

Caomhnú Árann EIP Project:

LLOC5013: REHABILITATION OF COASTAL HABITATS THROUGH GRAZING MANAGEMENT

Final Report



Togra Caomhnú Árann – LLOC5013

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Clár Chisti Eorpacha Struchtúrtha
agus Infheistíochta na hÉireann
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Caomhnú Árann Final Report

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1.0 Executive Summary

The Caomhnú Árann EIP (Project Rehabilitation of coastal habitats) is an EIP-Agri Operational Group co-funded by the Department of Agriculture, Food and the Marine and the EU. It started in 2021 and ended in March 2023. The project worked with land owners on an area of Machair commonage. Due to a range of external factors the site was in poor ecological condition. The factors included, overgrazing by rabbits lending it prone to storm damage, public access and the lack of capital investment to improve the grazing infrastructure. It was beyond individual stakeholders' capacity to improve the area, but through co-operation, greater community awareness and a range of actions work was completed on the site for the benefit of the farmers, the community and biodiversity. The stakeholders involved in the Operational Group included: Caomhnú Árann ctr; Department of Rural and Community Development Islands Division; Department of Housing, Local Government and Heritage: National Parks and Wildlife Service (NPWS); TEAGASC and Aran Island Farmers Group.

The main actions of this project were reducing the rabbit population in the area and restoring areas of bare and exposed Machair using different restoration techniques. Other actions included the provision of gates, rebuilding of boundary walls and control of invasive species. The gates, walls and signs were to help control public access and reduce the chance of further damage, particularly for ground nesting birds where dog disturbance is an issue. An educational element of the project was to inform the local community of the importance of the habitat for biodiversity and the vital link that farming plays in its appropriate management.

Table 1. Summary Table Caomhnú Árann Machair EIP Project

Start date:	01.06.21
End date:	31.03.23
Budget:	€71,110.00
Number of farmers:	11

Caomhnú Árann EIP addressed these issues through reducing the rabbit population in the area, restoring areas of bare and exposed Machair and repairing the boundary and access infrastructure linked with increase the awareness of the importance of the site for biodiversity.

The results of this project improved the forage availability of the Machair, helped restore the biodiversity of the grassland habitat and improved the quality of the habitat for ground nesting birds with an increase in breeding pairs of lapwing.

2.0 Brief description of the project

Trá Mór Machair site is located in the eastern shores of Inis Mór, Aran Islands, Co. Galway (Grid reference L 90575 07149) (Fig. 1). The site is approximately 79 hectares and is owned by 11 different shareholders all living on the island. The site is designated as a Special Area of Conservation (Inishmore SAC 000213) and part of the site is designated as a Special Protection Area (SPA Inishmore SPA 004152). The area has a Land Parcel number G14305L28. The Machair grasslands are predominantly in the southern part of the parcel (Fig.1).



Fig.1 The area of the proposed site outlined in Blue with the SAC designation in red.

The site is an internationally important, farmed coastal grassland habitat, listed as a Priority Habitat in the EU Habitats Directive. Along with the unique flora, the area supports a high number of breeding Lapwing, as well as nesting sites for other breeding waders such as ringed plover and snipe. The site forms part of a commonage with a number of farmers traditionally grazing the area with cattle.

Over the years, however, this important habitat has become degraded owing to a range of factors such as a rabbit population expansion and consequential overgrazing, a degradation of infrastructure as a result of a reduction in agricultural activity which has led to increased access by the public and increased damage from misuse.

3.0 More detailed reporting to address

3.1 Baseline Data

Parts of the Machair are severely eroded and were getting progressively worse over the years as the rabbit population continued to grow unchecked and to graze the site heavily, throughout the year. The western and south eastern section of the Machair had some of the most eroded Machair within the site (Fig.2). Large bare sand areas occur with small islands of vegetation up to 1m in height, which are evidence of the scale of the erosion event that has taken place (Fig.3). Elsewhere smaller bare patches are common as well as areas with the thinnest covering of vegetation (Fig. 2).



Fig.2 Severely eroded areas of Machair where over grazing and burrowing by rabbits has produced large areas of bare sand which are developing in to blow-outs



Fig.3 Steep sided Islands of vegetation remain within the eroded area, often riddled with rabbit burrows. Sides can be over 1m high, showing the volume of sand that has been lost from the site

The Machair habitat has been misused in places over the years, and issues such as dumping, lighting fires and vehicle access are all having a negative impact in the more accessible parts of the Machair particularly in the western part of the Machair. These activities occur where access is easiest along the road to the beach (Figs 4, 5 & 6).



Fig.4 Tyre marks within area of western section of Machair adjacent to the road.



Fig.5 Dumping of garden waste on the sandy substrate leads to the development of a rank flora composed of nettles, thistles and butterbur. The dumping of hedge cuttings can also lead to the establishment of invasive species on this priority habitat.



Fig.6 Large burn scar from bonfires in the western section of the Machair within easy access from road. Remains of burnt rubbish from cans, furniture and glass scatter the area.

3.2 KPIs

The Key Performance Indicators (KPIs) are based on the actions required to be delivered by the project partners to establish baseline data and implement a range of activities that eliminate damaging activities and start the process of habitat restoration. The KPIs, documented in the status review reports and associated results are detailed below.

3.2.1 Objective 1: Implementation of rabbit control and associated monitoring of results and start the process.

KPI: Identify the most practical method of rabbit control on the site within the limitations due to limited availability and cost of outside contractors to work on the islands. Determine a monitoring protocol to determine changes in rabbit populations.

Target: Implement an extended period of rabbit control on the island, which reduces population numbers and thus aiding in habitat restoration.

Result: In a previous project, AranLIFE, a rabbit cull was tried using a NPWS contractor who completed an intensive cull over a short period of time. This approach had limited success as the cover within the site for the rabbits is high in the dune section and the number controlled was limited. For this project a continuous approach was tried so from January 2022 until March 2023, a local qualified man was contracted to regularly shoot rabbits at the site. A total of 1,148 rabbits were shot throughout the year with a break between May and July during the Lapwing nesting time. This cull occurred over 174 hours throughout 2022 and 2023.

Table 2. Rabbit Cull Figures 2022-2023

Month	No. of Hours Shooting	No. of Rabbits
Jan-22	19	184
Feb-22	22	167
Mar-22	19	146
Apr-22	7	47
Jul-22	15	100
Aug-22	5	39
Oct-22	17	98
Nov-22	17	79
Dec-22	6	44
Feb-23	28	139
Mar-23	19	105
Total:	174	1148

3.2.2 Objective 2: Complete baseline habitat and archaeological assessment of site to record present condition and associated biodiversity.

KPI: Determine both the important habitat features and species of the site and also the main problematic areas to target habitat restoration. Included in this is a baseline archaeological survey of the site to ensure no management works are detrimental to the archaeology of the area.

Target: Develop a database of the area indicating the main features and species location.

Result: Baseline data

This area was surveyed in October 2021 to assess the habitat condition prior to any rehabilitation works taking place. The Trá Mór Machair is bisected by a road which runs to the beach to the north. The east and west sections of the Machair are heavily grazed by rabbits with the more severely eroding parts occurring in the western section. During the winter, parts of the Machair flood (Fig.7).



Fig.7 Flooding on the Machair during the winter

Vegetation

The vegetation of the Machair at Trá Mór has been detailed in previous surveys of the area during the precursor project of Caomhnú Árann, AranLIFE (¹Report on seaweed trials on Machair and ²Update to Machair Report). Throughout the Machair the vegetation, where present, is grazed heavily to a short turf that is composed primarily of bryophytes (Fig.8) along with herbaceous species such as Bulbous buttercup (*Ranunculus bulbosus*), Long-leaved plantain (*Plantago lanceolata*), Biting stone crop (*Sedum acre*), White clover (*Trifolium repens*), Daisy (*Bellis perennis*), Sand pansy (*Viola tricolor var. curtsii*) (Fig.9), Storks-bill (*Erodium cicutarium*), Birds-foot-trefoil (*Lotus corniculatus*), Lady's bedstraw (*Galium verum*), Wild thyme (*Thymus polytrichus*), Kidney vetch (*Anthyllis vulneraria*) (Fig.10) and Scarlet pimpernell (*Anagallis arvensis*) (Fig. 8 & 9). Other common species throughout include Red fescue (*Festuca rubra*) and Sand sedge (*Carex arenaria*) and Glaucous sedge (*Carex flacca*). The lichen *Peltigera canina* occurs occasionally as well as other lichen species. The heavy grazing pressure on this habitat throughout the year reduces the species diversity of the Machair habitat and causes severe erosion in parts of the Machair.



Fig.8 Vegetation cover where present, consists of a very short turf composed of bryophytes and herb, grass and sedge species

¹ https://www.caomhnuaranneip.ie/files/ugd/0ca2f5_501683eec2d94721ad157d0221394aa7.pdf

² https://www.caomhnuaranneip.ie/files/ugd/0ca2f5_0d5ef905e32a49ceaf9863a5d396c288.pdf



Fig.9 Sand pansy (*Viola tricolor var curtsii*) and Storks bill (*Erodium cicutarium*) within the Machair vegetation

Purple Milk-vetch (*Astragalus danicus*), (Fig. 10), grows on Machair and sandy places close to the sea. It is confined in Ireland to Inis Mór and Inis Meáin and is legally protected under the Flora (Protection) Order, 1999. The growth of this plant at this site is very much reduced compared to its growth at other sites on the islands. This reduced vigour is likely due to the grazing pressure from the rabbits.



Fig.10 Purple milk vetch *Astragalus danicus*, its only stations in Ireland occur on Inis Mór and Inis Meáin. The growth of *Astragalus danicus* is much more vigorous at other stations on the islands which are not impacted by rabbit grazing.

Breeding waders

The tightly grazed swards on the Machair, associated with damp areas, means the site is suitable habitat for Lapwing (*Vanellus vanellus*) (Fig.11.). Lapwings have undergone severe declines in breeding numbers: the most recent Bird Atlas reported a 53% decrease in its breeding range in Ireland in the last 40 years. Numbers at previous strongholds such as the Shannon Callows have declined by more than 80% in recent decades. Trá Mór has a strong lapwing population, so bird counts were taken in 2022 and 2023 to monitor the population. Figure 12 and Figure 13 details nest sites identified over the two counts and showed an increase in numbers in the second year.



Fig.11 Lapwing on the Trá Mór site - the high population makes it one of the top sites in Ireland



Fig.12 Survey work in April 2022, map showing 19 lapwing nest sites and one possible lapwing nest site



Fig.13 Survey work in April 2023, map showing 25 lapwing nest sites, overall breeding pair numbers are rising

3.2.3 Objective 3: Complete a range of concrete actions required to improve the habitat quality including application of seaweed, reprofiling of damaged areas, rebuilding of stone walls and provision of gates, improving habitat cover on damaged areas including removal of invasive species.

KPI: The aim of the project is to improve habitat quality using a series of management options available. The first step is identifying requirement options, determine best suited and then implementation and some monitoring works.

Target: The target is to implement the management options listed above on the appropriate areas within the overall site.

Result: The proposed actions in this objective was to reduce the chances of future damage from the threats identified in Section 3.0 and start the process restoration on the Machair. The original scope of this work was greater than what was completed. After discussions with our partners in the project, NPWS, some of the works were deemed unsuitable, e.g., reprofiling of damage areas, and therefore not completed. This had a knock on effect on some of the other actions as they were follow up work to this. After discussions with the farmers, it was felt water facilities were adequate and due to young children visiting the site water tanks should be avoided and so these were not constructed.

Action 1: Application of seaweed improving habitat cover on damaged areas.

To encourage stabilisation of eroding substrate storm deposited seaweed was applied to the bare sand areas within the trial plot. The seaweed increases the water retaining capacity of the substrate and increases the organic content thereby facilitating revegetation. In some areas wild flower seed collected from a nearby Machair site on Inis Meáin was also be applied to the test plots to encourage the establishment of vegetation cover to the site. A test site was also trialled to test the effectiveness of planting plugs of Kidney Vetch (*Anthyllis vulneraria*), Birdsfoot (*Lotus corniculatus*) and Ladies Bedstraw (*Galium verum*), grown from seed collected on the island. Enclosure cages (Fig.14) were established on different areas which prevented rabbit access and allowed the vegetation recovery to be monitored (Fig.15).

The result of this work was successful if rabbit grazing could be excluded, which good strike rates and cover from the treated areas although the planting of plugs was less successful, likely due to the sand blowing over the area increase planting depth. Electric fencing (Fig.16) was also tried as a way to exclude rabbits from the re-vegetating areas, but a trial area proved unsuccessful with rabbits continuously breaching the fence. Due to the cost of fencing on a large scale this was rejected as a suitable measure.



Fig.14 Enclosure cages to prevent rabbit access with different treatments



Fig.15 Vegetation growth within cage as a result of seed application, seaweed and rabbit exclusion.



Fig.16 Proprietary rabbit control fencing was trialled but proved to be ineffective at a large scale.

Action 2: Rebuilding of existing walls and gate installation

Damaged walls on the boundary of the site were allowing vehicle access resulting in added damage. As part of the project actions these damaged walls were rebuilt using local labour and expertise (Fig.17). Stone from within the site was primarily used and with additional unquarried stone sourced nearby. Gates were installed at suitable access points to give the farmers greater control on access. This facilitates the movement and management of cattle as well as limiting misuse of the Machair habitat.



Fig.17 Part of the stone wall built on the east side of the Machair to control grazing and reduce access to vehicles.

Action 3: Removal of Invasive species

The spread of invasive non-native shrubs within the Machair and dune system, *Olearia traversii* (Daisy bush or Ake ake) had naturalised in the dunes, from dumping of hedge clippings as well as possible natural dispersal mechanisms. *Olearia traversii* is a species of flowering plant in the family Asteraceae. It is endemic to the Chatham Islands of New Zealand. It is grown in other areas with mild oceanic climates such as Scotland. The shrub can become naturalised, reproducing by seed, and can propagate from semi-hard wood cuttings. It is a common component of the hedges within the GAA pitch and the adjacent houses close to the Trá Mór Machair. This species is not listed on the National Biodiversity Data Centre list of invasive species of either High or Medium impact but has continued to spread on the Machair complex.

After consulting with the farming stakeholders and members of the public living close to the Machair, the scrub was removed from the Machair complex (see Fig.18 for before and photos of the site). This was done through pulling, cutting with follow up stump treatment.



Fig.18 Before and after photos of the site to show removal of the *Olearia traversii*.

3.2.4 Objective 4: To improve local knowledge on the importance of the area for wildlife.

KPI: Whilst the site is a Natura 2000 site and Machair grassland is a qualifying interest of the SAC, there are additional species of high conservation interest on the site such as breeding Lapwing and Oystercatcher, species on the Red list of Birds of Conservation Concern (Gilbert et al. 2021), and Purple Milk Vetch, which is a Flora Protection order species. Improving the awareness of the site by the owners, locals and tourists is an important aspect of the project.

Target: Build up a database of the species present, hold a range of farm walks for farmers and locals and provide educational material to disseminate this information.

Result: Bird counts and species data is available for the site. To aid management and inform the public, a number of small notice boards were placed around the site during the lapwing breeding site. This was initiated by the farmers as there were concerns regarding a high number of people exercising on the site with unleashed dogs. Once improvements in access were finished (Action 2) higher quality removable information boards were designed.

The project held an education day in 2022 for the school children from Inis Mór (Fig.19). This included a visit to the site, so the children could see the young lapwing after hatching. The importance of the site was explained both for birds and plants.



Fig.19 Rónán Mac Giollaphárait, a local nature guide talking to children from the primary school about lapwings on the Machair.

The project has also worked closely with the new LIFE on Machair project. LIFE on Machair project aims improve the conservation status of Ireland's Machair grassland and Fixed dune habitats and the ecological conditions for breeding waders and pollinators on a number of Machair sites but does not include Trá Mór. The project will run over the course of six years, from 2022 to 2028. Caomhnú Árann has spoken at an event run by LIFE on Machair and visited a number of their sites to share information and experiences of our own project. This work will continue post project.

The project hosted visits from other organisations who were interested in the ongoing work. Ulster WildLife Trust (UWT) visited the site in early 2022 and 2023 to look at restoration works and lapwing management. In both visits the UWT aided in the bird counts as they had a strong expertise in this area. The project also facilitated a work placement student from Atlantic Technological University's (ATU) Marine Biology degree. The student carried out their final year thesis on the effect of rabbit grazing on the Machair.

3.3 Closing Evaluation

This project worked with the different shareholders of a Machair commonage on Inis Mór to address the issues affecting the habitat. Site plans were developed and agreement obtained with the competent authorities (DAFM and NPWS) as the site is within the Natura 2000 network. Desktop surveys were completed, to determine best methods for rabbit control and associated monitoring and information gathered on existing best practices for Machair restoration. High quality orthoimagery was collected using drones which aided in both determining actions and in the initial archaeological survey. The discussions with the partners did limit some of the works and as the reprofiling was not possible, a full archaeological survey was not required.

Capital works started on the site with rabbit control carried out by a local qualified contractor, the only local person available with the sufficient criteria. The local contractor was necessary as continuous control was possible over the length of the project at a much lower cost.

Construction of the wall and hanging of the gates have addressed the issues with access damage and the land owners will continue to maintain these. The area is importance of the site for breeding birds, particularly Lapwing, so bird counts were completed in the spring. Due to public access and associated disturbance, a number of information signs were erected along the main entrances.

The intra structure is now present to improve the overall condition of the site and over the project period there has been a rise in the recordings of Lapwing and Chough present. Rabbit numbers are still higher than ideal but recent sightings of stoats on the Machair may mean greater levels of natural control. The new ACRES Burren Aran project will continue with work on the site.

3.4 VFM

Caomhnú Árann LLOC5013 is funded under the European Innovation Partnership Scheme allowing farmers, scientists and other experts to collaborate together to develop new practices that are environmentally friendly and economically sustainable. The ultimate aim of these innovation partnerships is to road-test new ideas and practices which can then be used more widely by farmers and others to improve productivity and enhance resource efficiency. The project offered good value for money, though in biodiversity terms this can be difficult to quantify. Birds and plants found on the Machair are rare in an Irish and European context which is why the site is designated under Natura 2000. Ireland has a responsibility to bring these sites into favourable condition and have implemented the LIFE for Machair on nine other Machair sites across Ireland, but did not include Trá Mór. This verifies that habitat improvements works on Machair are necessary and fit into government policy. The large numbers of lapwing on the site, considered to be the national bird of Ireland, makes the site one of the best lapwing sites in Ireland and the work has built awareness of on this.

The trials we carried out on seaweed applications, wildflower seed and enclosure fences are feeding into the new ACRES BurrenAran project and the LIFE for Machair project who have already borrowed the enclosure cages for on site evaluation. Therefore the ripple effects of the project are good, adding to the Value for Money.

The project was managed by the Caomhnú Árann team, who also manage the EIP-Agri environment project LLOC1050. Therefore start-up costs and other administration costs weren't applicable so implementation costs were much lower than a stand-alone project. The project liaised closely with the partners and all proposed works discussed and any works that were deemed unnecessary were not completed.

4.0 Financial Report

Although the majority of the project objectives were met, there was significant underspend on this EIP project. This was mainly due to the fact that Caomhnú Árann are already running Call 1 EIP project and many of the administrative costs that would be associated with a standalone project were absorbed by the Call 1 project.

Implementation costs and actual groundworks were significantly lower than estimated due to:

- the input of locals at a lower cost
- the short timeframe of the project
- Call 1 project absorbing some of the implementation costs (such as wildflower seed collection and monitoring costs)
- some groundworks did not go ahead e.g. predator control, reprofiling of banks, provision of water infrastructure. This was due to lower anticipated costs and discussions with partners and best impact.

Table 3. Total Project Expenditure

Project Costs	Budget	Accrued to 09.05.23
ADMINISTRATION		
Admin – Personnel	€9,000.00	€5,574.27
Admin - T&S	€1,200.00	€1,956.95
TOTAL ADMINISTRATION COSTS	€10,200.00	€7,531.22
<i>% of Total Budget</i>	14.34%	31.74%
MANAGEMENT / IMPLEMENTATION		
Rabbit control	€24,000.00	€6,873.00
Predator control	€1,000.00	€0.00
Protection of nest sites by solar electric fences	€1,000.00	€445.27
Archaeological survey	€1,500.00	€0.00
Reprofiling steep angled banks	€1,600.00	€0.00
Seaweed application	€5,000.00	€1,584.80
Collection and spreading of wildflower seed from local Machair site	€1,000.00	€0.00
Repair existing stone walls	€4,000.00	€2,840.00
Install gates to facilitate livestock access	€3,250.00	€2,646.35
Provision of water infrastructure	€3,810.00	€0.00
Removal of non-native species	€500.00	€90.00
Informative signage	€2,000.00	€1,355.45
Educational Events / Workshops	€2,250.00	€0.00
Farmer participation cost	€4,500.00	€0.00
Monitoring	€2,000.00	€0.00
TOTAL Management	€57,410.00	€15,834.87
Overheads	€3,500.00	€362.00
TOTAL COSTS	€71,110.00	€23,728.09

5.0 Lessons learned

The following were the main lessons learned from the project:

- A local project team working directly with the landowners and liaising with other partners creates a greater interest in the work programme and a greater understanding of why it is necessary.
- Rabbits place substantial grazing pressure on a Machair site and equate to up on 1.5LU/ha which is well above the recommended stocking levels to achieve and maintain favourable condition
- Ongoing rabbit culls are required. Rabbit electric fencing had limitations for larger scale sites.
- Other features of the site need to be considered when developing a management plan. Overgrazing is detrimental to the botanical interest of the sward but can be beneficial to other species, such as Lapwing.
- Occasional seaweed applications on bare and impoverished areas has a beneficial effect increasing forage production, stabilising sand and increasing plant species count.
- Application of a seed source in association with preventing rabbit grazing was successful and has a roll in future habitat management on Machair.
- Increasing public awareness does result in greater understanding of the works and is appreciated by the local community. The local farmers had difficult previous to this in getting interest for public awareness of the site when they tried to construct suitable information points.

6.0 Actions to carry forward

The work completed under Caomhnú Árann will continue under the new ACRES BurrenAran CP project. A number of the farmers with shares in the commonage have entered the new agri-environment scheme. Within this a results based scoring scheme will be implemented and the project team, from the ACRES BurrenAran co-operation project, will work with the farmers to implement non-productive investments and landscape actions which to continue to improvements on the site. This will be aided greatly by the existing work completed, particularly the rabbit control and the improved access works.

The ACRES BurrenAran team will continue to monitor the site, particularly in relation to the lapwing numbers and work with the local community to improve awareness. Some of the enclosure cages will remain as this may act as a potential seed source allowing the colonisation of more bare areas.

Rabbit populations will continue to be an issue on the Machair, as complete control was not achieved nor desirable. Future works needs to consider this aspect of habitat management. However recent sightings of stoats in the area may mean a greater level of natural control of the rabbits (Fig.20).



Fig.20 Recent sightings of stoats on the Machair may aid in controlling rabbit numbers in the future.

7.0 Details of dissemination of project findings

To aid management and inform the public, notice boards were placed around the site during the lapwing breeding site. This was initiated by the farmers as there were concerns regarding a high number of people exercising on the site with unleashed dogs. These notice boards will be maintained by the farmers and the Acres BurrenAran Co-operation team. Details of the notice boards are detailed in Figure 21. The co-operation team are looking at ways of continue to raise awareness of the importance of the site and have spoken to some of the tour guides on the island as this further raises awareness on the importance of the site.



Fig.21 The information signs that are been used to raise awareness of the site and limit disturbance during the nesting season.

Bird count results have been forwarded to the project partners, including NPWS but the project has also contacted Birdwatch to make them aware of the importance of the site for Lapwing. All other recordings for plants and birds will be passed to Biodiversity Ireland.

Using drone footage and GIS technology details of the damage to the Machair have been documented, both historic and present data. This will enable future work and competent authorities to establish whether the site is continuing to improve.

The project has also worked closely with the new LIFE on Machair project. LIFE on Machair project aims improve the conservation status of Ireland’s Machair grassland and Fixed dune habitats and the ecological conditions for breeding waders and pollinators on a number of Machair sites but does not include Trá Mór. The project will run over the course of six years, from 2022 to 2028. Patrick Mc Gurn, the project manager, spoke at an event run by LIFE on Machair and visited a number of their sites to share information and experiences of our own project (Fig.22). The trial works completed under this project, collection and dispersal of wildflower seed, use of seaweed and using enclosure cages as a means of determining grazing pressures have been incorporated into the LIFE project.



Fig.22 Patrick McGurn, Project Manager with Caomhnú Árann EIP discussing the project works to a group of Machair commonage farmers in Ballyconneely.