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AVIAN BEHAVIOR ON PV SOLAR FACILITIES:

CLEAR EVIDENCE OF FORAGING, NESTING, AND PREDATION; LITTLE EVIDENCE OF DAYTIME COLLISION RISK

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Multi-regional

AI monitoring

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Find Evidence for Benefits and Adverse Effects of PV Facilities in Bird Ecology

Eighteen (18) behaviors across 11 sites in 9 states across 7 regions

Bird Behaviors

Fly high far
Fly close
Perch on panel
Perch on infrastructure
Perch on vegetation
Perch offsite
Land on ground
Walk/run
Forage
Mate
Breed
Nest
Preen
Allopreen
Vigilant
Aggressive
Collision avoidance
Collision

Study Regions

PS - Pacific Southwest (CA, AZ)

MP - Mountain-Prairie (WY)

MW - Midwest (MI, IL)

SW - Southwest (TX)

NE- Northeast (MA)

MA - Mid-Atlantic (VA)

SE - Southeast (GA)

Collect 300+ Observations for Each Site-Season

Using daytime videos, AI, and ethograms

Collect Video	Select Video	Review Video	Document Behavior	Analyze Behavior
Spring & fall 10–12 weeks each	AI scans videos and selects ones only containing birds	Trained interpreters review videos	…duration and taxonomy **300+ observations** for each site-season	Compare by site, region, season, time of day, and taxonomic group

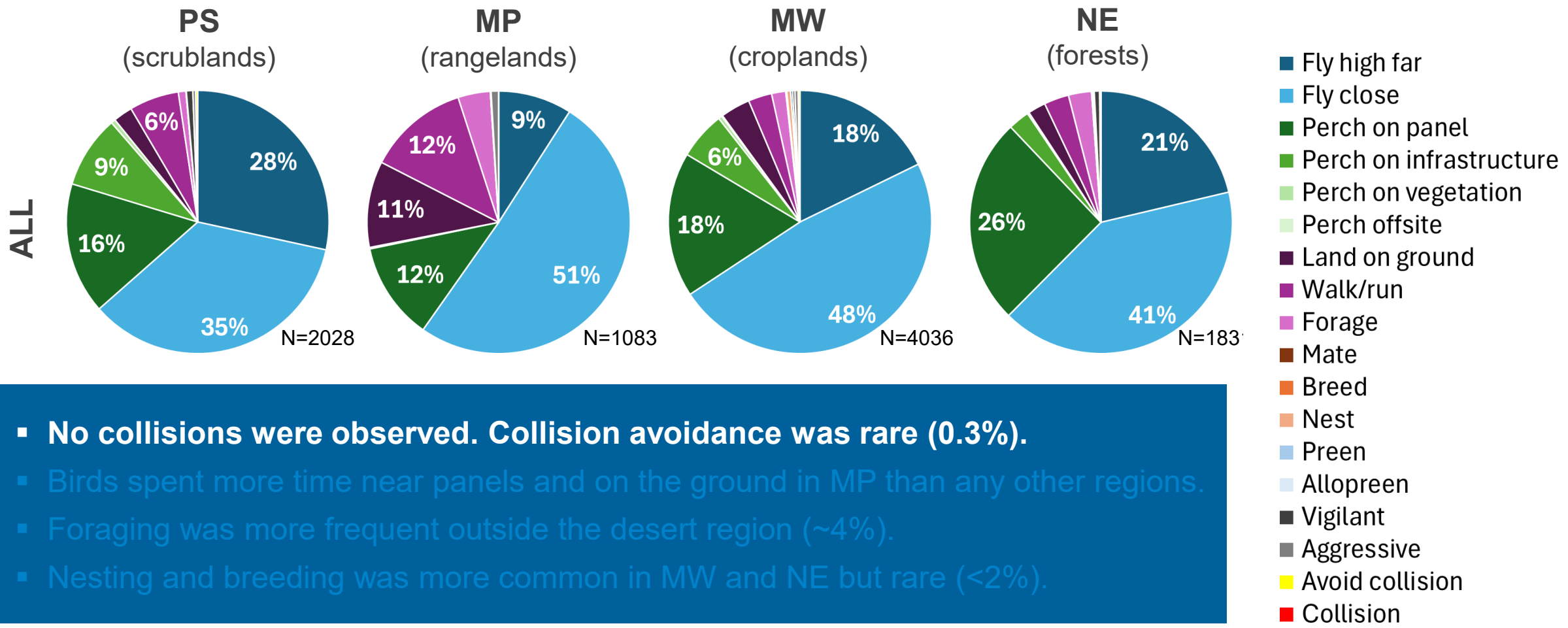
Daytime Only

Focus on Spring & Fall

4 Regions Completed to Date

Pacific Southwest (PS), Mountain-Prairie (MP), Midwest (MW), Northeast (NE)

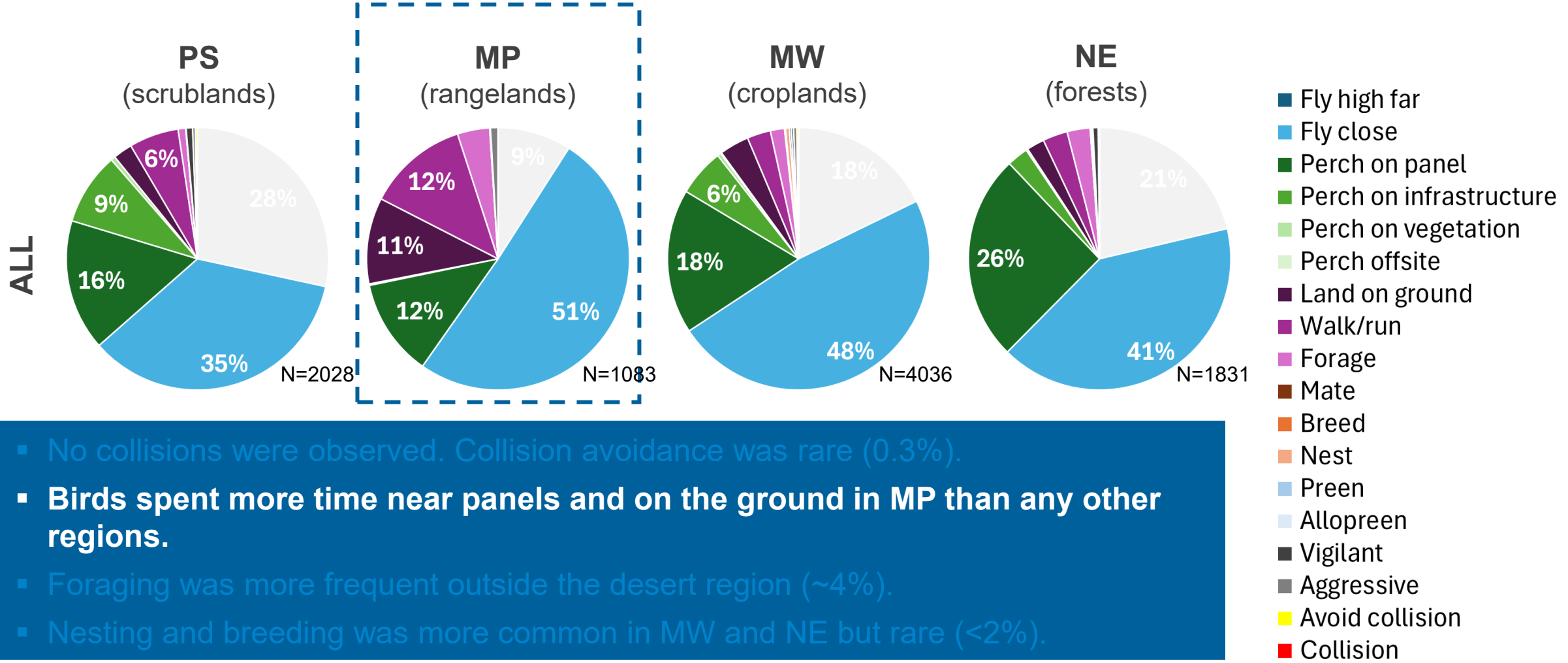
No Collisions



- **No collisions were observed. Collision avoidance was rare (0.3%).**
- Birds spent more time near panels and on the ground in MP than any other regions.
- Foraging was more frequent outside the desert region (~4%).
- Nesting and breeding was more common in MW and NE but rare (<2%).

Behaviors less than 5% of total observations are not labeled with %.

More Frequent Behavior Near Infrastructure and on the Ground in MP



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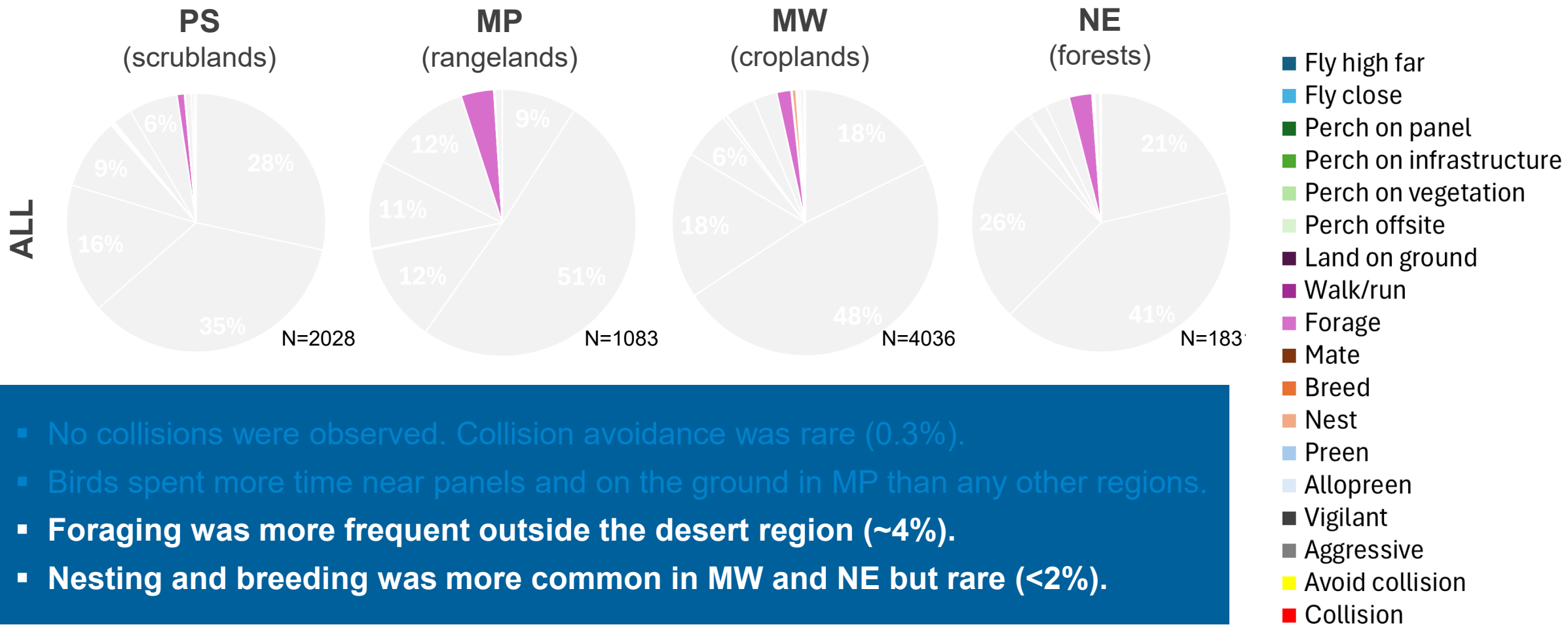
Sign of Birds Foraging and Breeding at Solar Sites



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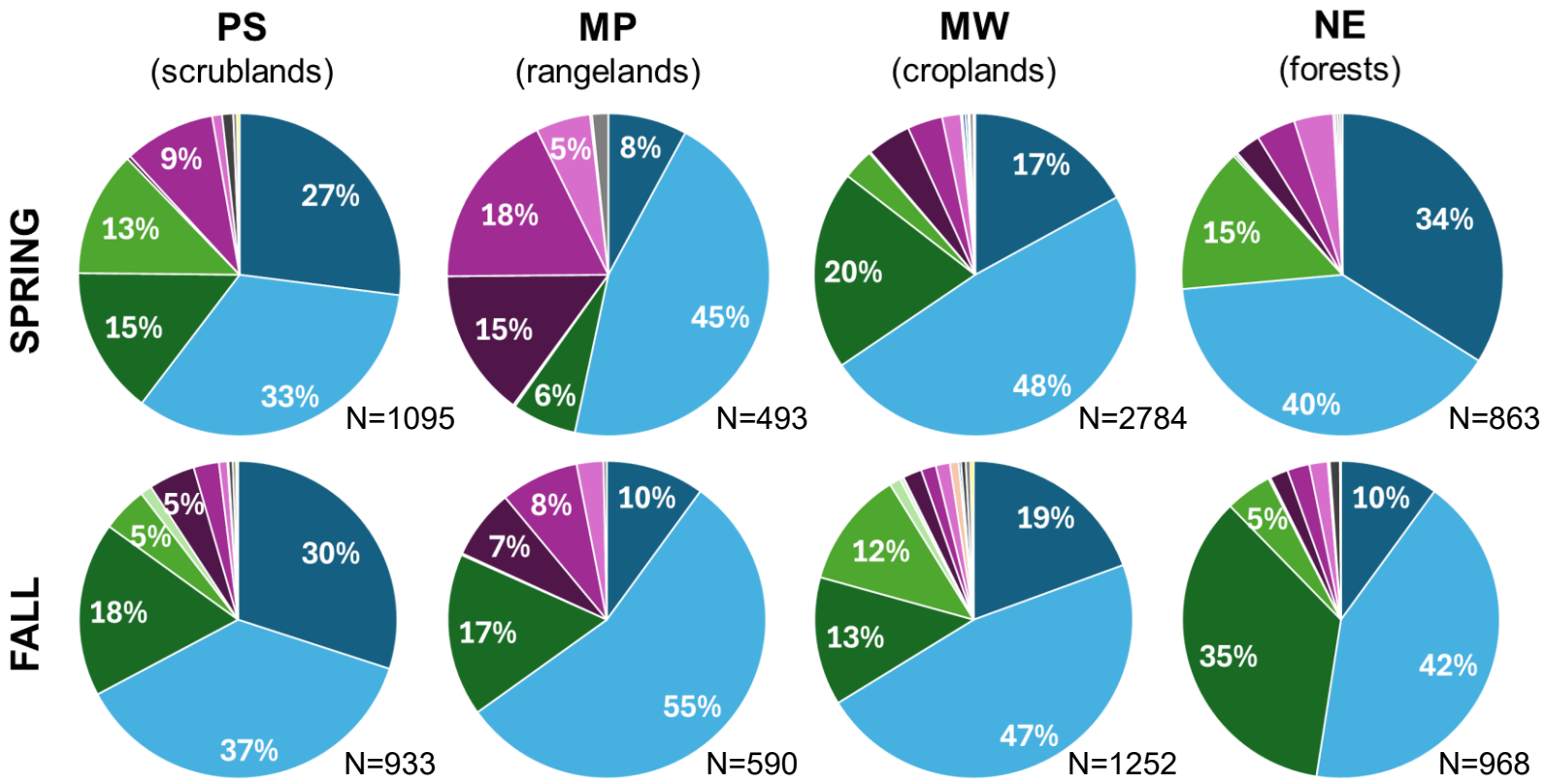
Bird Behaviors: Spring vs. Fall



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- Perch offsite
- Land on ground
- Walk/run
- Forage
- Mate
- Breed
- Nest
- Preen
- Allopreen
- Vigilant
- Aggressive
- Avoid collision
- Collision

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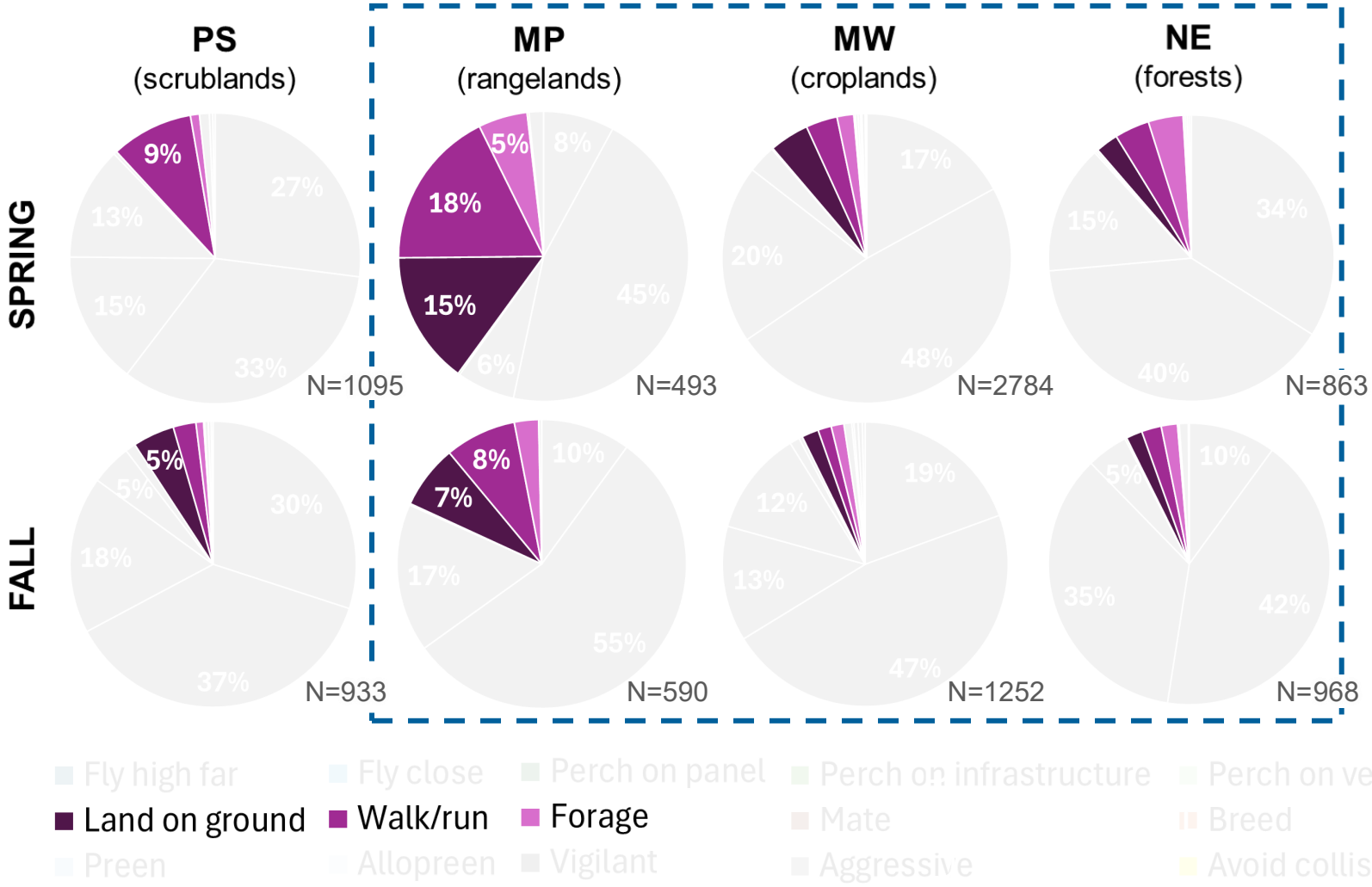
More Time on the Ground or Foraging in Spring outside the Desert Region



The seasonal difference was most pronounced in MP.

Foraging patterns may be related to difference in food availability between seasons.

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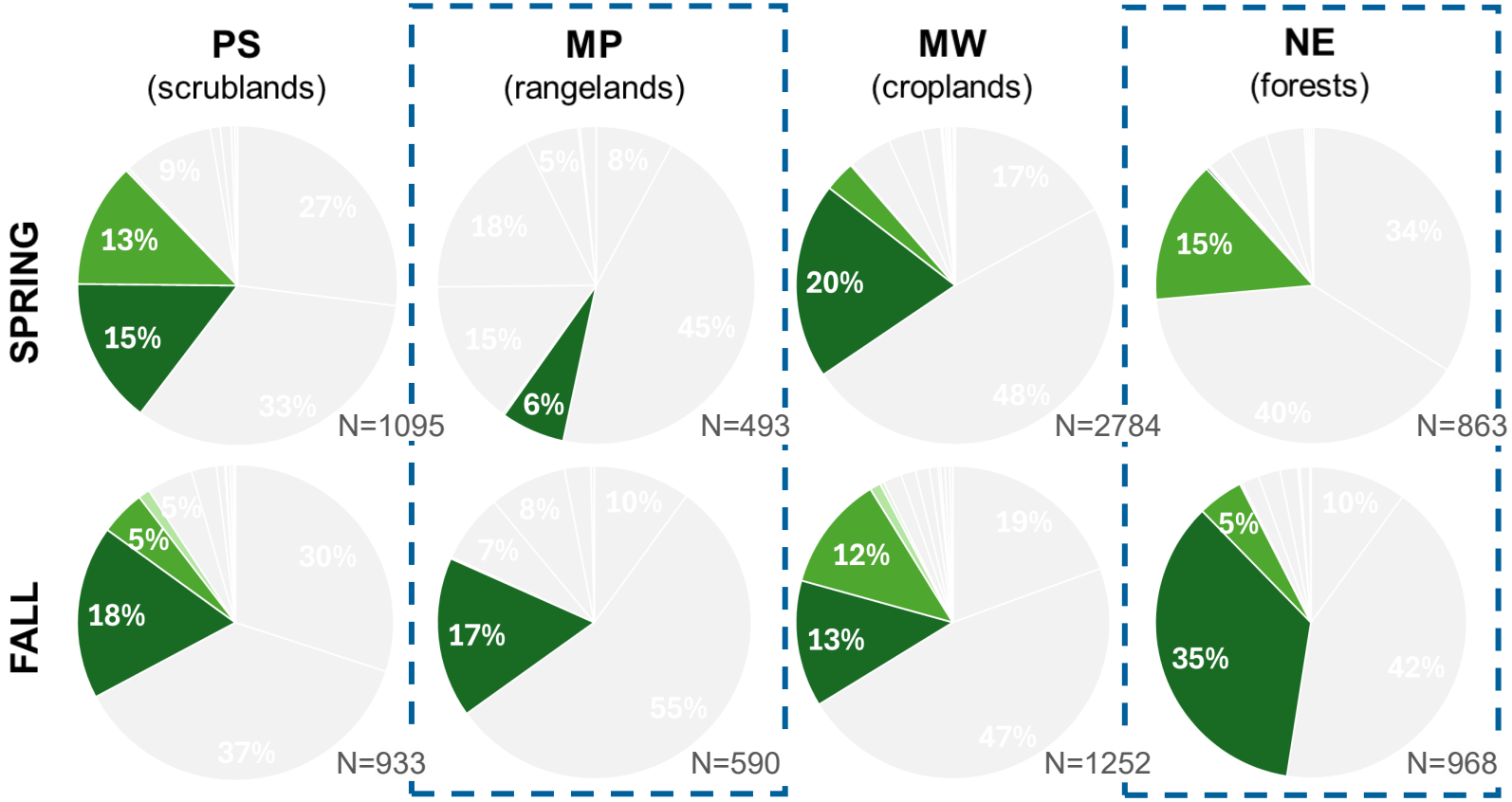
More Perching during Fall in MP and NE

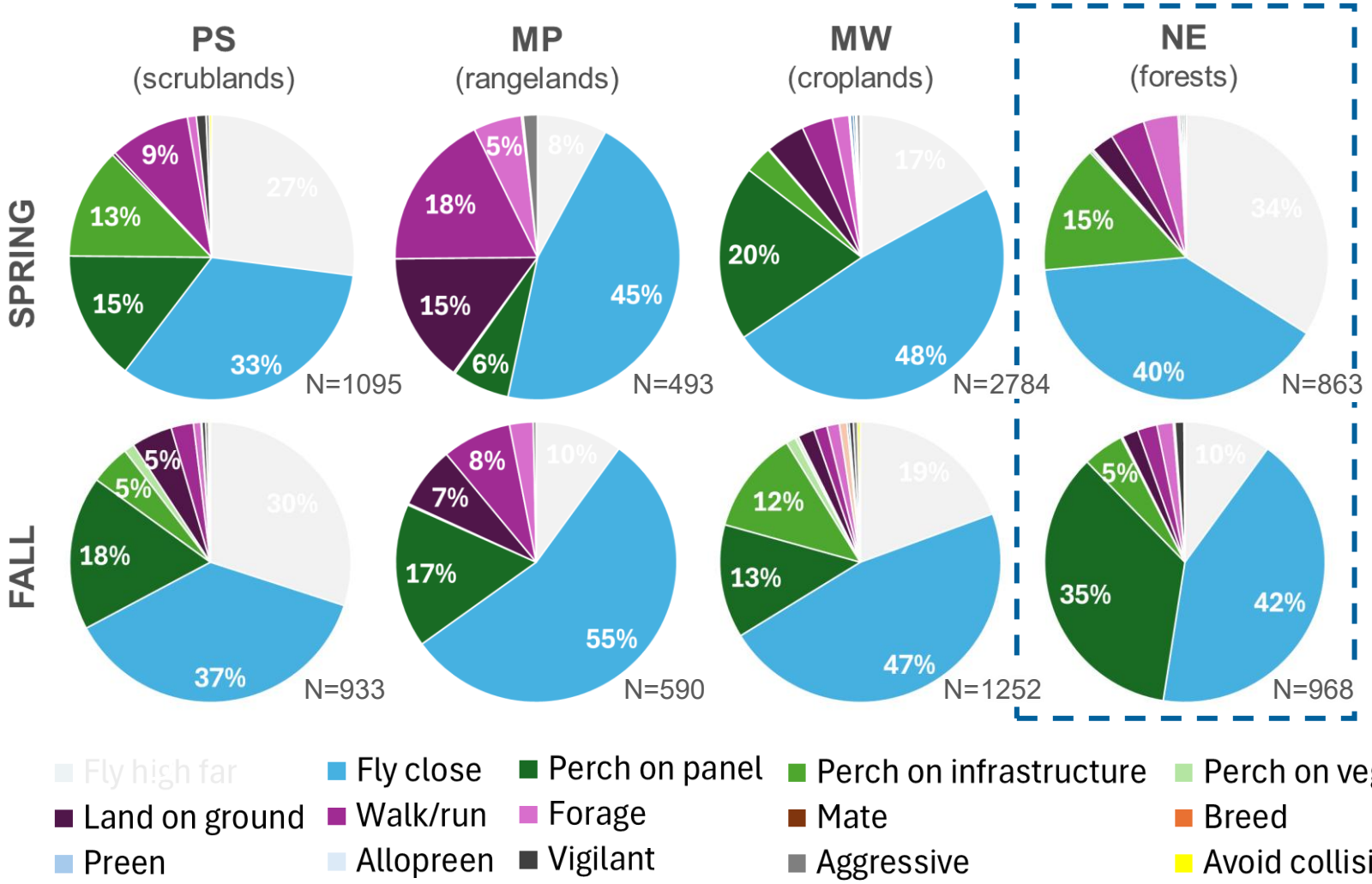


Fall includes the tail end of the breeding season for many songbirds.

The breeding birds with established territories nearby would spend time perching rather than simply flying through the sites.

Behaviors less than 5% of total observations are not labeled with %.

More Frequent Behavior Near the Facility Infrastructure during Fall in NE



Birds in NE were near facility infrastructure 90% of time in fall, while 66% in spring.

Fall migration includes more juvenile and young birds than spring, birds likely stop at the site more in fall than spring.

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Aggressive
Avoid collision
Collision

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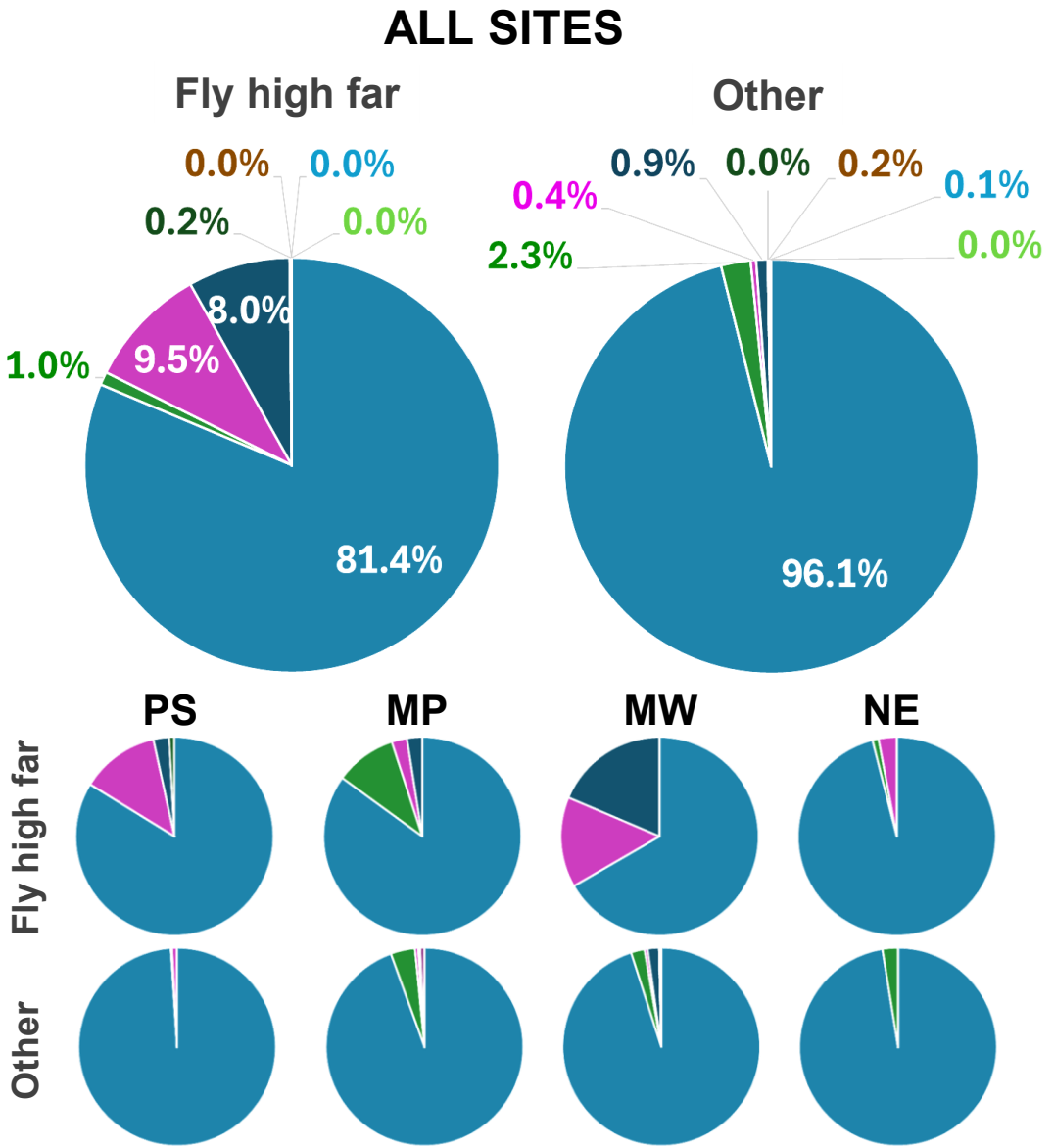
Low Daytime Collision Risks for Waterbirds

Songbirds were dominant overall.

- Raptors and waterbirds flew far above the sites by a noticeable proportion.
- Raptors sometimes descended toward facilities.
- Waterbirds rarely descended, except they occasionally flew close to panels.



Foraging

Wester/Chihuahuan meadowlark foraging on the ground

More video clips updated quarterly

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Foraging

Songbird flying/foraging insect without collision

More video clips updated quarterly

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Foraging

Eastern phoebe foraging an insect on a panel rack

Courtesy of University of Massachusetts Amherst
"**Informing Wildlife Conservation Strategies and Best Practices for Solar Facilities**" (DE-EE0010382)

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Flying

Barn swallows flying near panels without collision

Courtesy of University of Massachusetts Amherst
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Nesting

Eastern bluebird pair vising their nest

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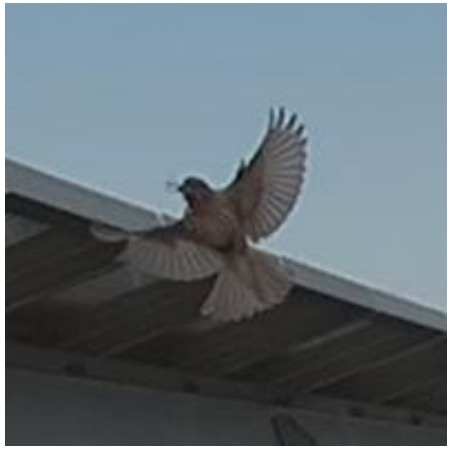
Nesting

House finch pair carrying nesting material



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INSIGHTS INTO AVIAN-SOLAR MORTALITY

Bird Predation 1

Red-tailed hawk flying above panels carrying a bird in its talons

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Bird Predation 2

Raptor feeding on a bird on the panel

Courtesy of University of Massachusetts Amherst
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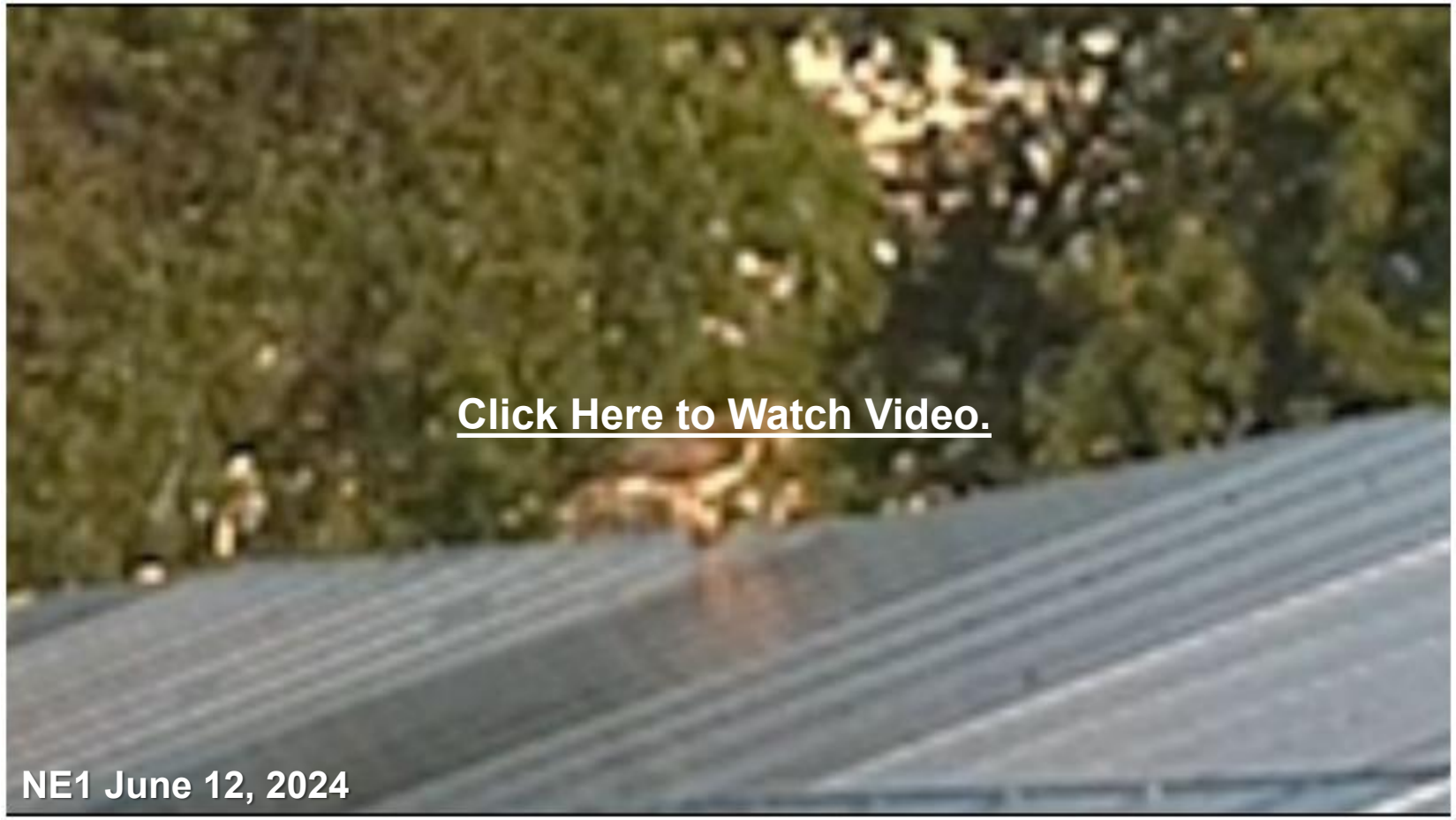
Bird Predation 2 (Close Up)

Raptor feeding on a bird on the panel



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Takeaways

- No collisions were observed
- Daytime collision risks for waterbirds appeared low.
- Birds appeared to be aware of PV facilities and navigated safely around the infrastructure, even using the sites as habitats.
- Solar sites provide valuable habitat to songbirds, as birds were foraging and breeding on site.
- Seasonal variation appeared to correspond to life cycles.
- Observations of raptors hunting and feeding on small birds offer new insights into the potential cause of avian-solar mortality.

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