

ÁGRIP ERINDA OG VEGGSPJALDA

VISTÍS / ECOICE

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VISTFRÆÐIFÉLAG ÍSLANDS

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VistÍs 2016 / EcoIce 2016
Ágrip erinda og veggspjalda

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STJÓRN VISTFRÆÐIFÉLAGS ÍSLANDS

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Ráðstefnan fer fram í fundarsal Verkís að Ofanleiti 2 í Reykjavík
Verkís er þakkað fyrir rausnarlegan stuðning við ráðstefnuna.

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DAGSKRÁ / PROGRAM

09.30 SKRÁNING - REGISTRATION

09.50 SETNING - CONFERENCE OPENING

Ingibjörg Svala Jónsdóttir, formaður Vistfræðifélags Íslands

10.00 STURLA FRÍÐRIKSSON - MINNINGARORÐ

Borgþór Magnússon og Sigurður A. Magnússon

10.15 MÁLSTOFA I - SESSION I

Fundarstjóri / Chair: Borgný Katrínardóttir

- Cross-disciplinary investigations of the long-term sustainability of human ecodynamic systems in Lake Myvatn district from 1700-1950**
Ragnhildur Sigurðardóttir
- 10:15 E1
- The effect of whole stream warming on insect emergence**
Gísli Már Gíslason
- 10.30 E2
- Crangonyx islandicus; what does it eat?**
Ragnhildur Guðmundsdóttir
- 10.45 E3

11.00 KAFFI OG VEGGSPJÖLD - COFFEE AND POSTERS

11.30 MÁLSTOFA II - SESSION II

Fundarstjóri / Chair: Róbert A. Stefánsson

- Farhættir og vetrarstöðvar íslenskra svartfugla**
Þorkell Lindberg Þórarinnsson
- 11:30 E4
- Takmarkandi þættir í stofnvistfræði íslenska melrakkans**
Ester Rut Unnsteinsdóttir
- 11.45 E5
- Hunting sustainability of six Icelandic bird species**
Erpur S. Hansen
- 12.00 E6
- Uppskerutap vegna ágangs gæsa á ræktarlönd að vori á Suðausturlandi**
Kristín Hermannsdóttir
- 12.15 E7

12.30 PALLBORÐSUMRÆÐUR: RANNSÓKNIR OG SAMFÉLAGSUMRÆÐA UM MEINTAR TJÓNTEGUNDIR

Frummælendur / Key speakers: Kristinn H. Skarphéðinsson, Tómas G. Gunnarsson og Menja von Schmalensee

13.00 HÁDEGISVERÐUR - LUNCH

14.00 MÁLSTOFA - SESSION III

Fundarstjóri / Chair: Jóhann Þórssón

- Sjálfbær landnýting og gæðastýrð sauðfjárframleiðsla: Óþvinguð þátttaka eða kvöð?**
Jónína Sigríður Þorláksdóttir
- 14:00 E8
- Insect herbivory on native and alien plants**
Mariana Tamayo
- 14.15 E9
- Pollinator diversity in native heath and alien Nootka lupine stands in Iceland**
Jonathan Willow
- 14.30 E10

14.45 AÐALFUNDUR - ANNUAL GENERAL MEETING

15.15 KAFFI OG VEGGSPJÖLD - COFFEE AND POSTERS

15.30 MÁLSTOFA - SESSION IV

Fundarstjóri / Chair: Elísa Skúladóttir

- Habitat mapping of bathyal benthic habitats in the northern Dreki area, Iceland**
Jessica Tadhunter
- 15:30 E11
- The interplay between ecology and evolution at small spatial scales: insight from Arctic charr in lava caves in Iceland**
Camille A. Leblanc
- 15.45 E12
- The developmental transcriptome of contrasting Arctic charr (*Salvelinus alpinus*) morphs**
Arnar Pálsson
- 16.00 E13

16.25 VEGGSPJÖLD, LOK OG LÉTTAR VEITINGAR - POSTERS, CLOSING AND LIGHT REFRESHMENTS

VEGGSPJÖLD / POSTERS

- V1 **Factors affecting nest predation in common eider**
Aldís Erna Pálsdóttir, Jón Einar Jónsson, Róbert Arnar Stefánsson og Árni Ásgeirsson
- V2 **Light sheep grazing on poorly vegetated sites – does it influence succession?**
Bryndís Marteinsdóttir, Kristín Svavarsdóttir og Þóra Ellen Þórhallsdóttir
- V3 **Vascular plant responses to moss cover changes in uneroded and restored tundra ecosystems**
Agústa Helgadóttir, Kristín Svavarsdóttir, Rannveig Anna Guicharnaud og Ingibjörg Svala Jónsdóttir
- V4 **Host-parasite interactions in rock ptarmigan and their potential impact on population dynamics**
Ute Stenkewitz, Ólafur K. Nielsen, Karl Skírnisson og Gunnar Stefánsson
- V5 **Parasite diversity of the rock ptarmigan in Iceland**
Ute Stenkewitz, Ólafur K. Nielsen, Karl Skírnisson og Gunnar Stefánsson
- V6 **Role of sheep as seed disperser through endozoochory in primary succession**
Alyssa Rockwell, Bryndís Marteinsdóttir, Þóra Ellen Þórhallsdóttir og Kristín Svavarsdóttir
- V7 **The Impacts of Sheep Grazing on Bryophyte Communities**
Edwin C. Liebig III, Thóra E. Thórhallsdóttir og Ingibjörg S. Jónsdóttir
- V8 **Are feather holes of rock ptarmigan associated with amblyceran chewing lice?**
Ute Stenkewitz, Ólafur K. Nielsen, Karl Skírnisson og Gunnar Stefánsson
- V9 **Macroinvertebrate biodiversity in Icelandic freshwater springs**
Agnes-Katharina Kreiling, Bjarni K. Kristjánsson, Árni Einarsson og Jón S. Ólafsson
- V10 **Shell traits of the common whelk (*Buccinum undatum L.*) in Breiðafjörður: environmental and spatial effects**
Hildur Magnúsdóttir, Snæbjörn Pálsson, Kristen Marie Westfall, Zophonías O. Jónsson og Erla Björk Örnólfsdóttir
- V11 **Vanadín háð niturnám í blágrænbakteríum og fléttum**
Rúna Björk Smáradóttir, Stefan Bartram, Ana J. Russi Colmenares og Ólafur S. Andrússon
- V12 **Effects of repeated environmental disasters on the survival of human communities and the resilience of natural ecosystems over 300 years in North East Iceland**
Ragnhildur Sigurðardóttir, Astrid Ogilvie, Viðar Hreinsson, Árni Daníel Júlíusson og Megan Hicks

ÁGRIP ERINDA / PRESENTATIONS ABSTRACTS

E1 Cross-disciplinary investigations of the long-term sustainability of human ecodynamic systems in Lake Myvatn district from 1700-1950

Ragnhildur Sigurðardóttir¹, Astrid Ogilvie^{2,3}, Árni Daníel Júlíusson¹, Viðar Hreinsson¹ og Megan Hicks⁴

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This presentation will focus on human ecodynamics in the context of farming practices in the Myvatn area of northeastern Iceland. The research is highly interdisciplinary, and draws on approaches from the natural sciences, including climatology, biology, and geology, and also environmental humanities/social sciences in the fields of history, literary and manuscript studies, social anthropology, and folklore studies. Primary data are drawn from documentary sources and the archaeological record. Myvatn is named for the lake of the same name, meaning literally "Midgewater". In 1978, the area was placed on the RAMSAR list of wetlands of international importance. The area may have been one of the first to be settled in Iceland (in the late ninth century) and is unique in the way that it has remained sustainable overall since then. The rich natural resources of the area are undoubtedly part of the reason for this. However, the sustainability of individual farms varied greatly. An important objective of the project is thus to examine socioecological relationships and resource-management decisions. In this regard, information is being gathered on aspects such as: numbers of livestock; the amount of hay gathered each season; the sizes and productivity of hay fields; the importance of winter foraging by sheep; the dependence on outlying hay fields; and the supplementary harvesting of wetland sedges and grasses. It is foreseen that the integration and synthesis of different lines of information will ultimately provide answers to the reasons for long-term sustainable or failed economies in the Myvatn region.

E2 The effect of whole stream warming on insect emergence

Gísli Már Gíslason og Aron Dalin Jónasson

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A cold stream (IS7) in Hengill volcano 20 km east of Reykjavík was heated up by leading the stream water through a pipe into a heat exchanger in a nearby warm stream (IS8) and back to the lower reaches of the original stream. Emergence traps were placed in the unheated (7–10°C) and heated

reaches (10–18°C) of the stream and in a warm stream (IS8) (19–22°C). This leads to changes in numbers of emerging insects, with a significant increase in total number of insects emerging from the heated stream and the warm stream. Of the total number of insects, Chironomidae were proportionally more numerous in the unheated reach compared with the heated reach, but blackflies (Simuliidae) and the predatory *Limnophora riparia* (Diptera) were both totally and proportionally more numerous in the heated reach. The fauna of the heated reach became more similar to the warm stream IS8. Heating up natural stream water by 3 to 8°C, similar temperature increase that is expected at high latitudes in the next century, will result in increased diversity and density of aquatic insects, higher production and increased density of predatory insects, to a lengthening of food chains and thus the height of the trophic network as a whole.

E3 *Crangonyx islandicus*; what does it eat?

Ragnhildur Guðmundsdóttir¹, Bjarni K. Kristjánsson², Viggó Þ. Marteinsson³ og Snæbjörn Pálsson¹

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Two subterranean freshwater amphipod species were recently discovered in Iceland, *Crangonyx islandicus* and *Crymostygios thingvallensis*. These species are found in the groundwater springs in lava fields within the volcanic active zone. Genetic patterns within *C. islandicus* show different monophyletic groups and even cryptic species in different geographic areas which indicates that the group has survived repeated glaciations in Iceland. Little is known of this groundwater ecosystem and nothing is known about its other species or the food source of the amphipods. To explore this system further the possible food or symbiotic bacteria of the amphipods we studied the bacterial community in the groundwater, the hyporheic zone and in the amphipods by targeting 16S rRNA using the Illumina MiSeq high throughput sequencing technique. Samples were obtained throughout the distribution range of *C. islandicus*. Distinct species composition of bacteria was found in the water samples and from the amphipods. Ten different genera were found in frequency higher than 1% in the water samples, but five in the amphipods and about 35%-40% being unclassified. The most common bacteria in the amphipods are *Halomonas* (43%) and *Shewanella* (17%) both known for chemosynthesis. Our initial results suggest that *C. islandicus* is feeding mainly on basalt eating bacteria or that they facilitate their living via symbiosis.

E4 Farhættir og vetrarstöðvar íslenskra svartfugla

Porkell Lindberg Þórarinnsson¹, Jannie Fries Linnebjerg¹, Yann Kolbeinsson¹, Erpur Snær Hansen², Aðalsteinn Örn Snæþórsson¹, Ingvar Atli Sigurðsson¹ og Böðvar Þórisson^{3,4}

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Vöktunarrannsóknir hafa sýnt fram á miklar breytingar hjá stofnum langvíu *Uria aalge*, stuttnefju *U. lomvia*, álku *Alca torda* og lunda *Fratercula arctica* hér á landi. Tegundirnar eyða meirihluta ársins úti á rúmsjó þar sem aðstæður ráða líklega miklu um lífslíkur þeirra. Mikilvægt er að afla upplýsinga um hvaða svæði fuglarnir nýta á þessum tíma til að útskýra stofnbreytingar og stuðla að vernd stofnanna. Þó um sé að ræða algengustu varpfugla Íslands, liggja afar takmarkaðar upplýsingar fyrir um svæðanotkun þeirra utan varptíma. Til að afla frekari upplýsinga var ferðum fullorðinna einstaklinga þessara fjögurra svartfuglategunda fylgt eftir utan varptímans. Fuglarnir voru veiddir á eggjum eða ungunum í 5 sjófuglabyggðum hér á landi sumarið 2014 og voru dægurrítar, sem afla upplýsinga um staðsetningu út frá birtutíma, festir á fætur þeirra. Gögn úr 68 dægurrítum sem endurheimtir voru sumrin 2014 og 2015 varpa ljósi á nokkur lykiltáttbreiðslusvæði íslenskra svartfugla utan varptímans, sem áður voru óþekkt. Talsverður munur var á dreifingu tegundanna. Í grófum dráttum reiddu lundar og stuttnefjur sig að verulegu leyti á hafsvæði langt frá Íslandsmiðum en álfur og langvíur héldu meira til við Ísland. Þá virtist dreifing og svæðanotkun einnig að einhverju leyti tengd því hvaða byggð fuglarnir tilheyrðu. Niðurstöður verkefnisins skapa grunn að frekari rannsóknunum á tengslum stofnþróunar og þeirra svæða sem þessar fjórar tegundir íslenskra svartfugla byggja afkomu sína á utan varptímans.

E5 Takmarkandi þættir í stofnvistfræði íslenska melrakkans

Snæbjörn Pálsson², **Ester Rut Unnsteinsdóttir**¹ og Ólafur K. Nielsen¹

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Melrakkinn, *Vulpes lagopus* (L.), er hánorræn tegund, útbreidd allt umhverfis norðurheimskautið. Á svæðum þar sem læmingjar eru aðalæðan, sveiflast stofnar melrakka reglubundið í takt við sveiflur læmingja og ná hámarki á 3-5 ára fresti. Á Íslandi og fleiri svæðum þar sem ekki eru læmingjar, sjást ekki slíkar sveiflur. Æðan er fjölbreytt og samanstendur m.a. af fugli, eggjum, hræjum ýmiskonar, hryggleysingjum og berjum. Í erindinu eru kynntar stofnbreytingar íslenska melrakkans og tengsl við ýmsa fuglastofna og veðurkerfi. Samvæmt veiditölum frá 1958-2003 var íslenski refastofninn í óþekktu hámarki um miðbik 20. aldar þegar refum tók að fækka og náði stofninn lágmarki á 8. áratugnum. Þá var stofninn kominn niður í 1.000-1.300 dýr en upp úr 1980 fór refum að fjölga aftur og voru um 8.000 dýr á landinu árið 2003. Tölfræðigreining á stofnbreytingum refa, ýmissa fuglategunda og veðurfars bendir til þess að tófustofninn hafi takmarkast af stofni rjúpunnar á fækkunartímabilinu 1950-1980 en ekki eftir það. Fjölgun í refastofninum var hinsvegar í samræmi við vöxt í stofnum gæsa, fýls og vaðfugla í kjölfar batnandi veðurfars. Jafnframt komu fram þéttleikaháð

áhrif, þ.e. að neikvætt samband var milli stofnbreytinga og fjölda refa. Niðurstöðurnar undirstrika möguleika refsins, sem tækifærissinna í fæðuvali, á að nýta sér breytingar á fæðuframböði í kjölfar hlýnandi loftslags.

E6 Hunting sustainability of six Icelandic bird species

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In Iceland six avian species are primarily hunted on the basis of their potential damage to human interests such as eider farming and airplane collision. According to the Icelandic Wildlife Act No. 64/1994 hunting is only permissible if sustainable. Here we present the first evaluation of hunting sustainability of these six species, using the “Potential Biological Removal” (PBR) method. The PBR produces the maximum sustainable harvest. We calculated PBR using stable age distribution (SAD) assuming no immatures among the sandeel feeders, reflecting the maximum level induced by long term reproductive failure. Hunting intensity index (VÁ) was produced by dividing PBR by the number hunted; VÁ = 1 presents the sustainable limit; VÁ < 1 defines sustainable hunt and VÁ > 1 unsustainable hunt. Only *Larus ridibundus* hunting was sustainable VÁ = 0.3. The following results clearly demonstrate that the hunting intensity is non-sustainable VÁ = (SAD/No imm.): *L. marinus* (15/26), *L. argentatus* (12/27), *L. hyperboreus* (5/26), *Corvus corax* (3.8), *S. parasiticus* (1.5/2.2), *L. fuscus* (1.1/15). Hunting these species should cease immediately according to Icelandic law. No studies exist quantifying the potential damage caused by these species in Iceland. Official management plans should also focus on evaluating the potential damage while retaining sustainable hunting levels.

E7 Uppskerutap vegna ágangs gæsa á ræktarlönd að vori á Suðausturlandi

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Nokkur umfjöllun hefur verið síðustu ár um meintan gróðurskaða sem bændur verða fyrir af völdum gæsa og andfugla. Talsvert hefur verið fjallað um ágang fuglanna í kornakra en einnig í hefðbundin tún að vori. Á Suðausturlandi hefur töluverð umræða átt sér stað um skaðann af beit fuglanna. Varð hún til þess að ráðist var í rannsókn á vegum Náttúrustofu Suðausturlands að meta uppskerutap á tünnum bænda í Austur-Skaftafellssýslu. Í erindinu verður farið yfir aðferðir og niðurstöður úr rannsóknunum sem gerðar voru á tünnum bænda á Suðausturlandi vorin 2014 og 2015.

E8 Sjálfbær landnýting og gæðastýrð sauðfjárframleiðsla: Óþvinguð þátttaka eða kvöð?

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Stór hluti gróðurs og jarðvegs á Íslandi hefur glatast í gegnum aldirnar og er framleiðni landsins víða mun minni en verið gæti. Bændur hafa því í vaxandi mæli horft til sjálfbærari

landnýtingar og uppgræðslu, meðal annars í gegnum aðild að gæðastýrðri sauðfjárframleiðslu. Rannsókn þessari var ætlað að varpa ljósi á árangur og skilvirkni gæðastýringarinnar hvað landbætur og þátttökuáðferðir við landgræðslu varðar útfra upplifunum, viðhorfum og væntingum bænda. Í þeim tilgangi voru tekin eigindleg ítarviðtöl við bændur á ákveðnu rannsóknarsvæði sem síðan voru greind út frá áðferðum grundaðrar kenningar. Færa má rök fyrir því að landbótaáðgerðir hafi áhrif á umhverfisvitund og -hegðun bænda í einhverjum mæli. Þó virðist vanta tengingu milli landnýtingarhluta gæðastýringar og annarra þátta kerfisins. Markmið landbóta og sjálfbærrar landnýtingar mættu vera skýrari auk þess sem styrkveitingar ættu að tengjast árangri slíkra áðgerða í auknum mæli. Samstaða og samræmi þarf að ríkja milli hagsmunaaðila, stofnana og lagaumhverfis hvað varðar forgangsröðun og áðferðir. Toppstjórnun virðist almennt ríkja innan gæðastýringarkerfisins þar sem bændur eru fremur álitnir hlutlaus verkfæri til að ná fram ákveðnum markmiðum fremur en uppspretta mikilvægra og gagnlegra upplýsinga og hugmynda. Því þarf að styrkja upplýsingaflæði og samskipti innan sem utan kerfisins og hvetja til aukins frumkvæðis og nýsköpunar ef gæðastýringin á að ná takmarki sínu á sviði sjálfbærrar landnýtingar.

E9 Insect herbivory on native and alien plants

Mariana Tamayo¹ og Guðmundur Halldórsson²

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The number of alien insect herbivores has increased and the dynamics of insect herbivory have changed in Iceland over the last 100 years. For example, the native red-backed cutworm (*Euxoa ochrogaster*; Brandygla) has expanded its host range to alien hosts including the invasive plant Nootka lupine (*Lupinus nootkatensis*). Although this native moth seems to feed on various native and alien plants and occurs around Iceland, its herbivory and exact distribution are unclear. To address these data gaps, we began assessing the distribution of the red-backed cutworm in southern Iceland related to Nootka lupine (alien invasive host) and lyme grass (native host; *Leymus arenarius*) in 2015. Moreover, we monitored male adults in 2 rutabaga fields (alien host, *Brassica napobrassica*), where the red-backed cutworm has been an agricultural pest. The red-backed cutworm was present in 11 of 31 sites surveyed. Mean larval abundance was 8 larvae per site (SE \pm 2), with the highest numbers seen on Nootka lupine. In contrast, the abundance of male adults was greater on lyme grass (67 \pm 3 male adults) and peaked in mid-August. We found a positive relationship between larval and adult abundance (Pearson = 0.67, p = 0.07), while larval mass and plant cover showed a negative relationship with temperature (Pearson \geq 0.59, p \leq 0.10). Overall, the area between Þorlákshöfn and Eyrarbakki appears to be a hot spot for red-backed cutworm distribution and herbivory on both native and alien host plants.

E10 Pollinator diversity in native heath and alien Nootka lupine stands in Iceland

Jonathan Willow¹, Mariana Tamayo¹ og Magnús Jóhannsson²

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²Landgræðsla ríkisins (The Soil Conservation Service of Iceland)
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Declines in abundance and diversity of pollinating insects are widely documented throughout Europe. Invasive alien-plant establishment is one of the numerous factors threatening pollinator communities. Throughout much of Iceland,

the alien plant *Lupinus nootkatensis* (*Nootka lupine*) has established competitive colonies that have replaced native flowering plants. The reduction of flowering plant diversity associated with the spread of *L. nootkatensis* could severely impact pollinators that are well-adapted to foraging on native flowering plants. The present study aimed to investigate how pollinator communities may be affected by the spread of *L. nootkatensis*. It was expected that pollinator communities observed foraging on native flowering plants would be more diverse than those foraging on *L. nootkatensis*. From June to August 2015, insects were collected from the flowers of *L. nootkatensis* and native flowering plants in the heath surrounding Vífilsstaðavatn, in Heiðmörk Nature Reserve. Specimens were later identified, and pollinator communities of *L. nootkatensis* and native flowering plants were analyzed. From the data gathered in this study, it seems that a number of Iceland's pollinating taxa, with special emphasis on Iceland's only native bee species, *B. jonellus*, are at risk of severe population declines if *L. nootkatensis* continues to replace native flowering plant communities throughout Iceland.

E11 Habitat mapping of bathyal benthic habitats in the northern Dreki area, Iceland

Jessica Tadhunter^{1,2}, Julian Burgos², Steinunn Hilma Ólafsdóttir², Stefán Áki Ragnarsson² og Mariana Lucia Tamayo¹

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Benthic habitats in the bathyal zone, defined as depths between 200 and 2000 m, account for 16% of the ocean floor, support a rich biodiversity, and provide crucial ecosystem services. Nevertheless, our understanding of the composition and distribution of these habitats is poor, particularly in Arctic waters. Recent interest in oil exploitation in the northern Dreki area, located at the northeast border of the Icelandic Exclusive Economic Zone, has increased the need for knowledge on benthic habitats in this area. The Marine Research Institute of Iceland has conducted an acoustic survey covering a 10,500 km² portion of the northern Dreki area (depth range 750-2200 m), and collected biological samples at 77 stations. The present study aims to identify benthic habitats within this study area and predict their distribution. A bottom-up approach will be employed, which will involve using a suite of multivariate analyses to identify biological communities and their relationships with environmental variables (e.g., depth, backscatter, and oceanographic parameters). This study will represent one of the first full-coverage habitat maps produced within Iceland's EEZ, and the first at these depths.

E12 The interplay between ecology and evolution at small spatial scales: insight from Arctic charr in lava caves in Iceland

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A key question in evolutionary biology is to understand which factors shape biological diversity. This is especially true at the intra-specific level, where evolutionary and ecologically processes interact to shape the phenotypic and genetic structure of natural populations. Long-term monitoring studies on highly replicated wild populations are particularly powerful to study divergence in space and time. We have studied phenotypic and genetic diversity of Arctic charr (*Salvelinus alpinus*) across four years and twenty lava caves around Lake Myvatn, NE. Iceland. Mark-recapture studies, combined with population genetics, show that these caves are inhabited by small local populations of charr with very low connectivity across caves. Individual tagging, combined with measurements of growth and morphology, further show phenotypic divergence at small spatial scales. Additionally local ecological factors seem to affect phenotypic traits in these populations.

These results strongly indicate that both evolution and ecological factors play a role in shaping genetic and phenotypic structure of wild populations at contemporary times.

E13 The developmental transcriptome of contrasting Arctic charr (*Salvelinus alpinus*) morphs

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Species and populations with parallel evolution of specific traits can help illuminate how predictable adaptations and divergence are at the molecular and developmental level. Following the last glacial period, dwarfism and specialized bottom feeding morphology evolved rapidly in several landlocked Arctic charr *Salvelinus alpinus* populations in Iceland. To study the genetic divergence between small benthic morphs and limnetic morphs, we conducted RNA-sequencing charr embryos at four stages in early development. We studied two stocks with contrasting morphologies: the small benthic (SB) charr from Lake Thingvallavatn and Holar aquaculture (AC) charr. The data reveal significant differences in expression of several biological pathways during charr development. There was also an expression difference between SB- and AC-charr in genes involved in energy metabolism and blood coagulation genes. We confirmed differing expression of five genes in whole embryos with qPCR, including lysozyme and natterin-like which was previously identified as a fish-toxin of a lectin family that may be a putative immunopeptide. We also verified differential expression of 7 genes in the developing head that associated consistently with benthic v.s.limnetic morphology (studied in 4 morphs). Comparison of single nucleotide polymorphism (SNP) frequencies reveals extensive genetic differentiation between the SB and AC-charr (1300 with more than 50% frequency difference). Curiously, three derived alleles in the otherwise conserved 12s and 16s mitochondrial ribosomal RNA genes are found in benthic charr. The data implicate multiple genes and molecular pathways in divergence of small benthic charr and/or the response of aquaculture charr to domestication. Functional, genetic and population genetic studies on more freshwater and anadromous populations are needed to confirm the specific loci and mutations relating to specific ecological traits in Arctic charr.

ÁGRIP VEGGSPJALDA / POSTER ABSTRACTS

V1 Factors affecting nest predation in common eider

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Down feathers of Eider ducks are collected by many landowners in Iceland. By minimizing nest predation, eider-down yield may be improved. This study assessed the effect of certain factors on predation rate in five colonies in W-Iceland. The factors were nest surroundings, nest initiation date, proximity to nests of predators, nest shelter, number of eggs and frequency of visits by predators. The study was conducted by visiting each colony twice throughout the incubation period and by using cameras with motion sensors. Total nest predation rate was 16% (n=178 nests). Identified predators were Ravens and Great Black-backed Gulls. Predation was significantly lower if nests were surrounded by angelica. Near the end of the incubation period, the angelica will overgrow nests and cover them from above, thus hiding them from avian predators. Predation rate was significantly higher on nests initiated early in the season, and decreased linearly as the incubation period progressed. Early in the season there are proportionally more predators relative to number of nests, vegetation is less advanced and nest density is low and therefore there is limited benefit from nearby eiders and gulls. Predator visits were significantly more common on nests which eventually were predated, or on average 1.7 times/day compared to 0.7 times/day on successful nests. Predators possibly identify nest locations and visit these sites to check eider female presence, and eventually try to flush her off the nest.

V2 Light sheep grazing on poorly vegetated sites – does it influence succession?

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Land degradation and soil erosion have shaped Icelandic ecosystems and are regarded among Iceland's largest environmental problems. Today, 40% of the country suffers from considerable erosion but many such areas are still grazed by sheep. This practice is controversial, but often justified with reference to the small stocking rate, and the belief that it could not have any significant effect on the ecosystem recovery. In harsh environments where growing conditions are poor, it can take decades before the cessation of grazing

produces noticeable changes at community level. Changes at the level of individual plants are likely to be much quicker and with time these will be expressed at higher levels of organization. In this study we evaluate the impact of light summer grazing (-1) on plant performance on Skeiðarársandur, a 1000 km² glacial outwash plain in SE-Iceland. While parts of Skeiðarársandur have continuous vegetation, most of it has <10% vegetation cover. Ecosystem development has been studied there since 1998 and in 2004, 10 large plots were fenced to exclude sheep grazing. We compared growth and seed production in three common plant species, *Cerastium alpinum*, *Arabidopsis petraea* and *Juncus trifidus*, inside and outside enclosures. None of these species is regarded as particularly palatable. Our results indicate that even such a low stock rate has a significant negative effect on growth and seed production. Clearly, this has implications for grazing management, supporting the view that such poorly vegetated sites, should not be used as grazing land for domestic stocks.

V3 Vascular plant responses to moss cover changes in uneroded and restored tundra ecosystems

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Mosses are an important component in many tundra ecosystems. In ecological restoration mosses may play an important role by stabilizing the soil. As the moss cover develops, the effects of mosses on ecosystem processes and the performance of vascular plants may change. To investigate these relationships, we established a moss thinning and removal experiment in an uneroded heathland and a 30 year-old restoration site in the subarctic-alpine highland of Iceland. Dominating bryophyte species were *Racomitrium lanuginosum* and *Sanionia uncinata* in the uneroded and restored heathlands, respectively. The effects of moss thinning and removal on selected soil properties (temperature, moisture, respiration, TOC, available NO₃⁻ and NH₄⁺) and on four target species (*Betula nana*, *Empetrum nigrum*, *Silene acaulis*, *Carex rupestris*) were measured in 27 plots (50x50cm) at each study site in 2011-2013. Soil temperature generally increased when the moss was removed, while no effects were detected on other soil variables. The vascular plant responses were positive (increased growth) or negative, depending on site. In the uneroded heathland the growth of *Betula* and *Carex* decreased when moss was removed, but no responses were detected in *Empetrum* and *Silene*. However, at the restoration site *Empetrum* responded significantly to

the treatments with an increased growth. This discrepancy in responses between the two sites may be due to generally younger individuals at the restoration site. The relatively young plants may have experienced a competitive release when the moss was removed to such an extent that it outweighed any negative impacts of moss removal.

V4 Host-parasite interactions in rock ptarmigan and their potential impact on population dynamics

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The population density of Icelandic ptarmigan fluctuates in cycles with peaks c. every 10 years. We investigated how the ptarmigan parasite community acts and parasites relate to ptarmigan age, body condition, and population density. We collected 632 ptarmigan in northeast Iceland 2006-12. From those, 630 (99.7 %) birds were infected with at least one parasite species, 616 (98 %) with ectoparasites and 536 (85 %) with endoparasites. The main factors associated with variation in the parasite community were host age and time. Chicks carried overall more parasites than adults and there were distinct annual fluctuations of parasite measures. Ptarmigan population density was associated with the coccidian parasites *E. muta* and *E. rjupa* in chicks. Annual aggregation levels of these eimerids fluctuated inversely with prevalence. Both prevalence and aggregation of particularly *E. muta* tracked ptarmigan population density with a 1.5 year time lag. The cause of the time lag could be explained by the host specificity of the eimerids, host density dependent shedding of oocysts, and their persistence in the environment. Further, ptarmigan condition was negatively affected at high intensities of *E. muta* and *E. rjupa* marginally, an indication for their pathogenicity. Our conclusion is that *E. muta* and *E. rjupa* through time-lag in prevalence with respect to host population size and by having a negative impact on condition in juvenile birds could act to destabilize ptarmigan population dynamics in Iceland.

V5 Parasite diversity of the rock ptarmigan in Iceland

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The rock ptarmigan *Lagopus muta* in Iceland shows cyclic population changes with peak numbers c. every 11 years. This project concentrates on the relationship of rock ptarmigan population change and health related parameters, including parasite infections. From 2006 to 2009, each year 100 ptarmigans were collected in northeast Iceland, in total 400 birds. The plumage and skin of every bird was examined for ectoparasites and signs of disease. The intestines and blood were examined for endoparasites. So far, 16 parasite species have been found of which 10 were ectoparasites and 6 were endoparasites. Seven of these parasite species were new to science (+). No blood parasites were found. The ptarmigan

body is habitat for a diverse ensemble of parasite species - a clear example of biodiversity on the micro scale. Each of these species has its specific niche with respect to where to live, what to feed on, and how to disperse. Examples are the five species of mites: one species is confined to the space between the vanes of distinct wing feathers, another is found in the down, at least one in the skin, and one in the quills of the larger wing feathers. Some of these mites feed on wax and keratin, others feed on host cells and body fluids. Dispersal can be direct, from bird to bird, or by phoresis whereby the hippoboscid fly is the vector for the mallophagans and some of the mite species.

V6 Role of sheep as seed disperser through endozoochory in primary succession

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Herbivorous mammals are crucial vectors for seed dispersal. Numerous studies show that many plant species are able to disperse through the process of endozoochory and are able to germinate from herbivore dung. In the case of Iceland, where there is little diversity of herbivore mammals, but a proportionally high number of freely grazing sheep, the role of the sheep as a seed disperser is critical. However, little assessment has been done to test the impact of endozoochory as a mechanism for seed dispersal, especially in areas of primary succession. The project objective is to gain insight into the role of sheep as a seed disperser in primary succession. We sampled sheep dung from 13 sites at Skeiðarársandur, a large glacial outwash plain in SE-Iceland. Dung samples were collected in August and October 2015 and grown in a greenhouse environment, where over several months, various seedlings emerged. The emerging species for each sample were identified and quantified based on individual species. Preliminary results show that sheep on Skeiðarársandur disperse various species through endozoochory, with the most numerous being: *Agrostis sp.*, *Carex maritima*, *Festuca richardsonii*, *Poa pretensis* and *Rumex acetosella*. Thus, through the process endozoochory, sheep serve as effective dispersers of many common plant species during primary succession in Iceland. The quantity, diversity, and characteristics of germinable species dispersed by sheep could have a significant effect on the dynamics and species richness of these systems.

V7 The Impacts of Sheep Grazing on Bryophyte Communities

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In tundra ecosystems, bryophytes could be sensitive to trampling and grazing by large herbivores, such as sheep. Depending on grazing intensity and the growing conditions, this disturbance may have strong effects on bryophyte communities. It is not well known how grazing affects bryophyte communities in tundra ecosystems. This study aimed at assessing the impacts of sheep grazing on the structure and composition of bryophyte communities. Bryophyte communities were compared in three grazed and three ungrazed valleys, in two regions in Northwest and North Iceland. Sampling was stratified to allow combinations of different growing conditions with respect to exposure, elevation, and

topography. Bryophyte layer depth, species diversity and abundance were measured, and species were grouped based on growth form and life-history strategy. Results indicate that sheep grazing significantly decreased the depth of the bryophyte layer, and this could result in consequences at the ecosystem level. Within west-facing slopes, species diversity was greater in grazed than in ungrazed valleys, which could mean there are less species to fill the various ecosystem roles of bryophytes in grazed valleys. Pleurocarpous mosses were more abundant in grazed valleys, suggesting this growth form may be better at dealing with herbivore disturbance than other growth forms. Successional species were less abundant in grazed valleys, suggesting that tundra ecosystems take a very long time to recover from sheep grazing. Competitive and stress tolerate species were more abundant in grazed valleys, suggesting they cope with disturbance and other impacts caused by sheep grazing.

V8 Are feather holes of rock ptarmigan associated with amblyceran chewing lice?

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Feather holes in wings and retrices have traditionally been suggested to be feeding traces of chewing lice (mallophagans). Here we test the hypothesis that feather holes are related with amblyceran mallophagans in particular. We studied mallophagan infestations and holes in tail feathers of 537 ptarmigan collected in early October 2007 - 2012 in north-east Iceland. Tails of 80 birds (15 %) had feather holes, and for mallophagans 377 birds (71 %) had *Goniodes lagopi*, 270 (51%) *Lagopoecus affinis*, and 69 (13 %) *Amyrsidea lagopi*. The prevalence of feather holes and *A. lagopi* did not differ, but the two other mallophagans were much more prevalent than the feather holes. Intensities of feather holes and *A. lagopi* were significantly positively associated. The two other mallophagans did not show such a relationship. Holes were mainly found on the innermost tail feathers, and most were located in the distal part of each feather. Amblyceran mallophagans, such as *A. lagopi*, are known to feed among other on host blood drawn by biting pin feathers whereas ischnoceran mallophagans, such as *G. lagopi* and *L. affinis*, are mainly keratin feeders. Based on the observed relationships, characteristics of the holes, morphology of *A. lagopi* mouth parts, and known feeding habits of amblycerans, we conclude that feather holes observed in ptarmigan may have various origins, but most probably to do with the feeding activity of *A. lagopi* during the pin feather stage which is a novel finding for the grouse family and the genus *Amyrsidea*.

V9 Macroinvertebrate biodiversity in Icelandic freshwater springs

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Freshwater springs are ecotones between surface and subsurface water habitats and have the potential to house a diverse and highly-specialized invertebrate fauna. In Iceland,

an abundance of cold and thermal springs can be found, which makes the country a perfect place to study temperature influences on stygobiont and crenobiont macroinvertebrates. The aim of this study is to analyze community composition in Icelandic freshwater springs at the surface-subsurface water interface and assess how temporal, environmental, and spatial factors shape biodiversity. We have sampled 35 warm and cold freshwater springs all over Iceland using a modified electric fishing gear. Macroinvertebrates clinging to the source duct are detached by the electric shock and washed into a driftnet fixed in front of the source. Additionally, water samples for eDNA analysis have been taken. Since the water temperature for each spring is seasonally and annually stable, community composition is expected to be similar all year round. For a biogeographical approach, springs both within and outside the volcanic active zone in Iceland will be compared in order to assess whether spring type (limnocene or rheocene), water temperature, or geographical distribution have greater influence on macroinvertebrate composition. Warm springs could act as habitat islands across the Icelandic freshwater landscape and thus may represent a unique ecosystem which requires special protection. So far, Chironomidae, Copepoda, Cladocera, Ostracoda, and Hydracarina (Acari) seem to be the most abundant invertebrate taxa in Icelandic freshwater springs.

V10 Shell traits of the common whelk (*Buccinum undatum* L.) in Breiðafjörður: environmental and spatial effects

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Mollusc shells exhibit a wide variation of easily measurable phenotypic traits including colour, thickness and shape, which make them ideal for the study of relative genomic and plastic contributions to phenotypic determination. Variable shell shape and thickness have been linked to environmental factors such as wave action and presence of predators using model species such as *Littorina saxatilis* and *Nucella lapillus*. The documented variability in shell morphology of the subtidal gastropod *Buccinum undatum* makes it another fitting candidate for research on trait determination. In Iceland the highest density of whelks is in Breiðafjörður, where whelk differ in life history traits between sites as well as in shell traits. The species distribution in Breiðafjörður covers a diverse area and many environmental factors that could influence shell morphology. The aim of the project is to understand the causes of the phenotypic variation in the common whelk, with respect to spatial and environmental variation. A combination of traditional morphometrics, geometric morphometrics and shell colour analysis is used to classify shell phenotypes of whelk in Breiðafjörður and their correlation with environmental factors was tested. Results indicate that a combination of environmental and genetic factors affects the shell phenotype of the whelk. The next steps in the project, analysis of genotypic variation and a common garden experiment, will shed better light on this.

V11 Vanadín háð niturnám í blágrænbakteríum og fléttum

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Ýmsir dreifkjörnungar geta afoxað tvínitur úr andrúmslofti og gert það þannig nýtanlegt til myndunar á lífrænum sameindum. Í norðlægum vistkerfum fer slíkt niturnám aðallega fram í blágrænbakteríum, t.d. af ættkvísl *Nostoc*, sem oft eru í samlífi með fléttum og mosum. Niturnámið fer aðallega fram í ensímflókum sem nýta frumefnið mólýbden en nýlega hefur fundist annað nítrogenasakerfi sem nýtir frumefnið vanadín. Ekki er ljóst hvert mikilvægi vanadín-nítrogenasakerfisins er í niturbúskap flétta og mosa og hvaða þættir stuðla að nýtingu þess fremur en hins ríkjandi mólýbden kerfis. Frumathuganir með ræktuðum *Nostoc* stofnum úr fléttum og mosum hafa sýnt að þeir halda vel niturnámsvirkni við lágt hitastig (5°C), og að við mólýbdenskort lækkar hlutfall 15N samsætunnar miðað við 14N, en það endurspeglar virkni vanadín-nítrogenasa. Þessum athugunum hefur verið fylgt eftir með athugunum á 15N hlutfalli í himnuskóf (*Peltigera membranacea*) við ýmsar aðstæður, og í hluta af sýnunum er 15N hlutfallið marktækt lægra en búast má við af mólýbden-nítrogenasa. Jafnframt er hægt að greina tjáningu á genum vanadín-nítrogenasa með RT-PCR mælingu á RNAi úr fléttum. Fléttusýni sem bera merki niturnáms með hjálp vanadíns virðast ekki hafa lægri styrk mólýbdens en samanburðarsýni og er skýringa nú leitað meðal annarra umhverfisþátta og mismunar í arfgerðum en ýmislegt bendir til þess að vanadín kerfið sé virkara við lágt hitastig.

V12 Effects of repeated environmental disasters on the survival of human communities and the resilience of natural ecosystems over 300 years in North East Iceland

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It has been challenging to equate social and ecological resilience with vulnerability to climatic change in coupled human and natural systems over long time scales. This is also true for analysis of environmental disasters. To fully understand vulnerability of these systems, new approaches are needed to address these issues cultivating a more holistic cross-disciplinary approach. We present an ongoing project on human ecodynamics in northeastern Iceland for the period AD 1700 to 2000. The project is highly interdisciplinary, and draws on data and approaches from the natural sciences, including climatology, biology, and geology, and also environmental humanities/social sciences in the fields of history, literary and manuscript studies, social anthropology, archaeology and folklore studies. Primary data are drawn from documentary sources and the archaeological record. Our objective is to model the effects of pandemics, climate and volcanic related disasters, as well as the effects of long term climatic change in this system which has been ravaged by repeated disasters, many of which have resulted in a human death toll of up to 30%. We analyze, furthermore, the natural effects of these disasters in light of human land uses to model the resilience of the system, and to identify the conditions on when the ecological system is pushed beyond a productivity threshold to a more degraded state, affecting the long term survival of humans in the system.