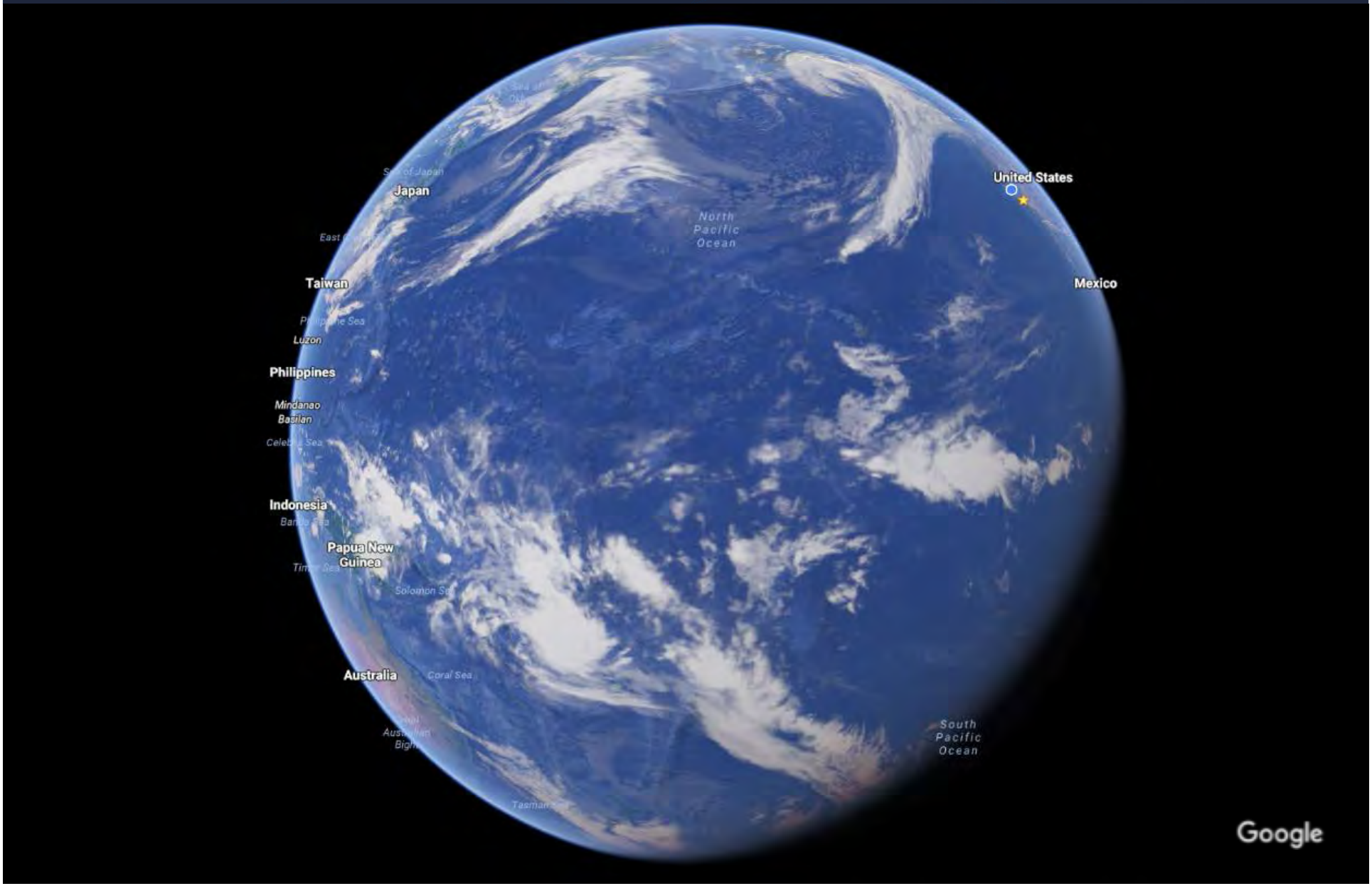
BASELINE CHARACTERIZATION OF THE NORTH COAST'S MARINE ENVIRONMENT USING SEABIRD REPRODUCTION, FORAGING EFFORT, AND DIET

Stephanie R. Schneider, Richard T. Golightly, Eric T. Nelson, Ken Griggs, Daniel C. Barton

North Coast MPA Baseline Monitoring Symposium—Eureka, CA

IMPORTANCE OF INDICATORS IN THE MARINE SYSTEM



IMPORTANCE OF INDICATORS IN THE MARINE SYSTEM

- Baseline characterization
  Including natural variability
- Rapidly detect change
- Identify cause of change

SEABIRDS AS INDICATORS

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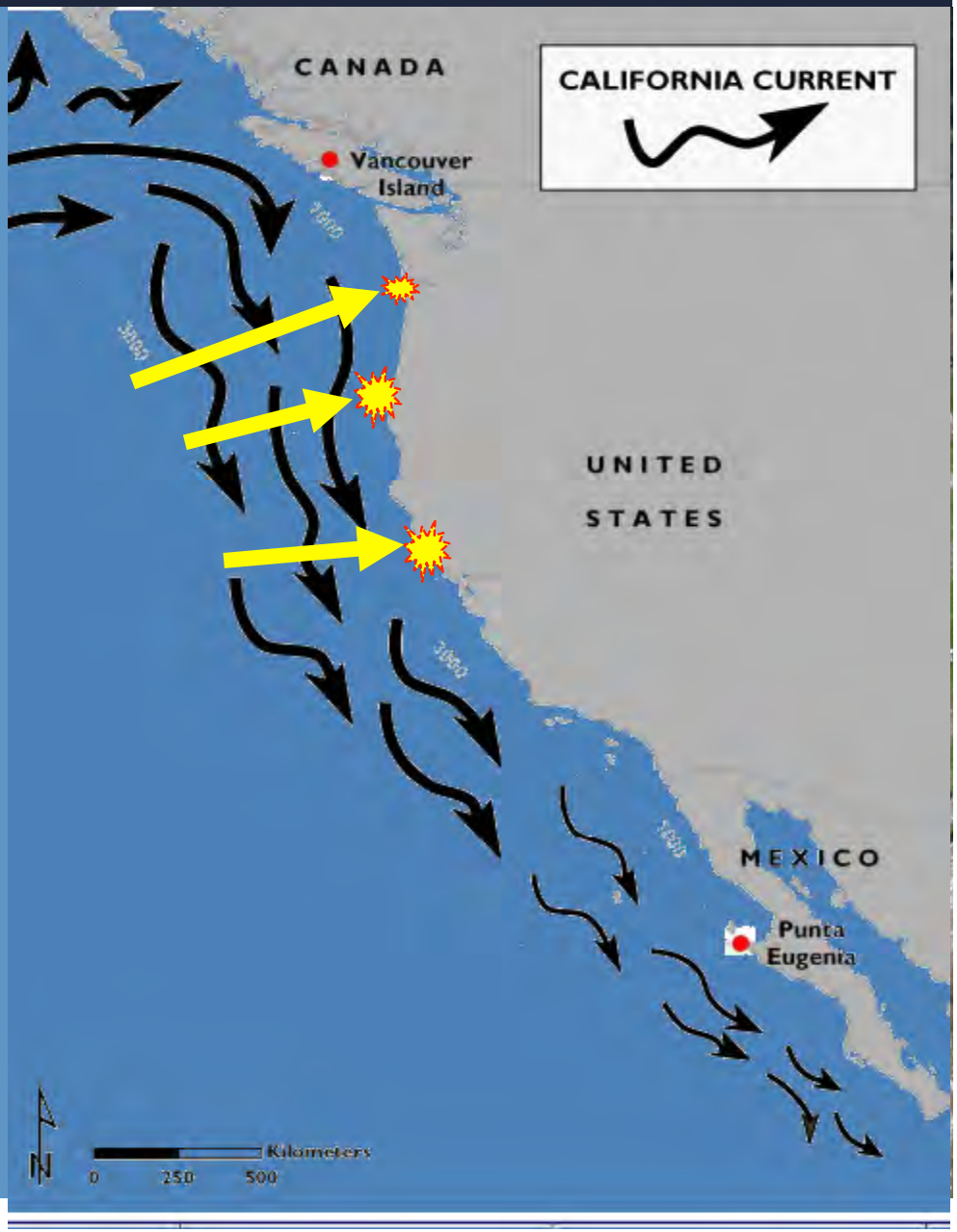
SEABIRDS AS INDICATORS



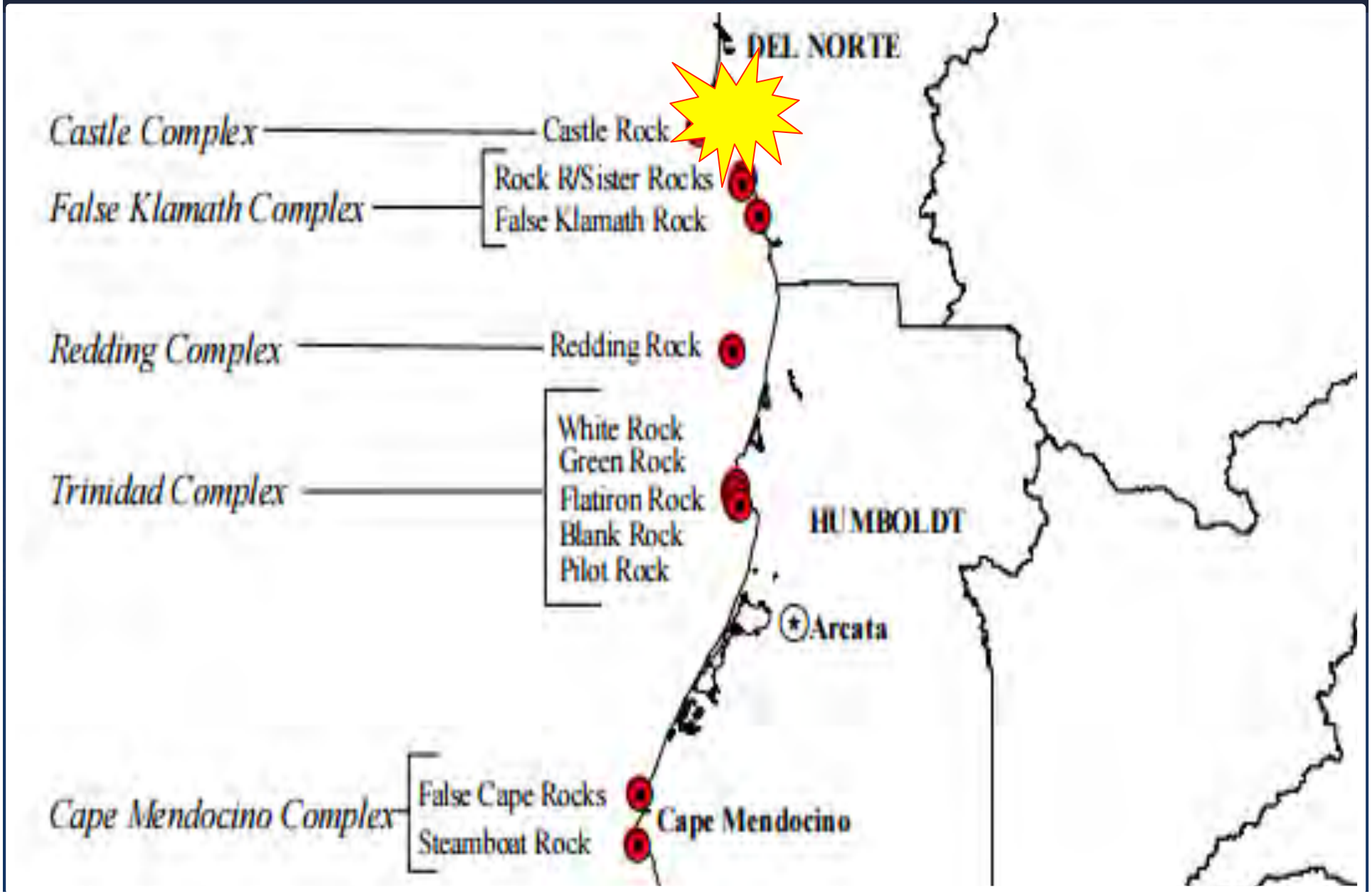
SEABIRDS AS INDICATORS

SEABIRDS AS INDICATORS

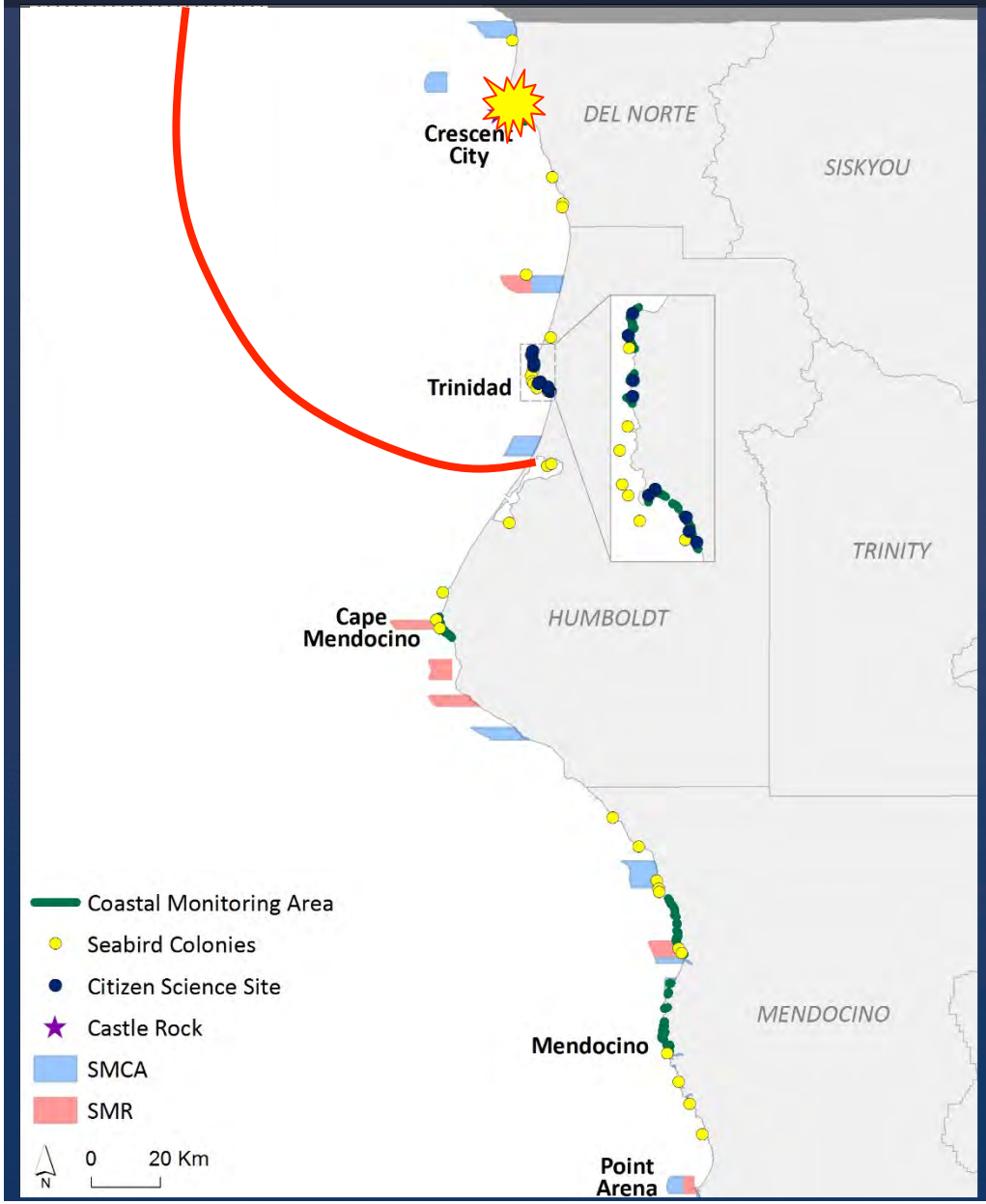
SEABIRDS AS INDICATORS

NOTE: This is NOT a north coast breeding seabird

SEABIRD COLONIES ALONG THE NORTH COAST



CASTLE ROCK'S PROXIMITY TO MPA'S



- MPA impacts
  - Direct → protection of nesting habitat
  - Indirect → enhancement of prey communities

CASTLE ROCK NATIONAL WILDLFE REFUGE

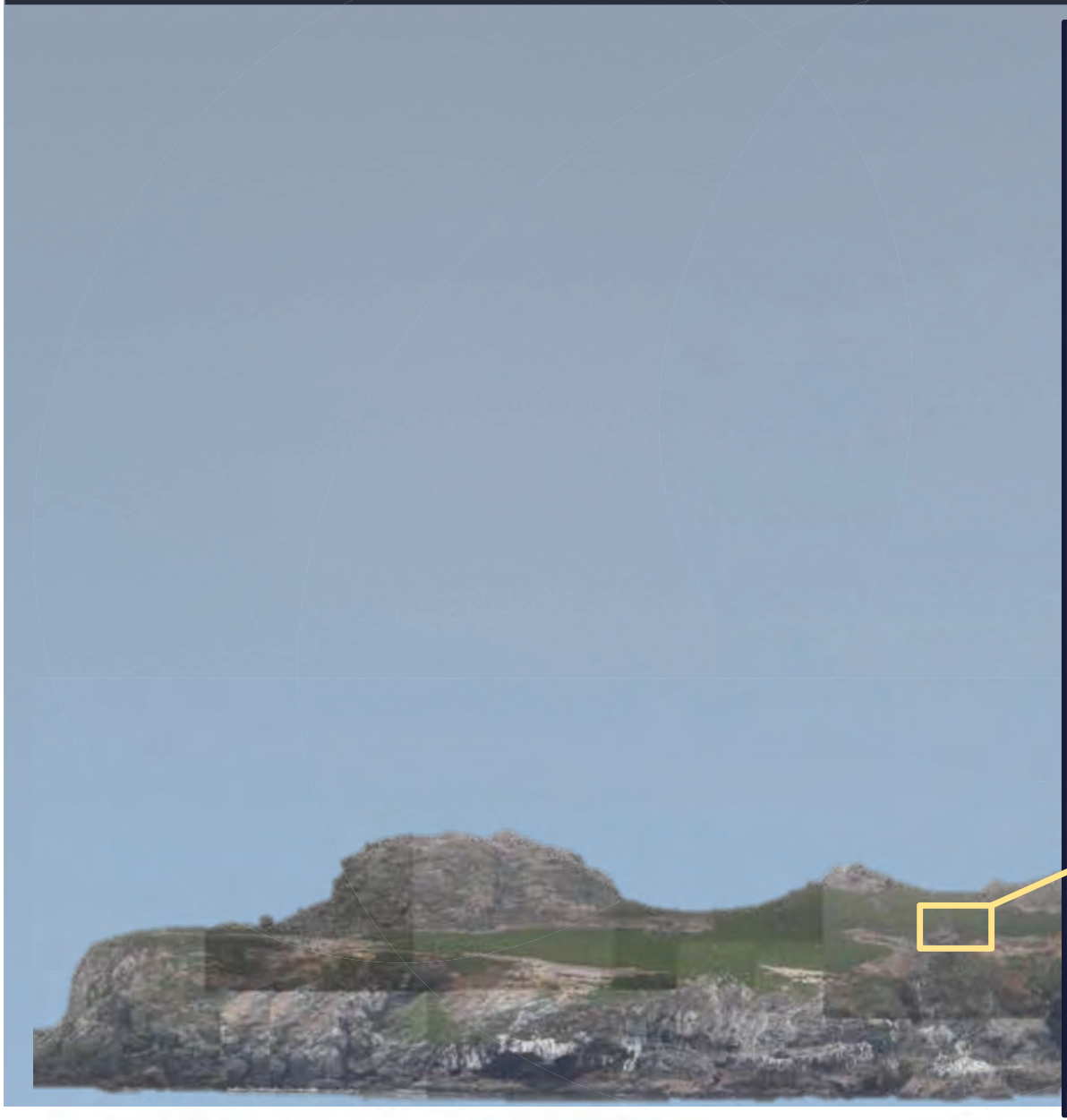
WHY COMMON MURRE?

- Well studied
- Abundance, reproduction, foraging effort, and diet reflect marine conditions

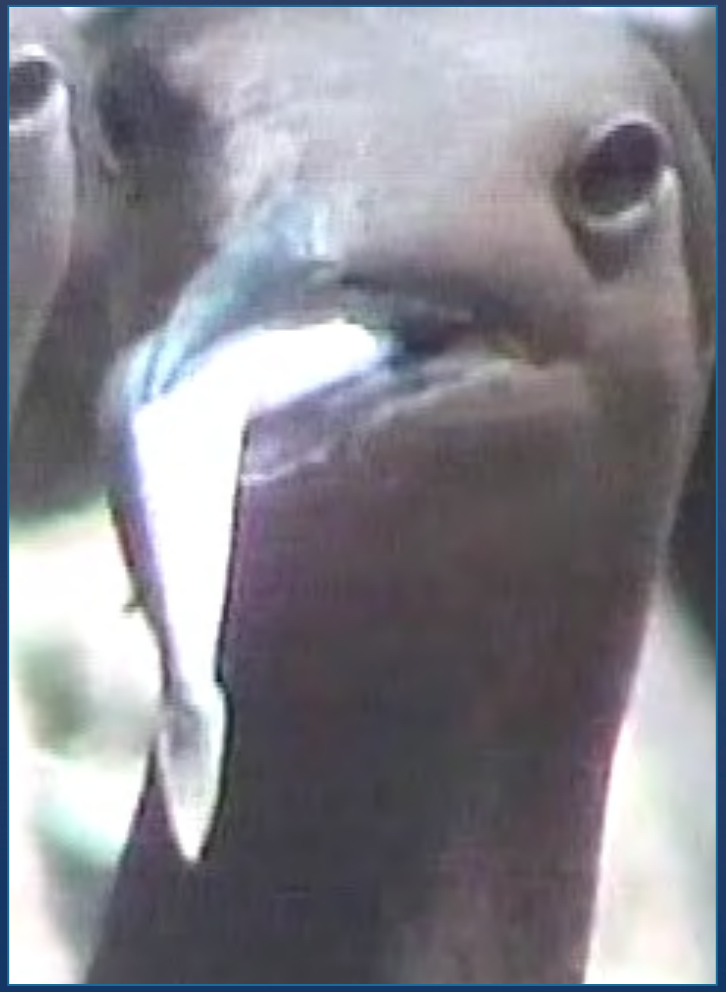
WHY COMMON MURRE?

- Well studied
- Abundance, reproduction, foraging effort, and diet reflect marine conditions
- Circumpolar distribution, facilitates comparisons

MAKING OBSERVATIONS AT CASTLE ROCK

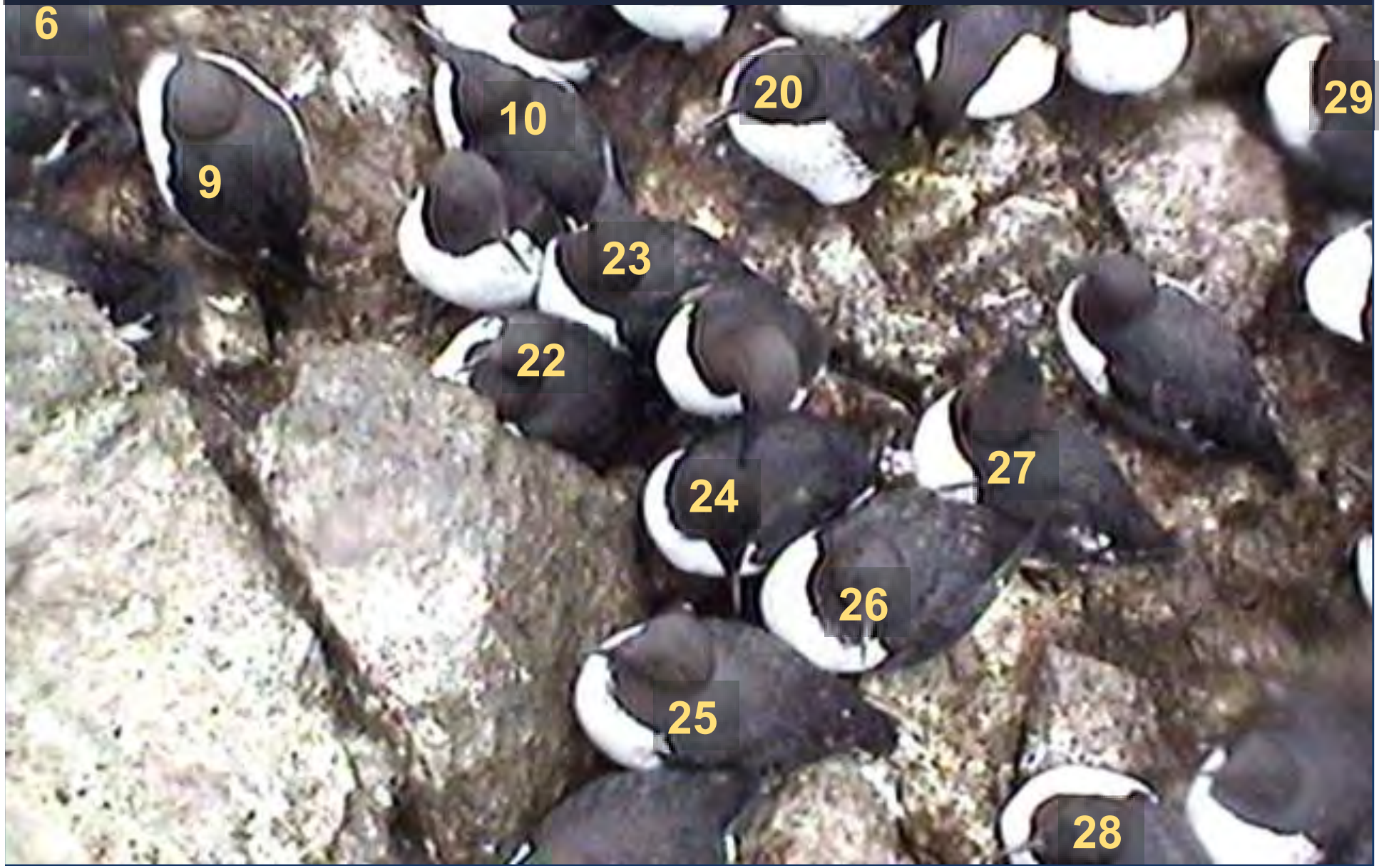


EXPERIMENTAL DESIGN

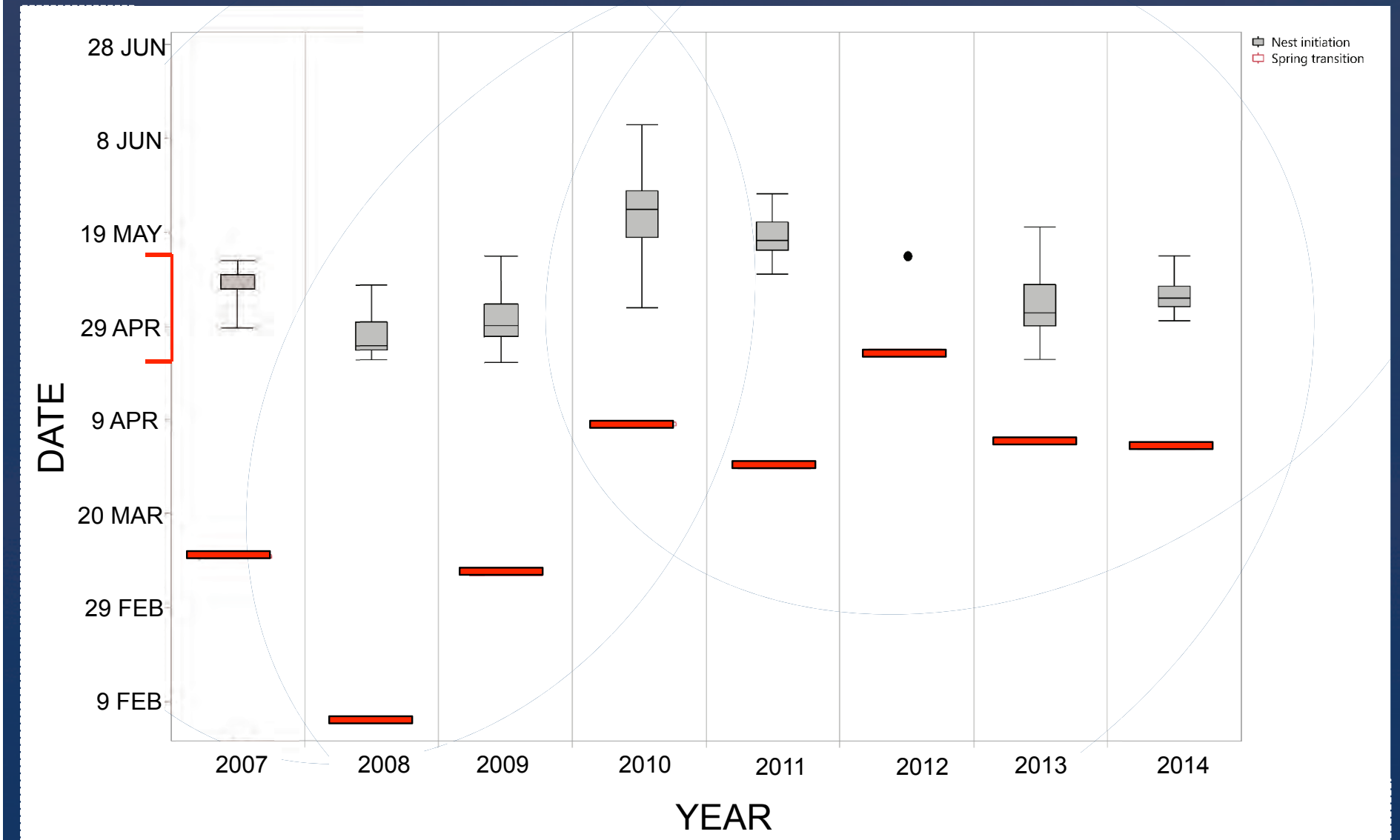


- Long-term year study
  - 2007 to present
- Reproductive success
  - 872 nests
- Foraging effort
  - 103 chick-rearing pairs
- Chick diet
  - 3855 prey

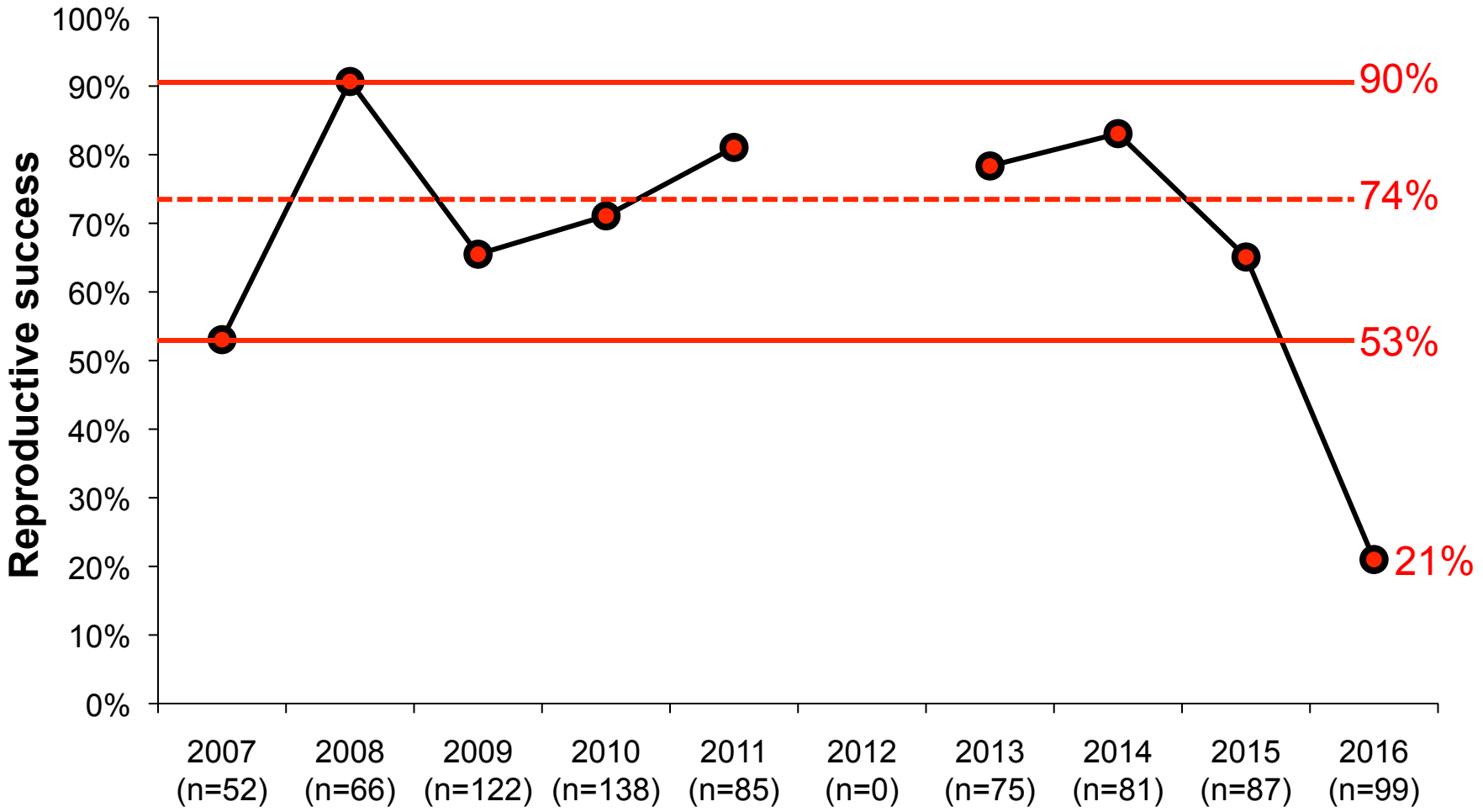
NEST SURVEYS



NEST INITIATION



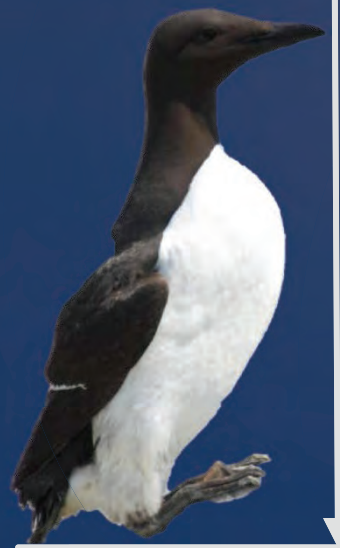
REPRODUCTIVE SUCCESS



IN GENERAL…..

RELATIONSHIP BETWEEN TIME ALLOCATION AND FORAGING EFFORT

Food availability

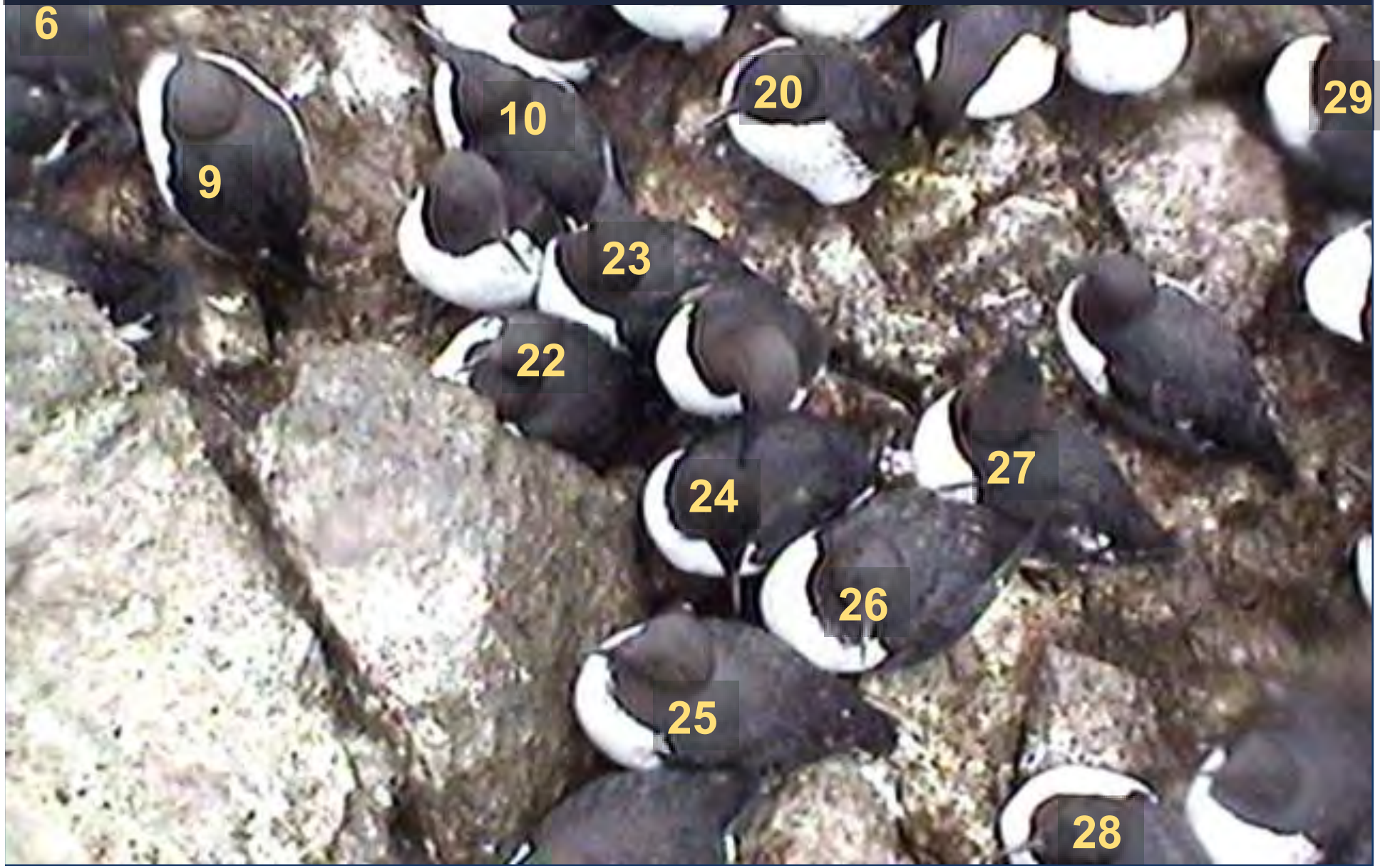


Flexible time allocation during chick rearing

- Co-attendance
- Unattended chicks

Fledging success

TIME ALLOCATION SURVEYS



CHICK DIET

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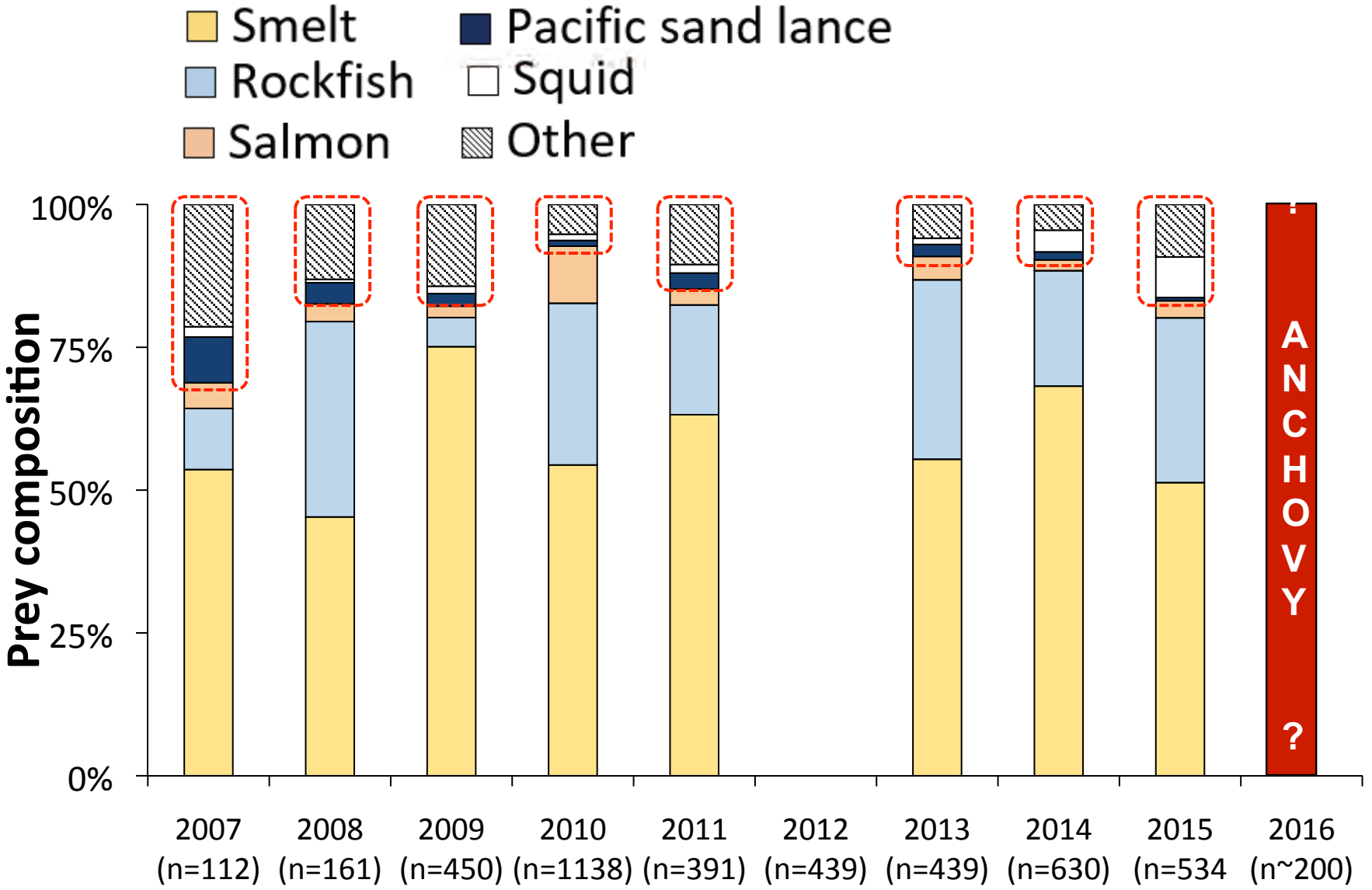
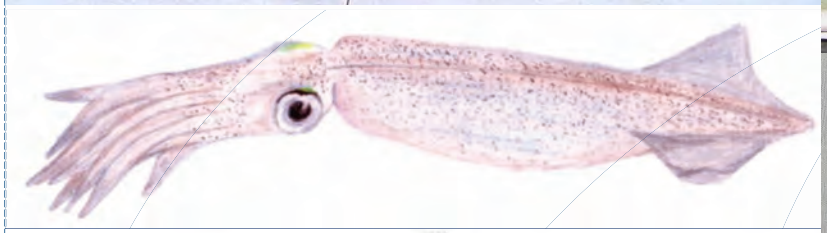
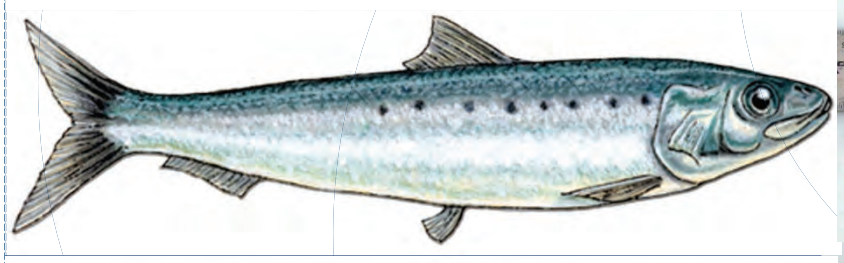

Smelt
Pacific sand lance
Rockfish
Squid
Salmon
Other
Prey composition
100%
75%
50%
25%
0%
ANCHOVY ?
2007 (n=112)
2008 (n=161)
2009 (n=450)
2010 (n=1138)
2011 (n=391)
2012 (n=439)
2013 (n=439)
2014 (n=630)
2015 (n=534)
2016 (n~200)









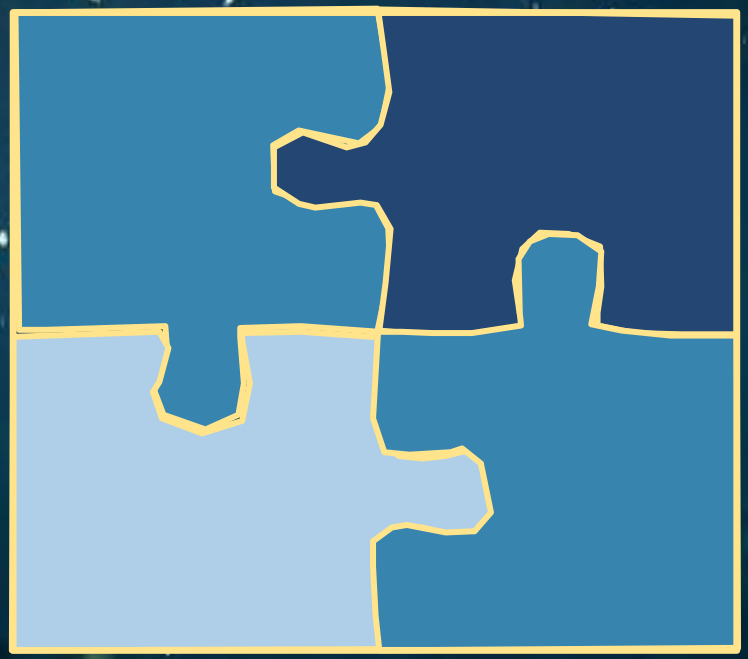




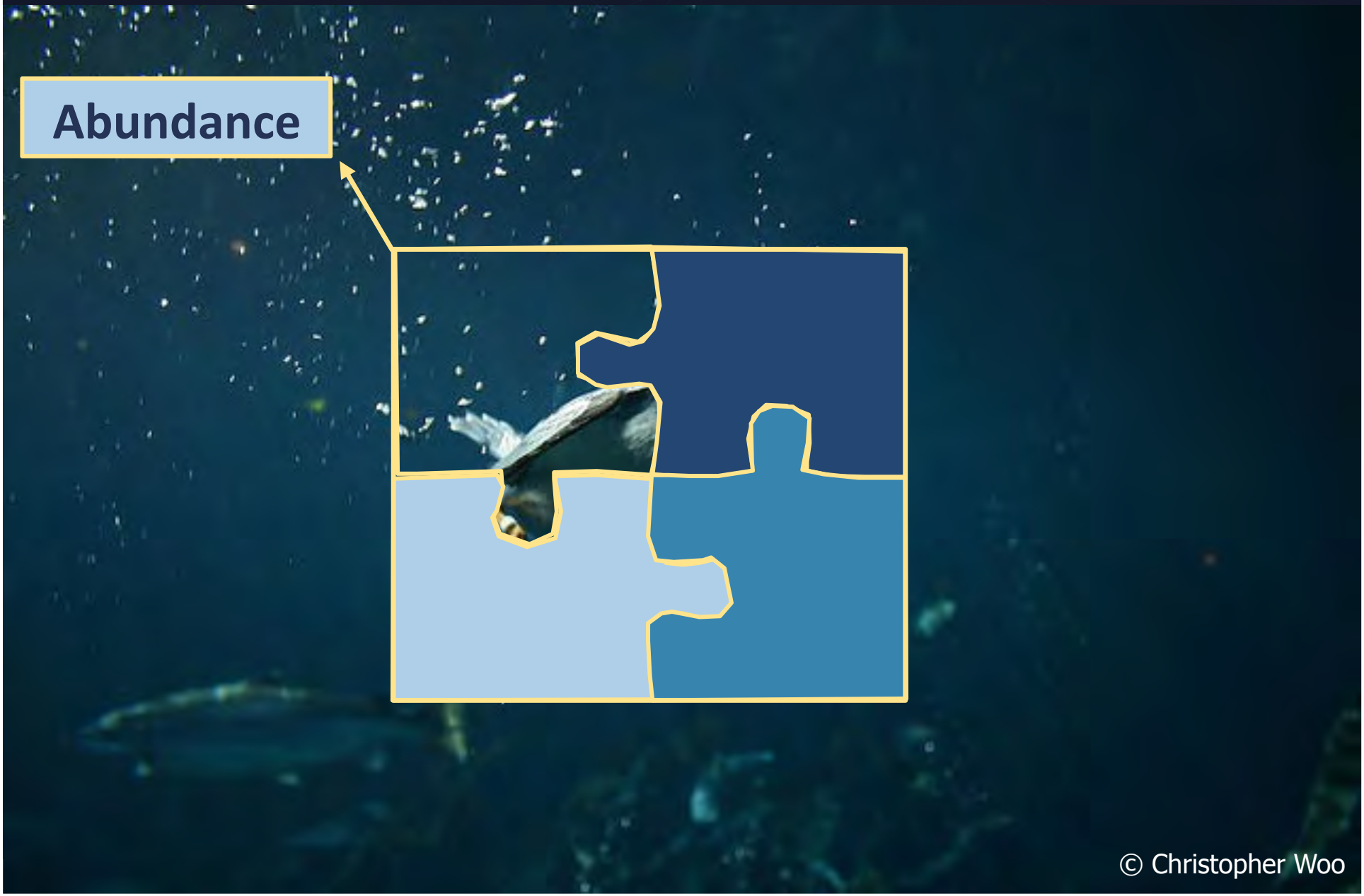




SEABIRD OBSERVATIONS & MARINE CONDITIONS



SEABIRD OBSERVATIONS & MARINE CONDITIONS



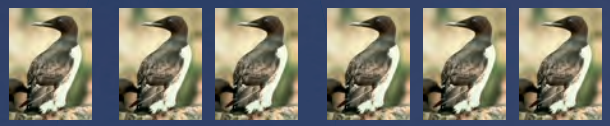
SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Broad-scale variation in seabird populations
  - Can be measured at many locations at once
- Cons
  - lag between marine changes and altered abundance for long-lived species

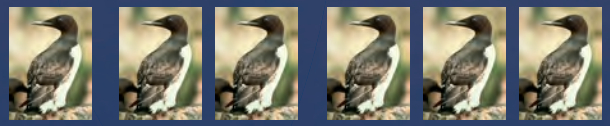
SEABIRD OBSERVATIONS & MARINE CONDITIONS

Assume long-lived (20+)
Assume reproductive failure

 = 100,000

Year 1  = 600,000

Year 2  = 600,000

Year 3  = 600,000

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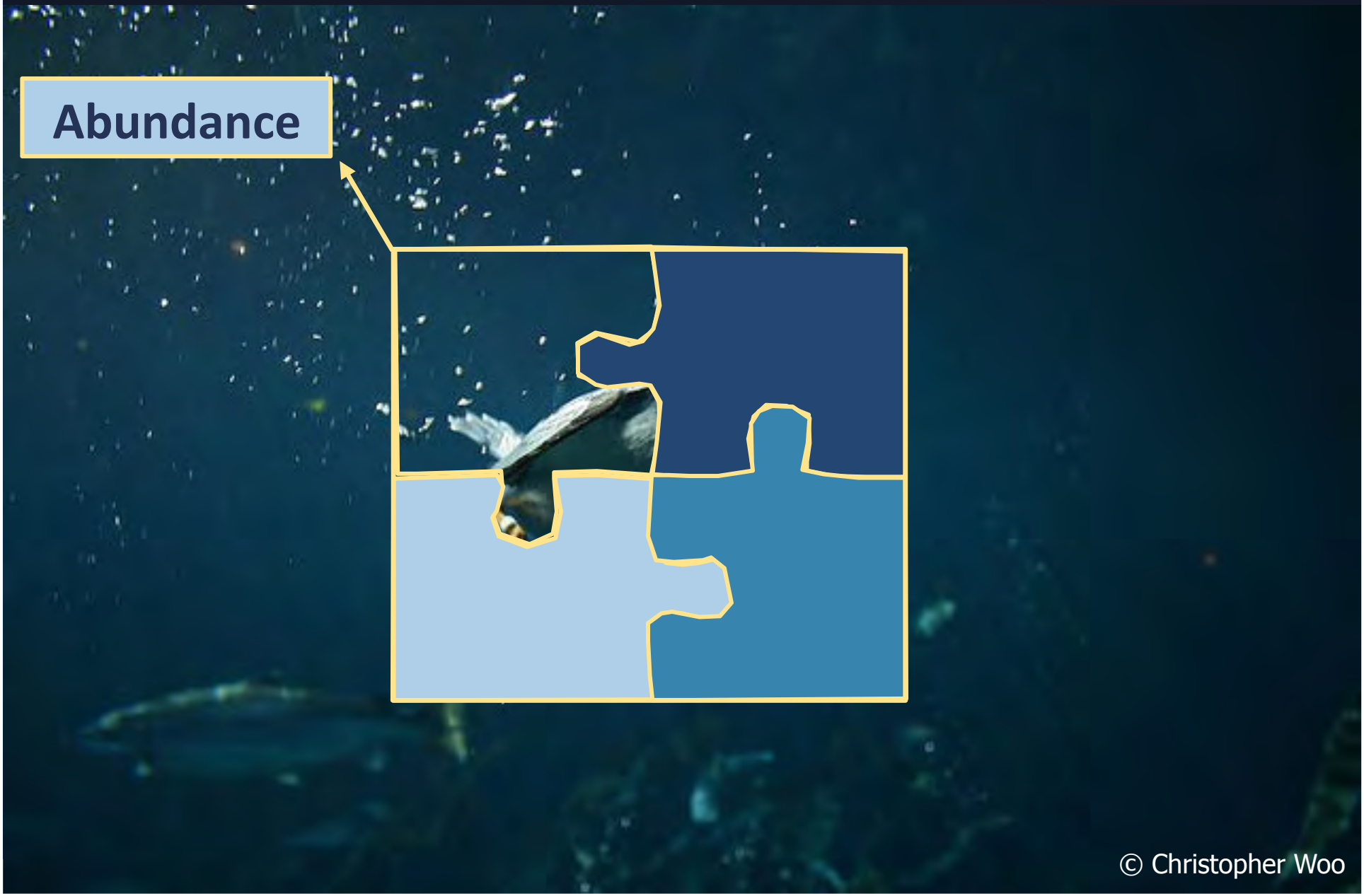
Year 14 Yep, still 6!

Year 20 Crash!

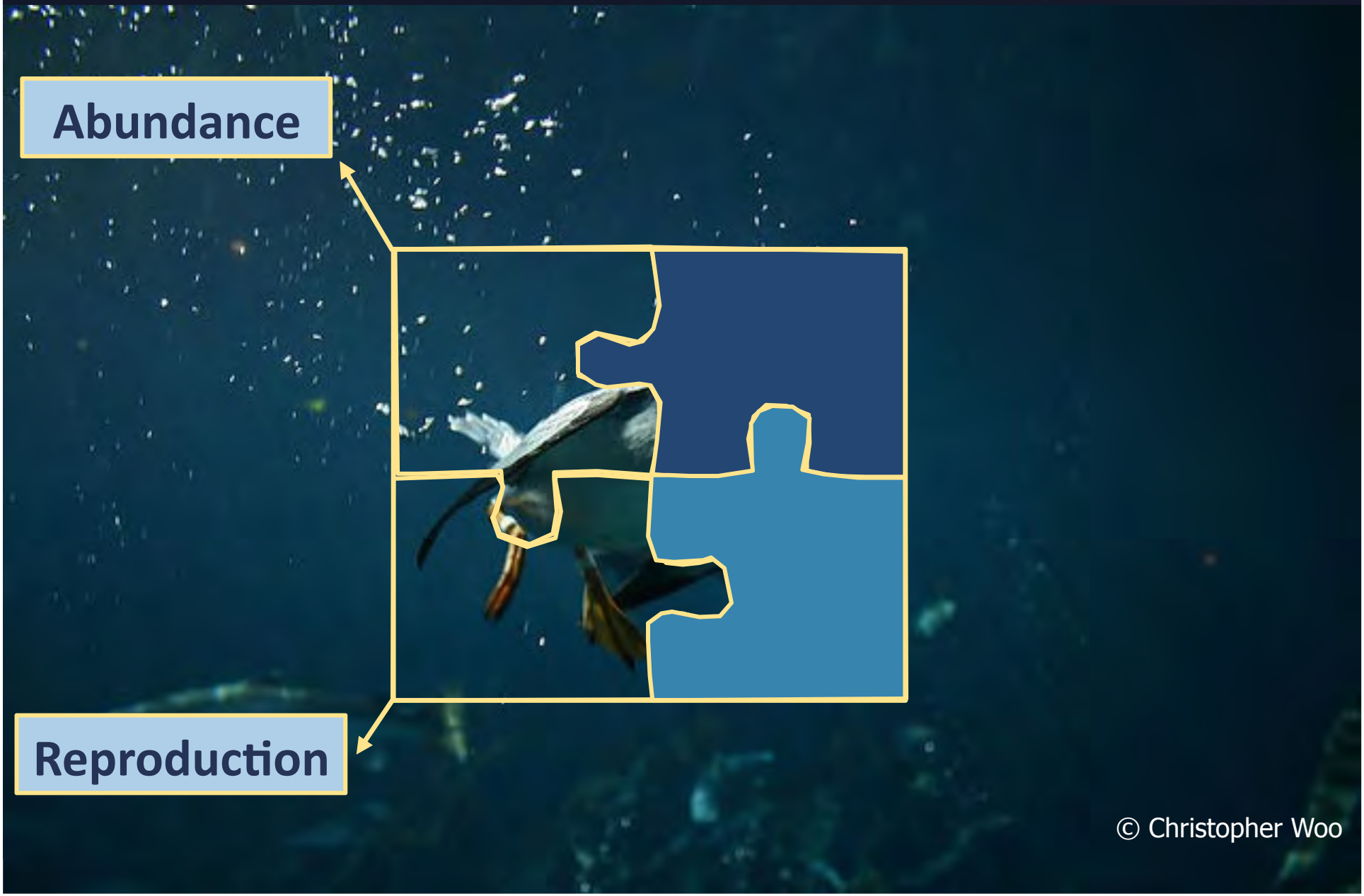
SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Broad-scale variation in seabird populations
  - Can be measured at many locations at once
- Cons
  - lag between marine changes and altered abundance for long-lived species
- Indicates
  - Long-term, region-wide changes in marine productivity

SEABIRD OBSERVATIONS & MARINE CONDITIONS

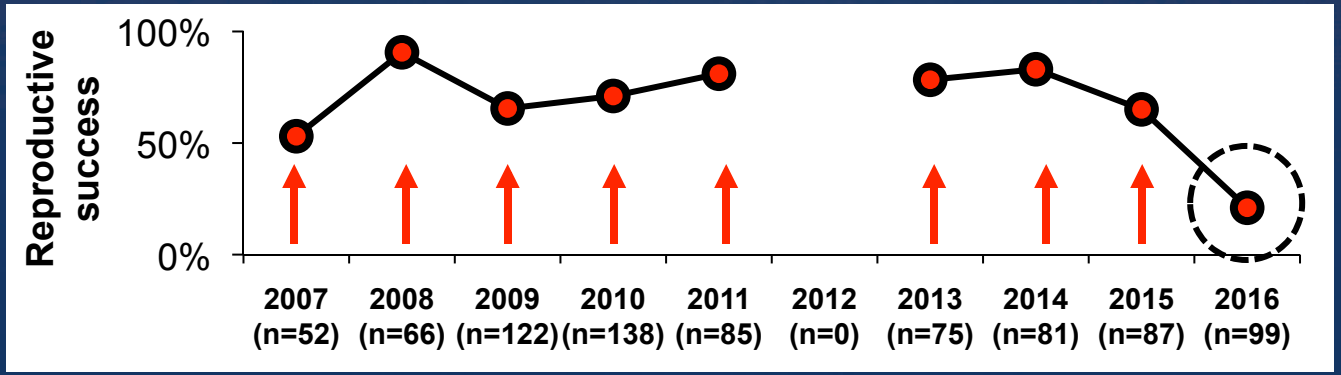


SEABIRD OBSERVATIONS & MARINE CONDITIONS



SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Informs changes in abundance
  - Know right away if seabirds are having difficulty
- Cons
  - Difficult to measure at many locations
  - No within-year sensitivity
- Indicates
  - Years where conditions are too poor to reproduce



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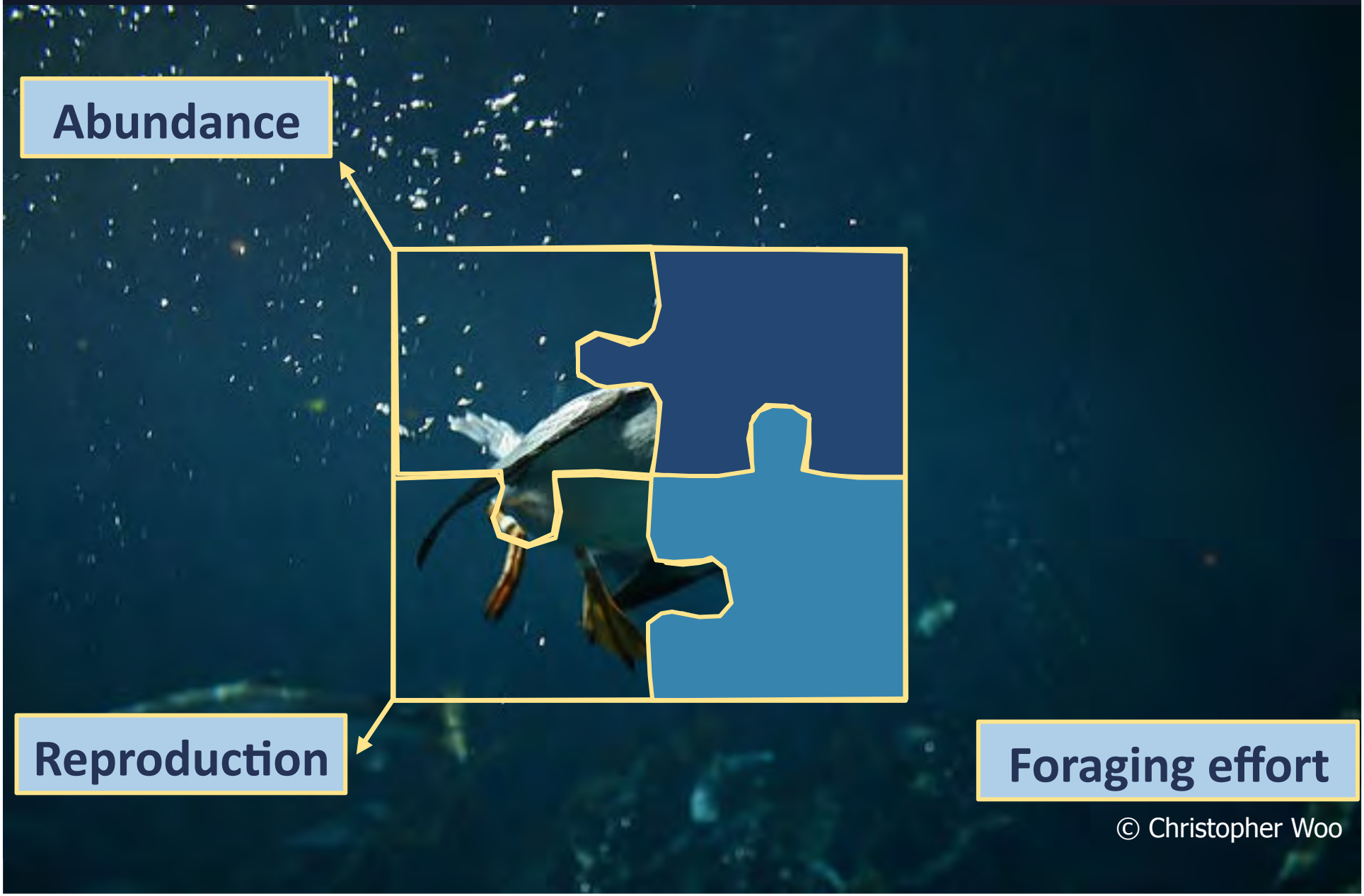
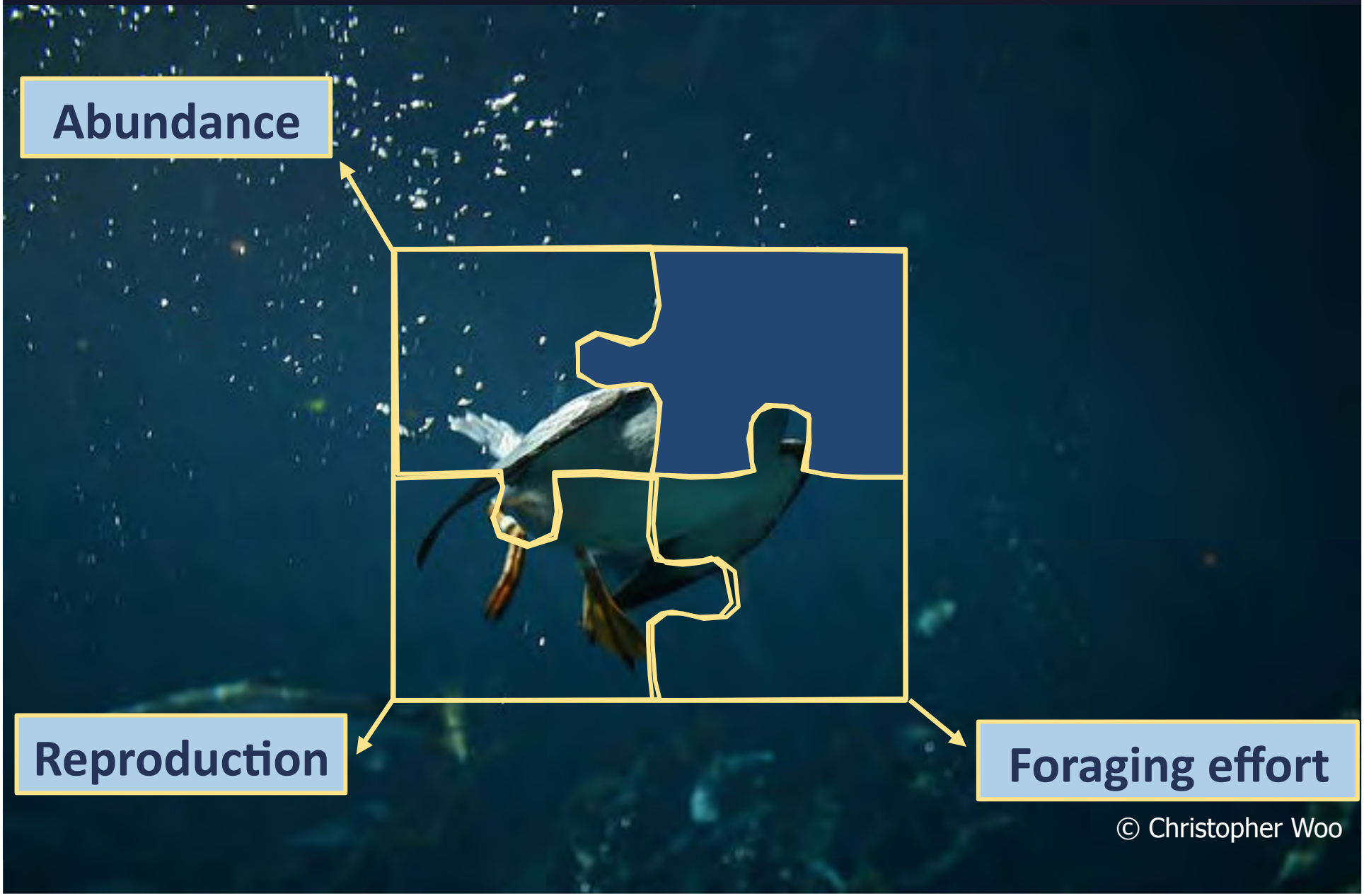


SEABIRD OBSERVATIONS & MARINE CONDITIONS



SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Rapidly reflects marine conditions

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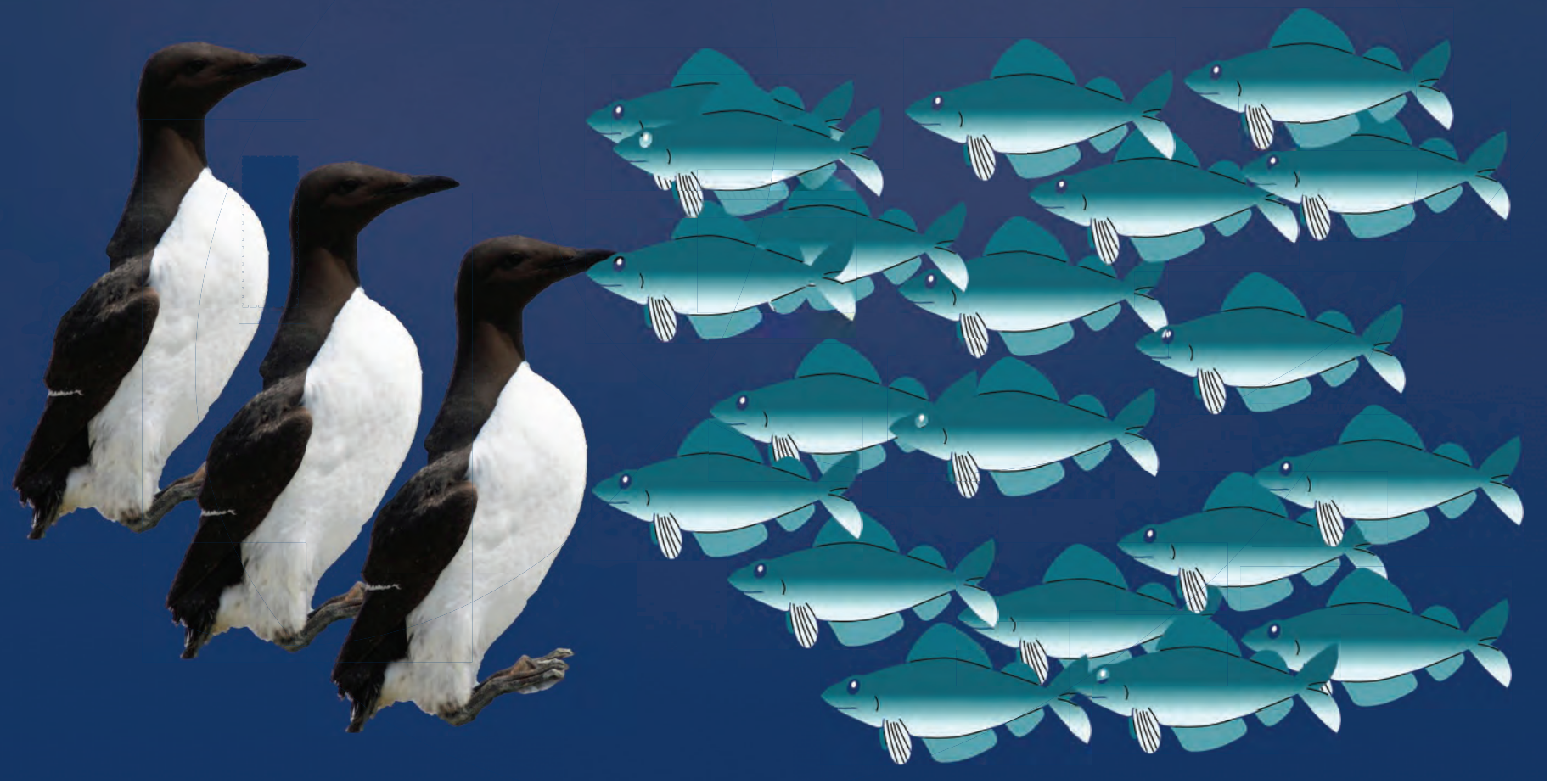

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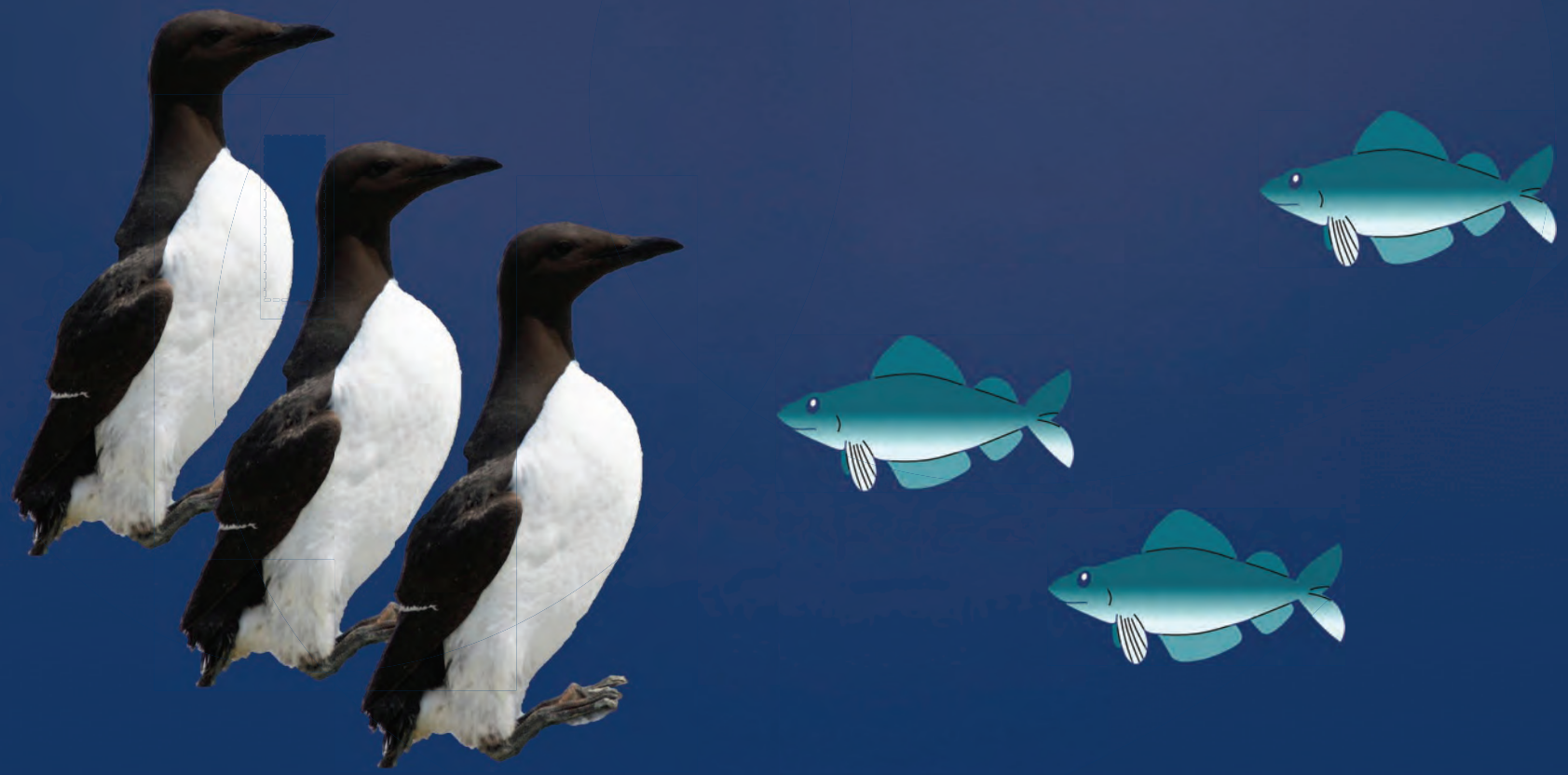


SEABIRD OBSERVATIONS & MARINE CONDITIONS

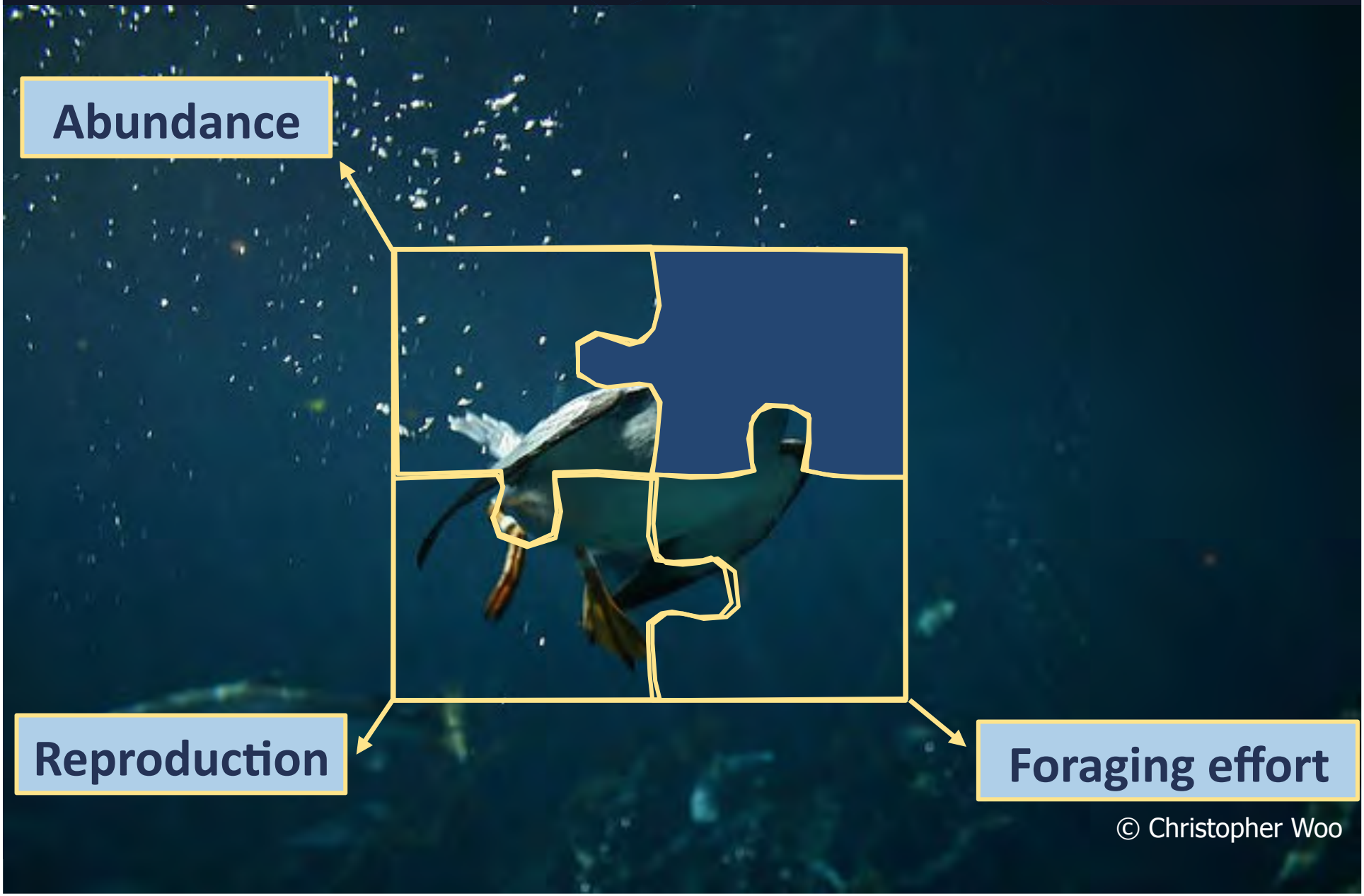
- Pros
  - Rapidly reflects marine conditions

Working hard to feed chicks

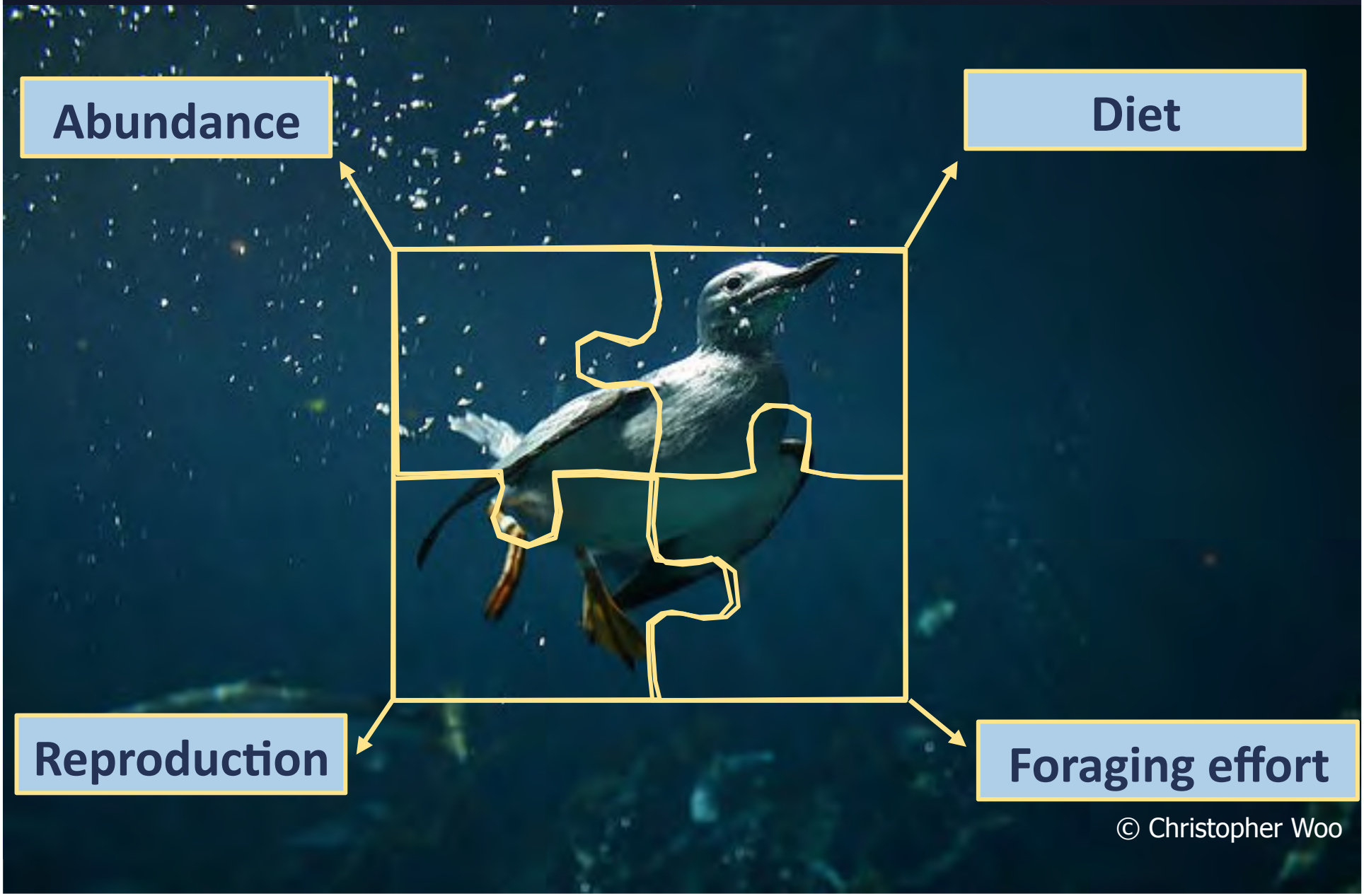
SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Rapidly reflects marine conditions
- Cons
  - Difficult to measure at many locations
  - Must select representative colony or colonies
- Indicates
  - Changes in the availability of prey at daily, weekly, and annual scales

SEABIRD OBSERVATIONS & MARINE CONDITIONS



SEABIRD OBSERVATIONS & MARINE CONDITIONS

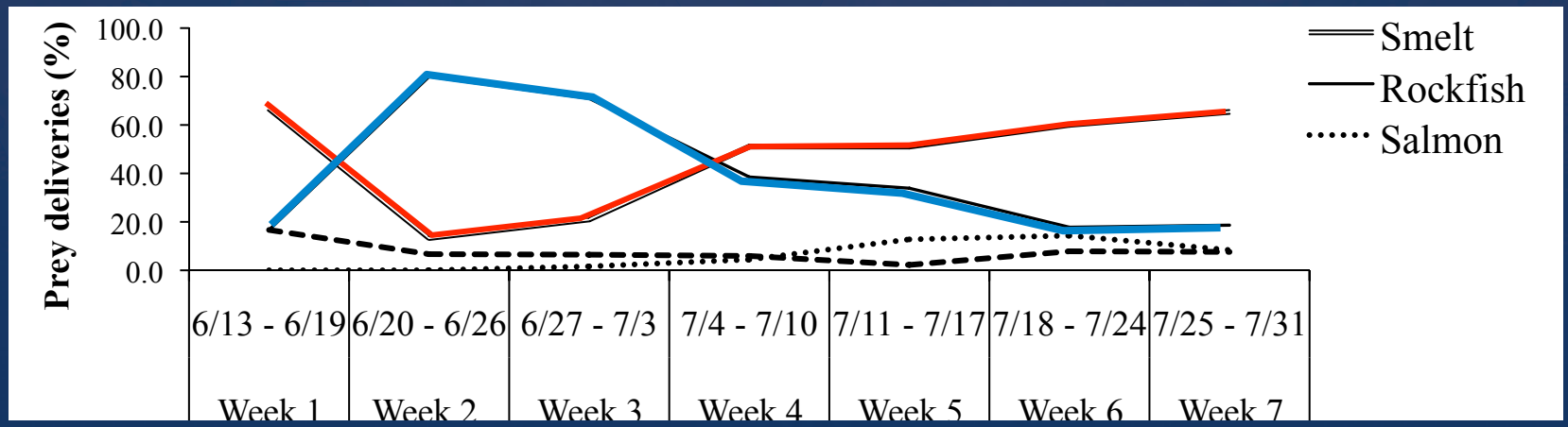


SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Natural sample of marine environment
- Cons
  - Difficult to quantify without cameras

SEABIRD OBSERVATIONS & MARINE CONDITIONS

- Pros
  - Natural sample of marine environment
- Cons
  - Difficult to quantify without cameras
- Indicates
  - Daily, weekly, annual changes in prey



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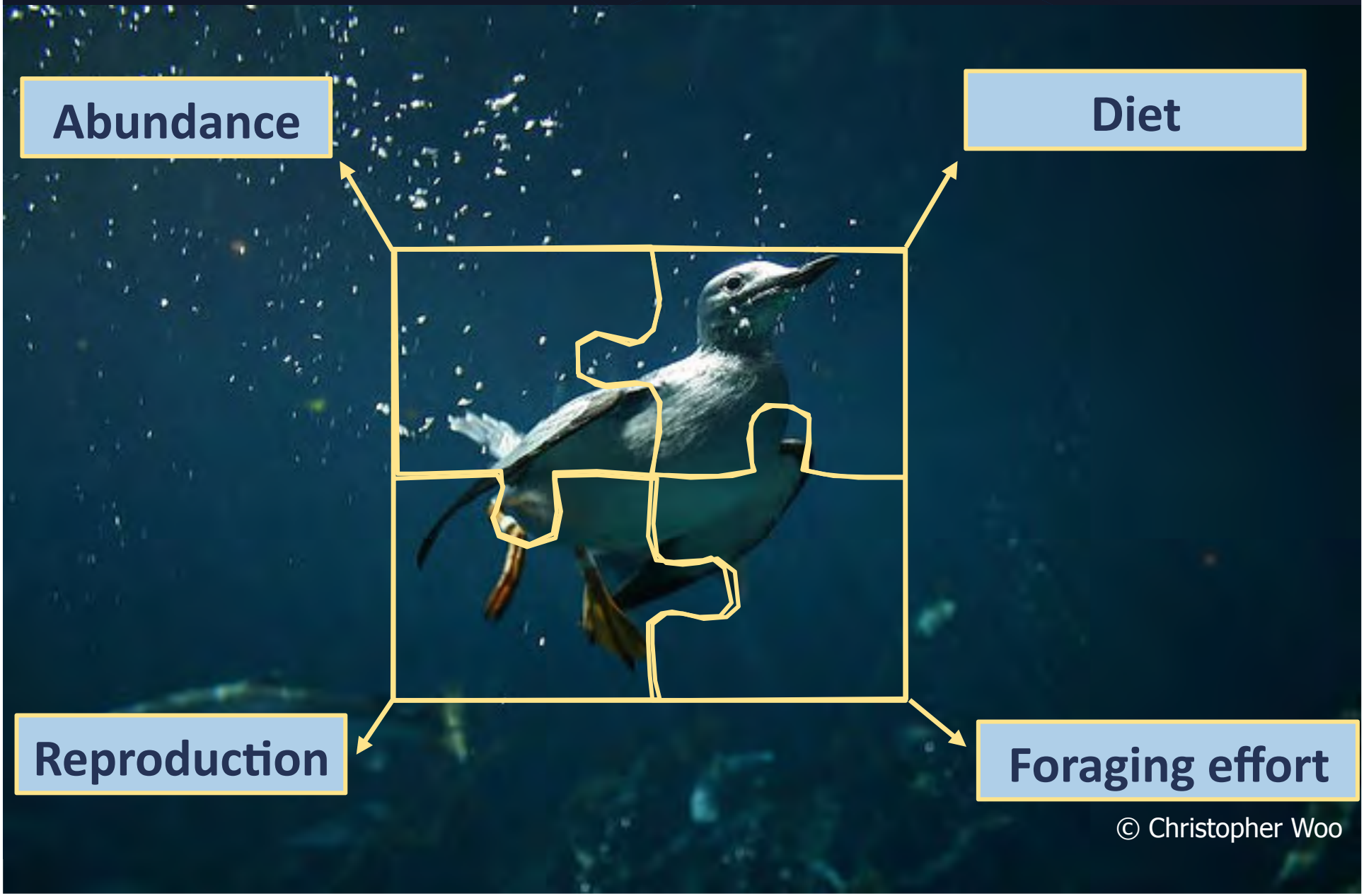

RECOMENDATIONS

- Multiscale Approach
  - Different metrics are complimentary
    - Long vs short term
  - Complete picture

- Benefit of Video
  - Eyes without disturbance
  - Permanent verifiable record
  - Revisit old video
  - Share with the public

COLLABORATIVE EFFORT

HUMBOLDT STATE UNIVERSITY

P. Gabriel, L. Eigner, M. Cunha,
K. Rian, P. Capitolo and many others!

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

NATIONAL WILDLIFE REFUGE SYSTEM

SeeMore Wildlife Systems : K. Schaad

UNITED STATES COAST GUARD 1790

Redwood National and State Parks

COAST

Moss Landing Marine Laboratories

…ANY QUESTIONS?

LIVE VIDEO: www.humbldt.edu/castlerockseabirds
CONTACT: StephanieRianneSchneider@gmail.com

CHICK PROVISIONING