

CANADIAN VERTEBRATE SPECIES AT RISK: INTEGRATING DATA FOR CONSERVATION IMPACT



How have population trends of Canadian vertebrate species correlated with their conservation status over time, and what visualization techniques can best communicate these relationships to conservation policymakers and wildlife managers?

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INTRODUCTION & PROJECT GOALS

- The Challenge:** Canada faces significant biodiversity loss (vertebrate populations ↓ 30%, mammals ↓ 42% since 1970). Traditional data displays often fail to connect conservation status with population outcomes effectively for decision-makers.
- Our Goal:** To develop an interactive visualization platform by integrating the Canadian Species at Risk (CAN-SAR) database and the Canadian Species Index (CSI). This platform uses affective visualization techniques to clearly communicate the correlation between conservation status and population trends to inform conservation policy and wildlife management.
- Inspiration:** Insights from the ZhouZhuang Life Mysterious Museum on tangible data presentation and narrative integration heavily influenced our design philosophy.

METHODOLOGY HIGHLIGHTS

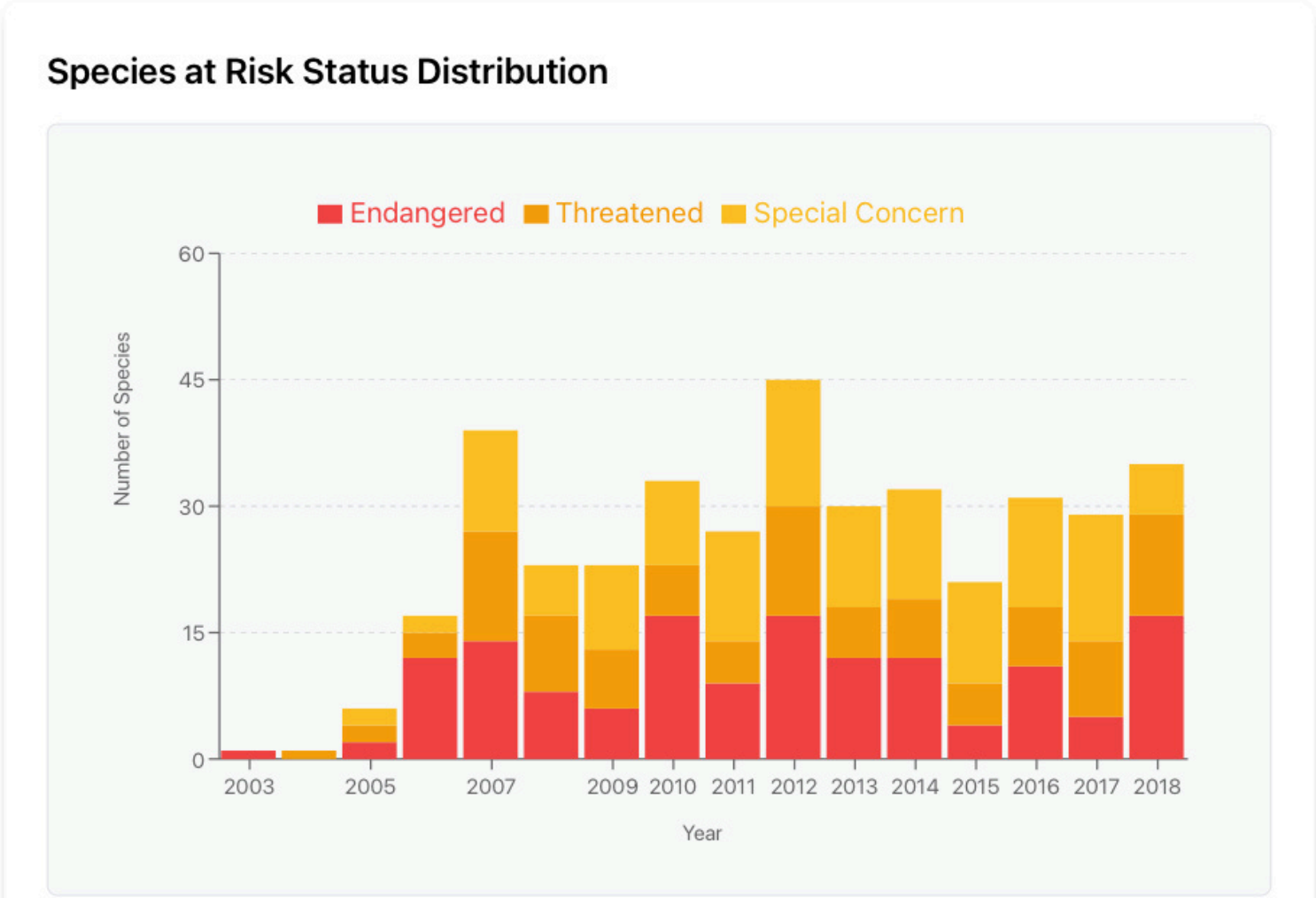
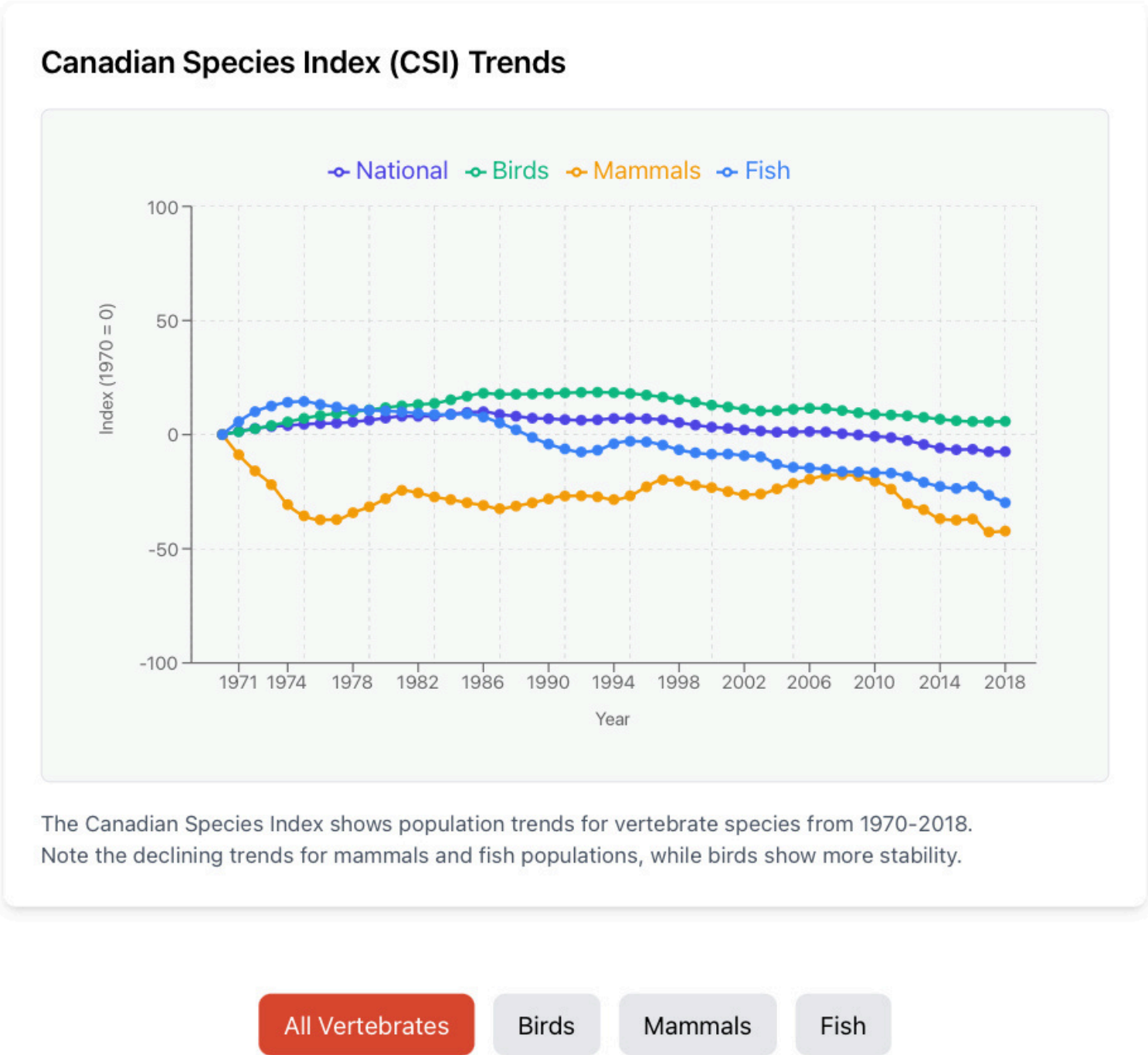
- Data Sources:** CAN-SAR (810 species, status, listing dates) & Canadian Species Index (900+ vertebrate population time-series).
- Integration & Analysis:** Python (pandas) for data merging, ITIS for taxonomic resolution, time-lagged cross-correlation.
- Visualization Design (React):** Development of interactive visual tools applying principles of color theory. Multi-layered, affective visualizations (e.g., progressive color intensity, species silhouettes) to enhance engagement and understanding.

KEY FINDINGS

- Positive Impact of Protection:** Elevated conservation status generally correlates with population stabilization or modest improvement.
- Taxonomic Differences:** Mammals (despite -42% overall decline) show stronger positive recovery responses post-protection compared to fish (-30% overall decline), which exhibit more variable responses.
- Response Lag:** Observable time lag between population declines and subsequent protection status changes.

Population Trends vs. Conservation Status

This visualization shows the correlation between Canadian vertebrate population trends (CSI) and species conservation status (CAN-SAR) over time (1970-2018).



CAPTION: DATA HOMEPAGE

Key Findings

Summary of key statistics and findings from the CSI and CAN-SAR datasets.

76

Endangered Species
Species facing imminent extinction or extirpation.

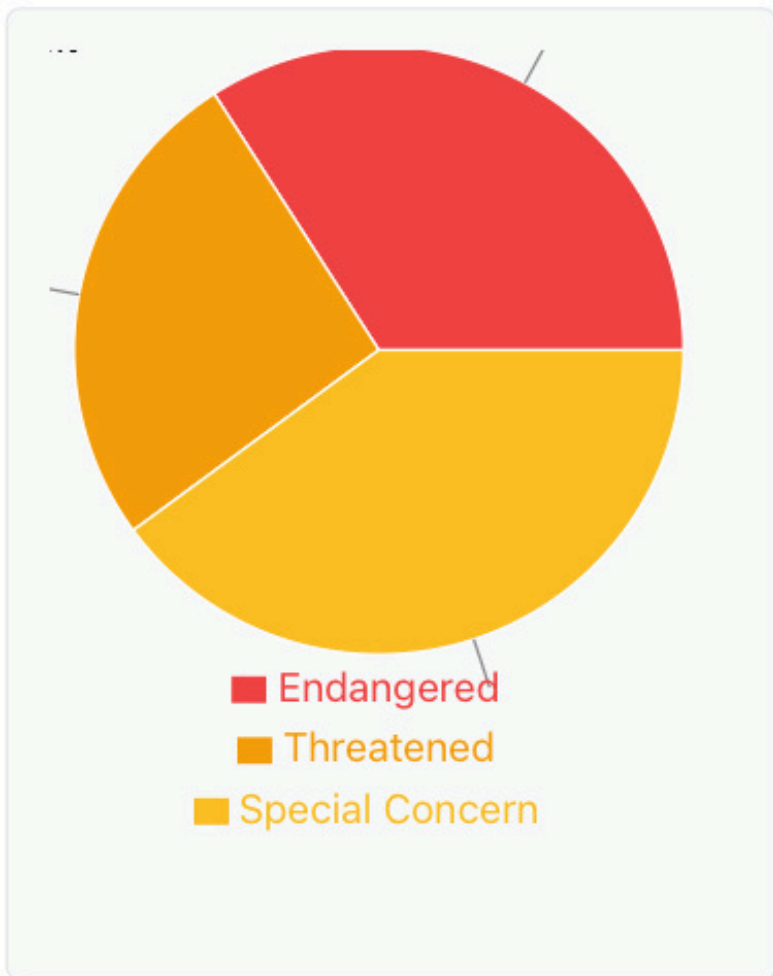
58

Threatened Species
Species likely to become endangered if nothing is done.

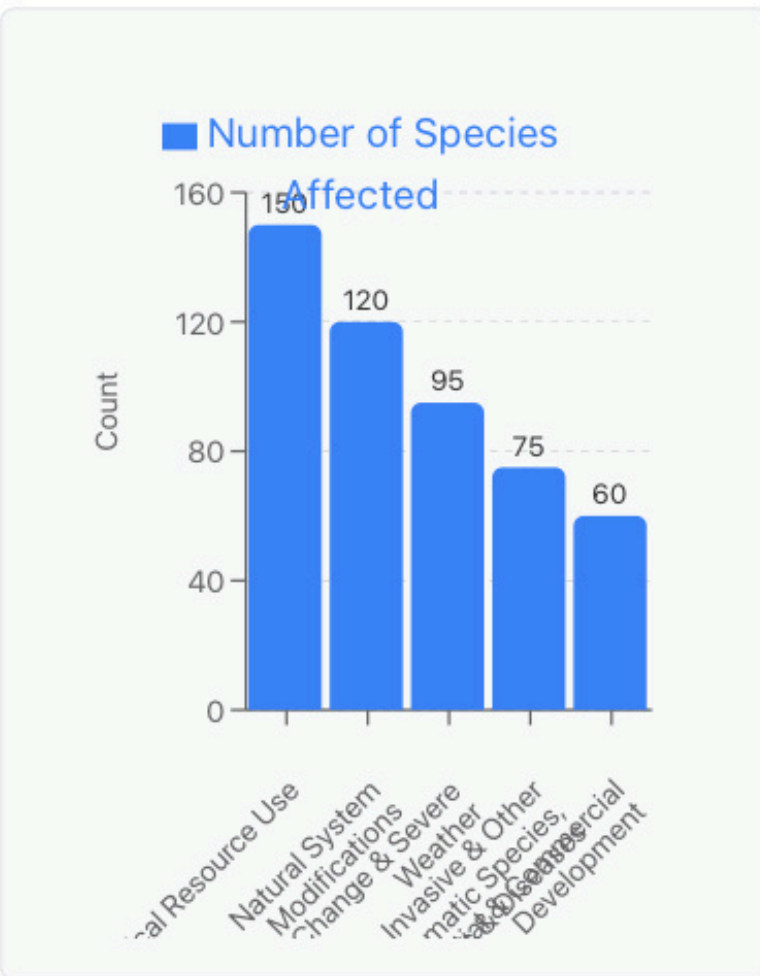
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Special Concern
Species that may become threatened or endangered.

SARA Status Distribution

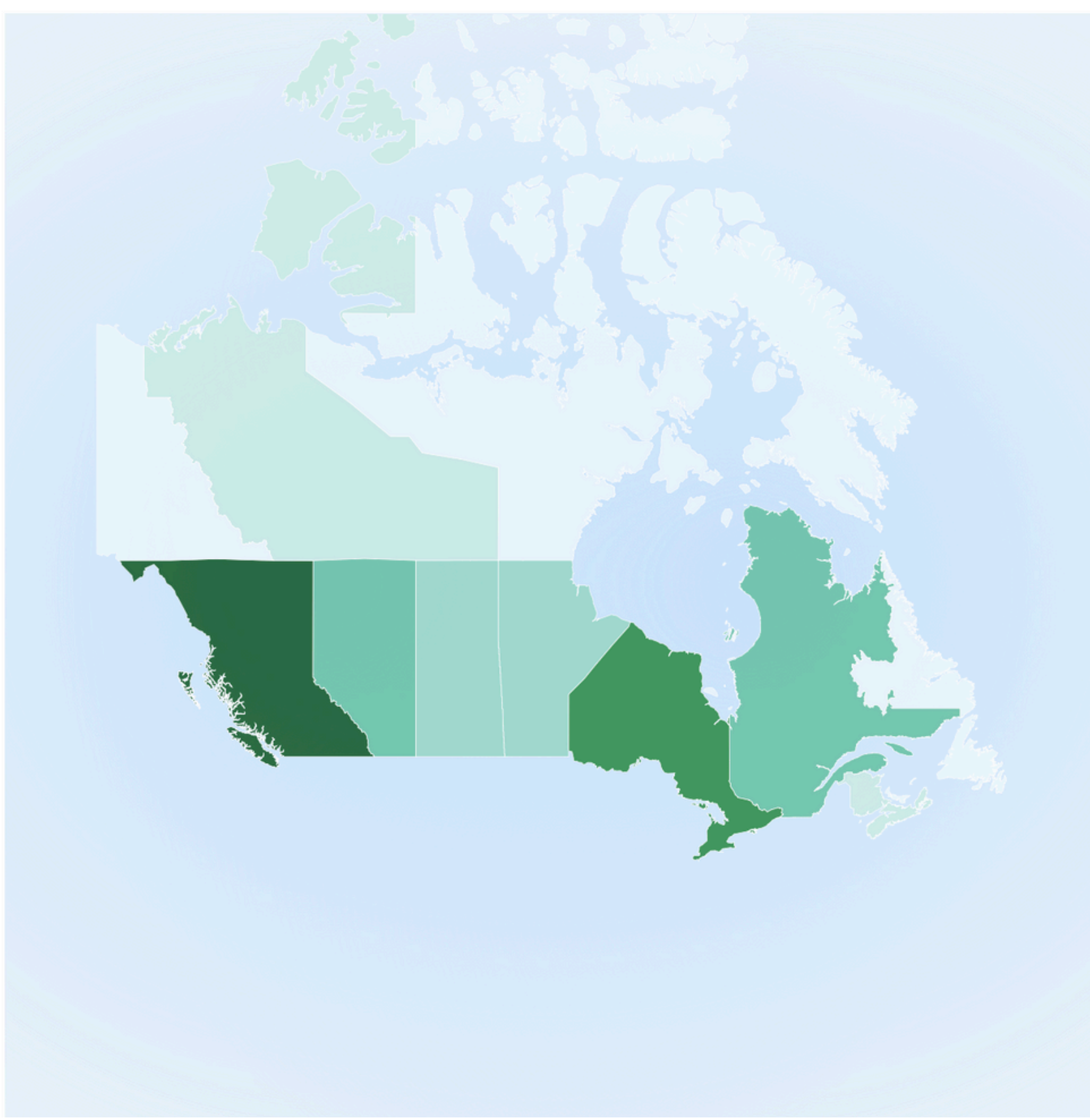


Top Threats to Canadian Species



- Top 5 Threats:**
- Biological Resource Use (30% of species affected)
 - Natural System Modifications (24% of species affected)
 - Climate Change & Severe Weather (19% of species affected)
 - Invasive & Other Problematic Species, Genes & Diseases (15% of species affected)
 - Residential & Commercial Development (12% of species affected)

CAPTION: KEY FINDINGS



CAPTION: CANADIAN PROVINCIAL OVERVIEW

Canada (National Summary)

542

Total Species at Risk

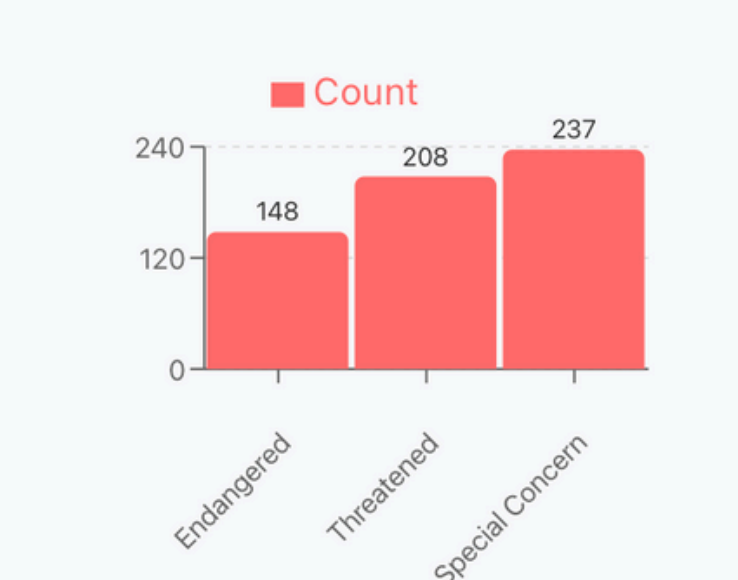
148

Endangered

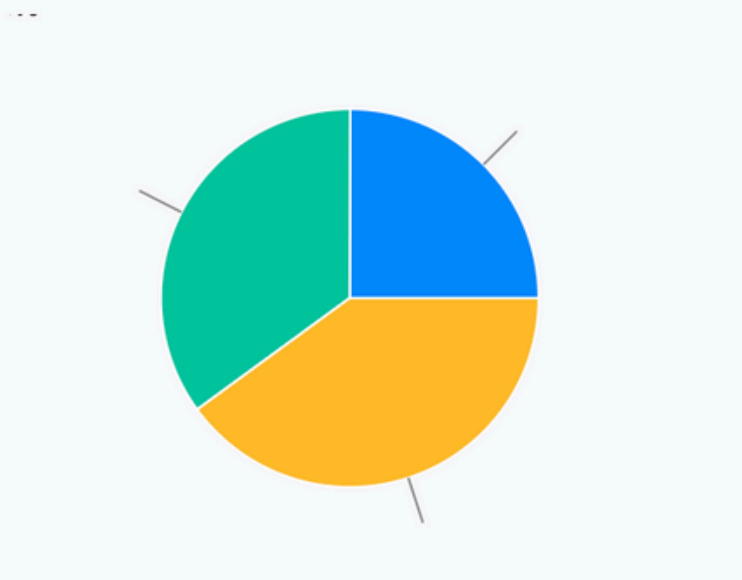
208

Threatened

Status Distribution



Status Proportion



Representative Species

- black swift (*Cypseloides niger*)
- bull trout saskatchewan-nelson rivers populations (*Salvelinus confluentus*)
- bull trout western arctic populations (*Salvelinus confluentus*)
- common nighthawk (*Chordeiles minor*)
- evening grosbeak (*Coccothraustes vespertinus*)
- basking shark pacific population (*Cetorhinus maximus*)

CONTRIBUTION TO UN SUSTAINABLE
DEVELOPMENT GOALS (SDGS)



Our project supports SDG 14 (Conserve & sustainably use marine resources) by visualizing marine species trends (e.g., -30% fish decline).



We advance SDG 15 (Protect terrestrial ecosystems & halt biodiversity loss) by visualizing status-population links for terrestrial species (e.g., -42% mammal decline).

EXPLORE OUR WORK

Full Code on GitHub



Interactive Website



Acknowledgments: We sincerely thank Prof. Luyao Zhang for guidance. We also acknowledge classmates, guest lectures, the Data Visualization Symposium, and the ZhouZhuang Life Mysterious Museum for their inspiration. This project utilized open-source tools including Python, pandas, and React.

Disclaimer: This is the final project for INFOSCI 301 Data Visualization and Information Aesthetics, instructed by Prof. Luyao Zhang at Duke Kunshan University in Spring 2025.