

POST-RELEASE MOVEMENTS OF 20 GPS TAGGED RED-TAILED HAWKS CAPTURED AT SEATTLE-TACOMA INTERNATIONAL AIRPORT



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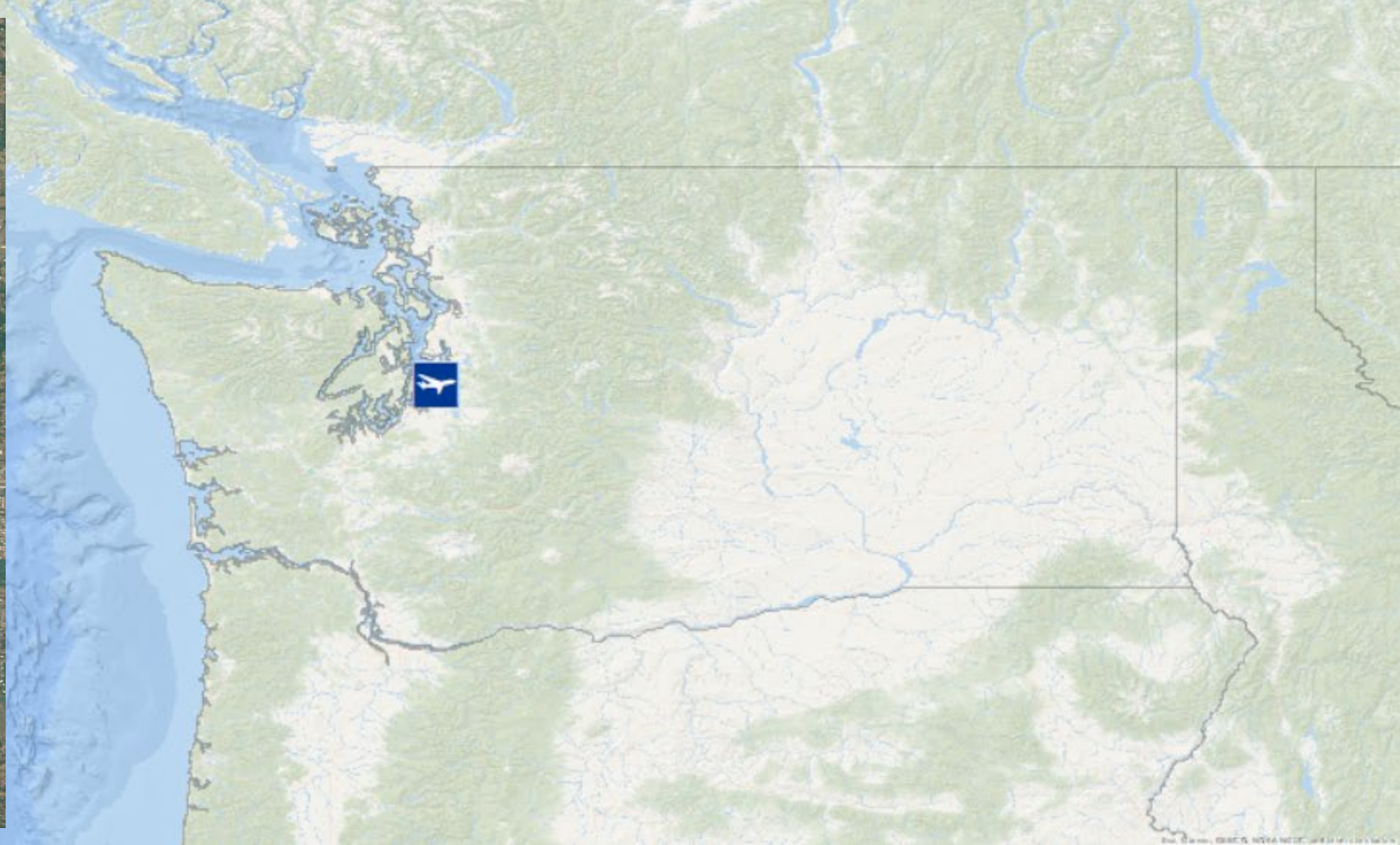
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2024 Aviation Wildlife Management Conference
Minneapolis/St. Paul, MN, August 20-22, 2024

Seattle-Tacoma International Airport (SEA)

Large hub west coast commercial airport owned and operated by the Port of Seattle

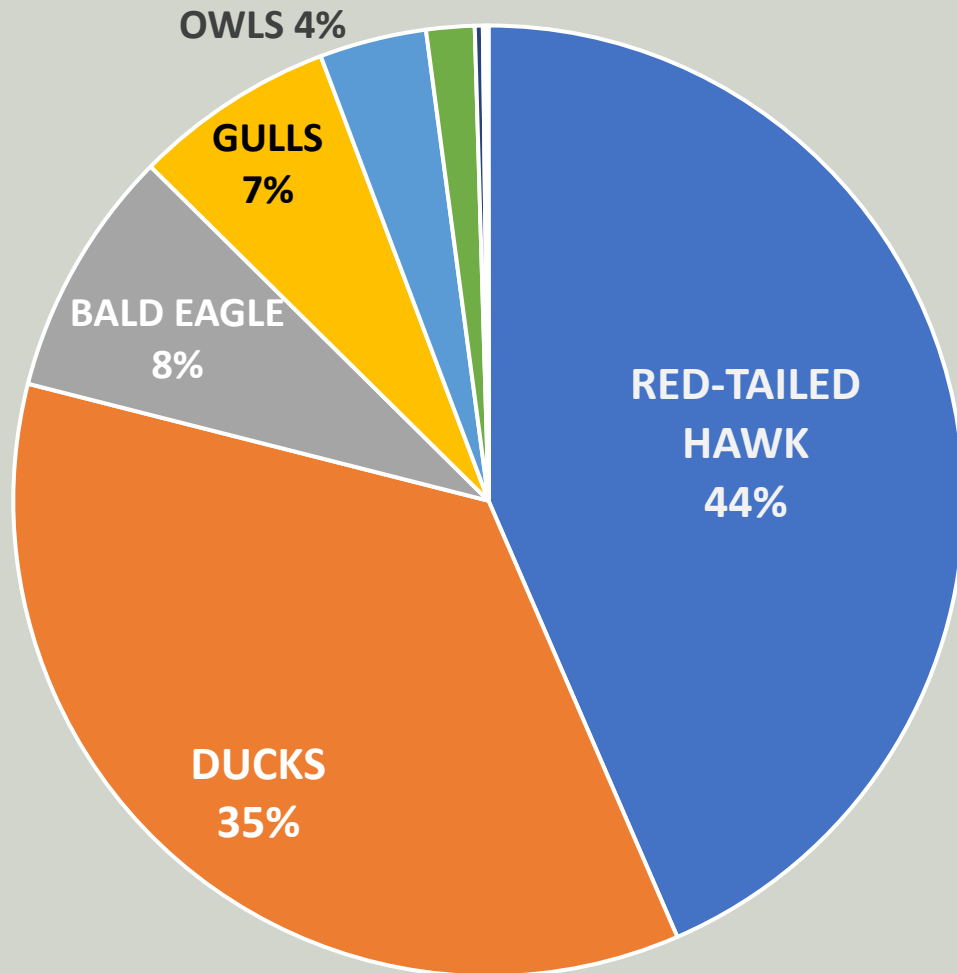


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Raptor Strike Hazard at SEA

2021–2023 Proportion of Risk



- Proportion of risk* calculated from SEA strike data & relative hazard scores
- Hazardous wildlife primarily managed via habitat management and physical controls
- Intensive management of Red-tailed Hawks (RTHA)

*DeVault et. al., 2018



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Raptor Strike Avoidance Program

Reduce raptor strikes using trap-translocation and intensive adaptive management

- Established 2001
- Bellair Airporter added 2005
- 24/7/365 airfield trapping since 2011
- WARRM established 2015
- First GSM-GPS backpacks 2020
- Additional GSM-GPS transmitters 2022 onward



>1,900 raptors translocated 2001–present

Trapping, Marking and Translocating RTHA

Continual and seasonal management techniques



- 24/7/365 passive trapping with Swedish goshawk traps
- Targeted active trapping during periods of high raptor activity
- Hawks marked with USGS leg band, patagial tags or VID leg band
- Translocated 120 km north; known or presumed breeders moved locally
- Released within 24-hours

Resident RTHA Management

Resident hawks have high return rate and territoriality

- Wing-tagged RTHA for tracking
- Targeted trap/mark/release of breeding adults to monitor residents
- 4 to 6 breeding pairs adjacent to airfield
- Annual nest monitoring and nest interventions to translocate or raise young off-site





Why put GSM-GPS Backpacks on RTHA?

- To explore home ranges, movement ecology, and various behaviors of resident adult breeders, non-breeding floaters, and migrants using ESRI ArcMap 10.6
- Ultimately, use data to drive raptor management decisions at SEA

GSM = Global System for Mobile Communications
GPS = Global Positioning System



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GPS-GSM Backpack Candidates

1. Adult known and presumed resident breeders
2. Harlan's Hawks (*B.j. harlani*) = winter residents?
3. Selection criteria:

behavioral observations
seasonality
territoriality/breeding/other
body condition
weight (896-1461g)/molt



GPS/GSM Solar-Powered Transmitters

(17) OrniTrack-25, (3) Ecotone

- Transmitters monitored and reprogrammed as needed to conserve solar-powered batteries
- GPS fixes varied from 15-min (summer) and 2-hrs (winter)
- GSM data messaging 2–5 days
- Individual device settings and data export accessed via online control panel

The screenshot displays the OrniTrack Control Panel interface. At the top, there is a logo for GLOBSENDAS and Ornitela, along with the title "OrniTrack Control Panel". Navigation buttons for "Financial", "Settings", and "Logout" are visible, along with a "Welcome, seatac" message. Below the navigation is a search bar and a "Show 10 devices per page" dropdown. The main content is a table listing 11 devices with columns for Name, S/N, battery level, Status, Last GPRS data, Next GPRS data, and Device notes. The table shows various OrniTrack-25 4GT and OrniTrack-25 4G devices with their respective serial numbers and last/next data reception times. Below the table, there are "Previous", "1", "2", and "Next" navigation buttons. A detailed view of a device (Name: OT-E25 4GT, S/N: 240387) is shown below the table, including its model (OT-E25-4GACT-C48) and firmware (2004231010). This view includes a "Track length" dropdown set to 15000 points, a "Satellite" dropdown, and a map showing the device's location near Victoria, British Columbia. The map also shows nearby locations like Bellingham, Anacortes, Mt. Vernon, Arlington, Port Angeles, Marysville, Whidbey Island, Edmonds, and Mt. Baker-Snoqualmie National Forest. The detailed view also shows "Last data received by GPRS: 2024-08-04 16:48:30 (UTC-7)", "Next data session expected: 2024-08-05 16:48:30 (UTC-7)", "Battery status: 100% (4174mV)", "Settings pending for transmission to device: 0", and "Data bytes in memory before last data session: 1152 bytes". Below the map, there are "Download data (UTC yyyy-mm-dd hh:mm)" fields for "From" (2024-07-29 00:00) and "to" (2024-08-05 22:18). At the bottom, there are checkboxes for "GF" and "GPRS+ALT", and dropdowns for "GPS+SENSORS". There are also icons for "KML", "KMZ", "CSV", and "SMS" data export options.

<input type="checkbox"/>	Name	S/N	Battery	Status	Last GPRS data	Next GPRS data	Device notes
<input type="checkbox"/>	OT-E25 4GT	240382	100		2024-03-14 13:14:08	2024-08-06 14:14:08	
<input type="checkbox"/>	OT-E25 4GT	240383	100	*	2024-07-02 16:54:03	2024-08-05 16:54:03	
<input type="checkbox"/>	OT-E25 4GT	240384	100		2024-08-05 09:50:39	2024-08-06 09:50:39	
<input type="checkbox"/>	OT-E25 4GT	240385	100	*	2024-05-23 10:59:51	2024-08-06 10:59:51	
<input type="checkbox"/>	OT-E25 4GT	240386	100		2024-07-26 17:15:50	2024-08-07 17:15:50	
<input type="checkbox"/>	OT-E25 4GT	240387	100		2024-08-04 16:48:30	2024-08-05 16:48:30	
<input type="checkbox"/>	OT-E50 4G	240403	100		2024-05-15 17:03:20	2024-08-05 17:03:20	
<input type="checkbox"/>	OT-E50 4G	240404	100		2024-05-15 17:03:12	2024-08-05 17:03:12	
<input type="checkbox"/>	OT-E50 4G	240405	100		2024-05-15 09:02:50	2024-08-05 17:02:50	
<input type="checkbox"/>	OT-E50 4G	240406	100		2024-05-15 17:02:49	2024-08-05 17:02:49	

Initial Result Summary

20 Red-tailed Hawks released with GSM-GPS backpacks between May 2020 and May 2024

- 20 Red-tailed Hawks
 - 18 *Buteo jamaicensis calurus*
 - 2 *B.j. harlani*
- ~178,000 GPS fixes during 6,340 post-release tracking days
- 10 of 20 presumed dead, 2 silent 30+ days
- Post-release survivorship 45 to 615 days
- Groups divided into 3 cohorts
 - 6 breeding residents at airport
 - 6 regional floaters that wandered western Washington
 - 8 migrants — most summered throughout British Columbia



Fates of Backpacked RTHA 2020–2024

ID	First Location	Last Location	Days Deployed	# of Records	Cohort	Recapture?	Age	Sex	Status	Mortality Cause	
V-K6	4/20/2024	7/2/2024	73	4197	Floater	Yes	ATY	F	Alive	.	
V-E0	4/12/2024	7/27/2024	106	7141	Floater	No	ASY	M	Alive	.	
Y-K42	11/11/2023	7/27/2024	259	5794	Resident	Yes	TY	M	Alive	.	
Y-K9	3/25/2023	7/27/2024	490	23266	Floater	No	TY	M	Alive	.	
Y-K7	1/25/2023	7/27/2024	549	20802	Floater	No	TY	F	Alive	.	
Y-K6	1/23/2023	7/24/2024	548	22736	Floater	No	ATY	M	Alive	.	
Y-K1	11/20/2022	7/27/2024	615	13263	Migrant	Yes	SY	M	Alive	.	
Y-K0	11/18/2022	6/18/2024	578	11395	Floater	No	TY	M	Alive	.	
Y-L1	11/1/2023	2/17/2024	108	699	Resident	No	ATY	F	Deceased	Strike	
Y-K8	10/22/2023	7/27/2024	279	8806	Resident	Yes	ATY	F	Deceased	Strike	
H-1	4/12/2023	3/25/2024	348	13229	Migrant	No	TY	M	Deceased	Unknown	
B-R3	2/11/2023	12/31/2023	323	10216	Migrant	Yes	TY	F	Deceased	Unkown	
B-X7	1/24/2023	12/27/2023	337	13477	Migrant	Yes	SY	M	Deceased	Unknown	
Y-K5	1/4/2023	3/4/2023	59	557	Resident	No	ATY	F	Deceased	GHOW	
Y-K41	12/29/2022	2/4/2023	37	259	Resident	No	TY	F	Deceased	GHOW	
Y-36	5/20/2020	6/20/2021	396	3406	Resident	Yes	ASY	M	Deceased	Strike	
Y-B3	5/18/2020	10/31/2021	531	1423	Migrant	No	ASY	M	Deceased	Unknown	
Y-B4	5/18/2020	2/19/2021	277	2199	Migrant	No	TY	F	Deceased	Strike	
V-R6	4/27/2024	5/23/2024	26	1217	Migrant	No	SY	F	Unknown	.	
H-2	11/3/2022	12/12/2023	404	14366	Migrant	No	SY	M	Unknown	.	
			6,343 as of 7/27/24	178,448 as of 7/27/24						8 Alive, 2 Unknown, 10 Deceased	



RTHA Groupings

RTHA divided into 3 cohorts based on behavioral observations

Group 1: “Adult Resident Breeders”
n=6

Defend and occupy distinct breeding territory and initiate nesting at SEA

Group 2: “Floaters”
n=6

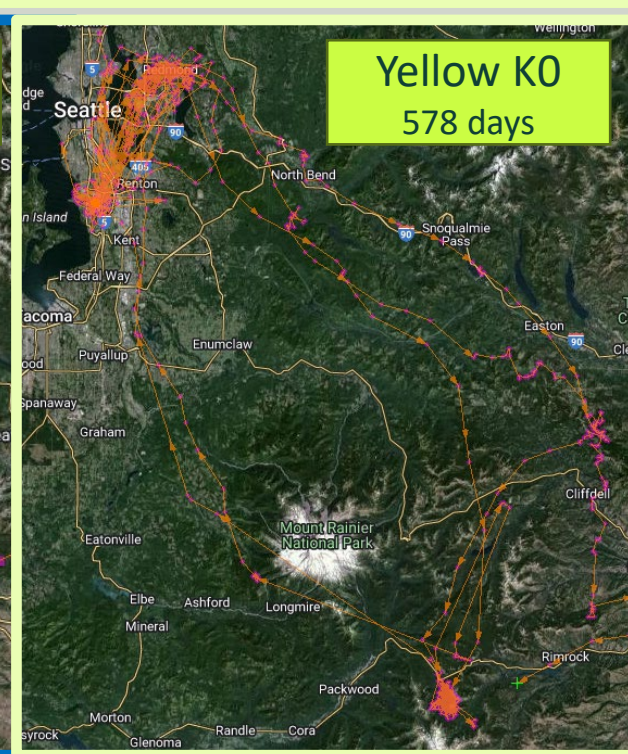
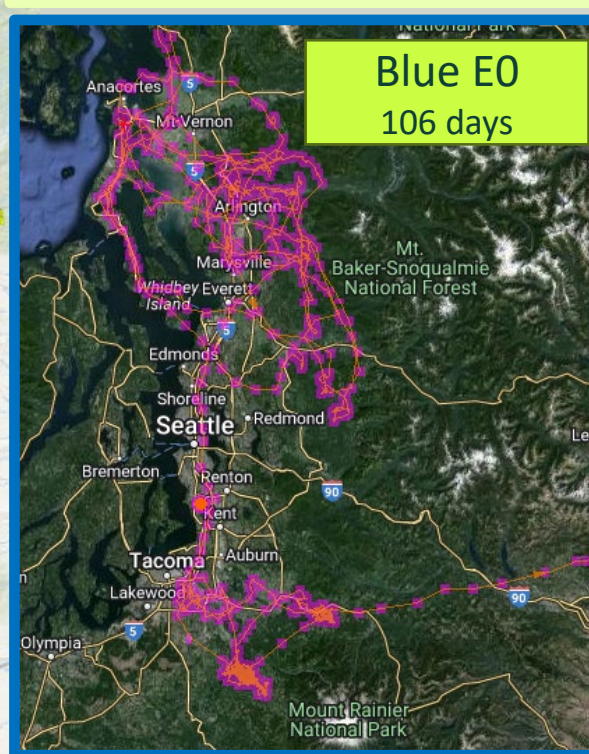
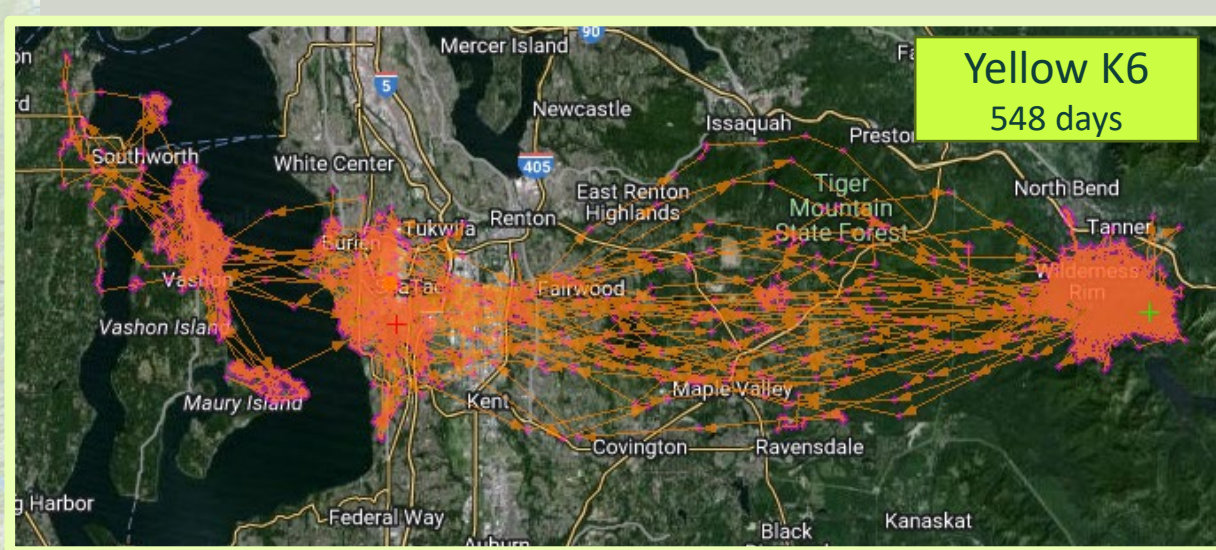
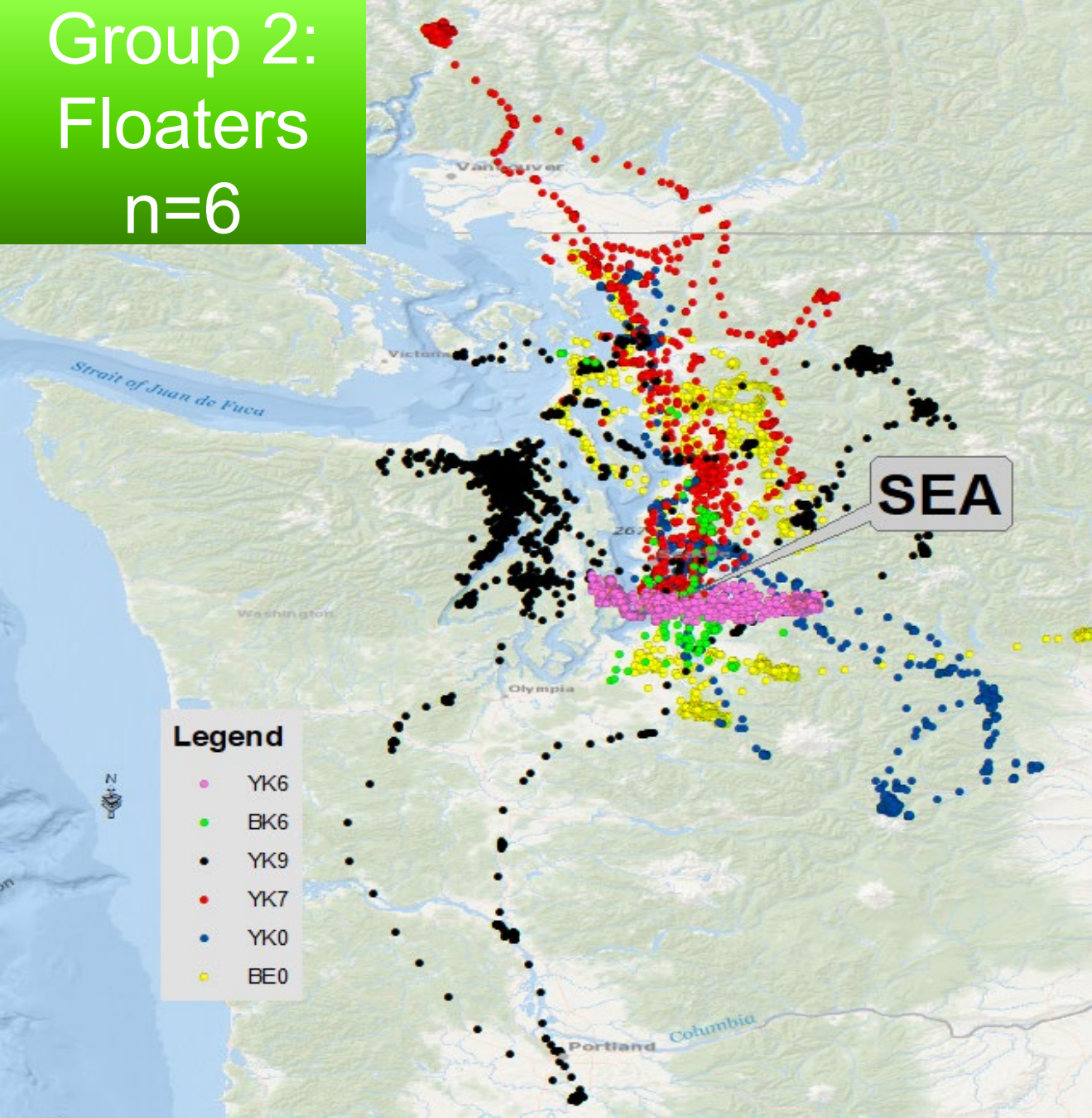
Individuals may occupy fringes of existing territories or wander Western Washington. Do not breed at SEA.

Group 3: “Migrants”
n=8

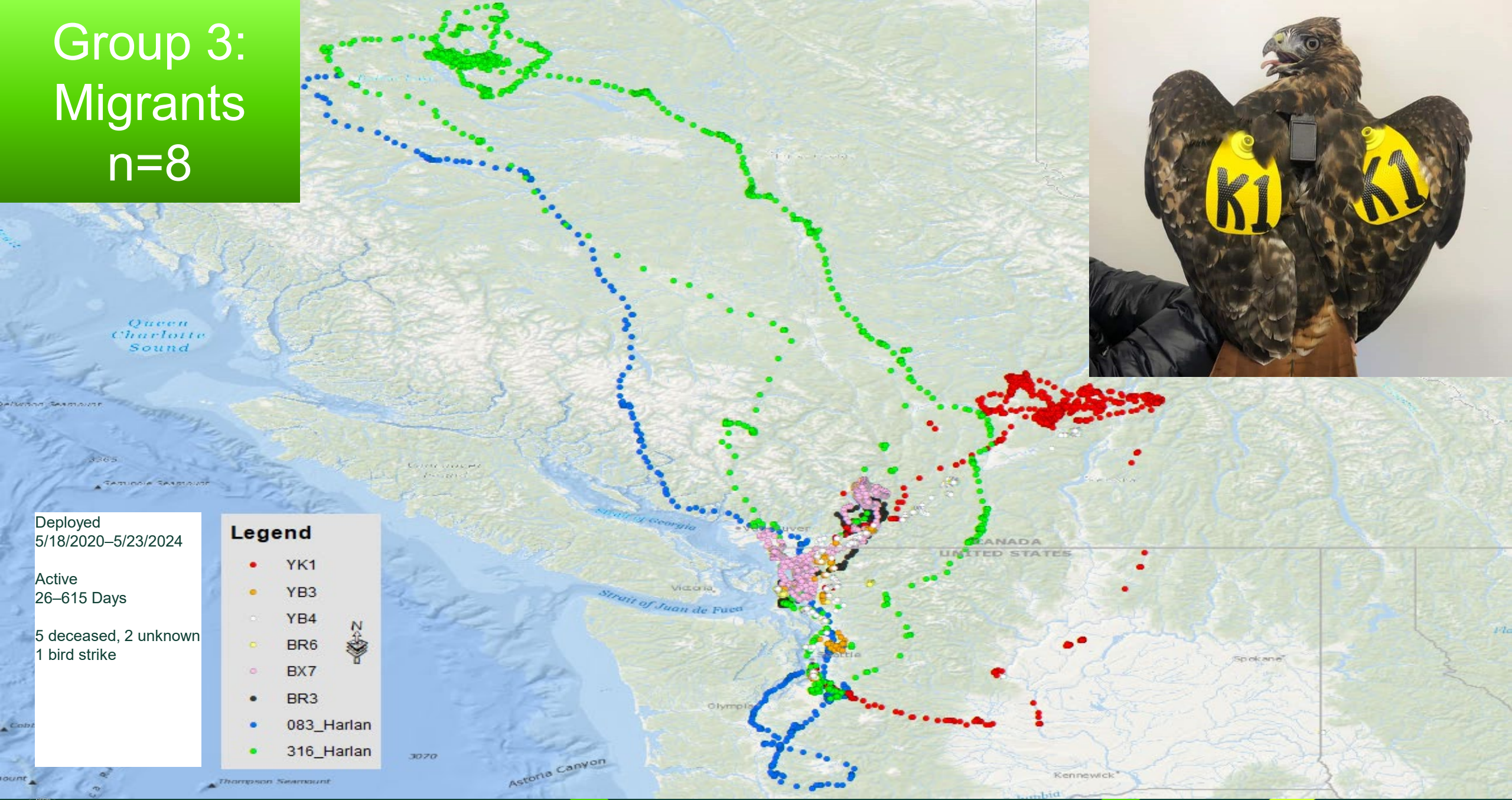
Individuals attempted or completed north and south migration routes. Do not breed at SEA.



Group 2: Floaters n=6



Group 3: Migrants n=8



Deployed
5/18/2020–5/23/2024

Active
26–615 Days

5 deceased, 2 unknown
1 bird strike

Legend

- YK1
- YB3
- YB4
- BR6
- BX7
- BR3
- 083_Harlan
- 316_Harlan



Adult Resident Breeders

Chartreuse = Y-K5 (59 days, owl)
Magenta = Y-K41 (37 days, owl)
Yellow = Y-K42 (259 days, alive)
Pink = Y-K8 (279 days, struck)

Light Blue = Y-L1 (108 days, strike)
Grey = Y-36 (396 days, strike)

Red = Y-K0 "Floater" (578 days, alive)
Present winter '23 and partial winter '24





Yellow L1 & Yellow 36

Yellow K5

Yellow K4 & Yellow K8

Yellow K0

Y-L1: 11/1/23-2/17/24 108 DAYS, STRIKE
 Y-36: 5/20/20-6/20/21 396 DAYS, STRIKE

Y-K5: 1/4/23-3/4/23 59 DAYS, OWL
 Y-K41: 12/29/22-2/4/24 37 DAYS, OWL

Y-K42: 11/11/23-7/27/24 259 DAYS, ALIVE
 Y-K8: 10/22/23-8/5/24 279 DAYS, STRIKE

Y-K0: 11/18/22-6/18/24 579 DAYS, ALIVE

Future Raptor Research and Management

Continue to collect data and monitor RTHA and other hazardous raptor populations

- Transmitters have ability to collect more data than standardized surveys and casual observations combined
- Birds do not need to be seen to know if they visit or use the airfield; patagial markers may become unnecessary
- Points delineate and confirm territory boundaries and nest positions; confirm resident status, longevity
- Different transmitters may be applied to different raptors for monitoring
- Data may be used to answer questions and adapt management
- Data may be reviewed with airport operations (flow, # operations, etc.) and strike data to analyze risk



Contact Information

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FALCON

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*Falcon North America, Inc., 186 US Oval,
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Raptor Strike Avoidance Program

Established 2001 to reduce aircraft strikes with raptors



24/7 passive trapping

Increased trap effort and experimentation

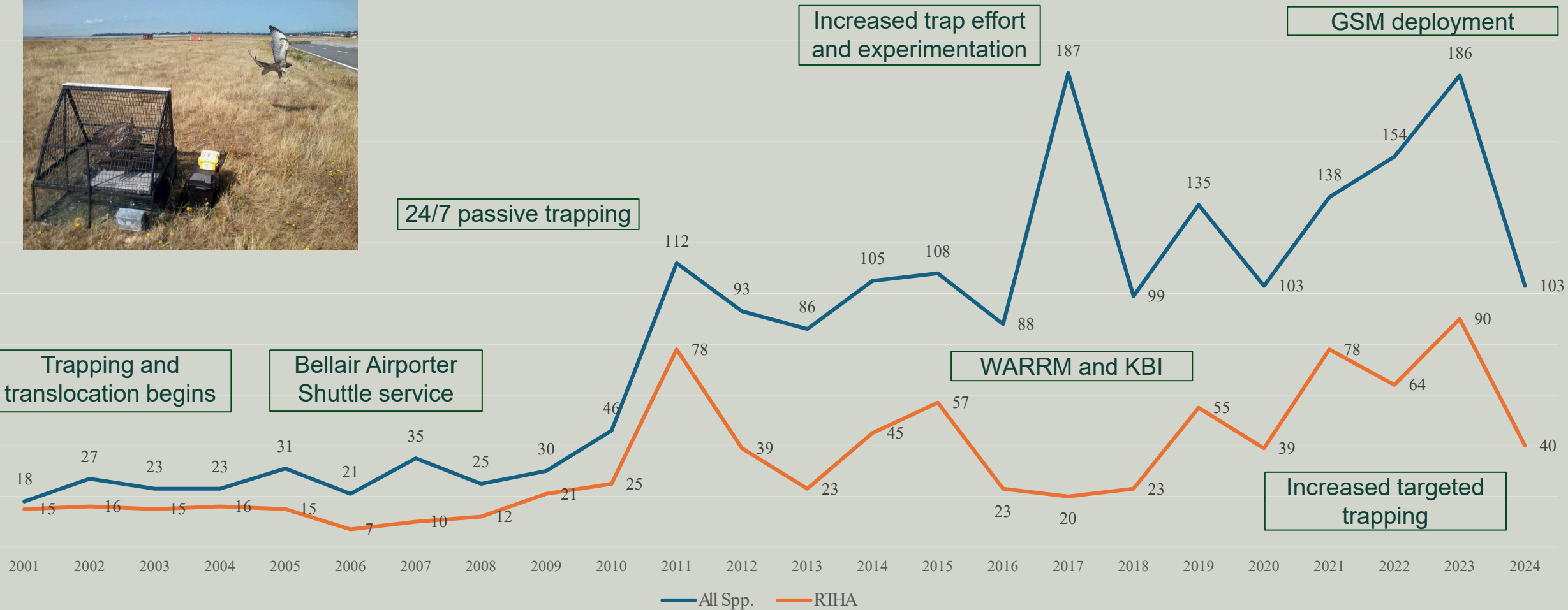
GSM deployment

Trapping and translocation begins

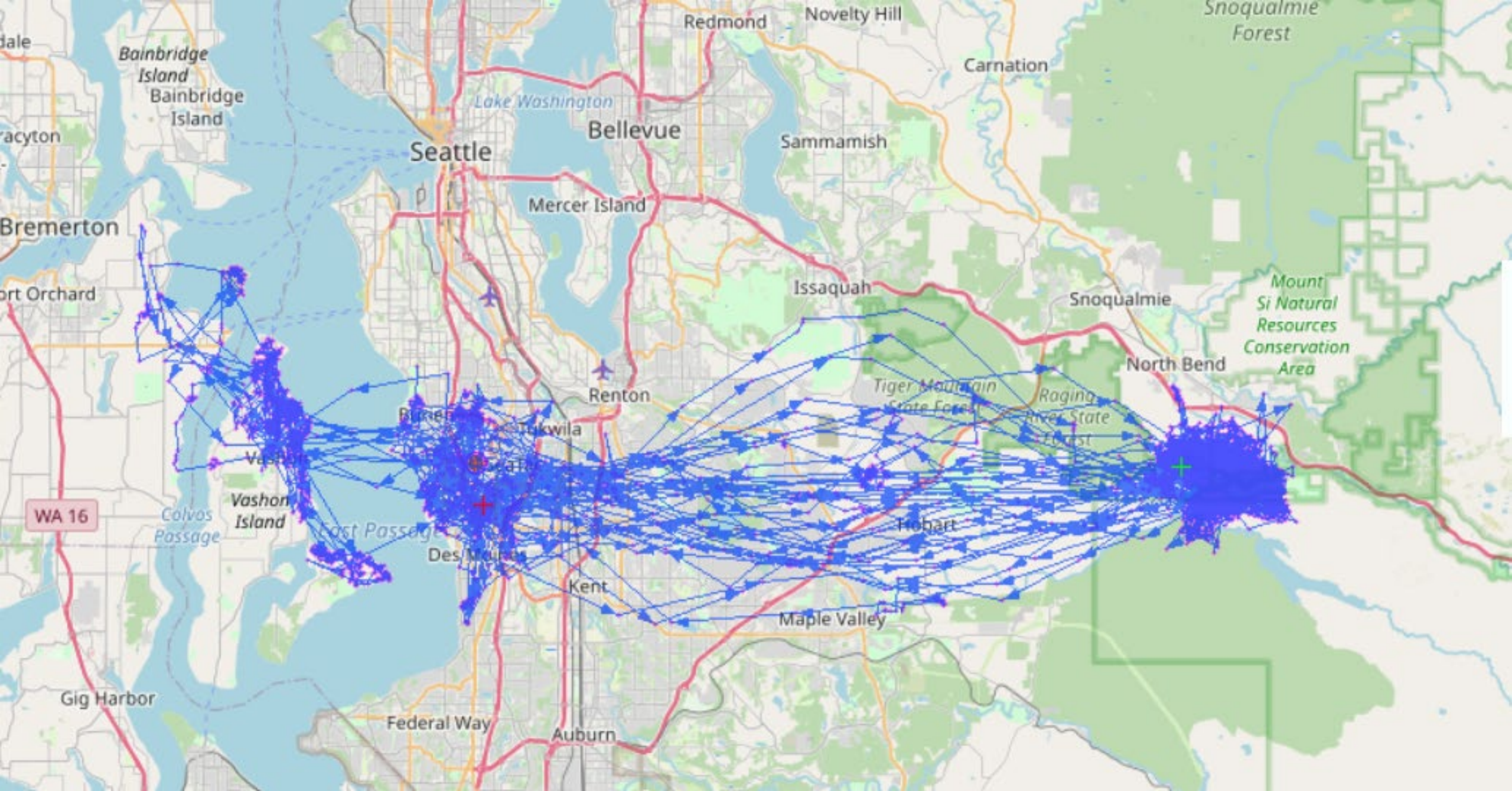
Bellair Airporter Shuttle service

WARRM and KBI

Increased targeted trapping







224083 - Harlans
Nov 2022 - Dec 2023
404 Days
14,366 Locations

*After Nov 3, 2022 capture at SEA,
bird flew south around Mt St Helens (~20days)*

Settled in at Emerald downs until April 10, 2023

Migrates to Central BC by April 16

Nests, then starts migration south Sept. 21

Back at Emerald Downs Oct 26

Flys North to Snohomish, dies Dec 12

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Mortality Location





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