

Vloga kitov in delfinov pri blaženju podnebnih sprememb

doc. dr. Tilen Genov

- 1) Morigenos – slovensko društvo za morske sesalce
- 2) Oddelek za biodiverzitetu, FAMNIT, Univerza na Primorskem

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8. konferenca učiteljev/-ic
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NAK 2025



ARSO
REPUBLIKA SLOVENIJA
ZA ŠOLSTVO



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA VZGOJO IN IZOBRAŽEVANJE



Sofinancira
Evropska unija

Vloga kitov in delfinov pri blaženju podnebnih sprememb



MORIGENOS

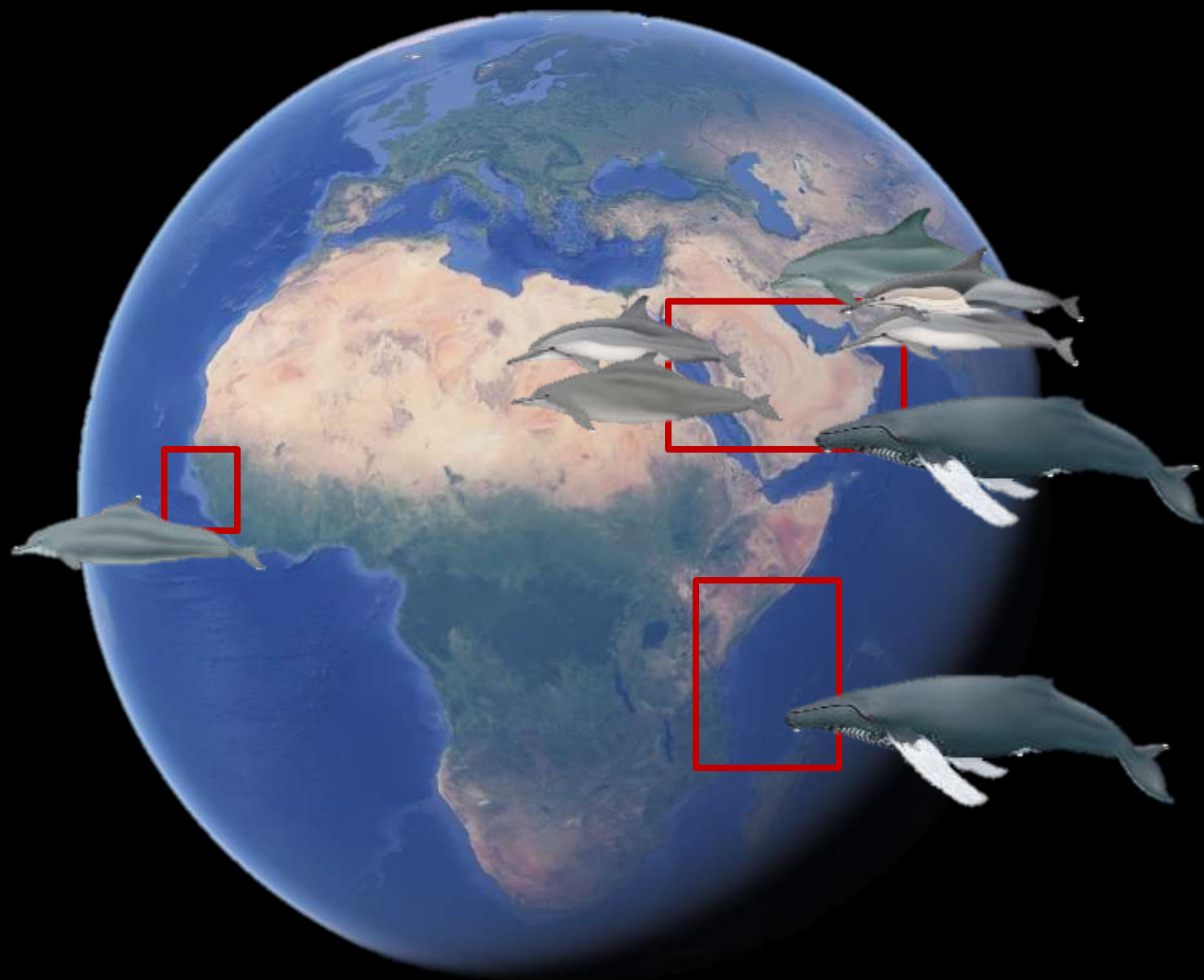


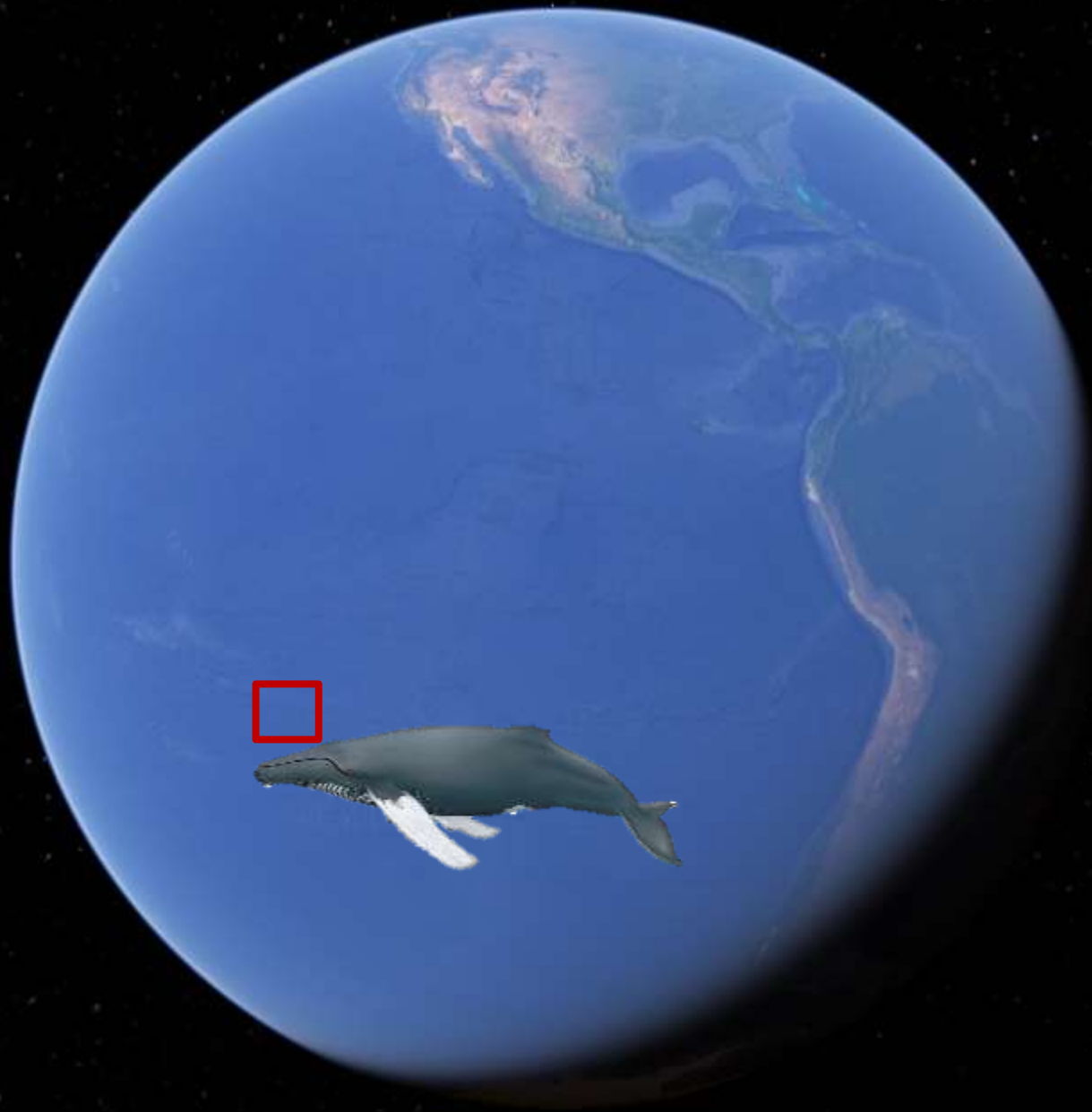
doc. dr. Tilen Genov

1. Morigenos – slovensko društvo za morske sesalce
2. Oddelek za biodiverziteto, UP FAMNIT









zakaj preučevati

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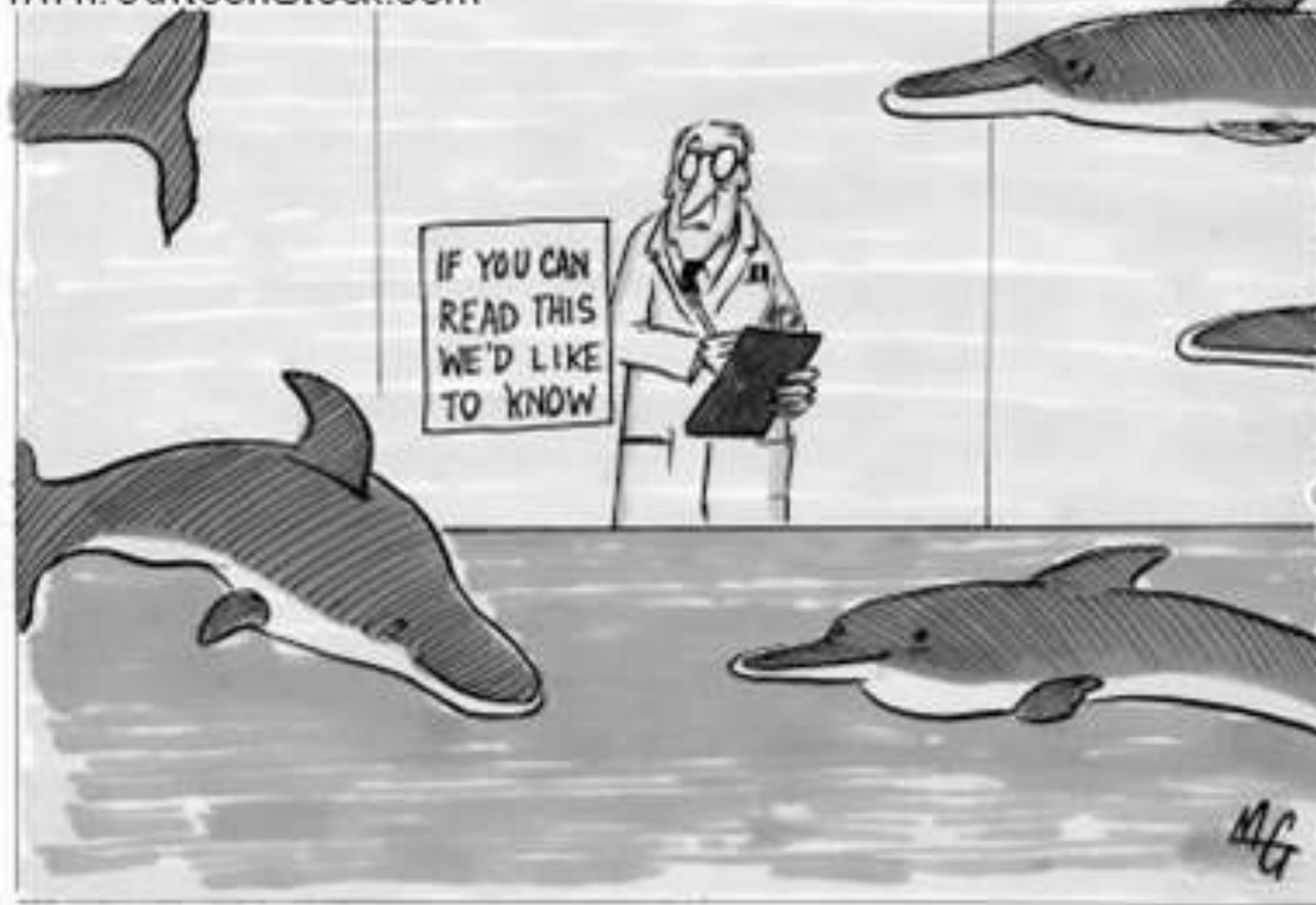






foto: Tilen Genov

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RIBIŠTVO



TURIZEM



PROMET



AKVAKULTURA







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**SAVE THE
PLANET**



PLANT TREES



Nature's Solution TO CLIMATE CHANGE

A strategy to protect whales can limit greenhouse gases and global warming

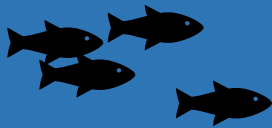
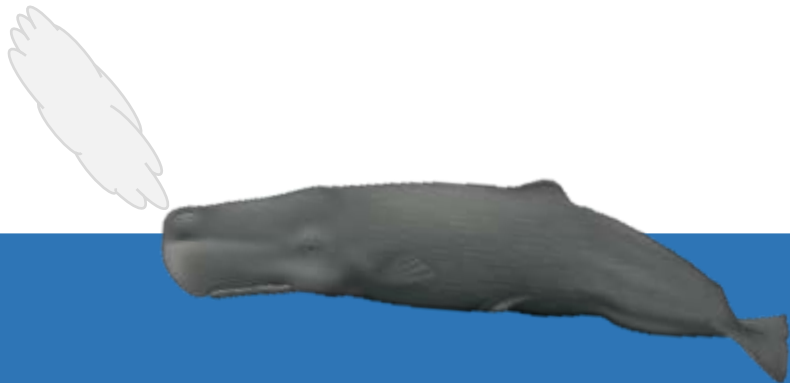
Ralph Chami, Thomas Cosimano, Connel Fullenkamp, and Sena Oztosun

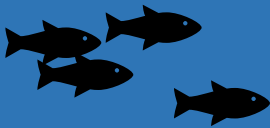
Kit glavač

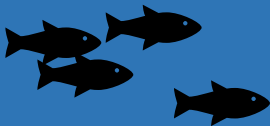
Physeter macrocephalus

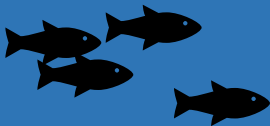


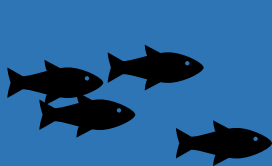
foto: Tilen Genov

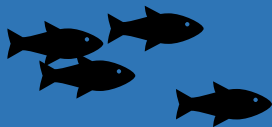


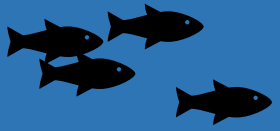
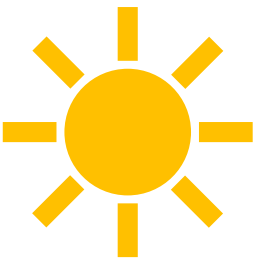


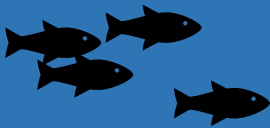


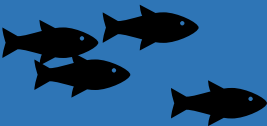


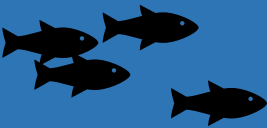




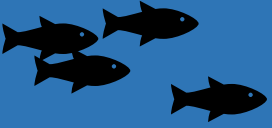
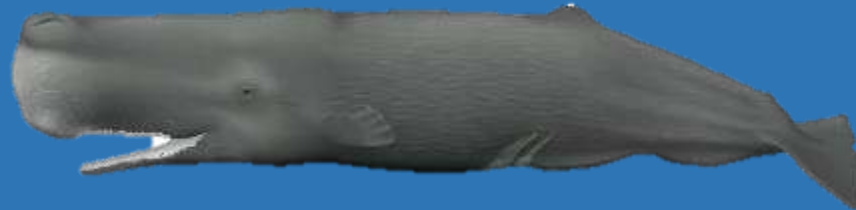
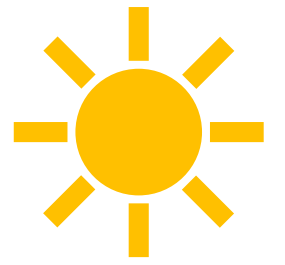








CO₂



The Whale Pump: Marine Mammals Enhance Primary Productivity in a Coastal Basin

Joe Roman^{1*}, James J. McCarthy²

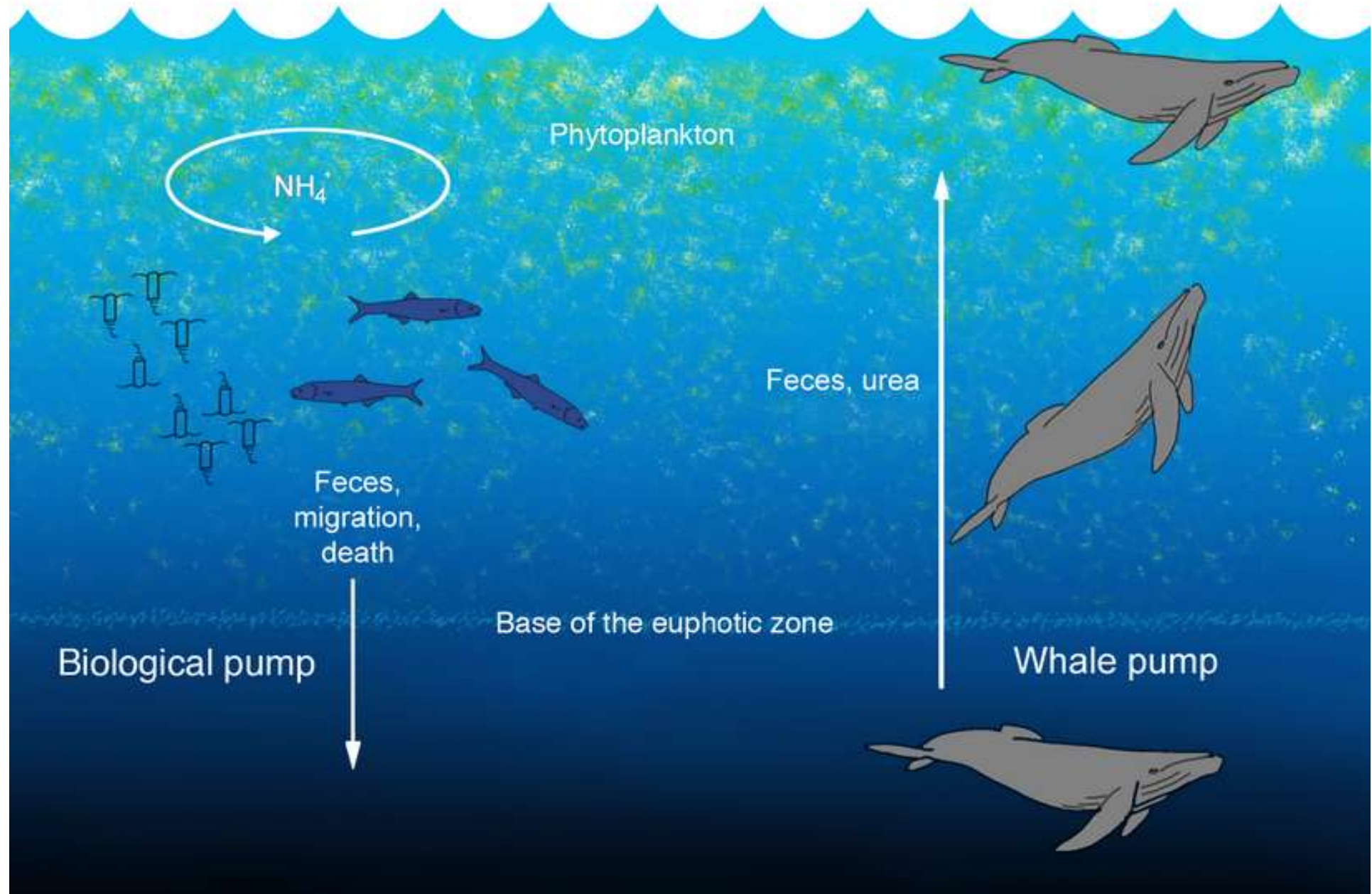
1 Gund Institute for Ecological Economics, University of Vermont, Burlington, Vermont, United States of America, **2** Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, United States of America

Abstract

It is well known that microbes, zooplankton, and fish are important sources of recycled nitrogen in coastal waters, yet marine mammals have largely been ignored or dismissed in this cycle. Using field measurements and population data, we find that marine mammals can enhance primary productivity in their feeding areas by concentrating nitrogen near the surface through the release of flocculent fecal plumes. Whales and seals may be responsible for replenishing 2.3×10^4 metric tons of N per year in the Gulf of Maine's euphotic zone, more than the input of all rivers combined. This upward "whale pump" played a much larger role before commercial harvest, when marine mammal recycling of nitrogen was likely more than three times atmospheric N input. Even with reduced populations, marine mammals provide an important ecosystem service by sustaining productivity in regions where they occur in high densities.

Zooplankton, Fish

Marine Mammals



The Whale Pump: Marine Mammals Enhance Primary Productivity in a Coastal Basin

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Abstract

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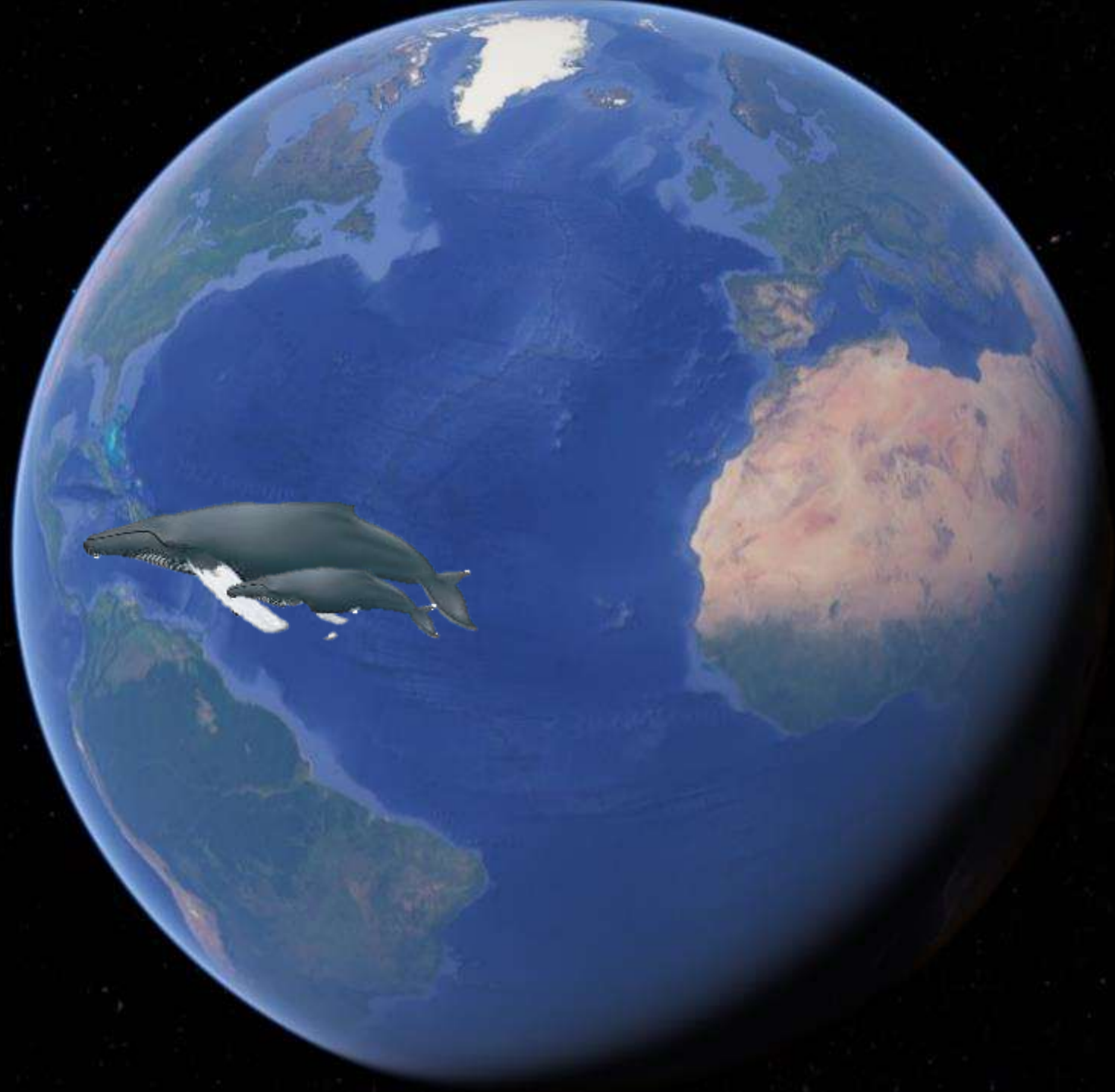
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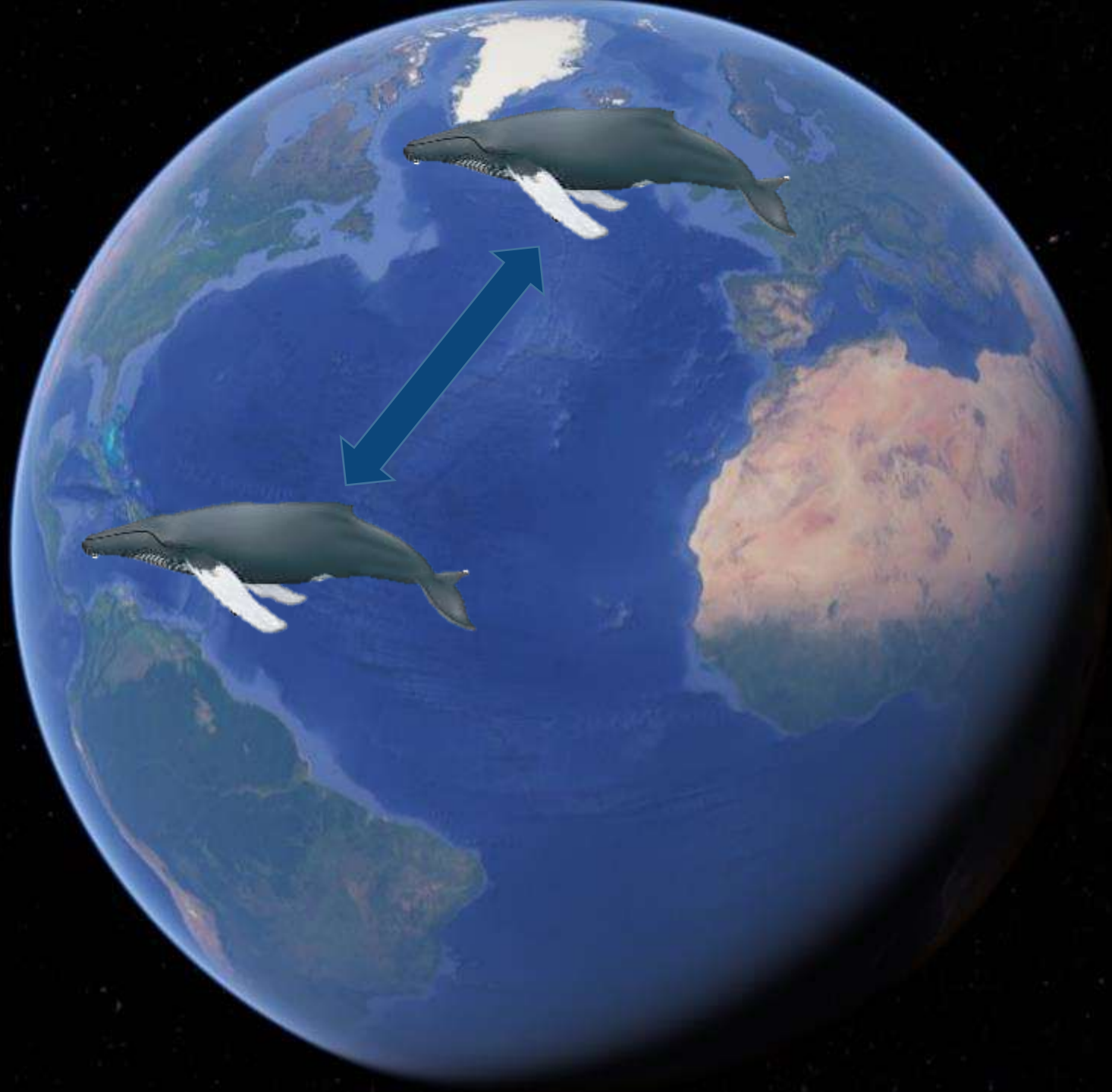
Megaptera novaeangliae

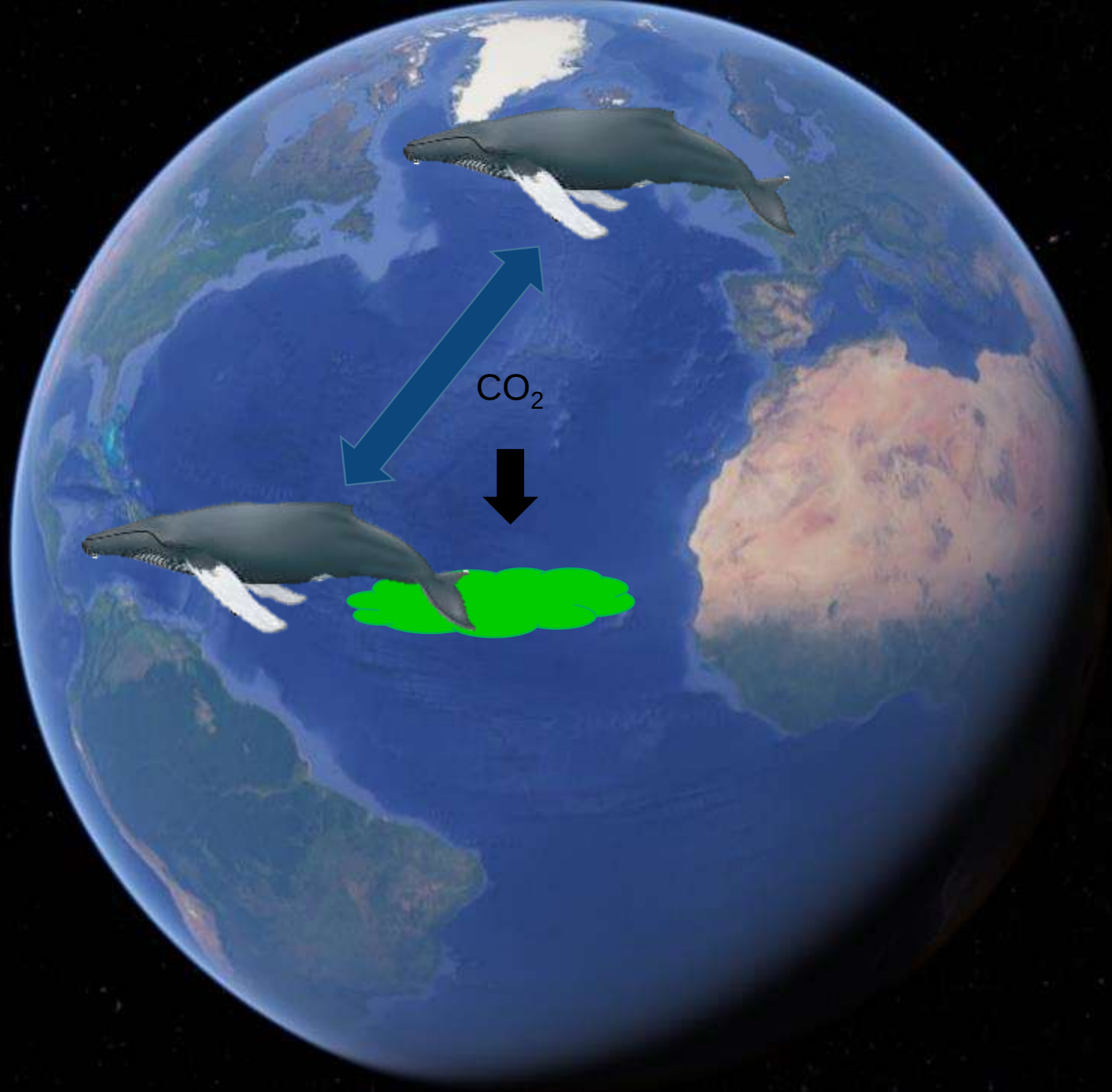


foto: Tilen Genov









Migrating baleen whales transport high-latitude nutrients to tropical and subtropical ecosystems

Received: 3 June 2023

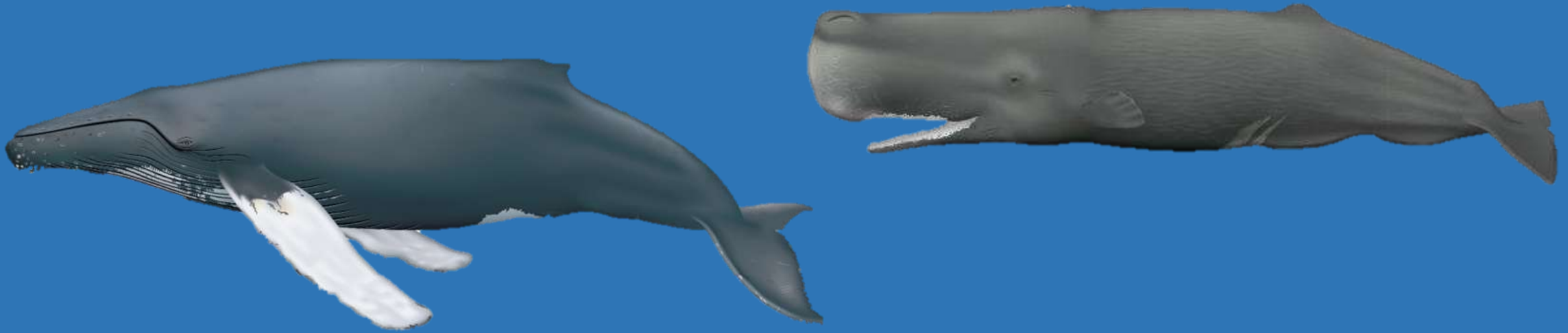
Accepted: 9 January 2025

Published online: 10 March 2025

 Check for updates

Joe Roman¹✉, Andrew J. Abraham², Jeremy J. Kiszka³, Daniel P. Costa⁴, Christopher E. Doughty⁵, Ari Friedlaender⁴, Luis A. Hückstädt⁶, Milton Marcondes⁷, Emma Wetsel⁸ & Andrew J. Pershing⁹

Baleen whales migrate from productive high-latitude feeding grounds to usually oligotrophic tropical and subtropical reproductive winter grounds, translocating limiting nutrients across ecosystem boundaries in their bodies. Here, we estimate the latitudinal movement of nutrients through carcasses, placentas, and urea for four species of baleen whales that exhibit clear annual migration, relying on spatial data from publicly available databases, present and past populations, and measurements of protein catabolism and other sources of nitrogen from baleen whales and other marine mammals. Migrating gray, humpback, and North Atlantic and southern right whales convey an estimated 3784 tons N yr⁻¹ and 46,512 tons of biomass yr⁻¹ to winter grounds, a flux also known as the “great whale conveyor belt”; these numbers might have been three times higher before commercial whaling. We discuss how species recovery might help restore nutrient movement by whales in global oceans and increase the resilience and adaptive capacity of recipient ecosystems.



CO₂





Opinion

Whales in the carbon cycle: can recovery remove carbon dioxide?

Hoidi C. Pearson^{1,*}, Matthew S. Savoca^{2,8}, Daniel P. Costa³, Michael W. Lomas⁴, Renato Molina⁵, Andrew J. Pershing^{6,8}, Craig R. Smith⁷, Juan Carlos Villaseñor-Derbez^{2,8}, Stephen R. Wing⁹ and Joe Roman¹⁰



Do whales really increase the oceanic removal of atmospheric carbon?

Jan-Olaf Meynecke^{1,2,3,4*}, Saumik Samanta⁵, Jasper de Bie^{1,2,3,4}, Elisa Seyboth⁶, Subhra Prakash Dey^{7,8}, Giles Fearon^{7,8}, Marcello Vichi^{7,8}, Ken Findlay⁶, Alakendra Roychoudhury⁵ and Brendan Mackey^{1,2}

¹Whales & Climate Research Program, Griffith University, Gold Coast, QLD, Australia, ²Griffith Climate Change Response Program, Griffith University, Gold Coast, QLD, Australia, ³Coastal and Marine Research Centre, Griffith University, Gold Coast, QLD, Australia, ⁴Cities Research Institute, Griffith University, Gold Coast, QLD, Australia, ⁵Department of Earth Sciences, Stellenbosch University, Stellenbosch, South Africa, ⁶Mammal Research Institute Whale Unit, Department of Zoology and Entomology, University of Pretoria, Hermanus, South Africa, ⁷Marine and Antarctic Research Centre for Innovation and Sustainability (MARIS), University of Cape Town, Cape Town, South Africa, ⁸Department of Oceanography, University of Cape Town, Cape Town, South Africa

Composition of cetacean communities worldwide shapes their contribution to ocean nutrient cycling

Received: 16 February 2023

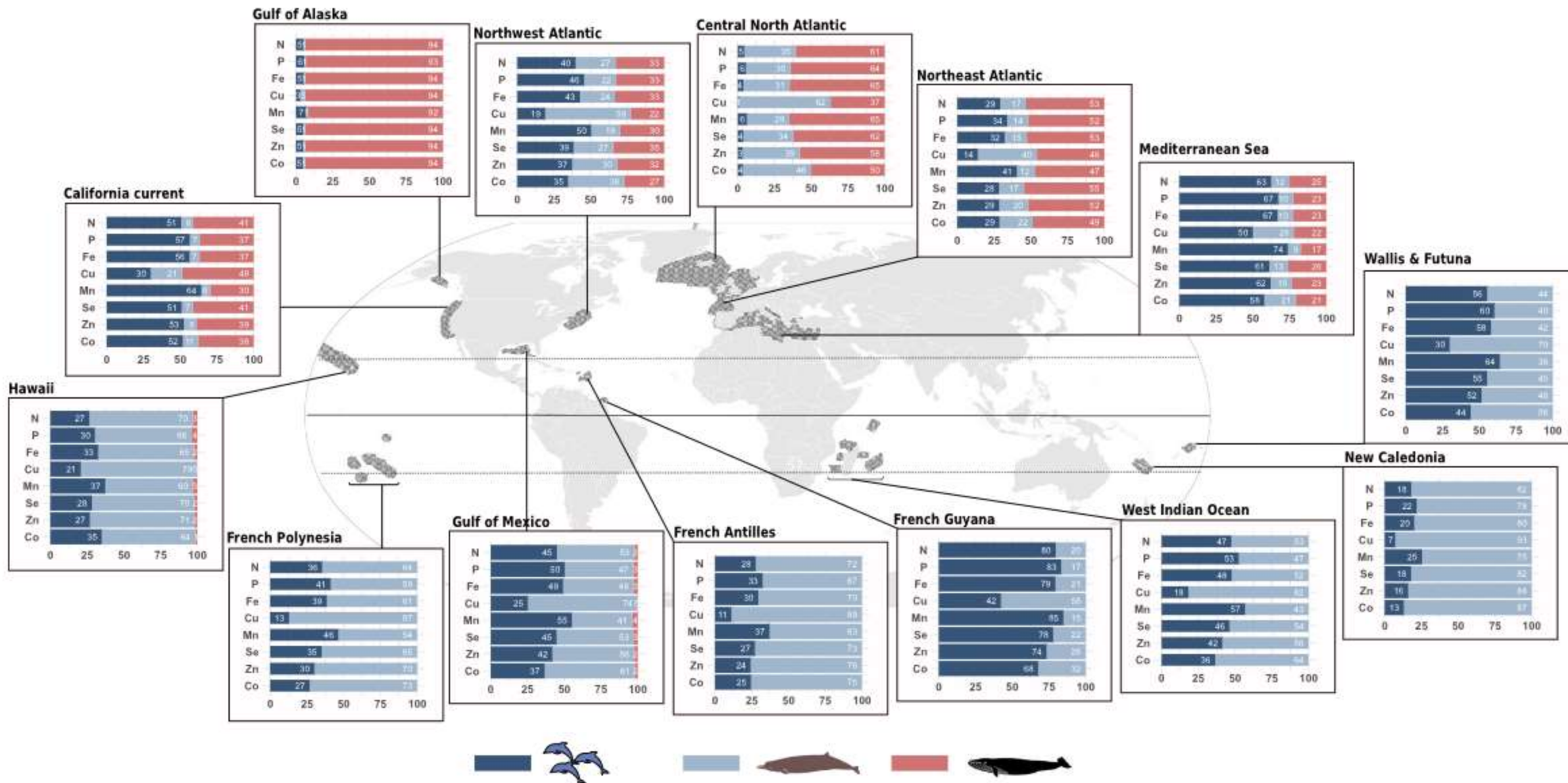
Accepted: 7 September 2023

Published online: 19 September 2023

 Check for updates

Lola Gilbert ^{1,2}, Tiphaine Jeanniard-du-Do¹, Matthieu Authier²,
Tiphaine Chouvelon ^{2,3} & Jérôme Spitz ^{1,2} 

Defecation by large whales is known to fertilise oceans with nutrients, stimulating phytoplankton and ecosystem productivity. However, our current understanding of these processes is limited to a few species, nutrients and ecosystems. Here, we investigate the role of cetacean communities in the worldwide biological cycling of two major nutrients and six trace nutrients. We show that cetaceans release more nutrients in mesotrophic to eutrophic temperate waters than in oligotrophic tropical waters, mirroring patterns of ecosystem productivity. The released nutrient cocktails also vary geographically, driven by the composition of cetacean communities. The roles of small cetaceans, deep diving cetaceans and baleen whales differ quantitatively and functionally, with contributions of small cetaceans and deep divers exceeding those of large whales in some areas. The functional diversity of cetacean communities expands beyond their role as top predators to include their role as active nutrient vectors, which might be equally important to local ecosystem dynamics.



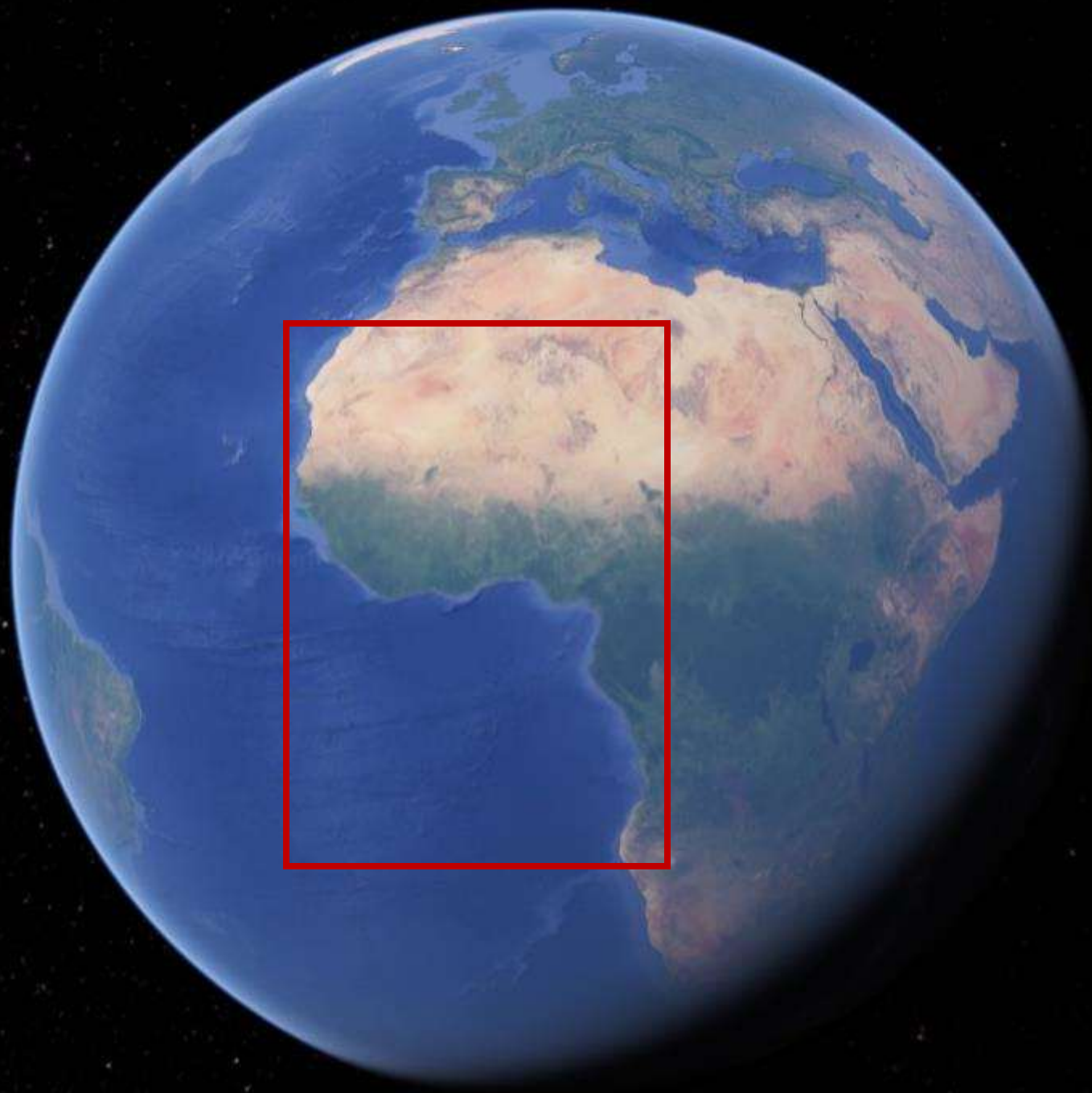


Atlantski beli delfin

Sousa teuszii



foto: Tilen Genov, CCAHD

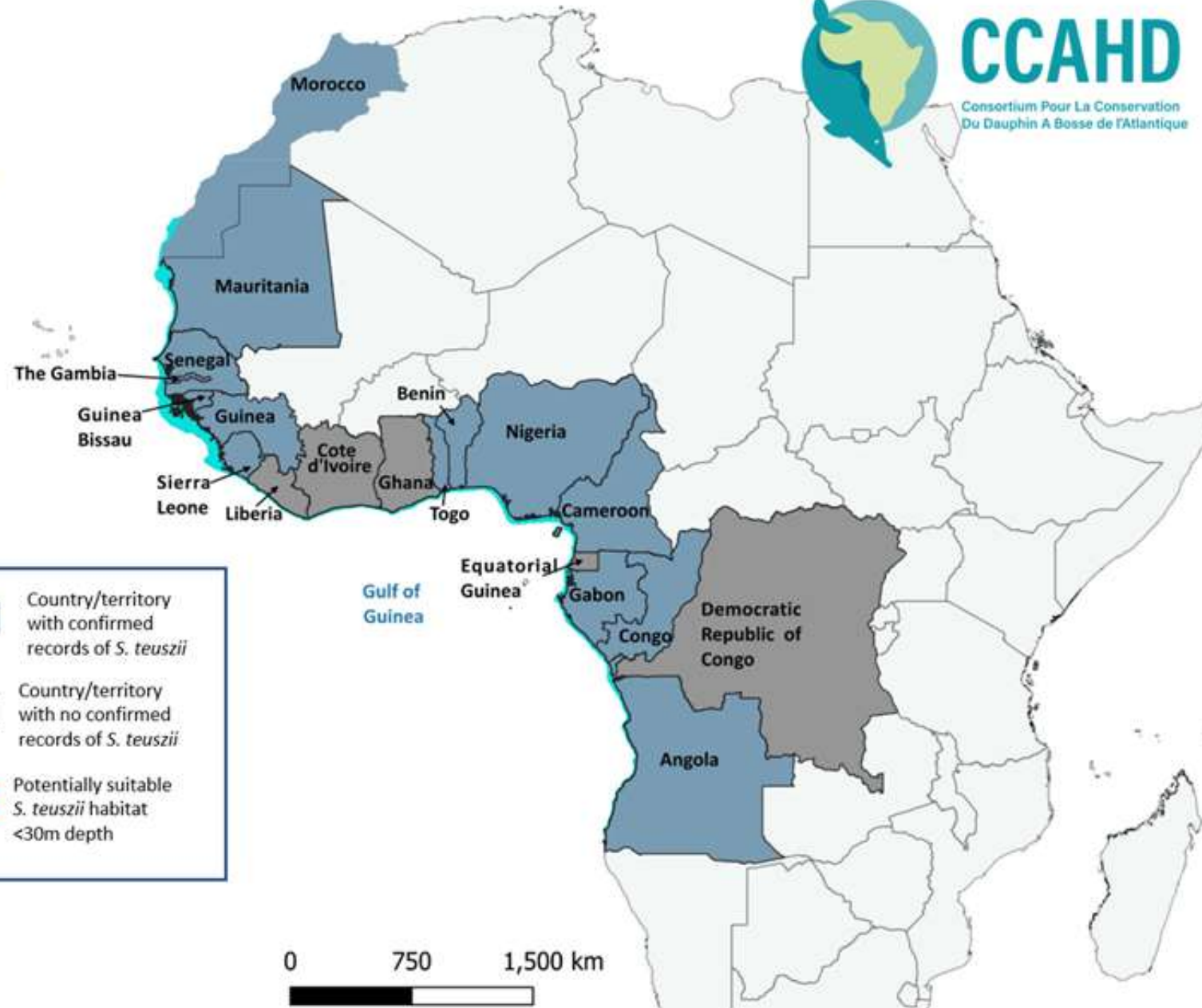




CCAHD

Consortium Pour La Conservation
Du Dauphin A Bosse de l'Atlantique

Atlantic
Ocean



-  Country/territory with confirmed records of *S. teuszii*
-  Country/territory with no confirmed records of *S. teuszii*
-  Potentially suitable *S. teuszii* habitat <30m depth

0 750 1,500 km

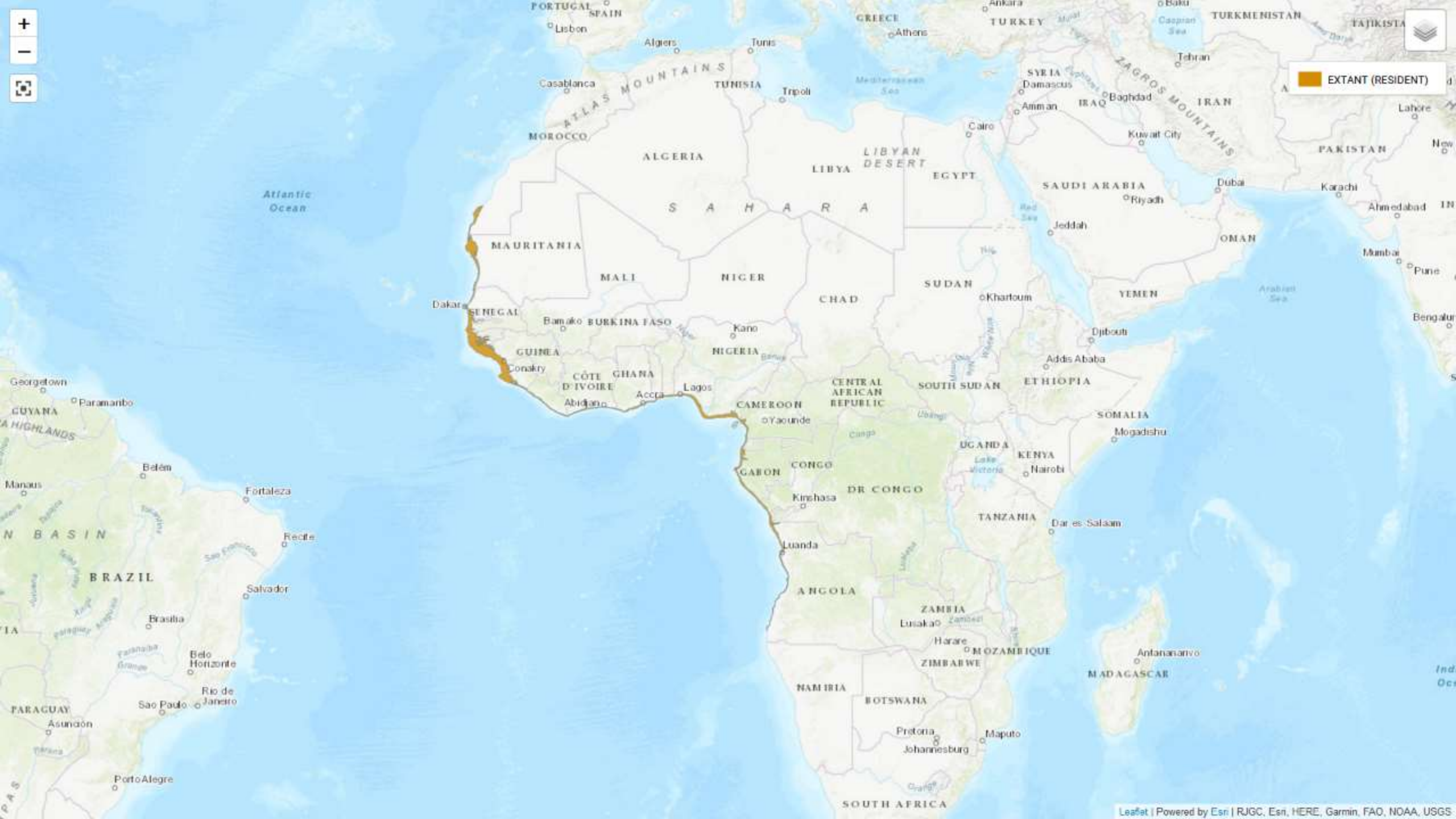




foto: Tim Collins, WCS



foto: Gianna Minton, CCAHD



foto: Tilen Genov, CCAHD



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foto: Tilen Genov, CCAHD



foto: Tilen Genov, CCAHD





PRILOV

foto: Tím Collíns, WCS



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RAZVOJ

foto: Tilen Genov



Ladijski

PROMET

foto: Aurore Malapert, Biotope



PROMET

foto: Tilen Genov, CCAHD



foto: Tím Collins, WCS



foto: Tilen Genov, CCAHD



< 3000 osebkov



VABLJENI V CENTER O DELFINIH



MORIGENOS CENTER O DELFINIH CENTRO DEI DELFINI THE DOLPHIN CENTRE

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 3. Beispiel
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OGLAŠANJE DELFINOV

VOCALIZZAZIONE DEL DELFINO / DOLPHIN VOCALISATION

KAKO DELFINI PROIZVAJAJO ZVUKOVE

Delfini zvake proizvedejo s pomočjo labialne fonacije, kar pomeni, da delujejo zelo podobno kot uporni glasovi pri človeku. Zvoki se ustvarijo v ustni votlini, ki deluje kot resonančni prostor. Delfini uporabljajo različne zvake, od preprostih klikov do zapletenih vrtilov. Vsak zvok ima svojo funkcijo in je del njihovega bogatega repertoarja.

VSAK ZVOK IMA SVOJO FUNKCIJO

Tako kot ptice, ljudje in drugi živali, delfini uporabljajo zvake za komunikacijo. Njihovi zvoki so del njihovega bogatega repertoarja, ki jim pomaga pri prepoznavanju, vzdrževanju socialnih vezí in pri iskanju hrane. Delfini imajo tudi različne vrste zvokov, ki jih uporabljajo za različne namene, od preprostih klikov do zapletenih vrtilov.

ECHOLOCATION

Echolocation je sposobnost živali, da s pomočjo zvokov in odbojev zvoka določijo položaj in velikost predmeta. Delfini uporabljajo to sposobnost za navigacijo in iskanje hrane. Njihovi zvoki so del njihovega bogatega repertoarja, ki jim pomaga pri prepoznavanju, vzdrževanju socialnih vezí in pri iskanju hrane.

IN CHE MODO I DELFINI PRODUCONO I SUONI

I delfini producono i suoni con l'aiuto di due paia di labiali foniche, che funzionano in modo molto simile all'uso delle corde vocali negli esseri umani. I delfini sprigionano forze dai polmoni negli spazi vuoti verso il lato di respirazione. La pressione dell'aria crea una vibrazione delle labiali foniche, quindi, combinando i suoni adiacenti, creano suoni diversi. Ogni paio di labiali foniche lavora indipendentemente, dandoci la possibilità di produrre contemporaneamente suoni diversi. I delfini usano questi suoni per comunicare (richiamare, esprimere emozioni, ecc.).

OGNI SUONO HA LA PROPRIA STORIA

Tanto come gli uccelli, gli esseri umani e gli altri animali, i delfini usano i suoni per comunicare. I loro suoni sono parte del loro ricco repertorio, che li aiuta a riconoscere, mantenere le relazioni sociali e a trovare il cibo. I delfini hanno anche diversi tipi di suoni, che usano per diversi scopi, dai semplici clic ai suoni più complessi.

HOW DO DOLPHINS PRODUCE SOUNDS

Dolphins produce sounds using two pairs of phonic lips, which work very similarly to the vocal cords in humans. Air from the lungs is pushed into the air space towards the blowhole, the air pressure then creates a vibration of the phonic lips and by using the adjacent muscles dolphins produce different sounds. Each pair of phonic lips works independently of the other so they can simultaneously produce several different sounds to communicate (call others, express emotions, etc.).

EACH SOUND HAS ITS OWN STORY

Just like birds, humans and other animals, dolphins use sounds to communicate. Their sounds are part of their rich repertoire, which helps them to recognise, maintain relationships and coordinate actions. Dolphins also have different types of sounds, which they use for different purposes, from simple clicks to more complex whistles.

ECHOLOCAION

Echolocation is the ability to use sound waves to determine the location and size of objects. Dolphins use this ability to navigate and find food. Their sounds are part of their rich repertoire, which helps them to recognise, maintain relationships and coordinate actions. Dolphins also have different types of sounds, which they use for different purposes, from simple clicks to more complex whistles.



IZOBRAŽEVALNI PROGRAMI



MORIGENOS CENTER O DELFINIH CENTRO DEI DELFINI THE DOLPHIN CENTRE

Hvala!

www.morigenos.org



University of
St Andrews

