
THE PLIGHT OF
MIGRANT LANDBIRDS
WINTERING IN THE CARIBBEAN
Joseph M. Wunderle, Jr. & Wayne J. Arendt

At time of IITF's 50th Anniversay (1989): A variety of studies showed population declines in Nearctic-Neotropical migrant birds

Most declines detected in temperate zone breeding ground studies:

Proc. Natl. Acad. Sci. USA
Vol. 86, pp. 7658–7662, October 1989
Population Biology

Population declines in North American birds that migrate to the neotropics

CHANDLER S. ROBBINS*, JOHN R. SAUER*, RUSSELL S. GREENBERG†, AND SAM DROEGE‡

Declines also detected in the only long-term study on the tropical wintering grounds:

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Long-term declines of winter resident warblers in a Puerto Rican dry forest: Which species are in trouble?

1989 Migrant Symposium,
Manomet, MA,
Smithsonian Inst. Press

Also, at time of IITF's 50th Anniversary (1989):

- Forest loss & fragmentation on **temperate breeding grounds** were believed to be the cause of migrant declines, by most researchers.

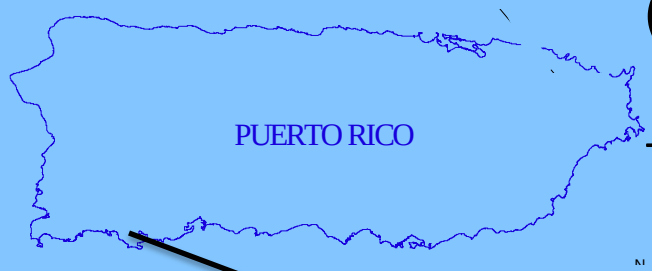
Versus

- Forest loss & fragmentation on **tropical wintering grounds** were believed to be the cause of migrant declines by some.

Now at IITF's 75th Anniversary (2014):

- Migrant decline causes are not viewed as a dichotomy (breeding vs. wintering ground), but evidence now suggests events in one stage of annual cycle can affect another stage.

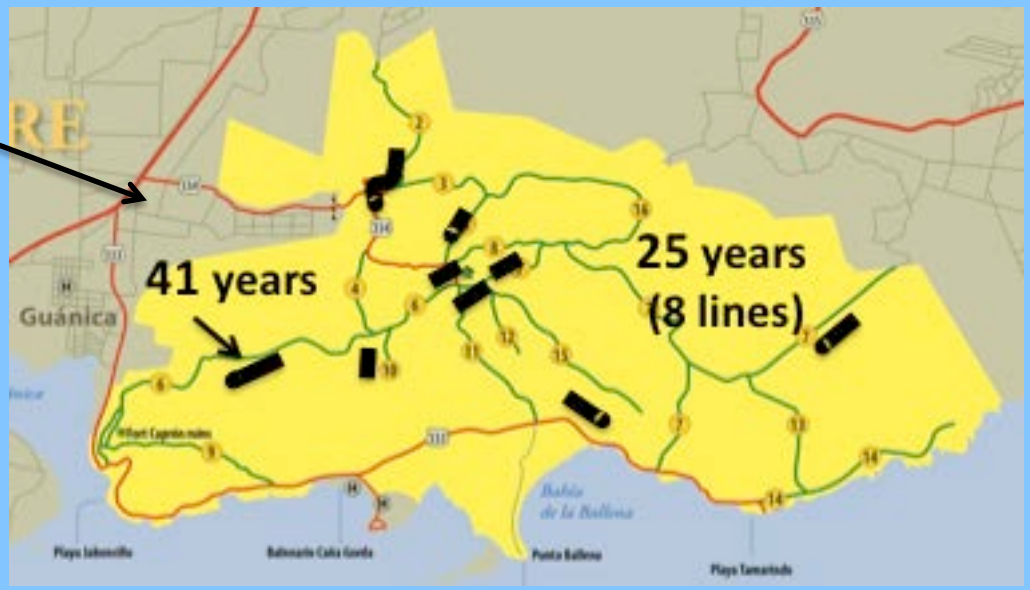
Long-term Monitoring Of Birds With Mist Nets & Banding Each January In The Guánica Biosphere Reserve, PR (Faaborg & Arendt et al.)



- 1 net line (16 nets; 200m) every **January** since 1973 (except 1977 & 1979)

- 8 net lines (128 nets) every **January** since 1989-91

Guánica Biosphere Reserve
(Subtropical Dry Forest)

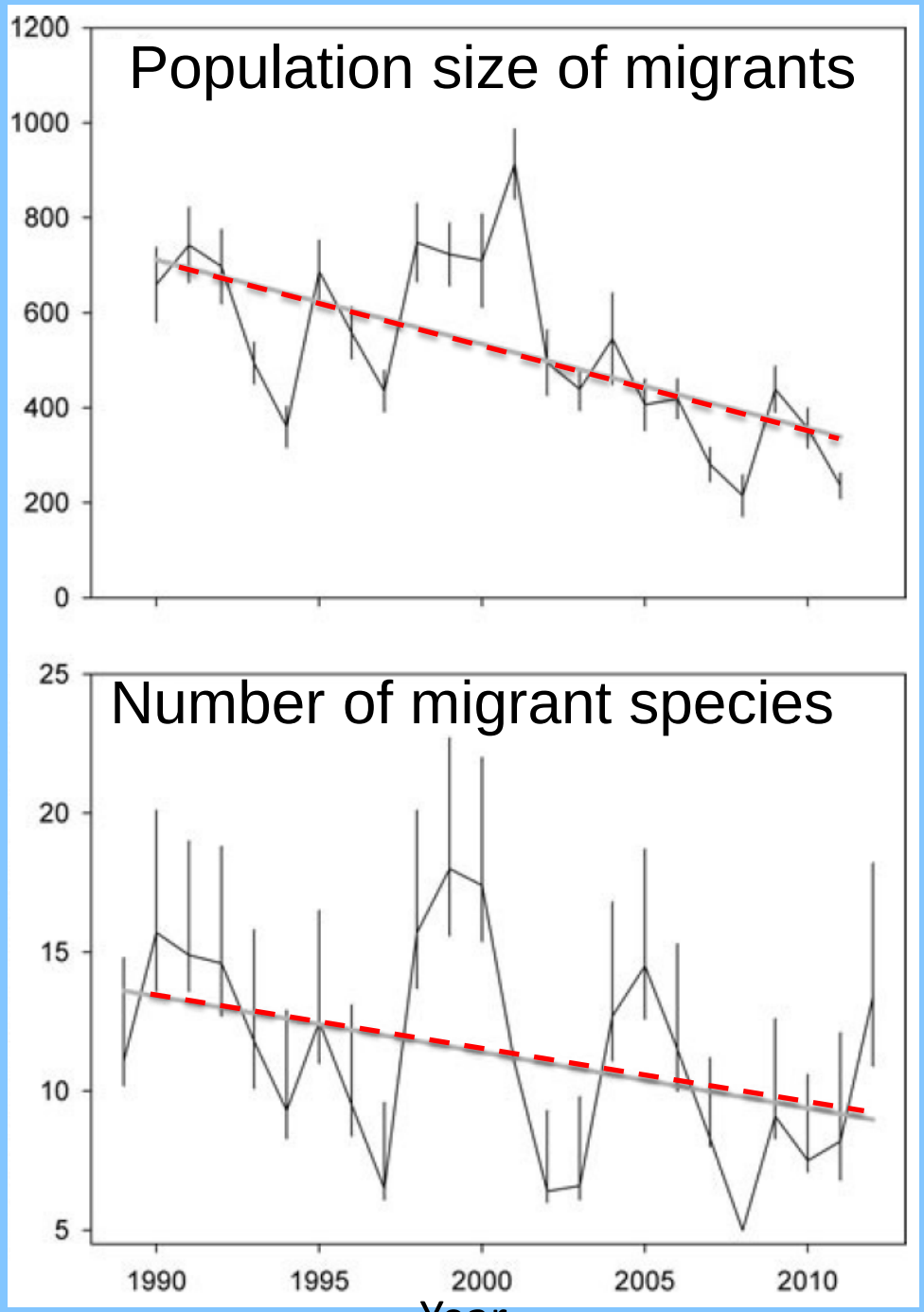


Faaborg et al. 2014

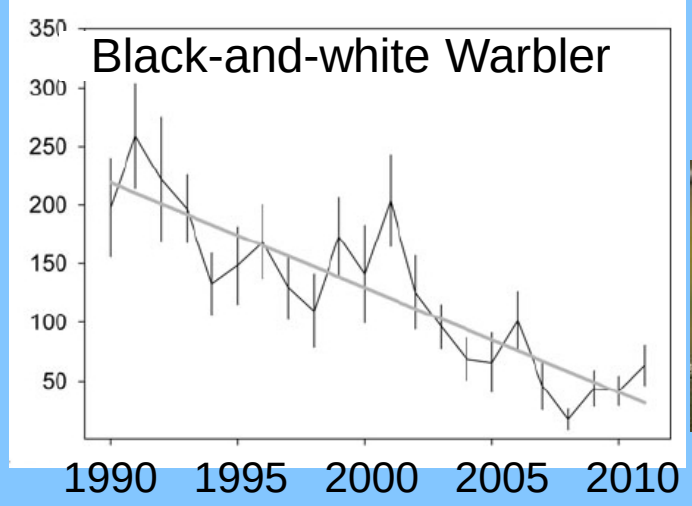
Declines of winter resident migrants in Guánica

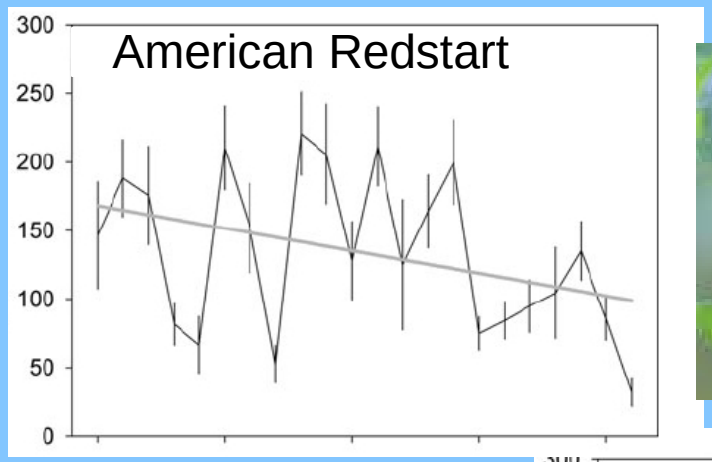
Total of 20 migrant species, mostly warblers ("reinitas")

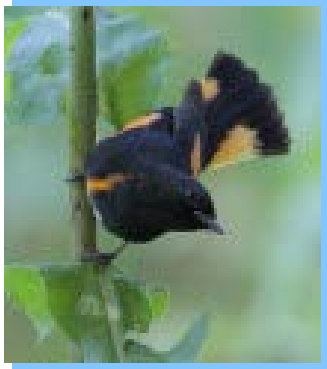
Faaborg et al. 2013

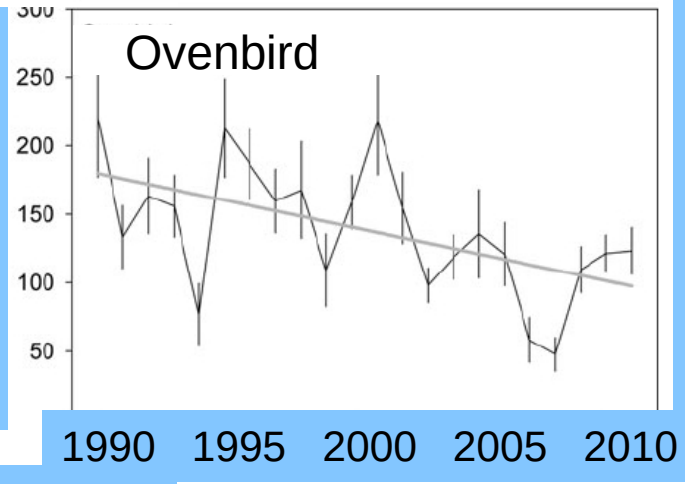


Declines in the three most common migrants in Guánica







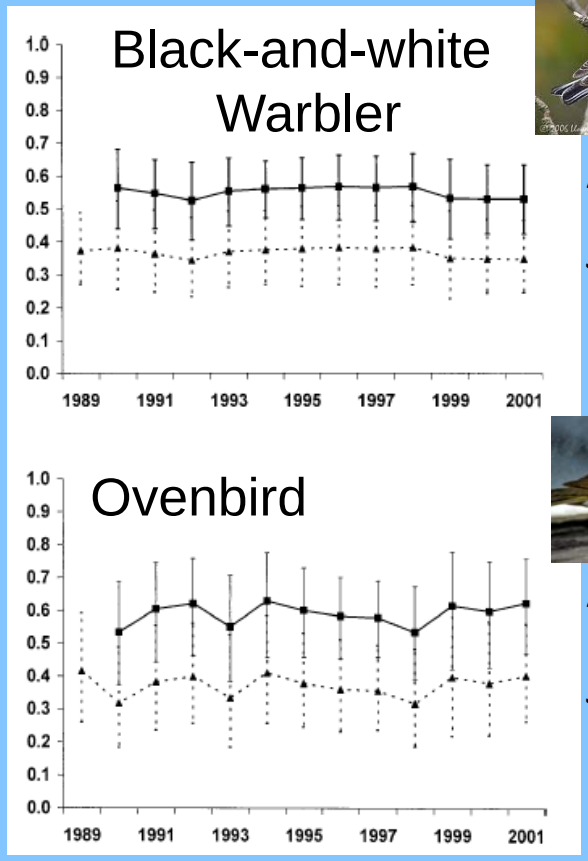


Estimated population size (± 95% CI)

Faaborg et al. 2013

Despite population declines, **annual survival rates have not changed** significantly over same period

Proportion surviving/year

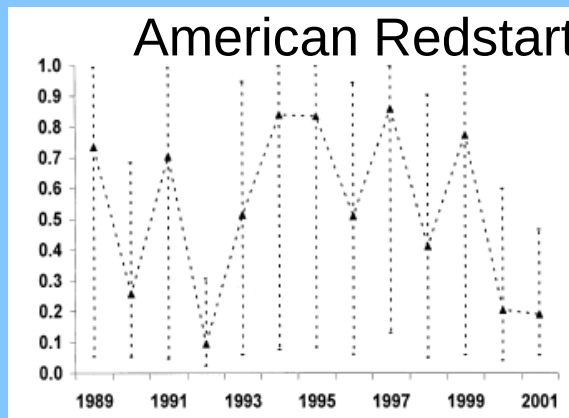


Adult

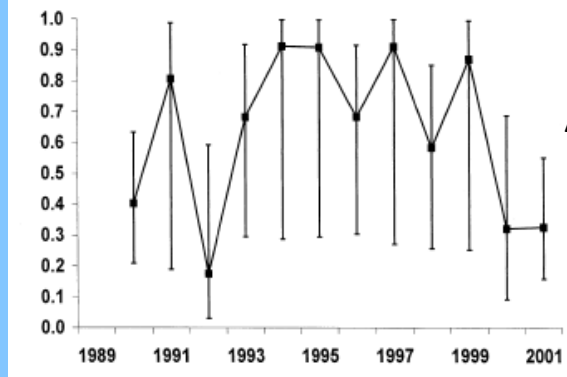
Juvenile

Adult

Juvenile



Juvenile



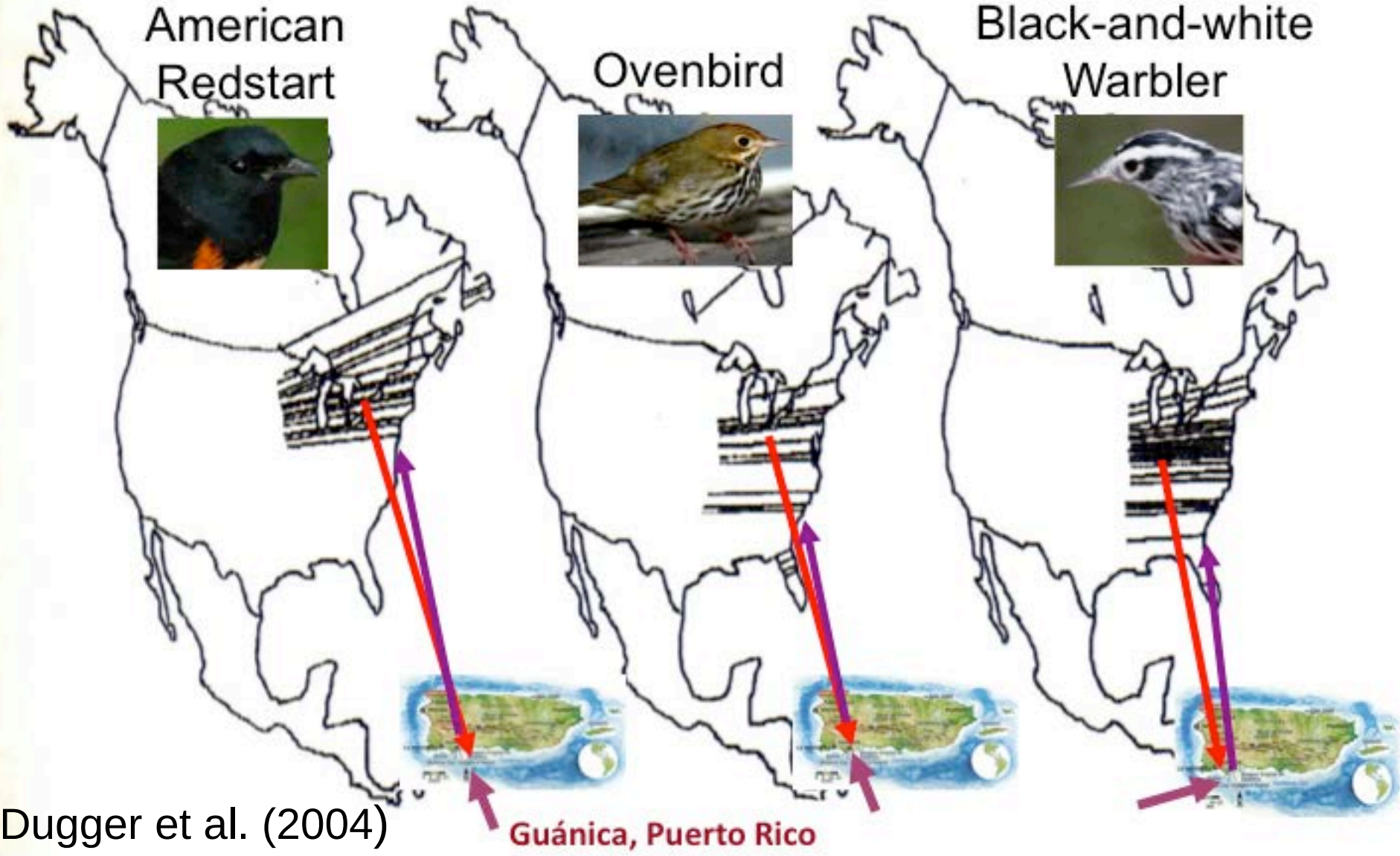
Adult

Thus population declines not due to changes in mortality, but due to changes in **recruitment** of birds to Guánica

Dugger et al. 2004

Where do Guánica's migrants come from?

Stable isotopes (δD) from feathers collected in Guánica were matched with maps of Deuterium to identify breeding ground latitude



Dugger et al. (2004)

Abundance in Guánica varied with **rainfall:** but differed with type of measure, location, and bird species

Black-and-white Warbler

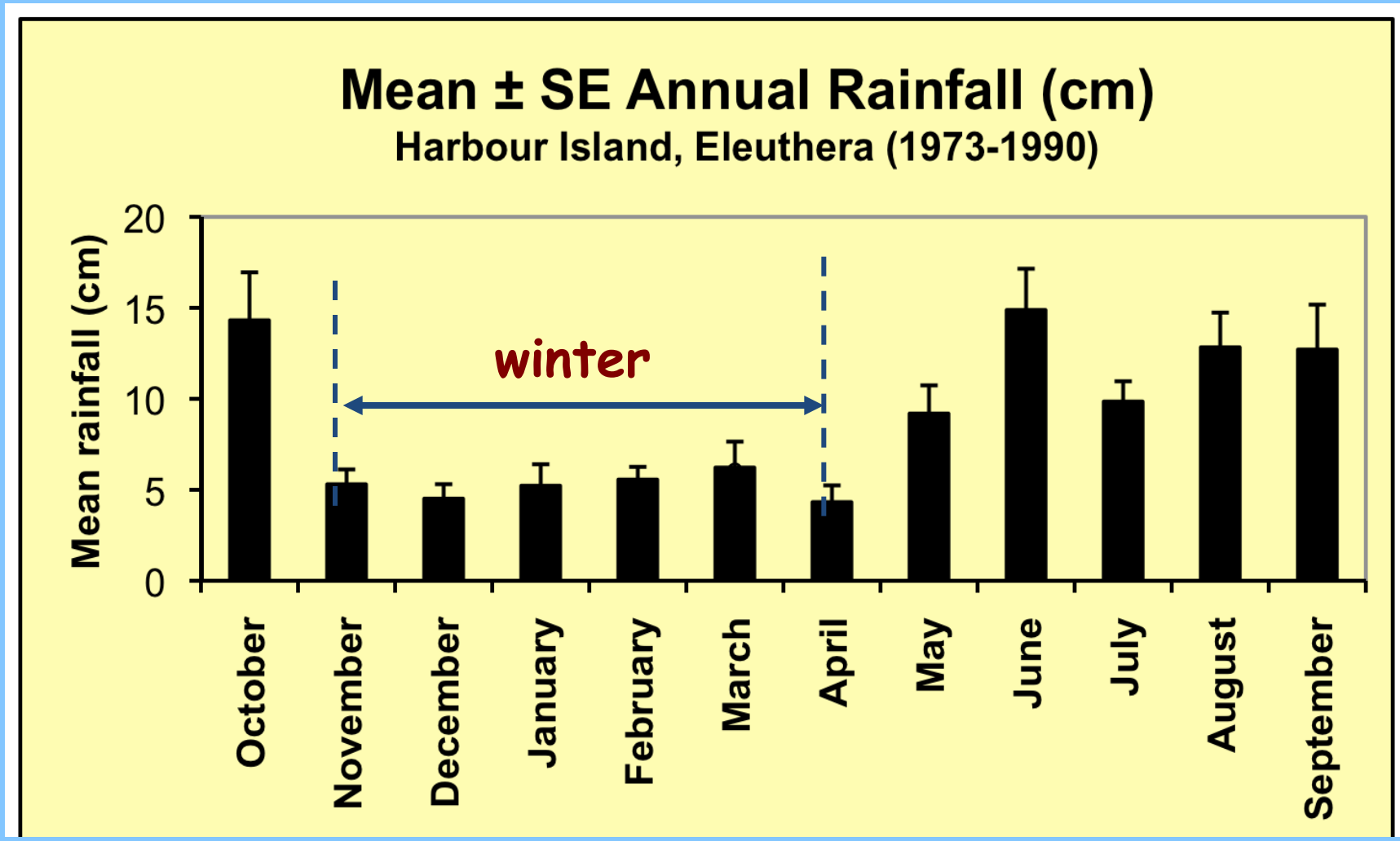
Total deviations from normal (cm)
Guánica winter rain

Ovenbird

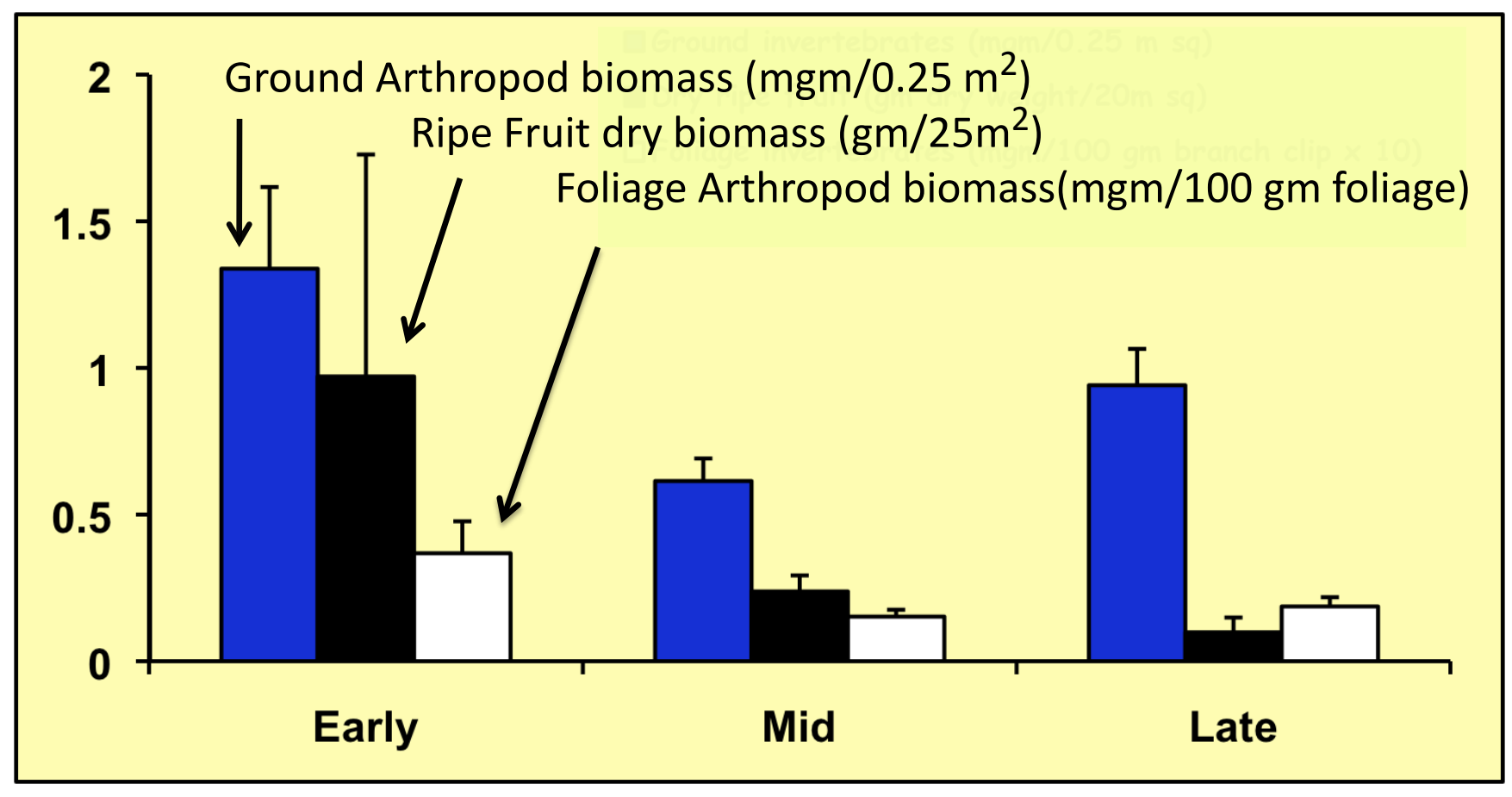
U.S. total rainfall (cm)

Dugger et al. (2004)

Rainfall, continued:
Winter is the dry season in The Bahamas & The Caribbean



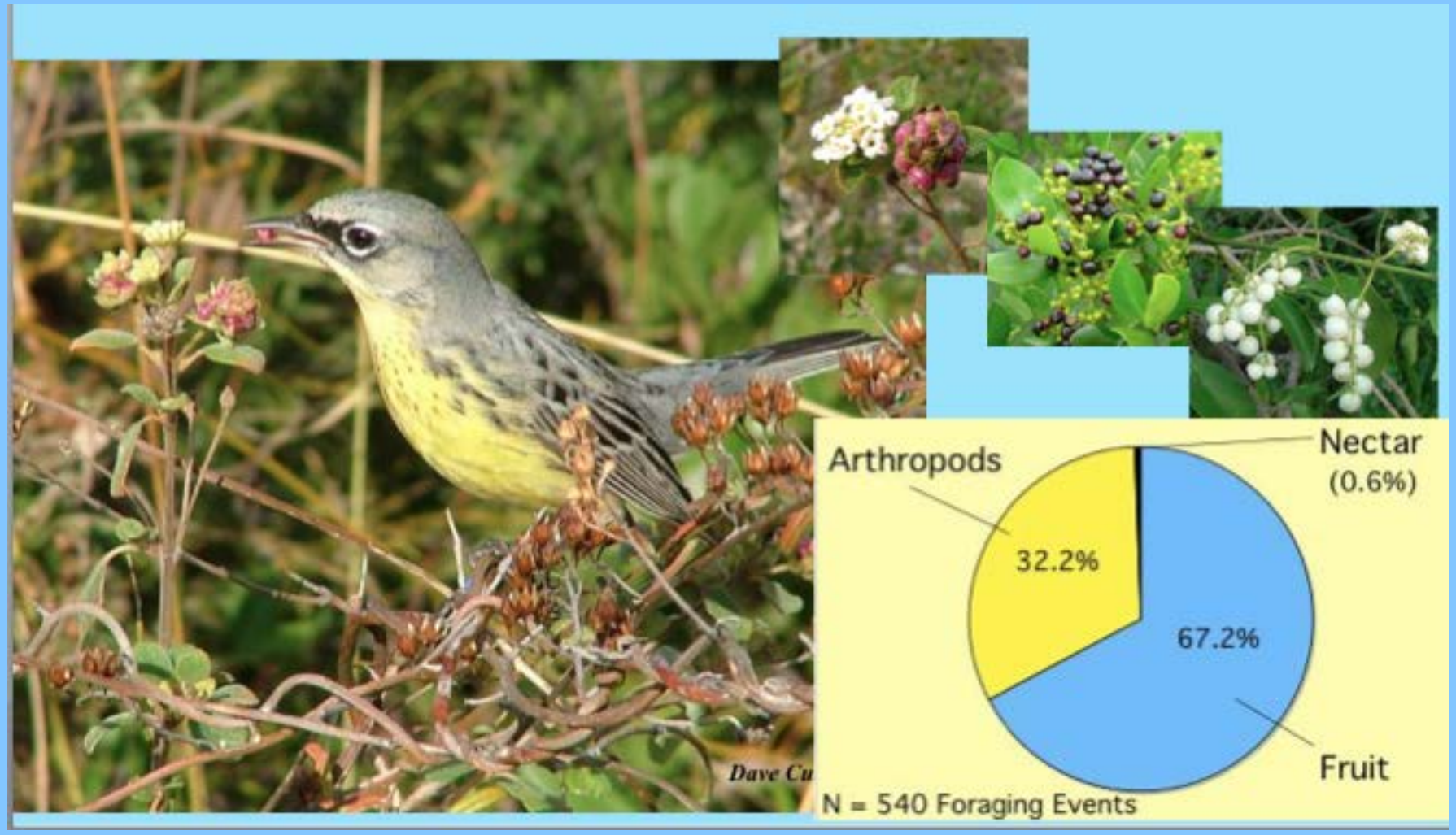
As winter becomes **drier**: food resources decline (e.g., Bahamas)



(Oct. – Dec.) (Jan. – Feb) (Mar. – April)

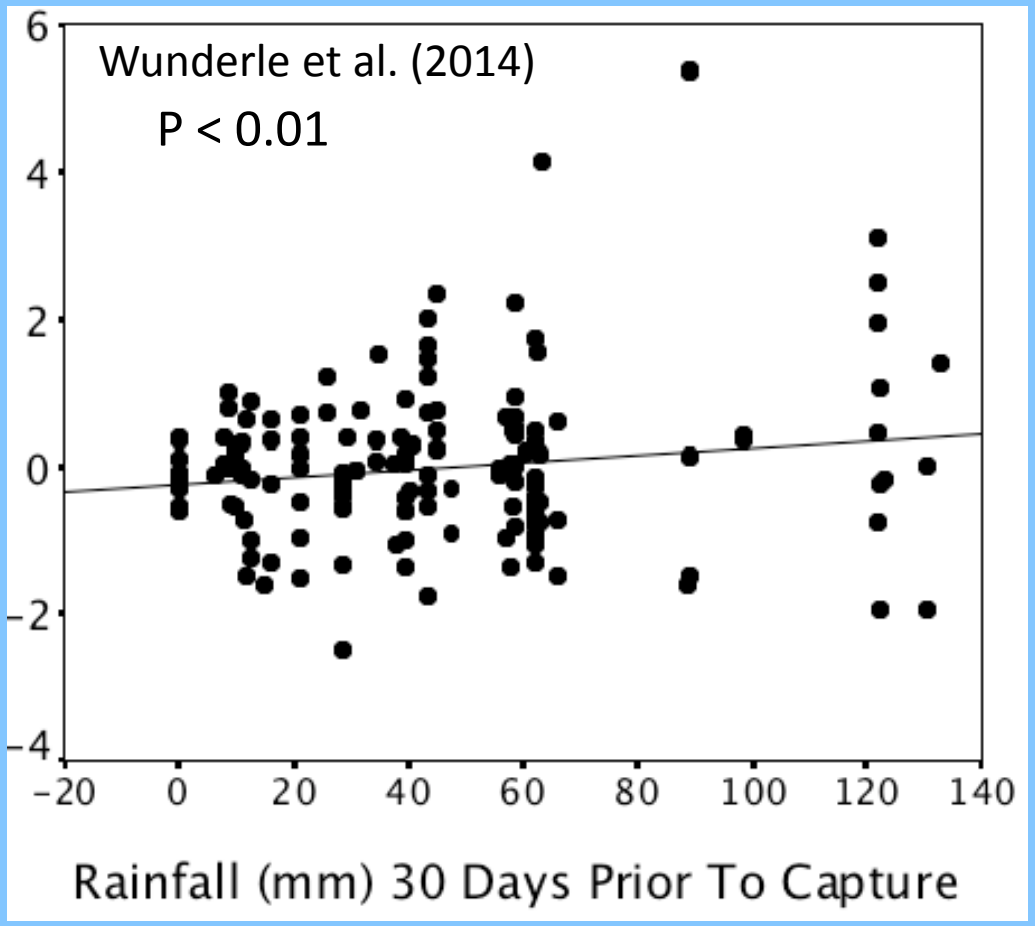
Wunderle et al. (2014)

Expect migrant Kirtland's Warblers wintering in Bahamas to be **sensitive to rainfall**, given fruit & arthropod diet



Wunderle et al. (2010)

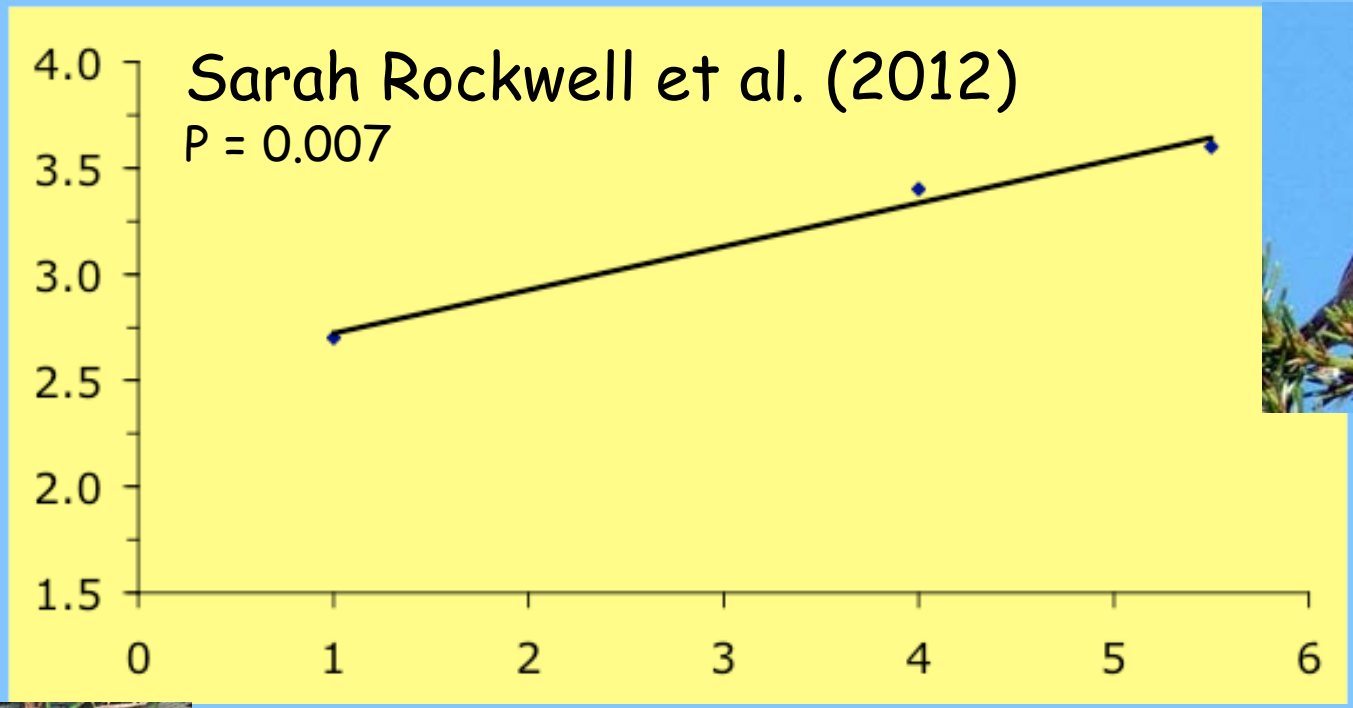
KIWA Body Condition Improves With Mar-April Rain(Corrected Body Mass Increases With Rainfall 30 days prior to capture)



*Residuals from a mixed model regression with covariates: days after 1 March, time after sunrise, 30 day prior rain; sex & age as fixed factors; site by winter interaction as random effect.

Effects of Bahamas March rainfall on KIWAs **carryover** to Michigan breeding grounds:

(More Bahamas March rain = more young/male)*



*Why? More March rain = earlier male arrival in MI

**Female sample sizes inadequate for analyses

Take home message:

Need to understand **carryover** effects

to implement **full life cycle migrant conservation**

Temperate Breeding Grounds

Ovenbird, breeding ground rain

Michigan reproductive success

Summer

Fall migration

Spring migration

Winter

Kirtland's Warbler Wintering ground rain

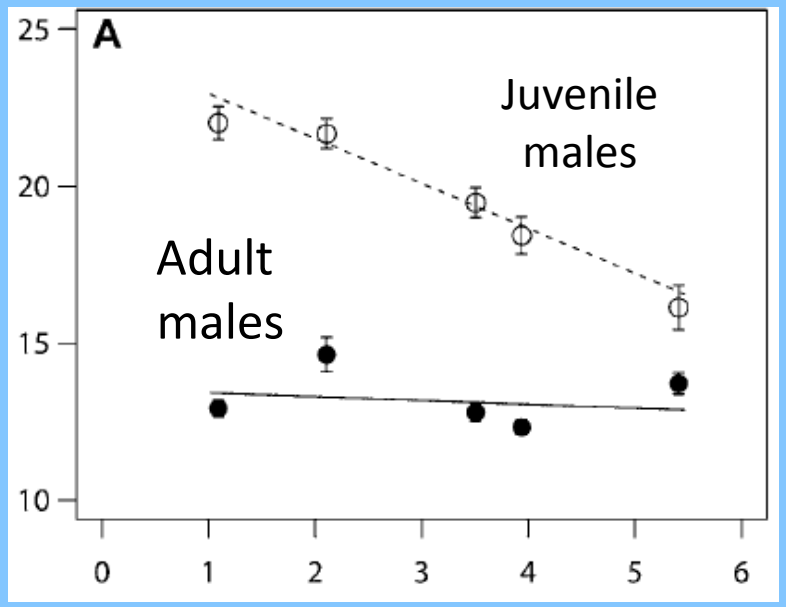
Guánca abundance

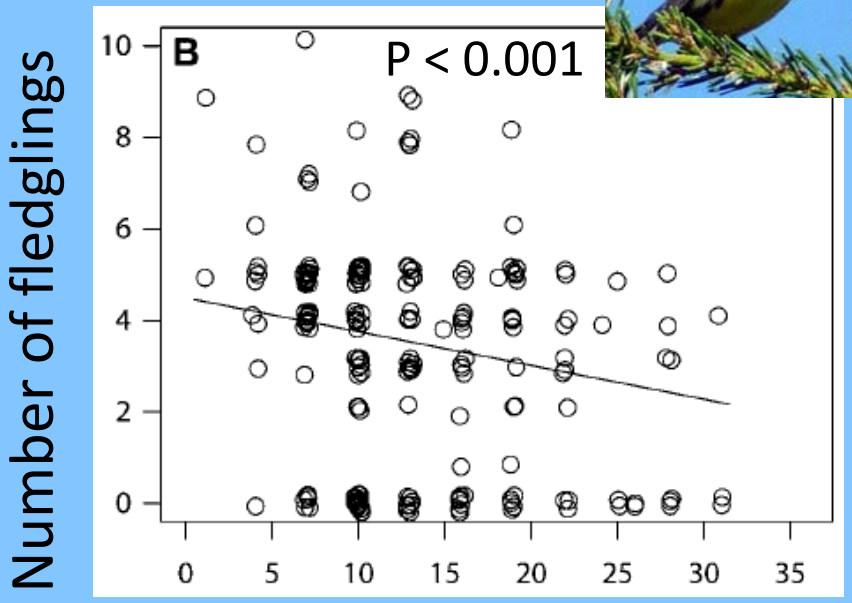
Tropical Wintering Grounds

How does Bahamas March rainfall affect KIWA breeding success?

Wet March: males* arrive early in MI = more fledglings

Dry March: males arrive later in MI = less fledglings





From: Sarah Rockwell et al. (2013)

*Insufficient female samples to measure effects on females

Decline In Winter Resident Captures In Guánica

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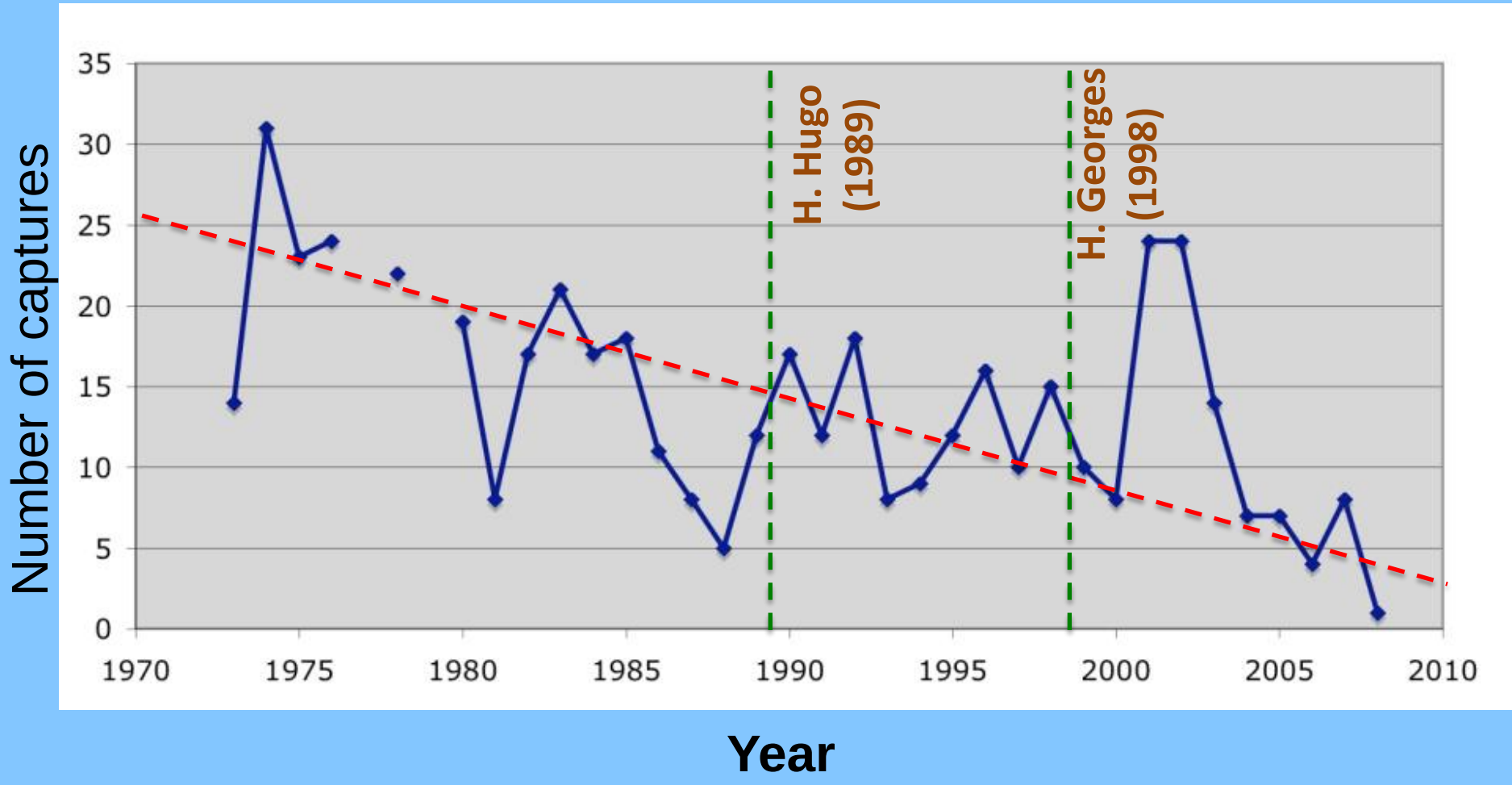
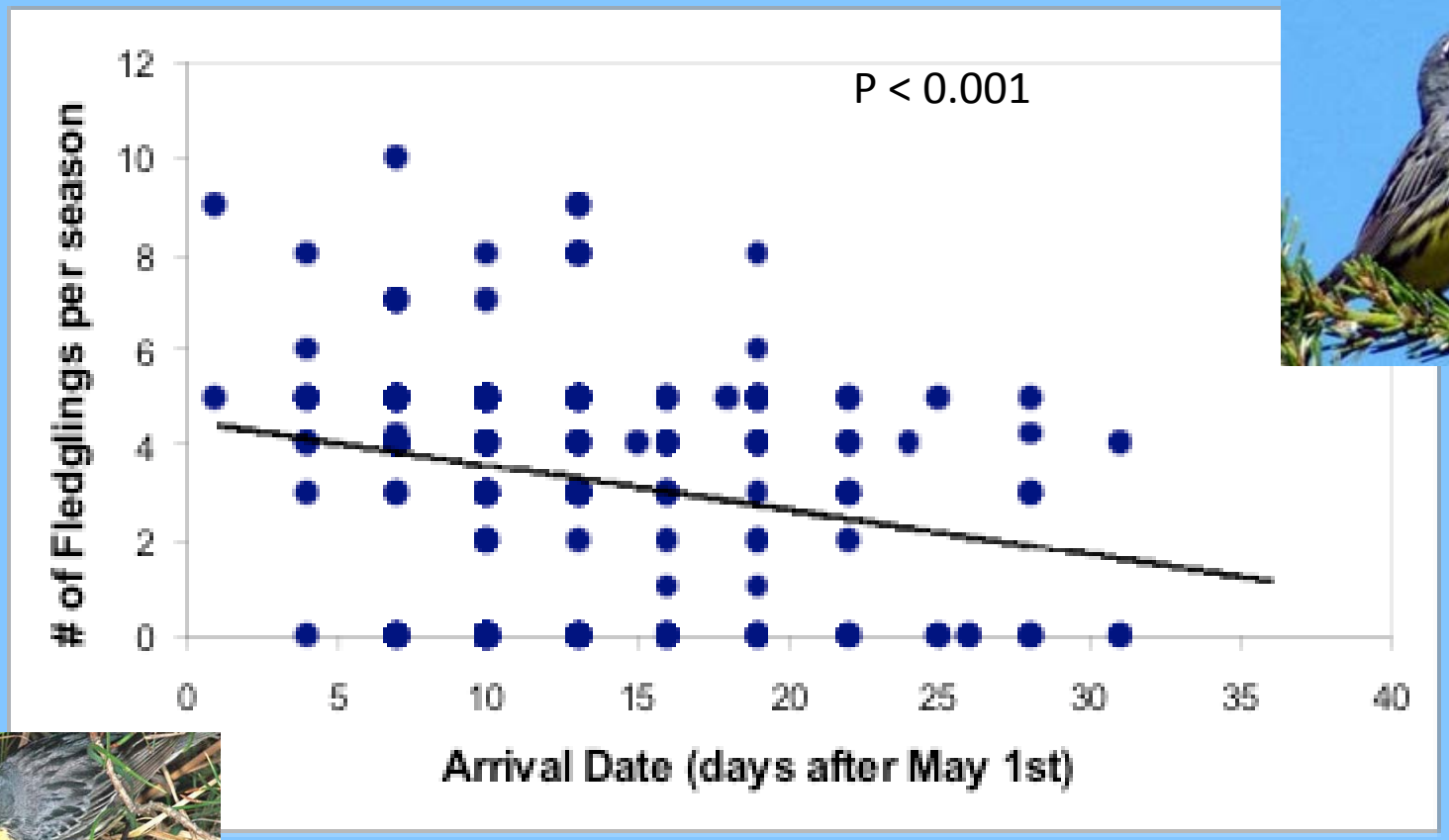
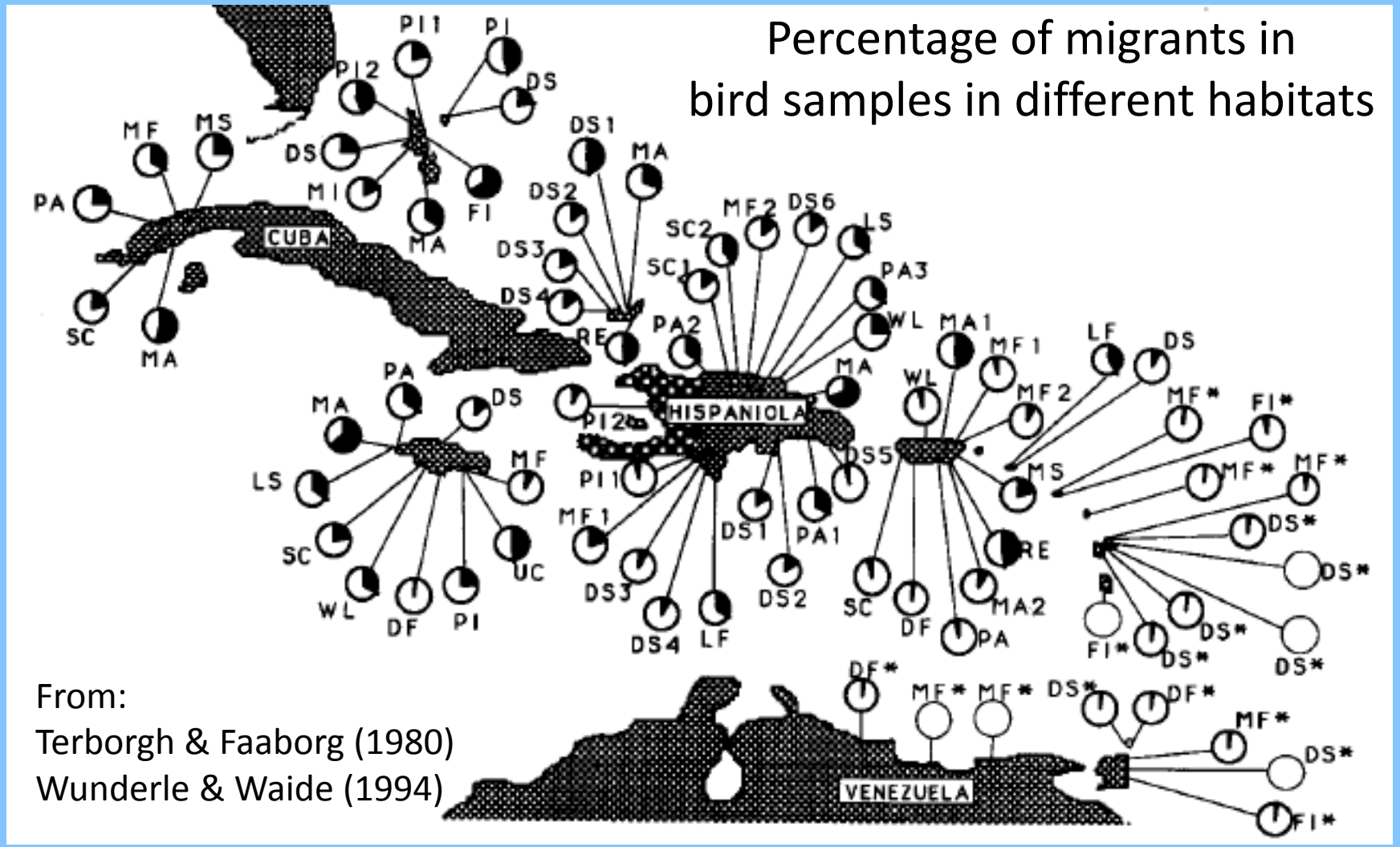


Male* KW arrival date in Michigan breeding grounds affects breeding succcess (Sarah Rockwell et al. 2012)



*Female arrival times unavailable because difficult to observe

Caribbean & Bahamas Are Important Sites For Wintering Nearctic-Neotropical Landbirds



From:
Terborgh & Faaborg (1980)
Wunderle & Waide (1994)

KIWA Corrected Body Mass Varies With Rainfall 30 Days Prior To Capture In March-April

Mixed model regression:
- corrected body mass as dependent variable

Source of Variation	df	t	P
Covariates			
Days after 1 March	142.9	3.08	0.0025
Time after sunrise	150.5	6.41	< 0.0001
Prior 30 day rainfall	133.1	2.35	0.0205
Fixed Effects			
Demographic class (sex & age)	149	-4.57	0.0004
Random effects			
Site x Winter		11.23*	0.0004

*Chi-square

Wunderle et al. (2014)