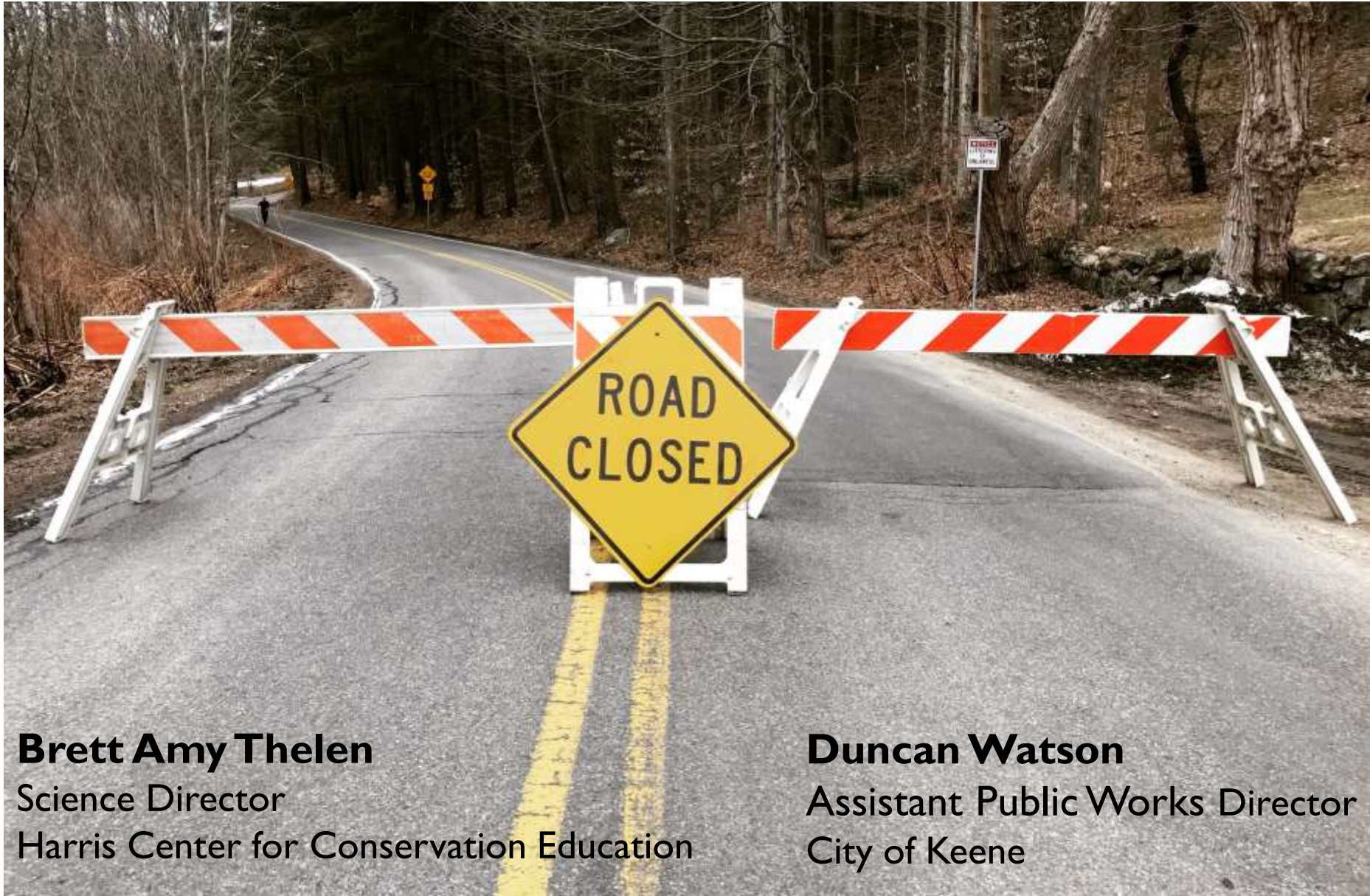


Amphibian Road Closures: Lessons Learned from a Pilot Season of “Big Night Detours” in Keene, NH



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the *spring* amphibian migration


What spurs an amphibian migration?

(1) thawed ground (minimal snow cover)

(2) warm ($> 40^{\circ}$) nighttime temperatures

(3) rain



A close-up photograph of a spotted salamander (Ambystoma maculatum) resting on a person's hand. The salamander has a black body with numerous bright yellow spots. It is positioned diagonally across the frame, with its head towards the bottom right and its tail towards the top left. The person's hand is visible, with fingers slightly curled around the salamander. The background is dark and textured, possibly asphalt or gravel.

spotted salamander
(*Ambystoma maculatum*)

photo: Morrison Family



wood frog
(*Lithobates sylvatica*)

photo: Noah Charney



photo: Dave Huth



spring peeper
(*Pseudacris crucifer*)



Jefferson/blue-spotted complex
(*Ambystoma jeffersonianum-laterale*)

Species of Greatest Conservation Need

photo: Jacob Drucker

gray tree frog
(*Hyla versicolor*)



photo: Dave Huth

American toad
(*Bufo americanus*)



photo: Dave Huth

green frog
(*Lithobates clamitans*)



photo: John White

pickerel frog
(*Lithobates palustris*)



photo: Russ Cobb



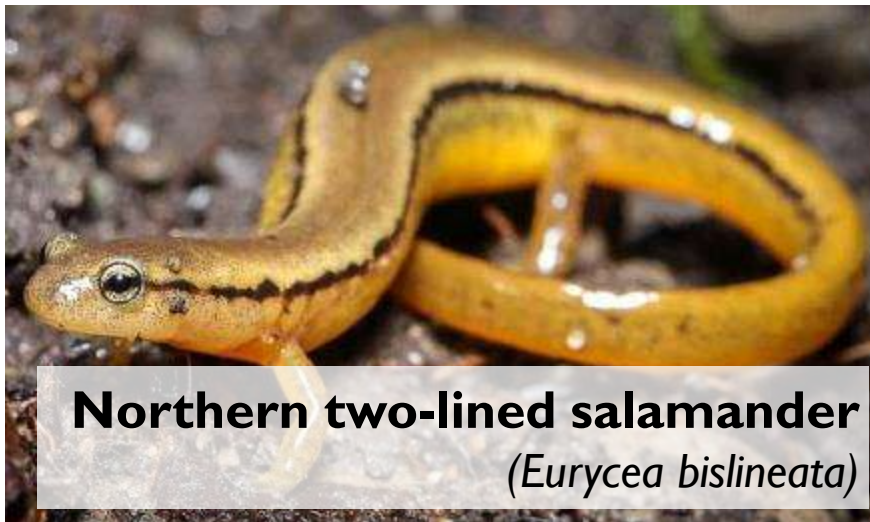
red eft (newt)
(*Notophthalmus viridescens*)

photo: Stone Horse Studios



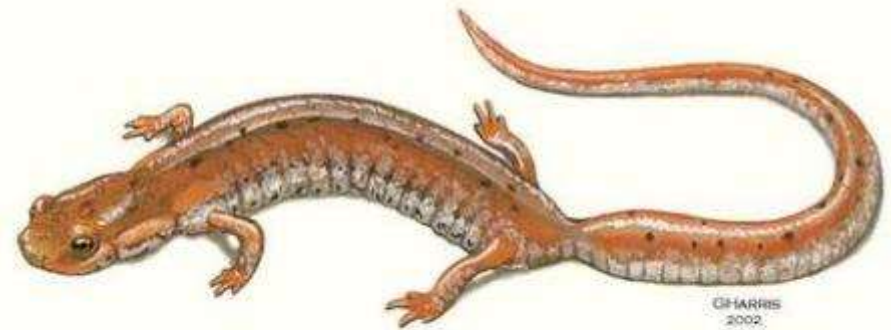
redback salamander
(*Plethodon cinereus*)

photo: Ignoffo



Northern two-lined salamander
(*Eurycea bislineata*)

photo: Dave Huth



four-toed salamander
(*Hemidactylium scutatum*)

So what?



MA: biomass of vernal pool-breeding amphibians greater than *all* breeding birds & small mammals in the 53-acre forest surrounding a single vernal pool (Windmiller 1996).

photo: Dave Huth

So what?



important prey

photo: bark

So what?



important
predators

photos: Dave Huth

So what?



AMPHIBIAN ROAD MORTALITY

Canada: 2 miles, 4 years, 30,000 dead amphibians

UK: 20-40% of breeding population die each year on roads

Australia: 5.5 million reptiles & amphibians roadkilled annually

NY: 50-100% mortality of salamanders attempting to cross a paved, rural road

MA: local extirpation of spotted salamanders due to road mortality within 25 years

Salamander Crossing Brigades



photo: Vernal Pool Association

by the numbers

1000+ volunteers
trained since 2006



by the numbers



**42,750+ amphibians
crossed since 2006**



photos: Bruce Boyer, Amy Unger, Julie Brown

Many families report that experiencing the amphibian migration is a ***transformative educational experience.***

by the numbers



KEENE

2006-2017

3 crossing sites

12,211 *live amphibians*

3,344 *dead amphibians*

incl. 176 *Jefferson complex salamanders*

by the numbers



photo: Jess Baum

These figures are ***underrepresentations*** of what's actually happening on the roads on migration nights.

variable volunteer effort

early evening only

dead often left uncounted

by the numbers



NO. LINCOLN STREET

2006-2017

9,242 *live* amphibians

1,632 *dead* amphibians

NORTH LINCOLN STREET



NORTH LINCOLN STREET



drone photo: Bobby Williams

on a typical “Big Night” at North Lincoln Street



photos: Brett Amy Thelen

25 volunteers will move nearly **1,000** amphibians across a stretch of road that is only **0.1** mile long, in just **4** hours.
Many ***families*** come to this site.

developing a road closure plan: *partners*



**Department of Public Works, including
Highway Superintendent & City Engineer**

in consultation with

Police Department

Parks Department

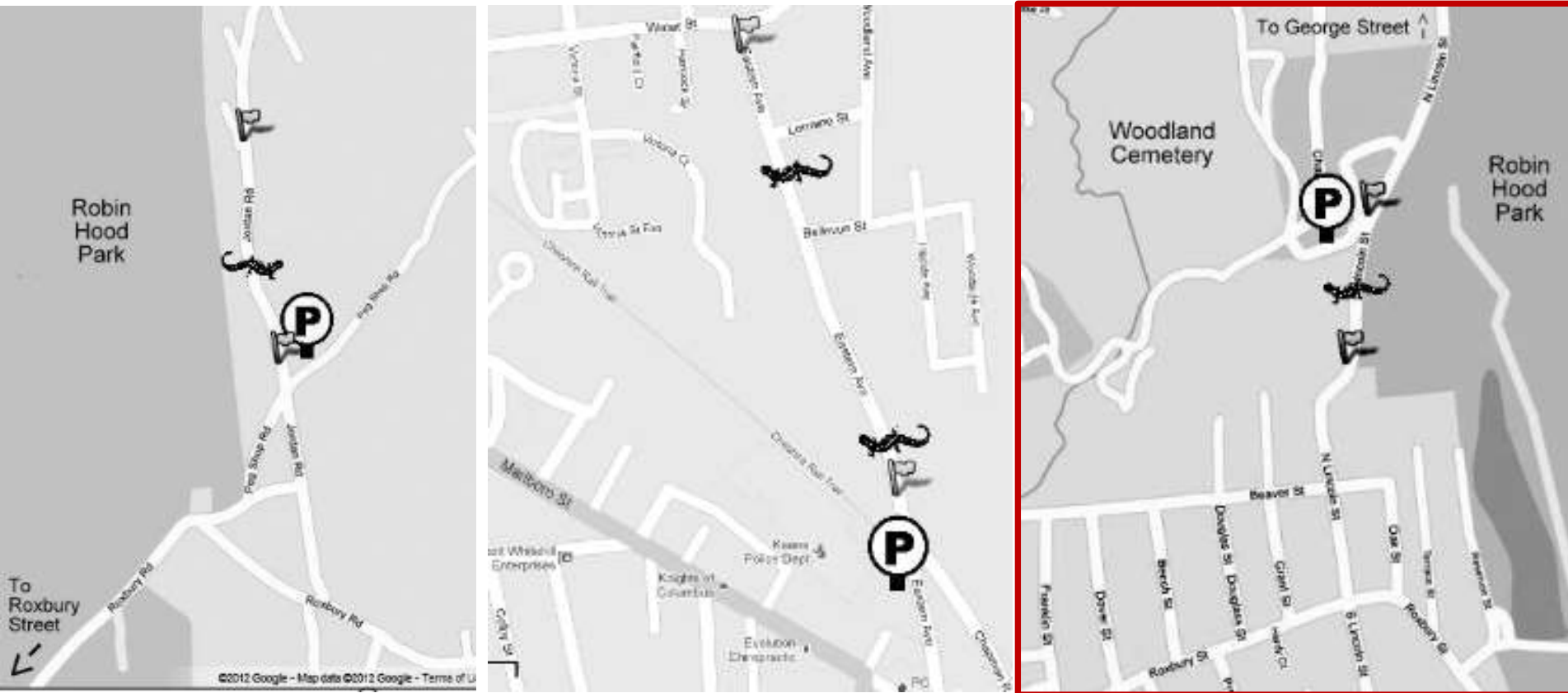
approval required by

City Council

vocal support from

**community
members**

developing a road closure plan: *site selection*



North Lincoln Street: simplest detour, no homes impacted, largest number of amphibians.

developing a road closure plan: *implementation*



variable message boards + A-frame barricades

A close-up photograph of a young child with blonde hair, wearing a bright yellow raincoat. The child is holding a flashlight in their right hand, which is illuminating a small, dark-colored frog with yellow spots. The child's face is lit by the flashlight's beam, and they have a focused expression. The background is dark, suggesting a nighttime outdoor setting.

message to City Council

photo: Brett Amy Thelen

Temporary road closures would (1) **protect amphibians** in the Robin Hood Park ecosystem, (2) create a **safe place for families*** to observe the migration, (3) at **minimal cost** to the City.

the road closure plan for **North Lincoln Street**

1. DETOUR

2. TIMING

3. FREQUENCY

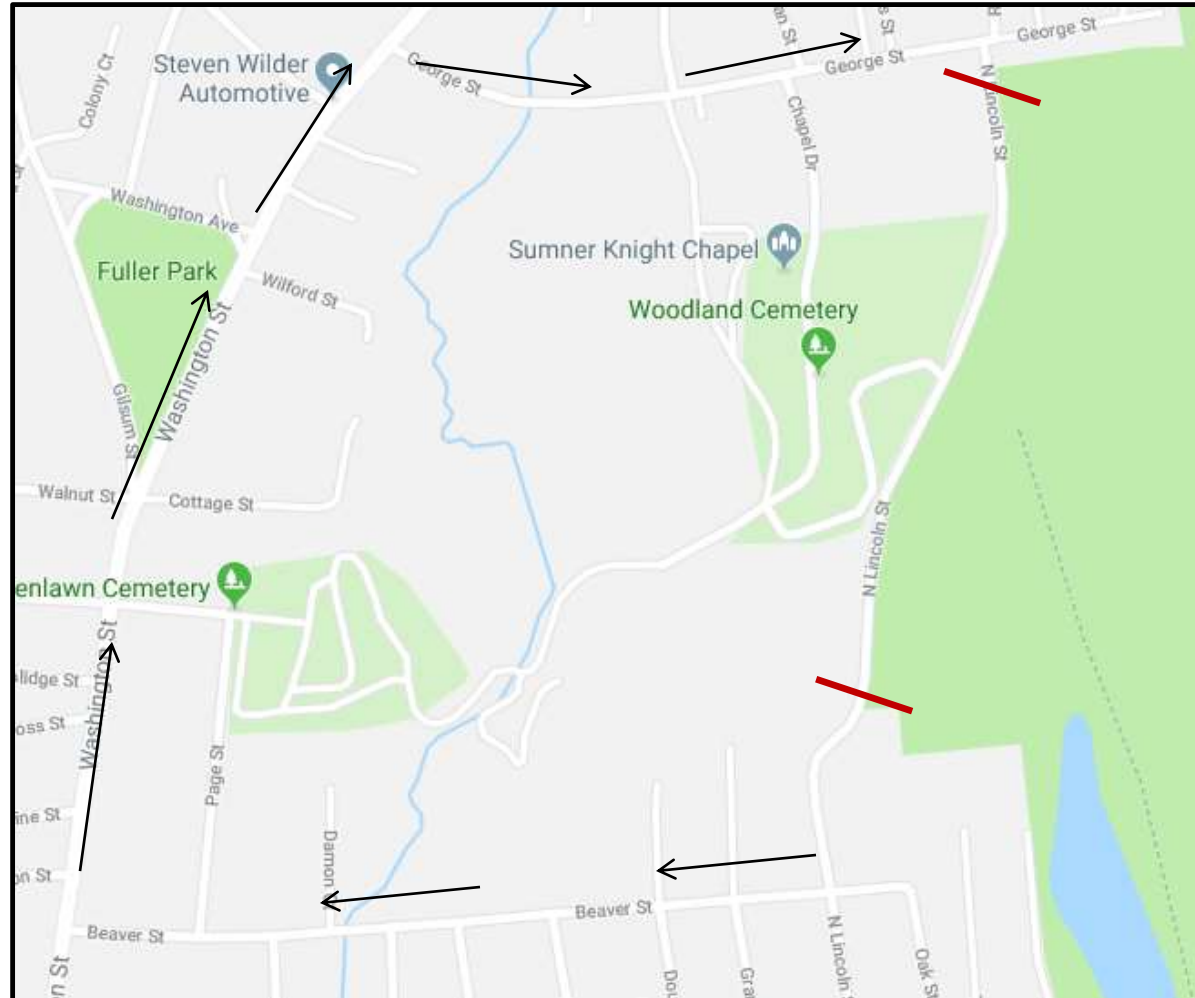


the road closure plan for **North Lincoln Street**

1. DETOUR

2. TIMING

3. FREQUENCY



the road closure plan for North Lincoln Street

1. DETOUR

2. TIMING

3. FREQUENCY

Wednesday MARCH 16	Thursday MARCH 17	Friday MARCH 18	Saturday MARCH 19	Sunday MARCH 19
				
<p> High Probability: get out your rain gear and reflective vest!</p> <p> Maybe So, Maybe Not: watch the weather; it's a nail-biter.</p> <p> Very Unlikely: too cold, too dry, or too snowy...there'll be no migration tonight!</p>				

- Decision by noon.
- Road closed ***before shift ends at 3 p.m.***
- Road re-opened at 7 a.m. the next morning.

the road closure plan for **North Lincoln Street**

1. DETOUR

2. TIMING

3. FREQUENCY



- 3 to 6 nights
- mid-March through late April

road closure outcomes: *frequency of closures*



total road closure nights: **4**
closure nights *with no migration*: **1**
open nights *with a migration*: **2**

road closure outcomes: *amphibian counts*

Species	3/29/18	4/12/18	4/25/18	4/27/18	5/6/18	Total
Wood Frog	420	443	67	10	24	964
Spring Peeper	349	300	209	79 (8)	17 (6)	954 (14)
Spotted Salamander	3	16	15	5	21	60
Red-backed Salamander	1	0	7	4 (1)	3	15 (1)
Eastern Newt	0	0	4	6 (2)	1 (6)	11 (8)
American Toad	0	0	10	2	1	13
Gray Tree Frog	0	0	0	0	8	8
Green Frog	0	0	1	0	0	1
Bullfrog	0	0	1	0	0	1
Total	773	759	314	106 (11)	75 (12)	2027 (23)

The most important thing about these numbers is that they are an underrepresentation – perhaps significantly so.

live (roadkilled)
 red = road open to vehicle traffic
 numbers represent crossings, not individual amphibians

road closure outcomes: *public engagement*



traditional media

local newspapers
statewide newspapers
NHPR

social media

City's most-shared posts
reached 78,000 people

in-person

20-50 visitors/night

road closure outcomes: ***public engagement***



photo: Julie Brown

recommendations: **planning**



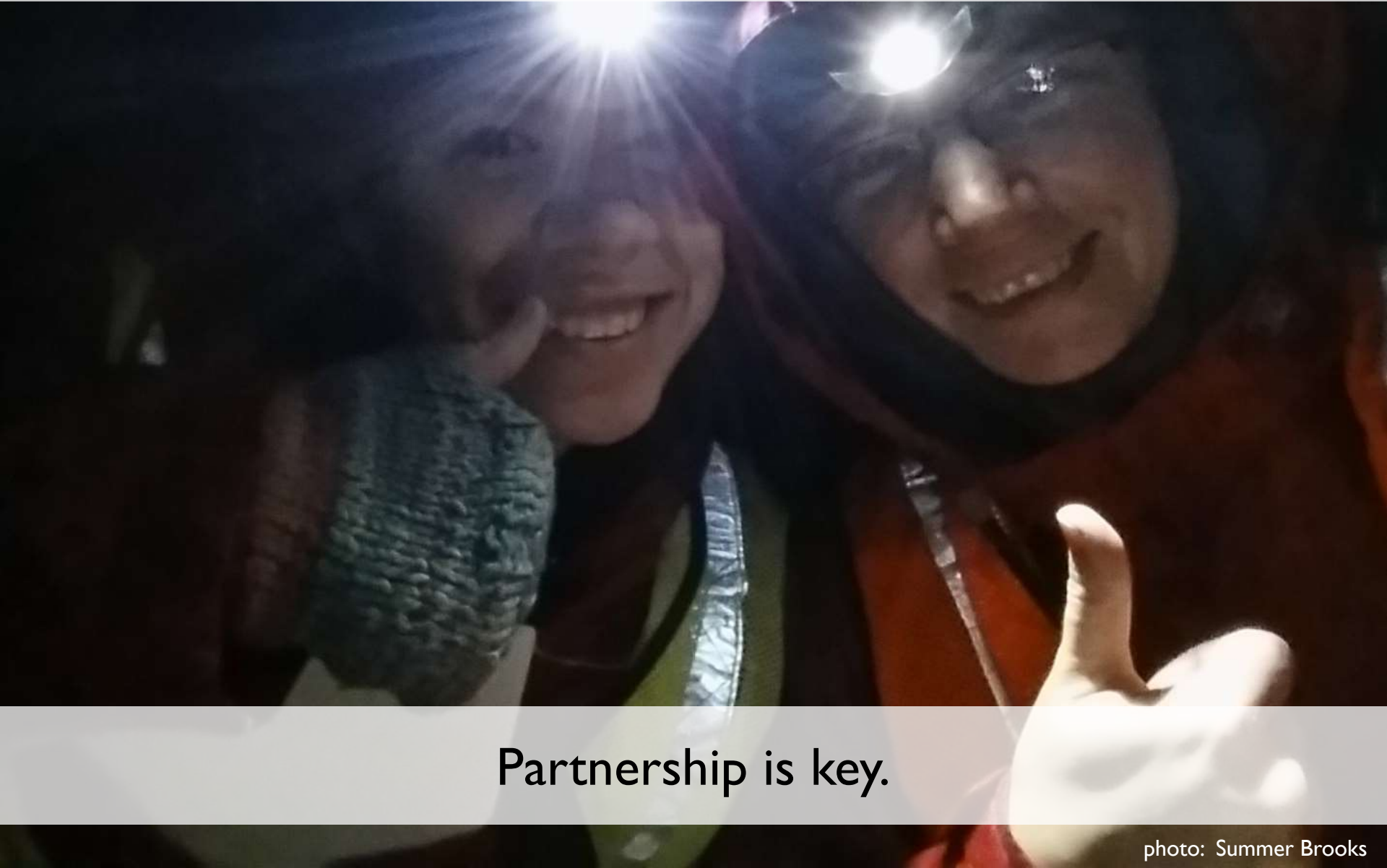
Start small.

recommendations: **planning**



Start early.

recommendations: **planning**



Partnership is key.

photo: Summer Brooks

recommendations: **communications**



Stay in close contact before & after each migration night.

recommendations: **communications**



1. The migration happens *after dark* and *only if it's wet out*.

2. If you plan to come out to the crossing, *bring a flashlight* and *dress for the weather*.

3. If you plan to visit when the road is not closed to vehicles, *wear a reflective vest* and *be vigilant about traffic*.

photo: Cheryl Martin

Develop a communications plan for the general public.

*recommendations: **education***



Have an onsite naturalist, especially when the road is closed.

*recommendations: **communications***



Be generous with your praise.

thank you letters

media

photos of cute kids

photo: Amy Unger

Questions?



photo: Anna Miller

Brett Amy Thelen

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