Winter tourism in the Vatnajökull Region

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Efnisyfirlit

Formáli

Skýrslan sem hér lítur dagsins ljós er afurð rannsóknarvinnu sem að mestu var unnin árið 2016. Rannsóknasetrið sótti þannig um styrk fyrir verkefnið í janúar 2016 til Atvinnu- og rannsóknasjóðs og hlaut jákvæðar undirtektir, þótt ekki hafi reynst unnt að veita verkefninu alla umsótta styrkupphæð. Upphaflegt vinnuheiti þessa verkefnis var *Vetrar- og jöklaferðaþjónusta í Ríki Vatnajökuls*. Þar sem endanlega skýrsla er að mestu skrifuð á ensku, ákváðu höfundar að einfalda heitið og hafa það jafnframt á ensku, frekar en íslensku.

Í styrkumsókninni var markmiðum verkefnisins lýst á eftirfarandi hátt:

> **Meginmarkmið verkefnisins er að afla upplýsinga, með spurningakönnunum og viðtölum, um gesti sem eru í vetrarferð í Ríki Vatnajökuls nú í ár. Sérstök áhersla verður lögð á ferðamenn í jöklaferðum (m.a. íshellaferðum) en ætla má að þeir séu stór hluti þeirra gesta sem sækir svæðið heim utan háannar. […] Verkefnið mun nýta spurningakönnun sem lögð var fyrir á svæðinu s.l. sumar og þannig m.a. gefa færi á samanburði milli sumar- og vetrargesta.**

Í lýsingu á gildi verkefnisins fyrir atvinnu- og byggðaþróun í héraðinu segir enn fremur:

> **Vetrarferðaþjónusta hefur eflst mjög hratt í Sveitarfélaginu Hornafirði á allra síðustu árum. Einu gögnin sem tiltæk eru um þessa ferðamenn eru úr tveimur stöðluðum könnunum sem gerðar eru á landsvísu, yfirleitt árlega (en þó ekki alltaf). Þær kannanir miða við stöðuna á landinu í heild og veita mjög takmarkaðar upplýsingar um þá ferðamenn sem kjósa að koma hingað. Efling ferðaþjónustu utan háannar eru afar brýnt hagsmunamál en vonlítið er að markaðssetja svæðið fyrir ferðamenn án gagna um viðhorf þeirra og væntingar. Vísbendingar eru um að vetarferðamenn hér séu annar og sérhæfðari markhópur en sumargestir og einnig að þessir ferðamenn séu annar markhópur en sá sem helst kemur í vetrarferðir til höfuðborgarsvæðisins.**
>
> **Einn helsti vaxtarbroddur vetrarferðaþjónustunnar hér (og einnig ein meginstoð greinarinnar að sumarlagi) eru ýmis konar ferðir eða afþreying sem tengist jöklum. Þetta skapar ferðaþjónustunni hér ákveðna sérstöðu, því hvergi á landinu er framboðið í jöklaferðum meira eða fjölbreyttara en í Ríki Vatnajökuls. Nánari vitneskja um ferðamennina sem eru að koma hingað núna að vetrarlagi er enn fremur mikilvæg forsenda fyrir skilvirka og árangursríka vöruþróun og nýsköpun, ekki síst í afþreyingargeiranum.**

Framvinda verkefnisins var með þeim hætti að mjög fljótlega eftir að niðurstaða um styrk lá fyrir frá Atvinnu- og þróunarsjóði (febrúar 2016) var byrjað að taka eigindleg viðtöl við vetrarferðamenn, auk þess sem lögð var fyrir megindleg spurningakönnun um skömmu síðar. Alls voru tekin 15 viðtöl og útfylltir spurningalistar fengust frá 139 þátttakendum (sjá lýsingar á hvorum rannsóknarhluta fyrir sig hér á eftir).

Rannsóknarvinnan var að stærstum hluta í höndum Johannes Wellings, sem þá var doktorsnemi í ferðamálafræði við Háskóla Íslands. Johannes skilaði skýrslum um þessa rannsóknarvinnu sína til rannsóknasetursins í júní og september 2016, en forstöðumaður setursins ákvað að bíða með útgáfuna þar til unnt væri að bæta við meira efni um stöðu vetrarferðaþjónustunnar á Hornafirði, m.a. í gegnum samanburð við önnur svæði á landinu, einkum þá á Suðurlandi. Vegna mikilla anna í störfum forstöðumanns seinkaði þessum áformum, en urðu þó til þess að hann, ásamt Johannes Welling, skrifaði bókarkafla á ensku um vetrarferðamennsku og árstíðasveiflu í ferðaþjónustu á Íslandi, með megináherslu á Ríki Vatnajökuls, á árunum 2017-2018.[1] Greinasafnið með þessum kafla kom síðan út snemma árs 2019. Jafnframt tók Þorvarður saman ýmsar upplýsingar um stöðu ferðaþjónustunnar á Hornafirði sem birtust í íslenskum skýrslum árin 2019 og 2020.[2] Þá birtu höfundar skýrslunnar, ásamt Rannveigu Ólafsdóttur, ritrýnda grein um megindlega hluta verkefnisins (ásamt öðrum gögnum) árið 2020.[3] Loks var þessi grein, ásamt öðrum ritverkum um áralangar rannsóknir Johannes Wellings á tengslum jöklaferðamennsku og loftslagsbreytinga á suðausturlandi, endurbirt með skýringum í doktorsritgerð sem hann varði í október 2020.[4] Má til gamans geta þess að þar með varð Johannes fyrstur manna til að hljóta slíka prófgráðu við íslenskan háskóla.[5] Höfundar skýrslunnar hafa enn fremur haldið fyrirlestra um verkefnið á fjórum fjölþjóðlegum ráðstefnum, auk kynninga á innlendum málþingum.

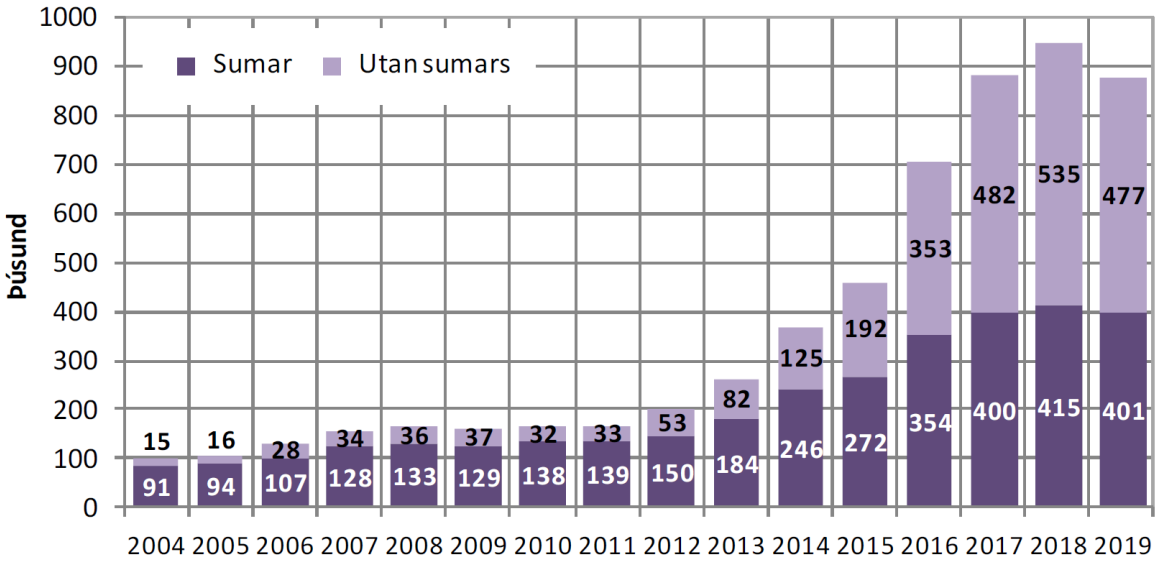
Þótt útgáfa þessarar skýrslu hafi vissulega dregist fram úr hófi þá sátu höfundar ekki auðum höndum á meðan, eins og sjá má hér að ofan. Styrkur Atvinnu- og rannsóknasjóðs leiddi þannig til birtingar á tveimur ritrýndum fræðiverkum, auk þess að nýtast í önnur skýrsluskrif og, síðast en ekki síst, í doktorsritgerð Johannes Wellings. Við færum því Atvinnu- og rannsóknasjóði Sveitarfélagsins Hornafjarðar okkar allra bestu þakkir fyrir góðan og mikilvægan stuðning. Einnig viljum við færa Rögnvaldi Ólafssyni og Gyðu Þórhallsdóttur, Helgu Árnadóttur hjá Vatnajökulsþjóðgarði og Rögnvaldi Guðmundssyni hjá Rannsóknum og ráðgjöf ferðaþjónustunnar miklar þakkir fyrir aðgang að óbirtum gögnum þeirra varðandi fjölda ferðamanna við Jökulsárlón og/eða á nærliggjandi svæðum. Johannes Welling færir enn fremur þakkir til Vina Vatnajökuls vegna stuðnings þeirra við doktorsrannsóknir hans.

[1] Þorvarður Árnason og Johannes T. Welling (2019). „Winter tourism and seasonality in Iceland". Í: U. Pröbstl-Haider, H. Richins & S. Türk (Ritstj.), *Winter tourism. Trends and Challenges*, s. 442-460. CABI.
[2] *Nýr veruleiki í mótun? Rannsókn vegna áhersluverkefnis SASS „Félagsleg þolmörk íbúa á Suðurlandi gagnvart ferðamönnum og ferðaþjónustu".* Þorvarður Árnason og Arndís L. Kolbrúnardóttir. Höfn: Rannsóknasetrið á Hornafirði, 2019; *Áhrif COVID-19 á ferðaþjónustu og samfélag í Sveitarfélaginu Hornafirði*. Arndís Ósk Magnúsdóttir, Hafdís Lára Sigurðardóttir, Arndís Lára Kolbrúnardóttir, Soffía Auður Birgisdóttir og Þorvarður Árnason. Höfn: Rannsóknasetrið á Hornafirði, 2020.
[3] Johannes Welling, Þorvarður Árnason og Rannveig Ólafsdóttir (2020). "Implications of Climate Change on Nature-Based Tourism Demand: A Segmentation Analysis of Glacier Site Visitors in Southeast Iceland". *Sustainability* https://doi.org/10.3390/su12135338
[4] Johannes Welling (2020). *Glacier tourism and climate change adaptation in Iceland*. Doktorsritgerð, Háskóli Íslands, land- og ferðamálafræði. https://hdl.handle.net/20.500.11815/2133
[5] https://www.hi.is/frettir/fyrstur_til_ad_ljuka_doktorsprofi_i_ferdamalafraedi_a_islandi

Inngangur

Rannsóknarverkefnið *Winter tourism in the Vatnajökull Region* var í grófum dráttum tvíþætt: Annars vegar gerð eigindlegra viðtala (Hluti A) og hins vegar fyrirlögn megindlegrar spurningakönnunar (Hluti B) fyrir erlenda ferðamenn. Meginforsenda verkefnisins var aukning í vetrarferðamennsku á starfssvæði Ríkis Vatnajökuls ehf, ferðaþjónustu-, matvæla- og menningarklasa suðausturlands, sem hafði farið stigvaxandi frá vetrinum 2012-2013 (Þorvarður Árnason og Johannes T. Welling, 2019). Umrætt starfssvæði klasans fellur að stofni til saman við Sveitarfélagið Hornafjörð og sú jökla- og íshellaferðaþjónusta sem var í forgrunni rannsóknirnar er enn fremur nær alfarið stundum innan Suðursvæðis Vatnajökulsþjóðgarðs. Til marks um hraða breytinganna má nefna að árunum 2010-2011 stóð Rannsóknasetrið á Hornafirði fyrir rannsókn á möguleikum vetrarferðaþjónustu á Hornafirði; viðfang þeirrar rannsóknar voru sumarferðamenn því ferðamenn að vetrarlagi voru þá svo fáir að ekki var talið unnt að gera slíka rannsókn á þeim sjálfum (Þorvarður Árnason, 2013). Í þessu sambandi er rétt að hafa í huga (þótt ótrúlegt megi virðast nú á dögum) að fyrst var farið að bjóða upp á heilsársopnun í gestastofunni í Skaftafelli og í þjónustumiðstöðinni við Jökulsárlón árið 2009.

Komur erlendra ferðamanna til Íslands jukust mjög mikið og hratt á tæplega 10 ára tímabili milli 2011-2019. Á þessu tímabili jókst fjöldi erlendra gesta á landsvísu um 450%, það er frá 500 þúsund gestum árið 2010 í 2,3 milljónir árið 2018, þegar fjöldinn var mestur (Ferðamálastofa, 2019). Á Hornafirði fjölgaði erlendum ferðamönnum hlutfallslega enn meira á sama tímabili eða um 550%, það er frá 170 þúsund gestum í 950 þúsund (Rögnvaldur Guðmundsson, 2020). Þessi aukning skapaði forsendur fyrir stofnun fjölda nýrra fyrirtækja í ferðaþjónustu innan sveitarfélagsins, auk þess sem rótgróin fyrirtæki færðu mörg hver út kvíarnar til að mæta aukinni eftirspurn eftir vörum og þjónustu. Önnur mikilvæg breyting á sama tímabili varðar aukningu á ferðum erlendra gesta á lágönninni (það er vetur, vor og haust) sem skapaði betri forsendur fyrir heilsársrekstri fyrirtækja en áður (Mynd 1). Áhrif aukinnar vetrarferðamennsku á Hornafirði komu einna sterkast fram í afþreyingunni; fyrirtæki í þeirri undirgrein ferðaþjónustunnar voru sjö árið 2010 en þrjátíu árið 2018, þar af tuttugu sem sérhæfðu sig í jöklaferðum af einhverjum toga og buðu þær fram á öllum árstímum.



Vetur	14%	15%	21%	21%	21%	22%	19%	19%	26%	31%	34%	41%	50%	55%	56%	54%
Sumar	86%	85%	79%	79%	79%	78%	81%	81%	74%	69%	66%	59%	50%	45%	44%	46%

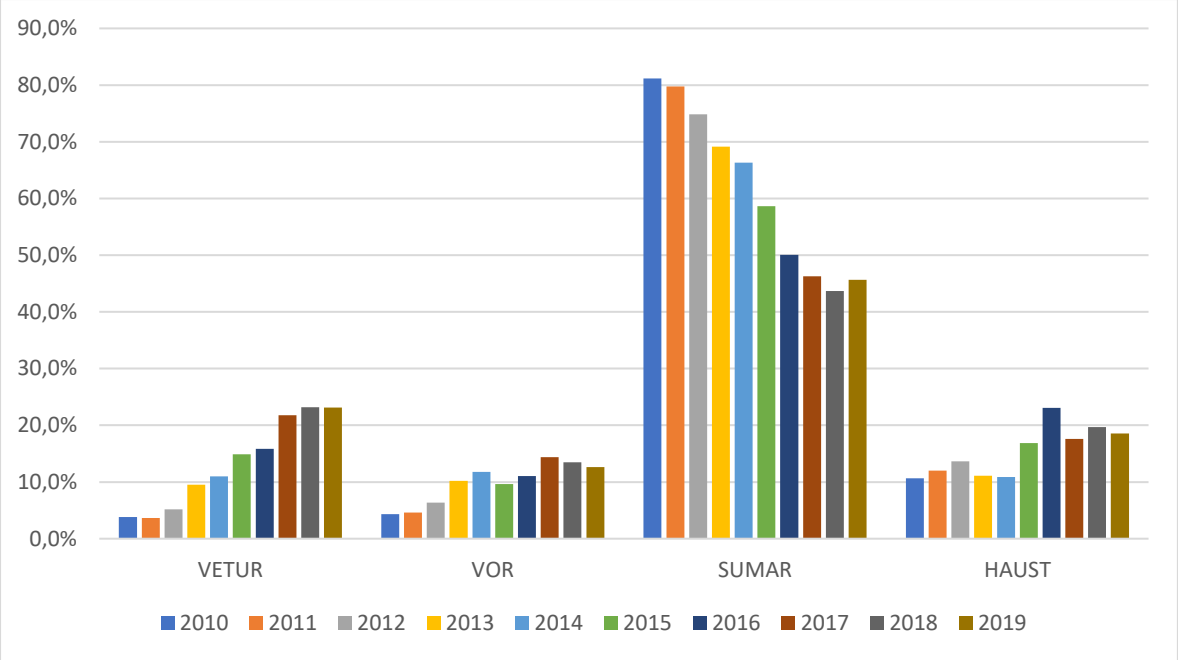
Mynd 1: Áætlaður fjöldi og skipting erlendra ferðamanna í Sveitarfélaginu Hornafirði sumar og vetur 2004-2019. Sumartímabilið nær samtals yfir júní, júlí og ágúst en vetrartímabilið nær yfir alla aðra mánuði sama almanaksárs. Heimild: Rögnvaldur Guðmundsson, 2020, bls. 9.

Eins og sjá má á Mynd 1, fór ferðamennska utan háannir á Hornafirði fyrst að vaxa verulega árið 2013, árið 2016 voru komur ferðamanna á lágönn og háönn nánast jafnmargar, en frá 2017 komu fleiri ferðamenn til Hornafjarðar á lágönn en á háönn. Rögnvaldur Guðmundsson (2020, bls. 10) segir um þessa langtíma þróun:

> **Sumarmánuðina þrjá er áætlað að erlendum ferðamönnum í Austur-Skaftafellssýslu hafi fjölgað úr 138 þúsund árið 2010 í 401 þúsund árið 2019, eða 2,9 falt. Hins vegar fjölgaði erlendum ferðamönnum utan sumartíma þar 15 falt á sama tímabili, úr 32 þúsund í 477 þúsund. Mest varð fjölgunin yfir fjóra helstu vetrarmánuðina, janúar, febrúar, nóvember og desember, eða 35 föld, úr um 4,4 þúsund árið 2010 í um 154 þúsund árið 2019.**

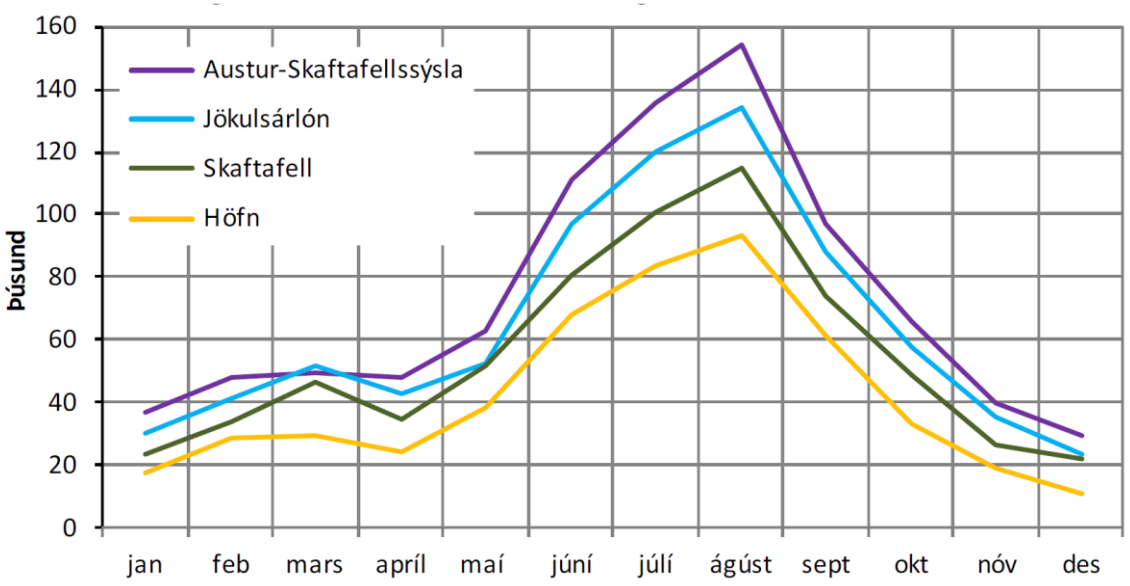
Augljóst er af ofangreindu að einhver grundvallarbreyting hafi átt sér stað á fyrri hluta tímabilsins sem hér um ræðir – breyting sem hafi síðan ágerst eftir því árin liðu.[6] Þessi breyting verður enn skýrari ef gögnin eru skoðuð nánar eftir árstíðum (Mynd 2):

[6] Fjöldi erlendra gesta á Hornafirði, sem og annars staðar á Íslandi, var í hámarki árið 2018. Fækkunin sem kemur fram milli áranna 2019 og 2018 má væntanlega rekja að stórum hluta til falls flugfélagsins WOW Air í mars 2019, en við það minnkaði framboð á lággjaldaflugferðum til landsins verulega.



Mynd 2: Áætluð hlutfallsleg skipting erlendra ferðamanna í Sveitarfélaginu Hornafirði eftir árstíðum. Tímabilið „vetur“ nær yfir janúar, febrúar, mars, nóvember og desember á sama almanaksári; tímabilið „vor“ apríl og maí; tímabilið „sumar“ júní, júlí og ágúst; og tímabilið „haust“ september og október. Eigin mynd höfunda, byggð á gögnum frá Rögnvaldi Guðmundssyni (2020, og óbirt gögn).

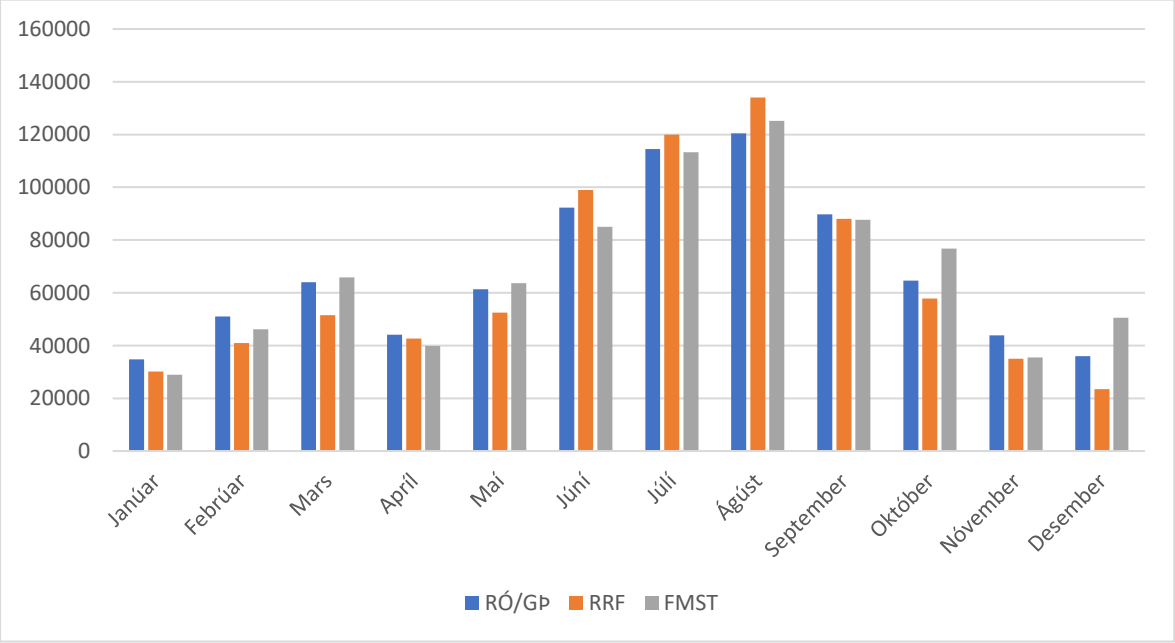
Vöxtur í vetrarferðamennsku var þó ekki alveg jafn alls staðar innan sveitarfélagsins; mestur var hann við Jökulsárlón, þar næst í Skaftafelli en talsvert minni vöxtur á Höfn (Mynd 3).



Mynd 3: Áætlaður fjöldi og hlutfall erlendra ferðamanna í Sveitarfélaginu Hornafirði (Austur-Skaftafellssýslu) og að Jökulsárlóni, Skaftafelli og Höfn eftir mánuðum 2019. Heimild: Rögnvaldur Guðmundsson, 2020, bls. 22.

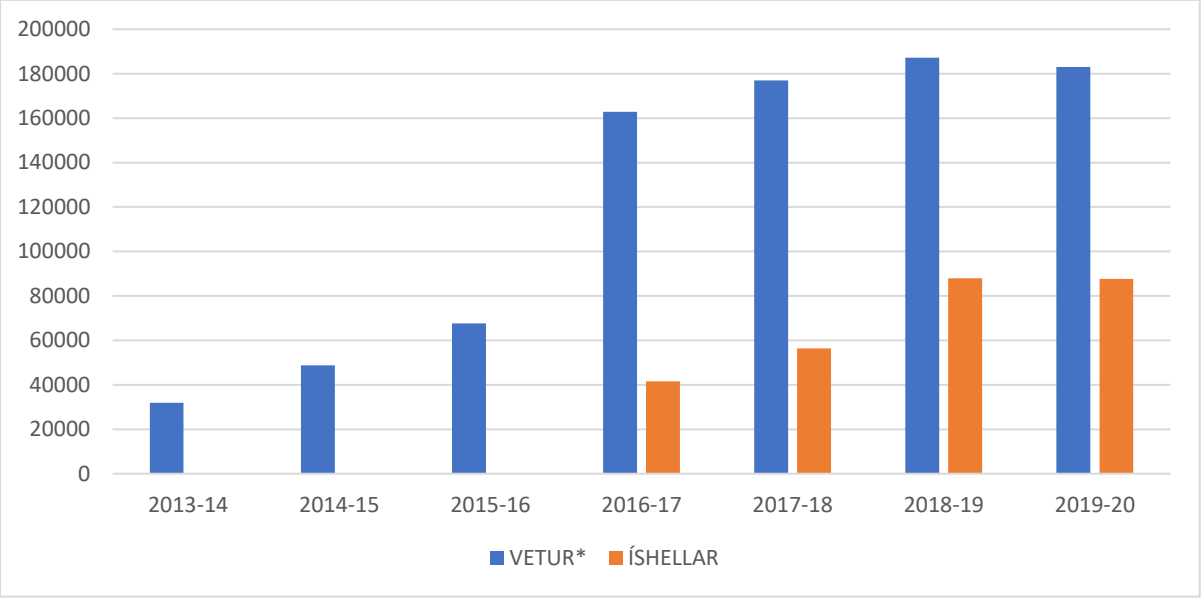
Nærtækasta skýringin á þessum mun á milli áfangastaða innan sveitarfélagsins (sem þó er ekki hægt að sannreyna út frá neinum fyrirliggjandi gögnum) liggur í ásókn erlendra ferðamanna í íshellaferðir en þær hafa aðallega verið í boði í Breiðamerkurjökli, ýmist þá vestan eða austan Jökulsárlóns og suma vetur á báðum svæðum. Samkvæmt gögnum Rögnvaldar Guðmundssonar (2020) komu þannig samtals um 773.000 erlendir gestir að Jökulsárlóni árið 2019 (þar af 422.000 eða 55% utan háannar), 656.000 í Skaftfell (þar af 360.000 eða 55% utan háannar) en 506.000 á Höfn (þar af 261.000 eð 52% utan háannar).

Tölulegum gögn um komur ferðamanna að Jökulsárlóni er skipulega safnað af þremur aðilum: Ferðamálastofu, fyrirtækinu Rannsóknum og ráðgjöf ferðaþjónustunnar (RRF), og Rögnvaldi Ólafssyni og Gyðu Þórhallsdóttur, rannsakendum við Háskóla Íslands. Gögn þeirra síðasttöldu eru unnin út frá niðurstöðum bílatalninga, safnað með teljara sem staðsettur er við afleggjarann að þjónustumiðstöðinni. Gögn Ferðamálastofu og RRF er safnað með spurningakönnunum sem lagðar eru fyrir erlenda ferðamenn. Niðurstöðum þessara ólíku aðferða við að meta fjölda ferðamanna ber nokkuð vel saman (Mynd 4). Hafa ber í huga að bílateljarinn sýnir heildarfjölda gesta, bæði erlendra og íslenskra, en reikna má með að þeir fyrrnefndu hafi þó verið í miklum meirihluta á mestu uppgangsárum ferðaþjónustunnar.



Mynd 4: Áætlaður fjöldi gesta/ferðamanna við Jökulsárlón eftir mánuðum 2019. Eigin mynd, unnin út frá gögnum frá Rögnvaldi Ólafssyni og Gyðu Þórhallsdóttur (óbirt gögn), Rögnvaldi Guðmundssyni/RRF (2020) og Ferðamálastofu/Mælaborði ferðaþjónustunnar.

Rögnvaldur Ólafsson og Gyða Þórhallsdóttir hafa einnig, að ósk Vatnajökulsþjóðgarðs, sett upp bílateljara við slóðana að íshellasvæðunum bæði vestan (Breiðá) og austan (Þröng) Jökulsárlóns, í kjölfar athuganna sem þjóðgarður stóð fyrir á umfangi íshellaferða við vestanverðan Breiðamerkurjökul veturinn 2016-2017. Bílateljararnir voru orðnir starfhæfir í byrjun íshellatímabilsins 2017-2018. Íshellaferðir byrja alla jafnan í byrjun nóvember og standa yfir til marsloka, hvert tímabil stendur því yfir í 5 mánuði. Til að áætla hlutfallslegan fjölda þeirra gesta við Jökulsárlón sem fóru í íshella- eða jöklaferð á Breiðmerkurjökul þarf því að umreikna fjöldatölur frá Jökulslárlóni þannig að tímabilin sem verið er að skoða rými saman. Hér að neðan nær tímabilið „vetur*“ þannig yfir nóvember og desember á fyrra ári og janúar, febrúar og mars á seinni árinu (Mynd 5). Jafnframt má færa rök fyrir því að slík skipting tímabila/árstíða sé áreiðanlegri leið til að skoða þróun í komum ferðamanna að vetrarlagi (Þorvarður Árnason og Johannes Welling, 2019), þótt ekki verði lengra farið út í þá sálma hér.

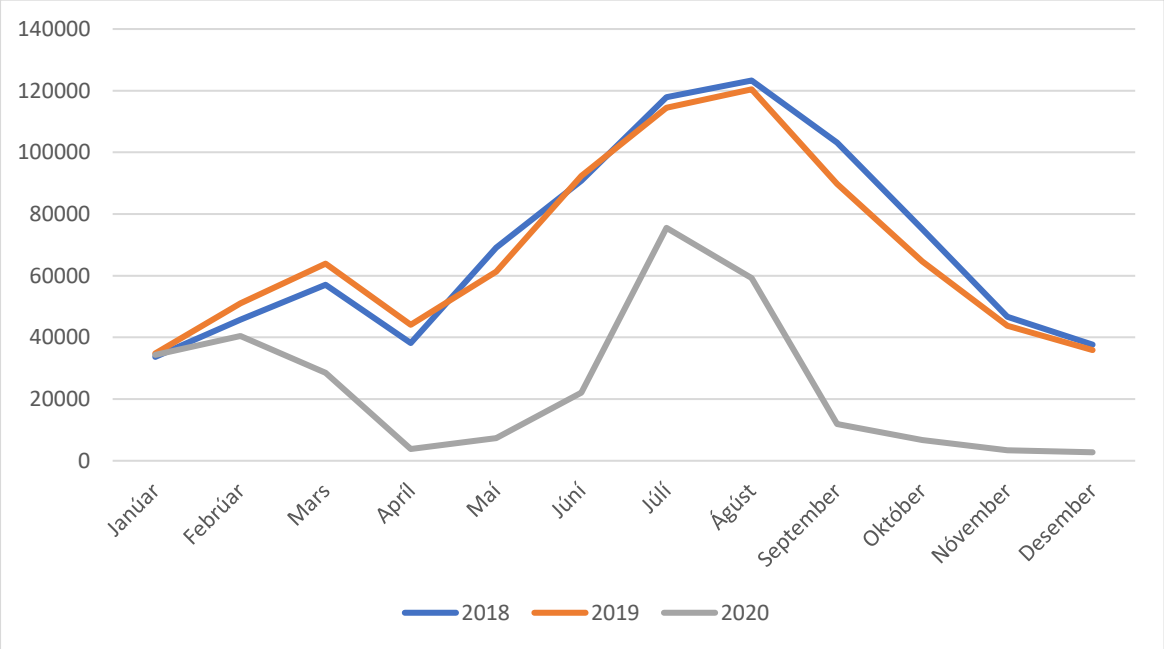


Mynd 5: Áætlaður fjöldi gesta/ferðamanna annars vegar við Jökulsárlón og hins vegar samtals á slóðunum við Breiðá og Þröng, þá mánuði sem íshellaferðir standa yfir (nóvember-mars). Eigin mynd, unnin út frá gögnum frá Rögnvaldi Ólafssyni og Gyðu Þórhallsdóttur (óbirt gögn), Rögnvaldi Guðmundssyni/RRF (2020, og óbirt gögn) og Vatnajökulsþjóðgarði (óbirt gögn).

Niðurstöðurnar gefa skýrar vísbendingar um að verulegur hluti þeirra ferðamanna sem koma að Jökulsárlóni að vetrarlagi fari í íshella- eða jöklaferð. Þannig samsvarar hlutfallslegur fjöldi ferðamanna sem fóru í íshellaferð tæplega helmingi (47%) allra ferðamanna sem komu að Jökulsárlóni veturna 2018-2019 og 2019-2020, um þriðjungi (32%) veturinn 2017-2018 og um fjórðungi (25%) veturinn 2016-2017. Tölur um veturinn 2016-2017 byggja á áætlun

Vatnajökulsþjóðgarðs, þær miðast eingöngu við íshellasvæðið vestan við Jökulsárlón og eru því líklegar til að vera vanáætlaðar. Tölur um veturinn 2017-2018 eru einnig settar fram með fyrirvara, þar sem áætla varð fjöldann við Breiðá fyrstu 10 vikur tímabils, vegna þess að bílateljarinn þar bilaði fljótlega eftir að hann var settur upp og sú bilun uppgötvaðist ekki fyrr en komið var fram í janúar. Einnig verður að hafa í huga að íshellatímabilið 2019-2020 varð talsvert umsvifaminna en ráð var fyrir gert þar sem áhrifa COVID-19 heimsfaraldursins fór strax að gæta í ársbyrjun 2021 (Arndís Ósk Magnúsdóttir o.fl., 2020).

Þegar þessar línur eru ritaðar er alls óvíst hvort, eða hvenær, ferðaþjónustan á Íslandi muni aftur ná sér á strik, né hvort hún verði með sama sniði og á undangengnum árum, meðal annars hvað vetrarferðamennsku snertir. Ljóst virðist þó að ferðaþjónustufyrirtæki telji framtíðina bjarta, því ríflega 20 þeirra sóttu um starfsleyfi fyrir íshella- eða jöklaferðum á Breiðamerkurjökli fyrir veturinn 2020-2021, fyrir samtals 3.045 viðskiptavini á dag (Vatnajökulsþjóðgarður, 2020). Fjöldi áætlaðra viðskiptavina var mjög breytilegur á milli fyrirtækja, eða allt frá 4 og upp í 300 daglega. Ólíklegt verður þó að teljast að núverandi tímabil standi undir þeim væntingum, því fjöldi gesta hefur var miklu minni á nýliðnu ári en á árunum þarnæst á undan, vegna COVID-19 (Mynd 6).



Mynd 6: Áætlaður fjöldi gesta/ferðamanna við Jökulsárlón eftir mánuðum árin 2018-2020. Eigin mynd, unnin út frá að mestu óbirtum gögnum úr bílateljurum frá Rögnvaldi Ólafssyni og Gyðu Þórhallsdóttur.

Gerð verður grein fyrir niðurstöðum hvors hluta rannsóknarinnar fyrir sig í köflunum hér á eftir, fyrst eigindlega hlutanum (viðtölunum) og svo megindlega hlutanum (spurningakönnuninni). Þar sem margt hefur breyst síðan rannsóknirnar voru gerðar – ekki síst eftir að COVID-19 faraldurinn brast á fyrir í ársbyrjun 2020 – þá er alls ekki sjálfgefið að niðurstöðurnar yrðu þær sömu nú í ár, ef samskonar rannsóknir væru gerðar. Það var heldur ekki ætlun okkar að reyna að varpa endanlegu ljósi á viðhorf og væntingar vetrarferðamanna – þessi rannsókn var fyrst og fremst hugsuð sem forkönnun (e. pilot) fyrir mun stærra og viðameira verkefni. Höfundar hafa á undanförnum árum ítrekað reynt að afla frekari styrkja í þessa síðartöldu rannsókn en hingað til án árangurs. Nánari upplýsingar um vetrarferðamenn á Hornafirði eru í tveimur ritrýndum verkum höfunda (Þorvarður Árnason og Johannes Welling, 2019; Johannes Welling, Þorvarður Árnason og Rannveig Ólafsdóttir, 2020).

Þrátt fyrir þennan ‚aldursmun´ á milli rannsóknartímans og samtímans teljum við forkönnun þessa hafa verulegt gildi, ekki aðeins sem stöðulýsing (‚skyndimynd‘) af viðhorfum ferðamanna eins og þau voru veturinn 2016, heldur einnig sem vegvísir að þeim mun ítarlegri rannsóknum sem vinna þarf til þess að skilja betur forsendur vetrarferðamennsku á Íslandi, sérstaklega þá í Ríki Vatnajökuls/Sveitarfélaginu Hornafirði þar sem slík ferðamennsku skiptir afar miklu máli. Mikilvægi hennar birtist meðal annars í aukinni veltu og auknum fjölda starfsmanna, en ekki síður í bættum möguleikum til heilsársrekstrar fyrirtækja og, síðast en ekki síst, nánast óþrjótandi tækifærum til nýsköpunar og þróunar.

HEIMILDIR:

Ferðamálastofa (2019): https://www.ferdamalastofa.is/is/tolur-og-utgafur/fjoldi-ferdamanna

Johannes Welling, Þorvarður Árnason og Rannveig Ólafsdóttir (2020). “Implications of Climate Change on Nature-Based Tourism Demand: A Segmentation Analysis of Glacier Site Visitors in Southeast Iceland”. *Sustainability*: https://doi.org/10.3390/su12135338

Rögnvaldur Guðmundsson (2020*). Erlendir ferðamenn í Austur-Skaftafellssýslu og að þremur stöðum þar 2004-2019.* Hafnarfjörður: Rannsóknir og ráðgjöf ferðaþjónustunnar.

Þorvarður Árnason (2013). *Vetrarferðamennska í Skaftafellssýslum – þróun og framtíðarmöguleikar*. Höfn: Rannsóknasetur Háskóla Íslands á Hornafirði.

Þorvarður Árnason & Johannes T. Welling (2019). „Winter tourism and seasonality in Iceland”. Í: U. Pröbstl-Haider, H. Richins & S. Türk (Ritstj.), *Winter tourism. Trends and Challenges*, s. 442-460. CABI.

Vatnajökulsþjóðgarður (2020): https://www.vatnajokulsthjodgardur.is/is/fraedsla/utgefid-efni/frettir/tilkynning-um-nidurfellingu-fjoldatakmarkana-i-ishella-2020-2021

A. Interviews with foreign visitors in the Vatnajökull Region

1 Introduction

Tourism in Iceland is characterized by high seasonality (Árnason, 2013). A large majority of the people that visit Iceland for its nature, culture or its diversity of recreational and adventurous outdoor activities come during the summer months. Different factors contribute to this seasonality such as visitors' work and school obligations, the Icelandic climate, the amount of daylight during the summer and the easy accessibility of most parts of Iceland during the summer season. However, since 2012, along with the strong growth of visitors in the summer months, the number of tourists that visit Iceland during the winter months has been increasing as well . Thus, in 2015, 370.000 visitors travelled to Iceland during the winter months (fig 1). Since 2012, the increase in the number of tourists has been proportionately greater in winter than in the summer season of the year. The year-on year increase during period 2012-2015 exceeded 30% for the winter month compare to an average of 18% increase during the summer seasons of the same period (ITB, 2016).

Figure 1: The number of foreign visitors to Iceland per year in the winter (Nov.-March) compared with visitor numbers in the rest of the year (Apr.–Oct.) (ITB, 2016)

Until recently, winter tourism in Iceland was almost exclusively concentrated in the capital area. During the last few years, however, more and more tourists have been travelling into

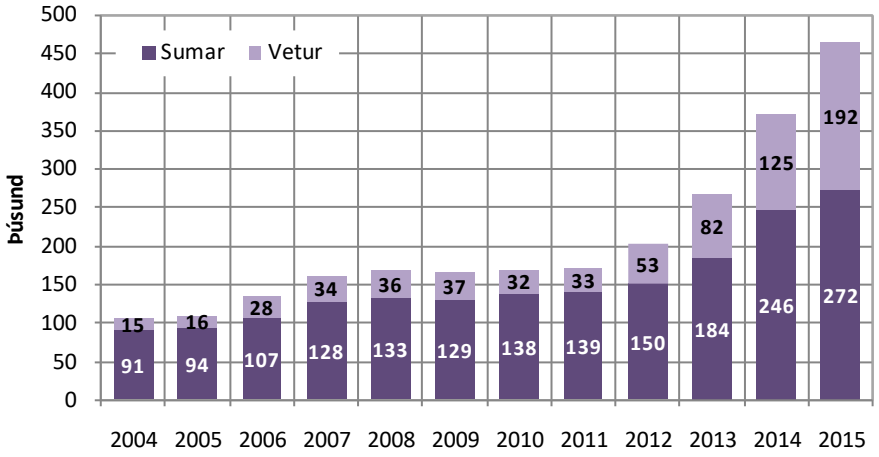
the countryside during this period. Research on this trend has so far been very limited but it is still clear that Southeast Iceland has become a popular region for tourists in off-summer seasons. The visitor numbers of two of the most popular tourist sites in the southeast Iceland have thus increased exponentially during the winter months (table 1).

Table 1: the number of visitors and percentage increase at two popular tourist sites in Southeast Iceland (Þórhalllsdóttir and Ólafsson, 2016)

	July 2012	July 2015	% increase	Dec. 2012	Dec. 2015	% increase
Jökullsárlón	68.327	97.876	43%	2.739	13.620	497%
Skaftafell	68.707	96.084	40%	1.697	8.021	472%

The on-going development of local and regional guided and non-guided tour possibilities such as Northern Lights tours, ice caves and winter glacier hikes are likely to have contributed significantly to this growth of winter tourism in Southeast Iceland (fig. 2).

Áætlaður fjöldi og skipting erlenda ferðamanna í Austur-Skaftafellssýslu sumar og vetur 2004-2015



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Vetur	14%	15%	21%	21%	21%	22%	19%	19%	26%	31%	34%	41%
Sumar	86%	85%	79%	79%	79%	78%	81%	81%	74%	69%	66%	59%

Fig. 2 Estimated foreign visitors to Austur-Skaftafellssýslu during summer and winter 2004-2015 (Rannsóknir og ráðgjöf ferðaþjónustunnar, 2016)

Despite this increase of visitors during the winter months, there is a lack of basic information concerning winter tourism in Iceland, both on national and regional levels. For this reason, the Hornafjörður Regional Research Centre decided to design and conduct a pilot research project on winter tourism in Southeast Iceland. This report presents the preliminary results of the qualitative part of this project. A report on the quantitative part will be forthcoming later this year. The main goal of the study presented in this report was to gain better

understanding of the travel behavior and attitudes of tourists which travel around Southeast Iceland during the winter season. In this report, winter tourism is defined as tourism activities that take place in the months November to March, which is similar to the period the Icelandic Tourism Board defines as winter season (ITB, 2016)

This report is divided into four chapters. After the introduction of the research project in the first chapter, the methods used for data collection and analysis are described, together with a description of the study area, in the second chapter. In the third chapter, the main results are outlined, followed by a conclusion in the last chapter.

2 Methodology

2.1 Data collection and analysis

The study used a qualitative research approach where data was collected by means of face-to-face interviews with 15 foreign tourists at three different locations in Southeast Iceland: Jökulsárlón, Hali and Höfn. The interviews were taken during the last week of February 2016. All interviews were conducted in English, which hampered to some extent the non-native English speaking respondents in the expression of their answers and comments. The length of the interviews was between 20 – 35 minutes. The interviews were semi-structured, using a basic interview framework in all cases, but where the order in which individual core questions were asked (and answered) varied, depending on the flow of conversation. The emphasis in the interviews and the specific questions asked were also adapted to suit the particular participants involved. The interview scheme, broadly followed in all interviews, covered the following topic areas: a) respondents' travel data, b) motivation, c) expectations and experiences, d) personal information, and e) two issues: tourism increase and climate change. All interviews were recorded, transcribed and analyzed through the search for repeated themes and topics using data analysis software.

It is important to emphasize that this study is explorative and that the results must not be interpreted as providing representative data about winter tourism in the Vatnajökull Region. The aim of the study was first and foremost to gain a better understanding of tourist's behavior and attitudes in the wintertime, and thus provide a foundation for more extensive research in the future.

2.2 Study area

The study area is the southeast part of the Vatnajökull icecap (fig. 3) and adjacent lowland areas, which has been marketed as the Vatnajökull Region (www.visitvatnajokull.is). In the last two decades this rural part of Iceland has developed from being an agricultural region to becoming an area where tourism activities are now a very important economic sector, second only to fisheries. The Vatnajökull icecap, the largest glacier in Europe, plays a central role in the regional tourism sector (Welling and Árnason, 2016).

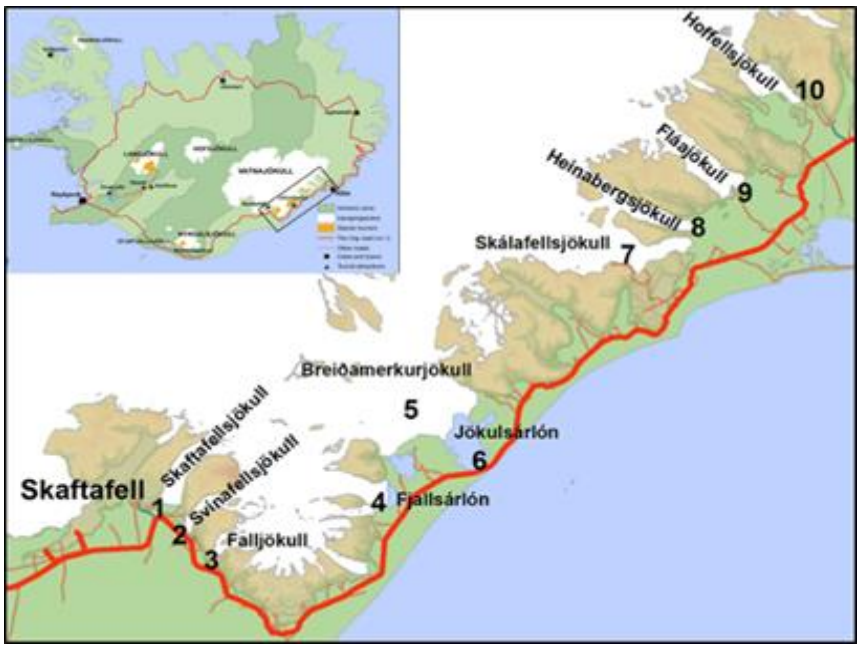


Figure 3: the study area: the Vatnajökull region

The icecap contains multiple outlet glaciers and glacier lakes of which several are regarded as glacier tourism sites suitable for tourism and recreational activities in summer as well as in winter time (table 2).

Table 2: Recreational activities and visitor numbers (winter 2014/15 and total 2015) of popular glacier sites in the Vatnajökull region. Source: Þórhallsdóttir and Ólafsson, 2016.

Glacier sites	Main recreation activities	Visitor nr. (2015)	Visitor nr. in winter (Nov '14-Mar '15)
Skaftafellsjökull	Sightseeing, educational hikes	50.430	5.520
Svínafellsjökull	Sightseeing, glacier hikes, ice-climbing	88.471	11.784
Fjallsárlón	Sightseeing, boat tours	157.907	7.792
Jökulsárlón	Sightseeing, boat tours	510.827	70.769
Heinabergsjökull	Sightseeing, glacier hikes, kayak tours	6.710	514
Hoffellsjökull	Sightseeing, ATV tours	20.368	1.910

Approximately a quarter (13 companies) of all the tourism enterprises situated in Vatnajökull region are operators that provide tours on or in the direct vicinity of the different outlet glaciers of the Vatnajökull icecap (The Vatnajökull Region, 2016). These tours include guided glacier walks, hikes and glacier traversing, ice-climbing, motorized tours with super-jeeps or snowmobiles on icecaps, boat and kayak tours on glacier lakes, photography tours in ice caves, and scenic flights by plane. In addition, most of the lodging companies, approximately 55% of the total tourism sector of the Vatnajökull region, are indirectly depend on the Vatnajökull glacier through marketing, the scenic background and provision of overnight stay facilities to visitors of the different glacier sites in the region.

Of the 13 local companies, 9 offer tours offer tours on or in the direct vicinity of the different outlet glaciers in the Vatnajökull region during the winter (fig. 4). The figure shows the relatively importance of ice caves (7 companies) for the regional operating tour companies during the winter season.

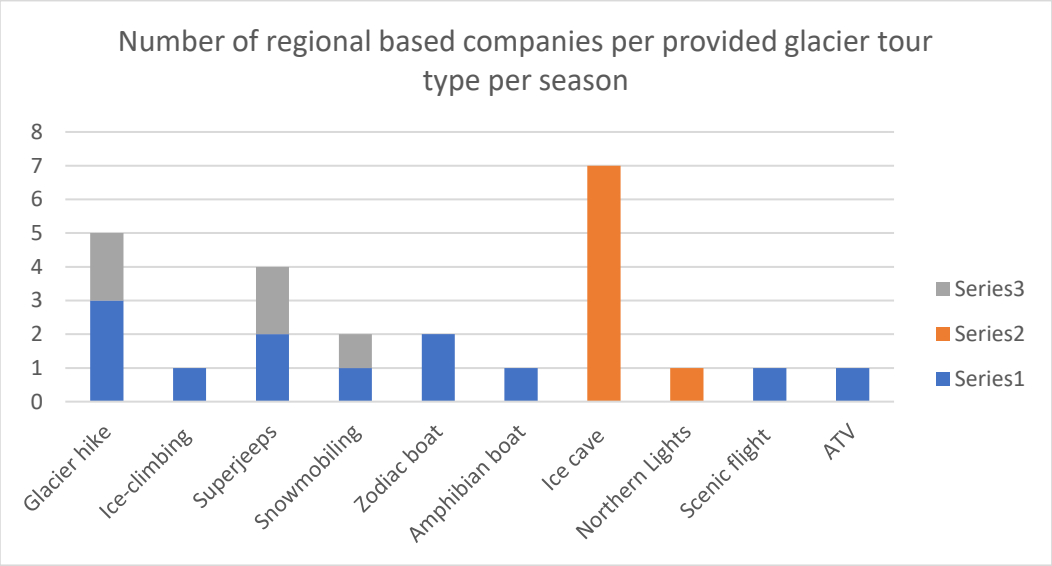


Figure 4: the number of regional tour companies per provided glacier based tour per season

3 Results

This section first presents the results drawing on the respondents´ personal and travel data, followed by findings related to visitors´ motivation, expectations and experiences. The results section ends with the description of two issues that have been addressed by the respondents.

3.1 Personal data of respondents

Table 3 gives an overview of the personal information of the participants in the study. Two thirds of the interviewed tourists were young adults travelling with their spouse or a friends group. Just one interviewee was travelling alone and two visitors were travelling with a family that consisted of parents and children. The United Kingdom (4 interviewees) and USA (3 interviewees) were the most frequent country of residence. This corresponds with the results of winter tourism survey of Icelandic Tourism Board (2014) which shows that the UK and USA are the most common nationality of foreign visitors to Iceland during the winter season.

Table 3: personal data of interviewees

Resp.	Travel party	Age group	Country of residence
1	Individual	50-60	UK
2	Couple	50-60	UK
3	Couple	20-30	Netherlands
4	Couple	20-30	USA
5	Couple	20-30	Austria
6	Couple	30-40	Austria
7	Couple	20-30	USA
8	Two friends	20-30	UK
9	Two friends	20-30	Italy
10	Two friends	50-60	USA
11	Two friends	20-30	Germany
12	Three students	20-30	UK
13	Four friends	20-30	Thailand
14	Family of four	15-20 / 50-60	France
15	Family of four	20-30 / 60-70	Switzerland

3.2 Travel information

The majority of the interviewed visitors (9 respondents) stayed between 7-10 days in Iceland and had just one overnight stay in the Vatnajökull region (fig. 5). A third of the interviewees (5 respondents) did not have an overnight stay in the region (fig. 6) and returned the same day, planning to overnight in South Iceland (2 respondents) or in Reykjavik (3 respondents). The total amount of total travel time spent in Iceland combined with the visitors´ itinerary schedule, with an average distance of over 1000 km, makes it difficult for respondents to stay more than 2 nights in the Vatnajökull region. In addition, the pre-emptive planned itinerary of some of the interviewees determines the length of stay in a region, as mentioned by a respondent:

"*The point is that we have the tours at different locations and we could not choose the dates because some are fully booked. So like the ice cave we had to do it yesterday, we have to stop by here today, and the dogsled in the North are in three days. So we have to hang out in this area for three days*" (respondent 2).

Furthermore, various interviewees stated that they thought two days was enough to visit the most popular tourist attractions in the Southeast area (i.e. glacier visitation, Jökulsárlón and ice-caves) and that popular summer outdoor recreation activities such as hiking were impossible, not available or unknown, as one respondent pointed out:

"*When you want to go hiking they [local tourism sector] have to differentiate between hikes in the summer and winter. So we did not really know what we could do here [in Höfn]*" (respondent 11).

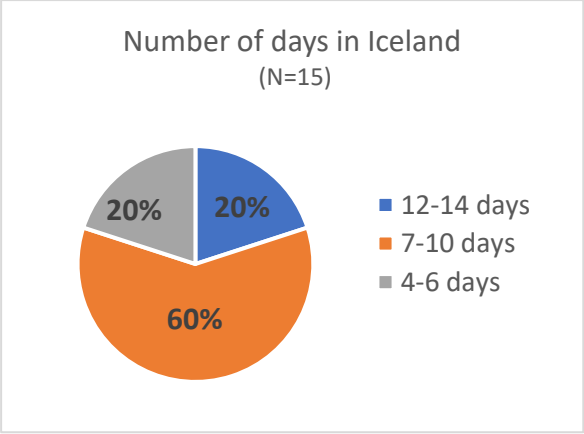


Figure 5: Respondents' number of days in Iceland region

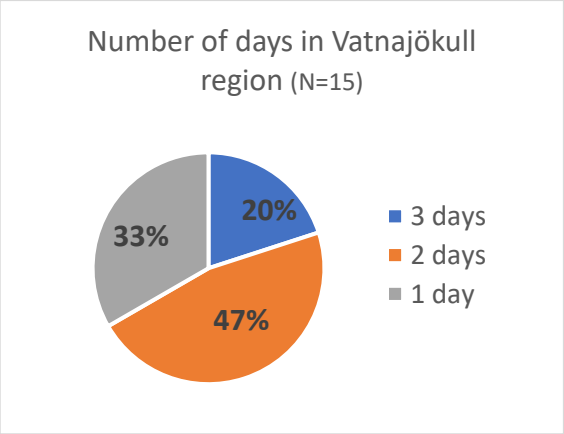


Figure 6: Respondents' number of days in the

Most of the interviewed tourists travelled from Reykjavik, where they arrived, along the south coast to southeast Iceland stopping on their way at several tourist sites and return the same way back (fig. 7). For most interviewees Jökulsárlón is the end point of their journey. Further east towards Höfn is for a majority of the respondents too far to return to Reykjavik that same day or is just an unknown territory as one respondent stated:

"I do not know anything about Höfn. I do not know what there is in the east of Iceland. It is now too far to travel to" (Respondent 3).

Two respondents travelled around Iceland along the Ring Road. Both respondents stayed 14 days in Iceland. A combination of southeast Iceland with the Snæfellsnes peninsula was visited by three interviewees. According to the tourists, the reason for visiting the west as well as southeast Iceland was that both regions have easily accessible attractions they really wanted to experience: whales/killer whales in west Iceland and glaciers/ice caves in southeast Iceland.

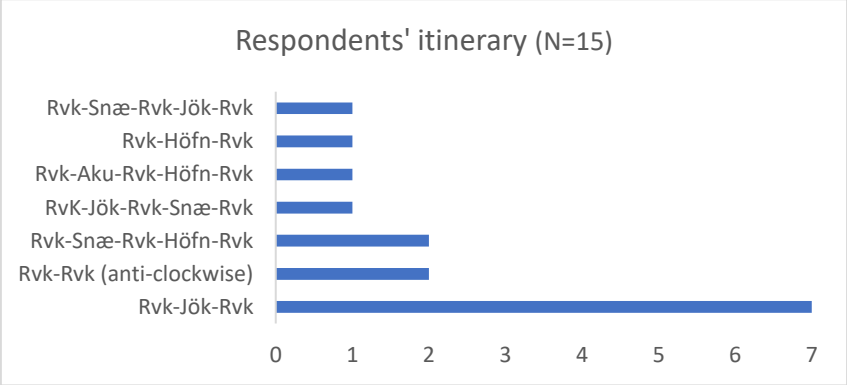


Figure 7: Respondents' itinerary – (Rvk= Reykjavik, Snæ = Snæfellness, Aku=Akureyri, Jök= Jökulsárlón/Hali)

Figure 8 shows the activities that respondents conducted or intended to conduct in the Vatnajökull region. Almost all the interviewed tourists did, or were planning to do, some form of nature sightseeing such as viewing outlet glaciers or the glacier lakes Jökulsárlón or Fjallsárlón from a short distance (14 respondents). Almost half of the respondents (7) intended to conduct or conducted a guided ice cave tour, while 4 respondents did a guided glacier hike. Almost all mentioned activities were glacier-based recreation activities, emphasizing the importance of glaciers for the regional tourism sector during the winter.

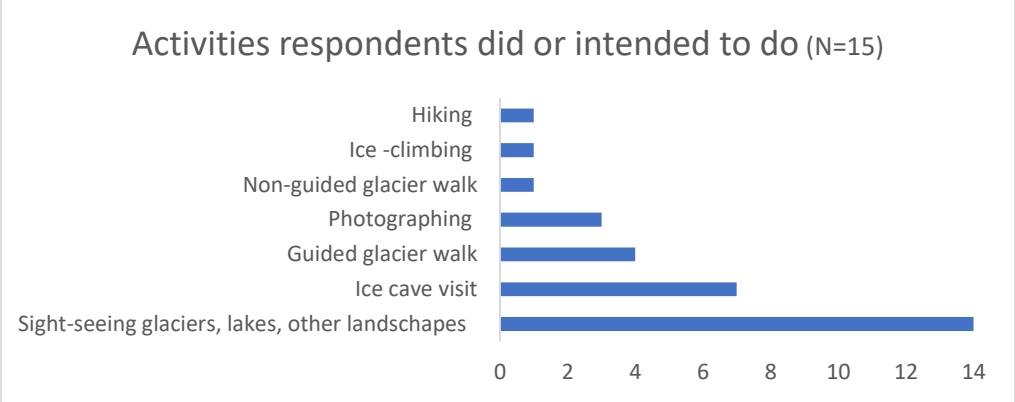


Figure 8: Activities tourists conducted or intended to conduct in the Vatnajökull region

3.3 Motivations

The respondents mentioned several motivations to visit Iceland (fig. 9), in particular nature. A relatively large number of respondents stated special family or friendship related reasons, such as a honeymoon, a birthday celebration or the annual family holiday trip, as a motive for traveling to Iceland. Others mentioned motivations that are not related to Icelandic nature were the follow-up of a previous unsatisfying trip to Iceland and the opportunities for inexpensive flights to Iceland and short travel time by low cost carriers:

"If you want to experience the beauty in winter, by us in UK you have to go to Scotland where there is a bit of snow now. That is an 8-10 hrs drive, but it is from Manchester airport 2,5 hrs flight with Easyjet to come to Iceland" (respondent 1).

A majority of the respondents mentioned the Icelandic natural environment, or its particular aspects or attributes, as important motivational factors to visit Iceland, such as the scenery, natural phenomena (volcanoes, ice caves), unique landscapes and nature in general, untouched, spacious and extraordinary, or as one respondent summarized:

"*The light and the space, the different experience. If you want to see nature, this is where you go. It is almost if you go back in time to see how it all began*" (respondent 1).

These motivational factors are in line with the findings from different general surveys on Icelandic tourism demand (ITB, 2014). In addition, there were relatively many respondents (3 respondents) who mentioned marine wildlife as their main motivation to visit Iceland:

"*We saw killer whales and dolphins, that was amazing and that was the main reason we came*" (respondent 6).

Although the whale-watching season is normally during the summer months, several interviewees went to Breiðafjörður along the north coast of the Snæfellsnes peninsula to observe whales and killer whales, taking a commercial boat trip or viewing the animals from the shore.

Figure 9: Respondents motivations to visit Iceland

The most mentioned motivation to visit Iceland in the wintertime (figure 10) was to see Northern Lights (7 respondents), followed by experiencing ice and snow and the winter landscape scenery (6 respondents). For some of the interviewees, the Northern Lights were their most important motivation:

'*It is a dream in life to see once the Northern Lights*" (respondent 14).

"*To some point I always wanted to go to Iceland. The Northern Lights is a must*" (resp. 15).

Other tourists considered the Northern Lights to be part of a set of related motivational reasons, as one respondent pointed out:

"*I wanted to see the Northern Lights, which I can see at lots of other places but here [in Iceland] there is something else to do as well*" (respondent 9).

Figure 10: Respondents' motivations to visit Iceland during the wintertime

For other tourists, the experience with a winter landscape they used to have in their home country is an important factor to visit Iceland during the wintertime:

"*In Germany you don't have much snow in the winter anymore. Also not much snow in the Alps. It is not a good season this year*" (respondent 5).

However, not only pull factors are mentioned by the interviewees but also personal reasons to go on a vacation during a particular period in the year:

"*We come here in the wintertime because this month was the best month to go all together. We all could go off from our works in February*" (respondent 10)

Or as another interviewee put it: *"…because I got a job 2-3 weeks ago and I did want to travel again before I start*" (respondent 15).

The major reason of the interviewees to visit the Vatnajökull region was to see specific natural landscape features such as the glacier lagoon Jökulsárlón, ice caves or the outlet glaciers (fig.11).

"*The primary reason was to find the natural beauty, the natural features of the country and the south part of Iceland has all of that. And it is more accessible than any other part of Iceland*" (respondent 15).

Furthermore, the possibility to participate in different glacier based tours such ice-climbing and glacier hiking were mentioned by a few tourists as a motivation to visit the region:

"You cannot do it in Germany or Italy. You can do ice-climbing but it is difficult this year and not that special" (respondent 7).

This results emphasize the importance and attraction of a few specific nature sites among the foreign visitors but also the relatively unfamiliarity with many other natural or cultural attractions that the Vatnajökull region has to offer.

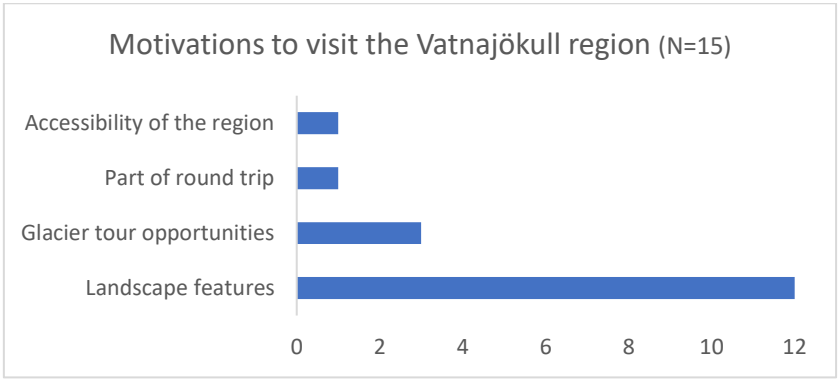


Figure 11: Respondents' motivation to visit the Vatnajökull region

Of the 15 interviewees, 5 had visited Höfn during their journey. All the respondents mentioned that their main reason to visit Höfn was to stay overnight in a hotel or guesthouse in the town (fig. 12). Other reasons were diverse and comprised of: visiting a friend, following-up a previous stay, visiting the lobster restaurant or the village from the movie *Secret life of Walter Mitty*, or that Höfn was just a part of the interviewees' travel route:

"Ater the ice cave tour finished at 5 o'clock it is dark and we did not want to drive far, so we stop by this village" (respondent 2).

These finding show that the majority of interviewed tourists visit Höfn for its infrastructure (i.e. lodging, facilities, restaurants, part of the travel route and its proximity to attractions) rather than perceive the town as a tourist destination *per se*.

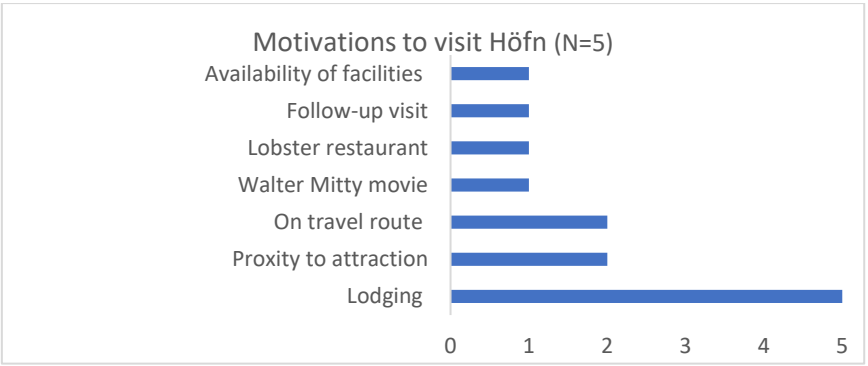


Figure 12: Respondents' motivations to visit the Vatnajökull region

3.4 Expectations and experiences

The majority of the interviewed tourists stated that their visit to Iceland in the wintertime fulfilled their expectations.

"*We knew we would enjoy it and the expectations were fulfilled, 100%*" (respondent 1).

For many interviewees this fulfillment depended on the possibility to view natural phenomena in real-life such as to see the Northern Lights, Killer Whales or ice caves, as one respondent noted:

"*Our expectations are fulfilled, definitely! We want to see the Northern Lights, which we saw. Then seals, whales and Orcas*" (respondent 13).

However, the expectations of many interviewees were grounded on images of natural phenomena they saw on the Internet. These images are often taken by professional photographers who use specialized equipment, selecting the best pictures to publish or post on specific web-sites. This led some respondents to disappointing or dissatisfying experiences when they perceived these phenomena themselves in their actual conditions.

'"*We thought it [Icelandic natural environment] would be bigger on scale, maybe because it is winter, like the waterfalls are smaller than I thought on scale. Maybe I had too high expectations. There is no moss and the ice cave space is real small, smaller than we thought*" (respondent 2).

"*The Northern Lights were not so active. You actually did not see them dance or anything. If you have a good camera it will look great but with the eye it is a bit greyish*" (respondent 4).

The use of comparison, however, also had a positive effect on the fulfillment of some respondents' expectations especially when it relates to previous experiences of natural landscapes in other countries, as one respondent pointed out:

"*Yes, I think it [Iceland] is more than I expect. We were in New Zealand two years ago and we saw a lot of nature, but the glaciers and geysers and surrounding are here more special*" (respondent 12).

Other expectations of Iceland or southeast Iceland that turned out more positive concerned practical conditions such as the weather, the accessibility of several tourist sites and the condition of the road network:

"*The roads are much better than I expected. Several friends told me that driving in Iceland during the winter was impossible*" (respondent 15).

From the interviews, different related factors that ground the general experience of the respondents could be discerned. First, the feeling of **wonder** characterized several respondents' experiences:

"*We expected a wow factor and that came true*" (respondent 8).

"*I was really overwhelmed because the nature is so pretty*" (respondent 12).

Most of the respondents were visiting Iceland for the first time and a majority of them had never experienced natural phenomena such as Northern Lights, ice caves or glaciers in real-life before. This experience of seeing such things for the first time led to a feeling of wonder. Another related factor that enhanced interviewees´ experiences was their encounter with unusual and for them **unique** phenomena.

"*The ice caves look majestic and very appealing, something that is unique*" (respondent 15).

"*We were at the glacier, it was fantastic. It is a completely different experience*" (resp. 1).

"*Every place is new for us. There is no other place to see such a landscape, the nature with wide and white snow and ice and nobody. It is rare, very rare*" (respondent 10).

The **naturalness** of the visited places was also mentioned frequently as an important element of a visitor's experience.

"*It is amazing, keeping the nature as natural as possible, not destroying it. That is something I really like as well*" (respondent 4).

"*This is a country of nature. It is different as any other I have been to. It is just like a giant national park"* (respondent 11).

Several respondents mentioned specific elements of naturalness such as the coldness, the light, the big skies and enormous space they experienced, the whiteness of the landscape and the silence and calm.

A non-natural element that contributed to the experiences of different respondents was the **locality** of the services provided to them, for example as one respondent mentioned:

"*What is nice to know for us is that all the tour companies are small family run businesses that diversified and embraced tourism. And they make a living of showing us around. It is not a big organization doing the tours. It is localized*" (respondent 1).

3.5 Issues

During the interviews, two different issues that are appear likely to have a significant impact on the tourism sector in the Vatnajökull region were specifically ask for: The large increase of tourist numbers and the impacts of climate change.

3.5.1 Increase of tourists

The current number of tourists at different sites was mentioned by several interviewees. Some respondents did not notice any form of crowdedness or had expected many more tourists in the region:

"*Better than I expected. Often we were at places where hardly anybody was*" (respondent 8).

However, most of the interviewees talked about the considerably large number of tourists they encountered during their trip, even though most of them were not disturbed by this:

"*There are many tourists. I have seen more tourists than Icelanders. But it is not too much*" (respondent 7).

"*We have seen lots of them [tourists]. The two waterfalls [Skógafoss and Seljalandsfoss] on the way were covered with tourists. But it is not too bad, we live in Como, we sometimes cannot walk through the street because of the amount of tourists*" (respondent 6).

Although a majority of the interviewees stated that they were not negatively affected by the gathering of many tourists at one spot, several respondents were searching for places that are unfamiliar among other tourists or not visited by many tourists:

"*We use Trip Creator to get information about Iceland. This site shows you the tiny places nobody knows about*" (respondent 4).

"*..it seems that most people stop at Vík and return to Reykjavík, I like to go more out where most people don't go*" (respondent 15).

Several respondents mentioned the possible negative consequences of the increase of visitors at certain sites for the summer season:

"*I am surprised how many people I see. I see people everywhere. It is not too bad till now. But I can see that the summertime will be chaos here*" (respondent 9).

"..but in summer it must be a different country. Then there will be much more people that will drive me crazy. The tourism is insane in summer. That probably keep me away" (resp.11).

Figure 12: Crowding in the Crystal ice-cave (photo: J.T. Welling)

A couple of interviewed tourists mentioned the negative effects they experienced with the increase of tourist numbers in the region or the popularity of Iceland for other sectors:

"*You see people everywhere now. Sometimes accommodation is difficult on the south coast. I made a reservation a month ago because it was difficult to find a room*" (respondent 3).

"*I went to Svínafellsjökull this morning. I was surprised, there was a film crew. So instead of being alone, the peacefulness or solitude, I saw Hollywood. This was disturbing because it looks out of place*" (respondent 2).

The perception of the crowdedness or amount of tourists is relative and depends for an important part on respondent previous experience with Iceland such: "*There are more people compared with previous visits to Iceland*" (respondent 3). This may depend on the population density of the visitor's place of residence, as one respondent stated:

"*the number of tourists is nothing, we are from London, it always crowded there*" (resp. 4).

3.5.2 Climate change

The respondents were also asked about their attitudes towards climate change and the impacts of climate change on the glaciers. Although there were two respondents that could not mention any effect of climate change on the outlet glaciers of the Vatnajökull region, the majority mentioned the retreat or thinning of the glaciers as an indicator of climate change. Four respondents referred to their home country where climate change has resulted in significant changes to glacial landscapes:

"*We know about the climate change because we learn about this process at our university and Austria [country of residence] is in some areas sensitive about climate change*" (resp.12).

"*Glacier is receding the same as in France, La Mer du glace is retreating very year*" (resp. 10).

When the interviewees were asked what causes the recent changes in the global climate several respondents mentioned anthropogenic sources. A couple of interviewed respondents, however, referred to natural causes:

"The retreat of glaciers here has to do with global warming, but that is due to natural cycles, that is not the cause of humans to that extent" (respondent 8).

In general, the moraine areas adjacent to the outlet glaciers in the Vatnajökull region are covered with snow during the winter season. Due to this coverage it is difficult for most visitors to see whether the glacier has retreated or not. This in turn means that the respondents´ attitudes about climate change impacts on the glaciers in southeast Iceland are not based on first-hand observation but rather almost entirely on information they obtained through the media before the visit to Iceland or during their trip (e.g. from guides or exhibitions).

4 Conclusion

In the last few years, Iceland has experienced a relative large-scale increase of tourist numbers during the winter season. A substantial part of these winter tourists visit the Vatnajökull region in southeast Iceland. This study examined the travel behavior and attitudes of foreign tourists who visit the Vatnajökull region during the winter season. The results show that the interviewees conducted just a short visit to Vatnajökull region (1-2 days) during which participating in an ice cave tour and nature sight-seeing were the most frequent conducted activities. Seeing natural phenomena such as ice and snow and Northern Lights are the main reasons in general to visit Iceland during the winter time, while visiting landscape features, such as the ice-caves of Breiðamerkurjökull and the glacier lagoon Jökulsárlón, where the main reasons to visit the Vatnajökull region. However, familiar or relational reasons are also an important motivational factor. The majority of the respondents' expectations were fulfilled by the trip but the representation of images prior to the journey led to some negative experiences of the visited phenomena at the spot. Furthermore, the study shows that tourists who visit southeast Iceland experience wonder, uniqueness, naturalness and locality. Finally, most interviewees noticed the relatively large number of tourists at some visited sites but were not unduly disturbed by this. Climate change is seen as a major cause of the current recession of the area´s glaciers and a majority of the respondents considered human activity as the main source of these changes.

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B. Survey of foreign visitors to the Vatnajökull Region

1. Introduction

This section summarizes the objectives, methods and findings of the second part of the study on winter tourists in Vatnajökull region. The first part of the study, undertaken in February 2016, had a qualitative approach, based on a set of interviews with foreign visitors to the region, and had the objective to gain insight into the travel behavior and attitudes of tourists which travel around southeast Iceland during the winter season. This research builds upon the results of the qualitative study by focusing particularly on diverse glacier sites of the southeast part of the Vatnajökull icecap (fig. 1), several of which have become very popular tourist destinations for all kinds of nature recreation during the summer and, increasingly, during the winter season as well (table 1).

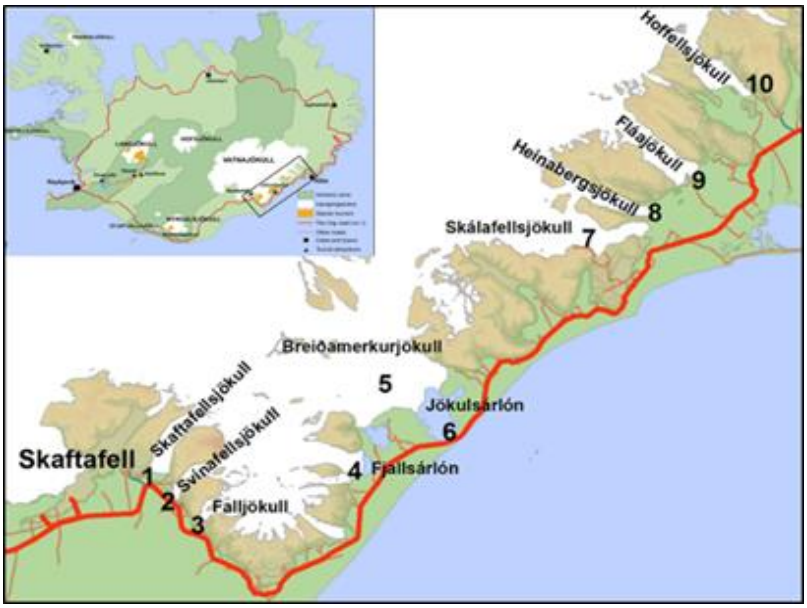

Figure 1: Study area: the Vatnajökull region

The Vatnajökull icecap, the largest glacier in Europe, plays a central role in the regional tourism sector (Welling and Árnason, 2016). The icecap contains multiple outlet glaciers and pro-glacial lakes of which several are regarded as glacier tourism sites, suitable for tourism and recreational activities in summer as well as in winter time (table 2). However, despite the growing popularity of glacier sites as tourist destinations, glacier tourism in general has until been a sparsely researched topic. Especially, basic information about the demand site for this

type of tourism is still lacking (Welling, Ólafsdóttir and Árnason, 2015). This research attempts to get better insight into tourists' attitudes and behavior in glacial environments by employing a visitor survey.

Table 1: Recreational activities and visitor numbers (winter 2014/15 and total 2015) of popular glacier sites in the Vatnajökull region.

Glacier sites	**Main recreation activities**	**Visitor nr. (2015)**	**Visitor nr. in winter (Nov '14-Mar '15)**
Skaftafellsjökull	Sightseeing, educational hikes	50.430	5.520
Svínafellsjökull	Sightseeing, glacier hikes, ice-climbing	88.471	11.784
Fjallsárlón	Sightseeing, boat tours	157.907	7.792
Jökulsárlón	Sightseeing, boat tours	510.827	70.769
Heinabergsjökull	Sightseeing, glacier hikes, kayak tours	6.710	514
Hoffellsjökull	Sightseeing, ATV tours	20.368	1.910

Source: Þórhallsdóttir and Ólafsson, 2016.

A major issue that has a significant impact on glacier tourism in the region is the effect of climate change (Welling & Árnason, 2016). Icelandic icecaps and glaciers are all categorized as being temperate or warm-based and are highly dynamic and sensitive to climate variation, resulting in rapid responses (advance or retreat) to changes in temperature and precipitation (Björnsson & Pálsson, 2008). Glacier recession has been especially pronounced since the 1990s, with all monitored icecaps retreating and thinning at an unprecedented pace (Björnsson & Pálsson, 2008, Hannesdóttir et al., 2010). Different outlet glaciers south-east of the Vatnajökull icecap, such as Virkisjökull–Falljökull, have shown an exceptional fast retreat since 2007 (Bradwell et al., 2013). Dynamic glacier models coupled with future climate scenarios predict that the Vatnajökull icecap will lose 25-35 % of its 1990 volume and most of its outlet glaciers completely disappear before 2040 (Björnsson & Pálsson, 2008). Future projections of glacier recession indicate that pro-glacial lakes will become longer and wider and gradually replace the outlet glaciers of the Vatnajökull icecap totally (Magnússon et al., 2012). The rapid shrinkage of glaciers forms a serious challenge for tourism in glacial environments because it triggers glacier hazards, hampers glacier accessibility, and affects the aesthetic value of the scenery (Kääb et al., 2006; Purdie, 2015). Despite this, the number of studies that focus on the relationship between climate change and glacier tourism are still very limited (Welling et al., 2015). In general, tourist perceptions and responses to climate

change are not well understood, and this results in a critical knowledge gap (Gössling et al., 2015).

Given these research gaps, the Hornafjörður Research Centre study involved conducting a visitor survey to: i) investigate the motives, behaviours and experiences of glacier sites by tourists in the Vatnajökull region during the winter season, and ii) examine the implications of climate change induced environmental changes for future glacier visitation in the region.

This report is divided into five chapters. After the introduction of the research project in the first chapter, the methods used for data collection and analysis are described in the second chapter. In the third chapter, the main results are outlined, followed by a chapter that describes the difference between winter and summer tourists of the Vatnajökull region on basis of a comparison between the results of winter visitor survey and the results of a similar visitor survey that was conducted in the summer of 2015. This report end with a brief conclusion in the last chapter.

2. Methodology

Data was collected by means of a visitor survey (N=139) at Jökulsárlón. This site is the most visited tourist destination in southeast Iceland. In 2016, a total of 641.000 people visit Jökullsárlón of which 75.100 visited the site in the winter months between January - March 2016 (Þórhallsdóttir & Olafsson, 2017). The survey consisted of self-completion questionnaires that were distributed at random to visitors at different spots at Jökulsárlón site. The survey on winter tourists is part of an overall quantitative study on glacier tourism in the Vatnajökull region. The questionnaire (Appendix 1) consisted of 17 closed questions concerning the following issues: a) visitors' demographics, b) visitation characteristics, c) their motivation and experiences, and d) their attitudes towards climate change and potential climate change induced implications for visitation to glacier sites in the near future. This last issue contained hypothetical but plausible questions concerning potential implications for visitation to glacier sites in the near future (2-4 years). These questions were based on findings from a recent study that examined climate change induced impacts on glacier tourism and the adaptive responses of glacier tour operators in the Vatnajökull region to these impacts (Welling, 2015).

The survey was conducted in English, French and German, which were the languages expected to be spoken by most of the tourists. The survey took approximately 10 minutes to complete. The surveys were undertaken during a six-day survey period in the last week of February 2016. After the data collection, the survey data were entered into an Excel spreadsheet and then uploaded into SPSS for statistical analysis.

It is important to emphasize that the sample used in this research (n=139) is too small to be a statistically representative sample for winter glacier tourism in general. However, this research is an explorative study with the objective to gain a better understanding of winter glacier tourists and the sample size of the survey is sufficient to provide a value and sound indication of glacier tourists behavior and attitudes in Vatnajökull region.

3. Results

First, this section presents the results drawing on the respondents´ personal and travel data, followed by findings related to visitor glacier visit behavior and attitudes. The last part of this chapter describes the respondents' perceptions on climate change and potential impacts for glacier visitation.

3.1 Tourists personal data

These data describe the survey sample by age, gender and place of residence.

3.1.1 Age

The average age of the respondents was 37 years (Sd=14,5). Figure 2 shows that almost half of the respondents have an age ranging between 25 -34 years (48%, N= 67) and just less than a third had an age of 45 or older (28%, N= 38). The age distribution of the respondents in this survey corresponds with the results of the international winter visitors survey by the Icelandic Tourism Board (2014), although the young adult cohort (25-34 years) is in this survey much more predominant (48% in this survey and 31% the ITB survey). The survey period of the research was outside any official school holiday which maybe can explain the over-representation of the young adult (25-34 years) respondents group.

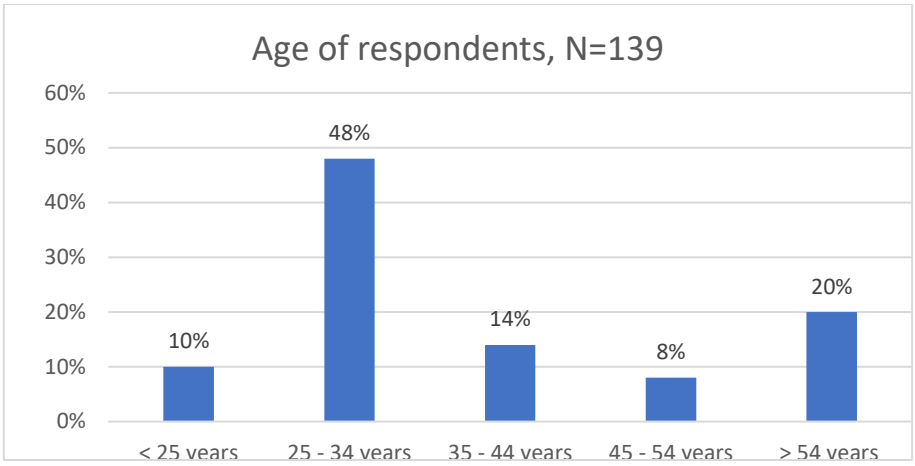

Fig 2: Age of the respondents

3.1.2 Gender

The gender of the respondents was almost equally distributed in the survey with a 51% majority of the male respondents (fig. 3).

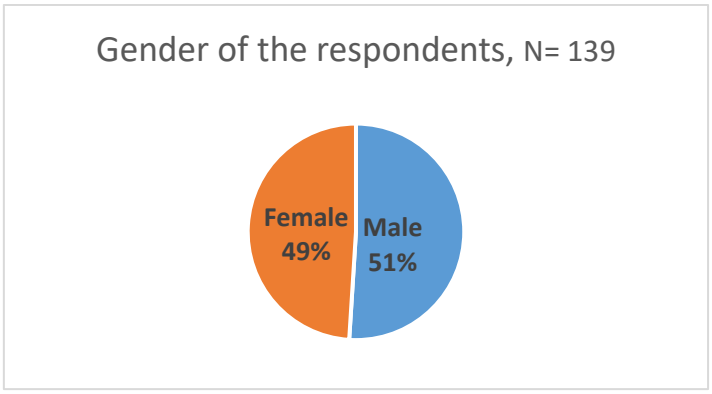

Figure 3: Gender of the respondents

3.1.3 Country of residence

Of all the respondents in the survey only two (1,5%) lived in Iceland. Almost all respondents were thus foreign visitors of which the largest single country of residence was the UK (25%, n=35), followed by the France (18%, n=25) and USA (17%, n=24), accounting in total for 60% of all respondents (fig. 4). A small group of respondents came from Asian countries (10%). Altogether, the respondents resided in 17 different countries.

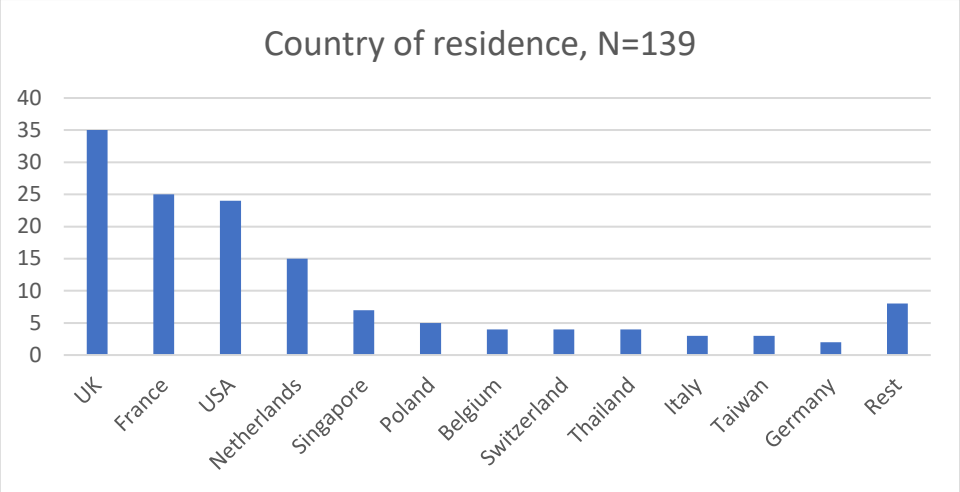

Figure 4: Country of residence of the respondents

3.2 Respondents' travel characteristics

3.2.1 travel party

The respondents' travel party are presented in figure. Couples (37%) and small groups up to 10 people (37%) formed the majority of the respondents' travel parties (fig. 5). Just a small number of respondents travel alone (6%) or as part of a large group (9%).

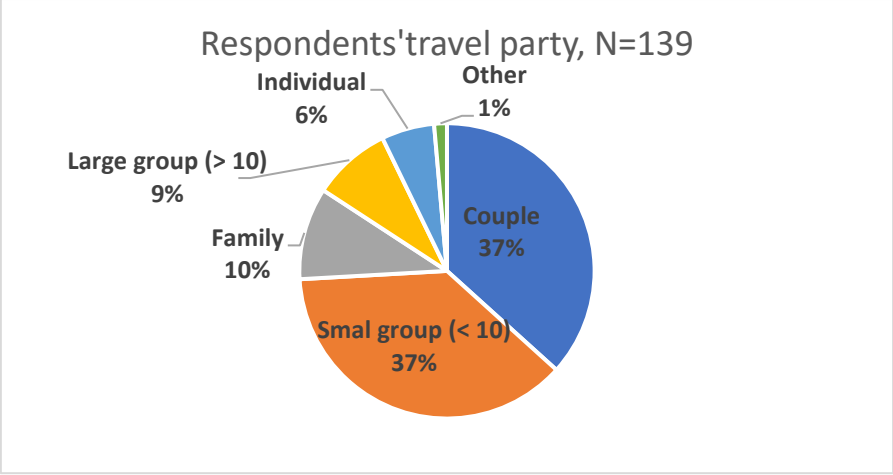

Figure 5: Respondents travel party

3.2.2 Days of stay

A relatively large part of the respondents does not stay overnight in the Vatnajökull region (38%) or stayed just two to four days in the region (37%). These numbers correspond with the

findings from the qualitative winter tourism research in which one third of the respondents did not stay overnight in the region and 47% of the respondents just stayed one night during their visit to southeast Iceland.

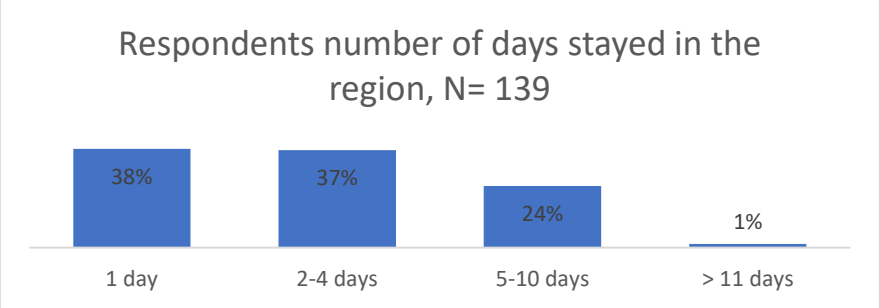

Figure 6: The respondents' number of overnight stay in the Vatnajökull region

3.2.3 Interested activities

Respondents were asked to indicate what activities they were interested to conduct during their visit in the Vatnajökull region. Taking an ice cave tour was the activity that most respondents were interested in (72,2% of all respondents, n=101), but also sight-seeing (70%, n=98), photographing (67%, n=93), Northern Lights tours (60%, n=84) and guided glacier walks (57%, n=79) were are activities that respondents were interested in (fig. 7).

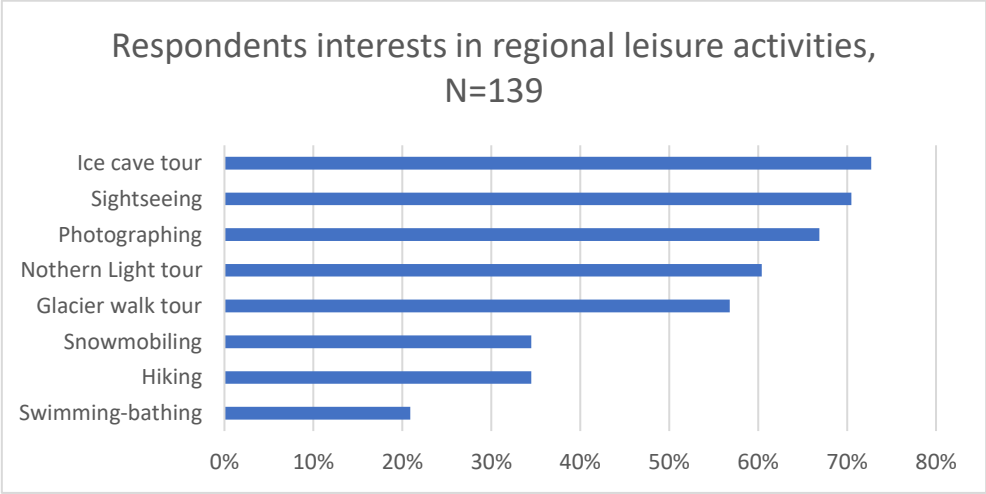

Figure 7: Regional outdoor leisure activities respondents were interested in.

3.3 Respondents´ glacier visit behavior

The data summarized in this paragraph describes some characteristics of the respondents' travel behavior at the visited glaciers sites. This includes visitors´ earlier visits to glaciers, glacier visit organization, the visited glacier site, the amount of time spent on regional glacier sites and the activities conducted on these sites.

3.3.1 Previous glacier visits

A slight majority of the respondents had never visit a glacier before (52%, n=72) and more than a third of respondents (36%, n=50) had visited a glacier a few times before (fig.8). Only a very few respondents (5%, n=7) had visited a glacier many times (> 10 times) during previous journeys. These respondents lived in Iceland, France and Switzerland, all countries with glaciers of which several are popular tourist destinations.

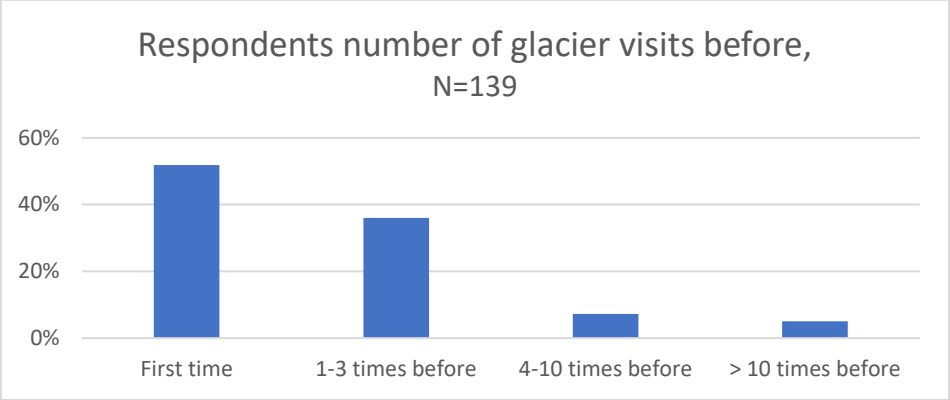

Figure 8: Respondents' number of glacier they visit before

3.3.2 Organizing glacier visit

Figure 9 presents the different ways the respondents organized their visitation to the glacier sites in the region. A considerable number of respondents (59%, n=82) organized their glacier visit by themselves with the help from social media or special websites. Relatively few respondents used a travel agency or tour company from the home country (19%, n=26) or a local tour operator or travel agency from Iceland (respectively 15% and 10% of the respondents).

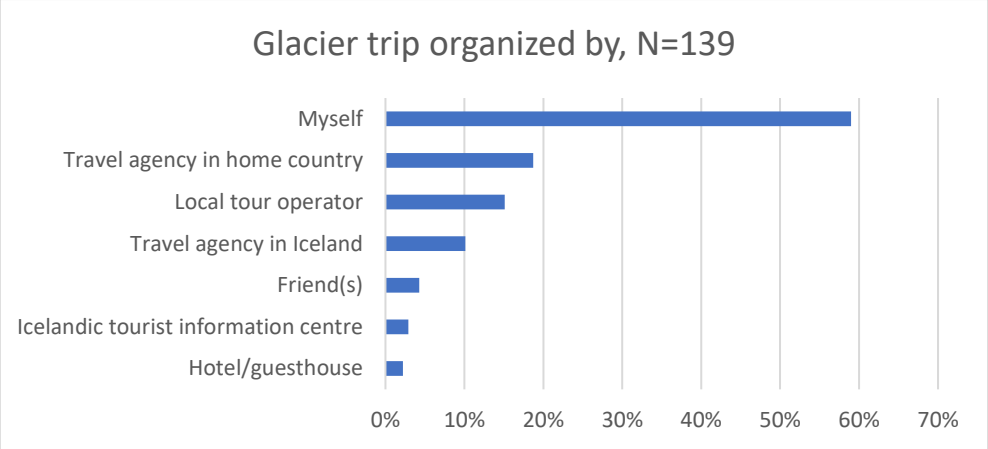

Figure 9: the way respondents organized their visitation glacier sites in the Vatnajökull region

3.3.3 Visited glaciers in southeast Iceland

Respondents were asked to choose from a list of glaciers sites in the region which they had visited during their journey in southeast Iceland. Multiple responses were possible. The list was supported by a colored map of the Vatnajökull region on which all glacier sites were marked. Almost all respondents had visited a glacier site (99%, n=138). Only one single respondent did not visit a glacier and three respondents did not know which glacier sites they had visited. Many respondents visited multiple glacier sites during their trip, the average number of glacier visits per respondent was 2,1 visits. Of the glacier sites in the region, Jökullsárlón was the site most often visited by the respondents (79%, n=110), followed by Skaftafellsjökull (58%, n=80), Svínafellsjökull (12%, n=36), and Breiðamerkurjökull (8%, n=24) (Fig. 10). This is not surprising because these four sites are relatively easy to access during the winter period and/or guided tours were provided on these sites. In addition, Jökulsárlón is one of the most marketed and well known tourist destinations of Iceland (ITB, 2015).

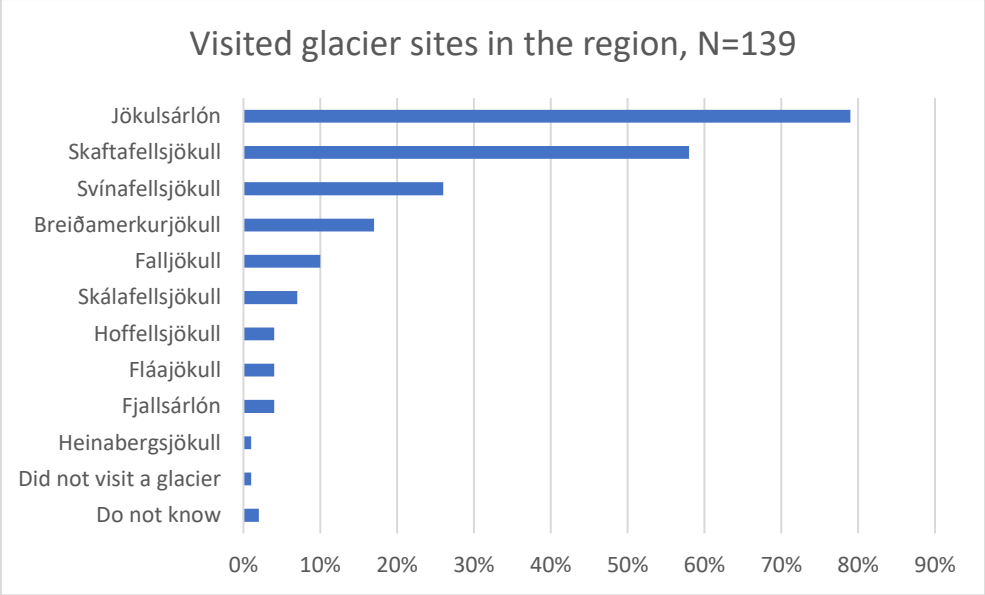

Figure 10: Percentage of visited glacier sites by the respondents

3.3.4 Time spent on glacier sites in the region

Respondents were asked in an open question how many hours they had spent on regional glacier sites altogether during their visits (fig. 11). A quarter of the respondents (n=34) spent an hour or less on the glacier sites they had visited and almost half of the respondents (47%, n=66) spent 2-4 hours on glaciers sites in the region. Just over one quarter of the respondents (28%, n=39) spent more than 5 hours altogether on glacier sites in the region. The often harsh weather conditions and limited accessibility of glacier sites during the winter season limits the duration of stays at glacier sites by tourists. In addition, the limited amount of time visitors spent in the region (see paragraph 3.2.2) influenced the time spent on regional glacier sites by visitors as well.

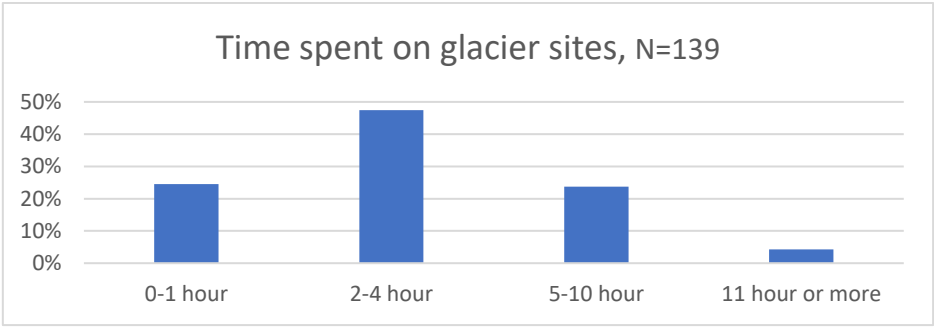

Figure 11: Respondents´ amount of time spent on glacier sites in the Vatnajökull region.

3.3.5 Activities conducted at glacier sites

Respondents were asked to indicate from a list of activities in the questionnaire which regional glacier based activities they had conducted. Multiple answers were possible. Almost all respondents (n=138) had conducted at least one activity on the list. On average, 2,5 different activities were conducted per person during their visit to the Vatnajökull region. The most conducted glacier based activities per respondent were viewing glacier from a short distance (68%, n=95), followed by photographing (64%, n=89), ice cave tours (45%, n=63) and guided glacier walk (29%, n=40) (fig. 12). Of all conducted activities (n=354) among the respondents, a considerable amount or 40% (n=143) involved the purchase of commercial tour products provided by tour operators or individual guides.

It is important to stress here that the percentage of conducted activities depends considerably on the period when the survey is administered during the winter season. The survey period of this research (last week of February) is the 'high season' of the ice cave tour season when tour operators are able provide three to four tours per day because of the amount of daylight during this period.

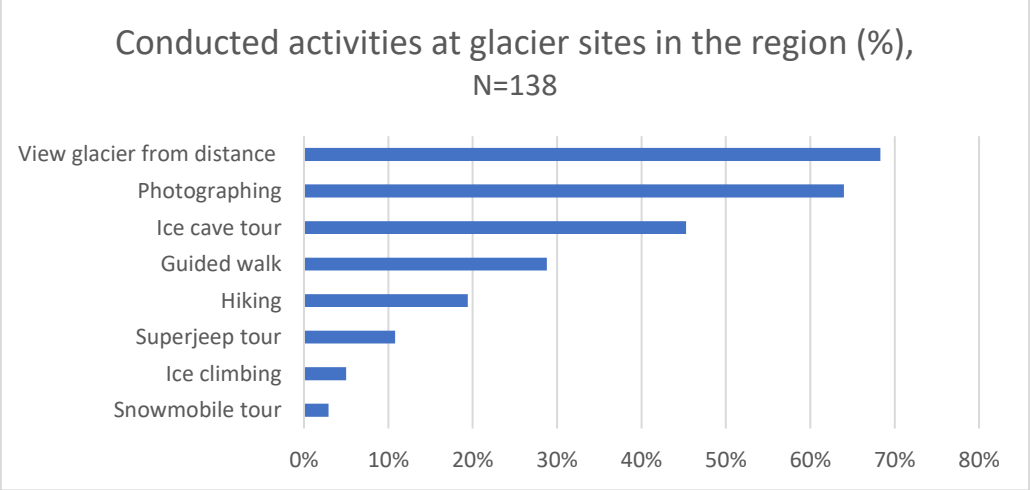

Figure 12: Conducted activities by the respondent at glacier sites in the Vatnajökull region.

3.4 Respondents attitudes towards glacier visits

This section addresses the attitudes respondents have towards glaciers as tourist destination. The paragraph describes the importance of experiencing glaciers to visit Iceland and the Vatnajökull region to visitors, important motivation to visit glacier sites and which aspects of glacier sites influence respondents' experience during their glacier site visit.

3.4.1 The importance of glacier to visit Iceland/Vatnajökull region

Figure 13 show how important glaciers were for respondents to visit Iceland or the Vatnajökull region. The results reveals that for a slight majority (56%, n=77) glacier are important/very important to visit Iceland. However, a substantial part of the respondents (44%, n=62) considers glaciers neutral or not important at all for their visit to Iceland. The figure also shows that more respondents indicate that glacier are important/very important for their visit to the Vatnajökull region (68%, n=94).

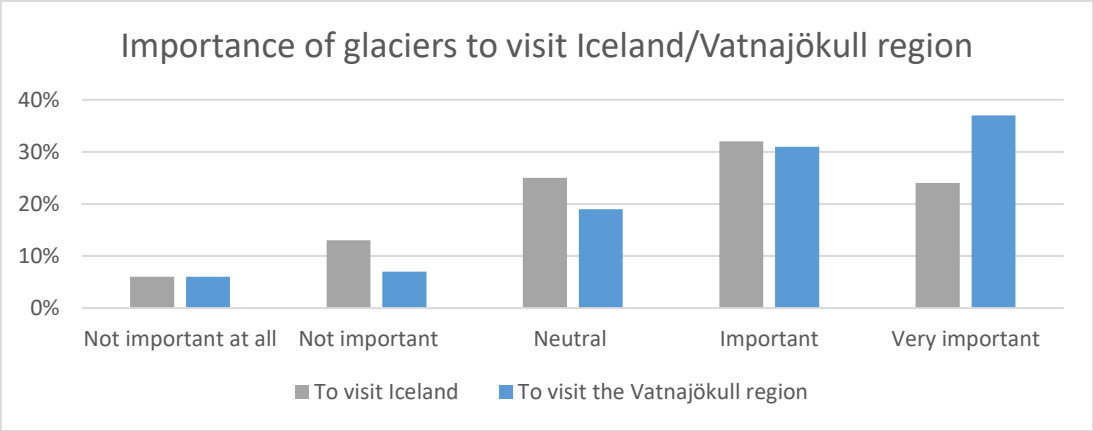

Figure 13: Importance of glaciers for respondents to visit Iceland and the Vatnajökull region.

3.4.2 Motivation to visit a regional glacier site

Respondents were shown a list of 10 possible motivations for visiting a glacier sites and asked to indicate the importance of each one in respect of their own motivation to visit. Importance was measured on a Likert-type scale (1=not important at all; 5=very important) and the mean scores calculated for each item.

The motivation 'Seeing a glacier or ice-cave in real-life' had the highest mean score ($\bar{x}$ = 4,6, σ =0.66) (fig. 14). Almost two third of the respondents (66%, n=92) indicate that this was a very important motivation to visit a glacier site in the region and none of the respondents indicate this motivation as not important or not important at all.

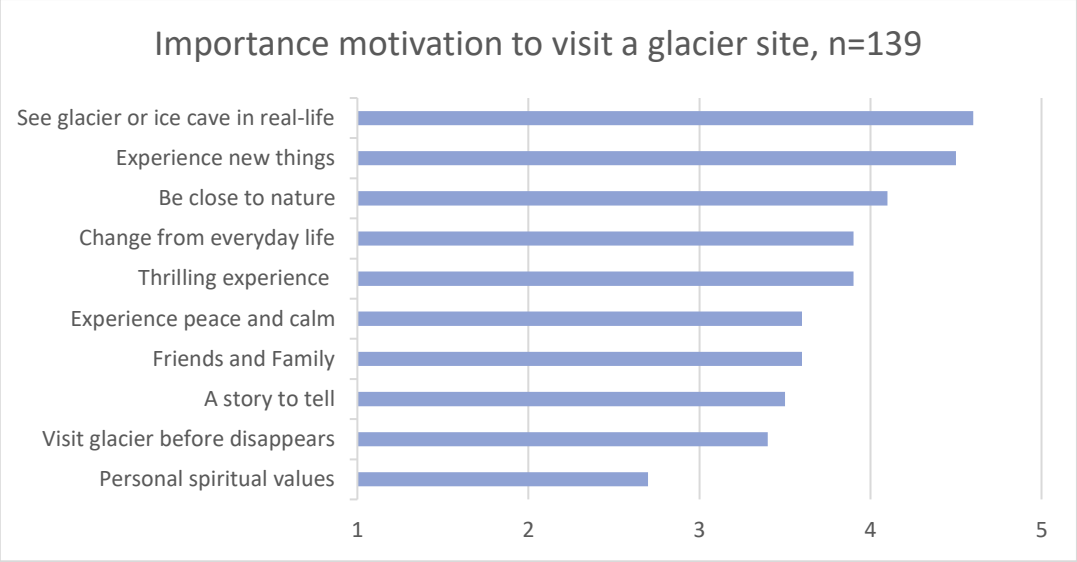

Figure 14: Motivations to visit a glacier site in the Vatnajökull region.

Other motivations to visit a glacier that had a high mean score were 'experience a new thing' ($\bar{x}$ = 4,5) and 'be close to nature'($\bar{x}$ = 4,1), both push factors of respondents that are not directly related to glacier items. Another notable result is the relatively low mean score of the motivation 'visit glacier before it disappears' ($\bar{x}$ = 3,4, σ = 1,35). This contrasts the results of another study concerning motivation factors of glacier tourism in New Zealand (Steward et al., 2016) in which the disappearance of glaciers constitutes one of the most important motivational factors to visit a glacier tourist destination.

3.4.3 Aspects of experience

Respondents were asked to indicate the importance of ten different aspects that could influence their glacier experience: weather conditions, landscape scenery, being in a unique environment, glacier size, proximity to the glacier, see glacier attributes (such as crevasses or blue ice), learning about glaciers, seeing real-life impacts of climate change, being in an untouched environment, and being in a challenging environment. A 5-point Likert-type scale was used (1=not important at all; 5=very important) to measure the importance of theses aspects for the respondents. The aspects were selected on basis of multiple interview sessions with glacier tour operators and tour observations (Welling, 2015) and other glacier visitor survey studies in New Zealand (Espiner & Wilson, 2013;Wilson et al., 2014).

The aspects 'unique environment' ($\bar{x}$ = 4,4, σ =0.88) and 'landscape scenery ($\bar{x}$ = 4,4, σ =0.79) both had the highest mean score of 4.4, followed by the aspect 'being in a untouched environment ($\bar{x}$ = 4,2) and 'seeing glacier features' ($\bar{x}$ = 4,1). The aspects 'seeing real-life

impacts of climate change' and 'the size of the glacier' had the lowest mean score (respectively $\bar{x}$ = 3,1 and $\bar{x}$ = 3,4).

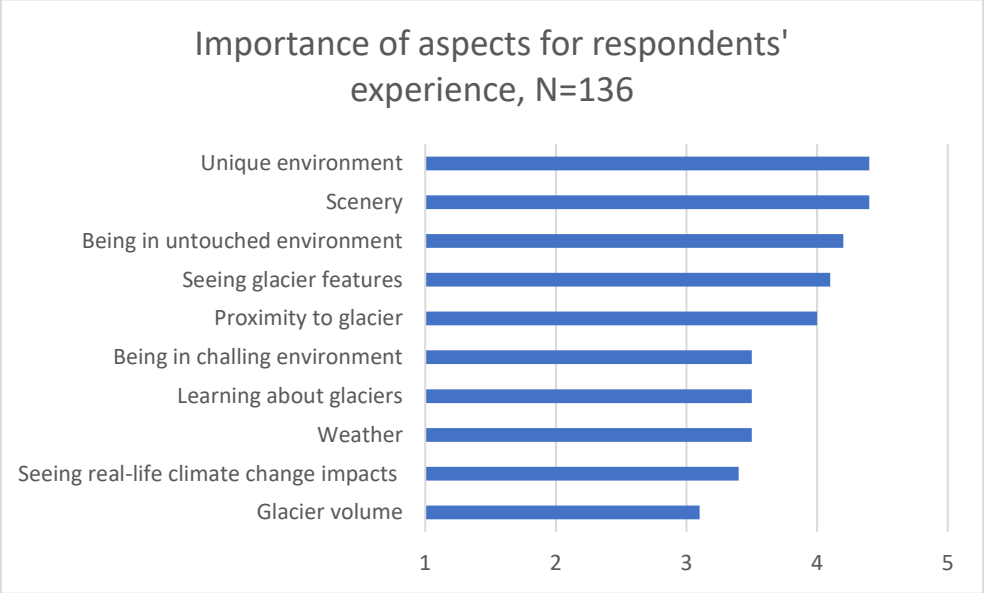

Figure 15: The importance of different aspects for respondents' experience at glacier sites.

3.5 Perception of climate change and potential impacts

The last part of the survey addressed the attitudes of the respondents towards climate change and its potential impacts in the near future. Questions were asked concerning the existence, causes and level of concern about climate change. These questions were the same as in the visitor survey from the research of Wilson et al. (2014) concerning glacier tourists' perception on climate change in New Zealand. Furthermore, this part of the questionnaire contained different scenario based hypothetical but plausible questions concerning potential implications for visitation to glacier sites in the near future (2-4 years). These questions were based on findings from a recent study that examined climate change induced impacts on and adaptive responses of glacier tour operators in the Vatnajökull region (Welling, 2015).

3.5.1 Perceptions towards climate change

The first statement that the respondents were asked to (dis)agree with was 'Climate change is happening right now'. A large majority of the respondents agreed (29%, n=40) or totally agreed (62%, n=86) with the statement while only 3 respondents disagreed (fig. 16).

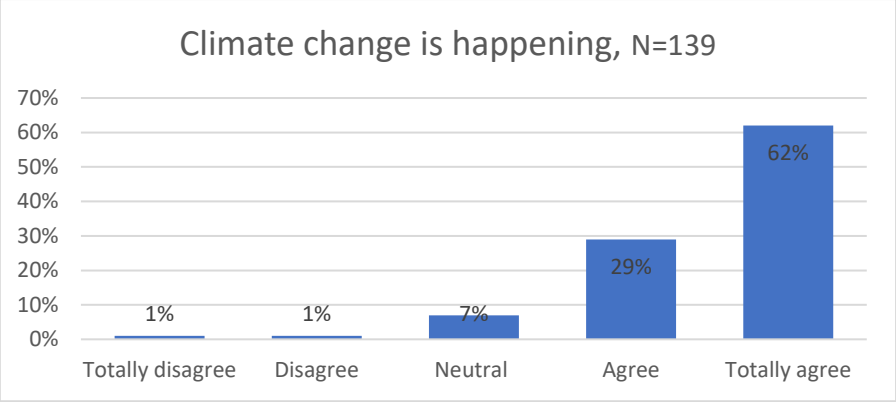

Figure 16: Percentage of respondents' responses on statement 'climate change is happening'.

The second statement related to the source of climate change:' Climate change is the result of human activity' (fig. 17). On this statement more than three quarters of the respondents agreed or agreed totally (respectively 26% and 54%). Not more than 7% (n=9) disagreed or disagreed totally with this statement.

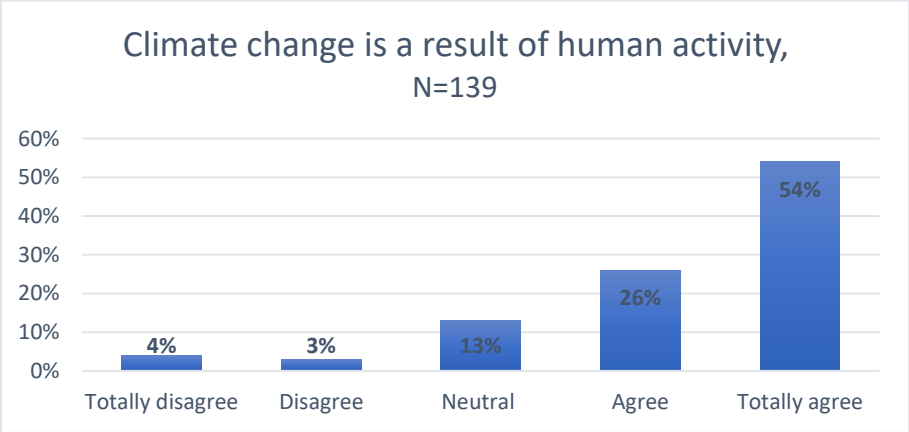

Figure 17: Percentage of respondents' responses on statement 'Climate change is a result of human activity'.

When the respondents were asked if they (dis)agreed with the statement 'Climate change is a result of natural causes' most of them choose the neutral option (34%, n=47) followed by agree (22%, n=30) and disagree (20%, n=28) (fig. 18). These results indicate that there is a considerable disagreement between the respondents concerning this statement but it also indicates that a relatively large part of the respondents are uncertain about the main cause of climate change.

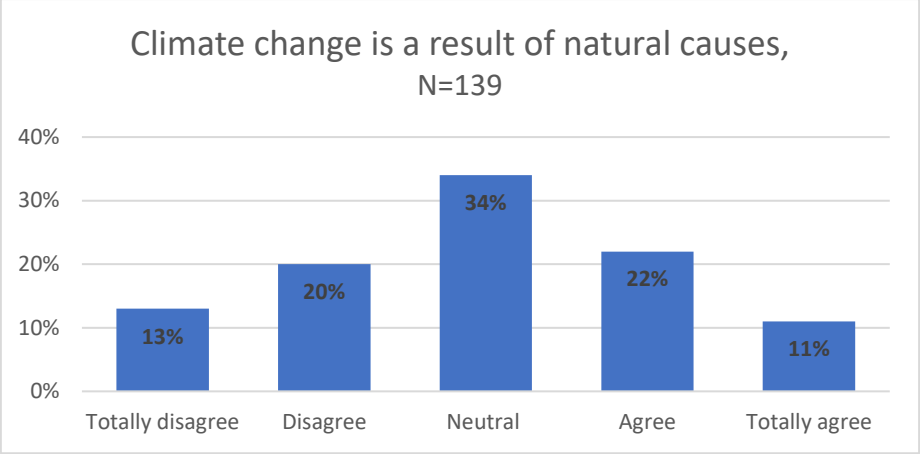

Figure 16: Percentage of respondents' responses on statement 'Climate change is a result of natural causes'.

The last statement concerned the level of concern about climate change: 'I am concerned about climate change' (fig. 19). More than a third of the respondents agreed totally with this a statement (37%, n=52) and another third agreed with this statement (35%, n=48). A minority of the respondents disagreed or disagreed totally with the statement (9%, n=12).

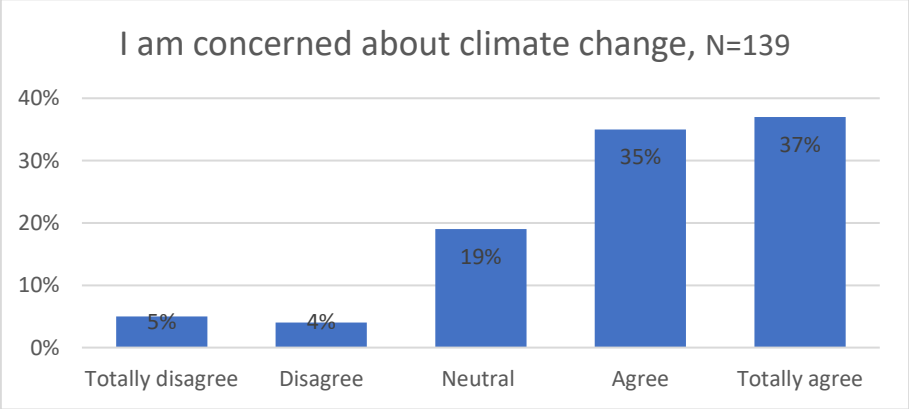

Figure 19: Percentage of respondents' responses on statement 'I am concerned about climate change'.

3.5.2 Potential future glacier tourist behavior

The respondents were asked to respond to eight different plausible future scenario's that we described in short statements concerning the accessibility, safety and scenery of sites under future climate conditions and potential adaptation measures from tourism sector to deal with climate change induced impacts on glacier sites. Respondents were asked about their willingness to visit a glacier site under certain future conditions. Their willingness was measured on a Likert-type scale (1=not willing at all; 5=very willing) and the mean scores calculated for each item.

The first statement relates to future changes in the accessibility to the glacier (fig. 20). Respondents were asked how willing they would be to visit the site if they could not come within 150 metres from the glacier margin. The results show that almost a quarter (23%, n=32) were not willing (at all) to visit that glacier site while 43% (n=59) of the respondents would still be willing to visit the glacier site.

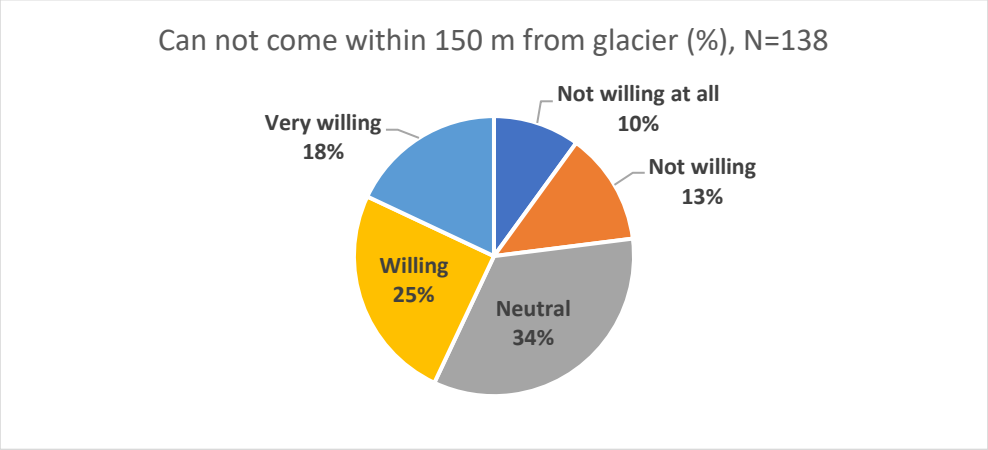

Figure 20: Respondents' willingness (%) to visit a glacier when they 'cannot come within 150 m from glacier'.

Respondents were also asked about their willingness to visit a glacier site if they could not stand on the glacier (fig. 21). The responses were almost the same as on the previous statement with 24% (n=33) of respondents indicating that they were not willing (at all) to visit the glacier site and 45% (n=61) stated that they were (very) willing to visit the glacier site.

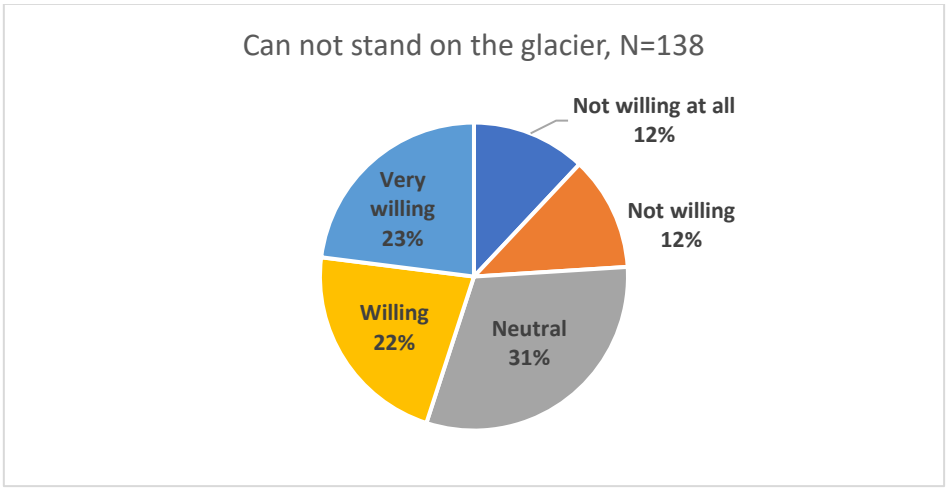

Figure 21: Respondents' willingness (%) to visit a glacier when they 'cannot stand on the glacier'

Another potential future impact on the accessibility of glacier sites is the extension of the distance between the parking places for a site and the margin of the glacier, resulting in an

increase of walking time for the visitors. Respondents were asked how willing they would be to visit a glacier site if they had to walk 45 minutes to come to the margin of the glacier (fig. 22). A majority (56%, n=77) of the respondents stated that they were (very) willing to visit the site while 22% (n=31) would not be willing (at all) to do this. A neutral stance was chosen by 22% of respondents.

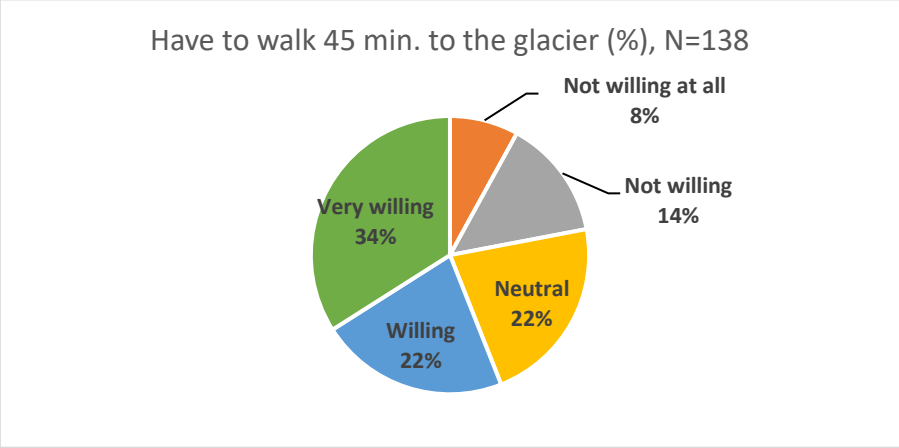

Figure 22: Respondents' willingness (%) to visit a glacier when they 'have to walk 45 min. to get to the glacier'

However, when a similar statement was given in the following question but with a walking time twice as long (1,5 hrs.,) the ration of respondents that were not willing (at all) to visit increased with 33% or from 31 respondents (22%) to 46 respondents (34%) (fig. 23). The number of respondents that were (very) willing to visit a glacier site where they had to walk 1,5 hrs. to reach the glaciers was 56 respondents (40%), which is a decrease of 37% relative to the respondents that were (very) willing to visit a glacier site when they had to walk 45 minutes to get to the margin of the glacier.

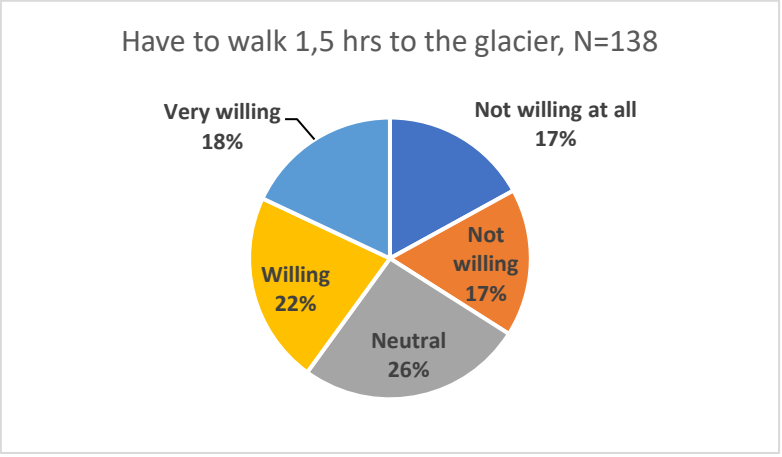

Figure 23: Respondents' willingness (%) to visit a glacier when they 'have to walk 1,5 hrs. to get to the glacier.'

Another potential climate induced impact on glacier sites is the degradation of scenery because of the melt-out of englacial debris and increased rock fall from the surrounding valley slopes that have been recently exposed (Purdie et al., 2015). Respondents were asked how willing they would be to visit a glacier site when this was covered largely with sand and debris (fig. 24). A majority of the respondents (55%, n=76) stated that they were not willing (at all) to visit such a glacier. Just a small part of the respondents (18%, n=26) was (very) willing to visit such a glacier site.

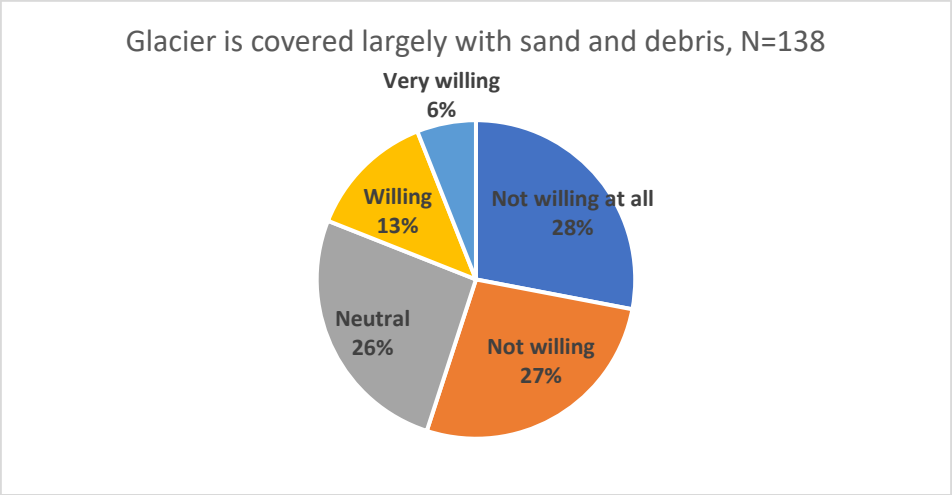

Figure 24: Respondents' willingness (%) to visit a glacier when the glacier is largely covered.

In order to cope with impacts of climate change on glacier sites, current tour operators already adapt their business operations to the changing conditions of the glacial environment in which they operate. One of most implemented adaptation measures to overcome accessibility problems is the use of transport vehicles such as super-jeeps or trucks. Future projections of the glacier recession indicate that an increase of the use of these transport vehicles will be necessary in the near future. Respondents were asked to indicate if they would be willing to visit a glacier site when they had to take a commercial truck or jeep to be able to come to the glacier. The results in figure 25 show that a considerable amount of respondents (43%, n=59) was not willing (at all) to visit a glacier site under these conditions. Only a third (32%, n=44) of the respondents was (very) willing to visit a glacier site when they had to take a commercial jeep/truck to come the margin of the glacier.

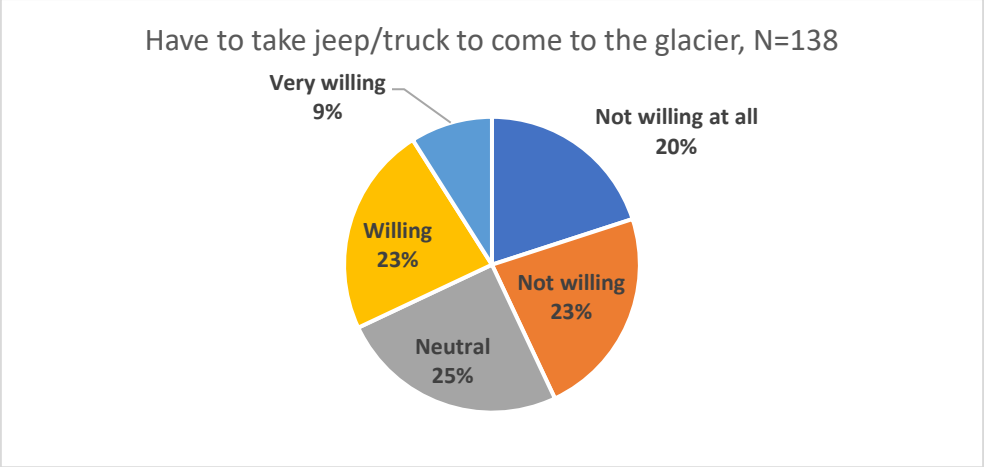

Figure 25: Respondents' willingness (%) to visit a glacier when they 'have to take commercial jeep/truck to get to the glacier'.

Another effect of the continuous recession of glaciers in the Vatnajökull region is the emergence and extension of sub-glacier rivers and lakes (Magnússon et al., 2012). The enlargement of glacier lakes and the emergence of new glacier rivers can be a serious obstacle to access the glacier margin in the near future. Respondents were asked how willing they would be to visit a glacier site if they had to cross a glacier lake with a commercial boat to be able to come to the margin of the glacier. Figure 26 shows that a third of respondents (32%, n=44) were not willing (at all) to visit a glacier site when they had to cross a lake with a commercial boat. Another third of the respondents (32%, n=44) choose a neutral position, while 36% (n=50) of the respondents stated that they would be (very) willing to visit such a glacier site.

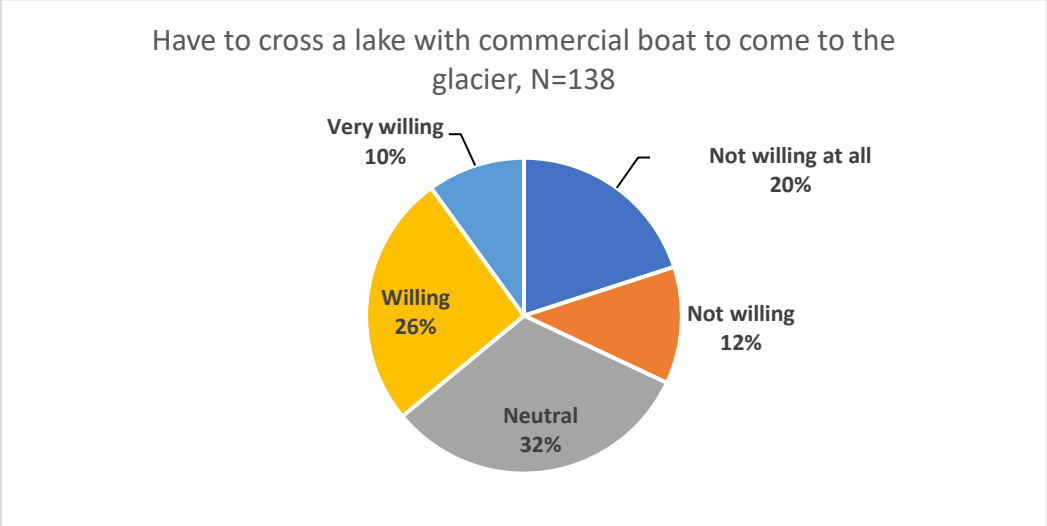

Figure 26: Respondents' willingness (%) to visit a glacier when they 'have to cross a lake with commercial boat to come to the glacier.

The last hypothetical statement on future conditions of glacier sites concerned the issue of safety of the visitors during their passage to the glacier. A new and often unstable moraine landscape emerges due to the fast retreat of glaciers. Rock-falls and landslides are common hazards in those areas that can endanger unexperienced visitors. An adaptation measure to cope with these impacts on visitors is to purchase professional guidance to the glacier margin, provided by a tour company or local guides. Respondents were asked to indicate if they would visit a glacier site if they had to take a guided tour for a safe passage to the margin of the glacier (fig. 27). A majority of the respondents (60%, n=69) stated that they would be (very) willing to visit a glacier site under these conditions while 22% (n=31) of the respondents took a neutral position. A considerable minority (28%, n=38) was not willing (at all) to visit a glacier site when they had to take a guided tour.

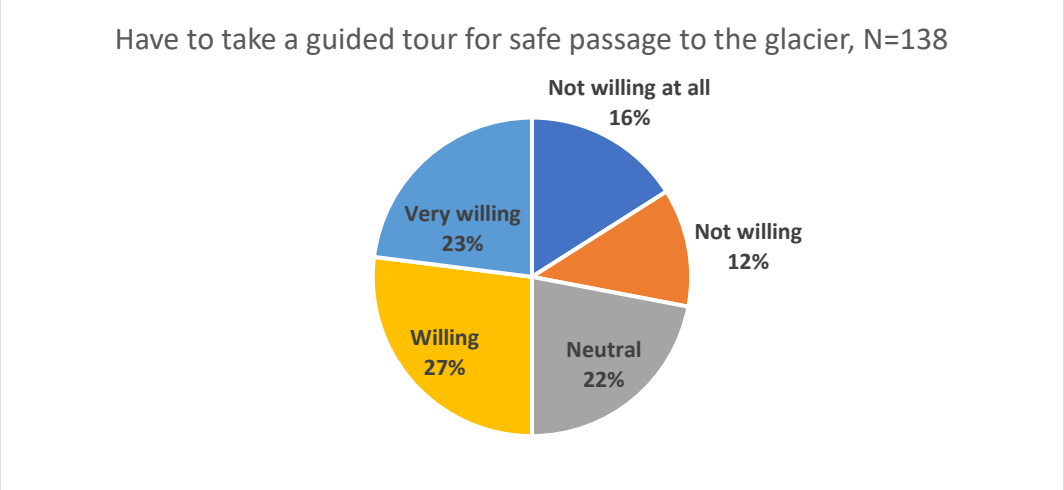

Figure 25: Respondents' willingness (%) to visit a glacier when they 'have to take a guided tour for safe passage to the glacier.

4. Comparison between winter and summer visitors

This section compares the results of the winter visitor survey with a summer survey (n=435) that was carried out in August 2015, in the vicinity of Skaftafell visitor center. The questionnaire of the summer visitor study is an exact copy of the questionnaire that was handed out for the winter study, except for the questions 'Interested activities in the region' (question 2) and 'conducted activities at glacier sites' (question 8). The questionnaire of the winter study included the response options Ice-cave tours and Northern Lights tours, while response options glacier kayak tours, scenic flights and camping were excluded (and vice-versa regarding the questionnaire of the summer study). Furthermore, question 6 in the winter questionnaire (important motives to visit a glacier site) differs from the summer version regarding an addition to one of the response options, namely 'See a glacier *or ice cave* in real-life' instead of 'See a glacier in real-life'.

T-tests and Pearson Chi-square tests were conducted to measure the significant differences between winter and summer visitors. Table 1 summarizes the visitor attributes that differ between the respondents participating in the winter and summer surveys on a 1% significant level from summer visitors.

Winter visitors are on average almost 4 years older than summer visitors. This difference is most significant with the age group 41 and older which was 30,9% of the total winter visitors´ sample while this age group was only 22,3% of total summer sample. The winter survey was conducted outside of a holiday season while the summer survey was not. A plausible explanation is that this can lead to an 'over-representation' of visitors in the higher age segments.

Another significant difference between winter and summer visitors is the average time visitors spent at glacier sites in the region. During the winter this is almost 2 hrs. less that during the summer (4,5 hrs. during winter and 6,3 hrs. during summer). Seasonal climate conditions at the sites and the shorter period that winter visitors stay in the region can possibly explain this significant difference. The percentage of visitors that stay less than 2 days in the region is during the winter significantly higher (38%) than during the summer (22,3%).

Table 1: Significant differences between summer and winter visitors of Vatnajökull region on basis of T-tests and Chi-square tests on a 1% significant level.

Question subjects		**Summer**	**Winter**
Age	Average	33,1	37,0
	41 years and older	22,3%	30,9%
Time spent at glacier site(s) during trip	Average	6,3 hrs	4,5 hrs
Stay in the region	> 2 days	21%	38%
Activities interested in to conduct during trip	Hiking	83,1%	34,0%
	Snowmobiling[#]	17,2%	34,5%
	Mountaineering[#]	21,6%	12,9%
	Swimming/bath	37,5%	20,9%
Visited glacier sites	Svínafellsjökull	37,7%	25,9%
	Fjallsárlon	14,9%	4,3%
	Breiðamerkujökull	7,4%	17,3%
Motives to visited glacier site(s)*	To see a glacier in real-life	4,2	4,6
	To be close to nature	4,4	4,1

[#] Difference between summer and winter on 0.05 significance level; * Measured on 5-Likert scale (1=not important at all; 5=very important)

Winter visitors differ also from summer visitors regarding the activities they are interested in conducting in the region. Visitors of southeast Iceland are significant less interested in the activities hiking, mountaineering and swimming/bathing during the winter than in the summer, which is not surprising in light of harsh weather conditions during the winter in Iceland. More notable is the significant difference between summer and winter visitors regarding their interest in snowmobiling, respectively 34,5% of winter visitor were interested in this activity compared to 17,2% of the summer visitors. However, more remarkable, with regard to visitors' interest in activities, is the absence of a significant difference between summer and winter visitors regarding the activities fishing, biking and glacier hiking tours.

Winter and summer visitors also differ with regard to the glacier sites they visited during their trip to southeast Iceland. The percentage of winter tourists that visited the glacier site Breiðamerkurjökull is significantly higher that the percentage of summer visitors that do so. The popularity of guided glacier cave tours at Breiðamerkurjökull, which are only provided during the winter, is likely to be the main reason for this difference. Conversely, the glacier sites Svínafellsjökull and Fjallsárlón are visited by a significantly lower percentage of winter visitors than summer visitors (see table 1). The relatively more difficult access to these sites in the winter time compared to the summer probably explains this difference.

Finally, there are significant differences between summer and winter visitors with regard to their motivation to visit regional glacier sites. The motivation *to see a glacier or ice-cave in real-life* had a significantly higher average score (4,6) among the winter visitors than among the summer visitors (4,2) while the motivation *to be close to nature* had, on average, a significantly higher score among summer visitors (4,4) than among winter visitors (4,1). Both differences underline the premise that the most important driver for glacier visitation by winter visitors is to experience a glacier's unique natural attributes (ice caves), while summer visitors are less focused on a single glacial attribute and are more motivated by the general scenery or the untouched natural environment.

5. Conclusion

In the last decade, tourism has increased considerably during the winter season in rural areas such as the Vatnajökull region. During the winter period, glacier sites in the Vatnajökull region are one of its most important tourist destinations, attracting tens of thousands of visitors. This study used a quantitative research approach by means of a visitor survey (n=139) to investigate the characteristics of winter glacier tourists: their motives, behaviours and experiences of glacier sites in the Vatnajökull region, and it also examines the implications of climate change induced environmental changes for future glacier visitation in the region.

This research has shown that a majority of the visitors are young adults (24-35) or 50+ adults living in West European countries or the USA. Most of them are travelling as a couple or in small groups, staying just 1-2 days in the region. The large majority of these visitors is interested in site-seeing in general or experiencing specific natural phenomena such as ice caves or Northern Lights.

Most of the visitors organized their trip by themselves, had never visited a glacier site before or only a few times, and visited on average 2 glacier sites during their journey in southeast Iceland, in most cases Jökulsárlón and Skaftafellsjökull. A majority of the respondents spent approximately a total of 4 hours on all visited glacier sites together, where most of them conducted the activities: viewing a glacier from a distance, photographing or taking an ice-cave tour.

Glacier sites are an important motivational element for visiting Vatnajökull region for a majority of the respondents, while seeing a glacier or ice-cave in real-life and experience something new are the most important motivations to visit regional glacier sites. The unique environment and scenery, together with being in an untouched environment, are the most important aspects for the respondents' experience of glacier sites in the region. These last results correspond with the findings of the qualitative study on winter tourism in Vatnajökull region. In that study, the respondents indicated that their experience of the Vatnajökull region was determined by factors such as their feeling of experiencing wonder, naturalness and uniqueness.

This study has shown as well that climate change induced changes to the glacial environment can have considerable effects on the visitation behavior of tourists. A considerable part of the

respondents proved to be unwilling to visit a glacier when the accessibility, scenery and safety was degraded or when the sites were only accessible by motorized transport or commercial guidance.

However, it is important to realize these results have to be treated with caution because the study only researched multiple effects of climate change on tourism demand. There are several factors that may determine why a tourist will visit a destination or not. Furthermore, what respondents state they will do in the near future does not guarantee that they actually will do this in same way when the time comes.

Finally, the research compared the results of the winter survey with the results from a similar visitor's survey conducted in the summer of 2015, which used an almost identical questionnaire. The comparison reveals significant differences between the respondents of the winter and summer surveys, with regard to visitors' age, length of stay in the region, activity interests, glacier visitation duration, visited sites and visitation motivations. The more benign climatic conditions during the summer and the opportunity to visit glacier caves in the winter are important factors that can explain differences between the visitors that travel in the Vatnajökull region during the summer and those that do so in the winter.

This quantitative research attempts to gain insight into various characteristics of tourists that visit the Vatnajökull region during the winter season. Together with the results of the qualitative research, this study creates a better picture of the diversity among winter tourists and contributes to a better basic understanding of winter tourists' behavior, preferences and attitudes. The results can be a valuable contribution to future policy, planning and marketing of winter tourism in the Vatnajökull region.

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APPENDIX 1: Questionnaire for winter tourists

Form nr_____

Date _____

Glaciers and Tourism

Dear visitor, the University of Iceland currently seeks insight into the development of glacier tourism and the challenges it faces in Southeast Iceland. Such information is valuable both for a better understanding of tourist needs and in order to improve tourist services. All information will be handled confidentially and are anonymous. The questionnaire should take about *8* minutes to complete. Your participation is very valuable. Thank you!

1. **How many days have you been staying in the Southeast Iceland?** ___ **days** (if less than 1 day write 0)

2. **What kind of activities are you interested in participating in this area?** (*mark all relevant activities)*

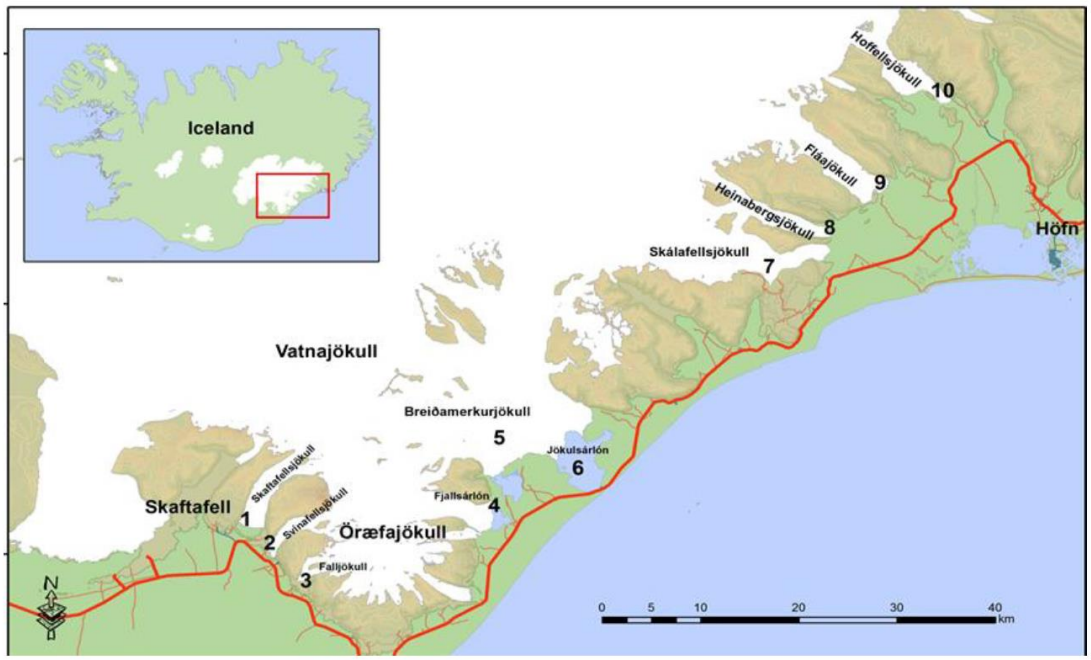
☐1 Sight-seeing	☐6 Glacier tour	☐10 Northern light tour
☐2 Ice-cave visit	☐7 Horse riding	☐11 Mountaineering
☐3 Biking	☐8 Jeep tour	☐12 Swimming/ bathing
☐4 Fishing	☐8 Hiking	☐13 Museum visit
☐5 Photographing	☐9 Snowmobiling	☐14 Boat tour

☐0 Other _____

3. **How many times have you visited a glacier in your life?** __ **time(s)** (if this was your first write 0)

4. **How did you organize your trip to the glacier(s) you are visiting in Southeast Iceland?** (*mark all relevant items)*

☐1 By myself	☐5 By tourist information centre
☐2 By travel agency in home country	☐6 By my hotel/guesthouse
☐3 By travel agency in Iceland	☐7 Do not know
☐4 By local tour company (such as Mountain guides /Glacier Guides)	☐0 Other, please describe: _____



5. Which glaciers or glacier sites according to the map above did you visit in Southeast Iceland?

☐1 Skaftafellsjökull	☐5 Breiðamerkurjökull	☐9 Fláajökull
☐2 Svínafellsjökull	☐6 Jökulsárlón	☐10 Hoffellsjökull
☐3 Falljökull	☐7 Skálafellsjökull	☐11 Did not visit a glacier
☐4 Fjallsárlón	☐8 Heinabergsjökull	☐12 Do not know

☐0 Other _____

6. How important were the following motivations to you to visit a glacier site in Southeast Iceland?

		Not important at all				*Very important*
a.	Do something with friends and family	☐1	☐2	☐3	☐4	☐5
b.	Have a thrilling experience	☐1	☐2	☐3	☐4	☐5
c.	To have a story to tell	☐1	☐2	☐3	☐4	☐5
d.	Experience new and different things	☐1	☐2	☐3	☐4	☐5
e.	See a glacier or ice cave in real-life	☐1	☐2	☐3	☐4	☐5
f.	Be close to nature	☐1	☐2	☐3	☐4	☐5
g.	Develop personal, spiritual values	☐1	☐2	☐3	☐4	☐5
h.	Visit a glacier before it disappears	☐1	☐2	☐3	☐4	☐5
i.	Have a change from everyday life	☐1	☐2	☐3	☐4	☐5
j.	Experience peace and calm	☐1	☐2	☐3	☐4	☐5

7. How much time did you spend at glacier sites in Southeast Iceland, all together? _____Hour(s)

8. What activities did you do at the glacier sites you visited in Southeast Iceland? (*mark all relevant activities)*

- ☐1 Guided walk on the glacier
- ☐2 Viewed the glacier from a short distance
- ☐3 Snow mobile tour
- ☐4 Super jeep tour
- ☐5 Photographing
- ☐6 Ice-cave tour
- ☐7 Ice climbing
- ☐8 Northern lights tour
- ☐9 Hiking
- ☐0 Other, please describe:

_____

9. How important was visiting a glacier for your decision to visit Iceland?

Not at all important				*Very important*
☐1	☐2	☐3	☐4	☐5

10. How important was visiting a glacier for your decision to visit Southeast Iceland?

Not important at all				*Very important*
☐1	☐2	☐3	☐4	☐5

11. How important were the following aspects for your experience during your last visit to a glacier site in Southeast Iceland?

		Not important at all				*Very important*
a.	The weather conditions	☐1	☐2	☐3	☐4	☐5
b.	The scenery of the glacial landscape	☐1	☐2	☐3	☐4	☐5
c.	Being in an unique environment	☐1	☐2	☐3	☐4	☐5
d.	The size of the glacier	☐1	☐2	☐3	☐4	☐5
e.	To come so close to a glacier	☐1	☐2	☐3	☐4	☐5
f.	Seeing glacier attributes such as crevasses, blue ice or calving ice-block	☐1	☐2	☐3	☐4	☐5
g.	Learning something about glaciers	☐1	☐2	☐3	☐4	☐5
h.	Seeing real-life impacts of climate change	☐1	☐2	☐3	☐4	☐5
i.	Being in an untouched natural environment	☐1	☐2	☐3	☐4	☐5
j.	Being in a challenging environment	☐1	☐2	☐3	☐4	☐5

12. To what extent do you agree with the following statements?

		Totally disagree				*Totally agree*
a.	Climate change is happening right now	☐1	☐2	☐3	☐4	☐5
b.	Climate change is the result of human activity	☐1	☐2	☐3	☐4	☐5
c.	Climate change is the result of natural causes	☐1	☐2	☐3	☐4	☐5
d.	I am very concerned about climate change	☐1	☐2	☐3	☐4	☐5

13. How willing are you to visit a glacier site when it had the following aspects?

		Not willing at all				*Very willing*
a.	You cannot come within 150 meter of the glacier	☐1	☐2	☐3	☐4	☐5
b.	You cannot touch or stand on the glacier	☐1	☐2	☐3	☐4	☐5
c.	The amount of walking time to come to the edge of the glacier is 45 minutes	☐1	☐2	☐3	☐4	☐5
d.	The amount of walking time to come to the edge of the glacier is 1,5 hours	☐1	☐2	☐3	☐4	☐5
e.	The glacier is almost entirely covered with sand, mud and stones	☐1	☐2	☐3	☐4	☐5
f.	It is only possible to come to the edge of the glacier by using commercial motorized transport (jeeps/truck)	☐1	☐2	☐3	☐4	☐5
g.	It is only possible to come to the edge of the glacier by crossing a glacier lake with a commercial boat	☐1	☐2	☐3	☐4	☐5
h.	It is necessary to take a guided tour for a safe passage to and on the glacier	☐1	☐2	☐3	☐4	☐5

14. Who are you traveling with? ☐1 Individual ☐2 Couple ☐3 Family ☐4 Small group (<10) ☐5 Big group (>10) ☐0 Other

15. What is your gender? ☐1 Female ☐2 Male

16. What is your year of birth? _____

17. In what country do you live? _____

Thank you for your participation!