Caribou Photocensus

1. Photocensus requirements
2. Comparison of film and digital camera systems

Nathan Pamperin
2018 ADF&G Caribou Workshop
January 29, 2018
- 31 Caribou herds
  650k – 1 mill. animals
- Largest herds photocensused (~7)
  ~ 90% of total animals
- Annual harvest of ~20,000 caribou from focus herds
- Take advantage of post-calving groups
Photocensus Requirements

- Weather/insect conditions for caribou to aggregate
- Groups need defined edges
- Favorable light conditions
- Radiotracking:
  - attempt to find all active collars
  - coordinated so photo plane can progress through groups
- Properly functioning equipment (plane, cameras, GPS, IMU, etc.)
Photocensus Challenges

- Main issues to overcome:
  - Location of photography unknown until last minute
    - flight planning on the fly
    - customized software to control cameras
  - Caribou move during photography
    - maximize swath
    - optimize overlap, minimize # of transects per group
    - need to be low enough to see caribou with naked eye
Photocensus Steps

1. Radiotracking Flights
2. Flying Photo Mission
3. Develop Imagery
4. Post Processing, Photo Layout
5. Counting Photos
Planes and Cameras

- **Airplanes**
  - Cessna 206 and DeHavilland Beaver

- **Cameras**
  - Black and white film cameras (old)
  - Digital cameras (new)

- **Computer**
  - Controls when cameras take pictures
  - Displays photo footprints in real time for adjusting overlap
  - Takes GPS location so we know where photos were taken
Photo footprint: 1,500ft x 1,500ft (@1,000ft agl)
Large group...
Photo Layouts
Digital Camera Systems

1. 3 cameras, each 100MP
2. Stabilized mount
3. GPS and IMU
4. Advanced flight management software
5. Software to stitch images together
# Swath width

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<th>Dual 50mm Cameras</th>
<th>Swath</th>
<th>Ground Sample Distance (GSD) (image center, oblique)</th>
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Digital System Footprints

1,800 m
5,900 ft

1,200 m
3,900 ft
Data Sources

Imagery

GPS

Inertial

![Diagram of data sources with imagery, GPS, and inertial components.]
Tie Points and Bundle Adjustment
Software Demonstration: Orthorectification
Photo Mosaic: Digital System

Image seamlines

50mm

90mm
### Counting: Digital System

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Differences Between Film and Digital Counts

- **Image quality**
  - digital produces better images under poor light
  - easier to count calves on digital imagery

- **Group photography/layout**
  - less transects with digital system = less sidelap
    - 2017: only 8 of 116 groups with >1 transect
  - flight management more accurate with digital

- **Digital counting in GIS**
  - more accurate than grid overlay and film prints

- **Day to day differences in groups**
  - back to back censuses can vary
Questions