

2022 Karner Blue Butterfly Summer Survey Results

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The Karner Recovery Program has been conducting Karner blue butterfly monitoring for 15 years!

MONITORING:

Within the WDNR Karner blue butterfly Recovery Program, monitoring throughout the Karner's range consists of two types of survey efforts, population surveys, which are conducted using a highly intensive survey method (distance sampling) and occupancy surveys, which are conducted using less intensive survey methods (occupancy-presence/absence) (Figure 1). Population surveys allow us to view a snapshot of what a specific site population level is estimated to be at that point in time. Occupancy surveys allow us to survey a greater number of sites and estimate the occupancy, detection, colonization and local extinction rates of the species. These estimates give us a larger picture view of the species health and its metapopulation dynamics across the state.

Population Surveys (distance sampling):

In 2022, 582 acres across 15 sites in 9 counties were surveyed using the higher intensive survey method of distance sampling to estimate local population size (Figure 1). A total population of 67,314 individuals was estimated on those 582 acres (Appendix Table 2). Number of individuals counted is highly dependent on the effort, or number of acres surveyed, which varies annually. To examine trends across years and among sites we therefore calculate butterflies estimated per acre surveyed. When comparing butterflies per acre, we saw a 13% increase in the total estimated number of butterflies per acre compared to 2021 (Figure 2). The number of butterflies per acre in 2022 was the 4th highest in the last 15 years of data collection (Figure 2). In 2022, the estimated number of butterflies per acre (116) surpassed the average number of individuals (96) over the study period. Populations throughout the state fluctuate every year, meaning not every

population will increase/decrease at the same time/rate. Each of the properties surveyed have been broken down into estimated butterflies per acre surveyed and can be found in the Appendix.

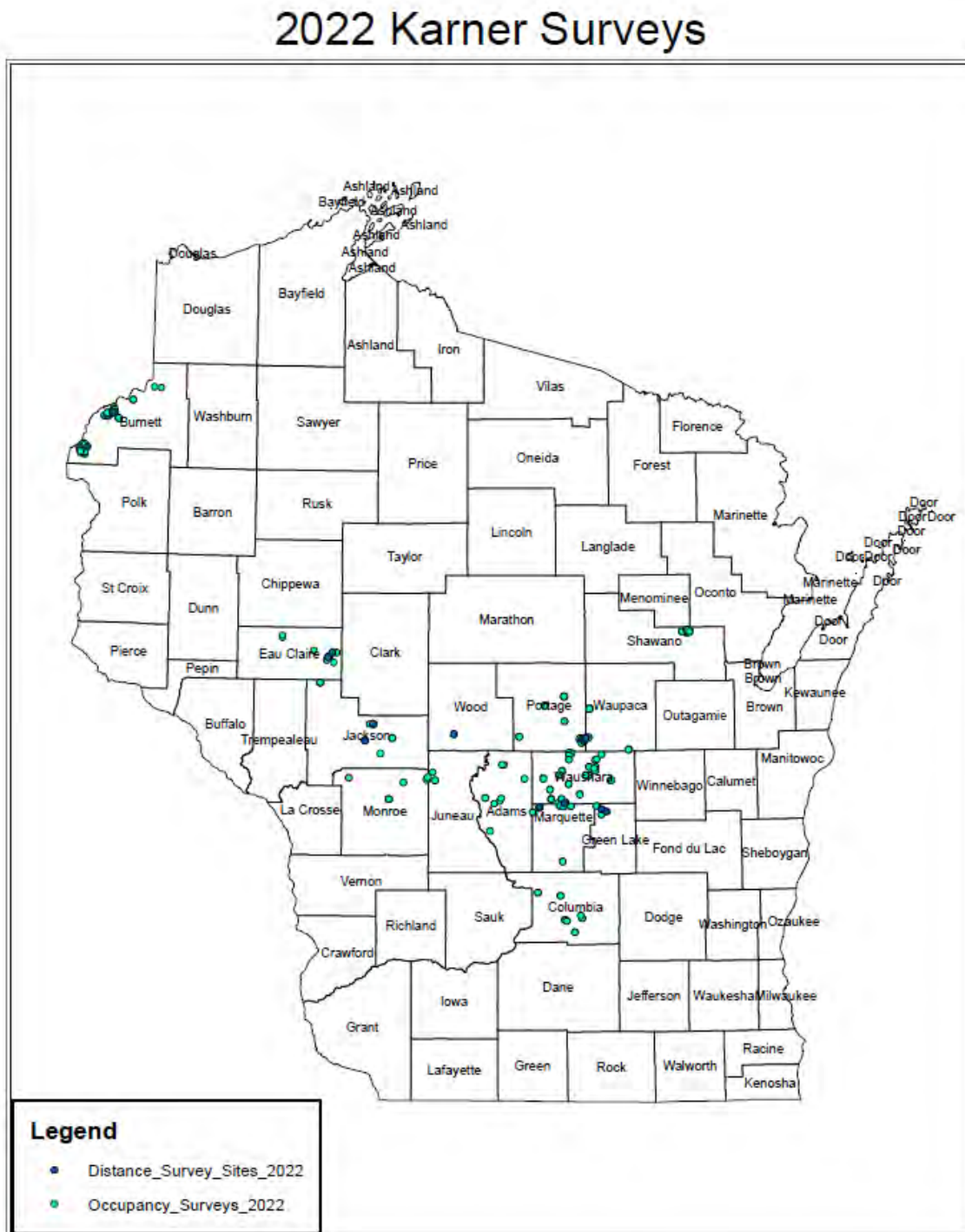


Figure 1. Wisconsin Karner Blue Butterfly Recovery Program monitoring effort in 2022.

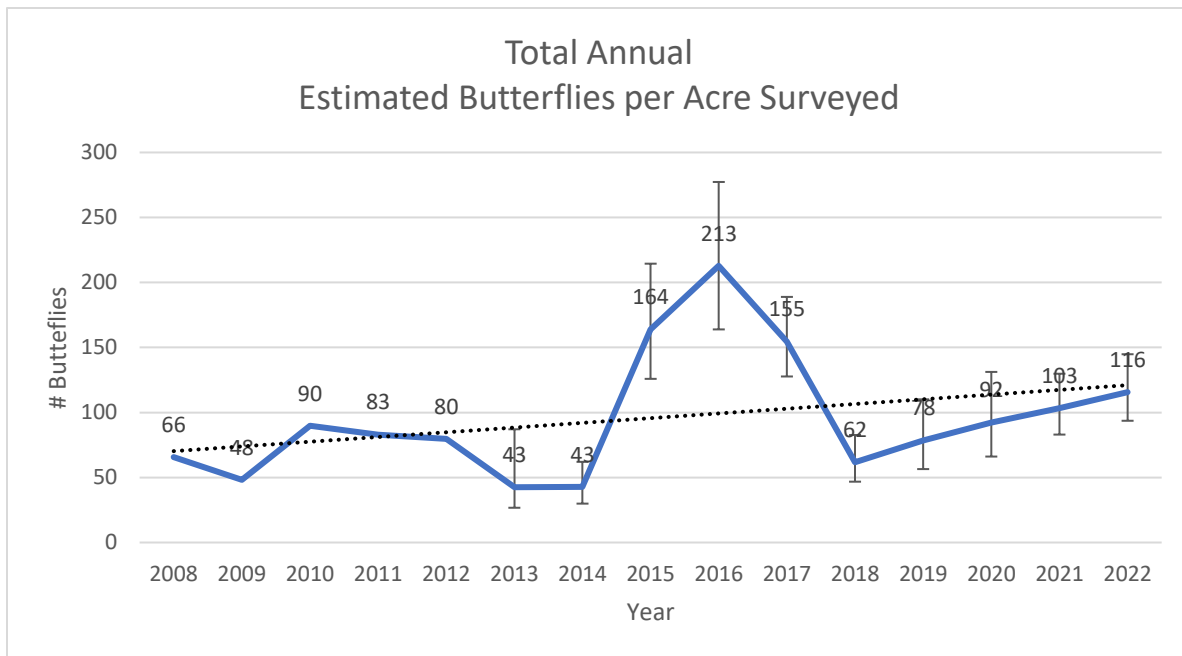


Figure 2. Annual estimated number of Karner blue butterflies per acre surveyed at all sites with 95% confidence levels. Dashed line represents linear trendline.

Occupancy Surveys:

For the 2022 field season, over 700 acres were surveyed using the lower intensive sampling method. These observations come from a variety of sources including DNR/HCP surveyors, contract crews, and participants in the [Karner Volunteer Monitoring Program](#). A total of 265 observations were submitted which is 53% more than 2021. Volunteers played a smaller role in collecting this type of data in 2022 with 18% of the total observations coming from volunteers. Contracted crews submitted 47% and DNR/HCP staff contributed 35%. Observers visited 153 sites in 2022 and of those, 116 sites had Karners present making the Naïve Occupancy 0.76 for 2022.

Utilizing these data, we can estimate occupancy rate (proportion of sites that are occupied), colonization rate (proportion of successful colonizations of unoccupied sites), and local extinction rate (proportion of formerly occupied sites becoming unoccupied). Based on these data, Karners are found to be consistently detectable at 0.91 (Table 1). Probability of extinction is 0.03, whereas colonization probability is 0.35 suggesting Karners are persisting within their Wisconsin habitats (Table 1). Occupancy probability is calculated each year and is the highest we’ve seen at 0.91 (Figure 3). One shortcoming of these data is the low number of repeated sites surveyed. Only one site has been surveyed every year for the last 5 years. Eight sites have been surveyed every 4 years, 24 sites have been surveyed every 3 years, and 32 sites have been surveyed every 2 years. The rest of the sites have been surveyed only once. This lack of repetition may contribute to a reduced confidence in the detection, extinction, and colonization estimates. A solution to this issue may be to focus survey effort in only one area of the state to

allow for targeted repeat survey effort. Another option could be to designate volunteer program leaders to organize volunteers in their areas of the state, allowing for more of the state to be covered.

Table 1. Detection, extinction, and colonization rates with standard error estimated from 2018-2022 data.

2018-2022		
Parameter	Estimate	Standard Error
Detection Probability	0.911	0.0159
Extinction Probability	0.0258	0.0206
Colonization Probability	0.349	0.0881

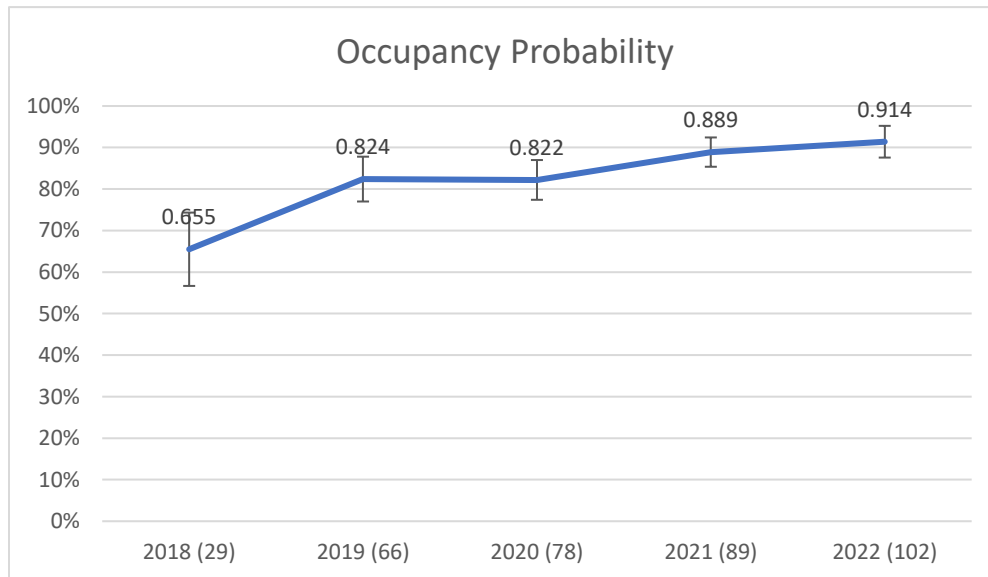


Figure 3. Annual Karner occupancy probability with standard error calculated in R. Number in parentheses represent number of sites per year.

In conclusion, Karners appear to be persisting and potentially increasing throughout their habitat in Wisconsin. Although populations fluctuate, we have seen an annual increase over the last 5 years. A combination of the Karner Habitat Conservation Plan, Karner Recovery Program, continued and expanded habitat management, and volunteer efforts have provided aid to the Karner Blue Butterfly’s overall improving status in Wisconsin.

*Interested in joining the Karner Volunteer Monitoring Program?
Click [here](#) to learn more or e-mail Chelsean.Weinzinger@wisconsin.gov to sign up!*

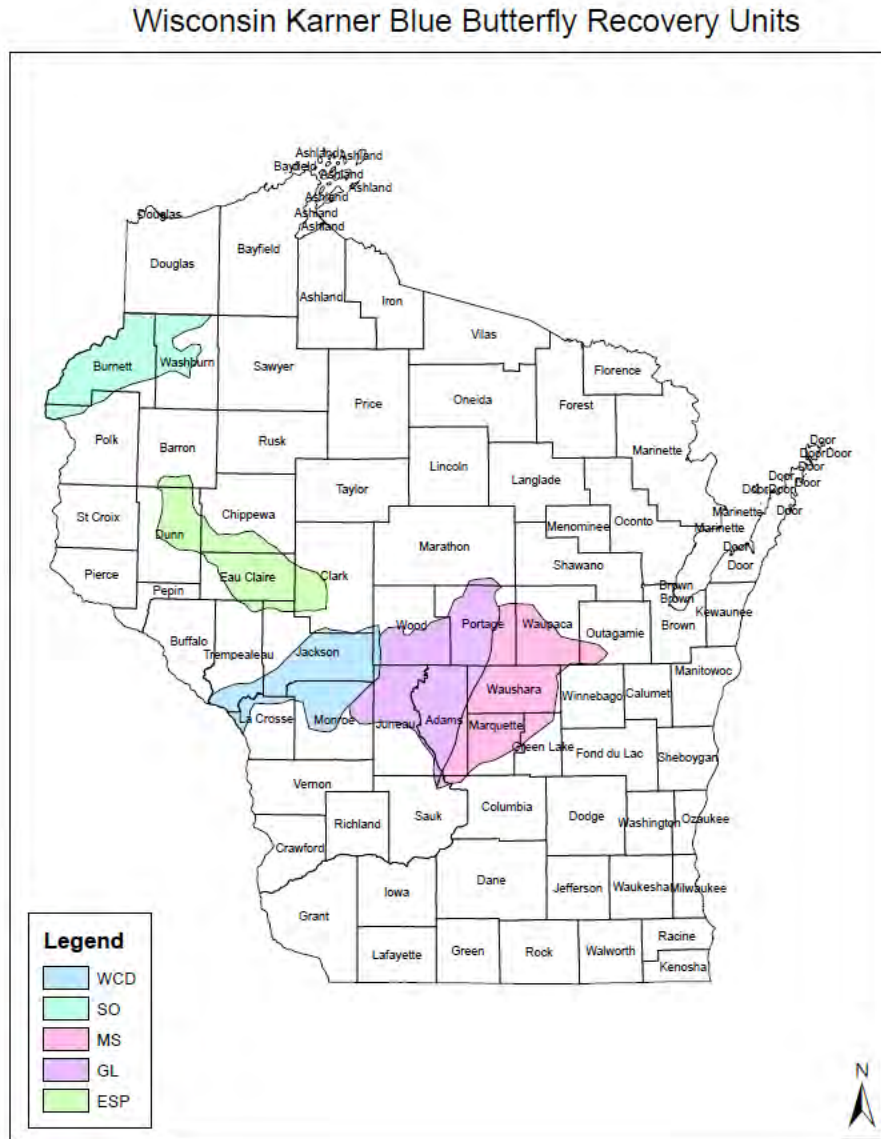


Figure 4. Breakdown of Recovery Units in Wisconsin.

Table 2. Annual Karner population estimates based on distance data collected at each recovery property. Note: population estimates are not directly comparable as the number of acres surveyed each year can vary.

WI KBB Population Estimate by Recovery Property																
RU	Property	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
GL	Sandhill W.A.	12,065	10,185	22,799	11,057	7,771	3,839	-	57,852	76,347	53,971	12,692	3,159	18,066	32,504	38,533
MS	Emmons Creek F.A.	4,089	1,921	4,395	3,452	5,597	4,733	697	1,335	3,002	4,781	1,629	4,173	3,933	1,939	1,224
	Hartman Creek S.P.	420	381	407	454	-	409	371	-	380	-	-	-	-	-	-
	Welch	706	1,207	1,417	2,497	2,842	2,611	-	6,239	10,856	4,773	3,183	10,154	5,361	5,660	9,487
	Greenwood W.A.	-	-	-	-	771	-	366	-	-	-	-	-	-	-	-
	White River W.A.	2,171	2,225	2,583	7,175	7,994	5,264	4,384	5,197	7,748	1,756	1,987	6,124	1,560	3,286	4,108
	Private Property 1	-	-	4,474	6,622	8,587	599	610	760	4,302	3,580	2,356	2,433	4,973	3,058	1,521
	Private Property 2	-	-	-	-	-	3,710	3,281	1,729	5,674	4,431	1,860	3,889	1,487	2,140	8,105
Private Property 3	-	-	-	-	-	-	-	-	-	-	386	1,030	1,677	1,093	-	
WCD	Black River S.F.	-	651	1,309	1,758	782	261	-	-	2,492	4,648	5,375	4,852	6,568	2,476	799
	Bauer Brockway SNA	-	-	-	1,837	-	316	-	-	3,336	2,346	372	0	569	1,209	446
SO	Crex Meadows W.A.	-	-	1,097	4,801	1,228	213	427	567	2,054	865	871	355	2,935	2,430	156
	Fish Lake W.A.	-	518	2,042	5,617	2,421	-	1,043	626	1,691	1,690	1,186	1,216	3,006	2,256	498
ESP	Canoe Landing Prairie SNA	-	-	-	-	-	-	-	-	-	-	-	-	2,203	1,567	1,153
	Coon Fork Barrens SNA	-	-	-	-	-	-	-	-	-	-	-	-	2,816	1,779	1,284
Total Population Estimate		19,451	17,088	40,523	45,270	37,993	21,955	11,179	74,305	117,882	83,227	32,541	38,032	54,570	60,304	67,314

Glacial Lake Recovery Unit (GL)

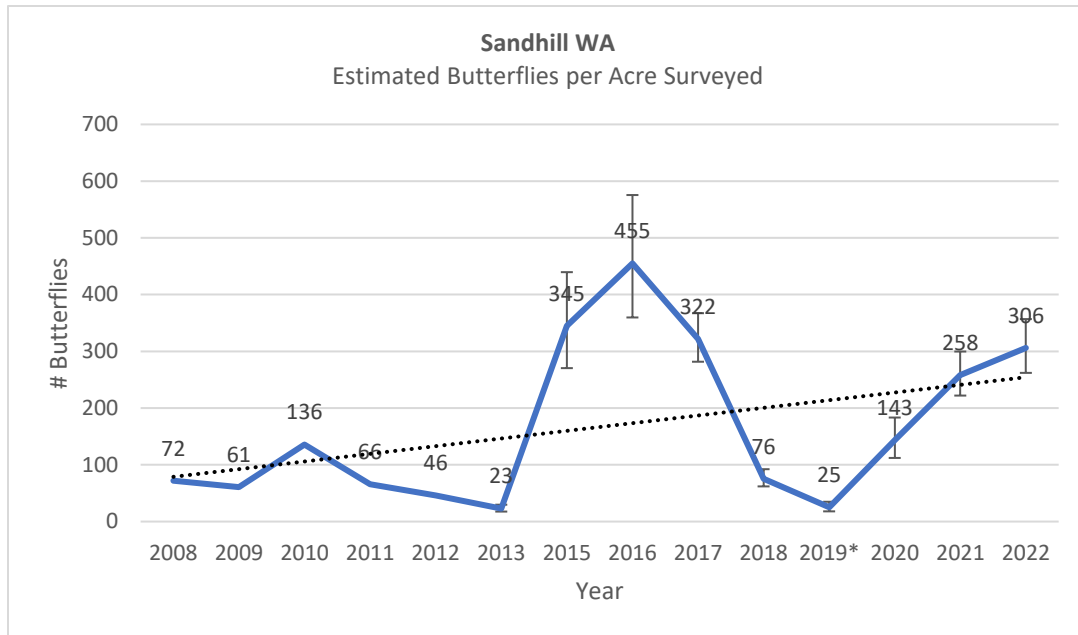


Figure 5. Annual estimated number of Karner blue butterflies per acre surveyed at Sandhill Wildlife Area with confidence levels. Dashed line represents linear trendline. Some estimates come from years where model assumptions were violated, making them less precise (starred years).

West Central Driftless Recovery Unit (WCD)

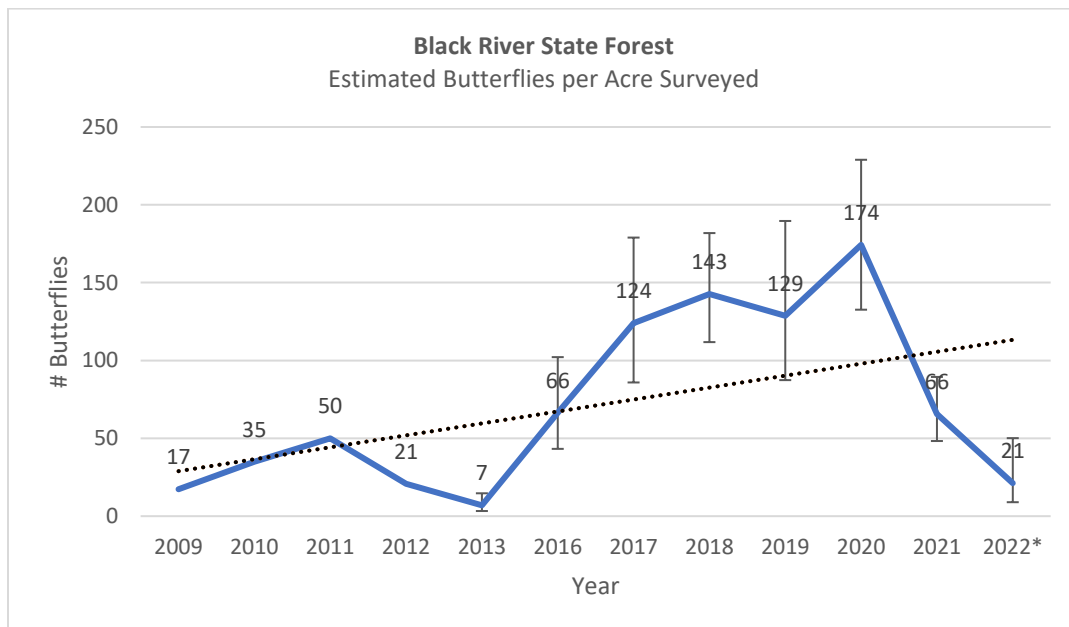


Figure 6. Annual estimated number of Karner blue butterflies per acre surveyed the Black River State Forest with confidence levels. Dashed line represents linear trendline. Some estimates come from years where model assumptions were violated, making them less precise (starred years).

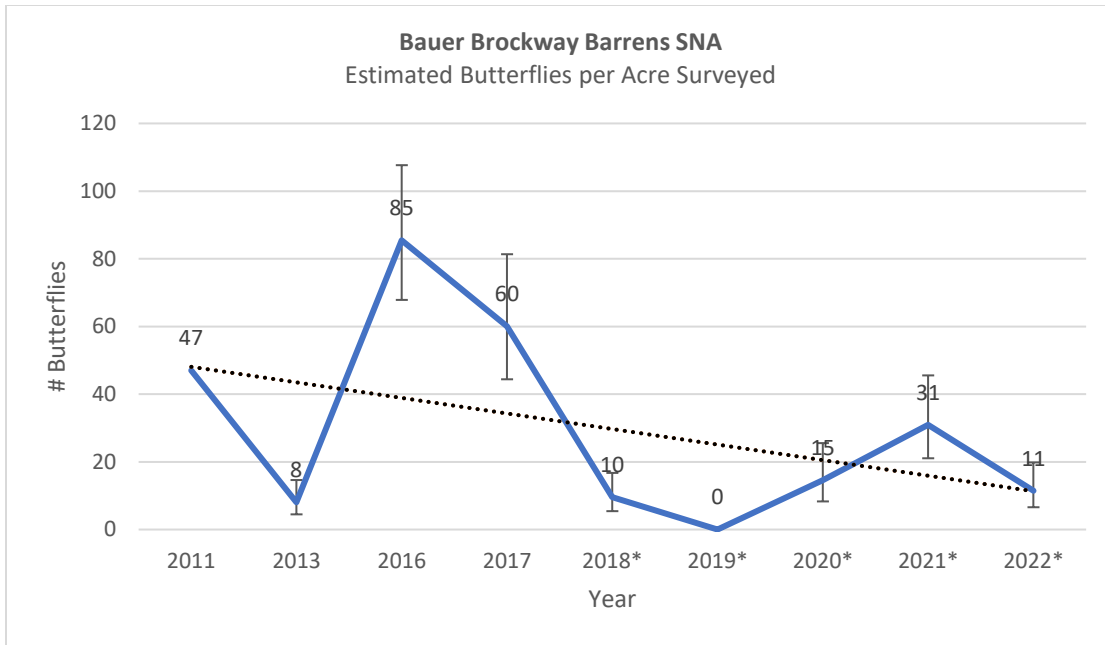


Figure 7. Annual estimated number of Karner blue butterflies per acre surveyed at Bauer Brockway Barrens with confidence levels. Dashed line represents linear trendline. Some estimates come from years where model assumptions were violated, making them less precise (starred years).

Escarpment & Sandstone Plateau Recovery Unit (ESP)

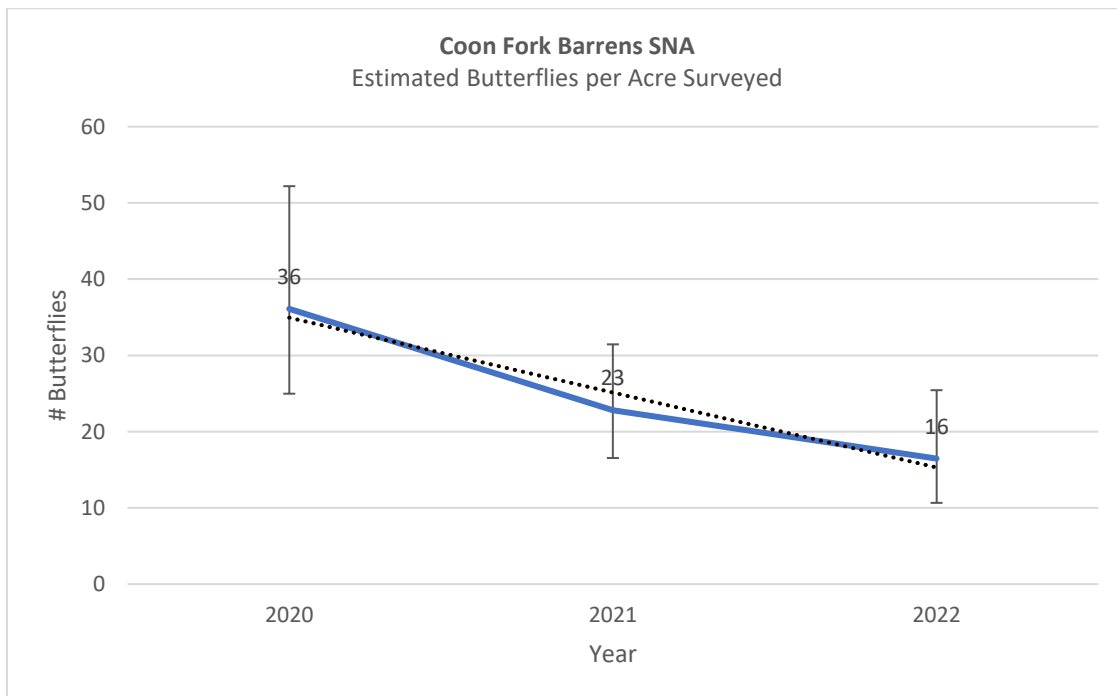


Figure 8. Annual estimated number of Karner blue butterflies per acre surveyed at Coon Fork Barrens State Natural Area with confidence levels. Dashed line represents linear trendline.

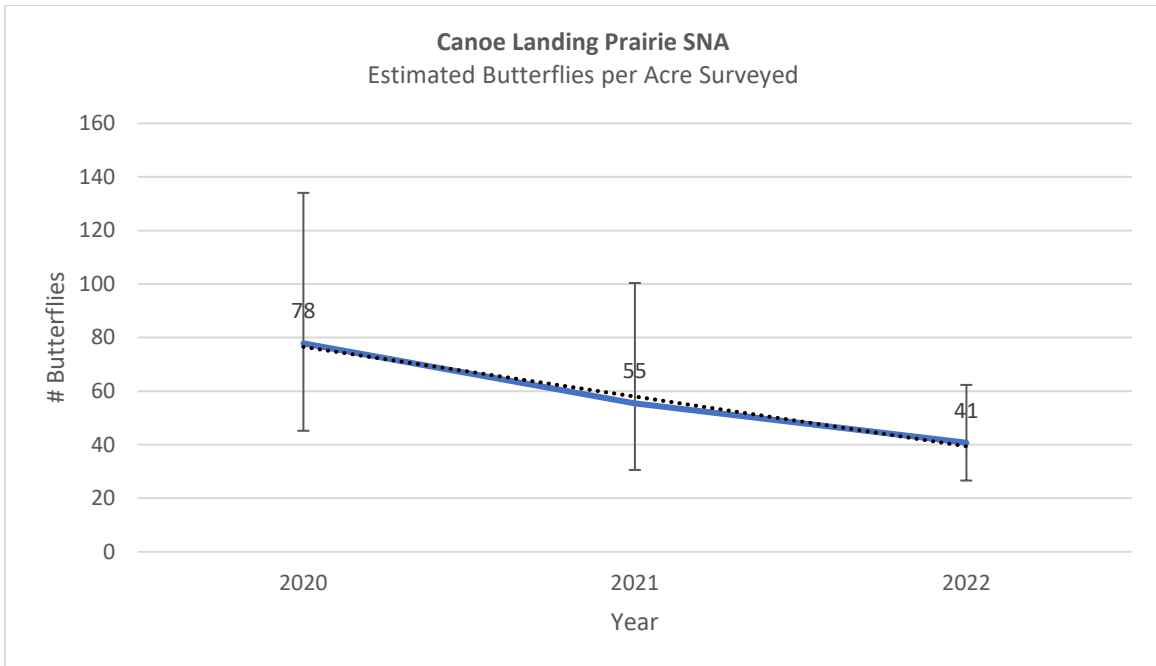


Figure 9. Annual estimated number of Karner blue butterflies per acre surveyed at Canoe Landing Prairie State Natural Area with confidence levels. Dashed line represents linear trendline.

Superior Outwash Recovery Unit (SO)

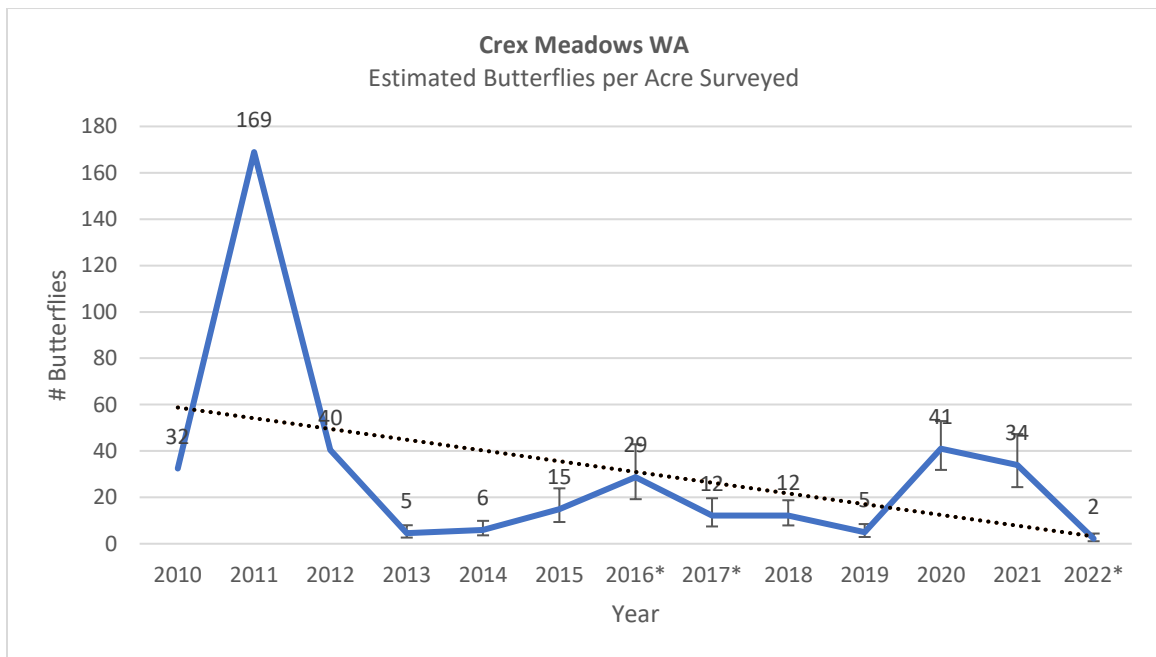


Figure 10. Annual estimated number of Karner blue butterflies per acre surveyed at Crex Meadows Wildlife Area with confidence levels. Dashed line represents linear trendline. Some estimates come from years where model assumptions were violated, making them less precise (starred years).

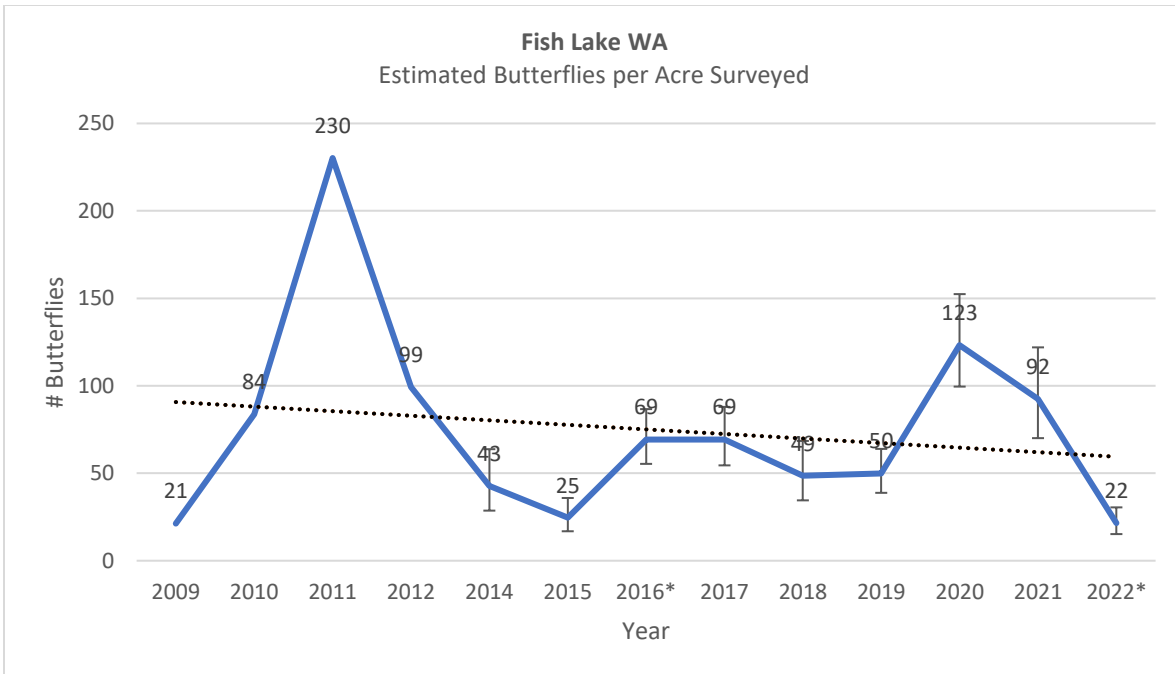


Figure 11. Annual estimated number of Karner blue butterflies per acre surveyed at Fish Lake Wildlife Area with confidence levels. Dashed line represents linear trendline. Some estimates come from years where model assumptions were violated, making them less precise (starred years).

Morainal Sands Recovery Unit (MS)

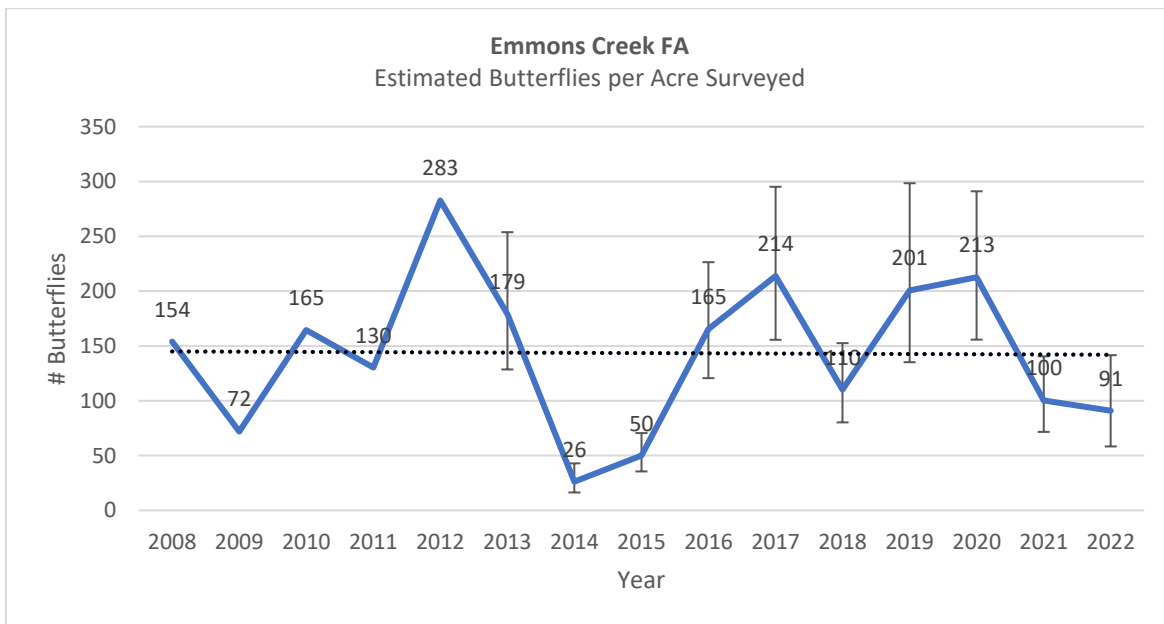


Figure 12. Annual estimated number of Karner blue butterflies per acre surveyed at Emmons Creek Fishery Area with confidence levels. Dashed line represents linear trendline.

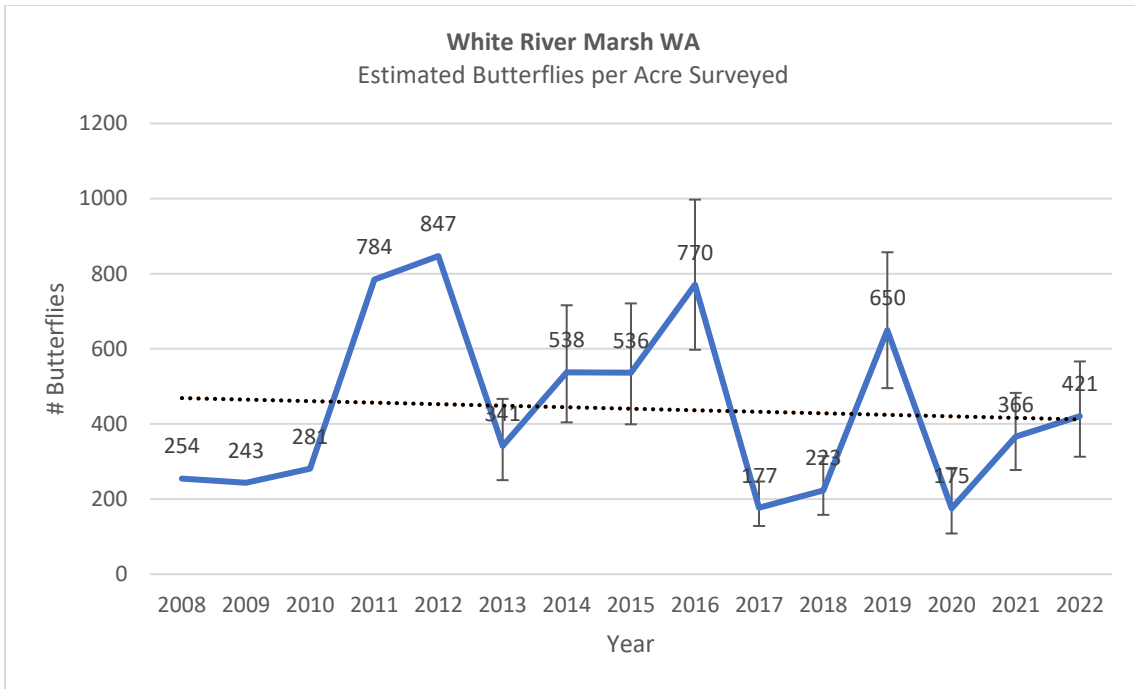


Figure 13. Annual estimated number of Karner blue butterflies per acre surveyed at White River Marsh Wildlife Area with confidence levels. Dashed line represents linear trendline.

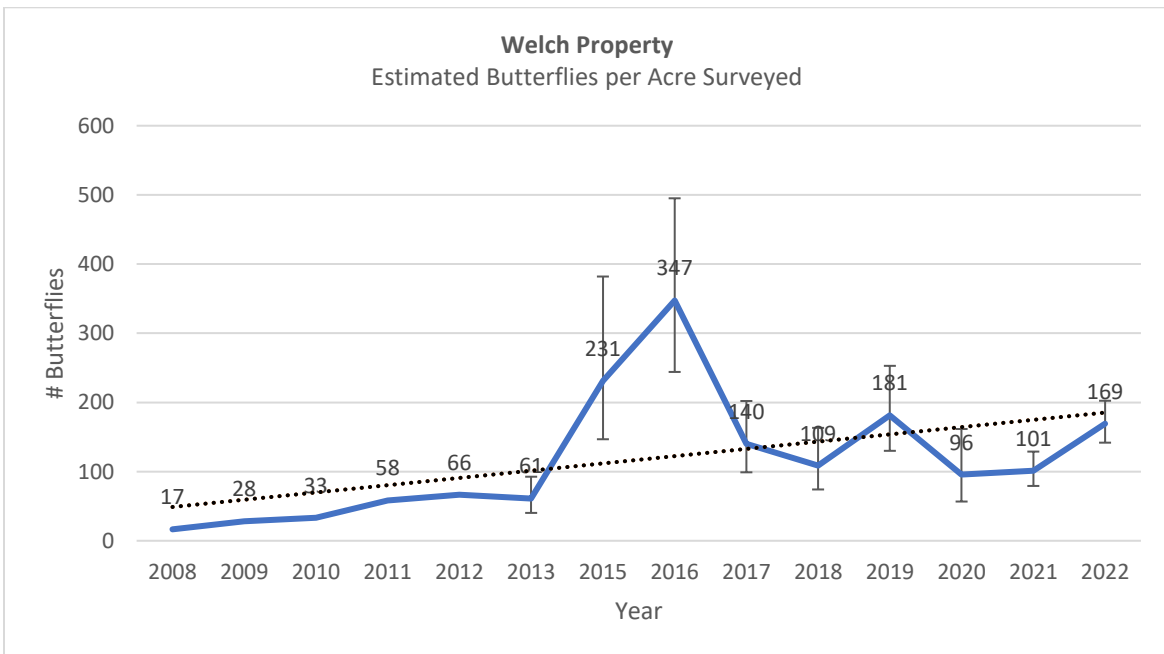


Figure 14. Annual estimated number of Karner blue butterflies per acre surveyed at Welch Property with confidence levels. Dashed line represents linear trendline.

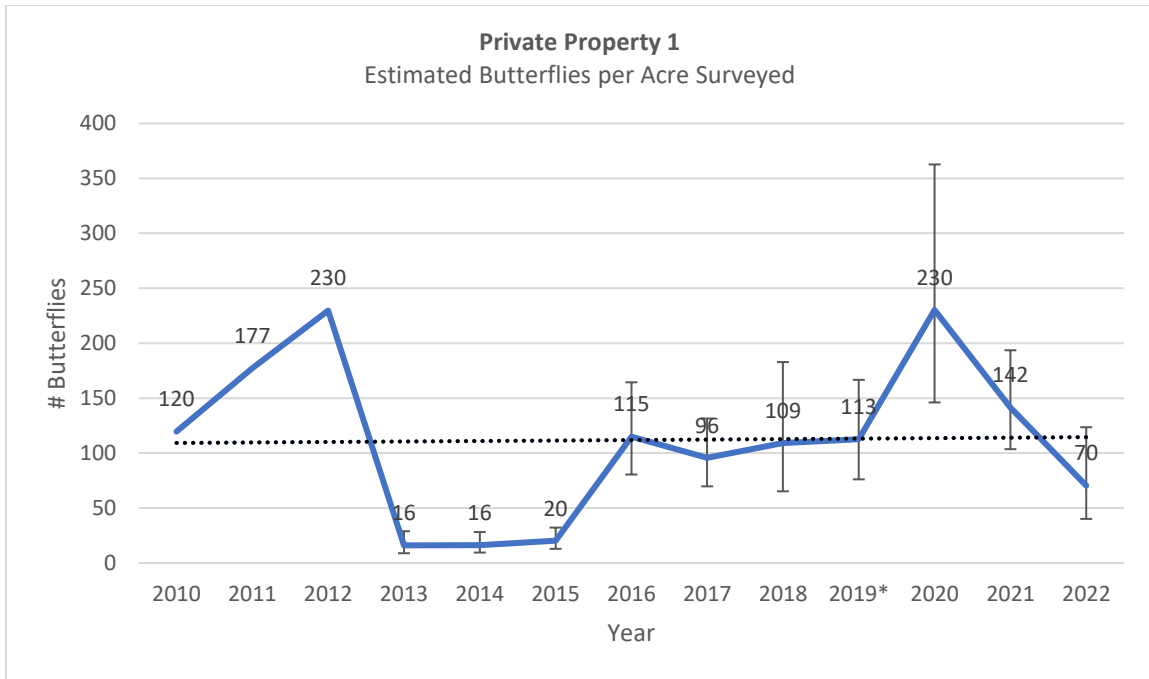


Figure 15. Annual estimated number of Karner blue butterflies per acre surveyed at Private Property #1 with confidence levels. Dashed line represents linear trendline.

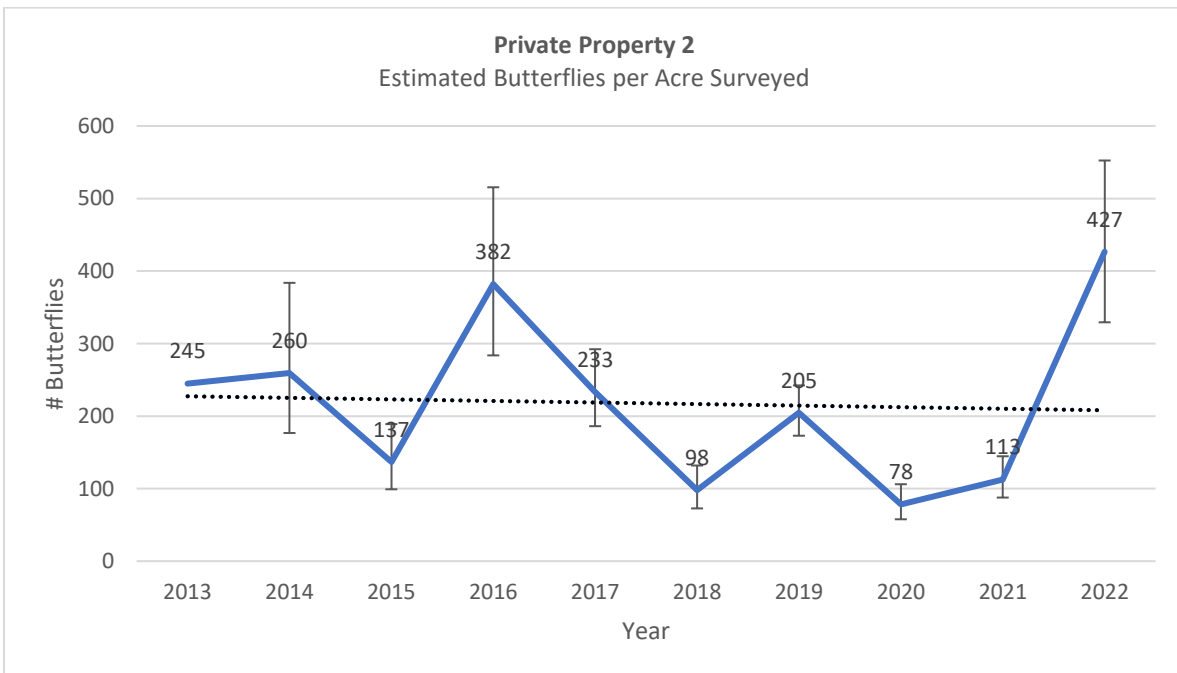


Figure 16. Annual estimated number of Karner blue butterflies per acre surveyed at Private Property #2 with confidence levels. Dashed line represents linear trendline.