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TRAVIS AUDUBON SOCIETY

BE A BETTER BIRDER (B3)

2021

RAPTORS

# SEVEN HABITS OF HIGHLY EFFECTIVE BIRDERS

- 1) Where are we? – County, sub-county...
- 2) When are we? – Season, month, 1/2 month...
- 3) Where is he? – Habitat, micro-habitat...
- 4) GISS & Structure – posture, behavior, primary extension ...
- 5) Bill & Head – length, shape, thickness, use...
- 6) Field Marks – plumage, pattern, behavior...
- 7) Diagnostic Field Marks –

Distribution !!

Identity !!

**RESULTS IN A DIAGNOSIS !!!**

# REFERENCES

- Field Guide to Hawks of North America by William S. Clark and Brian K. Wheeler, Houghton Mifflin, Second Edition (2001)
- Hawks from Every Angle: How to Identify Raptors in Flight by Jerry Liguori, Princeton University Press (2005)
- Hawks in Flight by Pete Dunne, David Sibley, and Clay Sutton, Houghton Mifflin (2012)
- A Photographic Guide to North American Raptors by Brian K. Wheeler and William S. Clark, Academic Press (1995)
- The Crossley ID Guide: Raptors by Richard Crossely, Jerry Liguori, and Brian Sullivan, Princeton University Press (2013)

# RAPTORS

## INTRODUCTION

- ▶ Much learned from hawk watchers
  - ▶ GISS, structure, birding by impression
  - ▶ Size differences not very helpful
- ▶ Juveniles plumages different than adults (in most species)
- ▶ Adults – only 1 plumage, but.....
- ▶ But ..... complications
  - ▶ Color morphs
    - ▶ Broad-winged Swainson's
    - ▶ Red-tailed Rough-legged
    - ▶ Ferruginous Short-tailed
    - ▶ Gyrfalcon
  - ▶ Geographic variation
    - ▶ Red-tailed Red-shouldered
    - ▶ Merlin Peregrine

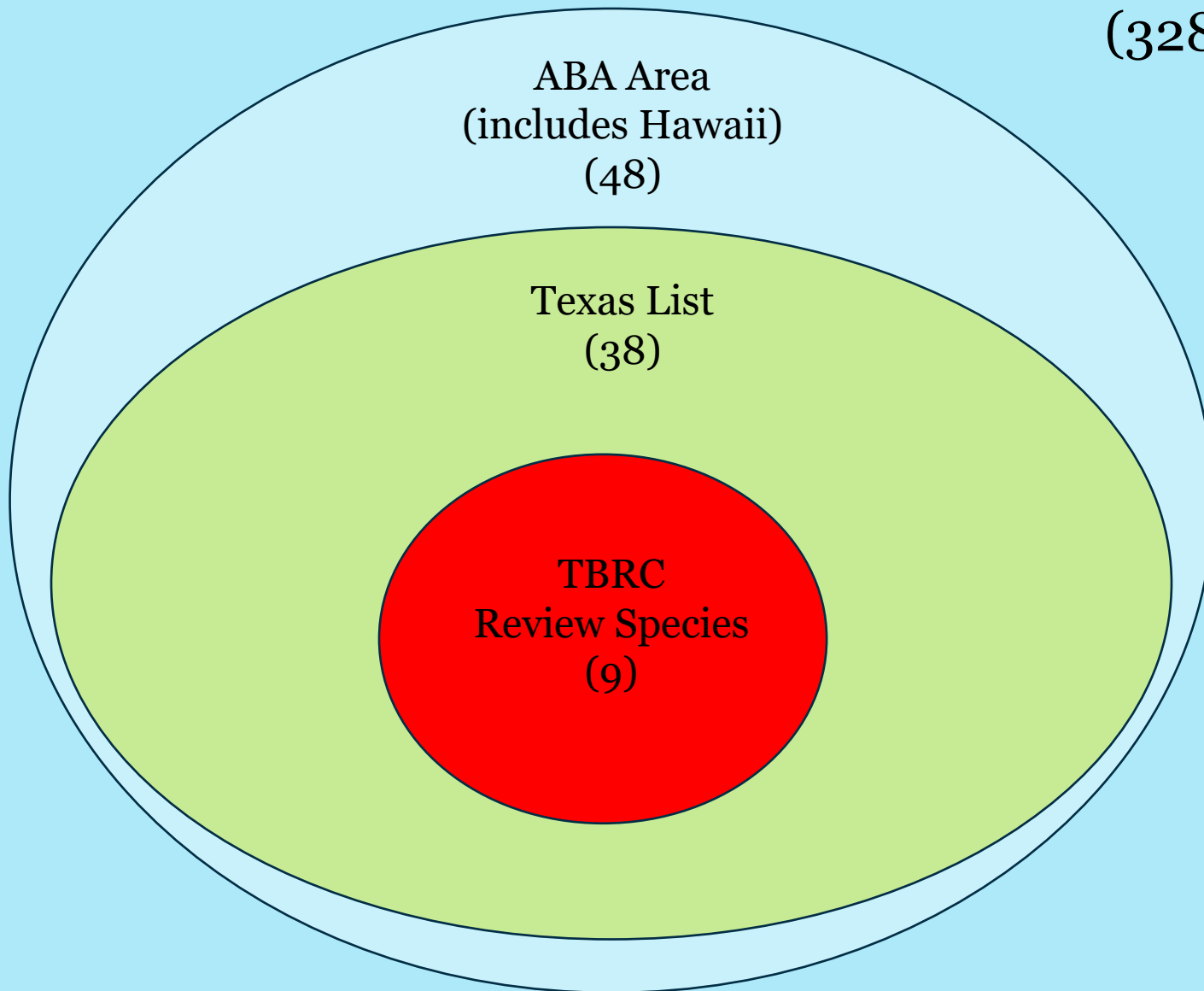
# RAPTORS

## INTRODUCTION

- ▶ Flying vs perched
- ▶ Flight silhouettes change from moment to moment:
  - ▶ viewing angle
  - ▶ wind conditions
  - ▶ maneuver
- ▶ Flight behavior
  
- ▶ Not covering:
  - ▶ Plumage in depth
  - ▶ Perched birds

HABIT 0: WHO

# Raptors & Vultures of the World (328)



# Raptors & Vultures of Texas By Family (29)+ (9) = 38

Accipitridae (27)

Buteo-like Hawks (11) (4)

Northern Harrier (1)

Accipiters (2) (1)

Kites (4) (2)

Eagles (2)

Cathartidae

New World  
Vultures  
(2)

Falconidae  
(8)

Falcons (5) (2)  
Caracaras (1)

Pandionidae

Ospreys (1)

*On Fine Green Silk*

Order, Family, Genus, Species

## DIURNAL RAPTORS OF ABA AREA NOT FOUND IN TEXAS

#	GROUP	FAMILY	GENUS SPECIES	COMMON NAME	ABA CODE
1	Vulture	New World Vultures (Cathartidae)	<i>Gymnogyps californianus</i>	California Condor	2
2	Buteo-like (large)	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Buteo rufinus</i>	Long-legged Buzzard	5
2			<i>Buteo solitarius</i>	Hawaiian Hawk	2
3	Accipiter		<i>Accipiter soloensis</i>	Chinese Sparrowhawk	5
5	Falcon	Caracaras and Falcons (Falconidae)	<i>Falco subbuteo</i>	Eurasian Hobby	4
5			<i>Falco tinnunculus</i>	Eurasian Kestrel	4
5			<i>Falco vespertinus</i>	Red-footed Falcon	5
6	Eagle	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Haliaeetus albicilla</i>	White-tailed Eagle	4
6			<i>Haliaeetus pelagicus</i>	Steller's Sea-Eagle	4
7	Kite		<i>Milvus migrans</i>	Black Kite	5

## DIURNAL RAPTORS OF TEXAS TEXAS REVIEW SPECIES

#	GROUP	FAMILY	GENUS SPECIES	COMMON NAME	ABA CODE
2	Buteo-like (large)	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Buteogallus urubitinga</i>	Great Black Hawk	5
2	Buteo-like (medium)		<i>Geranospiza caerulescens</i>	Crane Hawk	5
2			<i>Rupornis magnirostris</i>	Roadside Hawk	4
2			<i>Buteo brachyurus</i>	Short-tailed Hawk	2
3	Accipiter	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Accipiter gentilis</i>	Northern Goshawk	1
5	Falcon	Caracaras and Falcons (Falconidae)	<i>Micrastur semitorquatus</i>	Collared Forest-Falcon	5
5			<i>Falco rusticolus</i>	Gyr Falcon	2
7	Kite (broad)	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Harpagus bidentatus</i>	Double-toothed Kite	5
7			<i>Rostrhamus sociabilis</i>	Snail Kite	2

# 7 GROUPS OF RAPTORS IN TEXAS (38 SPECIES)

All Seasons	Winter Texan
Through Migrant	Cen-Tex Straggler
Range Restricted Texan	TBRC Review Species

## VULTURE

Turkey

Black

## BUTEO

Large Medium

Red-tailed

Swainson's

Zone-tailed

Ferruginous

Rough-legged

White-tailed

Common Black

Great Black (TBRC 1)

Red-shouldered

Broad-winged

Harris's

Gray

Short-tailed (TBRC 61)

Roadside (TBRC 11)

Crane (TBRC 1)

## ACCIPITER

Cooper's

Sharp-shinned

Northern Goshawk (TBRC 28)

## OTHER

Crested Cara Cara

Northern Harrier

Osprey

## FALCON

American Kestrel

Peregrine

Merlin

Prairie

Aplomado

Gyr Falcon (TBRC 1)

Collared-forest (TBRC 1)

## EAGLE

Bald

Golden

## KITE

Mississippi

Swallow-tailed

White-tailed

Hook-billed

Snail (TBRC 4)

Double-toothed (TBRC 1)

**DIURNAL RAPTORS OF TEXAS  
NON-REVIEW SPECIES**

#	GROUP	FAMILY	GENUS SPECIES	COMMON NAME	ALL SEASONS	THROUGH MIGRANT	RANGE RESTRICTED TEXAN	WINTER TEXAN	CEN-TEX STRAGGLER	ABA CODE	
1	Vulture	New World Vultures (Cathartidae)	<i>Coragyps atratus</i>	Black Vulture	X					1	
1			<i>Cathartes aura</i>	Turkey Vulture	X					1	
2	Buteo-like (large)	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Buteo jamaicensis</i>	Red-tailed Hawk	X					1	
2			<i>Buteo swainsoni</i>	Swainson's Hawk	X	X				1	
2			<i>Buteo albonotatus</i>	Zone-tailed Hawk	X					2	
2			<i>Buteogallus anthracinus</i>	Common Black Hawk				X			2
2			<i>Buteo regalis</i>	Ferruginous Hawk					X		1
2			<i>Buteo lagopus</i>	Rough-legged Hawk					X		1
2			<i>Geranoaetus albicaudatus</i>	White-tailed Hawk						X	2
2			Buteo-like (medium)	<i>Buteo lineatus</i>	Red-shouldered Hawk	X					
2	<i>Buteo platypterus</i>	Broad-winged Hawk		X	X					1	
2	<i>Buteo plagiatus</i>	Gray Hawk					X			2	
2	<i>Parabuteo unicinctus</i>	Harris's Hawk							X	1	
3	Accipiter		<i>Accipiter cooperii</i>	Cooper's Hawk	X					1	
3			<i>Accipiter striatus</i>	Sharp-shinned Hawk	X					1	
4	Other	Caracaras and Falcons (Falconidae)	<i>Caracara cheriway</i>	Crested Caracara	X					2	
4		Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Circus hudsonius</i>	Northern Harrier				X		1	
4		Ospreys (Pandionidae)	<i>Pandion haliaetus</i>	Osprey				X		1	
5	Falcon	Caracaras and Falcons (Falconidae)	<i>Falco peregrinus</i>	Peregrine Falcon	X					1	
5			<i>Falco sparverius</i>	American Kestrel				X		1	
5			<i>Falco femoralis</i>	Aplomado Falcon				X		3	
5			<i>Falco columbarius</i>	Merlin					X		1
5			<i>Falco mexicanus</i>	Prairie Falcon					X		1
6	Eagle		<i>Haliaeetus leucocephalus</i>	Bald Eagle	X			X		1	
6			<i>Aquila chrysaetos</i>	Golden Eagle			X			1	
7	Kite	Hawks, Kites, Eagles, and Allies (Accipitridae)	<i>Ictinia mississippiensis</i>	Mississippi Kite	X	X				1	
7			<i>Elanoides forficatus</i>	Swallow-tailed Kite					X	1	
7			<i>Elanus leucurus</i>	White-tailed Kite						X	1
7			Kite (broad)	<i>Chondrohierax uncinatus</i>	Hook-billed Kite			X			3

# TBRC REVIEW SPECIES

All Seasons

Winter Texan

Through Migrant

Cen-Tex Straggler

Range Restricted Texan

TBRC Review Species

BUTEO

VULTURE

Large

Medium

ACCIPITER

OTHER

FALCON

EAGLE

KITE

Northern Goshawk (TBRC 28)

Short-tailed (TBRC 61)

Snail (TBRC 4)

Roadside (TBRC 11)

Gyr Falcon (TBRC 1)

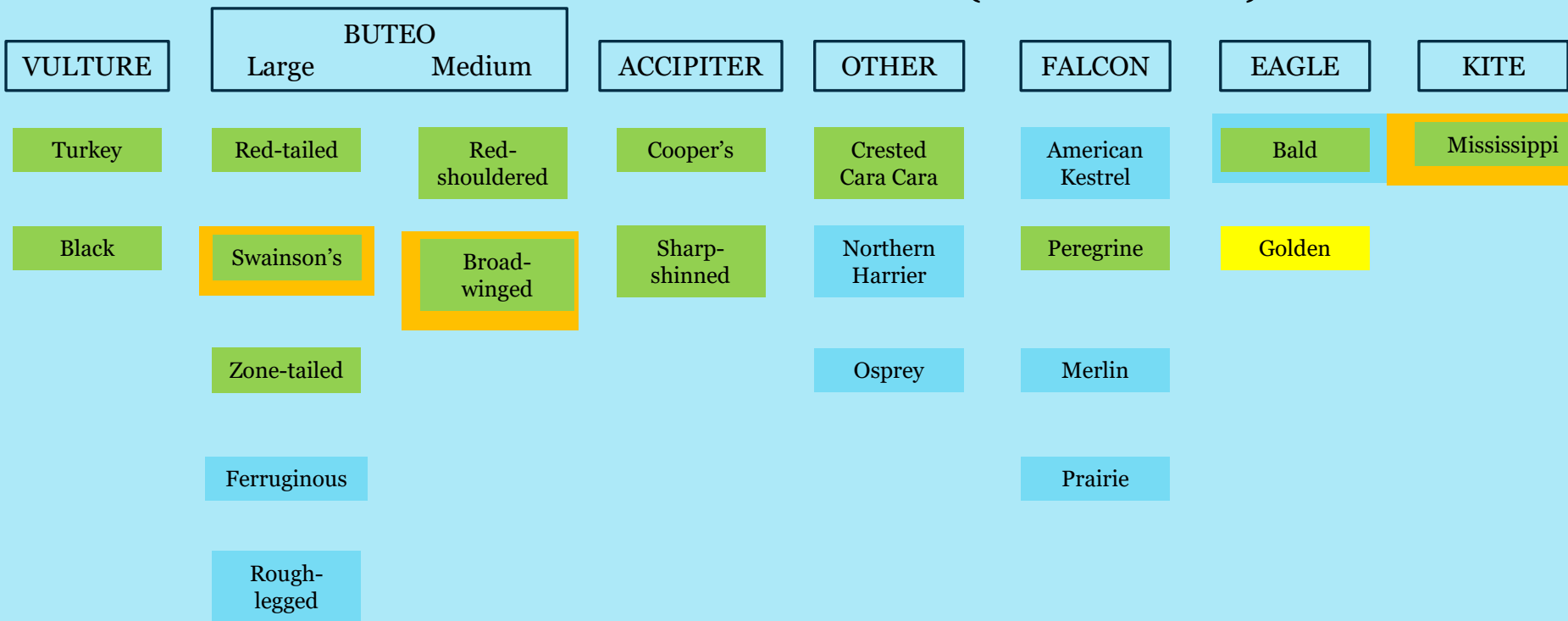
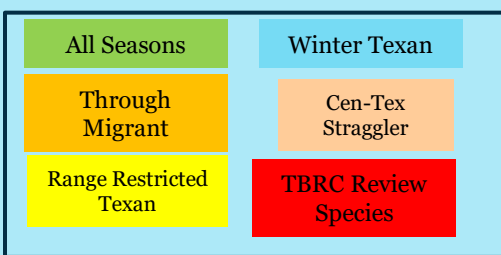
Double-toothed (TBRC 1)

Crane (TBRC 1)

Colored-forest (TBRC 1)

Great Black (TBRC 1)

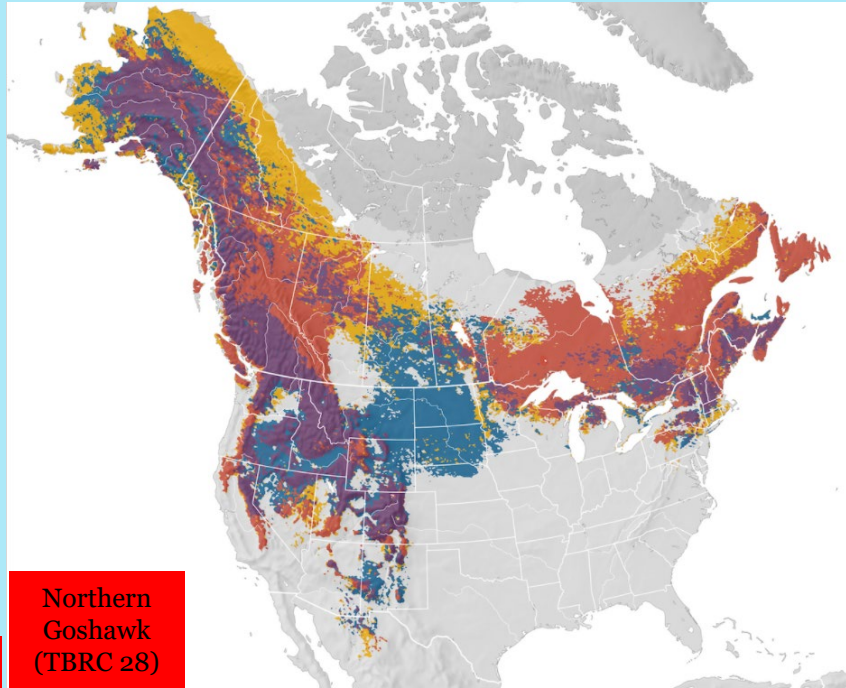
# 7 GROUPS OF **LIKELY** RAPTORS IN CEN-TEX (21 SPECIES)



# HABIT 1,2: DISTRIBUTION



Short-tailed Hawk (TBRC 61)



Northern Goshawk (TBRC 28)

# TBRC REVIEW SPECIES

Not too far from Texas



Roadside Hawk (TBRC 11)

- Year-round
- Breeding
- Migration
- Non-Breeding

**RELATIVE ABUNDANCE**

**Breeding season** May 17 - Jul 27

**Non-breeding season** Nov 30 - Jan 18

**Pre-breeding migratory season** Jan 25 - May 10

**Post-breeding migratory season** Aug 3 - Nov 23

Crane Hawk  
Hawk  
(TBRC 1)

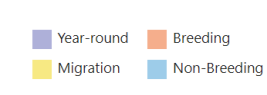


What do you notice about these birds ?

Double-toothed Kite  
(TBRC 1)



**TBRC REVIEW SPECIES**

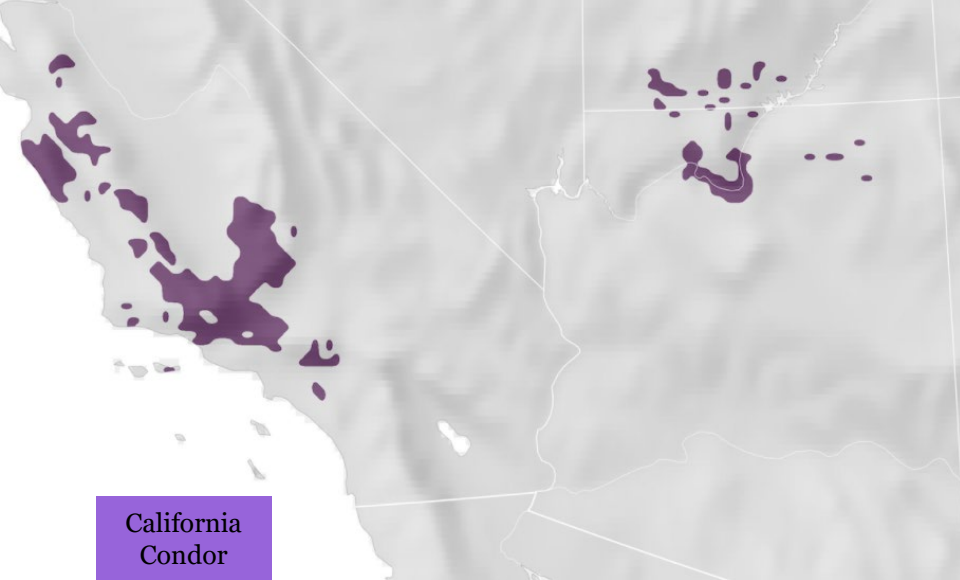


Great Black Hawk  
(TBRC 1)

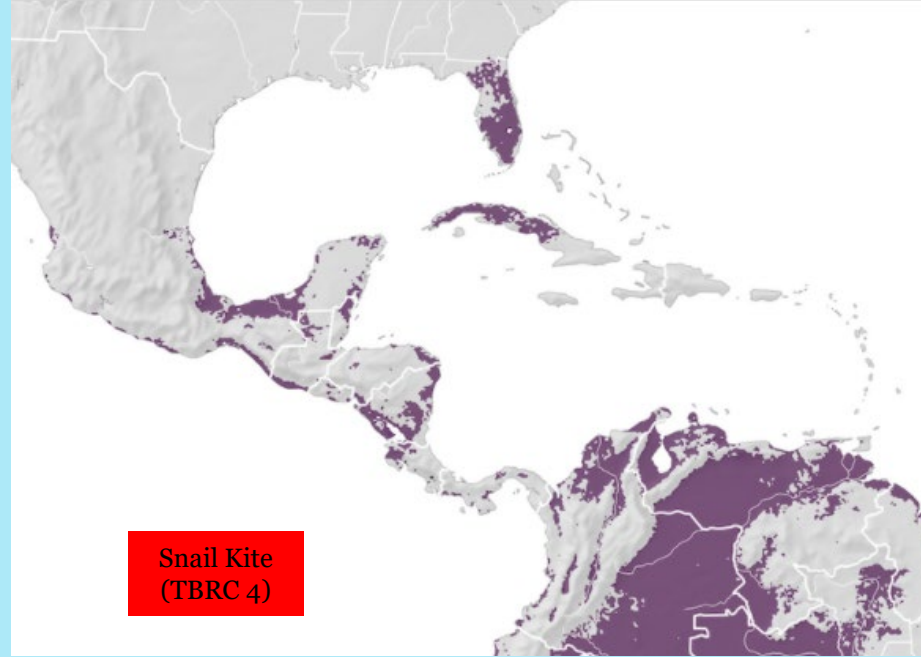


Collared-forest Falcon  
(TBRC 1)



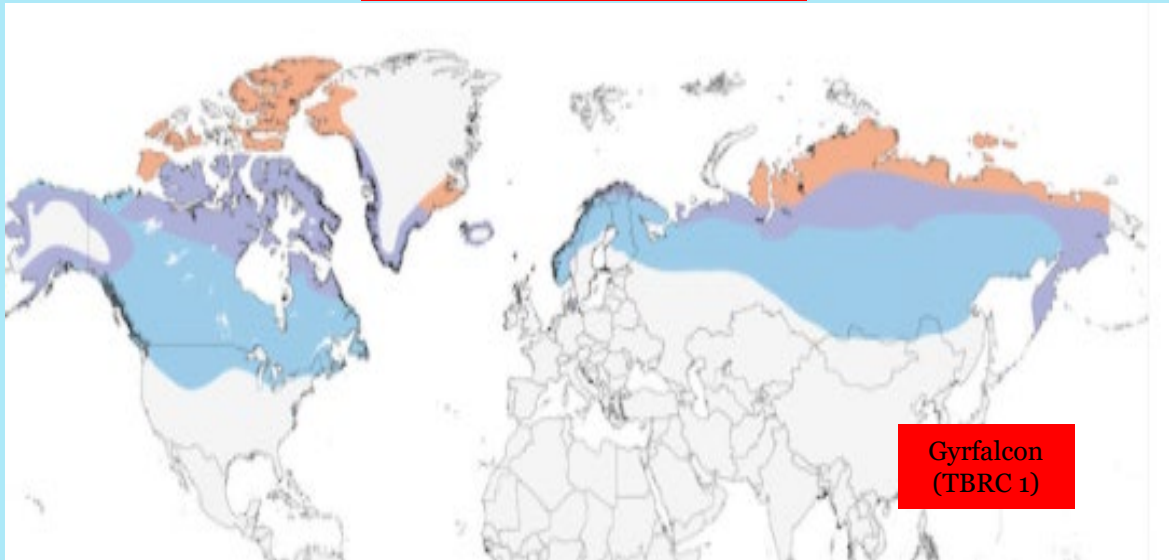


California  
Condor

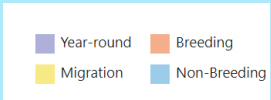


Snail Kite  
(TBRC 4)

**TBRC REVIEW  
SPECIES**



Gyr Falcon  
(TBRC 1)



All Seasons	Winter Texan
Through Migrant	Cen-Tex Straggler
Range Restricted Texan	TBRC Review Species

# RANGE RESTRICTED TEXANS (5)

VULTURE

BUTEO  
Large Medium

ACCIPITER

OTHER

FALCON

EAGLE

KITE

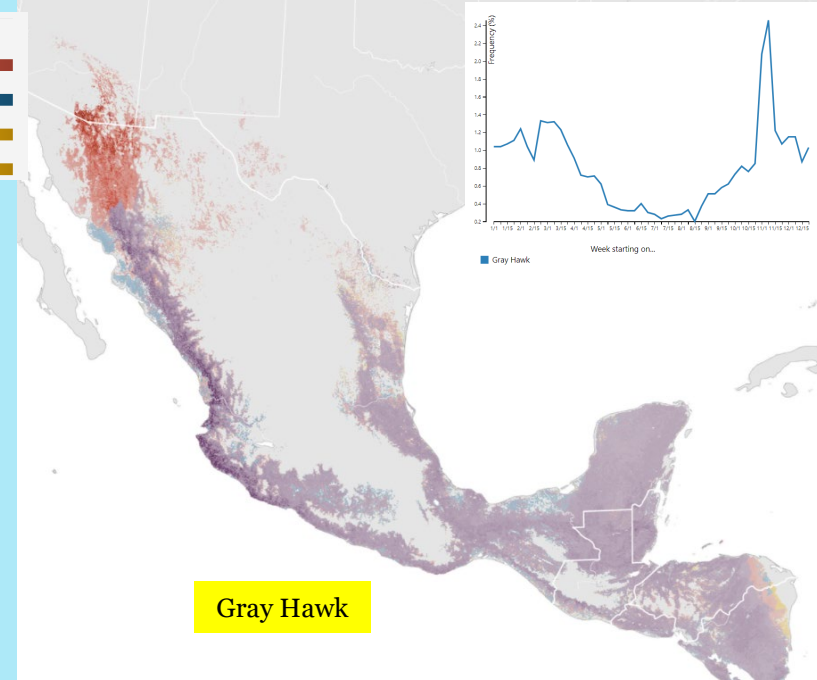
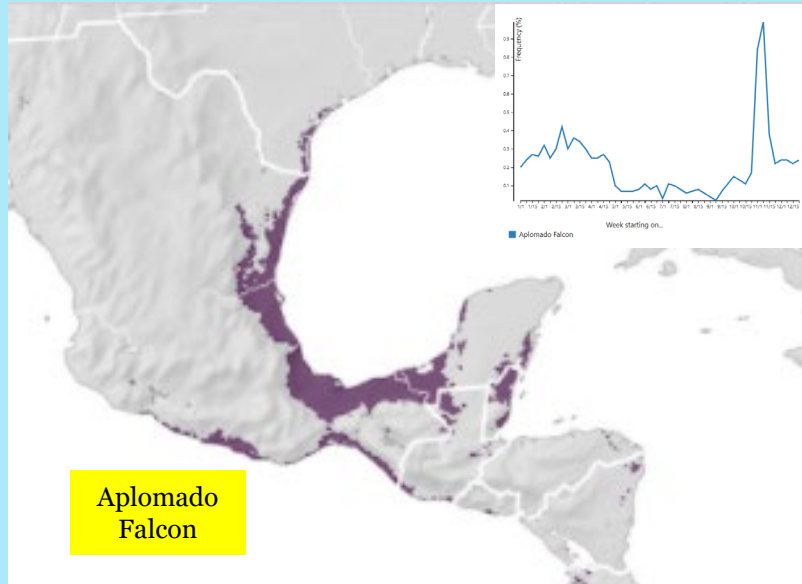
Golden

Gray

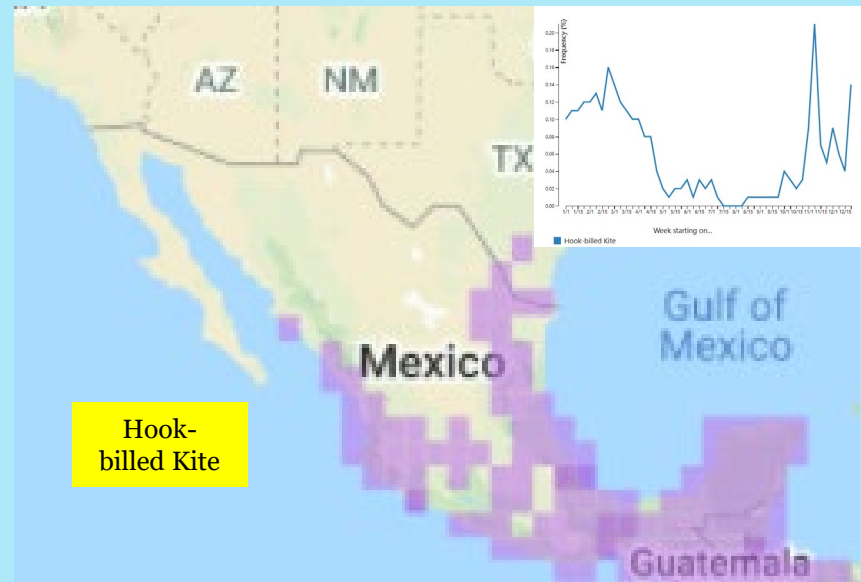
Hook-billed

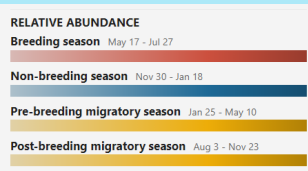
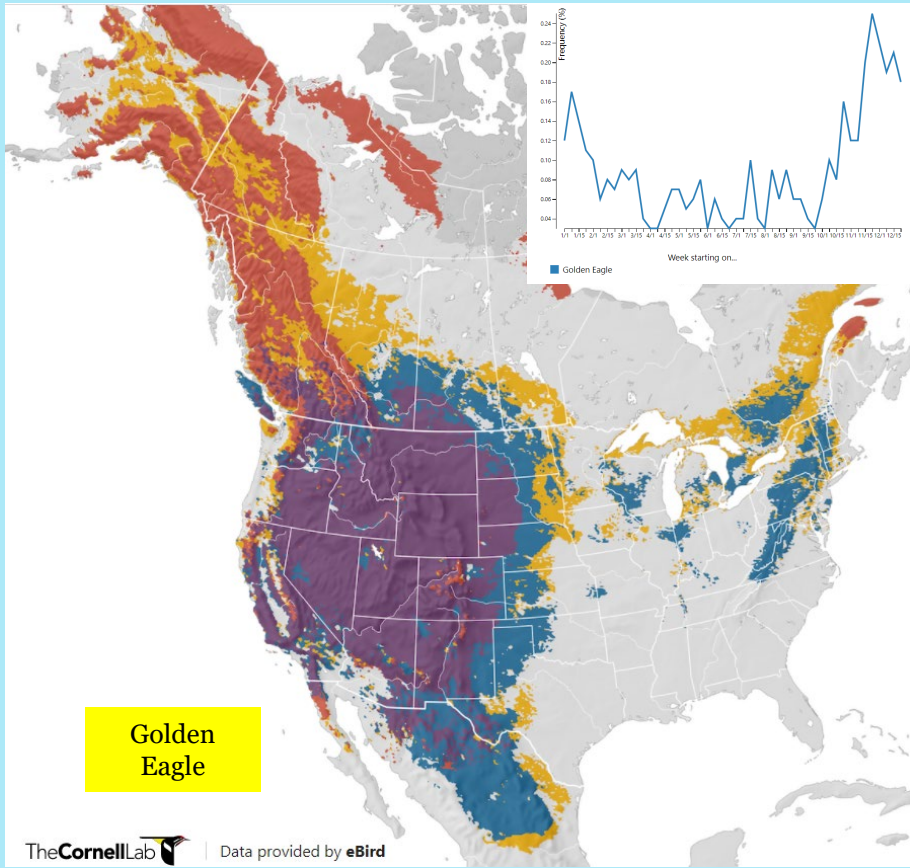
Aplomado

Common Black

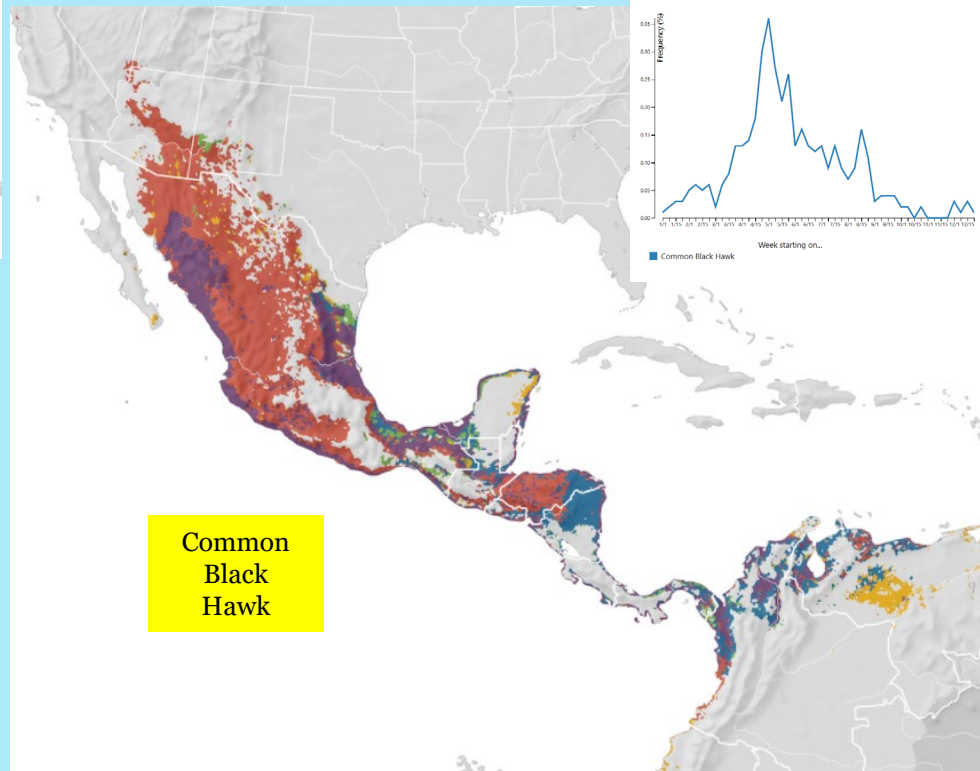


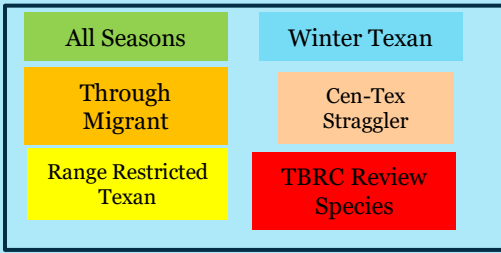
**RANGE  
RESTRICTED  
TEXANS  
(5)**





# RANGE RESTRICTED TEXANS (5)





# CEN-TEX STRAGGLER (4)

VULTURE

BUTEO  
Large Medium

ACCIPITER

OTHER

FALCON

EAGLE

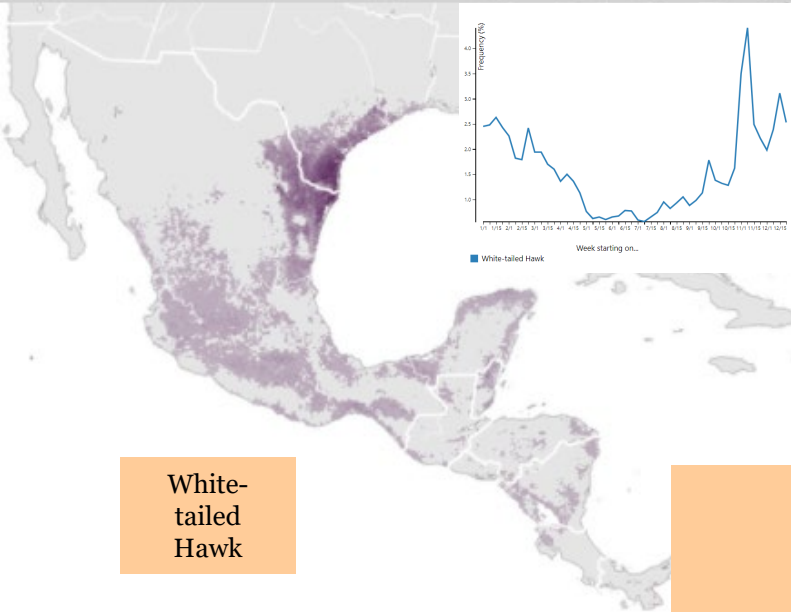
KITE

Harris's

Swallow-tailed

White-tailed

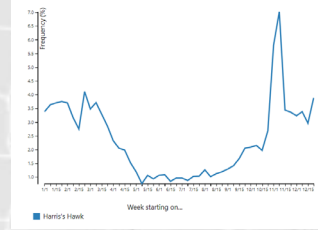
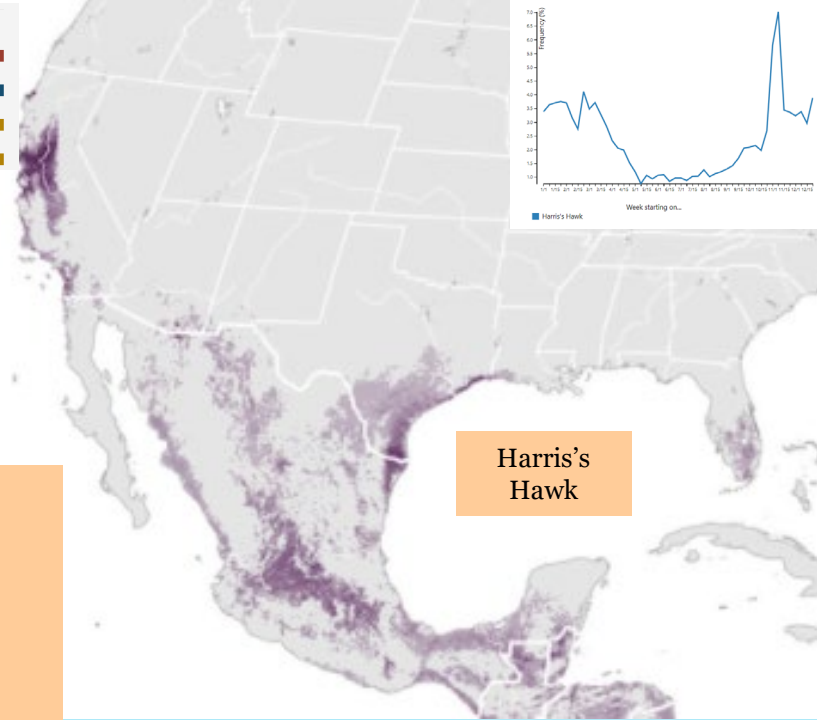
White-tailed



**RELATIVE ABUNDANCE**  
**Breeding season** May 17 - Jul 27  
**Non-breeding season** Nov 30 - Jan 18  
**Pre-breeding migratory season** Jan 25 - May 10  
**Post-breeding migratory season** Aug 3 - Nov 23

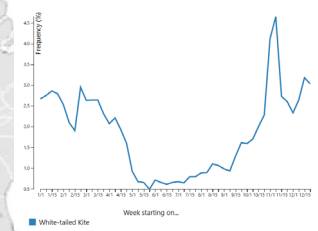
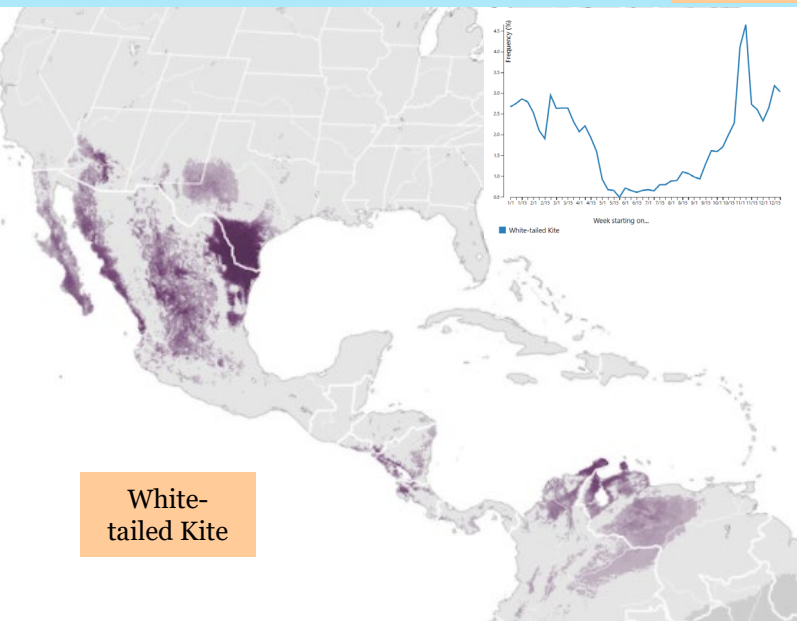


White-tailed Hawk

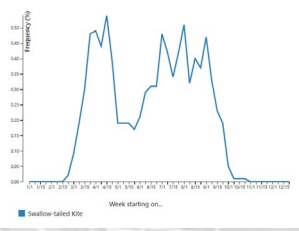
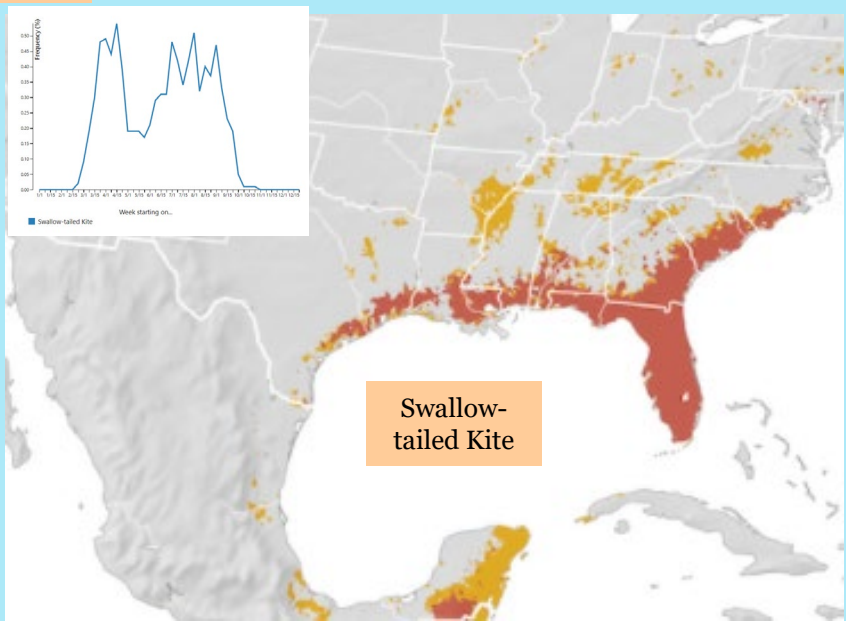


Harris's Hawk

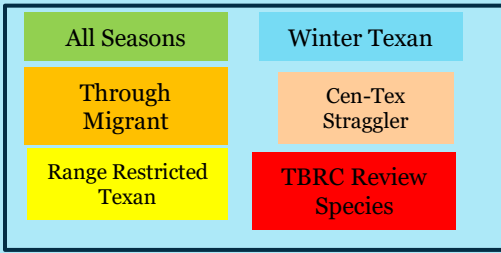
**CEN-TEX STRAGGLERS (4)**



White-tailed Kite



Swallow-tailed Kite



# THROUGH MIGRANTS (3)

VULTURE

BUTEO  
Large Medium

ACCIPITER

OTHER

FALCON

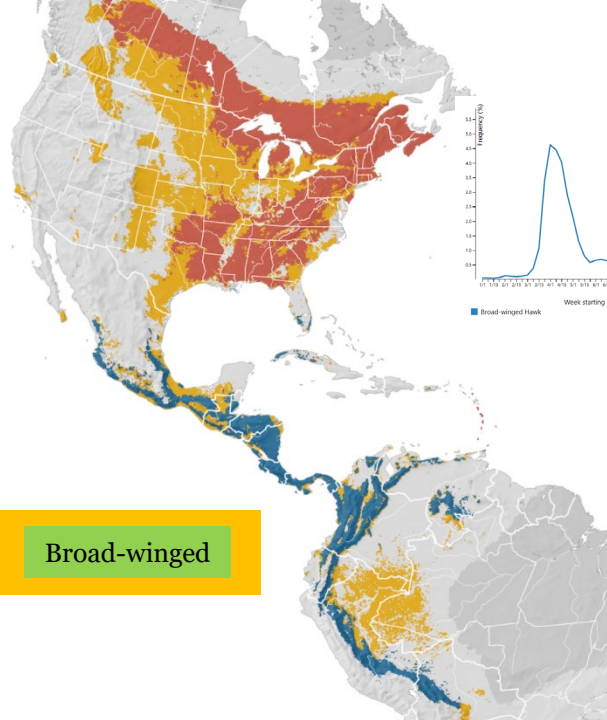
EAGLE

KITE

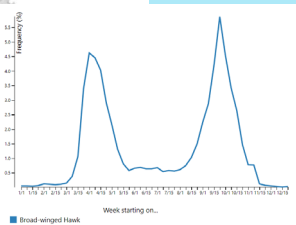
Mississippi

Swainson's

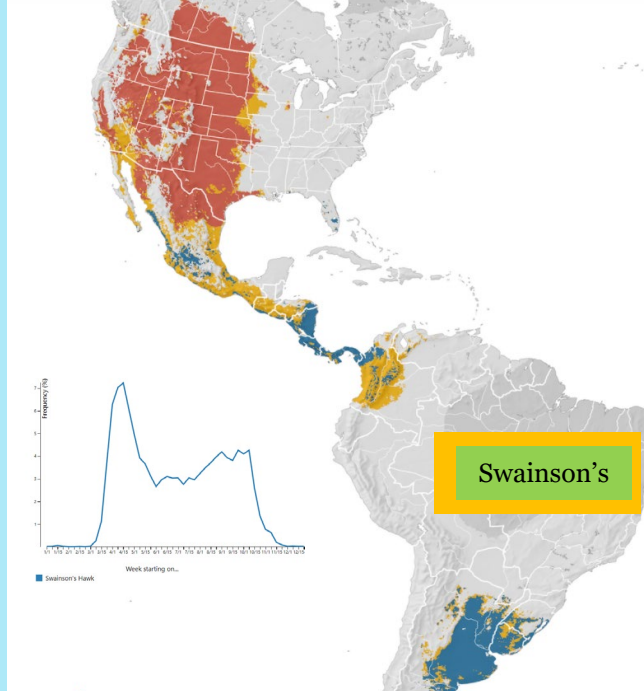
Broad-winged



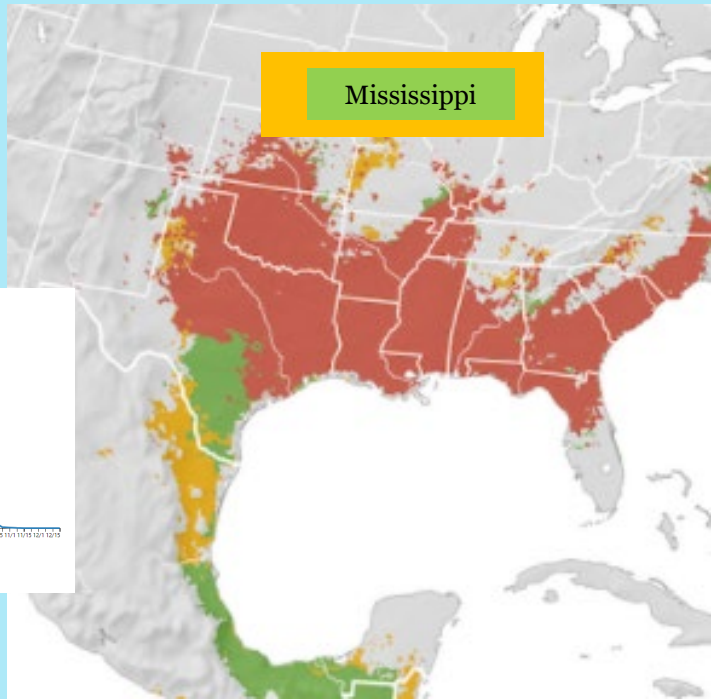
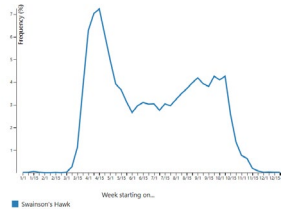
Broad-winged



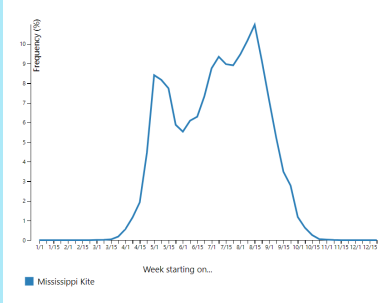
# THROUGH MIGRANTS (3)



Swainson's

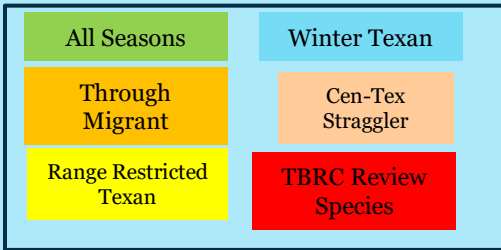


Mississippi



**RELATIVE ABUNDANCE**

<b>Breeding season</b>	May 17 - Jul 27
<b>Non-breeding season</b>	Nov 30 - Jan 18
<b>Pre-breeding migratory season</b>	Jan 25 - May 10
<b>Post-breeding migratory season</b>	Aug 3 - Nov 23



# WINTER TEXANS (8)

VULTURE

BUTEO  
Large Medium

ACCIPITER

OTHER

FALCON

EAGLE

KITE

American Kestrel

Bald

Northern Harrier

Osprey

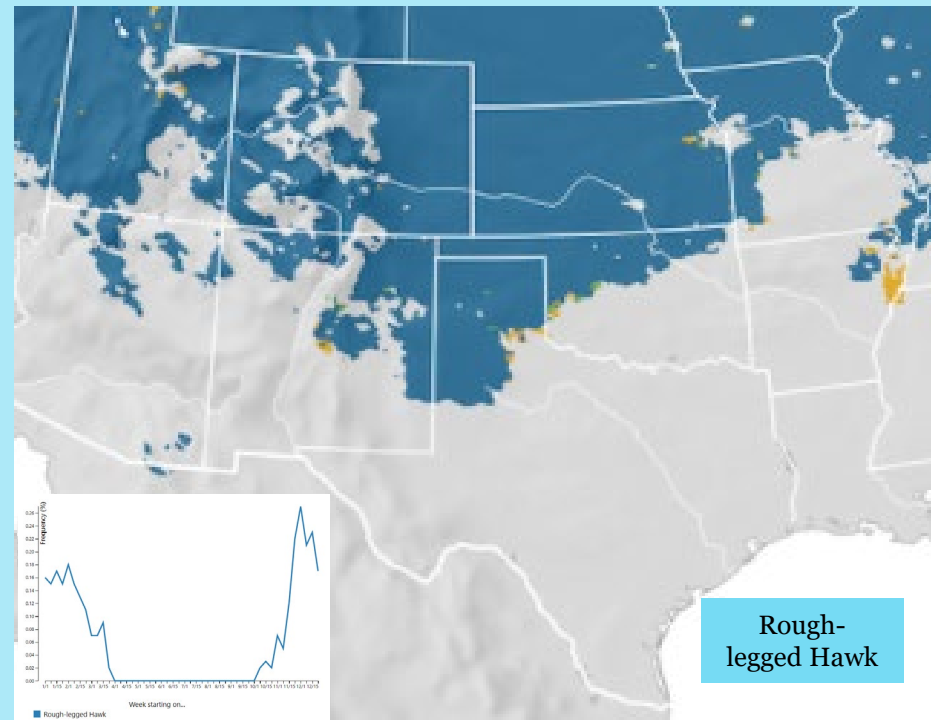
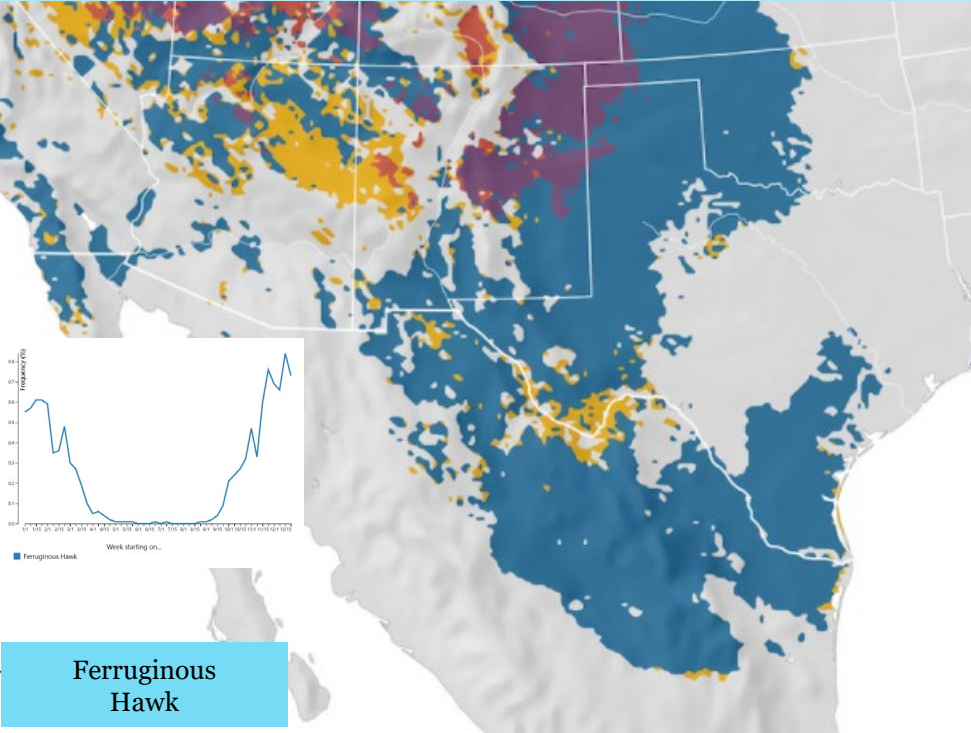
Merlin

Ferruginous

Prairie

Rough-legged

# WINTER TEXANS (8)



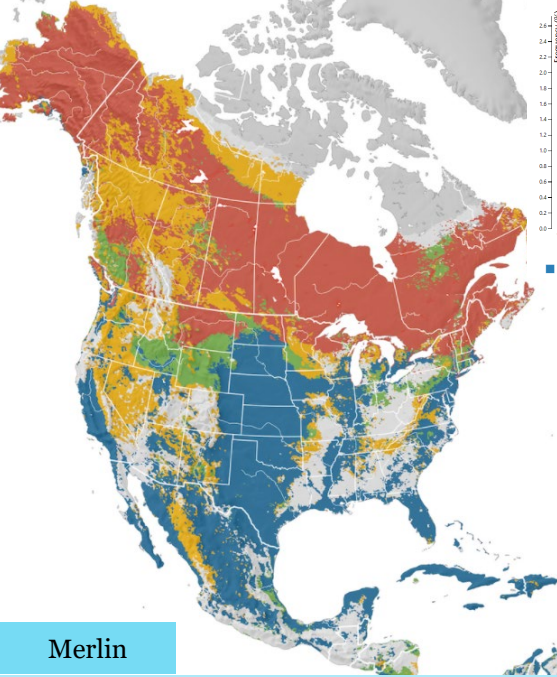
## RELATIVE ABUNDANCE

**Breeding season** May 17 - Jul 27

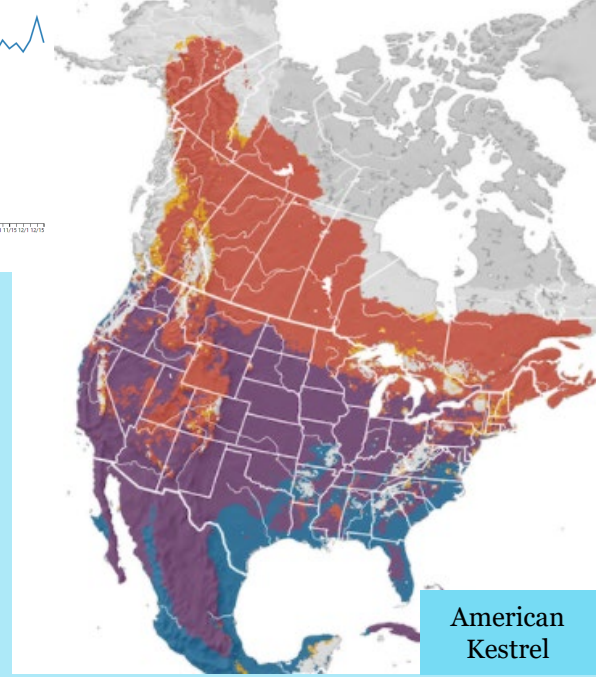
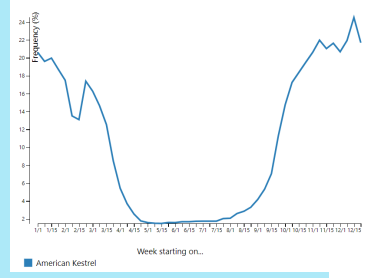
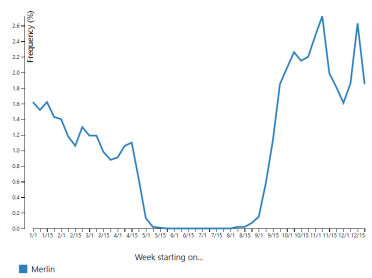
**Non-breeding season** Nov 30 - Jan 18

**Pre-breeding migratory season** Jan 25 - May 10

**Post-breeding migratory season** Aug 3 - Nov 23

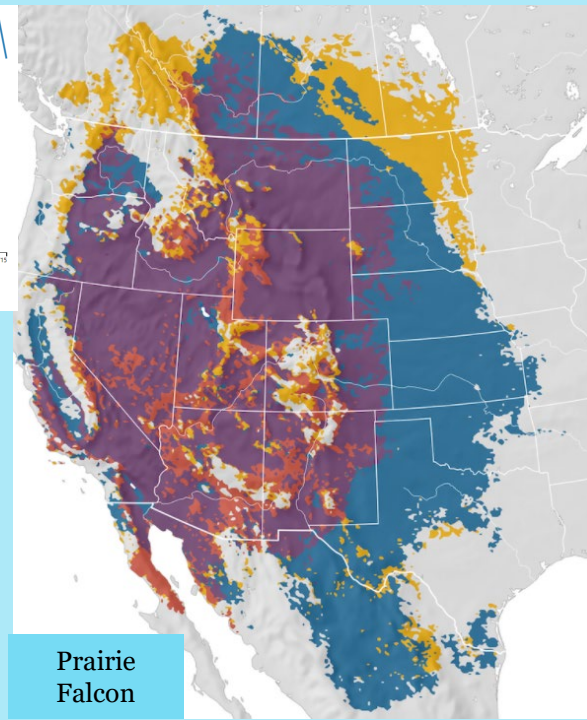
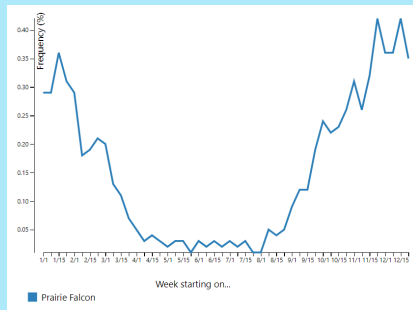


Merlin



American Kestrel

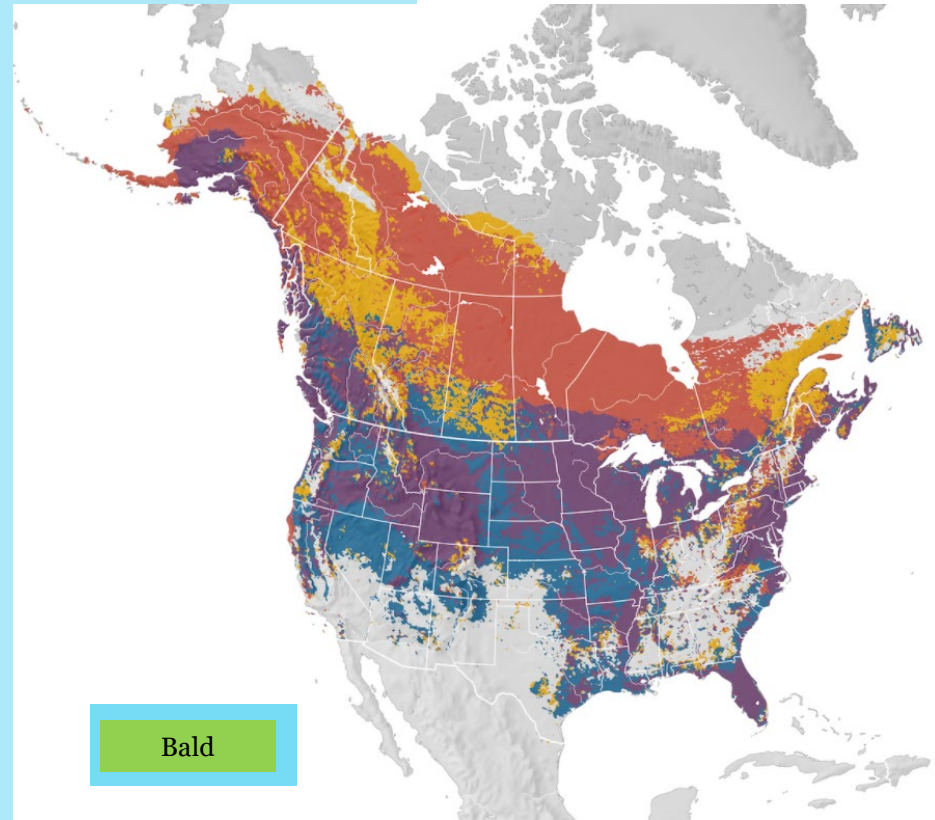
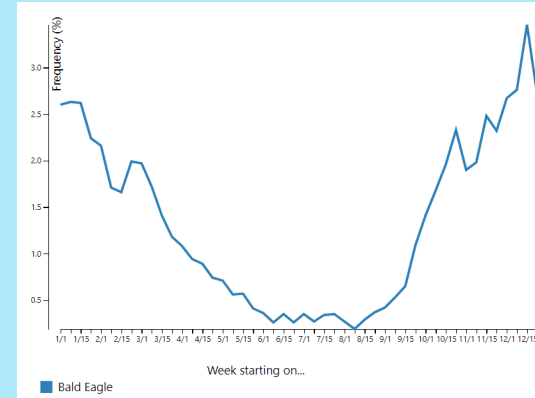
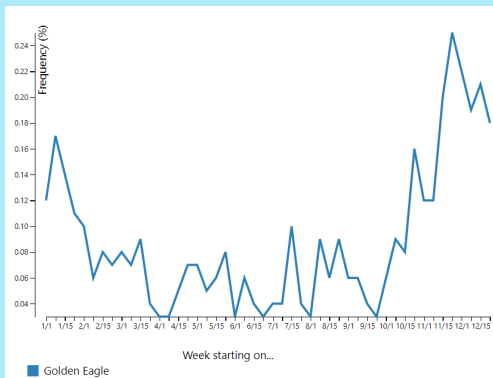
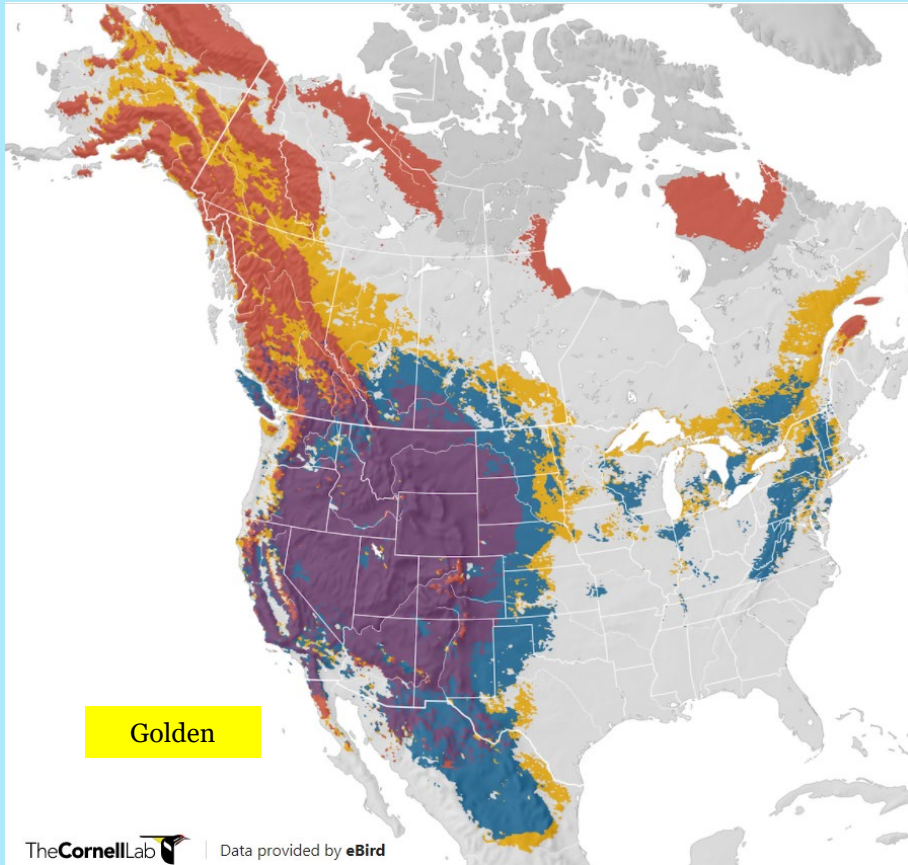
# WINTER TEXANS



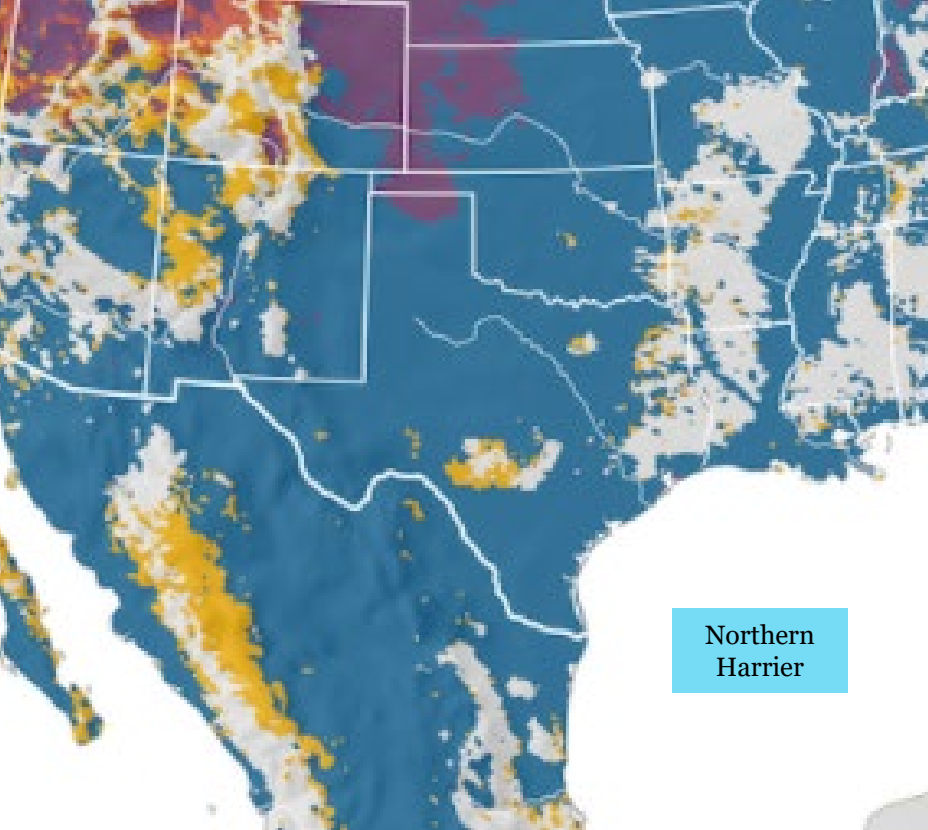
Prairie Falcon

RELATIVE ABUNDANCE	
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Pre-breeding migratory season	Jan 25 - May 10
Post-breeding migratory season	Aug 3 - Nov 23

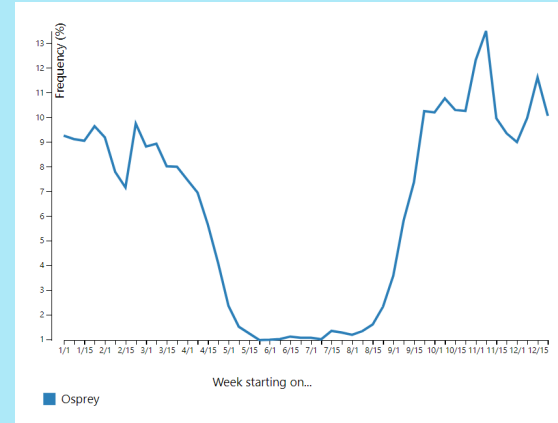
# WINTER TEXANS



# WINTER TEXANS



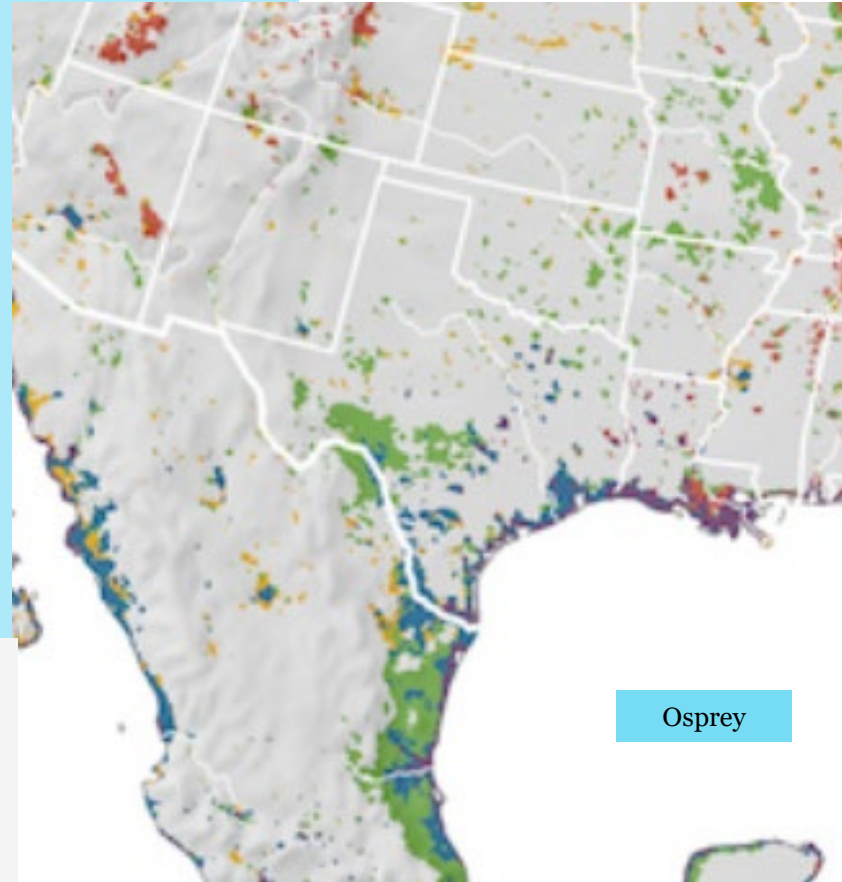
Northern Harrier



Osprey



Northern Harrier

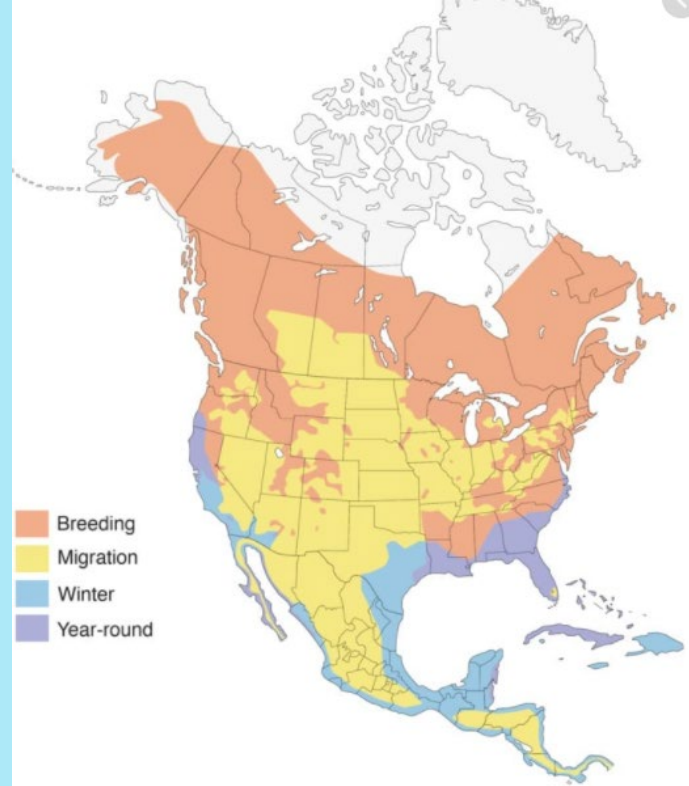
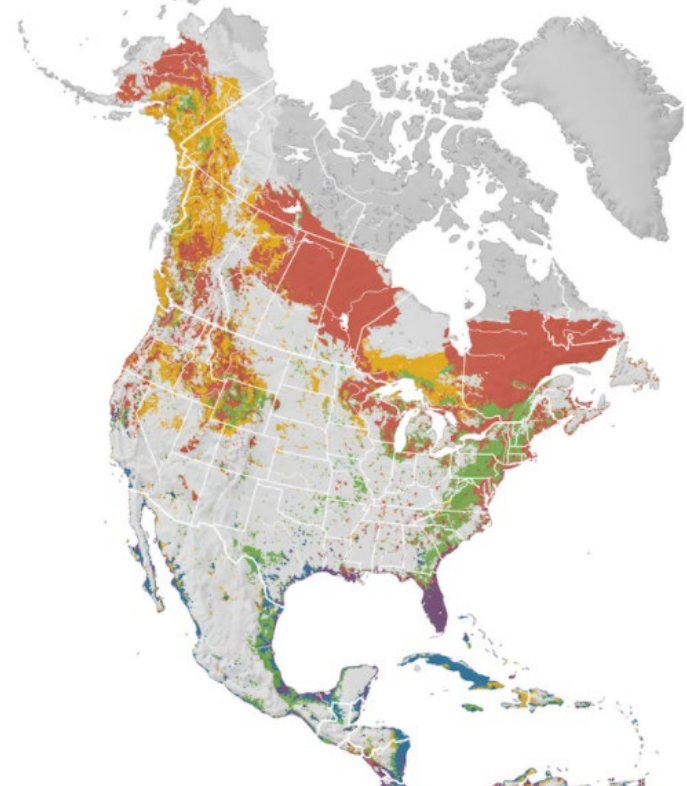


Osprey

**RELATIVE ABUNDANCE**

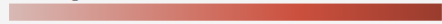
<b>Breeding season</b>	May 17 - Jul 27
<b>Non-breeding season</b>	Nov 30 - Jan 18
<b>Pre-breeding migratory season</b>	Jan 25 - May 10
<b>Post-breeding migratory season</b>	Aug 3 - Nov 23

# Osprey



## RELATIVE ABUNDANCE

**Breeding season** May 17 - Jul 27



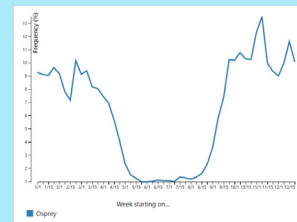
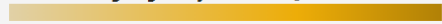
**Non-breeding season** Nov 30 - Jan 18

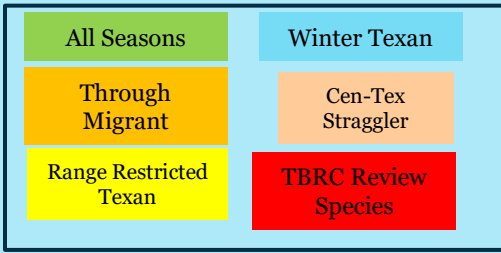


**Pre-breeding migratory season** Jan 25 - May 10



**Post-breeding migratory season** Aug 3 - Nov 23





# YEAR-ROUND TEXANS (13)

VULTURE

Turkey

Black

BUTEO  
Large Medium

Red-tailed

Swainson's

Zone-tailed

Red-shouldered

Broad-winged

ACCIPITER

Cooper's

Sharp-shinned

OTHER

Crested Cara Cara

FALCON

Peregrine

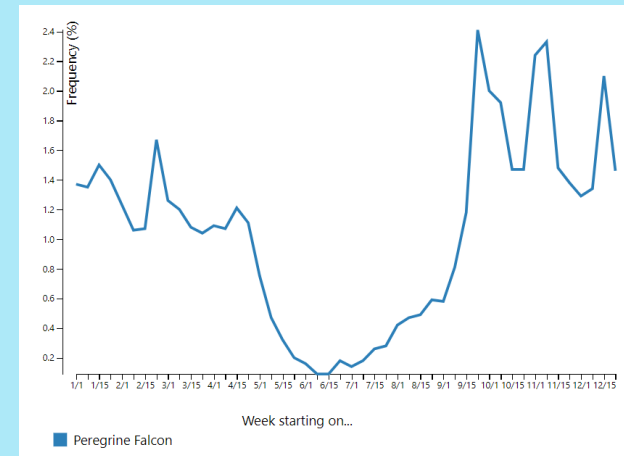
EAGLE

Bald

KITE

Mississippi

# FALCONS



Peregrine  
Falcon

**RELATIVE ABUNDANCE**

**Breeding season** May 17 - Jul 27

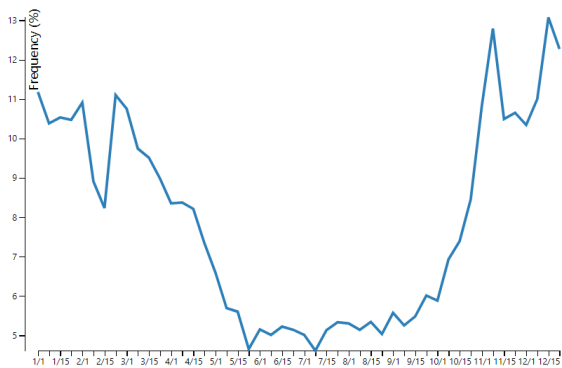
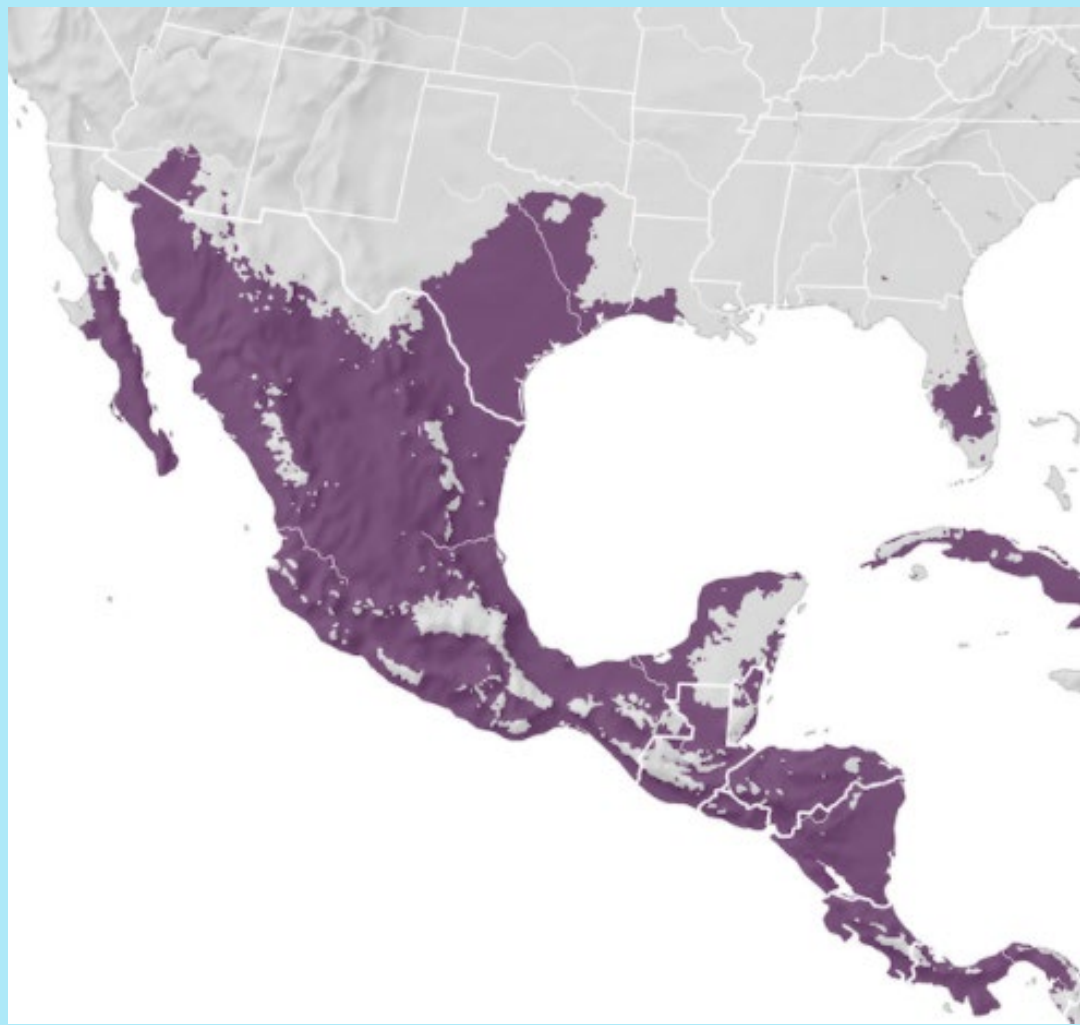
**Non-breeding season** Nov 30 - Jan 18

**Pre-breeding migratory season** Jan 25 - May 10

**Post-breeding migratory season** Aug 3 - Nov 23

# OTHER

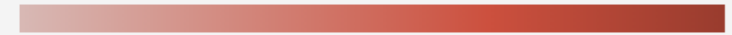
Crested  
Caracara



■ Crested Caracara

## RELATIVE ABUNDANCE

**Breeding season** May 17 - Jul 27



**Non-breeding season** Nov 30 - Jan 18

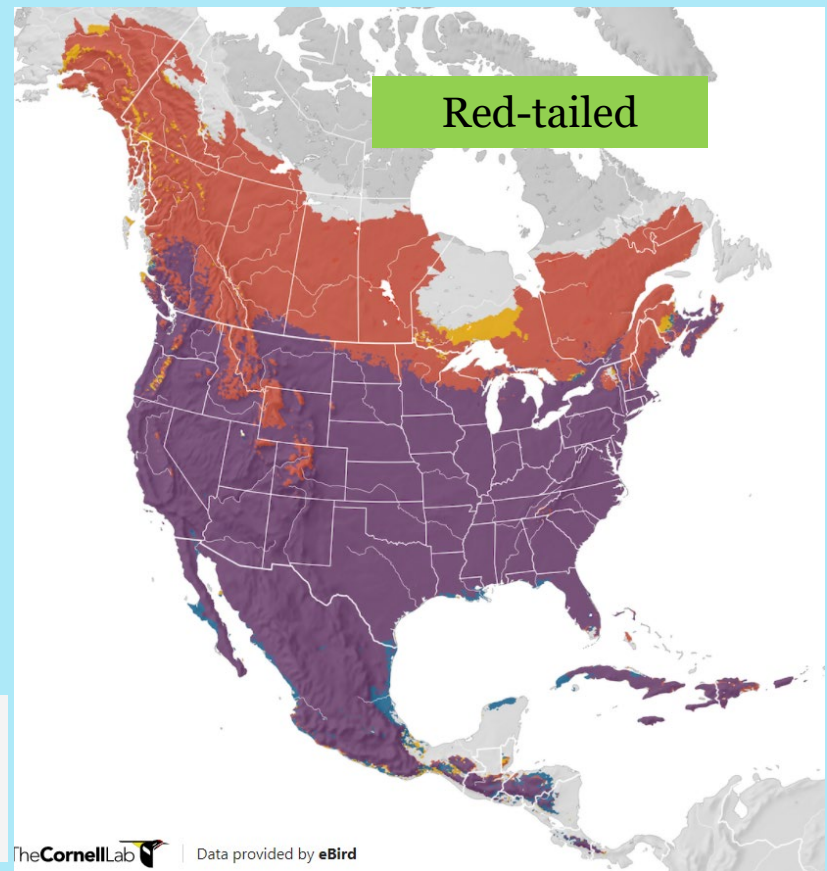
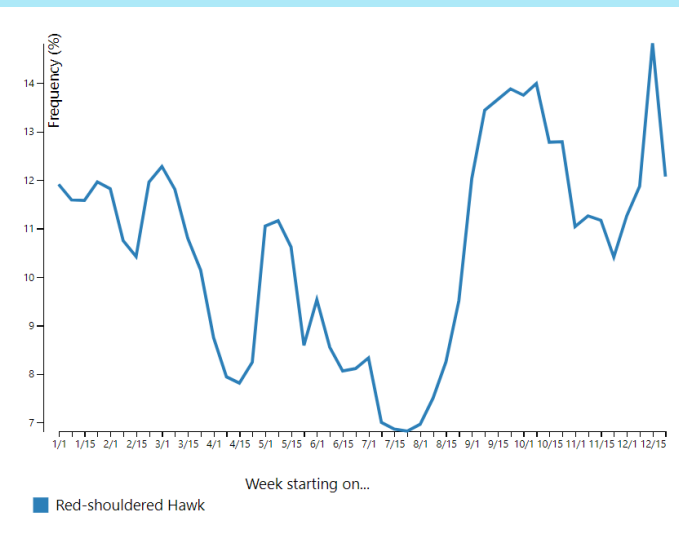
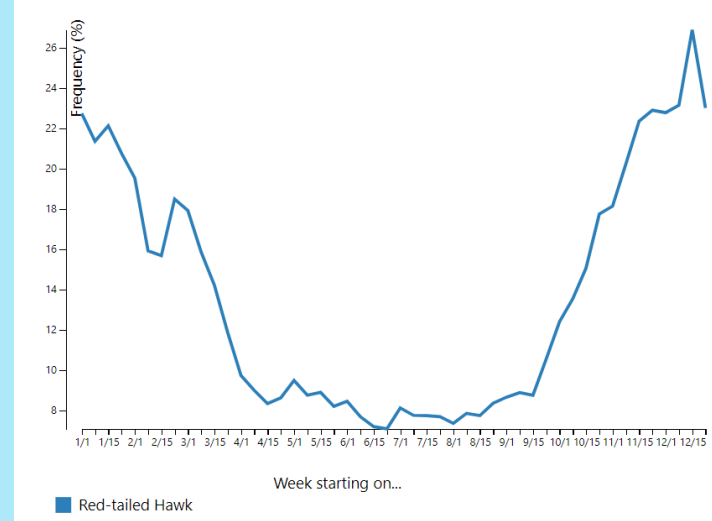
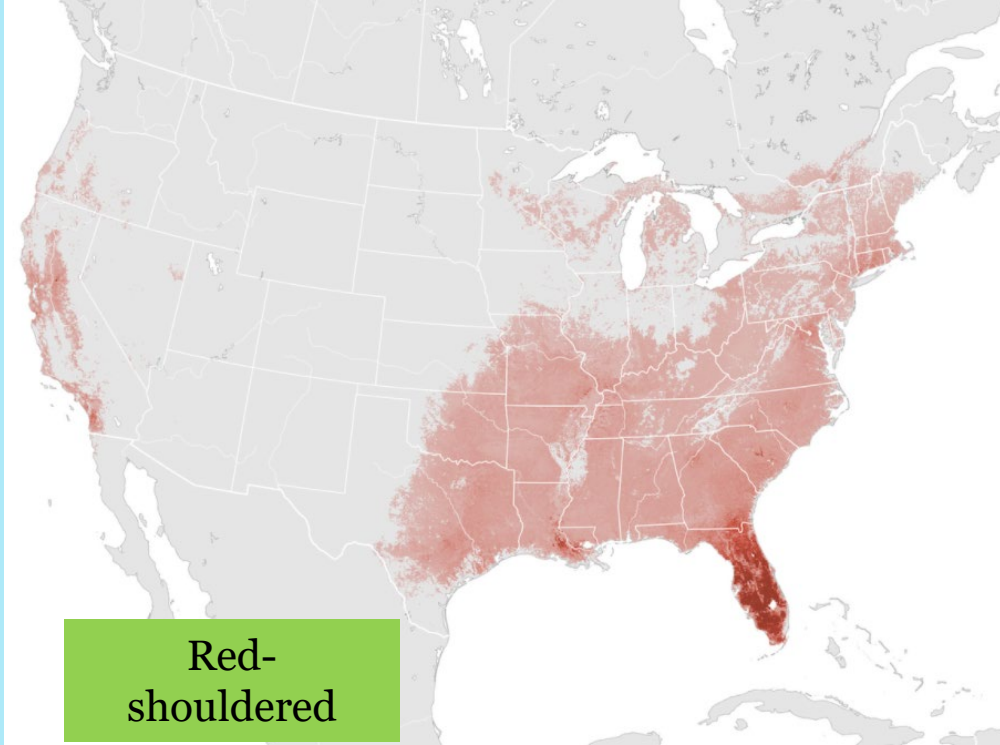


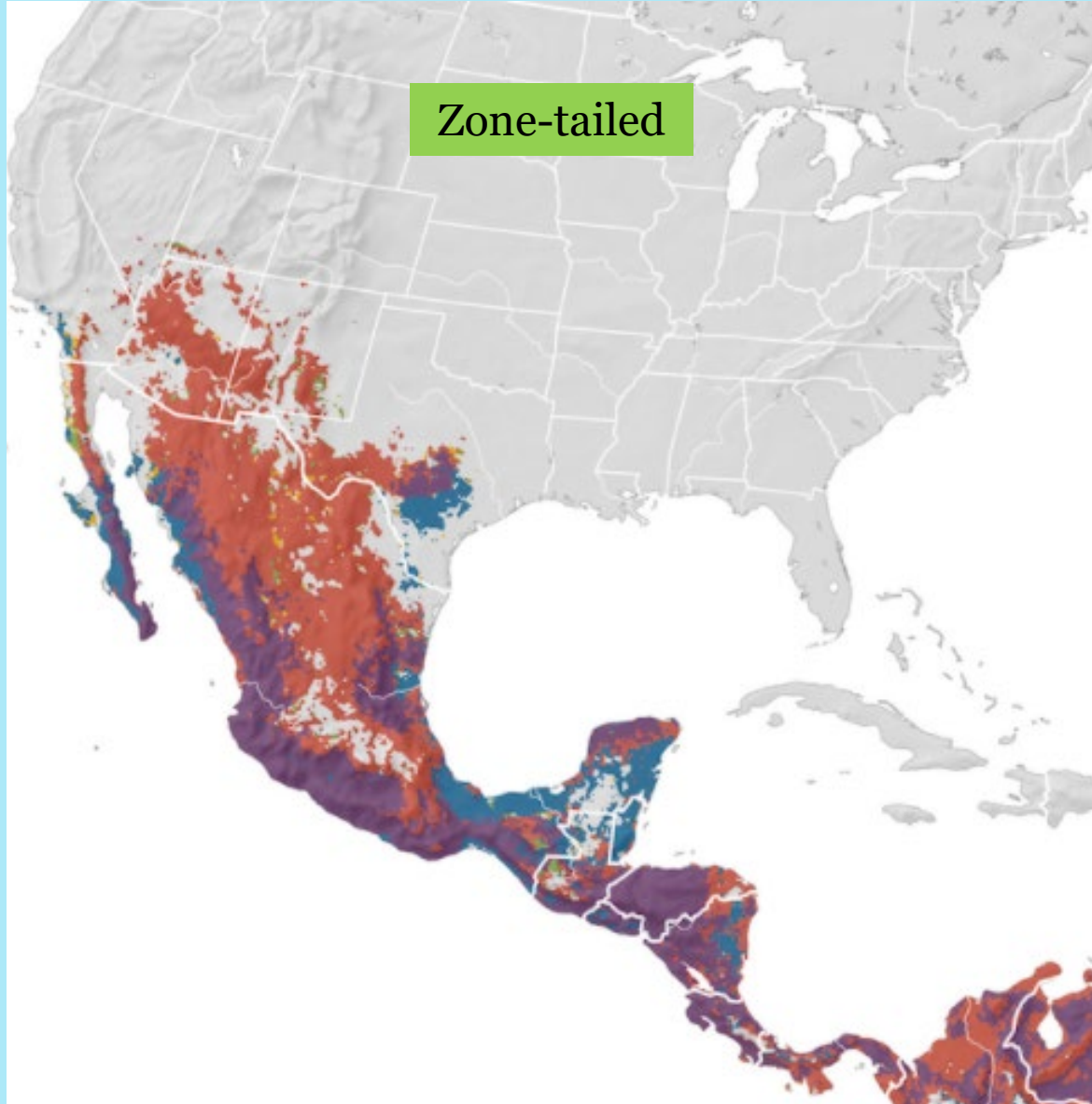
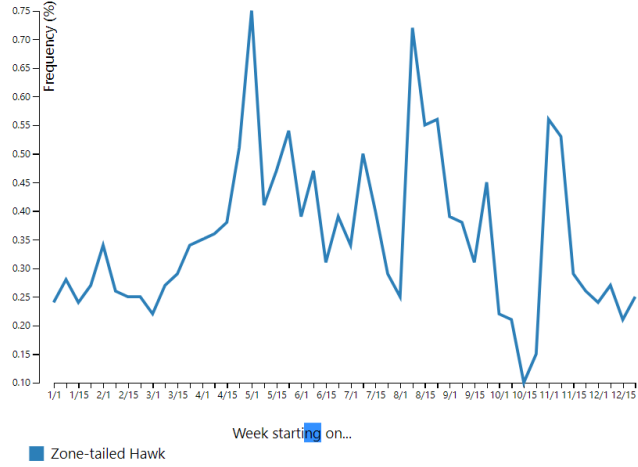
**Pre-breeding migratory season** Jan 25 - May 10



**Post-breeding migratory season** Aug 3 - Nov 23

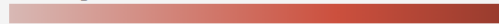






**RELATIVE ABUNDANCE**

**Breeding season** May 17 - Jul 27



**Non-breeding season** Nov 30 - Jan 18



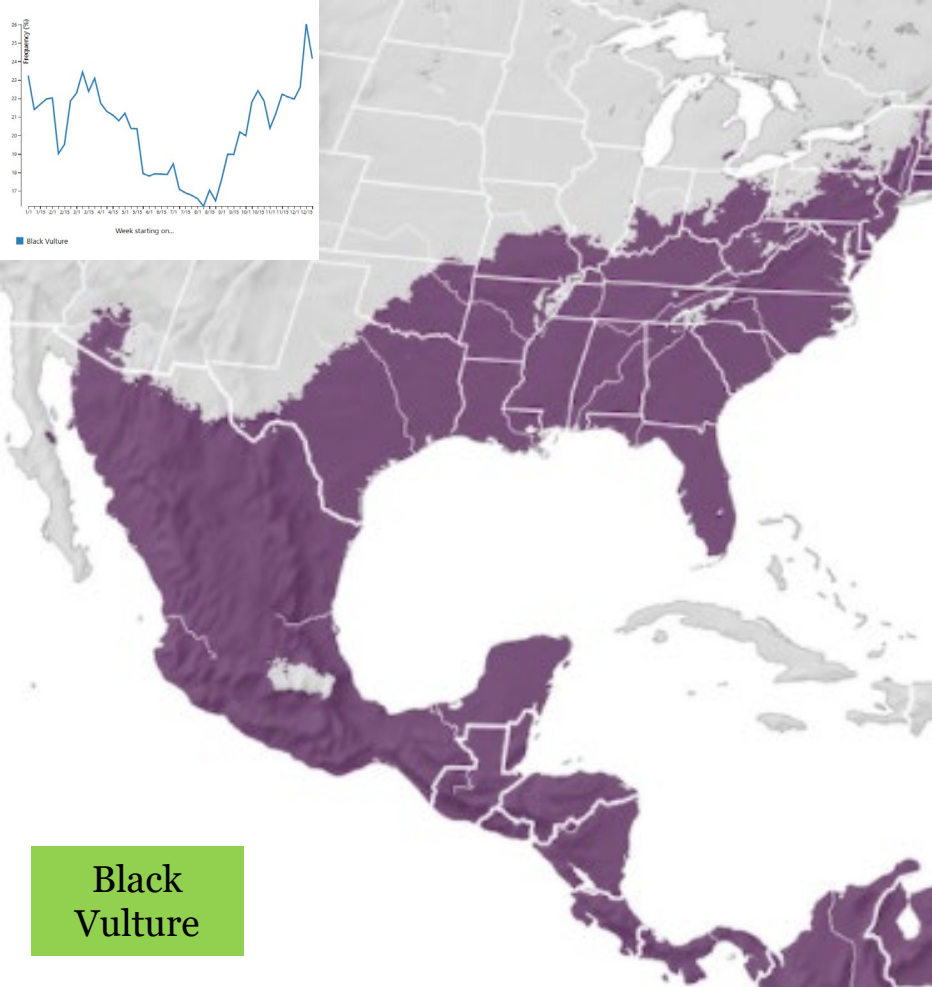
**Pre-breeding migratory season** Jan 25 - May 10



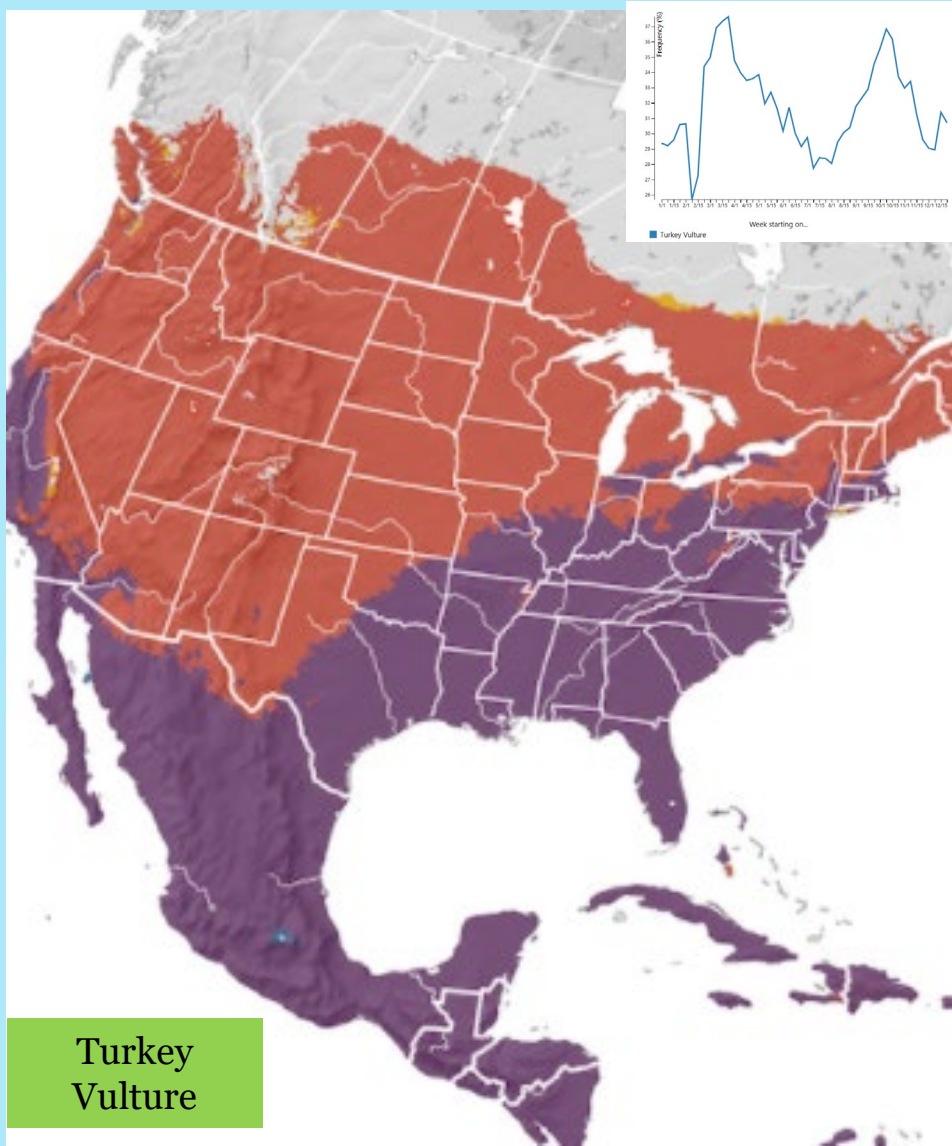
**Post-breeding migratory season** Aug 3 - Nov 23



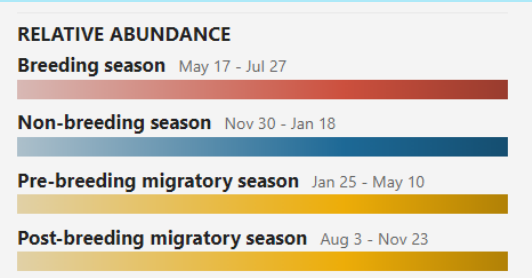
# VULTURES



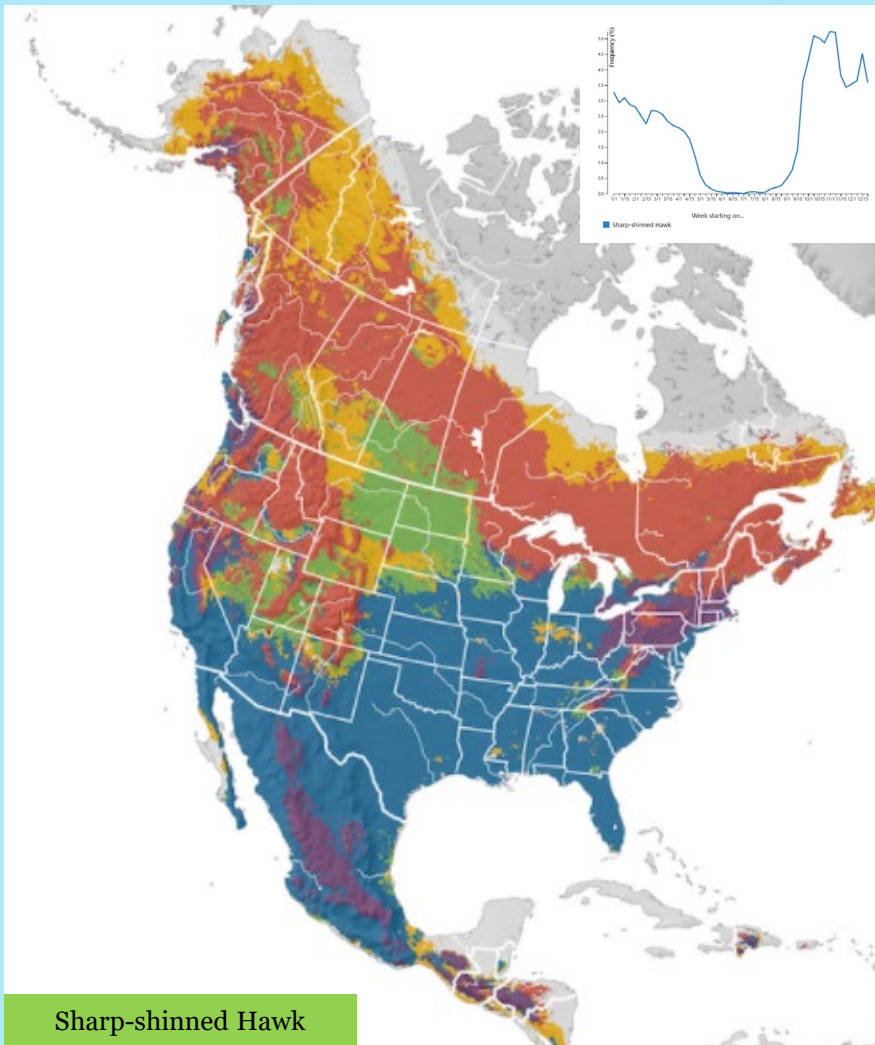
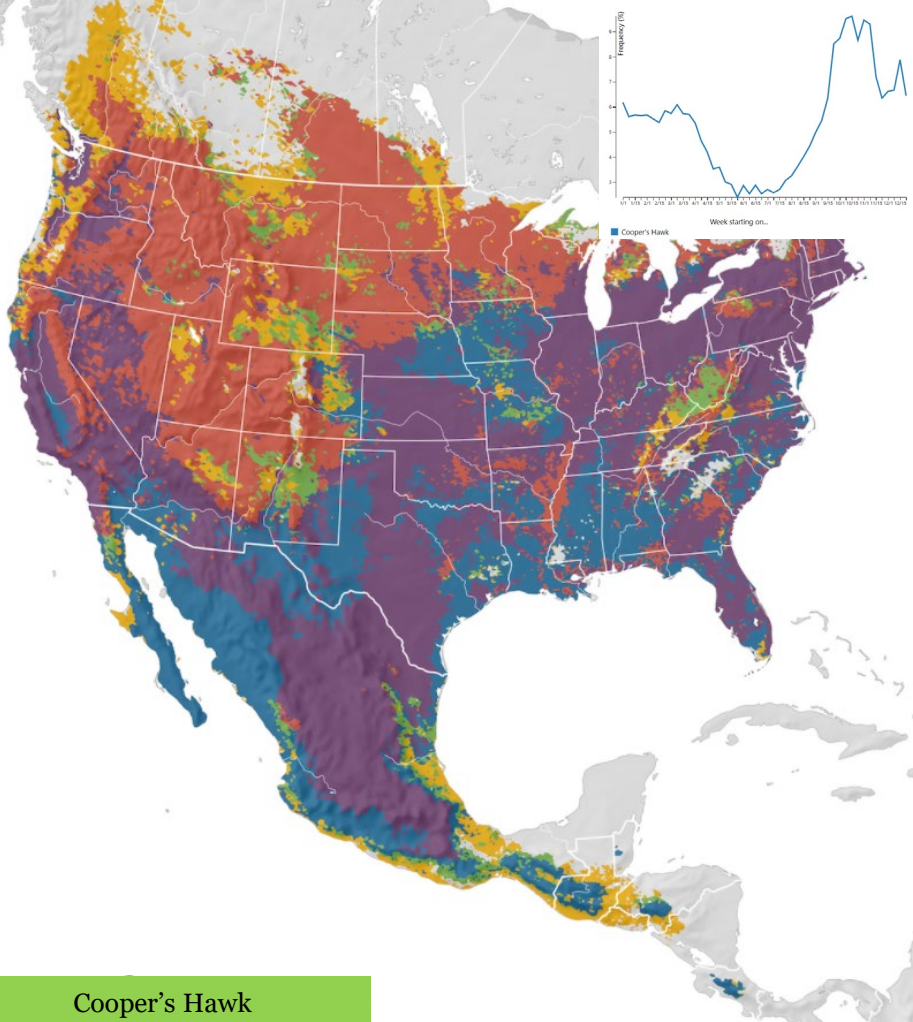
Black Vulture



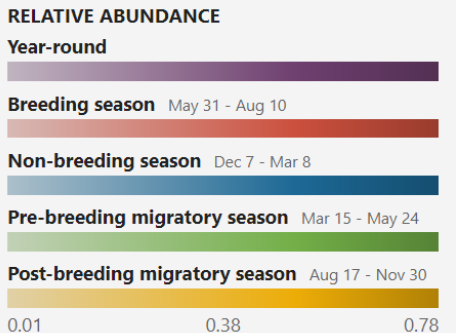
Turkey Vulture



# ACCIPITERS



Cooper's Hawk



Note: Seasonal ranges overlap and are stacked in the order above; view full range in season maps.

Sharp-shinned Hawk

# HABIT 3: HABITAT

# OPEN COUNTRY RAPTORS

- ▶ Red-tailed
- ▶ Swainson's
- ▶ Ferruginous
- ▶ White-tailed Hawk
- ▶ Short-tailed
- ▶ Rough-legged
- ▶ American Kestrel
- ▶ Prairie Falcon
- ▶ Gyrfalcon
- ▶ White-tailed Kite
- ▶ Northern Harrier
- ▶ Crested Caracara
- ▶ Golden Eagle



# FOREST RAPTORS

- ▶ Red-shouldered
- ▶ Broad-winged
- ▶ Northern Goshawk
- ▶ Cooper's
- ▶ Sharp-shinned
- ▶ Gray



# DESERT RAPTORS

- ▶ Harris's
- ▶ Zone-tailed
- ▶ Prairie Falcon
- ▶ Golden Eagle
- ▶ TV
- ▶ Red-tailed



# WETLAND RAPTORS

- ▶ Osprey
- ▶ Bald Eagle
- ▶ Northern Harrier
- ▶ Hook-billed Kite
- ▶ Snail Kite



# URBAN RAPTORS

- ▶ Peregrine
- ▶ Merlin
- ▶ Cooper's
- ▶ Red-tailed



LIKELIHOOD

**1,2,3) DISTRIBUTION – DEDUCTIVE REASONING**  
**JUNE, WILLIAMSON COUNTY, TEXAS.**  
**FLATLAND, WOODED BANKS OF SAN GABRIEL RIVER**

▶ 10 wrens in North America.

▶ **Bewick's**

▶ ~~Cactus~~

▶ ~~Canyon~~

▶ **Carolina**

▶ ~~House~~

▶ ~~Marsh~~

▶ ~~Pacific~~

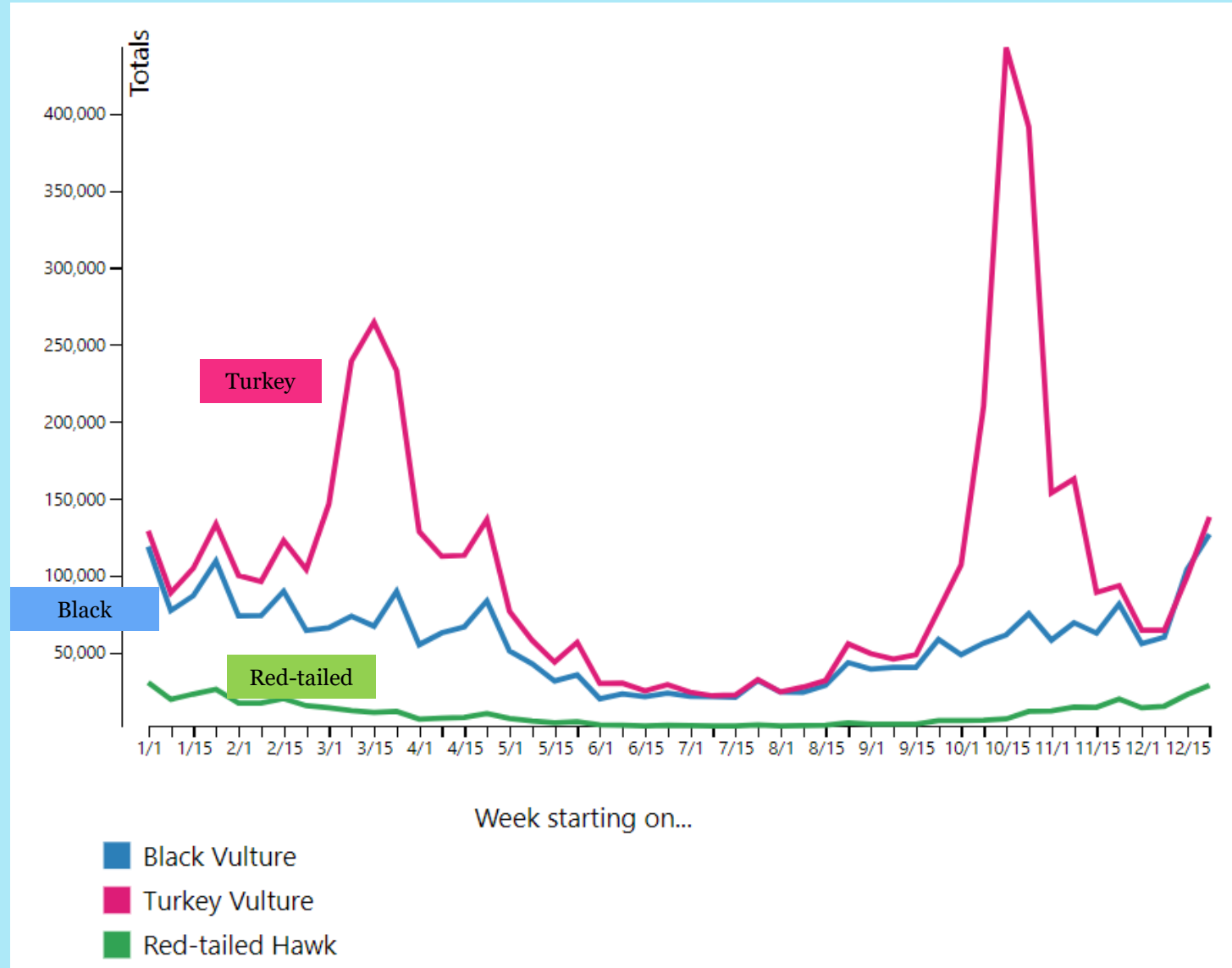
▶ ~~Rock~~

▶ ~~Sedge~~

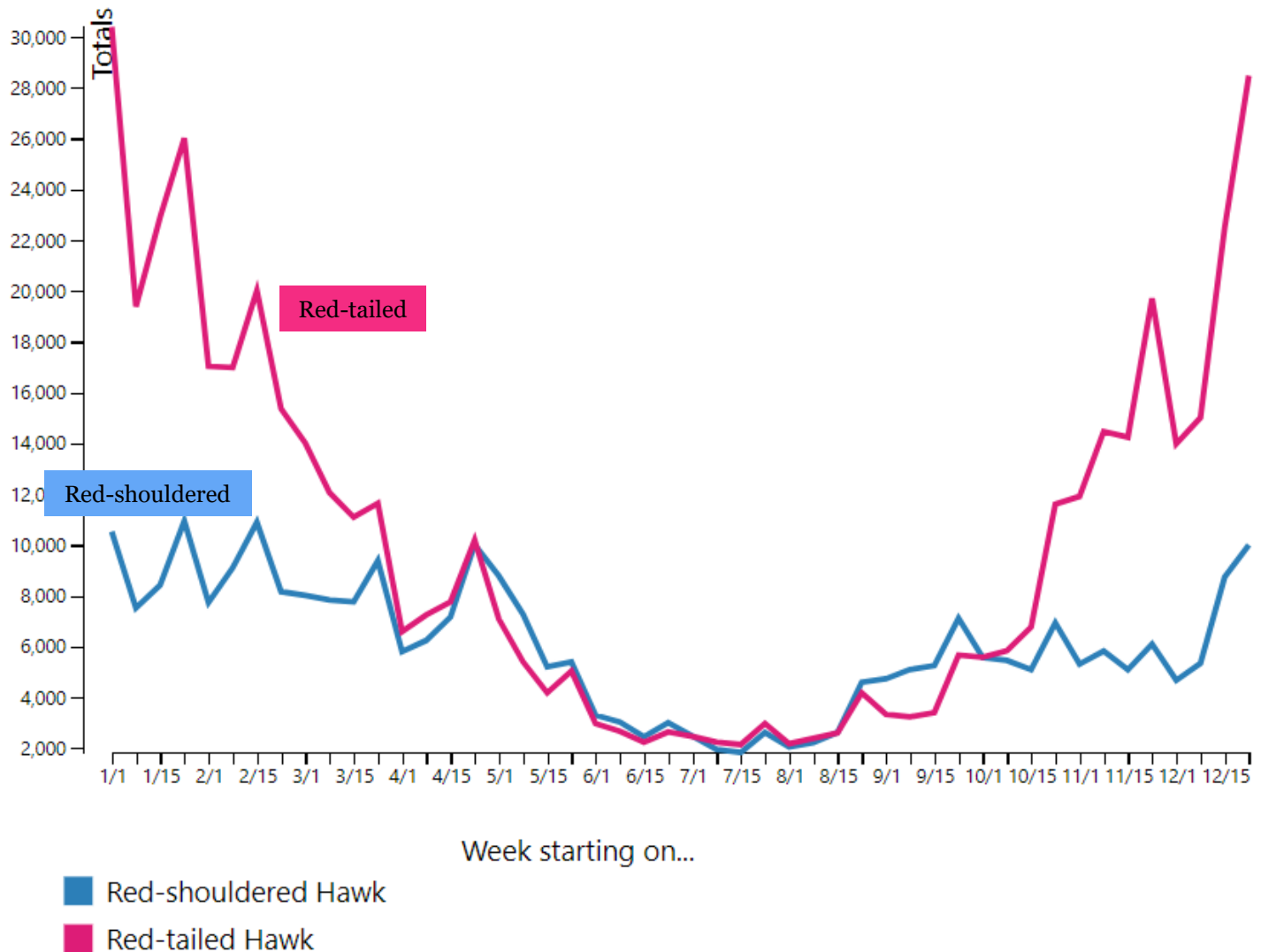
▶ ~~Winter~~



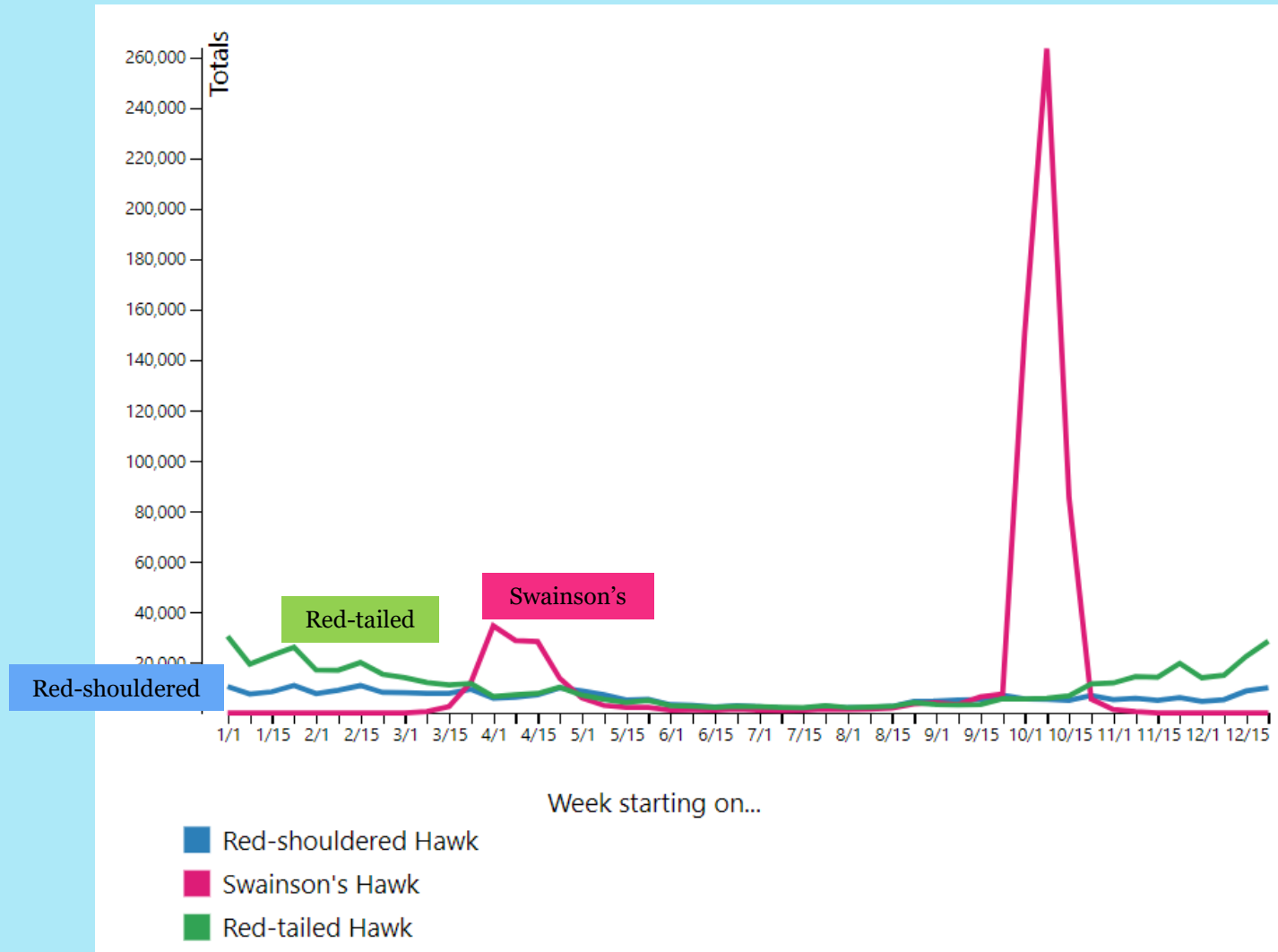
# RAPTOR LIKELIHOOD IN TEXAS



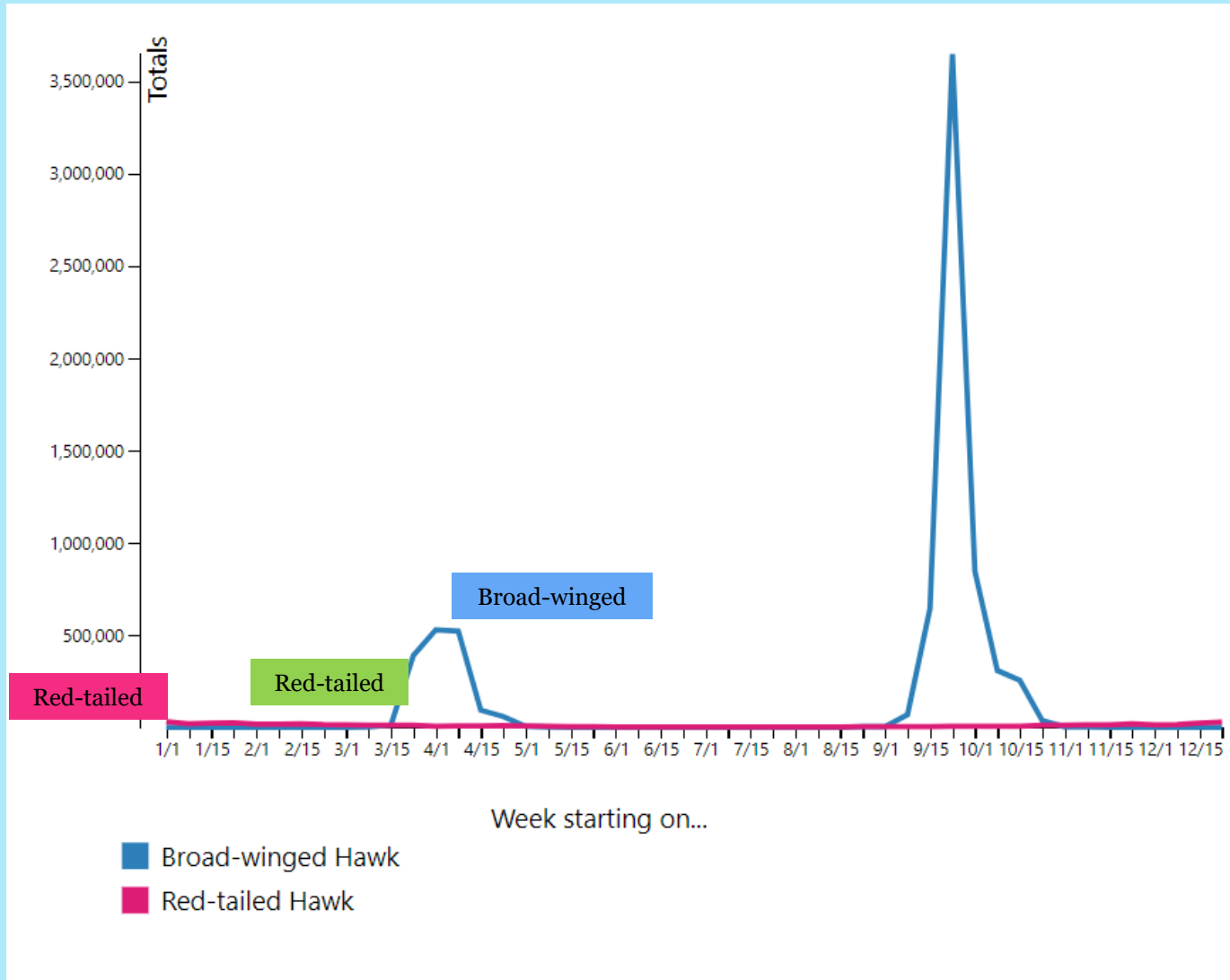
# RAPTOR LIKELIHOOD IN TEXAS



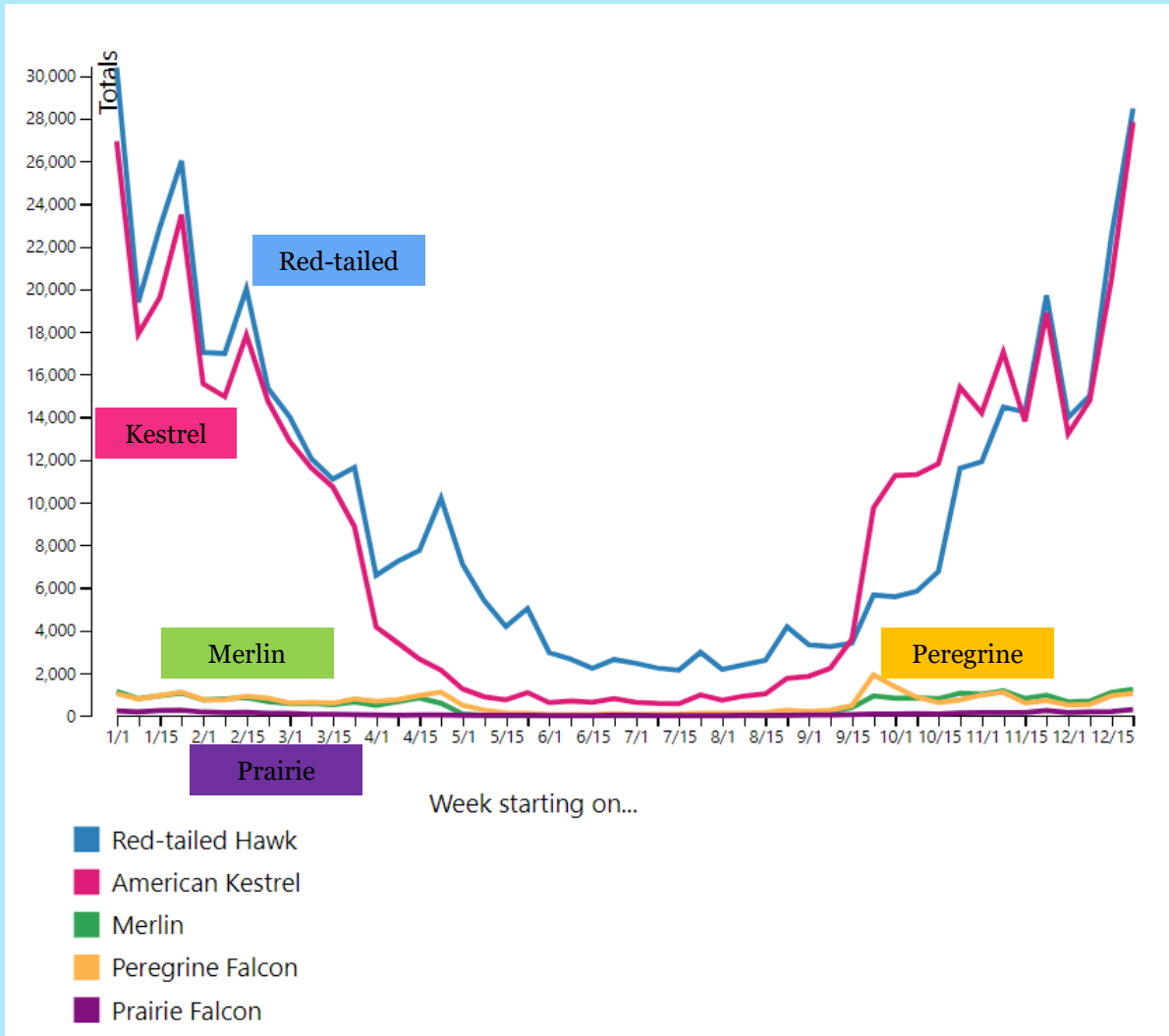
# RAPTOR LIKELIHOOD IN TEXAS – **MIGRANT SWAINSON'S**



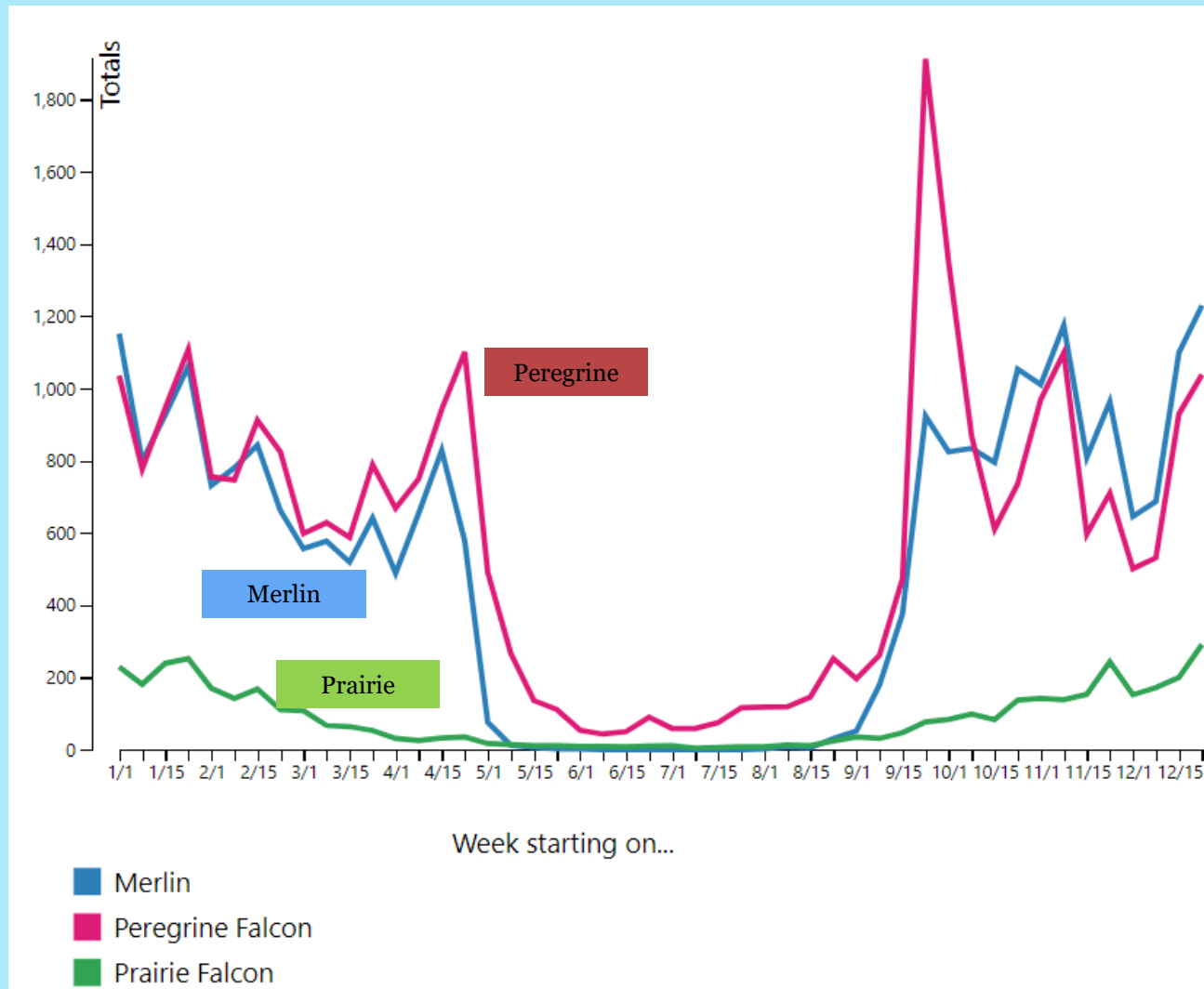
# RAPTOR LIKELIHOOD IN TEXAS – **MIGRANT BROAD-WINGED**



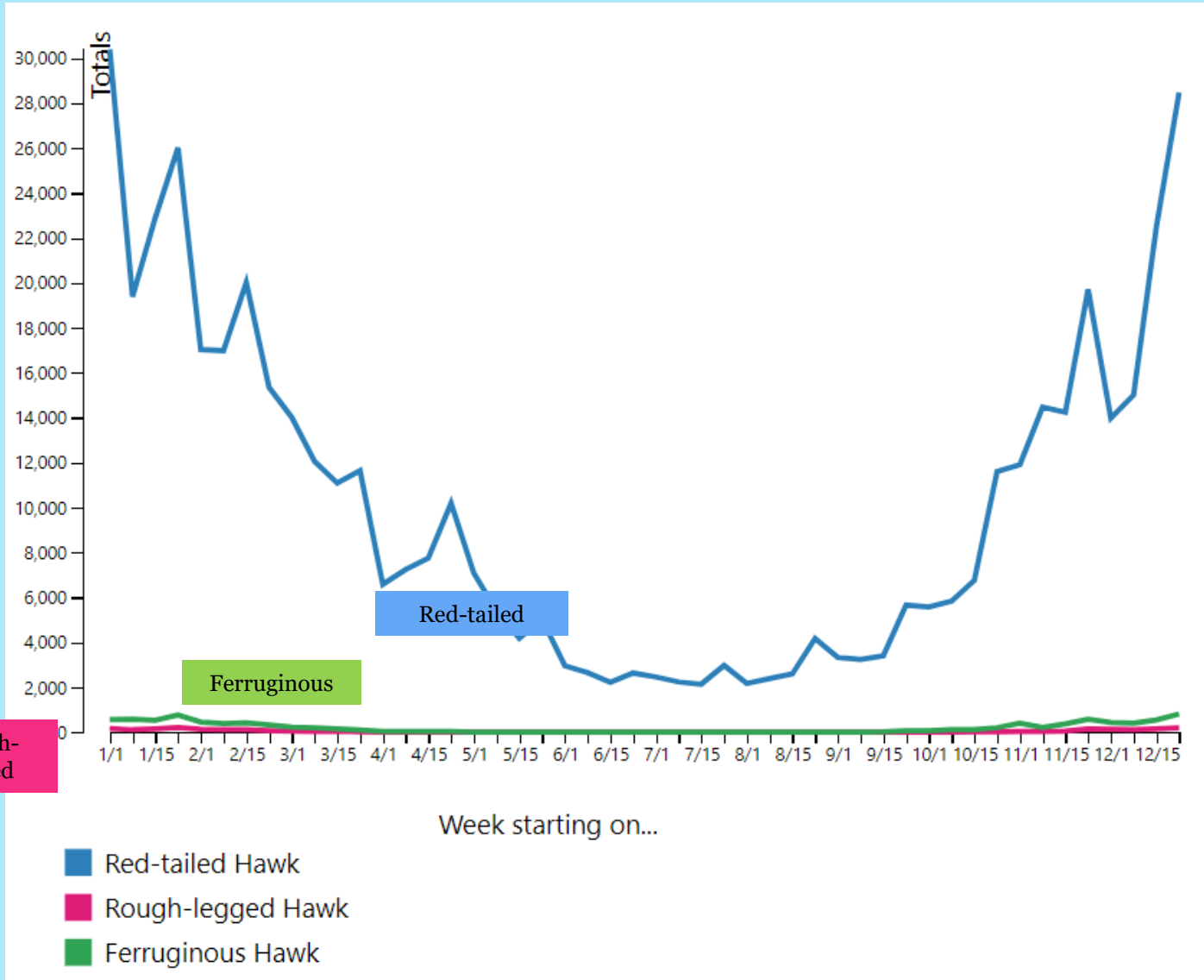
# RAPTOR LIKELIHOOD IN TEXAS -- **FALCONS**



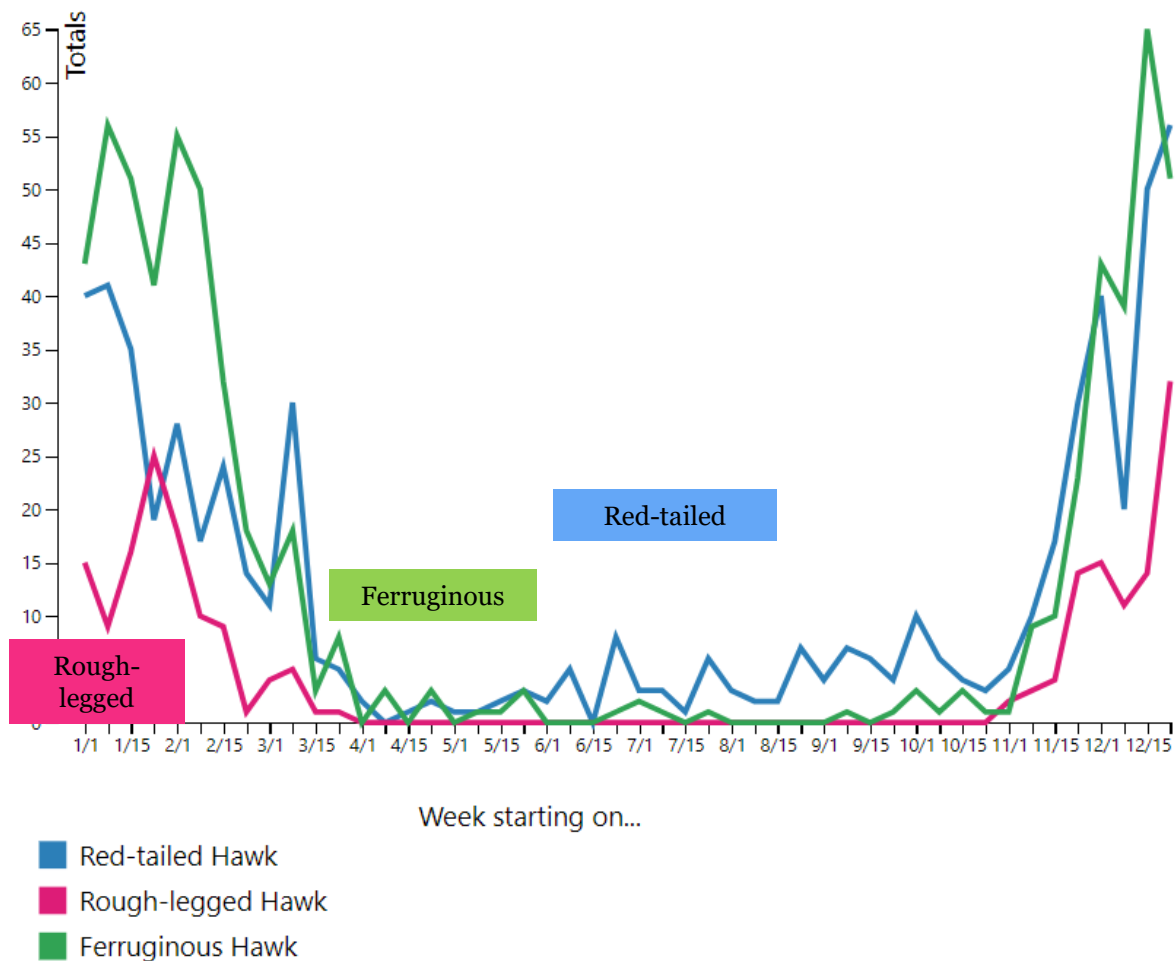
# RAPTOR LIKELIHOOD IN TEXAS -- **FALCONS**



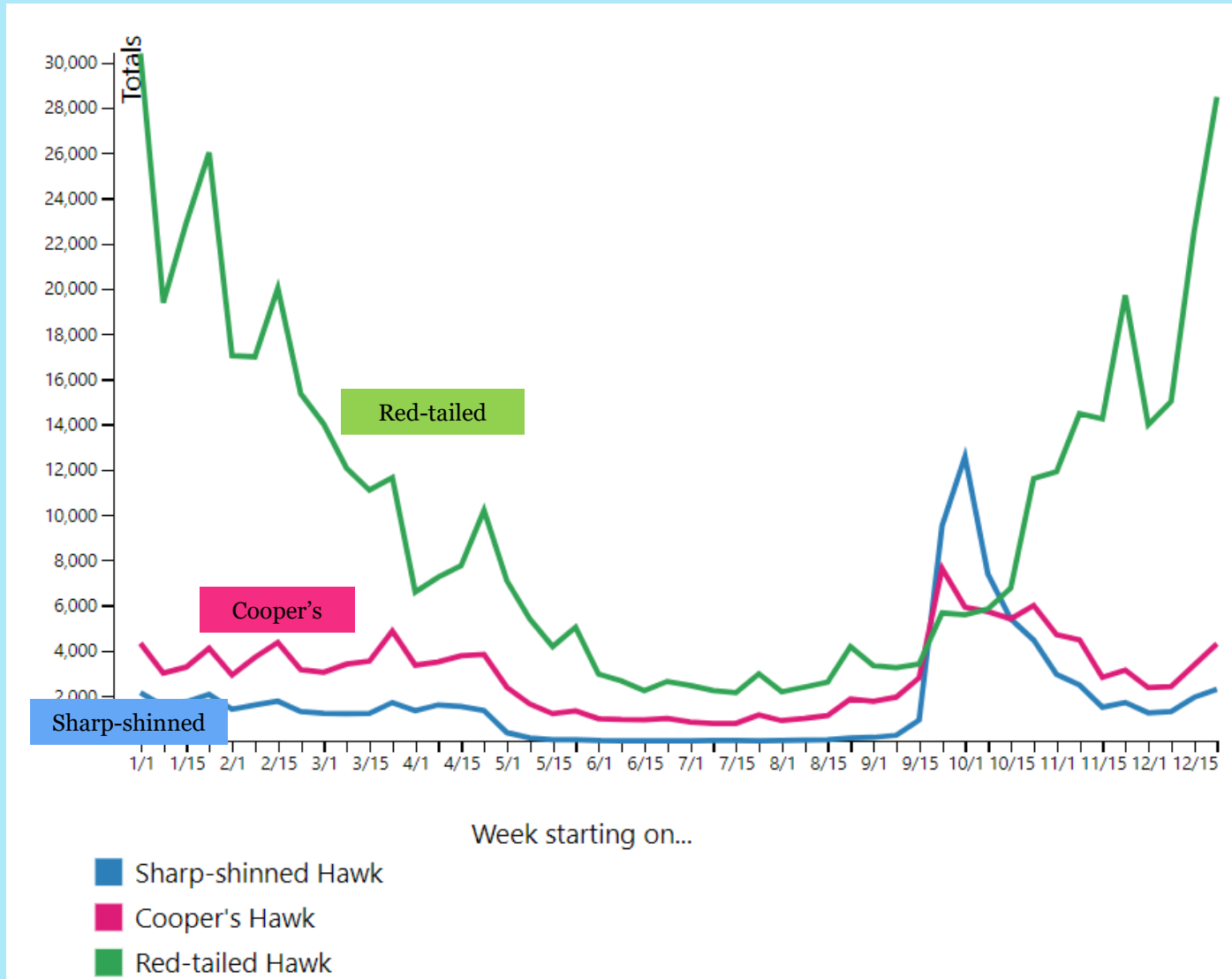
# RAPTOR LIKELIHOOD IN TEXAS



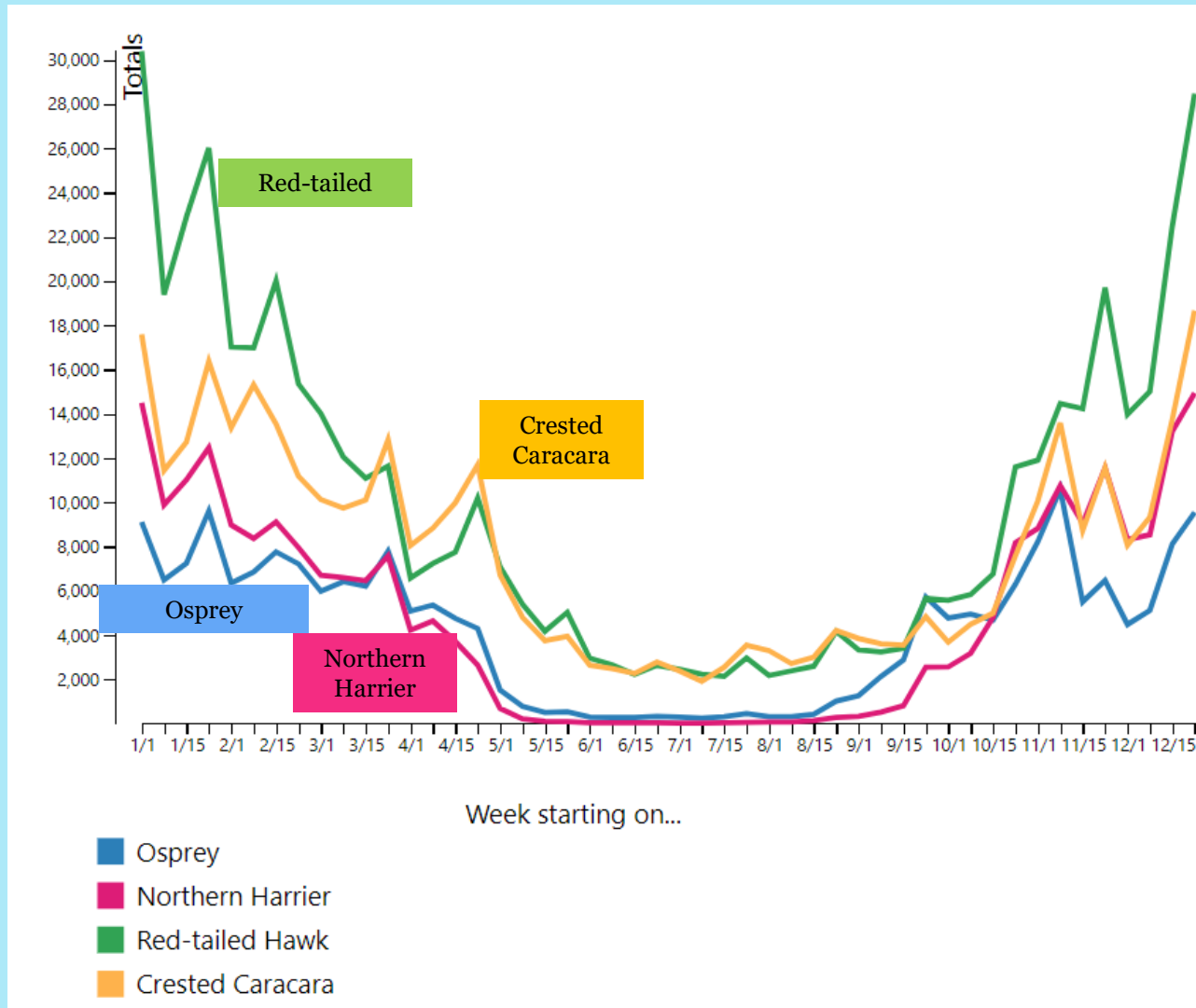
# RAPTOR LIKELIHOOD IN **DALLAM COUNTY**, TEXAS



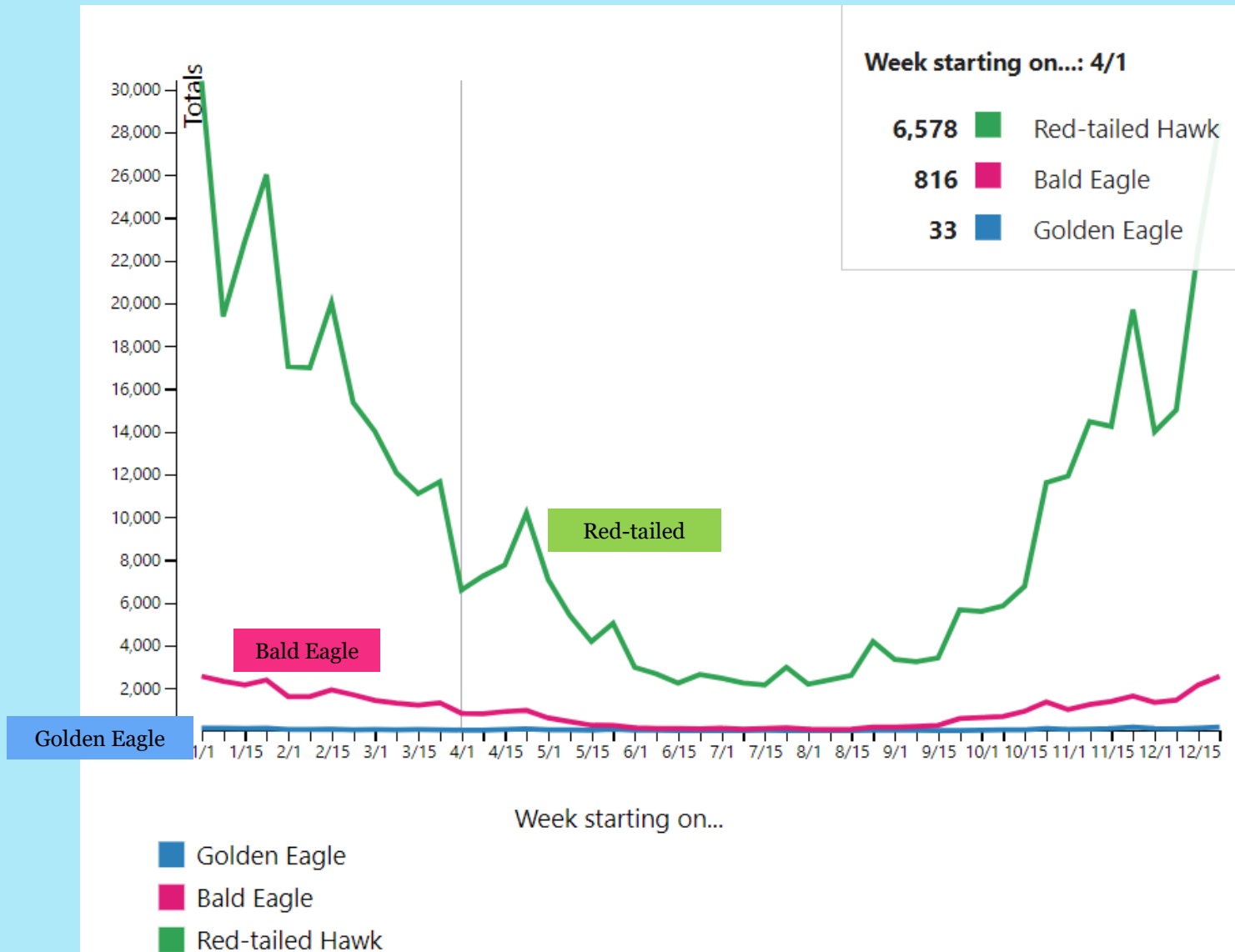
# RAPTOR LIKELIHOOD IN TEXAS -- ACCIPITERS



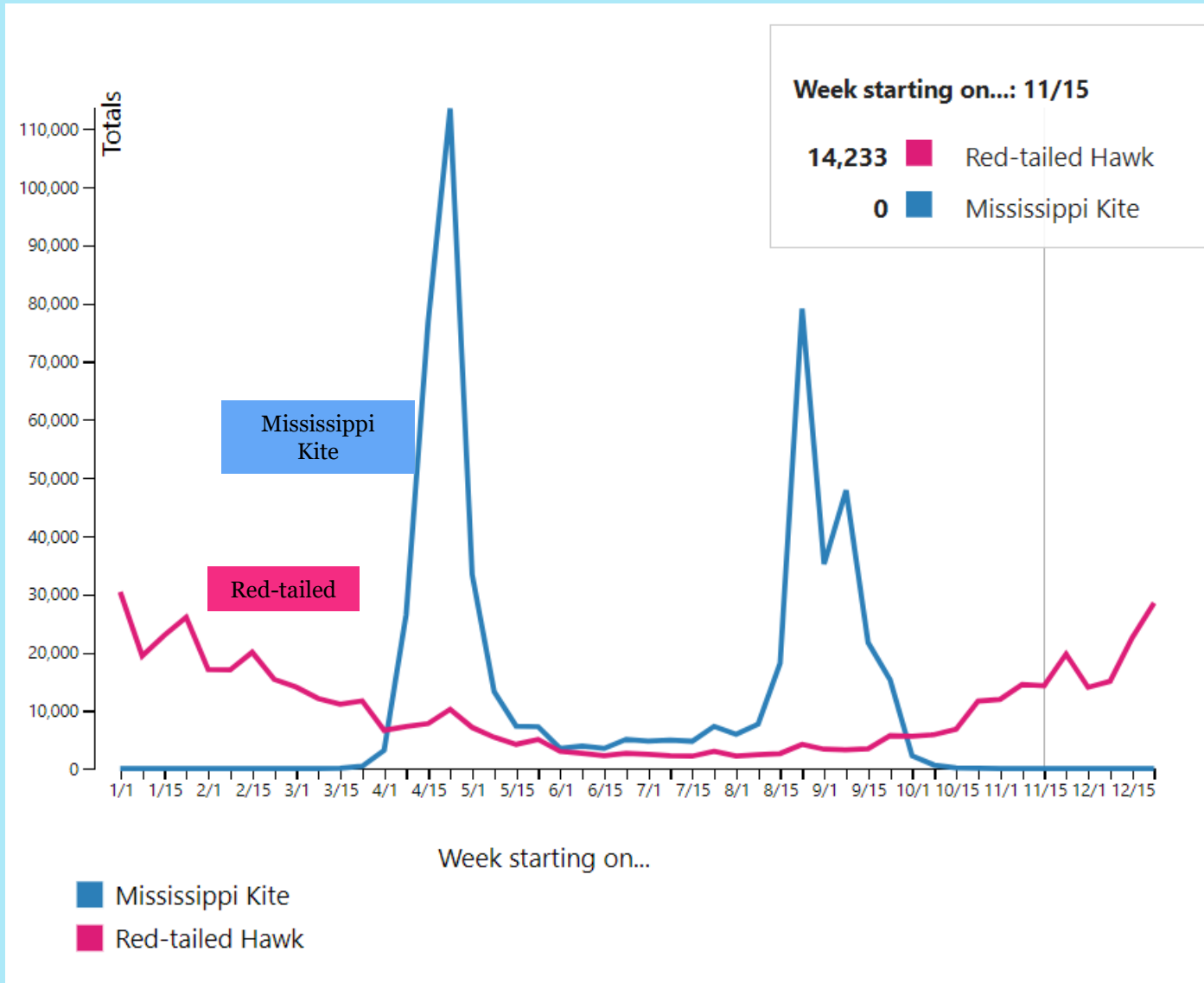
# RAPTOR LIKELIHOOD IN TEXAS -- OTHER



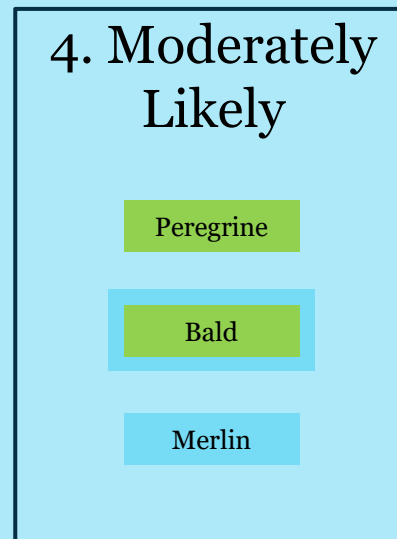
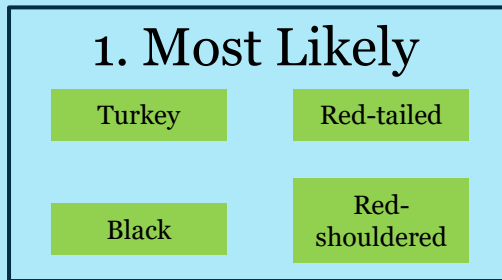
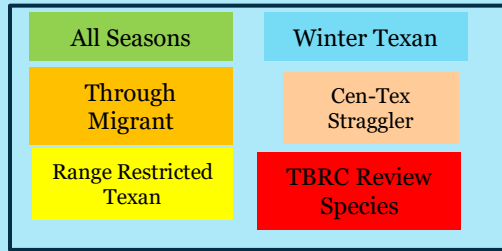
# RAPTOR LIKELIHOOD IN TEXAS -- **EAGLES**



# RAPTOR LIKELIHOOD IN TEXAS



# RELATIVE LIKELIHOOD OF **LIKELY** RAPTORS IN TEXAS (21 SPECIES)



# 7 GROUPS OF **LIKELY** RAPTORS IN TEXAS (21 SPECIES)

All Seasons	Winter Texan
Through Migrant	Cen-Tex Straggler
Range Restricted Texan	TBRC Review Species

## VULTURE

Turkey

Black

## BUTEO

Large      Medium

Red-tailed

Swainson's

Zone-tailed

Ferruginous

Rough-legged

Red-shouldered

Broad-winged

## ACCIPITER

Cooper's

Sharp-shinned

## OTHER

Crested Cara Cara

Northern Harrier

Osprey

## FALCON

American Kestrel

Peregrine

Merlin

Prairie

## EAGLE

Bald

Golden

## KITE

Mississippi

# LIKELY RAPTORS IN TEXAS THOUGHT PROCESS (21 SPECIES)

You see a flying raptor

Think season & distribution

Vulture?

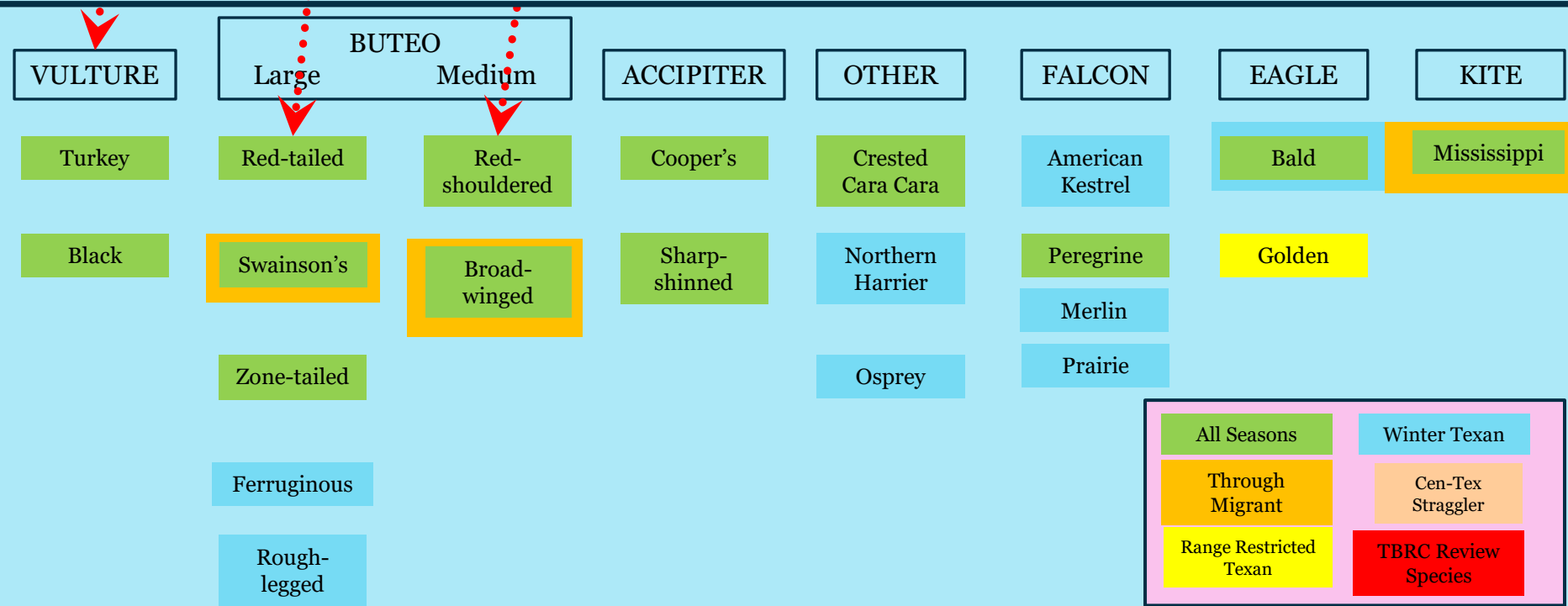
Red-tailed ?

Red-shouldered ?

Migration?

Place in Group based on structure/GISS

- Swainson's
- Broad-winged
- Mississippi



Yes

Yes

Yes

No

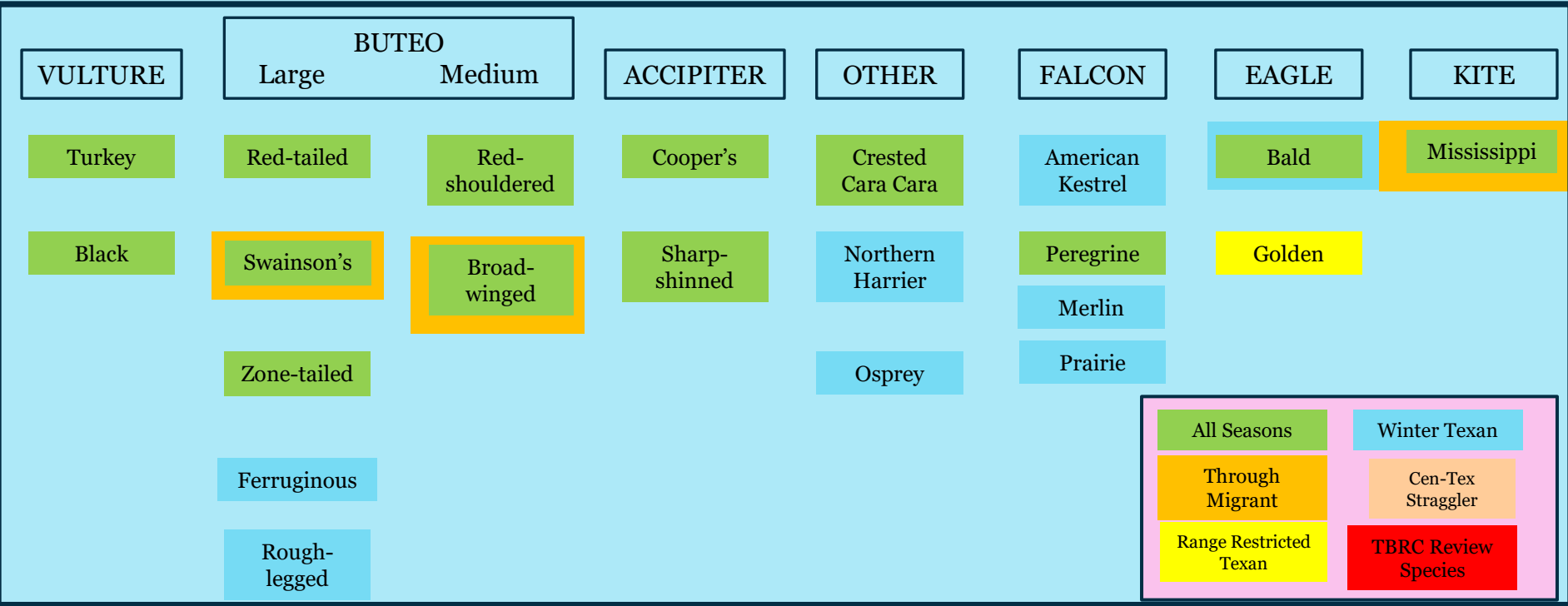
Yes

No

No

No

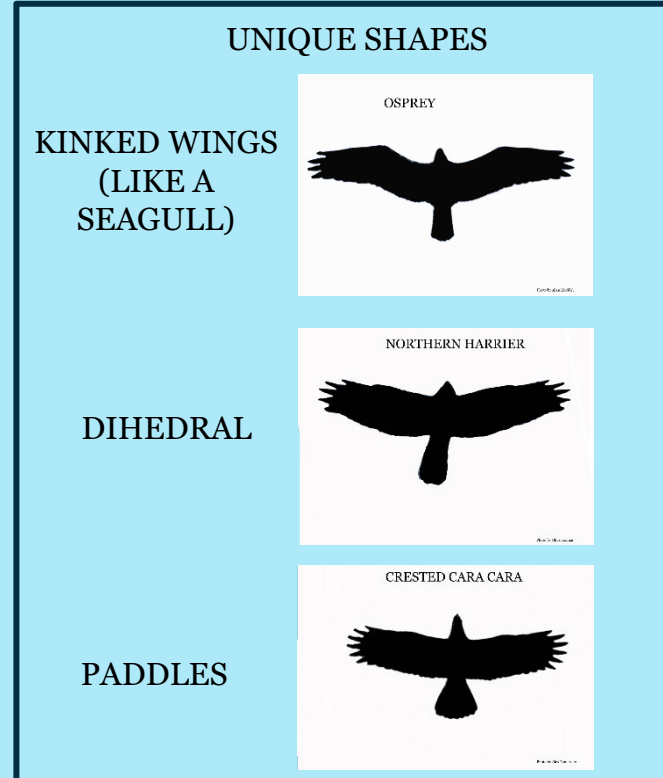
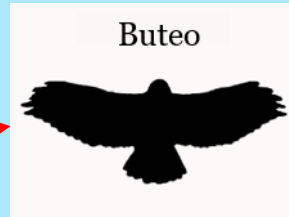
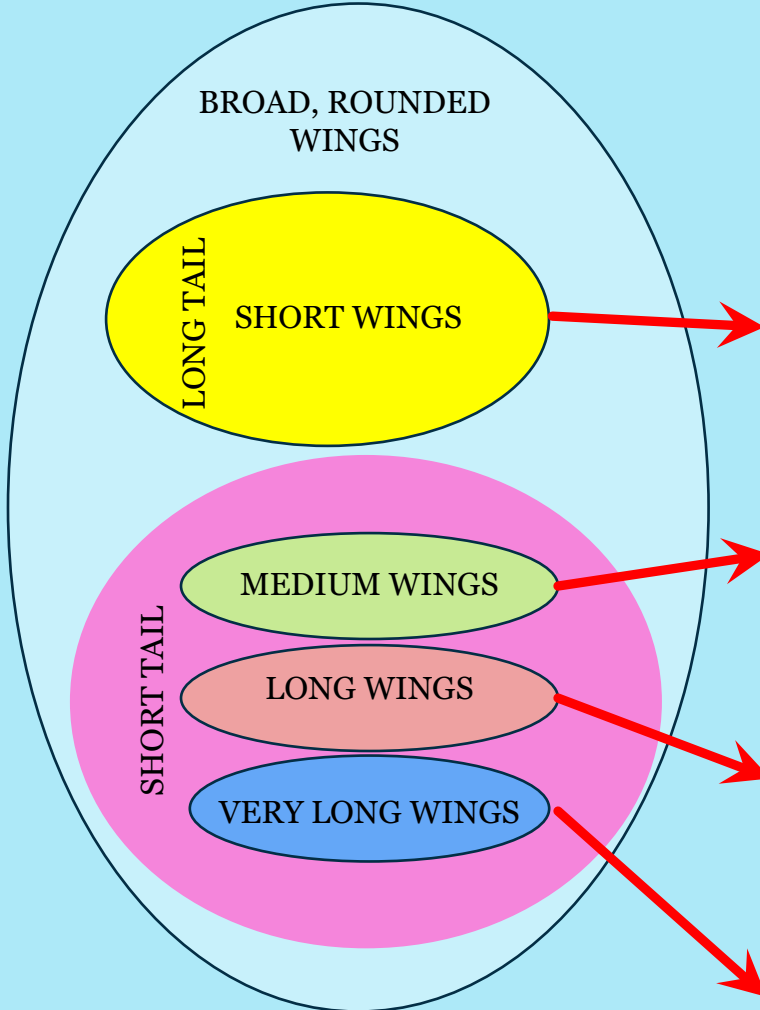
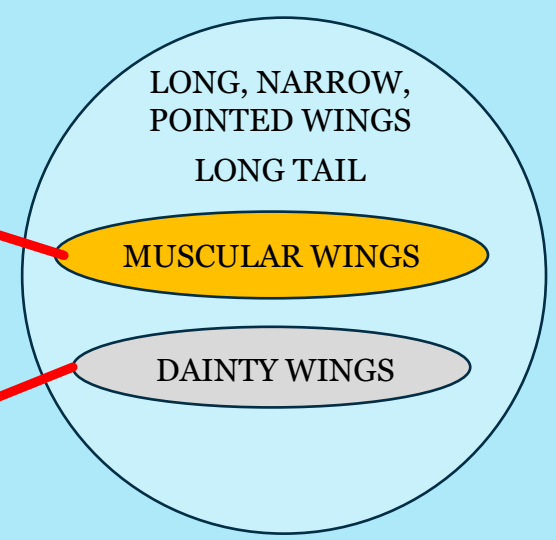
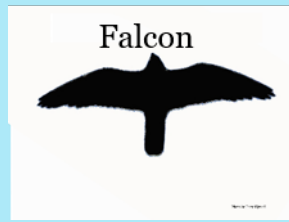
# GROUPING RAPTORS IN TEXAS (21 SPECIES)



# GROUPING RAPTORS BY STRUCTURE

- ▶ What are we looking for?
- ▶ Pieces of the raptor:
  - ▶ Head + body
  - ▶ Tail
  - ▶ Wings
- ▶ Length of tail
- ▶ Shape of tail
- ▶ Shape of wings
  - ▶ “Fingers”
  - ▶ Rounded
  - ▶ Sharp
  - ▶ Pushed-forward
  - ▶ Wing-width vs Wing-length

Group	Wing			Tail Length	
	Length	Width	Shape		
Vulture	Long	Broad	Rounded	Short	
Eagle	Long	Broad	Rounded	Short	
Buteo	Medium	Broad	Rounded	Short	
Accipiter	Short	Broad	Rounded	Long	
Falcon	Long	Narrow	Pointed	Long	
Kite	Long	Narrow	Pointed	Long	
Other	Harrier	Long	Narrow	Rounded	Long
	Cara Cara	Medium	Medium	Rounded	Medium
	Osprey	Long	Narrow	Rounded	Medium

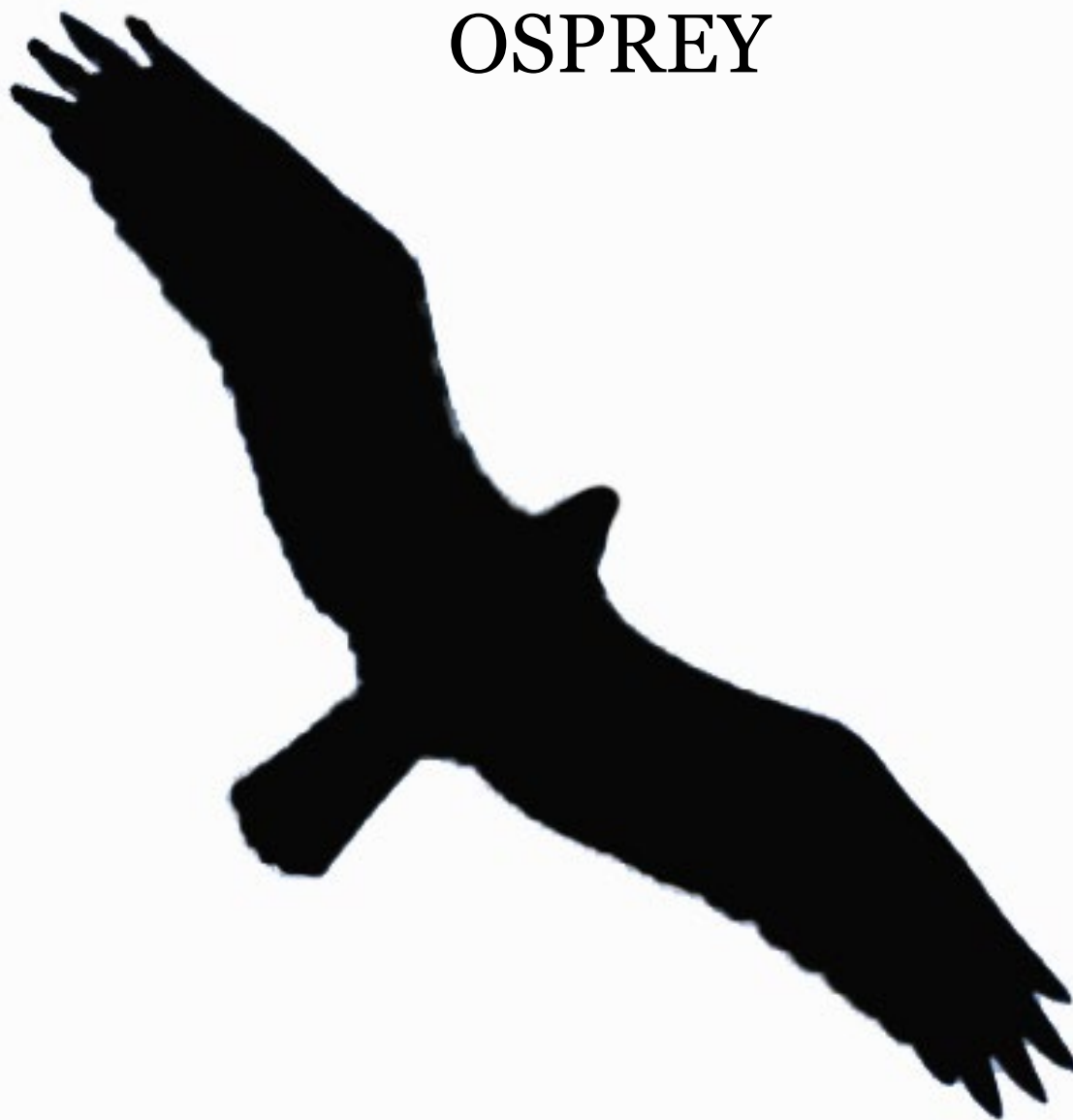


# STRUCTURE

# UNIQUE SHAPES

UNIQUE SHAPES	
KINKED WINGS (LIKE A SEAGULL)	<p>OSPREY</p>  <p>OSPREY</p>
DIHEDRAL	<p>NORTHERN HARRIER</p>  <p>NORTHERN HARRIER</p>
PADDLES	<p>CRESTED CARA CARA</p>  <p>CRESTED CARA CARA</p>

# OSPREY



# NORTHERN HARRIER



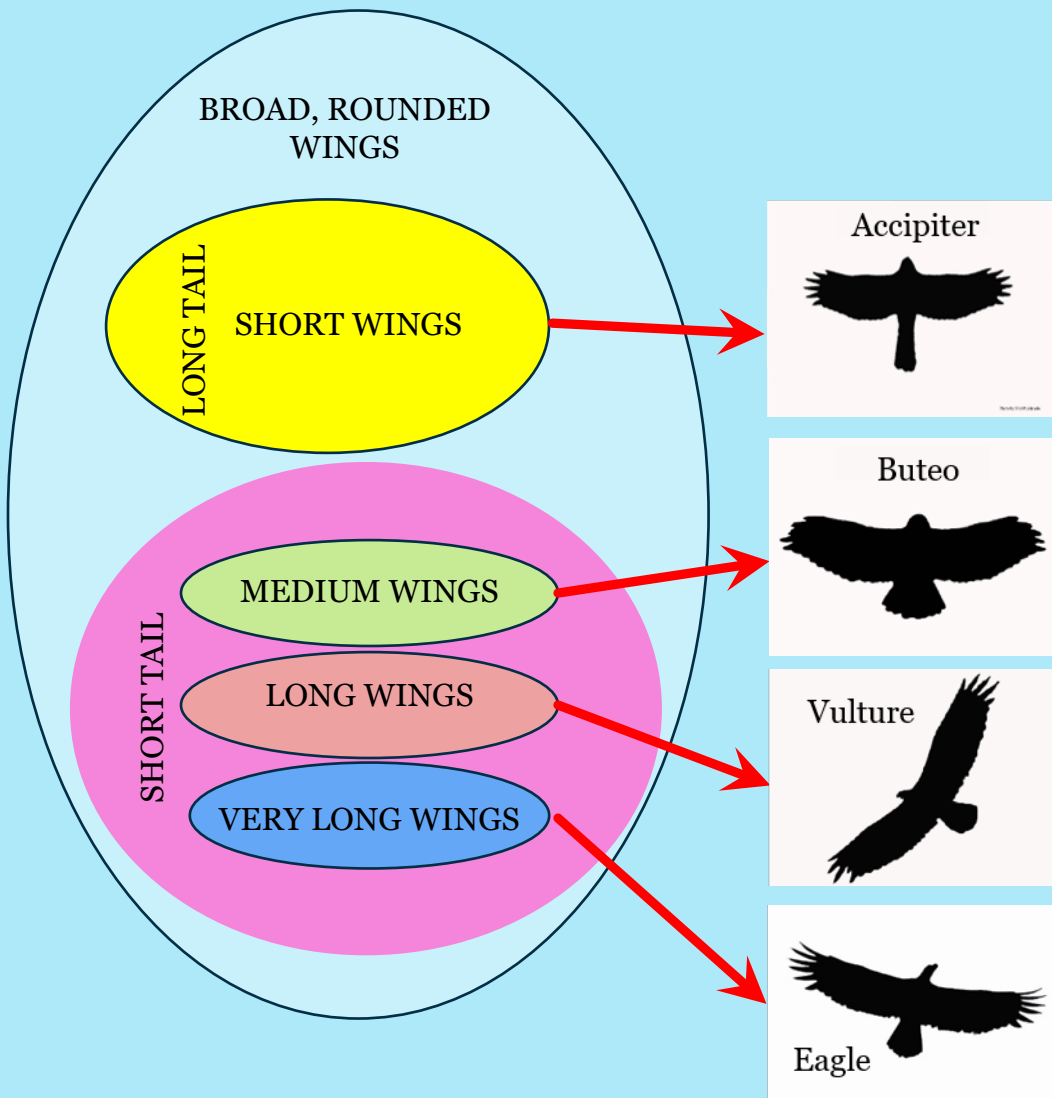
# NORTHERN HARRIER



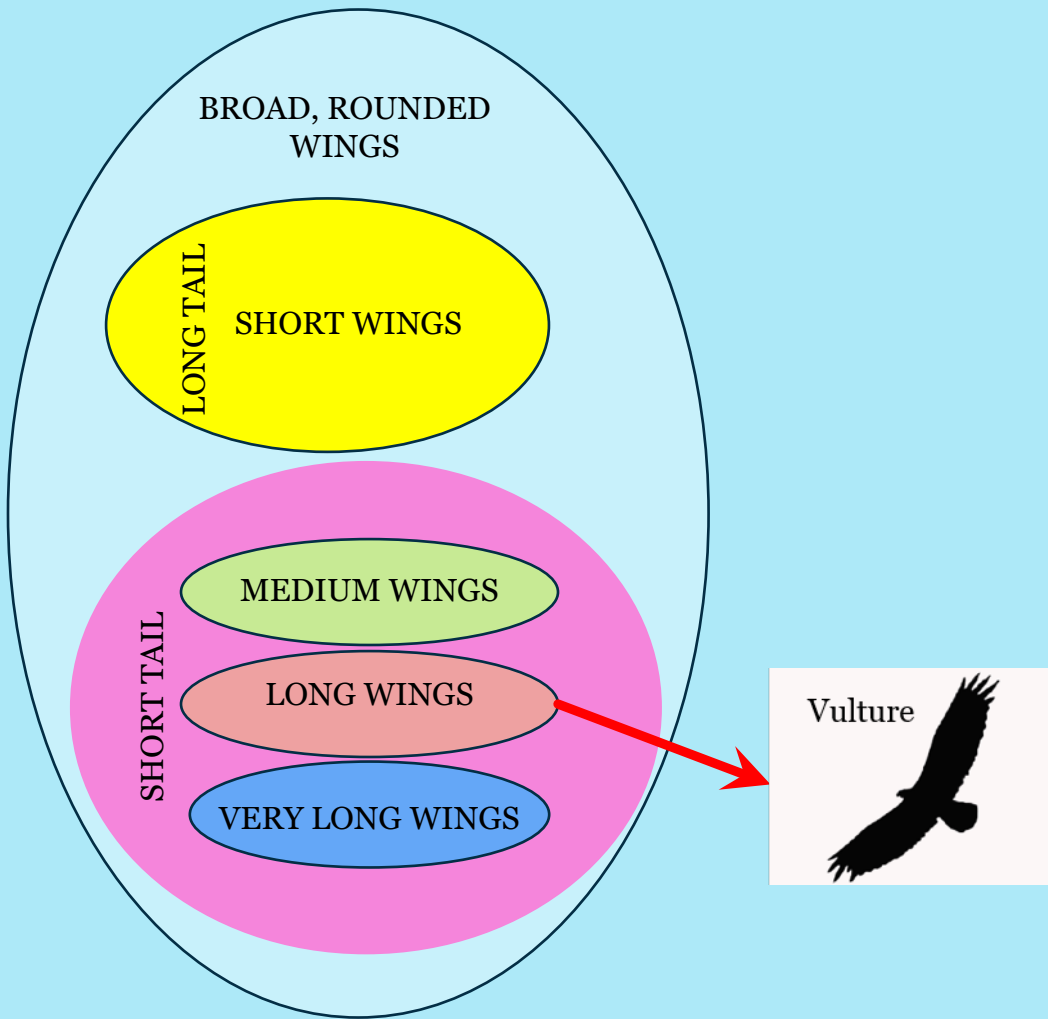
# CRESTED CARA CARA



# BROAD, ROUNDED WINGS



# BROAD, ROUNDED WINGS



?????



Photo by Mike Cameron



Photo by Mike Cameron

# TURKEY VULTURE

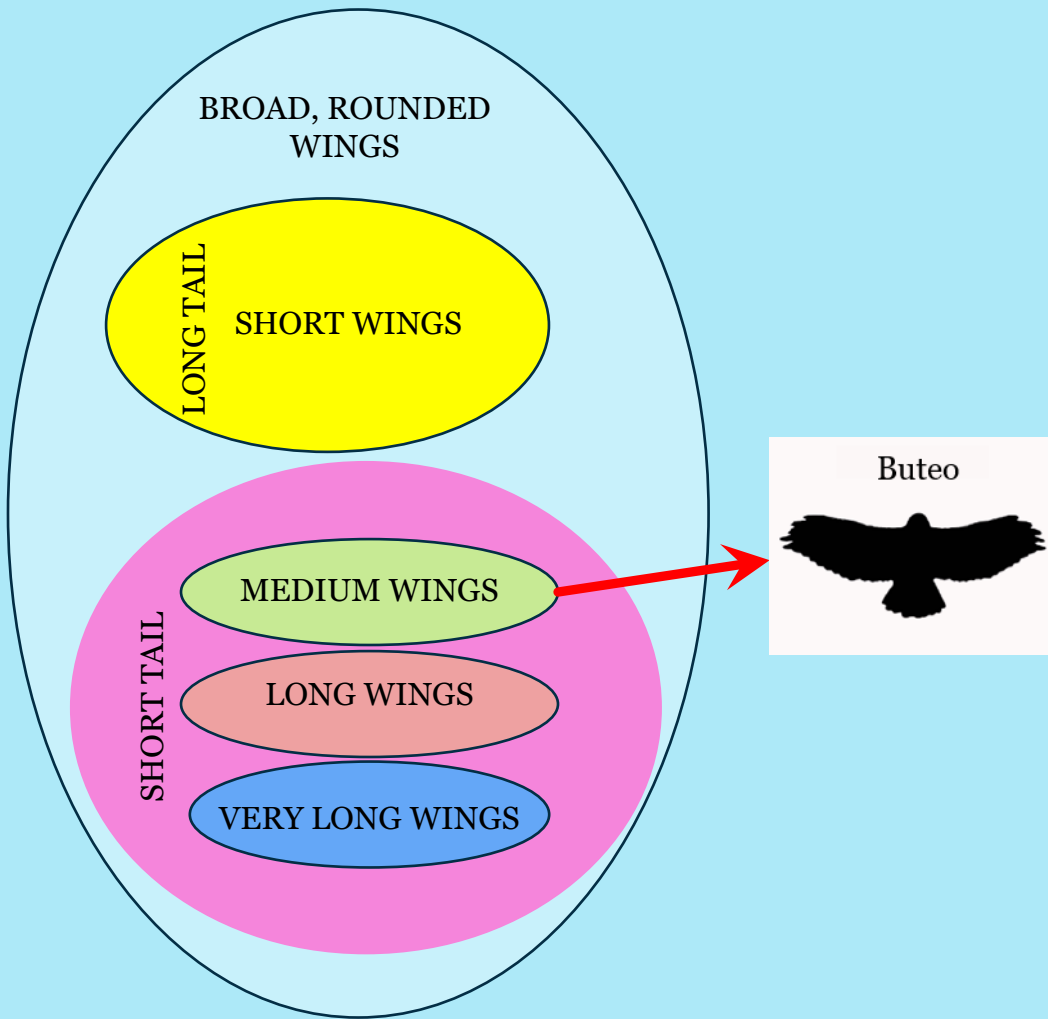


Photo by Mike Cameron

# BLACK VULTURE



# BROAD, ROUNDED WINGS



# RED-TAILED



# RED-SHOULDERED



# SWAINSON'S



# BROAD-WINGED



# BUTEOS



Photo by Scot Olmstead



Photo by Beth Price



Photo by Ryan Winkleman



Photo by Shawn Mason

# BUTEOS

Red-tailed



Photo by Scot Olmstead

Red-shouldered



Photo by Beth Price

Swainson's



Photo by Ryan Winkleman

Broad-winged



Photo by Shawn Mason

# BROAD, ROUNDED WINGS

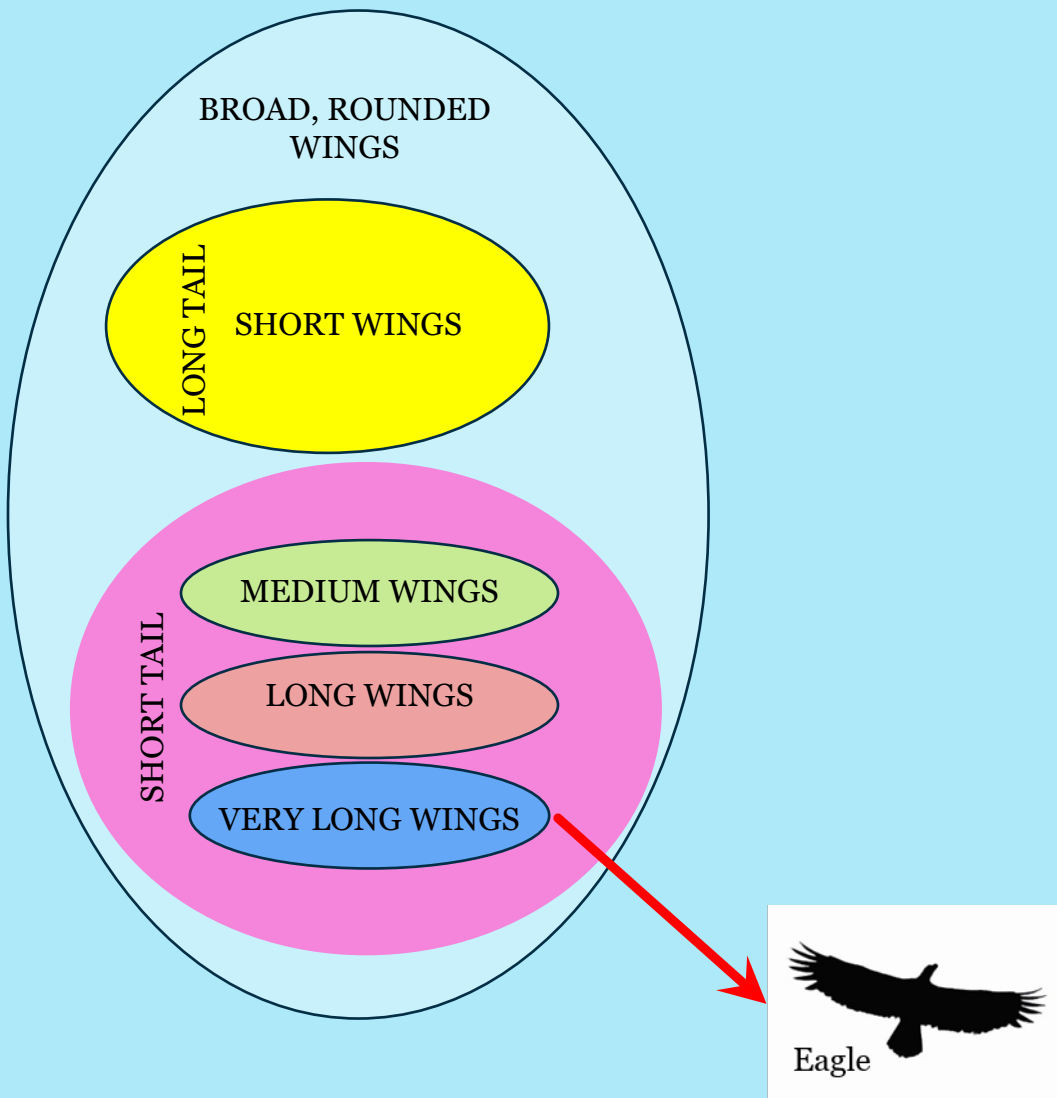




Photo by Scot Olmstead

??????



Photo by Eric Wanderwerf

# EAGLES

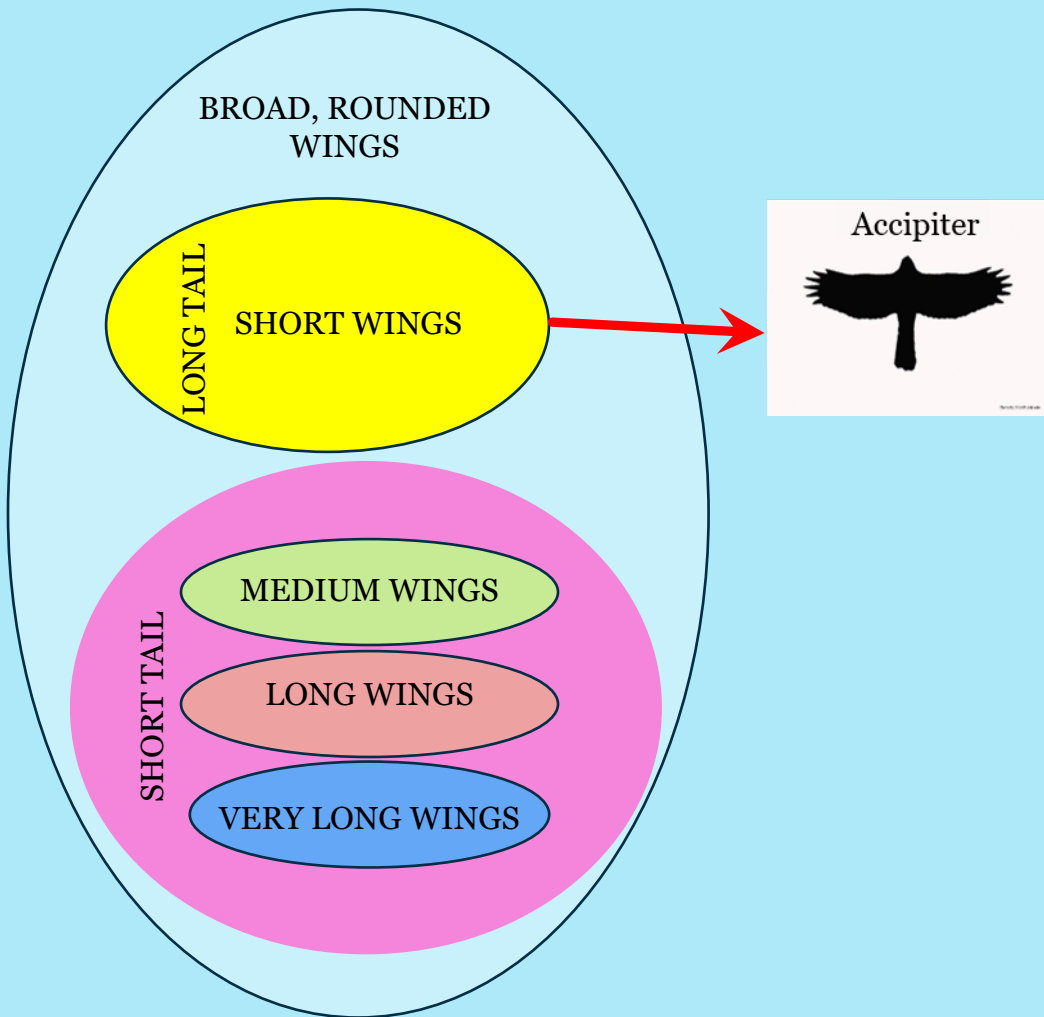


Photo by Eric Wanderwerf



Photo by Kent Leland

# BROAD, ROUNDED WINGS

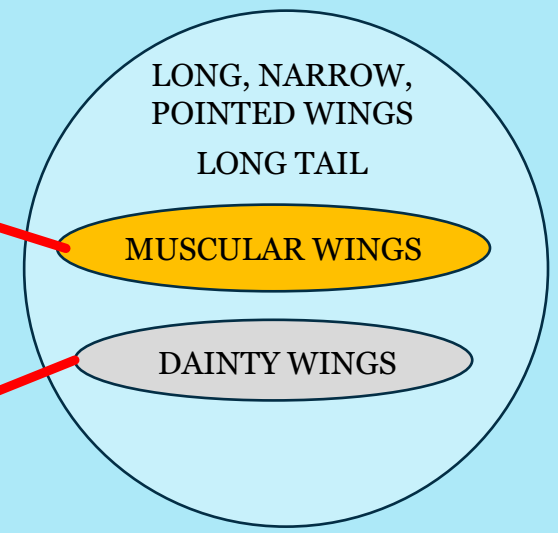
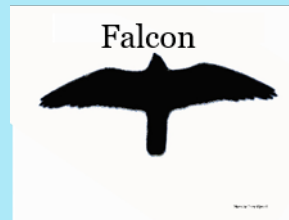


Accipiter

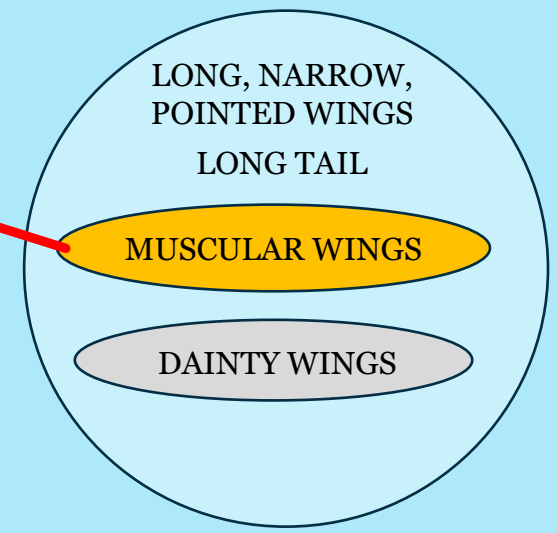


# COOPER'S





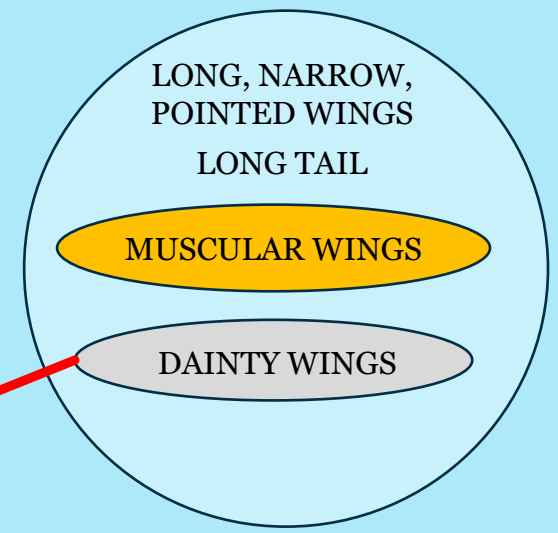
LONG,  
NARROW,  
POINTED  
WINGS  
(WITH LONG TAIL)



LONG,  
NARROW,  
POINTED  
WINGS  
(WITH LONG TAIL)

# PEREGRINE





LONG,  
NARROW,  
POINTED  
WINGS  
(WITH LONG TAIL)

# MISSISSIPPI KITE



# SHAPE CHANGES DURING FLIGHT

????????



??????



???????



?????



# IN FLIGHT SHAPES



?????



??????



???????



??????



??????



# VULTURES

# TV



Photo by Steve Kelling



Photo by Brian Sullivan

BV



Photo by Nick Athanas



Photo by Ann Van Sant

RED-TAIL

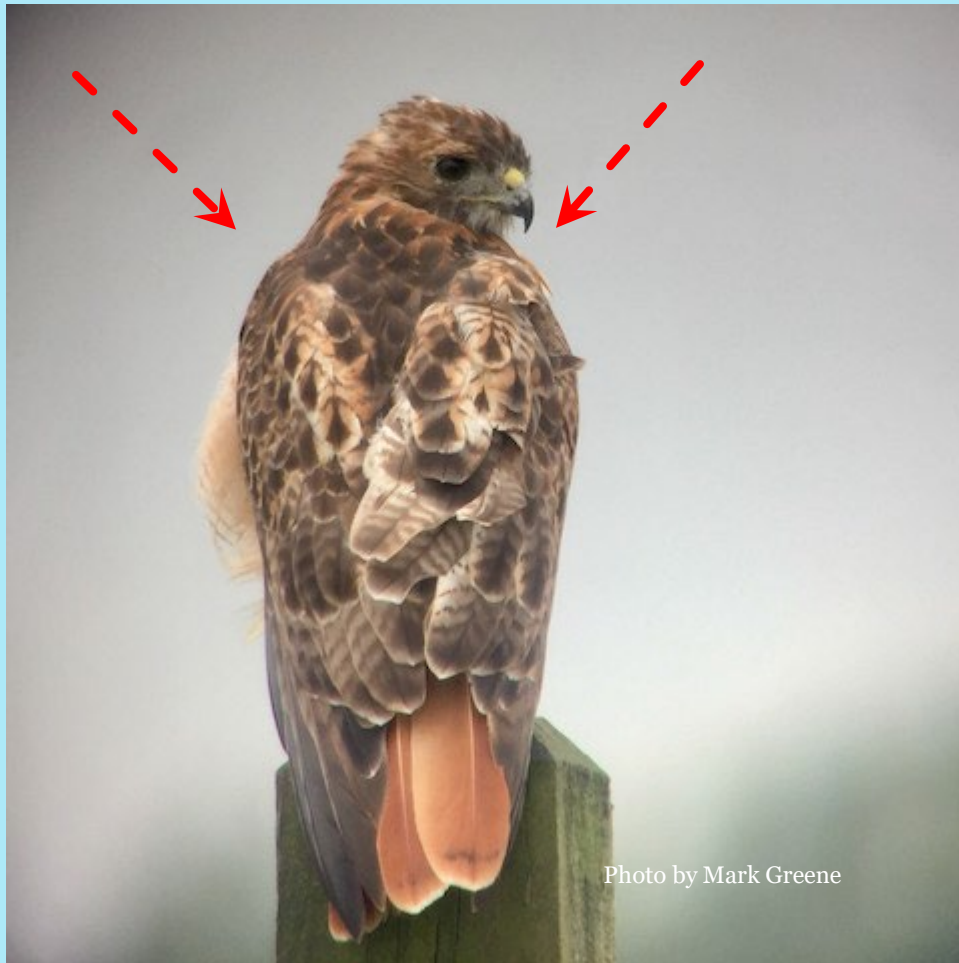
# RED-TAILED



Photo by Jerry Liguori

# Scapular "V"

# RED-TAILED



# RED-TAILED

Belly band



Photo by Chris McCreedy

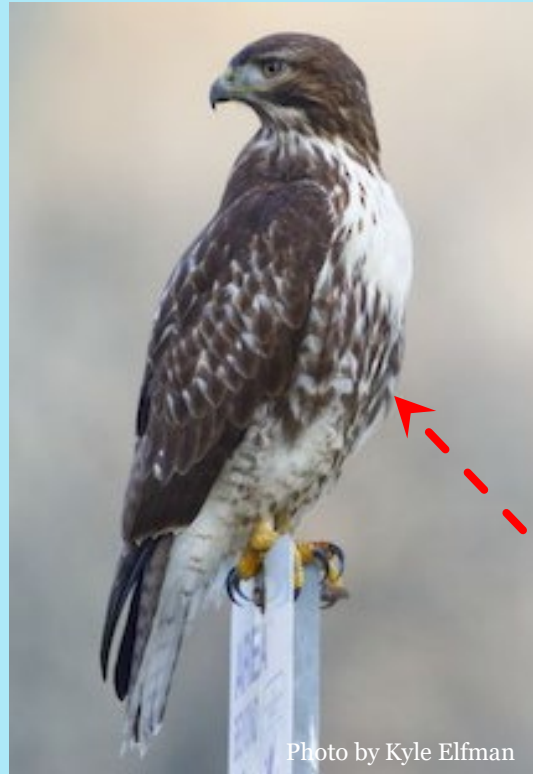


Photo by Kyle Elfman



Photo by Steve Kelling

# RED-TAILED

Patagial bar



Photo by Aaron Boone



Photo by Jerry Liguori



Photo by Steve Kelling

# RED-TAILED STRUCTURE BULGING SECONDARIES

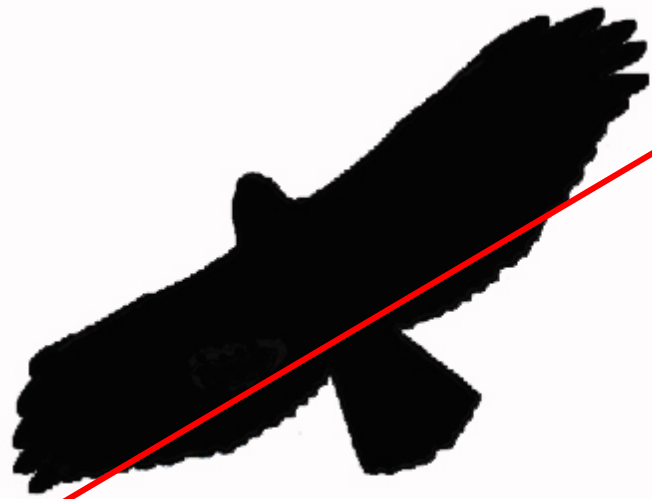


Photo by Jerry Liguori



Photo by Fran Meyerson



Photo by Jerry Liguori

# RED-TAILED STRUCTURE

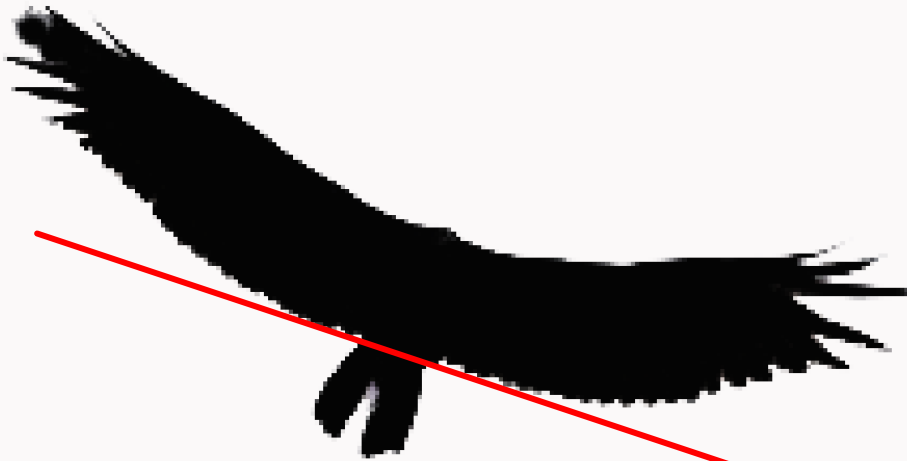


Photo by Steve Kelling

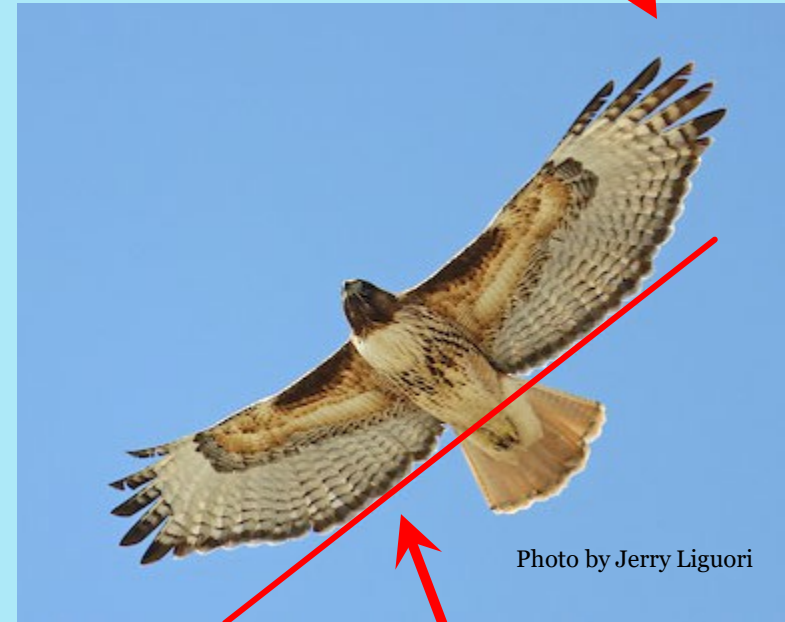


Photo by Jerry Liguori

Bulging  
Secondaries

Rounded  
wingtips with  
"Fingers"

# DO THESE BIRDS HAVE BULGING SECONDARIES ?



Photo by Steven Mlodinow



Photo by Brian Sullivan

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Photo by Steven Kelling



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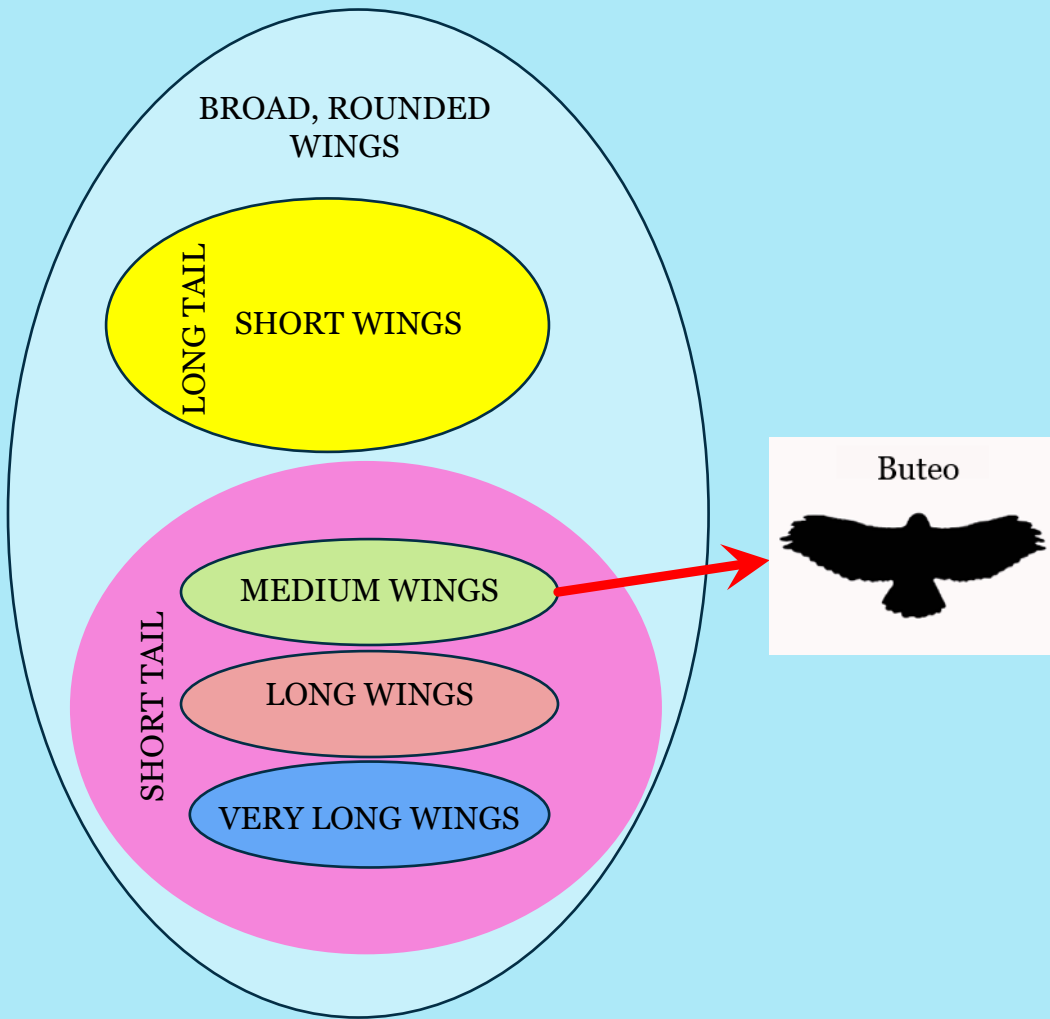


Photo by Robert Hamilton



Photo by Brian Sullivan

# BROAD, ROUNDED WINGS



Buteo



# RED-TAILED



# RED-SHOULDERED



# SWAINSON'S



# BROAD-WINGED



# BUTEOS



Photo by Scot Olmstead



Photo by Beth Price



Photo by Ryan Winkleman



Photo by Shawn Mason

# BUTEOS

Red-tailed



Photo by Scot Olmstead

Red-shouldered



Photo by Beth Price

Swainson's



Photo by Ryan Winkleman

Broad-winged



Photo by Shawn Mason

# BROAD, ROUNDED WINGS

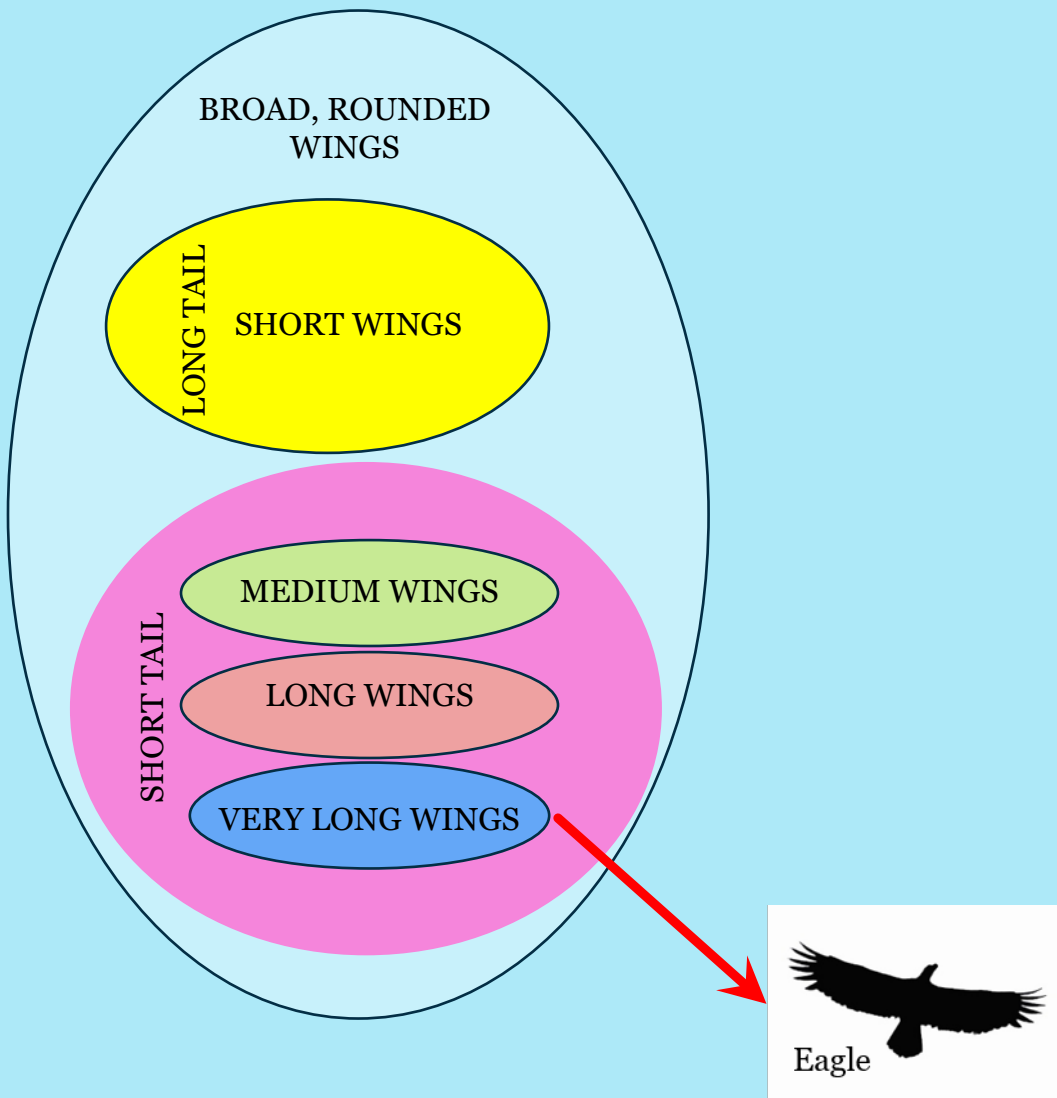




Photo by Scot Olmstead

??????



Photo by Eric Wanderwerf

# EAGLES

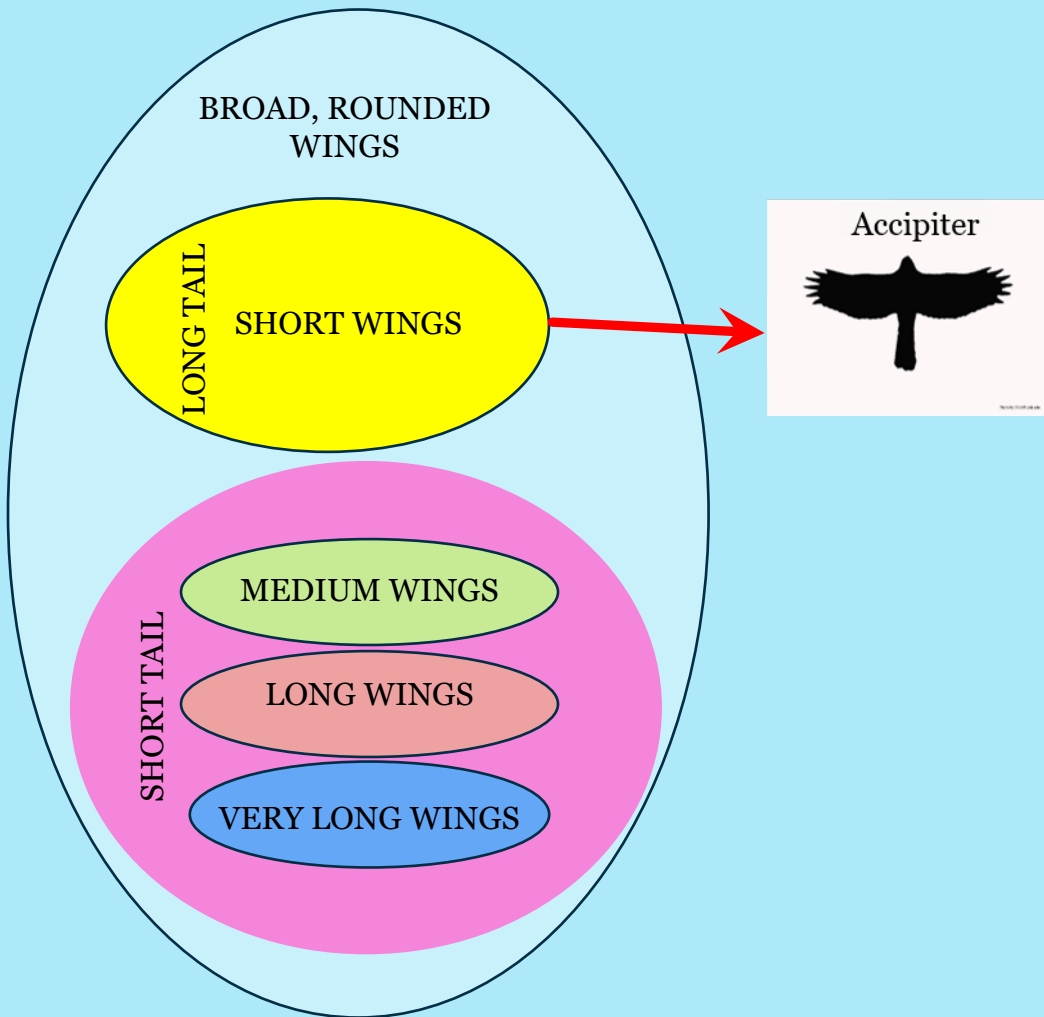


Photo by Eric Wanderwerf



Photo by Kent Leland

# BROAD, ROUNDED WINGS

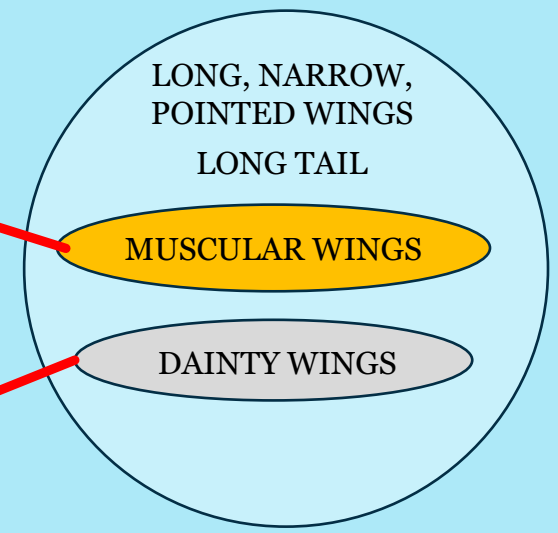
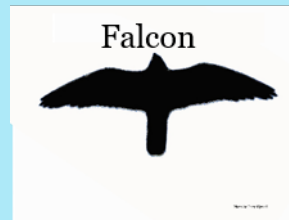


Accipiter

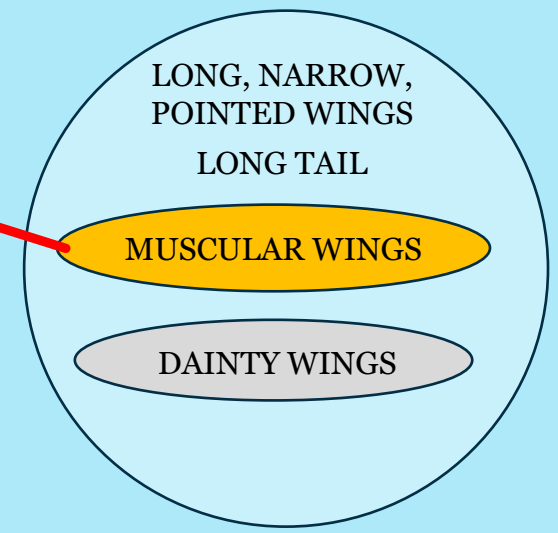
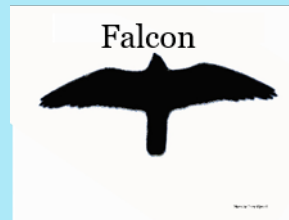


# COOPER'S





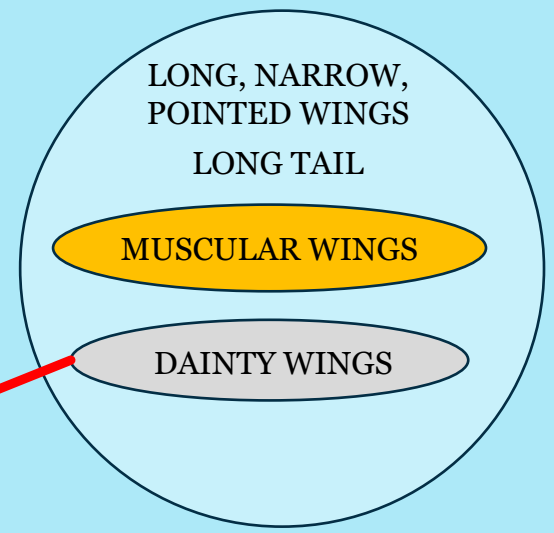
LONG,  
NARROW,  
POINTED  
WINGS  
(WITH LONG TAIL)



LONG,  
NARROW,  
POINTED  
WINGS  
(WITH LONG TAIL)

# PEREGRINE





LONG,  
NARROW,  
POINTED  
WINGS  
(WITH LONG TAIL)

# MISSISSIPPI KITE



RED-TAIL

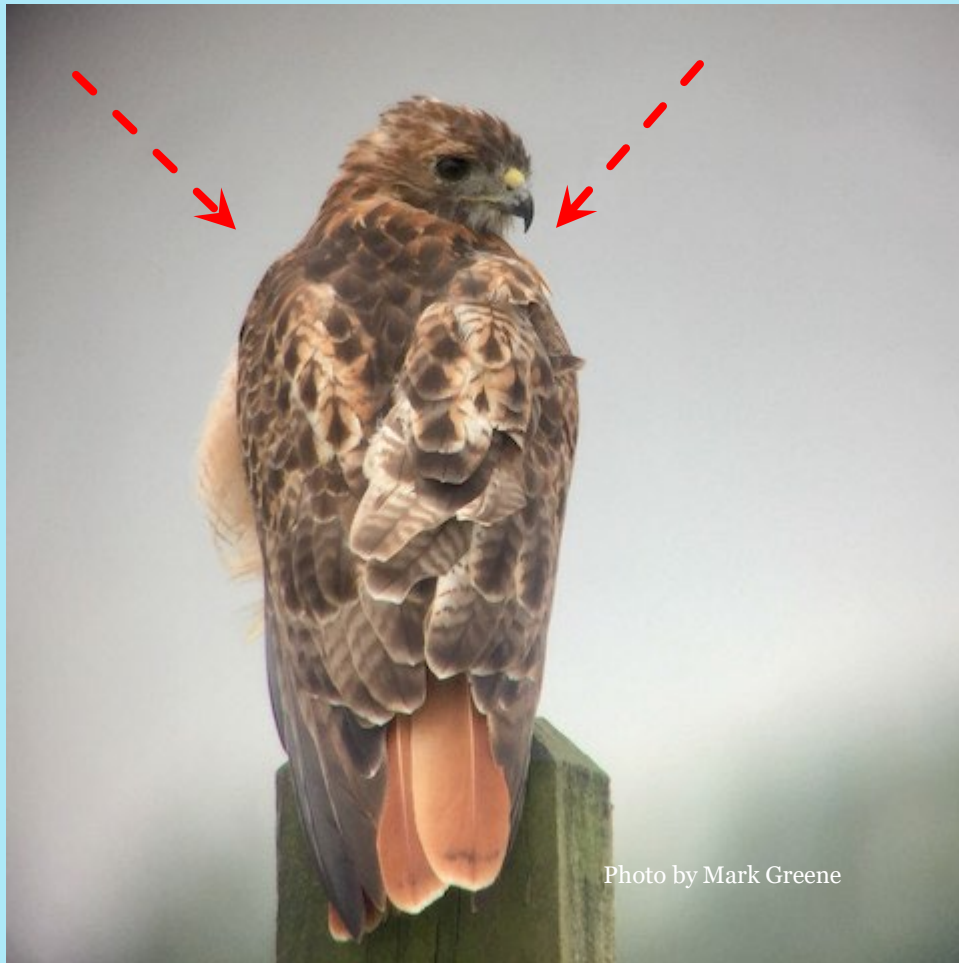
# RED-TAILED



Photo by Jerry Liguori

# Scapular "V"

# RED-TAILED



# RED-TAILED

Belly band



Photo by Chris McCreedy

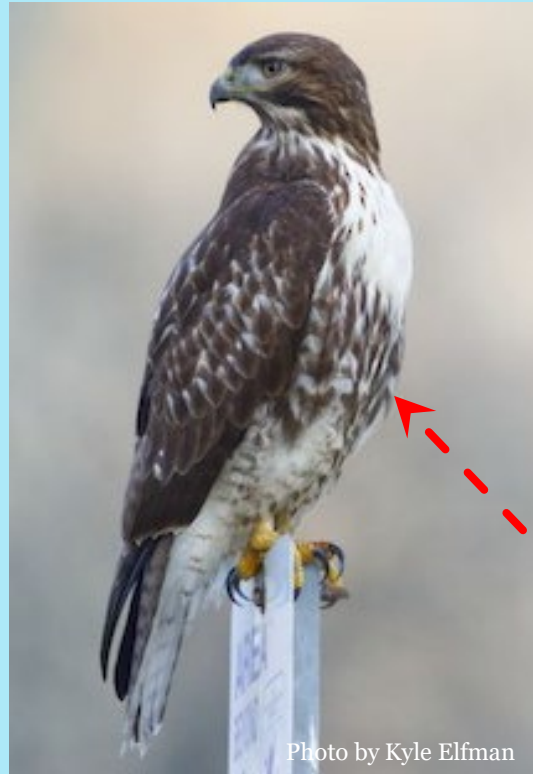


Photo by Kyle Elfman



Photo by Steve Kelling

# RED-TAILED

Patagial bar



Photo by Aaron Boone



Photo by Jerry Liguori



Photo by Steve Kelling

# RED-TAILED STRUCTURE BULGING SECONDARIES

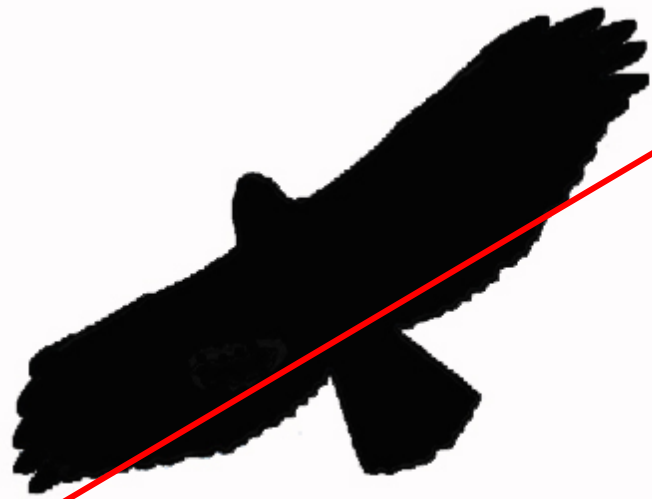


Photo by Jerry Liguori



Photo by Fran Meyerson



Photo by Jerry Liguori

# RED-TAILED STRUCTURE

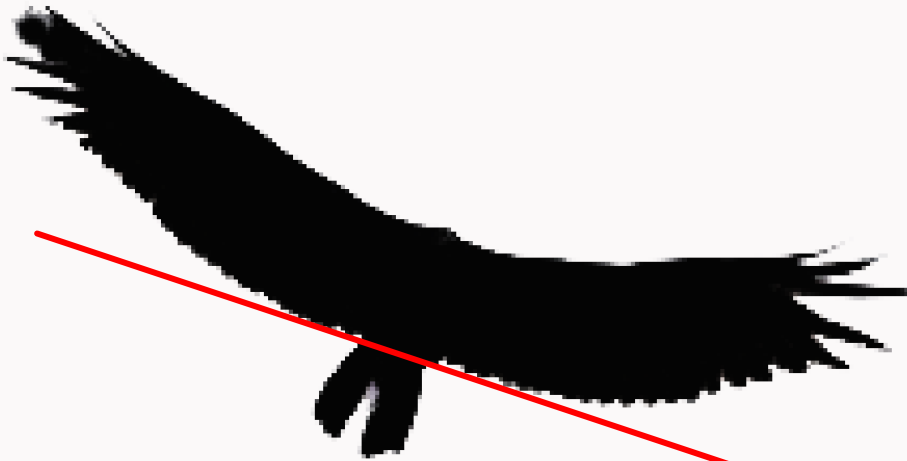


Photo by Steve Kelling

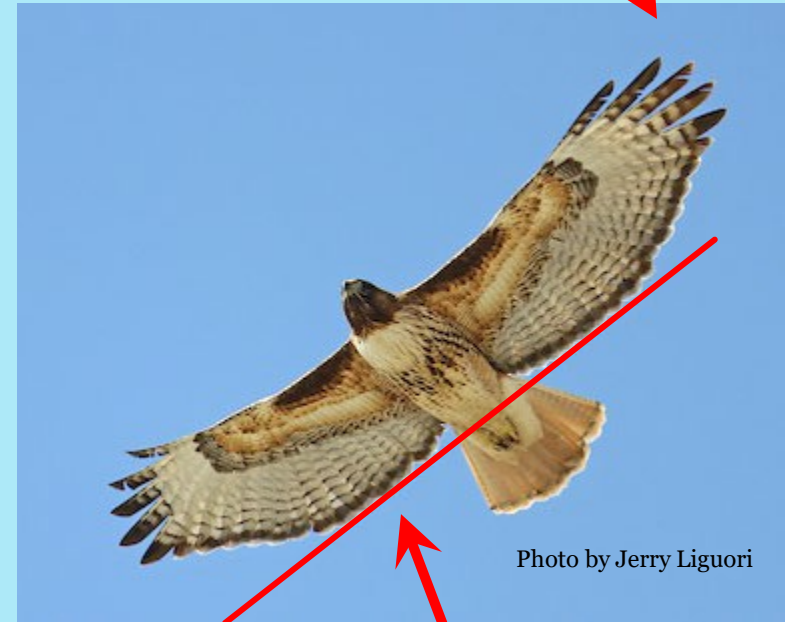


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