PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM (PRRIP -or- Program)

TO: PRRIP Technical Advisory Committee (TAC)
FROM: Executive Director's Office (EDO)
SUBJECT: Whooping crane (WC) stopover vs. flyover update
DATE: October 15, 2024

The EDO is currently working collaboratively with a TAC working group to develop a data analysis plan for addressing Extension Big Question #4: What factors influence WC decisions to stop or fly over the Associated Habitat Reach (AHR). This question will be addressed using WC locational data from cellular telemetry provided by the Whooping Crane Tracking Partnership. For each bird fitted with a telemetry unit, the dataset provides all locations at stopovers and flight locations between stopovers within Nebraska. In addition, the dataset provides ground locations from the stopover prior to a bird entering Nebraska and the stopover immediately after a bird exits Nebraska, as well as the flight locations in between. The dataset includes stopovers along Nebraska sand-bed rivers, including the Niobrara, Loup System, and the Platte as well as non-river stopovers in Nebraska.

The EDO has worked to QAQC the dataset in preparation for use, including examining migratory paths for consistency in position, speed, and altitude; identifying where data are missing from migratory paths; identifying instances when telemetered birds migrate together; and examining the frequency of collection of positional data across the dataset.

Together the TAC working group has:

- Developed general patterns and descriptive statistics for stopovers vs. flyovers overall and by river system (See Appendix)
- Prioritized the analyses to be performed in three tiers:
  Tier 1: Assess factors associated with river stopovers vs. river flyovers over all river systems
  Tier 2: Assess differences/similarities in stopovers vs. flyover patterns among river systems
  Tier 3: Assess differences/similarities among river stopovers vs. non-river stopovers
- Parsed the dataset to:
    - Identify roost locations for each night based upon ground locations.
    - Define stopovers based upon point clouds of roost locations.
    - Define flyovers.
    - Develop standardized data processing methods based upon these definitions to pull both stopovers and flyovers out of dataset for comparison.
- Discussed exceptions to typical patterns and how those are identified and dealt with in data processing.
- Discussed alternative scales over which WC might be making decisions as they approach river systems and over which explanatory variables should be measured.
- Discussed how to handle variation in the frequency at which positional data were collected.

Following from these discussions, the working group decided on an initial multi-scale approach to examine the importance of factors up to10 miles out from the river system of interest as well as the factors as birds encounter the river. The 10 miles is comparable to what has been identified in the past as available for roost site selection and is based upon the assumption that WCs can see and evaluate the river system at this distance. This distance is also supported by examination of patterns in telemetry data showing deviations from flight paths of no more than 8 miles upon approaching the Platte and the Loup River systems. For this broader scale of analysis, landcover variables will be evaluated within a buffer that spans 10 miles on either side of the flight path from 10 miles out to the river system of interest (Figure 1).

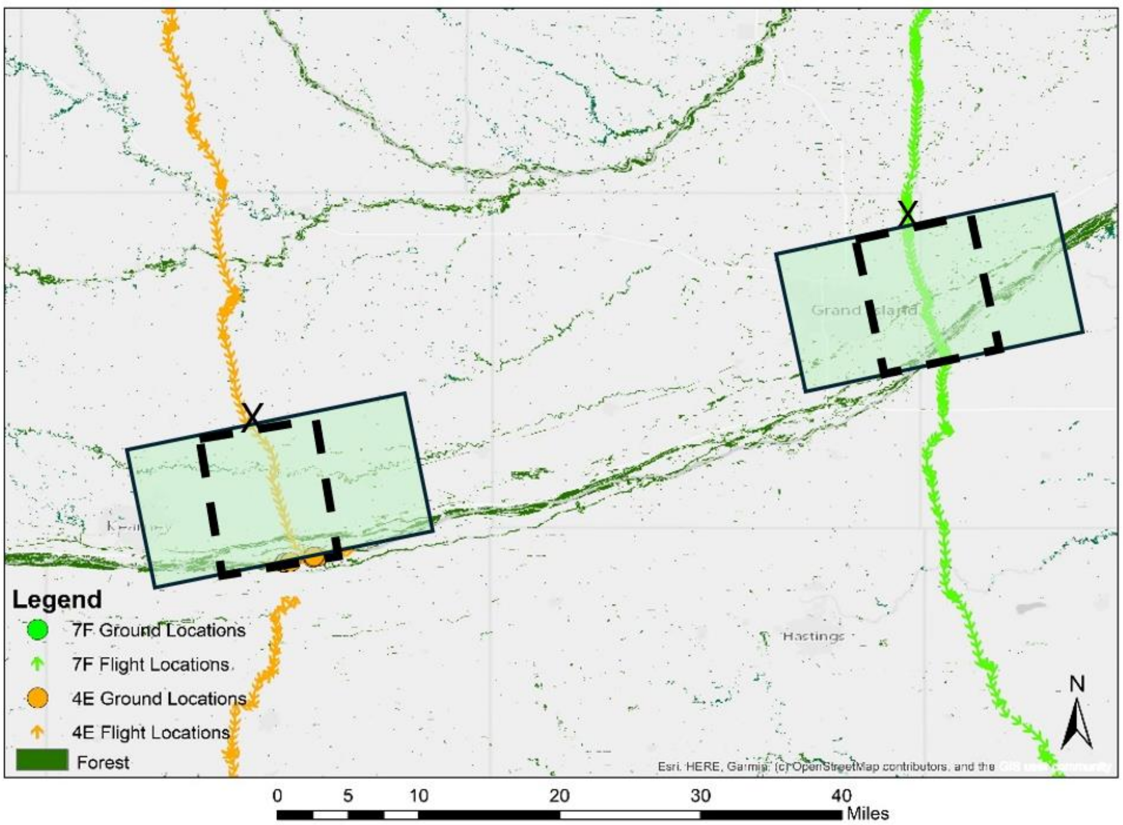


Figure 1. Example of the multi-scale approach that includes quantification of explanatory variables within an area 10 miles (solid outline) and 4 miles (dashed outline) on either side of a flight path when birds are up to 10 miles away from the river of interest. Factors within these areas will be tested for their importance to stopover initiation. The orange locations (left) correspond to a stopover. The green locations (right) correspond to a flyover.

For on-channel variables this buffer encompasses a total of 20 river miles. Thus, for on-channel variables, we will focus on the maximum unobstructed channel width available and the proportion of the channel greater than or equal to 650 ft unobstructed channel width. Wetted width has been suggested for use as a metric linked with flow across the multiple river systems.

Because we anticipate a 20-mile-wide buffer will be fairly homogenous in terms of landcover characteristics, we will also test a smaller four-mile buffer on either side of the flight path from 10 miles out until the flight path encounters the river (Figure 1). Telemetry data demonstrated that most deviations from original flight path upon encountering the Platte and Loup River systems were four miles or less. We anticipate this narrower buffer will provide more specificity regarding the conditions evaluated by individual WCs as they are making decisions in flight.

Finally, we will test the importance of factors within a 0.77-mile buffer around WC flight paths at the point where the bird encounters the river for flyovers and around the initial ground location for stopovers (Figure 2).

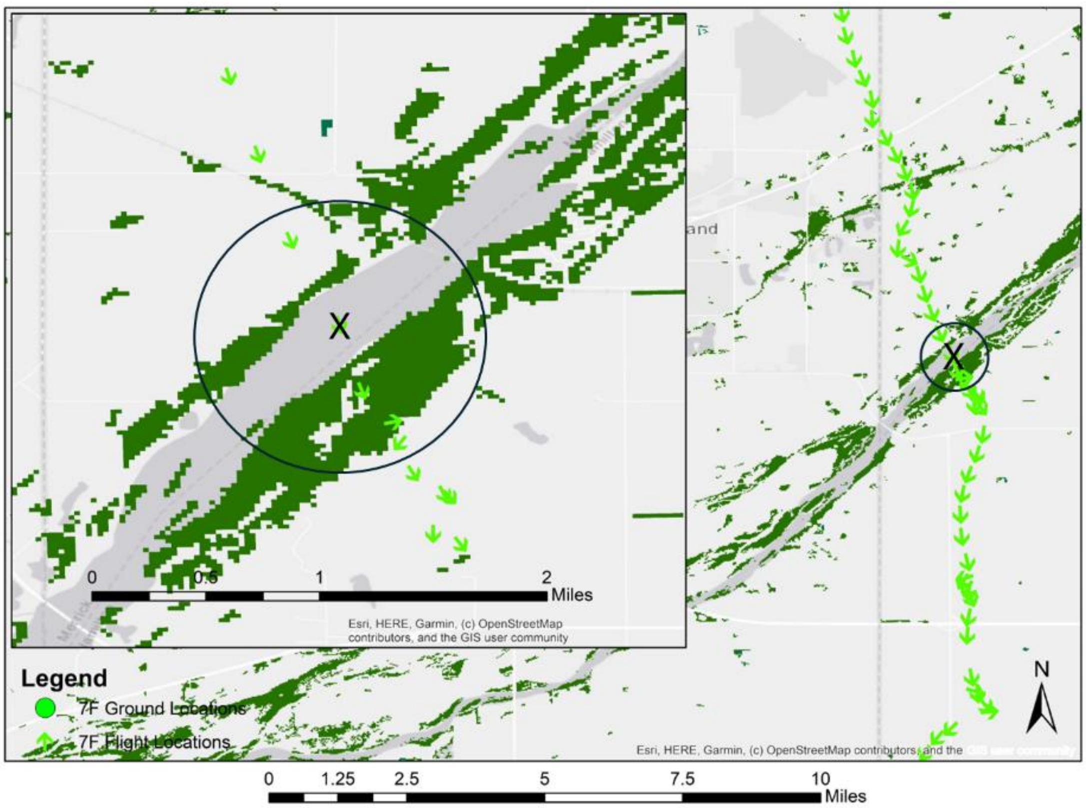


Figure 2. Example of the smaller scale 0.77-mile buffer for quantification of explanatory variables when a bird is encountering a river and chooses to flyover. Factors within this buffer will be tested for their importance to stopover initiation.

This buffer is the same as what was used to quantify metrics surrounding roost and available locations for roost site selection analyses. Telemetry data also showed that WCs utilize an area with a radius of 0.77 miles during stopovers on the Platte River.

The decision was also made to examine how results may vary by using only the data collected at 10-minute intervals or less versus the full dataset which ranges from point locations collected at one-minute intervals to intervals of an hour or more. Approximately 35% of the dataset will be available for analyses using only data collected at 10-minute intervals or less, having greater certainty about WC position and factors experienced for decision-making. This reduced dataset collected at a finer time scale is a better fit for the finer scale analysis, but sample size for considering multiple variables may be more limited. To use all of the data, temporal gaps will be filled through straight line interpolation from point to point. The larger the temporal gap, the more spatial uncertainty. Evaluating the importance of factors over a larger spatial scale that considers maximum (10 miles) and average (four miles) deviations from flight paths as WCs encounter Nebraska rivers is one way to account for this spatial uncertainty, but it has the drawback or providing less specificity and may not provide a strong signal.

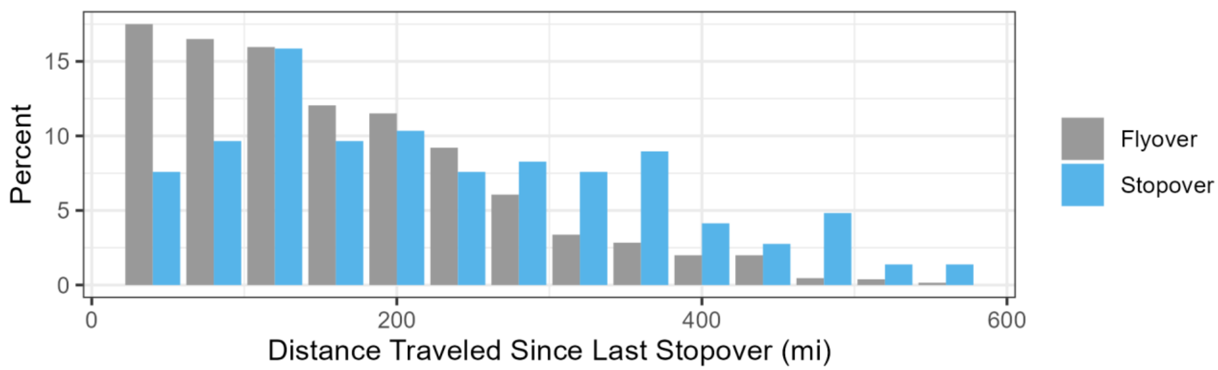
Appendices

Appendix 1. Summarization of duration (Hours Since Leaving Last Stop), distance (Distance Since Leaving Last Stop), and time of day (Hours Relative to Sunset) for stopovers and flyovers of Nebraska sand-bed rivers from 2017 – 2022 using cellular telemetry data for whooping cranes.

				Median		
Type	River	count	Percent Stops	Hours Since Leaving Last Stop	Distance Since Leaving Last Stop (mi)	Hours Relative to Sunset
Stopover	All	146	10	7.0	188	-1.5
Flyover	All	1,303		3.8	121	-4.3
Stopover	Niobrara	37	12	8.0	210	-0.5
Flyover	Niobrara	267		3.7	118	-4.1
Stopover	North Loup	26	9	6.4	201	-1.8
Flyover	North Loup	254		3.9	127	-4.1
Stopover	Middle Loup	39	14	5.9	156	-2.2
Flyover	Middle Loup	230		4.2	134	-4.0
Stopover	Loup	9	21	7.9	179	-2.4
Flyover	Loup	33		5.8	176	-4.1
Stopover	South Loup	1	<1	0.8	10	-4.8
Flyover	South Loup	229		3.7	118	-4.5
Stopover	Platte	34	10	7.8	253	-0.8
Flyover	Platte	290		3.6	114	-4.8

Appendix 2A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=146) and flyovers (gray; n=1,303) on Nebraska sand-bed rivers from 2017 – 2022.

A



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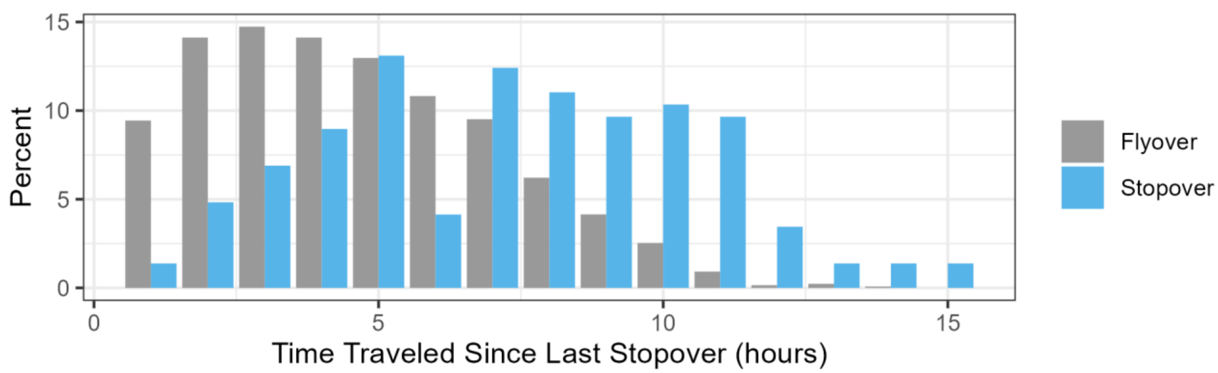

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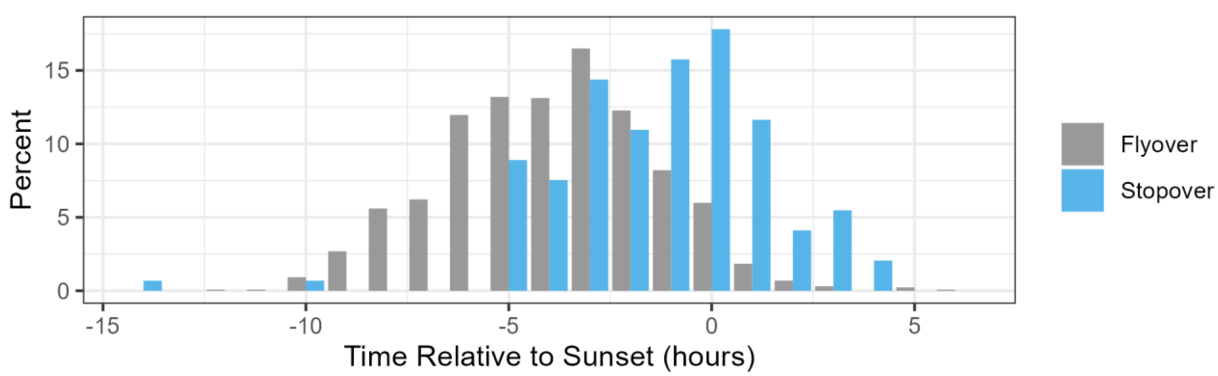
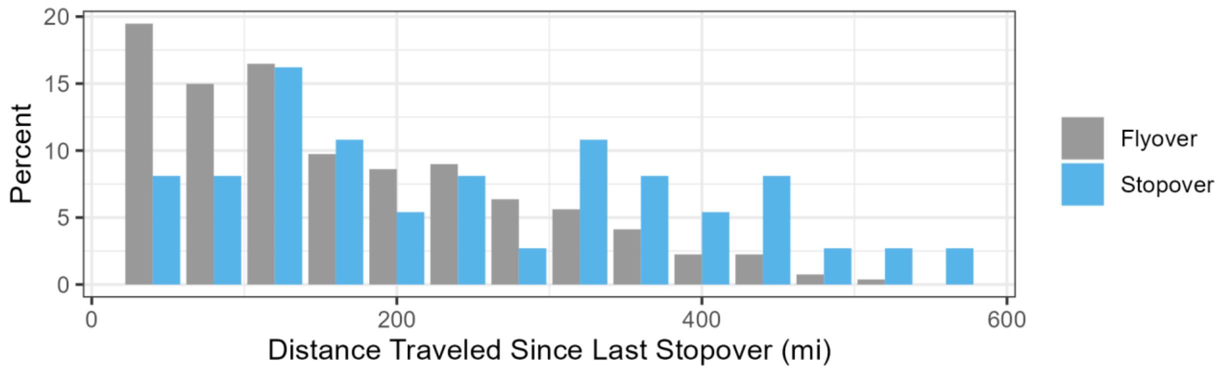


Appendix 3A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=37) and flyovers (gray; n=267) on the **Niobrara River** from 2017 – 2022.

A



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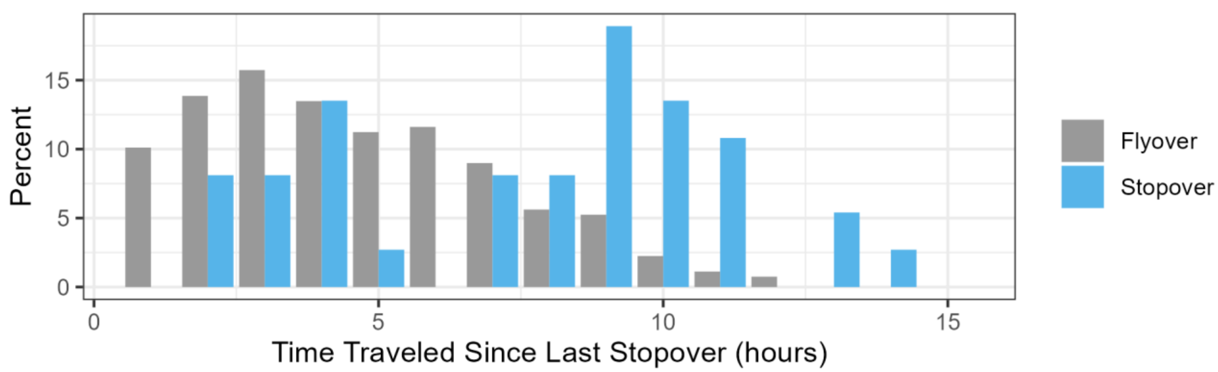

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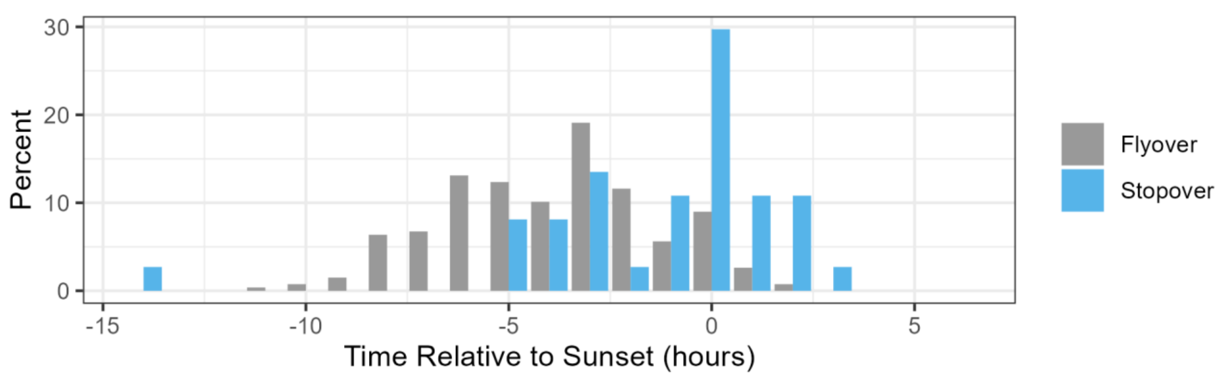
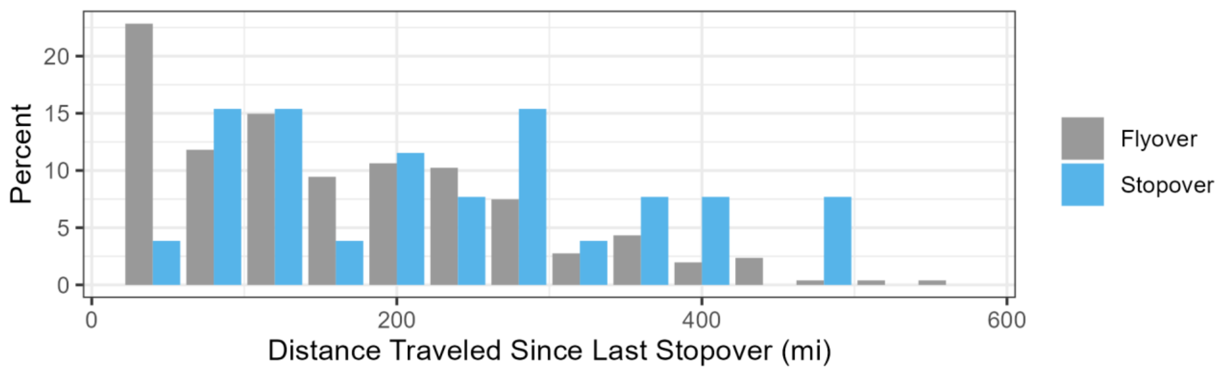


Appendix 4A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=26) and flyovers (gray; n=254) on the **North Loup River** from 2017 – 2022.

A



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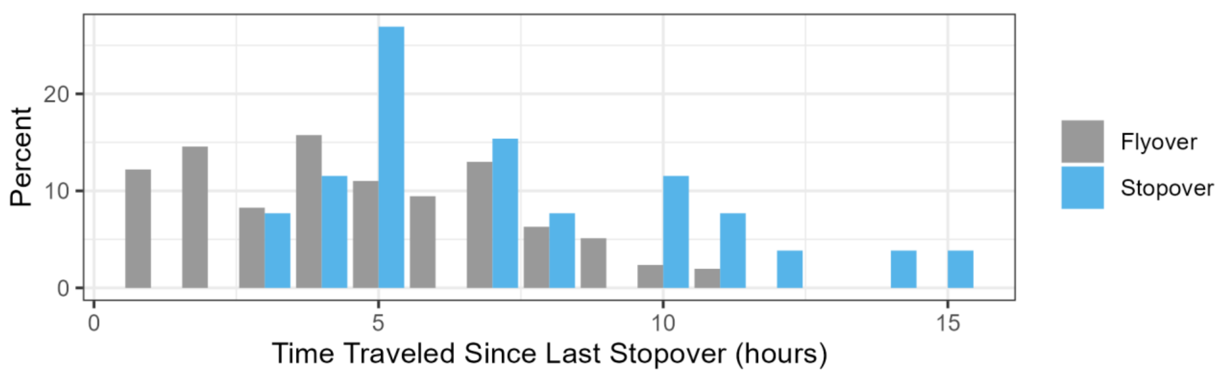

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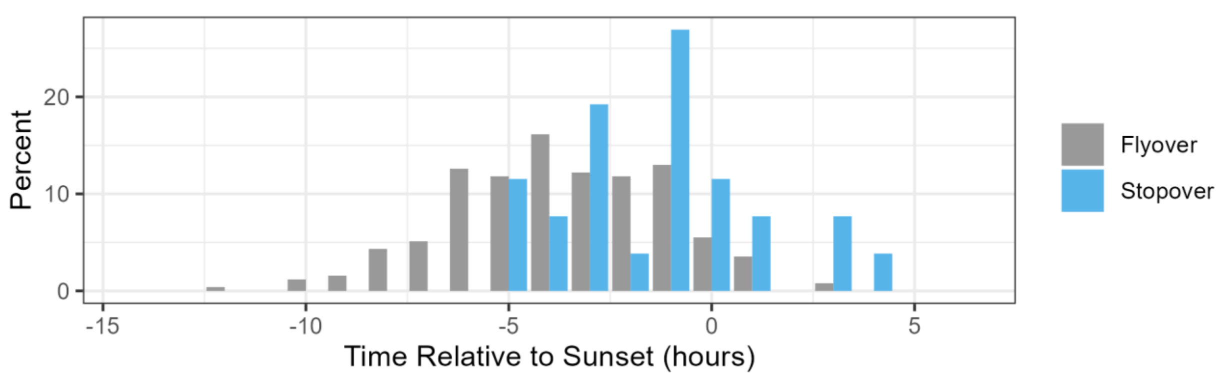
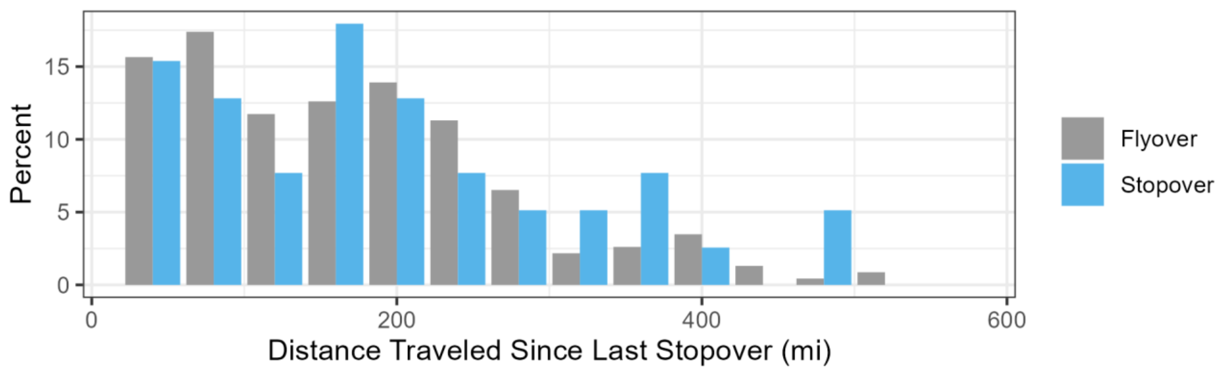


Appendix 5A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=39) and flyovers (gray; n=230) on the **Middle Loup River** from 2017 – 2022.

A



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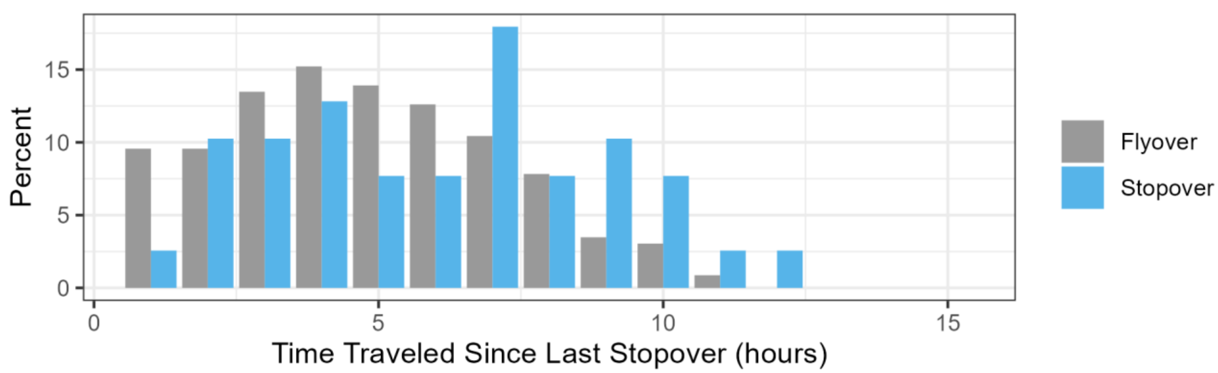

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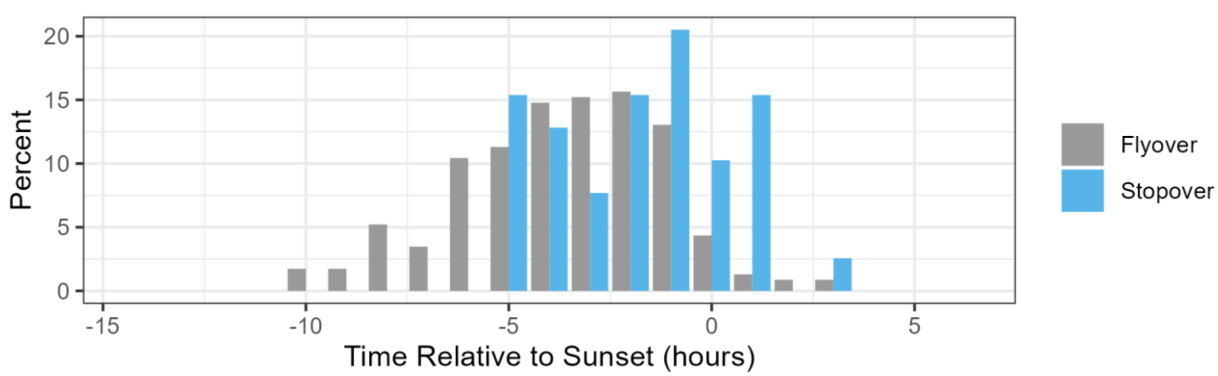
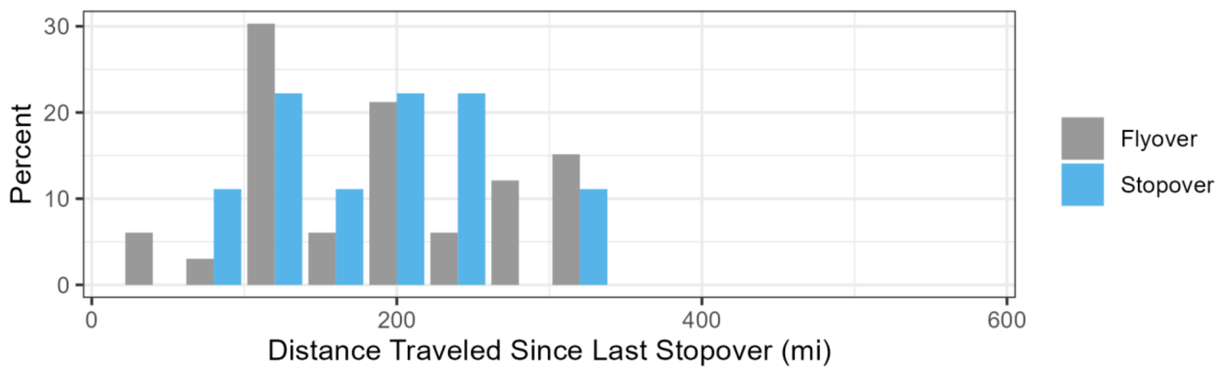


Appendix 6A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=9) and flyovers (gray; n=33) on the **Loup River** from 2017 – 2022.

A



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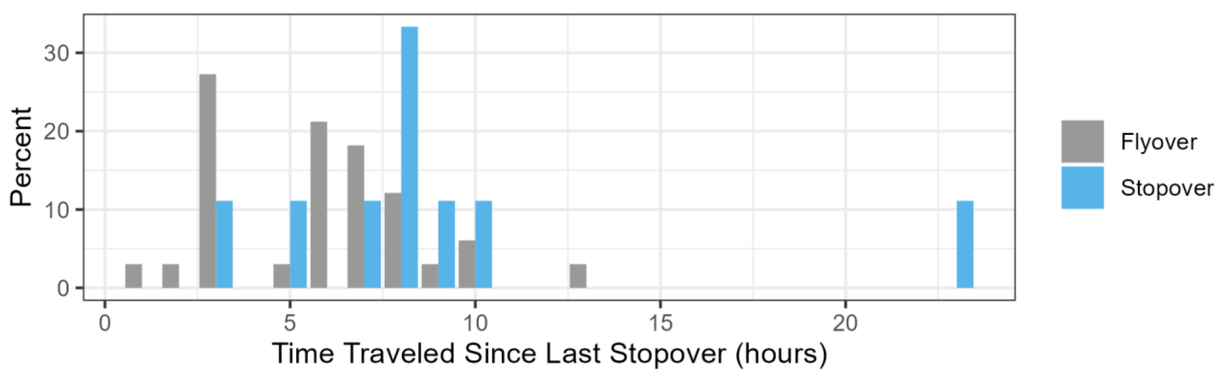

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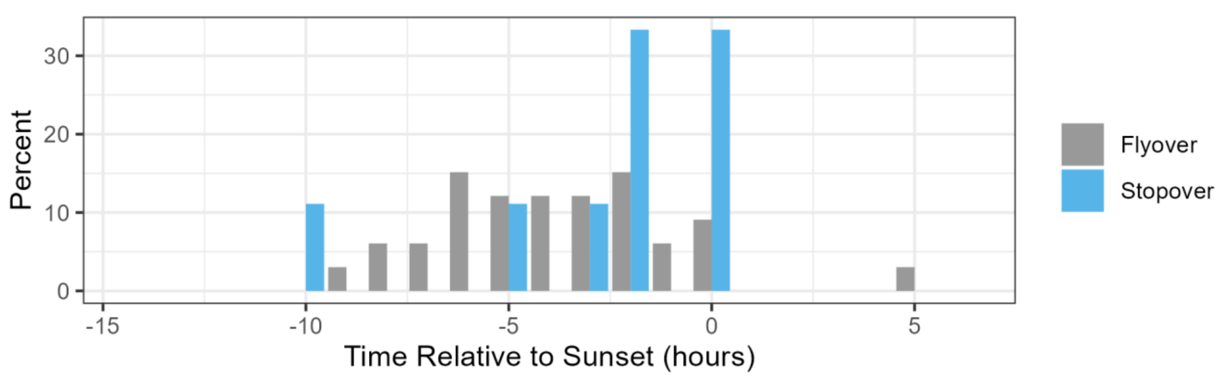
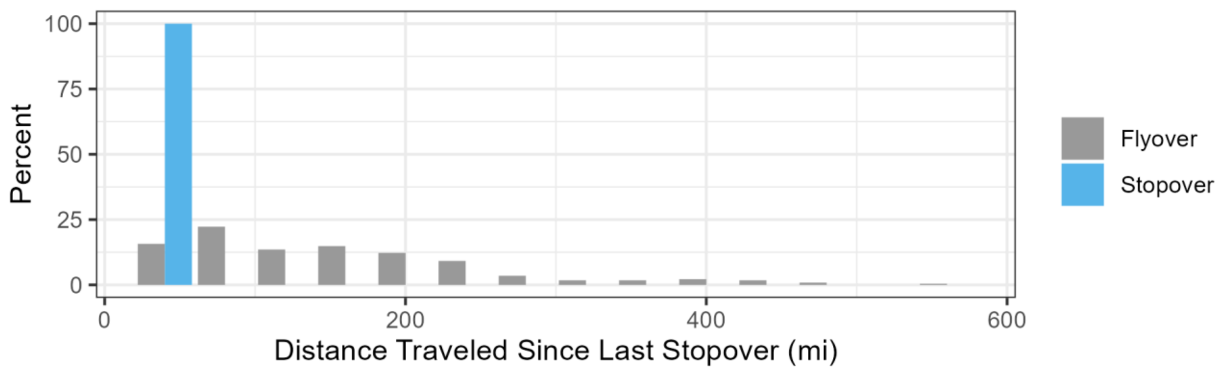


Appendix 7A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=1) and flyovers (gray; n=229) on the **South Loup River** from 2017 – 2022.

A



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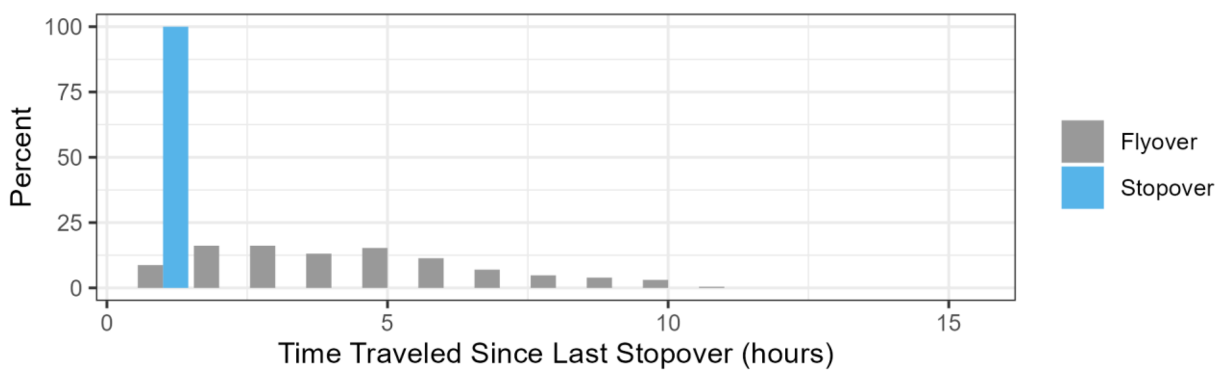

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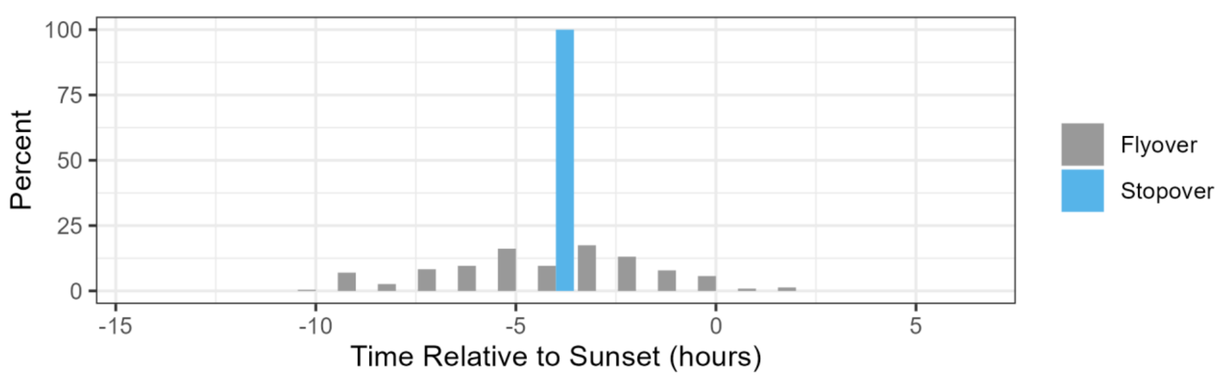
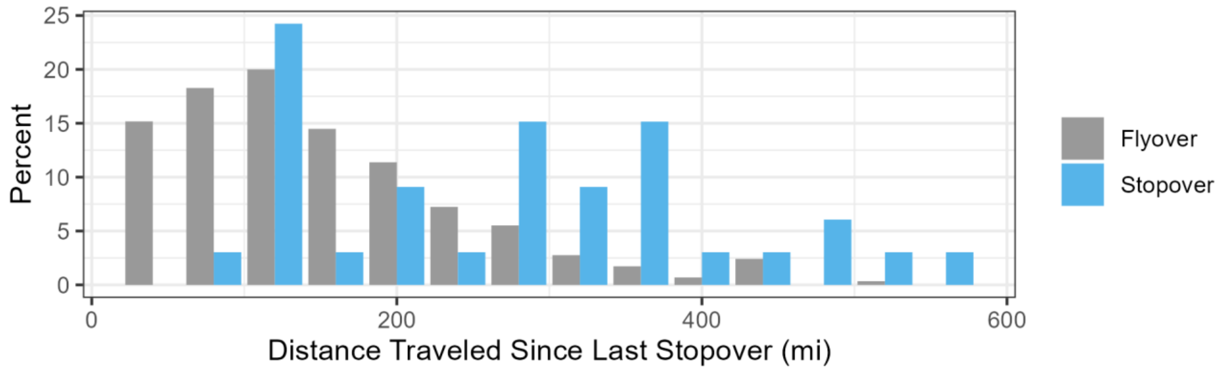


Appendix 8A-C. Percent of (A) distance traveled since last stopover, (B) time traveled since last stopover, and (C) time relative to sunset that occurred in each bin for stopovers (blue; n=34) and flyovers (gray; n=290) on the **Platte River** from 2017 – 2022.

A



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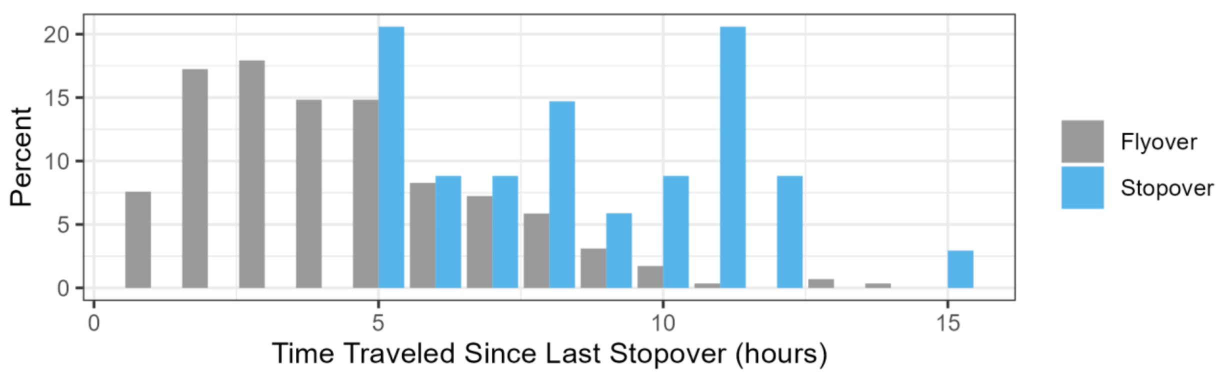

C