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# Stochastic simulations reveal few green wave surfing populations among spring migrating herbivorous waterfowl

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Tracking seasonally changing resources is regarded as a widespread proximate mechanism underpinning animal migration. Migrating herbivores, for example, are hypothesized to track seasonal foliage dynamics over large spatial scales. Previous investigations of this green wave hypothesis involved few species and limited geographical extent, and used conventional correlation that cannot disentangle alternative correlated effects. Here, we introduce stochastic simulations to test this hypothesis using 222 individual spring migration episodes of 14 populations of ten species of geese, swans and dabbling ducks throughout Europe, East Asia, and North America. We find that the green wave cannot be considered a ubiquitous driver of herbivorous waterfowl spring migration, as it explains observed migration patterns of only a few grazing populations in specific regions. We suggest that ecological barriers and particularly human disturbance likely constrain the capacity of herbivorous waterfowl to track the green wave in some regions, highlighting key challenges in conserving migratory birds.

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**Dataset** *Branta leucopsis* *Anser albifrons* *Cygnus cygnus* *Cygnus columbianus* *Anser cygnoides* *Anser fabalis* *Anser serrirostris* *Anser brachyrhynchus* *Anser albifrons flavirostris* *Anas platyrhynchos* *Anas acuta*

**Method evaluation**

[illegible] y [illegible] fi [illegible] *Am. Nat.* 180 – ( )

[illegible] *Proc. R. Soc. B-Biol. Sci.* 283 ( )

( y )

& J. Geophys. Res-Sol. Ea. 101 – ( )

& y — J. R. Stat. Soc. Series B Stat. Methodol. 57 – ( )

& Methods Ecol. Evol. 4 – ( )

& Methods Ecol. Evol. 5 – ( )

& y Evolution 57 – ( )

& y y Syst. Biol. 59 – ( )

R: A Language and Environment for Statistical Computing ( )

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