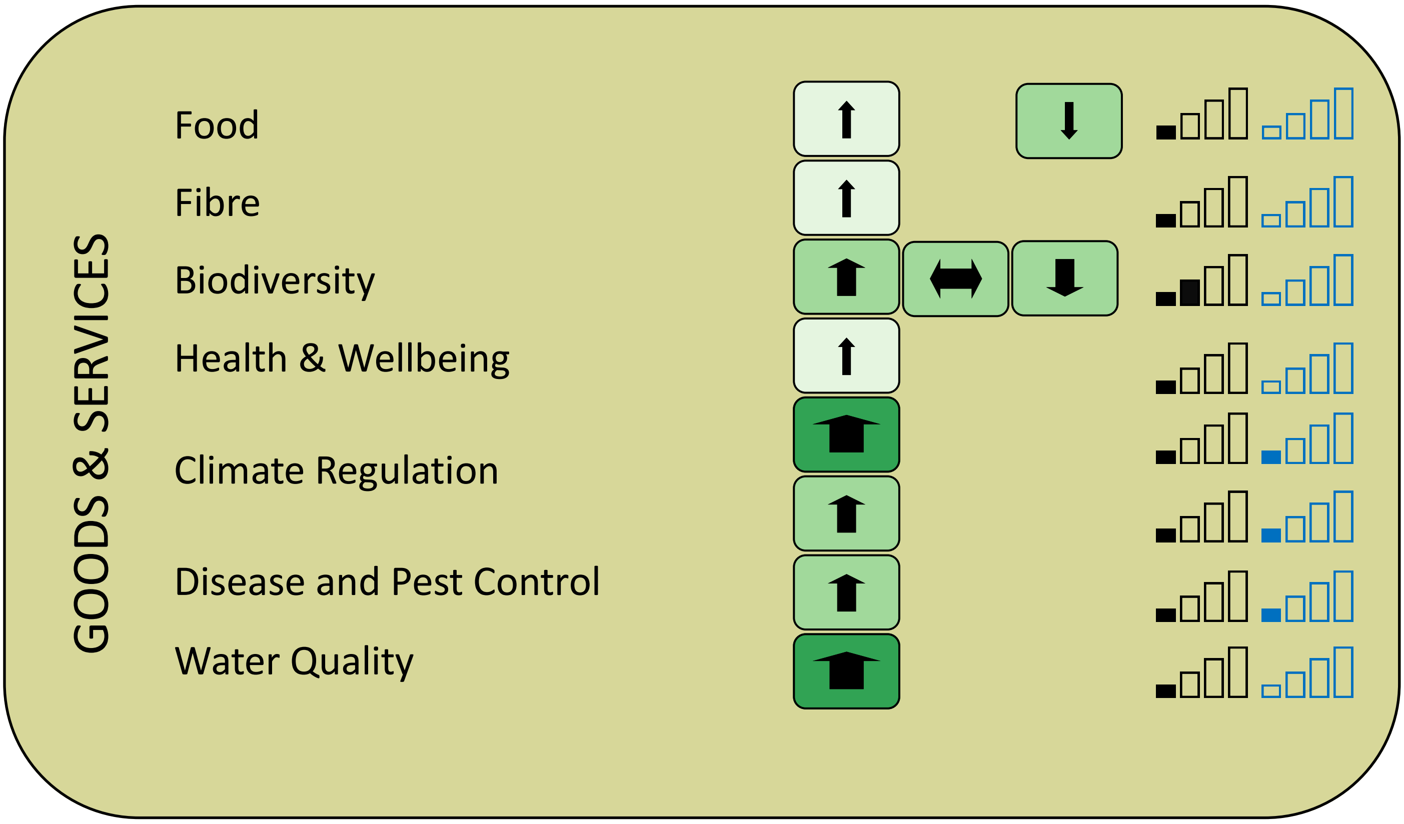
MANAGING ECOSYSTEM SERVICES

FRESHWATER

REDUCE GRAZING INTENSITY

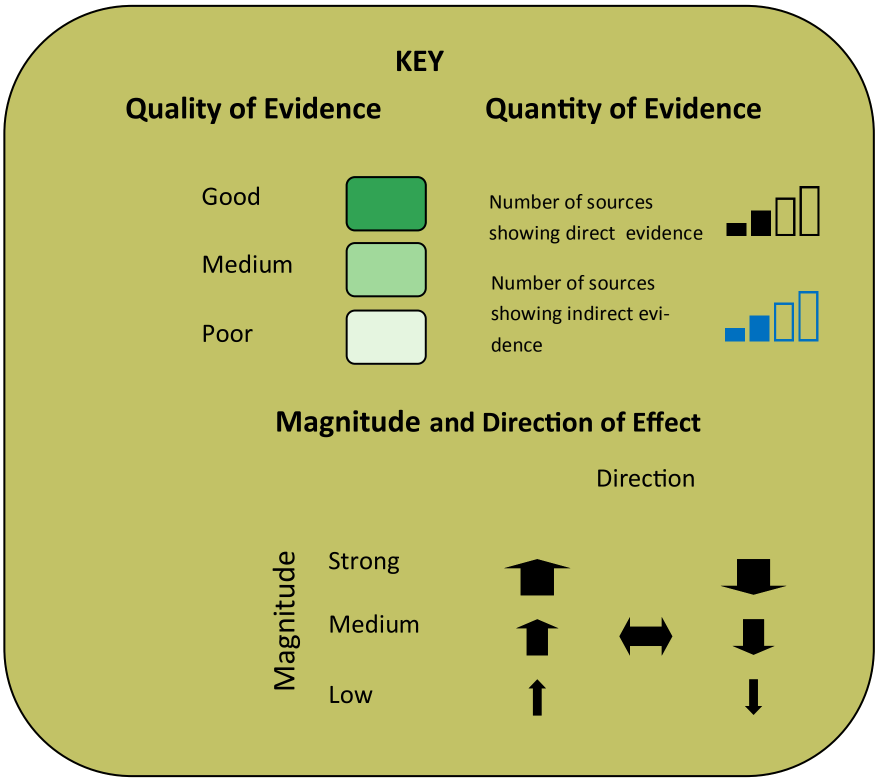
Reduce the level of grazing on wetlands and riparian areas by either lowering stock density or reducing the duration of grazing.



These pages represent a review of the available evidence linking management of habitats with the ecosystem services they provide. It is a review of the published peer-reviewed literature and does not include grey literature or expert opinion. There may be significant gaps in the data if no published work within the selection criteria or geographical range exists. These pages do not provide advice, only review the outcome of what has been studied.

Full data are available in electronic form from the Evidence Spreadsheet.

Data are correct to March 2015.



MANAGING ECOSYSTEM SERVICES

FRESHWATER

REDUCE GRAZING INTENSITY

Provisioning Services—providing goods that people can use.

Cultural Services—contributing to health, wellbeing and happiness.

Regulating Services—maintaining a healthy, diverse and functioning environment.

PROVISIONING

Food: ***Moderate Evidence***:-As shown by an analysis of the Somerset levels, a reduction in grazing intensity will reduce the potential supply of meat but also lead to a further reduction of land suitable for grazing through the establishment of alder carr woodland [1]. ***Weak Evidence:-*** The effect of grazing regime on food supply for salmonid fish on adjacent streams has also been investigated. A study from North America found that rotational grazing generated more riparian vegetation and terrestrial invertebrates in the stream food chain than intensive grazing[2]. A similar result was found in another study, also from North America, where streamside variables most favourable to salmonid fisheries were obtained from lower grazing intensities[3].

Fibre: *Weak evidence:-* A study of Estonian coastal marshes where farming was abandoned showed a change in their ecological characteristics such as more *Phragmites* reed stands which could be used for thatching[4].

CULTURAL

Biodiversity: *Strong Evidence:-* Data from a nine year long study of grazing in riparian grasslands associated with upland conifer forests found that species richness declined in un-grazed plots and remained static in grazed plots[5]. The stocking density was low however at 2.5 cows ha^{-1}. Grazing of calcareous fens in Germany resulted in a slight reduction of species richness and changes in species compositions compared with mowing. There was a trend for more species adapted to wet soil and flooding to be found on grazed rather than mown pastures[6]. A restored river floodplain in Luxembourg demonstrated that cattle grazing at a low intensity (1 cow ha^{-1}) could maintain a species richness of 15.8 species per plot compared with 10.1 species per plot in the un-grazed section[7]. A reduction in grazing intensity following abandonment of Estonian coastal marshes showed that the characteristic vegetation of this habitat was quickly lost with the development of scrub and *Phragmites* stands[4]. ***Moderate Evidence:-*** Following the cessation of heavy grazing, a mountain riparian system in the USA was studied with regard to how it responded to medium, light and no grazing regimes. Streamside and meadow species richness increased under all three regimes indicating that light to moderate grazing had no detrimental effect on species richness[8]. An Australian study found that lowering of stocking rates allowed recovery of meadows but had no effect on the prevalence of invasive non-native plants which are characteristic of this area[9].

CULTURAL

Health & Wellbeing: ***Moderate Evidence:-*** Studies in this area generally link cattle density and access to stream and river banks with the amount of coliform bacteria in the water. A model which was validated on a Scottish dairy farm found that *E. coli* bacterial contamination of rivers could be reduced by both lowering stocking density and not allowing cattle to directly enter the water[10]. ***Weak Evidence:-*** The failure of a long term water quality improvement initiative in West Virginia USA may have been due to increased livestock numbers[11]. The same study showed that removal of cattle led to a decrease in faecal coliform bacteria in subterranean drainage in grazed karst areas.

REGULATING

Climate Regulation: ***Strong Evidence:-*** Methane fluxes recorded at a restored wetland in Denmark showed that the daily emission rate was highly dependent on the presence of cattle[12]. Movement of cattle through the monitoring area could increase the emission rate by a factor of ten for short periods.

Erosion Control: ***Moderate Evidence:-*** In Idaho, USA, unregulated grazing was found to significantly increase the potential for sediment loss, largely from shallow slope banks which cattle preferred[13]. A simulation study, also from Idaho, suggested that moderate grazing could depress the streambank surface by 3 cm, while heavy grazing could depress it by 11.5 cm[14].

Disease and Pest Control: ***Moderate Evidence:-*** A model which was validated on a Scottish dairy farm found that *E. coli* bacterial contamination of rivers could be reduced by both lowering stocking density and not allowing cattle to directly enter the water[10]. An experiment looking at stocking rate for cattle on a grazed wetland in Belgium found that light grazing was better at suppressing invasive weeds such as reed canary grass and creeping thistle than mowing[15].

Water Quality: ***Strong Evidence:-*** The levels of phosphorus entering water courses is significantly higher in areas dominated by livestock farming than that dominated by arable in lowland England[16]. Livestock farming on heavy clay soils can lead to total Phosphorus loads of up to 2 $kgha^{-1}year^{-1}$. ***Moderate Evidence:-*** A model which was validated on a Scottish dairy farm found that *E. coli* bacterial contamination of rivers could be reduced by both lowering stocking density and not allowing cattle to directly enter the water[10]. ***Weak Evidence:-*** The failure of a long term water quality improvement initiative in West Virginia USA may have been due to increased livestock numbers[11]. The same study showed that removal of cattle led to a decrease in faecal coliform bacteria in subterranean drainage in grazed karst areas.

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