



EN

Protecting the biodiversity of salt marshes

Practical guide for the attention of
the stakeholders of the marshes



The European project LIFE Sallina aims at restoring and preserving salt marshes of the French Atlantic Coast which includes those of the Guérande peninsula, the Island of Noirmoutier and the Marais Breton.

Context

LIFE Sallina focuses on the preservation of natural habitats and emblematic species such as the Pied Avocet, the Common tern or the Dark spreadingwing. To ensure a balance between the conservation of the natural heritage and human activities, this project encourages sustainable salt production and involves all the local involved parties : local governments, professionals, environmental protection associations, and hunting associations.

This technical guide is intended for all involved parties of the marsh (salt manufacturers, shellfish farmers, breeders, hunters...) and gives you the tools to boost biodiversity in relation to the regulations and the objectives of the Natura 2000 sites. Complementary documents also provide you current knowledge about the natural habitats, fauna, and flora of our marshes.



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Some key figures

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Cover photo: Pied avocet © S. Batard

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Natura 2000 site **Marais breton, Baie de Bourgneuf, Île de Noirmoutier et Forêt de Monts**

- Area: 52 337 ha.
- Percentage of marine area: 30 %

Territory distributed between Vendée (52%) and Loire-Atlantique (18%) over 27 municipalities

Most representative habitats:

- Wet meadows, mesophilic meadows: 30%
- Salt marshes, salt meadows: 20%

Notable species

■ Pied Avocet

Recurvirostra avosetta
1 000 individuals in wintering, the 5th site at the national level

■ Common Tern

Sterna hirundo
400 to 460 breeding pairs, representing 30% of the regional population

■ Black-tailed Godwit

Limosa limosa
At least 100 breeding pairs in Marais breton, representing 70% of the French breeding

■ Mediterranean Spreadwing

Lestes macrostigma
Up to 4 000 individuals in favorable years

Natura 2000 site **Marais salants de Guérande, Traicts du Croisic et Dunes de Pen-Bron**

- Area: 3 622 ha
- Percentage of marine area: 35 %

Territory distributed over 5 municipalities in Loire-Atlantique

Most representative habitats:

- Salt marshes, salt meadows: 40%
- Mudflats and sandbanks, lagoons: 10%

Natura 2000 site **Marais du Mès, baie et dunes de Pont-Mahé, étang du Pont de Fer**

- Area: 2 688 ha
- Percentage of marine area: 21%

Territory distributed between Loire-Atlantique (76%) and Morbihan (2%) over 7 municipalities

Most representative habitats:

- Salt marshes, Salt meadows: 30%

Notable species (for both sites)

■ Pied Avocet

Recurvirostra avosetta
600 to 1300 breeding pairs, according to the years

■ Common Tern

Sterna hirundo
nearly 220 breeding pairs, representing 20% of the regional population

Action Sheets

Practices in the service of biodiversity

These Action sheets were created to help you understand the restoration, maintenance and/or management actions that can be implemented to promote the biodiversity of our marshes.

Each Action sheet recalls the main objectives targeted by the action and describes the technical recommendations, some of which are illustrated schematically.

For each of them, the environmental added values are specified in relation to the targeted habitats and species.

Legend



Refers to one or more sections



Refers to Regulations

Action Sheet

1

Maintenance of the hydraulic network

Water areas gradually silt up. Cleaning works are especially necessary to enable a better feeding and drainage of the marshes and then to restore the hydraulic and ecological functions of these environments.

Goals

To limit the siltation of the networks and the water areas

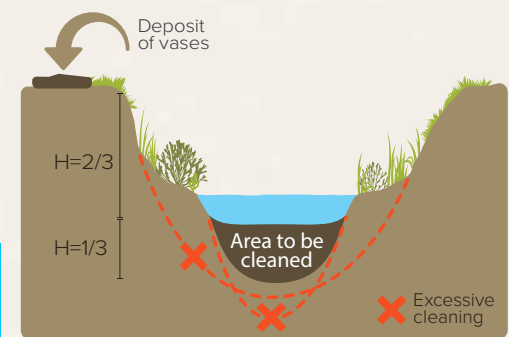
To facilitate fish movement

Recommendations

Concerning the hydraulic networks, it is advised to carry out a light **cleaning operation creating a central channel** (illustration 1) and maintaining the banks vegetation



Work dates :
from August 1st to January 31th for the AEEM ditches
and to February 28th for the AEEM salt marshes



1 | Cleaning

Pros: preserves the banks vegetation, favours the aquatic vegetation, limits the erosion and the sliding of the banks

In the absence of vegetation and significant erosion of the banks, **the cleaning can be combined with a gentle slope reshaping**

Pros: promotes the recolonization thanks to the banks vegetation, limits the erosion and the sliding of the banks

To carry out a basin raking within the first water storage basin

Pros: favours the survival of the fish fauna during the summer period

To deposit muds, and, if necessary, to remodel existing mud deposits, ensuring that the tops of humps are meticulously levelled

Pros: favours the rapid regrowth of the grass vegetation

To follow the muds deposits during 2 to 3 years

Pros: makes sure that invasive plant species (Baccharis) do not grow after works

The particular case of the salt marsh

Recommendations

After emptying, **let the water levels lower in the crystallizers** (up to about 5cm) by means of evaporation ; and then, the muds cleaning will be used for recovering the crystallizers banks

Pros: carries through with the growth of the Characeae vegetation and keeps part of their "spores" on the crystallizers banks

To conserve the vegetation of the salt meadows (salicornia, obione...) outside of the productive areas (first and second water storage basins...)

Pros: stimulates the flora diversity

In connection with...



Habitats & Species

Lagoons, grass beds, birds...



Assistance & tools

AEEM, Natura 2000 agreements...



Regulations

Ban on backfilling the lagoons

Hydraulic management

In salt marshes, the aquatic fauna comes from the marine environment. Consequently, it depends on a regular water renewal and on the transparency of the structures. The management of the water levels is also important for the well-being of bird populations, aquatic grass beds and halophilic vegetation.

Goals

To facilitate the fish movement, the feeding and the nesting of the birds and the presence of halophilic vegetation

Recommendations

Fish and aquatic fauna issue

To opt for structures offering diameters greater than 300 mm, to avoid too high bends

Pros: reduces the constraints of quantum tunnelling and the pressure on the fish fauna

To opt for “*érailles*” (in the salt marshes of Noirmoutier, this is a traditional open-air structure allowing fish circulation) and open-air structures (photo)

Pros: welcomes the fish fauna of any size

To facilitate the transparency of the structures towards the first water storage basin in any season

Pros: in spring-summer, it favours the sampling of bass and sea bream fish larva and in winter the sampling of the glass eels ; in autumn-winter, it favours the exit of the young marine fish and the glass eels during their downstream



“*Éraille*” fitted with pipe

To opt for the water levels higher than 20 cm

Pros: voids the temperature and oxygen variations that could damage fish

To carry out a regular renewal of the first supplying basins

Pros: increases the diversity of the aquatic fauna

Avifauna issue

During any season, to keep the water levels between 5 and 20 cm in the first water storage basins

Pros: favours the feeding of the young Pied avocets and of the wintering or migratory shorebirds

Halophilic vegetation issue

In accordance with usual practice, it is recommended, most of the time, to keep a water level below the halophilic scrubs (obione, soda...)

Pros: preserves the halophilic vegetation and maintains banks

Occasionally, to plan a drainage

Pros: mineralizes muds and boosts the aquatic flora

The particular case of the salt marsh

During autumn and winter, to opt for a flooding supplied by rainwater

Pros: favours a sufficient reduction of the salinity to allow the growth of the heritage Characeae vegetation with *Tolupylla salina*

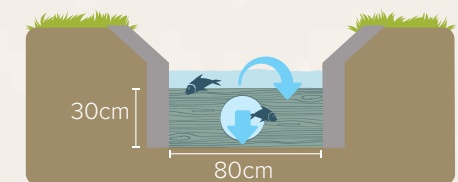
Seasonal management of a double purpose “*éraille*”

Illustration of an “*éraille*” with low drilled planks (diagram 1) to allow the

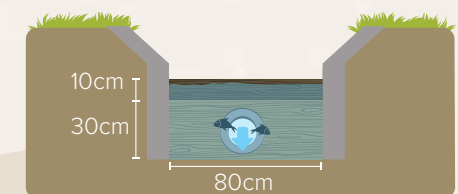
passage of water (by flowing) : thus, fish is able to pass when there is no economic activity

Illustration of an “*éraille*” with high drilled planks (diagram 2) with a passage of a smaller diameter pipe to allow the

adjustment of the water levels in order to meet economic requirements.



1 | “*Éraille*” with low planks



2 | “*Éraille*” with high planks

In connection
with...



Habitats
& Species

Lagoons, salt meadows, grass beds, birds, fish...

Banks maintenance and restoration

In a salty environment, level variations can strongly put banks under pressure. Moreover, the absence of vegetation, playing a maintenance role, weakens them. Likewise, the slope also has an impact on the banks.

Goals

To allow the growth of bank vegetation welcoming aquatic and amphibian fauna and birds

To allow the fauna to get access to water areas

To limit erosion

Recommendations

about banks with vegetation maintenance

To keep the bank vegetation (obione, soda...) by pruning them if necessary (except from March 15th to July 15th)

Pros: offers refuge zones for the fauna, maintains the bank stability

In case of digging under the bank vegetation, to plug with clay at the bottom of the bank (diagram 1)

Pros: maintains the existing vegetation

In case of grazing, to plan to install a fence at a distance from any hydraulic network (about 1 m.)

Pros: avoids the bank erosion due to trampling



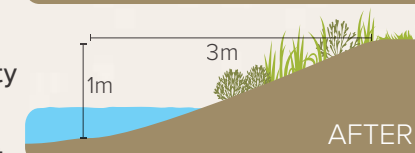
1 | Clay clogging

Recommendations

for eroded banks maintenance

To opt for a gentle slope of minimum 1 meter for 3 meters or for a filter strip (according to the land rights) (diagram 2)

Pros: favours vegetation growth and accessibility for fauna



2 | Gentle slope

If the vegetation is present (obione, soda...), **set aside root ball plants in order to replant** them after restoration

Pros: stimulates the vegetation regrowth

In case of halophilic planting : to opt for local seed banks and young plants

Pros: favours the local vegetation so as not to introduce invasive plant species

In case of installation of wood cladding, to limit its height to the mean waters level and then to soften the bank if the width permits (diagram 3)

Pros: builds up a solid anchor point with the cladding and allows the growth and the base of the vegetation above



3 | Timber cladding

NB : In the Bulrushes brackish basins, to keep some abrupt banks in order to welcome the Southern water vole.



as Sea wormwood and Sulphurweed are protected species, it is important to mark out their stations to limit the impacts.

In connection with...



**Habitats
& Species**

Salt meadows, halophilic scrubs, Southern water vole, passerines...



**Assistance
& tools**

AECM ditches, Natura 2000 agreements...



Regulations

Protected species

Creation and maintenance of nesting islands

The breeding Laridae birds and shorebirds choose areas with less or no vegetation, therefore protected from climatic risks and land predators. **The creation and the maintenance of nesting islands is important to welcome more species in the marshes** such as the Pied Avocet, the Common Tern and other Laridae birds and waders.

Goals

To favour the nesting of the Laridae birds and shorebirds

Recommendations

for creation of the nesting islands

■ On the scale of a basin, **to opt for the creation of several islands** being each about 40 to 50 m² and between about 10 and 20 cm high above the water line ; the islands must have a “natural” shape (photo).
Pros: helps the installation of the Laridae birds and shorebirds colonies



© CoC île de Noirmoutier

■ **To install islands at distance from the banks** with a water tour if possible

Pros: avoids the predation of the land predators

■ **To profile banks with gentle slopes** < 30%

Pros: allows the installation of the breeding birds on the islands ; facilitates the movement of the young birds after hatching

■ **To use clay-rich materials** from neighbouring activities (i.e. excavation materials coming from bank restoration or pond creation) and then to deposit them on a hard bottom

Pros: favours materials reuse, limits the carbon footprint, avoids the installation of occasional exotic invasive plant species, limits the impact on the basin bottoms

NB : on the undeveloped salt works, the nesting islands can be built on the basis of old clay pathes that have been manually reassemble

Recommendations

for the nesting islands maintenance

■ In February, **to clear the islands** and, if necessary, **to add more clay**

Pros : by limiting the vegetation presence, it allows the installation and the nesting of the Laridae birds and shorebirds

■ To occasionally **drown the islands** with salt water

Pros: limits the growth of the perennial grasses

Recommendations

for hydraulic management (diagram 1)

■ From March to September inclusive, **to maintain the emergence of the island from 10 to 20 cm high**

Pros: welcomes the breeding water birds, avoids the nests drowning

■ From October to February inclusive, **to keep the water level lower than 20 cm**

Pros: welcomes the migratory and wintering water birds



1 | Water levels

The right things to do in order to avoid any disturbance

To limit every day the number of passages close to the nesting area and to use the same tour

In connection with...



**Habitats
& Species**

Nesting and wintering
water birds



**Assistance
& tools**

AECM, Natura 2000
agreements...



Regulations

Protected species

Creation and maintenance of isolated lagoons (bulrushes), ponds, depressions

In salted areas, **ponds, depressions and isolated basins** are essential for **biodiversity** : reed beds can grow and welcome species restricted to soft to brackish habitat such as amphibians (Spotted pelodyte, newts...), dragonflies (Dark spreadwing), marsh passerines (Sedge warbler, Reed bunting...)

Goals

To protect soft to brackish habitats inside salt areas

To welcome the fauna and the flora restricted to these areas

Recommendations

for the depressions, ponds and isolated lagoons

■ **To plug the flow point of the depression** into the direction of the ditch (installation of cofferdams in October)

Pros: keeps the rainwater until spring

■ **Ponds** : **to alternate gentle and moderate steep slopes** and to vary depth

Pros: favours the heterogeneity of the habitats and diversifies the aquatic flora

■ **Isolated ponds and lagoons** : at least, every 10 years, **to carry out a slight dredging** ensuring the impermeability of the bottom and the development of the bank vegetation

Pros: limits landing ; allows fauna to find refuge in vegetation

■ During several years, **to maintain in turn water points close to each other** and to maintain partially **isolated lagoons and ponds**

Pros: ensures the recolonization of fauna and flora

■ If possible, **to drain at the end of the summer**

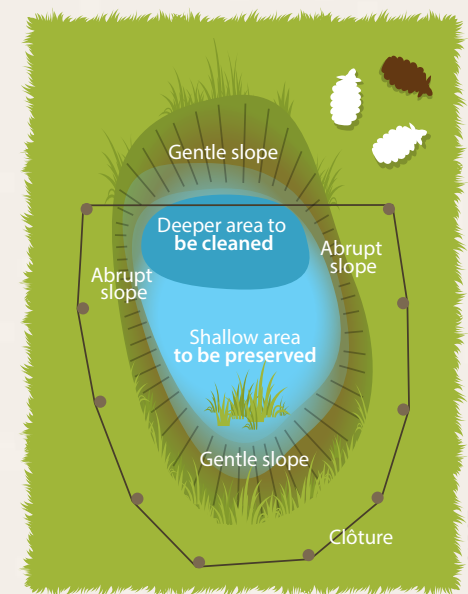
Pros: allows the quick filling with rainwater at the end of the works

■ **Not to fill with mud nor salt water**

Pros: protects the species restricted to the soft habitats

■ In pastures, **to enclose the elements or the ponds/basins on about ¾ of their perimeter** ensuring an access to the watering for animals

Pros: protects the banks from trampling, protects the reed beds, avoids the water turbidity



Pond maintenance diagram

Recommendations

for the reed beds and bulrushes maintenance

■ During the spring before the intervention, **to make an inventory of the habitats**

Pros: estimates the presence of possible species (ex. : dragonflies) laying in stems and then to guide the cutting interventions (cutting height)

■ **To opt for manual, mechanical mowing or animal traction** in the reed beds and bulrushes (with removal of the waste). To keep the rhizomes. To intervene during the autumn (from end of September)

Pros: makes the habitat more dynamic the next spring, limits the impact on the present fauna

■ To opt for **centrifugal mowing** (see diagram p.19)

Pros: helps animals to escape or to find refuge

■ **To keep islands and/or a line of banks** with vegetation

Pros: offers the fauna some refuge areas and keep a seed bank

In connection with...



Habitats & Species

Reed beds, Amphibians, Invertebrates (Dark spreadwing), Southwester water vole...



Assistance & tools

AECM, Natura 2000 agreements...



Regulations

It is not allowed to fill ponds ; ponds creation is subject to the Water Act (> 1 000 m2)



© Pierre Le Lann

Mowing and/or grazing management of the embankments

Embankments constitute the terrestrial part of the marsh ; they are characterized by more or less wet meadows that shelter up to 70 different species of plants. Among them, there are protected species such as the **Buttercup of Baudot** and the **Bigflower clover**. Many birds choose this area to nest, such as the **Northern lapwing** and the **Black-tailed godwit** who prefer wet grazed pastures or the **Short-eared Owl** who prefers meadows with high vegetation.

Goals

To maintain the preservation of the meadows

To offer nesting areas for birds

To maintain/increase the diversification of animal and plant species

Recommendations

To choose an adapted grazing instead of mowing (several possible methods : spring extensive grazing, late mowing of the low parts, rotational (diagram 1) or strip grazing)

Pros: maintains the heterogeneity of the open habitats, increases the fauna and flora diversity, decreases the mechanization and consequently the carbon footprint

To observe the presence of breeding birds in the meadows and then to adapt the date of turnout and the livestock density

Pros: allows the reproduction of the ground nesting birds and the fledglings

To opt for a late mowing : June 5th in the salt marsh and June 10th in the soft marsh

Pros: allows the reproduction of the ground nesting birds and the fledglings

To adopt “avoidance” measures : “scare bar” at the front of the vehicles, “centrifugal” mowing, (diagram 2), reduction of the vehicle speed, only one tractor/plot

Pros: allows the fauna to escape

To maintain non-mowed and non-grazed areas

Pros: favours the nesting of birds suited for high vegetation and the presence of insectss

To keep water in meadows (see record n°5 regarding the disconnected lagoons/ponds/depressions)

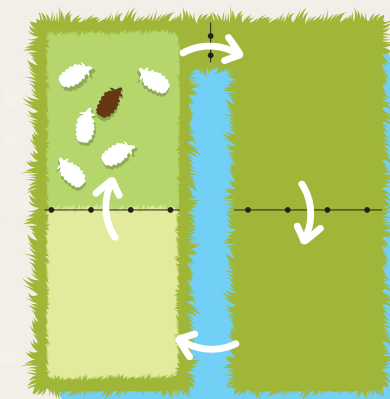
Do not fertilise, nor use liming or phytosanitary product

Pros: favours wildflowers diversifications

To keep the existing thickets (bramble, blackthorn...)

Pros: favours the passerines nesting

NB: Regarding the meadows on salt works, the debris from mowing and crushing must be removed : it allows flower diversification.



1 | Rotational grazing



2 | Centrifugal mowing



Habitats & Species

Sub-halophilic meadows and lean meadows, Black-tailed godwit, Common redshank, Northern lapwing, Short-eared Owl...



Assistance & tools

AECM, Natura 2000 agreements...



Regulations

Ban on ploughing meadows over 5 years of age

In connection with...

Exotic invasive plant species control

Our territories are impacted by several exotic invasive plant species such as Baccharis and Pampa Grass. Their presence often reflects the habitats health. Restoring habitats is a good way to durably fight against the exotic invasive plant species spread.

Goals

To maintain open the environments

To maintain heterogeneity and diversity of habitats and landscapes

Recommendations

- Do not use chemical products to eradicate them
- To manage the potential regrowth (by uprooting or extensive grazing)

Regarding the young roots of Baccharis and Pampa Grass

- Manual uprooting with a pickaxe or a special tool making sure you destroy all the roots

Regarding the big roots of Baccharis (> 1,20 m)

- To section the foot of the root and then bursting and salting the stump, or mechanical uprooting or animal traction

Regarding the big roots of Pampa Grass

- To cut the tussocks in order to avoid seeds dispersal
- Mechanical uprooting

Baccharis *Baccharis halimifolia*

Habitat : coastal wet areas

Geographical origin : South-East United States

Spread period : end September/October

Impacts :

- Homogenisation and closure of environment
- Diversity decrease
- "Windbreak effect" for salt activity
- Health : allergies
- Fire risks



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Pampa grass *Cortaderia selloana*

Habitat : wet lawns, marshes, ditches, river embankments

Geographical origin : South America (Chile, Brazil, Argentina)

Spread period : end September/October

Impacts :

- Homogenisation and closure of environments
- Diversity decrease
- Health : spiky leaves



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Intervention periods

Regarding the manual uprooting of the young roots, it is possible all year long, avoiding seeds dispersal (mid-September / October). No mechanical intervention between March 15th and July 15th.

Beginning of September, cutting of the Pampa grass tussocks

In
connection
with...



Assistance
& tools

AECM, Natura 2000
agreements...



Regulations

Baccharis and Pampa Grass are controlled species : it is forbidden to sell, to plant and to transport them

Other exotic invasive plant species can be observed, such as **Water primrose** (photo 1) or **New Zealand Pigmyweed** (photo 2) particularly suited for soft marshes. Nevertheless, these species are also present around freshwater sites (ponds...) in salt marshes



© T. Lefort

1 | Water-primrose



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2 | New Zealand pigmyweed

Habitats mosaic

On the same territory, **the diversity of environments and habitats welcomes many animal and plant species** ; this diversity favours their resilience. In a salty habitat, varied species are observed in areas presenting a different gradient of saltiness, from soft to brackish up to extremely salt. It is important **to adapt management of each type of environment** in order to keep a mosaic of habitats on different spatial scales.

Goals

To diversify habitats

To increase fauna and flora diversity

Recommendations

■ **To favour the differentiated management** of meadows (mowing and grazing) and rotation

Pros: maintains different plant heights in order to optimize flora and fauna diversity

■ **To keep and maintain the freshwater areas** (ponds, depressions) and/or brackish areas (disconnected basins)

Pros: allows the installation of Odonates (dragonflies) and Amphibians restricted to these habitats

■ **To favour the gentle slopes embankments**

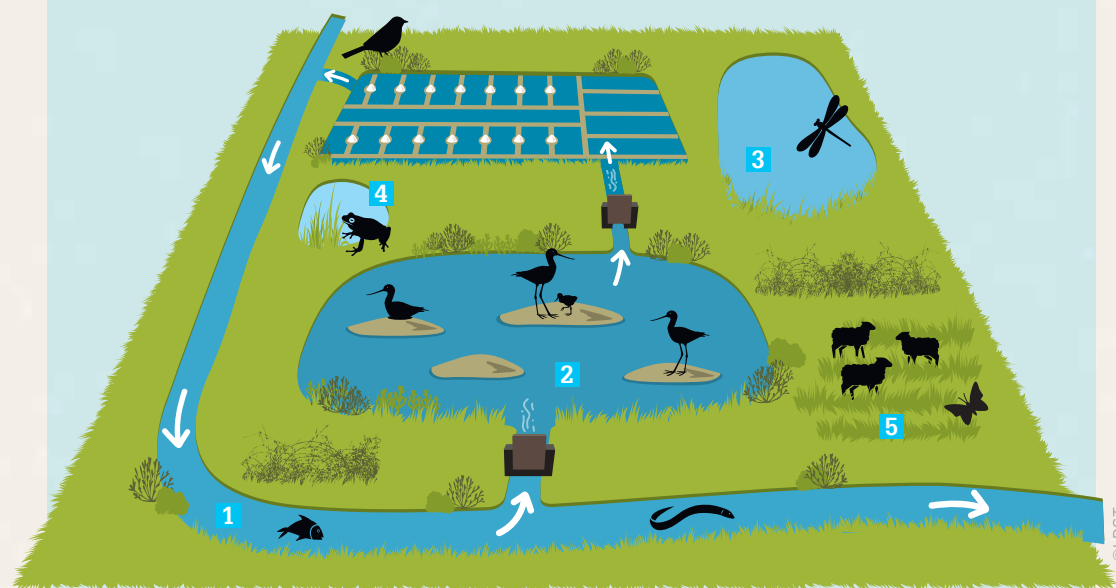
Pros: allows the terracing of the salt meadows vegetation and contributes to the embankment maintenance ; it also helps animal species (nursery, shelter..)

■ **To keep thickets** (bramble, blackthorn) while properly containing them

Pros: allows passerines nesting ; refuge for invertebrates

In picture

Illustration of an hydraulic unit with circulation of salt water 1
from the ditch (saltiness ~ 33 g/l) to the salt marsh (300 g/l)



2 Connected basins with an increasing gradient of saltiness (from the first water storage basin to the salt marsh)

Pros: on water storage basins, **presence of nesting islands, embankment vegetation** (halophilic thickets), **samphire...**

Pros: **presence of maintenance works** dedicated to economic activity and fish transference

3 Disconnected brackish basins with bulrushes, reed beds

4 Ponds with vegetation (reed beds...), depression with grass beds

5 Differentiated management of mowed and grazed meadows (more or less high vegetation)

**In
connection
with...**



**Habitats
& Species**

Sub-halophilic and mowing lean meadows, Vegetations, nesting and wintering birds, Odonates, Amphibians, Passerines...



**Assistance
& tools**

AECM, Natura 2000 agreements...



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Recipients:



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