Darwin Plus:
Overseas Territories Environment and Climate Fund

Final Report

Important note: *To be completed with reference to the Reporting Guidance Notes for Project Leaders: it is expected that this report will be a maximum of 20 pages in length, excluding annexes*

Darwin Project Information

Project Ref Number	DPLUS017
Project Title	LOWER PLANTS INVENTORY AND CONSERVATION IN THE FALKLAND ISLANDS
Territory(ies)	FALKLAND ISLANDS
Contract Holder Institution	FALKLANDS CONSERVATION
Partner Institutions	NATIONAL MUSEUM OF WALES, BANGOR UNIVERSITY
Grant Value	£183,958
Start/end date of project	01st APRIL 2014 – 31ST MARCH 2016
Project Leader	ANDREW STANWORTH
Project website	Various (see below)
Report author and date	DAFYDD EGRYN CRABTREE – MARCH 2016

1 Project Overview

The Falkland Islands (FI) archipelago comprises two main islands (East Falkland and West Falkland) and 703 smaller islands with a total land area of ca. 12,100 square kilometres. The archipelago is situated in the South Atlantic, circa 300 miles east of South America and 800 miles north of the Antarctic Peninsula.

Climatic conditions and a relative lack of competition from vascular plants contributes to an extensive lower plant flora in the Falkland Islands, with a high diversity of mosses, liverworts and lichens. These non-flowering plants also play an important role in the ecosystem services of the islands, e.g. through soil/peat formation and carbon storage. They also influence water and nutrient cycling by retaining soil moisture and preventing erosion.

This project sought to address the 'critical knowledge gap' in lower plants and lichens that was identified in The Falkland Islands Biodiversity Strategy 2008 – 2018. The project also aimed to provide data essential for effective conservation planning and enhancement of the 'Important Plant Areas' of the Falkland Islands. The project applied the ecosystem approach: a combination of taxonomic/biogeographical survey with consideration of the role of lower plants and lichens in providing ecosystem services, including cultural and educational benefits.

2 Project Achievements

2.1 Outcome

All but one of the project Outcomes as presented in the original proposal have been achieved, and several have been exceeded. Output 1.7 has nearly been completed with two published papers and two in press however many more journal articles are in preparation by specialists around the world as a result of the Darwin Initiative project. There is full confidence that this output will be completed within two months. The project has operated through a combination of continuous field work conducted by the Project Officer based in the Falklands, and four collecting expeditions organised by the Project Officer for teams of external specialists in bryology and lichenology. A greatly improved and updated species list of lower plants has thereby been created for the Falkland Islands, and many new taxa have been added as records, including species new to science.

Publicity about the project has been conducted through multiple media outlets and has raised awareness in the Falklands concerning the importance of lower plants for the island's biodiversity. It has also informed local communities about the role of lower plants in the

"economy of nature", particularly soil and water retention and the slowing of erosion, both of which are factors of great importance for land management in the Falklands.

The permanent legacy of the project includes the setting-up of botanical study facilities at two key sites in the Falkland Islands (at the Falklands Conservation Offices on East Falkland and at Fox Bay School on West Falkland).The facilities include microscopes, literature resources, field guides and consumable materials to aid in ongoing biological studies for residents and for visitors. These resources will continue to support studies of biological status and trends in the Falklands, as well as contributing to environmental education and community engagement in biodiversity conservation.

2.2 Outputs

Output 1.1: Recruit and train a Lower Plants Project Officer.

The Project Officer (Dafydd Crabtree) spent eleven weeks training at the National Museum of Wales (NMW) in Cardiff, with a further week spent at the Royal Botanic Gardens, Kew. The NMW training was conducted by Dr. Ray Tangney, Project Partner and Head of Cryptogamic Botany, and Alan Orange, Curator of Lower Plants (lichenologist) at NMW. Training included microscopy, bryophyte and lichen identification techniques for South-Atlantic species, and the reading and copying of relevant taxonomic literature for the Falkland Islands. Training was also provided in field taxonomy, collecting methods, laboratory techniques, equipment management and herbarium methods, including processes for the exchange of specimens with experts around the World. Compound and dissecting microscopes were loaned and gifted to the project and other laboratory consumables were provided by NMW.

A week was also spent by the Project Officer, training at Kew Gardens with former Falkland Island-based FC Plants Officer, Dr Rebecca Upson. This included an introduction to Important Plant Areas of the Falklands, planning of fieldwork and an introduction to the FI habitat classification system. A photo-database at Kew was used to cross-reference species and habitat types in order to facilitate field survey and expedition planning. Training in survey skills and data collection standards was provided, along with exposure to GIS mapping software (e.g. ArcPad), and the BRAHMS herbarium management software.

Two days of 4x4 vehicle training was provided by Falklands Conservation at the Minsmere RSPB site, by a qualified off-road instructor in preparation for remote locality fieldwork in the Falkland Islands.

Output 1.2 – Undertake 3 field expeditions

The first of the three proposed field trips (lichens and mosses) was undertaken between 16th of January and the 6th of February 2015. Field vehicle (Land Rover) capacity allows for four team members with space for support equipment and specimen storage. The first expedition team comprised Project Officer Dafydd Crabtree, Dr. Ray Tangney (NMW bryologist), Alan Orange (NMW lichenologist) and Dr. Alan Fryday (Southern Islands lichen specialist from Michigan State University in the USA).

Week one was spent surveying sites on East Falkland, including Mount Kent, Two Sisters and Cape Pembroke. The team surveyed Weddell Island for 3 days, with a day in Port Stanley for specimen processing. The second week was spent in West Falkland, surveying the Hornby Mountains, Fox Bay area, and Port Stephens. The final week was spent on East Falkland, with survey work in the North Arm and Lafonia. Additional time was spent sorting specimens, obtaining phyto-sanitary certificates and packing bryophyte and lichen material for dispatch overseas. A total of 700 lichen specimens (ca. 40kg) and 354 moss samples were collected, with reference specimens retained in the Falklands and duplicates distributed to overseas partner institutions for critical determinations.

The second scheduled field expedition (liverworts and mosses) took place during three weeks in November 2015, with three overseas scientists participating (Dr Ray Tangney (NMW

bryologist), Dr. Matt von Konrat (Hepatic specialist from the Chicago Field Museum) and Dr. Juan Larrain (Post-Doctoral bryologist at the University of Chile, Santiago)). Areas visited included Saunders Island, Pebble Island, Port San Carlos, Shallow Bay, Mt Adam and Dunbar, Fox Bay, Lafonia and Mt Usborne. Over a thousand specimens were collected, with samples retained in the Falkland Islands reference collection and duplicates distributed to overseas institutions for critical determinations.

The third expedition (two weeks in November 2015) was the lower plants and peatlands ecosystem services study, with the team comprising Prof Ed Maltby (Emeritus Wetland Science, Liverpool University), Dr Chris Evans (Centre for Ecology and Hydrology, Bangor), Dr. Shaun Russell (Bangor University) and Rosemary Maltby (Field Assistant). Habitat assessment and peat coring was conducted at existing and new study sites across East and West Falkland. The field study collected hundreds of moss peat depth-probe measurements and took 20 peat cores for later content/composition analysis. A special visit was made to a remote part of West Falkland as a result of a major peat fire (12km^2) which occurred during the time of the expedition. The ecosystem services team conducted a questionnaire survey of the local Falklands community, concerning knowledge and understanding of the peatland services of the Islands. Presentations were made about the research and the survey on local TV and radio, and a 2-hour presentation with interactive question and answer session was held at the Chamber of Commerce in Port Stanley on November 25th, 2015 (attended by 40 members of the public).

Because of the high number of new and interesting records obtained during the first expedition (Jan-Feb 2015) especially in regard to the lichens, funding was leveraged from external sources to support an additional visit by the lichenologists in 2015. During October of that year, Alan Orange (NMW) and Alan Fryday (Michigan) conducted a further two weeks of studies in the Saunders Island, Shallow Bay and Lafonia areas. A further 700 lichen specimens were collected (35kg), with duplicates distributed to project partner institutions for critical determinations. This fourth expedition was additional to the three planned project visits and was an example of the Darwin project's ability to 'leverage' supplementary activity through its impact and outreach.

A short four day collecting trip was conducted on South Georgia to gather 15 specimens of common Falkland species for the National Herbarium. This was to increase genetic diversity of housed specimens, to display species that displayed degrees of polymorphism and to have a cross-UKOT component for the Herbarium.

Output 1.3 – Produce updated lists of bryophytes and lichens

Species lists for the three taxonomic groups studied in this project (mosses, liverworts and lichens) have been included in Annex 4. New records for the Islands are highlighted in red and species that are new to science are highlighted in green. The scientists who have contributed to the project now consider that these lists are representative of circa 98% of the Falkland Islands lower plant and lichen flora. Determinations of difficult specimens and the taxonomic description of new species is ongoing, and academic publishing will continue long after the Darwin project has officially terminated. As a result of this project, studies of the taxonomy and biogeography of the Falkland Islands flora now have an extensive and reliable base-line and the project partners have undertaken to carry on this work beyond the currency of Darwin funding. The hepatic list is featured on the www.bryologyportal.org website, and when complete it will be fully featured including distribution maps, species descriptions, images, and label data - all openly accessible and searchable. The species list can be found at this website: http://bryophyteportal.org/portal/checklists/checklist.php?cl=69&pid=11

Output 1.4 – Establish lower plants GIS database

Using software developed by Oxford University; Botanical research herbarium management system (BRAHMS), a database of Falkland Islands bryophyte and lichen species has been created. This includes records from the existing literature, and specimens from earlier visits such as the lichen collections of Imshaug and Harris in 1968 (Michigan Herbarium) and the

John Engel hepatic collections, also of 1968 (Chicago Field Museum). The specimens from this Darwin project's four collecting expeditions, have been supplemented by the continuous sampling activity of the Project Officer during his two years based in the Falklands. The database in BRAHMS is not exclusive and can be opened and viewed through other available GIS software such as ArcMap and QGIS, increasing its value with other institutions. Now totalling over 9000 records, this database has greatly increased the accuracy of distribution maps created by the BRAHMS software, and is adding to the reliability of evidence for conservation and development planning in the Falklands.

Output 1.5 – Produce identification 'flip-guides' for common bryophytes and lichens

The project has created reproducible, loose-leaf reference and identification guides to the mosses and liverworts of the Falkland Islands, with descriptive text and illustrations for over 95% of the bryophytes recorded so far. It combines outputs of the current project with earlier work by, for example, John Engel (Chicago Field Museum) and Prof Jeff Duckett (Natural History Museum, London). The reference guides are held in hard copy and digital format at Falklands Conservation Offices (East Falkland) and Fox Bay School (West Falkland). Similar reference material is available for the lichens, and the project has exceeded its programmed output in respect of this group through the production of a book on the lichens of the Falkland Islands (author - Alan Orange (NMW)). The book contains descriptions of 100 species that are commonly found on the islands, accompanied by high quality photographs. 250 copies of the book have been printed to be sold through Falklands Conservation, the museum in Port Stanley and over the internet with NHBS as a distributor. This is an important legacy of the Darwin project, as until now there has been no equivalent text on lower plants for the Falkland Islands. Upgrading of the moss and liverwort guides to a similar high quality book format is a legacy activity of the current project that is continuing through the NMW-Chicago Field Museum collaboration.

Output 1.6 – Produce Ecosystem Services scoping report

Professor Ed Maltby (Emeritus Liverpool University), Dr Chris Evans (Centre for Ecology and Hydrology) and Dr Shaun Russell (Bangor University) carried out a pilot study of the ecosystem services of lower plants and peatlands in the Falkland Islands, during a two-week visit in November 2015. Numerous sites on East and West Falkland were visited and sampled, presentations were made to the local community (through broadcast media and a public event) and a questionnaire survey of the local community was conducted on peatland ecosystem services. The resulting pilot report is presented at Annex 5. Key findings were that lower plants contribute significantly to the soils and peatlands of the Falklands; that carbon reserves are significantly greater than has hitherto been recognised; that erosion is occurring at alarming rates and that mitigation measures through land management interventions will be needed in the future. Peat is deeply entrenched in the cultural history of the Falkland Islands and an annual "Peat-cutting Day" is observed by the local community. More work is urgently needed to fully quantify the extent of carbon reserves in the Falklands, and to inform land management measures to combat erosion.

Output 1.7 – Publish four peer-reviewed papers and articles.

The project has already published two journal articles on the lower plant flora of the Falklands:

Ochyra R, Crabtree D & Tangney R (2015). Studies on mosses in the Falkland Islands: I. Bucklandiella and Codriophorus (Grimmiaceae). Cryptogamie Bryologie 36(3).

Søchting U (2016). *Sirenophila ovis-atra* a new species of maritime Teloschistaceae from the Southern Hemisphere. Opuscula Philolichenum 15:1-5.

Two further papers are currently awaiting publication:

Fryday A (in press). Additional data on the genus *Austrella* (Pannariaceae, Collematineae, Peltigerales), including a new species from the Falkland Islands. The Lichenologist.

Fryday A (in press). Additions to the genus *Endocena* (Icmadophilaceae): a new combination and a new variety. The Lichenologist.

Many more journal articles are in preparation by specialists around the world as a result of the Darwin Initiative project. These will be published in the near future with full acknowledgement of the Darwin Initiative contribution. Several undetermined specimens are being closely studied at the moment and are thought to represent species new to science. The updated species lists for lichens, mosses and liverworts of the Falkland Islands can be consulted through contact with the project partners, and these will be formally published during 2016-17. As stated above (Output 1.5) books on the mosses and liverworts of the Falklands are in preparation and the book-format guide to the common lichens has already been completed. This work represents a major leap forward in botanical and biogeographical knowledge of the Falkland Islands (and the UKOTs) and is contributing to conservation planning and environmental education.

Output 2.1 – Provide management guidelines for important habitats' and species with localised distribution

The process for identifying and designating Important Plant Areas in the Falkland Islands has been developed and tested mainly in relation to flowering plants. As lower plants are such an important part of the flora, the current project has provided a greatly improved evidence base that now allows for all plants of a habitat to be considered when decisions are made on the designation of protected areas. Guideline materials on conservation planning for lower plants have been collected in the Falklands Conservation library and shared with conservation workers and officials. Information has also been provided on lower plant "hotspots" that will also be taken into consideration for habitat protection as conservation planning proceeds in the Islands.

Output 2.2 – Contribute to Species / Habitat management plans (or action plans) produced for Government, public authorities and other implementing agencies in the host country

The greatly enhanced knowledge of species presence and distribution that has resulted from this Darwin Initiative project, is helping to provide a far more comprehensive evidence base for land management and conservation planning in the Falkland Islands. From its inception, the project has maintained close links with the Environmental Planning Department of the Falklands Government, and all of the projects' outputs have been made available to environment and agriculture officials for consideration in planning decisions. A review of the Falkland Islands Biodiversity Framework is just occurring and the priority species list is being defined. A ten page document has ben constructed that lists ten species that are rare in the Falklands or have a restricted distribution that may be considered as part of the review for Species Action Plans. These include images, text descriptions and distribution maps. Further outputs on species distribution and ecosystem services provision will continue after the Darwin project ends, and will continue to be shared with local planning interests as they emerge. The lead external partners (National Museum of Wales and Bangor University) have promised to continue their ongoing links with Falklands Conservation and their engagement in environmental research at the Islands.

Output 2.3 – Enhance database of lower plant species distributions and conservation status for Falkland Islands

The Darwin Initiative Project Officer has set up the BRAHMS database at Falklands Conservation to incorporate all the FI lower plants information so that this platform now acts as an invaluable reference, mapping and planning resource for the Islands. It contains ample capacity to accommodate large amounts of new data, and a locally resident specialist has been trained to maintain and expand the database in the future.

Output 2.4 – Provide lower plants training and mentoring

The project has produced a bryophyte and lichen curation guide, detailing reference collection storage and exchange protocols for use by the Falkland Islands Herbarium. Tailored training, including management of the BRAHMS database, was provided for the volunteer Curator of the FI Herbarium (Helen Marsh). The lower plant specialists at the National Museum of Wales (Ray Tangney and Alan Orange) will maintain the specimen exchange programme and mentoring relationship with Helen, after the Darwin Initiative project has come to an end. The training workshop for the community at FICS in January 2015 was also attended by Falklands Conservation staff, with training in morphology, collecting and taxonomy.

Output 3.1 – Establish a reference collection in FI for bryophytes and lichens.

The project has added specimens of circa 100 accurately diagnosed and annotated moss species, and a further 100 lichen species to the official Falkand Islands herbarium reference collection, with full sets of duplicates lodged in the UK and the USA. Specimens of a similar number of hepatic species will be added to the collection when the final determinations have been carried out at the Chicago Field Museum and the Natural History Museum (London) (NHM). Specimens of more species will be added to the Herbarium as they are determined at the principal partner institutions overseas, and by taxonomic specialists around the World.

Towards the end of the project, a three day collecting trip was conducted by the Project Officer to South Georgia, to gather material of species that also occur commonly in the Falklands, to allow for critical biogeographical and genetic studies, especially of polymorphic species. This has added a cross-UKOT component to the herbarium

Output 3.2 – Establish a network for dissemination of results to peers

A strong network of international specialists was assembled to assist the core team members with the lichen and bryophyte studies for this Darwin Initiative project. The core team comprised:

Dafydd Crabtree (Project Officer, Falklands)
Dr Ray Tangney (NMW)
Dr Shaun Russell (Bangor University)
Alan Orange (NMW)
Prof Ed Maltby (Emeritus Liverpool University)

Additional self-funded specialists were recruited at an early stage of the project:

Prof Jeff Duckett (NHM)
Dr Alan Fryday (Michigan State Herbarium)
Dr Matt Konrat (Chicago Field Muesum)
Dr Juan Larrain (University of Chile, Santiago)
Dr Ryszard Ochyra (Institute of Botany, Polish Academy of Sciences)

Further specialists have come on board following exposure of the project at various events held in the Falklands, the UK and Chile (see also Output 4.1 below):

Dr. Maria Teresa Morales (Murcia University, Spain) (input for *Syntrichia*, *Tortula, Hennediella)*
Dr John Spence (Denver Herbarium, Northern Arizona Univ.) (*Bryum*, *Rosulabryum, Pohlia)*
Dr Barbara Murray (Curator, University of Alaska Herbarium) (Andreaeaceae)
Dr Ron Lewis-Smith (ex British Antarctic Survey) (bryophytes and lichens of Antarctica).
Dr Bruce Allan (Curator, Missouri Botanic Gardens)

Project Partner Dr Shaun Russell attended the biennial Congress of the International Association of Bryologists (IAB), held in Puerto Williams, southern Chile, in January 2015. Dr Russell made three presentations on behalf of the Darwin Initiative project: 1) Tangney RS & Russell S. Moss flora of the Falkland Islands; 2) Duckett J. (NHM) Liverworts of the Falkland Islands; 3) a workshop session on lower plants and “Citizen Science”, including the ways in which the local community have become engaged in the Darwin Initiative project in the Falkland

Islands. This exposure helped to disseminate information about the project more widely, and to attract the interest and assistance of many international bryologists.

Output 3.3 – Establish permanent monitoring plots

Permanent vegetation monitoring plots have been set up at the site of the earlier climate change study plots at Saladero Farm on East Falkland. The site is located in costal, oceanic heathland comprising mainly Whitegrass (*Cortaderia pilosa*) and Diddle-Dee (*Empetrum rubrum*). Nine plots have been established and are protected from grazing animals. Percentage cover of lower plants has been recorded, along with vascular plant species and overall vegetation cover. The FI Government Department of Agriculture has agreed to safeguard the plots, and follow-up surveys are planned by Falklands Conservation staff on a five year timescale. The next survey of the permanent plots at Saladero Farm plots will take place in 2021.

Output 4.1 – Run education and training workshops for the local community

At the end of the January-February 2015 field trip, an educational workshop was advertised in the local Falkland Islands newspaper. Entitled: 'Workshop on the common lichens and mosses of the Falkland Islands', the event was held at the Falkland Islands Community School in Port Stanley (East Falkland). Twenty two members of the local community took part in the workshop, including four staff of the South Atlantic Environmental Research Institute (SAERI), two teachers from the Community School and four staff of Falklands Conservation. Other participants included landowners and townspeople from Port Stanley. Four team members (Crabtree, Fryday, Orange and Tangney) delivered the workshop which included: 1) a general introduction to the Falkland Island species; 2) basic morphology and taxonomy of the groups; 3) practical work on macro-characteristics of common species; 4) hand-lens and microscope work to show the broad range of different species of lower plants and lichens found in the Falkland Islands. Feedback was consistently excellent, with participants expressing surprise and delight at this exposure to an aspect of the Islands' biodiversity that few were previously aware of.

An additional workshop aimed at a younger audience was held in January 2015, at the Fox Bay School in West Falkland. This workshop introduced pupils and teachers to the general characteristics of bryophytes and lichens, through the use of live specimens, hand-lenses and a camera microscope. A field trip was conducted in the area around Fox Bay to familiarise the participants with the plants in their natural habitats. Once again, responses from the audience were highly positive, with many indicating that their eyes had been opened to an aspect of the Island's vegetation that they had not recognised before.

In July 2015, a display about the Darwin Initiative Lower Plants project (evidence.pdf) was exhibited by Falklands Conservation at the annual Farmers Week 'Expo' in the Port Stanley Town Hall. A public talk and 'hands-on' workshop on bryophytes was also presented by the Project Officer during the 'Expo' week. The importance of lower plants in Falkland Islands vegetation and their role in soil moisture retention and carbon storage was emphasised to the audience which was principally from the farming community.

In the UK, information about the project was exhibited on the Falklands Conservation stall at the International Bird Fair in Rutland (20th – 23rd August, 2015).

On 25th November, 2015, the West Falkland workshop was repeated at Fox Bay School for a wider audience of pupils and local residents. Team members Ray Tangney, Matt von Konrat and Juan Larrain delivered the workshop on Mosses and Liverworts, with a programme of field study in nearby habitats and microscope work in the classroom. Participants learnt how to collect, preserve and correctly label specimens, with habitat, altitude and GPS coordinate data. Again, participants showed great interest and delight, especially at the beauty and complexity of these small plants, when observed through the dissecting and compound microscopes.

In November 2015, a public lecture with question-and-answer session was delivered by the project's ecosystem services team at the Chamber of Commerce in Stanley. Professor Ed Maltby and Dr. Shaun Russell spoke about 'Ecosystem Services and Nature's Benefits for the People of the Falkland Islands'. The event was attended by 40 local residents who also responded to the project's questionnaire survey on awareness and importance of peatland ecosystem services in the Islands. A second talk and presentation was conducted by Dr. Tangney, Dr. Konrat and Dr. Larrain in November 2015. This was part of the Falklands Conservation AGM which was attended by all present trustees, staff and members of the local community. Progress, results and interesting findings were discussed in the two hour talk.

During the two-year course of the project, the Project Officer also provided familiarisation sessions on bryophytes and lichens to selected secondary-level students from the Falkland Islands Community School (FICS) who receive work experience with Falklands Conservation. The sessions included field work, collecting and labelling techniques, characteristics of the principal lower plant groups, preparation techniques for microscopic specimens and chemical testing for the identification of lichen species.

Output 4.2 – Produce training materials for 40 workshop participants.

PowerPoint presentations with hand-out materials were created for all the workshops and presentations delivered as part of the Darwin Initiative Lower plants project. These included a general introduction to the morphology and taxonomy of the mosses and lichens of the Falklands, and an overview of the more common and conspicuous species of the Islands. Species information sheets were produced whenever live and dried specimens were displayed, including drawings, defining-characters and simple chemical reagent tests that are used to identify lichen species.

Laminated A2 posters were produced for the events and displays (evidence.pdf). These included a poster about the Darwin Initiative project and the importance of lower plants in the Falklands, and a poster on macro and micro characters that are used to differentiate and determine lower plant species. High quality images were used to demonstrate bryophyte and lichen characteristics, and a poster on members of the *Racomitrium* group of mosses focussed down on fine characteristics of discrimination for closely-related species.

With a donation from an external sponsor, a dissecting microscope and a compound microscope have been left by the project to equip the biological study facility and research centre at Fox Bay School in West Falkland. The project also supplied microscope slides, petri dishes, dissecting equipment and training materials such as reference guides that will continue to be used by the School and by scientists visiting West Falkland in the future.

Output 4.3 – Produce four host country and UK national press releases

Information about the Darwin Initiative project was distributed to an overseas audience by the Project Officer, during his attendance at an international bryological workshop held at Oregon State University in May 2015. A two-page article on the early results of the project was published in the Falklands Conservation magazine in summer 2015, following the first field expedition. A follow-up article on project progress was published in the winter (2015-16) edition of the Falklands Conservation magazine, with circulation to hundreds of FC members worldwide. This article included a two-page spread on the project's achievements over the preceding two years, and a report on the supplementary lower plants collecting expedition to South Georgia. A further article has been prepared for a regional newspaper in the UK (Wales), highlighting the importance of bryophytes and lichens, and the objectives and achievements of the Darwin Initiative project.

An article was published in the UK regional newspaper The Caernarfon and Denbigh Herald in May 2016. The article mentioned project objectives, results and information regarding the funding bodies.

A two page article was included in the May 2016 Darwin Initiative quarterly newsletter, on the highlights and results of the project.

The National Museum of Wales has blogged and tweeted about the project and its expeditions online, and many contributing scientists have also disseminated information about the project in their own popular publications and on their social media feeds e.g. Kew Gardens.

Output 4.4 – Produce 4 host country TV and radio press releases

On the 10th of February 2015, a live interview was conducted with BBC Radio Wales to highlight the Darwin Initiative Falkland Islands Lower Plants Project. The purpose of the interview was to explain the Project Officer's work in the Islands, detailing the nature of the project, its objectives and the general ecology of the archipelago. A further live radio interview with the BBC took place on the 15th of June 2015, with emphasis on field work experiences and the discovery of new plant records and possible new species.

Professor Edward Maltby and Dr. Shaun Russell were interviewed about the project, live on the Falkland Islands Radio Service in November 2015. They discussed the benefits of ecosystem services for the people of the Falkland Islands and the successes of the Darwin Initiative lower plants project. They advertised the peatland ecosystem services presentation at the Stanley Chamber of Commerce, which helped to attract an audience of 40 community members to the event. Prof Maltby also conducted an interview about the project with the Falkland Islands TV station, which was aired for a week on a loop at the local TV channel.

Output 4.5 – Produce 4 newsletter articles

Three articles have been completed for the Falklands Conservation Newsletter which is distributed locally and internationally via the Internet. The first article was produced in September 2014, announcing the arrival of the Project Officer and the objectives for the two-year study. The second article was published in February 2015 and covered the first local community workshop and the role of the visiting scientists. This article also covered the implementation of the field work, data collection and new records for the Islands. The third newsletter article was published in January 2016 and covered the fieldwork conducted in October and November 2015. Shortly after the project began, Falklands Conservation reduced its frequency of publishing from four to two newsletters per year. The fourth lower plants newsletter contribution will therefore be published later in 2016, after the project has ended.

2.3 Sustainability and Legacy

Awareness of the work that the Darwin Lower Plants Project has undertaken, has been raised through many activities with the local community in the Falkland Islands and through outreach overseas. In January 2015, UK project partner Dr Shaun Russell attended the International Association of Bryologists biennial Congress in Puerto Williams, Chile, where he gave three presentations relating to the project (see Output 3.2 above). As a result, many specialist contacts were made for the identification of collections and contributions to the remainder of the project during 2015/16.

The print and broadcast media have been used to raise awareness of mosses, liverworts and lichens in the Falklands, in order to fuel interest in the continuing study of the plants of the archipelago after the Darwin project has ended. Articles have been written for the Falklands Conservation magazine and Newsletter detailing highlights and outputs of the project. The high levels of turnout for the workshops, presentations and field trips, demonstrated the interest that was stimulated by the project, among Falkland Islanders who wished to learn more about the nature, ecology and biogeography of the Islands. The involvement of schoolchildren in many of the training events has also helped to embed an awareness and appreciation of non-flowering plants among the younger generation in the Islands.

A major legacy of the Darwin project is the fully functional bryophyte and lichen laboratory and herbarium reference collection with library at Falklands Conservation Offices (East Falkland), and the satellite facility at Fox Bay School (West Falkland). The knowledge of Falklands

Conservation staff and the local community has been enhanced and the ongoing stream of taxonomic papers and field identification guides and books, are key legacy products that will inform professional and amateur studies of the Islands' biology for years to come. The project has achieved its objective of closing the "critical knowledge gap" identified by the Falkland Islands Biodiversity Strategy 2008 – 2018. It has also established a sound evidence base and global resource for wider taxonomic and biogeographical studies of the plants of the high southern latitudes.

3 Project Stakeholders

Falkland Island stakeholders and project staff

All Falkland island stakeholders and project partners have shown strong support for the project. Project leader Dr. Andrew Stanworth (FC - Conservation Manager) has given advice on relationships with landowners and the planning of field work in remote areas. Monthly meetings were held throughout the project's duration, with the FC Watch Group Leader and the Community Engagement Manager, on the educational and outreach aspects of the project including workshop planning and school visits. Meetings were held with the Falkland Islands Government Environmental Planning Officer, Nick Rendell, to update the FI Government on the findings of the project, particularly with reference to the Falkland Islands Biodiversity Framework and for protected area planning.

International stakeholders and project staff.

During training in May and June 2014, the Project Officer met with collaborators at the Royal Botanic Gardens Kew and Professor Jeff Duckett at the Natural History Museum. Dr. Rebecca Upson (Kew Gardens) has given support and advice throughout the project, by email and during her visit to the island in March 2015 as part of the EU-BEST climate change project. This included advice on database maintenance, GIS software and herbarium management. Professor Jeff Duckett allocated time for the sorting and sending of hepatic specimens for the FI Herbarium, from the 2011 reconnaissance expedition, while continually giving advice on the South Atlantic hepatic flora. Throughout the project there has been continuous and close collaboration between the Project Officer in the Falklands and the core team members Dr. Ray Tangney and Alan Orange (National Museum of Wales), on project processes, the coordination of contributions from external experts and the publication of results from the field work. Project Partner Dr Shaun Russell (Bangor University) has provided advice and guidance on Darwin Initiative administrative processes, project outreach at international events, and a direct contribution to the ecosystem services component of the project.

4 Lessons learned

The four collecting expeditions were the highlight of the project, with exciting and sometimes unexpected results accruing from intensive collecting periods spent in the field by the visiting scientists. Patterns of species diversity and frequency of new records became more apparent after the first field expedition, and helped direct effort for maximum benefit in the ensuing expeditions. The continuous studies of the Project Officer based in the Falklands, helped to achieve wide coverage of collections from across the archipelago, and confirm hotspots versus relatively depauperate areas. Many new records of taxa were thereby added to the species lists for the islands, and publications on several species that appear new to science will be forthcoming over the next two years. These findings confirm the knowledge gap that had been identified prior to the project, and justify the efforts of the project to address this deficit.

The results of the field investigations take time to process and many specimens are still being studied by the collaborating institutions overseas. However, a much-enhanced picture of the Falklands lower plant flora has emerged after two years, with only a tiny percentage of specimens still proving difficult to determine. One of the most valuable lessons learned by the Project Officer, was the 'etiquette' of managing contributing scientists who are volunteering their time and effort to the project without remuneration. Some of the world's leading bryological

and lichenological specialists have contributed to the project, and it has sometimes proved to be a challenge over the short timescale, to secure prompt and timely responses from busy contributors who are scattered widely across the globe. Setting monthly goals and targets is fine when planning a project, but there will always be a need to adjust and adapt when relying on over-worked partners who are contributing their time voluntarily. In this project it has been a price worth paying because of the expert and authoritative nature of the inputs to the taxonomic work, and the major leap forward in knowledge of the Falkland Islands flora that the project has delivered.

4.1 Monitoring and evaluation

Since the start of the project, regular communication was maintained with the project's core team members and the network of international specialists. During the reporting period, Dr Ray Tangney at the National Museum of Wales was provided with fortnightly communications on the progress of the project, focussing principally on the arrangements for the field expeditions, updates on the Project Officer's collecting and identification work, and outreach activity with the local community in the Falkland Islands. There has been a continuous flow of specimen exchanges between Falklands Conservation and NMW. These have included reference specimens from NMW for the Falklands Herbarium and newly collected specimens from the Falklands for critical determination in the UK and elsewhere. Collaborators at NMW, and in Bangor, Santiago, Chicago and Michigan, have committed to work with Falklands Conservation on the lower plants of the Falklands, after the Darwin Initiative project has officially ended.

Due to distance of separation, project Steering Group meetings between Falklands Conservation and Falkland Islands Government staff on the one hand, and project partners in the UK on the other, they have generally taken place whenever the opportunity arises, such as when the expedition teams have visited the Islands. Former Falkland Islands based FC Plants Officer, Dr Rebecca Upson, accompanied by Dr. Colin Clubbe (Kew Gardens, London) visited the Islands in March 2015 as part of the EU-BEST climate change project. This provided an additional opportunity to monitor and assess progress with the project, particularly in regard to the BRAHMS taxonomic mapping database, data entry protocols and GIS aspects of the project.

All project progress and achievements were collated and reported to the Darwin Initiative on a six-monthly and annual basis.

4.2 Actions taken in response to reviews of annual reports

1. Include greater detail on the cause of undertaking one less period of fieldwork than originally planned for year 1, and the implications.

   It had been envisioned at the end of Year 1, that due to unexpected commitments for some of the scheduled visiting scientists, it might not be possible to complete the promised programme of three expeditions over the course of the two year project. However, team members pulled out all the stops to step up their own and others' contributions to the project, resulting in four expeditions plus the supplementary South Georgia excursion being completed by project's end.

2. Include detailed updates of progress against all outputs.

   These were included systematically in six-monthly and annual reports.

3. Include evidence of impacts of training and awareness raising activities.

   Evidence has been included in the Report in the form of pictures, scans of magazines and newsletters, and copies of outreach articles on the internet, Facebook and Twitter.

4. Develop a clear exit strategy to ensure that project outputs are sustained beyond the life of the project.

Project legacy has been secured through the setting-up and equipping of the biological study facilities in East and West Falkland. These units are staffed by volunteers from the local community who have received relevant training from Darwin Initiative project team members. The facilities include the enhanced herbarium and reference library in Stanley, with the BRAHMS database, and the biology study space at the Fox Bay School. Having the projects study facilities and trained staff as a permanent part of Falklands Conservations future has added to the legacy of the project by becoming a permanent component of the organisation and research institutions here in the Falkland Islands.Team members based at NMW and in Bangor, Chicago, Michigan and Santiago, have pledged to continue their engagement with Falklands Conservation staff as knowledge of the Islands' lower plant flora continues to accrue and deepen.

5 Darwin Identity

The Darwin Initiative logo has been presented on all publications and project documentation in the Falklands, and at all public events. This included the Falklands Science Week poster, the community training workshop, and in the Falklands Conservation Newsletter and Magazine articles. Overseas, the Darwin Initiative has been highlighted on a national UK radio station, and at the International Association of Bryologists biennial Congress which was inaugurated by the President of Chile. The logo and work of the Darwin Initiative was also presented by the Project Officer at a 4-day bryophyte workshop in Oregon State, USA in May 2015. In March 2016, The Blue Planet Society (which has an outreach readership of 120,000 people) blogged about Falklands Conservation and its Darwin Initiative projects from its website.

Awareness of the Darwin Initiative is high among local people in the Falkland Islands, due to the number of Darwin Initiative projects that have run there in the past. The Initiative is particularly appreciated by staff of Falklands Conservation, the South Atlantic Environmental Research Institute, and the Government Departments of Planning, Agriculture and Fisheries.

6 Finance and administration

6.1 Project expenditure

Project spend (indicative) since last annual report	2015/16 Grant (£)	2015/16 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs			**00**	
Consultancy costs			**00**	
Overhead Costs			**00**	
Travel and subsistence			**10**	
Operating Costs			**-10**	
Capital items			**-93**	**Herbarium cabinets were not purchased.**
Others			**00**	
TOTAL	**78,829**	**7793,044** **79,634**		

Staff employed (Name and position)	Cost (£)
Dafydd Crabtree – Project Officer	
Ray Tangney – Project Partner	
Alan Orange - Project Partner	
Alan Fryday - Project Partner	
Rebecca Upson – Project Partner	
Esther Bertram – Falklands Conservation CEO	
Farrah Peck – Falklands Conservation Office Manager	
Andrew Stanworth – Falklands Conservation Conservation Officer	
Elizabeth Milston – Falklands Conservation Community Engagement Leader	
David Spivak – Falklands Conservation UK Director	
TOTAL	**50538**

Consultancy – description of breakdown of costs	Other items – cost (£)
Ed Maltby – Peatland and Ecosystem Services Scoping Report	
TOTAL	**2000**

Capital items – description	Capital items – cost (£)
GPS Trimble Memory Card **Nails, Pipe – Peat Sampling Equipment**	
TOTAL	**36.000**

Other items – description	Other items – cost (£)
Postage + Office Consumables **Printing and Publishing Field Guide**	
TOTAL	

6.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Dr. Alan Fryday; In-kind contribution	
Dr. Juan Larrain; In-kind contribution	
Dr. Matt Konrat; In-kind contribution	
Dr. Shaun Russell	2500

TOTAL	**9500**

Source of funding for additional work after project lifetime	Total (£)
Dr. Alan Fryday; In-kind contribution	
Dr. Juan Larrain; In-kind contribution	
Dr. Matt Konrat; In-kind contribution	
TOTAL	**4000**

6.3 Value for Money

The project has provided excellent value for money, as it has met or exceeded most of its promised outputs and generated more new knowledge through the involvement of a wide network of scientific experts contributing on a voluntary basis. Large amounts of in-kind contributions have been made in terms of specialist time/effort and self-funded travel, as well as donations of equipment and consumables. Particular efforts were made to reduce long haul travel expenses and the high costs of accommodation in the Falklands, and many team members contributed from their own pockets or by readily accepting low-cost logistic alternatives in order to ensure that the project succeeded, both on time and within budget.

Annex 1 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1	Number of (i) students from the UKOTs; and (ii) other students to receive training (including PhD, masters and other training and receiving a qualification or certificate)	0
2	Number of (i) people in UKOTs; and (ii) other people receiving other forms of long-term (>1yr) training not leading to formal qualification	0
3a	Number of (i) people in UKOTs; and (ii) other people receiving other forms of short-term education/training (i.e. not categories 1-5 above)	0
3b	Number of training weeks (i) in UKOTs; (ii) outside UKOTs not leading to formal qualification	0
4	Number of types of training materials produced. Were these materials made available for use by UKOTs?	0
5	Number of UKOT citizens who have increased capacity to manage natural resources as a result of the project	2
Research Measures		
6	Number of species/habitat management plans/ strategies (or action plans) produced for/by Governments, public authorities or other implementing agencies in the UKOTs	0
7	Number of formal documents produced to assist work in UKOTs related to species identification, classification and recording.	7
8a	Number of papers published or accepted for publication in peer reviewed journals written by (i) UKOT authors; and (ii) other authors	2
8b	Number of papers published or accepted for publication elsewhere written by (i) UKOT authors; and (ii) other authors	0
9b	Number of computer-based databases enhanced (containing species/genetic information). Were these databases made available for use by UKOTs?	1 (yes)
9a	Number of species reference collections established. Were these collections handed over to UKOTs?	3 (yes)
9b	Number of species reference collections enhanced. Were these collections handed over to UKOTs?	0

Code	Description	Totals (plus additional detail as required)
Dissemination Measures		
14a	Number of conferences/seminars/workshops/stakeholder meetings organised to present/disseminate findings from UKOT's Darwin project work	5
14b	Number of conferences/seminars/ workshops/stakeholder meetings attended at which findings from the Darwin Plus project work will be presented/ disseminated	3
Physical Measures		
20	Estimated value (£s) of physical assets handed over to UKOT(s)	£4500
21	Number of permanent educational/training/research facilities or organisation established in UKOTs	2
22	Number of permanent field plots established in UKOTs	9
23	Value of resources raised from other sources (e.g., in addition to Darwin funding) for project work	

Annex 2 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. contact address, website)
Journal	Ochyra R, Crabtree D & Tangney R (2015). Studies on mosses in the Falkland Islands: I. Bucklandiella and Codriophorus (Grimmiaceae).	Polish	Polish	Male	Cryptogamie Bryologie	http://www.bioone.org/doi/abs/10.7872/cryb/v36.iss3.2015.289
Book	Alan Orange – Lichens of the Falkland Islands	English	Welsh	Male	Self Published	https://www.amazon.co.uk/Lichens-Falkland-Islands-Introductory-Guide-y/dp/1526201518

Annex 3 Darwin Contacts

Ref No	DPLUS017
Project Title	LOWER PLANTS INVENTORY AND CONSERVATION IN THE FALKLAND ISLANDS
Project Leader Details	
Name	Andrew Stanworth
Role within Darwin Project	Project Leader
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Phone	
Fax/Skype	
Email	
Partner 1	
Name	Dr Ray Tangney
Organisation	National Museum Wales
Role within Darwin Project	Project Partner
Address	
Fax/Skype	
Email	
Partner 2 etc.	
Name	Dr Shaun Russell
Organisation	Curator at Treborth Botanic Gardens
Role within Darwin Project	Project Partner
Address	
Fax/Skype	
Email	

Annex 4 Species Lists

Below are the species lists of the three taxonomic groups studied. The scientists who have contributed to the project now consider that these lists are representative of circa 98% of the Falkland Islands bryophyte and lichen flora. New records are highlighted in red, species that are suspected to be new to science are highlighted in green.

Moss taxa of the Falkland Islands

Achrophyllum crassirete (Matteri) Matteri
Achrophyllum magellanicum
*Acrocladium auriculatum (Mont.) Mitt.**
*Acroschisma wilsonii (Hook.f.) A.Jaeger**
Amblystegium serpens Schimp. in B.S.G.
Andreaea acutifolia Hook.f. & Wilson
Andreaea alpina Hedw.
*Andreaea appendiculata Schimp.**
Andreaea flabellata Müll.Hal.
*Andreaea flexuosa R. Br. Bis**
Andreaea parallela
Andreaea mutabilis Hook.f. & Wilson
Andreaea parallela Müll. Hal.
Andreaea pseudomutabilis Dusén
Andreaea rothii
Andreaea regularis Müll.Hal.
Andreaea rupestris Hedw.
Andreaea subulata Harv.
*Andreaea sp.**
Atrichopsis compressa (Hook.f. & Wilson) G.L. Sm.
*Bartramia ithyphylloides Schimp. ex Müll.Hal.**
Bartramia patens Brid.
Blindia curviseta Mitt.
Blindia magellanica Schimp. ex Müll.Hal.
Blindia torrentium Cardot & Broth.
Brachythecium albicans (Hedw.) Schimp.
Brachythecium austro-glareosum (Müll.Hal.) Paris
Brachythecium austro-salebrosum (Müll.Hal.) Paris
Brachythecium patagonicum
Brachythecium subpilosum (Hook.f. & Wilson) A.Jaeger
Brachythecium subplicatum (Hampe) A.Jaeger
*Breutelia angustiretis E.B.Bartram**
*Breutelia aureola (Müll.Hal.) Besch.**
Breutelia integrifolia (Tayl.) A.Jaeger
Bryoerythrophyllum recurvirostre (Hedw.) P.C.Chen
*Bryum (Gemmabrym) funckii**
Bryum (Gemmabryum) pabstianum
Bryum (Plagiobryoides) gilliesii
*Bryum (Plagiobryoides) platyphyllum**
*Bryum (Ptychostomum) eatonii**
*Bryum (Ptychostomum) gayanum**
Bryum algovicum Sendtn. ex Müll.Hal.
Bryum amblyodon Müll.Hal.
Bryum argenteum Hedw.
Bryum argenteum var. muticum
Bryum capillare Hedw.
Bryum dichotomum Hedw.
Bryum lamprocarpum Müll. Hal.
*Bryum microimbricatum**
Bryum miserum Cardot
*Bryum orbiculatifolium Cardot & Broth.**
Bryum pallescens Schleich ex Schwägr.
Bryum rhizoblastum Cardot & Broth.
Bryum sabuletorum Cardot & Broth.
Bryum subapiculatum Hampe
Bryum uvidum Cardot & Broth.

Gemmabryum caespiticium
Gemmabryum sp. unknown
Imbribryum laevigatum
Ptychostomum cf inclinatum
Ptychostomum inclinatum
Ptychostomum pseudotriquetrum
Rosulabryum billarderi
Rosulabryum macrophyllum
Rosulabryum perlimbatum
Rosulabryum sp unknown 1 "robust" ?
Rosulabryum sp unknown 2 ?
Calyptrochaeta apiculata (Hook.f. & Wilson) Vitt
Campylium polygamum (Schimp.) C.E.O. Jensen
Campylopus acuminatus Mitt.
Campylopus chilensis De Not.
Campylopus curvatifolius Cardot
Campylopus flexuosus (Hedw.) Brid.
Campylopus introflexus (Hedw.) Brid.
Campylopus modestus Cardot
Campylopus modestus var. deciduus Cardot & Broth.
Campylopus pallidus Hook.f. & Wilson
Campylopus pyriformis (Schultz) Brid.
Campylopus saddleanus (Müll.Hal.) Besch.
Campylopus spiralis Dusén
Campylopus sulphureo-nigritus Dusén
Campylopus vesticaulis Mitt.
*Catagonium nitens (Brid.) Cardot**
Catagonium nitidum (Hook.f. & Wilson) Broth.
Ceratodon purpureus (Hedw.) Brid.
Ceratodon purpureus var. falklandicum Cardot & Broth.
Chorisodontium aciphyllum (Hook.f. & Wilson) Broth.
Chorisodontium dicranellatum (Dusén) Roiv.
Chorisodontium leucopterum (Müll.Hal.) Roiv.
*Conostomum magellanicum Sull.**
Conostomum pentastichum (Brid.) Lindb.
Cratoneuropsis relaxa subsp. minor (Wilson & Hook.f.) Ochyra
Dendoligotrichum squamosum (Hook.f. & Wilson) Broth.
Dicranella campylophylla (Taylor) A.Jaeger
Dicranella hookeri (Müll.Hal.) Cardot
*Dicranella circinata**
*Dicranella vaginata**
*Dicranoloma aff. subimponens (Cardot) Broth.**
Dicranoloma billardieri (Brid.) Par. var. billardieri
Dicranoloma billardieri var. compactum (Cardot) Cardot & Broth.
Dicranoloma chilense (De Not.) Ochyra & Matteri
Dicranoloma falklandicum (Cardot) Broth.
Dicranoloma hariotii (Müll. Hal) Paris
*Dicranoloma imponens (Mont.) Renauld**
Dicranoloma robustum (Hook. f. & Wilson) Par.
*Didymodon australasiae**
Didymodon ampliretis E.B.Bartram
*Didymodon laevigatus**
Didymodon rigidulus Hedw.
Distichium capillaceum (Hedw.) Schimp. in B.S.G.
Distichium capillaceum var. compactum (Huebener) Dalla Torre & Sarnth.
Distichophyllum dicksonii (Hook.f. & Grev.) Mitt.
Distichophyllum eremitae (A.Jaeger) Paris
*Distichophyllum krausei (Lorentz) Mitt.**
Ditrichum austrogeorgicum (Cardot) Seppelt
Ditrichum austrogeorgicum var. longifolium (Broth.) Seppelt
*Ditrichum ditrichoideum (Cardot) Ochyra**
Ditrichum heteromallum (Hedw.) Britt.
Ditrichum hookeri (Müll.Hal.) Hampe
Ditrichum hyalinocuspidatum Cardot
Ditrichum hyalinum (Mitt.) Kuntze

Ditrichum strictum (Hook.f. & Wilson) Hampe
Drepanocladus aduncus (Hedw.) Warnst.
Drepanocladus fuegianus var. stenophyllus Cardot & Broth.
Drepanocladus longifolius (Mit.) Paris
Fissidens rigidulus Hook.f. & Wilson
Funaria hygrometrica Hedw.
*Grimmia anodon Bruch & Schimp.**
Grimmia tortuosa Hook.f. & Wilson
*Hennediella antarctica (Ångstr.) Ochyra & Matteri**
Hennediella densifolia (Hook. f. & Wilson) R.H. Zander
Hennediella heimii (Hedw.) R.H. Zander
Hennediella serrulata (Hook. & Grev.) R.H. Zander
Holodontium pumilum (Mitt.) Broth.
Hygrodicranum falklandicum Cardot
*Hymenodontopsis mnioides (Hook.) N.E.Bell, A.E.Newton & D.Quandt**
Hymenoloma antarctica (Mull. Hal.) Ochyra
Hymenoloma crispula (Hedw.) Ochyra
*Hypnum cupressiforme Hedw.**
Isopterygium elegans (Brid.) Lindb.
Kiaeria pumila (Mitt.) Ochyra
Kindbergia praelonga (Hedw.) Ochyra
Leptobryum pyriforme (Hedw.) Wilson
Leptodictyum humile (P. Beauv.) Ochyra
Leptodontium longicaule Mitt. var. microruncinatum (Dusén) R.H.Zander
Leptotheca gaudichaudii Schwägr.
*Lepyrodon lagurus (Hook.) Mitt.**
Muelleriella crassifolia (Hook.f. & Wilson) Dusén
Notoligotrichum angulatum (Cardot & Broth.) G.L.Sm.
Notoligotrichum trichodon (Hook.f. & Wilson) G.L. Sm.
Oedopidium griffithianum (Dicks.) Schwägr.
Orthodontium lineare Schwägr.
Orthotrichum rupestre Schleich. ex Schwägr.
Philonotis litorea Cardot & Broth.
*Philonotis polymorpha (Müll.Hal.) Kindb.**
Philonotis scabrifolia (Hook.f. & Wilson) Braithw.
Philonotis vagans (Hook.f. & Wilson) Mitt.
Plagiothecium falklandicum (Cardot & Broth.) Newton
Plagiothecium laetum var usbornense
Plagiothecium lucidum (Hook. f. & Wilson) Paris
Plagiothecium ovalifolium Cardot
Pohlia nutans (Hedw.) Lindb.
Pohlia wahlenbergii (Web. & Mohr.) Andrews var. wahlenbergii
Pohlia wahlenbergii var. glacialis (Brid.) E.F.Warburg
Polytrichadelphus magellanicus (Hedw.) Mitt.
Polytrichastrum alpinum (Hedw.) G.L.Sm.
Polytrichum juniperinum Hedw.
Polytrichum piliferum Hedw.
Polytrichum strictum Menzies ex Brid.
*Pseudocrossidium crinitum (Schultz.) RH Zander**
Psilopilum gymnostomulum (Müll.Hal.) Paris
Ptychomnion cygnisetum
*Ptychomnion densifolium (Brid.) A. Jaeger**
Racomitrium angustissimum (Bednarek-Ochyra & Ochyra) Larraín & J.Muñoz
*Racomitirum laevigatum A.Jaeger**
Racomitrium didymum (Mont.) Lorentz
Racomitrium geronticum Müll.Hal.
Racomitrium heterostichoides Cardot
Racomitrium lamprocarpum (Müll.Hal.) A.Jaeger
Racomitrium lanuginosum (Hedw.) Brid.
Racomitrium membranaceum (Mitt.) Paris
Racomitrium pachydictyon Cardot
Racomitrium patagonicum Bednarek-Ochyra & Ochyra
Racomitrium ptychophyllum (Mitt.) Mitt.
Racomitrium striatipilum Cardot
Racomitrium sudeticum (Funck) Bruch. & Schimp.

*Rhacocarpus purpurascens (Brid.) Paris**
*Rosulabryum subtomentosum (Hampe) J.R. Spence**
Sanionia uncinata (Hedw.) Loeske
Sarmentypnum sarmentosum (Wahlenb.) Tuomikoski
Schistidium andinum (Mitt.) Herzog
Schistidium apocarpum (Hedw.) Bruch & Schimp. in B.S.G.
Schistidium apocarpum subsp. confertum (Funck) Loeske
*Schistidium cupulare (Müll.Hal.) Ochyra**
Sciurohypnum glaciale (Bruch et al.) Ignatov & Huttunen
Sphagnum cuspidatum GF Hoff.
Sphagnum cuspidatum var. serrulatum (Schlieph.) Schlieph.
Sphagnum engelii HA Crum
Sphagnum falcatulum Besch.
Sphagnum falcatulum var. microporum Warnst.
Sphagnum fimbriatum Wilson
Sphagnum magellanicum Brid.
Sphagnum magellanicum var. congestum (Schimp.) Röll
Sphagnum nanoporosum var. skottsbergii Cardot
Sphagnum palustre L.
Sphagnum palustre var cymbifolium Ehrh.
Syntrichia aff. fragilis (Taylor) Ochyra
Syntrichia anderssonii (Ångström) R.H.Zander
Syntrichia antarctica (Hampe) RH Zander
*Syntrichia brachyclada (Cardot) R.H.Zander**
Syntrichia filaris (Müll. Hal.) RH Zander
Syntrichia fontana (Müll.Hal.) R.H.Zander
Syntrichia fuegiana (Mitt.) Mitt.
*Syntrichia geheebiaeopsis (Müll.Hal.) R.H.Zander**
Syntrichia laevipila Brid.
Syntrichia litorea (Cardot & Broth.) M.J.Cano & M.T.Gallego
Syntrichia magellanica (Mont.) R.H.Zander
Syntrichia papillosa (Wilson) Jur.
Syntrichia princeps (De Not.) Mitt.
Syntrichia robusta (Hook. & Grev.) R.H.Zander
Syntrichia rubella (Hook.f. & Wilson) R.H.Zander
Syntrichia rubra (Mitt.) R.H.Zander
Syntrichia saxicola (Cardot) R.H.Zander
Syntrichia subpapillosa (Cardot & Broth.) Matteri
*Tetraplodon fuegianus Besch.**
Tortula monoica Cardot
Tortula muralis Hedw.
Ulota phyllantha Brid.
Valdonia microcarpa (Mitt.) Ochyra?
Vittia pachyloma (Mont.) Ochyra
Warnstorfia exannulata (Schimp.) Loeske
Warnstorfia exannulata (Schimp.) Loeske var. nigricans (Brid.) Ochyra
Warnstorfia fluitans (Hedw.) Loeske
Weymouthia mollis (Hedw.) Broth.
*Zygodon cf. intermedius Bruch. & Schimp.**

Hepatic taxa of the Falkland Islands

Adelanthus lindenbergianus
Adelanthus tenuis
Anastrophyllum ciliatum
Anastrophyllum subcomplicatum
Andrewsianthus scabrellus
Aneura pinguis var. pinguis
Anthelia julacea
Anthoceros maritimus
Anthoceros punctatus
Austrolophozia fuegiensis
Austrolophozia paradoxa
Balantiopsis bisbifida

Balantiopsis cancellata
Balantiopsis erinacea
Barbilophozia hatcheri
Bazzania peruviana
Bazzania platycnema
Cephaloziella sp.
Cheilolejeunea obtruncata
Chiloscyphus austrigenus ssp. austrigenus
Chiloscyphus bispinosus
Chiloscyphus ciliolatus
Chiloscyphus coadunatus
Chiloscyphus dissitifolius
Chiloscyphus fissus
Chiloscyphus hookeri
Chiloscyphus koeppensis
Chiloscyphus lentus
Chiloscyphus leptanthus
Chiloscyphus novae-zeelandiae
Chiloscyphus pallidovirens
Chiloscyphus sabuletorum
Chiloscyphus semiteres var. semiteres
Chiloscyphus spegazzinianus
Chiloscyphus subviridis
Chiloscyphus sylvaticus
Chiloscyphus textilis
Diplophyllum obtusifolium
Frullania apiculata
Frullania boveana
Frullania dilatata
Frullania ericoides
Frullania lobulata
Frullania magellanica
Frullania microcaulis
Frullania nodulosa
Gackstroemia magellanica
Gackstroemia patagonica
Harpalejeunea decurvicuspis
Harpalejeunea marginalis
Harpalejeunea parasitica
Herzogobryum teres
Heteroscyphus divergenticiliatus
Heteroscyphus magellanicus
Heteroscyphus triacanthus
Hyalolepidozia bicuspidata
Isotachis intortifolia
Jensenia crassifrons
Jensenia difformis
Jungermannia hymenophyllum
Kurzia mollis
Kurzia saddlensis
Kurzia setiformis
Lejeunea corralensis
Lepicolea ochroleuca
Lepicolea rara
Lepicolea rigida
Lepidogyna menziesii
Lepidolaena reticulata
Leptoscyphus aequatus
Leptoscyphus chilensis
Leptoscyphus chiloscyphoideus
Leptoscyphus expansus
Leptoscyphus horizontalis
Leptoscyphus magellanicus
Lethocolea radicosa
Lophozia excisa

Marchantia berteroana
Marchantia emarginata
Marchantia papillata
Marchantia polymorpha
Marsupella funckii
Metzgeria ciliata
Metzgeria decrescens
Metzgeria engelii
Metzgeria leptoneura
Metzgeria scyphigera
Metzgeria sp.
Metzgeria violacea
Noteroclada confluens
Nothoceros fuegiensis
Nothostrepta bifida
Pachyglossa exilis
Pallavicinia xiphoides
Pedinophyllopsis abdita
Pigafettoa crenulata
Plagiochila acanthocaulis
Plagiochila angulata
Plagiochila ansata
Plagiochila cuneata
Plagiochila dura
Plagiochila elata
Plagiochila fagicola
Plagiochila heterodonta
Plagiochila hirta
Plagiochila obovata
Plagiochila semidecurrens
Plagiochila sp.
Plagiochila spinulosa
Pseudolepicolea kuehnemannii
Pseudolepicolea quadrilaciniata
Radula helix
Riccardia alcicornis
Riccardia breviramosa
Riccardia cochleata
Riccardia floribunda
Riccardia fuscobrunnea
Riccardia georgiensis
Riccardia granulata
Riccardia multifida
Riccardia multifida ssp. multifida
Riccardia opuntiiformis
Riccardia pallidevirens
Riccardia papillosa
Riccardia prehensilis
Riccardia regularis
Riccardia saxicola
Riccardia spectabilis
Riccardia tenax
Saccogynidium australe
Saccogynidium vasculosum
Schistochila alata
Schistochila carnosa
Schistochila caudata
Schistochila laminigera
Schistochila leucophylla
Schistochila splachnophylla
Solenostoma crassulum
Symphyogyna hochstetteri
Symphyogyna hymenophyllum
Symphyogyna podophylla
Syzygiella jacquinotii

Syzygiella paludosa
Syzygiella sonderi
Telaranea blepharostoma
Telaranea nematodes
Telaranea oligophylla
Telaranea plumulosa
Telaranea pseudozoopsis
Telaranea tetradactyla
Temnoma quadripartitum
Temnoma quadripartitum var. quadripartitum
Triandrophyllum subtrifidum
Wettsteinia densiretis

Lichen taxa of the Falkland Islands

Acarospora gwynnii C.W. Dodge & E.D. Rudolph
Agonimia tristicula (Nyl.) Zahlbr.
Alectoria nigricans (Ach.) Nyl. (syn. Gowardia nigricans (Ach.) Halonen et al.)
Alectoria sarmentosa subsp. vexillifera (Nyl.) D. Hawksw. (1972)
Anisomeridium sp. (cf.)
Arctomia subantarctica Øvstedal
Arthonia cyanospora Fryday ad int.
Arthonia intexta Almq.
Arthonia lapidicola (Taylor) Branth & Rostr.
Arthonia occidentalis Fryday ad int.
Arthothelium diffluens (Nyl.) Imshaug ex Fryday
Austrella "isidioidea" P.M. Jørg., Fryday & Ertz ined.
Bacidia falklandica Fryday sp. nov.
Bacidia "marina" Fryday sp. nov.
Bacidia "rosea" Fryday sp. nov.
Bacidia "pruinata" Fryday sp. nov.
Bacidia tuberculata Darb.
Bacidina sp. "A"
Bartlettiella fragilis D.J. Galloway & P.M. Jørg.
Brigantiaea fuscolutea (Dicks.) R. Sant.
Biatoropsis usnearum Räsänen
Bryobilimbia australis (Kantvilas & Messuti) Fryday, Printzen & S. Ekman
Bryonora granulata Fryday
Bryonora cf. pruinosa (Nyl.) Holtan-Hartwig
Bryoria austromontana P.M. Jørg. & D. Galloway
Bryoria chalybeiformis (L.) Brodo & D. Hawksw.
Bryoria mariensis Øvstedal, Common & Fryday
Bryoria cf. implexa (Hoffm.) Brodo & D. Hawksw.
Buellia alboatra (Hoffm.) Th. Fr
Buellia anisomera Vain.
Buellia bouvetii Øvstedal
Buellia coniops (Wahlenb.) Th. Fr.
Buellia discreta Darb.
Buellia decedens (Nyl.) Müll. Arg.
Buellia falklandica Darb.
Buellia "gypsyensis" Fryday sp. nov.
Buellia cf. illaetabilis I.M. Lamb
Buellia ocellata (Flörke ex Flot.) Körb.
Buellia punctata (Hoffm.) A. Massal.
Buellia russa (Hue) Darb.
Buellia "semi-imersa" Øvstedal ad int.
Buellia skottsbergii J. Stein. & Zahlbr.
Buellia spuria (Schaer.) Anzi
Buellia stellulata (Taylor) Mudd
Buellia sp. A
Bunodophoron melanocarpus (Sw.) Wedin
Bunodophoron patagonicum (C.W. Dodge) Wedin
Bunodophoron ramuliferum (I.M. Lamb) Wedin
Caloplaca ambitiosa (Darb.) Zahlbr.

Caloplaca "avium" Imshaug ex Orange sp. nov.
Caloplaca cf caesiorufella (Nyl.) Zahlbr.
Calopalca cirrochrooides (Vain.) Zahlbr.
Caloplaca hertelii Søchting
Caloplaca holocarpa (Hoffm.) A.E. Wade
Caloplaca hookeri (C.W. Dodge) Søchting, Øvstedal & Sancho
Caloplaca isidioclada Zahlbr.
Caloplaca johnstoni (C.W. Dodge) Søchting & Olech
Caloplaca megalariicola Øvstedal
Caloplaca siphonospora Olech & Søchting
Caloplaca schofieldii C.W. Dodge
Caloplaca sublobulata (Nyl.) Zahlbr.
Caloplaca wilsonii S. Kondratyuk & Karnefelt
Caloplaca 'Falkland A' (Austroplaca) indet./sp. nov.
Caloplaca 'Falkland B' (Austroplaca) indet./sp. nov.
Caloplaca 'Falkland D' (Austroplaca) indet./sp. nov.
Caloplaca 'Falkland E' (Gondwania) indet./sp. nov.
Caloplaca 'Falkland F' (Gondwania) indet./sp. nov.
Caloplaca 'Falkland G' (Gondwania) indet./sp. nov.
Caloplaca 'Falkland H' (Gondwania) indet./sp. nov.
Caloplaca 'Falkland J' (Cerothallia) indet./sp. nov.
Caloplaca 'Falkland K' (Sirenophila) indet./sp. nov.
Caloplaca 'Falkland M' indet./sp. nov.
Caloplaca 'Falkland N' (Sirenophila?) indet./sp. nov.
Caloplaca 'Falkland O' (Caloplaca s.s.) indet./sp. nov. (= C. cf. caesiorufella?)
Caloplaca 'Falkland P' (Sirenophila?) indet./sp. nov.
Caloplaca 'Falkland Q' indet./sp. nov.
Caloplaca 'Falkland R' (Austroplaca) indet./sp. nov.
Caloplaca 'Falkland S' indet./sp. nov.
Candelariella aurella (Hoffm.) Zahlbr.
Candelariella flava (C.W. Dodge & G.E. Baker) Castello & Nimis
Candelariella cf. xanthostigma (Ach.) Lettau (possibly sp. nov.)
Candelariella vitellina (Hoffm.) Müll. Arg.
Carbonea agellata (Darb.) Fryday
Carbonea assentiens (Nyl.) Hertel
Carbonea hypopurpurea Fryday
Carbonea phaeostoma (Nyl.) Hertel
Catillaria atomarioides (Müll. Arg.) H. Kilias
Catillaria glaucogrisea Fryday
Cetraria aculeata (Schreb.) Fr.
Cetraria ericetorum Opiz
Cetraria islandica ssp. antarctica Kärnefelt
Cetraria muricata (Ach.) Eckfeldt
Cetrariella delisei (Bory ex Schaer.) Kärnefelt & A. Thell
Chaenotheca furfuracea (L.) Tibell
Chrysothrix granulosa G. Thor ?
Cladia aggregata (Sw.) Nyl. sensu lato
Cladia cryptica Parnmen & Lumbsch
Cladia inflata (F. Wilson) D.J. Galloway
Cladonia anserina Ahti
Cladonia asahinae J.W. Thomson
Cladonia bellidiflora (Ach.) Schaer.
Cladonia borealis Stenroos
Cladonia cenotea (Ach.) Schaer.
Cladonia chlorophaea (Flörke ex. Sommerf.) Spreng.
Cladonia confusa R. Sant,
Cladonia corniculata Ahti & Kashiw.
Cladonia cornuta (L.) Hoffm.
Cladonia deformis (L.) Hoffm.
Cladonia farinacea (Vain.) A. Evans
Cladonia fimbriata (L.) Fr.
Cladonia flammea Øvstedal
Cladonia furcata (Huds.) Schrad.
Cladonia gracilis (L.) Willd. ssp. elongata (Wulfen) Vain.
Cladonia gracilis (L.) Willd. ssp. gracilis

Cladonia humilis (With.) J.R. Laundon
Cladonia laevigata (Vain.) Gyeln.
Cladonia lepidophora Ahti & Kashiw.
Cladonia luteoalba A. Wilson & Wheldon
Cladonia macilenta Hoffm. var. macilenta
Cladonia macilenta Hoffm.var. bacillaris (Ach.) Schaer.
Cladonia mawsonii C.W.Dodge
Cladonia merochlorophaea var. novochlorophaea Sipman
Cladonia mitis (Sandst.) Hustich
Cladonia neozelandica Vain. var. lewis-smithii Ahti, Elix & Øvstedal
Cladonia pleurota (Flörke) Schaer.
Cladonia pycnoclada (Pers.) Leight.
Cladonia pyxidata (L.) Hoffm.
Cladonia rangiferina (L.) Weber
Cladonia sarmentosa (Hook. f. & Taylor) C.W. Dodge
Cladonia scabriuscula (Delise) Leight.
Cladonia squamosa (Scop.) Hoffm.
Cladonia subchordalis A. Evans
Cladonia subsubulata Nyl.
Cladonia sulcata Archer
Cladonia symphycarpa (Ach.) Fr.
Cladonia ustulata (Hook. f. & Taylor) Leight.
Cladonia weymouthii F.Wilson ex A.W.Archer
Cliostomum aeruginascens (Müll. Arg.) Fryday
Cliostomum "pallidum" Fryday sp. nov.
Cliostomum corrugatum (Ach.:Fr.) Fr.
Cliostomum falklandicum Fryday & Coppins
Cliostomum flavidulum Hafellner & Kalb
Cliostomum griffithii (Sm.) Coppins in D. Hawksw. et al.
Cliostomum violascens (Müll. Arg.) Fryday
Coccotrema cucurbitula (Mont.) Müll. Arg.
Coccotrema coccophorum (Mont.) I. Schmitt, Messuti & Lumbsch
Coccotrema corallinum Messuti
Coccotrema magellanicum Messuti
Coccotrema ' rubromarginatum' Fryday & Orange sp. nov.
Coelopogon abraxas Brusse
Coelopogon epiphorellum (Nyl.) Brusse & Kärnefelt
Collema coccophorum Tuck.
Collemopsidium halodytes (Nyl.) K. Knudsen & Breuss
Collemopsidium foveolatum (A.L. Sm.) F. Mohr
Cystocoleus ebeneus (Dillwyn) Thwaites
Dactylospora australis Triebel & Hertel
Dictyonema "pulvinata" Øvstedal sp. nov.???
Endocena informis Cromb.
Endocena buckii var. 'falklandica' Fryday ined.
Enterographa "macloviana" Fryday sp. nov.
Frutidella caesioatra (Schaer.) Kalb
Fuscidea asbolodes (Nyl.) Hertel & V. Wirth
Fuscidea impolita (Müll.Arg.) Hertel
Fuscidea subasbolodes Kantvilas
Fuscopannaria praetermissa (Nyl.) P.M. Jørg.
Gyalectaria jamesii (Kantvilas) I. Schmitt, Kalb & Lumbsch
Halecania subsquamosa (Müll. Arg.) v.d. Boom & H. Mayrhofer
Haematomma erythromma (Nyl.) Zahlbr.
Haematomma nothofagi Kalb & Staiger
Heterodermia leucomelea (L.) Poelt subsp, leucomelea
Heterodermia leucomelea subsp. boryi (Fée) Swinscow & Krog
Himantormia deusta (Hook. f) A. Thell & Søchting
Hymenelia "microcarpa" Fryday sp. nov.
Hydropunctaria rheitrophila (Zschacke) Keller, Gueidan & Thüs
Hypogymnia antarctica (Bitter) C.W. Dodge
Hypogymnia lugubris (Pers.) Krog
Hypogymnia subphysodes (Kremp.) Filson
Hypotrachyna brevirhiza (Kurok.) Hale
Hypotrachyna sinuosa (Sm.) Hale

Immersaria fuliginosa Fryday
Intralichen christiansenii (D. Hawksw.) D. Hawksw. & M.S. Cole
Josefpoeltia sorediosa Kondratyuk & Kärnefelt
Lambiella andraeaicola (Fryday) Fryday comb. nov.
Lambiella psephota (Tuck.) Hertel & Rambold
Lambiella subpsephota (Fryday) Fryday comb. nov.
Lecania 'inspersa' Fryday sp. nov.
Lecania 'pallida' Fryday sp. nov.
Lecania 'rosea' Fryday sp. nov.
Lecania 'sigmaspora' Fryday sp. nov.
Lecania subfuscula (Nyl.) S. Ekman
Lecanora albescens (Hoffm.) Flörke
Lecanora capistrata (Darb.) Zahlbr.
Lecanora conizaeoides Nyl. ex Cromb.
Lecanora dispersa (Pers.) Röhl.
Lecanora epibryon subsp. broccha (Nyl.) Lumbsch
Lecanora epibryon subsp. xanthophora Lumbsch
Lecanora ecorticata J.R. Laundon
Lecanora expallens Ach.
Lecanora expectans Darb.
Lecanora ?flotowiana Spreng.
Lecanora hagenii (Ach.) Ach. s. lat.
Lecanora polytropa (Ehrh.) Rabenh.
Lecanora spegazzinii Müll. Arg.
Lecanora symmicta (Ach.) Ach.
Lecanora torrida Vain.
Lecanora xantholeuca (Müll. Arg.) Hertel
Lecanora zosterae Nyl.
Lecidea aggregata Fryday
Lecidea auriculata Th. Fr.
Lecidea cf. auriculata
Lecidea auriculata subsp. brachypora (Th. Fr.) Lettau
Lecidea cancriformis (specimen in AAS det. U. Ruprecht)
Lecidea charodrodes Zahlbr.
Lecidea haerjedalica H. Magn.
"Lecidea" globulispora Nyl.
Lecidea "imshaugii Fryday sp. nov.
Lecidea lapicida (Ach.) Ach.
Lecidea lygomma Nyl.
Lecidea medusula (C.W. Dodge) Hertel
Lecidea "lygommoides" Fryday sp. nov.
Lecidea plana (J. Lahm) Nyl.
Lecidea "rhizocarpoides" Fryday sp. nov.
Lecidea swartzioidea Nyl.
Lecidella carpathica Körb.
Lecidella elaeochroma (Ach.) M. Choisy
Lecidella euphorea (Flörke) Hertel
Lecidella wulfenii (Ach.) Körb.
Leifidium tenerum (Laurer) Wedin
Lepraria caesioalba (B. de Lesd.) J.R. Laundon
Lepraria elobata Tønsb.
Lepraria lobificans Nyl.
Lepraria malouina Øvstedal
Lepraria nivalis J.R. Laundon
Lepraria sp. A
Lepraria sp. B
Leprocaulon "compactum" Øvstedal sp.nov.
Leprocaulon subalbicans (Lamb) Lamb & Ward
Leptogium austroamericanum (Malme) C.W. Dodge
Leptogium limbatum F. Wilson
Lichenoconium xanthoriae M.S. Christ. 1956
Lithographa graphidioides (Cromb.) Imshaug ex Coppins & Fryday
Lithographa opegraphoides Coppins & Fryday
Lithothelium falklandicum (Nyl.) Aptroot
Massalongia carnosa (Dicks.) Körb.

Mastodia tessellata (Hook. f. & Harv.) Hook. f. & Harv.
Megalaria grossa (Pers. ex Nyl.) Hafellner
Megalaria obludens (Nyl.) Fryday & Lendemer
Melanelixia subglabra (Räsänen) Crespo, Divakar & Elix
Melanohalea elegantula
Melanohalea ushuaiensis (Zahlbr.) O. Blanco, A. Crespo, Divakar, Essl, D. Hawksw. & Lumbsch
Melanotopelia blepharostoma Lumbsch & Divakar
Melanotopelia rugosa (Kantvilas & Vězda) Lumbsch & Mangold
Menegazzia cincinnata (Ach.) Bitter
Menegazzia magellanica R. Sant.
Menegazzia subpertusa P. James & D.J. Galloway
Menegazzia sp.
Micarea incrassata Hedl.
Micarea lignaria (Ach.) Hedl.
Micarea melaena (Nyl.) Hedl.
Muellerella pygmaea (Körb.) D. Hawksw.
Mycoblastus bryophilus Imshaug ex Kantvilas
Mycoblastus campbellianus (Nyl.) Zahlbr.
Mycoblastus dissimulans (Nyl.) Zahlbr.
Myriospora smaragdula (Wahlenb.) Nägeli
Neofuscelia loxodes (Nyl.) Essl.
Normandina pulchella (Borrer) Nyl.
Ochrolechia antarctica (Müll. Arg.) Darb.
Ochrolechia deceptionis (Hue) Darb.
Ochrolechia frigida (Sw.) Lynge
Ochrolechia szatalaënsis Verseghy
Opegrapha "falklandica" (O. rupestris) ad int.
Opegrapha "hebensis" ad int.
Opegrapha sp. (sorediate)
Opegrapha quinqueseptula Zahlbr.
Pannoparmelia angustata (Pers.) Darb.
Parmelia cunninghamii Cromb.
Parmelia kerguelensis F. Wilson
Parmelia lindsayana Øvstedal & Elix
Parmelia omphalodes (L.) Ach.
Parmelia protosulcata Hale
Parmelia saxatilis (L.) Ach.
Parmelia sulcata Taylor
Parmotrema reticulatum (Taylor) M. Choisy
Parmotrema sp.
Peltigera aubertii C. W. Dodge
Peltigera didactyla (With.) J.R. Laundon
Peltigera patagonica Räsänen
Peltigera truculenta De Not.
Pertusaria alterimosa Darb.
Pertusaria "argentata" Fryday sp. nov.
Pertusaria aspergilla (Ach.) J.R. Laundon
Pertusaria cerebrinula Zahlbr.
Pertusaria erubescens (Taylor) Nyl.
Pertusaria macloviana Müll. Arg.
Pertusaria malvinae Messuti
Pertusaria microcarpa Nyl.
Pertusaria pachythallina (Räsänen) Messuti
Pertusaria panyrga (Ach.) A. Massal.
Pertusaria "parva" Fryday sp. nov.
Pertusaria perrimosa Nyl.
Pertusaria salacinifera Messuti
Pertusaria spegazzinii Müll. Arg.
Physcia adscendens (Fr.) H. Olivier
Physcia caesia (Hoffm.) Fürnr.
Physcia dubia
Physcia tenella (Scop.) DC.
Placidium squamulosum
Placopsis fusciduloides D.J. Galloway
Placopsis cf. lambii (probably undescribed, also known from mainland S. America)

Placopsis perrugosa (Nyl.) Nyl.
Placynthiella icmalea (Ach.) Coppins & P. James
Placynthiella oligotropa (J.R. Laundon) Coppins & P. James
Platismatia glauca (L.) W.L. Culb. & C.F. Culb.
Plectocarpon leuckertii (S.Y. Kondr. & D.J. Galloway) Ertz & Diederich
Poeltidea inspersa Fryday
Poeltidea perusta (Nyl.) Hertel & Hafellner
Polychidium muscicola (Sw.) Gray
Porina austroatlantica P.M. McCarthy & Fryday
Porina leptalea (Durieu & Mont.) A.L. Sm.
Porpidia macrocarpa (DC.) Hertel & A.J. Schwab
Porpidia striata Fryday
Porpidia tuberculosa (Sm.) Hertel & Knoph
Protopannaria azorellae P.M. Jørg. & R. Poulsen
Protousnea poeppigii (Nees & Flot.) Krog
Protousnea teretiuscula Krog
Pseudocyphellaria berberina (G.Foster) D.J. Galloway & P. James
Pseudocyphellaria crocata (L.) Vain.
Pseudocyphellaria endochrysa (Delise) Vain.
Pseudocyphellaria freycinetii (Delise) Malme
Pseudocyphellaria gilva (Ach.) Malme
Pseudocyphellaria glabra (Hook. f. & Taylor) C.W.Dodge
Pseudocyphellaria hirsuta (Mont.) Malme
Pseudocyphellaria intricata (Delise)Vain.
Pseudocyphellaria lechleri (Müll. Arg.) Du Rietz
Pseudocyphellaria norvegica (Gyeln.) P. James
Pseudocyphellaria vaccina (Mont.) Malme
Psoroma cinnamomeum Malme
Psoroma hypnorum (Vahl) Gray
Psoroma hirsutulum Nyl.
Psoroma polychidioides (Zahlbr.) P. M. Jørg.
Punctelia stictica (Delise ex Duby) Krog
Racodium rupestre Pers.:Fr.
Ramalina canariensis J. Steiner
Ramalina laevigata Fr.
Ramalina terebrata Hook. f. & Taylor
Ramboldia petraeoides Nyl. ex C. Bab. & Mitt.) Kantvilas & Elix
Rhizocarpon "caeruleum" Fryday ad int.
Rhizocarpon distinctum Th. Fr.
Rhizocarpon geographicum (L.) DC.
Rhizocarpon hochstetteri (Körb.) Vain.
Rhizocarpon infernulum (Nyl.) Lynge
Rhizocarpon nidificum (Hue) Darb.
Rhizocarpon lavatum (Ach.) Hazsl.
Rhizocarpon polycarpum (Hepp) Th. Fr.
Rhizocarpon reductum Th. Fr.
Rhizocarpon simillimum (Anzi) Lettau
Rhizocarpon subpostumum (Nyl.) Arnold
Rhizocarpon superficiale (Schaer.) Malme
Rinodina blastidiata Matzer & H. Mayrhofer
Rinodina conradii Körb.
Rinodina oleae Bagl.
Rinodina peloleuca (Nyl.) Müll. Arg.
Rinodina sp.
Roccellina falklandica (Zahlbr.) Tehler
Roccellina cf. falklandica (very close to type, but sterile, sorediate)
Sarcosagium campestre (Fr.) Poetsch. & Schied.
Schaereria fuscocinerea (Nyl.) Clauzade & Cl. Roux
Schaereria porpidioides Fryday & Common
Scoliciosporum umbrinum (Ach.) Arnold
Siphula fastigiata (Nyl.) Nyl.
Siphulastrum mamillatum (Hook. f. & Taylor) D.J. Galloway
Siphulastrum triste Müll. Arg.
Sirenophila ovis-atra Søchting, Søgaard & Sancho
Sphaerophorus globosus (Huds.) Vain.

Sporodictyon cruentum (Körb.) Körb.
Stereocaulon cumulatum (Sommerf.) Timdal
Stereocaulon glabrum (Müll. Arg.) Vain.
Stereocaulon ramulosum (Sw.) Räusch.
Stereocaulon melanopotamicum Lamb
Stereocaulon tomentosum Fr.
Sticta gaudichaldia Delise
Sticta weigelii Isert
Tasmidella variabilis var. inactiva Kantvilas
Tephromela atra (Huds.) Hafellner
Tephromela atrocaesia (Nyl.) Fryday
Tephromela atroviolacea (Nyl.) Fryday
Tephromela "lignicola" Orange sp. nov.
Tephromela lirellina (Darb.) Fryday
Tephromela skottsbergii (Darb.) Fryday
Tephromela superba Fryday
Thamnolia vermicularis (Sw.) Ach. ex Schaer.
Thelenella mawsonii (C.W. Dodge) H. Mayrhofer & P.M. McCarthy
Thelenella kerguelena (Nyl.) H. Mayrhofer
Topeliopsis macrocarpa (C.W. Dodge) Mangold
Trapelia coarctata (Turner ex Sm.) M. Choisy
Trapelia sp. nov. (e.g. Orange 22626)
Trapeliopsis gelatinosa (Flörke) Coppins & P. James
Trapeliopsis cf. granulosa (Hoffm.) Lumbsch
Trapeliopsis "muscicola" sp. nov.
Trapeliopsis "subantarctica" Fryday sp. nov.
Tremolecia atrata (Ach.) Hertel
Tuckermanopsis chlorophylla (Willd.) Hale
Umbilicaria polyphylla (L.) Baumg.
Umbilicaria polyrrhiza (L.) Fr.
Usnea durietzii Motyka
Usnea fuegiana Motyka
Usnea igniaria Motyka
Usnea lethariiformis Motyka
Usnea nidulifera Motyka
Usnea pallida Motyka
Usnea sp.
Usnea antarctica DuRietz.
Usnea aurantiaco-atra (Jacq.) Bory
Usnea austrocampestris Øvstedal
Usnea trachycarpa (Stirton) Müll. Arg.
Varicellaria rhodocarpa (Körb.) Th.Fr.
Verrucaria cylindrophora Vain.
Verrucaria elaeomelaena s.l.
Verrucaria mawsonii C.W. Dodge
Verrucaria psychrophila I.M. Lamb (1948)
Verrucaria durietzii I.M. Lamb
Verrucaria muralis
Verrucaria racovitzae Vain.
Verrucaria cf. sublobulata Eitner ex Servít
Verrucaria tesselatula Nyl.
Verrucaria 'Falkland A' indet./n sp. (marine)
Verrucaria 'Falkland B' indet./n sp. (marine)
Verrucaria 'Falkland C' indet./n sp. (marine)
Verrucaria 'Falkland E' indet./n sp. (freshwater)
Verrucaria 'Falkland F' indet./n sp. (freshwater)
Verrucaria 'Falkland H' indet./n sp. (marine)
Verrucaria 'Falkland J' indet./n sp. (marine)
Verrucaria 'Falkland K' indet./n sp. (marine)
Verrucaria 'Falkland L' indet./n sp. (marine)
Verrucaria 'Falkland M' indet./n sp. (marine)
Verrucaria 'Falkland N' indet./n sp. (marine)
Verrucaria 'Falkland Q' indet./n sp. (marine)
Verrucaria 'Falkland R' indet./n sp. (marine)
Verrucaria 'Falkland S' indet./n sp. (marine)

Verrucaria 'Falkland T' indet./n sp. (marine)
Verrucaria 'Falkland U' indet./n sp. (freshwater)
Verrucaria 'Falkland V' indet./n sp. (freshwater)
Xanthomendoza mendozae (Räsänen) S.Y. Kondr. & Kärnefelt
Xanthoparmelia loxodes (Nyl.) O. Blanco, et al.
Xanthoparmelia mougeotii (Schaer.) Hale
Xanthoparmelia stygiodes (Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch
Xanthoparmelia submougeotii Hale
Xanthoria adscendens S.Y. Kondr.
Xanthoria candelaria (L.) Th.Fr. coll.
Xanthoria elegans (Link.) Th. Fr.
Xanthoria parietina (L.) Th. Fr.
Xenolecia spadicomma (Nyl.) Hertel
Xylographa parallela (Ach.) Fr.
Xylographa vitiligo (Ach.) J.R. Laundon
Zwackhiomyces sp.

Excluded Species
Arthonia abrothallina Nyl.
Cetraria subscutata D.L. Lindsay
Verrucaria ceuthocarpa Wahlenb.
Verrucaria maura Wahlenb.
Verrucaria mucosa Wahlenb.

Annex 5 Ecosystem Services Pilot Report

Peatland Ecosystem Services in the Falkland Islands
A Scoping report based on a short field visit 14-28 November 2015.

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Background

There are growing national and international interests in the recognition of the roles of the natural environment in contributing to the general well-being of people as well as specifically underpinning sustainable economic development. This has led to assessments at various scales from global to national and regional of the status and values of "natural capital" and the work of nature (previously largely unrecognized or at best taken for granted) in delivering benefits to human communities as well as biodiversity.The term "ecosystem services" is used to describe those elements of functioning of the more or less natural ecosystems that are recognized by people as beneficial. There is currently considerable effort to incorporate such recognition in National Accounts and new approaches to decision-making in both environmental and other policy areas where the outcome threatens the maintenance or quality of provision of ecosystem services.

Peat dominates large parts of the Falkland Islands landscapes and in some locations has accumulated to exceptional depths. Deposits of over 11metres on Beauchene Island have been described by Lewis Smith and Clymo (1984) and similar depths occur on East Falkland such as Hooker's Point. Elsewhere the peat may be thin and merge into the organic surface horizons of mineral soils. Maltby and Legg (1983) described the range of peat-forming systems and emphasized the variation according to landscape context, hydrology and associated vegetation communities. Peat has been forming on the Falklands since at least 12,500 BP.

There is still considerable uncertainty regarding:

1. The factors promoting peat formation and developmental history given the relative dryness of the climate and the contrasts with conditions even further South in Chile and Argentina.
2. Reasons for considerable variations in the rate of accumulation between and within different landscapes.
3. The total amount of carbon stored within the Falklands (though various reasonable estimates have been proposed by McAdam and others)
4. The status of peat under current environmental conditions and likely scenarios of future development especially in relation to carbon dynamics and land surface stability.
5. Understanding of and a reliable evidence base to support the range of ecosystem services provided by the Falkland Islands peatlands , their perception by the wider population and those outside the Islands.

The present report draws on additional observations by the principal author from 1983-5 when he investigated the nature and properties of the peat associated with more than 100 minefields laid during the Falklands War as well as subsequent visits in 2010 and 2011. A key objective of the brief visit in 2015 was to establish:

1. The level of appreciation of peatland ecosystem services and assessment of their status and/or examples of failure or deterioration.
2. Priorities for research and conservation actions.

A Scoping Questionnaire

A simple questionnaire was trialled to gauge the perception of the services provided by Falklands peat and peatlands among Islanders (Annex I).

Interviewees were selected opportunistically among guides at Volunteer Point and whilst staying with landowners out in camp. The membership of Falklands Conservation based in the Islands were circulated and responses were gathered also amongst those attending the public lecture given by EM and SR in Stanley.

Summary overall results are given in table 1.

The main findings from this preliminary survey of some 25 respondents are:

1. Recognition of peat as an asset rather than a hazard by a ratio of 2:1.
2. Despite this, apparently limited understanding of the nature and extent to which peat provides multiple ecosystem services at different scales. (A list of putative ecosystem services is outlined in table 2).
3. Awareness of the historical cultural importance of peatlands expressed in language/visual/smell/holiday terms and its importance (now much reduced) as fuel.
4. A quarter of respondents aware of the potential value of the Falklands peat as a global carbon store significant in climate change mitigation-or aggravation if lost.
5. Only rare recognition of the possible values of peat as habitat for significant elements of biodiversity, in education and palaeoenvironmental information although there was some identification of its importance in the prevention of erosion,water retention and most interestingly the attraction of visiting scientists who contribute to the economy.
6. Fire was identified as the most significant hazard by over half those questioned, followed by “bogging” (16%), erosion (12%), acidity (8%) and global warming (4%).
7. Only 7 returns came from the entire email listing of Falklands Conservation which could be an indication of a rather low priority rating of peat on the personal priorities for conservation.

Such results would indicate the need and potential value for a more structured and comprehensive survey effort required to better assess the significance of peat to the Falkland Islands communities. This would help inform an appropriate awareness-building initiative and the need for supportive evidence-based research outcomes which can feed into FIG policy as well as links to international activities.
It is significant that currently there are no estimates available which indicate the actual or potential value of the Falkland Islands peat resources either to the island economy or internationally. This should be a priority among future environmental activities and would benefit from the experience of the UK National Ecosystem Assessment.

Condition of the Falkland Islands peatlands

Whilst there are areas of peat, notably in river valleys, depressions and low plains ,there are extensive areas of erosion especially on sloping ground and surrounding deep peat banks,exposing bare soil , regolith and in some case stone runs. Causes such as grazing pressure and more recently fire have been variously cited as explanation. There is a suggestion that fire frequency may be greater in recent decades than in the past. This cannot be verified on the basis of current knowledge but there is no question that the impact of fire on dry and deep peat will be much more severe than on wetter and shallow peats.
The opportunity arose to visit a current peat fire at Main Point.It was thought that the fire was initiated by a lightning strike and despite considerable efforts to extinguish was still burning many days afterwards. It is not unknown for peat fires to continue to burn for many months and to re-ignite from depth in even shallow peatlands The details of the Main Point fire are recorded by the Department of Agriculture who are concerned to assist the landowner in the recovery of important grazing land lost through the combustion of the peat and conversion to ash which is highly unstable under the normal windy conditions of the Islands. Erosion pins were inserted in the different surface types produced by different intensities of burn. Monitoring will enable the rate of change and any future pattern of recovery to be recorded. A more comprehensive study of the fire hazard is recommended together with an evaluation of restoration options.
Advice on restoration was provided to the landowner and the Agriculture Department based on experience gained from the monitoring and restoration of peat affected by severe fires on the North York Moors in the UK in 1976.

In some areas peat banks have been exploited as turbary to source fuel for domestic use. The practice has declined significantly in recent years but areas of bare peat and exposed mineral surfaces provide special habitat conditions for lower plant species which the larger project has documented. Elsewhere, peatlands have been disturbed by minefield clearance but recovery of surface integrity is already a priority consideration in this effort.
Unpublished observations of peat banks at between Mount Harriet and Goat Ridge by EM between the 1980s and 2015 suggest that peat erosion may have started 800-1100 years ago. This would point to non-anthropogenic causes but could also be related to a significant climatic change or a critical stage of development of the peat body.Detailed analysis of C:N ratios throughout the peat body provide information on changes in the decomposition of the organic matter comprising the peat mass and sheds light on hydrological and environmental changes over the last 10,000 years or so. The specific changes over time in the ratio in the surface peat gives an indication of whether the peat body is actively accumulating or progressively degrading. The potential value of these data in assessing the ecological status of the peat under current environmental conditions cannot be over-estimated and so every effort should be made to find funding to analyse the most recent samples collected during this field visit.

Recommendations

1. A more comprehensive and structured analysis should be undertaken to evaluate the perceptions of the Island communities of the peat resource and its importance or not to their well-being.
2. A UK NEA style assessment should be undertaken to assess the ecosystem services actually and/or potentially delivered by the FI peat, historical changes and possible futures under different scenarios.
3. Evaluation of the contribution of such services to the Islands economy and international benefits.
4. Specific, more detailed and verifiable assessment of the peat carbon store and its significance in a global context.
5. Assessment of the erosion threat to peatlands with particular reference to fire and the options for restoration.
6. Determination of the current trends in peat erosion and degradation/accumulation and more comprehensive assessment of the evidence provided within peat bodies of climate and other possible environmental changes which can be used to reinforce appropriate policy responses.