River Otter Data Analysis

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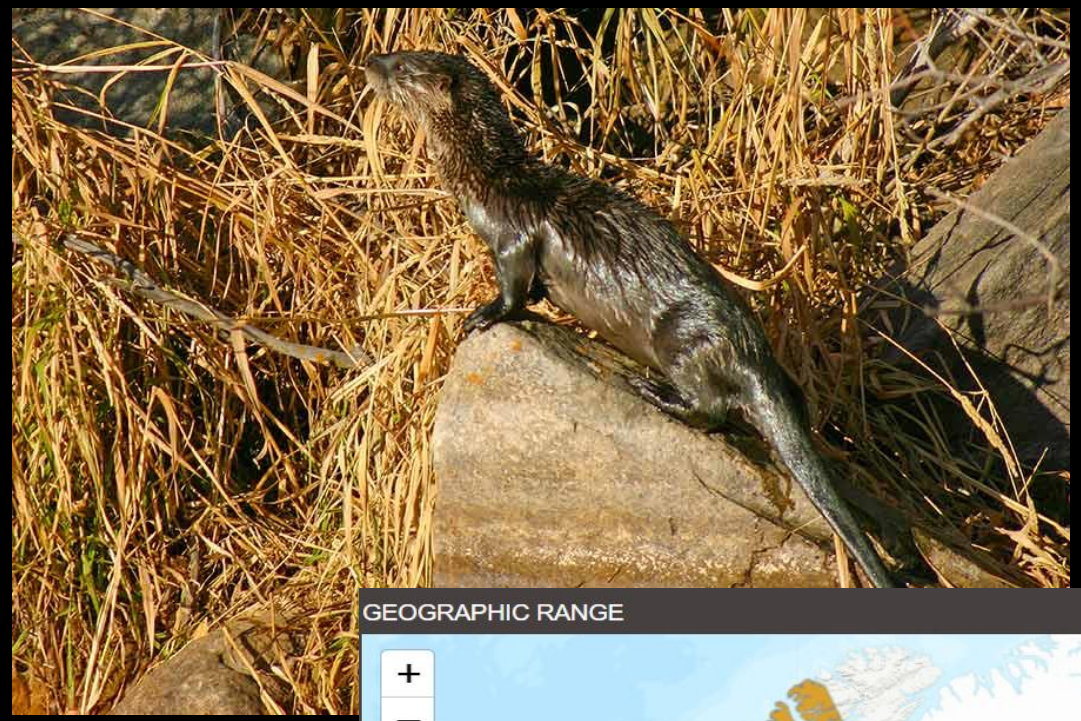
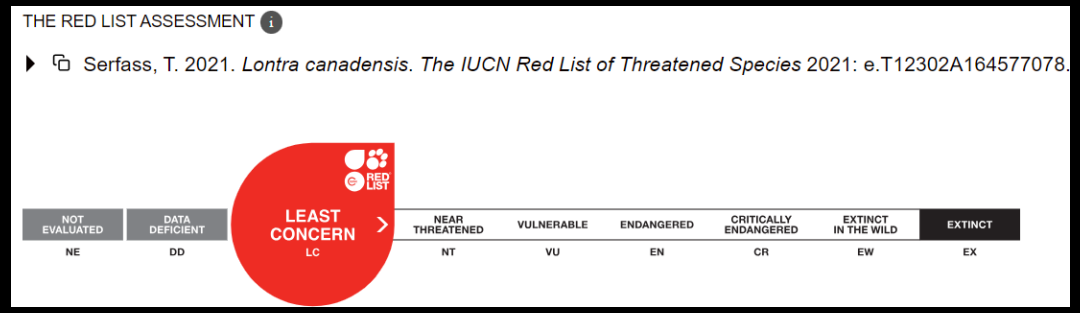
Introduction - Background

- Northern river otter (*Lontra canadensis*)
  - Native to Utah
  - Low abundance
    - Unregulated trapping by early settlers
    - Habitat loss
  - Rare Species
    - No legal harvesting since 1899
  - 67 individuals reintroduced in 1989 and 2000s
    - Green River
    - Strawberry
    - Escalante
    - Provo River





https://wildlife.utah.gov/news/utah-wildlife-news/1225-dwr-asking-utahns-to-report-otter-sightings.html

Introduction - Background

- Northern river otter (*Lontra canadensis*)
  - Difficult to monitor
    - Secretive
    - Low densities
  - No current Utah population estimate
  - Found in rivers, reservoirs, lakes
  - Main prey = fish
  - Important indicator species
    - Health of aquatic environment

https://wildlife.utah.gov/news/utah-wildlife-news/1225-dwr-asking-utahns-to-report-otter-sightings.html

Introduction - Data

- Anonymous data contributor
- Conservation research project
- Volunteer surveyors
- Data entry from trail cam footage
  - Lower Provo River
  - Middle Provo River
  - Strawberry River
  - Weber River
- Researcher is primarily interested in presence/absence of river otters and other species overlap

https://www.cbc.ca/news/canada/prince-edward-island/pei-river-otter-trail-cam-more-sightings-1.7158491

Objectives

- Reformat/clean data
- Perform exploratory analysis:

1. How do animal sightings differ between survey locations?
2. Which individual surveys within each location had the most/least animal sightings?
3. Where were river otters sighted, and how often were they sighted compared to other animals?
4. Compare probabilities of other animal sightings to river otter sightings. Are there any possible patterns?

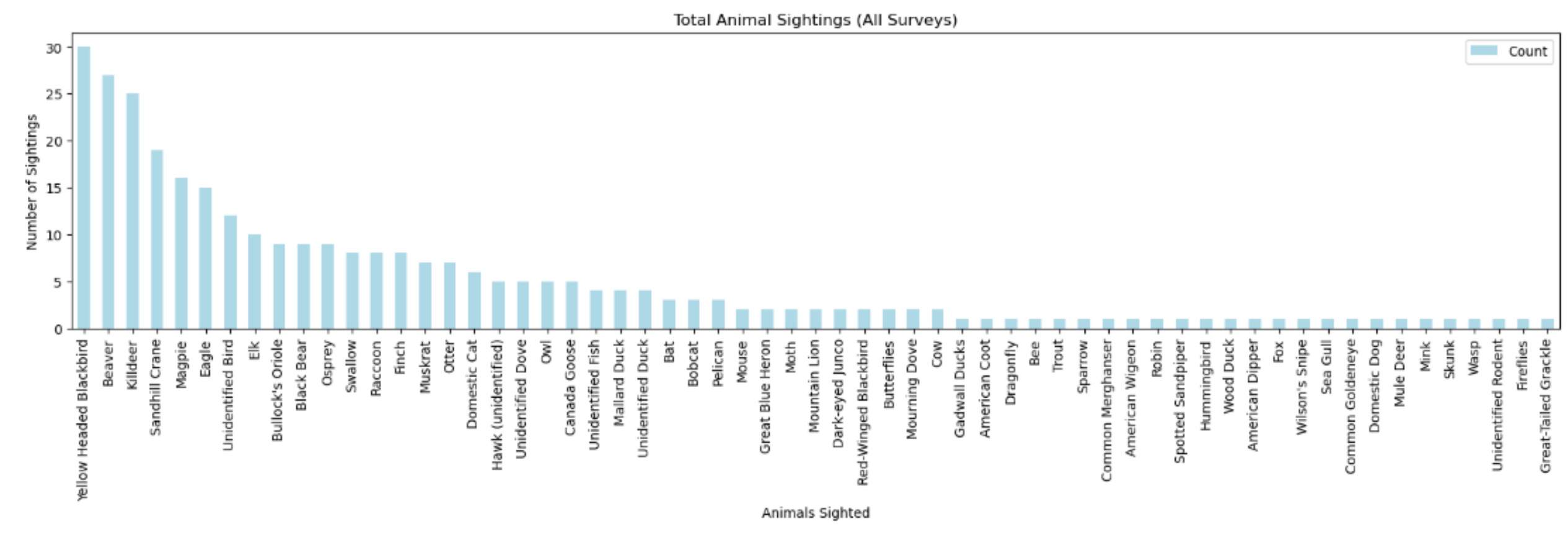
Methods

- Original Data (protected)
  - Inconsistent entry
  - Manually re-entered/compiled into a single excel spreadsheet w/ 6 columns:
    - Location, Survey #, Camera #, SD Card, Animal Sighted, Animal Count
    - 310 rows
- Altered Data:
  - Modified animals sighted (find/replace, manually altered some)
- Exported as CSV
- Imported into Jupyter Notebook
  - Pandas
  - Matplotlib
  - Scipy.stats

Methods

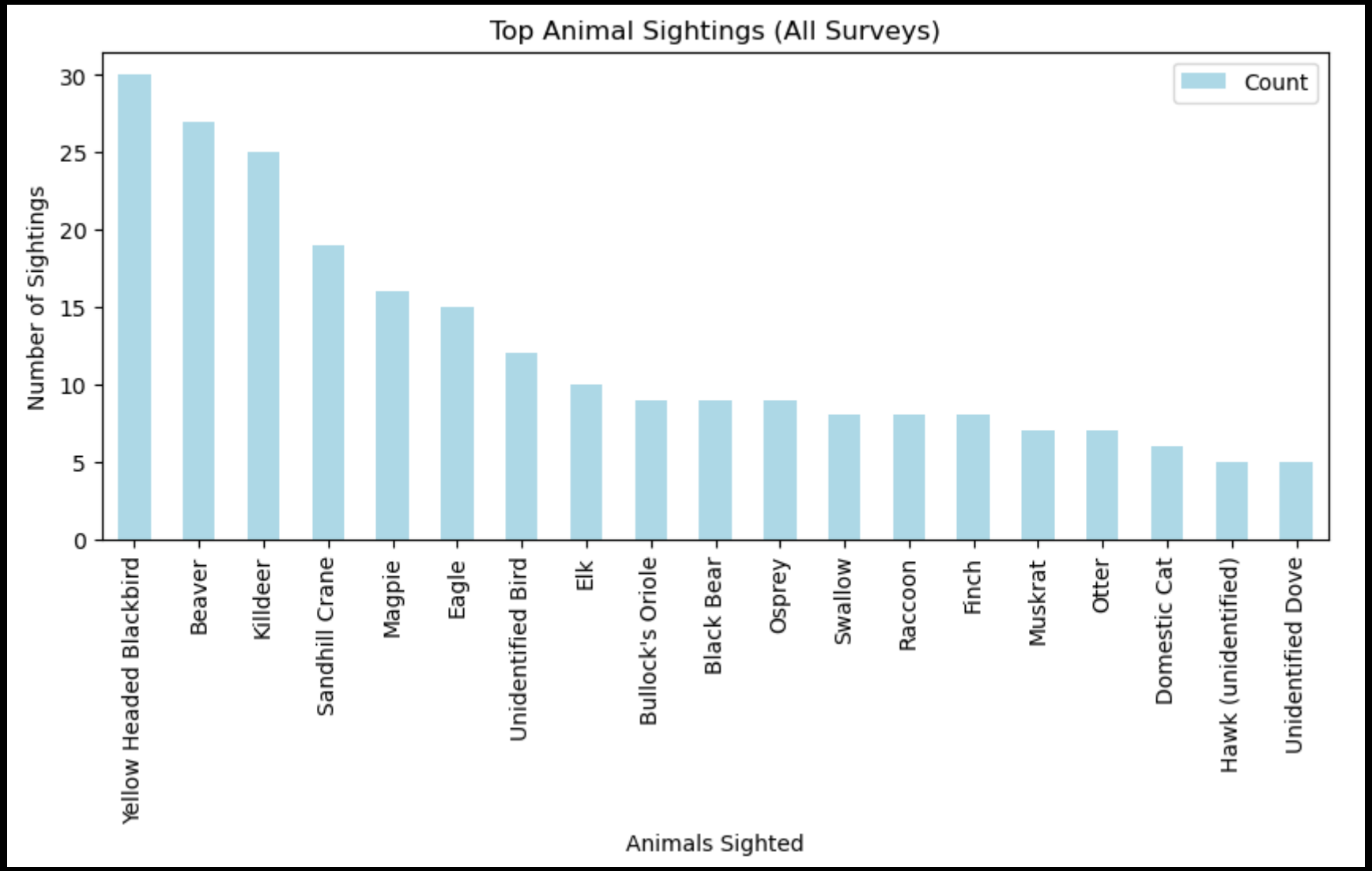
- Further Cleaning:
  - Replace misspelled or close-duplicate Animals Sighted
- Did not use
  - “Camera #”, “SD Card”, “Animal Count”
    - Able to analyze animal presence/absence with “Animals Sighted” only
- Compiled various pandas dataframes and matplotlib plots
- Calculated Animal Sighting Probabilities at Otter Sites and compared to Non-Otter Sites
- Heatmap w/ Seaborn for plotting probabilities and searching for patterns

Results



- 309 animal sightings total
- 61 different species

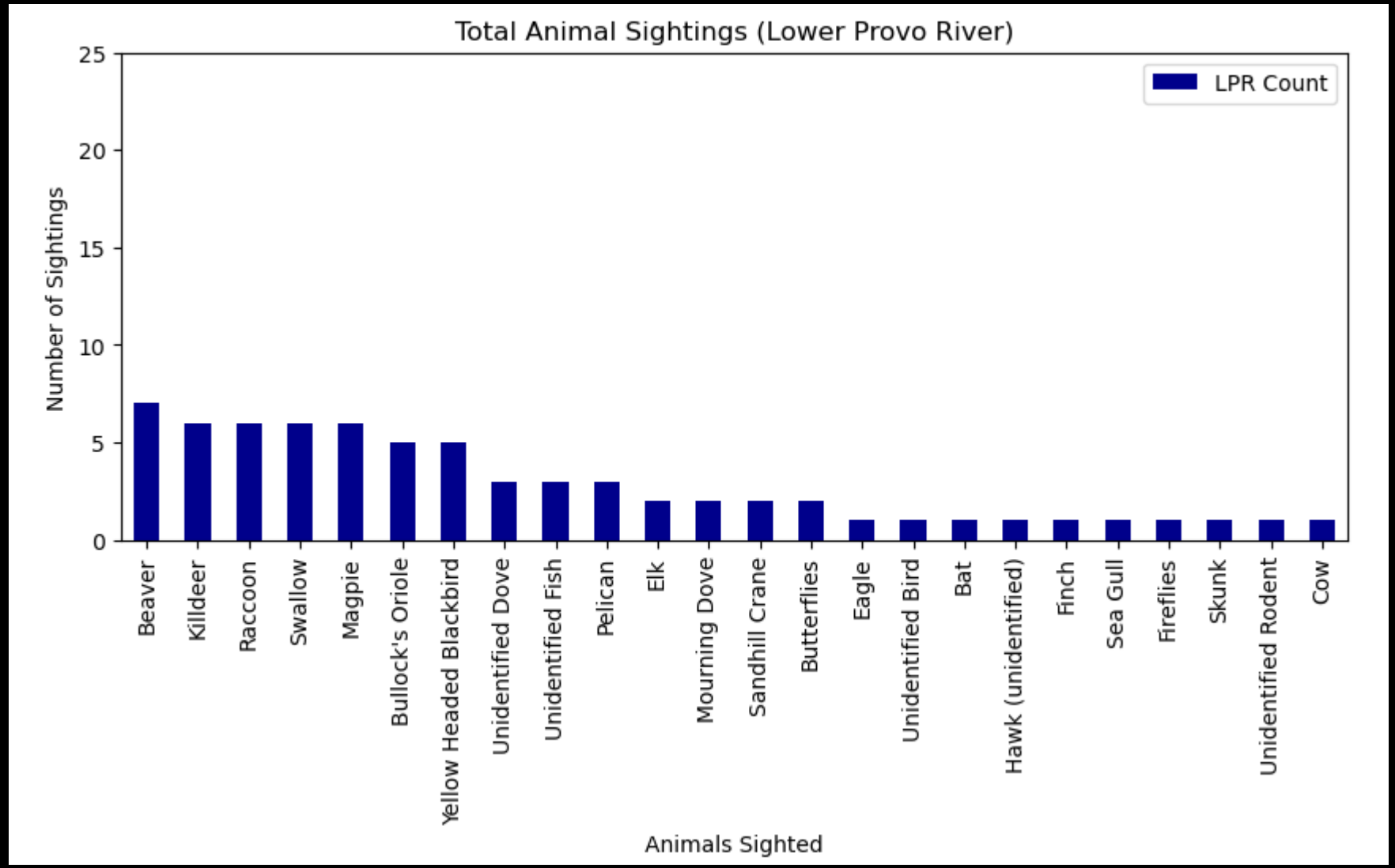
Results


Top Animal Sightings (All Surveys)
Count
Number of Sightings
0
5
10
15
20
25
30
Yellow Headed Blackbird
Beaver
Killdeer
Sandhill Crane
Magpie
Eagle
Unidentified Bird
Elk
Bullock's Oriole
Black Bear
Osprey
Swallow
Raccoon
Finch
Muskrat
Otter
Domestic Cat
Hawk (unidentified)
Unidentified Dove
Animals Sighted

Results

Lower Provo River

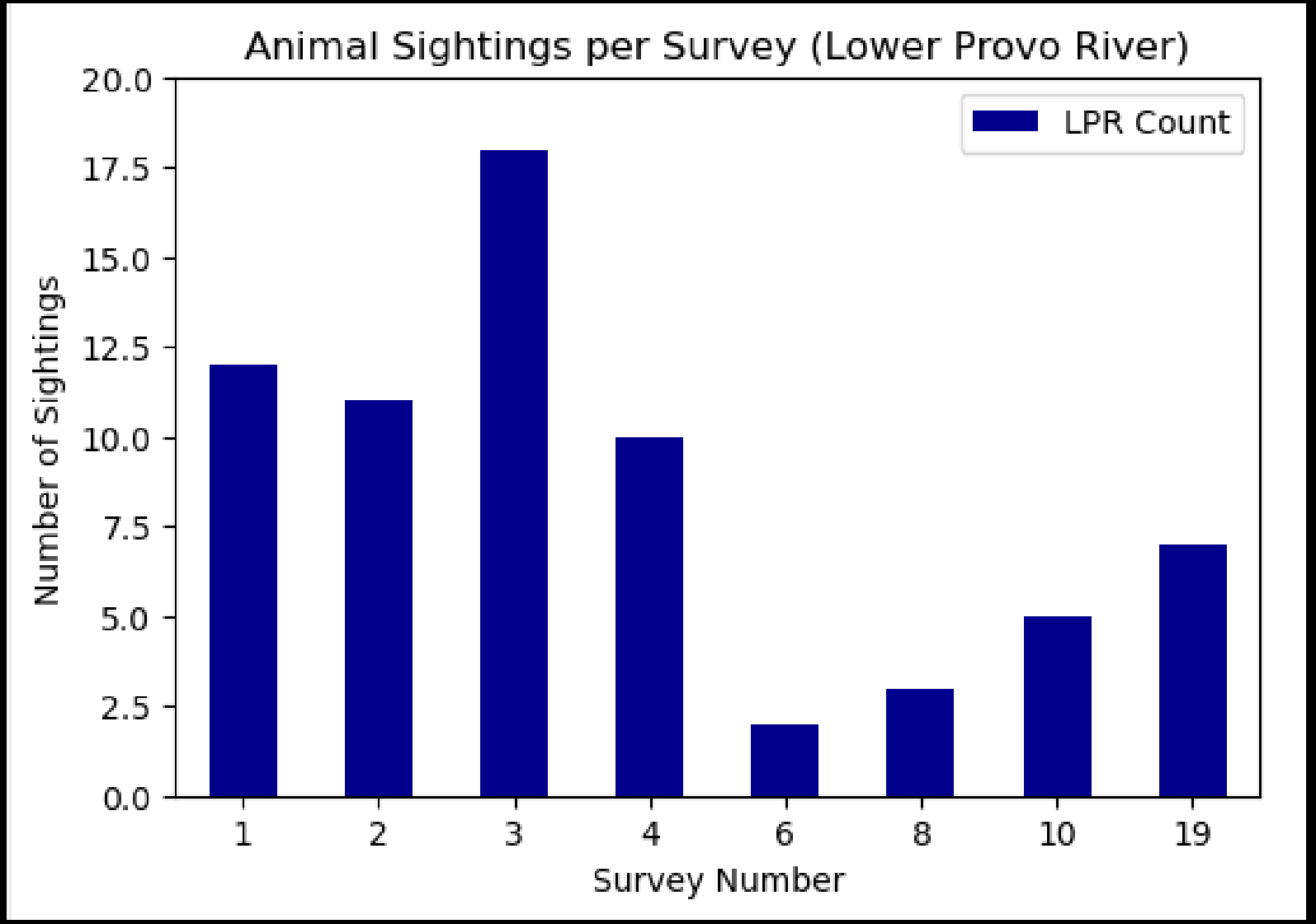
- Top Animals Sighted
  - Beaver
  - Killdeer
  - Raccoon
  - Swallow
  - Magpie



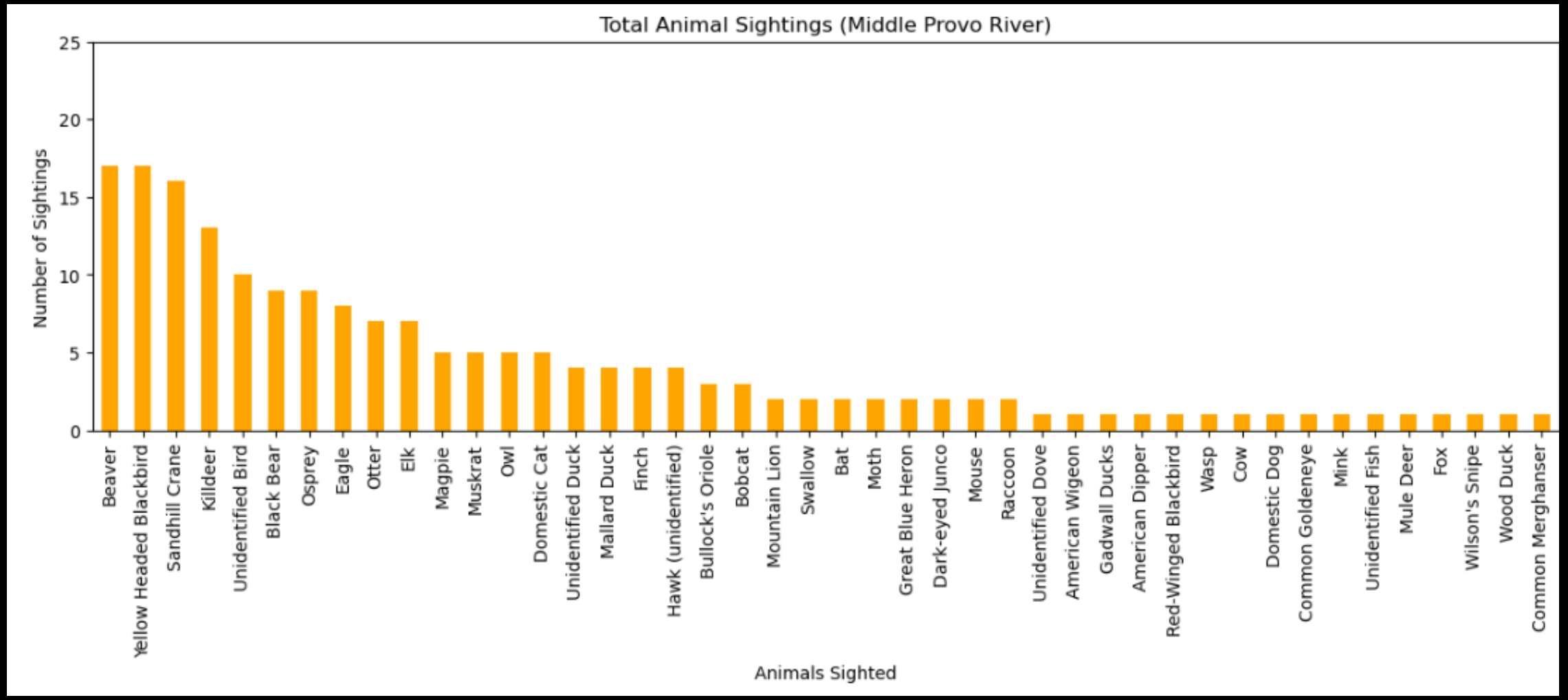
Results

Lower Provo River

- Survey # stats:
- Mean = 8.5
- Max = 18
  - (#3)
- Min = 2
  - (#6)



Results

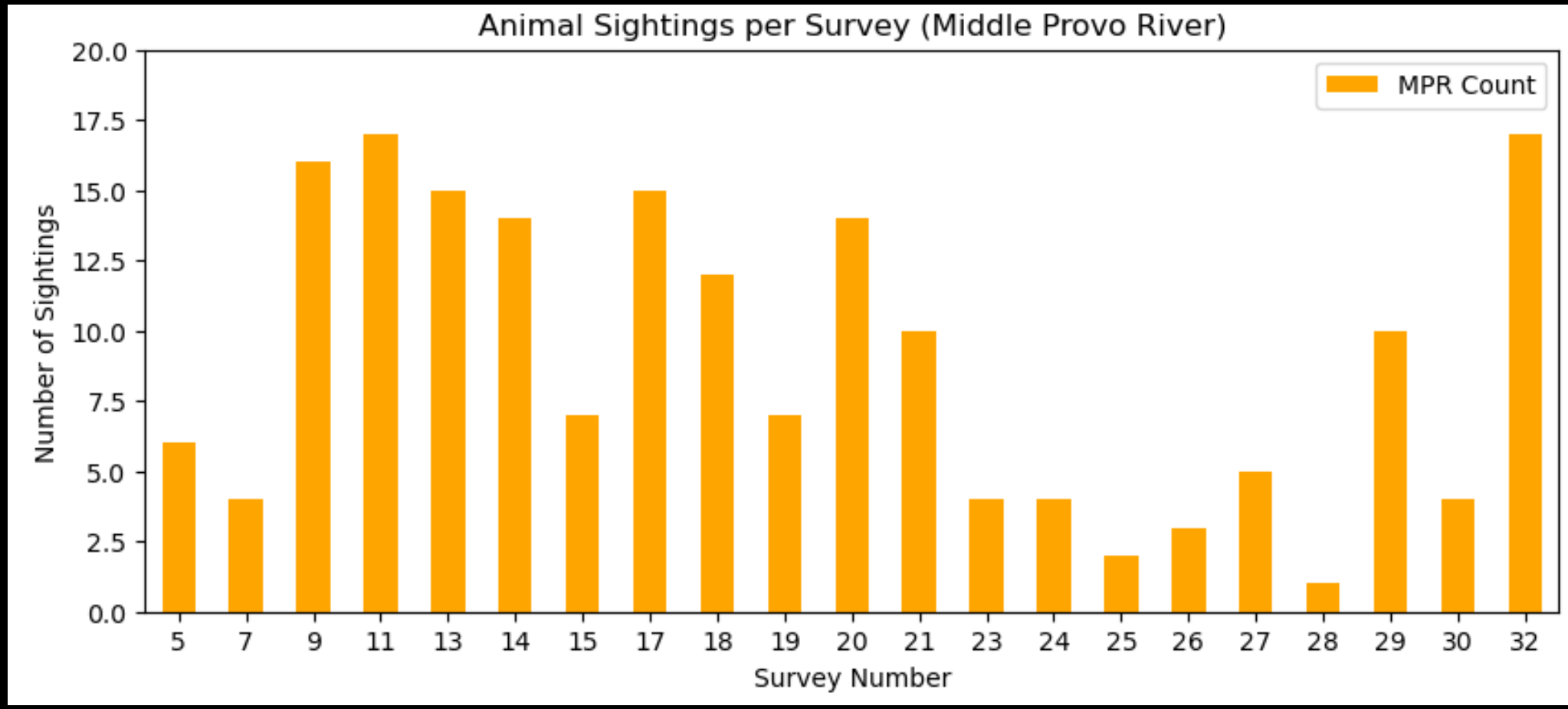


Middle Provo River Top Animals Sighted = Beaver, Yellow-Headed Blackbird, Sandhill Crane, Killdeer, Unidentified Bird

Results

Middle Provo River

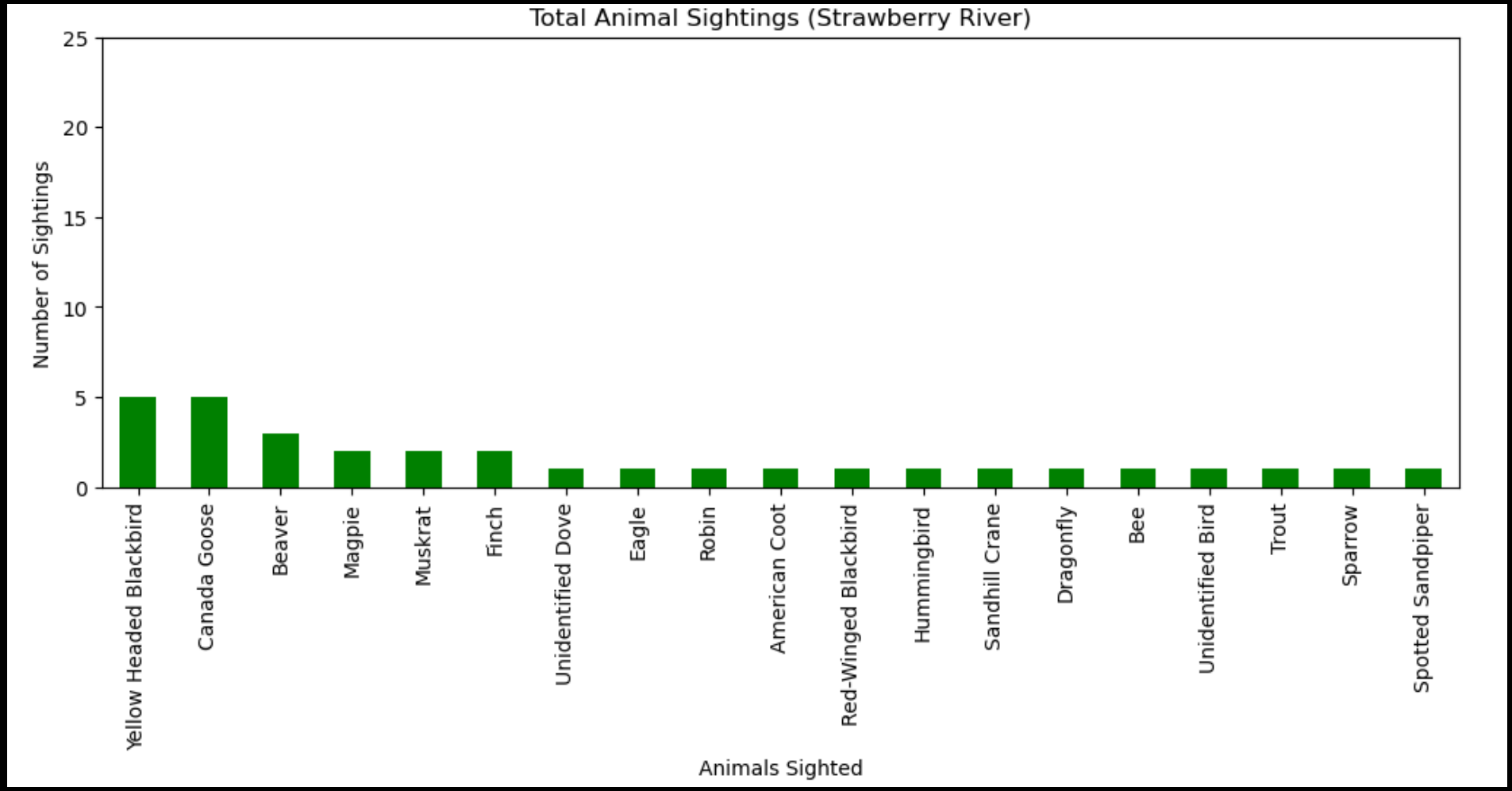
- Survey # stats:
- Mean = 8.9
- Min = 1
  - (#28)
- Max = 17
  - (#11, #32)



Results

Strawberry River

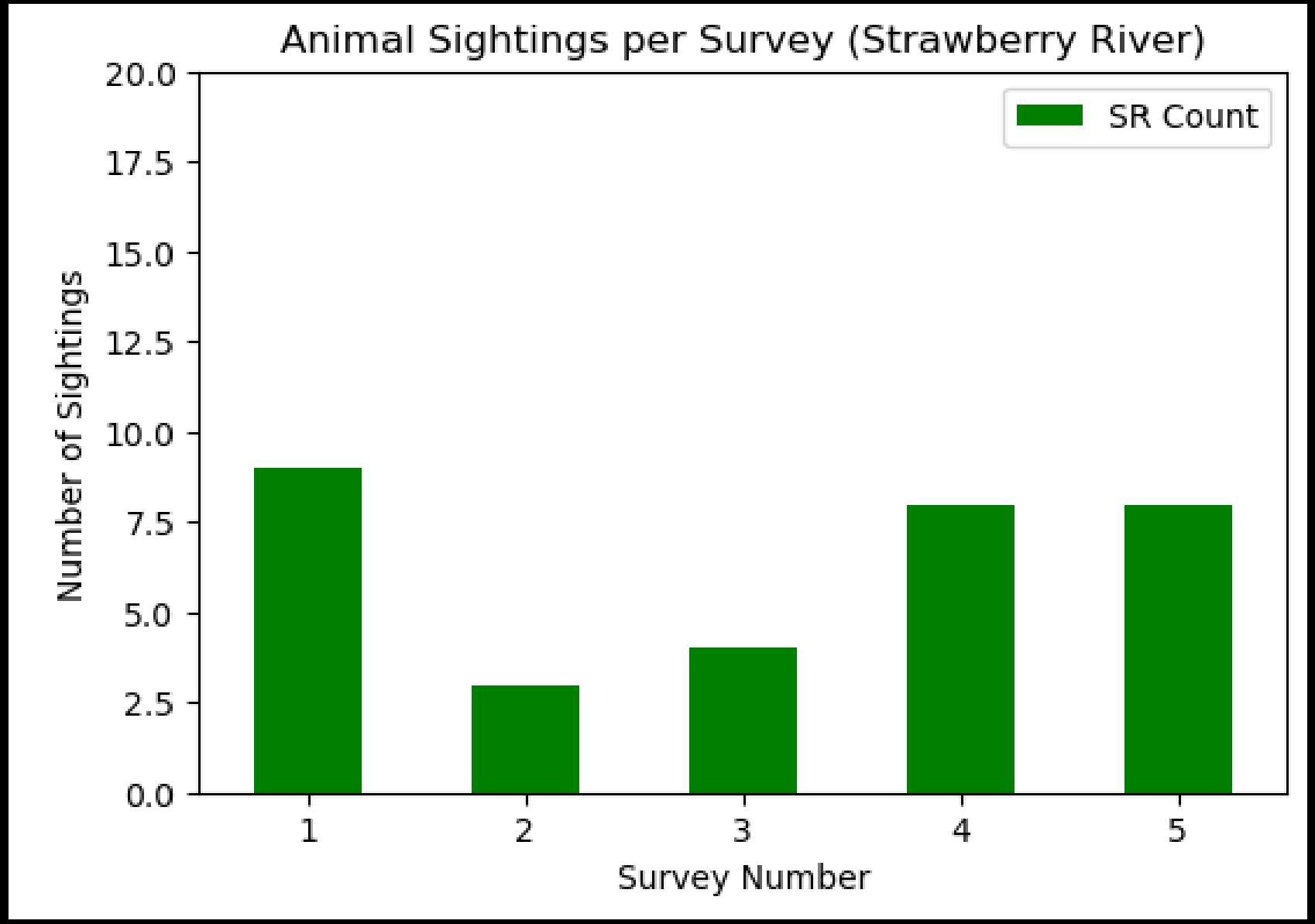
- Top Animals Sighted
  - Yellow Headed Blackbird
  - Canada Goose
  - Beaver
  - Magpie
  - Muskrat



Results

Strawberry River

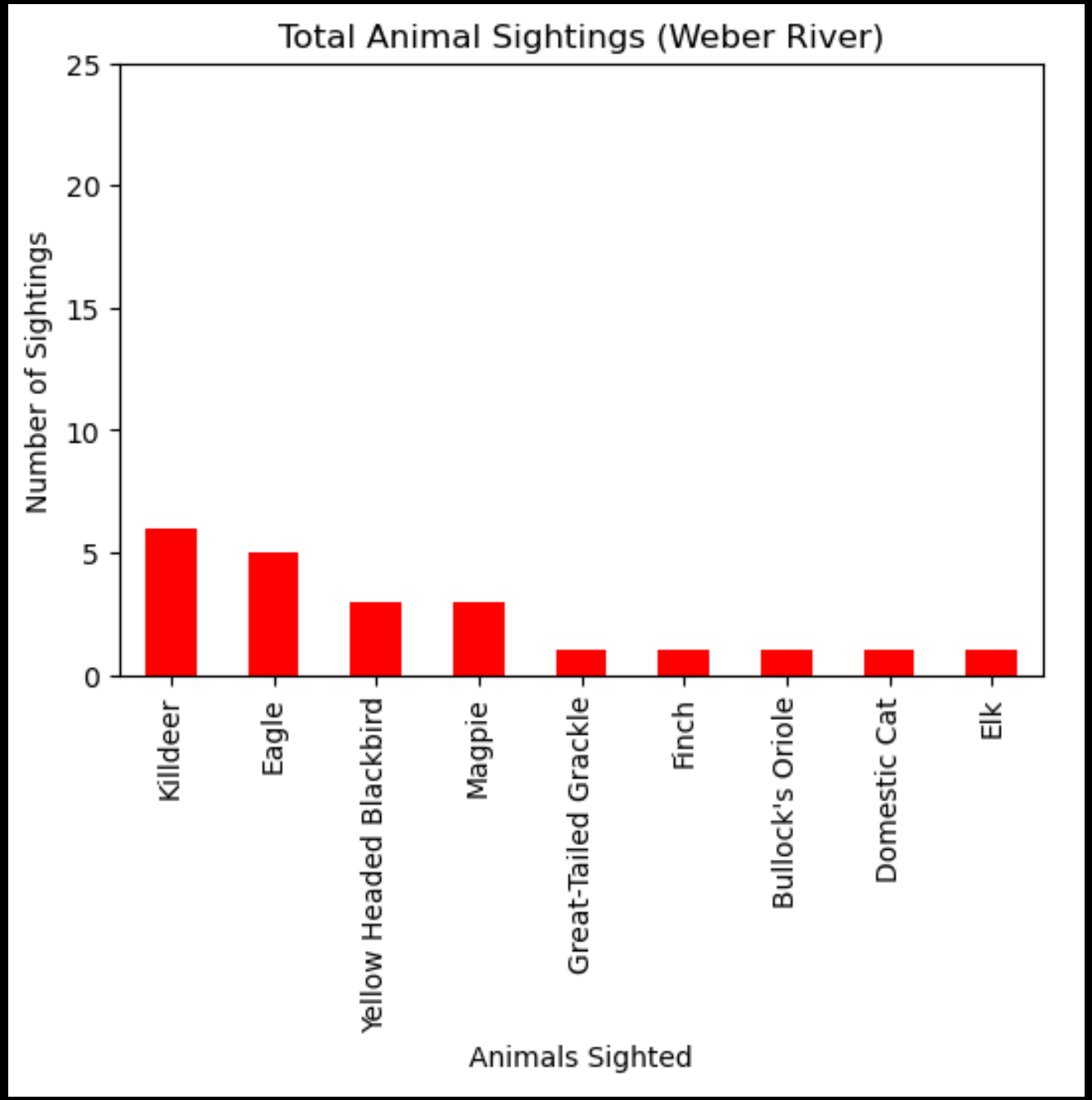
- Survey # stats:
- Mean = 6.4
- Max = 9
  - (#1)
- Min = 3
  - (#2)



Results

Weber River

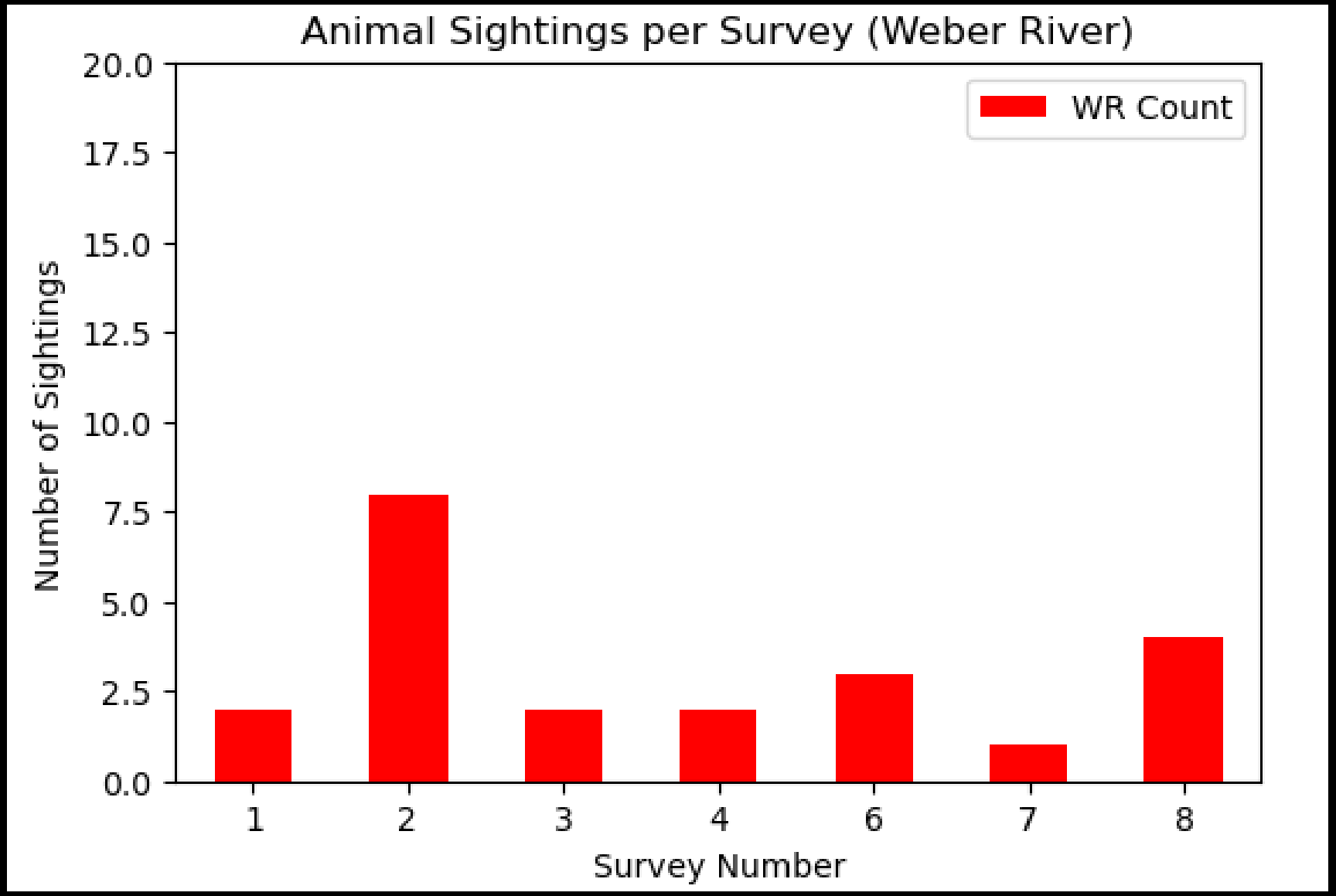
- Top Animals Sighted
  - Killdeer
  - Eagle
  - Yellow Headed Blackbird
  - Magpie



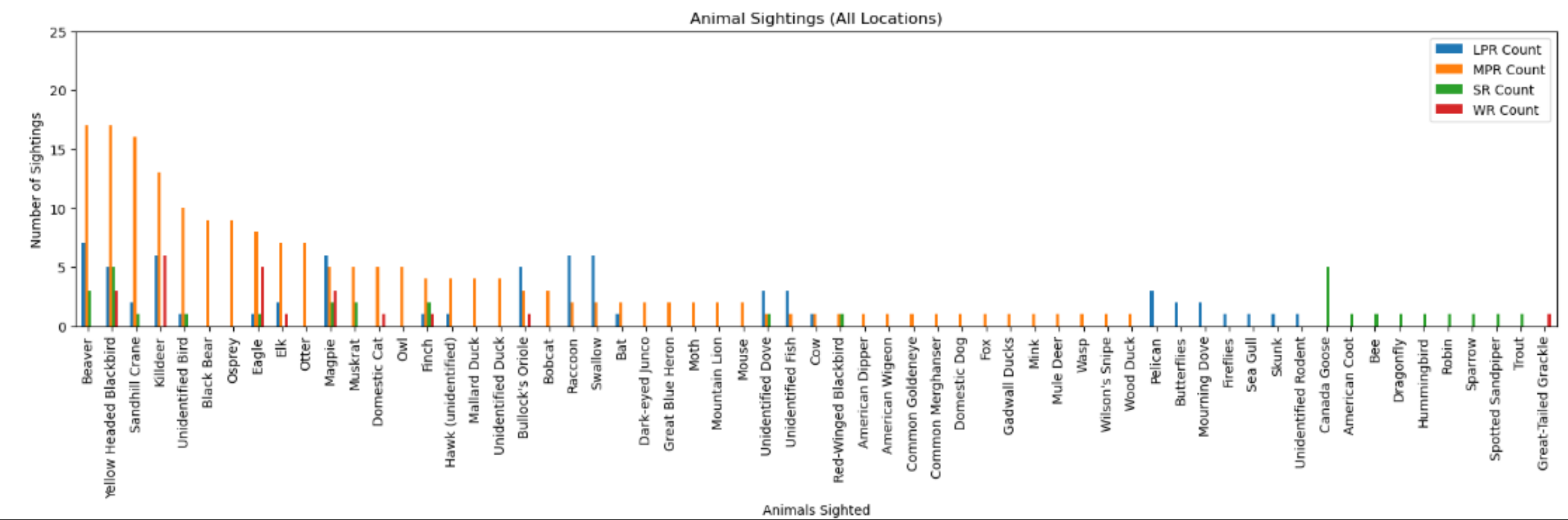
Results

Weber River

- Survey # stats:
- Mean = 3.1
- Max = 8
  - (#2)
- Min = 1
  - (#7)



Results

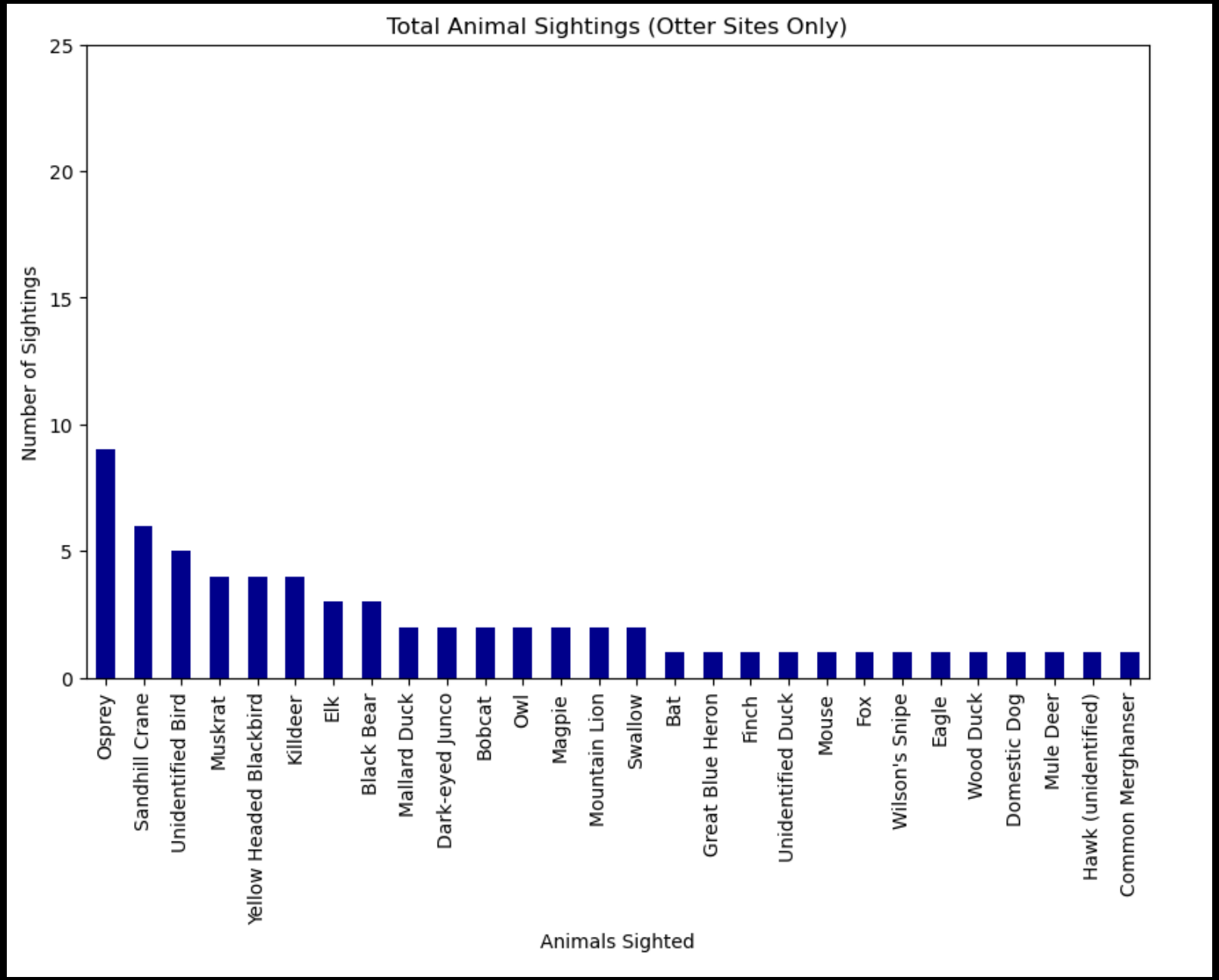

Animal Sightings (All Locations)
Number of Sightings
Animals Sighted
LPR Count
MPR Count
SR Count
WR Count
0
5
10
15
20
25
Beaver
Yellow Headed Blackbird
Sandhill Crane
Killdeer
Unidentified Bird
Black Bear
Osprey
Eagle
Elk
Otter
Magpie
Muskrat
Domestic Cat
Owl
Finch
Hawk (unidentified)
Mallard Duck
Unidentified Duck
Bullock's Oriole
Bobcat
Raccoon
Swallow
Bat
Dark-eyed Junco
Great Blue Heron
Moth
Mountain Lion
Mouse
Unidentified Dove
Unidentified Fish
Cow
Red-Winged Blackbird
American Dipper
American Wigeon
Common Goldeneye
Common Merghanser
Domestic Dog
Fox
Gadwall Ducks
Mink
Mule Deer
Wasp
Wilson's Snipe
Wood Duck
Pelican
Butterflies
Mourning Dove
Fireflies
Sea Gull
Skunk
Unidentified Rodent
Canada Goose
American Coot
Bee
Dragonfly
Hummingbird
Robin
Sparrow
Spotted Sandpiper
Trout
Great-Tailed Grackle

Results

- Otter Sites:
  - 7 sightings total
  - Middle Provo River only
    - Survey #s
      - #5
      - #13
      - #15
      - #17
      - #18
      - #32

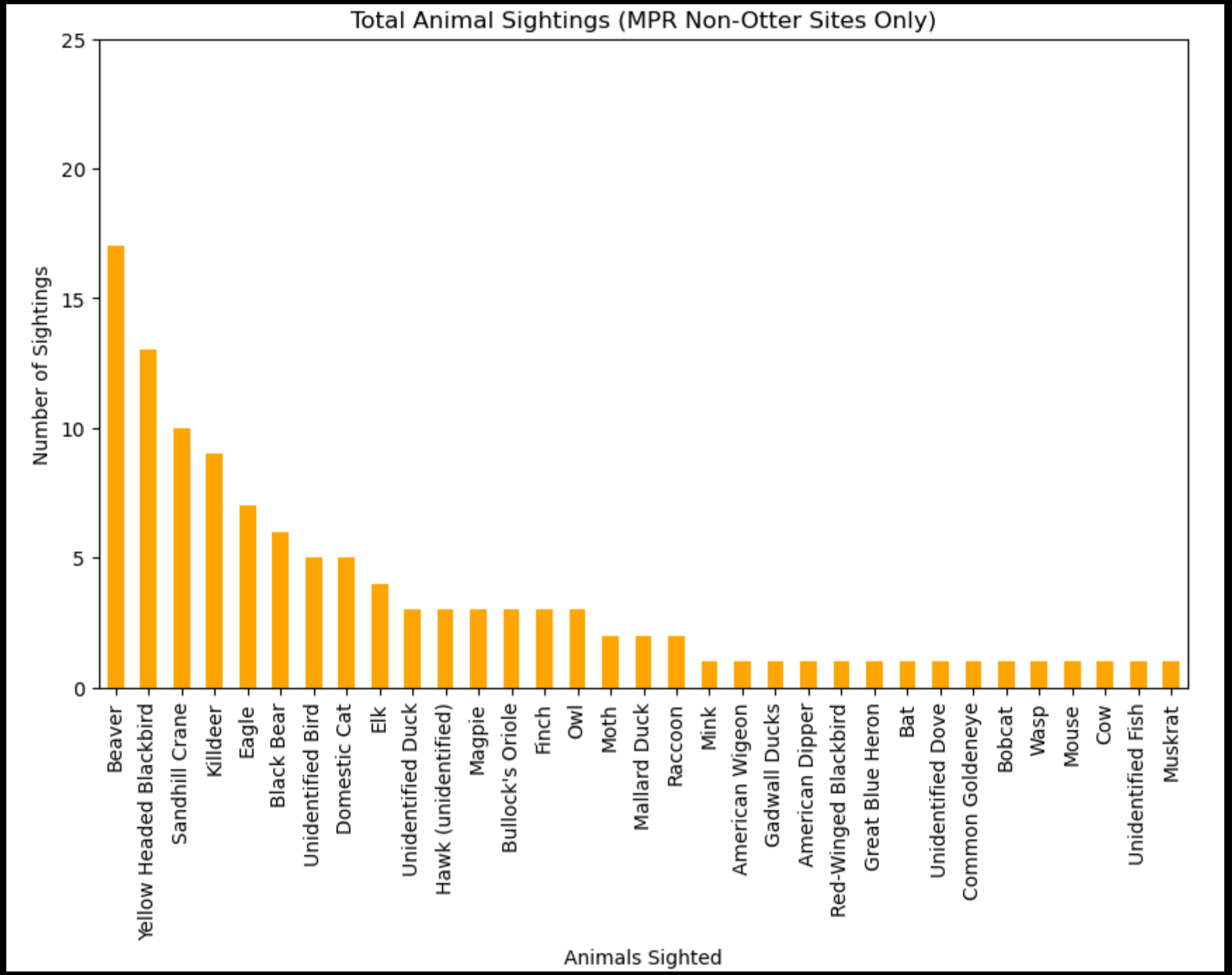
Analysis

- Top Animals Sighted at Otter Sites:
  - Osprey
  - Sandhill Crane
  - Unidentified Bird

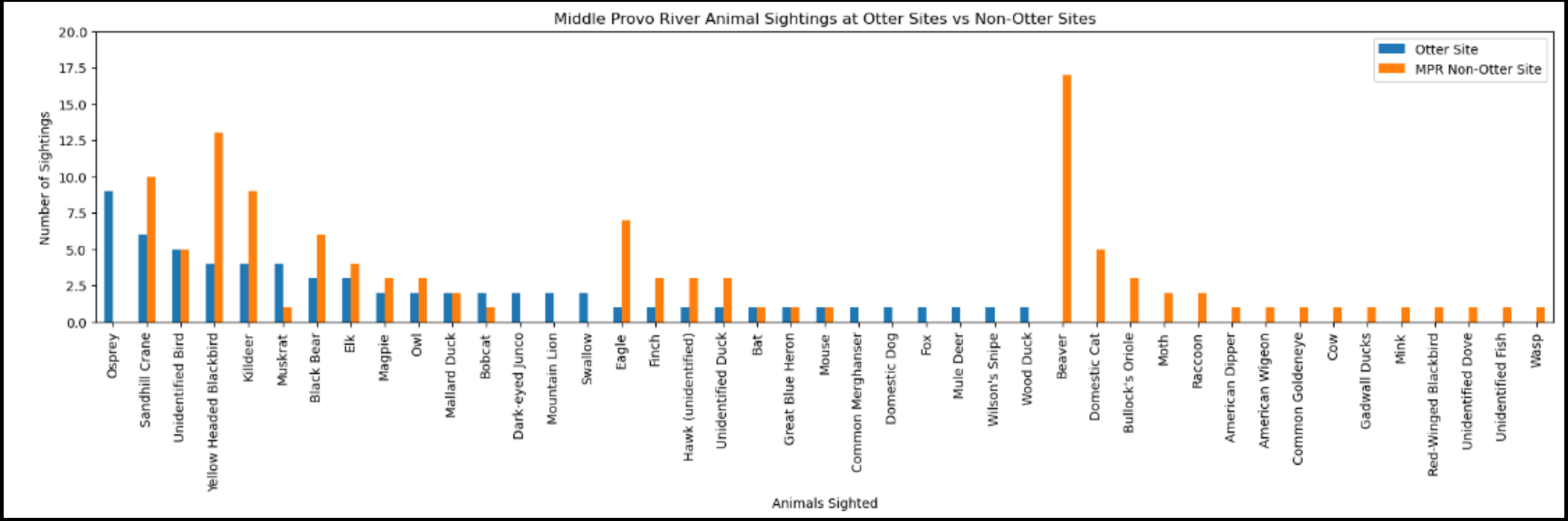


Analysis

- Top Animals Sighted at Non-Otter Sites:
  - Beaver
  - Yellow Headed Blackbird
  - Sandhill crane

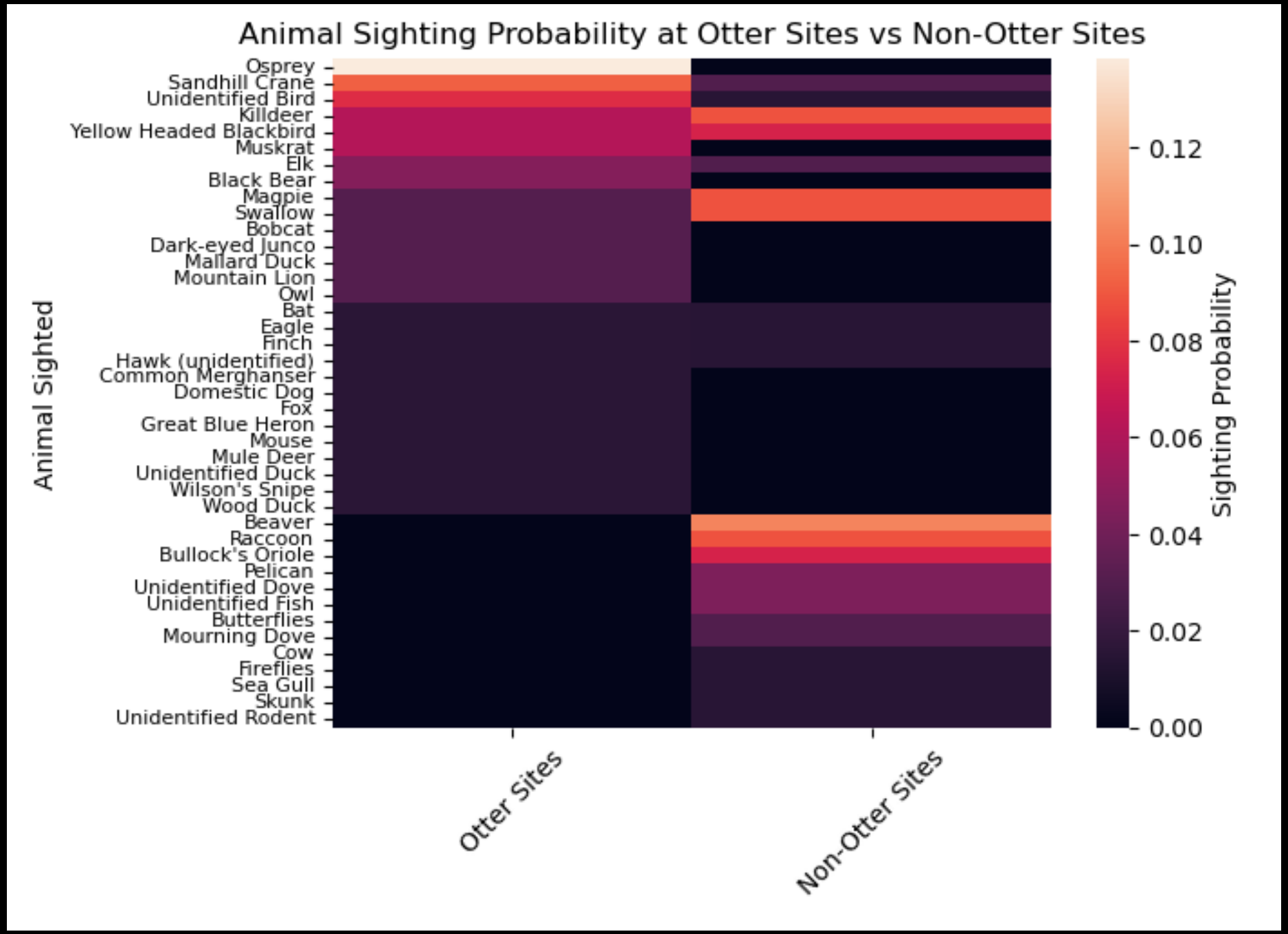


Analysis


Middle Provo River Animal Sightings at Otter Sites vs Non-Otter Sites
Otter Site
MPR Non-Otter Site
Number of Sightings
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
Osprey
Sandhill Crane
Unidentified Bird
Yellow Headed Blackbird
Killdeer
Muskrat
Black Bear
Elk
Magpie
Owl
Mallard Duck
Bobcat
Dark-eyed Junco
Mountain Lion
Swallow
Eagle
Finch
Hawk (unidentified)
Unidentified Duck
Bat
Great Blue Heron
Mouse
Common Merghanser
Domestic Dog
Fox
Mule Deer
Wilson's Snipe
Wood Duck
Beaver
Domestic Cat
Bullock's Oriole
Moth
Raccoon
American Dipper
American Wigeon
Common Goldeneye
Cow
Gadwall Ducks
Mink
Red-Winged Blackbird
Unidentified Dove
Unidentified Fish
Wasp
Animals Sighted

Analysis

- Otter Sites:
  - Much higher probability of sighting an Osprey
    - Sandhill crane
- Non-Otter Sites:
  - Much higher probability of sighting a
  - Beaver
    - Racoon



Conclusion

1. How do animal sightings differ between survey locations?

- Lower Provo River
  - 68 animal sightings
  - 24 different species
  - 8 surveys performed
- Middle Provo River
  - Most animal sightings
    - 187
  - Most diversity
    - 44 different species
  - Most number of surveys performed
    - 21 surveys
- Strawberry River
  - 32 animal sightings
  - 19 different species
  - Least number of surveys performed
    - 5 surveys performed
- Weber River
  - Least animal sightings
    - 22 animal sightings
  - Least diversity
    - 9 different species
  - 7 surveys performed

Conclusion

2. Which individual surveys within each location had the most/least animal sightings?

- Lower Provo River
  - Most animal sightings
    - Survey #3 (18)
  - Least animal sightings
    - Survey #6 (2)
- Middle Provo River
  - Most animal sightings
    - Survey #11 and #32 (17)
  - Least animal sightings
    - Survey #28 (1)
- Strawberry River
  - Most animal sightings
    - Survey #1 (9)
  - Least animal sightings
    - Survey #2 (3)
- Weber River
  - Most animal sightings
    - Survey #2 (8)
  - Least animal sightings
    - Survey #7 (1)

Conclusion

3. Where were river otters sighted, and how often were they sighted compared to other animals?

- 7 sightings out of 187 total = 0.0374 sighting probability on MPR
  - 9th most sighted animal on MPR out of 44 different species

- Middle Provo River only
  - Survey #s
    - #5
    - #13
    - #15
    - #17
    - #18
    - #32

Conclusion

4. Compare probabilities of other animal sightings to river otter sightings. Are there any possible patterns?

- Otter Sites:
  - Much higher probability of sighting an Osprey
    - Sandhill crane
- Non-Otter Sites:
  - Much higher probability of sighting a
  - Beaver
    - Racoon

Conclusion

4. Compare probabilities of other animal sightings to river otter sightings. Are there any possible patterns?

- Possible explanation:
  - Habitat overlap between otters and osprey
    - Shared prey items
  - Habitat separation between otters and beavers
    - Negative interactions
    - Different environment preferences

Suggestions for Next Steps

- Run statistical tests on how animal sighting probabilities at otter sites compare to non-otter sites
  - Contingency table
  - Chi-squared to test for goodness of fit or independence
- Collect data on other environmental factors to identify habitat preferences
  - Vegetation
  - River characteristics (flow, depth)

Questions?

Resources

- https://wildlife.utah.gov/news/utah-wildlife-news/1225-dwr-asking-utahns-to-report-otter-sightings.html
- https://www.iucnredlist.org/fr/species/12302/164577078#geographic-range