

Birdstrike Identification: a Fundamental Piece of Due Diligence

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Ingrid Rochon
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Smithsonian
National Museum of Natural History

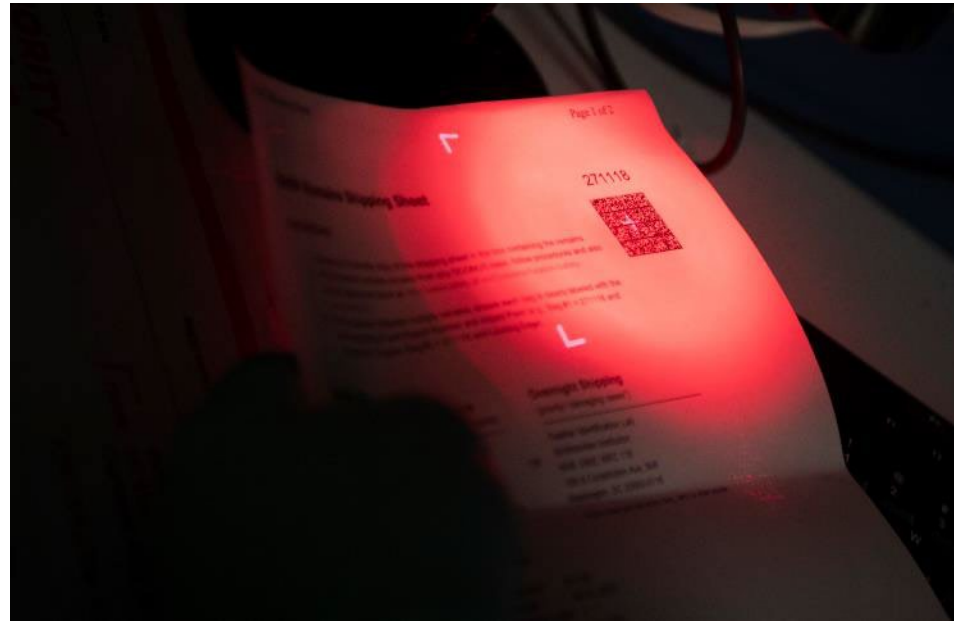
Feather Lab: General Stats & Overview



- Over 11,000 strikes identified last year
- 55% FAA, 35% USAF, 10% USN/USMC
- Process over 400 strikes a week in busiest times
- 91% of samples received get a species-level identification
- 93% of cases are completed within 6 days of receipt



Internal Tracking



Strike Report Confirmation: 2024-07-23-101440		
Revision: 1		
Date of Incident: 07/23/2024	Local Time of Incident: 07:15	Time of Day: Day
Airport Name/ICAO Code: KATL (Atlanta, GA) - 71	Runway Used: 8L/8R	Sky Condition: Some Cloud Precipitation: [] Fog [] Rain [] Snow [] Other
Height (AGL):	Speed (IAS):	Phase of Flight: Unknown
Operator:	Aircraft Registration:	Flight Number:
Aircraft Make/Model:	Engine Make/Model:	Wing Identification:

USN BASH Remains Shipping Sheet

3457916

Instructions

1. Include a print friendly copy of this shipping sheet in the box containing the remains. (Print)
2. If this shipment includes remains from any OCONUS base, follow procedures and also include paperwork found at: <http://www.safety.af.mil/USNCONUS/Airson-Safety/DownfallBASH/>
3. If the shipment includes multiple remains, ensure each bag is clearly labeled with the corresponding Event Report Number and Impact Point (e.g. Bag #1 = 3457916 and Outside #1 Engine, Bag #2 = 3457916 and Landing Edge)
4. Bird strikes are usually identified within two weeks after receiving the remains. Please promptly mail the remains and be aware material coming from OCONUS locations may take longer to arrive. For questions about species identification, reach out to the Smithsonian (beathen@si.edu) or by telephone at (202) 633-0801.

Ship To

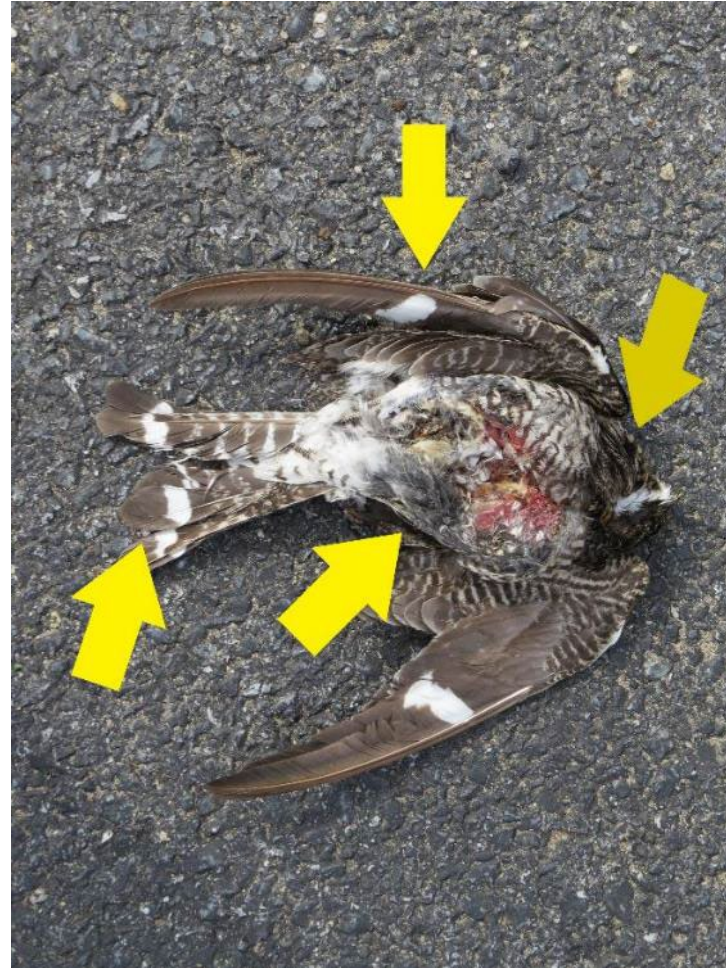
U.S. Postal Service (all US Postal Service mail)	Courier Shipping (example: Fed Ex, UPS, DHL, etc.)
Feather Identification Lab Smithsonian Institution NHB, EG00, MRC 116 P.O. Box 37912 Washington, DC 20560-7912	Feather Identification Lab, MRC 116 National Museum of Natural History 100 Constitution Ave. NW Washington, DC 20560-0116

USN Event Information

The screenshot displays the 'Bird Strike Dashboard' software. The main interface includes a navigation bar with 'Reports' and 'Find BSR Reports' buttons. A table lists various bird strike reports with columns for Agency, Report #, Lab #, Strike Date, and Location. A pop-up window titled 'Adding New AF BS Report' is open, allowing users to enter details for a new report, such as Agency (Air Force), Case/Report # (1517444), Strike Date (07-27-2024), and Location (Joint Base Andrews Naval Air Facility). The interface also shows a list of bird species on the right side, including 'Red-tailed Hawk (Buteo jamaicensis)' and 'Least Tern (Stercorarius anthracinus)'.

Remains Collection

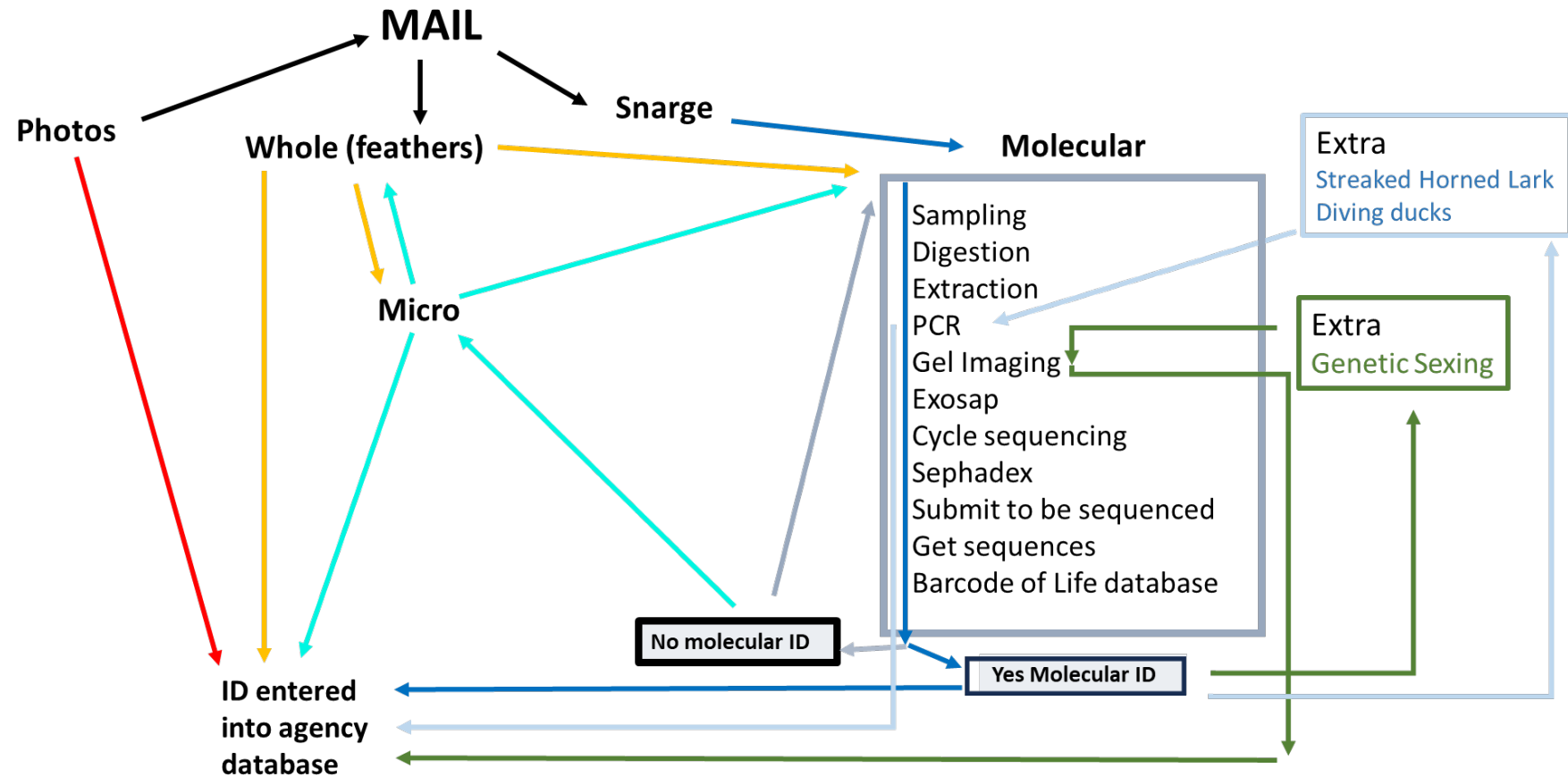
Whole/partial carcass



Snarge/blood smear

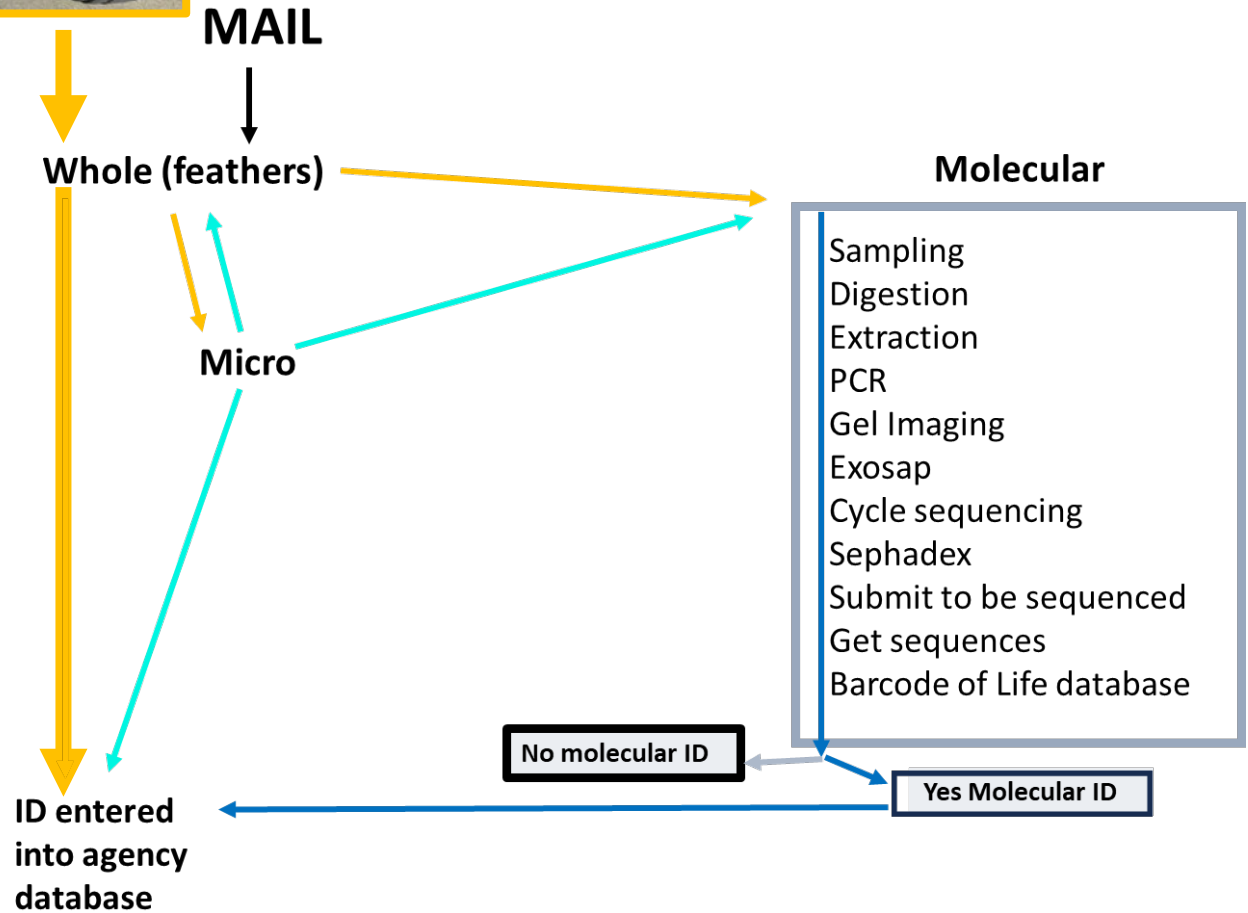
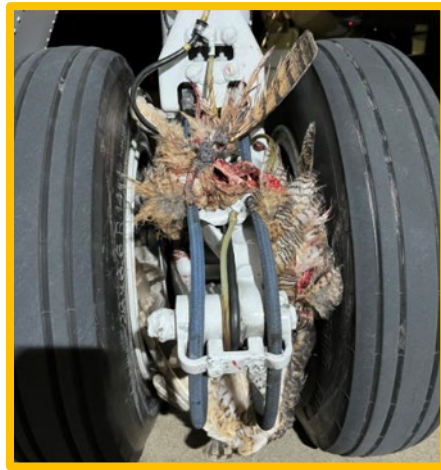


Workflow



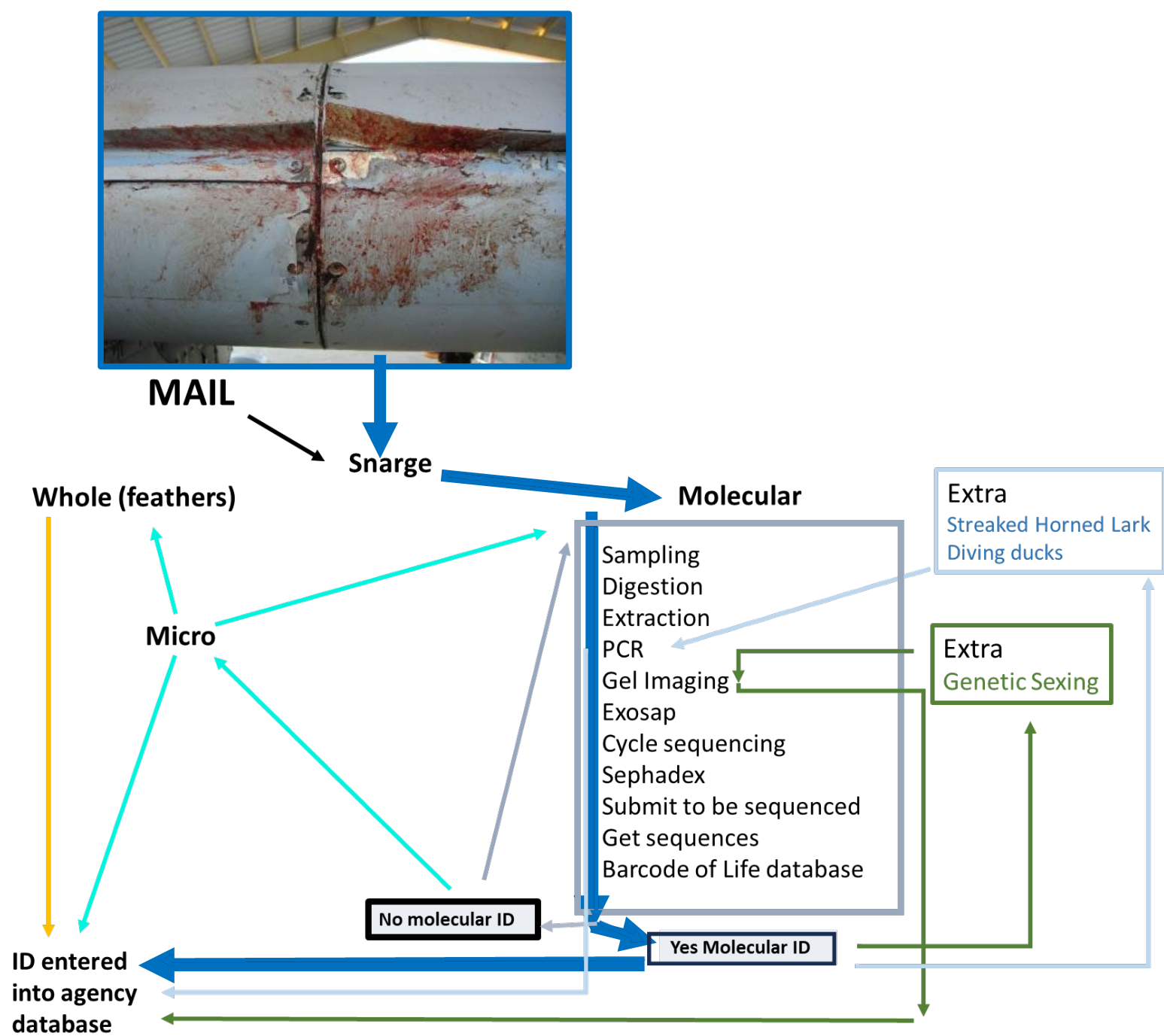
Workflow

Whole Feather



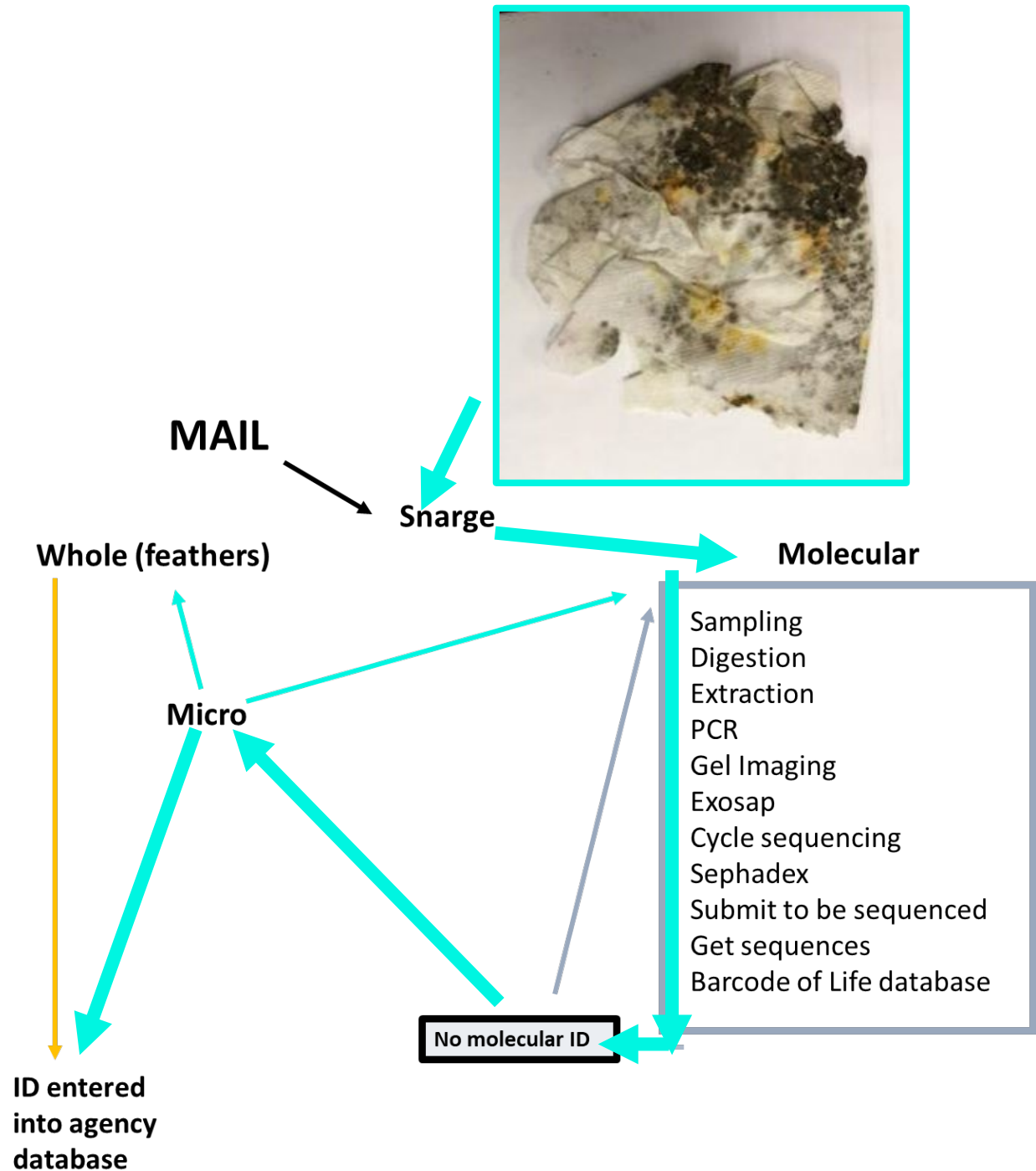
Workflow

DNA



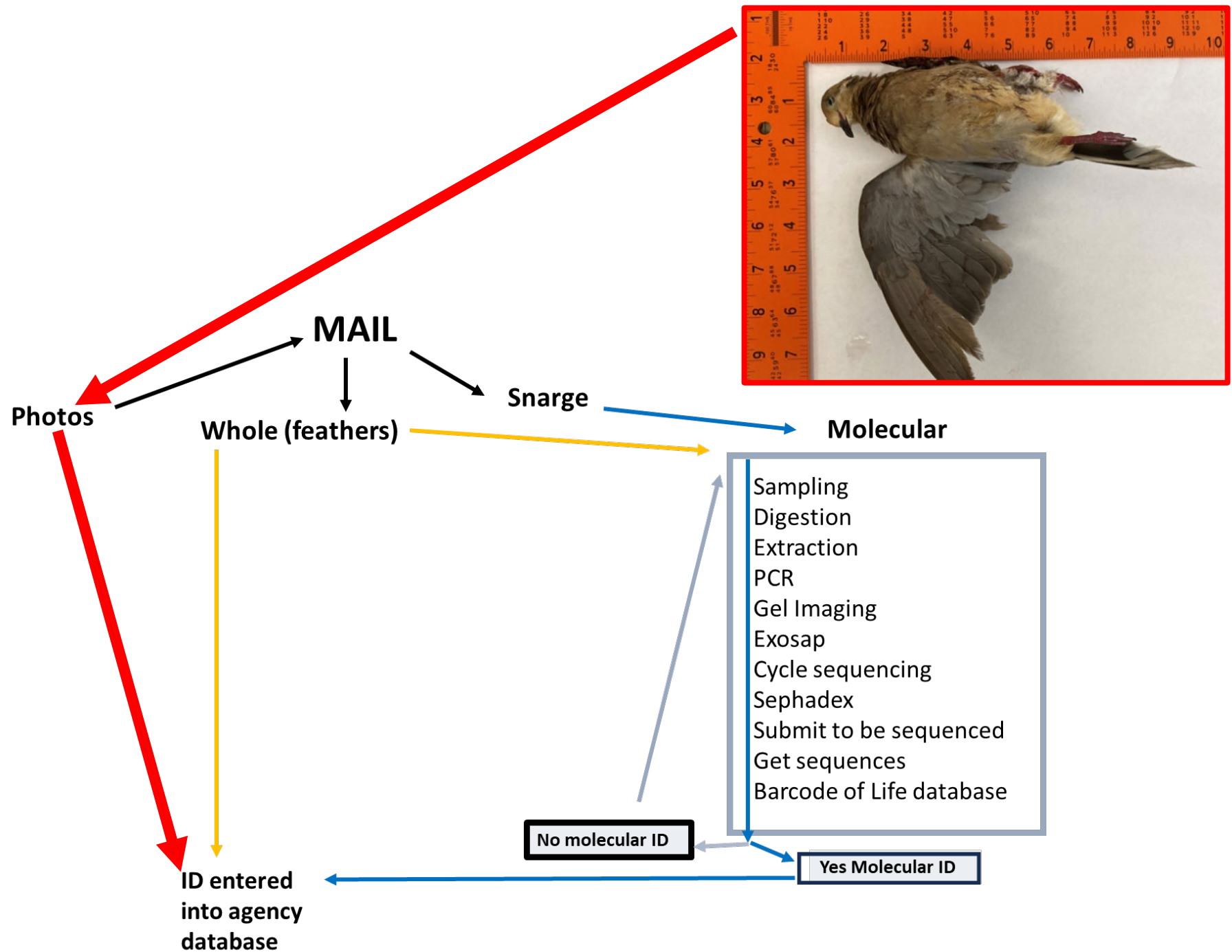
Workflow

Micro



Workflow

Photo



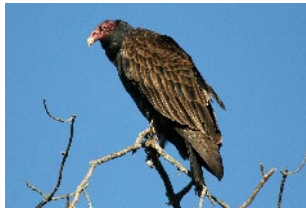
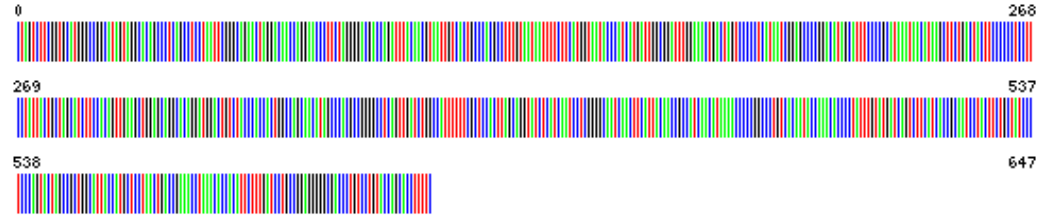
**Due diligence
in
molecular
identification**



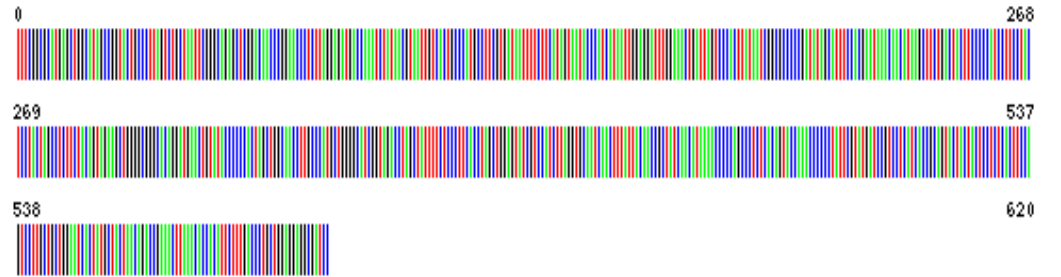
Molecular Barcoding CO1 – universal barcoding primers for birds



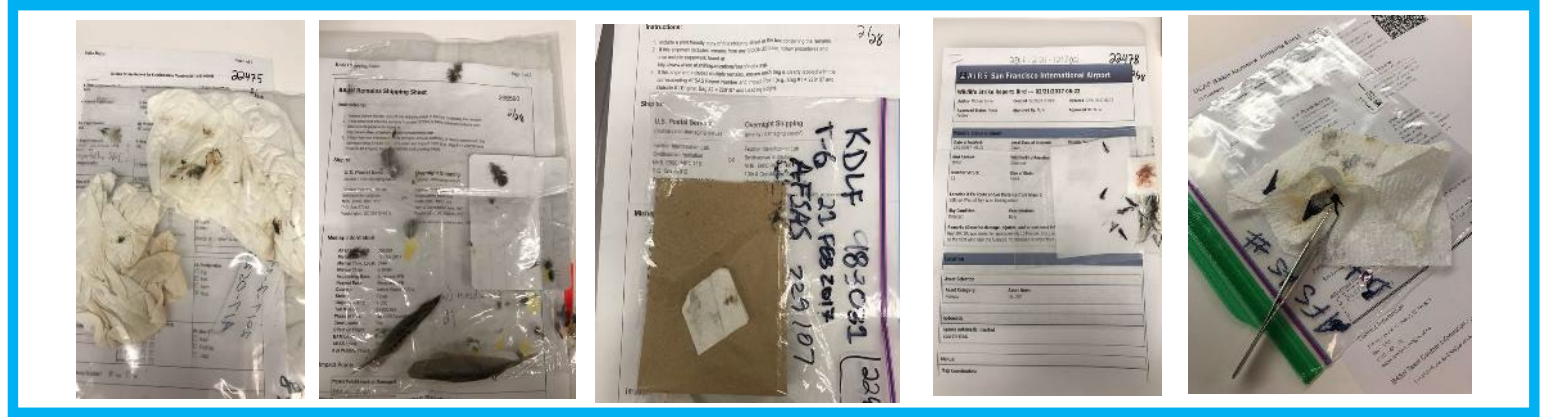
Barn owl



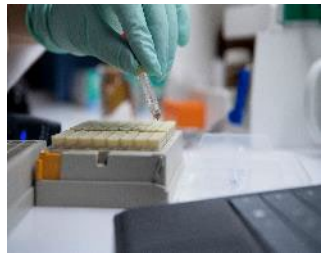
Turkey vulture



SNARGE



**FEATHER LAB
(FLAB)**
sampling



**LABORATORY
ANALYTICAL
BIOLOGY (LAB)**
molecular work



extraction



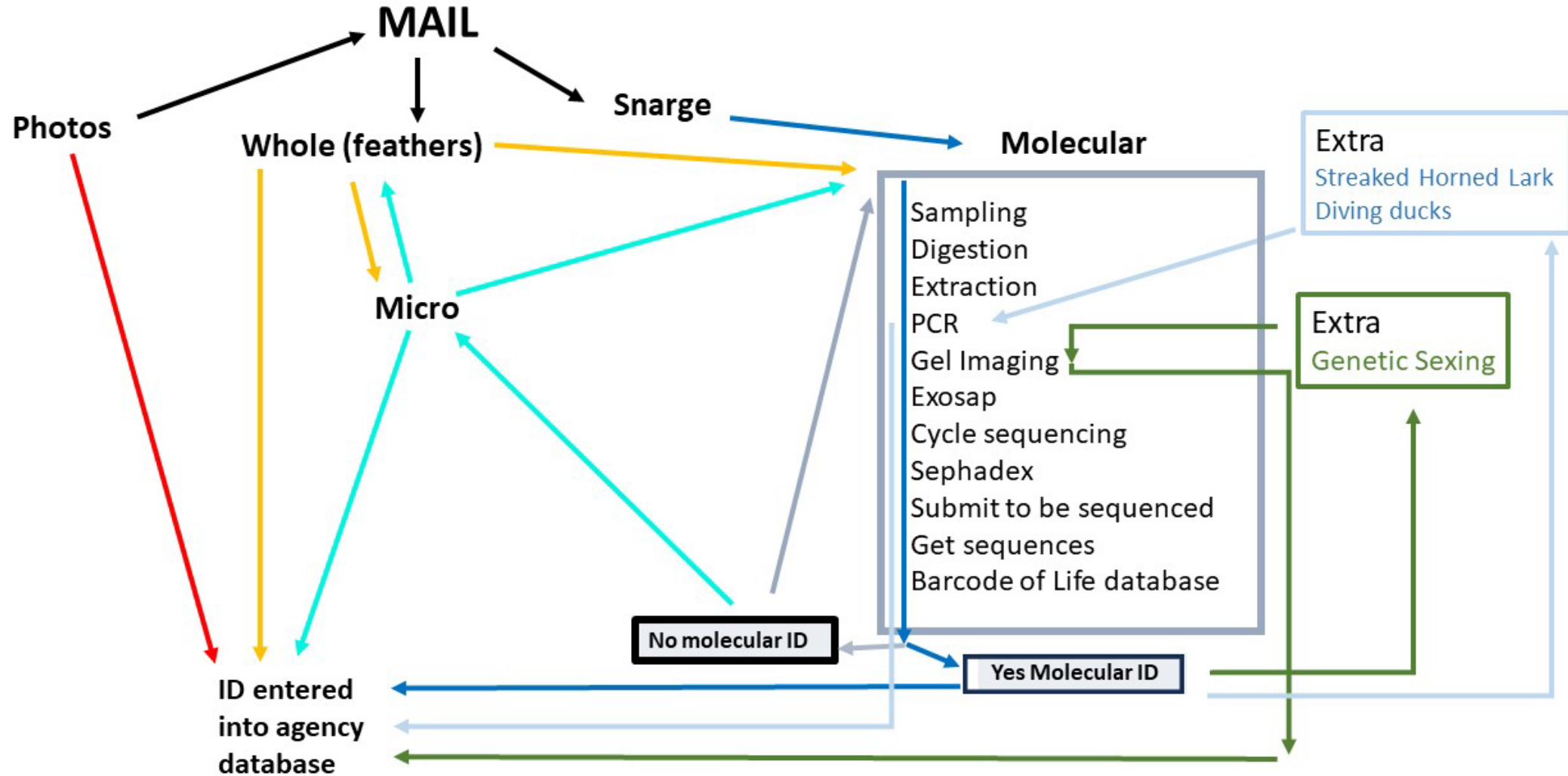
sequencer



Sequences to ID

SNARGE Processing Snarge to ID

The Workflow to Molecular Identification



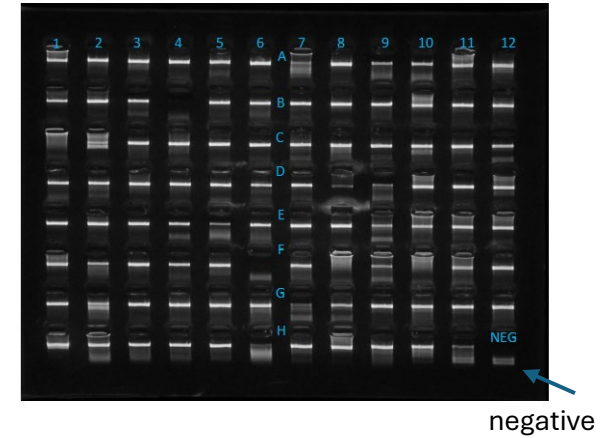
Molecular Quality Check

Negative Control

Every plate, every extra PCR reactions have a negative control

Visual check for every plate and extra PCR done

- Fresh buffers and primer solutions*
- Pipettes, tips under UV light*
- 10% Bleach or 70% ethanol wipes for surfaces*



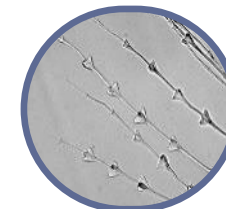
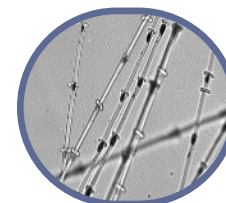
Positive Control

Identification match with

- feathers in the bag/ vouchered specimens in the collection
- micro
- info on report sent; location, flight track

Repeat PCR with different primers; same extraction

Resample snarge



Streaked Horned Lark

ND2

MtDNA ND2 sequence identifies Streaked Horned Lark (*Eremophila alpestris strigata*) from birdstrike to US Air Force F-15 at Portland International Airport, Oregon

Conservation Genet Resource (2013) 5:997–999



Streaked Horned Lark

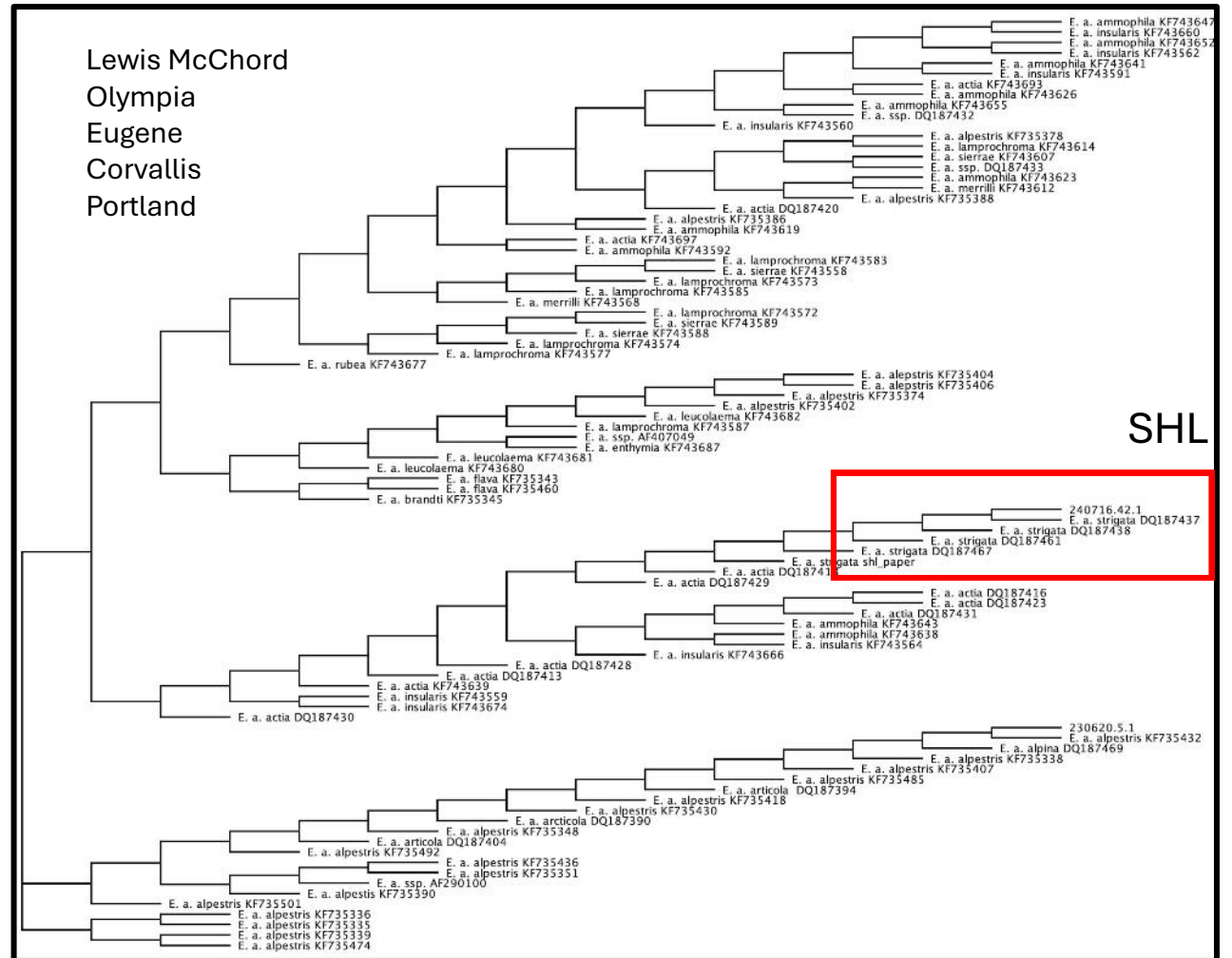


Horned Lark

With the standard barcoding primers CO1: ID on BOLD/GenBank to a mix Horned Lark/ Streaked Horned Lark

Using ND2 primers and constructing a phylogenetic tree: Able to tease out on GenBank the Streaked Horned Lark

ND2

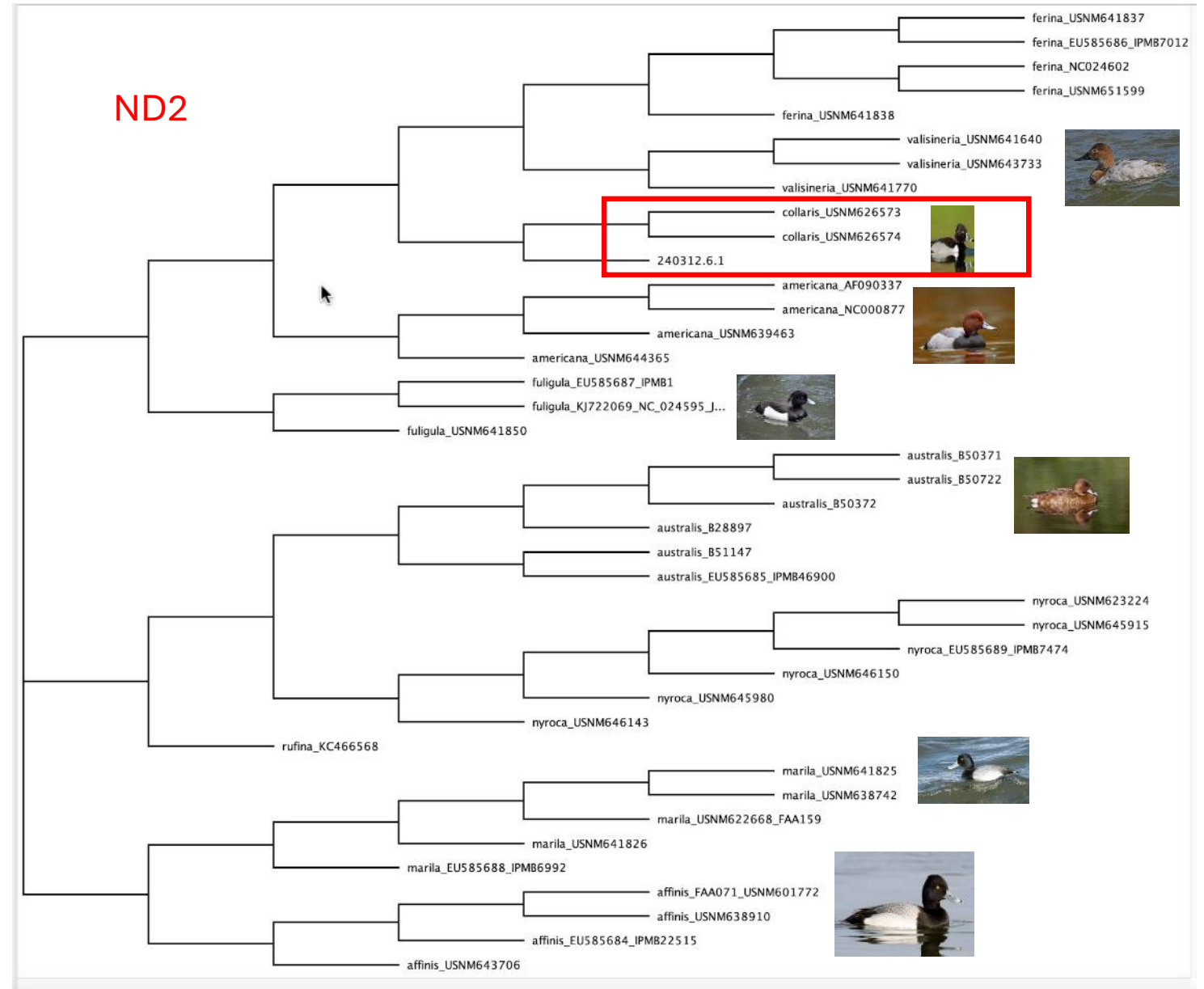


Diving Ducks

ND2

ND2 as an additional genetic marker to improve identification of diving ducks involved in bird strikes

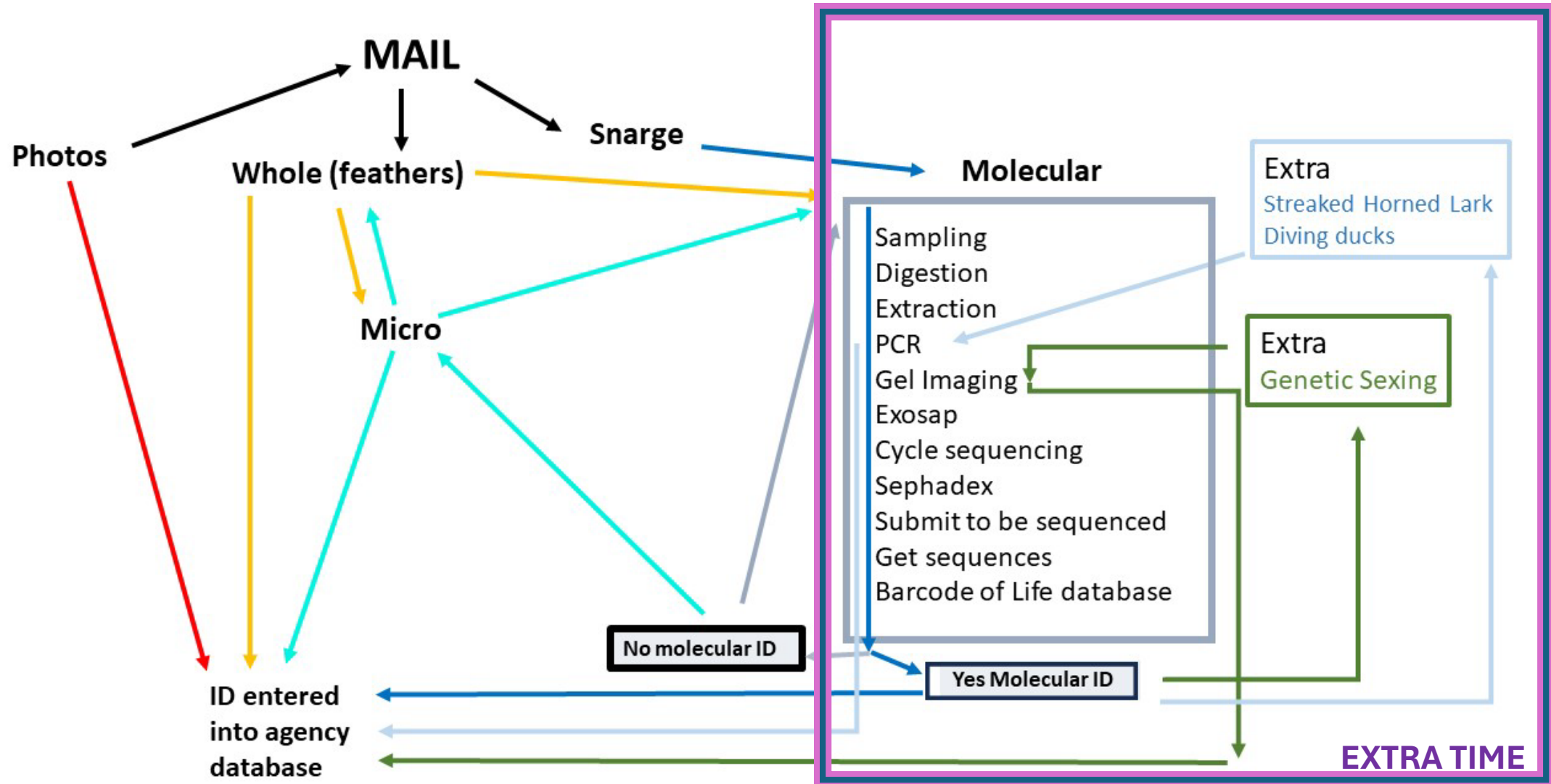
Human-Wildlife Interactions. (2020) 14 (3):365–375.

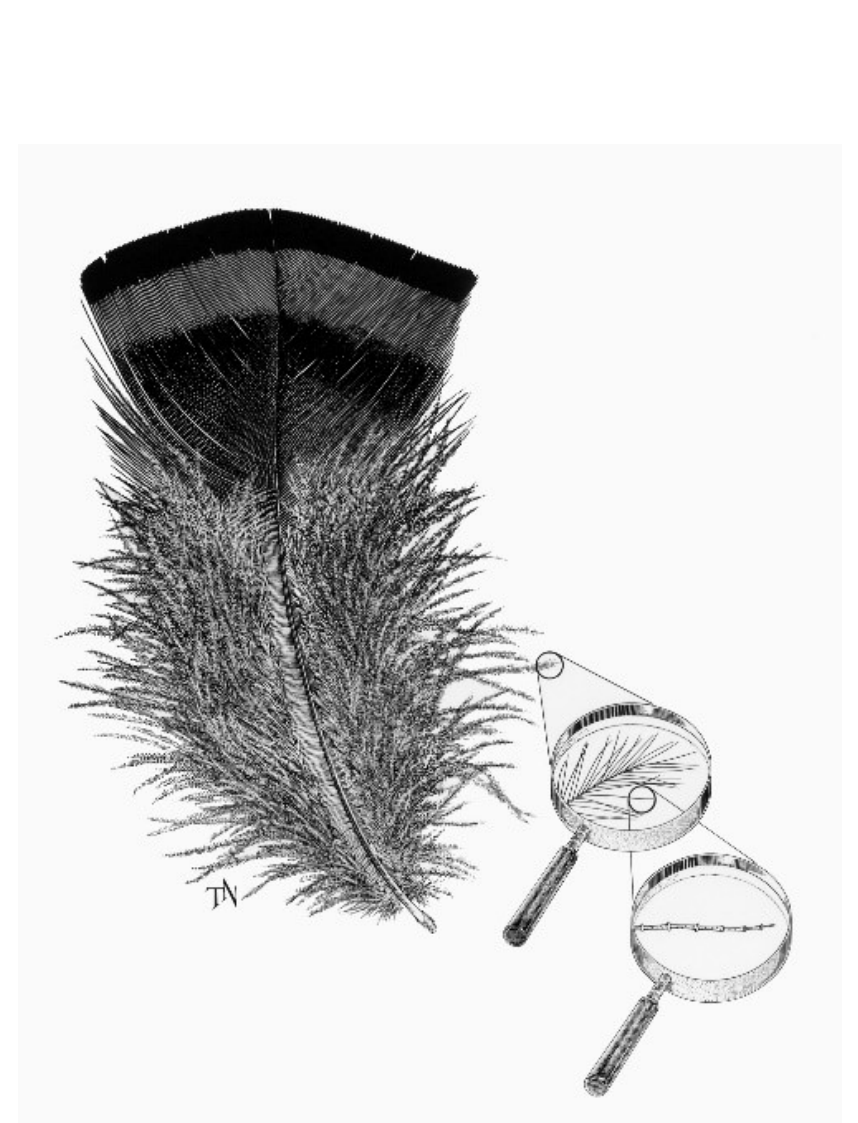


Genetic Sexing

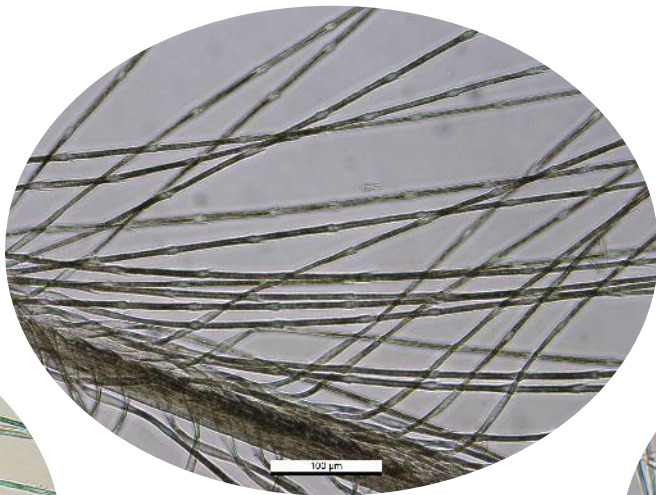


Extra Workflow to Molecular Identification

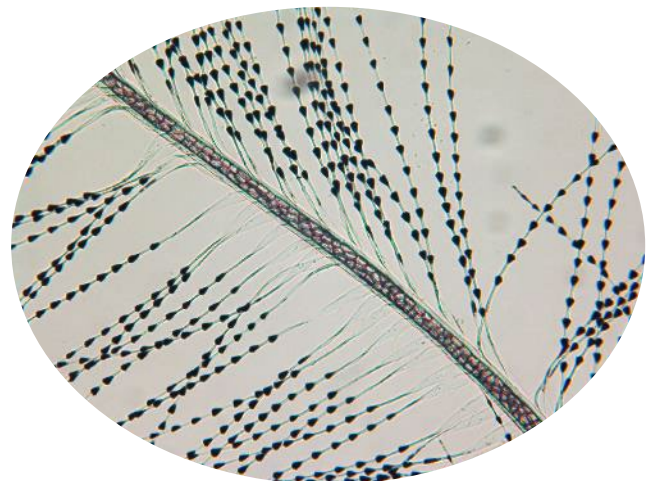




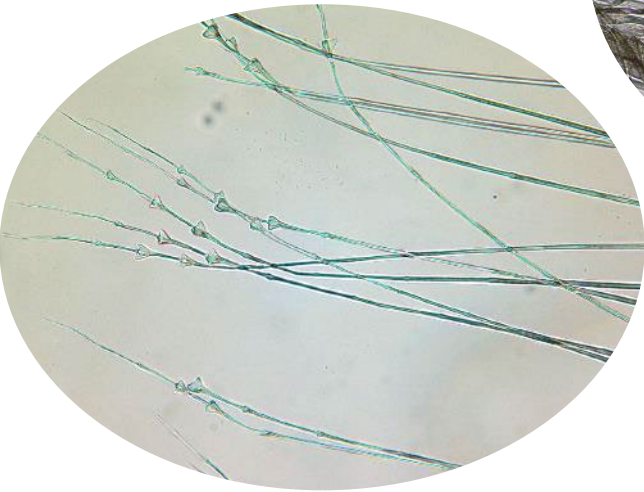
Due Diligence Under the Microscope



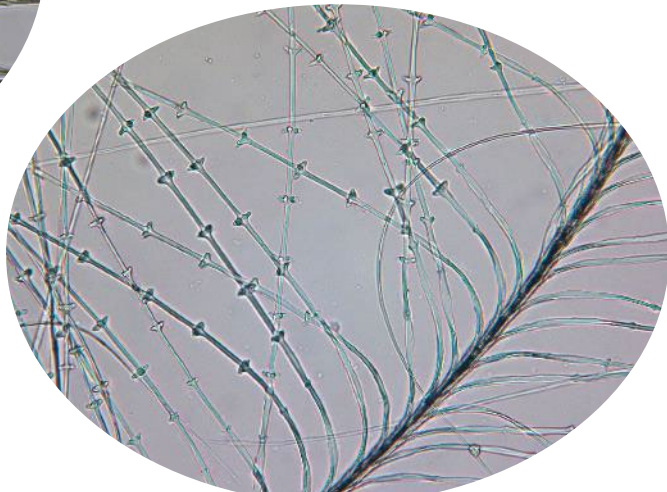
Accipitriformes:
Birds of Prey



Passeriformes:
Perching Birds



Anseriformes: Ducks & Geese



Columbiformes: Doves



Microscopic Backup to Support Whole Feather Identifications

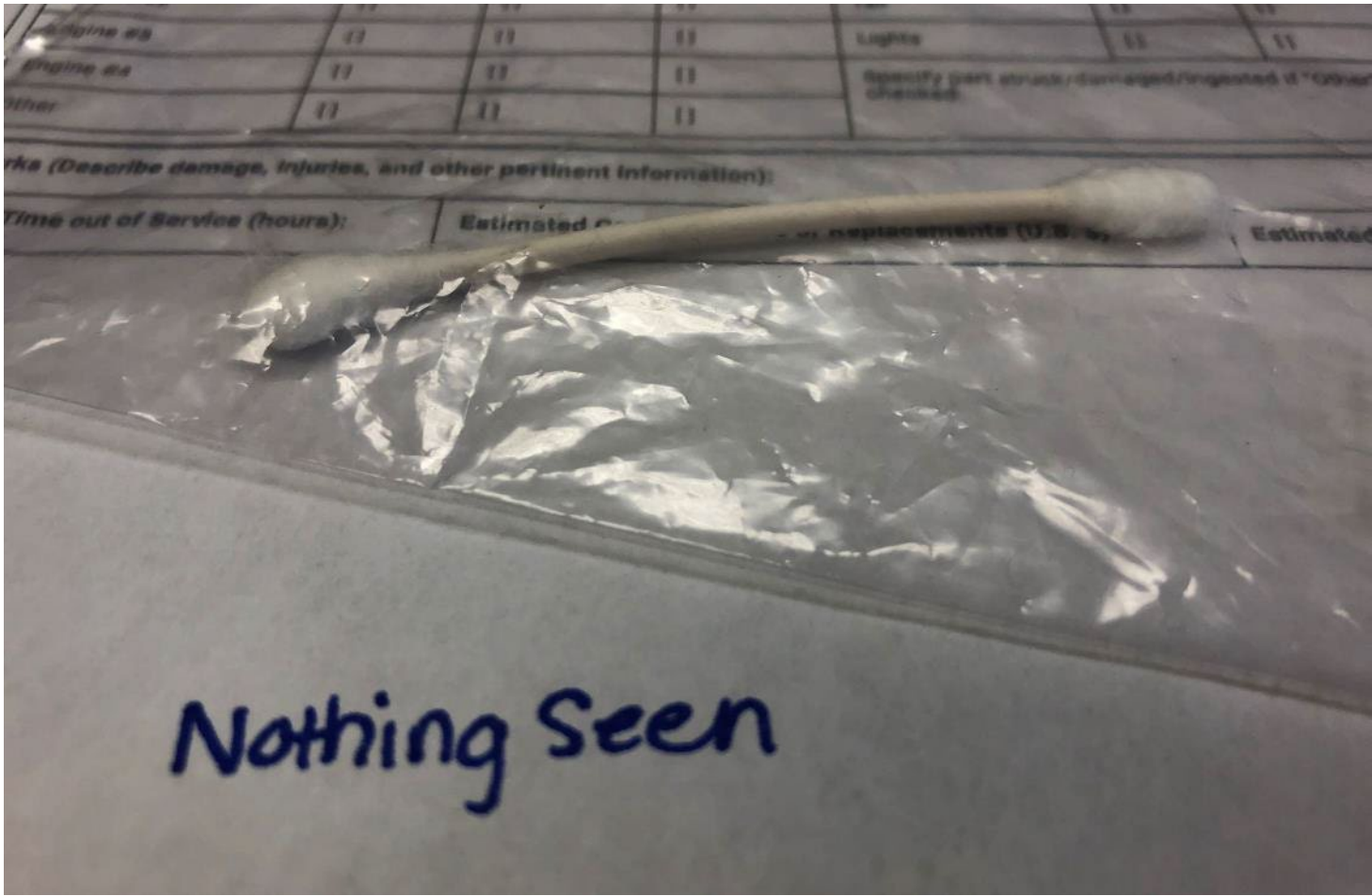
Photo credits

American Woodcock – Fyn Kynd, Flickr, CC BY 2.0

Killdeer – TexasEagle, Flickr, CC BY-NC 2.0





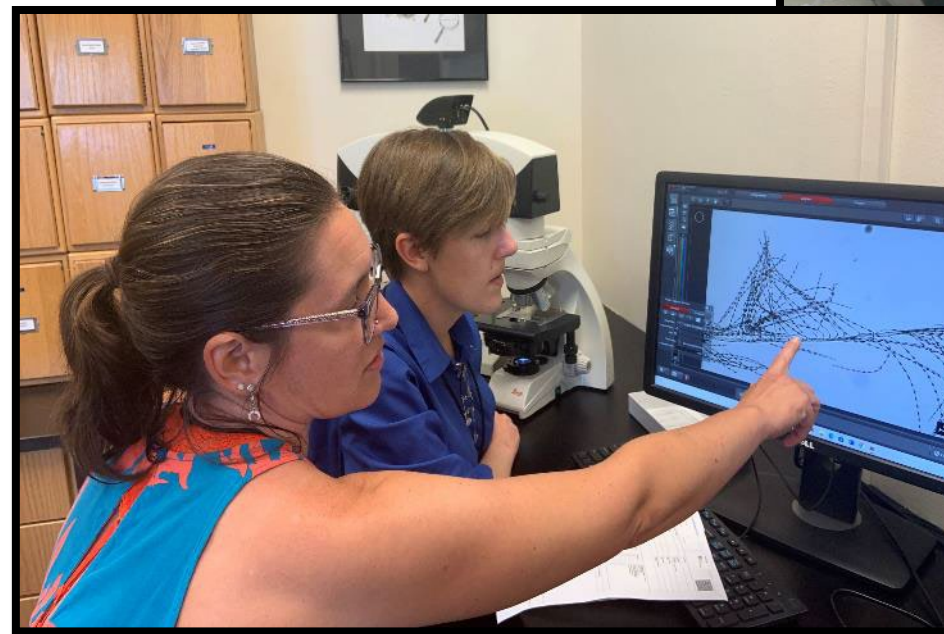


Micro Corroborates DNA IDs

Micro Validates Unusual Species and/or Geography



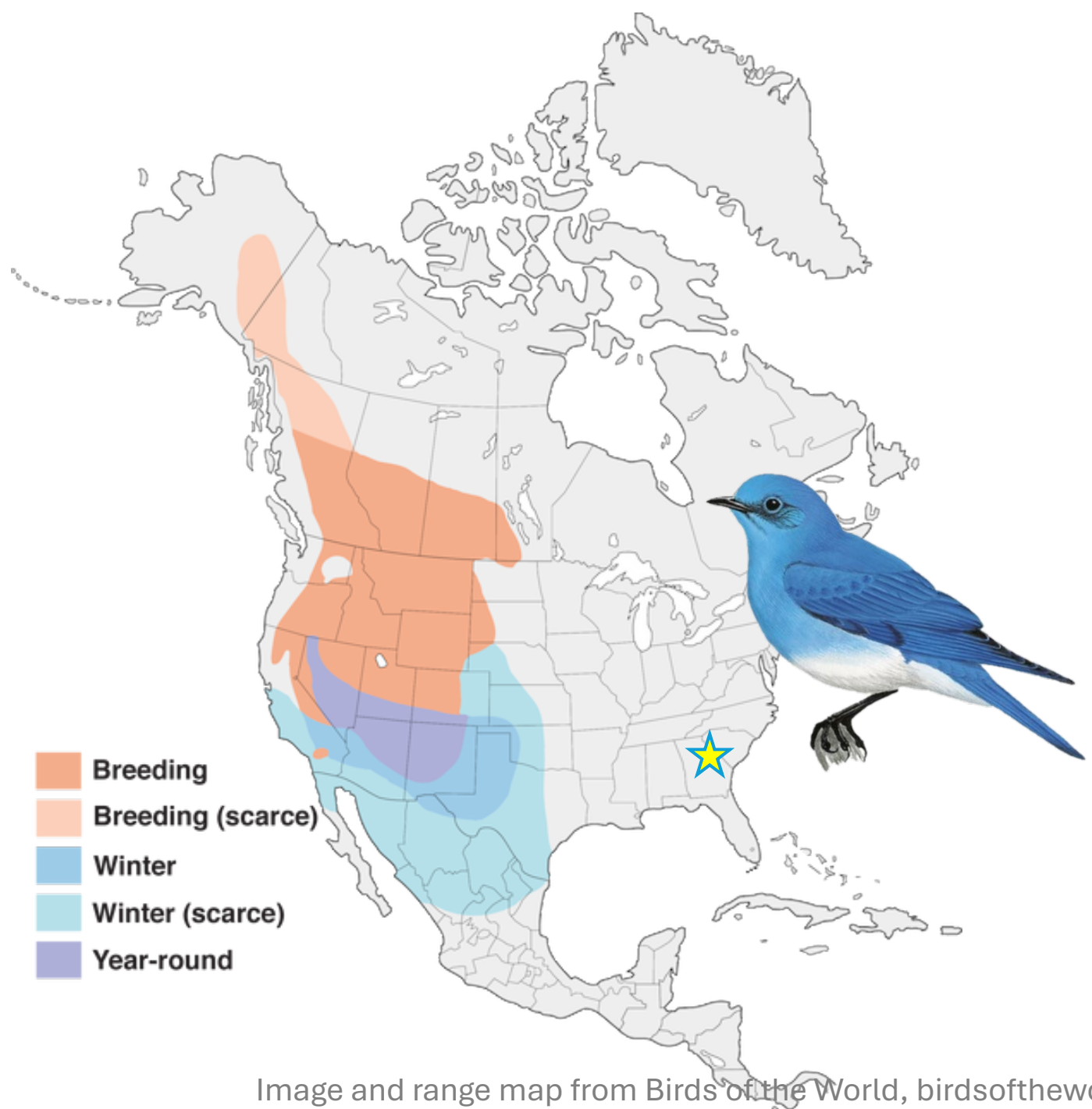
Checks and Balances



Resources



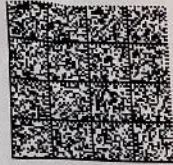
Tracking Flights and Species Geography



USAF BASH Remains Shipping Sheet

240724.9

9614016



Instructions

1. Include a print friendly copy of this shipping sheet in the box containing the remains. (Print)
2. If this shipment includes remains from any OCONUS base, follow procedures and also include paperwork found at: <http://www.safety.af.mil/Divisions/Aviation-Safety-Division/BASH/>
3. If this shipment includes multiple remains, ensure each bag is clearly labeled with the corresponding Event Report Number and Impact Point (e.g., Bag #1 = 9614016 and Impact Point #1, Engine; Bag #2 = 9614016 and Impact Point #2, Engine).
4. Bird strikes are usually identified within two weeks of receipt. Please promptly mail the remains to the Smithsonian. For questions about species and be aware material coming from OCONUS locations may require special handling. For questions about species identification, reach out to the Smithsonian, (Washington, DC) by telephone at: (202) 633-0801.

Ship To

U.S. Postal Service
(all other mail service mail)

Courier Shipping

(example: Fed-Ex, UPS, DHL, etc.)

Feather Identification Lab
Smithsonian Institution
NHB, E600, MRC 116
P.O. Box 37012
Washington, DC 20013-7012

Feather Identification Lab, MRC 116
National Museum of Natural History
1000 Constitution Ave, NW
Washington DC 20560-0116

Event Information

Event Investigation ID: 9614016
 Event Date: 11 Jun 2017
 Event Time, Local: 17:00:00
 Accounting Base: MRC
 Owning Organization: 73
 Nearest Base: JMW
 Country: USA
 State: Georgia

1, Tier 2: HH-60W
BUNO: 17-04428

Impact Points

IMPACT POINT

Inside Engine NO. 1

Required Remarks to Ship

HH-60W Bat strike; str

Attached Files for Ship

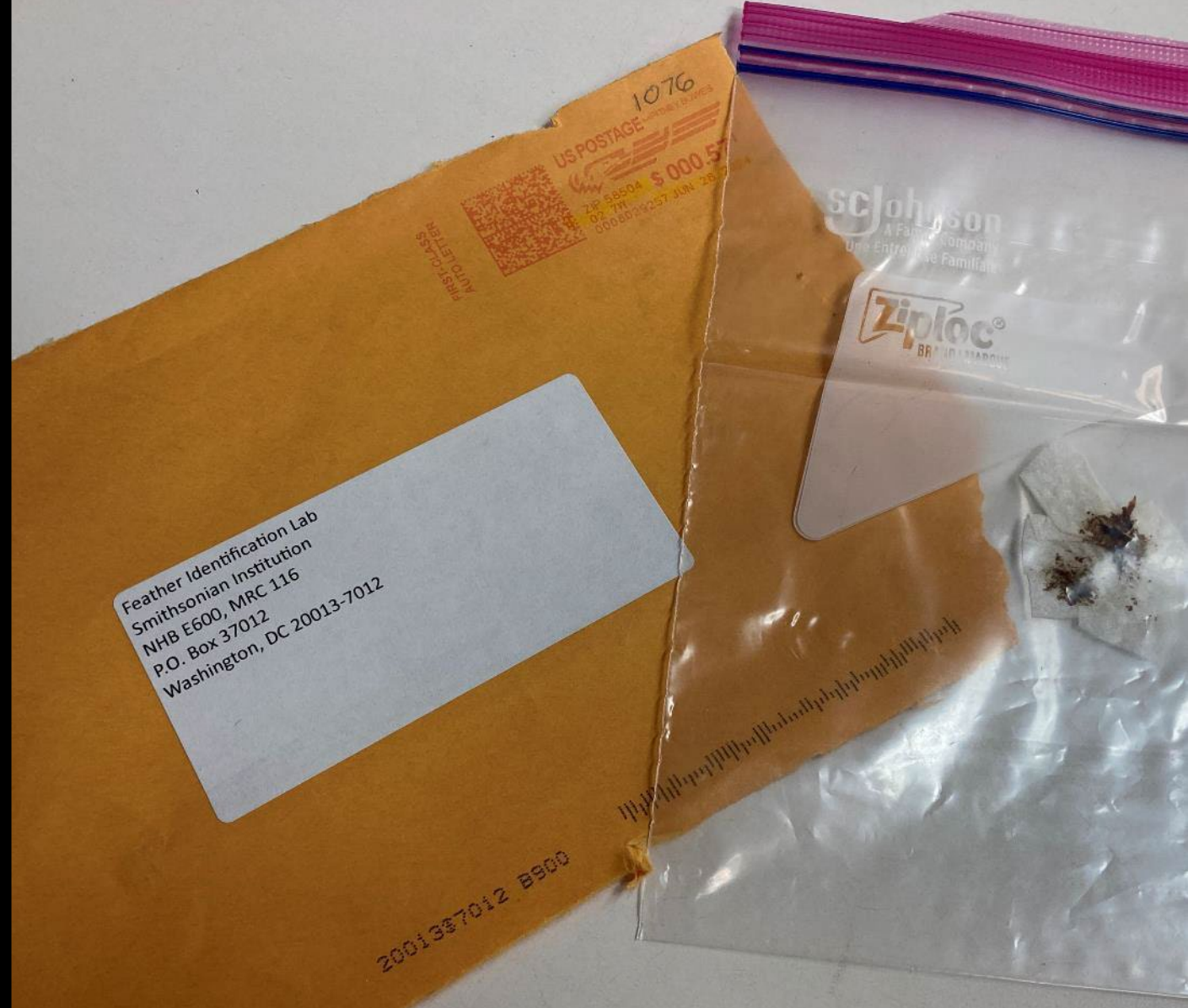
Ther

CCO or In

E7; House/Andy
Moody
(312) 461-5333
andrew.hooper@us.af.mil

*Inside #1 engine
9614016*

240724.9.1











Sample Metadata



Remains With No Information

Search the Database






Search Criteria

Strike Report Number: 	<input type="text"/>	Strike Report Index Number:	<input type="text"/>
Airport Name:	<input type="text"/>	DR Airport ID:	<input type="text"/>
Operator Name:	<input type="text"/>	DR Operator ID:	<input type="text"/>
Registration: 	N123XY	Remains Collected:	<input type="checkbox"/>
Flight Number: 	<input type="text"/>	St Identified:	BOTH 
Damage:	<input type="text"/>	Ingeored:	<input type="checkbox"/>
Birds/Other Wildlife:	Select	Triggering event:	<input type="checkbox"/>

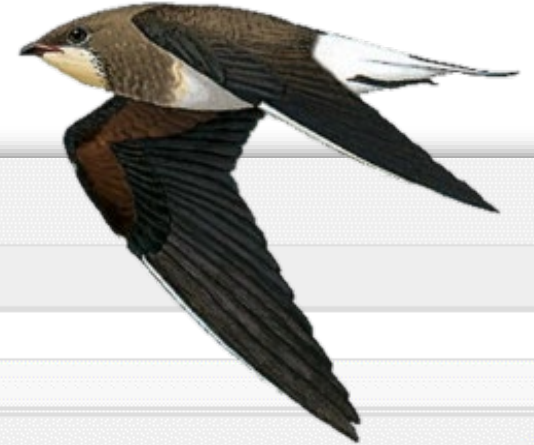
Date Range From:	2024-06-01 	To:	2024-06-08 
LUPDATE Date Range From:	<input type="text"/> 	To:	<input type="text"/> 

Aircraft Type:	<input type="text"/>	Remark:	<input type="text"/>
Engine Type:	<input type="text"/>	State:	<input type="text"/>
Phase of Flight:	<input type="text"/>	Location and/or Distance from Airport:	<input type="text"/>
Images:	<input type="checkbox"/>	Reporter name: 	<input type="text"/>
Processing Status:	<input type="text"/>	Strike Report Type(s):	CIVILIAN 

Note: The table generated from the search criteria above includes only 5 of the 98 data fields. To view all 98 data fields use the "Export to Excel" button to download a Microsoft Excel spreadsheet with your data. For a full list of columns and their descriptions, click [here](#).

Processing Status:  : New  : Working  : Public  : Deleted  : Quarantined

Last Steps: Entering the data



Impact Points

IMPACT POINT	STRUCK OR DAMAGED
Inside Engine NO. 3	Struck
Landing Gear	Struck

Wildlife Information

#	SPECIMEN ORDER	SPECIMEN SPECIES	METHOD OF IDENTIFICATION	WEIGHT	IMPACT POINT
1	Gulls, Terns, Shorebirds, etc. (Order Charadriiformes)	Oriental Pratincole (Glareola maldivarum)	Whole	80 g. / 2.86 oz.	Inside Engine NO. 3
2	Gulls, Terns, Shorebirds, etc. (Order Charadriiformes)	Oriental Pratincole (Glareola maldivarum)	Whole	80 g. / 2.86 oz.	Landing Gear

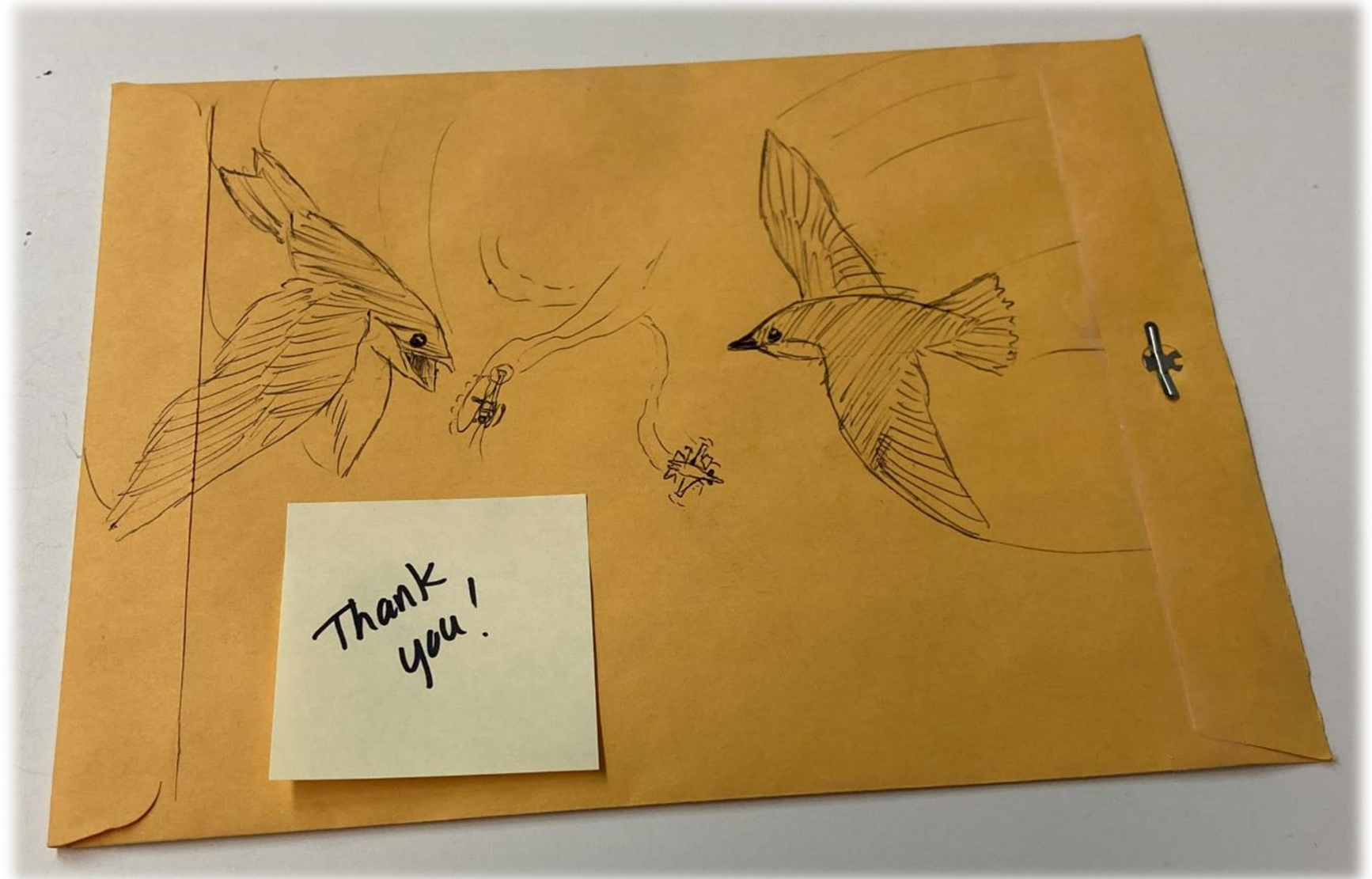
Last Steps: Entering the data



Contact Us!

featherlab@si.edu

202-633-0801



Photos



- Include scale reference (can be common object)
- Show multiple angles and/or color patches
- Remove from bag
- Attach as “BASH Files” in AFSAS/RMI

Shipping to the Right Address

Couriers cannot deliver to P.O. Box addresses.

USPS Mail sent to street address gets irradiated.

We recommend sending all damaging/high profile via a trackable service,
preferably an overnight courier.

US Postal Service

Feather Identification Lab
Smithsonian Institution
National Museum of Natural History
E-600, MRC 116
PO Box 37012
Washington, D.C. 20013-7012

Courier / Shipping

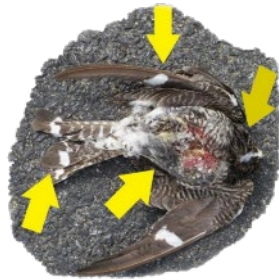
Feather Identification Lab, MRC 116
Smithsonian Institution
National Museum of Natural History
1000 Constitution Ave, NW
Washington, DC 20560

(FedEx, UPS, DHL)

Remains Collection Guidelines

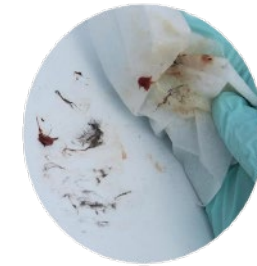
In all Cases:

- If both whole feathers and snarge are available, collect both.
- Let sample dry before sealing in a bag.
- If extremely damaging or high-profile strike, collect all available evidence.
- Each impact point on an aircraft and each carcass should be ***treated as a separate sample.***



Whole/
Partial
Carcass

- ***Pluck a variety of feathers***
 - wing, tail, breast, back, any feathers with color or pattern
- Do not cut feathers
- Limit amount of “chunks” of tissue
- Don’t send entire/partial carcass
- Take photos



Snarge

- Scrape off all snarge possible
- Use alcohol
 - not water, bleach, or cleansers
- Include feathers if available
- Limit amount of “chunks” of tissue
- ***Allow sample to dry*** if wet
- Store in freezer until ready to send