CLIMATE MEDIATES THE CO
AND BENEFITS OF SITE FIDE
IN A MARINE PREDATOR

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PATRICK ROBINSON, KYLIE SCALES, D
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UNDERSTANDING CHANGES
IN TRANSITIONAL AREAS
OF THE PACIFIC 2018

ANIMAL HABITAT SELECTION STRATEGIES BALANCE NUMEROUS TRADEOFFS

High quality or quantity resources

Search and travel costs

Predation or Competition risk






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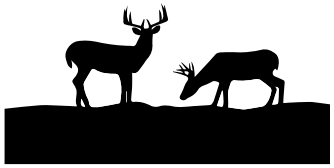
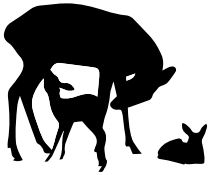
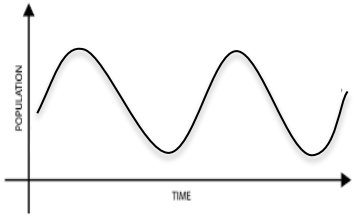
HOW WILL SPECIES RESPOND TO ENVIRONMENTAL CHANGE?

Habitat Selection → Food, Shelter & Mates → Survival & Reproduction → Population Dynamics







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HOW WILL SPECIES RESPOND TO ENVIRONMENTAL CHANGE?

Environmental Change

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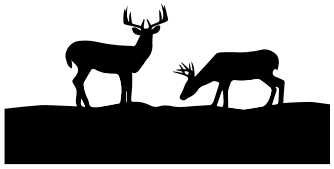

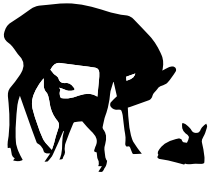

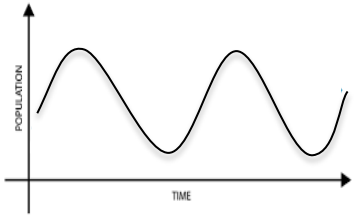

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SITE FIDELITY IS THE REPEATED USE OF THE SAME AREA FOR FORAGING, BREEDING OR SHELTER

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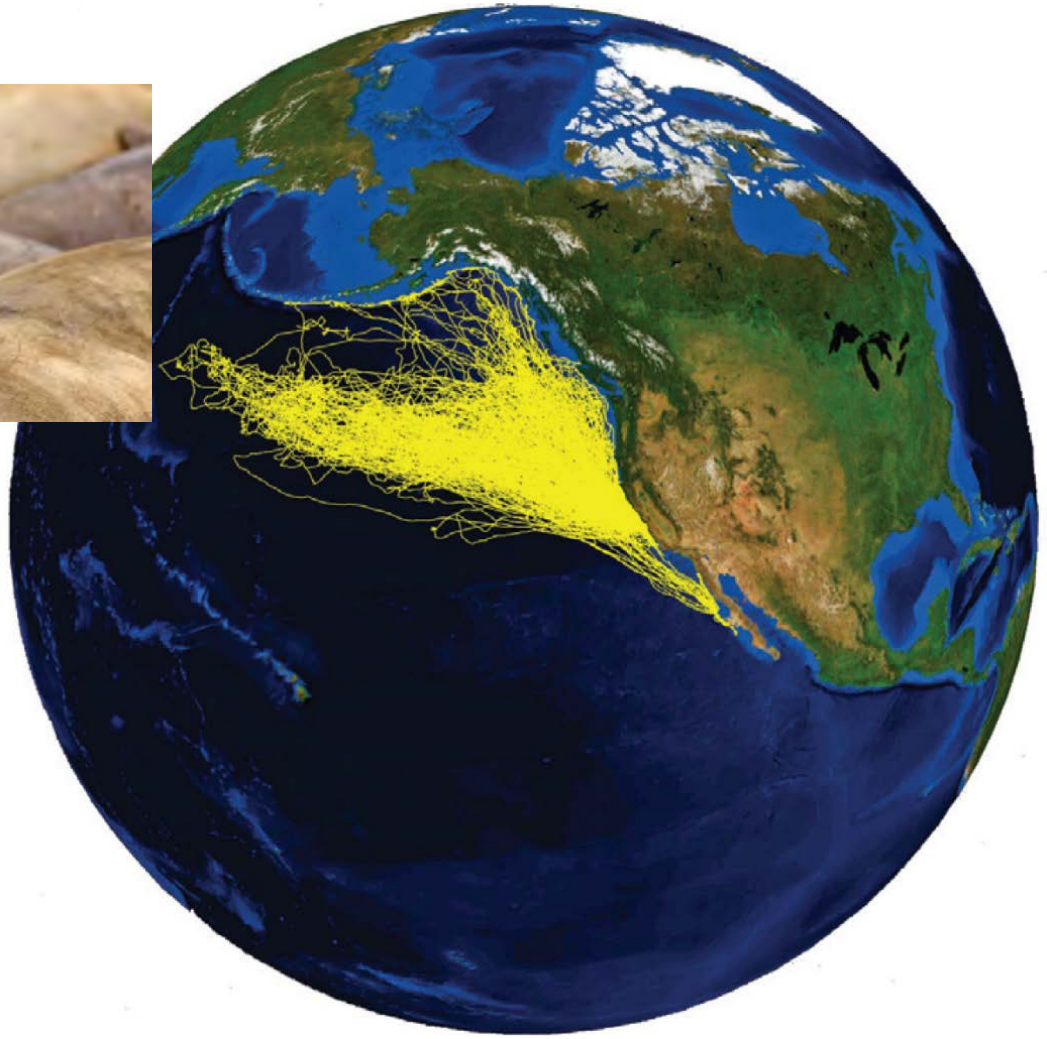
ELEPHANT SEALS DISPLAY INDIVIDUAL SPECIALIZATION IN SITE FIDELITY



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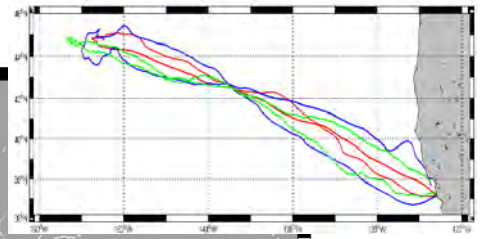

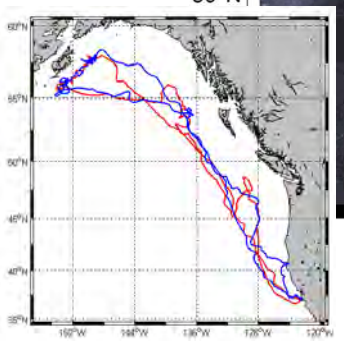

Costa *et al.* 2012,
Ann Rev Ecol Evol Syst

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SITE FIDELITY CAN PROVIDE LONG-TERM BENEFITS IN UNPREDICTABLE ENVIRONMENTS…

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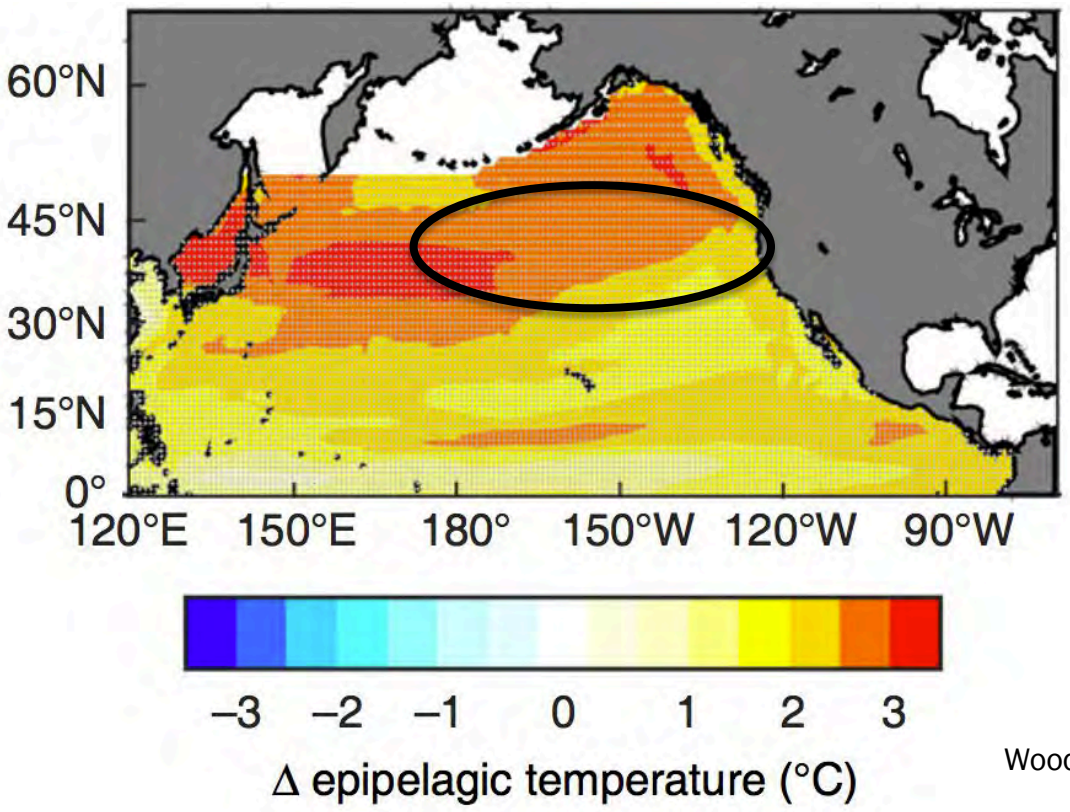
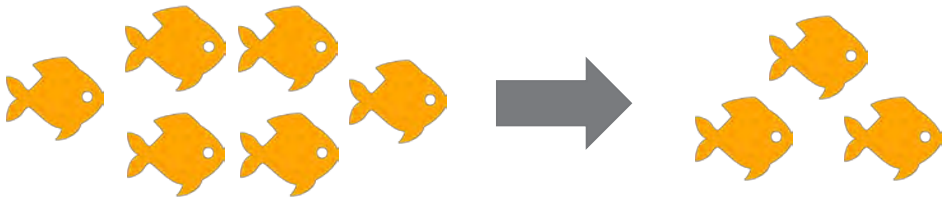
… BUT MAY BE MALADAPTIVE IN ENVIRONMENTS EXPERIENCING CLIMATE CHANGE.



Woodworth-Jefcoats *et al.* 2016, *Global Change Biology*

CHANGING CLIMATE CONDITIONS CAN ALTER…

Abundance



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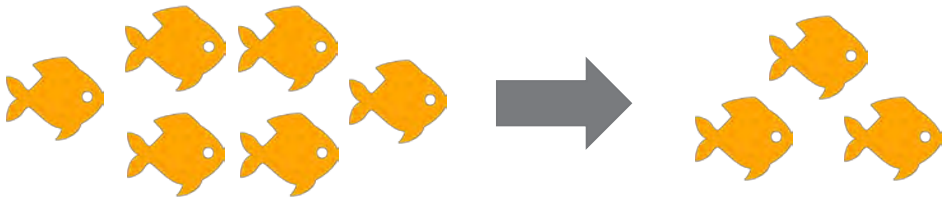
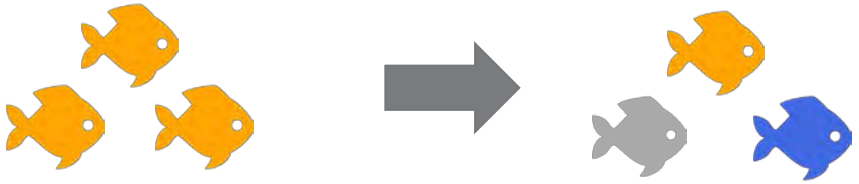


Community composition



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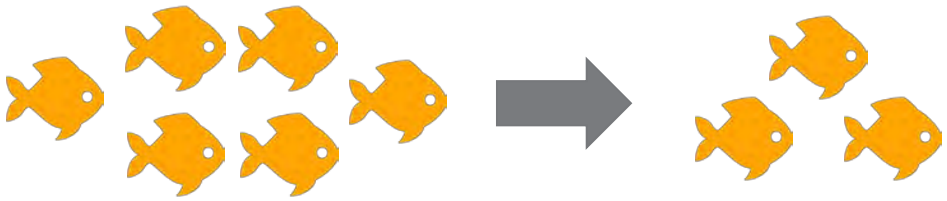

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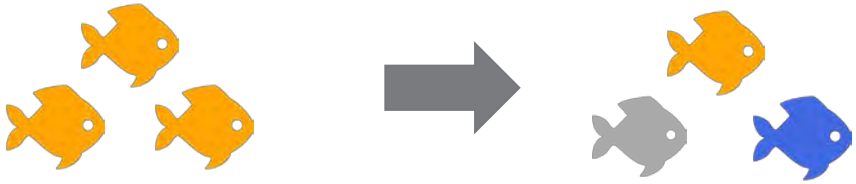
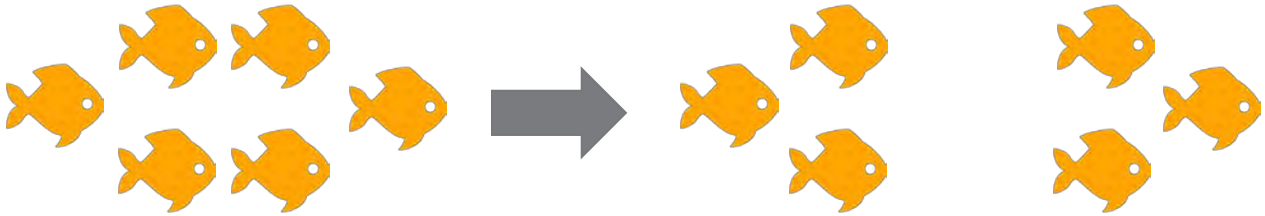


Distribution



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KEY QUESTIONS

Q1: Which strategy wins in the long run?

Q2: How do different environmental conditions affect strategic trade-offs?

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SATELLITE TRACKED 30 ADULT FEMALES OVER MULTIPLE YEARS

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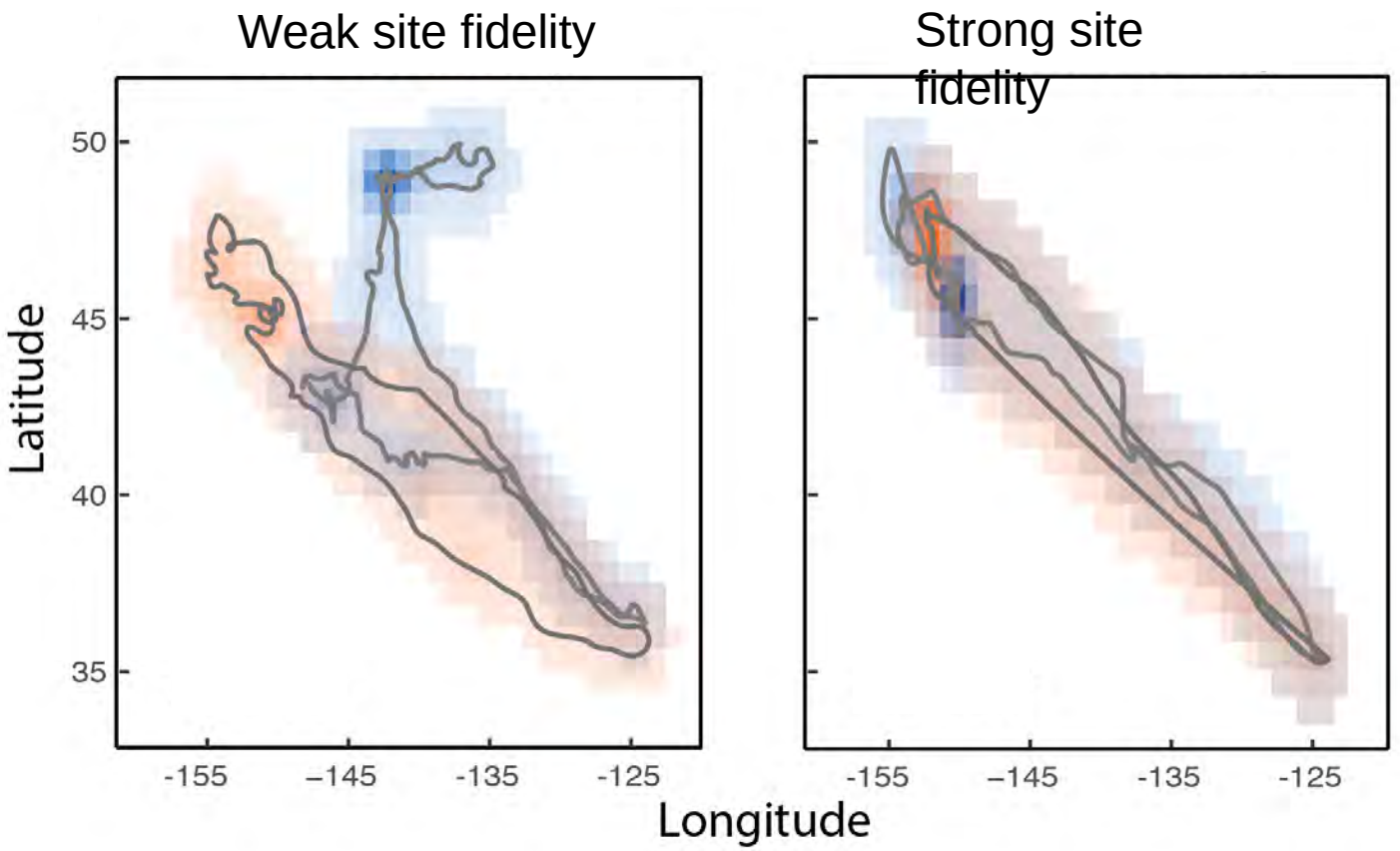
QUANTIFIED SPATIAL CONSISTENCY BETWEEN MIGRATION TRACKS



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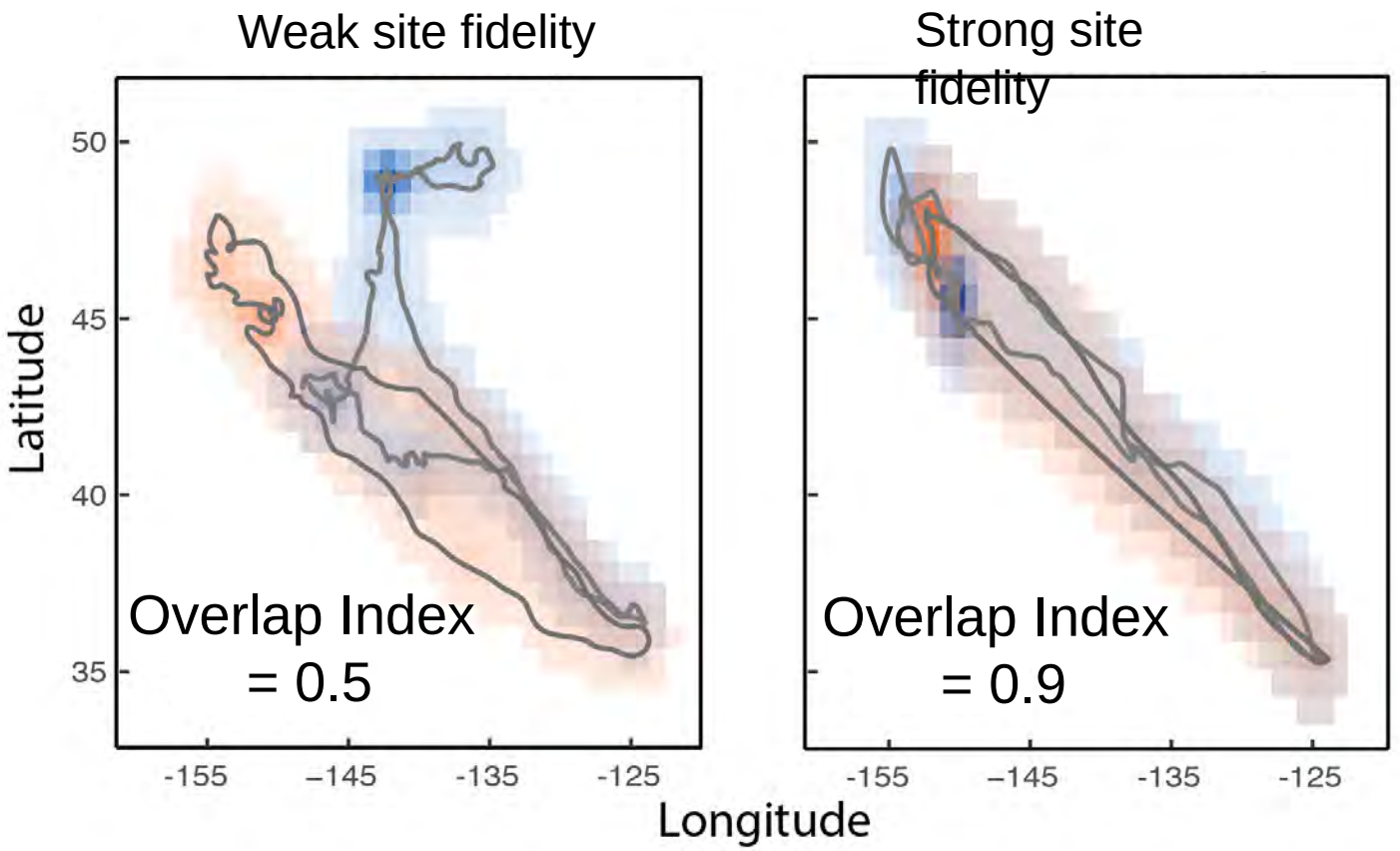

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MEASURED WEIGHT GAINED OVER EACH MIGRATION

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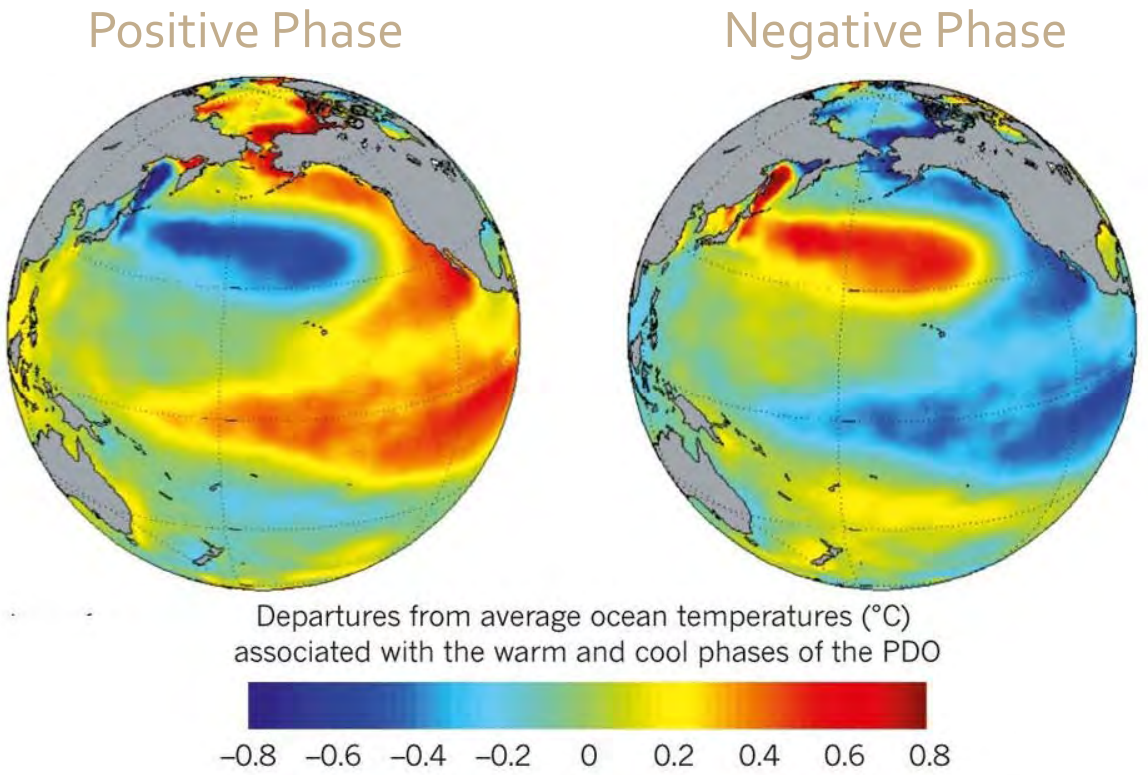
CLIMATE CONDITIONS IN NORTH PACIFIC MEASURED BY PACIFIC DECADAL OSCILLATION INDEX



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THE NORTH PACIFIC CLIMATE IS BECOMING MORE VARIABLE

Global Change Biology

Global Change Biology (2013) 19, 1662–1675, doi: 10.1111/gcb.12165

Increasing variance in North Pacific climate relates to unprecedented ecosystem variability off California

WILLIAM J. SYDEMAN*, JARROD A. SANTORA*, SARAH ANN THOMPSON*, BALDO MARINOVIC† and EMANUELE DI LORENZO‡

nature climate change

LETTERS

PUBLISHED ONLINE: 24 JULY 2017 | DOI: 10.1038/NCLIMATE3351

Continued increase of extreme El Niño frequency long after 1.5 °C warming stabilization

Guojian Wang[1,2], Wenju Cai[1,2]*, Bolan Gan[1], Lixin Wu[1]*, Agus Santoso[2,3], Xiaopei Lin[1], Zhaohui Chen[1] and Michael J. McPhaden[4]

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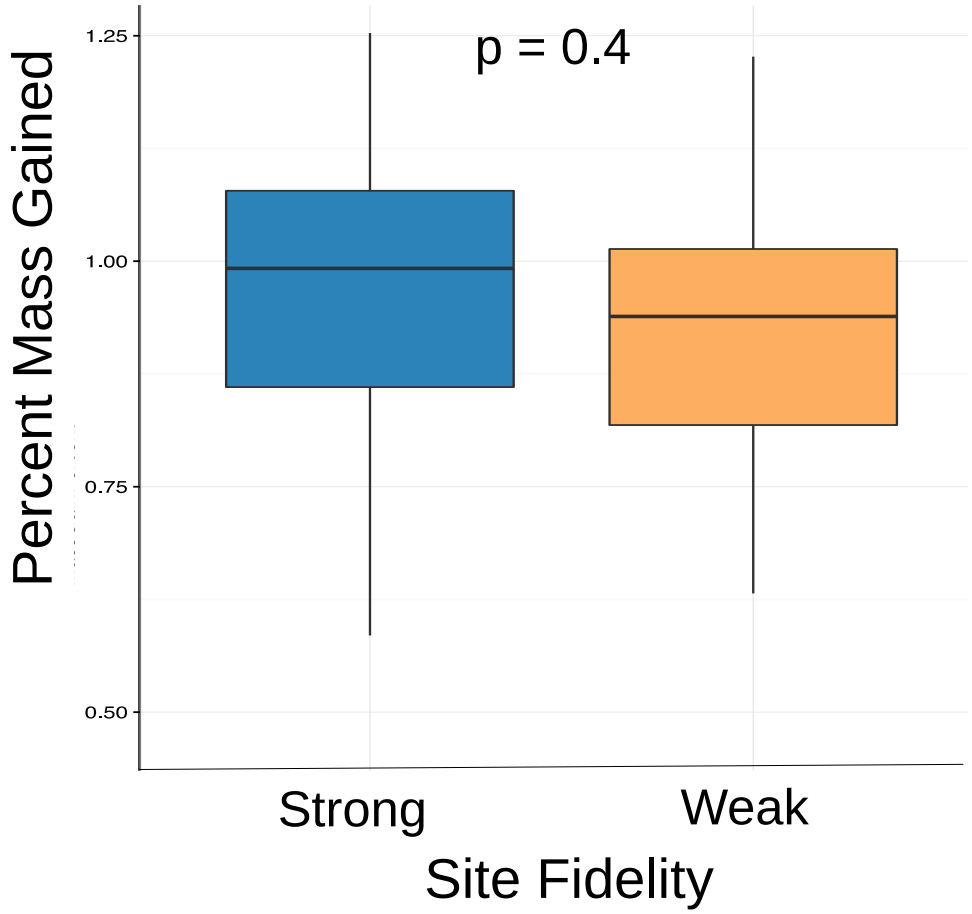
OVER 10-YEAR PERIOD, STRATEGIES BALANCE OUT



Abrahms *et al.* 2018, *Ecology Letters*

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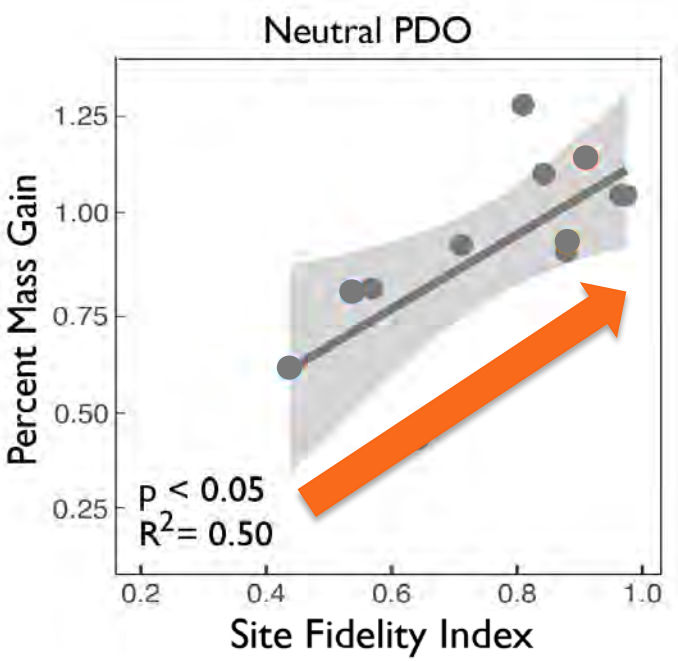
CLIMATE CONDITIONS IMPACT THE RELATIVE SUCCESS OF SITE FIDELITY STRATEGIES



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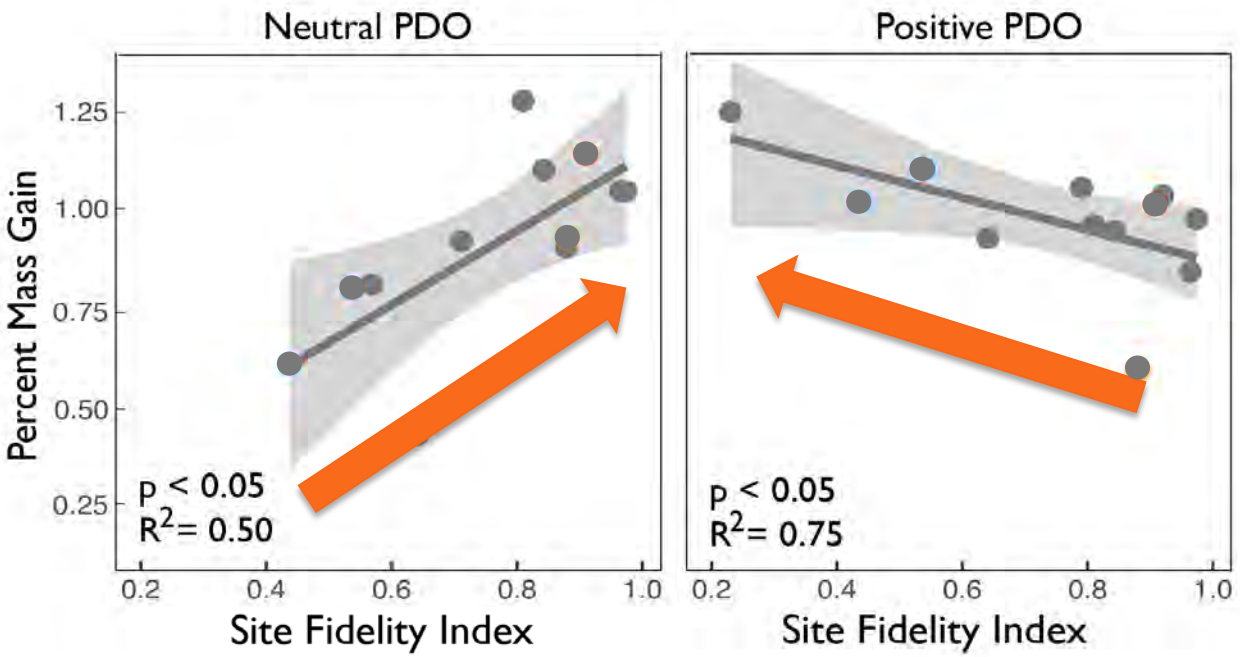

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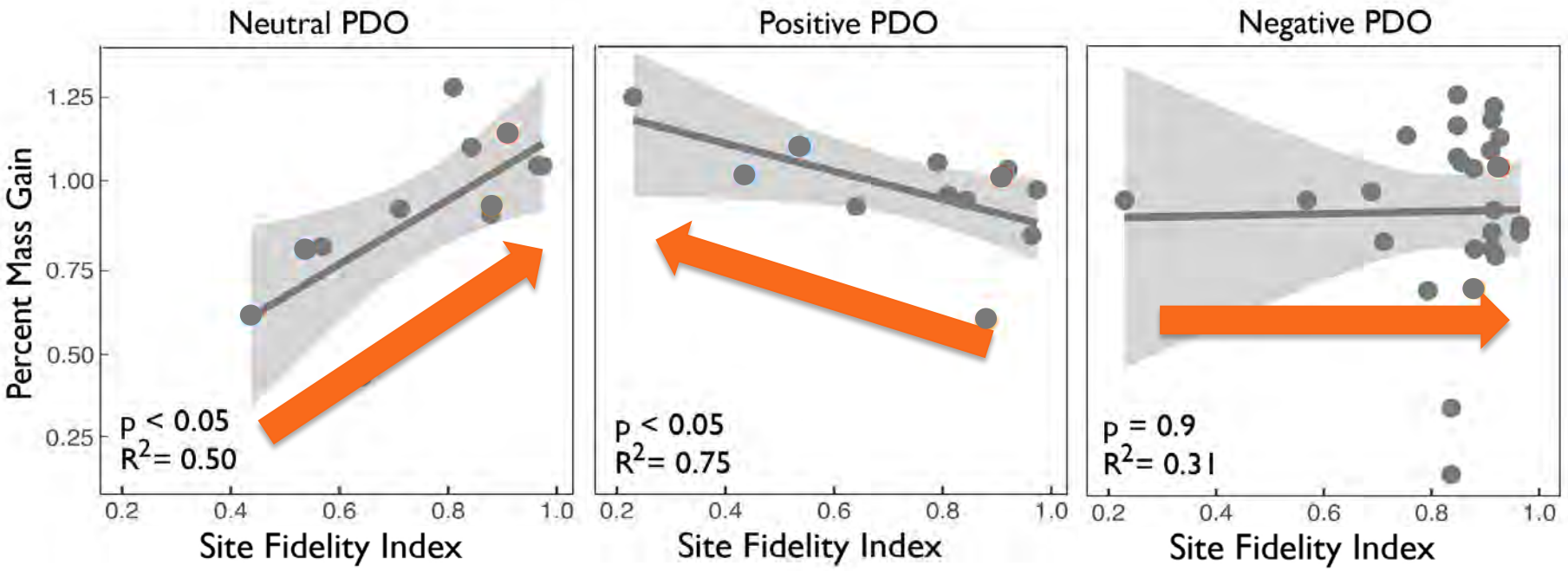

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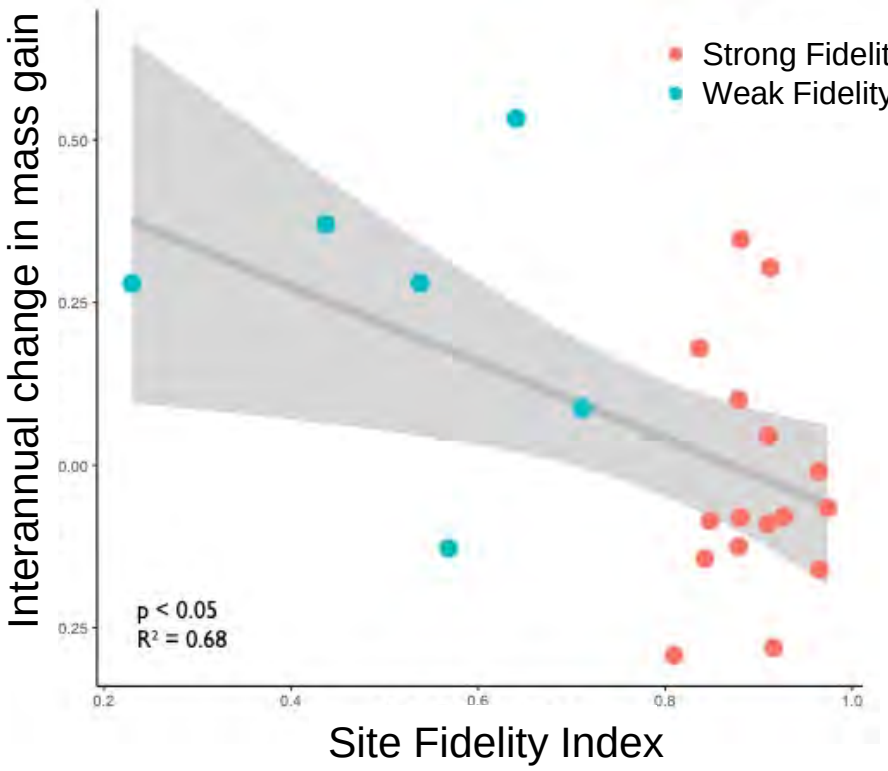
INDIVIDUALS WITH STRONG FIDELITY HAD MORE CONSISTENT WEIGHT GAIN BETWEEN YEARS



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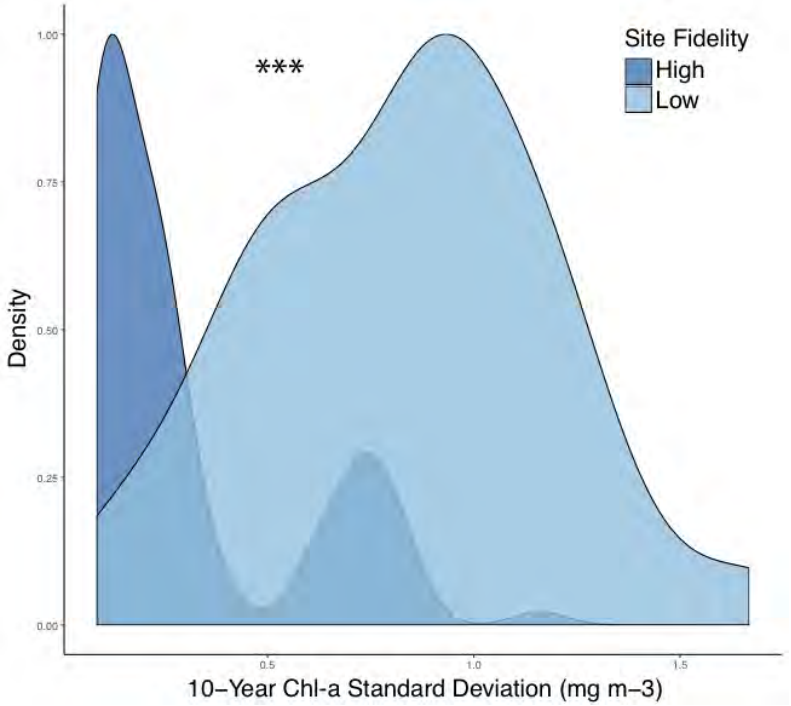
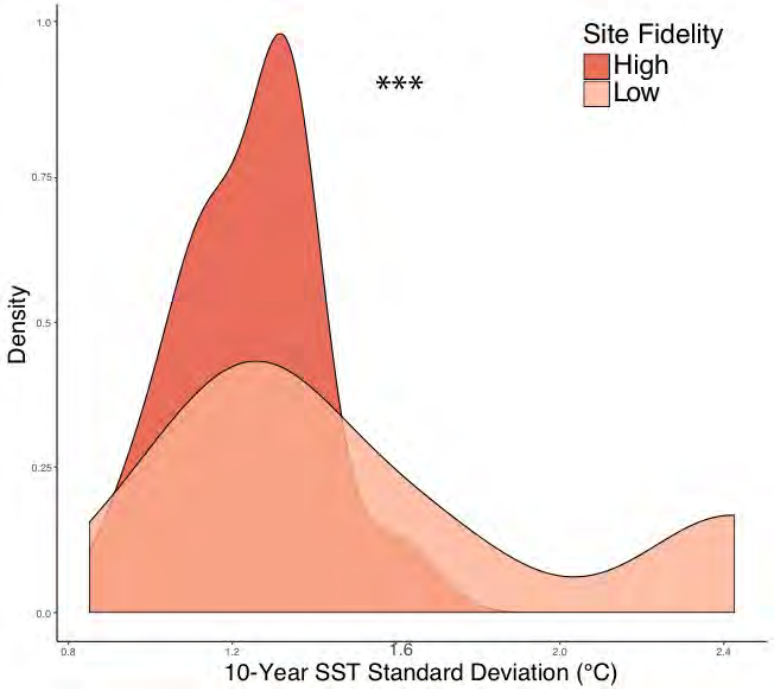
INDIVIDUALS WITH STRONG FIDELITY USED AREAS WITH GREATER HABITAT STABILITY



Stable ⟷ Variable



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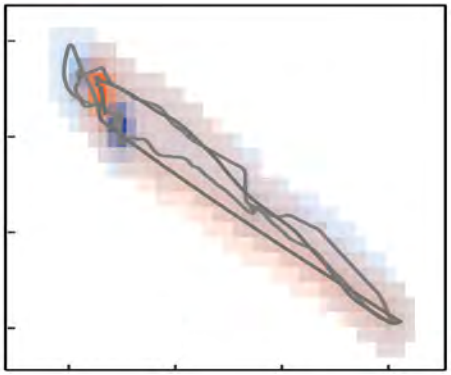
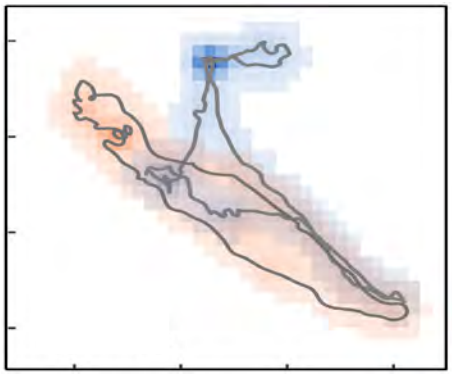
IN SUMMARY…

Strong site fidelity



Stable rewards & habitat

Weak site fidelity



Variable rewards & habitat

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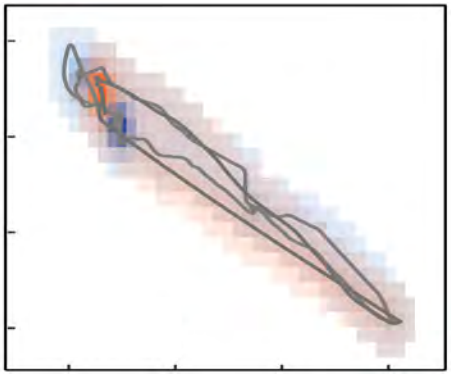
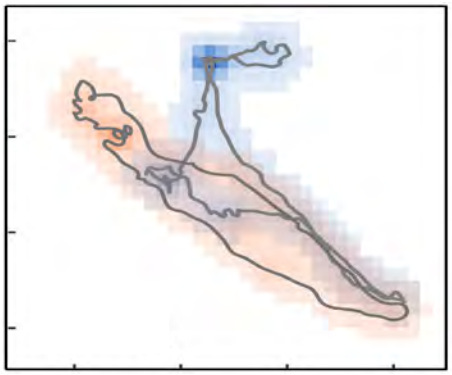


Stable rewards & habitat

Best in average climates

Weak site fidelity



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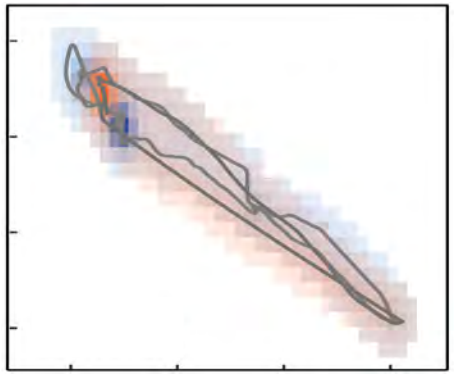

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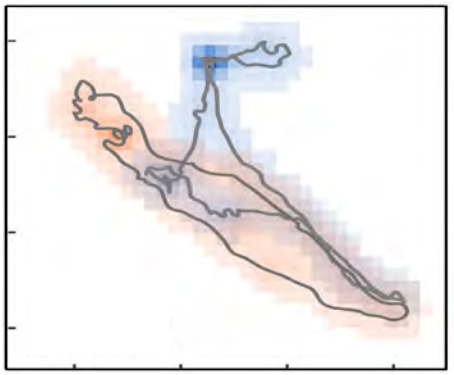

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Adaptive under past stable conditions?

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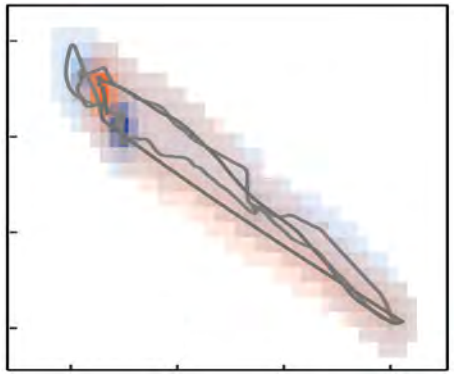

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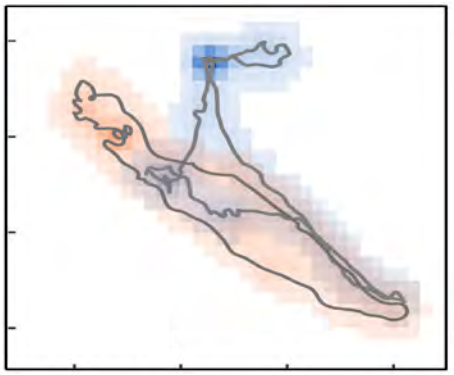

Variable rewards & habitat

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Adaptive under increasingly variable conditions?

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NOAA FISHERIES

GTOPP Global Tagging of Pelagic Predators

UNIVERSITY OF CALIFORNIA SANTA CRUZ

THANK YOU!

THANKS TO: ELLIOTT HAZEN, STEVEN BOGRAD, JUSTIN BRASHARES, PATRICK ROBINSON, KYLIE SCALES, AND DANIEL CROCKER

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