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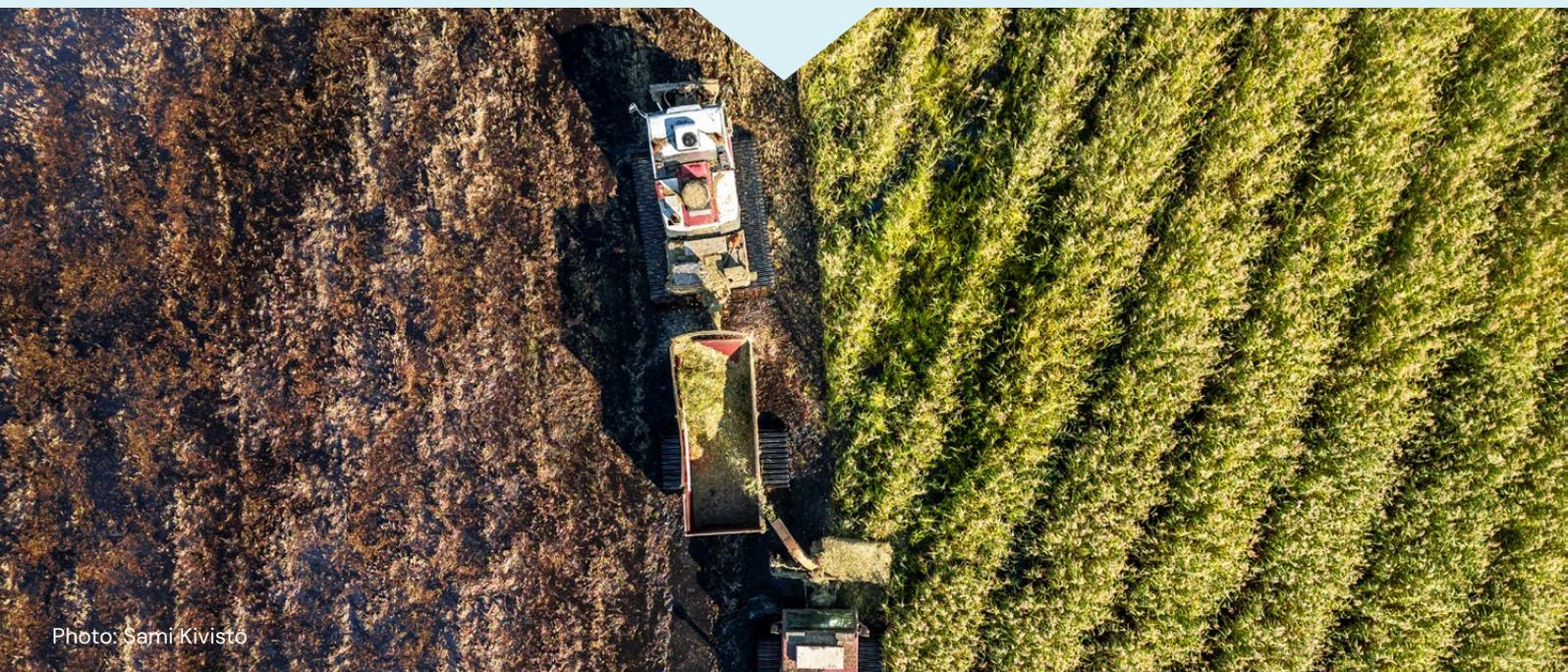
BalticReed

ECOLOGICAL GUIDELINES FOR SUSTAINABLE REED HARVESTING



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1. INTRODUCTION

The common reed (*Phragmites australis*), later referred to as reed, is a tall grass that grows along the shores of lakes, rivers, and the Baltic Sea. In shallow, nutrient-rich waters it often forms large, dense reed beds. Reed has an important role in the ecosystem and reed beds serve as a vital habitat for many species (Below & Mikkola-Roos, 2007; Degerman, Axelsson & Hermansson, 2022). Reed beds also bind carbon, absorb nutrients flowing from land and prevent erosion (Graneli, 1992; Karstens, 2015). On the other hand, reed spreads easily to large areas shading out other plants (Roosaluste, 2007), homogenizes habitats, and in addition, decomposing reed biomass can cause various problems, such as methane emissions (Myllyviita & Mattila, 2019).

Reed is often mowed or harvested for ecological reasons, such as coastal management, restoration of bird habitats or nutrient removal. Also, reed can be harvested for the collection of a versatile biomaterial to be used in for instance thatching, as growing media or as straws (Čížková, Kučera, Poulin & Květ, 2023; Myllyviita, Mattila & Leskinen, 2015; Valkama, Lyytinen & Koricheva, 2008; Köbbing, Thevs & Zerbe, 2013).

Before starting reed mowing or harvesting, it is essential to clearly define the main objectives for the harvest. These may include controlling reed growth, restoring or managing habitats, removing nutrients, and utilizing the reed biomass. Optimally, a single project can serve several of these purposes simultaneously (Cahill & Clauder, 2013).

Clear objectives guide the key planning decisions: whether mowing a site is sensible, where and when it

should take place, how it will be carried out, and how the harvested biomass will be used. Well-defined goals also support the best ecological outcomes. Reed can be cut either in summer or winter, and the chosen season significantly affects the ecological impacts (Čížková et al, 2023). Planning should also consider the location of the work—whether it takes place on land, alluvial land, or in water.

Harvesting should generally be preferred over mowing, as it ensures that nutrients are removed from the cutting site, allows the biomass to be utilized, and prevents problems caused by decomposing plant material—such as methane emissions and soil surface elevation. Collecting the reed material near ditch mouths is especially important to prevent blockages and maintain proper water flow. Cutting reed in such



Photo: Maria Gustavsson

places should in general be avoided, as reed efficiently takes up nutrient loads coming from e.g. fields (Huhta, 2009).

In these guidelines, mowing refers to cutting and crushing the reed without collecting it, while harvesting means cutting, collecting, and utilizing the reed. For simplicity, the term cutting is used throughout to describe reed cutting in general, whether the material is collected or not..

These recommendations are intended especially for those planning the cutting of common reed, such as municipalities, authorities, associations, companies and other stakeholders wishing to understand the impacts of reed cutting.

The approach is practical and aims to provide a clear overview of the factors that ensure the ecological sustainability of reed cutting, considering both the positive and negative effects of reedbeds. However, as each cutting site is different, and the impacts are diverse, it is not possible to provide fully universal guidelines, but each site should be planned individually.

These guidelines have been formulated 19.12.2025 as part of the BalticReed project and they are part of a broader set of interconnected reports, which together provide a more complete understanding of reed harvesting and its implementation. The other reports are:

- Reed Value Chains – A report produced by the BalticReed project group
- Guide to Reed Harvesting – Permits, Notifications and Assessments
- Monitoring of coastal bays following reed harvesting in Interreg BalticReed
- Ohjeita ruokologistiikkaketjun suunnitteluun (only in Finnish and Swedish)



Photo: Maija Salmiovirta



2. ENHANCING BIODIVERSITY

Reed beds are valuable habitats in coastal areas providing food, shelter and breeding grounds for many species. Cutting practices can often influence the biodiversity in these areas either by improving ecosystem health or by disrupting sensitive life cycles. To avoid negative impacts on biodiversity it is important to consider when, where and how the cutting will be done and whether it should be done at all.

Biodiversity in reed beds is often highly dependent on a mosaic-like structure rather than a uniform reed stand (Trnka, Peterková, Prokop & Batary, 2014; Andersen et al, 2020). Mosaic-like reed structures can include open shorelines, uncut reed beds, and selectively cut areas with uncut patches or buffer zones – such as reed borders or blue zones. The different reed structures within a mosaic-like reed bed, each serve their own purpose and support various species (Tscharntke, 1992). Planning such structures requires aligning the reed cutting strategy with the specific goals and conditions of the site to achieve the best ecological outcomes (Huolman & Priha, 2007).

The uncut areas reduce erosion, limit nutrient run-off and provide nesting and foraging areas for birds as well as shelter and feeding grounds for amphibians and invertebrates (Below & Mikkola-Roos, 2007; Andersen et al, 2021). Especially the reed fringe facing the water hosts a large species richness and should be managed carefully while harvesting.

Many bird species are highly dependent on dense reed stands for nesting, cover and foraging (Valkama et al, 2008; Degerman et al, 2022). Careful planning of reed-cutting activities—both in terms of timing and location—is therefore essential. Reed harvesting should never be carried out during the nesting season. Instead, harvesting must take place outside the breeding period, which in Finland and Sweden typically starts in early April and continues until mid-July or early August, although this varies by species and site.

It is also important to account for the specific nesting requirements of reed-breeding birds, as several species prefer particular reed characteristics for nesting or

feeding. This means that designated cutting zones must be planned with breeding birds in mind. For example, many reed-nesting species rely on older reed stands, and in some cases, a mosaic of older reed with edges toward open water is particularly favorable (Malzer & Helm, 2015; Gilbert, Tyler, Dunn ja Smith, 2005). In addition, reed beds can function as important resting and feeding sites during bird migration, which should also be taken into consideration (Lehikoinen, Lehikoinen, Mikkola-Roos & Jaatinen, 2017). Similarly, amphibians and invertebrates such as dragonflies use reed for food and shelter, further emphasising the importance of leaving safe animal refuges (Degerman et al, 2022).

It is important to get local knowledge about the species residing in the area where cutting is planned. Information about the site-specific bird nesting periods and invertebrate species can be inquired from the local environmental authority. Local birders and bird associations can also be a good source of information on the sighted birds in the area (BirdLife Sweden, 2025).

Reed cutting can also function as a tool for ecological restoration. If carefully planned and integrated with other measures, cutting will strengthen ecological resilience and support long-term landscape sustainability (Javanainen, Kemppainen, Orjala, Perkonjoja & Saarni, 2013).

Reopening shorelines through reed cutting is essential in restoring coastal meadows and habitats for breeding and migratory wader birds. For wader birds, a completely open shoreline is ideal, as it provides unobstructed visibility, safe nesting grounds, and easy access to foraging areas (Below & Mikkola-Roos, 2007; Alexandersson, Ekstam & Forshed, 1986).

Well planned reed cutting can also benefit the aquatic biodiversity. When dense reed stands are thinned and harvested, light penetration increases, and submerged vegetation can re-establish. These areas create important spawning and nursery grounds for predatory fish such as pike and perch, offering both food and protection for young individuals (Niemi et al, 2023).

SELECTIVE CUTTING METHODS

When planning reed harvesting and choosing a method to enhance biodiversity, several factors affect which method is most suitable. Each listed method can cause negative effects such as nutrient leakage and the breakdown of the reed bed, which lead to carbon dioxide emissions and further nutrient release. A lot of research is ongoing in this area. To find out which method is best for your site, we recommend contacting your local municipality, County Administrative Board, ELY Centre, or similar authority for advice on how to best support the local environment.

Different selective cutting methods serve distinct ecological purposes:

Blue zones

Blue zones are the shallow water between land and a dense reed belt. It features open water and provides important habitats for fish fry, invertebrates, and birds. It can form naturally due to grazing or be maintained through reed clearing. Blue zones help support biodiversity and ecosystem function.



Picture 1. Blue zones.

Reed borders

Leaving a strip of uncut reed at the outer edge of the reed belt, facing open water, creates a reed border that acts as a protective buffer. The border reduces shoreline erosion by breaking incoming waves and stabilizing sediments. It could also help to filter particles and nutrients from surface runoff, improving water quality. In addition, the outer reed zone provides habitats for fish fry, invertebrates, and birds. Reed borders help protecting the shoreline and support ecological functions.



Picture 2. Reed borders.

Reed patches

Reed patches are areas of uncut or intact reed that are deliberately left standing within or around harvested zones. These patches function as important ecological refuges, offering shelter, feeding areas, and breeding grounds for a wide range of species. By maintaining structural variation within the reed belt, reed patches help preserve habitat diversity, support local wildlife populations, and strengthen the ecological resilience of the area.

Together, these methods support biodiversity, improve water quality, and contribute to the ecological resilience of coastal environments.



Picture 3. Reed patches.

When conducting the actual cutting, it should be carried out in a manner that allows the birds and other animals to leave the cutting area safely (e.g. by starting in the middle of the mowing area or leaving a passage through which the animals can move). Local environmental authorities can guide with the process of evaluating the biodiversity needs of the cutting site

and inform if additional nature surveys of the habitats and species are needed in the area. This will ensure sustainable reed harvesting becomes not only a tool for reducing nutrient loading but also a means of enhancing biodiversity, restoring habitats, and strengthening the resilience of ecosystems.

EXAMPLE OF PLANNING TOOLS FOR COASTAL MANAGEMENT

Long-term management planning ensures ecologically balanced and sustainable habitat management.

In Finland, broad-scale regional coastal multipurpose plans have been prepared for some coastal areas. The coastal multipurpose plans are not legally binding and are intended to be used as planning tools. The plans are prepared by the environmental authorities in collaboration with landowners and other stakeholders and help identify, which areas are suitable for different activities such as recreation, nature conservation, reed harvesting etc. Regional needs, landowners' opinions and the well-being and sustainability of the area on a larger scale is taken into consideration in preparation of the plans. They help to assign which areas that should be cut, left untouched, or managed through other methods such as grazing.

While some regional multipurpose plans already exist (Kemppainen, 2014), their overall development is still in its early stages. Expanding these efforts would be very beneficial for sustainable coastal management. A guide on coastal multipurpose planning (Klemola, Härjämäki & Pihlaja, 2013) has been published to support this approach and can be used as a basis for creating regional coastal management plans.

In Sweden and Finland there may be local management plans prepared for your harvesting area. Check with your municipality, county administration board or local water council to get more information.



Photo: Suvi Pörhölä

Picture 4. Coastal multipurpose plans are always prepared together with landowners and other stakeholders.



3. PROTECTED NATURE AREAS, HABITATS AND STRICTLY PROTECTED SPECIES

Certain areas, habitats, and species are protected under EU directives and national legislation (Directive 2009/147; Directive 92/43; Sundseth, 2015; European Commission; European Environment Agency; Ministry of the Environment; Naturvårdsverket). It is the responsibility of the project implementer to investigate the conservation status of the site and identify any protected habitats or species present. This may require arranging a nature survey or consulting an expert for the assessments.

Before starting the project, the implementer should contact the relevant environmental authority—such as the Finnish Supervisory Agency, the Government of Åland, or County Administrative Boards in Sweden—for guidance on necessary steps.

If the site is protected or contains protected habitats or species, the environmental authority will assess whether reed mowing or harvesting is permitted under the establishment or management plan or if the project harms the protected species or habitat. This assessment will determine whether further surveys or permits are needed, and how/if the harvesting can be carried out (Graph 1). The conservation status may affect both the timing and the methods used in the project.

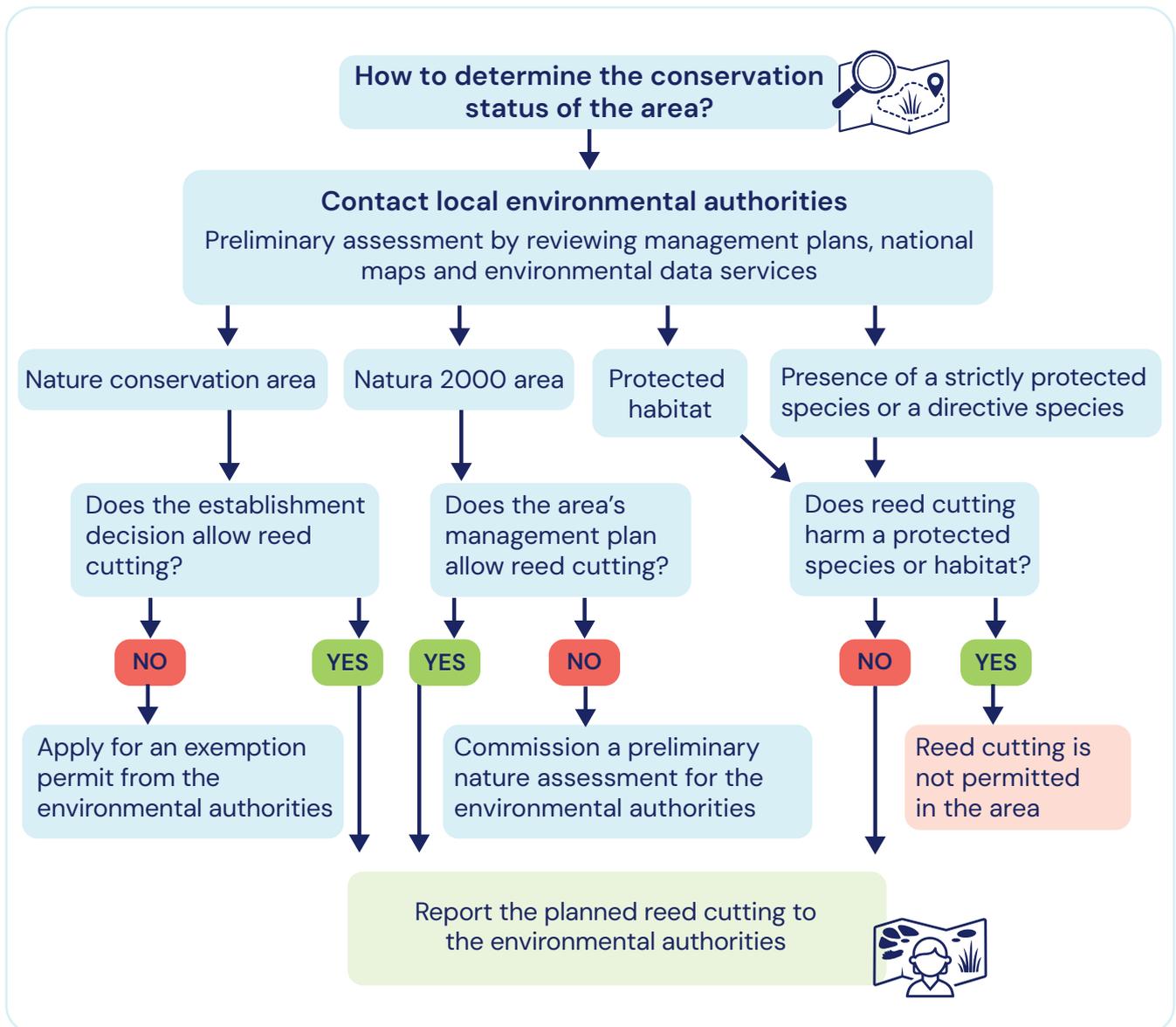
The presence of a protected habitat or species does not automatically prohibit reed cutting. In some cases, it may even support conservation goals. For example, for boreal Baltic coastal meadows that are protected under the EU Habitats Directive, reed cutting is a key restoration and management tool (Underwood).



Photo: Pasi Jakkula

Picture 5. Marsh harrier, photo Pasi Jakkula

Graph 1: Identifying the possible conservation statuses and the required steps, surveys and permits.



Well-planned reed cutting can also benefit reed-dependent species. The bittern (*Botaurus stellaris*) and reed warblers, for instance, rely on reed beds for nesting, while the Reed Bunting (*Emberiza schoeniclus*) prefers mosaic-like reed structures created by selective cutting of reed (Below & Mikkola-Roos, 2007). In Finland, bittern populations have been supported by habitat management projects that include reed mowing and harvesting, particularly within Natura 2000 areas (White, Purps & Alsbury, 2006). Similar approaches have also been implemented in Sweden, where reed cutting is used to improve habitat conditions for the species in Natura 2000 sites and other key wetland areas.

Strictly protected species are listed in Annex I of the Birds Directive (Directive 2009/147) and Annex IV of the EU Habitats Directive (Directive 92/43). The Birds Directive also states that, Member States must preserve, maintain and re-establish bird habitats for all wild bird species to ensure a sufficient diversity and area of habitats.



Photos: Pasi Jakkula

Pictures 6 and 7. Reed bunting and bearded tit.

Here are some examples of species that may restrict reed cutting:

- **Moor frog** (*Rana arvalis*): In moor frog habitats, any mechanical cutting of reeds in the water or on the shore should be carried out in the winter (on ice) from November to March.
- **Bird species:** Several bird species such as Western Marsh Harrier (*Circus aeruginosus*), Eurasian Bittern (*Botaurus stellaris*), Bearded Reedling (*Panurus biarmicus*), reed bunting (*Emberiza schoeniclus*), and Great Reed Warbler (*Acrocephalus arundinaceus*) are dependent on reed habitats for nesting. Reed cutting should be carefully planned and should be scheduled outside of the nesting season.
- Some insects depend on reed both above and below water. For example, the Meriuposkuoriainen beetle (*Macrolea pubipennis*) is sensitive to mechanical disturbance and habitat loss caused by reed cutting. The only observations of the species in Europe are from the Finnish coast of the Baltic Sea. (HELCOM, 2013)

The responsibility for investigating the conservation background of an area and identifying any protected habitats or species lies with the project implementer. In practice this means that the implementer is responsible for:

- Consultation with environmental authorities or with experts for assessments.
- Arranging the necessary surveys or expert assessments before starting the project.
- Applying for the necessary environmental permits.



4. NUTRIENTS

Reed plays an important role in maintaining the health of aquatic ecosystems by acting as a natural nutrient filter. Through the roots, reed absorbs nutrients from the sediment. Today, changes in farming and forestry practices have led to an excess of nutrients leaching from the land into our water bodies, resulting in an observed increase in reed growth. By capturing and storing nutrients in its above- and below ground biomass, reed helps to improve water quality and reduce the risk of overfertilization in lakes and coastal areas (Köbbing, 2013; Huhta, 2007).

Cutting affects the nutrient flows in the area. During summer, most nutrients are bound within the growing plant, while in autumn they are transferred to the roots system for storage and used for regrowth the next season. Harvesting in mid- to late summer removes more nutrients, as they are still present in the above-ground biomass (Hansson & Fredrissón, 2004). Scheduling harvesting to this period is recommended if the aim of the harvest is to remove nutrients. However, repeated harvesting this time of year may weaken reed regrowth, especially when done before the nutrients have returned to the root system (Asaeda, Rajapakse, Manatunge & Sahara, 2006). In contrast, while winter

harvesting removes less nutrients, as they have already been transferred to the roots, it may actually enhance the regrowth (Buttler, 1992; Huhta, 2009) and is preferable if the aim is to maintain reed viability and encourage reed growth. Winter harvesting when the ground is frozen is also gentler for the sediment and thus better in that regard.

Harvested reed must be transported away from the water and shore without delays to prevent nutrient inflow to the water from the decaying biomass. (Huhta, 2009) If temporary storage is required, deposition of the harvested reed mass should be located sufficiently far from the waterbody and timed during dry periods, when the ground can carry the weight and the risk of nutrient runoff is minimized. It is also essential to avoid depositing reed in ecologically sensitive areas and to consider the visual impact, especially along shores used for recreation. Leaving reed in the water should be avoided as it can create shaded zones where light penetration is decreased and underwater environments may be disturbed.



Picture 8. Mown reed left in the water can create shaded zones which have negative impacts on the underwater environments.



Picture 9. If temporary storage is required, the reed should be located far away from the waterbody.

Since sediments and reed root systems store large amounts of nutrients, it is important to consider how cutting affects them. Mowing or harvesting equipment should be carefully chosen and adapted to each site to minimize disturbance of the ground or coastal sediments, which could release nutrients. It is also crucial to avoid damaging the reed roots.

Special care should be taken when harvesting in water. In reed, nutrients are transported from the roots to the stalks in spring and early summer, and from the stalks

to the roots in autumn. Cutting reed below the water surface during the spring transportation phase interrupts this mechanism, potentially causing nutrients to leak into the water. Harvesting above water between the translocation phases (mid-late summer) (Hansson & Fredriksson, 2004) removes more nutrients from the system and should not be considered as a risk (Huhta, 2009). To minimize the risk of nutrient release into the aquatic system, cutting below the water should therefore be avoided especially when the plants are actively transporting and storing nutrients.

REED AS A PLAYER IN CARBON CYCLE

A lot of research is being conducted regarding coastal ecosystems and carbon dynamics and the results are still ambiguous. Reed contains substantial amounts of carbon: the carbon content of fresh reed sprouts ranges from 44–47% of dry matter, depending on habitat conditions (Eller, Guo, Ye, Mozdzer & Brix, 2021). In addition to the above-ground parts of the plant, carbon is also stored in the below-ground parts (the root system). Their relative contributions to total carbon storage depend on factors such as stem density, dry bulk density, the presence of competing species, water level, and salinity. (Williamson, Jilbert, Norkko & Gustafsson, 2025) Carbon sequestration in reed increases sharply during the growing season, particularly in the stems and leaves. In contrast, below-ground sequestration is negative during the growing season and increases only after the season has ended (Wang et al, 2022).

Information on harvesting and mowing equipment can be found from the BalticReed Logistical guide.



Photo: Eeva Tähtikarhu

Picture 10. Using reed as a construction material binds the carbon in reed for a long time.



5. REED PREVENTS EROSION

Erosion-prone seabeds in shallow waters are sensitive areas as the sediment can easily be disturbed and washed away. Protecting these bottoms is important because they play a key role in supporting aquatic ecosystems, preventing coastal erosion, and maintaining water quality. Disturbance of these areas can lead to habitat loss for fish and invertebrates, increased turbidity, and the release of nutrients that may contribute to algal blooms. (Boverkett; Lind, 2023).

Reeds are vital for shoreline protection. Their dense root systems bind the soil and stabilize the sediment, reducing erosion caused by waves, currents, and ice movement. The above-ground parts of the reed bed also act as a physical barrier, dampening wave energy and slowing water movement near the shore. This helps to prevent the shoreline from being worn away and provides a buffer zone that protects inland areas from flooding and storm surges (Lind, 2023).

When planning reed cutting, selective cutting techniques, such as cutting in a mosaic pattern or leaving a reed barrier, should be prioritised, as this provides shelter for wildlife and helps to anchor the soil. Timing is also crucial: cutting should be avoided during high water levels or rough weather, when the risk of stirring up sediment is greater. (Ajosenpää, 2014)

Educating machine operators about environmental sensitivity and mapping out erosion-prone zones in advance are also key strategies for shoreline protection. Collaborating with ecologists or conservation experts ensures that harvesting activities are planned with nature conservation in mind, helping to preserve both the habitat and the water quality.

When cutting reed, it is especially important to use gentle methods in erosion-prone areas such as soft shores and shallow bottoms. Heavy machinery with high surface pressure or aggressive cutting can compact the soil, damage the root system, accelerate erosion, and harm the surrounding environment. Using careful, low-impact techniques helps preserve the structure and function of these sensitive habitats. Cutting the reeds higher—rather than close to the ground—helps protect the root systems and reduces disturbance to the sediment.

To minimize the impact on the sea bottoms during water reed harvesting, several careful methods can be applied. One effective approach is to use floating equipment or harvest from boats, which avoids direct contact with the soft sediment. Harvesting during winter, when the ice is thick enough, is another gentle method that allows access without disturbing the seabed.

Permanently inhibiting reed growth in estuaries with frequently recurring harvesting should be avoided, as the reeds trap solids and nutrients carried by rivers.

More information about harvesting equipment and logistical planning in *Ohjeita ruokologistiikkaketjun suunnitteluun*. Information on possible uses for reed biomass (practical and commercial) can be found in the *Reed Value Chains – A report produced by the BalticReed project group*.



6. PERMITS AND NOTIFICATION

Before initiating reed cutting, it is essential to assess whether it is the most environmentally appropriate measure for the area. The need for cutting reed can be highly location-specific, so it is important to check whether there are any prevailing restrictions in the area that limit or prohibit reed mowing or harvesting (See Chapter 3).

The first step is to contact your local environmental authority:

- Finland: the Finnish Supervisory Agency
- Sweden: Länsstyrelsen
- Åland: Ålands Landskapsregering
- and/or your municipality.

They can provide advice on environmental and conservation considerations and inform you of any required permits or additional assessments, and help plan the timing, harvesting methods, storage and handling of reed biomass to minimize the negative environmental impact and to maximise the positive. This is especially important if the site is protected, has cultural or historical values or contains endangered habitats or species. For larger mechanically harvested reed projects, it is especially important to check whether an environmental permit or notification to the authorities is required for depositing and storing the harvested reed.

Landowner and/or water area owner consent is required in all areas, before cutting can begin, and it is recommended to obtain it in writing. Consent is also required for deposition of harvested reed material. In protected areas deposition of reed mass might be restricted or prohibited altogether.

Several useful tools and resources are available to support the planning of reed mowing and harvesting. Regionally, there may be management plans available that also cover reed cutting and provide practical guidance, such as the local measurement plans in Sweden and coastal multi-purpose management plans in Finland. These integrate objectives related to nature conservation, recreational use, and landscape management.

There are some country specific regulation in Sweden, Finland and Åland that need to be taken into consideration depending on the country where the cutting takes place:

- **In Finland**, when harvesting mechanically in water areas, a harvesting and dredging notification must be submitted online at least 30 days before the planned activity. In other areas such a notification is not needed. If the site is a protected landscape or a nationally significant built cultural environment, additional notifications or permits may be required. Your local authority will guide you through the necessary procedures. Water areas in this context are defined as areas lying below the actual average water level.
- **In Sweden**, contacting the local environmental authority is typically sufficient to determine whether a permit is required. For larger harvesting areas, a 12:6 permit is needed from the relevant County Administrative Board (Länsstyrelsen). Since assessments may differ between regional authorities, it is always best to contact your County Administrative Board before starting reed harvesting to confirm the applicable regulations in your area.
- **In Åland** official permits for reed harvesting are not required, however a landowner consent is always needed.

In addition, various guides, websites and materials provide useful information on reed harvesting methods and best practices.

Useful information on reed harvesting and permits:

- [Reed up on reed](#)
- [Ruokoinfo website](#)
- Guide to Reed Harvesting – Permits, Notifications and Assessments

REFERENCES

- Ajosenpää, T. (2014). Suunnittelulla ja ruo'on hyötykäytöllä tehokkuutta rantojen hoitoon. Tuloksia ja kokemuksia VELHO-hankkeesta. *Varsinais-Suomen ELY-keskuksen raportteja* 55/2014→
- Alexandersson, H., Ekstam, U. and Forshed, N. (1986). Stränder vid fågelsjöar. Skötsel av naturtyper. LT/Naturvårdsverket.
- Andersen, L. H., Nummi, P., Bahrndorff, S., Pertoldi, C., Trøjelsgaard, K., Lauridsen, T. L., Rafn, J., Fredriksen, C. M. S., Kristjansen, M. P. and Bruhn, D. (2020). Reed bed vegetation structure and plant species diversity depend on management type and the time period since last management. *Applied Vegetation Science* 24 (1), 1–10. <https://doi.org/10.1111/avsc.12531>→
- Andersen, L. H., Nummi, P., Rafn, J., Frederiksen, C. M. S., Kristjansen, M. P., Lauridsen, T. L., Trojelsgaard, K., Pertoldi, C., Bruhn, D. and Bahrndorff, S. (2021). Can reed harvest be used as a management strategy for improving invertebrate biomass and biodiversity? *Journal of Environmental management* 300, 113637. <https://doi.org/10.1016/j.jenvman.2021.113637>→
- Asaeda, T. R., Rajapakse, L., Manatunge, J. and Sahara, N. (2006). The effect of summer harvesting of *Phragmites australis* on growth characteristics and rhizome resource storage. *Hydrobiologia* 553 (1), 327–335.
- Below, A. and Mikkola-Roos, M. (2007). Part III. Reed bed birds. Part of: I. Ikonen and E. Hagelberg (ed.) Reed up on Reed. Turku: Southwest Finland Regional Environment Centre, 40–45. <https://urn.fi/URN:ISBN:978-952-11-2781-6>→
- BirdLife Sweden (2025). *Program för fågelskydd och naturvård*→
- Boverket (nd). Kusterosion – PBL kunskapsbanken. Website. Reference 7.1.2026. https://www.boverket.se/sv/PBL-kunskapsbanken/detaljplan/lansstyrelsens-tillsyn/tillsynsvagledning_naturoluckykor/sakerhetsfragor/kusterosion/→
- Buttler, A. (1992). Permanent plot research in wet meadows and cutting experiment. *Vegetatio* 103, 113–124.
- Cahill, B. and Clauder, J. (2013). New Uses of Marine Resources in the Baltic Sea Region: General Environmental Assessment. SUBMARINER Report 4. <http://publications.submariner-project.eu>→
- Čížková, H. K., Kučera, T., Poulin, B. and Květ, J. (2023). Ecological Basis of Ecosystem Services and Management of Wetlands Dominated by Common Reed (*Phragmites australis*). European Perspective. *Diversity* 15 (5), 629. <https://doi.org/10.3390/d15050629>→
- Degerman, E., Axelsson, R. and Hermansson, R. (2023). Bladvassar – en unik våtmarksmiljö i förändring – Orsaker, konsekvenser och nödvändiga åtgärder. Länsstyrelsens rapportserie. Rapportti 2022:16.
- Directive 2009/147. Directive 2009/147 of the European Parliament and of the Council (EC) of 30 November 2009 on the conservation of wild birds. Reference 1.12.2025. <https://eur-lex.europa.eu/eli/dir/2009/147/oj>→
- Directive 92/43. Council Directive (EEC) 92/43 of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Annex IV. Reference 1.12.2025. <https://eur-lex.europa.eu/legal-content/FI/TXT/HTML/?uri=CELEX:31992L0043>→
- Eller, F. G., Guo, X., Ye, S., Mozdzer, T.J. and Brix, H. (2021). Suitability of wild *Phragmites australis* as a bio-resource: Tissue quality and morphology of populations from three continents. *Journal of Ecology* 128 (3), 1234–1250.
- European Commission, (nd). The Habitats Directive. Website. Reference 3.12.2025. https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive_en→
- European Environment Agency, (nd). Annex IV: animal and plant species of community interest in need of strict protection. Website. Reference 3.12.2025. <https://eunis.eea.europa.eu/references/2326/species>→
- Gilbert, G. G., Tyler, G. A., Dunn, C. J. and Smith, K. W. (2005). Nesting Habitat Selection by Bitterns *Botaurus stellaris* in Britain and the Implications for Wetland Management. *Biological Conservation* 124(4), 547–553.
- Graneli, W., Weisner, S. and Sytsma, M. (1992). Rhizome dynamics and resources storage in *P.australis*. *Wetlands Ecology and Management* 1 (4), 239–247.
- Hansson, P. and Fredriksson, H. (2004). Use of summer harvested common reed (*Phragmites australis*) as nutrient source for organic crop production in Sweden. *Agriculture, Ecosystems and Environment* 102 (3), 365–375.
- HELCOM (2013). "Macrolea pubipennis." HELCOM Red List of Baltic Sea Species in Danger of Becoming Extinct. Viitattu 1.12.2025. <https://helcom.fi/wp-content/uploads/2019/08/HELCOM-Red-List-Macrolea-pubipennis.pdf>→
- Huhta, A. (2009). Decorative or Outrageous – The significance of the Common Reed (*Phragmites australis*) on water quality (2009). Turun Ammattikorkeakoulu. Comments 48. <https://urn.fi/URN:ISBN:978-952-216-086-7>→
- Huhta, A. (2007). Part II. To cut or not to cut? The relationship between Common Reed, mowing and water quality. Part of: I. Ikonen and E. Hagelberg (ed.) Reed up on Reed. Turku: Southwest Finland Regional Environment Centre, 30–38. <https://urn.fi/URN:ISBN:978-952-11-2781-6>→
- Huolman, I. and Priha, M. (2007). Part III. Back to the meadow – Restoration of coastal meadows. Part of: I. Ikonen and E. Hagelberg (ed.) Reed up on Reed. Turku: Southwest Finland Regional Environment Centre, 46–53. <https://urn.fi/URN:ISBN:978-952-11-2781-6>→

- Javanainen, K., Kemppainen, R., Orjala, M., Perkonoja, M. and Saarni, K. (2013). Liv i vassen – glittrande vatten. Anvisningar om strandskötsel. Närings-, trafik- och miljöcentralen i Egentliga Finland. Guide 7/2013. <https://www.doria.fi/handle/10024/93186>→
- Karstens, S., Schwark, F., Forster, S., Glatzel, S. and Buczko, U. (2015). Sediment tracer tests to explore patterns of sediment transport in coastal reed beds – a case study from Darss-Zingst Bodden Chain. *Rostocker Meeresbiologische Beiträge* 25, 41–57.
- Kemppainen, R. (2014). Oukkulanlahden – Naantalinaukon ranta-alueiden monikäyttösuunnitelma. Elinkeino-, liikenne- ja ympäristökeskus raportteja. https://www.doria.fi/bitstream/handle/10024/94399/Raportteja_9_2014.pdf→
- Klemola, H. H., Härjämäki, K. and Paihlaja, K. (2013). Opas ranta-alueiden monikäyttösuunnitteluun. [Maaseutuverkoston esite](#)→
- Köbbing, J. F., Thevs, N. and Zerbe, S. (2013). The utilisation of reed (*Phragmites australis*): a review. *Mires and Peat* 13 (14), 1–14.
- Lehikoinen, P., Lehikoinen, A., Mikkola-Roos, M. and Jaatinen, K. (2017). Counteracting wetland overgrowth increases breeding and staging bird abundances. *Scientific Reports* 7, 41391. <https://doi.org/10.1038/srep41391>→
- Lind, M. (2023). Vägledning – implementering av naturbaserade åtgärder för att minska negativa effekter av erosion längs kusten. [Project report](#)→
- Malzer, I. and Helm, B. (2015). The Seasonal Dynamics of Artificial Nest Predation Rates along Edges in a Mosaic Managed Reedbed. *PLOS ONE* 10 (10), e0140247. <https://doi.org/10.1371/journal.pone.0140247>→
- Ministry of the Environment, nd. Lajien ja luontotyyppien suojelu. Website. Reference 1.12.2025. <https://ym.fi/lajien-ja-luontotyyppien-suojelu>
- Myllyviita, T. and Mattila, T. (2019). Carbon footprint of reed harvesting. Projektiesittely. Suomen ympäristökeskus.
- Myllyviita, T., Mattila, T. and Leskinen, P. (2015). Järviruo'on niittäminen ja hyötykäyttö – Elinkaariarviointi ympäristövaikutuksista. [Suomen ympäristökeskuksen raportteja 27](#)→
- Naturvårdsverket, (nd). Arter och artskydd. Website. Reference 1.12.2025. <https://www.naturvardsverket.se/amnesomraden/arter-och-artskydd/>→
- Niemi, N., Hansen, J. P., Eklöf, J. S., Eriksson, B. K., Andersson, H. C., Bergström, U. and Östman, Ö. (2023). Influence of reed beds (*Phragmites australis*) and submerged vegetation on pike (*Esox lucius*). *Fisheries Research* 261, 106621. <https://doi.org/10.1016/j.fishres.2023.106621>→
- Roosaluste, E. (2007). Part I. The Reed itself. art of: I. Ikonen and E. Hagelberg (ed.) *Reed up on Reed*. Turku: Southwest Finland Regional Environment Centre, 8–10. <https://urn.fi/URN:ISBN:978-952-11-2781-6>→
- Sundseth, K. (2015). The EU birds and habitats directives. European Commission. Environment Directorate General. <https://op.europa.eu/en/publication-detail/-/publication/7230759d-f136-44ae-9715-1eacc26a11af>→
- Trnka, A. V., Peterková, V., Prokop, P. and Batary, P. (2014). Management of Reedbeds: Mosaic Reed Cutting Does Not Affect Prey Abundance and Nest Predation Rate of Reed Passerine Birds'. *Wetlands Ecology and Management* 22 (3), 227–234. <https://doi.org/10.1007/s11273-013-9325-3>→
- Tscharntke, T. (1992). Fragmentation of *Phragmites* habitats, minimum viable population size, habitat suitability, and local extinction of moths, midges, flies, aphids, and birds. *Conservation Biology* 6, 530–536.
- Underwood, E. (nd). Boreal Baltic Meadows (1630) – Finland. [https://circabc.europa.eu/sd/a/2e36adb4-0304-4d54-915f-c44deb435e15/FI%20-%20Boreal%20Baltic%20coastal%20meadows%20\(1630\)%20-%20Final.pdf](https://circabc.europa.eu/sd/a/2e36adb4-0304-4d54-915f-c44deb435e15/FI%20-%20Boreal%20Baltic%20coastal%20meadows%20(1630)%20-%20Final.pdf)→
- Valkama, E. S., Lyytinen, S. and Koricheva, J. (2008). 'The Impact of Reed Management on Wildlife: A Meta-Analytical Review of European Studies'. *Biological Conservation* 141 (2), 364 – 374.
- Wang, S., Li, S., Zheng, S., Gao, W., Zhang, Y., Cao, B., Cui, B and Shao, D. (2022). Estimating Biomass and Carbon Sequestration Capacity of *Phragmites australis* Using Remote Sensing and Growth Dynamics Modeling: A Case Study in Beijing Hanshiqiao Wetland Nature Reserve, China. *Sensors* 22 (9), 3141. <https://doi.org/10.3390/s22093141>→
- White, G., Purps, B. and Alsbury, S. (2006). The bittern in Europe: a guide to species and habitat management. The RSPB, Sandy. <https://www.heronconservation.org/media/resources/Bittern-in-Europe.pdf>→
- Williamson, M. J., Jilbert, T., Norkko, A. and Gustafsson, C. (2025). Carbon Storage in Coastal Reed Ecosystems. Preprint EGU sphere. <https://doi.org/10.5194/egusphere-2025-2368>→

APPENDIX: PRE-HARVEST CHECKLIST

REED HARVESTING CHECKLIST

1. DEFINE PURPOSE

- Define the main goal — e.g. ecosystem restoration, biomass use, nutrient removal.
- Clarify expected outcomes: nutrient removal, biodiversity gain, erosion control, material production, etc.

2. SITE CONSTRAINTS

- Obtain written consent from the landowner or water area owner before harvesting.
- Check whether the site is protected, such as a Nature Reserve, Natura 2000 area, or another designated conservation site.
- Review management or protection plans to understand what is permitted in the area.
- If the site contains protected habitats or species (birds, amphibians, invertebrates, or rare plants), contact the relevant environmental authority for guidance:
 - Sweden: County Administrative Board (Länsstyrelsen)
 - Finland: the Finnish Supervisory Agency
 - Åland: Åland Government (Landskapsregering)
- The authority will determine whether reed harvesting is allowed and if additional surveys or permits are required.
 - The presence of protected species or habitats does not automatically prohibit harvesting, but timing and method may be restricted.
- Country-specific rules:
 - Sweden: Larger areas usually require a 12:6 consultation or permit from the County Administrative Board.
 - Finland: A harvesting and dredging notification must be submitted to the ELY Centre at least 30 days before mechanical harvesting in water areas.
 - Åland: Harvesting is allowed with landowner consent, but local rules may apply.

3. NATURE, SPECIES & NUTRIENT REMOVAL

- Exclude key nesting zones of reed-dependent birds from harvesting, even in winter.
- Avoid bird nesting season — typically early April to mid-July, or early August in bird-rich areas.
- Check with local experts or authorities for site-specific timing (birds, amphibians, insects).
- Aim to create or maintain a “blue zones” — an open, shallow water zone between shore and reed stand that supports fish and wildlife.
- Leave uncut patches and buffer zones to maintain a mosaic-like structure that supports biodiversity and erosion control
- For maximal nutrient removal, harvest in mid-late summer, when nutrients are still in the stems.
- Do not cut below the water surface in spring — this can release nutrients into the water.
- When uncertain, request site-specific advice or a species assessment before harvesting begins.
- Avoid harvesting during high water levels or rough weather, when erosion risk is greatest..

4. METHOD & EQUIPMENT

- Choose equipment suited to site conditions and goals.
- Ensure operators are briefed on environmental restrictions and site sensitivities.
- On land or frozen ground:
 - Avoid heavy machinery on soft or erosion-prone bottoms.
 - Frozen ground is safest for sediments and roots; allows machinery use with minimal disturbance.
 - Winter harvesting on ice gives good access and supports reed regrowth.
- In water:
 - Requires extra care to avoid stirring soft sediment or releasing nutrients.
 - Do not cut below the water surface in spring, when nutrients move upward in the plant.
 - Use floating or light equipment to minimize bottom impact.
- Remove harvested reed immediately from the shore or water to a firm, dry ground well away from the shoreline to prevent nutrient leakage.
- Avoid storing reed in or near sensitive habitats or areas prone to runoff.

5. DOCUMENTATION

- Record GPS coordinates and take before-and-after photos of the harvesting area.
- Keep copies of all permits, notifications, and landowner agreements.
- Note the date, method, and area harvested for future monitoring and reporting.
- Contact the relevant environmental authority if follow-up reporting or verification is required.
- Store documentation so it can support long-term management planning and ecological evaluation.
- Contact the responsible environmental authority when needed (e.g., County Administrative Board, ELY Centre, ÅLR).

FINAL CHECK

- Purpose and goals clearly defined
- Landowner consent obtained
- All permits and approvals secured
- Sensitive habitats and species assessed
- Season confirmed as open
- Appropriate method and equipment selected
- Biomass handling and storage arranged
- Documentation and monitoring in place

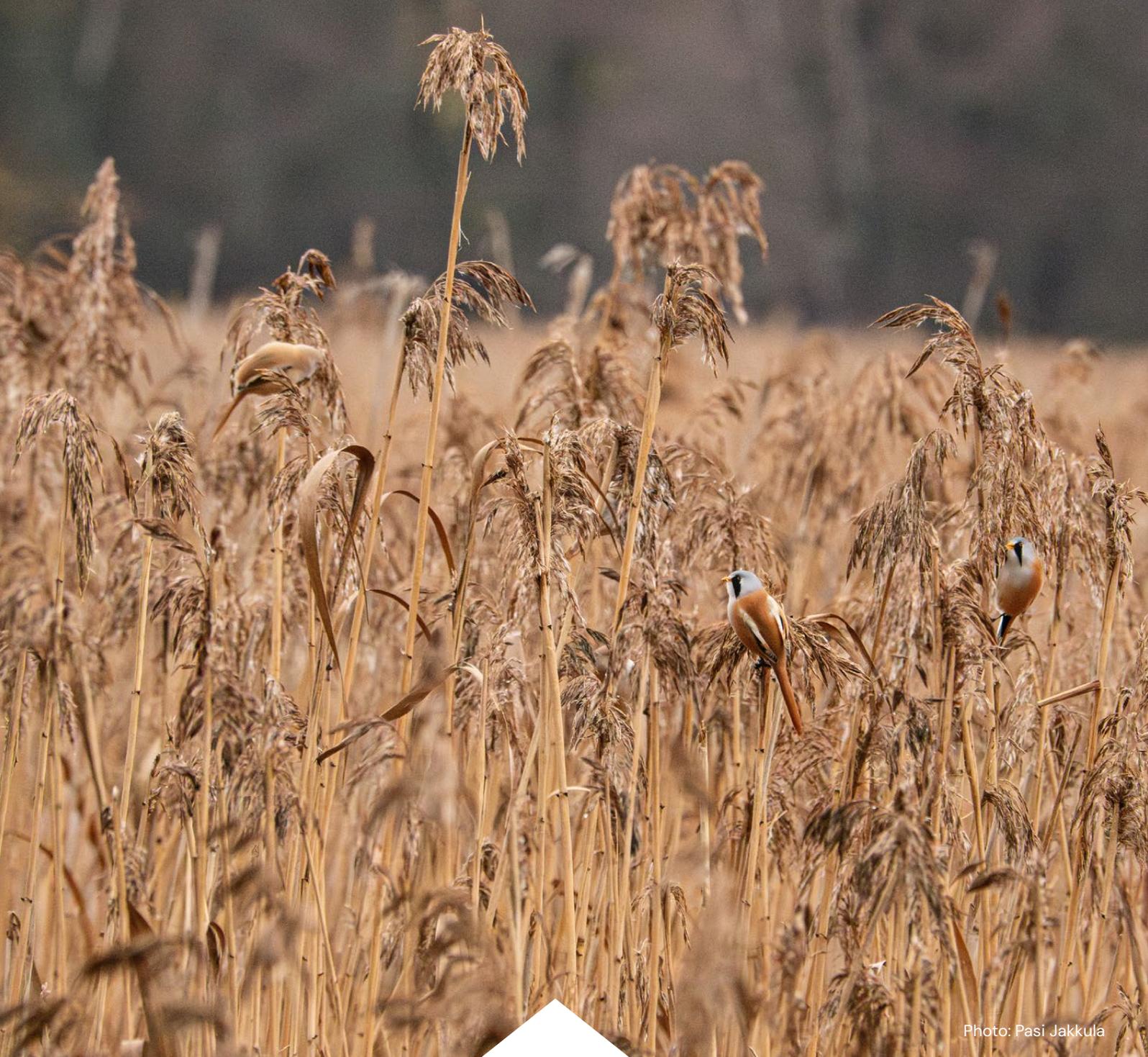


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