in New England
  - Detailed inspections, emergence studies, and acoustic monitoring of 18 selected bridges (red star)
  - Monitored early, mid, late seasons



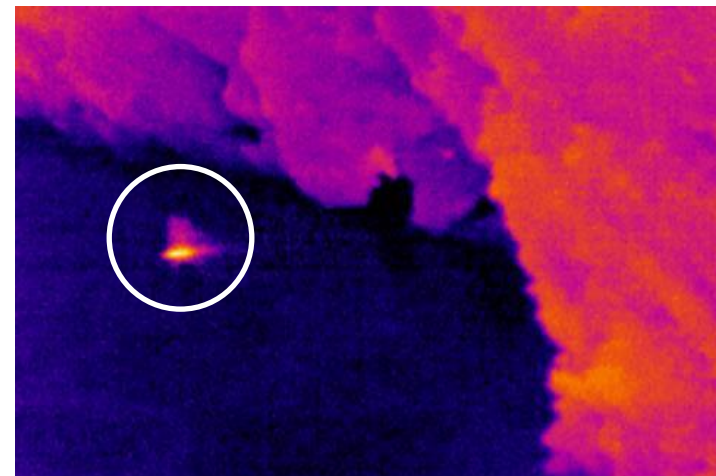
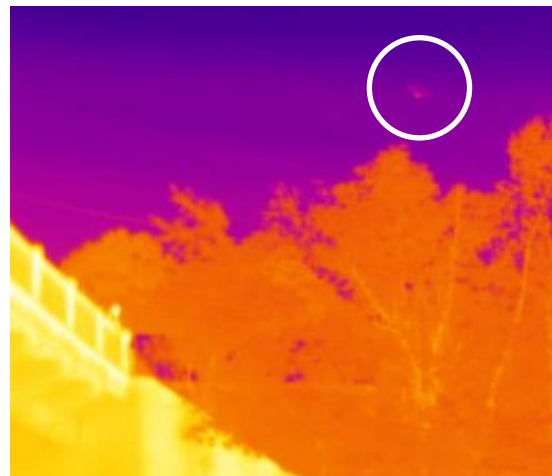
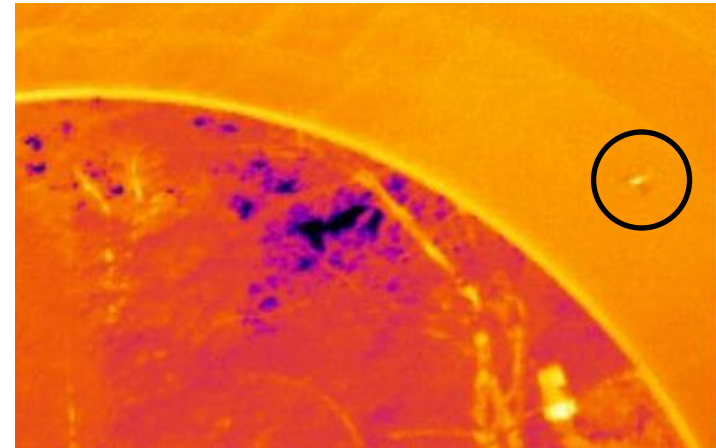
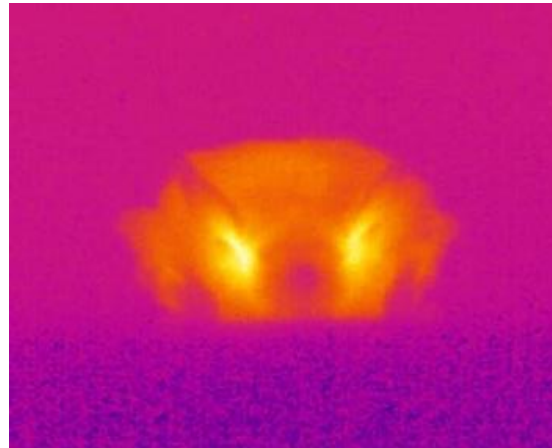
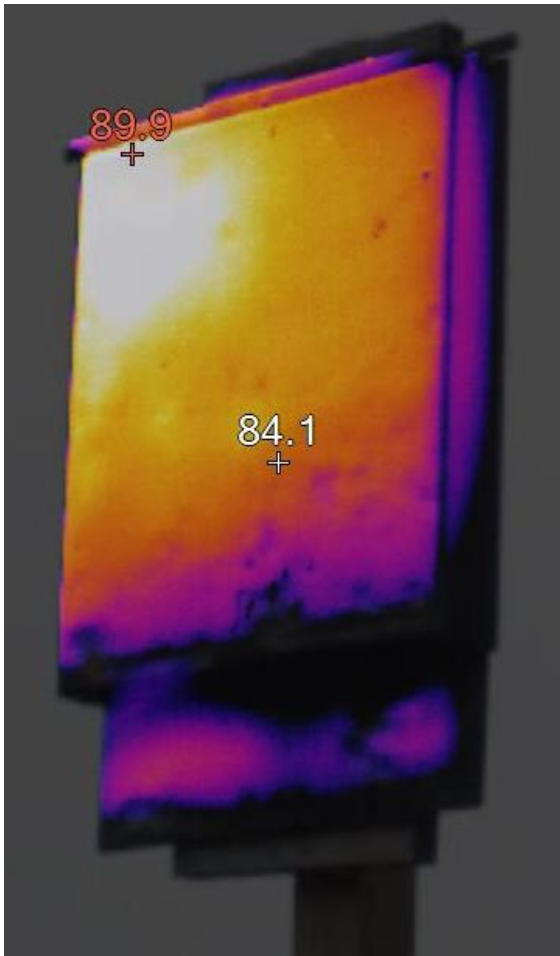


# Detailed Inspections

- More detailed inspections of 18 selected bridges
  - Inspecting all accessible locations
  - Ladder, waders, flashlight
  - Borescope use
  - Infrared thermal camera use

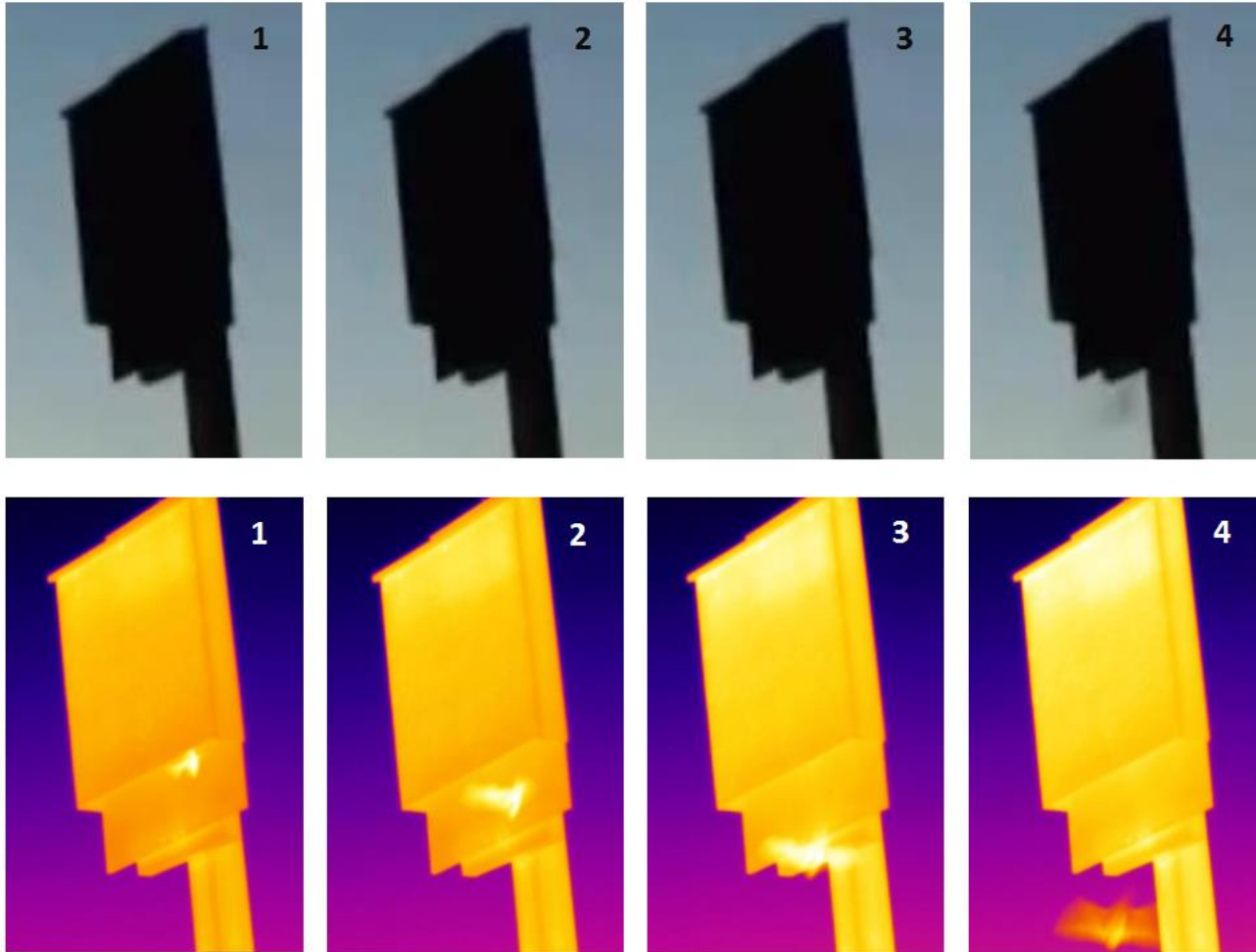


# Infrared Imaging





# Infrared Imaging—Emergence Studies



# Acoustic Monitoring

- Acoustic monitoring of 18 selected bridges summer 2015 through 2016
  - Pettersson D500X acoustic monitors
- Data analysis
  - Two automated acoustic bat identification software programs used
  - SonoBat and EchoClass



# Acoustic Monitoring—Analysis

Nightly Call  
Classifications

	EchoClass	SonoBat <i>Consensus</i>
<b><i>MYSE</i></b>	5	0
<b><i>MYSO</i></b>	69	60
<b><i>MYLU</i></b>	57	212
<b><i>PESU</i></b>	0	0
<b><i>EPFU</i></b>	12	11
<b><i>LANO</i></b>	4	1
<b><i>LABO</i></b>	871	1
<b><i>LACI</i></b>	12	7
<b><i>MYLE</i></b>	2	1



# Acoustic Monitoring—Analysis, Non-Agreement

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# Acoustic Monitoring—Analysis & Considerations

Nightly Call  
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<b><i>MYSE</i></b>	5	0	0	7
<b><i>MYSO</i></b>	69	60	126	149
<b><i>MYLU</i></b>	57	212	371	358
<b><i>PESU</i></b>	0	0	0	0
<b><i>EPFU</i></b>	12	11	11	12
<b><i>LANO</i></b>	4	1	1	1
<b><i>LABO</i></b>	871	1	6	13
<b><i>LACI</i></b>	12	7	7	8
<b><i>MYLE</i></b>	2	1	3	3

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# Acoustic Monitoring—Additional Information

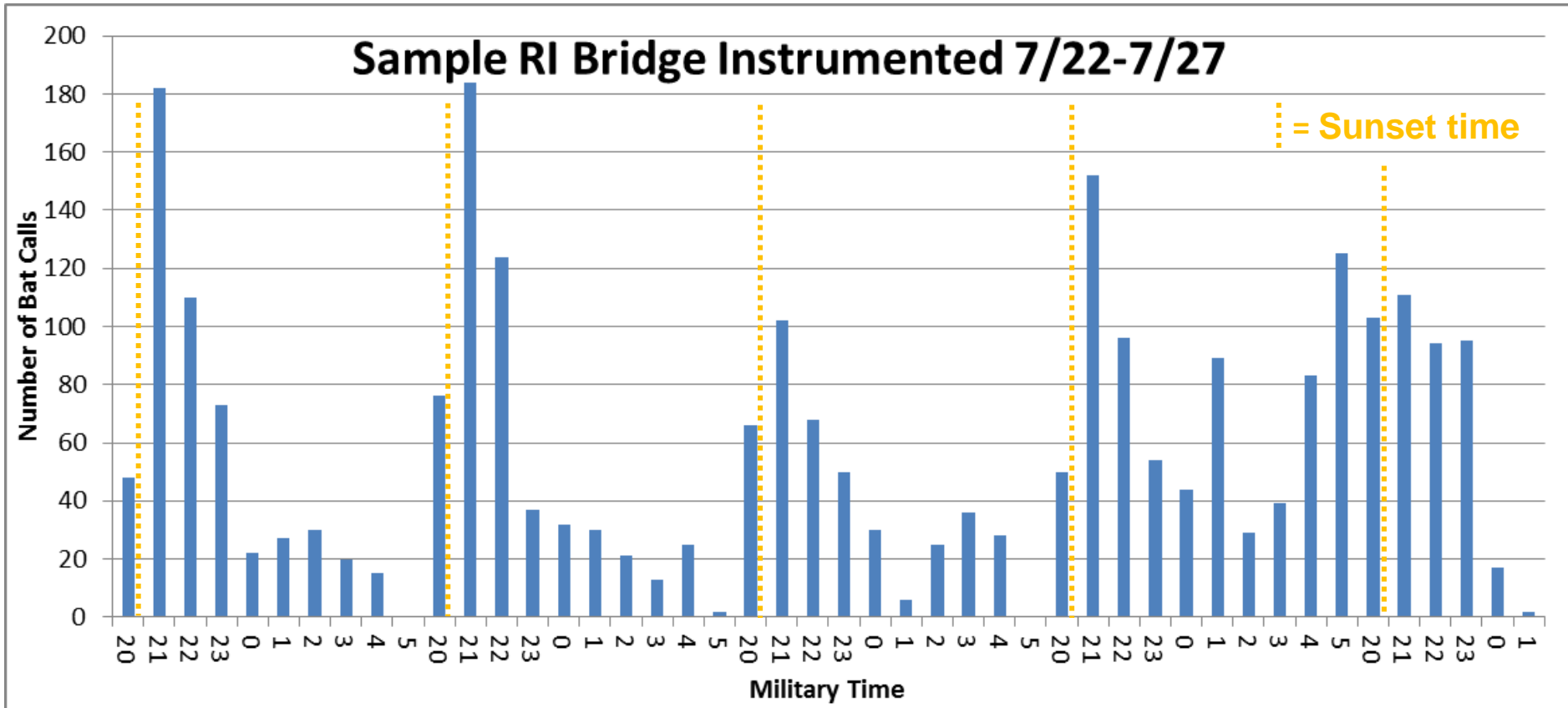


Figure showing bat calls recorded per hour

## Bridge Survey

- FHWA/FRA report: Range-Wide Biological Assessment for Transportation Projects for Indiana Bat and Northern Long-Eared Bat (2015)
  - “Any bridge/structure suspected of providing habitat for any species of bat will be removed from work schedules until such time that the DOT has obtained clearance from the US Fish and Wildlife Service, if required.”
  - Current 4(d) rule
  - Visual/Sound/Droppings/Staining
  - Subjective to those performing the survey
  - “Presence of one or more indicators is sufficient evidence that bats may be using the structure.”



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# Presence Indicator—Visual/Sound

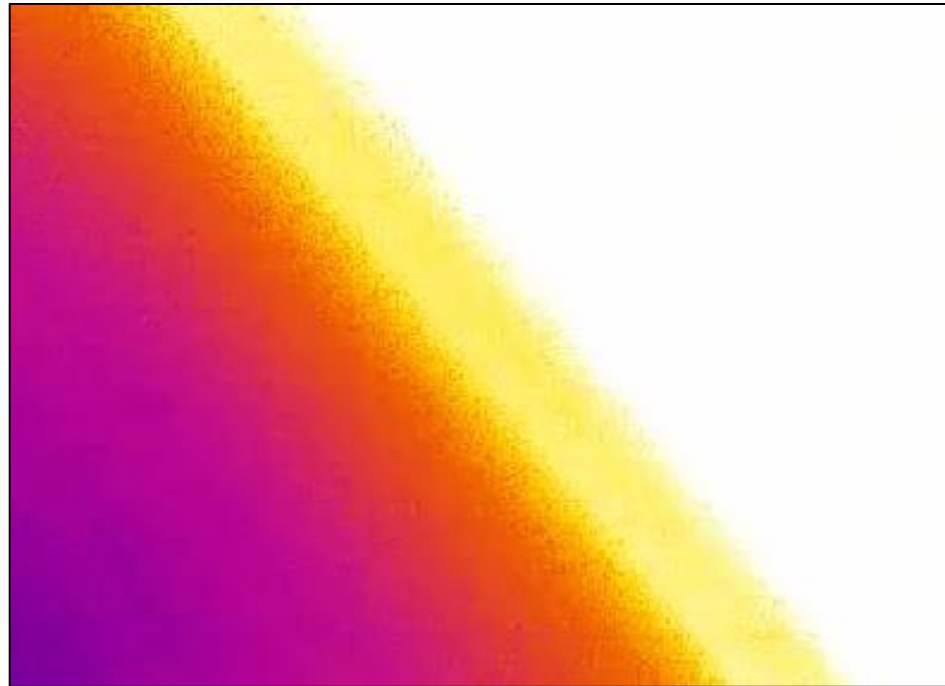
Maternity colony observed in VT bridge



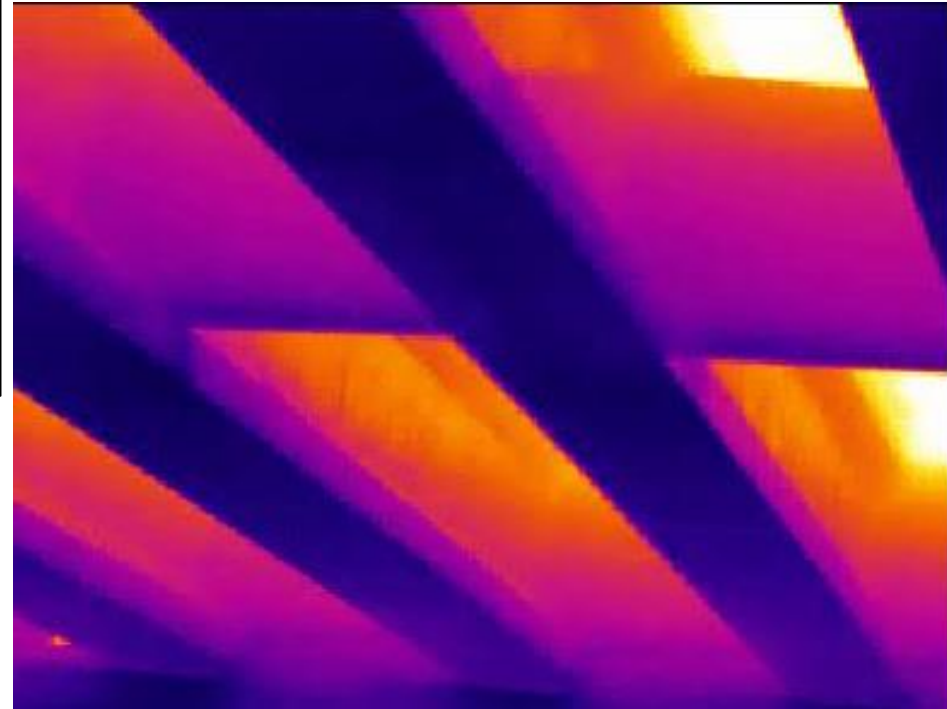
Dead *Myotis* bat found under bridge near abutment

Bat observed in open roost at RI bridge

## Presence Indicator—Visual/Sound



'Visual' Presence indicator  
captured through infrared  
imaging videos





# Presence Indicator—Guano



Photos on  
left Courtesy  
of Sarah  
Boyden  
(ME DOT)



# Presence Indicator Confusion—Guano & Staining



Photos courtesy of Jeff Gore, Florida Fish and Wildlife Conservation Commission



# Presence Indicator—Staining



Staining from unspecified causation

# Presence Indicator—Staining



Staining from  
unspecified causation



# Presence Indicator—Case Study



Photos Courtesy  
of Sarah Boyden  
(Maine DOT)

## Presence Indicator—Case Study



“Worker disturbed a large group of roosting bats – so many emerged from the crack that he took a break from his repair work to give them a chance to clear out of the roost.”

Photos Courtesy of  
Sarah Boyden (Maine DOT)



# Summary and Conclusions

- Methodology
  - Visual observation/inspection
  - Infrared camera/thermal analysis
  - Emergence studies
  - Acoustic monitoring

## Summary and Conclusions

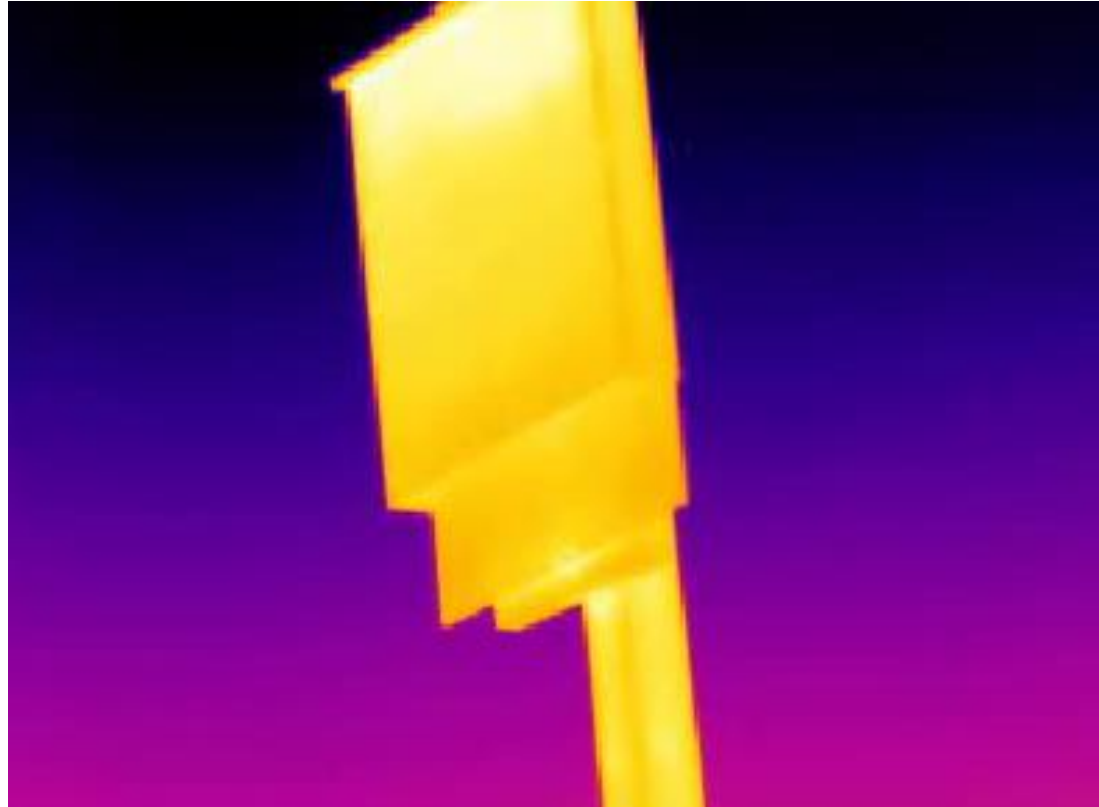
- Preliminary findings and recommendations
  - 11 bridge roosts in New England with roosting potential and roosts in vicinity of many bridges
  - Automated acoustic bat identification software programs discrepancies
  - Supplemental survey form to be completed as well to gain more information
  - Inspector training/cross disciplinary training



Thank you

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