Dunlin subspecies exhibit regional segregation along the East Asian-Australasian Flyway

Benjamin J. Lagassé et al.

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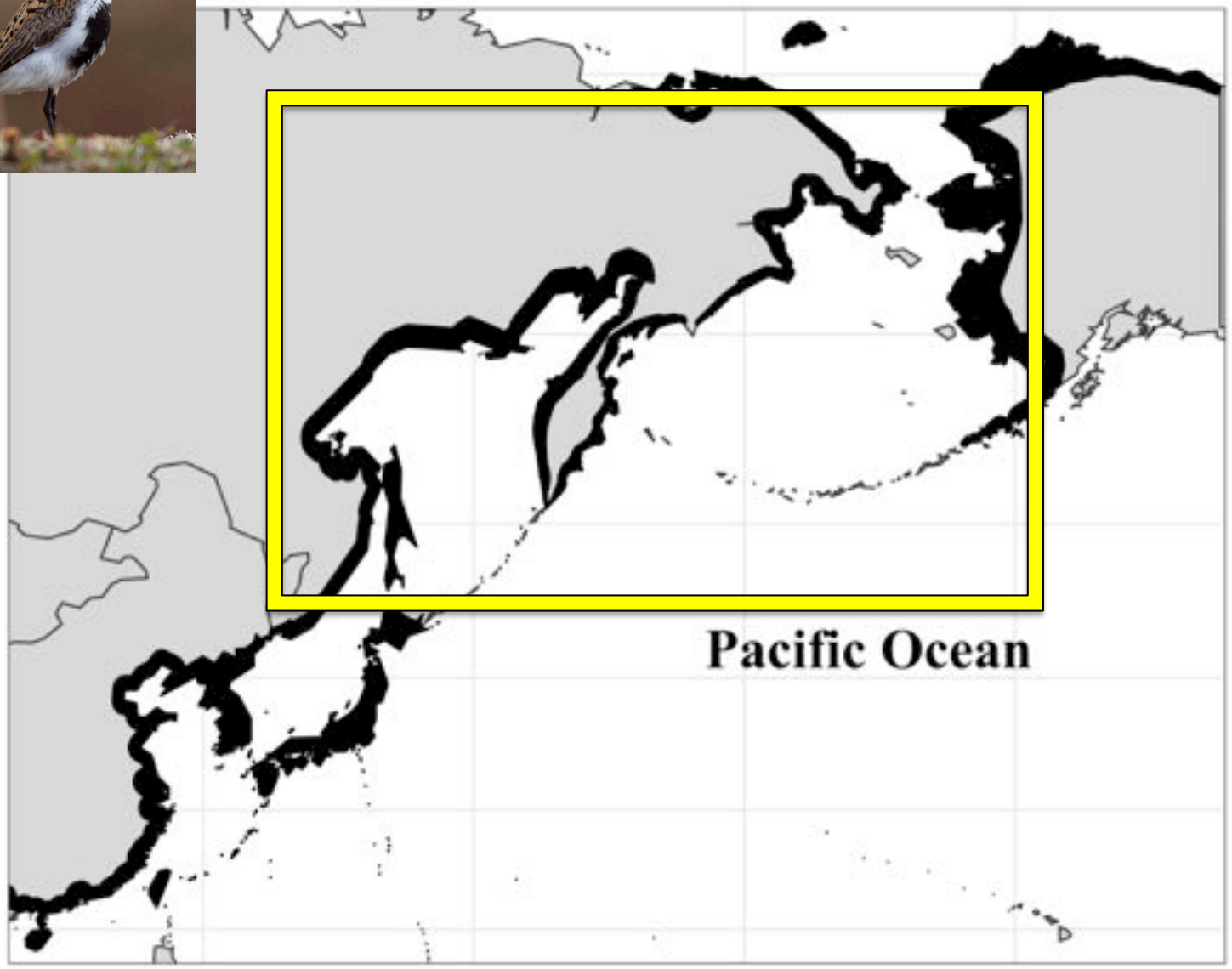
Subspecific breeding ranges

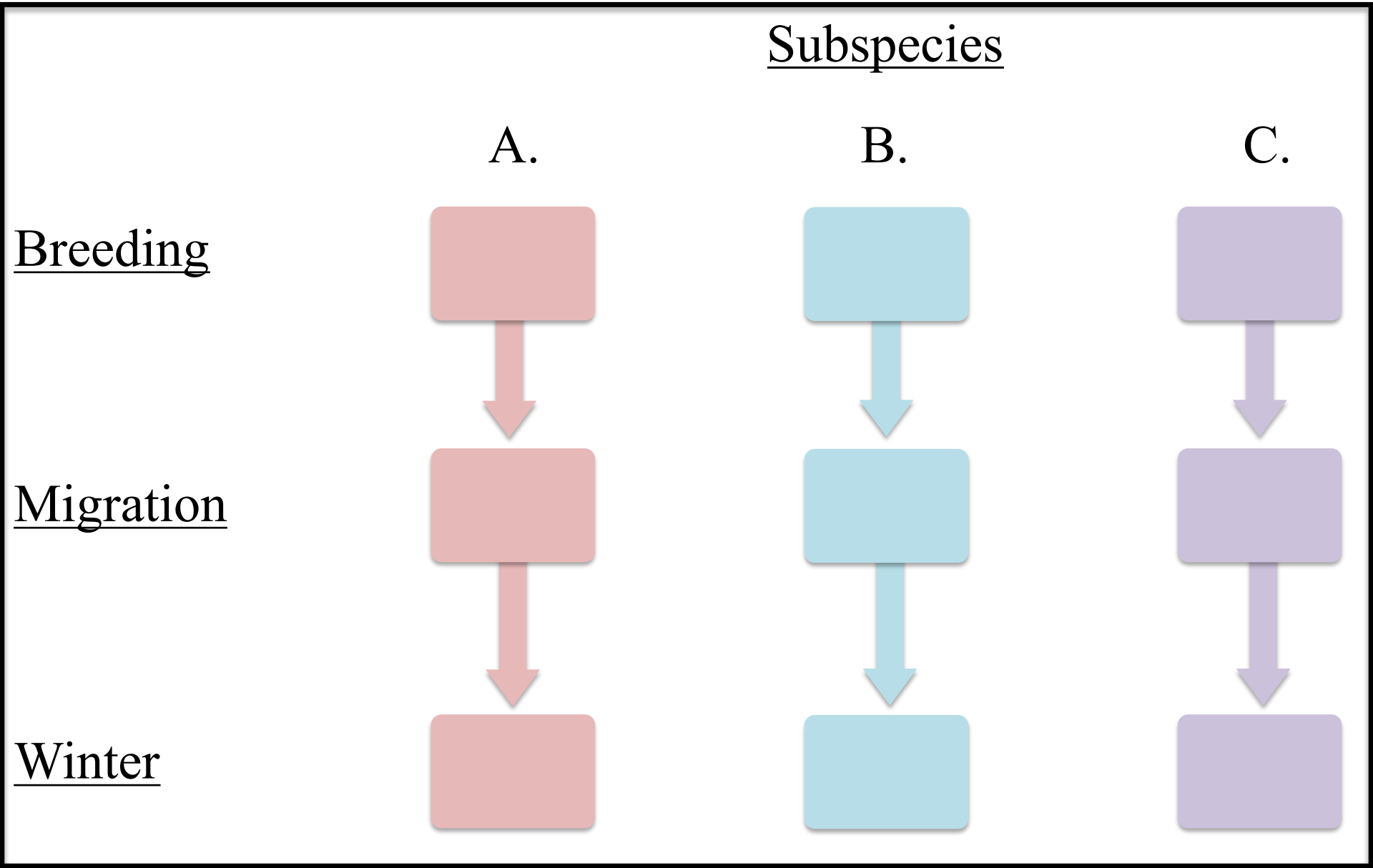
Migration range



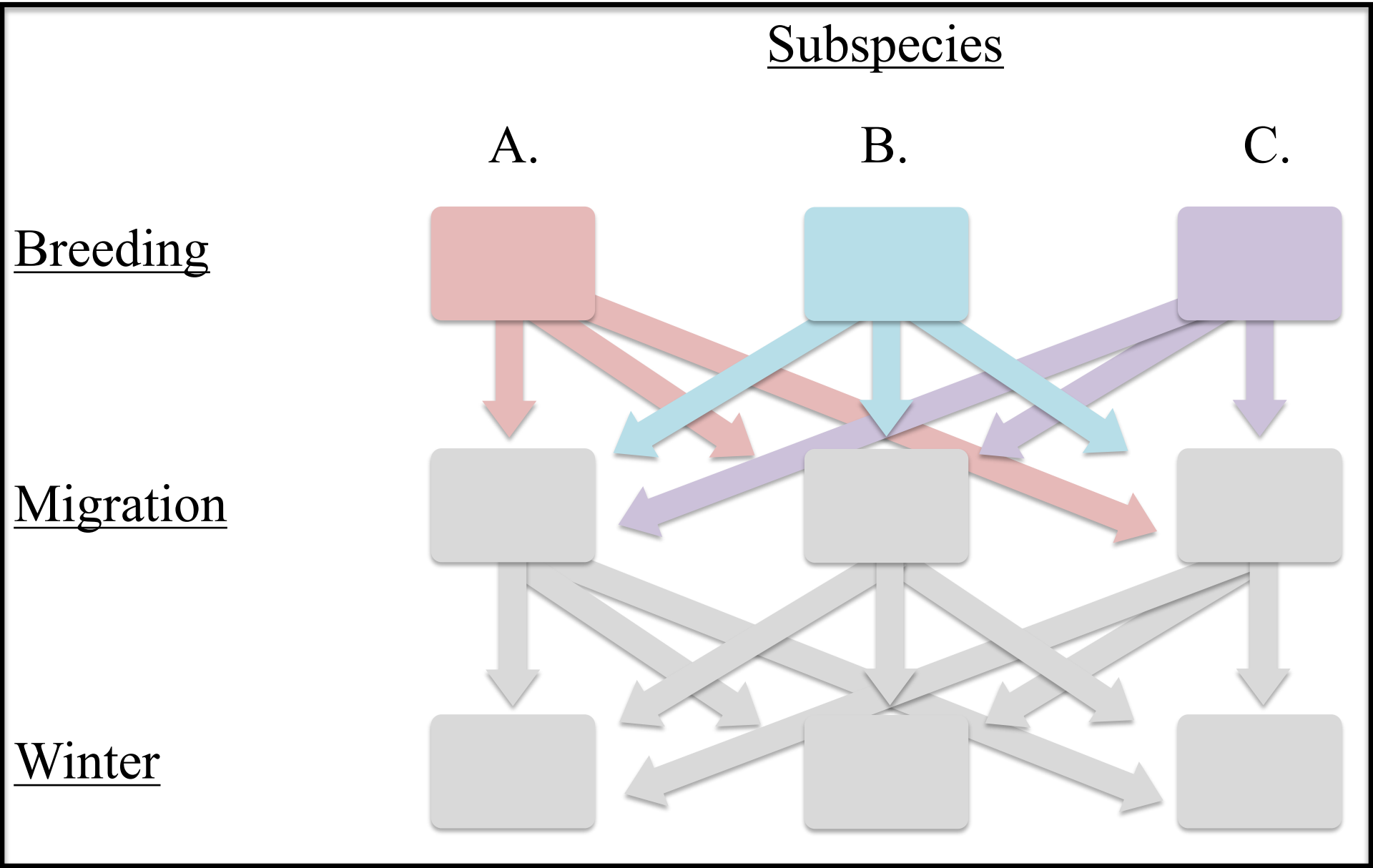
Winter range

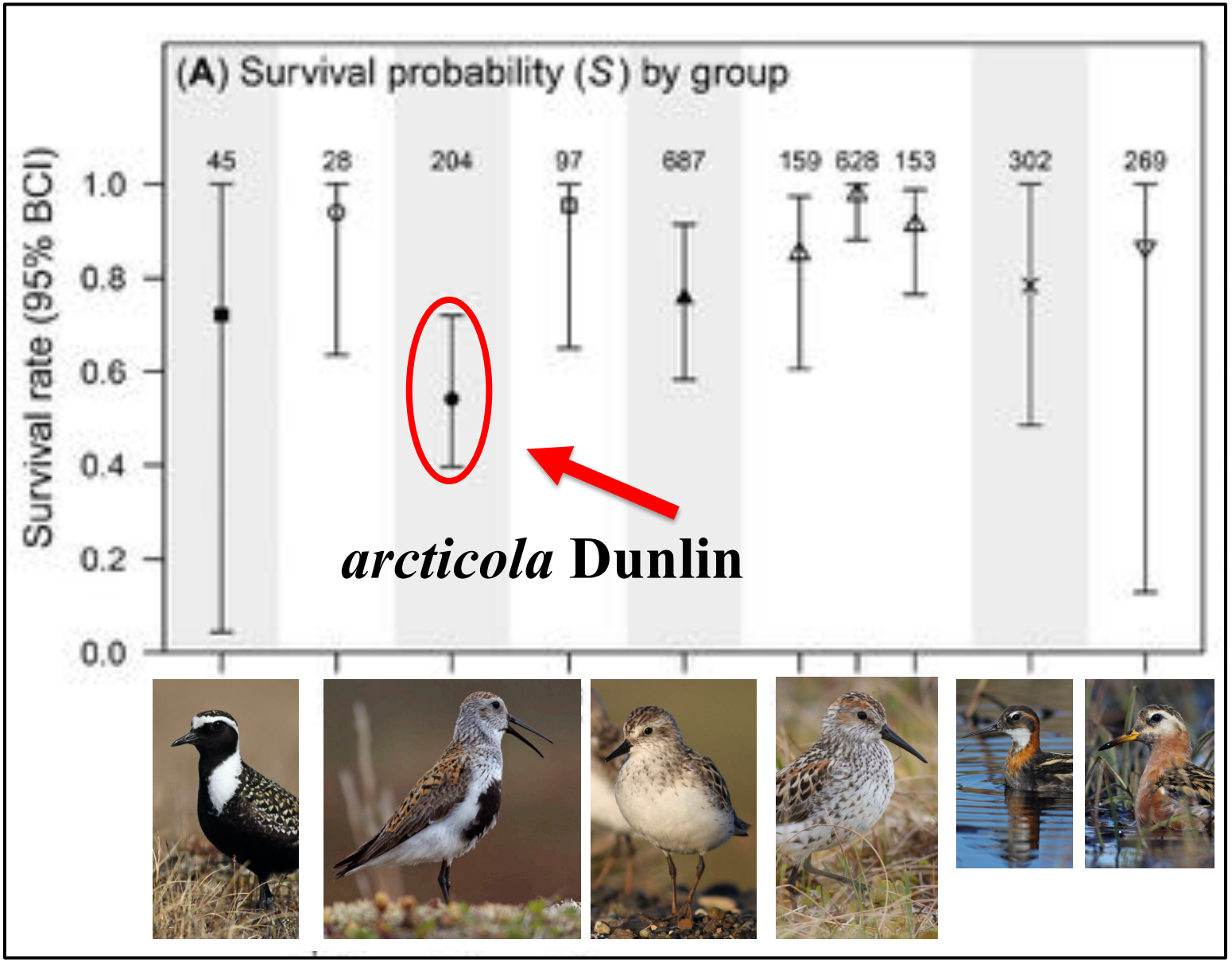
Subspecific nonbreeding ranges

Strong migratory connectivity

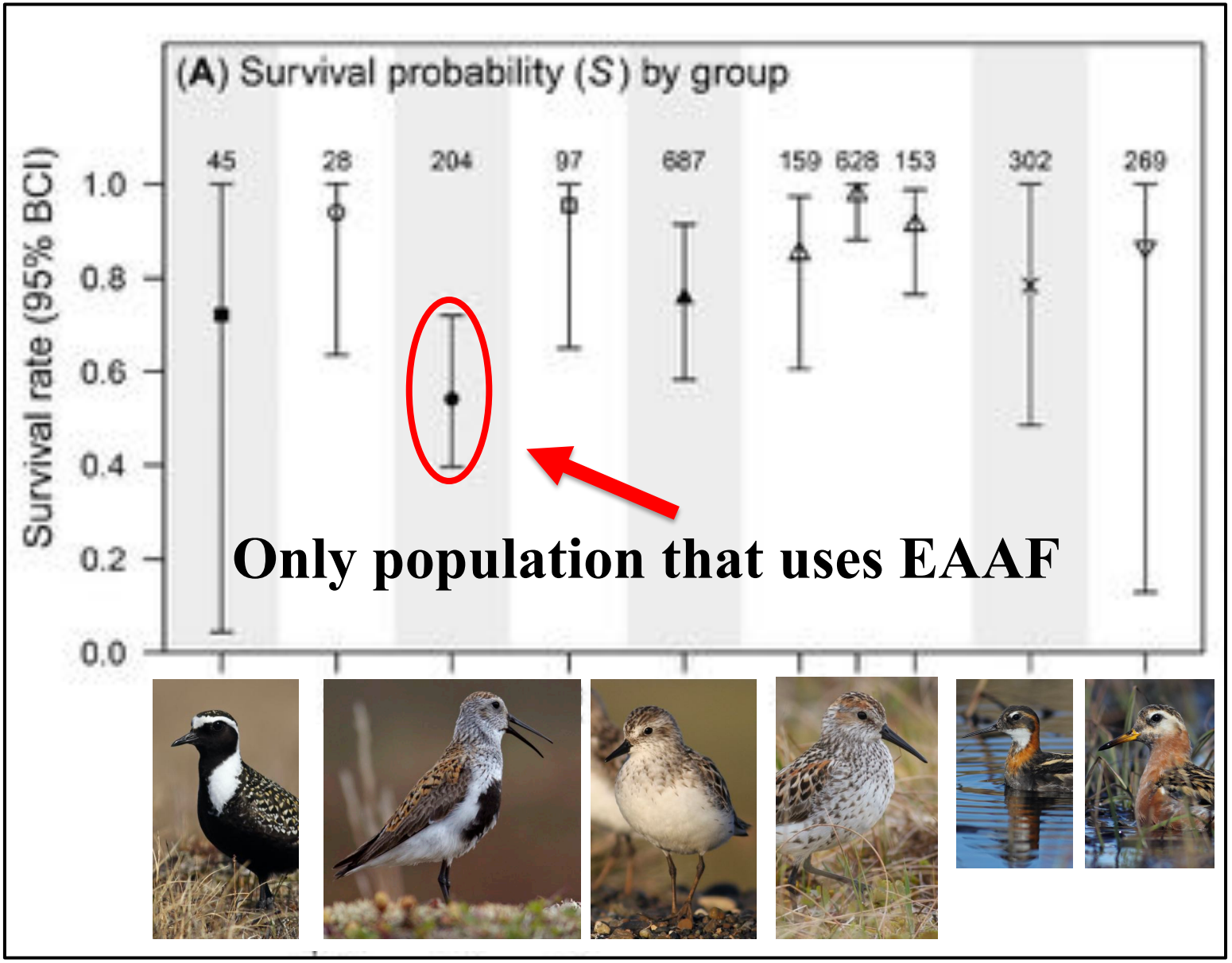


Weak migratory connectivity



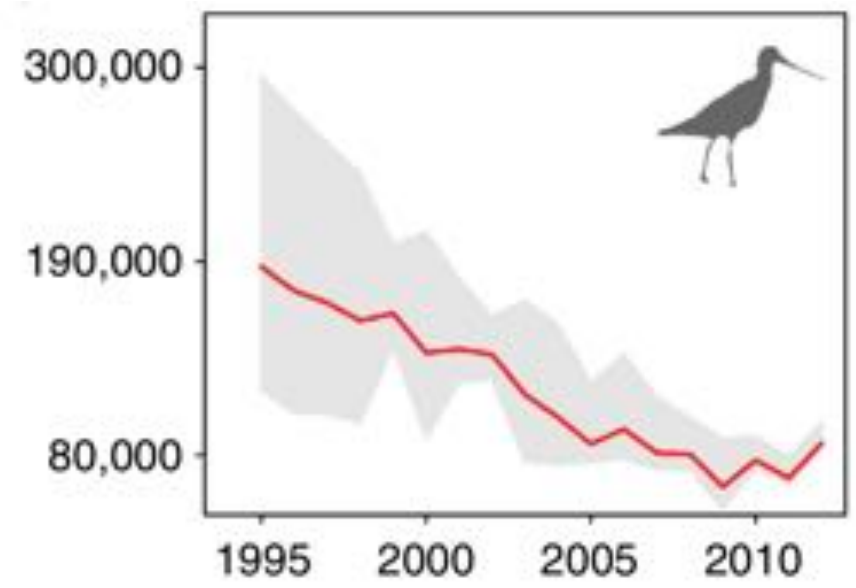


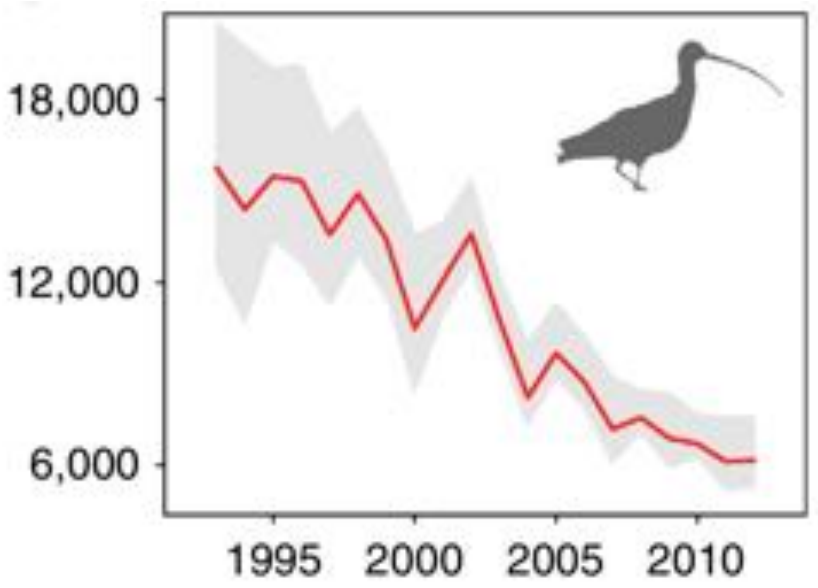
Weiser et al. 2018. The Auk: Ornithological Advances 135:29-43



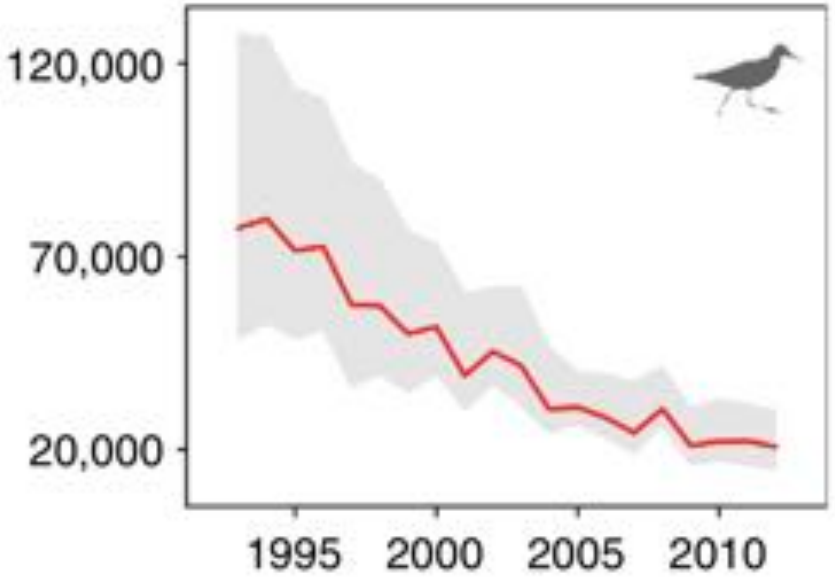
Weiser et al. 2018. The Auk: Ornithological Advances 135:29-43

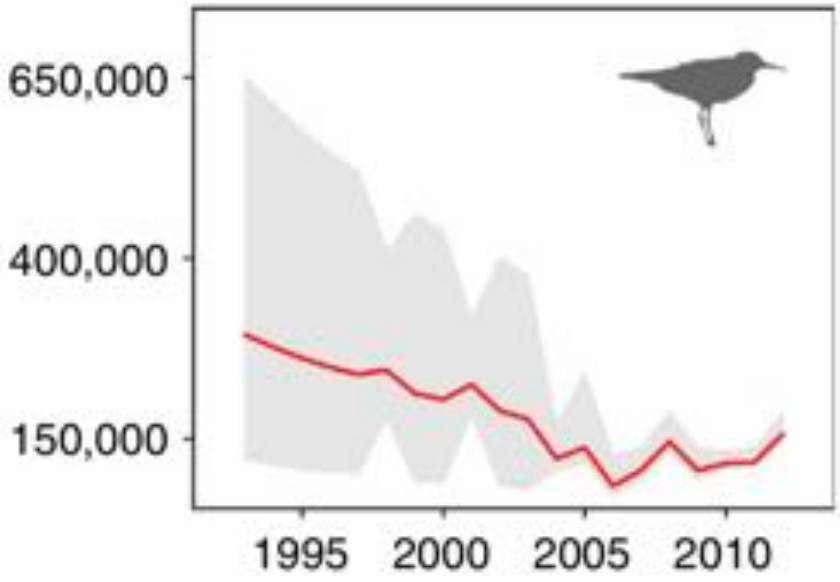
Community-wide population declines on the EAAF





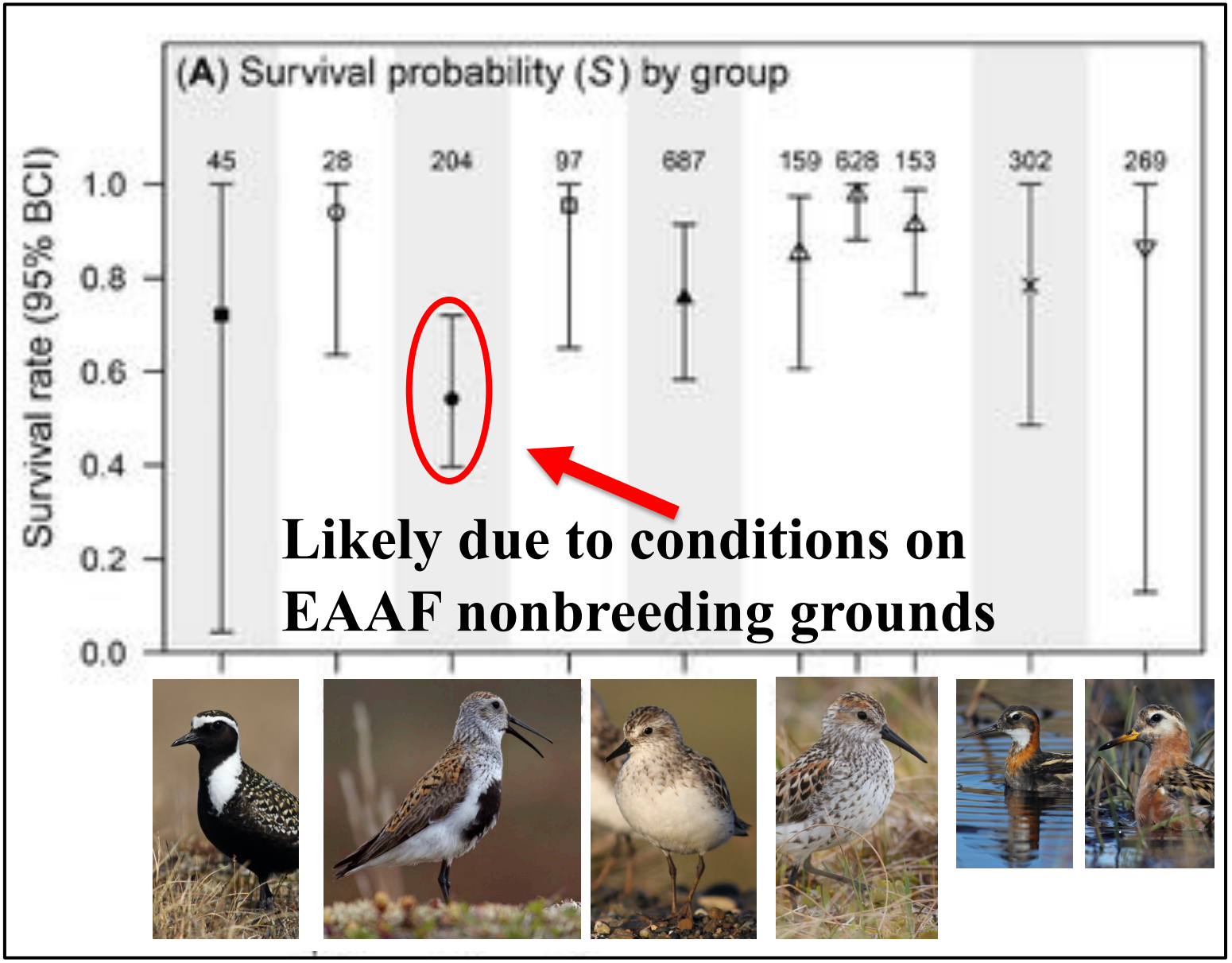
Studds et al. 2017. Nature Communications 8:14895





> 65% loss of intertidal habitats in the Yellow Sea

Melville et al. 2016. Emu 116:100-110



Weiser et al. 2018. The Auk: Ornithological Advances 135:29-43

However…

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?
?

(A) Survival probability (S) by group
Survival rate (95% BCI)
0.0
0.2
0.4
0.6
0.8
1.0
45
28
204
97
687
159
628
153
302
269
?

We evaluated the migratory connectivity of Dunlin subspecies along the EAAF using band recoveries

OBJECTIVE

- Assess whether Dunlin subspecies segregate between the Yellow Sea, China Sea, and Japan

Methods

Dunlin were captured on their breeding grounds.

Methods

Upon capture, each bird received a site-specific color band combination.

Methods

Dunlin were resighted across the flyway by local bird watchers and field biologists.

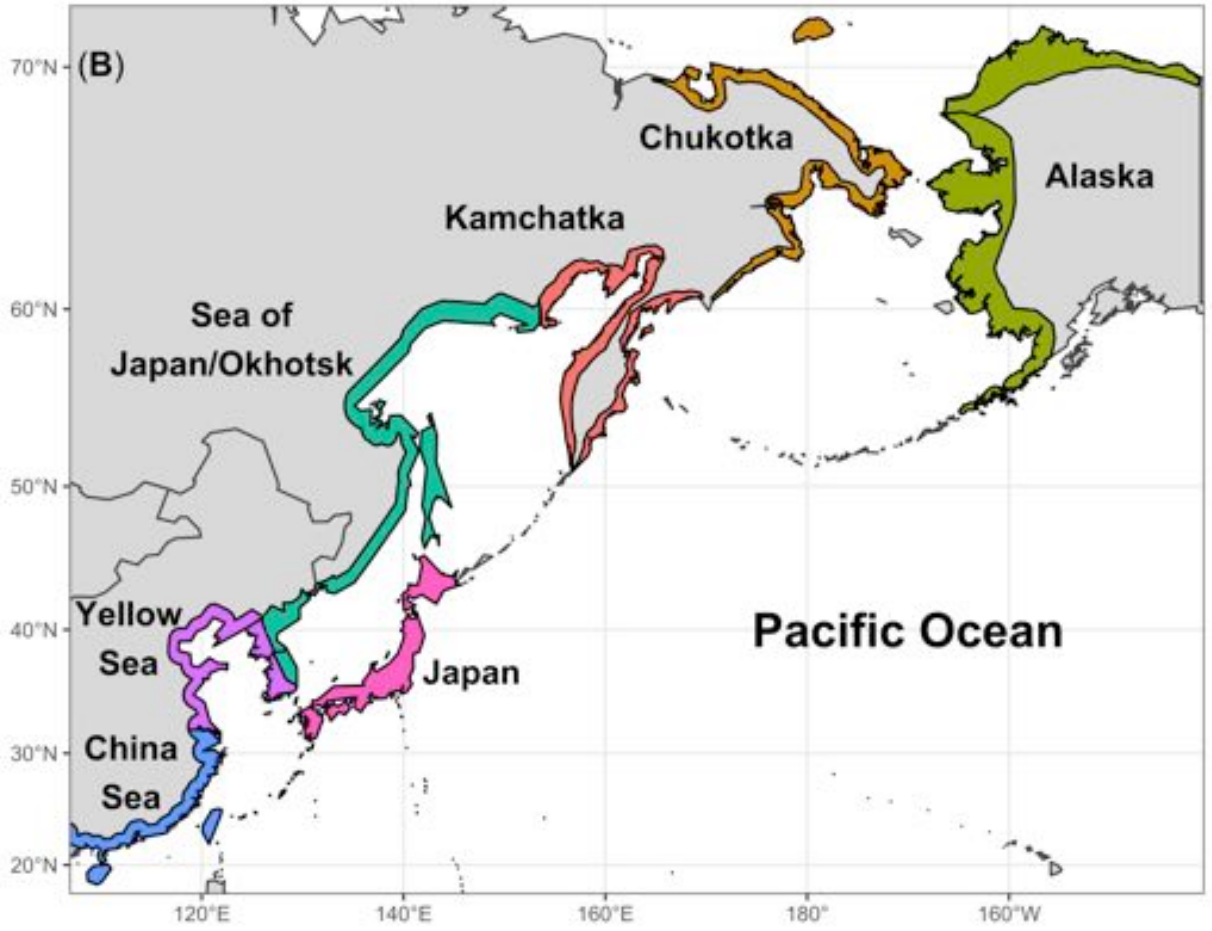
- Known subspecies

Banding and observation records (1960–2017)

	Subspecies			
	C. a. actites	*C. a. sakhalina*	*C. a. kistchinski*	*C. a. arcticola*
Birds banded	~800	~1,200	~50	~4,050
Observations	18	13	0	523
Recoveries	9	12	0	202

- Discarded repeat observations

Assigned each recovery to a flyway region…



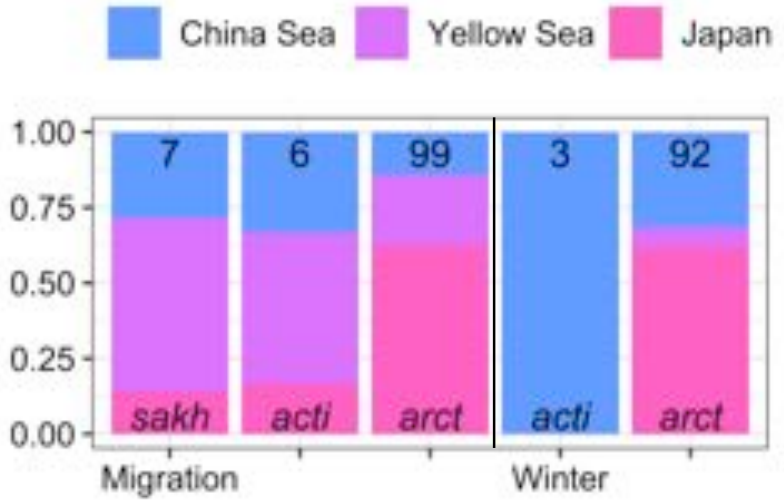
…and to a season

- Winter recoveries (December–February)
- Migration recoveries (did not specify between N vs S)

Methods

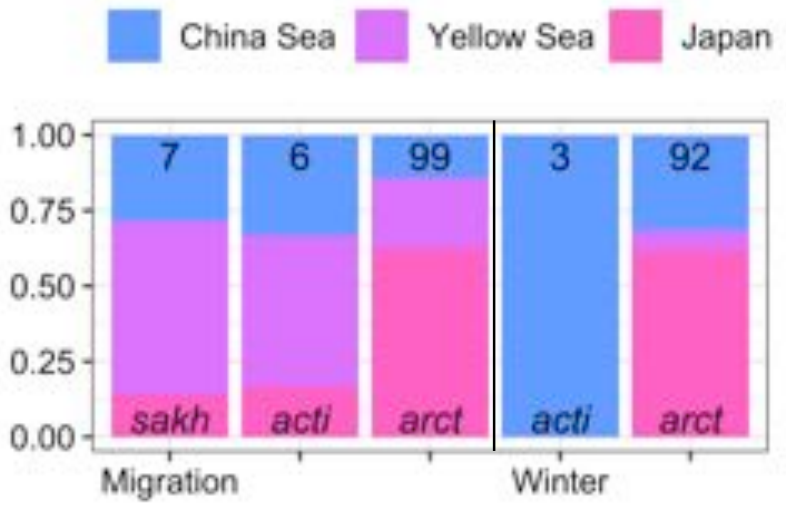
We compared the proportions of ssp. migration and winter recoveries that occurred in the Yellow Sea, China Sea, and Japan using pairwise Fisher's exact tests

Results


China Sea
Yellow Sea
Japan
1.00
0.75
0.50
0.25
0.00
7
6
99
3
92
sakh
acti
arct
acti
arct
Migration
Winter

Results

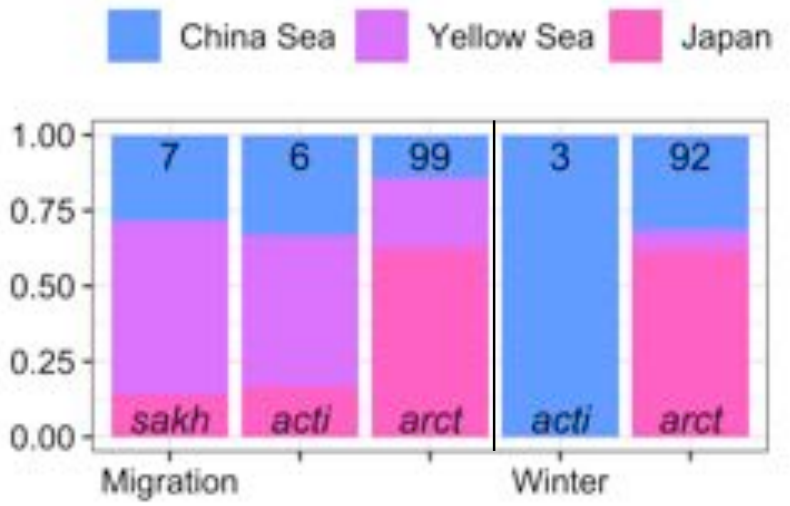
- During migration, all ssp. were recovered in the Yellow Sea and China Sea at a similar rate (P=0.07–1.00)



Results

- During migration, all ssp. were recovered in the Yellow Sea and China Sea at a similar rate (*P*=0.07–1.00)

- During migration, the odds of recovering *arct* Dunlin in Japan were 8–10x greater than those for *sakh* or *acti* Dunlin (*P*=0.02 & 0.04, respectively)

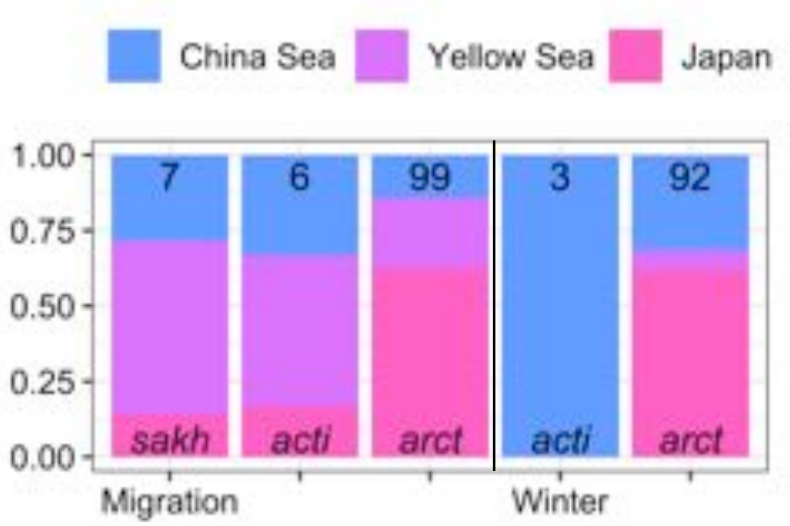


Results

- During migration, all ssp. were recovered in the Yellow Sea and China Sea at a similar rate (*P*=0.07–1.00)

- During migration, the odds of recovering *arct* Dunlin in Japan were 8–10x greater than those for *sakh* or *acti* Dunlin (*P*=0.02 & 0.04, respectively)

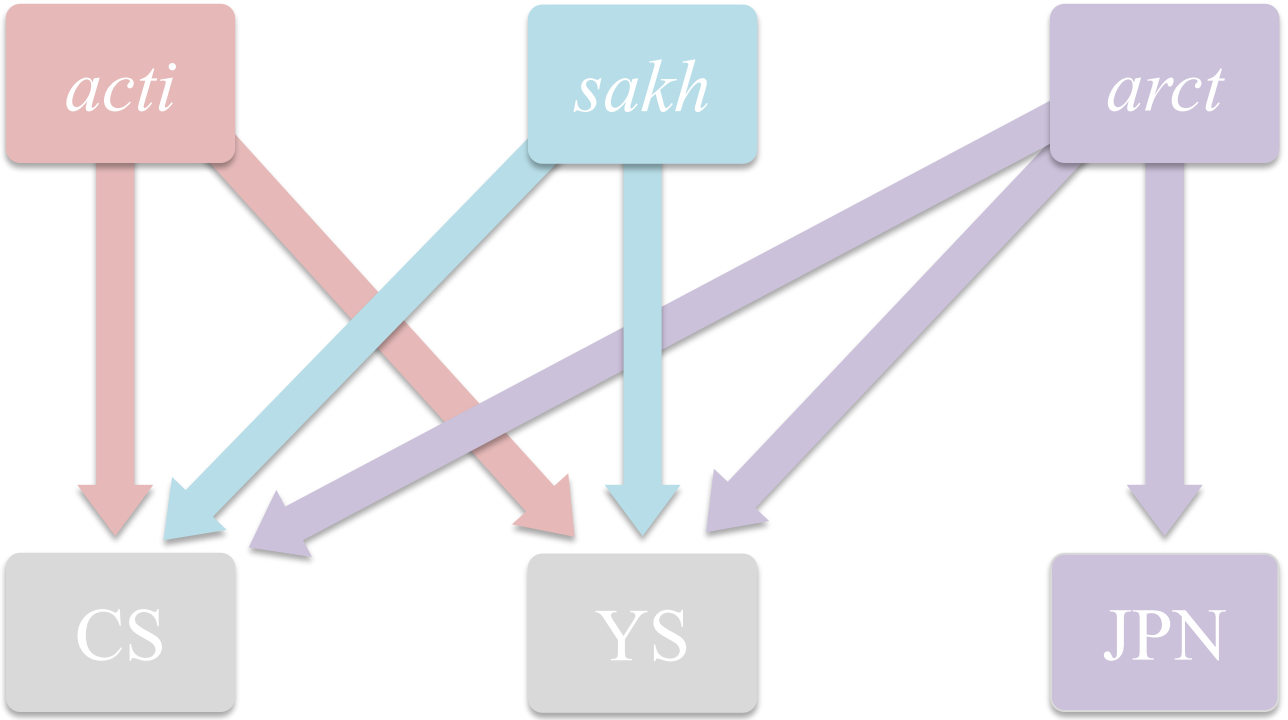
- During the winter, *arct* Dunlin were recovered more often in Japan (*P*=0.06) and *acti* more often in the China Sea (*P*=0.04)

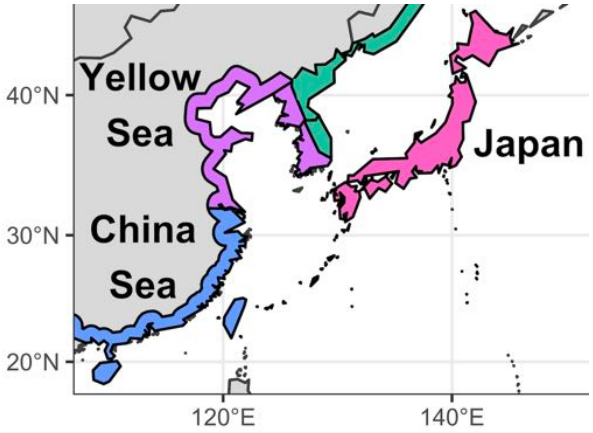


Dunlin migratory connectivity

Breeding

Nonbreeding





Dunlin migratory connectivity

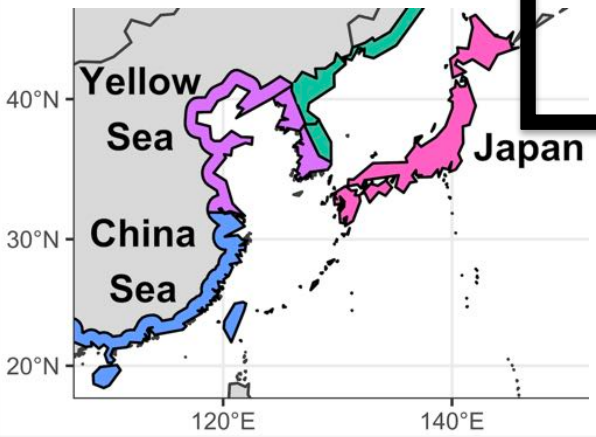
Breeding

acti *sakh* *arct*

?

Nonbreeding

CS YS JPN



We also evaluated the migratory connectivity of nonbreeding Dunlin using band recoveries

OBJECTIVE

- Assess whether Dunlin of unknown subspecies segregate between the Yellow Sea, China Sea, and Japan

Banding and observation records (1960–2017)

	Populations of nonbreeding Dunlin of unknown subspecies			
	China Sea	Yellow Sea		Japan
Birds banded	~4,250	~5,700		~7,275
Observations	93	116		55
Recoveries	50	58		46

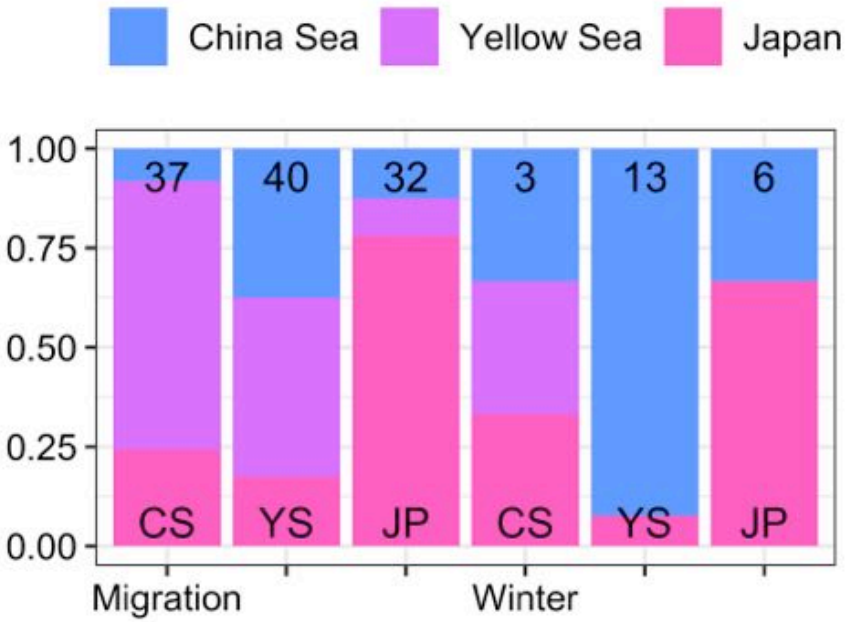
- Discarded repeat observations

Results

- During migration, Dunlin marked in the CS were 19x more likely to be recovered in the YS than Dunlin marked in JP ($P<0.001$)

- Dunlin marked in the YS were 4–19x more likely to be recovered in the CS than Dunlin marked in JP ($P=0.02–0.03$)

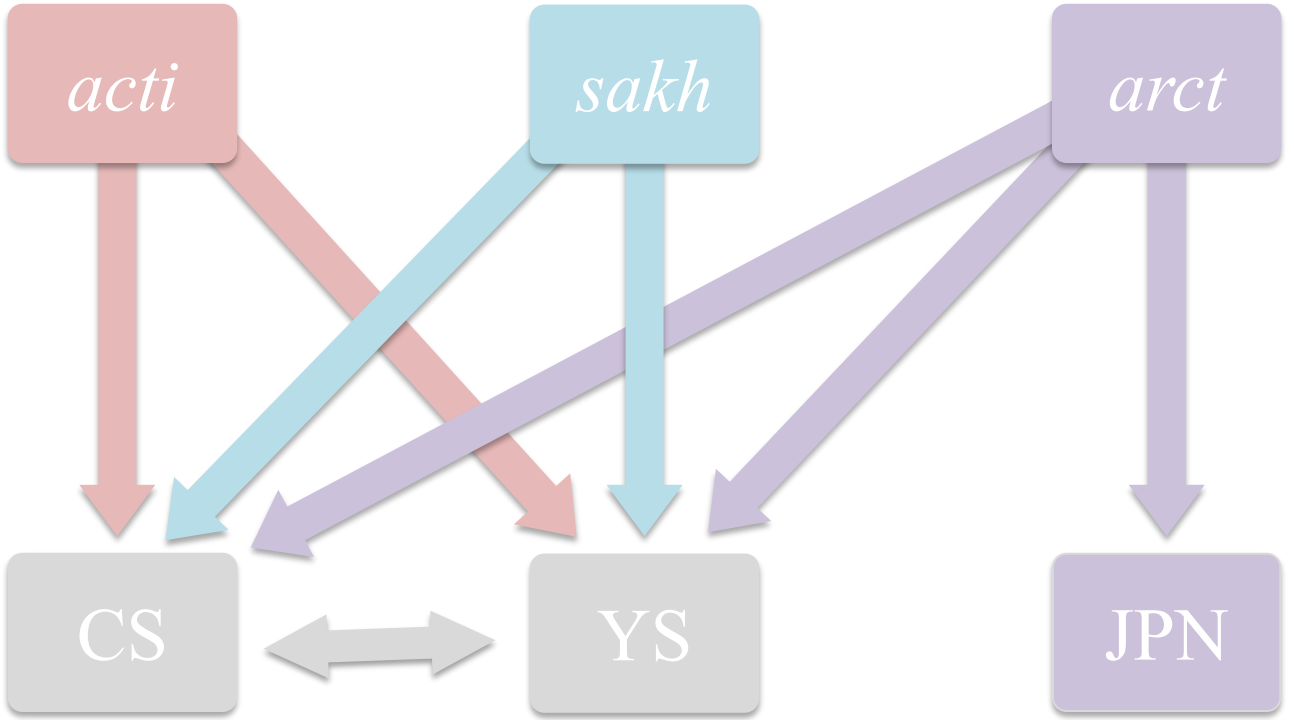
- Dunlin marked in the YS and CS were recovered in JP at similarly low rates ($P=0.35$ & 0.58)

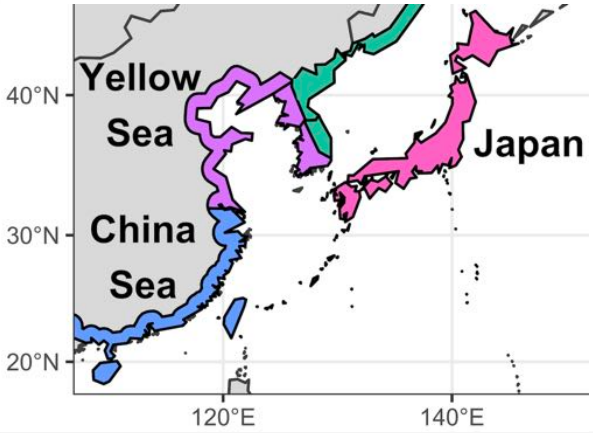


Dunlin migratory connectivity

Breeding

Nonbreeding

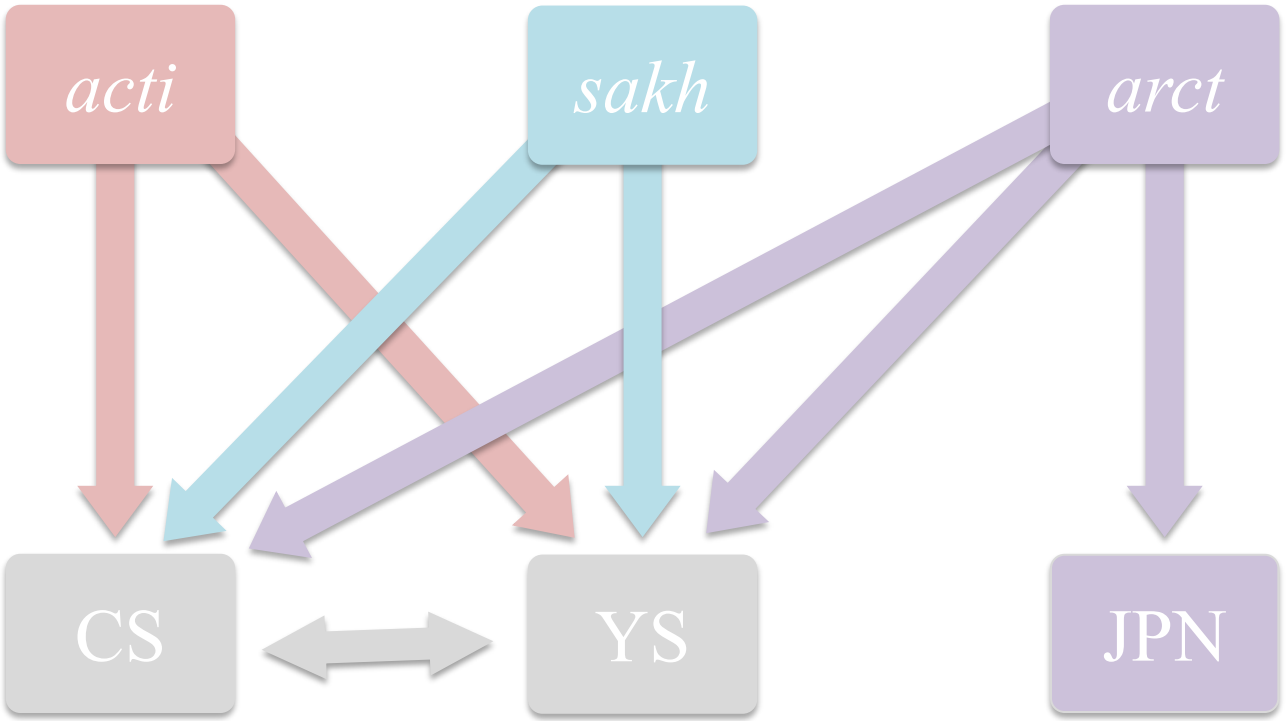




Dunlin migratory connectivity

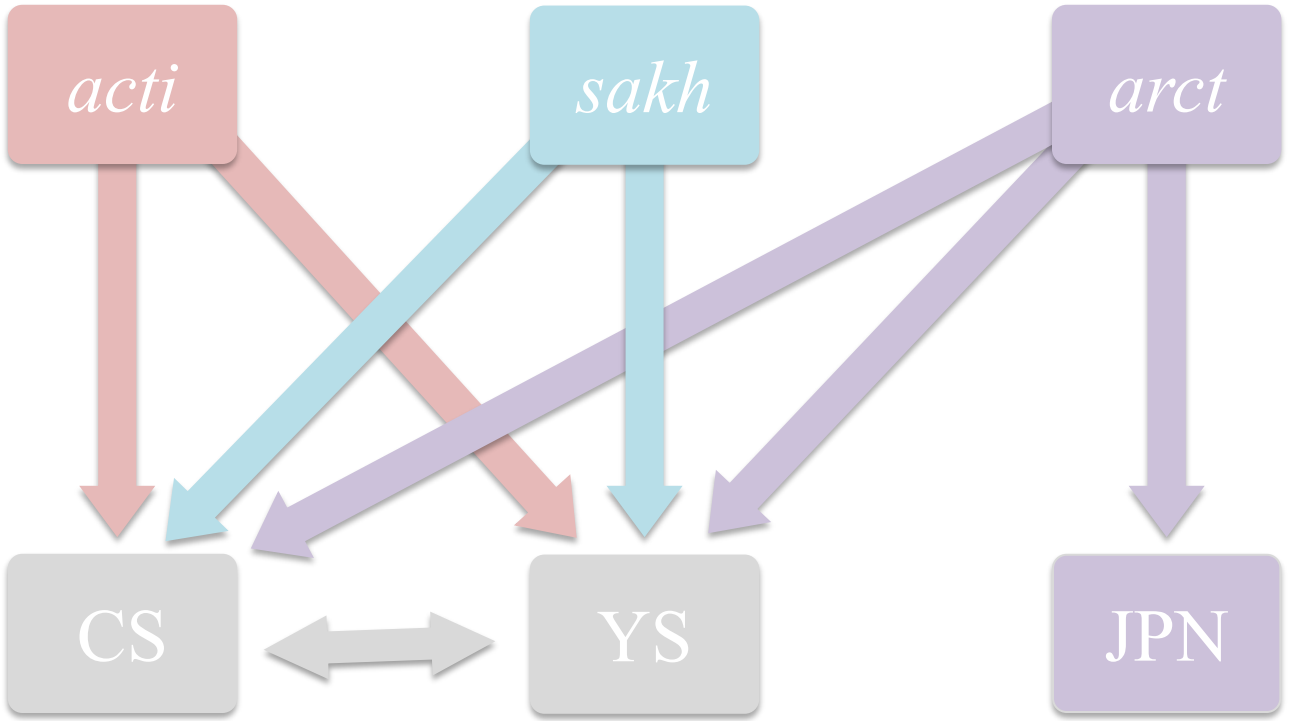
Breeding

Nonbreeding



So what?

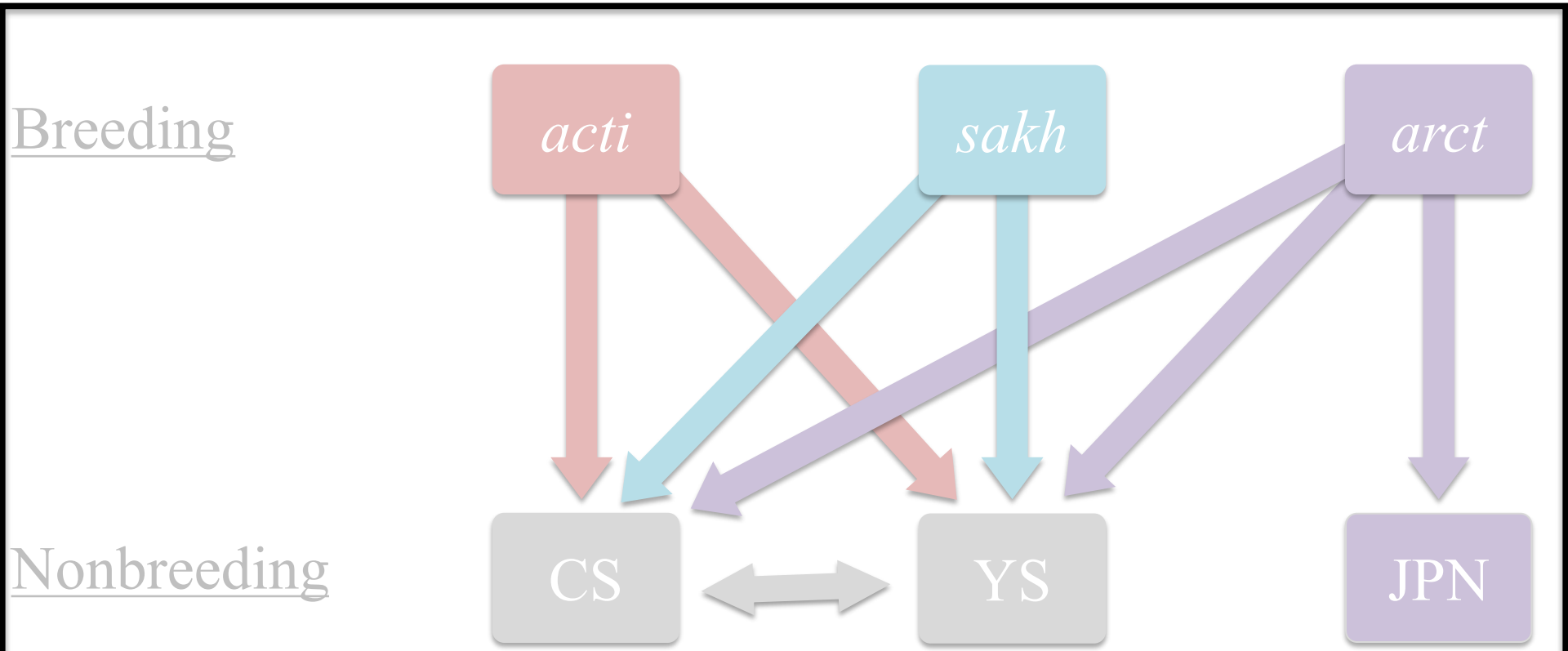
Dunlin migratory connectivity



So what?

- Recoveries suggest all ssp. are likely affected by habitat loss in the Yellow Sea

Dunlin migratory connectivity



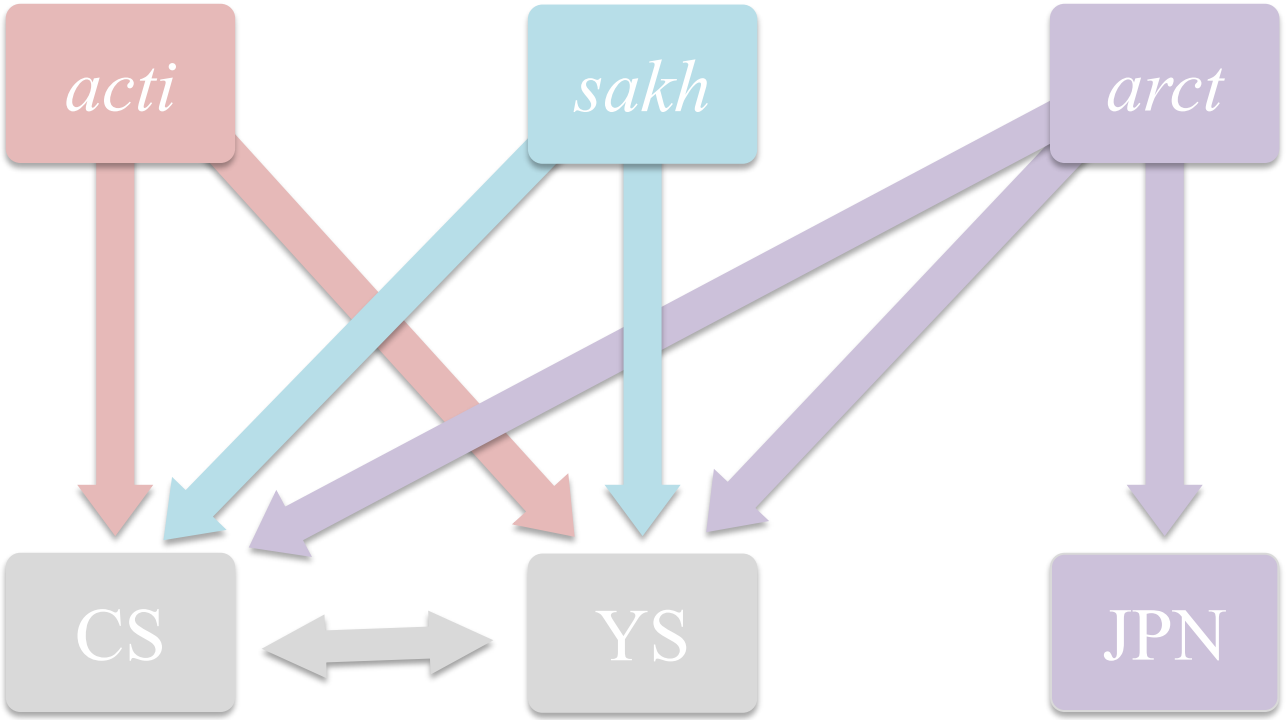
So what?

- Recoveries suggest *arct* Dunlin may be comprised of at least 2 discrete wintering populations

Dunlin migratory connectivity

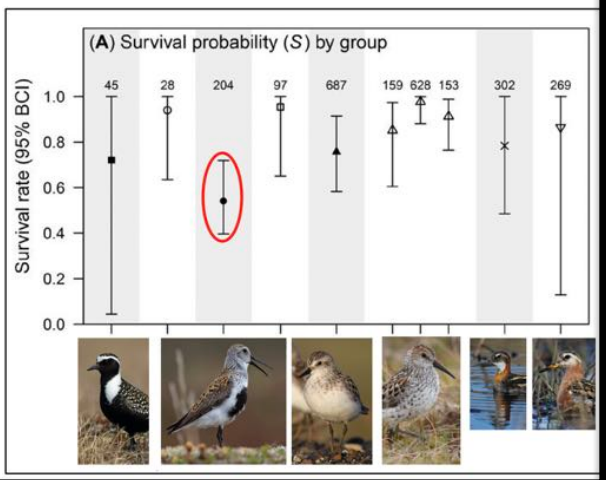
Breeding

Nonbreeding



So what?

- Recoveries provide a rudimentary "roadmap" to begin to investigate where and ~why the greatest *arct* mortality is occurring



CAVEAT

- Band recoveries resulted from incidental observer efforts

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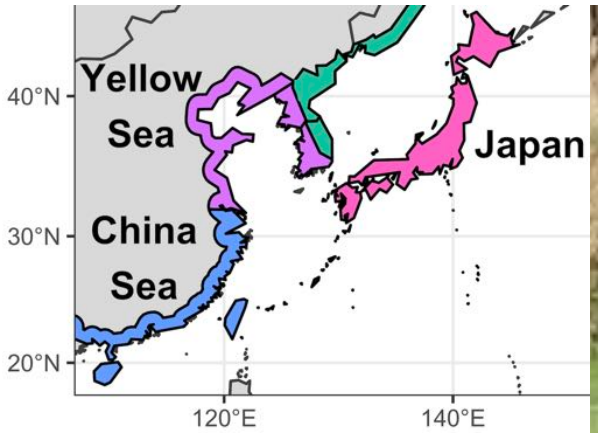
- Variable observer efforts within a region could have biased our results

- Although observer efforts are impossible to determine, >90% of each ssp. recoveries occurred in the same 12-year period, suggesting ssp. generally experienced similar observer efforts within each region



BEST NEXT STEPS

- Compare results w/geolocator tracking data (2010–2019)

BEST NEXT STEPS

- Compare results w/geolocator tracking data (2010–2019)

- Ground-truth results using DNA and morphological assignment techniques on the nonbreeding grounds

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AWSG

Australasian Wader Studies Group

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Questions?
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Proportion of seasonal recoveries by arct pop. & region