Boreal Baltic coastal meadows* (1630) – Finland

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Conservation status	EU28: Endangered (EUNIS A2.5b) FI: U2 (+)
Protection status	HD: Annex I (priority habitat)
Area (2007-12)	EU: 258 km^2 FI: 60 km^2
MS with genuine improvement	FI
Other MS	EE, LV, SE

Summary: Boreal Baltic coastal meadows are a priority habitat found around the coastlines of the Baltic Sea on areas of land upheaval where livestock have been grazed since prehistoric times. The meadows are now in an unfavourable status due to the abandonment of grazing and overgrowth with reeds and woody vegetation. In Finland, the amount of managed coastal meadows has increased during the past ten years due to targeted restoration actions in the Natura 2000 sites, led by the local and national conservation authorities and with cooperation and voluntary action by farmers. Finnish Rural Development Programme funding through agri-environment and non-productive investments, combined with significant national funding and targeted LIFE and Interreg funded projects, have supported restoration and the reinstatement of grazing on several hundred hectares. Key wins and good practices include the attractive agri-environment payment level for the more valuable areas of habitat, gains in knowledge of efficient reed cutting and utilization strategies, and actions that improve cattle farmers' access to large areas of land for grazing.

Background

Status and EU occurrence

The habitat is found around the coastlines of the Baltic Sea on areas of land upheaval where livestock have been grazed since prehistoric times, preventing the establishment of forest. It occurs mainly in the Boreal biogeographic region (BOR) in Finland, Estonia, Latvia and Sweden, with a small area in the Continental (CON) biogeographic region of Sweden (NB on the Baltic coasts of Poland and Lithuania, dune habitats predominate, and in Germany and Denmark coastal meadows are classified as habitat 1330 Atlantic salt meadows). The range is reported as favourable in all Member States and at the EU level.

Most of the currently existing habitat is in Estonia (138 km^2), followed by Finland (60 km^2) and Sweden (46 km^2 in BOR and 13 km^2 in CON), with a small area in Latvia (1.8 km^2). All Member States report using an estimate based on partial data with some extrapolation and/or modelling to assess distribution.

The overall EU conservation status of Boreal Baltic coastal meadows was assessed as unfavourable-bad, but with an improving trend in the 2007-2012 period (with range assessed as favourable, distribution as unfavourable-bad, structure and functions as unfavourable-bad, and future prospects as unfavourable-inadequate).

In Finland (Boreal biogeographic region) the conservation status was assessed as unfavourable-bad with an improving trend in distribution and future prospects. Estonia and Sweden reported the overall trend in conservation status as stable, whilst Latvia reported it as deteriorating.

The potential range of coastal meadows in Finland lies along the whole coastline from the Eastern Gulf of Finland to the bottom of the Botnian Bay. The distribution is reported as unfavourable-inadequate due to the substantial loss of habitat compared to 50 years ago, but the trend is improving as the amount of managed coastal meadows has increased during the past ten years.

Ecological requirements

Coastal meadows are low growing plant communities in the geolittoral zone, sometimes interspersed with salt patches. They occur along the Baltic coasts where the salinity is low (brackish water) and the tide hardly exists, but influence from land upheaval (isostatic readjustment) and ice occurs (European Commission, 2013). Most of the areas were traditionally used for mowing or grazing, thus enlarging the areas and keeping the vegetation low, rich in vascular plants and suitable for nesting waders. Characteristically the vegetation occurs in distinct zones, with saline vegetation closest to the sea. There is a marked south-north variation in the plant communities, from those similar to the Atlantic salt marshes in the south, to more brackish water influenced meadows further to the north (Doody, 2008). Land upheaval along the Finnish coastline increases along a gradient from zero in the south to around 0.9 cm per year in the northern part of the Baltic Sea (Gulf of Bothnia).

The vegetation is characterised by Spike-Sedge (*Eleocharis*), grasses and species of Sedge (*Carex*), Flat-sedge (*Blysmus*) and Rush (*Juncus*), with patches of the taller Club-rush (*Schoenoplectus*), Water Horse-tail (*Equisetum fluviatile*) and Common Reed (*Phragmites australis*) (Doody, 2008) (Lehikoinen et al, 2017). Characteristic Habitats Directive Annex II plants are Pendant Grass (*Arctophila fulva*), Fourleaf Mares Tail (*Hippuris tetraphylla*), Water Plantain (*Alisma wahlenbergii*), and endemic varieties or subspecies of the Siberian Primrose (*Primula nutans*). The level of grazing pressure has a profound impact on the nature of the vegetation, which ranges from short, species-poor swards associated with heavily grazed meadows to lightly grazed ones with dense swards and areas of reeds and rushes (Doody, 2008).

The habitat is associated with small shallow water pools and channels which are key sites for the Habitats Directive Annex II and IV dragonfly species Yellow-spotted Whiteface (*Leucorrhinia pectoralis*), Natterjack Toad (*Bufo calamita*) and Green Toad (*Bufo viridis*). There are also a number of endemic or locally restricted insect species associated with the habitat.

It is a key breeding habitat of the Birds Directive Annex I taxa Baltic Dunlin (*Calidris alpina schinzii*) and Ruff (*Philomachus pugnax*). It is also key breeding habitat for Black-tailed Godwit (*Limosa limosa*), Curlew (*Numenius arquata*), Redshank (*Tringa tetanus*) and other waders. The traditionally more heavily grazed meadows are a key migration habitat for the Annex I species Lesser White-fronted Goose (*Anser erythropus*) and other duck and goose species.

Pressures and threats

Finland (BOR) reported the **pressures** on Boreal coastal meadows in 2007-2012 as abandonment of mowing and grazing by cattle (high importance), combined with diffuse pollution to surface waters due to agricultural and forestry activities (medium importance) (ETC/BD 2014). Dredging and dumping of limnic sediments and the presence of invasive alien species are pressures of low importance.

The major cause for the unfavourable status is the abandonment of traditional agriculture (i.e. low intensity grazing and periodic cutting) since the 1950s, which has led to overgrowth with homogenous reedbeds, shrubs and trees. Historically, coastal meadows around the Baltic were grazed with dairy heifers, beef cattle, sheep, or mixed herds, either privately owned by farmers or jointly grazed as common land (Rannap et al, 2004). However, sheep grazing in Finland is rare as the meadows are too wet. Since dairy farming has become uneconomical on these grasslands, many have been abandoned. In Finland, the number of livestock farms and the number of livestock have declined drastically. Vegetation growth due to abandonment is exacerbated by eutrophication from diffuse pollution to surface waters from agricultural and forestry activities and from untreated wastewater from summer cabins or cottages (pollution from untreated urban wastewater ceased in the 1970s). Eutrophication drives the growth of thick reed beds in shallow water, and cattle will keep away from high reed beds.

Breeding wader populations have declined due to the loss of open habitat to overgrowth. Breeding waders are also suffering low breeding success due to predation from invasive non-native American Mink (*Neovison vison*) and Racoon Dogs (*Nyctereutes procyonoides*), as well as the increasing abundance of native predators including Red Fox (*Vulpes vulpes*) and raptors (Herrmann and Thorup, 2011).

Dredging of limnic sediments and dumping of dredged deposits is a pressure on meadows which are situated near summer cottages. Coastal meadows near urban areas are heavily affected by recreational use.

The main **threats** reported by Finland are the continuing abandonment of traditional agriculture, eutrophication, and dumping of dredged sediments. Climate change is likely to reduce coastal sea ice formation during winter, which may accelerate the rate at which abandoned grasslands become overgrown with woody vegetation. In

the long term, climate change may lead to sea level rises that outpace the rate of coastal uplift, reducing the coastal meadow habitat area (Strandmark et al, 2015).

Drivers of improvements: actors, actions and their implementation approaches

Organisers, partners, supporters and other stakeholders

National conservation activity involves the following:

Organisers:

- Metsähallitus Parks & Wildlife Services is responsible for managing Natura 2000 sites on state owned land. Metsähallitus directly manages 9.74 km^2 of Boreal Baltic coastal meadow habitat in Natura 2000 sites (Mikkonen and Moilanen, 2013), i.e. 16% of the reported total area of habitat.
- Local centres for Economic Development, Transport and the Environment (ELY-centres) have coordinated the management of Natura 2000 on privately-owned land in the past, but the responsibility of practical implementation in the privately owned conservation areas has been transferred from most ELY-centres to Metsähallitus during recent years (Raatikainen pers comm, 2018). Most of the Baltic coastal meadow habitat lies in Natura 2000 sites on privately owned land or outside the network.

Partners:

- The key land owning stakeholders may be individual farmers, farming communities, or public entities. Most semi-natural grasslands are now owned by non-farming landowners. A few areas of coastal meadow are owned by the military.
- Meadow management is done in close co-operation with local cattle owners, who apply for agri-environment payments.

Supporters and other stakeholders (both in the case of nationally-funded and LIFE co-financed activities) are:

- Recreational users including local people, summer cabin owners and hunters.
- Ministry of Agriculture and Forestry.

The three LIFE projects most responsible for conservation status improvements during 2007–2012 were organised by the Centre of Economic Development, Transport and the Environment for South-western Finland, or by regional authorities (Uusimaa Regional Environment Centre and municipal authority of Turku) in partnership with the Centre.

Contributions / relevance of strategic plans

The Finnish government **nature conservation programme for bird wetlands** aims to maintain nearly 300 important sites for wetland birds, in total over 700 km^2 including many valuable coastal meadows. This target is considered to be an important contribution of Finland to the Ramsar Convention.

Metsähallitus Parks & Wildlife Services manage the state-owned part of the Finnish Natura 2000 network according to the **Principles of Protected Area Management** in Finland, supported by monitoring of the state of protected areas and periodic evaluation of the effectiveness of management procedures and the need for new or corrective measures. This guide covers the practices and principles of conservation and management of habitats, species and cultural heritage as well as those of securing sustainable protected area use.

The Finnish national **Invasive Alien Species Strategy** and other international commitments (IMO, HELCOM, and EU) have driven actions to tackle invasive alien species including trapping of American Mink and Racoon Dogs.

Measures taken and their effectiveness

The conservation measures reported by Finland for the conservation of the habitat in 2007-2012 are:

Application of conservation measures for *Boreal Baltic coastal meadows* for 2007-2012 (FI-BOR)

Measure	Type	Ranking	Inside/outside Natura	Broad Evaluation
2.1 - Maintaining grasslands and other open habitats	recurrent	High	Both	Enhance
6.3 - Legal protection of habitats and species	legal one-off	Medium	Both	Enhance
6.0 - Other spatial measures	administrative recurrent	Low	Both	Enhance
4.0 - Other wetland-related measures	legal one-off	Low	Both	Enhance
6.1 - Establish protected areas/sites	legal one-off	Medium	Both	Enhance

Source: FI-BOR Article 17 report 2013 available at https://bd.eionet.europa.eu/article17/reports2012/

Conservation measures have been undertaken by the Finnish conservation authorities as part of the delivery of nature conservation programmes and the management of nationally owned protected areas, and by farmers motivated and financed by rural development payments under Pillar 2 of the Common Agricultural Policy. The Finnish agri-environment programmes have been designed to support the grazing of Baltic coastal meadows since 2001, and the agri-environment programme 2007–2013 expanded the range of beneficiaries for the management of semi-natural habitats and establishment of wetlands schemes to include registered associations.

The most important measures for restoration of the habitat are removal of reeds and shrubs and reinstatement of grazing with cattle or sheep (Doody, 2008). Restoration requires the removal of trees by cutting, followed by uprooting (and may be preceded by bark removal to weaken trees), and clearance of reeds by mowing or burning (Rannap et al, 2004). Grazing pressure must be adjusted to the characteristics of the meadow and the species that require particular protection. Where mowing was the traditional management method, this should be maintained if possible, particularly where rare plant species are found. Combined grazing with different types of cattle, or cattle and horses or sheep is effective in maintaining diverse vegetation structure and plant species diversity (Laurila et al, 2015; Rannap et al, 2004). The reinstatement of grazing requires the erection and maintenance of fences, bridges and gates to access the pastures and control and rotate the livestock (Rannap et al, 2004). Coastal meadows often require fences that continue into the water, and these must be repaired or removed every winter as they are damaged by ice and storms. Cattle will graze young reed shoots in shallow water if the reed has been mown or burnt, or 2m strips have been cut into the reed to allow cattle access (Rannap et al, 2004). Reed cutting or burning needs to be done in summer when water levels are low and the plant's nutrients have not yet been stored in the root system.

Designation of Natura 2000 areas and establishment and implementation of site management plans have also been important measures, particularly where management responsibility has transferred to public authorities as traditional farming uses have been abandoned. Finland has designated 92 Natura 2000 sites for the habitat and reports that 63% of the estimated total habitat area (36-38 km^2 of habitat) is in Natura 2000 areas (ETC-BD, 2014), and this proportion has increased due to new designations within the last decade. Much of this habitat area lies within SPAs designated for breeding wader populations. Some Natura 2000 sites are now being managed because local or national nature conservation authorities take on the management in cooperation with cattle owners.

Communication and awareness raising activities with local populations and recreational users were important measures to increase and maintain support for nature conservation and to reduce pressures from recreational use.

In Finland, the habitat has been targeted by more than five LIFE projects over the last two decades (see Annex II). Of these, three restored 6% of the habitat in Finland (33 ha and 185 ha and 142 ha restored of the estimated total 6000 ha):

- The LIFE06 NAT/FIN/000129 project (2006-2012) restored 33 ha of coastal meadows in Preiviikinlahti Bay by mowing, rotovating and furrowing reed beds. This is an effective method because it destroys the root system, imitating the effects of being trampled by cattle.

- The LIFE03 NAT/FIN/000039 project (2003-2007) restored ca 22 ha of coastal meadows, of which 18 ha is in the Natura 2000 area Medvastö-Stormossen (FI0100024), ca 3 ha in the Natura 2000 area Laajalahden lintuvesi (FI0100028) and 1 ha in the Natura 2000 area Vanhankaupunginlahden lintuvesi (FI0100062) (Ilpo Huolman, pers comm 2018). Restoration was mainly by mechanical cutting and harrowing of vegetation (reeds) on land, tree and shrub removal, and removal of aquatic vegetation and bottom sediment by dredging (Lehikoinen et al, 2017). These actions were followed by cattle grazing. Management plans for government owned Natura 2000 sites established by the LIFE03 NAT/FIN/000039 project (2003-2007) were reviewed in 2017, and it was concluded that the management of the areas will continue in accordance with the original plans as they have proved to be effective (NEEMO LIFE team, 2017).
- The LIFE02 NAT/FIN/008468 project (2002-2006) restored 142 ha of coastal meadows by removing reed growth and trees and reintroducing cattle grazing (Savonen, 2007). The project produced restoration and management plans for some of the meadow areas, but there is no information on whether management has continued.

If the cattle owners can get access to large enough grazing areas, many of them are interested in increasing the area of land they graze (Raatikainen pers comm, 2018). This requires good coordination of potential areas, as well as good knowledge of potential farmers. So in many areas, a key issue is how to get farmers and areas to find each other. The good network of managed coastal meadows in state owned conservation areas on the southern coast of Finland, and the conservation agency's database of state owned areas, means that it can "market" these areas for potential farmers. A website (Grazing Bank: https://www.laidunpankki.fi/) is used for announcing available grazing sites or available grazing animals, maintained by Pro Agria (farmers advisory organisation). Metsähallitus is an official partner of this service. Pohjois-Pohjanmaa ELY centre have also done good work in coordinating the management of coastal meadows in the Botnian Bay, maintaining a plan of which areas are suitable for grazing, and planning for how to manage the most important bird sites by grazing, monitoring birds and contacting farmers.

Funding sources (current and long-term) and costs (one-off and ongoing)

Funding sources include rural development funds (agri-environment and non-productive investments), national funds, LIFE and Interreg projects. Also, a lot of volunteer based work has been done, especially vegetation clearance by farmers.

The Finnish agri-environment programmes 2001-2006 and 2007-2013 raised the awareness of biodiversity issues in Finland and considerably increased the area of managed coastal meadows. The Finnish agri-environment programme 2007–2013 expanded the range of beneficiaries for the management of semi-natural habitats and establishment of wetlands schemes to include registered associations, and Finland reported some 22,000 ha of traditional rural biotopes under special agri-environment contracts in this period (Ymparisto, 2014). However, some areas of coastal meadow were excluded from direct payments due to failing the eligibility criteria on presence of non-grass vegetation such as reeds and rushes (Anna Schulman, personal communication).

According to the Finnish Prioritised Action Framework (PAF), agri-environment support for semi-natural habitats in 2007-2013 was more successful in supporting the management of coastal meadows than other semi-natural habitats, as the large meadows are relatively easy and reasonably profitable to manage as pastures for large herds. The area of managed semi-natural habitat has increased by approximately 2,000 ha since 2007, including several hundred hectares of coastal meadows. However, the PAF also states that the amount of subsidy does not fully cover the cost of managing semi-natural grasslands.

A significant amount of national conservation funding has been targeted at restoring sites, particularly by the Local centres for Economic Development, Transport and the Environment (Raatikainen pers comm, 2018).

Six EU-funded projects restored significant areas of coastal meadow habitat in Finland in the last decade and provided a total of around 3,400,000 Euros from LIFE and INTERREG funds (see Annex II for details of LIFE projects). However, only part of this funding went to the coastal meadow habitat.

The LIFE02 NAT/FIN/008468 project was able to engage local farmers in the management of the restored coastal meadows, and engage them in agri-environment contracts to fund the ongoing grazing of the meadows (Savonen, 2007).

In contrast, in the 15 SPA sites restored in the LIFE03 NAT/FIN/000039 project (2003-2007), no cattle farmers were available near the sites to taken on the grazing. Therefore, the cattle grazing the wetlands were rented by

environmental administration authorities and transported to the wetlands, both of which increased the costs arising from grazing (Lehikoinen et al, 2017).

Future actions and actions since 2012

The Finnish PAF for Natura 2000 in 2014-2020 identifies the priority conservation measures for Boreal Baltic coastal meadows as:

1) coastal habitat multipurpose planning and establishment of nature conservation areas

2) recurrent management through:

- agri-environmental contracts for livestock moving and grazing (including compensation for loss of income)
- in areas not eligible for agri-environmental agreements through national public funding or ERDF

3) restoration of coastal habitat types through:

- agri-environmental measures for restoration of coastal habitats and dunes (e.g. compensation for work related to restoration and acquisition of fence material)
- restoration funded through ERDF, EMFF, LIFE, and national public funds in areas that are not eligible for agri-environmental funding

4) control of eutrophication from run-off waters through agri-environmental contracts, through meeting the targets of the Baltic Sea Action Plan and through implementation of the Baltic Sea Conservation Programme.

In the current rural development programming period (2014-2020), an agri-environment option is available for farmers and registered associations to manage wetlands and semi-natural grasslands, which includes coastal meadows, through parcel-specific contracts, with a payment of 450 €/ha/yr or 600 €/ha/yr for the most valuable sites (Ministry of Agriculture and Forestry, 2014). These contracts must follow a site management plan that has been approved by the ELY Centre, who can amend requirements during the contract period to ensure that it is as appropriate as possible considering the objectives of the operation within the limits of the funds available for the environment payment scheme. Non-productive investment funding is available for initial clearing and fencing as well as wetland restoration. In addition, under Pillar 1 coupled payments are available for extensive beef cattle grazing and for Areas of Natural Constraint (Ministry of Agriculture and Forestry, 2014).

The Finnish Board on Ecological Restoration (FBER), a nationwide cooperation body established by Metsähallitus, evaluates, develops and promotes the quality of the ecological restoration and management of natural and semi-natural habitats, and their impact on society. The Finnish Expert Group for Semi-natural Grasslands has compiled several proposals for improving RDPs and thereby the state of Finnish semi-natural grasslands. Key proposals for coastal meadows are:

- inventories of the semi-natural grasslands should be carried out;
- in the RDP more focus should be put into the most endangered types, for example, dry meadows and calcareous biotopes, more advisory work should be done among landowners;
- national funding should be established in order to support the funding gap that the RDP leaves and national funding should be targeted to the currently ineligible sites;
- Natura 2000 sites are first in the priority list if the money in RDP is running out; and
- payments should be extended to cover the reed beds that are standing within water on the shoreline of the coastal meadows (as in many areas these block access for birds to the water's edge and reduce important open shoreline habitat), as currently the payments are only for the actual meadow (Raatikainen pers comm, 2018).

These actions are incorporated in the national action plan for threatened habitats in Finland to 2020 (Ympäristöministeriö, 2011).

Nature conservation is undergoing a re-organisation in Finland, in which the ELY-centres (former Environmental Centres) are abolished and the national authority Metsähallitus takes over the responsibility for privately owned Natura 2000 areas as well as managing state owned land. However, as the latter is still their main priority, this may not necessarily improve the governance situation for Boreal coastal meadow management.

The future sustainability of coastal meadow management will depend very much on providing options for farmers to develop a business from nature conservation which does not rely only on cattle grazing (Strandberg pers comm, 2018).

Achievements

Impacts on the target habitat

The area of managed coastal meadow has increased by several hundred hectares since 2007. The three LIFE projects targeted at coastal meadows restored around 200 ha by clearing reed growth and trees, enabling the reinstatement of cattle grazing.

The current area under agri-environmental contracts for managing biodiversity and landscape in agricultural areas is 29,300 ha (Schulman pers comm, 2018). Most of this area is semi-natural grassland protected for its biodiversity value, including coastal meadows, but it also includes several thousand hectares of areas with high landscape values.

Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

In Finland, the population decline of the Baltic Dunlin (*Calidris alpina schinzii*) has recently halted, which has been attributed to habitat restoration measures primarily on coastal meadows (Tiainen et al, 2016).

Monitoring of bird populations in the 15 SPA sites restored in the Gulf of Finland LIFE project (2003-2007) found that management was correlated with a rapid increase in waterbird numbers (Lehikoinen et al, 2017). Bird abundances in every guild (dabbling ducks, diving omnivores, diving piscivores, swans, geese, waders, and Black-Headed Gulls *Larus ridibundus*) showed a positive correlation with one or more management actions, and cutting and harrowing, grazing and dredging exhibited a positive correlation with the bird numbers of at least one guild. Cattle grazing was the most closely correlated action. During spring migration both red-listed and Annex I species showed a positive correlation with cattle grazing, as did red-listed species during the autumn migration. The numbers of red-listed species staging on the wetlands during autumn also increased after dredging and after cutting and harrowing.

Environmental education in the 15 SPAs targeted by the LIFE03 NAT/FIN/000039 project (2003-2007) is ongoing, as wetland programs and weekend tours for families are still taking place ten years after the project ended (NEEMO LIFE team, 2017). Visitor numbers to the Natura 2000 sites are high - the bird observation towers are very popular and draw thousands of visitors each year.

Conclusions and lessons learnt

The key targeted conservation measures that led to the improvements

- The key measure is the agri-environment support targeted at semi-natural grasslands (including coastal meadows) for the last two decades, which has resulted in increasing interest in grazing coastal meadows and an increase in the area managed by farmers by several hundred hectares (Raatikainen pers comm, 2018). In the period 2014-2020 the agri-environment application process and the management plan preparation has been made easier (as less calculation of costs is needed). Also, other support such as coupled payments have helped to increase interest in keeping beef cattle on land outside the intensive grassland areas.
- Successful habitat restoration has included mowing, rotovating and furrowing reed beds, cutting and uprooting trees and shrubs, and dredging of aquatic vegetation. This has recreated open habitat that can be grazed by cattle.

Conservation measures that have not been sufficiently effective

- Reinstating management of privately owned areas of habitat has sometimes been difficult. For example, none of the privately owned areas targeted by the LIFE03 NAT/FIN/000039 project (2003-2007) are covered by agri-environmental contracts ten years after the project end and they are no longer grazed (NEEMO LIFE team, 2017). In privately owned Natura 2000 areas, the ownership structure is often fragmented and includes some elderly landowners who have found the application process for agri-environment subsidies too laborious to pursue. Management plans for some of the privately owned land areas were not seen as a sufficient management tool, as they were not binding and in several cases the owner did not abide by the plans.
- Baltic Dunlin (*Calidris alpina schinzii*) breeding success is depressed by nest damage due to trampling by cattle where grazing densities are high in spring (i.e. before June) (Pakanen, Luukkonen and Koivula, 2011). As the meadows continue to attract immigrants, they act as an ecological sink. By mid-June, most of the breeding season is over, and cattle let onto the land do not cause much damage to breeding

birds. Site management plans should adjust grazing practices according to local conditions (timing of breeding and grazing, space use of cattle and birds), and nest trampling rates monitored. Postponing grazing until mid-June is about three weeks later than what is optimal from the farmer's point of view (Pakanen et al, 2016), and as the main issue in Finland is the lack of management or undergrazing, it is necessary to find compromises. Also, in some cases the low grazing pressure from delayed grazing means the recovery of grassland vegetation is slow.

Factors that supported the conservation measures

- Management of privately owned and abandoned areas of habitat within Natura 2000 sites has relied on the intervention of the responsible local authority. For example, management continued on the privately owned Natura 2000 areas targeted by the LIFE03 NAT/FIN/000039 project (2003-2007) – on which grazing has been abandoned - because the ELY-centres used their yearly maintenance grants to clear the meadows (NEEMO LIFE team, 2017). Most of the Natura 2000 management has now been transferred to the national agency Metsähallitus.

Factors that constrained conservation measures

- The number of cattle farms and their distribution are still not sufficient to meet grazing needs, and despite the existence of coupled payments, livestock farming is not profitable in Finland.
- It is difficult to support management of small areas of habitat (Raatikainen pers comm, 2018). The current agri-environment payments are fairly good in relation to the costs of maintaining large areas of coastal meadows but are often not enough on small areas (<10 ha). The national action plan for threatened habitats and the PAF highlight the urgent need for national funding to support management on the valuable habitat areas ineligible for CAP payments, for example because they are outside working farms.
- Farmer advice services and information are inadequate, and the general knowledge of semi-natural grasslands among advisory organisations need to be improved. The Finnish PAF recommends more attention to biodiversity advising at local level and at individual farms. Also, positive motivation of current and new potential managers is needed (Raatikainen pers comm, 2018). Case studies and examples are important motivators.

Quick wins that could be applied elsewhere for the habitat

- New methods and machinery for removing reed from coastal meadows have been tested and several promising solutions are being used by new contractors (Raatikainen pers comm, 2018). Knowledge of the importance of removing the reed before grazing has greatly increased and this has led into good quality management in many valuable areas. Removing the reed also from the water in the front of coastal meadow is very important for the birds, but agri-environmental payments are not eligible for areas of reed in water, so this has sometimes been neglected.
- Some farmers have shown interest in managing coastal meadows under the agri-environment scheme by reed cutting or mowing, without grazing, provided they have the right machinery and their farm is located near the area in need of management (Raatikainen pers comm, 2018).

Examples of good practice, which could be applied to other habitats

- The higher agri-environment payment level for the most valuable areas (600 €/ha) has made the new agri-environmental scheme more attractive, and in the long run this should have a positive effect on other semi-natural habitats as well (Raatikainen pers comm, 2018).
- The grazing bank website maintained by the farmers advisory organisation has increased cattle owners access to grazing areas, and consequently their interest in increasing the area of land they graze (Raatikainen pers comm, 2018). Similarly, the Botnian Bay ELY-centre method has improved their planning of which areas are suitable for grazing, and how to manage the most important bird sites by grazing, monitoring birds and contacting farmers.

References

Doody, J P (2008) *Management of Natura 2000 Habitats: 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)*. Management of Natura 2000 Habitats Technical Report 2008 02/24, European Commission, Brussels.

ETC/BD (2014) Article 17 reports by Member States. Available at https://bd.eionet.europa.eu/article17/reports2012/

European Commission (2013) *Interpretation Manual of European Union Habitats - EUR28*. European Commission, Brussels.

Herrmann, C and Thorup, O (2011) *Population Development of Baltic Bird Species: Southern Dunlin (Calidris alpina schinzii L. 1758)*. HELCOM Baltic Sea Environment Fact Sheet.

Huolman, Ilpo (2018), senior advisor at Centre for Economic Development, Transport and the Environment, personal communication 2 January 2018

Laurila, M, Huuskonen, A, Pesonen, M, Kaseva, J, Joki-Tokola, E and Hyvärinen, M (2015) Divergent impacts of two cattle types on vegetation in coastal meadows: implications for management. *Environmental Management* No 56 (5), 1199-1213.

Lehikoinen, P, Lehikoinen, A, Mikkola-Roos, M and Jaatinen, K (2017) Counteracting wetland overgrowth increases breeding and staging bird abundances. *Scientific Reports* No 7, 41391.

Mikkonen, N and Moilanen, A (2013) Identification of top priority areas and management landscapes from a national Natura 2000 network. *Environmental Science & Policy* No 27, 11-20.

Ministry of Agriculture and Forestry (2014) Coupled support ensures the supply of domestic raw materials to the food industry. http://mmm.fi/en/coupled-support

Ministry of Agriculture and Forestry (2014) Rural Development Programme for Mainland Finland 2014–2020. https://www.maaseutu.fi/globalassets/rural_fi/rural-program/rural_development_programme_2014-2020.pdf

Ministry of Environment (2014) Prioritised Action Framework (PAF) for Natura 2000 for the EU Multiannual Financing Period 2014-2020. Finland.

NEEMO LIFE team (2017) *Ex-Post Monitoring Mission report: LIFE03 NAT/FIN/000039 Gulf of Finland project*. NEEMO LIFE team, Confidential report.

Pakanen, V-M, Aikio, S, Luukkonen, A and Koivula, K (2016) Grazed wet meadows are sink habitats for the southern dunlin (*Calidris alpina schinzii*) due to nest trampling by cattle. *Ecology and Evolution* No 6 (20), 7176-7187.

Pakanen, V-M, Luukkonen, A and Koivula, K (2011) Nest predation and trampling as management risks in grazed coastal meadows. *Biodiversity and Conservation* No 20 (9), 2057-2073.

Raatikainen, Katja (2018) conservation biologist at Metsähallitus Parks & Wildlife Finland, personal communication 12 January and 26 February 2018

Rannap, R, Briggs, L, Lotman, K, Lepik, I and Rannap, V (2004) *Coastal Meadow Management - Best Practice Guidelines*. The experiences of LIFE-Nature project "Boreal Baltic Coastal Meadow Preservation in Estonia" LIFE00NAT/EE/7083, Ministry of the Environment of the Republic of Estonia, Talinn.

Savonen, K (2007) *Management of Urban Natura 2000 Areas in SW Finland. Life Nature Project LIFE02NAT/FIN/8468 2002-2006. Final Report (Laymans Report)*. Environmental Protection Office, Turku, Finland.

Schulman, Anna (2018) Ministry of Agriculture and Forestry, personal communication 25 January 2018.

Strandberg, Camilla (2018) NEEMO LIFE projects evaluation team, personal communication 13 March 2018.

Strandmark, A, Bring, A, Cousins, S A O, Destouni, G, Kautsky, H, Kolb, G, de la Torre-Castro, M and Hambäck, P A (2015) Climate change effects on the Baltic Sea borderland between land and sea. *Ambio* No 44 (Suppl 1), 28-38.

Svendsen, L.M., Pyhälä, M., Gustafsson, B., Sonesten, L. Knuuttila, S. (2015) Inputs of nitrogen and phosphorus to the Baltic Sea. HELCOM core indicator report. Online. Viewed 14 December 2017, at http://helcom.fi/baltic-sea-trends/indicators/inputs-of-nitrogen-and-phosphorus-to-the-basins

Tiainen, J, Mikkola-Roos, M, Below, A, Jukarainen, A, Lehikoinen, A, Lehtiniemi, T, Pessa, J, Rajasärkkä, A, Rintala, J, Sirkiä, P and Valkama, J (2016) *Suomen lintujen uhanalaisuus 2015 - The 2015 Red List of Finnish Bird Species*. YMPÄRISTÖMINISTERIÖ • SUOMEN YMPÄR I STÖKESKUS (Ministry Of The Environment • Finnish Environment Institute), Helsinki.

Ymparisto (2014) *Fifth National Report to the Convention on Biological Diversity: Finland*. Minstry of the Environment, Finland.

Ympäristöministeriö (2011) Toimintasuunnitelma uhanalaisten luontotyyppien tilan parantamiseksi. Suomen Ympäristö 15 | 2011. Ympäristöministeriö, Helsinki. Available at https://helda.helsinki.fi/bitstream/handle/10138/37027/SY15_2011_Toimintasuunnitelma_uhanalaisten_luontotyyppien_tilan_parantamiseksi.pdf?sequence=1

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Annex 1. Status of boreal Baltic coastal meadows at Member State and biogeographic levels

Favourable	FV	Unknown	XX	Unfavourable - inadequate	U1	Unfavourable - bad	U2

Qualifier (+) improving (-) deteriorating (=) stable (x) unknown (n/a) not reported

	2001-06	2007-12				
	Overall	**Range**	**Area**	**Structure**	**Future**	**Overall**
EE (BOR)	U1 (-)	FV	FV	U1	U1	U1 (=)
FI (BOR)	U2	FV	U1	U2	U1	U2 (+)
SE (BOR)	U2	FV	U2	U1	U2	U2 (=)
LV (BOR)	U2 (+)	FV	U2	U2	U2	U2 (-)
EU overall (BOR)	U2	FV	U2	U2	U1	U2 (+)
SE (CON)	U2	FV	U2	U1	U2	U2 (=)
EU overall (CON)	U2	FV	U2	U1	U2	U2 (=)

Source: Member State Article 17 reports as compiled by ETC-BD on EIONET https://bd.eionet.europa.eu/article17/reports2012/

Annex 2. LIFE Nature Projects in Finland that aimed to help conserve boreal Baltic coastal meadows

Project Title	Project N°	MS	Type of Beneficiary	Time period
Light & FIre LIFE	LIFE13 NAT/FI/000099	FI	National Authority	2014 - ongoing
Kokemäenjoki-LIFE	LIFE06 NAT/FIN/000129	FI	National Authority	2006-2012
Anser-Eur - Conservation of *Anser erythropus* on European migration route	LIFE05 NAT/FIN/000105	FI	NGO-Foundation	2005-2009
Management of wetlands along the Gulf of Finland migratory flyway	LIFE03 NAT/FIN/000039	FI	Regional Authority	2003-2007
Management of Urban Natura 2000 areas in SW Finland	LIFE02 NAT/FIN/008468	FI	Local Authority	2002-2006
Meadow restoration (WWF-Fin)	LIFE00 NAT/FIN/007067	FI	NGO-Foundation	2001-2004

Source: Life Programme database, projects with *Baltic coastal meadows* listed as a key word and with significant area of habitat targeted