Summary

Grazing management in relation to the restoration of fauna communities in dry dune meadows

End report 2009-2013

Introduction

A lack of grazing due to a decline in the agricultural use of dune grasslands and heathlands and a decline in the rabbit population due to illness, has led to a decrease in quality and quantity of these vegetations. The Dutch coastal dunes have become encroached with tall grasses and shrubs. This process has been accelerated even more as a result of an increase in the atmospheric deposition of nitrogen. The result is a loss of biodiversity of flora and fauna. This summary focuses on the Natura 2000 Habitat type 'Dune grassland' (H2130*) and the 'Heathlands with crowberry' (*Empetrum nigrum*) and 'Heather' (*Calluna vulgaris*) (priority Habitat types 2140* and 2150*).

As of the eighties in the previous century, coastal dune managers began using grazing (mainly cattle, horses and sheep) as an instrument to prevent the overgrowth of the dune landscape by shrubs. Both in the Wadden district as well as in the Renodunaal district (the coastal dunes of the provinces of Noord-Holland, Zuid-Holland and Zeeland), present-day grazing is resulting in a decline of the overgrowth and therefore contributes to maintaining grasslands in the grey dunes and heathlands.

Generally speaking, present grazing management also has a positive effect on the characteristic fauna communities of the coastal dunes, although the effect does differ for different animal groups and between types of grazing. It is precisely these differences that provide important input for a further optimization of grazing management.

This is a summary of the second and final report further to a large-scale study into the effects of grazing on the soil, vegetation and fauna of coastal dunes. The results of the first phase are presented in Van Oosten *et al.* (2013) and have been incorporated in this summary. A large part of the first-phase data concerning soil chemistry and vegetation has been analyzed a second time using improved statistical analyzes.

The object here is to provide managers with instruments to further optimize the grazing management in coastal dunes, such that the positive effects of grazing on counteracting overgrowth are maintained *and* the restoration of fauna communities is stimulated.

Assessment of expectations concerning the effects of grazing

It can be said of both the Wadden district and the Renodunaal district that the current grazing measures result in a decline in the overgrowth and the litter accumulation and therefore contribute to maintaining dune grasslands (H2130*) and heathlands with crowberry and heath (H2140* and

H2150*). In addition, it can be concluded that the grazing measures as taken in the coastal dunes during the past decades do contribute to maintaining and restoring fauna communities in the (half) open dune landscape and dune grasslands. However, the effects of the various forms of grazing on various fauna groups vary greatly and therefore offer starting points for a further optimization of grazing management.

The question is whether or not general patterns exist in the effects of grazing on fauna communities. The report on which this summary is based observes a division into two districts, the Renodunaal district and the Wadden district. These districts differ greatly in terms of their soil chemistry and therefore also with regard to management problems. And so the grazing measures in the Renodunaal district differ (grazing pressure, grazing time, composition of the herd) from those in the Wadden district.

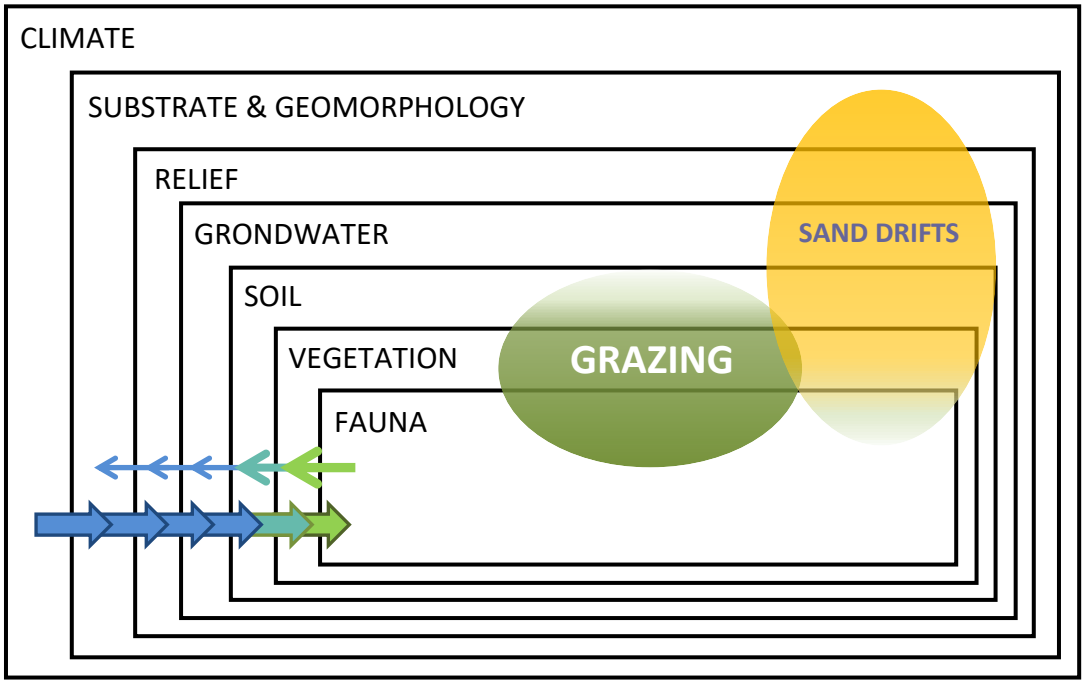

Figure 1. *Influence of grazing projected on the hierarchic model of coastal dune systems (after Bakker et al. 1979): the dune system is mainly regulated by large-scale factors: climate, substrate and geomorphological processes largely determine the relief and the groundwater (blue arrows) and with that, the soil development, plant growth and fauna.*
Grazing has a major impact on the fauna species (competition, facilitation, etc.) and on the vegetation, as well as on the soil, though to a lesser degree. As a result, the system also has feedback mechanisms (green arrows).

Differences between the Wadden district and the Renodunaal district

The physio-geographical differences between the Wadden district and the Renodunaal district play an important role in managing the vegetation composition and the sensitivity of a dune system for overgrowth. An important conclusion here is that both the manner in which grazing is applied as well as the result of the grazing on the vegetation and fauna differ between these two districts.

Differences in N-sensitivity of dune grasslands
An important difference concerns the high levels of calcium and iron in the soil in the Renodunaal district and the relative low values of these elements in the Wadden district. Phosphate (P) is bound by calcium and, to a lesser degree, by iron, and so the dunes in the Renodunaal district are often P-limited.

Both the calcium and the iron content are low in the Wadden district, and so the fixation of P is not an issue. The availability of P is therefore high in the dunes of the Wadden district, as a result of which the development of vegetation is limited by the amount of nitrogen (N). Low N:P ratios of plant material in the Wadden district are an indication that N is a limiting factor in the area. And so the Wadden district dunes are more sensitive to a high nitrogen deposition than the dunes in the Renodunaal District. Combined with a decline in grazing and digging by rabbits, sand drifts and less grazing, the deposition of N results in the overgrowth of the (half) open dune landscapes. This process started much sooner in the Wadden district and progressed across a large part of the dunes. The process of becoming overgrown is slower in the calcium-rich parts of the dunes (H2120 and H2130) and it started later as well. Due to the acidification of the upper soil layer and the accelerated dissolution of calcium-phosphate in the soil, the secondary dunes have become highly overgrown as well, as a result of which the P that was once fixated becomes available to the vegetation. This highly increased the sensitivity of the calcium-rich dunes to N-deposition. This process is observed in parts of the coastal dunes in the Renodunaal district and progresses slower than in the Wadden district.

Differences between the districts in types of grazing

The above explains why the managers in the two districts have deployed grazing in different ways as a measure to counteract overgrowth. In the Wadden district, where overgrowth occurred earlier and to a greater extent, the average grazing pressure is higher than in the dunes of the Renodunaal district. Also, mainly due to differences in cultural-historical background, the grazing measures in the Wadden district more often involve mixed herds (cattle with sheep and/or horses), whereas the use of solely cattle is more common on the mainland.

Effects of grazing on the availability of nutrients

Nitrogen and phosphate limitations

Part of the plant biomass is removed as a result of grazing. If the grazing pressure is high enough (as is the case in the Wadden district compared to the Renodunaal district), then the litter input will decrease and part of the available N will disappear from the system. Grazing has no significant effect on the P-availability in the soil.

The effect of the strong decline in the production of litter in the Wadden district is evident from a significant decrease in the N:P-ratio in plant material, from 12.8 in ungrazed areas to 11.9 in grazed areas. These values indicate that the limitation of N for plant growth increases as a result of grazing. Grazing does not lead to a change in the N:P-ratio in plant material in the Renodunaal district. The ratio is an average of 13.8 in ungrazed areas and 13.7 in grazed areas. These ratios are an indication of a co-limitation of N and P in the dune grasslands studied in this district.

Effects on mineralization and nitrification

The decreased availability of N in the grazed areas in the Wadden district has an effect on the nitrification and mineralization processes in the soil. The total amount of the mineral N in the soil in the Wadden district is significantly lower in grazed areas compared to ungrazed areas. The nitrification in grazed areas progresses much slower as well, indicating a lower N-availability for micro-organisms. The net mineralization also shows a declining trend, but this decline is not significant as the locations in the study are spread out.

No effect on the amount of N, mineralization and nitrification is evident in the Renodunaal district between grazed and ungrazed areas. These results also indicate that the soil processes and the vegetation in the dunes in the Wadden district are highly regulated by the availability of nitrogen, whereas this has only a very minor role in the dunes in the Renodunaal district. This is in keeping with the effect-oriented measures in the dry dunes (Kooijman et al. 2005).

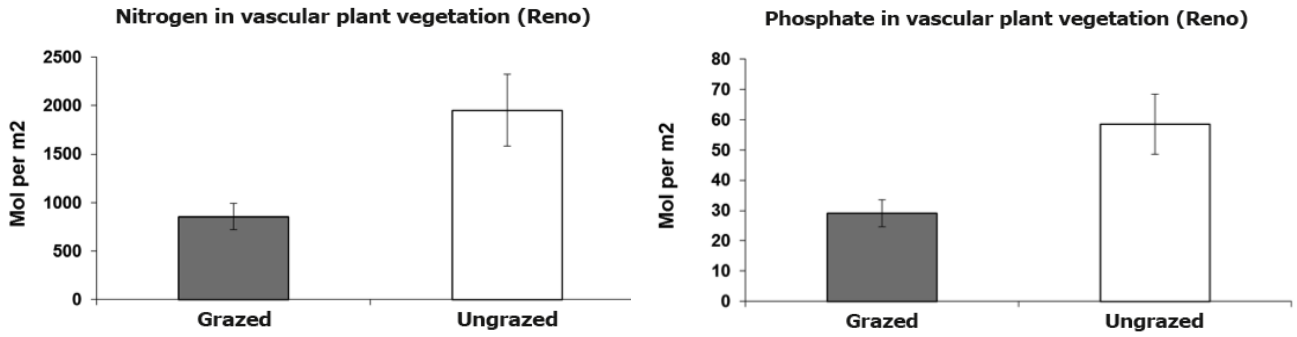

Figure 2a. *Effect of grazing on total N and total P in vascular plants and litter in the Renodunaal district. All effects are significant.*

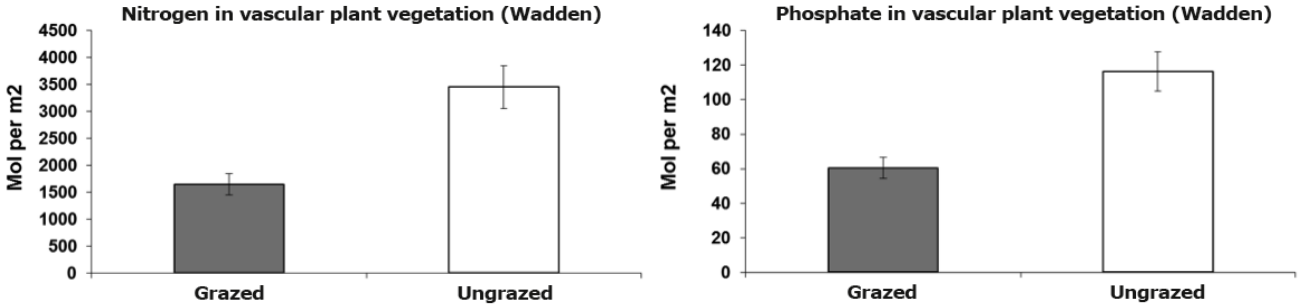

Figure 2b. *Effect of grazing on total N and total P in vascular plants and litter in the Wadden district. All effects are significant.*

Food quality of the plants for herbivores

Various studies have shown that the food value of plants can increase as a result of grazing (Kleinebecker *et al*. 2011, among others). The C-content of grass leaves in grazed areas is slightly lower than that in ungrazed areas, resulting in a decline in the C:N-ratio. In addition, the Ca and Mn contents in grasses are slightly higher in grazed areas. There is no difference between the nitrogen content in the leaves of grasses on grazed and ungrazed areas. The N-content of the litter decreases slightly, probably because the grass leaves are easier to digest.

Effects on vegetation structure and microclimate in dune grasslands

Reduction of biomass and vegetation height

Present-day grazing measures lead to a reduction in the biomass of vascular plants and litter in both the Wadden district as well as the Renodunaal district. This is mainly due to a reduction in broad-leafed grasses, leading to much lower vegetation. The surface area of (small) open sandy spots increases in the Renodunaal district, from 1.7 to 3.2 %. There is no significant increase (0.7 to 0.9 %) in the Wadden district despite a higher grazing pressure.

Figure 3. *Grazing leads to a low and homogeneous height of grassland vegetation. On a larger scale, in a grassland-shrub complex, habitat heterogeneity can increase due to grazing.*

Grazing not only leads to a lower, more uniform vegetation structure in dune grasslands, the variation in the vegetation height is reduced as well. As shrubs and tree wildshoots are only partially influenced by grazing (Van Breukelen & Van Til 2005, Wouters et al 2011), a higher variation in vegetation structure often will develop on a larger landscape scale in complexes of grasslands and shrubs (Figure 3.).

Variation in microclimate

The low vegetation resulting from grazing leads to a warmer microclimate in the dune grasslands in both districts. Expectations were that the uniform structure would lead to a levelling of the variation in microclimate, but this is found not to be the case: the variation in the temperature of the vegetation and the soil surface in dune grasslands increases as a result of grazing. The variation in microclimate has been analyzed in various ways, each time based on the manner in which animals use their living environment for thermo-regulation. Both the complexity of the distribution of warm and cool spots as well as the distance, on average, that an animal must cover to reach a colder or warmer environment are negatively influenced by the height of the vegetation and therefore positively influenced by grazing. Both districts show a positive effect of grazing on the variation in microclimate in relation to the number of years that an area has been grazed, but the Wadden district also sees a negative effect due to the high grazing pressure. And so prolonged grazing at a low pressure will result in a more varied microclimate in grasslands in that area.

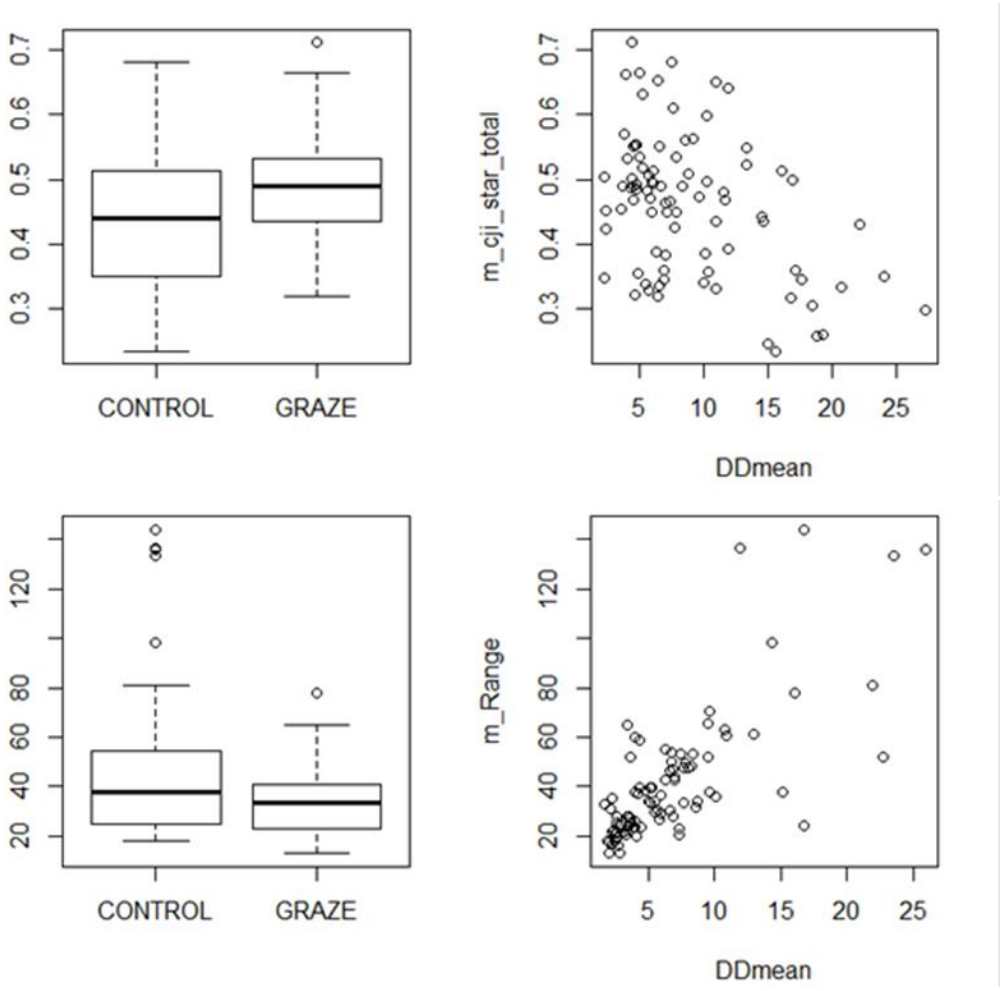

Figure 4. *Effect of grazing on variation in microclimate (expressed as GJI, above left), mean temperature in °C (below left), and the correlation between mean vegetation height (Dropdisk mean) and variation in microclimate expressed in CJI (right above) and 'range' (right below). In a Mixed*

Linear Model grazing has no direct effect on CJI and range, but does have an indirect effect via mean vegetation height.

Effects on the composition of the vegetation and the occurrence of flowers

The biomass of vascular plants (mainly broad-leaf grasses) and litter declines in both districts as a result of grazing (Figure 4). The present level of grazing therefore suffices in preventing the overgrowth of dune grasslands and therefore in maintaining the habitat types dune grasslands (priority Habitat type 2130*) and heathlands with crowberry and heather (priority Habitat types 2140* and 2150*).

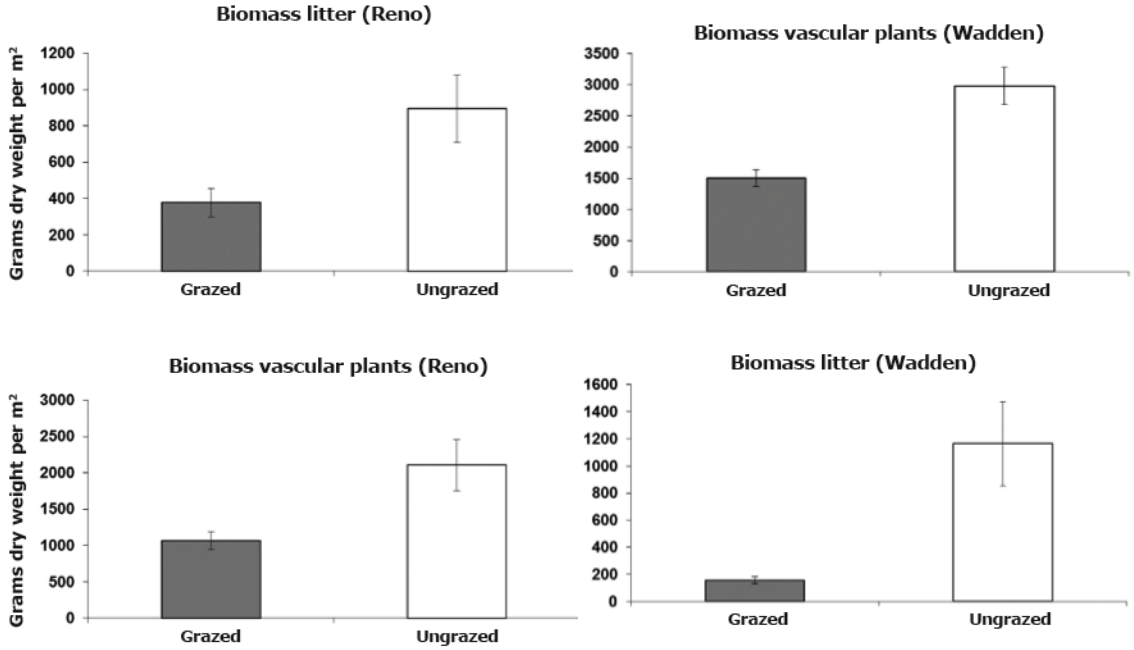

Figure 5. *Effect of grazing on biomass of vascular plants and litter in Renodunaal district and Waddendistrict. All effects are significant.*

There is an increase in the cover of narrow-leaf grasses in both districts, but the cover with lichens, woody plants and mosses does not change or only marginally. The herbaceous plant cover in the Wadden district is three times lower than in the Renodunaal district and both the higher grazing pressure as well as the longer grazing time have a negative effect on the herbaceous plant cover in the Wadden district. The herbaceous plant cover in the Renodunaal district is not influenced by grazing, but rather by the availability of calcium and nitrogen in the soil, in accordance with the findings of Tahmasebi Kohyani *et al.* (2008). Grazing has a negative effect on the occurrence of flowers in the Wadden district as it further diminishes the herbaceous plant cover. This effect was significant in the dry season in 2010, but that was not the case in the more moderate season of 2011. The occurrence of flowers is higher in the Renodunaal district compared to the Wadden district as a direct consequence of a higher degree of herbaceous plant cover. A small positive effect of grazing on the occurrence of flowers was found in the Renodunaal district in the moderate 2011 season, but not in the dry 2010 season.

Effects on fauna

The effects of grazing on summer birds, butterflies, rabbits and the sand lizard have been analyzed based on prolonged series of measurements in grazed and ungrazed areas. These species are influenced by grazing both directly and indirectly. Whether species benefit from or are negatively influenced by grazing depends upon the balance between facilitating changes (nest opportunity, improvement food quality, warmer microclimate, et cetera) and disrupting processes (competition regarding food, disturbance, predation) (Van Klink *et al*. 2014).

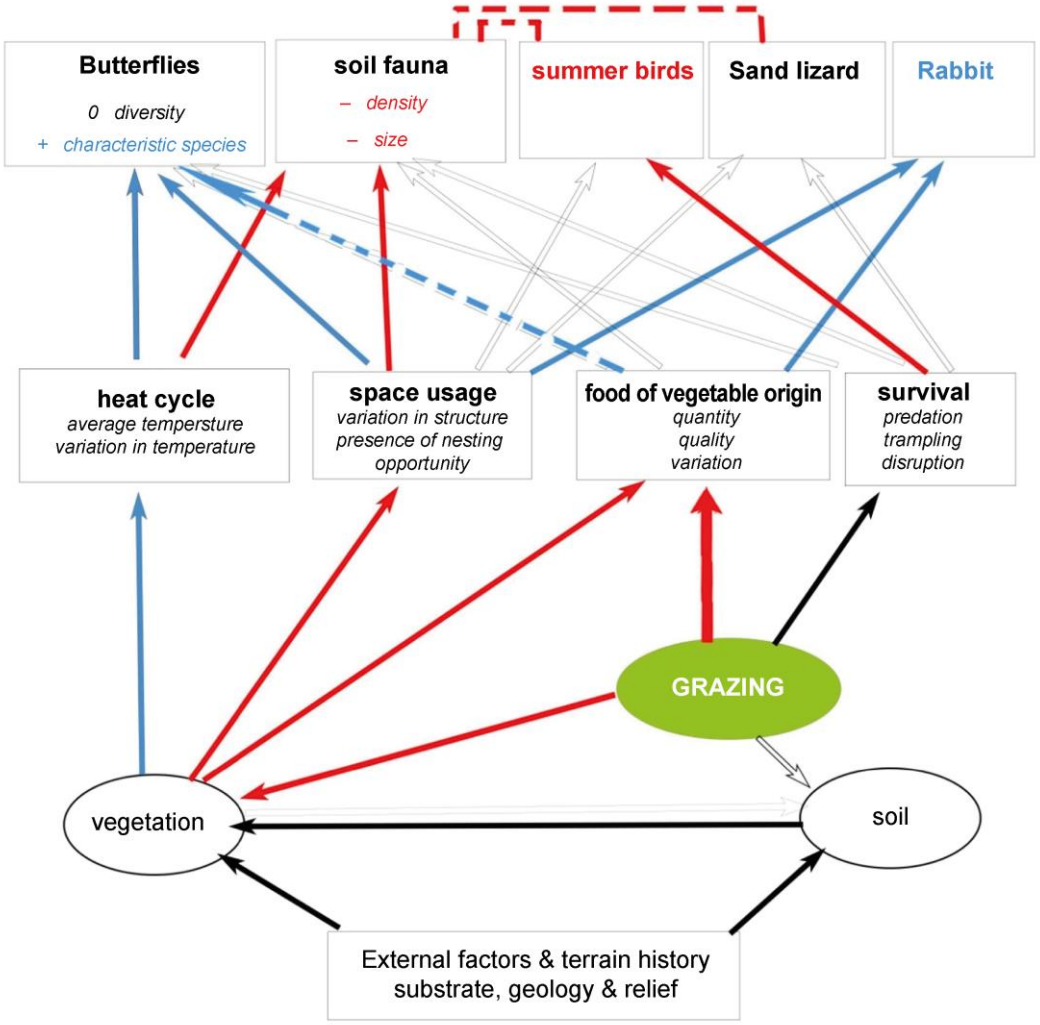

Figure 6. *A simplified diagram showing the positive (blue) and negative (red) effects of grazing management on the Wadden dune system and animal species. Expected effects that have not been researched (black) or of which the impact is uncertain (dotted lines) are also shown. Effects of grazing on vegetation and (to a lesser degree) the soil are more significant (bold lines) compared to the Renodunaal district due to the relatively high grazing pressure.*

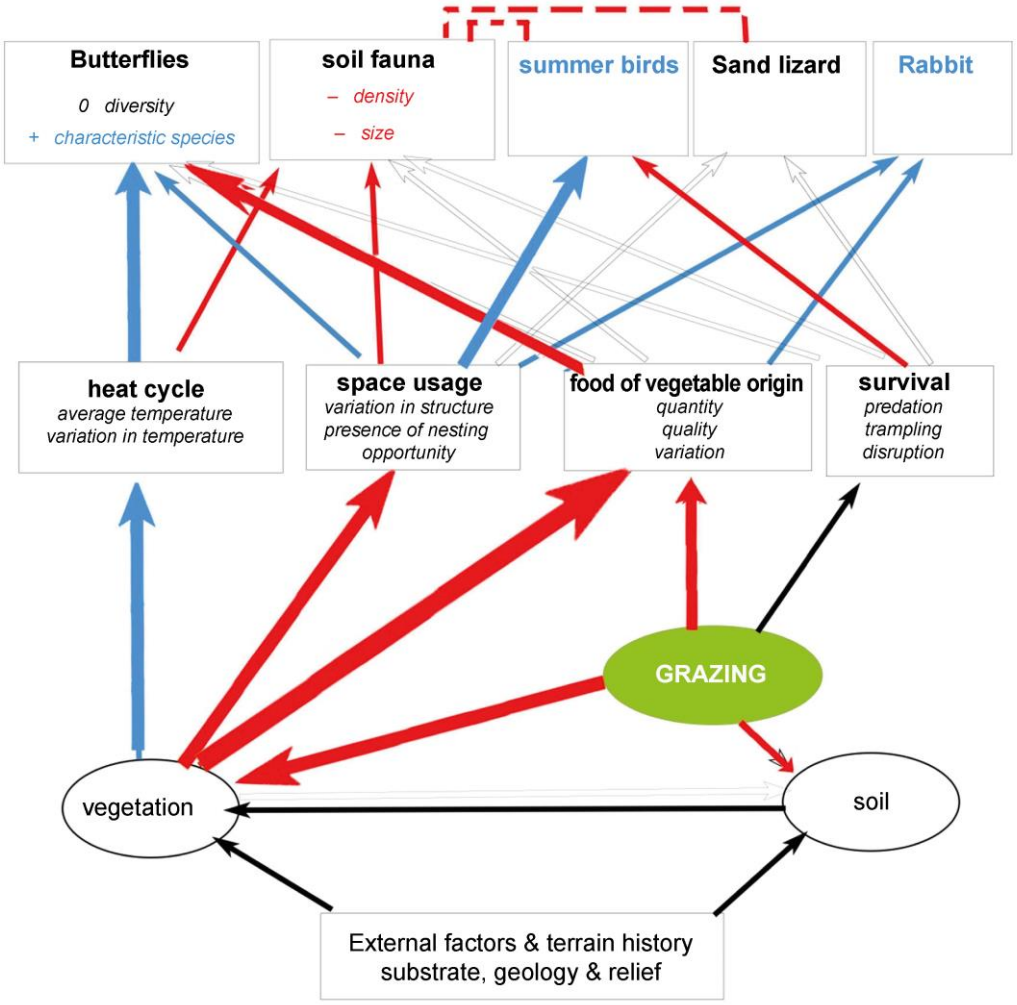

Figure 7. *A simplified diagram showing the positive (blue) and negative (red) effects of grazing management on the Renodunaal dune system and animal species. Expected effects that have not been researched (black) or of which the impact is uncertain (dotted lines) are also shown. Due to the relatively low grazing pressure, the effects of grazing are of a lesser extent (thin lines) compared to the Wadden and mainly concern the vegetation and, to a lesser degree, the soil.*

Figures 6 and 7 show the various direct and indirect effects of grazing on animal species in the Renodunaal district and the Wadden district.
The effects on invertebrate soil fauna were studied in the field: these are animal species that live in the first 10 cm of the soil and the litter layer. These animals are directly influenced by any changes in the litter layer, the microclimate and treading. Moreover, they are easily measured quantitatively on a fixed surface area within the plots that were also used for the soil and vegetation research. Large invertebrates that do not live in the soil or during only part of the year and that make use of the landscape on a larger scale, such as bees, butterflies and locusts, can probably benefit from the more varying microclimate (Wunsch *et al.* 2012, Wouters & Remke 2012, among others). However, these species were not sampled in the field in this project.

Soil fauna densities
Grazing negatively influences the density of the soil fauna, both small animal species (<0.5 cm) as well as medium-sized (0.5-1.5 cm) and in the Renodunaal district, the larger as well (> 1.5 cm). Contrary to expectations, a warmer, more varied microclimate is found not to be favorable to larger species; the highest densities of large soil fauna are found in cool and constant microclimates in high vegetation, whereas the smaller species are found relatively more often in a warmer, varied

microclimate in low vegetation. This corresponds with the findings of Van Oosten *et al.* (2014) that wheatears are dependent upon somewhat coarser vegetation for their food supply. In addition, the plant food quality highly influences the densities of the soil fauna; High P and N contents and a low C:N-ratio show a positive correlation with the density of the animal species. The fact that grazing does not have a positive effect on the density of the soil fauna leads one to presume that the positive effect of grazing on the plant quality is too minor to make a difference ecologically, as a result of which the negative effect of a warmer microclimate is dominating. The effects of fresh drift sand on the plant quality (Wouters & Remke, 2012, among others) are far greater than that of grazing and probably have more influence on the fauna.

Diet guilds, mobility and generation cycle

As can be expected, the number of herbivores (mainly caterpillars and beetle larvae) and detritivores (mainly wood louses and beetles that make up the darkling beetles) decreases as a result of grazing. A higher food quality of plants and litter (mainly higher P and N-contents) have a slightly positive effect on the densities of detritivores, but the loss of litter biomass is much greater. The density of carnivore soil fauna increases in both districts as a result of grazing. Mobile, flying species benefit from grazing, whereas ambulant or crawling animal species generally show a negative correlation to grazing. The most significant effect of grazing concerns a decrease in species that develop over a number of years in the form of larvae, such as click beetles. The effects of grazing on species with a single generation per year are extremely minor; the food quality of plants appears to play a more important role with respect to these species.

Effects of grazing on butterflies

The effects of grazing are more positive for the characteristic open dune butterfly species, such as dark green fritillaries and Small Copper (*Lycaena phlaeas*), than they are for more common butterfly species. This can be said of both the Wadden district and the Renoduraal district. The butterfly species that show a positive correlation to grazing mostly live on low herbaceous plants in low-nutrient habitats (*Argynnis niobe*, Queen of Spain fritillary *Issoria lathonia*, Small copper *Lycaena phlaeas*) or on high shrubs that are out of reach of grazing cattle (Purple Hairstreak). Species that strictly depend upon broad-leaf grasses and herbaceous plants during the caterpillar stage, such as Skipper butterflies and Orange tip, show a decline as a result of grazing as their host plants are selectively eaten away. (Half) open dune species, such as Small Copper, Queen of Spain fritillary and Brown argus, show a positive correlation to a low grazing pressure. If the grazing pressure increases, then the effect of grazing becomes negative for these species as well.

Effects of grazing on vertebrates

Not one significant effect of grazing on the trend of the sand lizard in coastal dunes could be established. The species has significantly increased in numbers during the past decades and appears to have reached its maximum density in both grazed and ungrazed areas based on the fact that the numbers are levelling off (Figure 7.).
Previous studies in the Renodunaal dunes of the province of Noord-Holland (Wouters *et al.* 2012) also indicate that grazing can change the height structure of the vegetation, to be sure, but that it does not change the suitability of the habitat for the Sand lizard.

The rabbit is found to positively respond to the opening up of the vegetation by grazing cattle. The species is increasing in numbers in the grazed areas compared to the ungrazed areas, and so the measure appears to be suitable for allowing the rabbit populations to increase again. However, VHD (Viral Haemorrhagic Disease) still has a major influence on the development of the rabbit population and population decreases have been reported during the past years (not included in the present analysis) in both grazed as well as ungrazed areas. And with that, the rabbit remains an important but – because of its sensitivity for disease - unreliable ally for dune managers (Van Breukelen & Van Til 2005).

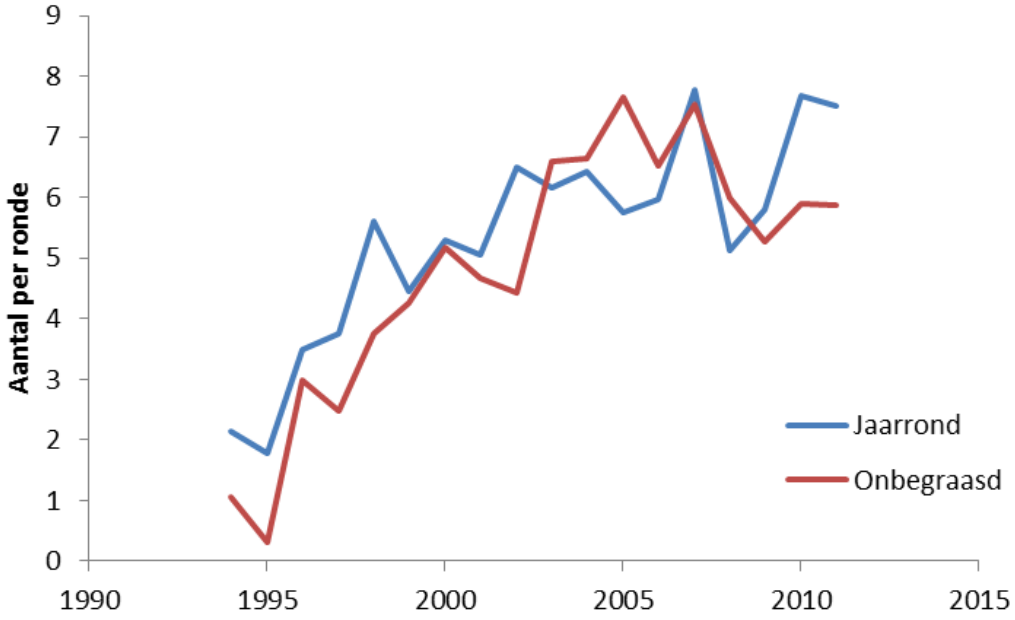

Figure 8. *Mean number of Sand Lizards on monitoring transects in the period 1994-2011 in grazed (blue) and ungrazed (red) dune areas (jaarrond = year-round; onbegraasd = ngrazed; aantal per ronde = number per round).*

Open dune summer birds in our coastal dunes show a sharp decrease in the past decades. On average, grazing has a slightly negative effect on summer birds with a preference for open dunes and high shrubs. Summer birds with a preference for brushwood and low shrub have a varying response to the use of grazing. However, there are major differences regarding the effects of the various forms of grazing. Mixed herd grazing and a high grazing pressure (as often used in the Wadden district) has a positive effect on open dune summer birds, such as the Eurasian oystercatcher, Wheatear and Eurasian skylark, whereas a low grazing pressure using cattle (as more often used in the Renodunaal district) generally has a negative effect on this group.
This positive effect of a high grazing pressure is striking, as a higher grazing pressure is associated with both lower densities and, on average, smaller invertebrate prey in the soil (this study) and a higher degree of disturbance during the breeding season (Mandema *et al.* 2013).
Various explanatory factors (or combinations thereof) can be put forward, but a definitive answer can only be provided through specific subsequent research into the success of the various bird species in terms of their reproduction.
The Hen harrier avoids grazed dunes both for brooding purposes as well as for foraging and grazing therefore appears to be of a negative influence on this species. Of all of the species examined in the study, the Hen harrier has the longest nesting period by far, 10 to 12 weeks from the building of a nest through to fledging. The songbirds referred to here are smaller and have a nesting period of 5 to 6 weeks. Larger species, such as the Eurasian oystercatcher, Northern lapwing, Eurasian curlew and the Common shelduck have an egg-laying and brooding period of 4-5 weeks, after which the young can migrate as nidifugous birds. Intensive grazing probably increases the nesting opportunities for the Wheatear and the Eurasian skylark, and in the case of the Wheater, such an increase is also indirectly facilitated by rabbits.

Optimization of the grazing management in dune grasslands

Grazing in the form as it has been applied in the Dutch coastal dunes in the past three decades has had, on average, a slightly positive effect on the animal communities of (half)open dry dunes. However, the effects differ between both the various forms of grazing as well as between the various fauna groups. And so there is not a single form of grazing that has a positive effect on all of the characteristic species in the various fauna groups.
As the various factors that make up the grazing method (grazing pressure, grazing time, composition of the herd) are highly dependent of one another and, moreover, are not evenly distributed across the dunes of the Renodunaal district (calcium-rich) and the dunes in the Wadden district (calcium-poor), it is not possible to determine any individual 'knobs' for managers to turn in order to optimize the grazing management.

The dunes in the Wadden district are N-limited and are grazed at a higher grazing pressure (average 0.18 livestock units), mainly using mixed herds (generally cattle with horses and/or sheep). This leads to major changes in the structure of the vegetation and the availability of N for plants, which, incidentally, does not lead to a major improvement of the food quality of plants. Open dune summer birds appear to benefit from this, with the important exception of the Hen harrier, which avoids grazed areas when brooding as well as for foraging. Despite the higher grazing pressure, this does not generate more open sandy spots, which may be caused by the use of sheep and/or due to the fact that the rabbit densities appear to be lower than those found in the Renoduraal dunes. The cover with herbaceous plants and the occurrence of flowers decreases as a result of the present grazing. And so butterflies benefit less from a higher grazing pressure and the soil fauna density is lower in the more intensely grazed dune grasslands.

The Renodunaal dunes are not N-limited and the applied grazing pressure is, on average, lower (0.14 livestock units/ha/year) and relatively often with cattle. The height of the vegetation structure is lowered, but there are no changes in the N-availability or the plant quality. Open dune and high shrub summer birds react negatively to a low grazing pressure (< 0.20 livestock units/ha/year), probably because the vegetation is not sufficiently opened up, whereas disruption does occur. The proportion of open sand does increase, however, which may be caused by a higher rabbit density and/or by the use of cattle instead of sheep. The herbaceous plant cover and the occurrence of flowers also increase locally, particularly in spots where the soil is high in calcium. The butterflies that are characteristic of the (half) open dunes, such as dark green fritillaries and the Small Copper, respond positively to the prevailing grazing pressure. The Sand lizard populations in the Renoduraal district are not influenced by grazing.

Grazing pressure, timing and herd composition
Although characteristic fauna communities in coastal dunes generally benefit from the grazing measures that have been taken in the past decades, it is possible to optimize these even further. The measures that the manager can apply when regulating grazing concern the grazing pressure, the timing of the grazing and the composition of the herd.
The influence of the various types of herds on the fauna could not be determined in this study, as this factor is so completely intertwined with the soil type, grazing pressure and grazing time. The choice for a certain herd composition depends mainly upon the type of overgrowth that is to be counteracted. Depending upon the animals used, one can expect more grassy or more woody plant species to be consumed (browsers and grazers). A more direct effect of the type of herd on fauna communities concerns the generation of open sandy grubbing locations and also the degree of activity in the area. Ruminating cattle are far less active than non-ruminating horses and are therefore less disruptive for summer birds (Mandema *et al.,* 2013).

A factor that influences the effects on fauna much more directly concerns the grazing pressure. Whereas some species benefit from a high grazing pressure (such as open dune summer birds), other species are sensitive to the same high grazing pressure (various butterfly species). In order to have the characteristic species of various fauna groups benefit from grazing, it is essential to work with a varying grazing pressure. There are various options to that end, including the development of natural grazing gradients or intensive active regulation of the grazing pressure. Concerning the latter, one may opt to vary the timing of the grazing in a year or between years. The calcium-poor Wadden dunes that are N-limited, and therefore more sensitive to overgrowth, are less suitable for extensive, integrated grazing compared to the P-limited Renodunaal dunes. More and more intensive measures – such as restoring small-scale and large-scale sand-drifts and the removal of wood wildshoots - are in any case essential in the Wadden district (compared to the Renoduraal district) in order to maintain a (half) open dune landscape, priority habitats such as the dune grasslands and heathlands and open dune animal species.

Additional management

The soil material regulates the dune system on a higher hierarchic level than grazing. Dune soils that are rich in calcium and iron bind P, making this element a limiting factor. Calcium-poor or decalcified soils have a much lower P-fixation, and so the growth of vegetation is highly regulated by the amount of N that is available. It is also evident that the occurrence of herbaceous plants, and with that the presence of flowers, is highly regulated by the calcium richness of the soil (this study and Tahmasebi Kohyani et al., 2008). This study furthermore shows a positive correlation between the food quality of plants and litter and high densities of both large and small soil fauna species, but also that grazing has but a minor effect on this food quality. The soil dynamics, in which fresh calcium-rich sand reaches the surface, has a much greater positive effect on both the food quality of plants as well as on the abundance of herbaceous plants.

A previous study (Wouters & Remke, 2012) examined the plant quality of narrow-leaved grasses subjected to sand-drifting, both in the field and in the form of a greenhouse experiment. It showed that the N% of grasses that are subjected to sand-drifts is higher than those not subjected (whether grazed or ungrazed). The average C:N-ratio is much lower as a result, making the grasses much more nourishing for herbivores.

Soil dynamics in the form of erosion and the shifting and accumulation of sand are therefore an extremely important steering factor in the dune system. These dynamics can be partially effected through the treading of cattle and an increase in the rabbit population as a result of grazing, but additional measures will be required for the time being in order to restore and maintain small-scale dynamics (stretches of bare sand) and large-scale dynamics (foredunes). Because of the low calcium content of the soil in the Wadden district and the limited soil dynamics that can be achieved through grazing, the need to restore the dynamics in the Wadden district is higher than the need in the Renodunaal district.

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