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Fourteen-year Summary of Canadian Bird Strike Identifications - Smithsonian Institution Feather Identification Lab

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Fourteen-year Summary of Canadian Bird Strike Identifications - Smithsonian Institution Feather Identification Lab



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Division of Birds
Smithsonian Institution
National Museum of Natural History

Outline

- History of the SI Feather ID Lab
- The role of DNA barcoding
- Current state of bird strike ID in Canada
- Potential for a Canadian ID centre

Feather Identification Lab

Established in 1960 by Roxie Laybourne



Logan Airport Electra Crash

October 4, 1960

Worst bird strike in history:
62 people killed

Feather Identification Lab



Carla Dove joined in 1989

- 1st interagency agreement in 1994 (U.S. Air Force)
- FAA joined in 2000
- Navy joined in 2008

Feather Identification Lab

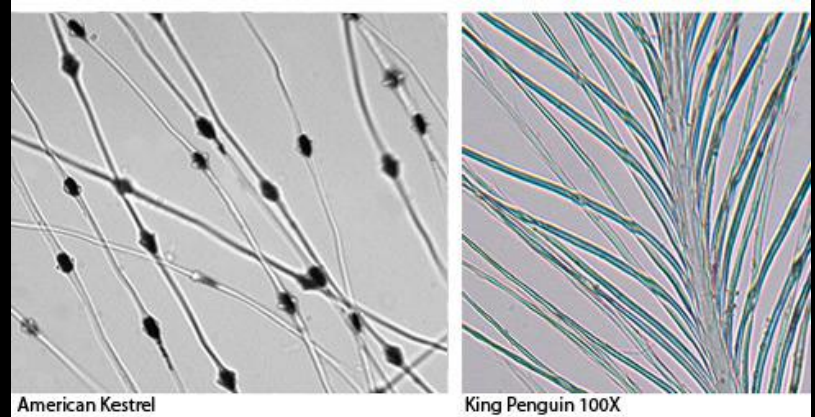
- Employs a staff of four
- Operates on an annual budget of \$530 K
- Identify ~6,000 bird strikes annually



Feather Identification Lab



Whole feather



American Kestrel

King Penguin 100X

Microstructure



“Gross” morphology



DNA barcoding

Feather Identification Lab

- 2003-2006: Research and Development
- 2006: DNA barcodes regularly employed

24% increase in
species-level IDs!



DNA barcoding

DNA Barcoding

Established by Dr. Paul Hebert at the
University of Guelph in Ontario

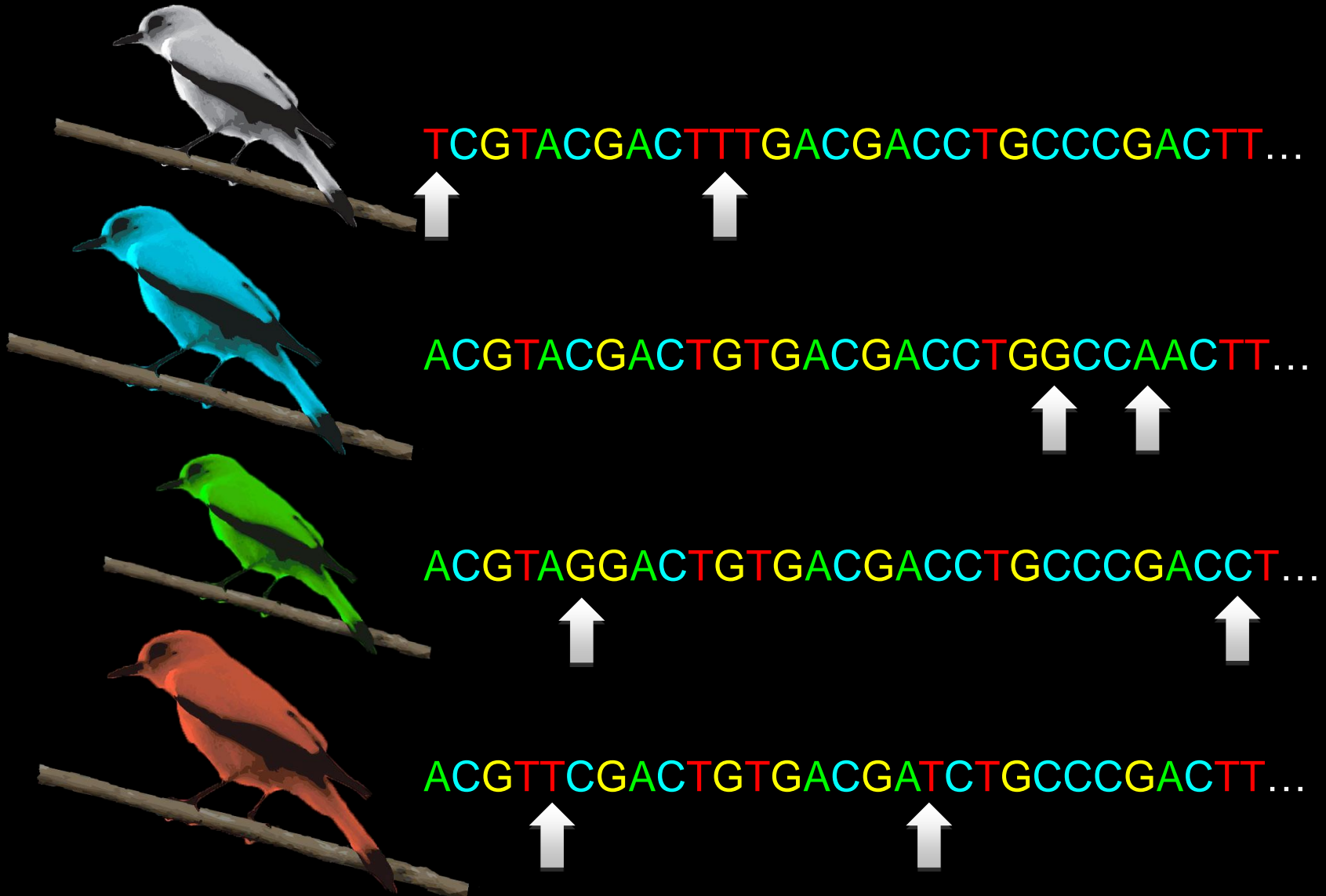


DNA Barcoding

Using a standardized DNA marker for species identification (i.e. COI)

[illegible]

DNA Barcoding

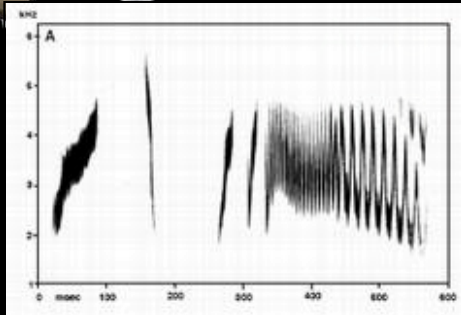


DNA Barcoding

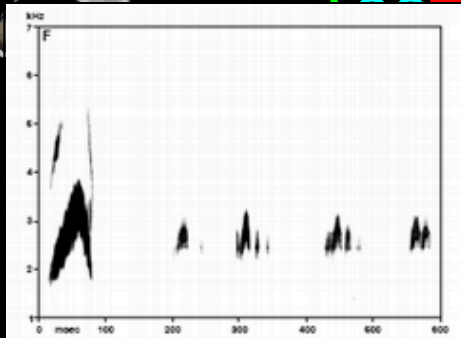
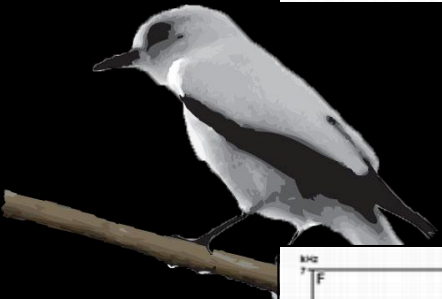


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DNA Barcoding



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ACCTACGACTGTGACGACCGGCCCGACTT...
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DNA Barcoding



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ACGTACGACTGTGACGACCTGGGGCAACTT...



ACGTAGGACTGTGACGACCTGCCCGACTT...



ACGTACGACTGTGACGATCTGCCCGACTT...



DNA Barcoding

unknown

DNA library - known

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ACGTACGACTTTGACGACCTGGGCGACTT
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Corvus corone

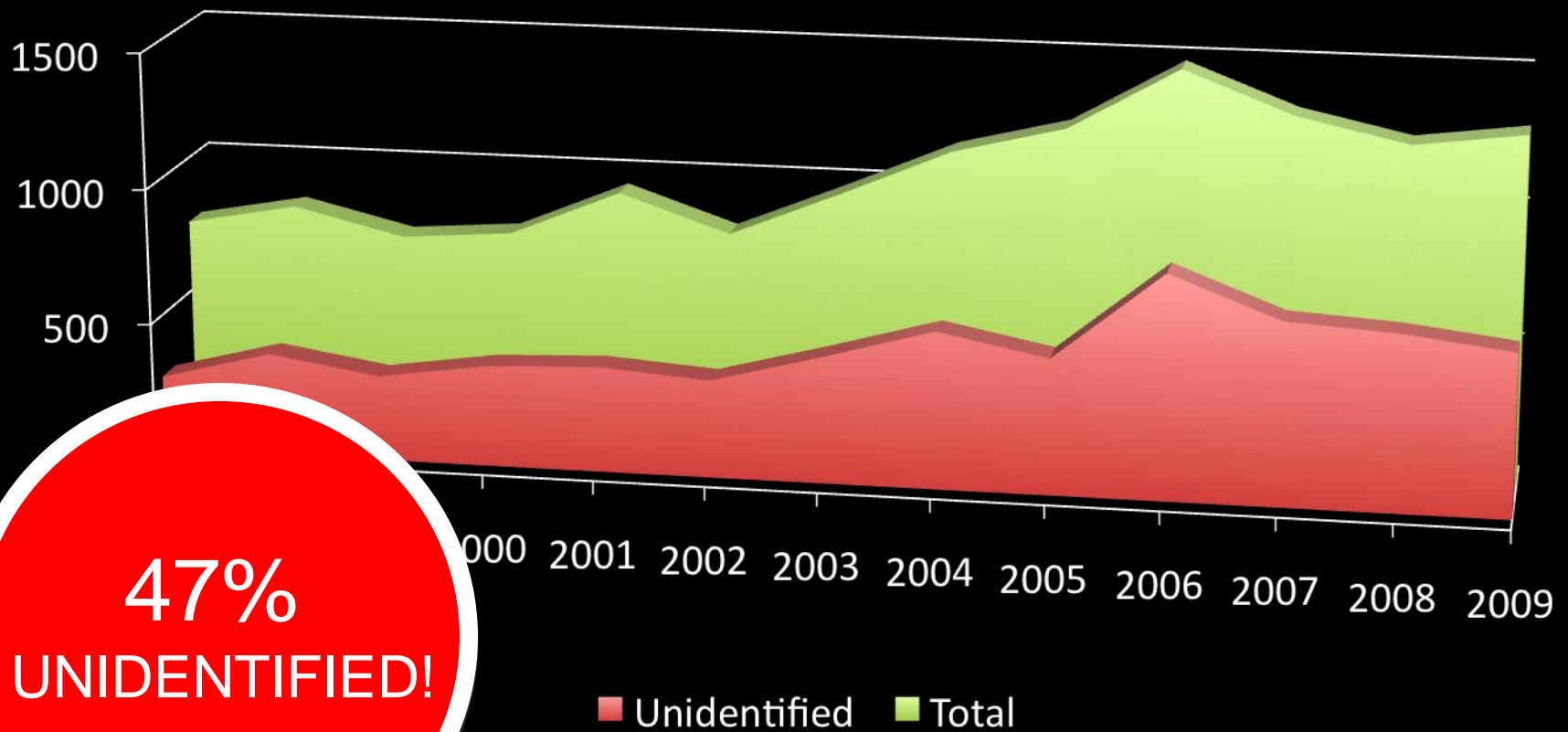


The Feather Lab and Canada

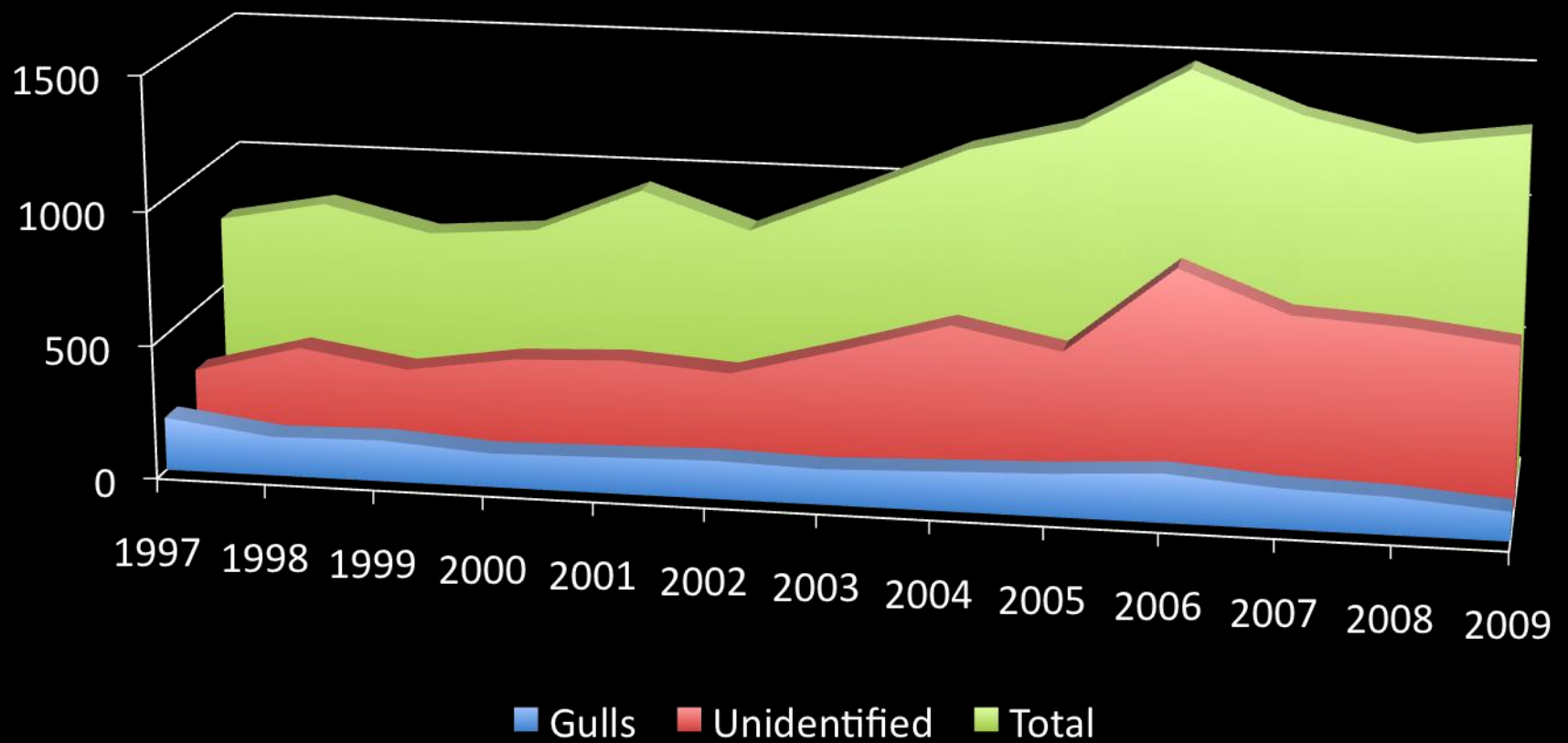
- Current database dates back to 1997



Canadian Bird Strikes - civil



Canadian Bird Strikes - civil



Ambiguous categories

15% of birds strikes are identified as “gulls”

Franklin's



250 g

Herring



>1.0 kg

Ring-billed



500 g

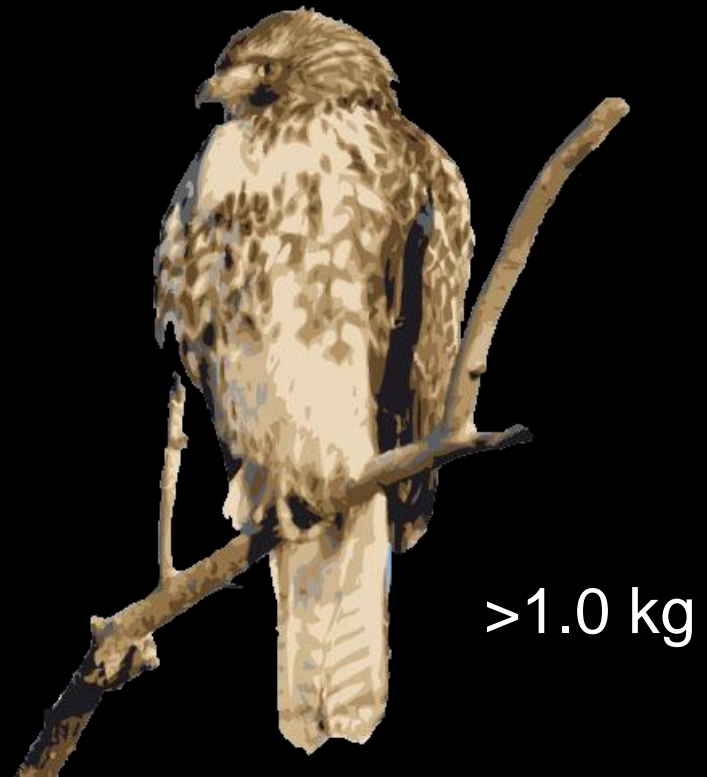
Ambiguous categories

2.5% of birds strikes are identified as “hawks”

Sharp-shinned

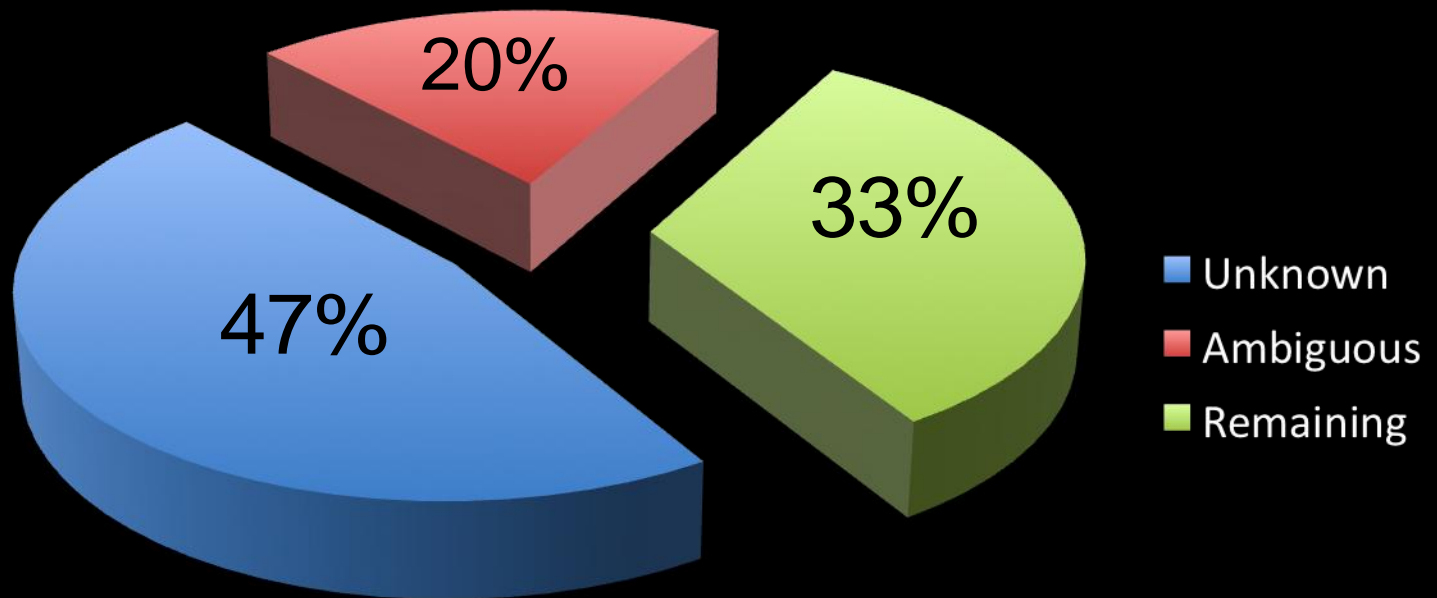


Red-tailed

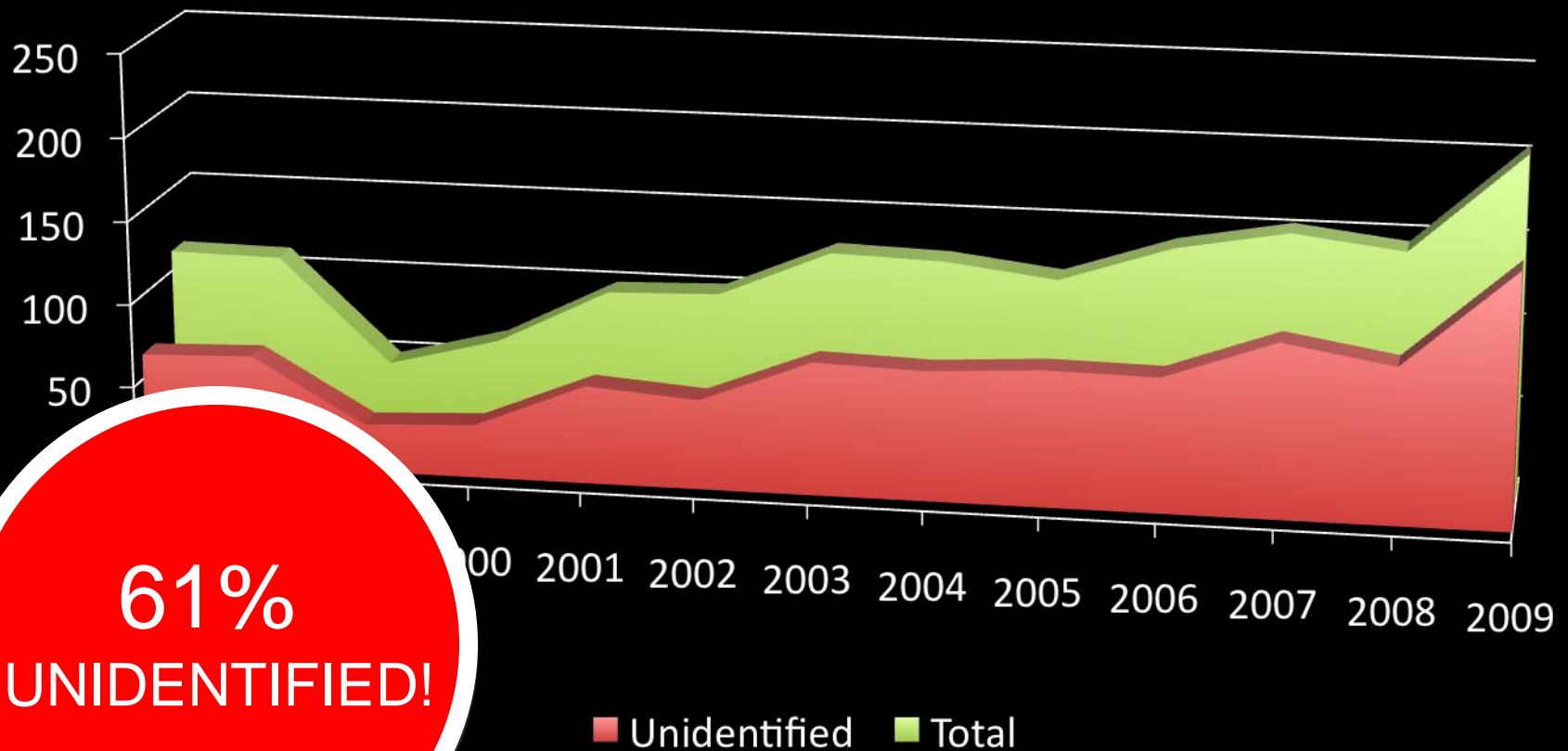


Canadian Bird Strikes - civil

Identification rates



Canadian Bird Strikes - military



The Feather Lab and Canada

- No interagency agreements with Canadian institutions

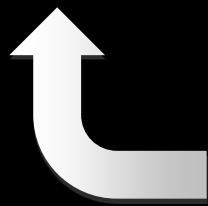
The Feather Lab cannot...

- accept payment from other countries
- accommodate additional workflow from Canadian bird strikes

(cross-border permitting can also be an issue)

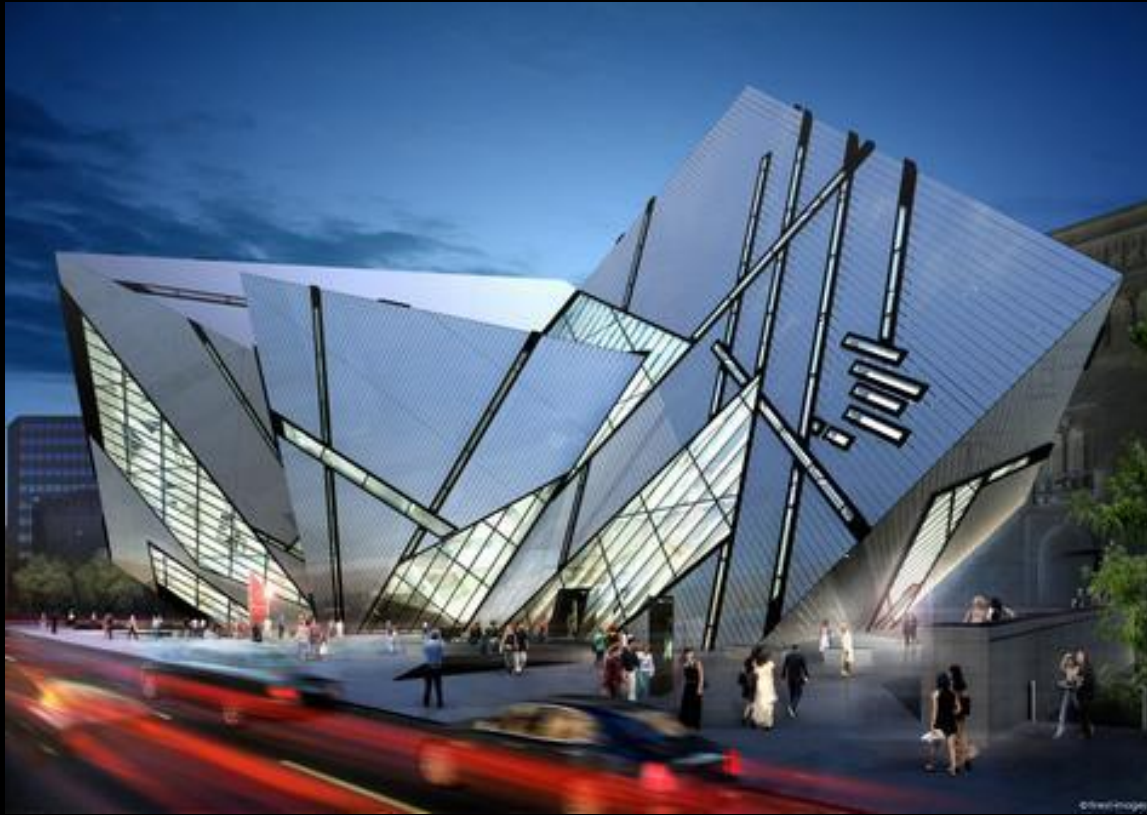
Cost of an ID centre in Canada

- Average cost per identification = \$84
(much lower than historical rates: \$400/ID)
- An annual budget of \$130,000* should support a staff member, overhead, and cover lab costs



Essential!

Royal Ontario Museum



11th largest ornithology collection in
the world (~140,000 specimens)

Biodiversity Institute of Ontario University of Guelph



Global hub for DNA barcoding

Conclusions

- Majority of Canadian bird strikes are currently left unidentified
- Techniques are available to improve bird strike identification
- Resources for an improved bird strike ID program already exist in the country

Acknowledgements

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