

Bat Activity in Riverine Stands of Native Plains Cottonwood and Naturalized Russian Olive in Southeastern Montana

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The Problem

Russian Olive is invading eastern Montana riverine systems, replacing native Plains Cottonwoods.

Does this matter to bats?



Naturalized Russian Olive



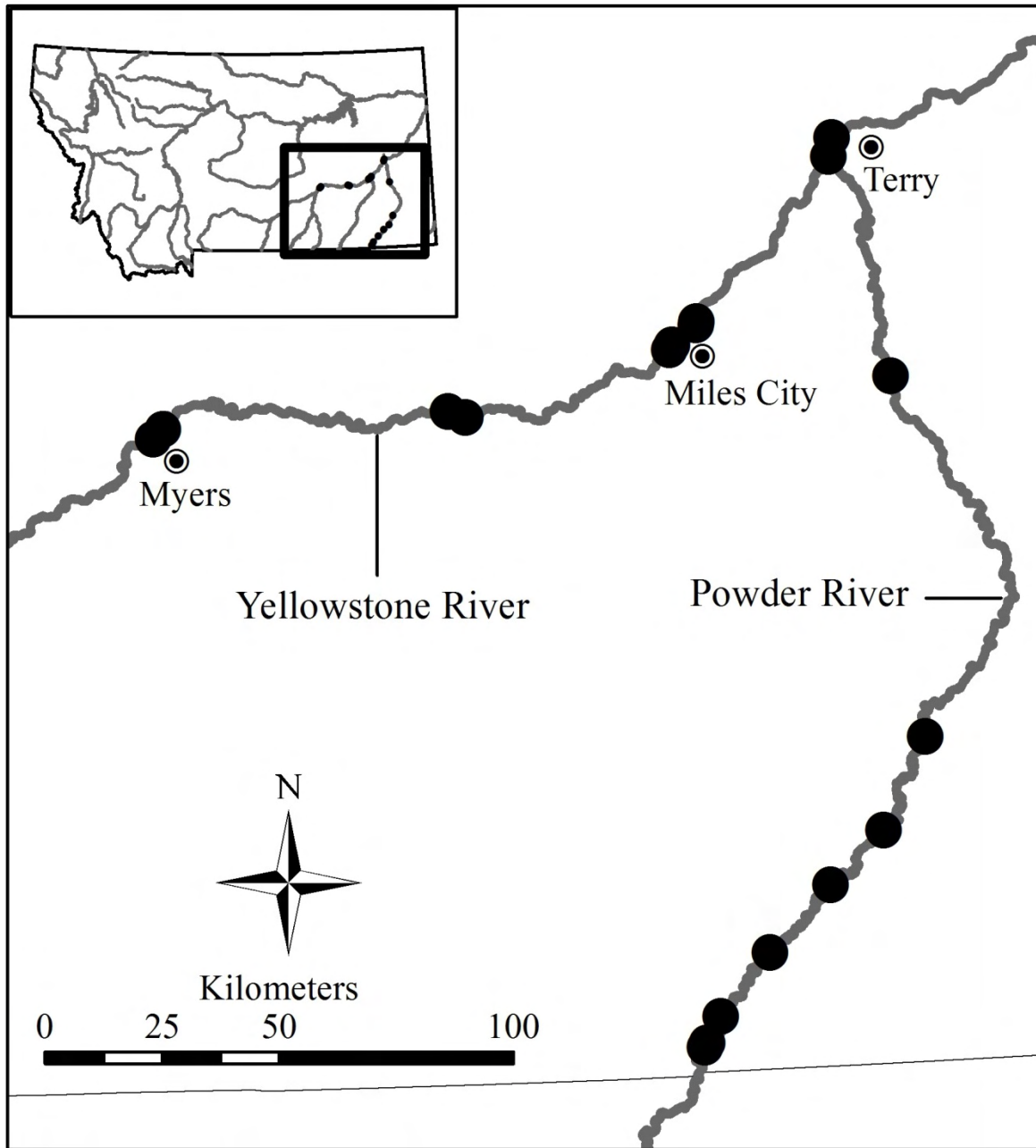
- Small tree, to 14 m tall
- Forms dense canopy
- Branches thorny
- Wood very hard
- Thin stringy bark

Native Plains Cottonwood



- Large tree, often 25-30 m tall
- Forms open canopy
- Branches not thorny
- Wood relatively soft
- Thick loose bark





Cottonwood Stand: 11-15
Isaac Homestead near Hysham



Cottonwood Stand: 11-9
Calypso Fishing Access near Terry



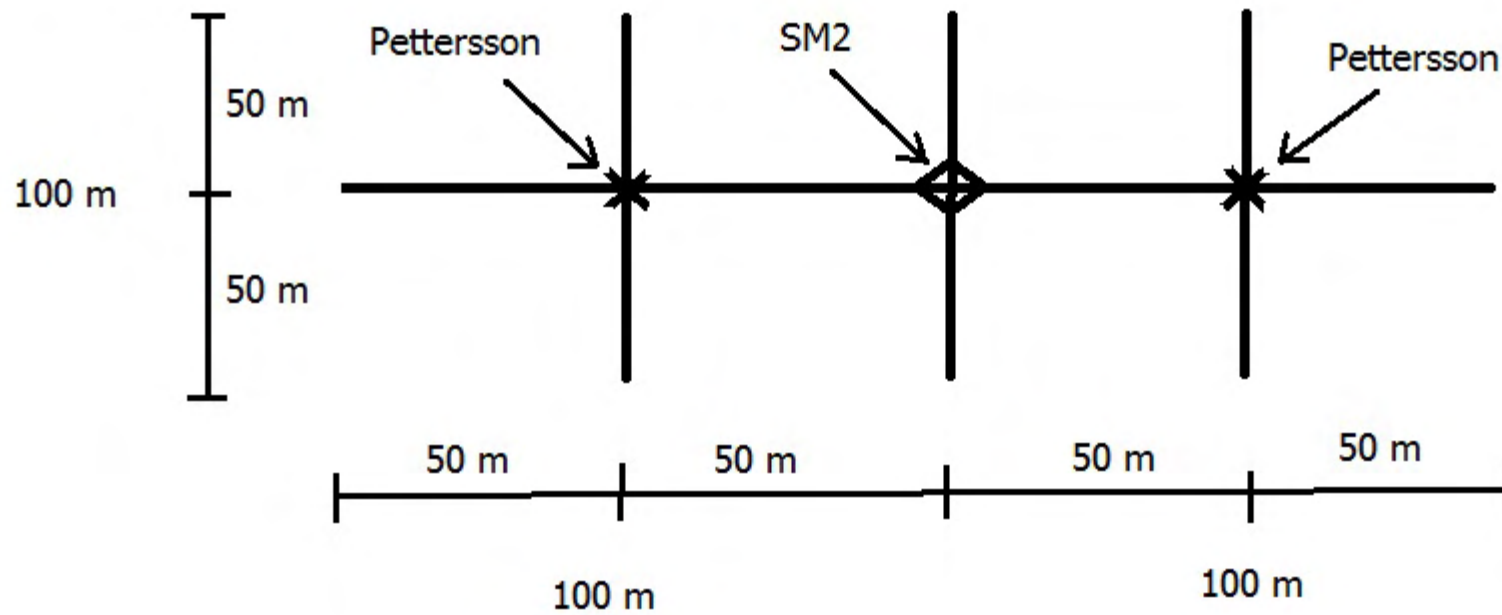
Russian Olive Stand: 11-17
Far West Fishing Access near Rosebud



Russian Olive Stand: 11-3
Near Broadus



Site Sampling Design



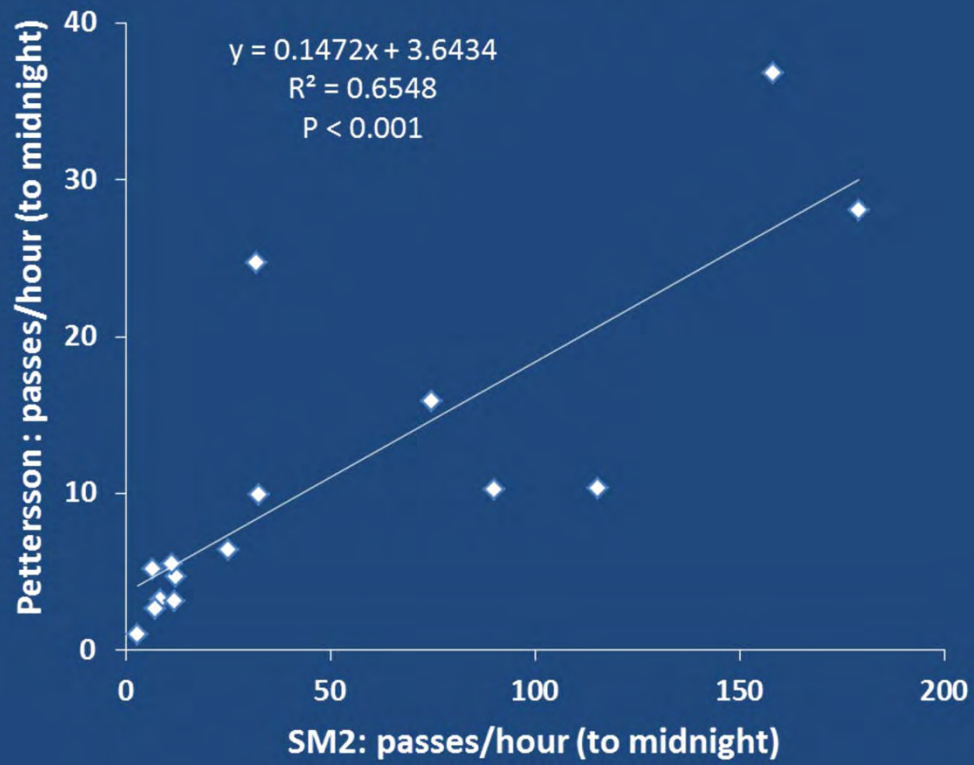
Pettersson D240X in Russian Olive Stand





SM2 in Russian Olive Stand

Detector Type Correspondence



Bat Activity and Canopy Type

PETTERSSON RESULTS (Rank Sums Test)

Until Midnight

Pode: 14.2 ± 11.1 passes/hour

Elan: 4.8 ± 3.0 passes/hour

P = 0.026

All night

Not available (Storage capacity filled)

SM2 RESULTS (Rank Sums Test)

Until Midnight

Pode: 70.6 ± 63.4 passes/hour

Elan: 12.9 ± 12.3 passes/hour

P = 0.014

All night

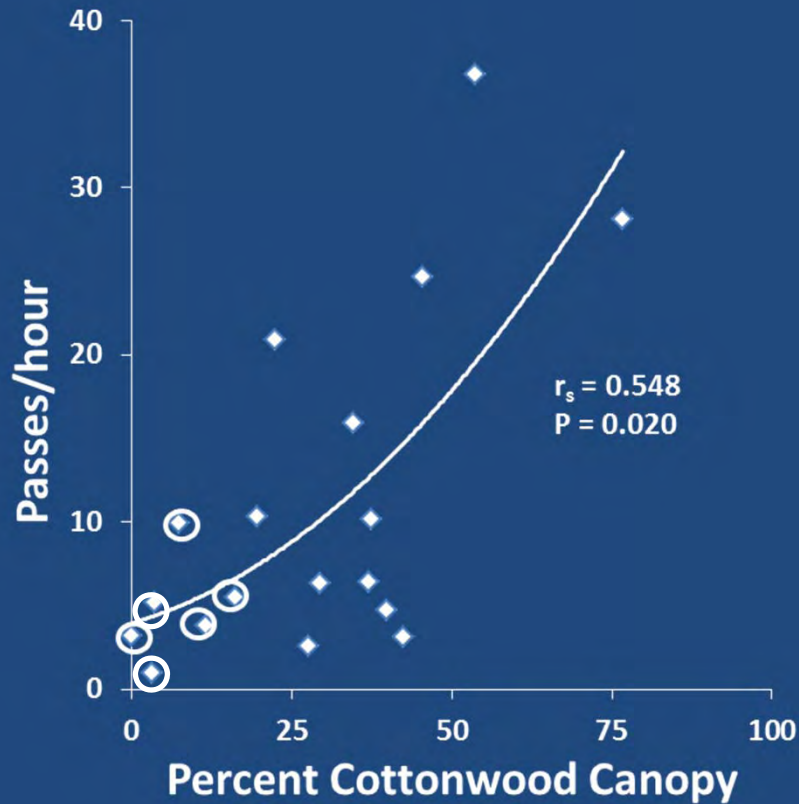
Pode: 63.1 ± 55.8 passes/hour

Elan: 11.0 ± 9.5 passes/hour

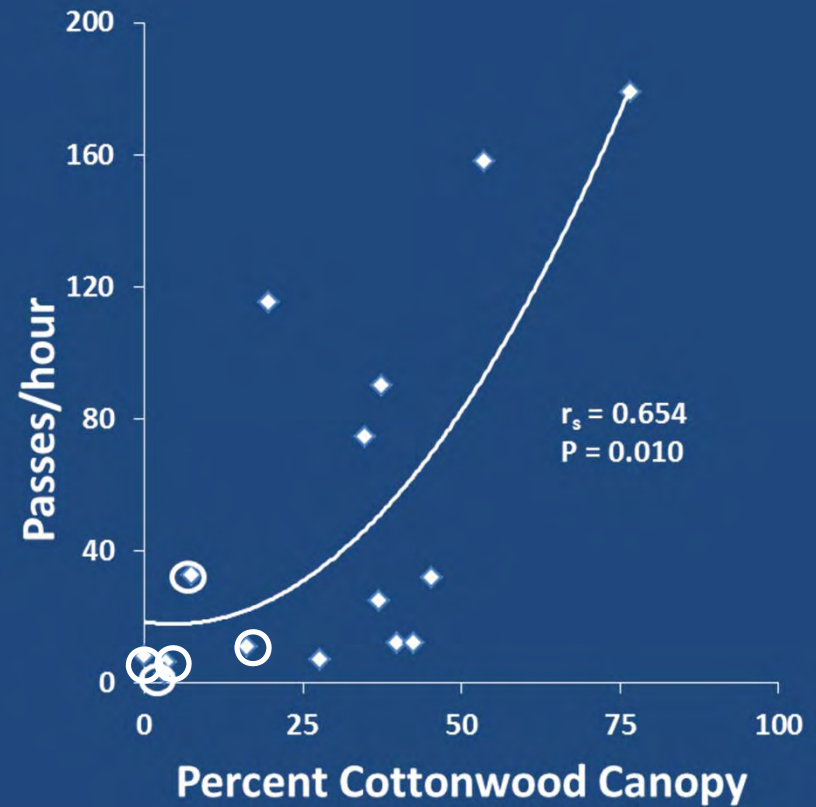
P = 0.007

Bat Activity and Cottonwood Canopy Cover

Petterson (18 stands)



SM2 (15 stands)



Bat Species Diversity (Definitive Calls)

SM2: 6.0 ± 1.5 species/site
Petterson: 3.6 ± 1.6 species/site
(Paired t-test, $P < 0.001$)

SM2: PODE = 5.6 ± 2.1 /site
Elan = 4.4 ± 1.5 /site
(Two sample t-test, $P = 0.210$)

Ten Bat Species Detected (SM2)
(15 sites)

Big Brown Bat (12)

Western Small-footed Myotis (11)

Western Long-eared Myotis (12)

Little Brown Myotis (11)



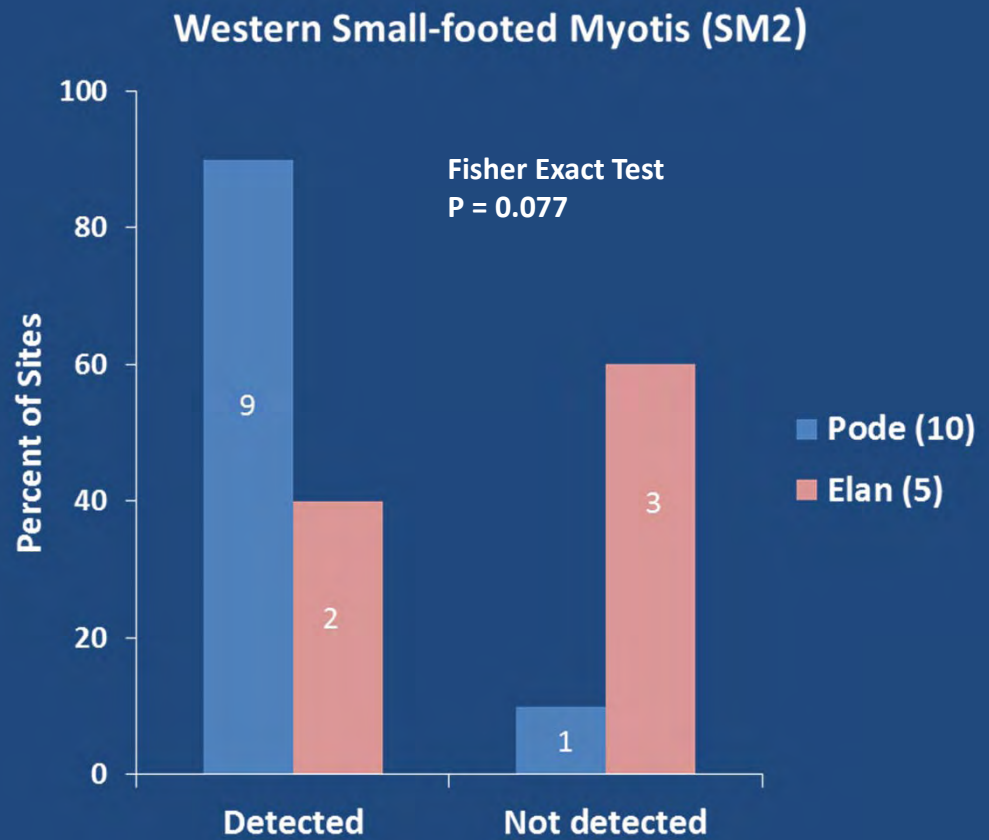
Western Long-eared Myotis

One bat species detected at all (n = 15) sites sampled with SM2 (Jul to Sep)

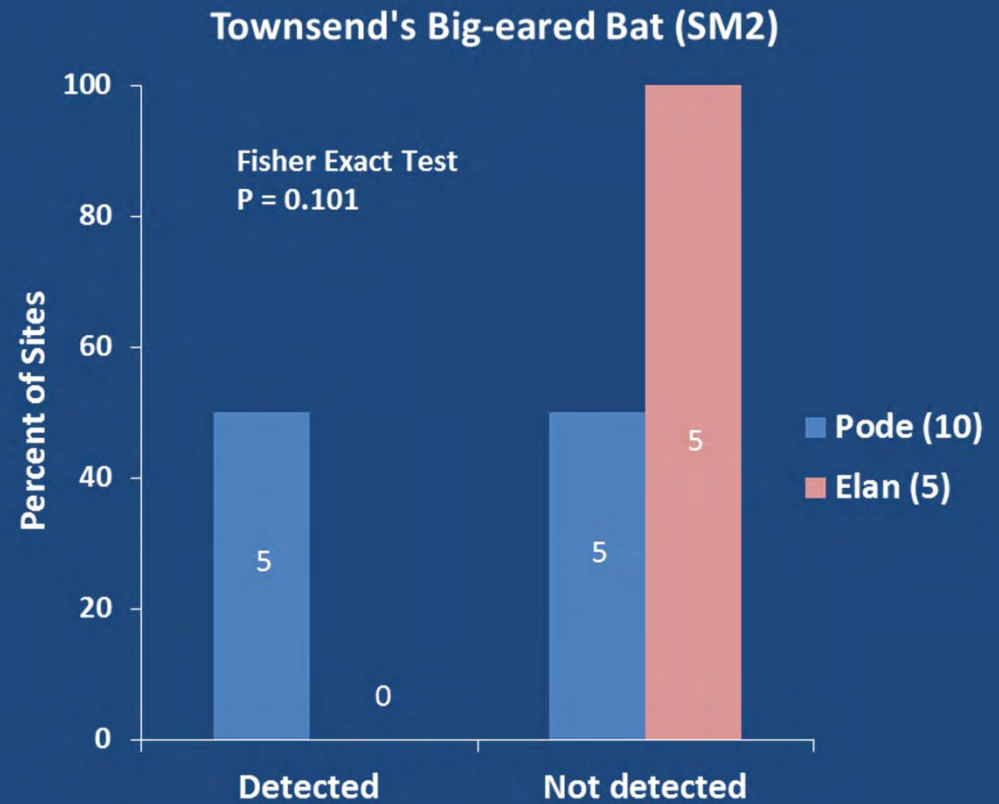


Silver-haired Bat

Western Small-footed Myotis (SM2)



Townsend's Big-eared Bat (SM2)



Stand Attributes

Presence of cavities

All cottonwood, 1 of 6 Russian Olive: $P < 0.001$ (Fisher Exact Test)

Presence of loose bark

All cottonwood, 4 of 6 Russian Olive: $P = 0.098$ (Fisher Exact Test)

Presence of snags/dead limbs

All cottonwood, 4 of 6 Russian Olive: $P = 0.098$ (Fisher Exact Test)

Mean canopy height (m)

Cottonwood: 20.0 ± 3.9 , Russian Olive: 8.3 ± 1.4 : $P < 0.001$
(Wilcoxon Rank Sums Test)

Primary Cavity-nesting Birds Detected in Riparian Sites



Northern Flicker



Downy Woodpecker



Hairy Woodpecker



Red-headed Woodpecker



White-breasted Nuthatch

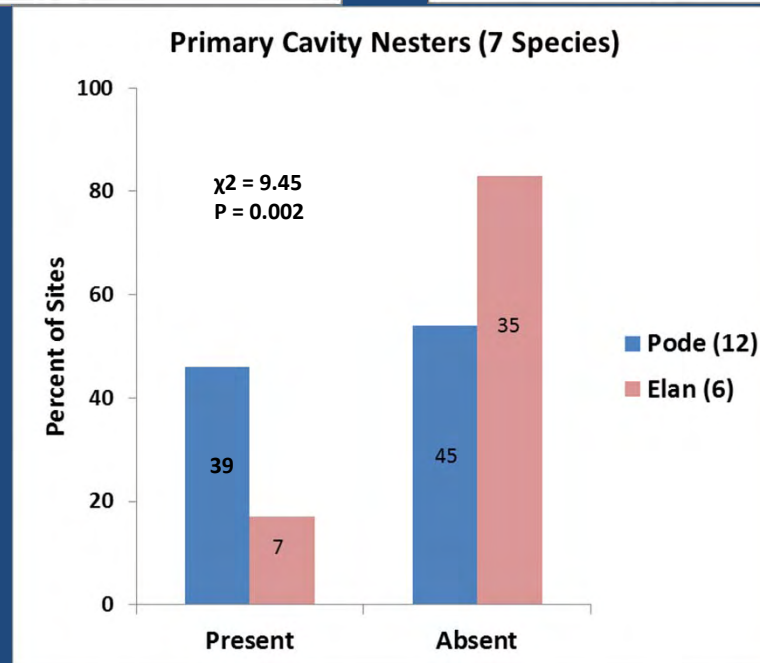
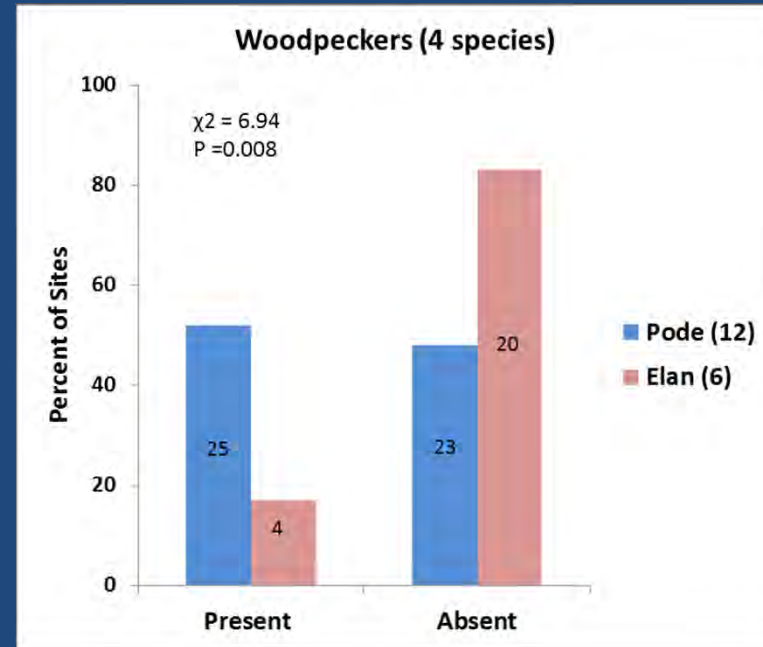
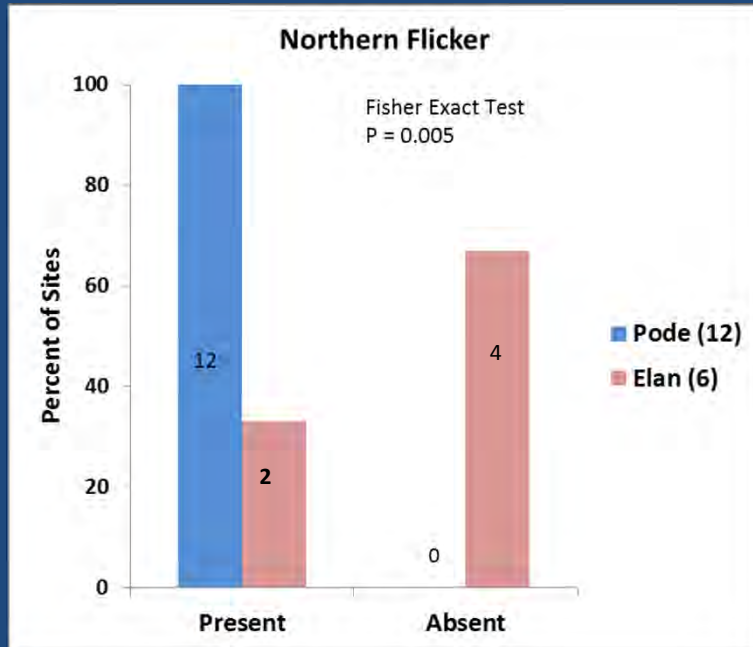


Black-capped Chickadee



Red-breasted Nuthatch

Primary Cavity-nesting Birds and Stand Type





SUMMARY

More Bat Activity in Cottonwood Stands

INTERPRETATION

Cottonwoods:

- 1) Provide a more open understory for bat foraging**
- 2) Provide more roosting habitat for bats
(in the canopy, behind loose bark, in cavities)**
- 3) Attract more cavity-making birds
(woodpeckers, nuthatches, chickadees)**
- 4) Support more insects of the types bats favor as food**

Thank You

Environmental Protection Agency, Region 8
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