

Exploring variation in shorebird chick growth - a global collaborative effort

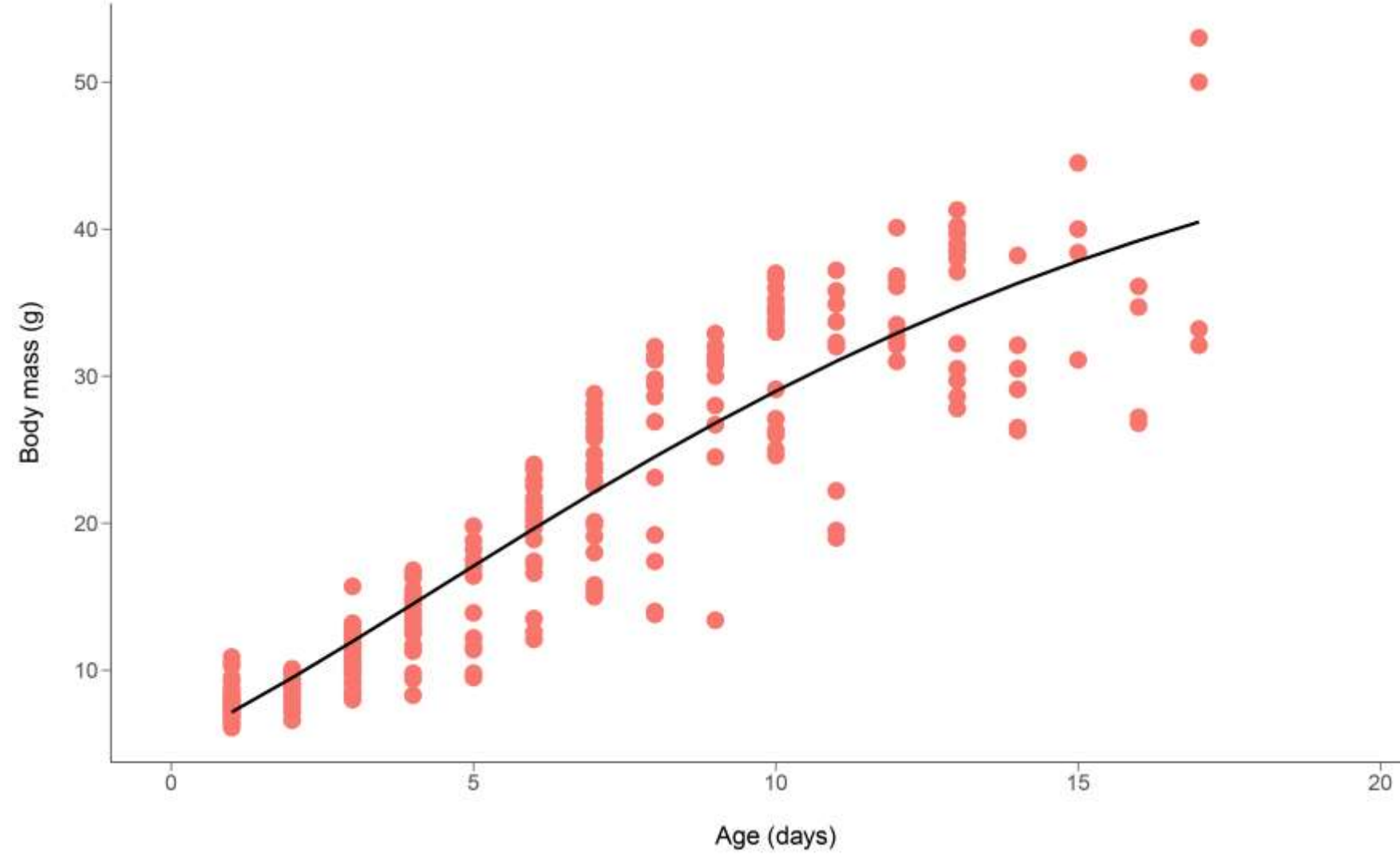
Jeroen Reneerkens &
Thomas Lameris



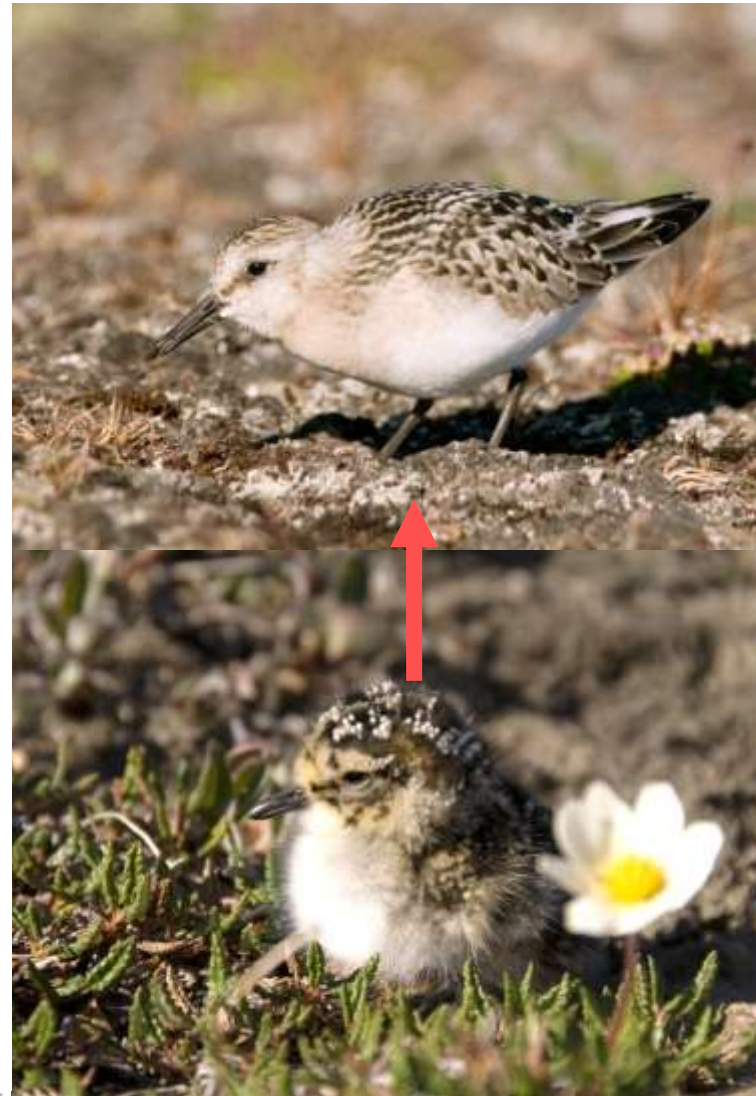
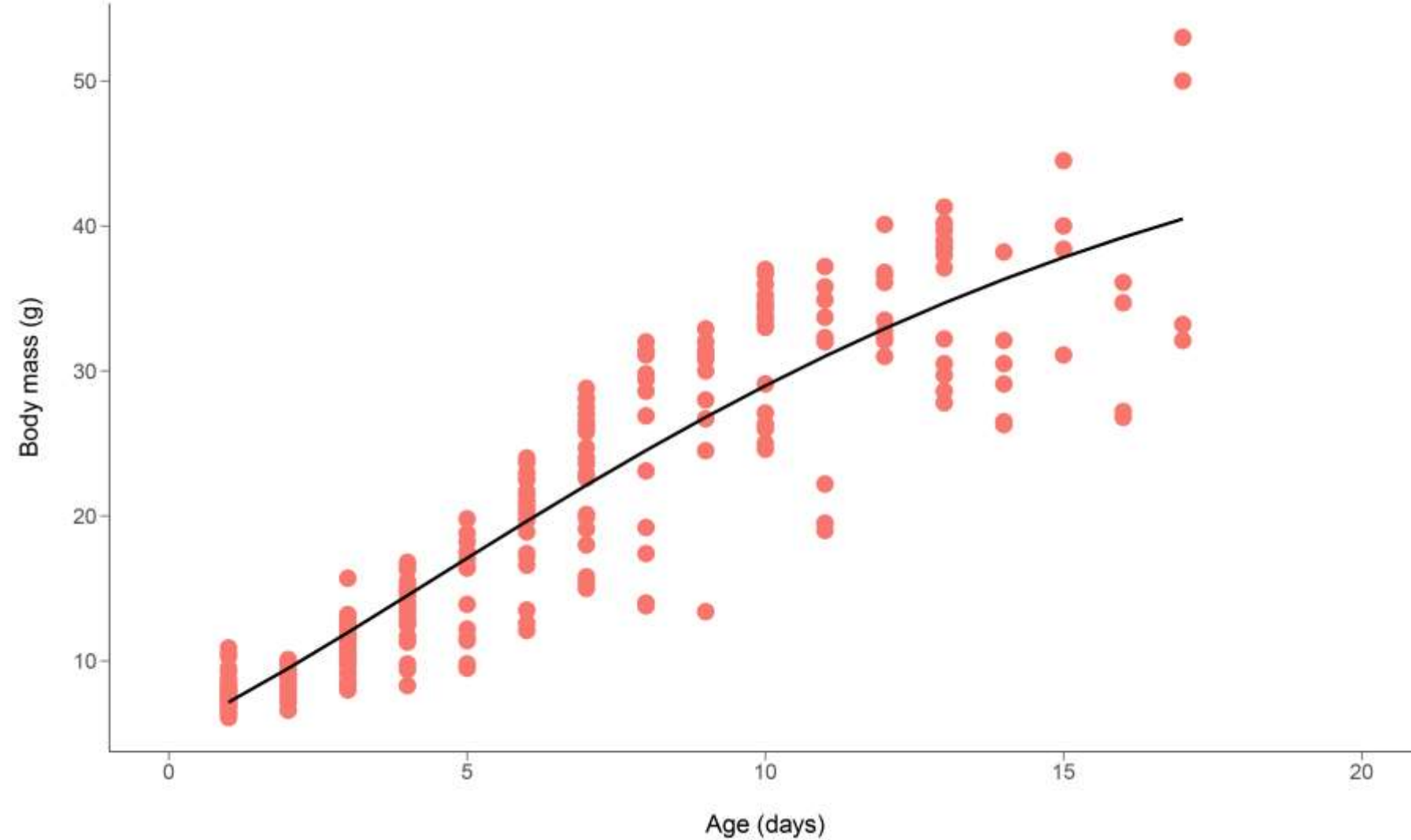
Exploring variation in shorebird chick growth - a global collaborative effort

Jeroen Reneerkens & Thomas Lameris, Adam Cardilini, Afonso Rocha, Ailsa McGilvary-Howard, Albert Salemgareev, Aldis Palsdóttir, Alejandra Vázquez-Rójas, Aleksey Koshkin, Alex Sansom, Alexandr Putilin, Alfredo Gonzalez, Allison Anholt, Alyona Shmalenko, Ana Coelho, Andrew Parnas, Anne Corkery, Anne Rutten, Araceli Argüelles-Tico, Bethany Darby, Birgitta Steingrimsdóttir, Bob Jonge Poerink, Böðvar Þórisson, Brian Robinson, Brittany Morey, Callie Gesmundo, Camilo Carneiro, Casey Weissberg, Chelsea Weithman, Chiara Caccamo, Christian Hoefs, Christina Howell, Christy Morrissey, Clemens Küpper, Colby Slezak, Colin Corse, Colleen Handel, Court Brown, Daniel Catlin, Daniel Lees, Daniel Ruthrauff, Danielle Eneix, David Douglas, David Garcia-Jacome, David Lank, David Tattoni, Diane Borden, Diego Vega-Romero, Dimitri Giunchi, Don-Jean Leandri-Breton, Egor Loktionov, Elena Merkulova, Ella Lunny, Emily Weiser, Emma Penning, Enrica Pollonara, Erica Nol, Esmat Elhassan, Eunbi Kwon, Eva Vozabulová, Evgeny Syroechkovsky, F Senez-Gagnon, Felicia Sanders, Fernando Faria, Ferran Fito, Gabriel Garcia-Peña, Gaute Grønstøl, Grainne Maguire, Gunnar Hallgrímsson, Hanna Prüter, Hannah Vincelette, Hans Schekkerman, Henk Jan Ottens, Ingrid Tulp, Irina Andreeva, Iryna Litovska, Jacob de Vries, James Fraser, James Johnson, James Pearce-Higgins, Jan van Gils, Jannik Hansen, Jared Wilson, Jasper Koster, Jean-François Lamarre, Jeff Wagner, Jelle Loonstra, Jesse Amesbury, Jim Johnson, Job ten Horn, Johannes Hungar, Johannes Kamp, Jonathan Cohen, Jos Hooijmeijer, José Alves, Jose Masero, Juan Fernández-Elipe, Karen Krijgsveld, Karla Alvarado-Castro, Kasun Ekanayake, Katerina Brynychová, Katherine Christie, Kees de Jager, Kees Oosterbeek, Kees Wanders, Kelsi Hunt, Kirsten Grond, Kirsty Gurney, Kristal Kostoglou, Kseniya Yakovlets, Laura McDuffie, Laura McKinnon, Laura Tan, Laura Wallace, Lauren Puleo, Lee Tibbitts, Leon Kelder, Liesbeth Verlinden, Lisa Ferguson, Lourenço Falcao-Rodrigues, Lucas DeCicco, Lucie Pešková, Luke Eberhart-Hertel, Luke Wilde, Lydia Lozano, Angulo, Maarten Hotting, Madina Makhmetova, Magali Frauendorf, Maks Dementyev, Marc van Leeuwen, Márcio Repenning, Marian Hernandez, Marian Snively, Mark Watson, Martijn van de Pol, Martin Bulla, Martin Sládeček, Martti Soikkeli, Matthew Danihel, Maxim Koshkin, Meaghan Lyon, Medardo Cruz-López, Melanie Wilson, Michael Weston, Michaela Haring, Michelle Stantial, Miguel Ángel Gómez-Serrano, Mike Nicoll, Mikhail Soloviev, Miroslav Šálek, Mitch Paisker, Mo Verhoeven, Molly Garner, Moray Souter, Nathan Senner, Nicolas Lecomte, Nicole Deluca, Nodir Azimov, Oddvar Heggøy, Olav Sâtvedt, Oliva Castañeda-González, Oscar Sánchez-Velázquez, P Malako, Patrick Jodice, Paula Machín, Pavel Tomkovich, Peter de Vries, Phil Whitfield, Guy Morrison, Rab Rae, Rachel Gingras, Rafael Martig, Raul Quintero Felix, Reina Galvin, Rene Beamonte-Barrientos, Rianne van Deelen, Richard Lanctot, Rik Smith, Rinus Dillerop, Rob Sheldon, Rob van Bemmelen, Robert Gill Jr., Ron Summers, Rose Swift, Ruslan Urazaliyev, Salvador Gómez del Ángel, Sama Zefania, Samantha Collins, Samantha Franks, Samantha Robinson, Sarah Saalfeld, Scott McWilliams, Shelby McCahon, Stephanie Lomas, Stephen Brown, Stuart Sharp, Syrymgul Zaripova, Tafitsoa Mijoro, Tamara Volkmer, Tamás Székely, Terje Lislevand, Theunis Piersma, Thomas Mondain-Monval, Thomas Rieke, Tim van der Meer, Timur Iskakov, Tom Versluijs, Tómas Gunnarsson, Tong Mu, Torgrim Breiehagen, Triin Kaasiku, Tucker Grigsby, Veli-Matti Pakanen, Verónica Méndez, Veronika Firlová, Veronika Janatová, Vinícius Domingues, Wendoly Rojas-Abreu, Wiebe Kaspersma, Will Britton, William Jones, Willow English, Wim Tijssen, Yianni Laskaris, Yuliya Sheremet, Yuri Artukhin, Zacharay Pohlen

Calidris alba

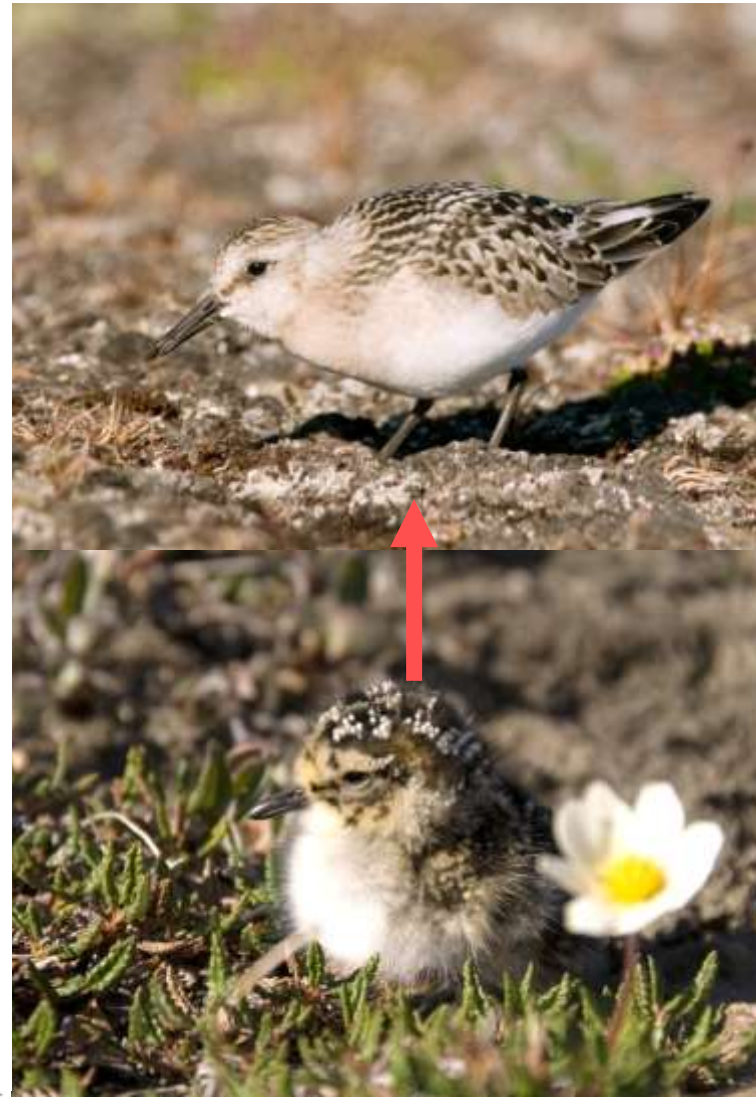
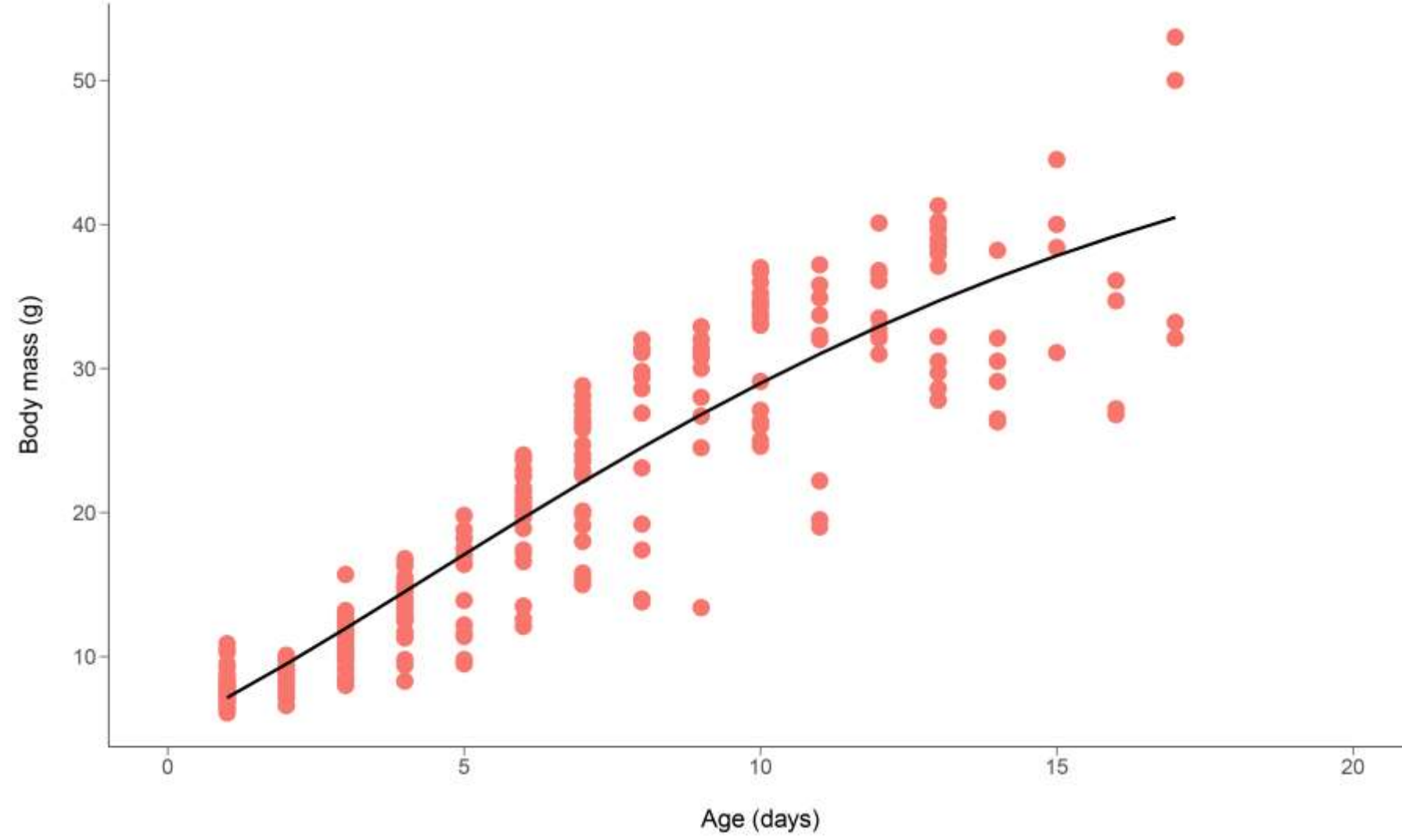


Calidris alba



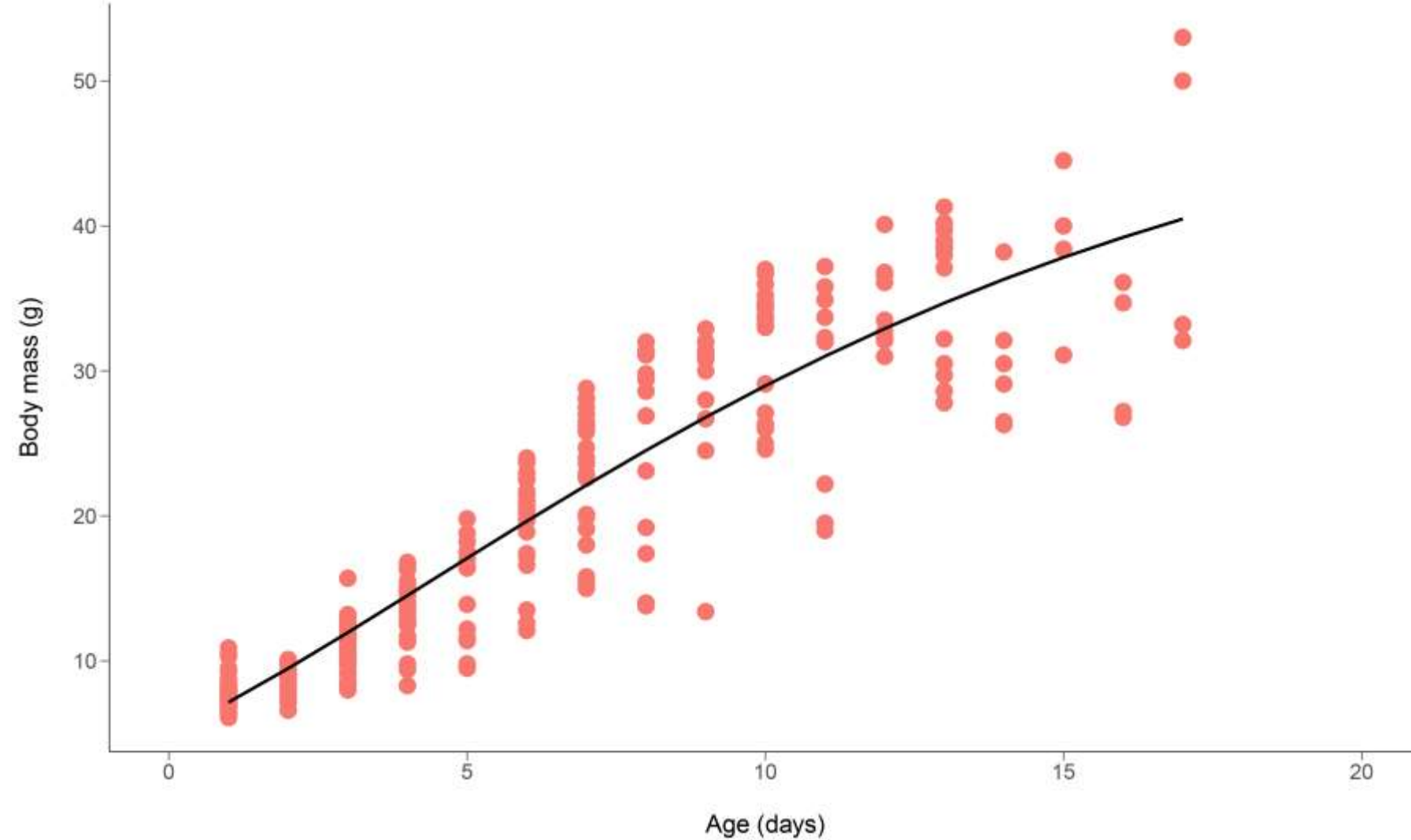
Full-grown at 25 days, life expectancy ~ 9 years

Calidris alba



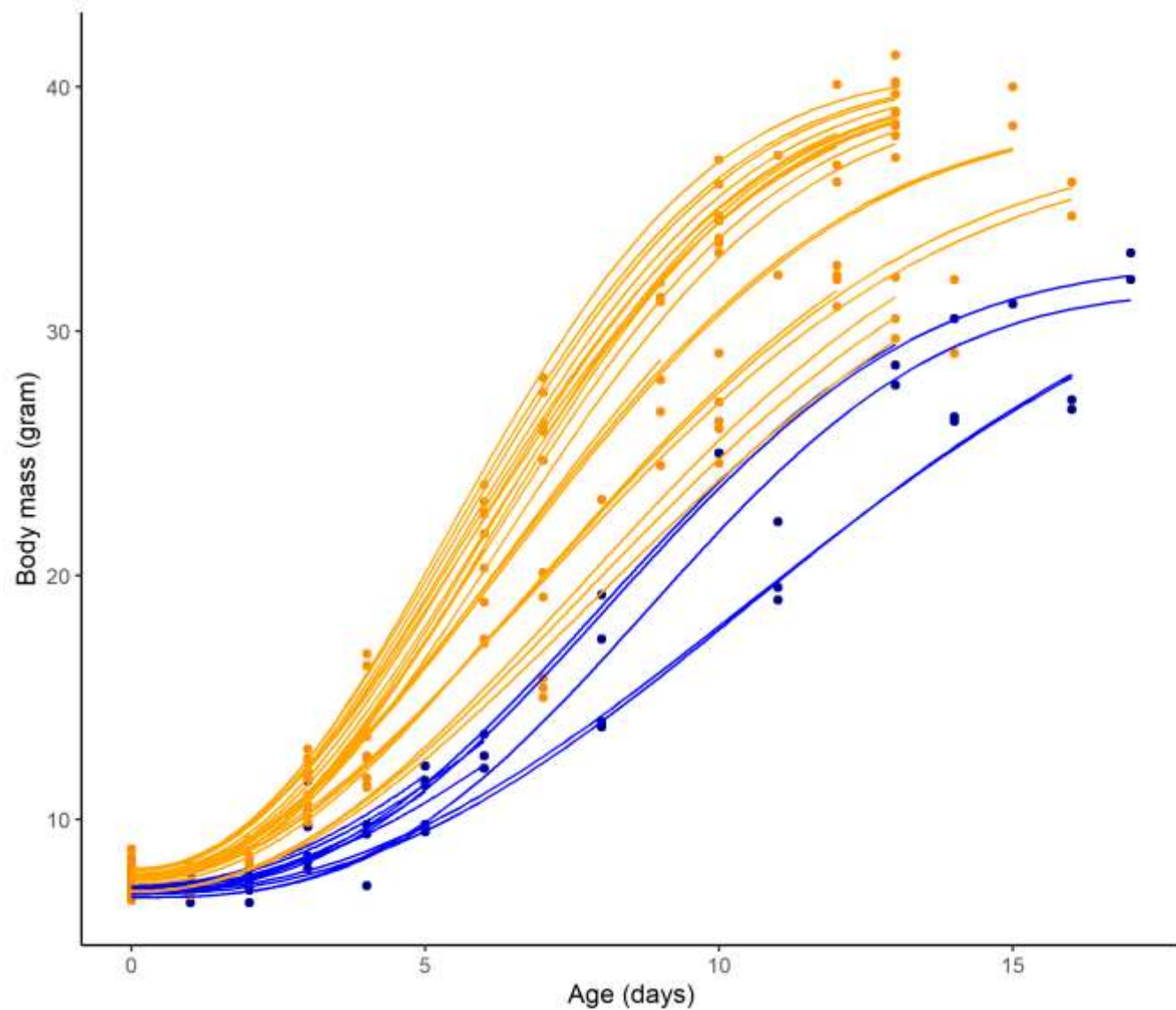
Full-grown at 25 days, life expectancy At 0.8% of a lifetime

Calidris alba

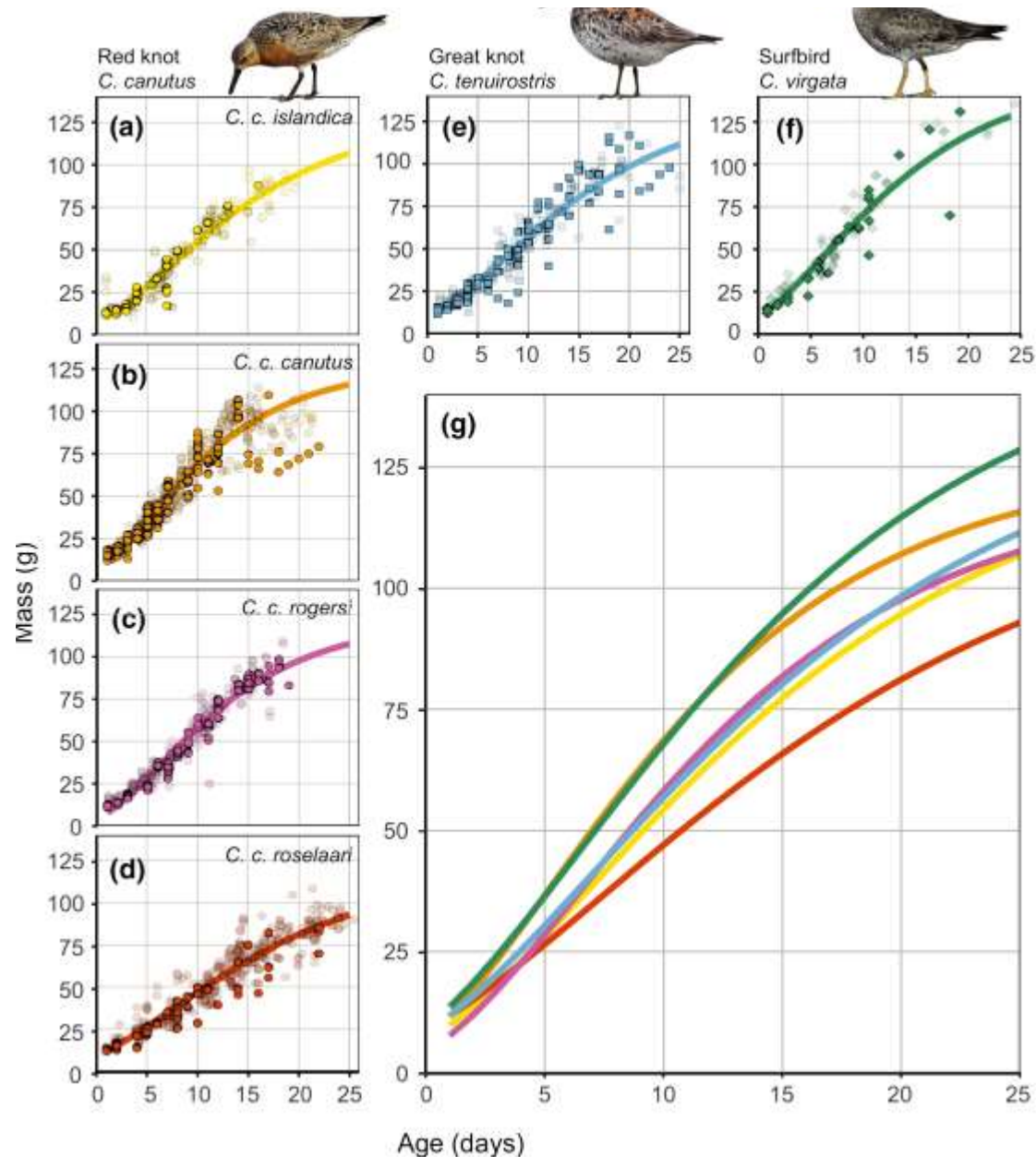


➤ ~40 times faster full grown compared to humans!

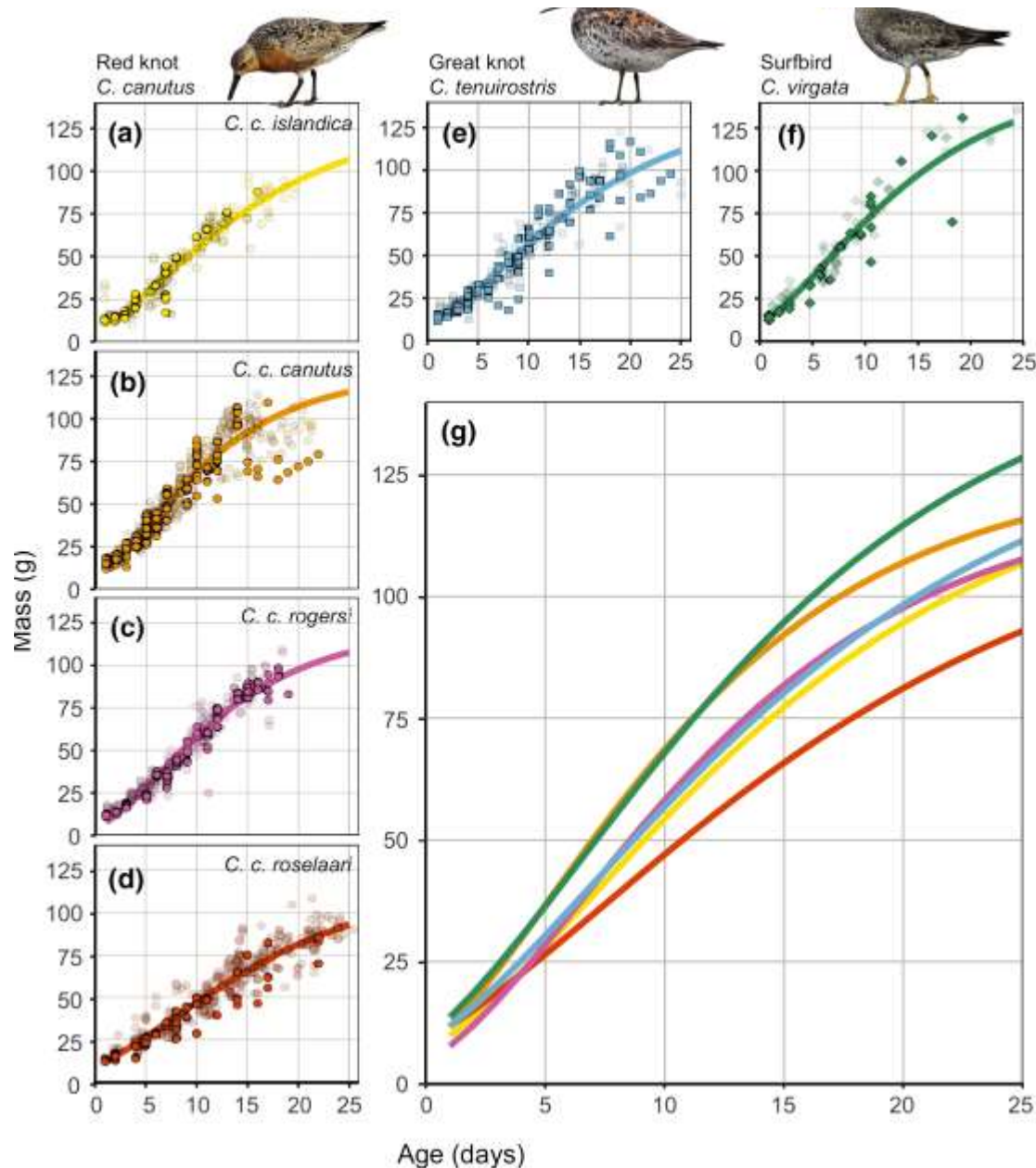
Variation between individuals and years



Variation between (sub)species



Variation between (sub)species



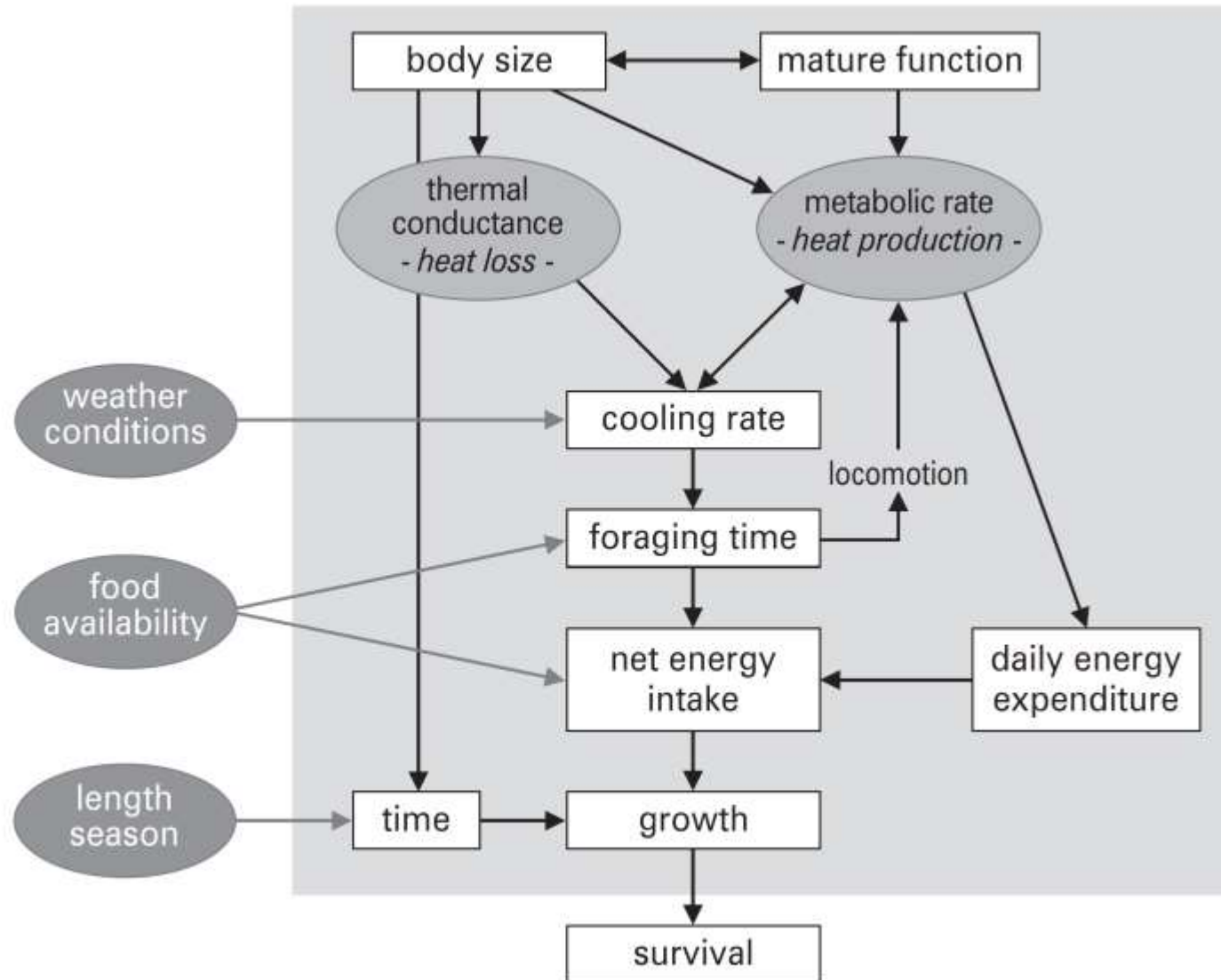
Population-specific growth rate

Red Knot: 0.076 - 0.121

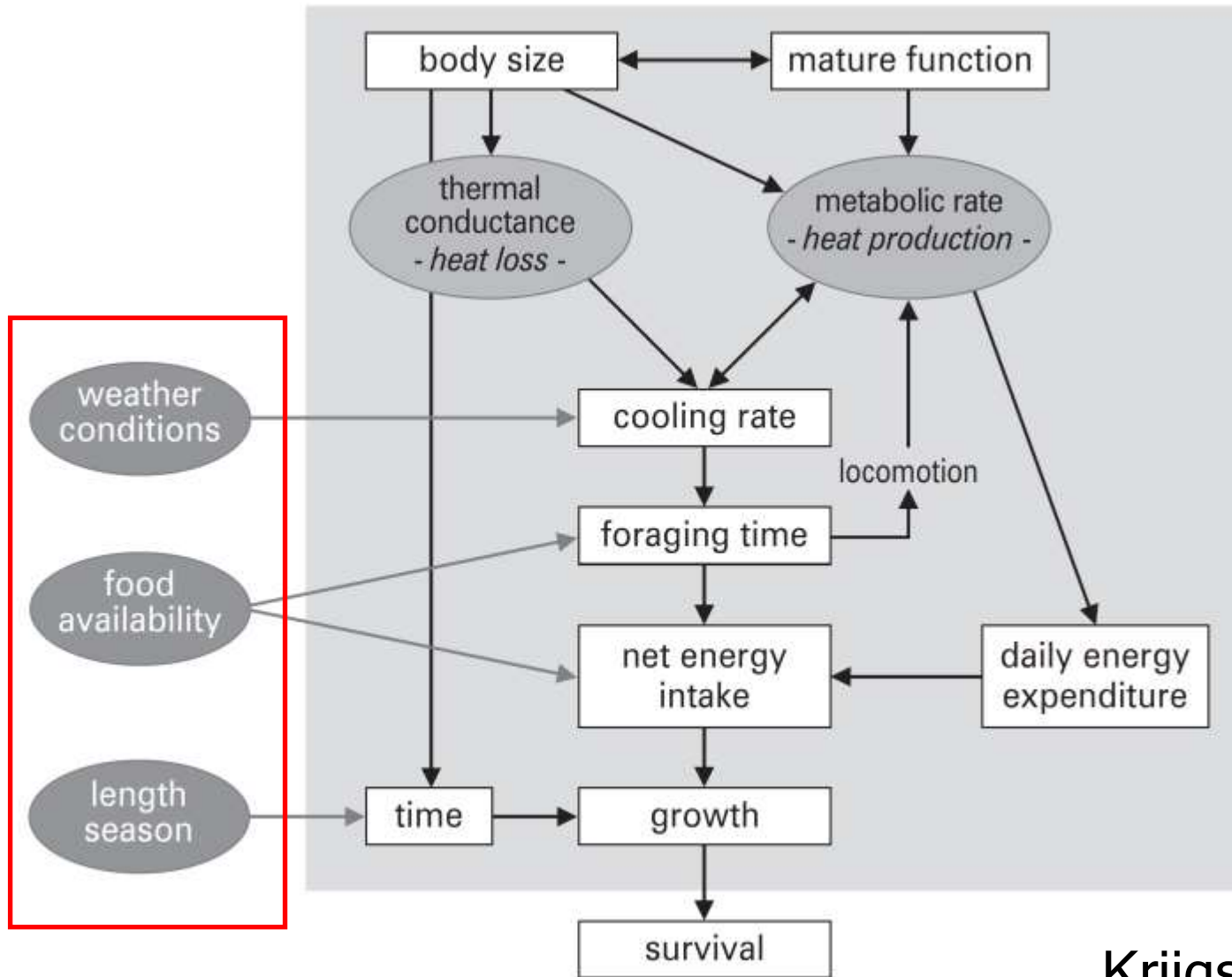
Great Knot: 0.087

Surfbird: 0.094

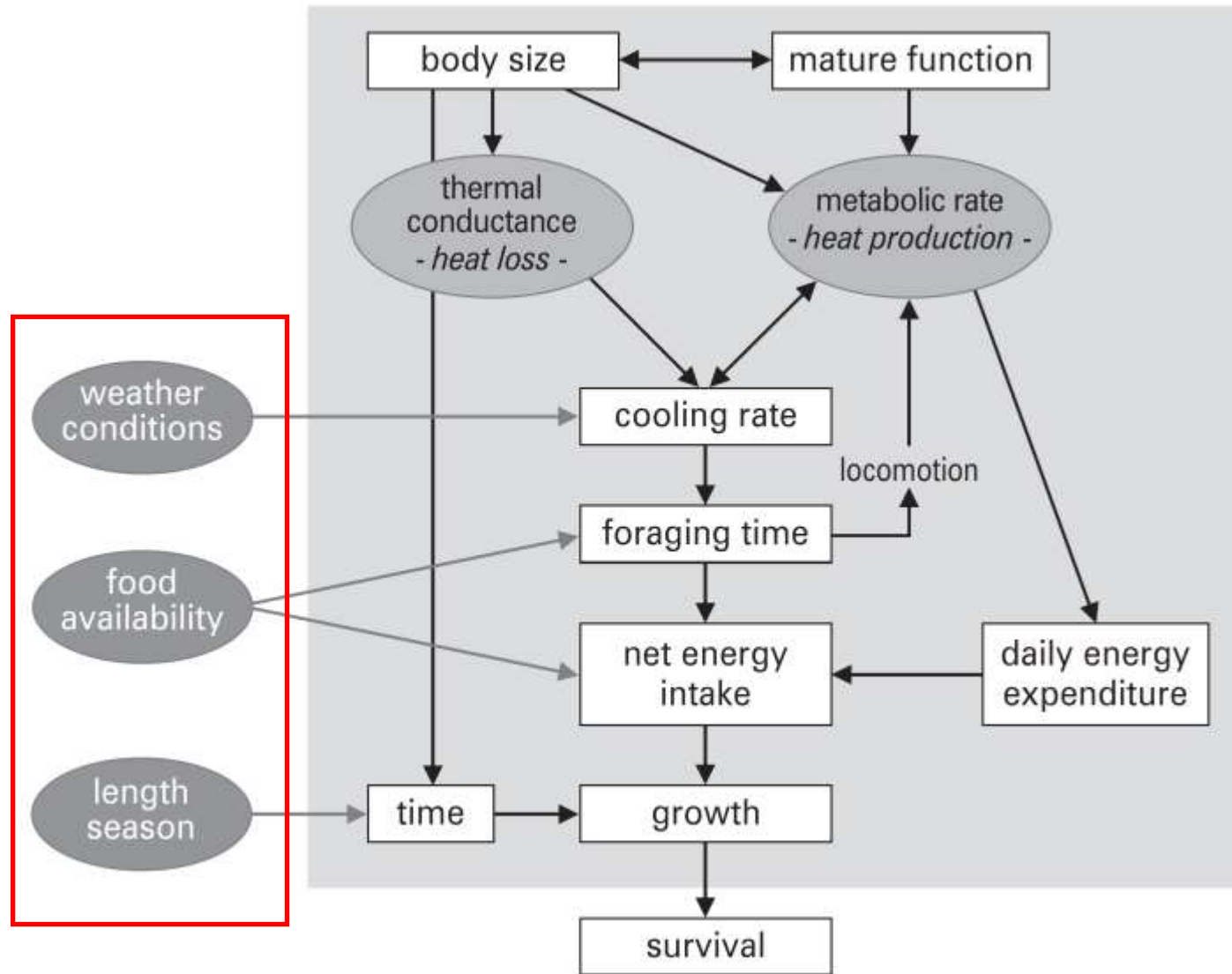
The importance of body size



Selection for fast growth at higher latitudes?



Selection for fast growth at higher latitudes?



Dependent on species size ?

Call for collaboration in global analysis on chick growth

Aim: analyse shorebird chick growth in relation to climatic variation, comparing species / populations / study sites

Join if you have **chick biometric data** for **any shorebird** species

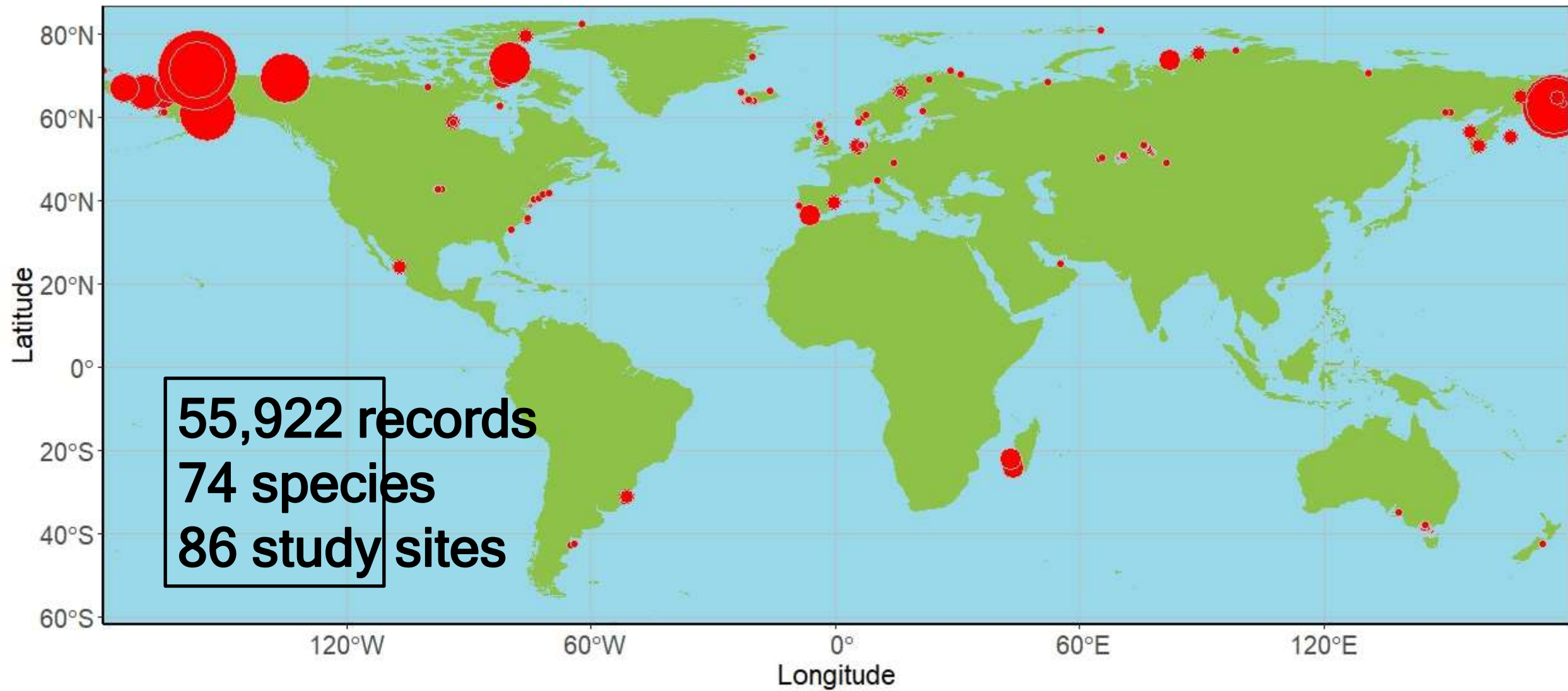


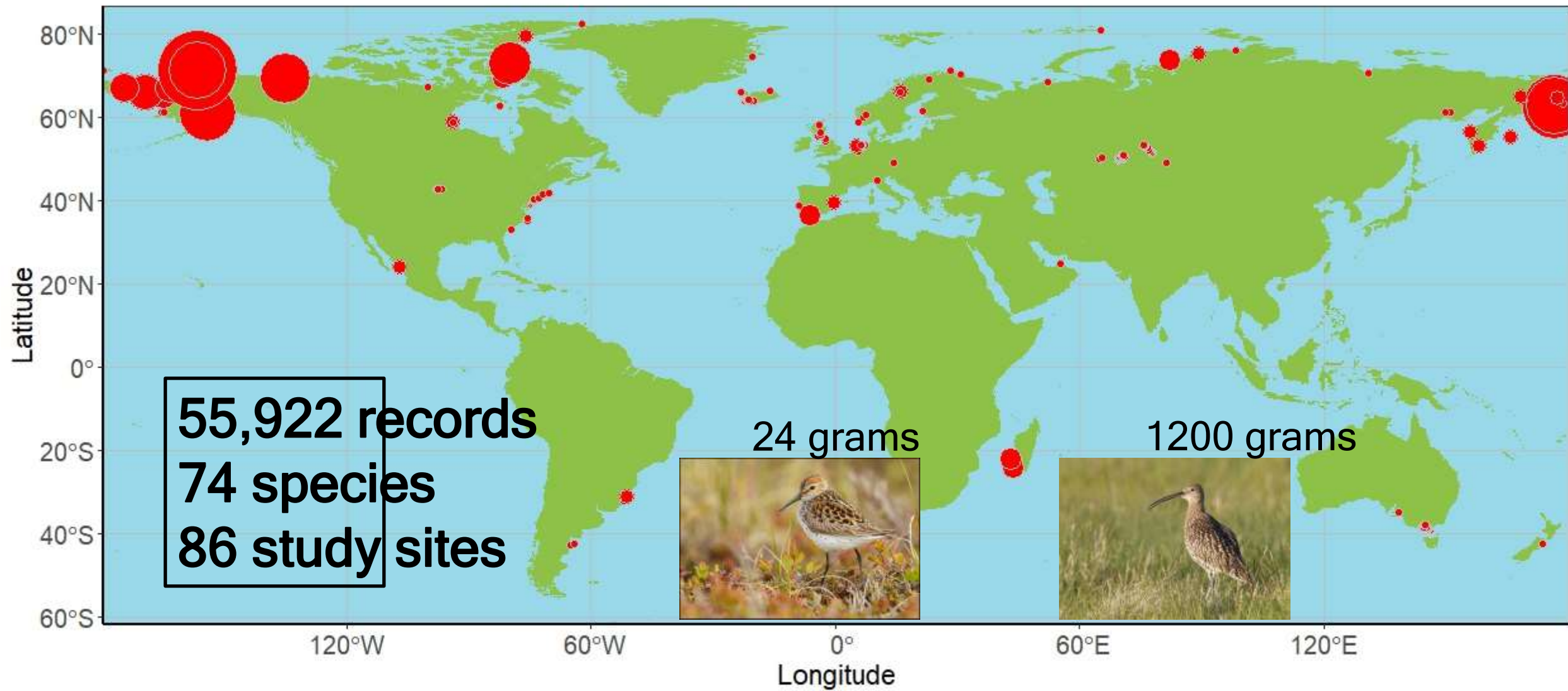
Please contact:

thomaslameris@gmail.com

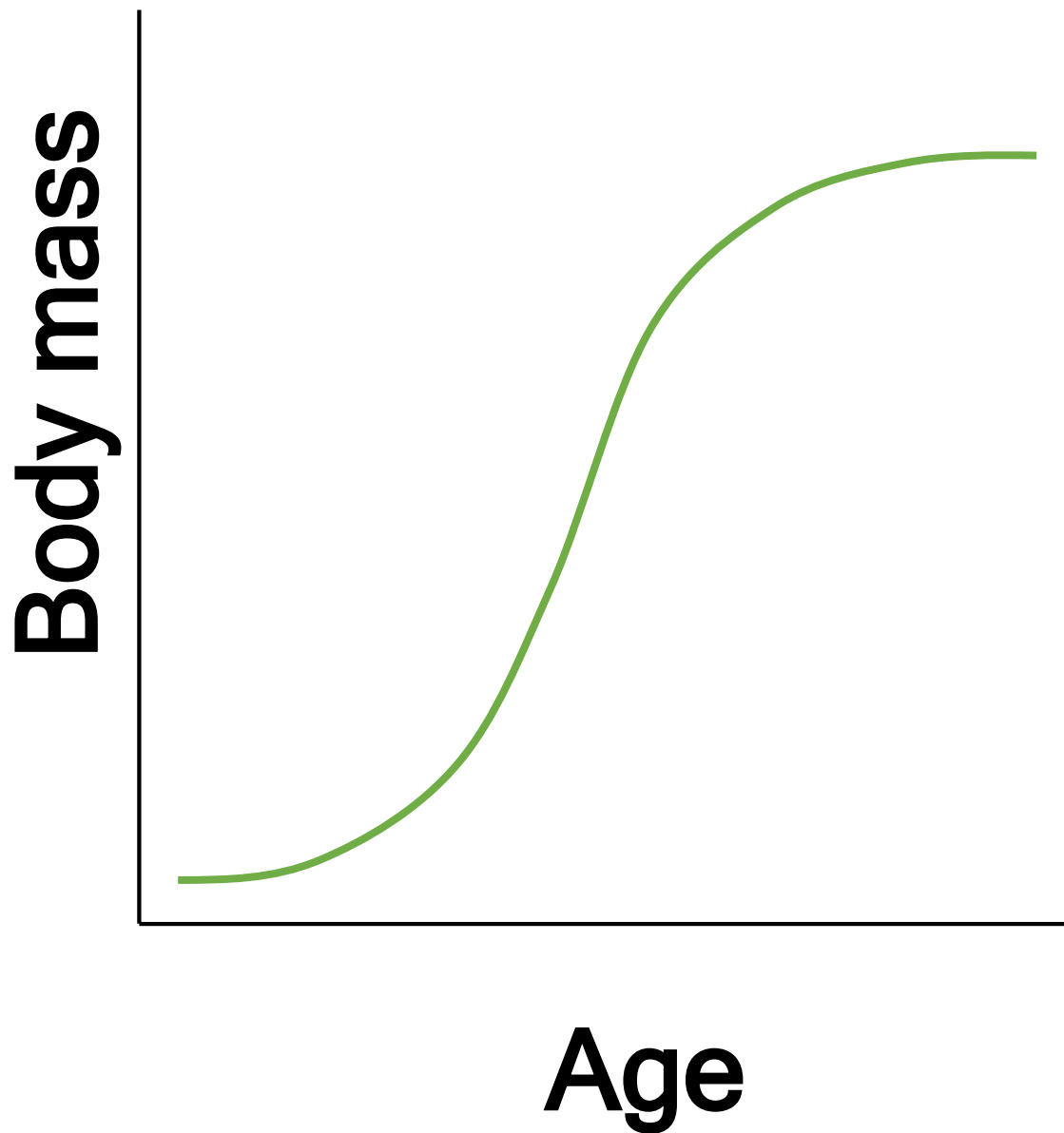
jeroen.reneerkens@nioz.nl



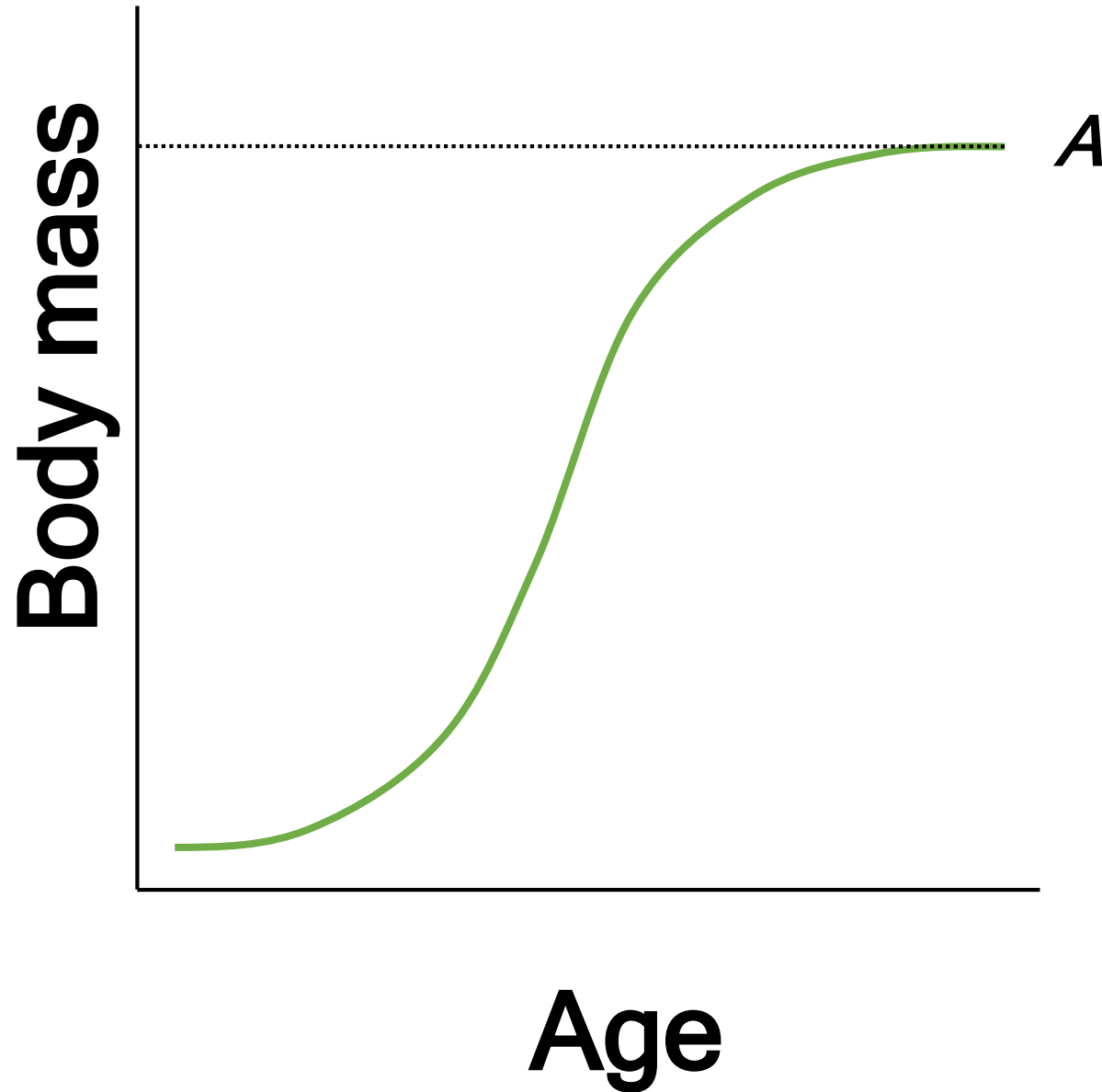




Growth models

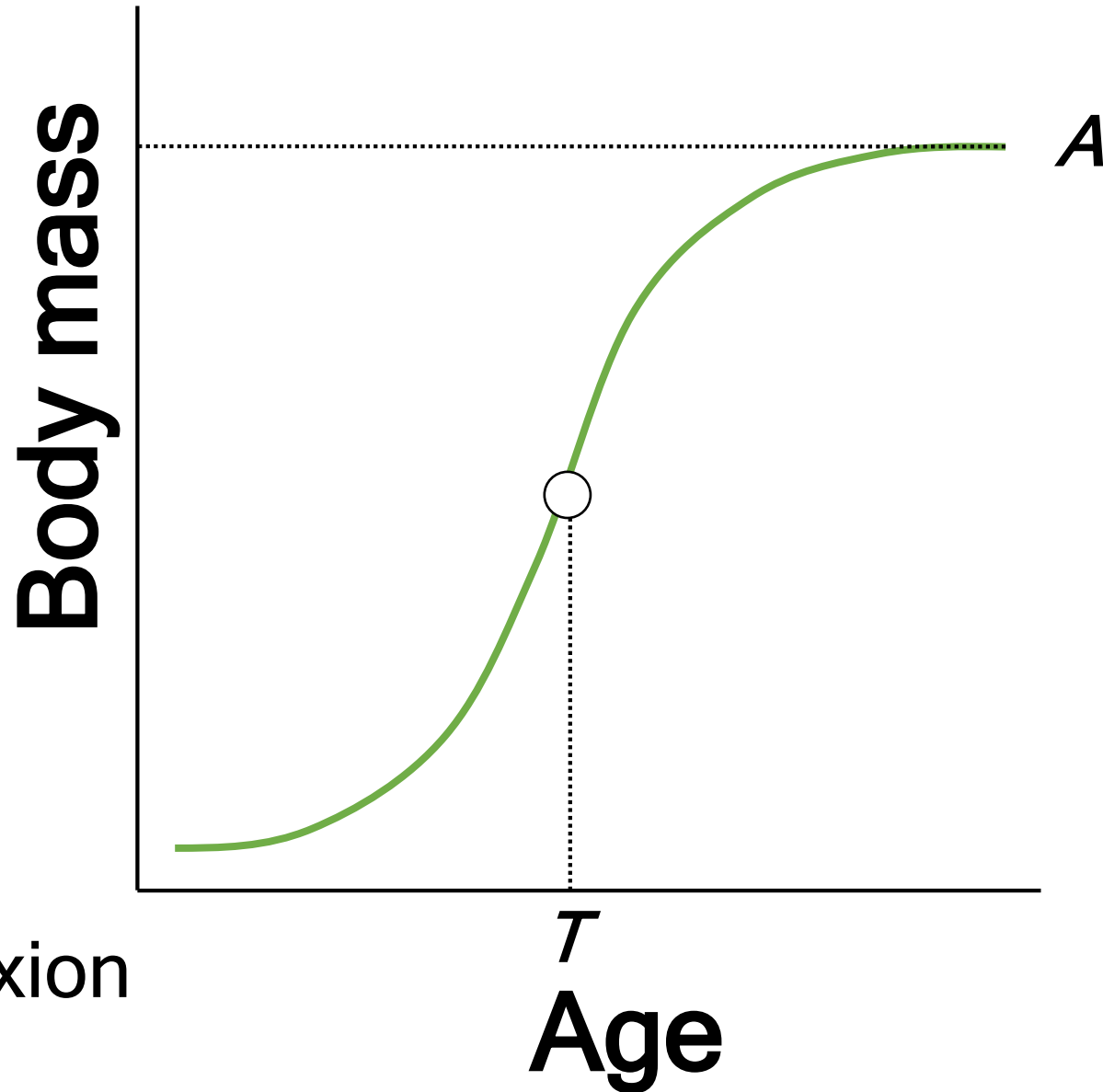


Growth models



$A = \text{asymptote}$

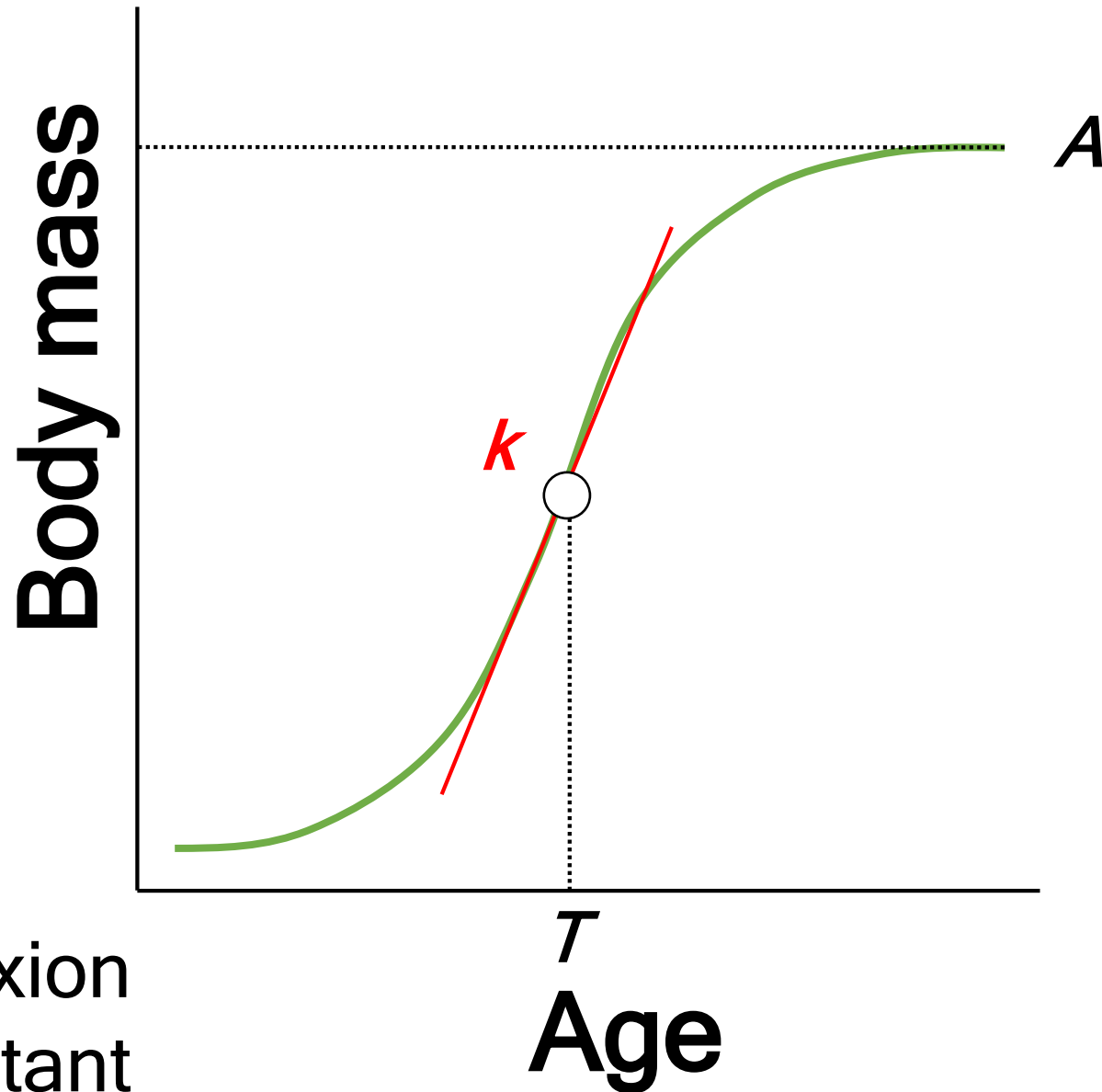
Growth models



A = asymptote

T = time at inflexion

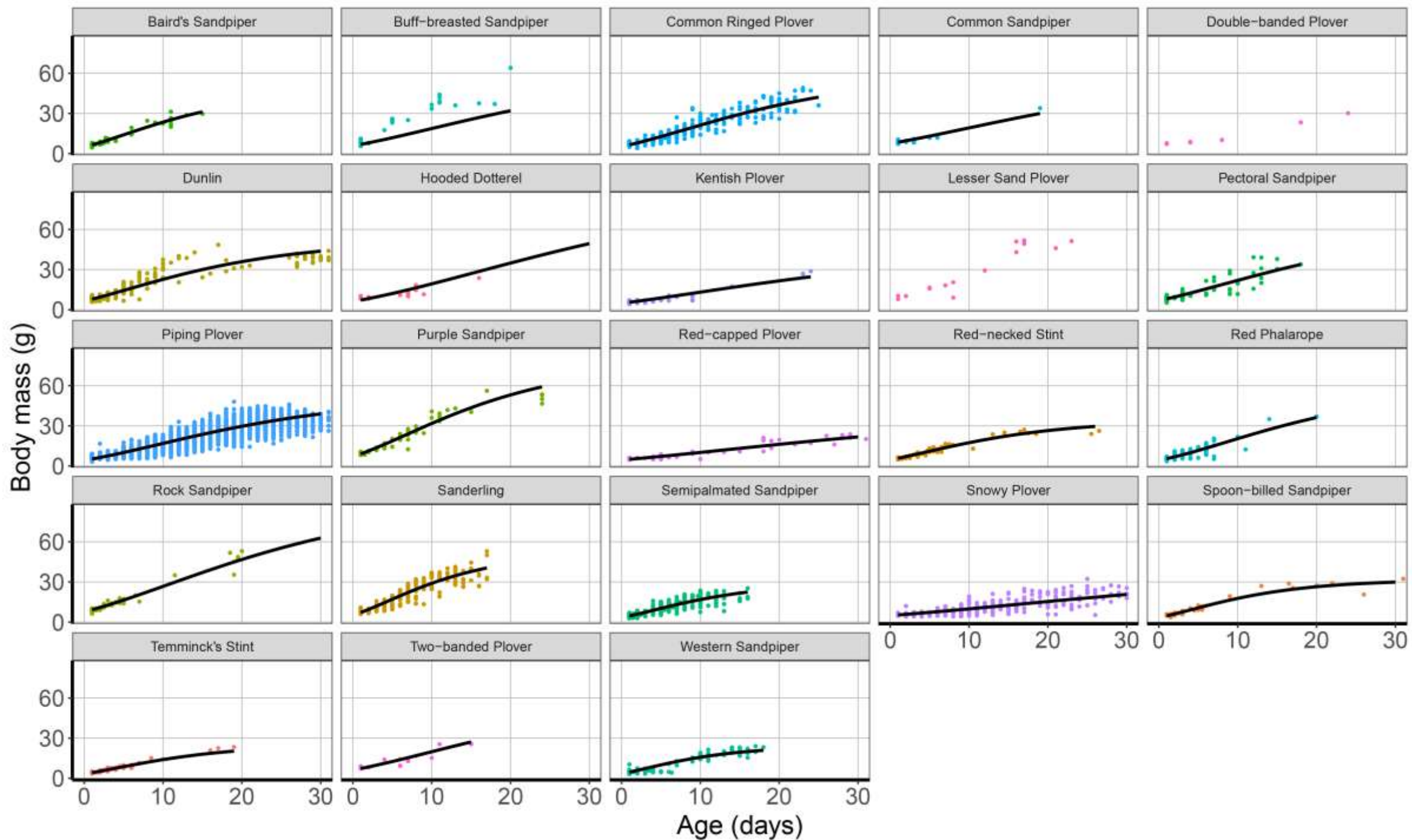
Growth models

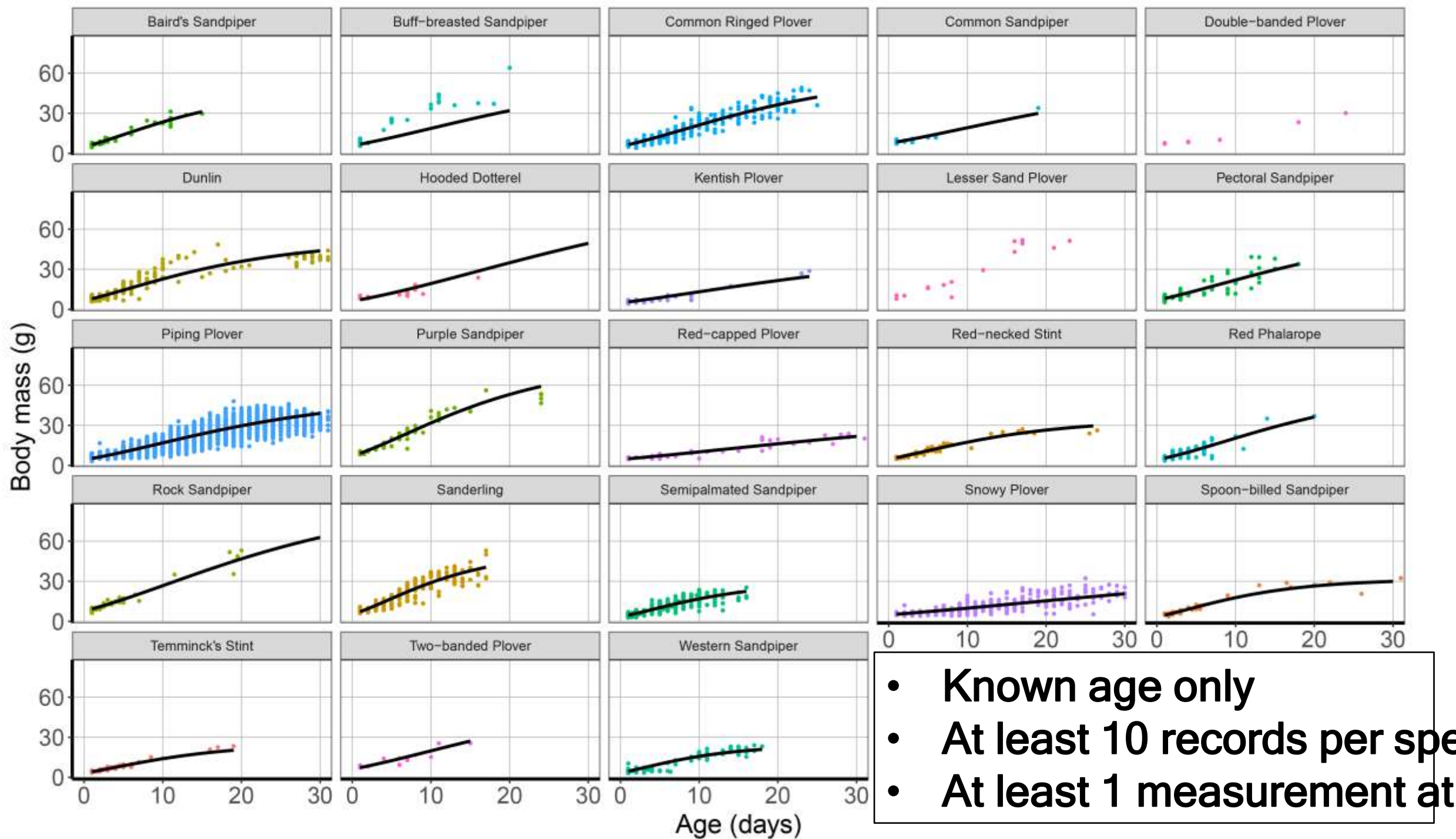


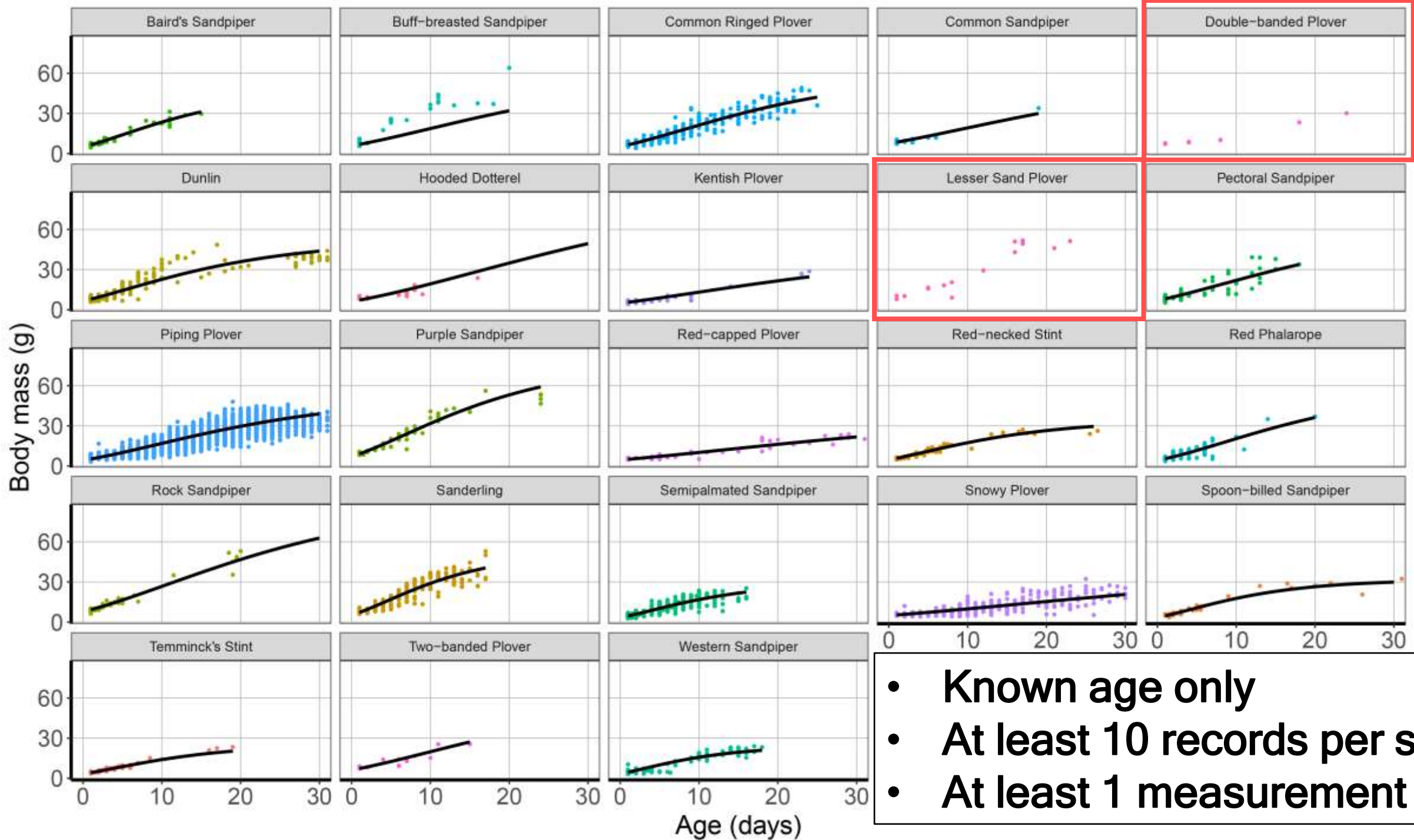
A = asymptote

T = time at inflexion

k = growth constant







- Known age only
- At least 10 records per species
- At least 1 measurement at each age

Effects **latitude** and **size** on species-specific growth rates



Effects latitude and size on species-specific growth rates



Expectations:

- growth rate decreases with size

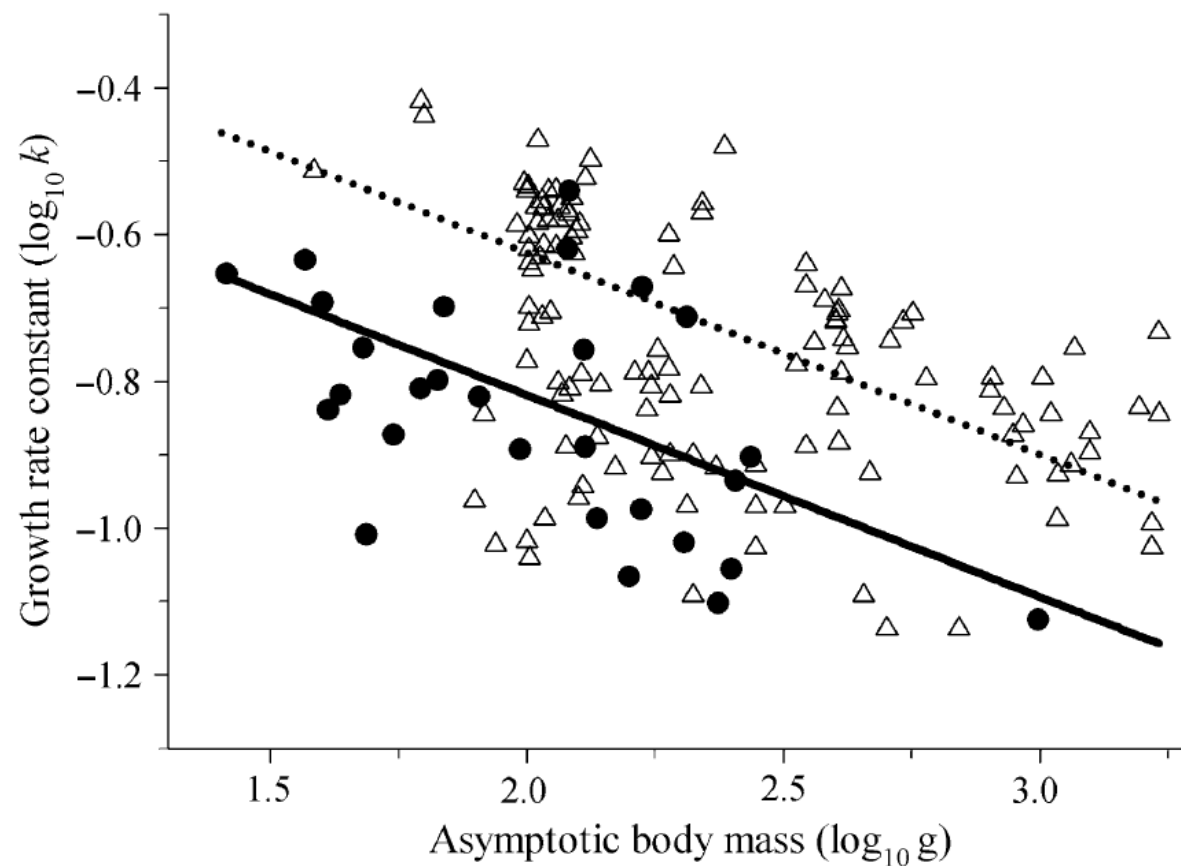
Effects **latitude** and **size** on species-specific growth rates



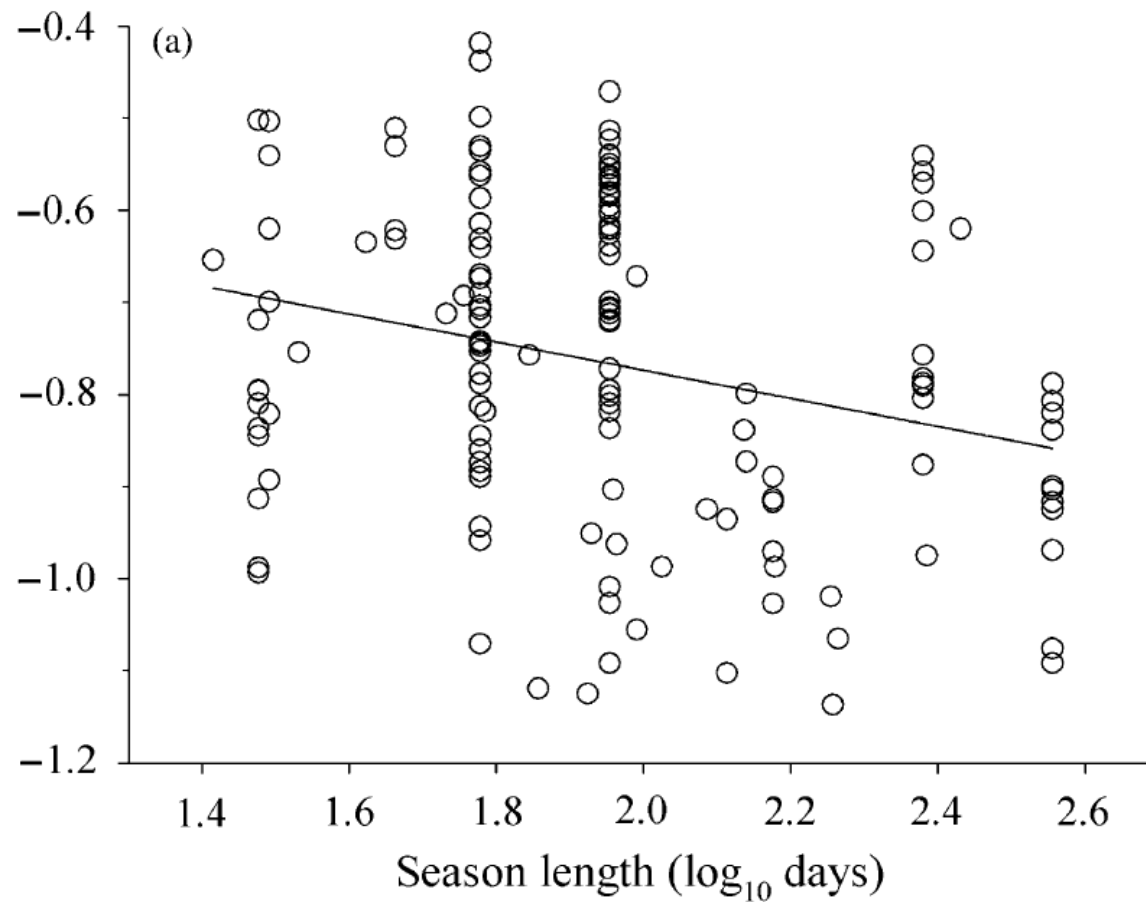
Expectations:

- growth rate decreases with size
- growth rate increases with latitude

Chick growth rates in Charadriiformes

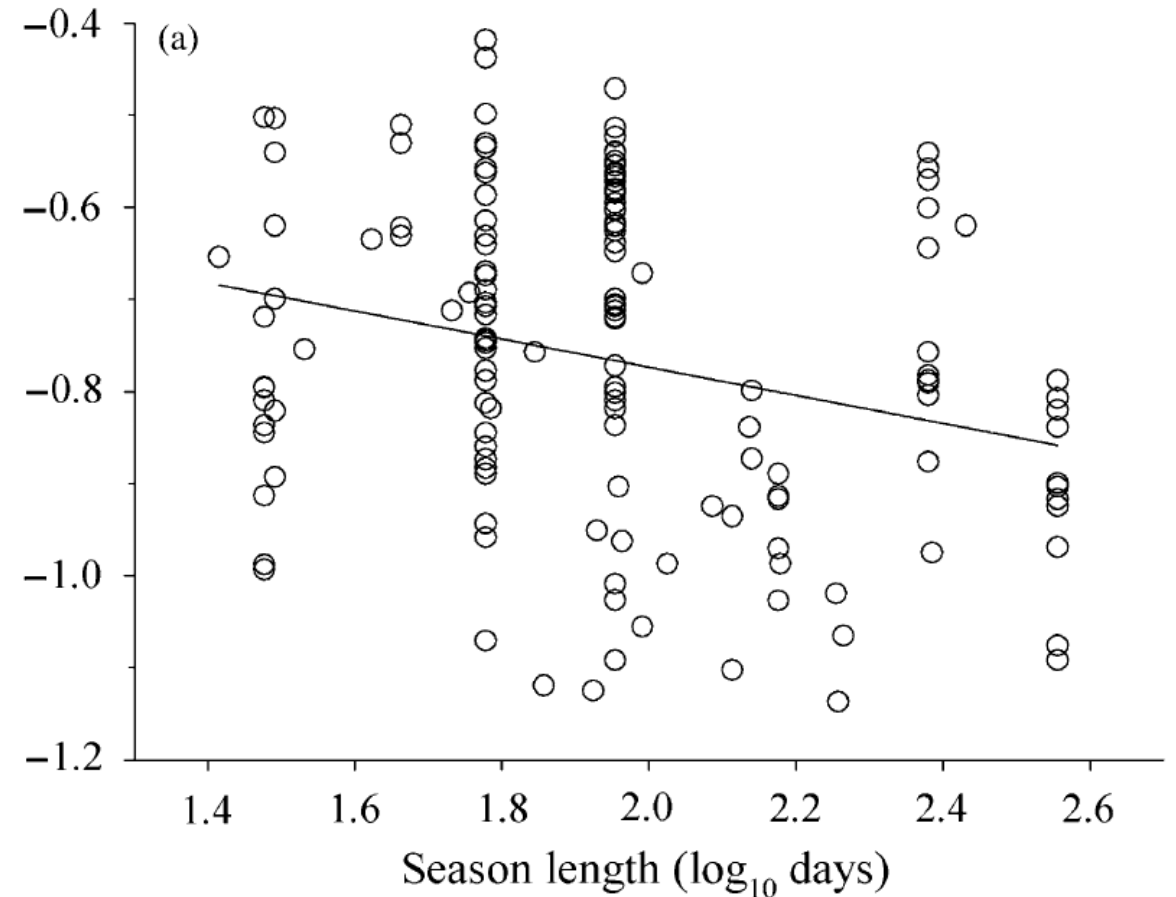


Chick growth rates in Charadriiformes



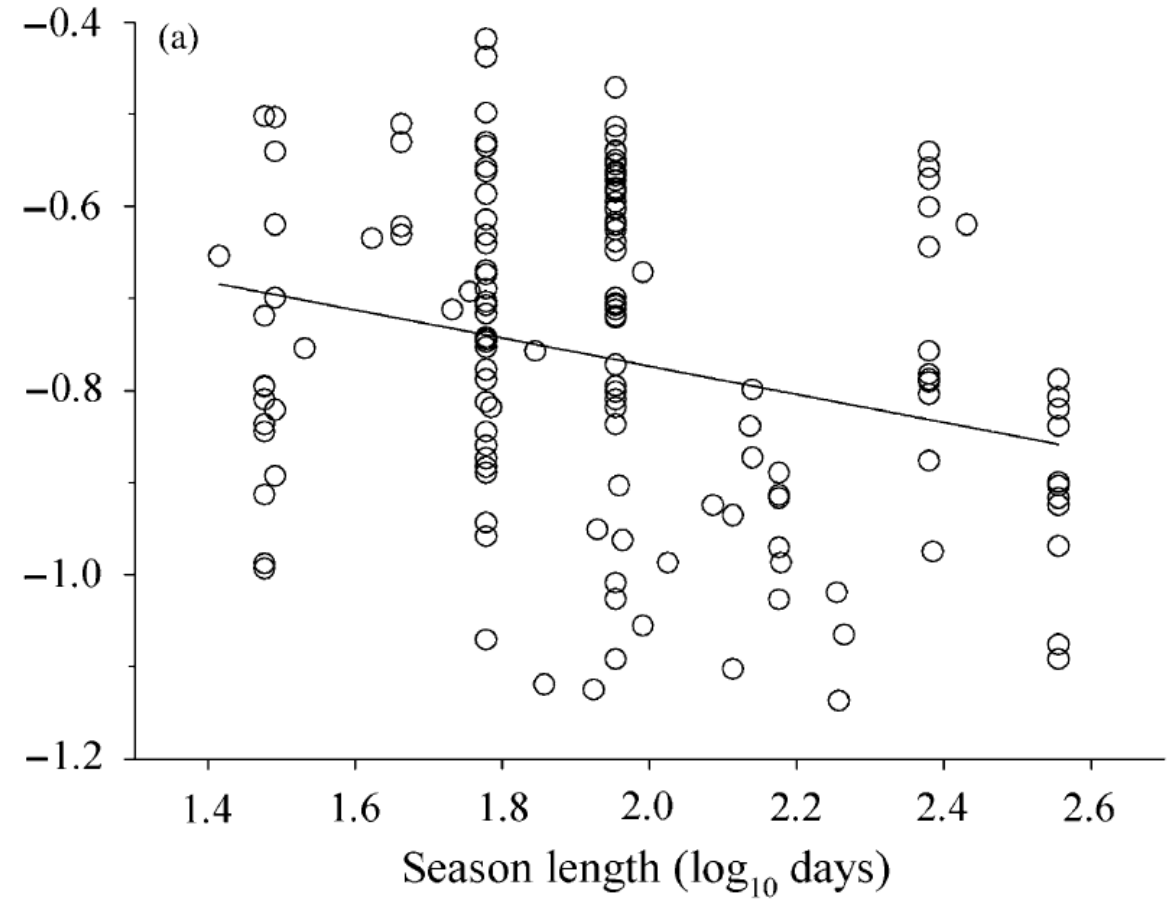
Chick growth rates in Charadriiformes

- Based on published data from literature



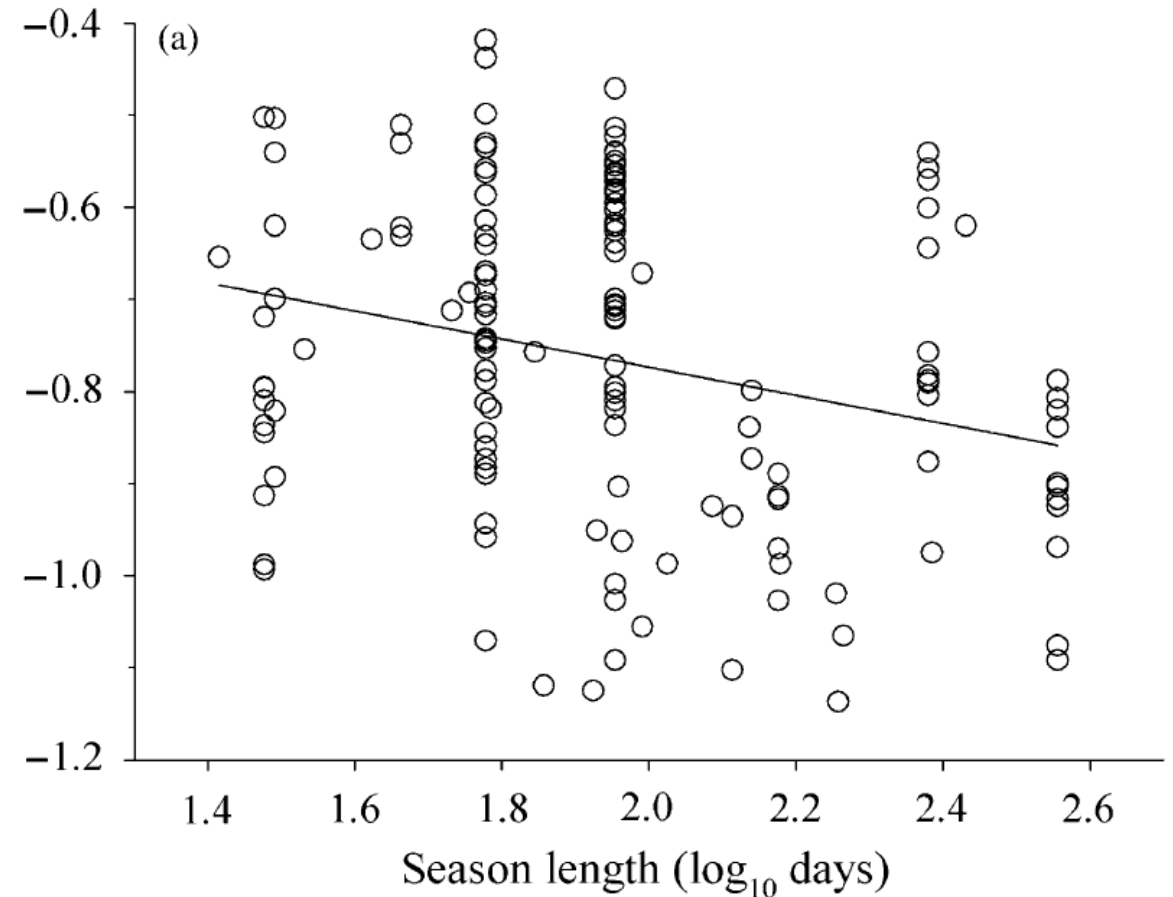
Chick growth rates in Charadriiformes

- Based on published data from literature
- Includes many semi-precocial species



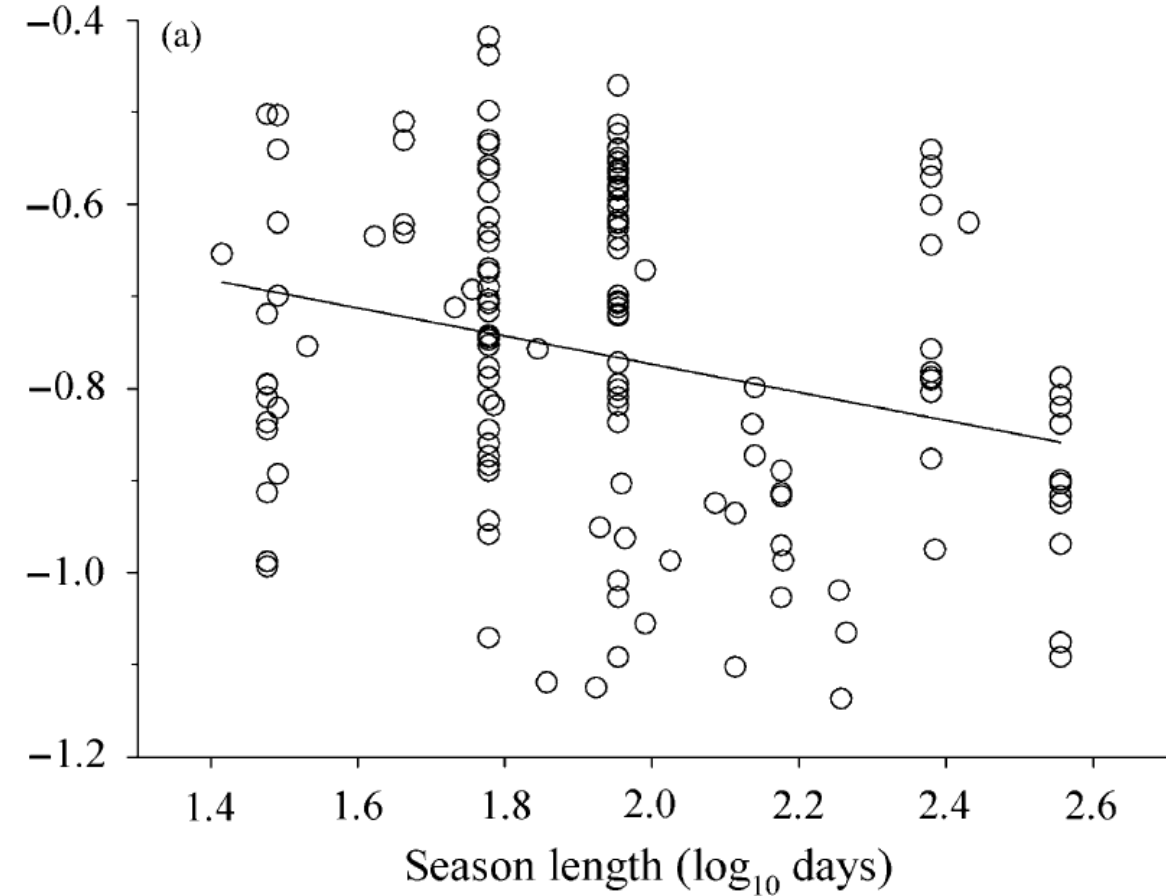
Chick growth rates in Charadriiformes

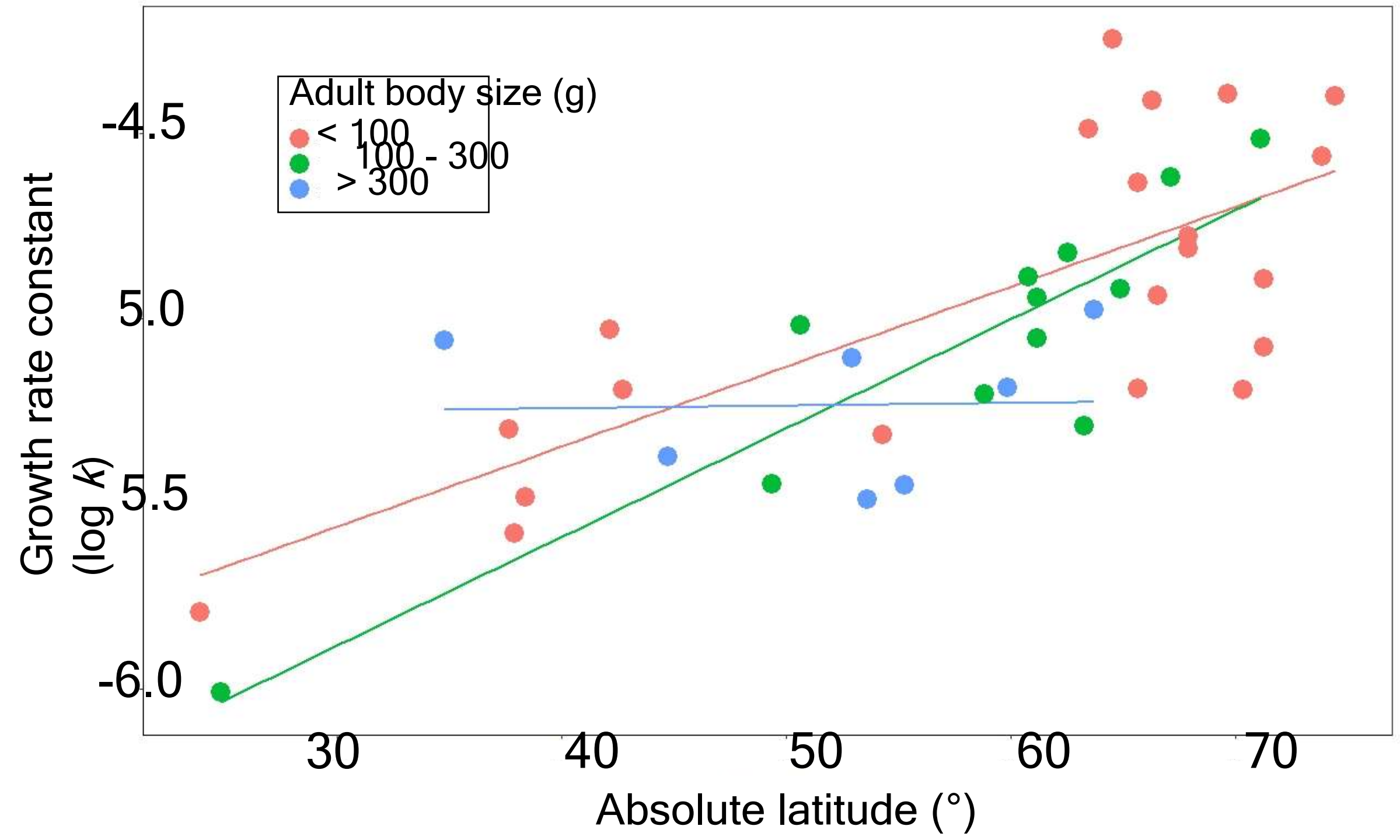
- Based on published data from literature
- Includes many semi-precocial species
- Season length poorly defined



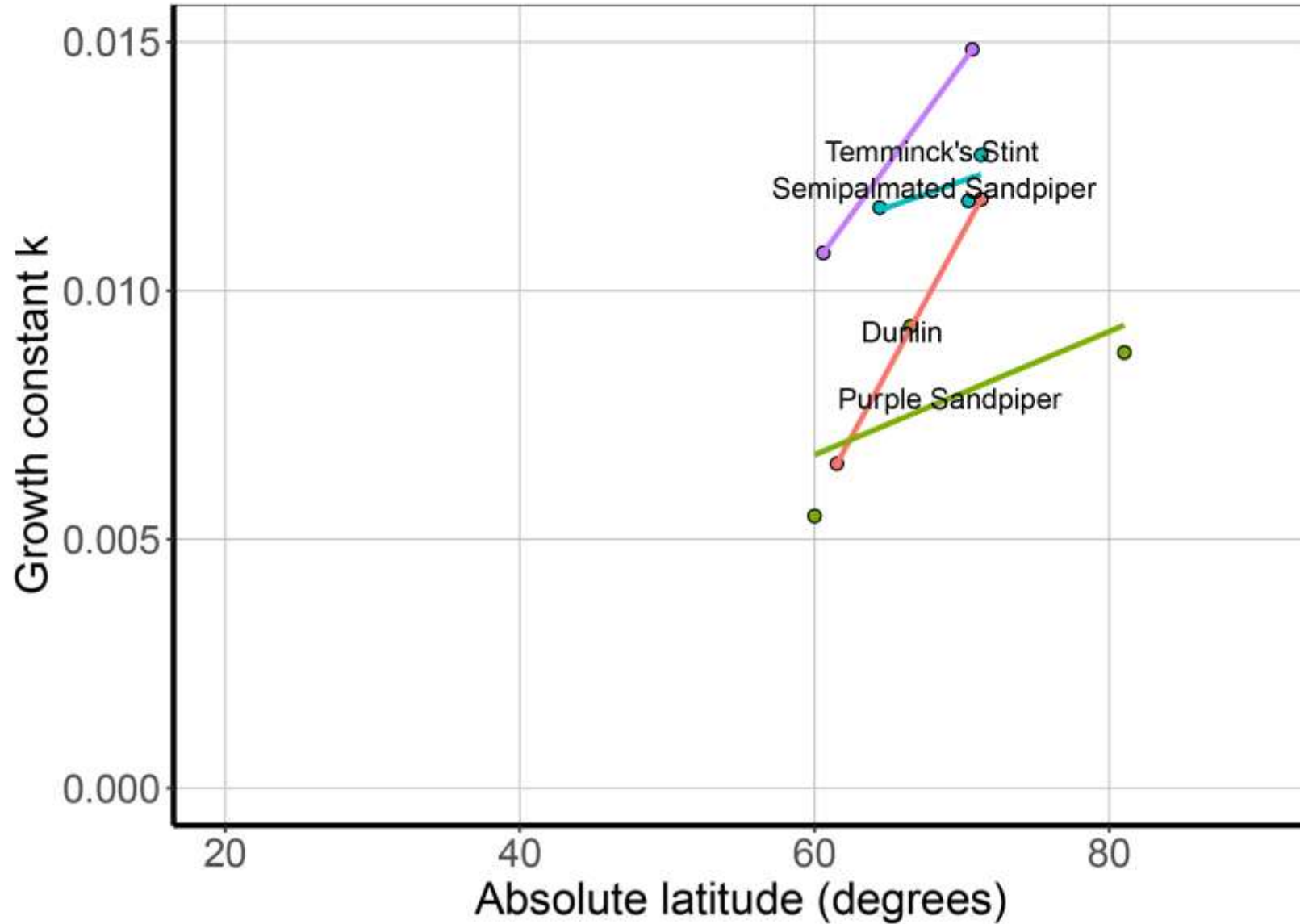
Chick growth rates in Charadriiformes

- Based on published data from literature
- Includes many semi-precocial species
- Season length poorly defined
- Interaction asymptotic body mass x season length not tested

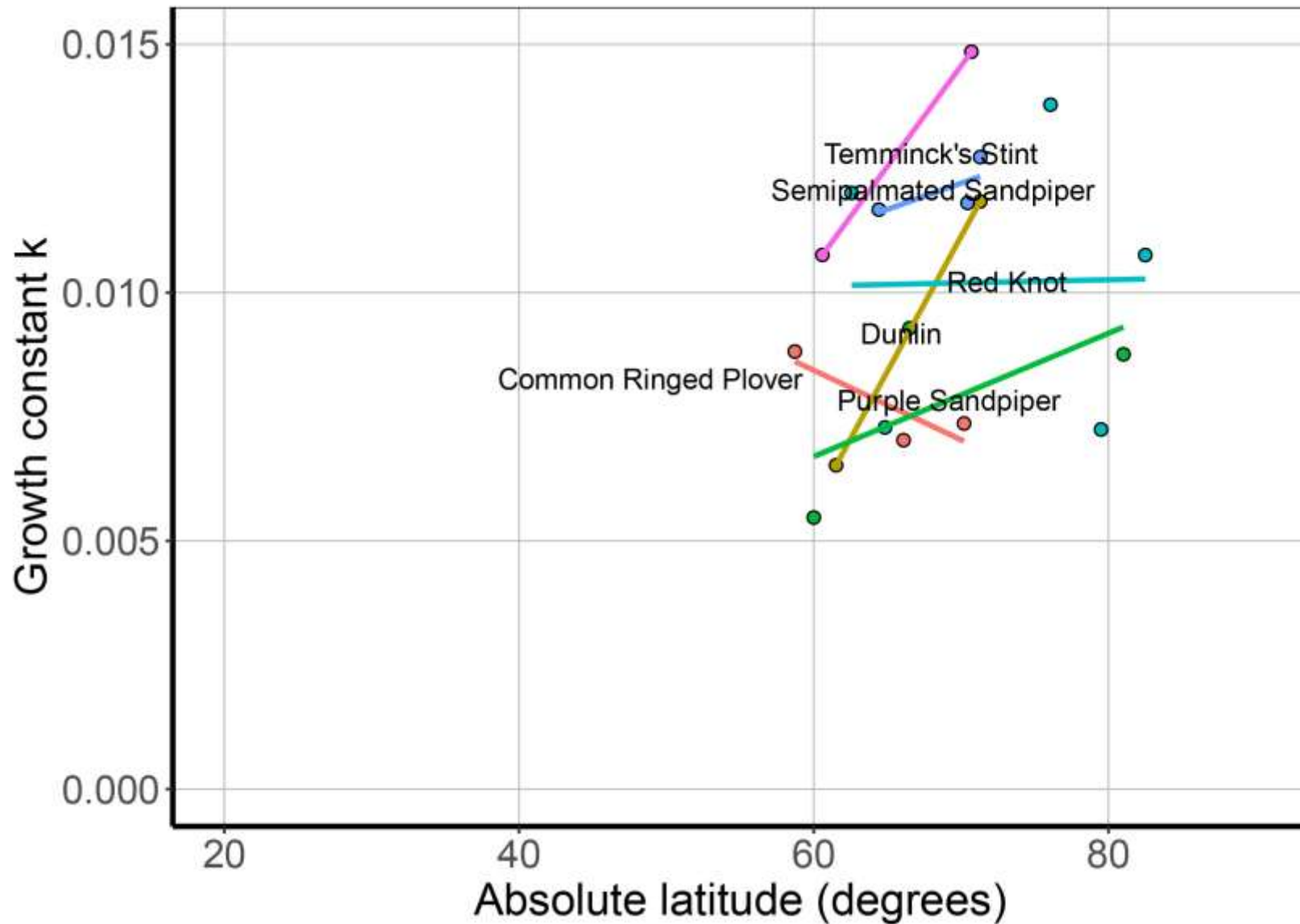




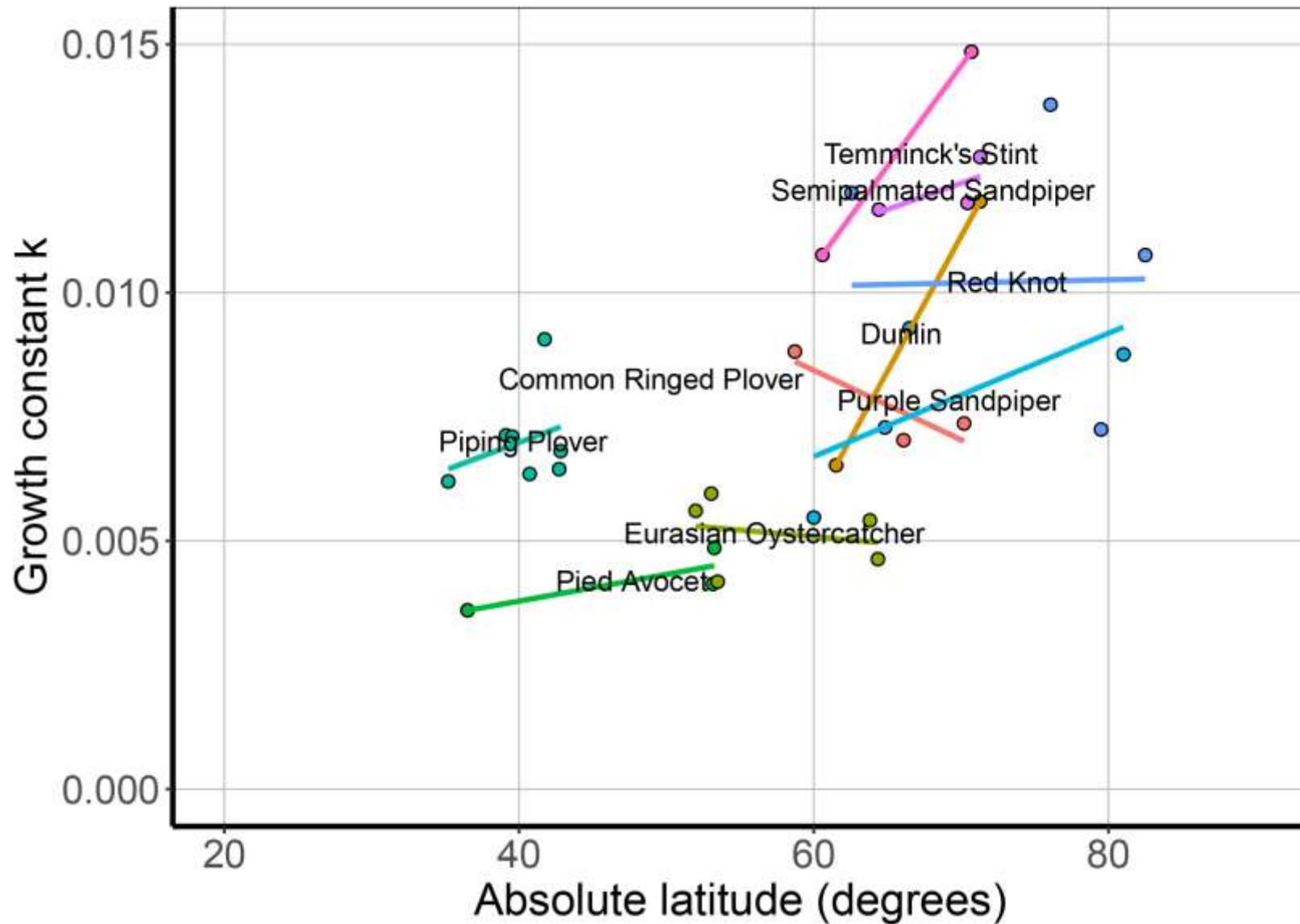
Within-species effect of latitude



Within-species effect of latitude



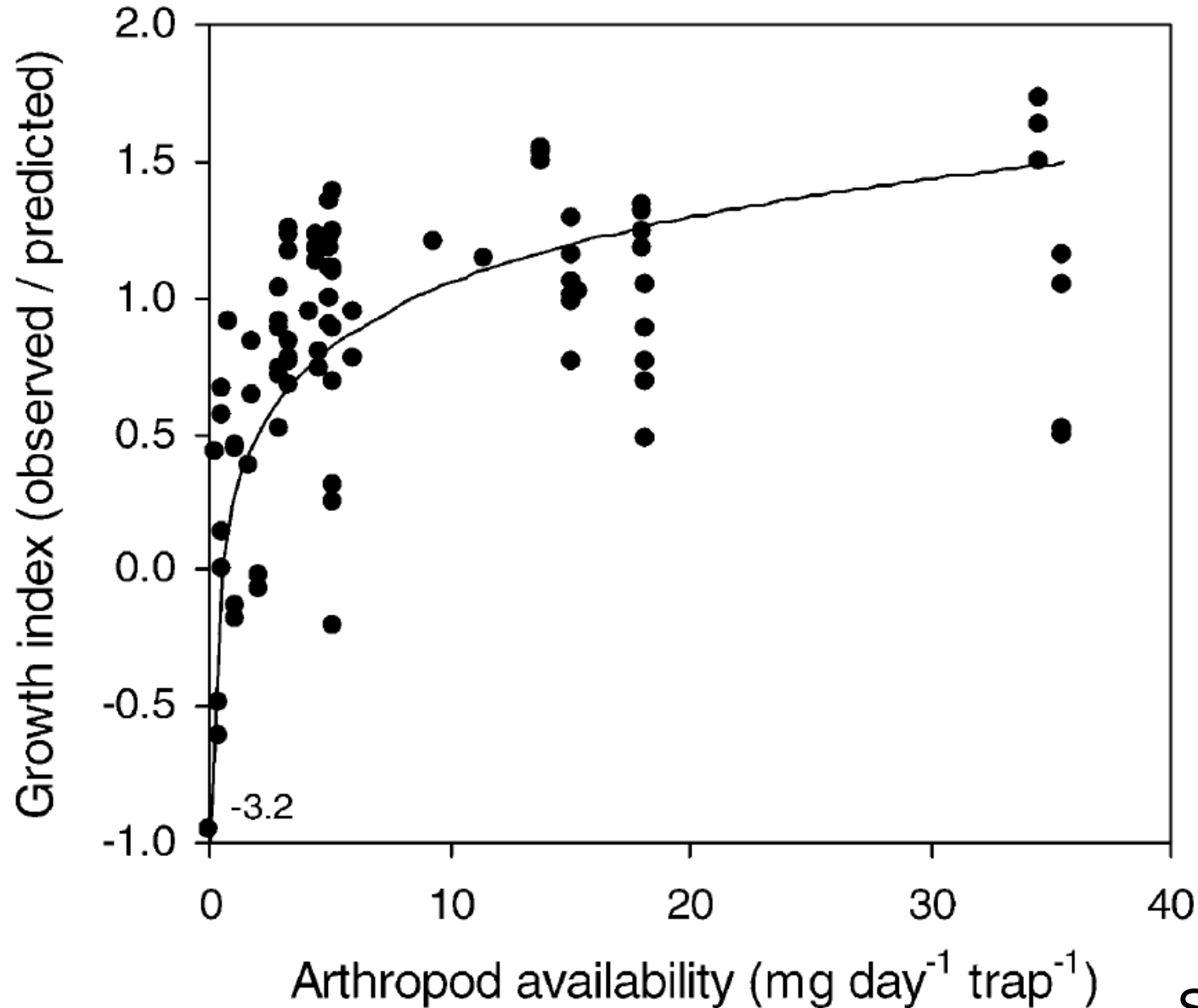
Within-species effect of latitude



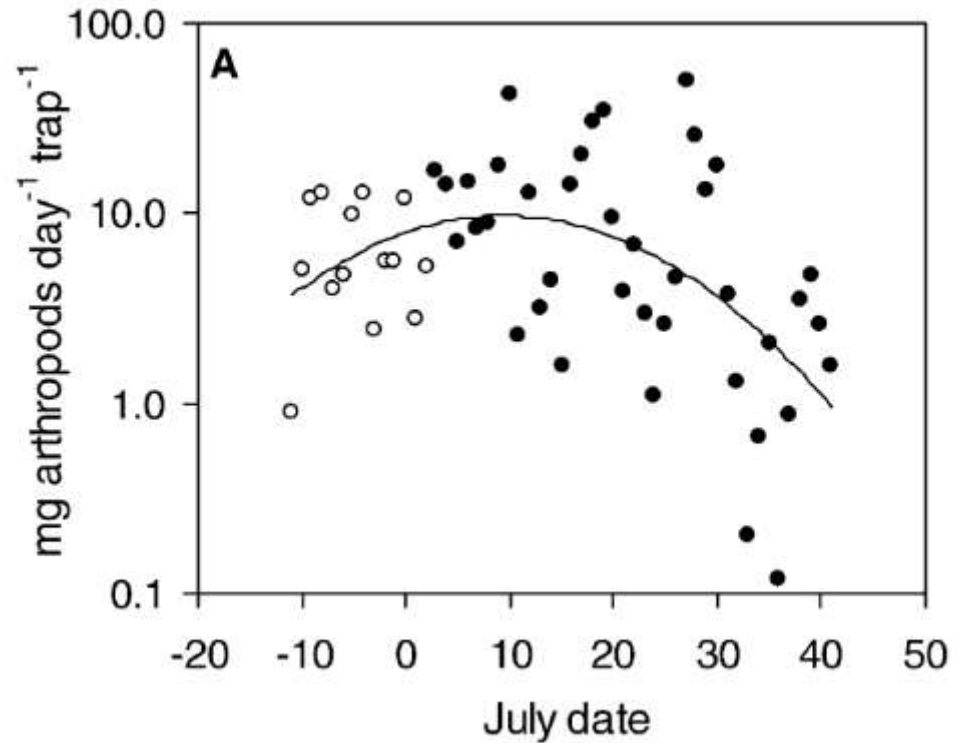
The elephant in the room...



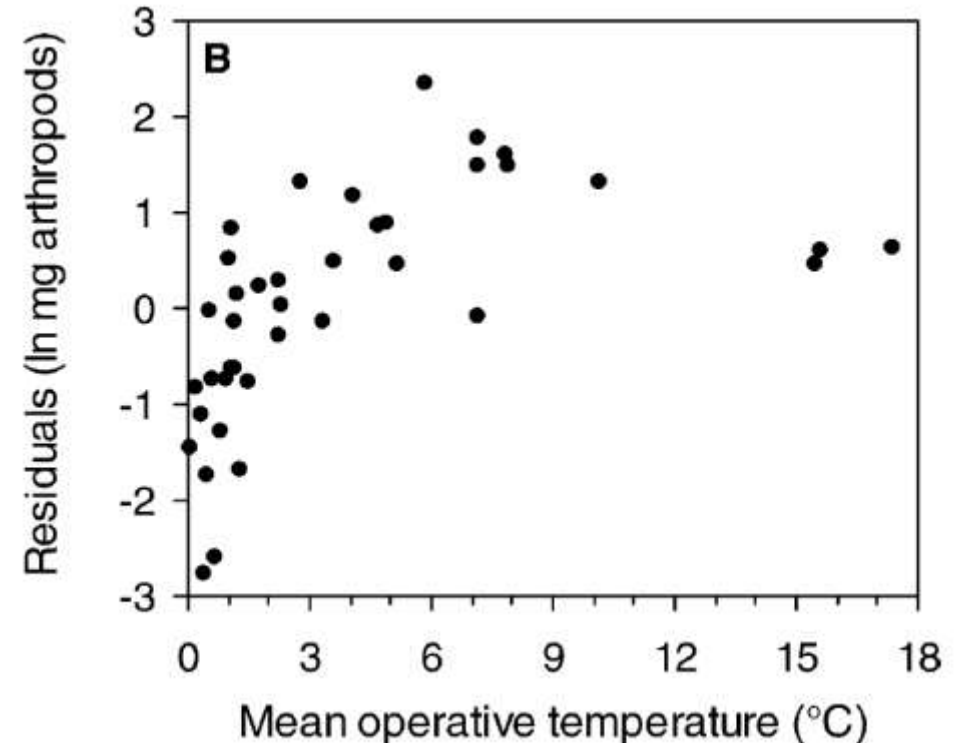
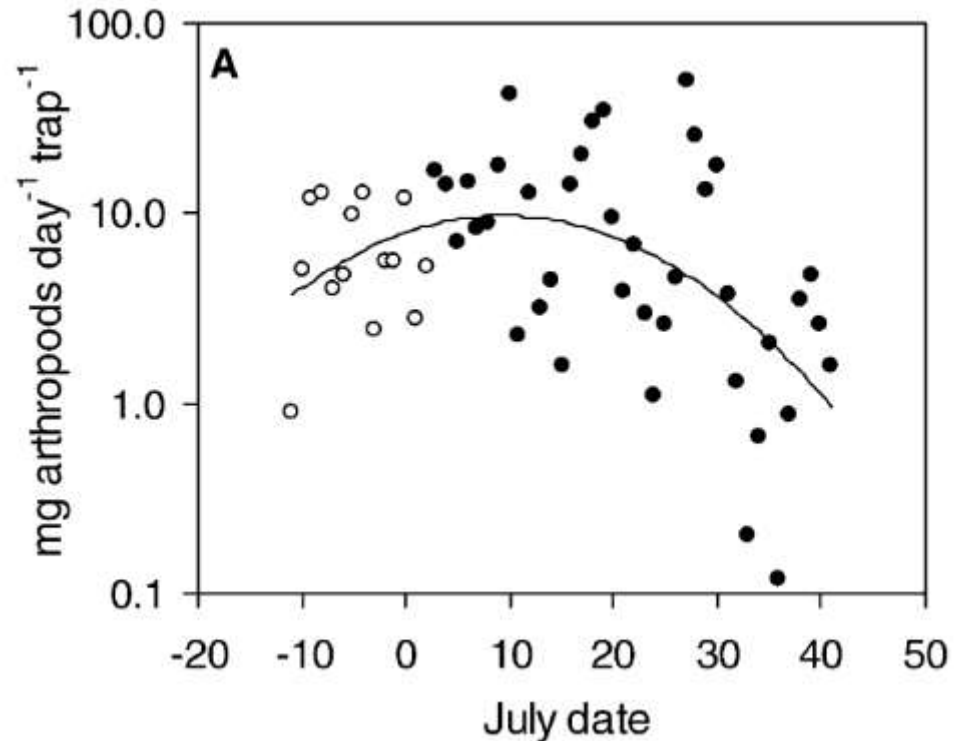
Food availability promotes chick growth

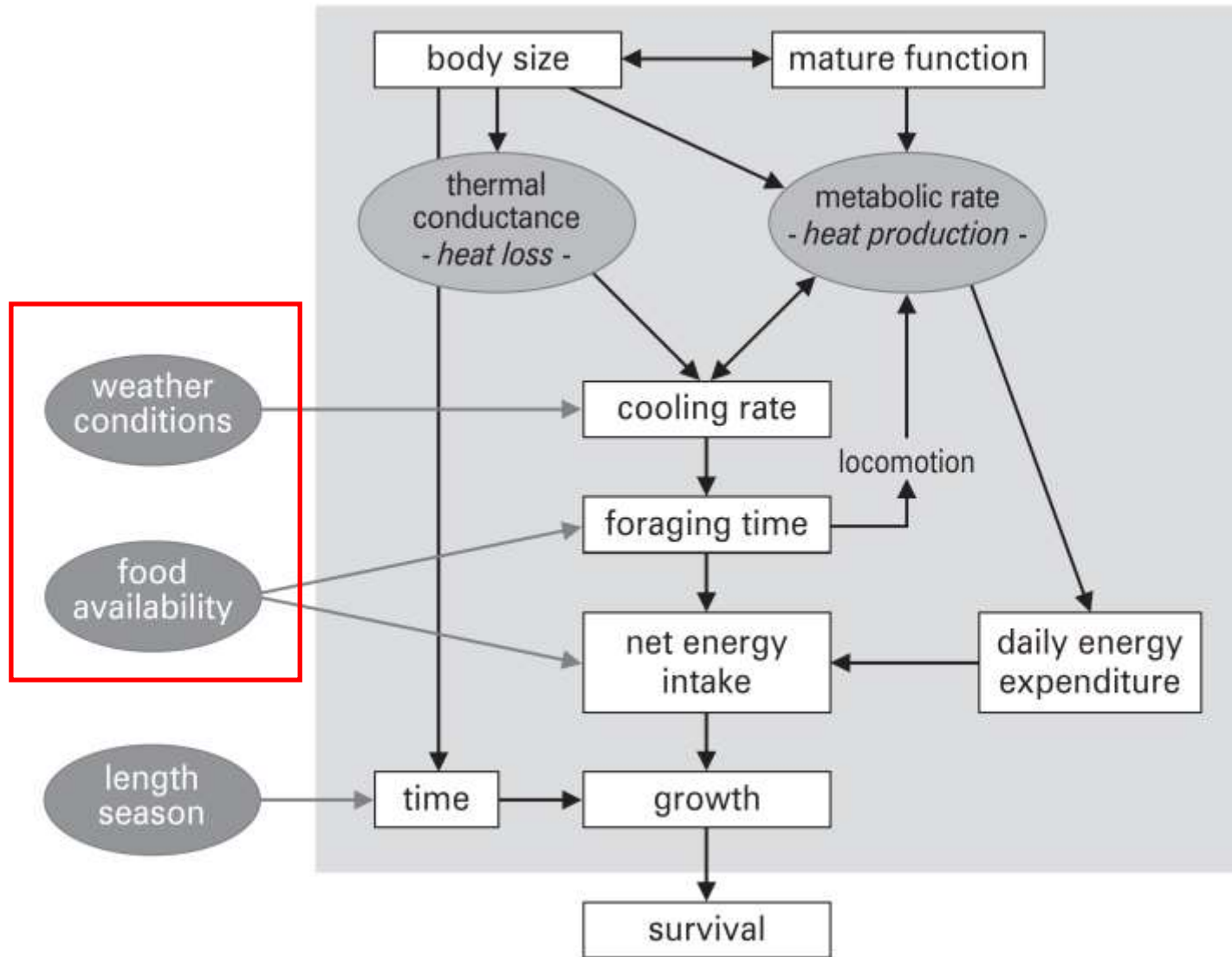


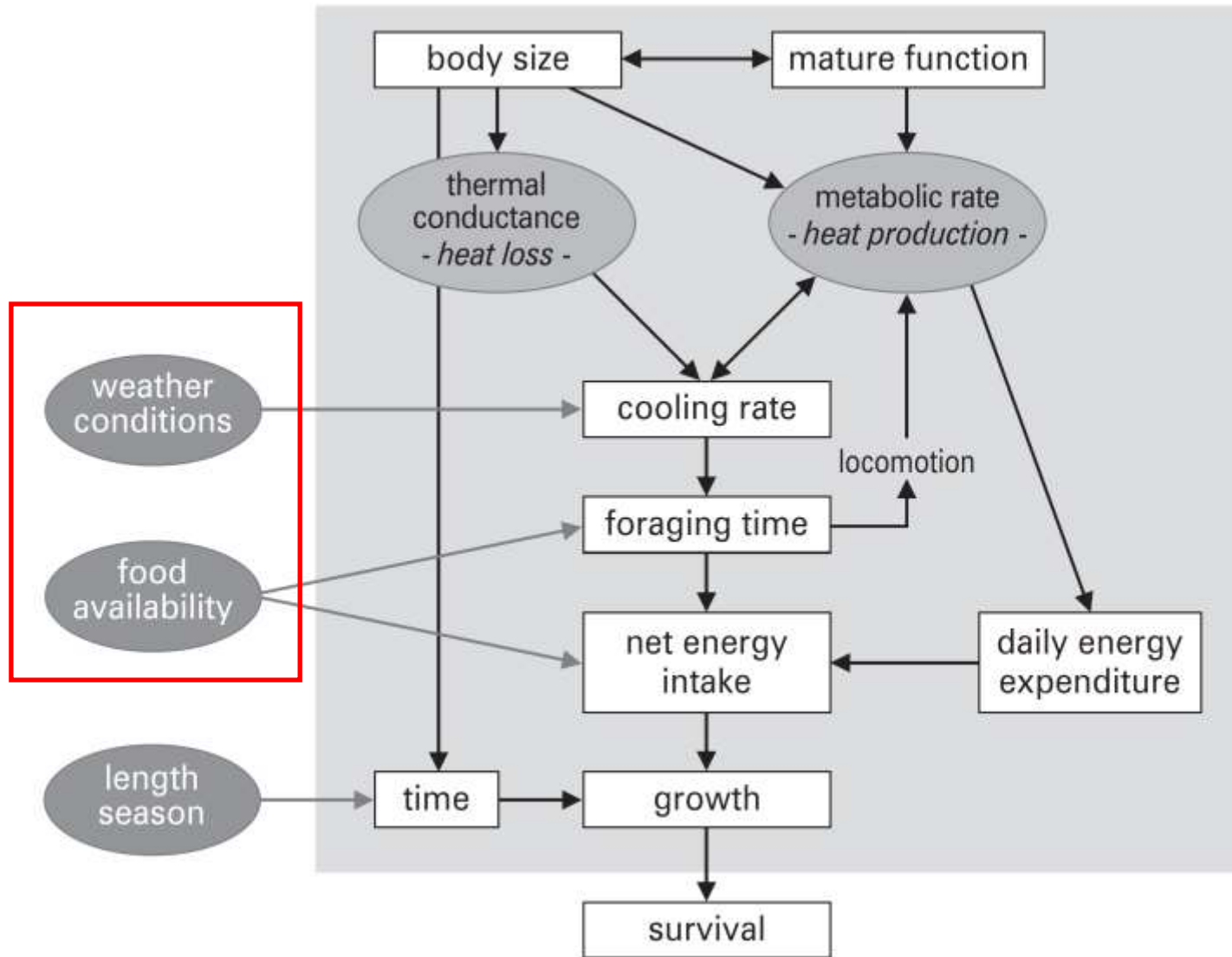
Food availability depends on date



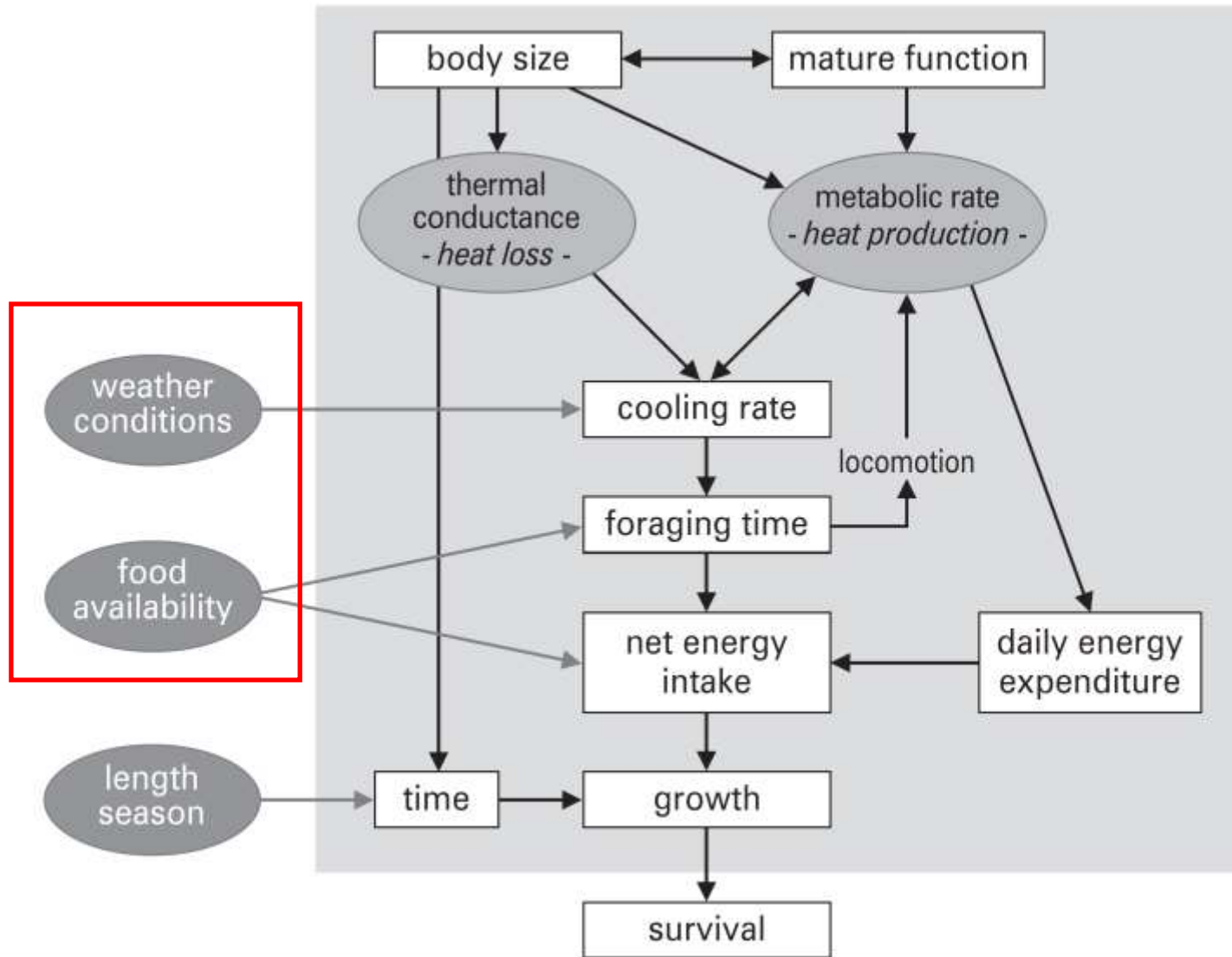
Food availability depends on date and temperature



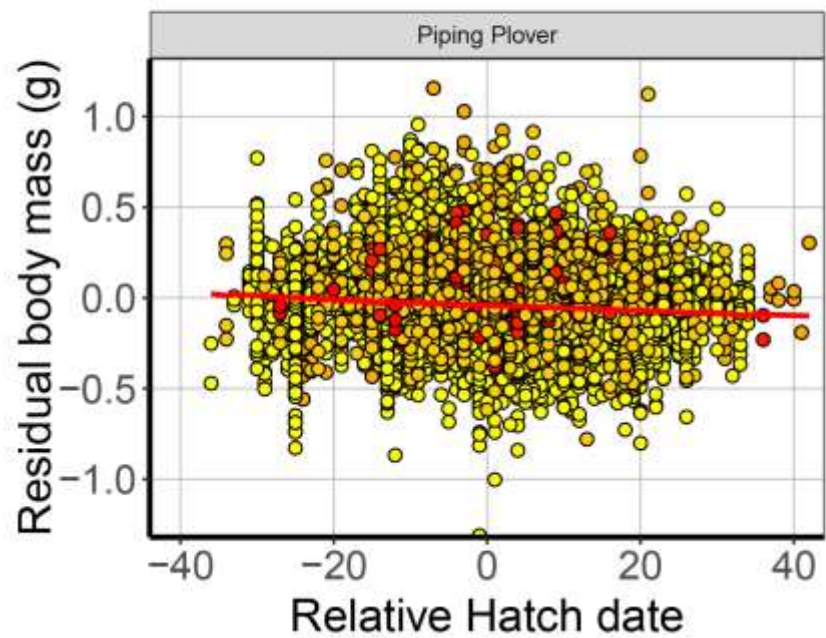
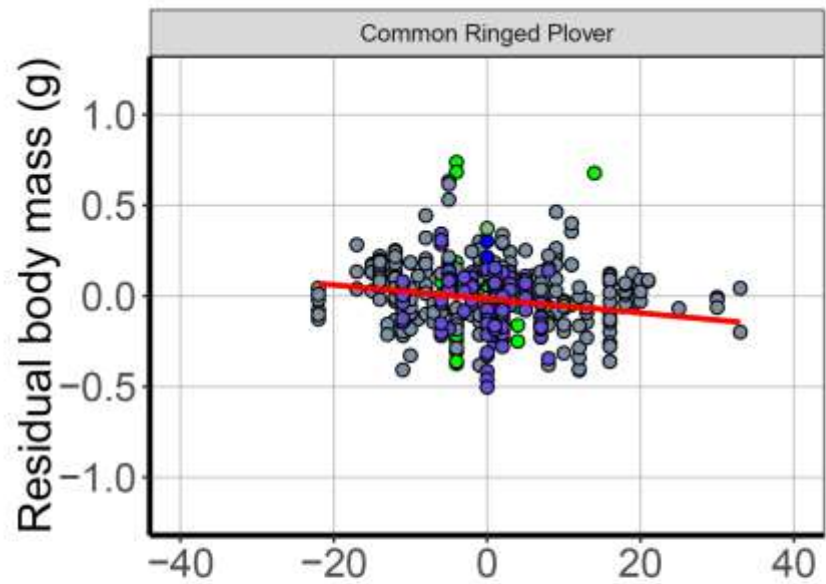




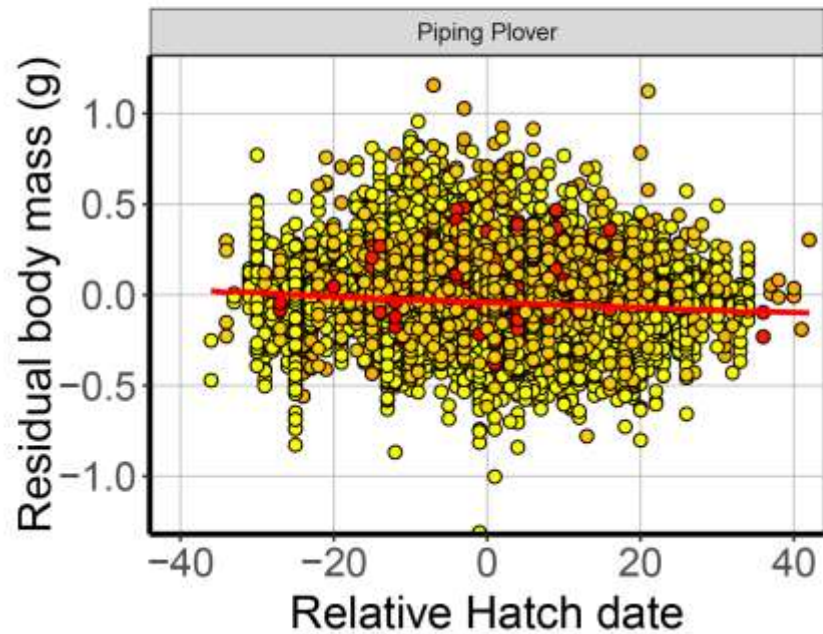
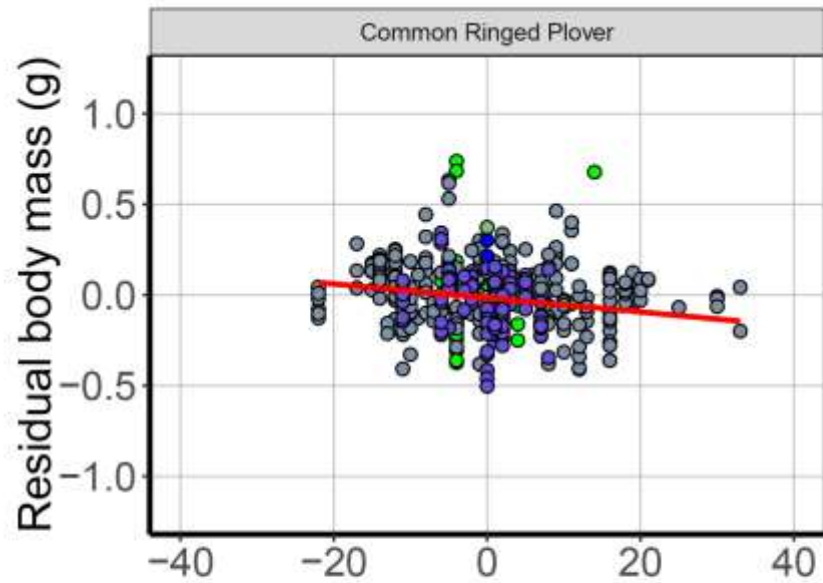
- National Centers for Environmental Prediction (NCEP)

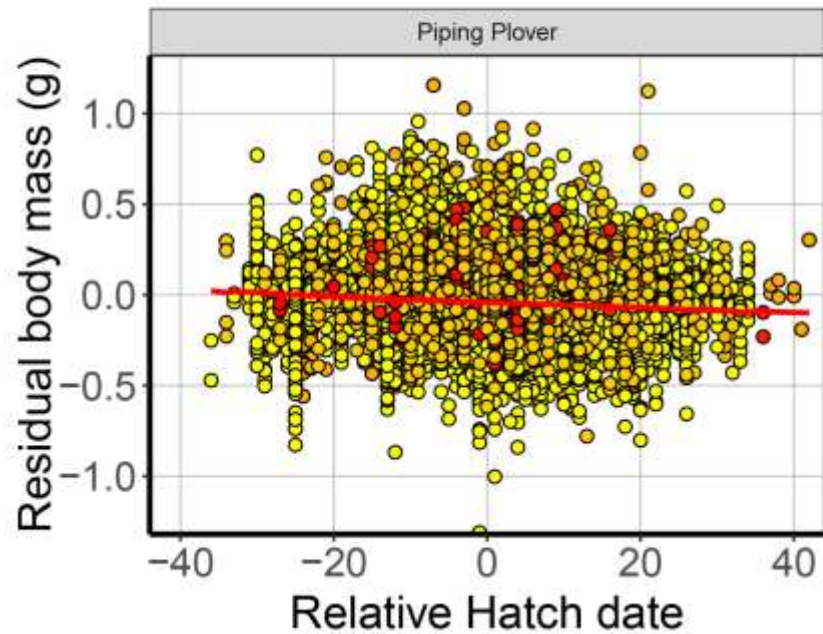
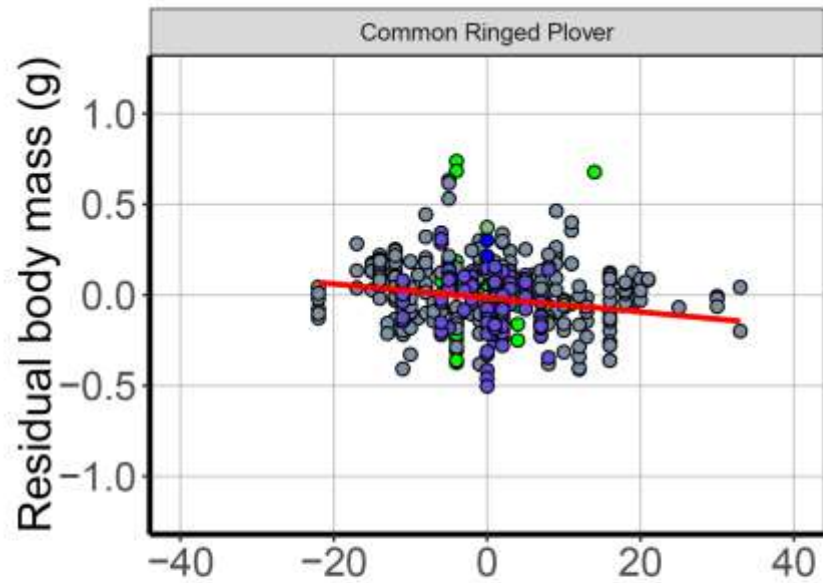


- National Centers for Environmental Prediction (NCEP)
- Available at 26 of 79 locations



- Negative effect of hatch date on growth

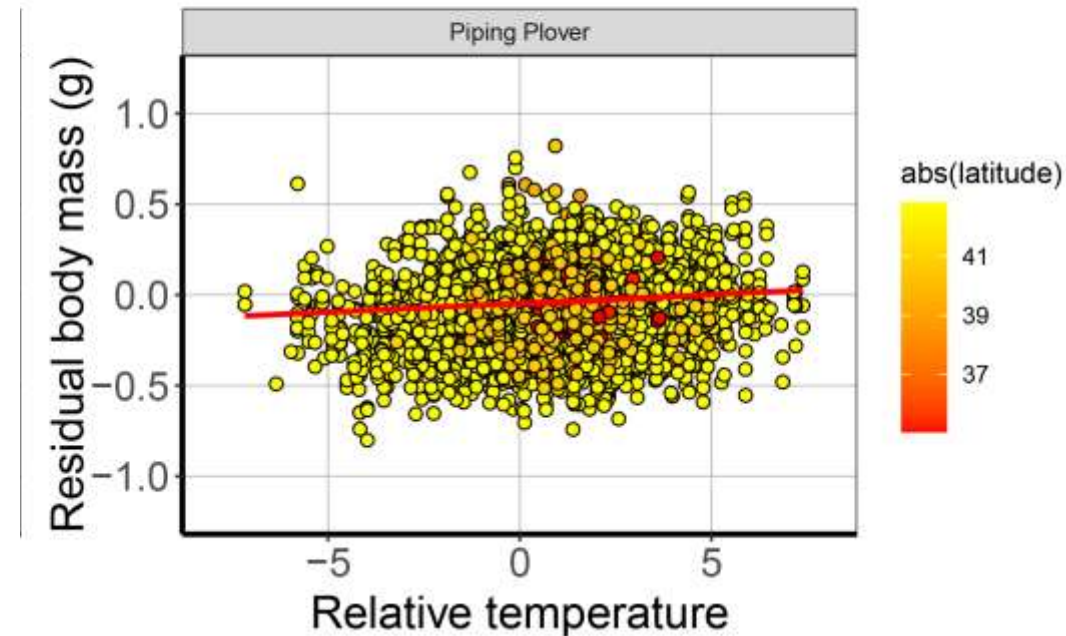
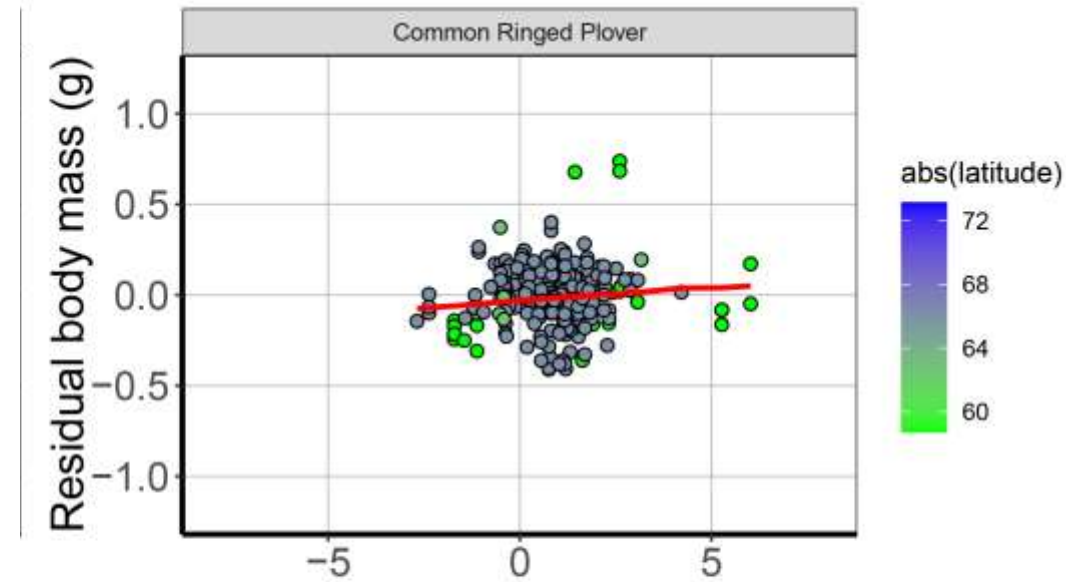




- Negative effect of hatch date on growth
- Effect increases with latitude



- Positive effect of temperature on growth
- Effect increases with latitude



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Thank you!

