



Elk Calving Area Closure Dates

Elk calving areas (formally indicated as elk production areas) are areas where elk calves are born. These areas are typically identified through observations of cow elk between May 15 and June 15. For approximately two weeks after birth elk calves exhibit a “hiding” strategy- where they are scentless and remain in place while the mother forages for food. Studies have shown declining elk productivity (e.g. surviving calf/cow ratio) when elk are disturbed during calving season.

For this reason, wildlife managers have recommended seasonally closing elk production areas to humans. Opening dates across Colorado include June 16, June 20, and July 1. The latest CPW recommendation is a closure that lasts through June 30, opening July 1.

This paper uses empirical research on the distribution of birth dates of northwest Colorado elk to determine what fraction of elk calves are impacted depending on the opening date. We use the data acquired from Byrne 1990 that summarizes three years of estimated elk birth dates derived from inspection of elk fetuses in cow elk. We then use two hiding period horizons (10 days and 14 days) to determine a range of impacted elk calves.

	1988	1989	1990	Total	Total w/o Aug	Percent	Cumulative %	100% - Cum.
May 1-5								
May 6-9								100%
May 11-15	1		1	2	2	1%	1%	99%
May 16-20	2		1	3	3	2%	3%	97%
May 21-25	3		3	6	6	3%	6%	94%
May 26-30	9	6	4	19	19	10%	16%	84%
May 31-June 4	13	3	21	37	37	20%	36%	64%
Jun 5-9	5	12	25	42	42	23%	59%	41%
Jun 10-14	0	7	29	36	36	19%	78%	22%
Jun 15-19	1	1	16	18	18	10%	88%	12%
Jun 20-24	2	0	5	7	7	4%	91%	9%
Jun 25-29		1	6	7	7	4%	95%	5%
Jun 30-Jul 4		2	3	5	5	3%	98%	2%
Jul 5-9		0	2	2	2	1%	99%	1%
Jul 10-14		1		1	1	1%	99%	1%
Jul 15-19		1		1	1	1%	100%	0%
Jul 20-24				0				
Jul 25-29				0				
Jul 30-Aug 3				0				
Aug 4-8				0				
Aug 9-13				0				
Aug 14-18				0				
Aug 19-23				0				
Aug 24-28			2	2				
Aug 29-Sep 2			2	2				

Figure 1 shows the Byrne data over three years. Elk calves were assigned to 5-day bins.

The Byrne data was acquired over three years (1988, 1989, 1990). Each elk calf was placed in a 5-day birth date bin. For example, June 10-14 is a single bin. For finer resolution we assumed elk birthdates were evenly distributed across each 5-day period, which each day accounting for 20% of the total of that bin. We summed data from all three years together.

The earliest calf birthdate was May 11-15. Four calves were born between August 24 and September 2. These late date births were considered unviable in our analysis, as this gives reduced time to build up body weight and fat for the winter. With those four calves removed, the latest birthdate was July 15-19, and included 186 calves. The distribution of birthdates is shown below:

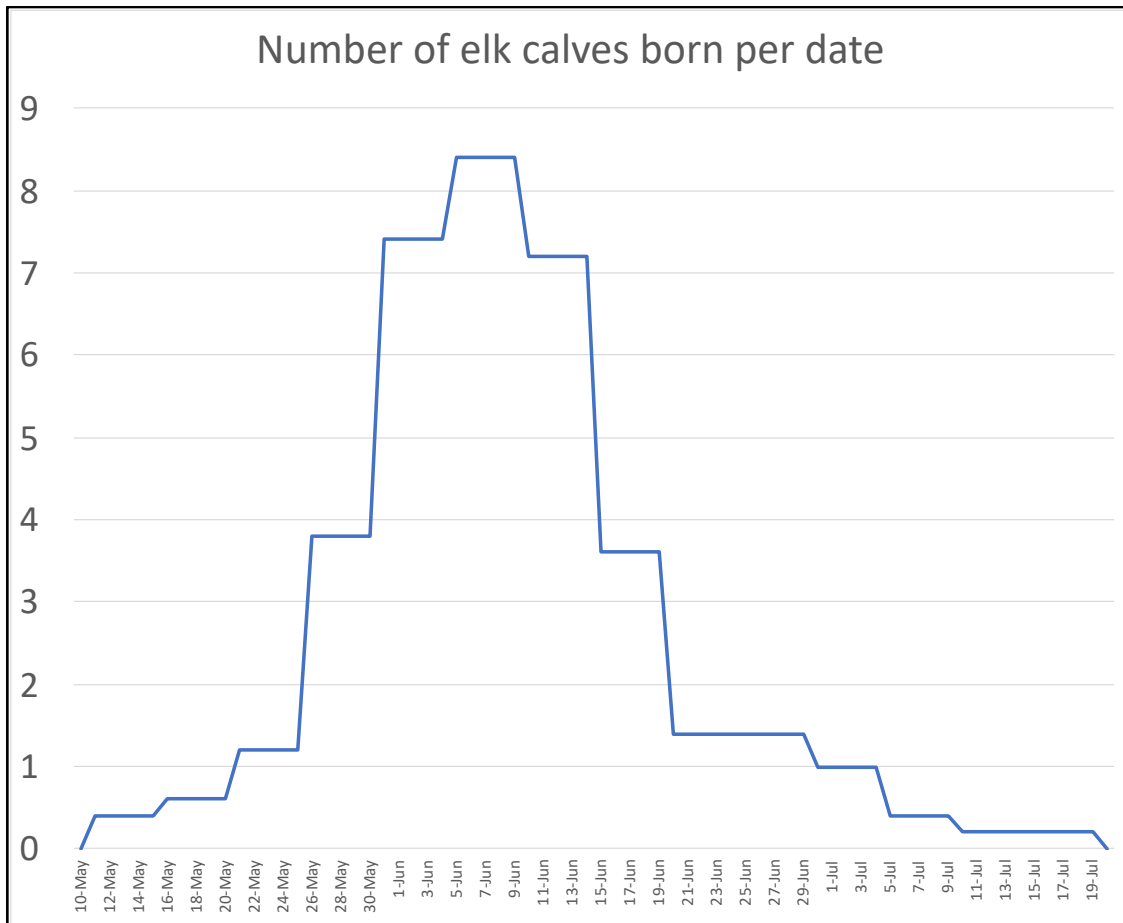


Figure 2 Distribution of birthdates for 186 northwest Colorado elk calves.

We can see that the shape of the curve approximates a normal distribution, but is somewhat stretched out for later dates. This may be due to cow elk becoming pregnant during the second estrus. Approximately 80% of elk calves are born through June 15. The figure below shows the cumulative percentage of elk calves born by date.

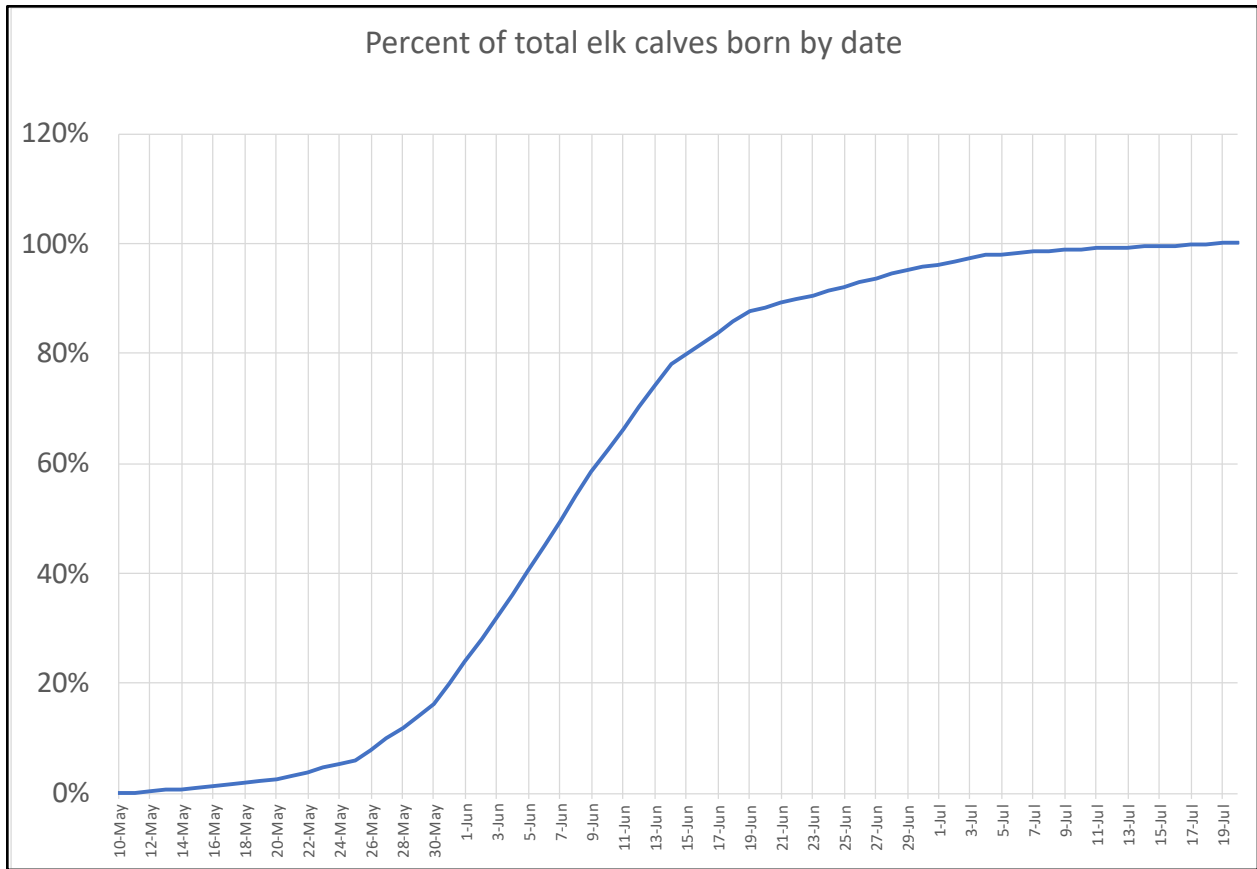


Figure 3 Cumulative percentage of all elk calves born by date.

Once we know the distribution of birthdates, it is straightforward to add the hiding period of 10 or 14 days to calculate the portion of calves potentially disturbed by humans. This is shown in Figure 4, below.

Figure 4 shows the significant impact opening dates have on portion of elk calves potentially disturbed. A June 16 opening date leads to 76% of elk calves exposed to human disturbance when using a 14-day hiding period. This lowers to 55% if a more conservative 10-day hiding period is used. In either case, a majority of elk calves will be subject to human disturbance if a calving area is opened on June 16.

A July 1 opening date lowers both percentages. The portion of disturbed calves drops from 76% to 18% assuming a 14-day hiding period. It drops from 55% to 11% for a 10-day hiding period. There are two takeaways from this data. One is the substantial beneficial decrease in the number of elk calves disturbed by moving the opening data two weeks later to July 1. In both cases the number of disturbed elk calves dropped by over a factor of four.

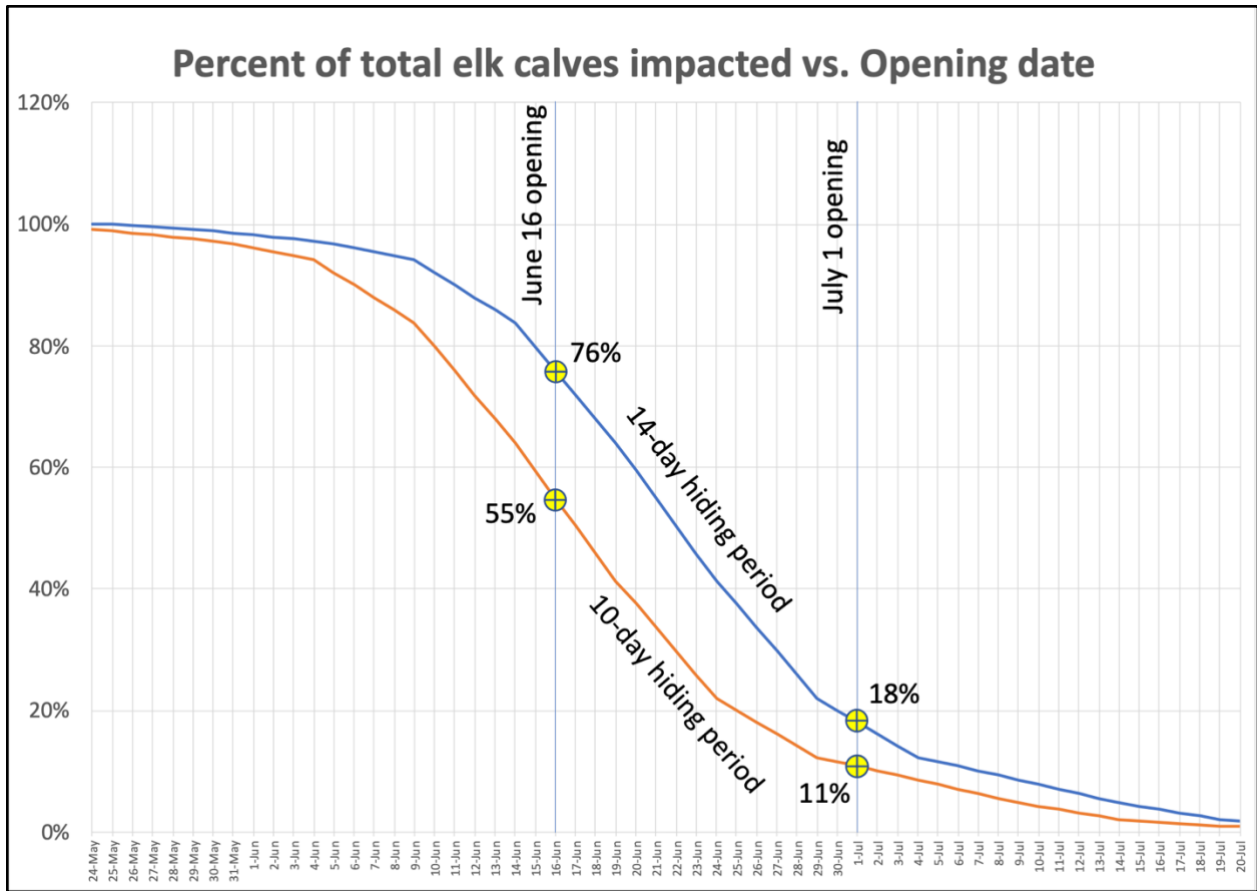


Figure 4 shows the portion of calves exposed to be disturbed depending on the opening date of the calving area to humans.

The other takeaway is that specifying a July 1 opening date doesn't eliminate the impact to elk calves. Somewhere between 11% and 18% of the calves remain exposed to human disturbance. This, coupled with enforcement issues, leads to the preferable solution of avoiding calving areas altogether. It is only when this is not feasible should we look at seasonal closures as a form of mitigation. When we do, a July 1 opening date is much less impactful than a June 16 opening date.