

ÁGRIP ERINDA OG VEGGSPJALDA

VISTÍS / ECOICE

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VISTFRÆÐIFÉLAG ÍSLANDS

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VistÍs 2015 / EcoIce 2015
Ágrip erinda og veggspjalda

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STJÓRN VISTFRÆÐIFÉLAGS ÍSLANDS

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Isabel Barrio
Róbert Arnar Stefánsson

ÁVARP FORMANNS / CHAIR'S ADDRESS

Dear ecologists,

I welcome you all to the fourth Ecological conference organized by the Icelandic Ecological Society. I am happy to announce that our young society has reached two important milestones. First, we are now organizing our annual conference outside Reykjavík and we are going from a one-day conference to a two-day conference.

Secondly, our membership has now reached one hundred. Our Nordic sister societies are indeed much bigger, but in a small country like Iceland this is a good achievement and we should be proud of it.

In last year's conference address, I emphasized the importance of having an active ecological society here in Iceland and I want to repeat it here. Because how few we are, we are scattered among various institutes in the country making it difficult to establish the critical mass needed for productive research environments. Most of us compensate for that through participation in strong international networks, which is extremely important to guarantee high research quality. However, it is equally important to create a critical mass nationally through collaboration across institutes. This national networking is the core of the Icelandic Ecological Society. Discussion on how that can be best achieved is on the agenda at this conference and I encourage you all to participate.

There is an increasing demand for ecological contributions to environmental policy making. To meet that demand here in Iceland, we need to have a solid basis. The cornerstone of that is a productive research environment. Although we can celebrate today that we have reached two important milestones, we still have others to reach, such as involving even more ecologists in our society.

I regret that I cannot be with you today in person, but wish you a fruitful conference with a lot of good discussions. Finally, I want to thank the organising committee for a good job.

Ingibjörg Svala Jónsdóttir,
Chair of the Icelandic Society of Iceland

MÁNUDAGUR / MONDAY

10:30 REGISTRATION AND COFFEE

11:20 CONFERENCE OPENING

11:30 INTRODUCTORY LECTURE I

11:30 Y1 **Population regulation in the American mink**
Róbert A. Stefánsson

11:55 SESSION I

Chair: Tómas Grétar Gunnarsson

Seven Little Salmon Swimming in the Sea. - Marine feeding areas and vertical movements of Icelandic stock of Atlantic salmon (*Salmo salar L.*) as inferred from recoveries of Data Storage Tags

11:55 E1 *Jóhannes Guðbrandsson*

12:10 E2 **Vegetation on Islands of Breidafjörður**
Thomas H. Carlsen

12:25 E3 **Postglacial colonization of aquatic insects in Iceland**
Gísli Már Gíslason

12:40 LUNCH

13:30 SESSION II

Chair: Isabel C Barrio

13:30 E4 **Settlement decisions of juvenile shorebirds**
Tómas Grétar Gunnarsson

13:45 E5 **Trait-based plant community assembly in primary succession**
Bryndís Marteinsdóttir

14:00 E6 **Biological diversity in Iceland**
Skúli Skúlason

15:00 POSTER SESSION AND COFFEE

16:00 ANNUAL GENERAL MEETING (ICE)

16:30 DISCUSSION - VISTÍS

18:00 ICEBREAKER AND CONFERENCE DINNER

21:00 VISTÍS PUBQUIZ

ÞRIÐJUDAGUR / TUESDAY

08:00 BREAKFAST

08:30 WORKSHOP

08:30 W1 **Mixed Effects Models in Ecology using R**
Isabel C Barrio

09:45 INTRODUCTORY LECTURE II

09:45 Y2 **Global threats to Icelandic Eiders?**
Jón Einar Jónsson

10:10 SESSION III

Chair: Gísli Már Gíslason

10:10 E7 **Nordic Society Oikos journals in a changing publishing landscape**
Linus Svensson

10:25 E8 **Humpback whale song repertoire during winter in subarctic waters**
Edda Elísabet Magnúsdóttir

10:40 E9 **Impact of natural soil warming on carbon stocks and ecosystem structure and function in Icelandic grasslands**
Niki I.W. Leblans

10:55 COFFEE AND POSTERS

11:15 SESSION IV

Chair: Ágústa Helgadóttir

11:15 E10 **Spatial and seasonal variability of abundance of zooplankton in waters of Breiðafjörður**
Érlingur Hauksson

11:30 E11 **135 year time series of Atlantic Puffin harvest is negatively correlated to sea surface temperature: Puffin chick production a function of temperature dependent population control of sandeel prey?**
Erpur Snær Hansen

11:45 E12 **Environment and vegetation of Brunasandur, SE Iceland: a thousand year history**
Póra Ellen Þórhallsdóttir

12:15 LUNCH

13:15 SESSION V

Chair: Bryndís Marteinsdóttir

13:15 E13 **Environmental monitoring on lakes and rivers in Reykjavík area: Cheap, quick and dirty!**
Haraldur R. Ingvason

13:30 E14 **Common Loon (*Gavia immer*) capture in Iceland.**
Pétur Halldórsson

13:45 E15 **Flexibility in the diel activity of juvenile stream-dwelling Arctic charr**
Stefán Óli Steingrímsson

14:00 CLOSING AND POSTER AWARDS

VEGGSPJÖLD / POSTERS

- V1 **To Read and Heal the Land**
Ólafur Arnalds og Ása L. Aradóttir
- V2 **Unravelling shell trait variation in the common whelk (*Buccinum undatum L.*)**
Hildur Magnúsdóttir, Zophonías O. Jónsson, Snæbjörn Pálsson og Erla Björk Örnólfsdóttir
- V3 **Eeny, meeny, miny, moe: feather holes and mallophagans in the rectrices of the Icelandic rock ptarmigan**
Ute Stenkewitz, Ólafur K. Nielsen, Karl Skírnisson og Gunnar Stefánsson
- V4 **Understanding the role of herbivore diversity to inform sustainable grazing practices in the tundra**
Isabel C Barrio, Ingibjörg Svala Jónsdóttir, Guðmundur Halldórsson og Sveinn Runólfsson
- V5 **Short-term vegetation response to sheep grazing exclusion as a restoration measure in heathland in NE Iceland**
Kristín Svavarsdóttir og Johann Thorsson
- V6 **Icelandic geese – monitoring breeding success**
Arnór Þ. Sigfússon
- V7 **Sheep Grazing Causes a Variation in Life History Structure of Moss Communities**
Edwin Carl Liebig III, Þóra Ellen Þórhallsdóttir og Ingibjörg Svala Jónsdóttir
- V8 **Community composition, diversity and activity of N fixing Cyanobacteria associated with mosses in sub-arctic alpine ecosystems**
Ana J. Russi, Ólafur S. Andrésson1 og Ingibjörg S. Jónsdóttir
- V9 **Proglacial vegetation succession in front of Skaftafellsjökull**
Kristín Svavarsdóttir og Þóra Ellen Þórhallsdóttir
- V10 **Moss layer in Icelandic subarctic tundra has impact on soil temperature – acts as an insulator and reduces fluctuations**
Agústa Helgadóttir, Kristín Svavarsdóttir, Rannveig Anna Guicharnaud og Ingibjörg Svala Jónsdóttir1
- V11 **Seasonal variation in benthic invertebrate assemblage in *Fucus spiralis* and *Ascophyllum nodosum* at differently exposed rocky shores in SW-Iceland**
Sólvi Rúnar Vignisson, Sunna Björk Ragnarsdóttir, Gunnar Þór Hallgrímsson og Halldór Pálmar Halldórsson

ÁGRIP KYNNINGARERINDA / INTRODUCTORY LECTURES ABSTRACTS

Y1 Population regulation in the American mink

Róbert A. Stefánsson og Menja von Schmalensee
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Understanding population dynamics and regulation is a fundamental issue in ecological research, especially in the context of invasive species. The American mink (*Neovison vison*) is among the most invasive species in Europe. It was introduced to many European countries in the 1920s and 1930s. Hunting statistics indicated a high population growth rate in many countries but in the last two decades, many mink populations seem to have decreased. Changes in population density of native predators, such as otter and red fox, with subsequent changes in competition and prey availability for mink, have been proposed as likely explanations in some areas.

The Icelandic terrestrial vertebrate ecosystem is rather simple compared to mink habitats in other countries. With only two carnivores (Arctic fox (*Vulpes lagopus*) and American mink), one abundant rodent (wood mouse (*Apodemus sylvaticus*)), no amphibians or reptiles, Iceland is an interesting country for mink studies. Relatively accurate mink harvest data since 1958 provide a good approximation on changes in mink population size. Combined with research on mink carcasses, an opportunity to understand the regulation of the mink population has appeared. Influencing factors will be discussed, such as intra-guild competition and the cascading effects of climate change through the food web, with negative effects on mink body condition, fertility and survival. The results are compared to mink population changes in other countries.

Y2 Global threats to Icelandic Eiders?

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The status of the Icelandic eider *Somateria mollissima* population is evaluated based on nest counts, brood counts and sex ratios. Nest numbers of Icelandic eiders generally are not correlated with weather or climate change; whereas evidence is increasing that their food supply is vulnerable to warming temperatures or ocean acidification. The Icelandic eider population increased 1980-1990 but has declined from 1991 onwards. In the longest nest count series, Brokey Islands 1906-2007, there was no correlation with local weather but segmented regression indicated that warm regimes were periods of decline whereas the cold regimes coincided with peak nest numbers but also catastrophic events. Nest initiation dates seem more sensitive to weather changes than nest numbers. Nest counts remain to be up-dated for the last six years but there is little evidence for major changes in 2008-2014, as indicated by the available nest counts, brood counts or sex ratios. Surprisingly, the overall populations index for Iceland 1980-2010 trends similarly to those for the Baltic Sea, Norway, Scotland and the White Sea. The synchrony across Northern Europe suggests the influence of a large global-scale driver, possibly the Atlantic multidecadal oscillation in SST (AMO) or ocean acidification. Two major knowledge gaps that require further studies are the food availability for Eiders in Iceland and the high incidence of low-pathogenic avian influenza relative to Eider populations in western North America.

ÁGRIP ERINDA / PRESENTATIONS ABSTRACTS

E1 Seven Little Salmon Swimming in the Sea. - Marine feeding areas and vertical movements of Icelandic stock of Atlantic salmon (*Salmo salar* L.) as inferred from recoveries of Data Storage Tags

Jóhannes Guðbrandsson^{1,2}, Sigurður Már Einarsson², Ingi Rúnar Jónsson² og Sigurður Guðjónsson²

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In early summer 2005 and 2006 we released 598 salmon smolts tagged with DST-tags in Kíðafellsá in Kjós. After spending one year at sea five salmon returned in 2006 and two in 2007. The tags measured temperature and depth at one hour interval and the complete profiles of the whole ocean migration was recorded for the first time in Atlantic salmon. Most of the time the salmon stayed close to the surface and showed diurnal behavior staying at more depth during the day. During the latter part of their ocean migration the salmon also took deep (>100 m) and short dives independent of the time of day. The temperature measured ranged from 6 to 15 °C with warmer waters during summer. We used the temperature for geo-location by comparison with sea surface temperature (SST) database (NOAA). From the diurnal vertical behavior we also estimated the solar noon each day using weekly windows. The information from these two sources was combined in a Hidden Markov Model (HMM) that have previously been used for fish geo-location from other data-sources. The salmon stayed southwest of Iceland in the Irminger Sea for the first months after leaving the river and migrated east towards the Faroes Islands during the fall and back again after new years. For the remainder of their ocean migration the salmon stayed in the Irminger sea before returning back to the river.

E2 Vegetation on Islands of Breidafjörður

Thomas H. Carlsen^{1,2} og Arni Asgeirsson²

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In the summer of 2014 25 Islands in the southeast part of Breidafjörður were mapped for vegetation. The variation between Islands was great regarding to number of species, vegetation types (legends), vegetation cover and other aspects. What causes these extreme variations? Why are some

Islands similar and some not? And how will the Islands develop and change in relation to vegetation in the future? This vegetation mapping gives us a clue that factors like the landuse, geological aspects, topography, birdlife and impact of the Ocean all play important role in shaping and defining the different vegetation types.

E3 Postglacial colonization of aquatic insects in Iceland

Gísli Már Gíslason og Snæbjörn Pálsson

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1. Biological diversity of the Arctic has been shaped by the glacial periods of Pleistocene. Species have diverged in allopatric areas during prolonged periods and expanded their distribution following the retreat of the glaciers. Genetic patterns of various species reflect the impact of these climate changes. Recent work on freshwater invertebrates have showed different patterns from many vertebrate and terrestrial species. Diversity of freshwater insects in Iceland is low but its species could originate from either North-America or Europe. 2. We studied the origin of two species of Icelandic Trichoptera, the Palaearctic *Potamophylax cingulatus* and the Holarctic *Apatania zonella*. The variation of the COI gene of the mtDNA in Iceland and from the distribution range of the species were studied. In *P. cingulatus*, which colonized Iceland during the second part of the 20th century, no variation was detected in the Icelandic population, and the flies were closely related to flies from the Faroe Islands, reflecting its most likely route of colonisation. The Icelandic population of *A. zonella*, a species with highly skewed sex ratio was analysed both for the COI gene and three nuclear. The genetic patterns revealed two lineages, one Nearctic and other Palearctic which diverged during last Ice Age. Both lineages co-occur in Iceland and in few specimens from Alaska and Yukon, where high diversity is observed. The molecular variation is highly structured, both at the large geographical scale as within Iceland. 3. The species composition of Icelandic aquatic insects is mainly of Palaearctic origin, but these two examples show two different ways of colonization, and further studies are warranted to obtain a general understanding of their origin.

E4 Settlement decisions of juvenile shorebirds

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The quality of habitats that organisms occupy is a major driver of fitness. For long-lived vertebrates, such as many birds, high levels of adult philopatry is the norm, largely independent of whether individuals occupy higher or lower quality habitats. Natal philopatry is thought to be a useful rule-of-thumb for settlement decisions in the absence of higher resolution information on which to base decisions, and indeed most birds disperse non-randomly when returning to their breeding grounds for the first time as adults. In migratory birds the situation is more complex as juveniles also have to make settlement decisions on the wintering grounds and the quality of the habitat occupied in one season can have profound effects on fitness measures in the other seasons through carry-over effects. The process of settlement decisions in migratory systems where juveniles migrate without parents is however, notoriously difficult to study at the relevant spatial and temporal scales. A population-wide, tracking study of Black-tailed Godwits which breed in Iceland and winter in W-Europe has shown strong seasonal links at the individual level. The same individuals tend to use either higher quality habitats both in winter and summer or poorer quality habitats in both seasons, a pattern termed seasonal matching. This pattern has profound implications for population dynamics and evolutionary processes. Since 1999, over 500 godwits chicks have been individually marked in Iceland and many of them have subsequently been seen on their wintering grounds in W-Europe. These sightings allow us to reconstruct the process of juvenile settlement and to explore the factors influencing the initiation and maintenance of seasonal matching of habitat quality.

E5 Trait-based plant community assembly in primary succession

Bryndís Marteinsdóttir¹, Kristín Svavarsdóttir² og Þóra Ellen Þórhallsdóttir¹

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For a plant to colonize a new site, it must successfully pass through a series of filters. It must produce propagules that disperse to the site (seed limitation filter) and be able to grow under the local abiotic (environmental filter) and biotic (species interaction filter) conditions. Only slightly different filtering early on may have long lasting implications for ecosystem development, but these initial phases are poorly understood.

We studied early plant community assembly on Skeiðarársandur in SE-Iceland. Plant succession on the sandur has been extremely slow with only patches of it developing vegetation with over 10% cover. Assembly in 47 plots was examined and the regional species pool of the sandur determined. Data on plant functional traits (i.e. measurable characteristics that influence plant fitness) related to estab-

ishment, dispersal and persistence were collected for species in the regional species pool.

Null-models are used to determine how functional traits influence which species from the regional species pool establish at the local sites. While this approach is commonly used to explore plant community structure, very few studies have been conducted in primary successional habitats.

Here, preliminary results will be presented. The study improves our knowledge on how different filters shape plant communities and enhance our ability to manipulate this process in ecological restoration.

E6 Biological diversity in Iceland

Skúli Skúlason¹, Hilmar J. Malmquist², Stefán Óli Steingrímsson¹ og Bjarni K. Kristjánsson¹

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Biological diversity at most levels is relatively low in Iceland. This is related to geographic isolation and young age of ecosystems. Combined with relatively diverse and dynamic environments of the island this sets the stage for testing various hypotheses and theories, that for example relate to: a) The processes that generate biological diversity including rapid evolution of intraspecific diversity; b) patterns and processes of colonization and community development; c) relations between biodiversity and ecosystem stability including food-web dynamics; and e) ecological and evolutionary dynamics, including the role of phenotypic plasticity and how evolutionary changes affect ecosystems. The current project has the following objectives: First, to overview the characteristics and nature of biological diversity in Iceland, with initial emphasis on vertebrates. Second, to consider and compare selected studies which relate to the above hypotheses and theories. Thirdly, to propose relevant future studies on these topics. In addition to its scientific value, increased and comprehensive understanding of biological diversity has important implications for the development of sensible future management and conservation of nature in Iceland.

E7 Nordic Society Oikos journals in a changing publishing landscape

Linus Svensson

Oikos Editorial Office

Ekkert ágríp / No abstract

E8 Humpback whale song repertoire during winter in subarctic waters

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The songs of the male humpback whales (*Megaptera novaeangliae*) have traditionally been associated with mating at tropical and subtropical mating grounds during winter. This study provides the first report of humpback whale

singing behavior in the subarctic waters of Northeast Iceland using long-term bottom-moored acoustic recorders. Recordings were collected during 1) Sept. '08–Feb. '09, 2) Nov. '09–Apr. '10 and 3) Jan.–Mar. '11. Continual singing was detected during all winter seasons with peak song occurrence during January–February in all years. The songs from 2011 were used to demonstrate a level of structure and pattern characteristics of songs described from traditional mating grounds. The results had 19 phrase type classifications and displayed a predictable sequence from the cyclic patterns in the song recordings from January to March. A total of 2811 song units from all years were measured and objectively divided into 11 groups with increasing number of different song units being produced per day in February. That timing coincides with the timing of peak seasonal hormonal activity in sexually active humpback whales in the Northern hemisphere. The song unit repertoires included stable song unit types occurring frequently in songs in all years while other song unit types were replaced more rapidly. This study indicates the importance of a subarctic feeding ground for song exchange and possibly as an opportunistic mating ground for migrating or overwintering humpback whales.

E9 Impact of natural soil warming on carbon stocks and ecosystem structure and function in Icelandic grasslands

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Geothermal areas offer a unique opportunity to study the effect of temperature increase in natural ecosystems. In the FORHOT research project (Natural soil warming in natural grasslands and a Sitka spruce forest in Iceland; www.forhot.is) the effect of soil warming on various ecosystem processes is studied. The main advantages of the FORHOT study sites are that 1) their warming (controls, +1, +3, +5, +10, +20°C) surpasses the full range of the predicted future warming for the sub-arctic predicted by the IPCC's RCP scenarios, allowing us to identify potential non-linear responses to soil warming, and 2) the presence of both short-term (7 years) and long-term (>30 years) warmed grasslands within 3 km distance allows us to differentiate between transient and more permanent responses to soil warming, and enables us to look at processes that evolve on larger time scales. The main limitation is that the warming is only from the below, which may limit some plant processes which are driven more by leaf or air temperature. We have observed a 40% loss of soil C stocks at a soil warming level of 5–10°C in these grasslands. This warming is within the IPCC predictions for northern latitudes late this century. This provides an empirical support that such ecosystems may become a source of CO₂ in the future, thereby potentially further enhancing climate change. Our research mainly aims to understand the underlying mechanisms of this large observed loss in ecosystem C stocks in warmer soils.

E10 Spatial and seasonal variability of abundance of zooplankton in waters of Breiðafjörður

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In year 2014 Vör (RCB) started an investigation on seasonal, spatial and temporal variability of zooplankton in wates of Breiðafjörður. Two stations (BFS2 and BFS4)

on the inner transect at about 22°50' W, were selected. This study was a „continuation“ of a comprehensive study done by Vör (RCB) in the period of 2007 – 2009, incorporating not only zooplankton but also phytoplankton and environmental monitoring. Sigurðardóttir (2012) observed great seasonal variability, spatial variability being less important and indications of high temporal variability in the zooplankton (Sigurðardóttir, 2012). Spatially, I observed abundance of the copepod *Calanus finmarchicus* being significantly higher at a station (BFR2) on the outer transect (23°50' W), than at a inner transect (station BFS3) in year 2009, and the abundance of copepods of genus *Acartia* and *Pseudocalanus* and gastropod larvae being significantly lower. Decapoda larvae and zoea were significantly more abundant on BFS4 in year 2014. Seasonal variability in abundance was the rule. Comparing community structure, with Redundancy analysis (RDA), showed that the copepod *C. finmarchicus* was more abundant at the outer, copepods of genus *Acartia*, *Pseudocalanus* and the cladoceran *Evadne nordmanni* at the inner station, in year 2009. Seasonal differences were that abundance of cirriped nauplii and cypris were highest in early and of cyclopoid copepods *Oithona* sp. and calanoid copepods *Acartia* sp. in late summer. In year 2014, the most marked seasonal difference in community structure, was that Cirriped nauplii and cypris, were dominating in the early summer.

E11 135 year time series of Atlantic Puffin harvest is negatively correlated to sea surface temperature: Puffin chick production a function of temperature dependent population control of sandeel prey?

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The complete pole netting harvest record (1880–2014) of Atlantic Puffins in the Westman Islands, Iceland, is negatively correlated to seasonal sea surface temperatures (SST). Ringing recoveries show that pole netting is age selective with 80% of the harvest being immatures. Variation in harvest reflects past production until age of maturity & colony attendance of immature birds, both reflecting availability of the key prey, the Lesser Sandeel. The relationship between Puffin harvest & SST is hypothetically explained by sandeel population control by temperature dependent metabolic rate. Sandeel life history is composed of summer growth period in May–July, and dormant winter period in August–April spent buried in sand. In winter, increased SST accelerates the sandeel's metabolism & their rate of reserve depletion, but reduces energy allocation to growth & reserves during summer. A critical sandeel length threshold *L_{th}* was calculated annually for the sandeel dormancy period, which the 0-group sandeels need to attain to survive the SST profile of the following winter. Mean annual summer temperature was also calculated. The 3 variables were prewhitened & split into regimes by a sequential t-test. Three main production crashes were identified in 1890, 1932 and 2005, and three regimes of growth 7.5 cm & 2 warm summer regimes correspond to the observed Puffin production pattern.

E12 Environment and vegetation of Brunasandur, SE Iceland: a thousand year history

Þóra Ellen Þórhallsdóttir

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Iceland is an exceptionally dynamic country with frequent, large-scale disturbances. These both derive from natural

causes, notably the action and interaction of volcanism and glaciers and from human impact. The region from Mýrdalssandur to Örafi has probably changed the most since the settlement. The evolution of a part of that region, Brunasandur and vicinity, over the past thousand years has been constructed from documents in *Diplomatarium islandicum* dating from the 12th to the 16th century, and from travellogs, chronicles and regional descriptions from the 18th and 19th centuries. Soon after the settlement, Brunasandur appears to have been devastated by massive floods. Lyme grass flourished in the sandy waste and was an important resource at least from the early 12th century. Barley was cultivated in the vicinity at least until the 14th century. Natural birch woodland is now very limited but much of the region was heavily forested in the first centuries after the settlement. Brunasandur remained a sandy and barren outwash plain of the river Hverfisfljót for almost 600 yrs. In the late 18th century, the Laki lava forced the river eastwards and an astonishingly rapid vegetation succession was initiated. The first farms were settled only 40 yrs after the Laki eruption. In the early 20th century, large-scale irrigation projects initiated different successional processes. After the irrigation fields fell into disuse, the vegetation seems to have largely reverted back.

E13 Environmental monitoring on lakes and rivers in Reykjavík area: Cheap, quick and dirty!

Haraldur R. Ingvason, Finnur Ingimarsson, Þóra Hrafnadóttir og Stefán Már Stefánsson
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Long term monitoring of environmental conditions is an essential tool in ecological research. However, starting and running monitoring projects may be difficult for many reasons: They may require expensive equipment, commitment of the staff in question and – if the force is strong with you – interesting results may emerge as soon as after the first decade or so! When Náttúrufræðistofa Kópavogs started monitoring lakes and rivers in the Reykjavík area the decision was made that it should require minimal tools, focusing on the measurement of temperature, pH and conductivity, and later on also chlorophyll. Fieldwork should take only half a day each time, repeated at least monthly, and lab work should be absolutely minimal. Regarding the results, monitoring always takes time. Results of environmental factors in monitored lakes covering 7–15 years will be presented along with an introduction of a new spin off monitoring of continuous temperature measurements in lake Hafravatn, using data loggers.

E14 Common Loon (*Gavia immer*) capture in Iceland.

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Despite extensive research in Northern America on the Common Loon (*Gavia immer*), little is known about the Common Loon population in Iceland. Only five individuals have been banded in Iceland, of which only one was caught intentionally, and no measurements (weight, wingspan, etc.) have been published. This makes it impossible to know where the Icelandic population fits on the considerable weight gradient observed between populations in America (ranging from 4-5 kg. up to 7 kg.). Another important question which remains to be answered is to what extent the population winters by the coast of Europe vs. the coast

of Iceland. With techniques obtained during loon fieldwork with a U.S. Geological Survey research group in Wisconsin and Minnesota, as well as numerous communications with American loon researchers, an attempt will be made this spring to capture healthy breeding adults in Iceland. This project is partly done in collaboration with researchers at the Northern Michigan University (USA) and McGill University (Canada), who will conduct genetic and toxic analysis on samples collected.

E15 Flexibility in the diel activity of juvenile stream-dwelling Arctic charr

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Diel activity provides important insights into the way animals use, compete for and share habitats in time, and can have direct consequences for individual fitness and populations. Flexibility in diel activity, and the degree to which individuals modify this behaviour under different ecological conditions, remains a fruitful research topic. Recently, we conducted a series of field experiments, using individually-tagged juvenile (1+) Arctic charr placed in semi-natural stream enclosures, to test for the effect of key ecological factors on diel activity and growth. In general, Arctic charr exhibited vast variability in the overall level and the timing of activity. First, as expected, individuals increased their overall activity from colder to warmer streams. Second, when shelters were limited, Arctic charr switched from nocturnal to diurnal activity. Third, at higher population density, fish increased their overall activity, in part via increased activity at crepuscular times. Finally, when exposed to different water flow regimes, fish seized activity at high water levels but showed a burst of feeding activity when water levels dropped again. Across these experiments a pattern emerges; flexible diel activity patterns appear to enable Arctic charr to maintain comparable growth rates under suboptimal conditions.

ÁGRIP VEGGSPJALDA / POSTER ABSTRACTS

V1 To Read and Heal the Land

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Society and land users often accept degraded condition of ecosystems as a normal. Many Icelandic ecosystems are severely degraded or in a collapsed state due to centuries of grazing and other use of marginal land. Much of this poor state, however, goes un-noticed by land-users and the general public alike. It is a fundamental challenge of nature conservation, land use and restoration ecology to educate society about the ecosystem condition and ensure recognition of the problems where they exist. We have developed education material about land literacy and restoration in Iceland. The book familiarizes readers with ecosystem processes, physical and biological controls and constraints of land condition, and ecological succession. It presents easily identifiable ecosystem condition stages and fundamental principles of land restoration. “To Read and Heal the Land” (Að lesa og lækna landið in Icelandic) is aimed at students, interested public and professionals alike. The book is 112 pages, in Icelandic, and is published jointly by Landvernd—an Icelandic nature NGO, the Icelandic Soil Conservation Service and the Agricultural University of Iceland. The e-book will be distributed free of charge at the Landvernd and Landgræðslan web pages.

V2 Unravelling shell trait variation in the common whelk (*Buccinum undatum* L.)

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Associations between genetic composition and habitat through the study of patterns of genetic change and adaptation are sought by both evolutionary biology and ecology. Molluscan shells exhibit a wide variety of phenotypic traits that are easily measured, e.g. colour, thickness and shape, and as the mantle is the only organ that secretes proteins involved in shell formation, this simplifies the study of relative genomic and plastic contributions to phenotypic determination. In Breiðafjörður, the common whelk (*Buccinum undatum*) exhibits extreme variation in shell colour, shape, ridges, banding and thickness. While the common whelk is widely

distributed throughout the North Atlantic, Breiðafjörður is the only known part of the species distribution with a wide range of colour morphs and stark differences in shell traits over small geographic distances. This natural experimental system provides an unprecedented opportunity to study the relative roles of genotypic polymorphism and plasticity in shell trait determination. The aim of the presented project is to determine to what extent shell trait variation is controlled by genotypic, transcriptomic, or environmental variation. Further, the signatures of selection acting upon genes correlated with shell trait variation will be unravelled along with the phylogeographic patterns of genomic variation across the species distribution. An overview of the context and methodology of this current research project is presented.

V3 Eeny, meeny, miny, moe: feather holes and mallophagans in the rectrices of the Icelandic rock ptarmigan

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Feather holes in wings and rectrices of birds have been suggested to be feeding traces of chewing lice (mallophagans). There are two main avian mallophagans – ischnocerans and amblycerans. Ischnocerans are stationary and specialized feather eaters whereas amblycerans are agile and more general feather and tissue eaters that need some blood in their diet that they apparently obtain by piercing pin (blood) feathers of their host. Three species – two ischnocerans (*Goniodes lagopi*, *Lagopoecus affinis*) and one amblyceran (*Amyrsidea lagopi*) – are known for the Icelandic rock ptarmigan. Here we studied the tails and wings of 537 ptarmigan collected between 2007 and 2012 in Northeast Iceland and counted feather holes and mallophagans. Our discoveries were 80 tails (15 %) showing feather holes, 417 (79 %) carrying ischnocerans, and 69 (13 %) amblycerans. The number of birds with feather holes was similar to the number of birds with the amblyceran whereas ischnocerans were much more prevalent. Feather hole intensity was significantly positively associated only with the amblyceran. Feather holes were mainly on the innermost tail feathers, but also the proximal secondary wing feathers, suggesting that this space offers most protection from host preening and flight. Our findings let us suspect that the amblyceran is a bloodsucker that is associated with the feather holes in ptarmigan tails and wings, and this is a novel finding for the grouse family and the genus *Amyrsidea*.

V4 Understanding the role of herbivore diversity to inform sustainable grazing practices in the tundra

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Tundra rangelands in Iceland are simultaneously used by domestic and wild herbivores. These systems are relevant to local economies, as roughly one half of the forage consumed by sheep comes from highland ranges. However, these areas are very sensitive to soil disturbances because they lay on thin volcanic soils, and overgrazing is one of the main causes of soil erosion. Most studies evaluating the impacts of herbivory in tundra ecosystems have focused on one (or at most two) herbivores. However, the simultaneous impacts of different herbivores can lead to outcomes that are not predictable by the effects of each herbivore separately. This project will investigate the role of herbivore diversity on the functioning of tundra rangelands and how the effects of multiple herbivores combine to influence plant communities. Extensive efforts to halt soil degradation and restore these ecosystems have been conducted since the early 1900s by the Icelandic Soil Conservation Service. Soil reclamation usually involves revegetation through fertilization and seeding, and protecting vast areas from sheep grazing. These practices provide a unique, long-term landscape-scale experiment, where the effects of herbivore diversity can be evaluated at sites with different productivity (i.e. fertilization), stages of soil reclamation and contrasting climatic regimes. The results of this project will help guide grazing management in natural rangelands used seasonally by wild and domestic herbivores.

V5 Short-term vegetation response to sheep grazing exclusion as a restoration measure in heathland in NE Iceland

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Despite much effort in ecological restoration in Iceland for over a century, little emphasis has been on degraded fully vegetated ecosystems. A better understanding of the degradation processes and the role of key species in such ecosystems is needed. A research project was initiated in 2014 with the aim of studying degradation processes in inland heathland at 380 m above sea level in NE Iceland, in which sheep grazing is believed to contribute greatly to its degradation. This ecosystem is widely distributed all over Iceland, particularly over 200 m a.s.l. The study area was recently designated as a restoration site and sheep excluded from part of the area by fence in 2011. The newly established fence offers a unique opportunity to compare vegetation response with and without sheep grazing. The aim of the current study was to evaluate how resilient this heathland ecosystem is. Here we report some preliminary results presenting observed short-term (3 years) vegetation response to release of grazing. The vegetation composition differed amongst the sites. More species richness on the grazed side may be related to higher

diversity at intermediate disturbance regimes. The relatively rapid change observed at the ungrazed site indicates a high potential for recovery of the ecosystem. Nearby areas show simultaneously that the soils are excessively vulnerable and there is a need for identifying thresholds occurring in the ecosystem.

V6 Icelandic geese – monitoring breeding success

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Goose wings have been collected from Icelandic hunters around the country since 1993. The wings are sorted by species and age, i.e. adult birds and young, hatched in the previous summer. The aim of the study is to study and monitor the age composition of the goose bag in Iceland. The age composition in the hunting bag reflects the breeding success of the species and can be used as such to interpret population changes that have occurred in the Icelandic goose breeding- and staging populations since mid-20th century. Proportion of juveniles in the bag is assumed to be higher in the bag than in the populations as the susceptibility of the age classes to hunting is not the same but it can probably be safely assumed that it remains constant between years. Age composition of the goose hunting bag has been monitored by the author since 1993 – 2014, excluding the years 2001-2002. The age composition of the Greenland White-fronted Goose (*Anser albifrons flavirostris*) has been assessed in fields and wetlands since it was protected in 2006 and wings therefore no longer available. As well as reflecting changes in breeding success between years the proportion of young in the bag can be used with the bag statistics from the Environment agency to estimate numbers of young and adult geese shot every year and as an input to population models for the goose species.

V7 Sheep Grazing Causes a Variation in Life History Structure of Moss Communities

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Mosses play an important role in tundra ecosystems. They may colonize recently disturbed habitats and either act as facilitators or competitors in terms of vascular plant growth. There are still many unknowns about factors that influence the structure and composition of moss communities. Grazing by large herbivores, such as ungulates, can have strong effects on moss communities, affecting e.g. how those communities are structured. The impact of ungulates on plant communities depends on the intensity and selection of grazers, and the general growing conditions. However, previous studies have rarely explored the impacts on the various life history groups of mosses. By grouping moss species by life history strategies, we gain one tool to help us better understand how disturbance by ungulates influence the structure of moss communities. We conducted a vegetation survey in six grazed and ungrazed valleys in two regions of Iceland, Vestfirðir and Norðurland. The survey was stratified at different landscape

scales to reflect environmental variation, such as, exposure, elevation, and topography. This stratification also helped us determine for which communities the disturbance was most severe. We measured moss species diversity in a systematic way, and grouped them based on their life history. Preliminary results indicate that grazing activity had a significant impact on certain life history groups and those impacts were localized to particular landscape scales.

V8 Community composition, diversity and activity of N fixing Cyanobacteria associated with mosses in sub-arctic alpine ecosystems

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Background Moss associated cyanobacterial communities (MAC) are thought to be the major drivers of the Nitrogen (N) budget at high latitudes. Most studies have been carried out in the boreal forest and the High Arctic, whereas biological N fixation in other moss-rich regions e.g. sub-arctic alpine ecosystems may also be largely MAC-based.

Objective To evaluate diversity, abundance and N fixation activity of cyanobacteria associated with the four most species *Racomitrium lanuginosum*, *Hylocomium splendens*, *Pleurozium schreberi* and *Sanionia uncinata*, all abundant in Icelandic ecosystems.

Methods Moss samples were collected from three moss-dominated ecosystems in Iceland. Cyanobacterial identification and quantification was carried out by phase-contrast, fluorescence and confocal scanning microscopy. Estimation of cyanobacteria relative abundance was performed by amplification and sequencing of *nifH* genes. N fixation was assessed with the acetylene reduction assay (ARA).

Conclusions The cyanobacterial strains identified appeared to be from the orders Stigonematales and Nostocales. N fixation varied over time, also it was responsive to microclimatic/micro-topographic gradients. Simulated climate warming and grazing negatively affected N fixation activity. Moss water content and type of vegetation were the most influential parameters on potential N₂ fixation activity. Our finding may have substantial impact on the understanding of the N cycle in this terrestrial environment.

V9 Proglacial vegetation succession in front of Skaftafellsjökull

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The long time scales of many ecological processes make direct observations difficult and it may be necessary to adopt other approaches. In succession, space-for-time substitution is a well established practice and many studies, some now regarded as classic, were based on such chronosequences. An early attempt to describe primary succession in Iceland was done by the Swedish botanist Åke Persson when describing proglacial chronosequence at successive distances from Skaftafellsjökull glacier, SE Iceland. We relocated Persson's sites in 2009 and repeated his observation as faithfully as possible based on his descriptions and maps. Patterns

of vascular species frequency and species composition were compared for sites across a time scale of almost a half century and directional trends with increasing substrate age are compared in 1962 and 2009. Thus, we obtained an approximate 100 years successional sequence in front of the glacier. Our analysis supports Persson's assumption that the spatial sequence in 1962 adequately represented temporal scale and represented successional stages. The rate of change slowed down with time and the plots furthest from the glacier and longest free of the glacier had changed the least between the two surveys. Thus, the later seral stages defined by Persson were no longer distinguishable in 2009.

V10 Moss layer in Icelandic subarctic tundra has impact on soil temperature – acts as an insulator and reduces fluctuations

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Mosses are an important component of many ecosystems of the subarctic tundra in Iceland. Sadly, soil erosion is dominant in big parts of the highlands of Iceland. Various restoration actions have though been made to prevent further soil erosion in those degraded lands. Although mosses are of great abundance in Iceland, it is poorly understood how they influence restoration of these ecosystems after severe erosion, both above and below ground. To improve our understanding of the role of mosses on the below ground environment in a heathland restoration we ask: how does the moss layer effect the soil temperature? We examined relationships between moss depth and soil temperature in 30 plots (30x30cm) at a relatively dry 30 years old restoration site in the highlands of Iceland (Eyvindastaðaheiði, 65°N, 530 m elevation). The dominant bryophyte species was *Sanionia uncinata* and the moss cover averaged approx 90% in the research area. Eroded land with no moss was used as a comparison site to illustrate soil conditions prior to restoration interventions and a nearby intact heathland was used as a reference site. The moss layer depth affected the soil temperature significantly. With increasing moss depth the soil temperature decreased and daily temperature fluctuations were reduced. Soil temperature fluctuated more frequently at the eroded land and least at the intact heathland. These results show that the moss layer plays an important and complex role in ecosystem restoration. It acts as an insulator for soil temperature which is a key factor in ecosystem restoration in stabilizing the surface in harsh environment such as Eyvindastaðaheiði.

V11 Seasonal variation in benthic invertebrate assemblage in *Fucus spiralis* and *Ascophyllum nodosum* at differently exposed rocky shores in SW-Iceland

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Seasonal variation in benthic invertebrate assemblage in

Fucus spiralis and *Ascophyllum nodosum* was studied in Sandgerði, SW-Iceland, over a 23-month period. Two rocky shore sites on the northwestern Reykjanes peninsula were monitored, one in relatively sheltered area and the other at an exposed location. Algae was sampled each month and brought to the laboratory where it was wet weighed and cleaned of invertebrates. Counts and size measurements were performed on the invertebrates following identification

to the genus or species level. Here are shown possible effects of wave exposure on abundance and seasonal variation of selected benthic invertebrate species at the two different habitats and sampling sites. Seasonal variation in benthic invertebrate assemblage is evident in both *F. spiralis* and *A. nodosum* for both sites where the abundance generally declines during winter.

ÁGRIP VINNUSTOFA / WORKSHOP ABSTRACTS

W1 Mixed Effects Models in Ecology using R

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Ecological data often violate the assumptions of many basic statistical tests. One of these assumptions is the independence of observations. For example, when measuring the lengths of several leaves on a branch or when measuring body weight of an animal in successive recaptures, our measurements are not necessarily independent – they come from the same individual and are thus more likely to be similar amongst themselves than to measurements taken from other individuals. In these cases, mixed effects models become an extremely useful tool. The aim of the workshop is two-fold: (1) to understand what is a mixed effects model and when (we need) to use it, and (2) learn to run a mixed effects model using the freely-available statistical software R. We will combine a brief theoretical explanation of what mixed models are, with a case study investigating how food preferences of an alpine herbivore are affected by previous grazing by another herbivore.

Requirements: We will be running models in R using a case study on interactions among different herbivores, so participants are requested to bring their own laptop with a running version of R installed (the software can be downloaded for free at <http://www.r-project.org/>; installing RStudio is also recommended: <http://www.rstudio.com/>). Some knowledge in the use of R is advisable but, as we will be following a script, it is not essential.