Zoogeochemy: bird grazing enhances wetland methane emissions
The myriad animal zoogeochemical effects on carbon cycling. Animals can mediate net carbon sequestration by plants (net primary productivity, NPP) by altering CO₂ uptake into (black arrows) and from (red arrows) ecosystems. Herbivore grazing and tree browsing can alter the spatial distribution of plant biomass. Predators can modify herbivore impacts via predation and altered landscape and nutrient dynamics.
1. Oxygen transport

Associations of Methanotrophs with the Roots and Rhizomes of Aquatic Vegetation
King 1994

Nitrification-denitrification at the plant root-sediment interface in wetlands
Reddy et al. 1989
2. Stem efflux

Dingemans et al 2011 Ecology
Belowground biomass

![Belowground biomass 0-15 cm April 2013](chart)

- **Waterfowl**: 
- **Exclosure**: 

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**Note**: The chart shows a comparison of belowground biomass between waterfowl and exclosure conditions in April 2013. The data indicates a statistically significant difference, as denoted by the *** symbol.
A

- birds
- exclosure

Methane flux (mg CH₄-C m⁻² hr⁻¹)

Nov-12 Jan-13 Mar-13 May-13 Jul-13 Sep-13 Nov-13 Jan-14 Mar-14 May-14

Winton and Richardson 2017 Ecology
Summer / Fall
Summer / Fall  Winter
Bird effects on N cycle

Winton, Moorman and Richardson 2016 Water Air and Soil Pollution
Fig. 4. Potential interlinked system of recycling nutrients. The diagram shows a potential route of nutrient transport of the planet in the past. Red arrows show the estimated fluxes or diffusion capacity of nutrients listed in Table 1. Grey animals represent extinct or reduced population densities of animals.
Thanks for listening!

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