TO: TECHNICAL ADVISORY COMMITTEE
FROM: JASON BRUGGEMAN
SUBJECT: WHOOPING CRANE MONITORING PERIOD WORKING GROUP
DATE: MARCH 31, 2023

I. MEETING AND PURPOSE

The whooping crane monitoring period working group met on March 21, 2023, to evaluate and discuss potential changes to the spring and fall survey dates for PRRIP systematic aerial surveys. Current PRRIP survey dates are March 6–April 29 for spring and October 9–November 15 for fall. The workgroup was formed to address several questions that arose during the January 18, 2023 Technical Advisory Committee (TAC) meeting: (1) do the dates of spring and fall PRRIP systematic aerial surveys need to be adjusted to account for changes in the timing and duration of whooping crane migration; (2) how to compare previous data collected using shorter survey season lengths with data collected using current survey season lengths; (3) what to do with previous data collected outside of the established survey season; and (4) how to modify the spring and fall whooping crane reports to accommodate these issues? The workgroup consisted of the following members: Dave Baasch (Crane Trust); Jason Bruggeman (EDO); Patrick Farrell (EDO); Malinda Henry (EDO); Mallory Jaymes (EDO); Matt Rabbe (USFWS); and Dave Zorn (CNPPID).

II. DATA EVALUATED AND DISCUSSED

The EDO summarized and analyzed dates of observations for whooping crane groups and individual whooping cranes from the spring and fall migration from multiple sources and provided an overview of results during the meeting. The data sources included: (1) the USFWS public sighting database for Nebraska (1975–2022) that includes PRRIP systematic aerial observations; (2) PRRIP systematic aerial survey data for the Associated Habitat Reach (AHR) along the central Platte River (2001–2022); (3) PRRIP opportunistic location data for the AHR (2001–2022); and (4) telemetry location data from individual whooping cranes marked during the phase one telemetry study (2010–2018) in Nebraska and during the current cellular telemetry tracking study (2018–2021) within 62 miles of the AHR. The working group found results obtained from the USFWS public sighting data and PRRIP systematic aerial surveys to be most informative, and the dates of whooping crane group observations to be most useful in assessing changes to current monitoring season dates. Using observation dates of whooping crane groups to evaluate the monitoring period aligns with the use of groups (rather than individuals) as the independent sampling unit for Program analyses. It gives equal weight to observation dates of large and small groups and tends to result in a broader range of observation dates when evaluating percentiles. We summarize results from group observations from both data sources below.

A. Spring Migration Data

a. USFWS Public Sighting Data for Nebraska

There were 586 observations of whooping crane groups during 1975–2022 (**Figure 1**). The EDO examined mean and median dates of group observations, 2.5th and 97.5th percentiles of group observation dates, and 5th and 95th percentiles of group observation dates for: the entire 1975–2022 period; two periods (1975–1999; 2000–2022); five 10-year periods (1975–1984; 1985–1994; 1995–2004; 2005–2014; 2015–2022); and 10 five-year periods (1975–1979; 1980–1984; 1985–1989; 1990–1994; 1995–1999; 2000–2004; 2005–2009; 2010–2014; 2015–2019; 2020–2022; **Table 1**). Observations ranged between February 11 and May 23 with mean and median observation dates of April 4 and April 6, respectively (**Figure 1**). The 2.5th through 97.5th percentile of observations ranged between March 5 and May 2, whereas the 5th through 95th percentile of observations ranged between March 9 and April 23 for the entire 1975–2022 period (**Table 1**).

The mean, median, and 2.5th, 97.5th, 5th, and 95th percentile dates of group observations shifted to at least seven days earlier from the 1975–1999 period to the 2000–2022 period (**Table 1**). Similarly, there were shifts to earlier mean, median, and percentile dates of group observations when comparing the 1975–1984 and 1985–1994 periods to the 2005–2014 and 2015–2022 periods (**Table 1**). Although there was a general shift to earlier group observation dates over time when considering five-year periods, the five-year periods had considerable variability in mean, median, and percentile dates across periods (**Table 1**).

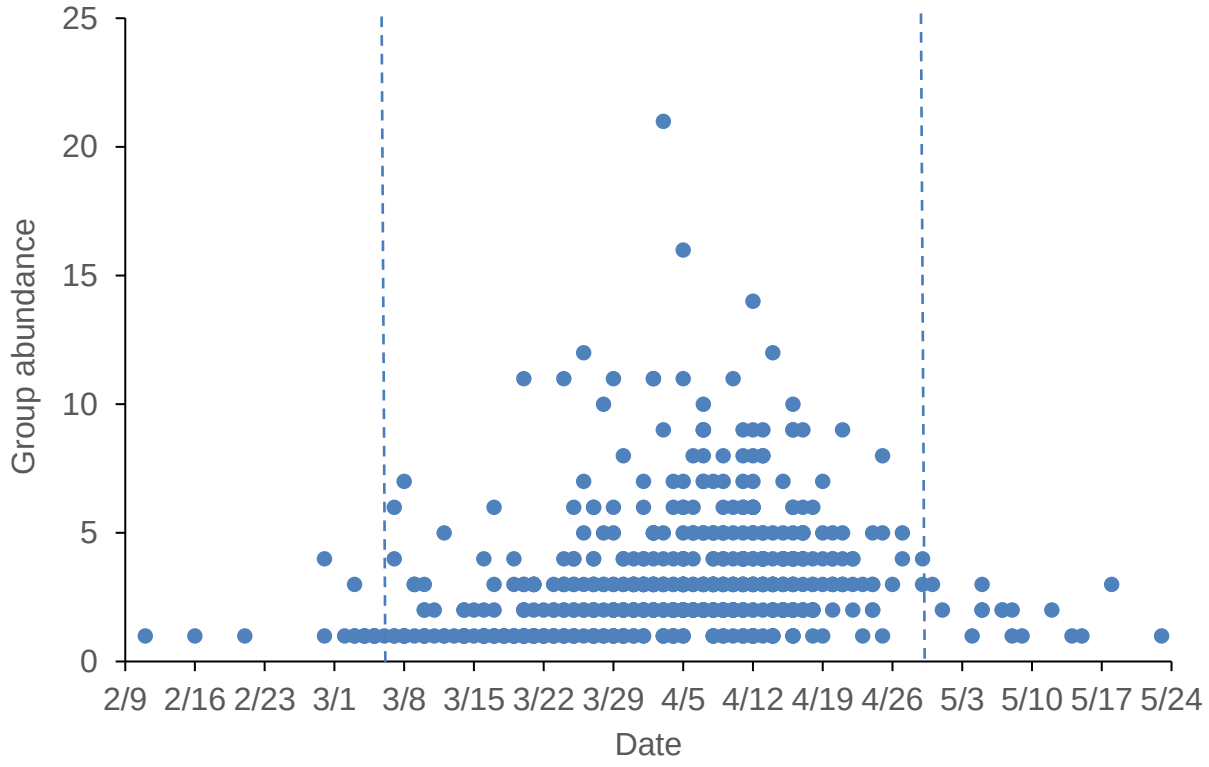

Figure 1. Whooping crane group abundance by date for observations recorded during spring 1975–2022 from the USFWS public sighting database. The current dates of PRRIP spring systematic aerial surveys (March 6–April 29) are depicted with vertical dashed lines.

Table 1. The number of whooping crane groups, mean and median dates of group observations, and 2.5th, 97.5th, 5th, and 95th percentiles of dates of group observations based on the USFWS public sighting database for observations recorded during spring migration between 1975 and 2022. Statistics are provided for 1975–2022, two periods (1975–1999; 2000–2022); five 10-year periods (1975–1984; 1985–1994; 1995–2004; 2005–2014; 2015–2022); and 10 five-year periods (1975–1979; 1980–1984; 1985–1989; 1990–1994; 1995–1999; 2000–2004; 2005–2009; 2010–2014; 2015–2019; 2020–2022). The current spring monitoring period is also denoted.

Period	No. of groups	Mean date	Median date	2.5th–97.5th	5th–95th
Current Spring Monitoring Period				3/6–4/29	
One Period					
1975–2022	586	4/4	4/6	3/5–5/2	3/9–4/23
Two Periods					
1975–1999	187	4/11	4/11	3/12–5/8	3/21–4/29
2000–2022	399	4/1	4/2	3/5–4/23	3/8–4/18
10-Year Periods					
1975–1984	27	4/11	4/14	3/30–4/19	4/1–4/18
1985–1994	94	4/13	4/11	3/24–5/12	4/1–4/29
1995–2004	87	4/6	4/8	3/3–5/7	3/8–5/3
2005–2014	167	4/3	4/5	3/5–5/4	3/7–4/19
2015–2022	211	3/29	3/30	3/5–4/19	3/9–4/17
Five-Year Periods					
1975–1979	7	4/10	4/12	3/29–4/19	3/30–4/19
1980–1984	20	4/12	4/14	4/1–4/18	4/1–4/18
1985–1989	44	4/11	4/9	3/24–5/12	3/24–4/28
1990–1994	50	4/14	4/12	4/4–5/6	4/4–4/27
1995–1999	66	4/7	4/9	2/26–5/8	3/9–5/6
2000–2004	21	4/3	4/5	3/5–4/23	3/8–4/22
2005–2009	60	4/9	4/12	3/12–5/11	3/16–5/5
2010–2014	107	3/31	4/3	3/5–4/17	3/7–4/16
2015–2019	121	4/1	4/3	3/5–4/19	3/12–4/18
2020–2022	90	3/27	3/27	3/5–4/18	3/8–4/15

b. PRRIP Systematic Aerial Surveys

There were 360 observations of whooping crane groups during 2001–2022 PRRIP spring systematic aerial surveys (**Figure 2**). Observations ranged between March 7 and April 20 with mean and median observation dates of March 30 and March 31, respectively (**Figure 2**). The 2.5th through 97.5th percentile of observations ranged between March 9 and April 16, whereas the 5th through 95th percentile of observations ranged between March 12 and April 14 for the entire 2001–2022 period.

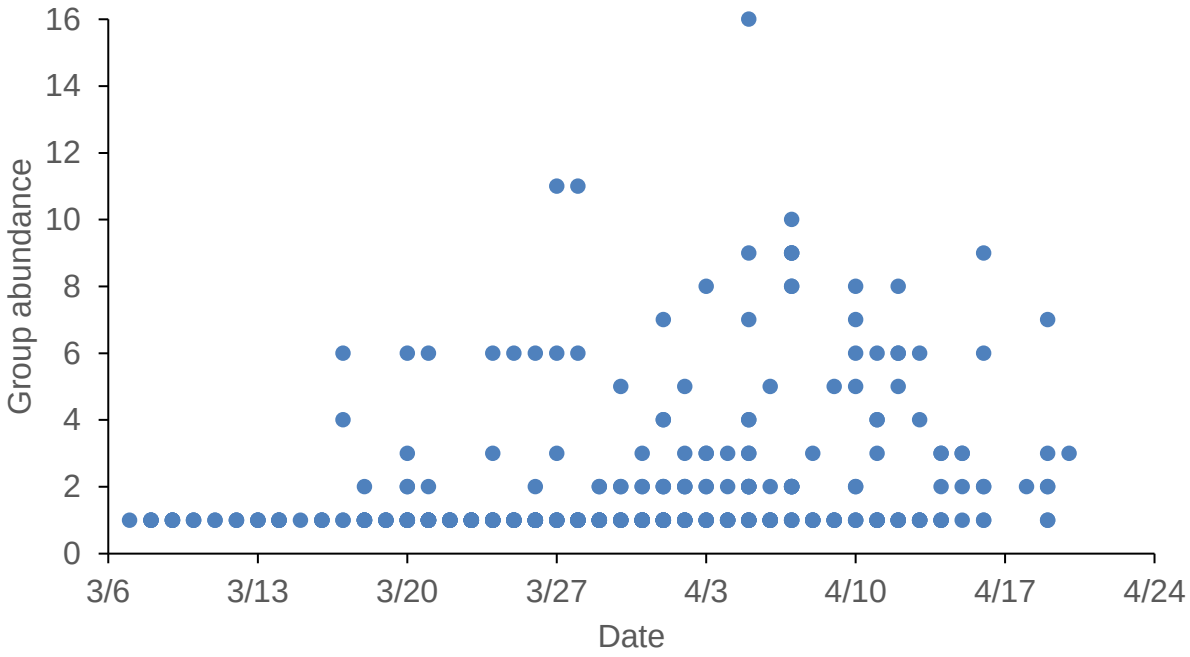

Figure 2. Whooping crane group abundance by date for observations recorded during 2001–2022 during PRRIP spring systematic aerial surveys.

c. Spring Data Summary

Current PRRIP spring systematic aerial survey dates range between March 6 and April 29. This date range encompassed 5th and 95th percentiles of dates of group observations from USFWS public sighting data for the 1975–2022 period, 1975–1999 and 2000–2022 periods, four of five 10-year periods, and nine of 10 five-year periods (**Table 1**). Additionally, the current PRRIP survey date range encompassed 2.5th and 97.5th percentiles of dates of group observations for the 1975–2022 period, 2000–2022 period, four of five 10-year periods, and two of 10 five-year periods (**Table 1**). Therefore, current PRRIP survey dates include 5th and 95th percentile dates for previous and recent periods. However, there has been a shift to earlier group observations over time and PRRIP aerial surveys have not documented any groups after April 20 during any spring survey dating back to 2001.

B. Fall Migration Data

a. USFWS Public Sighting Data for Nebraska

There were 346 fall observations of whooping crane groups during 1975–2022 (**Figure 3**). Observations ranged between September 27 and December 2 with a mean and median observation date of October 29 and October 30, respectively (**Figure 3**). The 2.5th through 97.5th percentile of observations ranged between October 8 and November 17, whereas the 5th through 95th percentile of observations ranged between October 14 and November 14 for the entire 1975–2022 period (**Table 2**).

The mean, median, and 2.5th, 97.5th, 5th, and 95th percentile dates of group observations shifted to at least four days later from the 1975–1999 period to the 2000–2022 period (**Table 2**). Similarly, there were shifts to later mean, median, and percentile dates of group observations when comparing the 1975–1984 and 1985–1994 periods to the 2005–2014 and 2015–2022 periods (**Table 2**). As with the spring data, the five-year periods had considerable variability in mean, median, and percentile dates across periods (**Table 2**).

b. PRRIP Systematic Aerial Surveys

There were 176 observations of whooping crane groups during 2001–2022 PRRIP fall systematic aerial surveys (**Figure 4**). Observations ranged between October 15 and November 20 with mean and median observation dates of November 4 and November 5, respectively (**Figure 4**). The 2.5th through 97.5th percentile of observations ranged between October 19 and November 18, whereas the 5th through 95th percentile of observations ranged between October 23 and November 15 for the entire 2001–2022 period. Since 2015, observations of whooping crane groups have occurred on or after November 15 in four years and there has been a general decreasing trend in the number of days between the November 15 survey and final observation since 2001 (**Figure 5**).

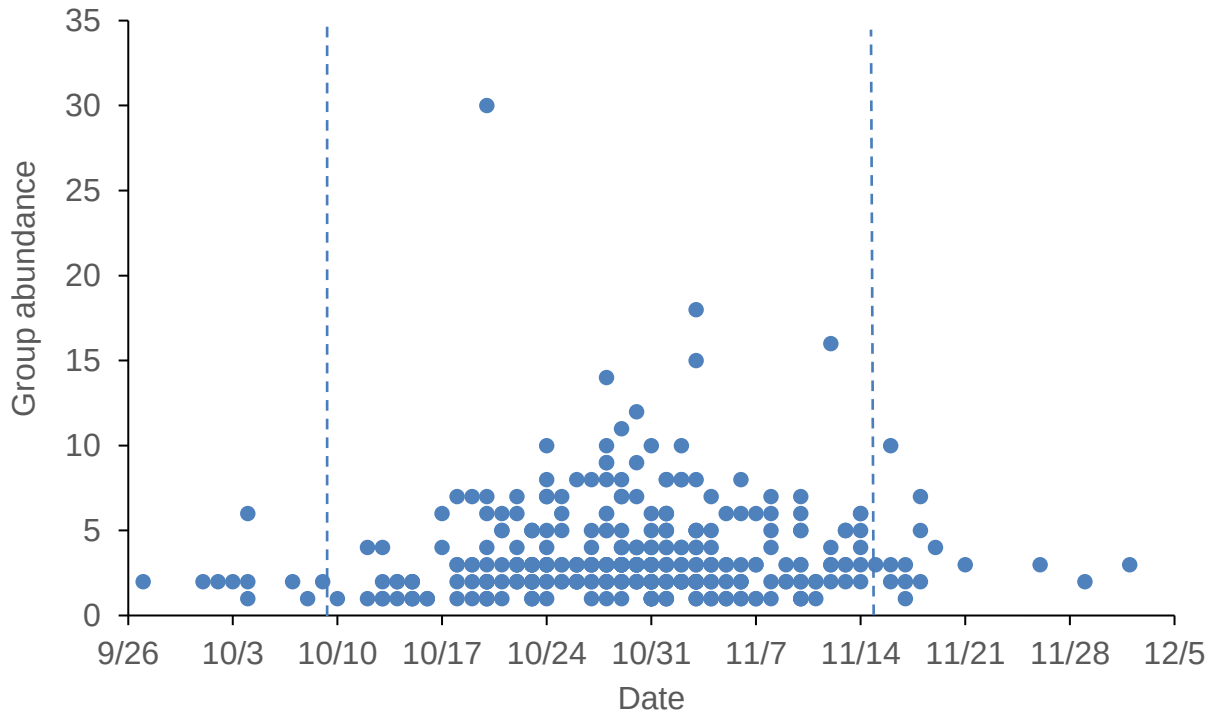

Figure 3. Whooping crane group abundance by date for observations recorded during fall 1975–2022 from the USFWS public sighting database. The current dates of PRRIP fall systematic aerial surveys (October 9–November 15) are depicted with vertical dashed lines.

Table 2. The number of whooping crane groups, mean and median dates of group observations, and 2.5th, 97.5th, 5th, and 95th percentiles of dates of group observations based on the USFWS public sighting database for observations recorded during the fall migration between 1975 and 2022. Statistics are provided for 1975–2022, two periods (1975–1999; 2000–2022); five 10-year periods (1975–1984; 1985–1994; 1995–2004; 2005–2014; 2015–2022); and 10 five-year periods (1975–1979; 1980–1984; 1985–1989; 1990–1994; 1995–1999; 2000–2004; 2005–2009; 2010–2014; 2015–2019; 2020–2022). The current fall monitoring period is also denoted.

Period	No. of groups	Mean date	Median date	2.5th–97.5th	5th–95th
Current Fall Monitoring Period				10/9–11/15	
One Period					
1975–2022	346	10/29	10/30	10/8–11/17	10/14–11/14
Two Periods					
1975–1999	117	10/26	10/27	10/6–11/12	10/11–11/9
2000–2022	229	10/30	10/31	10/13–11/17	10/15–11/14
10-Year Periods					
1975–1984	31	10/26	10/28	10/10–11/8	10/14–11/3
1985–1994	58	10/26	10/27	10/3–11/9	10/7–11/8
1995–2004	61	10/27	10/28	10/13–11/14	10/14–11/11
2005–2014	103	10/29	10/30	10/7–11/17	10/15–11/14
2015–2022	93	11/2	11/2	10/15–11/23	10/18–11/14
Five-Year Periods					
1975–1979	8	10/25	10/23	10/17–11/3	10/18–11/3
1980–1984	23	10/26	10/28	10/9–11/11	10/12–11/2
1985–1989	29	10/28	10/31	10/9–11/9	10/12–11/8
1990–1994	29	10/23	10/24	10/2–11/10	10/5–11/5
1995–1999	28	10/28	10/25	10/17–11/13	10/18–11/11
2000–2004	33	10/27	10/30	10/11–11/11	10/13–11/17
2005–2009	49	10/27	10/29	10/6–11/6	10/14–11/6
2010–2014	54	11/1	10/30	10/11–11/17	10/16–11/16
2015–2019	58	11/3	11/2	10/15–11/27	10/17–11/17
2020–2022	35	10/31	11/1	10/19–11/13	10/20–11/11

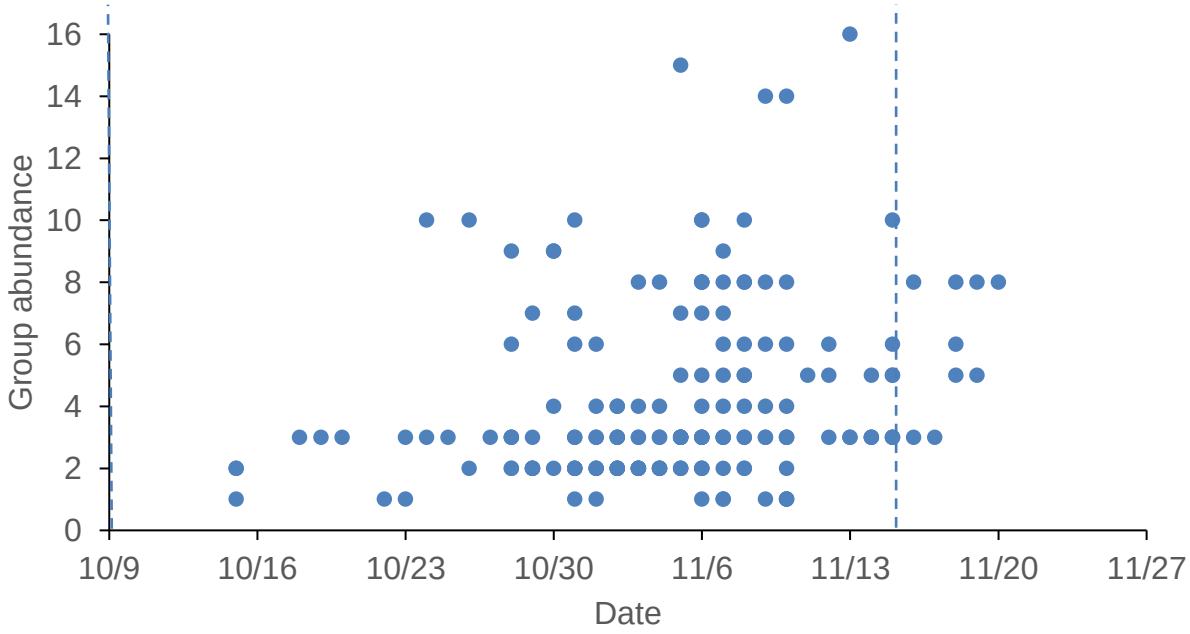

Figure 4. Whooping crane group abundance by date for observations recorded during 2001–2022 during PRRIP fall systematic aerial surveys. The current dates of PRRIP fall systematic aerial surveys (October 9–November 15) are depicted with vertical dashed lines.

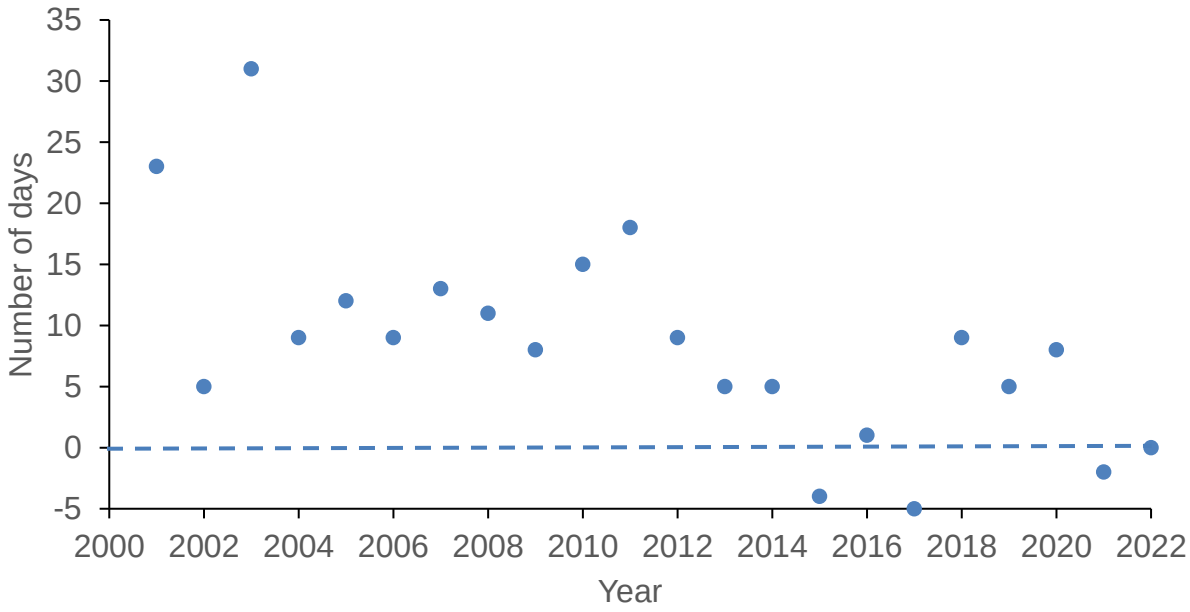

Figure 5. Number of days between the November 15 survey and final observation for PRRIP fall systematic aerial surveys conducted during 2001–2022. A negative value for number of days denotes the observation occurred after November 15.

C. *Fall Data Summary*

Current PRRIP fall systematic aerial survey dates range between October 9 and November 15. This date range encompassed 5th and 95th percentiles of dates of group observations from USFWS public sighting data for the 1975–2022 period, 1975–1999 and 2000–2022 periods, four of five 10-year periods, and six of 10 five-year periods (Table 2). The current PRRIP fall survey date range did not encompass 2.5th and 97.5th percentiles of dates of group observations for the full 1975–2022 period or the shorter 1975–1999 and 2000–2022 periods (Table 2). Therefore, current PRRIP survey dates include 5th and 95th percentile dates for previous and recent periods of ≥10 years. However, the 95th percentile of date of group observations has shifted for several recent periods to November 14, which nearly matches the November 15 survey end date (Table 2). The earliest observation recorded during PRRIP fall aerial surveys since 2001 was October 15 and surveys have been extended beyond November 15 in four of the last eight years in accordance with established monitoring protocol.

III. WORKING GROUP RECOMMENDATIONS

The working group recommended changing monitoring dates for PRRIP spring and fall whooping crane systematic aerial surveys based on data and results presented. These recommendations were based on: (1) shifts in the 5th and 95th percentiles of dates of whooping crane group observations for spring and fall from the USFWS public sighting database over time; (2) no observations after April 20 of any year during PRRIP spring systematic aerial surveys; (3) no observations before October 15 of any year during PRRIP fall systematic aerial surveys; and (4) an increase in observations on and after November 15 during PRRIP fall systematic aerial surveys over the past several years. The working group recommended using 10-year rolling periods to evaluate changes in 2.5th and 97.5th and 5th and 95th percentiles of dates of group observations from the USFWS public sighting database. Using a shorter time interval, such as the five-year periods evaluated and presented at the working group, was not recommended due to the high variability in the range of observation dates and percentiles within and across periods.

A. Process for Establishing and Reevaluating Spring and Fall Survey Dates

The EDO will use the USFWS public sighting database to calculate the 2.5th and 97.5th and 5th and 95th percentiles of the dates of whooping crane group observations in 10-year rolling periods on an annual basis based on the most recent 10 years of available data. The 10-year period appears to be sufficiently long to not be overly influenced by annual variability in whooping crane migratory behavior. The working group wanted to increase the likelihood that the survey dates encompassed the 5th and 95th percentiles of dates of group observations, and establishing survey dates that included the broader 2.5th and 97.5th percentiles provides a buffer should the timing and duration of migration shift over time.

The EDO will analyze percentiles of dates of group observations, draft a summary of results, and provide the information to the TAC on an annual basis. Annual assessments will occur in January after the USFWS has completed their database review and provided data to the EDO. For example, the EDO will use USFWS data from 2015–2024 to evaluate spring and fall survey

dates for 2025 in January 2025. The annual assessment will afford a better understanding of changes in the timing and duration of whooping crane use of the central Platte River that have occurred over the most recent 10 years, and will serve as an annual check in to see if observation dates approach or surpass the 5th and 95th percentiles of group observations. If so, this will serve as a trigger for another formal assessment by the TAC of whether or not to adjust survey dates.

B. Establishing Survey Dates for the 2024 Spring and Fall Migration

To provide recommended survey dates for 2024, the EDO calculated the 2.5th and 97.5th and 5th and 95th percentiles of the dates of whooping crane group observations for the 2013–2022 period for both spring and fall migrations and compared them to current survey dates. For the spring migration, dates of group observations ranged between February 28 and May 5 (mean = March 31; *n* = 271) during 2013–2022. The 2.5th and 97.5th percentiles of dates of group observations were March 5 and April 19, respectively, and the 5th and 95th percentiles were March 10 and April 17, respectively, during 2013–2022. For the fall migration, dates of group observations ranged between September 27 and December 1 (mean = November 2; *n* = 121) during 2013–2022. The 2.5th and 97.5th percentiles of dates of group observations were October 15 and November 18, respectively, and the 5th and 95th percentiles were October 17 and November 16, respectively, during 2013–2022.

Based on the data for the prior 10 years, the working group's recommendation is to modify PRRIP's systematic aerial surveys for whooping cranes in 2024 to occur between March 5 and April 19 for spring and October 15 and November 18 for fall. These changes would shorten the spring survey from 55 to 46 days and the fall survey from 38 to 35 days. We are asking the TAC for formal consideration of the working group's recommendations to modify the dates of whooping crane surveys in spring and fall of 2024. If the full TAC would like to make this recommendation, it will be presented to the Governance Committee (GC) for their consideration in June 2023.

C. Process for Comparing Previous Data Collected Using Shorter or Different Survey Season Lengths and Modifications to Whooping Crane Reports

The number of survey days within PRRIP's systematic aerial monitoring period has changed over time (PRRIP 2023a). This should be considered when evaluating performance metrics over time. The working group recommended using the following procedure for evaluating whooping crane proportion of population and number of crane use days across years. First, calculate the 5th and 95th percentiles of group observations from the USFWS public sighting database based on the 10 years prior to and including the year of data being evaluated. For example, for whooping crane survey data collected during 2022, percentiles of dates would be determined using data from 2013–2022. Second, determine the number of individuals, number of groups, and number of crane use days that PRRIP observed for the season in question between dates corresponding to the 5th and 95thpercentiles of group observations over the 10 year period. Third, repeat steps 1 and 2 for every year dating back to 2007, which was the first full year of PRRIP systematic surveys. Fourth, report each season's performance metrics as those observed within the dates that encompass the 5th and 95th percentiles of group observations over the rolling 10-year window. For earlier years when survey periods were shorter, it is possible that PRRIP's monitoring period

did not fully encompass the 5th and 95th percentiles of group observations in the USFWS public sighting database. If that is the case, the report will clearly denote these seasons as such. This procedure would afford a more direct comparison across years for which survey season dates and lengths changed as opposed to the current process of reporting proportion of population and number of crane use days regardless of survey season length as documented in Figure 3 of recent whooping crane reports (e.g., PRRIP 2022, PRRIP 2023b).

In future versions of the spring and fall whooping crane reports, a figure similar to Figure 3 will be provided that presents proportion of population and number of crane use days unadjusted for date percentiles and varying survey season length. The EDO will provide a second figure in the report that depicts proportion of population and number of crane use days recorded only between dates that correspond to the 5th and 95th percentiles of group observations for the preceding 10 years for all years dating back to 2007.

IV. LITERATURE CITED

PRRIP. 2022. Platte River Recovery Implementation Program: Implementation of the whooping crane monitoring protocol – Spring 2022 Report. https://platteriverprogram.org/sites/default/files/2022-11/Implementation%20of%20the%20Whooping%20Crane%20Monitoring%20Protocol%20-%20Spring%202022%20FINAL.pdf#page=13.

PRRIP. 2023a. Platte River Recovery Implementation Program: 2023 JAN TAC whooping crane update. Slides 15-20. https://platteriverprogram.org/system/files/2023-01/07_2023%20Jan.%20TAC%20WC%20update.pdf.

PRRIP. 2023b. Platte River Recovery Implementation Program: Implementation of the whooping crane monitoring protocol – Fall 2022 Report. https://platteriverprogram.org/system/files/2023-02/10%20-%20Implementation%20of%20the%20Whooping%20Crane%20Monitoring%20Protocol%20-%20Fall%202022%20DRAFT.pdf#page=14.