

tussen Duin & Dijk



Connection and defragmentation

Nature in Noord-Holland. Volume 17 3 ● 2018

Flora is flouri

outside our nature reserves

● Photos: Theo Baas.



● Road verge with bulbous buttercup along the Kanaaldijk in Alkmaar.

The foundations are there; now it's time to sort out the management.

It is widely known that nature in rural areas has been greatly impoverished over the past decades, leading to many small and scattered nature areas that have each become isolated. At the same time, those same rural areas harbour a fine-meshed network of infrastructure such as roads, dikes and storage basins. With the right kind of management, these 'ribbons' running through the man-made landscape can actually fulfil an important function for many plants and animals – as places of residence, shelter and connection. As far back as 30 years ago, Wageningen University professor Zonderwijk already stressed the importance of better management of 'linear features in the countryside' (Wonink *et al.*, 1987) This theme is still as relevant as ever. In this article, I would like to plead again

for optimisation of the management of road verges, dikes and storage basins in order to enhance their function for plants and animals.

Road verges

In our province, there are many hundreds of kilometres of road verges managed by Rijkswaterstaat, the Province, water boards and municipalities. The provincial road network in Noord-Holland alone stretches across approximately 560 kilometres (Dekker, 2000). In the 1980s, influenced by professor Zonderwijk, many municipalities, provinces and other organisations started with environmentally-focused road verge management. Instead of regular mowing with flail mowers, providing a rough cut and look for the verges and leaving the mowings to rot down, now the grass was meant to be mown in one to two full rounds and the mowings neatly removed, the land laid fallow. Because the mowings are taken away, the road verge will

slowly become less fertile, meaning that not only the biodiversity will increase, but the amount of biomass carried off each time is gradually reduced as well.

The Province of Noord-Holland has been managing part of its road verges in an environmentally-friendly way since 1983 (figure 1 and legend with vegetation types).

Management

Environmentally-friendly road verge management is well worth the effort. The results are very encouraging in many cases. It is all underpinned by a mowing schedule tailored to specific vegetation types, and simply consistent management choices. In order to be able to evaluate the policy, a monitoring network would be necessary. Unfortunately, we have observed a growing trend towards flail mowers again in recent years. Species-rich road verges quickly revert to rough, species-poor vegetations domi-

Figure 1. Species-rich, ecologically managed verges along provincial roads in Noord-Holland.

Legend for vegetation types on ecologically managed road verges.

Type 1 – Vegetation with dune grassland species on a dry, sandy, lime-rich soil.

Distinctive species: little mouse-ear (*Cerastium semidecandrum*), field mouse-ear (*Cerastium arvense*), field scabious (*Knautia arvensis*), common restharrow (*Ononis repens* subsp. *repens*), early hair-grass (*Aira praecox*), sand cat's-tail (*Phleum arenarium*), prairie junegrass (*Koeleria macrantha*), spring vetch (*Vicia lathyroides*), viper's bugloss (*Echium vulgare*), narrowleaf hawkweed (*Hieracium umbellatum*), yellow bedstraw (*Galium verum*).

Type 2 – Violion caninae grasslands on dry, sandy, lime-deficient soil.

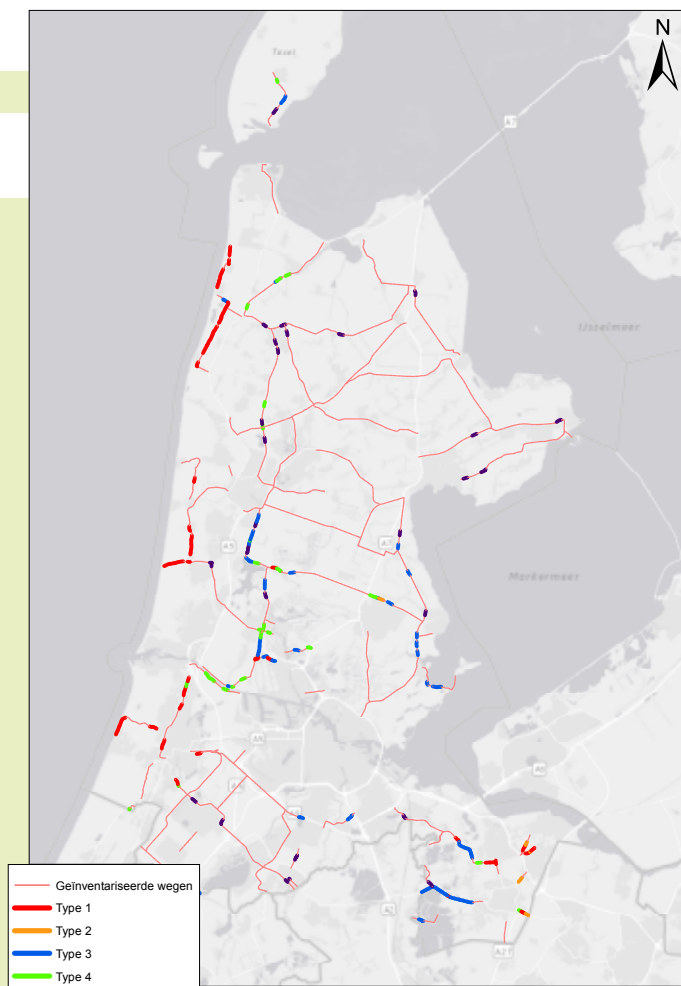
Distinctive species: heather (*Calluna vulgaris*), grey hair-grass (*Corynephorus canescens*), fine-leaf sheep fescue (*Festuca filiformis*), Scotch broom (*Cytisus scoparius*), little white bird's-foot (*Ornithopus perpusillus*), wavy hair-grass (*Deschampsia flexuosa*), shepherd's cress (*Teesdalia nudicaulis*).

Type 3 – Vegetation with ragged robin (*Silene flos-cuculi*) and water ragwort (*Jacobaea aquatica*) on a medium rich, moist to wet, moderate acid soil on sand, peaty sand, peat, and peaty clay.

Distinctive species: ragged robin, marsh thistle (*Cirsium palustre*), moneywort (*Lysimachia nummularia*), lesser pond sedge (*Carex acutiformis*), greater pond sedge (*C. riparia*), tworank sedge (*C. disticha*), southern marsh orchid (*Dactylorhiza majalis* subsp. *praetermissa*), meadowsweet (*Filipendula ulmaria*), water ragwort.

Type 4 – vegetation with bulbous buttercup (*Ranunculus bulbosus*) and ragwort (*Jacobaea vulgaris*) on relatively dry, moderately rich soil on sand, sandy clay and light clay.

Distinctive species: bulbous buttercup, ragwort, field wood-rush (*Luzula campestris*), sweet vernal grass (*Anthoxanthum*



odoratum), thyme-leaf sandwort (*Arenaria serpyllifolia* s.s.), mouse-ear hawkweed (*Hieracium pilosella*), hare's-foot clover (*Trifolium arvense*).

Type 5 – Other herb-rich verges on dry to damp, often clay-soils and nutrient-rich sandy soil.

Characteristic species: meadow vetchling (*Lathyrus pratensis*), lesser hawkbit (*Leontodon saxatilis*), hedge bedstraw (*Galium mollugo*), brown knapweed (*Centaurea jacea*), garden star-of-Bethlehem (*Ornithogalum umbellatum*), ox-eye daisy (*Leucanthemum vulgare*), common self-heal (*Prunella vulgaris*), bush vetch (*Vicia sepium*).

nated by cow parsley (*Anthriscus sylvestris*), common nettle (*Urtica dioica*), bitter dock (*Rumex obtusifolius*) and common hogweed (*Heracleum sphondylium*). This way, the results of decades of meticulous road verge management can be wiped out in just a few years. As it turns out, it is difficult to pursue a consistent policy on road verge management within the ever-changing environment of government organisations. Unfortunately,

meticulous road verge management tends to end up last in a long line of different priorities for funding.

Dikes

Noord-Holland boasts a wide variety of dikes. In general, we distinguish between coastal dikes (the Delta dikes along the North Sea, Wadden Sea coast and the IJsselmeer) and 'inner dike' embankments (Provincie Noord-Holland, 1991).

Coastal dikes

The coastal dikes have all been raised to 'Delta height', the base on the seaward side is often covered with an asphalt and/or basalt layer and they have a stepped slope. The land side of the dike consists of a grass embankment. The vegetation on the seaward side and the land side tends to differ greatly. The basalt banks can harbour a rich variety of ferns, like hart's-tongue fern (*Asplenium scolopendrium*), male



● Sea kale on the Afsluitdijk.

fern (*Dryopteris filix-mas*), lady fern (*Athyrium filix-femina*), broad and narrow buckler-fern (*D. dilatata* and *D. carthusiana*) and the ivy-leaved toadflax (*Cymbalaria muralis*) (figure 2). Along the IJsselmeer, this also includes the garden angelica (*Angelica archangelica*).

The basalt structures along the North Sea and Wadden Sea dikes feature sea kale (*Crambe maritima*) and sea fennel (*Crithmum maritimum*). Both species originally occur on rocky coasts and they have only been known to appear in our country since last century. Until a few decades ago these plants were still rare, but both numbers are on the rise. The richest habitat for both these species can be found on the Wadden-facing side of the Afsluitdijk. The development of the sea kale here is especially spectacular: along the entire length of the Afsluitdijk, we can see a continuous ribbon of sea kale.

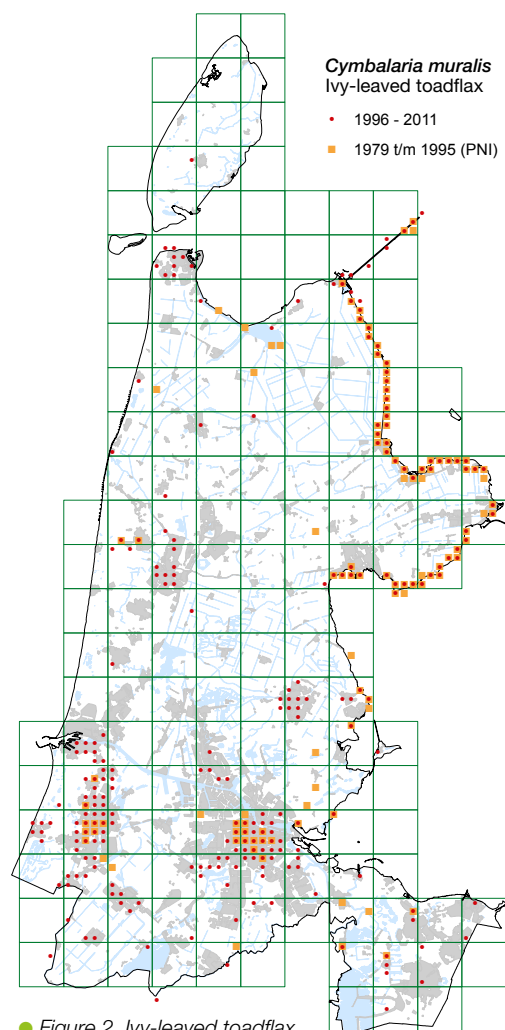
The grass slopes of sea dikes are usually grazed by sheep. Typical species to be found on shortly grazed sea dikes are false-rye barley (*Hordeum secalinum*), blue field madder (*Sherardia arvensis*) and knotted hedge-parsley (*Torilis nodosa*). The latter species within the Netherlands is only found in the

Delta, IJsselmeer and Wadden Sea areas (figure 3).

Embankments

There is great variation within this group and it depends, among other things, on the altitude, the soil profile, the type of soil, the relief and its exposure to the sun (Provincie Noord-Holland, 1991). At the foot of the dike there will often be a wide ditch, and some dikes have a wider, wet, base. The vegetation depends on the above factors and the management. Many dikes are grazed by sheep, but some are mowed as well, and unfortunately some using flail mowers. Typical dike species are false-rye barley, crested dog's tail (*Cynosurus cristatus*), rough hawksbeard (*Crepis biennis*), common self-heal (*Prunella vulgaris*) and spotted burclover (*Medicago arabica*). The Wierdijk on Wieringen features the only habitat of the slender-flower thistle (*Carduus tenuiflorus*) in the Netherlands.

The wet base around a dike can harbour a great many species, including the big trefoil (*Lotus pedunculatus*), marsh arrowgrass (*Triglochin palustris*) and southern marsh orchid (*Dactylorhiza majalis* subsp. *praetermissa*). Dike ditches

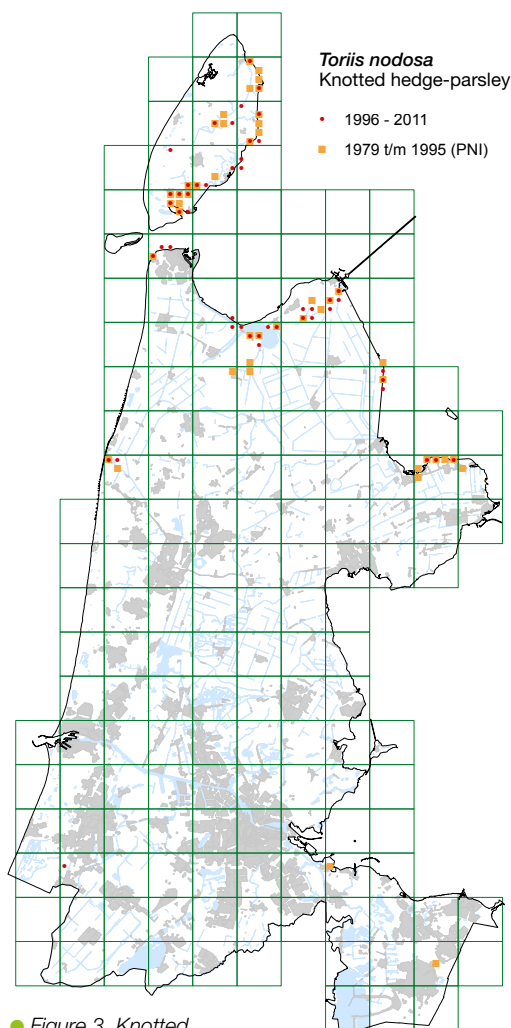


● Figure 2. Ivy-leaved toadflax.

are generally much richer in aquatic plants than the adjacent area, because they are much less exposed to fertilisation.

Management

Many dikes thrive with low-intensity grazing by sheep. The grazing leads to a short and dense vegetation, yet still leaves plenty of space open and gives many varieties the all-important opportunity to sprout. In addition, sheep contribute to the dissemination by getting seeds stuck in their coats. If a dike is mowed, it is advisable to do it in stages, especially where large surface areas are concerned; for example mow the lower or upper half first and the other part one month later. That this is not yet widespread practice is demonstrated by the fact that the Afsluitdijk for years now has always been mowed in the early summer, within a few days and across its whole length. Where one day the white of the ox-eye daisies



● Figure 3. Knotted hedge-parsley.

(*Leucanthemum vulgare*) still lights up the entire structure; a few days later, 30 kilometres of connecting zone is completely bare.

The use of herbicides on dikes is also incompatible with eco-friendly management. Yet still, in many places, herbicides are still being used, especially against thistles (*Cirsium spp.*, *Carduus spp.*).

However, thistles are an excellent source of nectar for butterflies, bees and other insects. What is frustrating is that no distinction is being made, meaning species such as field eryngo (*Eryngium campestre*) and spear thistle (*Cirsium vulgare*) also fall victim. It is this use that nearly eradicated the slender-flower thistle on Wieringen. It would be good to see the land tenure regulations include a ban on the use of herbicides.

Storage basins

Noord-Holland features a comprehensive system of storage basins

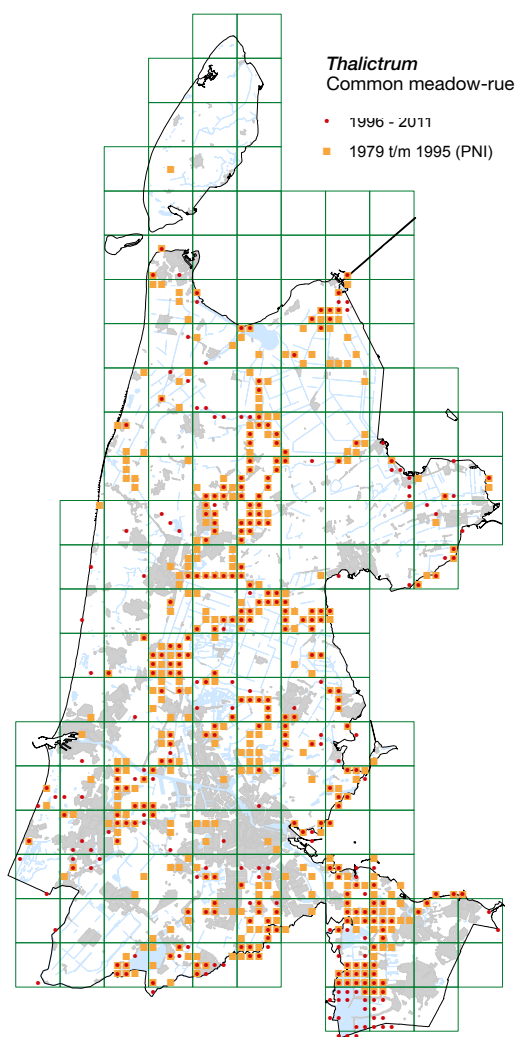
(figure 4). These basins are used to keep the water level of the lower polders at the right level. In periods of drought, water is let in from the basin and in wet periods, water is pumped out and flows into the basin or is channelled away. Because the basin water tends to be very rich in nutrients, it may be desirable to isolate the areas with good water quality from the basin. This is mostly in the case of specific areas with nutrient-poor water and singular vegetation, such as reserves in the Vechtstreek and along the inner dune edge. Here, they prefer not to allow in 'foreign' water, though



● Figure 4. Waterways.

in dry periods that was sometimes inevitable.

Often, the banks of storage basins are reinforced or lined with reed and tall forbs such as hairy willowherb (*Epilobium hirsutum*), hemp-agrimony (*Eupatorium cannabinum*), hedge bindweed (*Convolvulus sepium*), greater and lesser pond-sedge (*Carex riparia* and *C. acutiformis*) and bittersweet (*Solanum dulcamara*). Sometimes there are wide reed beds along the banks. The reed beds in these storage basins can be very rich in herbaceous species like marsh-marigold (*Caltha palustris*), valerian



● Yellow water lily.

● Figure 5. Common meadow-rue.

(*Valeriana officinalis*), ragged robin (*Silene flos-cuculi*), southern marsh orchid and common meadow-rue (*Thalictrum flavum*). To the north of the North Sea Canal, the latter species is mostly bound to reed beds in storage basins (figure 5). In some places, there are even sphagnum reed beds with species like royal fern (*Osmunda regalis*), crested wood fern (*Dryopteris cristata*), round-leaved sundew (*Drosera rotundifolia*) and several species of peat moss (*Sphagnum spp.*).

In general, the storage basins are very nutrient-rich and contain few aquatic plants, though many storage basins do feature species with floating leaves, such as water lilies (*Nymphaea alba*) and yellow water lilies (*Nuphar lutea*).

The storage basins act as an important connecting route for plants. Plants can enter the polder from the storage basin by means of rhizomes or seeds, and vice versa, venture into the storage basin from the polder. If the conditions

are favourable, species can settle in these new areas. As the polder water in the peat meadow areas above the North Sea Canal is slowly desalinating, it is attracting more and more species that favour these conditions, like sweet flag (*Acorus calamus*), cowbane (*Cicuta virosa*), water lily (*Nymphaea alba*), yellow water lily (*Nuphar lutea*), frogbit (*Hydrocharis morsus-ranae*), cyperus sedge (*Carex pseudocyperus*), marsh marigold and fringed water lily (*Nymphoides peltata*).

Management

The reed beds in storage basins are important both for plants and marsh birds. Depending on the objective, they can be mown annually or in a multiannual cycle. What is primarily important here is to prevent the storage of woody plant species. In the IJsselmeer, creating foreshores has proven successful. Between Andijk and Medemblik, for instance, the creation of 144 ha of foreshore started in the early 90s,

and the area is proving successful at creating opportunities for both nature and recreation. The reconstruction of the Afsluitdijk scheduled between 2018 and 2022 also offers opportunities. The design features reed beds and a fish ladder.

In closing

Plants provide a basis, for instance by being a habitat for many other organisms like insects, birds and mammals. Unfortunately, the biodiversity in rural areas has greatly declined over the past decades. In order to put a halt to this decline, we need to make the most of every opportunity. A network of well-managed roadside verges, dikes and storage basins can work wonders in this regard. No expensive interventions will be necessary, as the foundations are already there.

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