



DAGSKRÁ / PROGRAM
&
ÁGRIP / BOOK OF ABSTRACTS

Vistís/EcoIce
Askja - Háskóli Íslands
5 apríl 2024

Vistfræðifélag Íslands / The Icelandic Ecological Society

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Vistís 2024 / EcoIce 2024 Dagskrá / Program

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| 09:30 | HÚS OPNAR / HOUSE OPENS |
| 10:00 | SETNING OG ÁVARP FORSETA VISTFRÆÐIFÉLAGS ÍSLANDS / CONFERENCE OPENING AND WELCOME WORDS FROM VISTFRÆÐIFÉLAG'S CHAIR – Edda Elísabet Magnúsdóttir |
| 10:15 | ÁVARP STOFNUNAR RANNSÓKNASETRA HÍ / WELCOME WORDS FROM THE UNIVERSITY OF ICELAND'S RESEARCH CENTERS – Sæunn Stefánsdóttir, forstöðumaður Stofnana Rannsóknasetra HÍ |
| 10:40 | TILKYNNINGAR OG UPPHAF MÁLSTOFA / GENERAL HOUSKEEPING AND START OF SESSIONS - VISTÍS BOARD |

10:45 MÁLSTOFA I / SESSION I — LÍFFRÆÐILEG FJÖLBREYTNÍ OG VERNDARLÍFFRÆÐI / BIODIVERSITY AND CONSERVATION

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| 10:45 | Tröllasmiðurinn í Hornafirði <i>Hólmfríður Jakobsdóttir, Kristín Hermannsdóttir, Lilja Jóhannesdóttir</i> |
| 11:00 | Relationship between Patch Size and Avifauna in Icelandic Wetlands <i>Aron Alexander Þorvarðarson, Tómas Grétar Gunnarsson, Gunnar Þór Hallgrímsson</i> |
| 11:15 | Who is hiding within the moss? A small dive into the bryosphere in a changing tundra <i>Bastien Papinot, Snæbjörn Pálsson, Ingibörg Svala Jónsdóttir</i> |
| 11:30 | Fjölbreytileiki sveppa í framvindustigum birkiskóga á Íslandi. <i>Hilmar Njáll Þórðarson, Edda Sigurðís Oddsdóttir, Snæbjörn Pálsson</i> |
| 11.45 | The Nordic Biodiversity Framework – a new BIODICE project <i>Skúli Skúlason, Ole Sandberg, Ragnhildur Guðmundsdóttir, Rannveig Magnúsdóttir</i> |

12:00 HÁDEGISVERÐUR / LUNCH

13:00 MÁLSTOFA II / SESSION II – SJÁVARVISTFRÆÐI / MARINE ECOLOGY

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| 13:00 | Meta-analysis of the Cetacea gut microbiome: diversity, co-evolution and interaction with the anthropogenic pathobiome <i>Elena Radaelli, a Giorgia Palladino, Enrico Nanetti, Daniel Scicchitano, Simone Rampelli, Sabina Airoidi, Marco Candell, Marianna Marangi</i> |
| 13:15 | Do micronutrient profiles of parasites match those of their hosts?: A case study of elasmobranchs and their tapeworms. <i>Haseeb S Randhawa</i> |
| 13:30 | Rockling Roulette: Unveiling cryptic species misidentification Charlotte S. Matthews , Haseeb S. Randhawa, James Kennedy, Anna H. Ólafsdóttir, Christophe Pampoulie |
| 13:45 | Einstakt botndýrasamfélag við suðurströnd Íslands <i>Þorleifur Eiríksson, Sigurður Ívar Jónsson, Halldór Pálmar Halldórsson og Þorleifur Ágústsson.</i> |

14:00 MÁLSTOFA III / SESSION III – ÞURRLENDIS VISTFRÆÐI / TERRESTRIAL ECOLOGY

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| 14:00 | The carbon flux balance in Icelandic grasslands under grazing and long-term grazing exclusion <i>Christian Klopsch, Anna Gudrun Thorhallsdóttir, Aslaug Geirsdóttir, Björn Thorsteinsson, Richard Bardgett, Rene van der Wal</i> |
| 14:15 | Land degradation impacts ecosystem processes independent of plant functional type composition in the Icelandic highlands <i>Ian Klupar, Isabel C Barrio, Alejandro Salazar, Bryndís Marteinsdóttir, Ingvild Ryde, Ingibjörg Svala Jónsdóttir (CANCELLED)</i> |
| 14:30 | Predicting dung nutrient dynamics of Icelandic tundra herbivores using Near Infrared Spectroscopy (NIRS) <i>Mathilde Defourneaux, Laura Barbero-Palacios, Jonas Schoelynck, James D.M. Speed, Noémie Boulanger-Lapointe, Isabel C. Barrio</i> |
| 14:45 | Population structure, viability, and dynamics of an Arctic predator under combined impacts of intense harvesting and climate change <i>Ester Rut Unnsteinsdóttir, Bruce McAdam, Nicolas Lecomte, Anna Bára Másdóttir and Snæbjörn Pálsson</i> |

15:00 KAFFIHLÉ / COFFEE BREAK

15:15 MÁLSTOFA IV / SESSION IV – FISKAVISTFRÆÐI / FISH ECOLOGY

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| 15:15 | <p>Personality traits as indicators of welfare in farmed fish. David Benhäm</p> |
| 15:30 | <p>Local movement patterns in three sympatric stream-dwelling salmonids Gabrielle Ladurée, Marie Delbasty, Anna-Maria Molls, Jordi Braz Aznar, Laura K. Weir, Stefán Ó. Steingrímsson</p> |
| 15:45 | <p>Spatial overlap of alien European flounder (<i>Platichthys flesus</i>) and native Arctic charr (<i>Salvelinus alpinus</i>) and brown trout (<i>Salmo trutta</i>) in near-shore waters Michelle Lorraine Valliant, Theresa Henke, Guðbjörg Ásta Ólafsdóttir</p> |
| 16:00 | <p>Combined effects of temperature and diet on performance and differential gene expression in threespine stickleback (<i>Gasterosteus aculeatus</i>) Alessandra Schnider, Bjarni K. Kristjánsson, Katja Räsänen, Zophonías O. Jónsson</p> |
| 16:15 Flash talk | <p>Stalking fish: a yearlong look into habitat utilisation of Arctic charr in Thingvallavatn Lieke Ponsioen, Fia Finn, Gustav Hellström, Haraldur R. Ingvason, Benjamin D. Hennig, Zophonías O. Jónsson, Finnur Ingimarsson, Kalina H. Kapralova</p> |
| 16:20 Flash talk | <p>Teeth traits variation in ecologically specialized and sympatric Arctic charr (<i>Salvelinus alpinus</i>) ectomorphs. Guðbjörg Ósk Jónsdóttir, Anthony Curtat, Finnur Ingimarsson, Sigurður Sveinn Snorrason, Sarah Elizabeth Steele, Arnar Pálsson</p> |

MÁLSTOFA V / SESSION V ATFERLISVISTFRÆÐI FUGLA / BEHAVIOUR
ECOLOGY OF BIRDS

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| 16:30 | Dietary preferences of Icelandic short-eared owls (<i>Asio flammeus</i>) in different ecotypes Viktor Árnason, Gunnar Þór Hallgrímsson |
| 16:45 | Home range size and habitat use of a recently established long-eared owl (<i>Asio otus</i>) population in Iceland Moirá Aileen Brennan, John Calladine, Gunnar Þór Hallgrímsson |
| 17:00 | Wintering and migration strategies of Horned Grebes <i>Podiceps auritus</i> breeding in Iceland Porkell Lindberg Þórarinsson, Benjamin Merkel, Aðalsteinn Örn Snæþórsson, Yann Kolbeinsson |
| 17:15 | Rapidly changing population numbers of ground-nesting birds in South Iceland Aldís E. Pálsdóttir, Böðvar Þórisson and Tómas G. Gunnarsson |

17:45 AÐALFUNDUR / ANNUAL GENERAL MEETING

17:30 VEGGSPJÖLD OG VEITINGAR / POSTERS AND REFRESHMENTS

POSTERS

1. Patterns of Feeding Element Specialization in Polymorphic Arctic Charr Populations.
Kenedy Williams, Guðbjörg Ósk Jónsdóttir, Sarah E. Steele, Finnur Ingimarsson, Sigurður S. Snorrason, Pamela Woods and Arnar Pálsson
2. Activity and potential effects of ants on fauna in Icelandic geothermal areas
Andreas Guðmundsson Gähwiler, Nína Guðrún Baldursdóttir, Marco Mancini & Arnar Pálsson
3. NordBorN: a research and educational platform to understand borealization in the Nordic region.
Isabel C Barrio, James D M Speed, Mariana Verdonen, Alejandro Salazar, Anne Bjorkmann Ása L Aradóttir, Beatrice Trascau, Bjarni Diðrik Sigurðsson, Christian Schultze, Dorothee Ehrich, Efrén López-Blanco, Emmanuel P Pagneux, Gunnar Austrheim, Hlynur Óskarsson, Isla Myers-Smith, Jane U Jepsen, Jarad P Mellard, Jón Guðmundsson, Katrine Raundrup, Katrín Björnsdóttir, Kristine Westergaard, Mariana García Criado, Mathilde Defourneaux, Miguel Villoslada, Niels Martin Schmidt, Pasi Korpelainen, Rolf A Ims, Tanguy Bernard, Timo Kumpula
4. Temperature and its effect on the intensity of insect herbivory in the Icelandic highlands
Eleanor Greer, Isabel C. Barrio
5. Ecological classification for monitoring of the status of coastal waters in Iceland according to the Water Framework Directive (2000/60/EC)
Hildur Magnúsdóttir, Rakel Guðmundsdóttir, Eydís Salome Eiríksdóttir
6. Dairy sheep farming: a solution to valorize abandoned mountain rangeland
Marta Ruzzier, Andrea Messa, Tamburini Alberto
7. Biodiversity changes in drained Icelandic peatlands – are bryophytes an indicator of drainage and degradation state?
Ágústa Helgadóttir, Vigdís Freyja Helmutsdóttir, Sunna Áskelsdóttir
8. Effect of wildlife-tourism on behaviour and spatial distribution of harbour seals (*Phoca vitulina*) estimated based on trail camera photos.
Hólmfríður Jakobsdóttir, Haseeb Randhawa, Eric Ruben dos Santos, Sandra Magdalena Granquist
9. Grazing cessation affects traits of palatable plants
Axel Ingi Einarsson, Ingibjörg Svala Jónsdóttir
10. Genetic differentiation between sympatric morphs of Arctic charr influences transcriptional regulators and developmental expression
Sébastien Matlosz, Han Xiao, Lea Jerman Plesec, Alexander Guðjónsson, Sigríður Rut Franzdóttir, Arnar Pálsson, Zophonías Oddur Jónsson
11. Hitchhiker of the microplastic ocean: *Xenobalanus globicipitis* (Steenstrup, 1852)
Guðrún Ósk Sæmundsdóttir, Valérie Chosson, Odei Garcia-Garin, Alex Aguilar, Asunción Borrell, Guðjón Már Sigurðsson, Haseeb S. Randhawa

12. Water table height as a predictor of peatland respiration
Vigdís Freyja Helmutsdóttir, Ölvir Styrmisson, Sunna Áskelsdóttir, Ágústa Helgadóttir
13. Satellite tagging of northern bottlenose whales off Iceland documents long-distance migrations
Paul J. Wensveen, Patrick J.O Miller, Barbara K. Neubarth, Jörundur Svavarsson

ÁGRIP ERINDA / PRESENTATION ABSTRACTS

MÁLSTOFA I / SESSION I — LÍFFRÆÐILEG FJÖLBREYTNÍ OG VERNDARLÍFFRÆÐI / BIODIVERSITY AND CONSERVATION

Tröllasmiðurinn í Hornafirði

Hólmfríður Jakobsdóttir¹, Kristín Hermannsdóttir¹, Lilja Jóhannesdóttir¹

1. Náttúrustofa Suðausturlands

Tröllasmiður (*Carabus problematicus*) er eitt stærsta skordýr Íslands og finnst aðeins á litlu svæði í Sveitarfélaginu Hornafirði, frá Hoffelli og austur að Almannaskarði. Íslenski tröllasmiðurinn er undirtegund (*C.p. islandicus*) og er hana því hvergi að finna annars staðar en í Hornafirði. Tröllasmiðurinn hefur ekki verið mikið rannsakaður á Íslandi og byggist þekking á útbreiðslu hans á gömlum heimildum og tilviljanakenndum athugunum. Sumarið 2022 notaðist Náttúrustofa Suðausturlands við upplýsingar frá almenningi og fallgildrum til þess að kortleggja útbreiðslu tröllasmiðs á þekktum fundarstöðum og svæðum sem sést hefur til hans. Tröllasmiður náðist í gildrum á fimm af tólf sniðum. Alls fengust tólf tröllasmiðir í gildrunar. Einn tröllasmiður náðist í gildru í austur Almannaskarði sem er austar en áður hefur verið staðfest með rannsóknum. Þetta gæti bent til þess að útbreiðsla tröllasmiðs hafi færst austar frá rannsóknum á fyrri hluta síðustu aldar. Ljóst er að frekari rannsókna er þörf til öflunar grunnupplýsinga um þessa sérstöku tegund, svo sem um virkni tröllasmiðs frá vori fram á haust og dvala hans. Nauðsynlegt er að þróa betri skaðlausar aðferðir við rannsóknir á tröllasmið en þeim sem beitt var árið 2022 sem voru talsvert tímafrekar og viðkvæmar fyrir veðri. Einnig er þörf á að kortleggja betur útbreiðslu tegundarinnar á austurhluta svæðisins, í Lóni, til að varpa ljósi á hve langt austur útbreiðslan nær.

Relationship between Patch Size and Avifauna in Icelandic Wetlands

Aron Alexander Þorvarðarson¹, Tómas Grétar Gunnarsson², Gunnar Þór Hallgrímsson³

1. Reykjavíkurborg
2. Rannsóknasetur Háskóla Íslands á Suðurlandi
3. Háskóli Íslands

The Icelandic countryside has wetlands of various shapes and sizes. These wetlands support over fifty species of birds, including ten species that constitute significant proportions of their global populations. Despite wetlands of various sizes being used by birds the current legislation does not grant protective status to wetland patches that are smaller than 2 hectares. This legislation echoes a remnant of the past, where it was believed that larger habitats will always be more beneficial for environmental and biological conservation goals compared to smaller habitats. This has since been greatly contested, and a debate spanning almost half a century has since persisted. This debate is commonly referred to as the SLOSS debate (Single Large or Several Small). The aims of this thesis were to cast light on the validity of the current legislation regarding wetland conservation and inform the SLOSS debate by exploring how bird abundance, density, and diversity correlate with wetland sizes in south and west Iceland. The findings show that the smallest wetland patches generally hold highest density of birds, with the density steadily decreasing as the wetland patch size grows larger. Both bird abundance and bird diversity do however increase with increased wetland patch size. These findings highlight the importance of wetland patches of all sizes and show how their importance is context dependent. This would be beneficial to keep in mind for future implementation of both conservation and restoration efforts where the need to achieve multiple benefits for climate and biodiversity is increasingly being recognized.

Who is hiding within the moss? A small dive into the bryosphere in a changing tundra
Bastien Papinot¹, Snæbjörn Pálsson¹, Ingibörg Svala Jónsdóttir¹

1. Háskóli Íslands

Inside the moss layer, the “bryosphere” is an unsuspected biodiversity, often overlooked when it comes to global microbiobiodiversity. The variety of species, groups and ecological functions can be of major importance for ecosystems, especially in fragile areas like the Arctic landscapes. With 1/3 of its surface being covered by moss-dominated ecosystems, Iceland hosts more than 600 bryophyte species. However, bryophyte and bryosphere diversity in tundra ecosystems are being threatened by climate change pressures, such as shrubification and shading, although often modulated by unsustainable livestock grazing. To understand parts of the complex interactions between those factors and the important biodiversity within the moss layer, we here investigate the bryosphere diversity of the abundant Icelandic moss species *Racomitrium lanuginosum* (“hraungambri” in Icelandic). Using the different parts of the moss shoots for environmental DNA analysis in a setup with two different sites and sheep grazing pressures located in Auðkúluheiði (highlands) and Þingvellir (lowlands) on the sub-arctic island, we take a look at the differences between the trophic network and abundances of different taxa from bacterial to eukaryotic organisms hidden in this bryosphere. From first insights on data from both 18S and 16S markers, it seems that the position in the moss layer has a more important effect on bryosphere diversity than sites and grazing regimes. When it comes to the bryofauna, arachnids, collembolas and nematodes are more present in the bottom part of the moss layer, most likely participating in the decomposition process in the tundra.

Fjölbreytileiki sveppa í framvindustigum birkiskóga á Íslandi.

Hilmar Njáll Þórðarson¹, Edda Sigurðís Oddsdóttir², Snæbjörn Pálsson¹

1. Líf- og umhverfisvísindadeild, Háskóli Íslands
2. Skógrækt Ríkisins
3. Landsvirkjun

Verkefnið sprettur úr BirkiVist, þverfræðilegu rannsóknarverkefni sem miðar að þróun skilvirkra leiða við endurheimt birkiskóga á landsvísu. Markmið þessa hluta snýr að mati á líffræðilegum fjölbreytileika sveppa í jarðvegi birkiskóga á ólíkum framvindustigum. Jarðvegssýni voru tekin með 3,5 cm breiðum jarðvegsbor úr mismunandi framvindustigum 10 birkiskóga víðsvegar á Íslandi sumarið 2022.

Visthverf náttúrusýn – um samspil hugvísinda og vistfræði í sögulegu ljósi
*Unnur Birna Karlsdóttir*¹

1. Rannsóknasetur HÍ á Austurlandi

Í erindinu verður fjallað um samleið umhverfissögu og vistfræði og hvernig þessar greinar hafa haft áhrif hvor á aðra í þágu umræðu um tengsl manns og náttúru. Þessar tvær greinar hafa átt sögulega samleið í áratugi og brúað bil milli umræðu á sviði hugvísinda og náttúruvísinda, ekki hvað síst í rannsóknum á tengslum manns og náttúru. Þetta síðastnefnda á ekki aðeins við um meðvitund mannsins um hlutverk sitt varðandi mikilvægi náttúru- og umhverfisverndar og þróun þeirrar hugmyndafræði sem þar hefur valdið hugarfarsbreytingu í sambúð manns og náttúru heldur einnig í þeirri umræðu sem lítur að mikilvægi heilbrigðs óraskaðs vistkerfis fyrir manninn, heilbrigði mannfólksins og vellíðan í heimi sem verður æ manngerðari. Nálgunin er hugmyndasöguleg; byggt verður á ýmsum heimildum og ekki hvað síst á kenningum og niðurstöðum nokkurra helstu fræðimanna sem koma við sögu í vestrænni umhverfissögu síðan á 19. öld og fram til okkar daga.

The Nordic Biodiversity Framework – a new BIODICE project
*Skúli Skúlason*¹², *Ole Sandberg*²³, *Ragnildur Guðmundsdóttir*²³ and *Rannveig Magnúsdóttir*²⁴

1. Hólar University
2. Icelandic Museum of Natural History
3. University of Iceland
4. Landvernd

The Nordic Biodiversity Framework is a new collaborative project that examines the implementation of the Kunming-Montreal Global Biodiversity Framework targets (GBF) in policy in the Nordic region. The project is coordinated by BIODICE and funded by the Nordic working group for Biodiversity of the Nordic Council of Ministers. The project addresses the rapid loss of biodiversity, one of the most pressing issues of our times. The vision of the GBF is a world of living in harmony with nature where “by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people”. According to the GBF, 23 targets are to be met for 2030 and the primary aim of the Nordic Biodiversity Framework project is to evaluate and support the implementation of the first eight of those targets in the Nordic countries. The focus will be on compiling and interpreting existing knowledge on biodiversity and policy in the different countries and to establish a network of scientists, experts, policy makers and other stakeholders. This will be achieved through targeted information gathering and workshops. The expected results in 2024 will support the national needs for realistic plans and actions for reaching the GBF targets.

MÁLSTOFA II / SESSION II – SJÁVARVISTFRÆÐI / MARINE ECOLOGY

Meta-analysis of the Cetacea gut microbiome: diversity, co-evolution and interaction with the anthropogenic pathobiome

Elena Radaelli^{1,2}, Giorgia Palladino^{1,2}, Enrico Nanetti¹, Daniel Scicchitano^{1,2}, Simone Rampelli^{1,2}, Sabina Airoidi³, Marco Candela^{1,2}, Marianna Marangi⁴

1. Unit of Microbiome Science and Biotechnology, Department of Pharmacy and Biotechnology (FaBiT), Alma Mater Studiorum - University of Bologna, Via Belmeloro 6, 40126 Bologna, Italy
2. Fano Marine Center, The Inter-Institute Center for Research on Marine Biodiversity, Resources and Biotechnologies, Fano, Italy
3. Tethys Research Institute, Viale G.B. Gadio 2, 20121 Milano, Italy
4. Department of Clinical and Experimental Medicine, University of Foggia, Viale Luigi Pinto, 71122, Foggia, Italy

Despite their pivotal roles in marine ecosystems, only few studies have addressed the gut microbiome (GM) of cetaceans in a comprehensive way. Being long-living apex predators with a carnivorous diet but evolved from herbivorous ancestors, cetaceans are a proper model for studying GM-host evolutionary drivers of symbiosis (e.g., through microbial characterization and phylosymbiosis investigation) and represent a valuable proxy of overall marine ecosystem health by monitoring the GM status and the distribution of pathogenic microorganisms in cetaceans. We investigated the GM of 8 different cetacean species, considering both parvorders (Odontocetes and Mysticetes), by means of 16S rRNA-targeted amplicon sequencing. To this aim, we collected faecal samples from free-ranging individuals of cetaceans circulating within the Pelagos Sanctuary (North-western Mediterranean Sea) and we included publicly available cetaceans GM sequences. Parasitological analyses were performed on the collected samples targeting 3 protozoan parasites possibly linked to the anthropogenic activities.

Our results highlighted a trajectory related to host phylogeny and taxonomy, with remarkable GM declinations which may reflect adaptations to different diets of mysticetes and odontocetes. Besides, while most samples were found also to be infected by protozoan parasites of potential anthropic origin, we report that this phenomenon did not lead to severe GM dysbiosis.

This study underlines the importance of both host phylogeny and diet in shaping the GM of cetaceans, showing significant microbial differences between parvorders. Furthermore, the presence of potentially human-derived protozoan parasites in faeces of free-ranging cetaceans emphasizes the importance of these animals as bioindicators of anthropic impact on marine ecosystems.

Do micronutrient profiles of parasites match those of their hosts?: a case study of elasmobranchs and their tapeworms.

Haseeb S Randhawa¹

1. Faculty of Life and Environmental Sciences, University of Iceland

Chemical analyses, such as stoichiometry and stable isotope analyses, are used increasingly to shed light on host-parasite interactions and trophic ecology. These methods can reveal the flux of energy from host to parasites and provide key insights into the trophic position of the latter. However, the extent to which micronutrient profiles, such as essential fatty acids (FA) and amino acids (AA), of parasites mirror those of their host remains unknown. Here, I compare the FA and AA ratios from tapeworms relative to their elasmobranch hosts using gas chromatography. The results suggest that FA and AA profiles differ between elasmobranchs and their respective tapeworm parasites. Additionally, host nutrition seems to affect micronutrient profiles of their tapeworm parasites. However, the implications of differing profiles for individual parasite fitness remain largely unexplored.

Rockling Roulette: Unveiling cryptic species misidentification

Charlotte S. Matthews¹, Haseeb S. Randhawa², James Kennedy³, Anna H. Ólafsdóttir¹, Christophe Pampoulie¹

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3. Marine and Freshwater Research Institute, Árnagata 2-4, 400 Ísafjörður, Iceland

Cryptic species hold important insights into biodiversity and evolutionary processes, yet their identification poses challenges. Related species with highly conserved morphological traits can lead to errors when discriminating species based on morphological taxonomy, commonly used during routine ecosystem surveys. Here, we describe the scientific approach to delimiting two cryptic species through evidence integrated from multiple techniques, including life history traits, otolith characteristics and molecular analyses. Samples were collected and identified as juvenile *Gaidropsarus argentatus* (the Arctic rockling) during an extensive ecosystem survey in the summer of 2020 in the Iceland Basin and Irminger Sea. There were apparent differences in biological traits between basins, including length-weight and otolith-fish size relationships. Initially attributed to environmental variations, stark differences in traits prompted a molecular analysis to investigate genetic distinctions. Barcoding (cytochrome c oxidase subunit I; COI) revealed the presence of two pseudo-sibling species: *G. argentatus* in the Iceland Basin and *Gaidropsarus ensis* (the threadfin rockling) in the Irminger Sea, with adults only distinguishable by two inconspicuous morphological characteristics, as the juveniles do not have these traits, they are almost identical. Our study provides an example of an integrative approach to identifying cryptic species, highlighting the importance of the scientific process of hypothesis testing and multi-evidence-based conclusions. Cryptic species can impact biodiversity estimates and ecological studies when not accounted for or misidentified. Therefore, we emphasize the necessity of taxonomic expertise and multifaceted discrimination methods, advocating for increased training and caution when dealing with taxa known for cryptic species complexes.

Einstakt botndýrasamfélag við suðurströnd Íslands

Þorleifur Eiríksson¹, Sigurður Ívar Jónsson¹, Halldór Pálmar Halldórsson² og Þorleifur Ágústsson¹

1. RORUM
2. Háskóli Íslands

Vegna fyrirhugaðrar efnistöku fram af Landeyja- og Eyjafjallasandi var botndýralíf kannað sumarið 2023 á tilgreindu efnistökusvæði. Sýni voru tekin á 15–30 m dýpi á 65 stöðvum á 82 km löngu svæði undan ströndinni. Vestan Markarfljóts var svæðið 72 km² og austan þess 47 km². Niðurstöður sýna einstakt samfélag hryggleysingja á botni. Burstaormurinn *Spiophanes bombyx* fannst á 97 % stöðva og *Nephtys ciliata* á 92 % stöðva og reyndust þessar tvær tegundir ríkjandi á svæðinu. Ríkjandi tegundirnar eru annars vegar rándýr (*N. ciliata*) og hins vegar set/grotæta (*S. bombyx*) og því að líkindum um að ræða mikilvægt samband rándýrs og bráðar í vistkerfi botns við suðurströnd landsins. Pungrækjan *Eudorella emarginata* fannst á 68% stöðva og *Echiura* ormar á 62% en aðrar tegundir/flokkunareiningar (burstaormar, samlokur, krabbadýr og ígulker) komu fyrir á 2–61% stöðva. Það sem gerir niðurstöðurnar sérstakar er samfélagsgerðin, sem ekki hefur sést áður hér við land. Um mjög stórt sýnatökusvæði er að ræða þar sem aðeins fundust 42 botndýrategundir í heildina en 4–16 tegundir reyndust á hverri sýnatökustöð. Ennfremur sýnir skyldleikagreining að allar stöðvar voru mjög svipaðar með tilliti til fjölda einstaklinga og tegunda og ekki hægt að greina skiptingu eftir svæðum, fyrir utan að stöðvar vestan Markarfljóts sýndu aukinn skyldleika við hverja aðra miðað við stöðvar austan fljótsins. Niðurstöðurnar eru sérstaklega áhugaverðar í ljósi þess hve stórt svæðið er og samfélagsgerðin einsleit og sérstök. Hugsanlega má líkja samfélagsgerðinni við samband rjúpu og fálka sem er vel þekkt dæmi um samband bráðar og rándýrs.

MÁLSTOFA III / SESSION III – ÞURRLENDIS VISTFRÆÐI / TERRESTRIAL ECOLOGY

The carbon flux balance in Icelandic grasslands under grazing and long-term grazing exclusion
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3. University of Iceland,
4. Agricultural University of Iceland,
5. University of Manchester
6. Swedish University of Agricultural Sciences

Iceland has vast amounts of permanent grasslands that have been shaped and maintained by livestock grazing for centuries. In recent decades however, livestock farming is increasingly abandoned, resulting in decreasing numbers of grazing animals. A growing number of scientific studies emphasises the key role of herbivores in grazing ecosystems for ecosystem multifunctionality, including carbon cycling. We aimed to investigate the long-term effect of grazing exclusion on Icelandic grasslands that have been primarily shaped by herbivores. The talk will focus on differences in growing season carbon fluxes in 36 sites around Iceland with paired grazed and long-term (>20 years) protected plots. Carbon fluxes were measured with a closed chamber method. Important environmental variables influencing primary production (GPP) and ecosystem respiration (Reco) were recorded simultaneously. We found that grasslands were net carbon sinks during the growing season, but that in long-term grazing exclosures, net carbon uptake (NEE) was on average 48 % lower compared to grazed pairs. Both GPP and Reco were higher in most grazed sites compared to exclosures. In general, NEE was higher in grass-dominated sites, compared to shrub-dominated sites. We measured NDVI as a proxy for green vegetation and found higher NDVI values in most grazed pairs compared to exclosures. We suggest that NDVI could potentially be used as a proxy for GPP. We conclude that Icelandic grasslands have high rates of carbon uptake during the growing season, but that this ecosystem function is strongly reduced following multi-decadal herbivore removal.

Land degradation impacts ecosystem processes independent of plant functional type composition in the Icelandic highlands

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Land use, especially livestock grazing, significantly impacts ecosystem structure and function, often leading to land degradation. Overgrazing accelerates soil erosion and alters vegetation, diminishing primary ecosystem functions like decomposition and productivity. Plant Functional Types (PFTs) categorize species based on similar traits which reflect strategies for growth and maintenance, affecting ecosystem processes. In Icelandic tundra, soil erosion and selective grazing by sheep initiate land degradation, hindering ecosystem recovery. Bare ground cover, a potential abiotic threshold, restricts succession processes and affects ecosystem structure and function. Here, we suggest a novel PFT grouping which separates species into retarding, facilitating, and neutral species based on their influence on ecosystem processes in the context of degradation. Additionally, we hypothesize that tundra ecosystems dominated by unpalatable, retarding species will have lower productivity and decomposition rates than communities dominated by palatable, facilitating species prior to abiotic threshold but not after it. Our results show that land degradation has a significant influence on ecosystem structure without a corresponding impact on ecosystem processes as we expected. While our PFT grouping did not have a direct relationship to productivity or decomposition, per say species grouped as retarding PFT corresponded with increases in litter stabilization rates.

Predicting dung nutrient dynamics of Icelandic tundra herbivores using Near Infrared Spectroscopy (NIRS)

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Herbivores can play a crucial role in nutrient recycling and soil biogeochemistry of tundra ecosystems, through dung deposition. However, the extent of their contribution may vary among species and across the growing season due to differences in body weight, digestive physiology, and fluctuations in diet composition and quality. Traditional wet laboratory methodologies for estimating nutrient concentration and stoichiometry in animal waste can be expensive. To address this challenge, we developed a low-cost alternative using Near-Infrared Spectroscopy. Using a set of 191 fresh samples analyzed with traditional wet laboratory methodologies with their associated spectral signature, we established a general model for the main Icelandic tundra herbivores (sheep, reindeer, and pink-footed goose) to assess fecal nutrient concentrations (nitrogen, phosphorus, and carbon). Models reached a variance explained ranging between 88% and 91%. Leveraging the models on a dataset comprising over 300 samples, we predicted and evaluated differences in fecal quality among the three herbivores throughout the growing season. Preliminary findings indicate significantly lower nitrogen content in wild species dung (geese and reindeer) compared to domestic (sheep), as well as lower levels of phosphorus and carbon content in geese compared to mammals. Furthermore, all three species exhibited a trend towards decreasing nitrogen and phosphorus content, and increasing carbon content over the growing season. These estimates of dung nutrient content dynamics offer valuable insights into the contribution of different herbivore species to the soil biogeochemistry within the context of significant changes in the Icelandic herbivore community.

Population structure, viability, and dynamics of an Arctic predator under combined impacts of intense harvesting and climate change

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In this project we focus on the Icelandic Arctic fox which has experienced a high rate of harvest for centuries. Due to isolation, it is an ideal population for investigating possible implications of habitat fragmentation due to differences in resources, land use strategies and climate change. Our population dynamics model will be built on a unique and long-term fox harvest and age-cohort data and a combination of state-of-the-art population structure analyses. We build on whole genomics, isotopes and morphological analyses to forecast harvesting and climate change impacts. To generate dynamics scenario with and without harvest we analyse over 40 years of den occupancy and litter size from field surveys in Arctic fox sanctuaries vs. counties with hunting programs. During this period, we have detailed data from harvest as well as carcasses that have been analysed in terms of age and fertility as well as bone and other tissue collection. Dispersal dynamics are key parameters for the population dynamics modelling so we will deploy satellite telemetry on foxes to quantify their dispersal between regions with various ecotypes and harvesting regimes. We hypothesize that the structure of the fox population determines the level of sensitivity to harvest and climate changes and that various subpopulations may show different dynamics. Furthermore, the level of dispersal in the past as measured by genetics and current dispersal as measured with telemetry. Lastly we predict that trait structure (trophic niche measured with isotopes and jaw morphology) in fox population will drive the population dynamics in the respective areas.

MÁLSTOFA IV / SESSION IV – FISKAVISTFRÆÐI / FISH ECOLOGY

Personality traits as indicators of welfare in farmed fish

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There is growing interest in animal welfare from both the public and the scientific community. This is a complex concept because there is still no formal consensus regarding definitions and methods to approach it, which becomes even more complicated in fish due to their vast diversity; what holds true for one species may not apply to another. Furthermore, fish farming is a much more recent activity compared with that of terrestrial animals. Studies on welfare aim to determine what is harmful or undesirable for the animal and try to mitigate negative impacts on their well-being. Extensive research has been conducted on behavioral, physiological, growth, and health indicators of welfare impairment. However, welfare also concerns what is beneficial or desired by the animal, which relates to positive welfare. Research on positive welfare in fish is lagging. The purpose of this talk is to examine how the field of personality can be implemented in the welfare framework of farmed fish.

Local movement patterns in three sympatric stream-dwelling salmonids

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Juvenile stream-dwelling salmonids exhibit movement that varies among individuals, populations and species. This within-stream movement can be a response to the availability of resources, habitat quality, and or social interactions. However, many studies in this field rely on the recapture of marked fish in large streams and are not always suitable for monitoring movement and associated behaviour at a smaller scale. Sympatric juvenile wild Arctic charr (*Salvelinus alpinus*), Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) were captured (n= 48 individuals per species) and placed in four enclosed sections (~48 m²) in a side-channel of the stream Sæmundará, in North Iceland. We repeatedly followed the position of each visible tagged fish for 39 days and recorded their behaviour, such as their local space use and social interactions. We expect Atlantic salmon to be more evenly distributed (via territorial mosaic) and show less movement than brown trout, and especially Arctic charr, that may be more plastic, and exhibit less attachment to specific areas e.g., by adopting schooling behaviour. Here, we present preliminary results from this study with an overview of the upcoming steps of the project.

Spatial overlap of alien European flounder (*Platichthys flesus*) and native Arctic charr (*Salvelinus alpinus*) and brown trout (*Salmo trutta*) in near-shore waters

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As anthropogenic impact continues to affect the aquatic world, fish movement is sensitive to environmental changes, altering consumer nutrient and energy distribution within food webs. Alien species can, for example, disrupt energy distributions of native food webs. The European flounder (*Platichthys flesus*) is an alien species that was first seen in Iceland in 1999 and has since rapidly increased in distribution and abundance within near-shore marine, coastal and estuary environments. The spread of the flounder has caused concern about its impacts on native salmonid species that may utilize similar habitats as summer foraging grounds. The presented study is in its early stages to examine overlap of spatial and depth distribution of the alien European flounder and native anadromous salmonid species, Arctic charr (*Salvelinus alpinus*) and brown trout (*Salmo trutta*), within Iceland. European flounder is a catadromous species, and studies within its natural range have suggested significant plasticity in life-history, including facultative migration. These characteristics can increase its competitive advantage in areas with low interspecific diversity, such as Icelandic freshwater. The specific aims of the current study are to 1) document habitat use and movement of European flounder in Icelandic nearshore and freshwater systems and 2) understand niche use and overlap of European flounder in comparison to native salmonids. To meet these aims, acoustic telemetry data was collected within the marine environment of a fjord and a brackish river system. Preliminary results of area use and movement of the European flounder and anadromous salmonids will be presented.

Combined effects of temperature and diet on performance and differential gene expression in threespine stickleback (*Gasterosteus aculeatus*)

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How phenotypic variation can arise and be maintained is still not fully understood. Threespine stickleback (*Gasterosteus aculeatus*) have served as a model organism to study environmentally induced phenotypic variation and rapid changes in phenotypes within and across generations. The aim of this project was to study variation in gene expression underlying phenotypic variation in the spatio-temporally varying system, Lake Mývatn threespine stickleback. To this end we collected liver samples from wild breeding males and females from contrasting habitats. We further collected liver samples from reproductively active individuals reared under differing experimental conditions, which reflect contrasts observed in the wild (temperature: 12°C vs. 21 °C; diet: Cladocera vs. bloodworms). We found clear environmental effects on traits directly associated with fitness, such as maternal investment, body condition and male breeding colouration. We further identified various differentially expressed genes in response to temperature, diet, sex, and interactions thereof. Especially genes involved in metabolic and transmembrane transport were found to be differentially expressed between diets and temperatures. Additionally, temperature affected gene expression in genes involved in immune response. Moreover, some differentially expressed genes link directly back to the varying reproductive investments observed in the wild and the experimental individuals. Thus, this study deepens our understanding of the underlying mechanisms that are involved in producing observed phenotypic variation and provides an example for how phenotypic variation can arise through differential gene expression.

Stalking fish: a yearlong look into habitat utilisation of Arctic charr in Thingvallavatn
Lieke Ponsioen¹, Fia Finn¹, Gustav Hellström², Haraldur R. Ingvason³, Benjamin D. Hennig¹, Zophonías O. Jónsson¹, Finnur Ingimarsson, Kalina H. Kapralova⁴

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3. Hafrannsóknastofnun
4. Keldur

Thingvallavatn, the largest lake in Iceland, harbours four morphs of Arctic charr which have diverged along the benthic-limnetic ecological axis and occupy different ecological niches. The availability of various ecological niches in the lake makes it an ideal system to address fundamental ecological questions on habitat utilisation. Even though studies on Arctic charr in Thingvallavatn date back to the 1800s, little is known about behaviours related to habitat choice due to its technically challenging nature. Acoustic telemetry is ideal for filling this knowledge gap as it allows for tracking free-ranging animals and assessing their behaviour in their natural habitat with minimal invasiveness. In this study 61 Arctic charr individuals belonging to all four morphs were tagged and information on water pressure and temperature was collected over an entire year. This makes it possible to explore the ecological niches throughout the seasons of the different morphs. The use of acoustic telemetry not only provides better insight into the behaviour and ecology of Arctic charr in Thingvallavatn, but also allows for generating temperature profiles of the lake, which comprise invaluable information for their conservation.

Teeth traits variation in ecologically specialized and sympatric Arctic charr (*Salvelinus alpinus*) ecomorphs.

Guðbjörg Ósk Jónsdóttir¹, Anthony Curtat¹, Finnur Ingimarsson¹, Sigurður Sveinn Snorrason¹, Sarah Elizabeth Steele¹, Arnar Pálsson¹.

1. Háskóli Íslands

The diversity of functional anatomy related to feeding has been influenced by natural selection. This diversity is particularly impressive in fishes and correlates with various ecological specializations. Differences between species originate as variation within species that selection can act on. The level of phenotypic parallelism and its ontogenetic roots are an active field of study. Arctic charr (*Salvelinus alpinus*) is a freshwater fish species known for its variation, allopatric and sympatric polymorphism, and most commonly diverges along a benthic-pelagic axis. In Lake Þingvallavatn, Iceland, four morphs of landlocked arctic charr coexist which differ in their ecology (differing in preferred prey, behaviour, habitat use, and external feeding morphology). Two of the morphs are benthic and two pelagic. We studied variation in functional phenotypic (i.e., bones shape and teeth characteristics) variation in nine upper and lower jaw bones of the four sympatric Þingvallavatn charr ecomorphs and compared them. We have found clear phenotypic divergence between benthic and pelagic landlock morphs, with shape differing in four bones (dentary, articular-angular, premaxilla and maxilla), tooth number in 5 (dentary, maxilla, palatine, vomer and glossohyal) and tooth angle in one (maxilla). These results highlight the rapid functional evolution of specific anatomical structures, likely due to ecological opportunities.

MÁLSTOFA V / SESSION V ATFERLISVISTFRÆÐI FUGLA / BEHAVIOUR
ECOLOGY OF BIRDS

Dietary preferences of Icelandic short-eared owls (*Asio flammeus*) in different ecotypes
Viktor Árnason¹, Gunnar Þór Hallgrímsson¹

1. Háskóli Íslands

The short-eared owl (*Asio flammeus*) is a unique and widely distributed owl species that has hitherto received little attention from Icelandic researchers, despite having been present here since the 1930s. As it mostly preys on voles in other countries, its main source of food in Iceland has so far remained a mystery. Using GPS-tracking and pellet dissection of five individual short-eared owls, their feeding habits were linked with UNIS-classified ecotypes. As expected, the diet consisted mainly of wood mice (*Apodemus sylvaticus*), the rest consisting of small birds, undefined species of mice, and one instance of a house mouse (*Mus musculus*). There was a statistically significant difference in the dietary composition of individuals as well as between ecotypes. Three individuals preferred mice and two preferred birds. The highest proportion of mice were caught in grasslands, moss lands, wetlands, and screes & cliffs, with the lowest proportion of mice in moraines & sands, woodlands, lava fields, and coastlands. Although a significant difference was found between the proportions of mice in the different ecosystem types, it would be desirable to repeat the experiment with a larger sample size, as well as testing for the variables which account for the differences between individuals such as weight, age, sex, size etc.

Home range size and habitat use of a recently established long-eared owl (*Asio otus*) population in Iceland

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Little knowledge currently exists regarding the long-eared owl (eyrugla; *Asio otus*) population newly breeding in Iceland. Formerly considered a vagrant in Iceland, the species was first recorded breeding here in 2003. Despite the population's recent success, suitable habitats for the species in Iceland are limited. In the northernmost latitudes of its range, the long-eared owl inhabits boreal forests dominated by conifers. Though Iceland falls within the boreal latitudes, only 2% of its total land area is forested. Of these forests, birchwood constitutes 43%, while non-native conifers comprise 42%. Additionally, Iceland has very few apex predators in contrast to the long-eared owl's typical range. This allows for a unique natural setup where habitat can be assessed as a limiting factor without considerable impact from natural predators and interspecific competition. To understand the long-eared owl's success in Iceland, it is imperative to examine how the species is using this particular ecosystem. The primary objective of this study is to investigate the home range size and habitat use of long-eared owls during the breeding season in Iceland. Habitat use is determined at the large scale (selection of home range from the southwest Iceland region) and the small scale (selection of foraging locations within the home range). Eight long-eared owls were fitted with either an Interrex MINI (n=7) or Ornitela (n=1) GPS transmitter. Four tags successfully transmitted 364 foraging points. Analysis showed a strong selection for forest habitats at the large scale and a weak selection for mixed forestry plantations at the small scale.

Wintering and migration strategies of Horned Grebes, *Podiceps auritus*, breeding in Iceland
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The Horned Grebe (*Podiceps auritus*) population breeding in Iceland has gone through drastic changes during the last decades. The drivers behind these changes are unknown, but when attempting to describe these it is important to understand the ecology of this migratory species throughout the whole year. While the breeding ecology of Horned Grebes is well documented, relatively little is known about the migration strategies and wintering ecology of this species. The aims were to describe the migration strategies and identify wintering areas of Slavonian Grebes breeding in Iceland. Geolocators were fitted to 37 Horned Grebes breeding on two lakes in north-east Iceland from 2009 to 2012. Of these, 19 were recovered and provided useful data on wintering areas and migration timing. The results indicated that the grebes moulted on freshwater lakes before gradually moving to the sea and later migrating to the wintering areas. Most of the birds wintered on the sea around the British Isles. However, there was surprisingly high variation in wintering strategies and little overlap of wintering areas. Grebes tracked for consecutive years showed high wintering philopatry. Individual Slavonian Grebes may be vulnerable to local environmental conditions, but the high variability in wintering strategies and relatively large non-breeding distribution is expected to make the population generally less sensitive to local environmental conditions in the wintering areas over the long term.

Rapidly changing population numbers of ground-nesting birds in South Iceland
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2. Háskóli Íslands

Biodiversity is declining globally, which has largely been attributed to habitat changes and diverse human impact on natural and semi-natural habitats. Iceland hosts several internationally important populations of ground-nesting birds which rely on open habitats, particularly of some waders where a large part of the world population breeds in lowland Iceland. Changes in the large Icelandic land bird populations are unclear as monitoring of those populations is still in its infancy but here, abundances of common species in South Iceland, the largest lowland region in the country, were monitored in a roadside survey from 2011-2023. Out of nine populations in the study, (both waders and passerines), one is increasing, two remain stable, and six are decreasing. Although the drivers behind these changes are currently unclear, they may be attributed to changes in predation rates or land use. The Southern lowlands may be facing more pressure from anthropogenic changes, than other parts of the country, such as the introduction of man-made habitats such as houses and forestry. These factors may then be accompanied by changes in predator numbers and/or distribution. Both these processes could in theory contribute to decreasing population numbers of species that use open habitats, while more urban or tree dependant species may increase. Independent of the drivers, these rapid changes in several of the large populations of open-habitat specialist in Iceland's largest lowland area, are a grave cause for concern.

ÁGRIP VEGGSPJALDA / POSTER ABSTRACTS

Patterns of Feeding Element Specialization in Polymorphic Arctic Charr Populations.
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Feeding elements in fish are highly diverse and can be used as a model to study adaptive and parallel evolution. Intraspecific diversity in ecological traits related to feeding is particularly impressive in the Icelandic Arctic charr (*Salvelinus alpinus*). This intraspecific ecological variation can be seen in resource morphs (polymorphism) within the species and even lakes. Variation in craniofacial traits in monomorphic and polymorphic Arctic charr populations in Iceland can be used to test for parallel evolution and evolution of allometry. This project aims to explore craniofacial adaptations, maxilla and lower jaw lengths and dimensions, and head morphology in Arctic charr in Iceland. The main hypotheses are i) feeding traits in Arctic charr will differ between monomorphic vs polymorphic lakes, ii) allometry for lower jaw traits will differ between Arctic charr populations across lakes, and iii) gill raker counts will vary by lakes, reflecting mainly differences between pelagic vs. benthic morphs. Data from the Ecological Survey of Icelandic Lakes Database (ESIL), a data collection from 1980-1990, will be reanalyzed. Linear measures of craniofacial and gill raker traits from adult fish of several populations will be analyzed using multivariate and regression frameworks. Preliminary data shows substantial variation in the registered variables and indicates differences between lakes. More broadly, climate change could affect resource availability in Icelandic lakes, and further research will be crucial to protect Arctic charr populations.

Activity and potential effects of ants on fauna in Icelandic geothermal areas

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Species invasion has been identified as a lead cause behind the loss of biodiversity. Iceland is not immune from such invasions and has in recent years undergone colonisation by multiple species of ants. Most species settle inside houses in urban areas where a few species have also established colonies in gardens. In contrast, two ant species have been detected in some of Iceland's geothermal areas. Both belong to the Ponerinae subfamily, one originating from Mediterranean Europe and the other from Sub-Saharan Africa. Their activity patterns and effects on local fauna are unknown. Invertebrate surveys conducted over the course of one year from 2022-23 tested the potential impact of these two species, focused on the relationships between the new colonists and the native Icelandic fauna. The data thus far suggest that one species, *Hypoponera ergatandria* undergoes a period of annual diapause with no activity, while the second species, *H. eduardi*, remains active throughout winter. This appears to be a relatively unique phenomenon as ants living in wild habitats at comparable latitudes (64°N) appear to undergo seasonal diapause. Analysis of data from the invertebrate surveys has not revealed a strong impact of either species on the abundance of most invertebrate groups. No significant associations were observed between the presence of ants and those of various invertebrate groups, with the possible exception of beetles, which while rather rare, were shown to be negatively affected. This shows the need for annual invertebrate monitoring efforts and further research on these potentially invasive colonisers.

NordBorN: a research and educational platform to understand borealization in the Nordic region.

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2. Norwegian University of Science and Technology
3. University of Gothenburg
4. UiT The Arctic University of Norway
5. Aarhus University
6. University of Edinburgh
7. Norwegian Institute for Nature Research
8. Greenland Institute of Natural Resources
9. University of Eastern Finland

Climate and land use changes are shifting biome boundaries worldwide. At higher latitudes, these shifts mean an expansion of species typical of the boreal forest into the tundra, a process known as borealization. These changes in the forest-tundra biome boundary include among others, the encroachment of woody species (treeline advance and shrub expansion), changes in the trophic and functional structure of ecosystems, or the spread of non-native species. Such changes will have important consequences for the functioning of terrestrial Nordic ecosystems and ultimately, for their ability to provide valuable ecosystem services. The Nordic Borealization Network (NordBorN) is a five-year project funded by NordForsk that will establish a collaboration platform across the Nordic countries to understand the implications of borealization in Nordic terrestrial ecosystems. NordBorN aims at: 1) creating a venue for research excellence in terrestrial ecology to understand the processes, drivers and consequences of borealization of Nordic ecosystems, and 2) establishing a training hub for the next generation of Nordic researchers. To achieve this goal, NordBorN brings together six Nordic universities and three associated partners who will jointly develop research funding applications and will create opportunities for mobility and co-supervision of graduate students across Nordic universities.

Temperature and its effect on the intensity of insect herbivory in the Icelandic highlands
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Insect herbivory currently occurs at low intensities across the tundra. However, the intensity of insect herbivory is predicted to increase as the tundra warms. To assess trends in insect herbivory over time, we recorded the type and intensity of insect herbivory on *Betula nana*, a common shrub species in the Icelandic highlands, and related the findings to climate data for the regions sampled. For seven years we have collected leaf samples from marked individuals distributed across two highland field sites in order to gain insight into both the temporal and the spatial variations in insect herbivory. Samples were collected annually during the summer growing season and were examined in the lab for signs of leaf damage. We found that, while the collected data shows considerable variation in leaf damage on *B. nana* within and between sites, as well as across years, leaf damage generally increased under warmer conditions. Given the ubiquity of insect herbivory in the tundra, an increase in intensity could have a major impact on the make-up of tundra plant communities and their associated food webs. Therefore, the ability to accurately monitor insect herbivory across different tundra ecosystems will be crucial for understanding biodiversity changes in these vulnerable ecosystems.

Ecological classification for monitoring of the status of coastal waters in Iceland according to the Water Framework Directive (2000/60/EC)

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Extensive agricultural land use and human population growth have had a profound impact on the aquatic environment in the Anthropocene, mostly through intensification of nutrient fluxes from land causing structural and functional changes in aquatic ecosystems with persistent repercussions for water quality. In marine ecosystems, destruction of seagrass communities, harmful algal blooms, increased hypoxia and anoxia in deeper waters, and declines in harvested species, are a few of the problems that have been linked to nutrient overenrichment. Coastal ecosystems, in particular, are considerably affected due to their proximity to the pollution, and need to be protected and monitored. To counter this degradation of aquatic ecosystems and restore them to a healthy state, several legislations have been adopted around the world. In Europe, the Water Framework Directive (WFD, 2000/60/EC) was established to ensure sustainable management of groundwater, freshwater and marine water in the European Union. To this end, the WFD states that water bodies should be classified based on their ecological status, according to a prioritised list of biological, chemical, physio-chemical, and hydromorphological elements. Hence, in Iceland, the Icelandic Water Management Act (36/2011) and Regulation 535/2011 have been implemented by the Environment Agency. Here we present ecological classification elements and quality indices that have been developed by the Marine and Freshwater Research Institute for monitoring coastal waterbodies in Iceland. Biological quality elements currently utilised are phytoplankton biomass (chlorophyll a), soft bottom invertebrates (diversity index NQI1) and hard bottom macroalgae (community composition), and the physiochemical quality element of winter nutrient (NO_3 , PO_4) concentration.

Dairy sheep farming: a solution to valorize abandoned mountain rangeland

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In the Italian mountains, and particularly in the Alps, a depopulation phenomenon occurred in the past in favor of the industrialization of major cities. This event led to the abandonment of villages, cultivations, and pasture areas, resulting in degradation and afforestation, with detrimental ecological consequences. The recent population increase in mountain areas calls for finding rural practices to re-valorize those areas. The project P.A.N. PRAT in Nasolino (Bergamo Alps) proposes the dairy sheep husbandry as a solution. Sheep are rustic, highly adaptable animals that can feed on low-quality pastures and cope with cold temperatures. Dairy sheep farming involves a lower stocking density per hectare compared to meat production farms; therefore, they do not require extensive grazing spaces and can easily adapt to small plots with high slopes, characteristic of mountainous regions. This study follows the first steps of the project and provides an agronomic evaluation of the management of a small flock of dairy sheep reintroduced in the valleys of the Bergamo Alps, in northern Italy, to revalorize mountain rangelands through an extensive farming system with rotational pastures. The flock was mostly fed pasture grass and hay. Sheep were weighed to calculate daily weight gains. Plant samples were collected to assess forage quality and whether forage met the sheep's nutritional requirements. Animal growth was adequate, and forage fulfilled the animals' nutritional requirements. The findings suggest that this type of farming could valorize mountains; it could also suit other northern rangelands where extensive sheep grazing is an important land use.

Biodiversity changes in drained Icelandic peatlands – are bryophytes an indicator of drainage and degradation state?

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Icelandic peatlands have been extensively drained in past decades, and now efforts are being made to restore these endangered ecosystems. Because of their prominence, vascular plants have overshadowed bryophytes in peatland research in Iceland. Therefore, it is unknown how drainage affects the cover and species composition of bryophytes. In spring of 2023, a field study was conducted with 40 plots located in SW Iceland. The main aim was to monitor greenhouse gas fluxes from peatlands in varied conditions; intensity of drainage, land use, distance from the sea, altitude and proximity to active volcanic zones. Other assessed factors included habitat types, vegetation cover and plant species composition, and an attempt was made to evaluate the level of degradation. At first glance, bryophytes appear to be sensitive to disturbance, and their abundance and species composition are good indicators of the level of peatland degradation.

Effect of wildlife-tourism on behaviour and spatial distribution of harbour seals (*Phoca vitulina*) estimated based on trail camera photos.

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With growing interest in wildlife-tourism in Iceland concerns on the potential negative effects of seal watching on the endangered Icelandic harbour seal population are rising. However, knowledge on the impact of land-based tourism on harbour seals is limited. In this study, wildlife tracking cameras at five haul out sites in the Westfjords and NW Iceland (total of 8813 hours) were used to estimate the effects of land-based seal watching on abundance, spatial distribution and behaviour of harbour seals. Some indicators that harbour seals are disturbed by tourism were detected. The seals were more vigilant at seal watching sites compared to control sites. Furthermore, within the seal watching site Illugastaðir, vigilance increased among seals hauling out closer to the visitors. At Illugastaðir seals were also more vigilant during the day, when more visitors were in the area, compared to the night. However, no evidence was found that the number of tourists at the seal watching site, Illugastaðir, affected the proportion of vigilant seals, abundance, or spatial distribution within a haul out. Some environmental factors affected abundance and behaviour of harbour seals. Abundance was affected by temporal factors, wind speed, wind direction, wind chill equivalent temperatures, tide height, and precipitation, while vigilance was affected by time of year, seal group size, wind speed and wind chill equivalent temperatures. The results of this study can be used to improve management and conservation plans for the Icelandic harbour seal population, such as to establish seal watching guidelines.

Grazing cessation affects traits of palatable plants

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Sheep grazing has a long history in Iceland and along with other agriculture practices has completely changed the landscape, ecosystems and vegetation composition. Sheep (*Ovis aries*) select palatable plants and the aim of this project was to investigate responses of plant traits to grazing cessation of the following palatable species; *Bartsia alpina*, *Bistorta vivipara* and *Festuca richardsonii*. The following traits were examined; Plant height, Specific Leaf Area (SLA) and Stem-Specific density (SSD). We utilized one hectare fence established in 1996 to prevent sheep grazing in a grazing common at Auðkúluheiði. Samples were collected both inside and outside the fence to measure trait responses to grazing cessation. NDVI was measured to approximate the primary productivity of vegetation. Moss layer depth was also assessed. Results showed that grazing cessation affects certain plant traits, deepens the moss layer and increases NDVI values. Vascular plants in ungrazed plots were higher and their height correlated with increased moss depth eluding to possible etiolation. SLA values were low and did not significantly respond to grazing cessation pointing to limited plasticity in SLA of these species. SSD of *B. alpina* did not respond to cessation but increased for *B. vivipara* and furthermore for *F. richardsonii*, indicating faster growth or lower survival in grazing plots.

Genetic differentiation between sympatric morphs of Arctic charr influences transcriptional regulators and developmental expression

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Adaptive evolution favors changes in genes and developmental processes that allow organisms to utilize specific feeding resources, and this even happens within species. Such resource polymorphism is often found among salmonids that colonized new habitats after the last ice-age, with repeatable morphological divergence that relates to specialization to benthic vs pelagic niches. These systems are ideal to study genetic and developmental changes associated with rapid evolution. Arctic charr is one of the more polymorphic salmonids and in lake Thingvallavatn four morphs coexist in sympatry. Population genomics has confirmed monophyly of these morphs and revealed genetic separation among three of them. In this study we ask if whole genome sequencing of two individuals per morph (PL-, LB and SB-charr) can highlight loci and genomic regions that differentiate morphs, by comparison to available SNPs from ddRADseq data. Furthermore we ask if genes differentially expressed between these morphs (during early development) are over-represented in these genomic regions of differentiation, and if similar patterns are seen for residues with differential methylation between morphs. The results reveal overlap of genetic signals and in some morphs differential expression. Bulk of the differentially expressed genes however do not associate with regions with high genetic divergence, illustrating that most are affected by changes in trans-factors or upstream (earlier) elements or events in the developmental system. Finally, the data provide numerous candidate loci that may associate with morph separation and the specific adaptations that characterize these morphs.

Hitchhiker of the microplastic ocean: *Xenobalanus globicipitis* (Steenstrup, 1852)
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Marine pollution is primarily a consequence of anthropogenic activities. Among the large variety of marine litter, plastic poses a significant threat to ocean ecosystems. Microplastics have become a major concern due to their widespread distribution, potential harm to marine life, and toxicity related to plastic additives (e.g. Bisphenol A, organophosphates). While extensive studies have been conducted on various marine organisms, certain ecological niches remain unexplored. *Xenobalanus globicipitis* is an obligate cetacean barnacle, sharing the marine environment with its host. It ingests microplastics potentially through filter feeding from similar sources as its cetacean host. This study investigates the presence, types, and concentration of microplastics in *X. globicipitis*, providing insights into both the barnacle's ecology and that of its host species. During the summer of 2022, *X. globicipitis* individuals were collected from the caudal fins of fin whales captured off western Iceland. The digestive tract and remaining tissues of 100 barnacles (10 barnacles from each of 10 different fin whale individuals) were analyzed separately to assess microplastic presence and composition in different parts of the barnacle. The study aims to bridge gaps in understanding microplastic ingestion by barnacles and its ecological implications. Analyzing the chemical composition of microplastics in different parts of *X. globicipitis* will contribute to a broader understanding of marine ecosystem pollution. Additionally, variations in microplastic type and polymer composition may offer insights into fin whale migration patterns.

Water table height as a predictor of peatland respiration

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Rewetting drained peatlands is widely recognised as an effective way to quickly curb greenhouse gas emissions while, at the same time, conserving native biodiversity. However, peatland respiration is strongly influenced by seasonal and annual climatic variations, making proper monitoring both costly and labour intensive. It would therefore be of great advantage if emissions could be approximated using more efficiently monitored variables. Water table height is the single predictor that has shown the strongest relationship with CO₂ respiration, as it represents the proportion of the aerated peat layer susceptible to decomposition at each given time. This relationship remains to be sufficiently explored for Icelandic peatlands. So here we attempt exactly that, using data that has been gathered since 2018 as a part of our ongoing peatland monitoring project. The sites are primarily distributed around the SW corner of Iceland, but future plans include increasing coverage of other parts of the country. Monitoring points within sites are of various states ranging from no to severe drainage, and some were even rewetted during the monitoring period. We can therefore not only assess the general relationship between peatland respiration and water table height, but also see whether it depends on land use type. Additionally, we considered which period of the growing season should be used to get the most reliable fit.

Satellite tagging of northern bottlenose whales off Iceland documents long-distance migrations

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Northern bottlenose whales (*Hyperoodon ampullatus*) are a deep-diving oceanic odontocete that has a large overall range within the eastern North Atlantic, inhabiting waters from Svalbard to the Azores. Understanding of their movements is relatively poor; knowledge of seasonal distribution patterns is limited, and photo-identification is challenging due to a lack of reliable markings and distinctive features. Here, we report on the movements of four northern bottlenose whales that were equipped with satellite transmitters within the Icelandic Exclusive Economic Zone in 2022 and 2023. Three individuals tagged offshore in June separately travelled to the Azores archipelago (straight-line distance ~3,200km) following similar routes, where they arrived in late July or early August. All three individuals headed back northwards soon after their arrival to the Azores. One individual was recorded completing a round-trip and was back in the Nordic Seas from September to December. In contrast, an individual tagged in late August remained inside Eyjafjörður for the entire tag duration. This small but unique data set reflects new evidence about the species' movements within the northeast Atlantic in late summer and autumn and confirms that these deep divers occasionally reside in shallow coastal waters for weeks. In combination with previous satellite telemetry work and visual sighting patterns, the data suggest that northern bottlenose whales spent most of their life feeding in high-latitude waters but periodically visit the oceanic Azores archipelago for brief periods in summer, potentially during fast roundtrips for physiological maintenance.