

Effects of Yearly Seasons on Wildlife Strikes at Part 139 Airports in Colorado



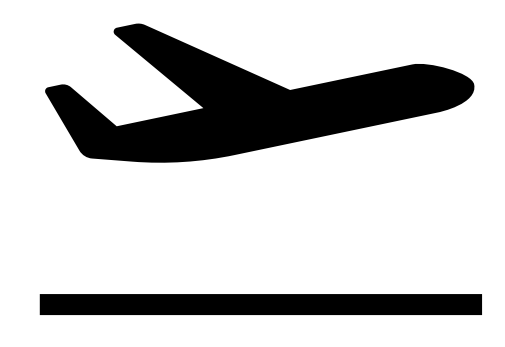
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INTRODUCTION

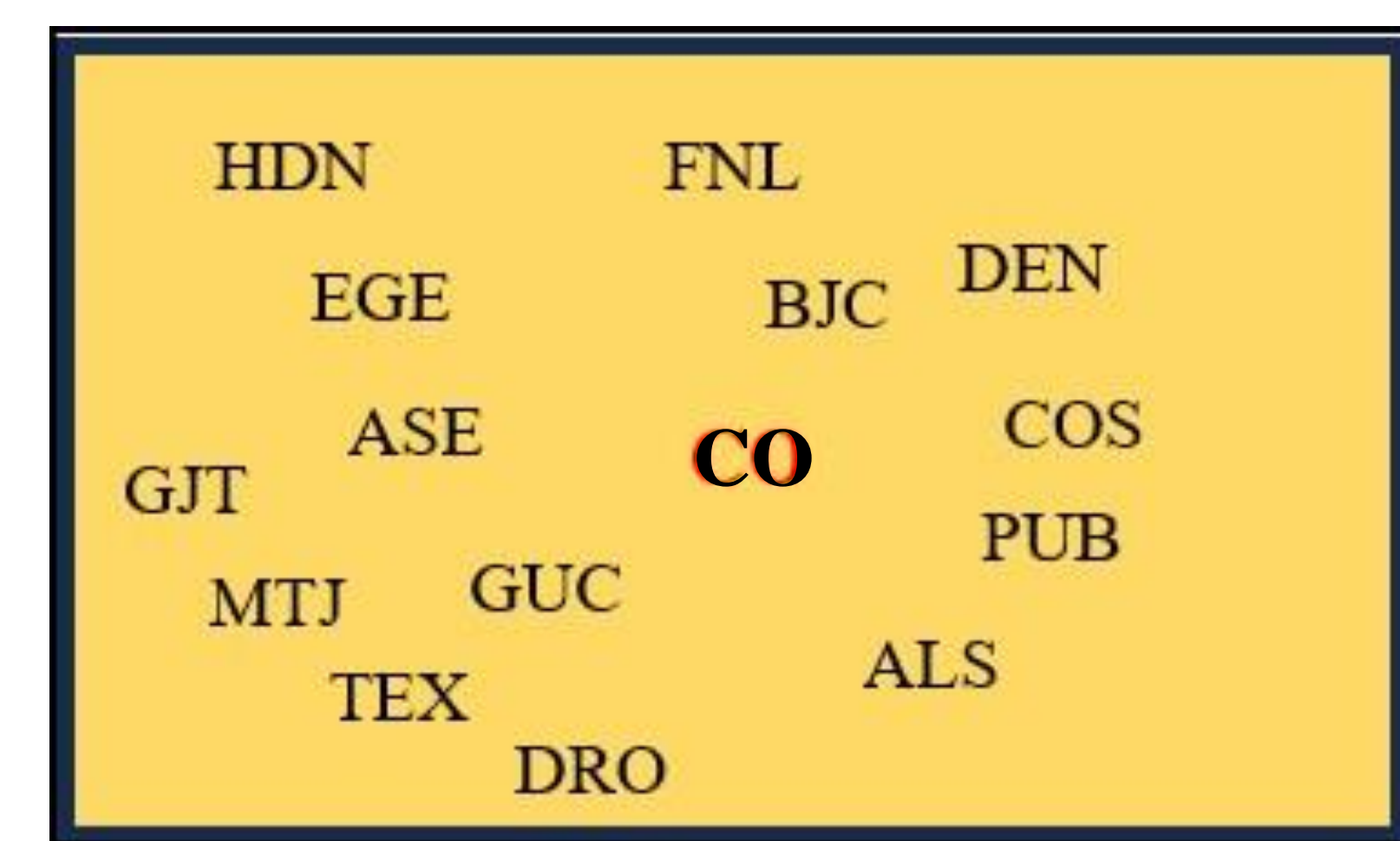
- Wildlife strikes are one of the most significant aviation safety concerns in Colorado.
- Seasonal patterns can affect the risk of wildlife strikes to aircraft.
- This study may provide further insight on the highly variable conditions (e.g., seasons) that may affect the risk of wildlife strikes across the U.S.

WILDLIFE STRIKE THREATS TO AVIATION & HUMAN LIFE

In the United States, from 1990 through 2022:
18,851 damaging strikes were reported.
\$1.06 billion expenses (direct & indirect costs).
44 human fatalities were registered.



PART 139 AIRPORTS in CO



Airports are displayed as per their location in the Colorado state map.

RESULTS - KRUSKAL WALLIS TEST

Descriptive Statistics	
Seasons	WSI Mean
Spring	31.02
Summer	44.57
Fall	18.05
Winter	10.02

RESEARCH QUESTIONS

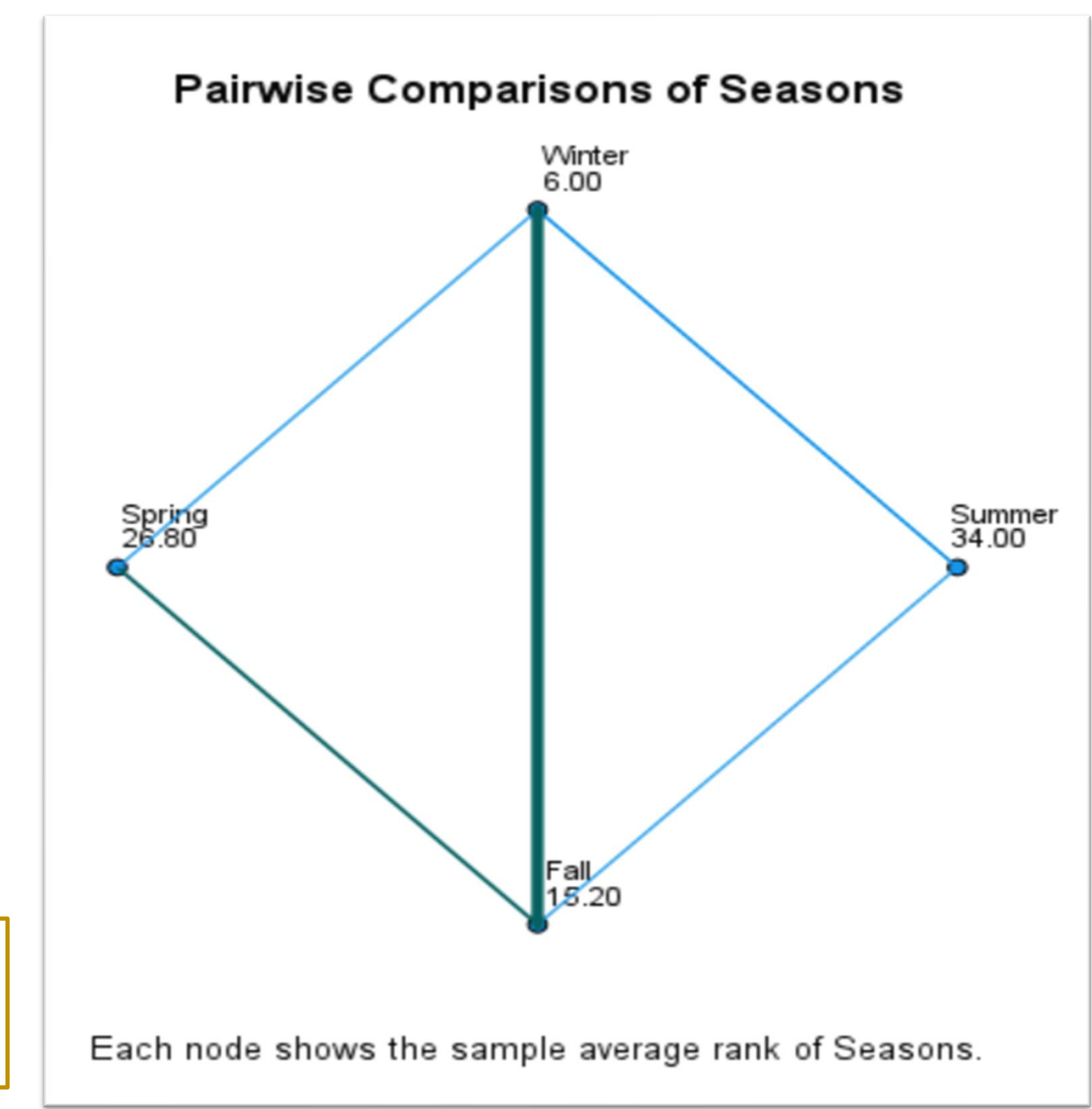
- **RQ1.** What are the number of wildlife strikes per 100,000 aircraft movements at the 14 Part 139 airports in Colorado?
- **RQ2.** Are the seasons of the year a significant predictor of wildlife strikes at Part 139 airports in Colorado?
- Aircraft components damaged include:



METHODOLOGY

- Wildlife-strikes: FAA National Wildlife Strike Database.
- Aircraft Operations: FAA Air Traffic Activity System, respectively (2013-2022).
- Data were transcribed into an Excel spreadsheet for data analyses.
- For the purpose of this study, yearly seasons were considered as Spring (March 20 – June 19), Summer (June 20 – September 21), Fall (September 22 – December 20), and Winter (December 21 – March 19).
- The researcher summarized the data and calculated the wildlife-strike index (WSI) as the number of wildlife strikes per 100,000 aircraft operations per year.
- A Kruskal-Wallis test was conducted.

$$\text{Wildlife Strike Index} = \frac{\text{Number of Wildlife Strikes}}{\text{Number of Aircraft Operations}} \times 100,000$$



FINDINGS

WILDLIFE STRIKE INDICES										
AIRPORTS	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALS	0.00	0.00	0.00	0.00	0.00	0.00	0.52	1.38	0.00	1.73
ASE	11.38	24.55	22.60	2.39	21.04	34.66	21.39	85.35	27.41	23.45
BJC	11.47	34.76	22.33	11.23	12.40	13.39	9.78	13.87	12.81	6.62
COS	25.45	41.47	32.36	23.81	33.10	43.55	24.29	22.78	29.30	46.63
DEN	74.52	87.98	77.48	77.37	51.43	78.41	86.25	111.37	108.59	126.31
DRO	2.59	3.36	3.82	4.90	8.19	3.39	6.25	0.00	2.12	2.30
EGE	13.22	12.35	10.35	15.53	13.62	7.13	6.92	10.42	20.51	29.64
FNL	0.65	2.69	3.18	1.23	2.34	2.83	0.08	7.59	7.43	3.45
GJT	8.35	8.83	20.88	6.65	2.29	6.04	8.36	37.64	5.25	15.24
GUC	0.00	0.00	0.00	0.00	0.00	1.13	1.04	0.00	0.53	0.57
HDN	3.88	6.05	6.37	3.68	5.26	4.52	1.04	5.52	4.24	2.30
PUB	2.09	4.06	3.56	5.31	14.27	6.61	5.31	5.58	7.50	8.83
MTJ	5.82	2.69	4.46	7.36	3.51	0.00	0.52	2.07	2.12	0.57
TEX	1.29	0.00	0.00	0.61	0.58	0.56	0.00	0.00	0.00	0.00
Total WSI for all airports	23.84	30.19	25.39	23.61	18.46	25.10	24.60	29.76	30.69	36.86



- A Kruskal-Wallis test was conducted.
- Airports in Colorado between the four seasons of the year (2013-2022).
- $n = 10$ for all four seasons.
- Distributions of WSI were similar for all groups, as assessed by visual inspection of a boxplot. Median WSI were statistically significantly different between different seasons, $\chi^2(3) = 33.682, p < .001$.
- Pairwise comparisons were performed with a Bonferroni correction for multiple comparisons.
- Adjusted p-values are presented.
- This post hoc analysis revealed statistically significant differences in WSI between:
 - Spring ($Mdn = 31.61$) and summer ($Mdn = 41.65$)
 - Summer and Winter ($Mdn = 10.32$)
 - Summer and Fall ($Mdn = 17.24$)
 - Spring and winter ($Mdn = 10.32$).

DISCUSSIONS

- Findings suggested that the risk of wildlife strikes is significantly higher during Summer as compared to the other seasons of the year.
- The wildlife-strike indices have increased over the years in all Part 139 airports in Colorado from 2013 to 2022.
- Findings are of interest to aviation stakeholders operating at those airports as well as the airport operators.
- More efforts to reduce wildlife strikes will enhance aviation safety, thus preventing human injuries and fatalities, and reducing aircraft damage costs.

REFERENCES

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