



Skýrsla nr. C18:08
Áhrif friðlýstra svæða á framleiðslu og atvinnu í
næsta umhverfi
desember 2018

HAGFRÆÐISTOFNUN



HÁSKÓLI ÍSLANDS

Hagfræðistofnun Háskóla Íslands

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Formáli

Á vormánuðum 2018 óskaði umhverfis- og auðlindaráðuneytið eftir því að Hagfræðistofnun kannaði áhrif friðlýstra svæða á tekjur og atvinnu í nánasta umhverfi þeirra. Jukka Siltanen, umhverfis- og auðlindafræðingur, M.Sc., vann að athuguninni og er greinargerð hans á ensku birt í viðauka þessarar skýrslu. Skýrslan sem fer hér á eftir er byggð á greinargerðinni. Í skýrslunni er sjónum einkum beint að störfum í nánasta umhverfi svæðanna, en í greinargerð Jukka má sjá rækilegri greiningu á þýðingu þeirra í hagkerfinu.

Sérstakar þakkir eru færðar Rögnum Ólafssyni og Gyðu Þórhallsdóttur, sem létu í té tölur um ferðamenn, og starfsmönnum þjóðgarða sem ræddu við ferðamenn.

Skýrslan var rýnd af tveim óháðum sérfræðingum á sviðinu.

Reykjavík, í desember 2018,
Sigurður Jóhannesson

Ofgnótt af störfum – en ekki alls staðar

Þjónusta við ferðamenn er orðin stærsta útflutningsgreinin og náttúran virðist vera aðalaðdráttaraflíð. Erlendir ferðamenn nefna langflestir náttúru landsins sem helstu ástæðu Íslandsferðar (92,4%).¹ Eftir 2010 fjölgaði ferðum útlandinga hingað hratt. Straumurinn kom á hagstæðum tíma. Hann réði mestu um að efnahagur landsins náði sér fljótt úr djúpri lægð.² En á seinni árum hefur sú spurning orðið áleitnari hvort landið þolir alla ferðamennina. Fjöldi þeirra hefur bæði slæm og góð áhrif. Álag á umhverfi og samfélög nærri ferðamannastöðum hefur aukist, en á móti kemur til dæmis að tækifæri skapast til uppbyggingar þar sem byggð stendur höllum fæti.

Skýrslan, sem hér fer á eftir, bregður ljósi á áhrif friðlýstra svæða á atvinnulíf í nánasta umhverfi þeirra. Þetta er ekki greining á kostnaði og ábata, en athugunum af þessum tveim gerðum er oft ruglað saman. Tekjur af ferðamönnum eru ekki hreinn ábati fyrir landsmenn. Á móti tekjunum kemur til dæmis vinna. Sjaldan hefur færri vantað vinnu á Íslandi en nú. Sem stendur eru störfin fremur of mörg en of fá og hagstjórn hlýtur á næstu misserum að miða að því að kæla hagkerfið og fækka störfum. Þar við bætist að talning starfa er frumstæð greiningaraðferð. Störf eru miseftirsótt. Það hefur til dæmis lengi verið talið stóriðju til tekna að þar bjóðast vel launuð störf sem eru eftirsótt á íslenskum vinnumarkaði. Á hinn bóginn hefur gengið illa að manna störf í veitinga- og gistihúsum með Íslendingum undanfarin ár. Frá 2009 til 2018 bættust nokkru fleiri erlendir starfsmenn við í veitinga- og gistihúsum en íslenskir. Innflytjendur voru 41% starfsmanna í greininni á öðrum ársfjórðungi 2018.³ Að nokkru leyti stafar þetta vafalaust af því að þarna hefur starfsfólki fjölgað mjög hratt undanfarin ár, en einnig kann að vera að mörg störf í veitinga- og gistihúsum freisti Íslendinga ekki nægilega miða við þau kjör sem eru í boði. Miklu betur hefur tekist að manna störf í flugi með íslensku starfsfólki.⁴ Þegar á allt er litið er samt hæpið að reikna það ferðamennsku til tekna um þessar mundir að hún stuðli að fjölgun starfa á Íslandi. En þegar kemur að áhrifum á nánasta umhverfi friðlýstra svæða kann þessu að víkja öðruvísi við. Friðlýst svæði eru um allt land og mörg eru í landshlutum þar sem fólki fækkar. Stjórnvöld hafa lengi reynt að treysta byggð á fámönnum svæðum⁵ og mikill vilji er fyrir því, bæði hjá ráðamönnum og almenningi, að byggð blómstri sem víðast. Þess vegna er fróðlegt að skoða áhrif friðlýstra svæða á atvinnulíf í næsta nágrenni þeirra. Í framhaldinu væri til dæmis gagn að því að skoða tekjur bænda af ferðaþjónustu. Sauðfjárrækt veitir óvísu fulla atvinnu og eftir því sem tækni fleygir fram fækkar verkum á sauðfjárbúum. Af tekjum ábúðarbænda á ríkisjörðum, sem flestir rækta sauðfé, var aðeins þriðjungur frá búinu sjálfu árið 2015.⁶ Þjónusta við umferð um friðlýst svæði gæti átt þátt í að fylla skarðið sem verður þegar hefðbundnari bústörfum fækkar.

¹ Ferðamálastofa, 2018, Tourism in Iceland in Figures

² Sjá til dæmis Hagfræðistofnun og Byggingastofnun (2017). Hagvöxtur landshluta, bls. 4, sjá https://www.byggingastofnun.is/static/files/Hagvextur/hagvextur_landshluta_2008-2015.pdf

³ Hagstofa.is, Fjöldi starfandi í atvinnugreinum samkvæmt skrá eftir árum, kyni, aldri og bakgrunni 2008-2018. Rúmlega 5.600 innflytjendur bættust í hóp starfsmanna og tæplega 4.900 með íslenskan bakgrunn. Árið 2018 voru yfir 90% starfsmanna í framleiðslu málma með íslenskan bakgrunn.

⁴ Hagstofa.is, Fjöldi starfandi í atvinnugreinum samkvæmt skrá eftir árum, kyni, aldri og bakgrunni 2008-2018. Um 90% af ríflega 2.600 starfsmönnum sem bæst hafa við í flutningum með flugi frá 2008 eru með íslenskan bakgrunn.

⁵ Sjá til dæmis lög um Byggingastofnun, 1999, nr. 106.

⁶ Hagfræðistofnun, 2017, Ábúðarjarðir í ríkiseigu, bls. 24.

Í skýrslu Jukka Siltanens, sem birt er í viðauka, er bæði horft á tengsl friðlýstra svæða við atvinnu og veltu í næsta nágrenni og á landinu öllu. Athugunin lýsir umfangi starfseminnar, en fræðimenn vara við því að slík greining sé notuð til þess að meta orsakarsamhengi.⁷ Störf sem tengjast friðlýstum svæðum ryðja burtu öðrum störfum, en erfitt er að segja til um hve mörgum er rutt úr vegi. Líkast til eru ruðningsáhrifin oft lítil í nánasta umhverfi, sérstaklega þar sem byggð er almennt á undanhaldi. Þar kann vinna sem tengist friðlýstum svæðum að vera að miklu leyti viðbót við annað atvinnulíf. Öðru máli gegnir um áhrif svæðanna á fjölda starfa á landinu öllu. Sennilega eru þau lítil. Eins og sjá má í viðauka gegna margir störfum á Íslandi núna, sem tengja má við friðuð svæði. En ef þeir missa vinnuna býðst flestum sennilega annað starf einhvers staðar á landinu – sem ekki tengist friðuðum svæðum.

Þetta má taka þannig saman:

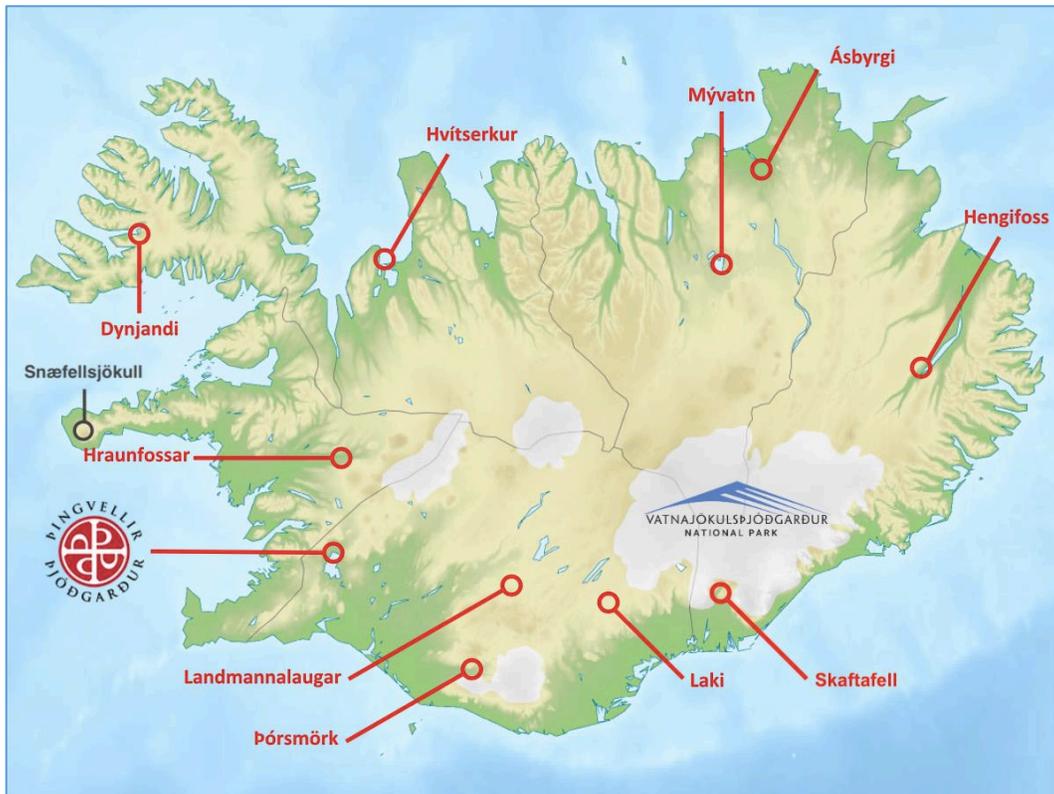
- 1) Margir vilja efla byggð á landsvæðum sem standa höllum fæti, en á hinn bóginn er lítil þörf á fleiri störfum á öllu landinu um þessar mundir.
- 2) Greiningin fer sennilega nærri um áhrif friðaðra svæða á atvinnu í nánasta umhverfi, sérstaklega þar sem byggð stendur höllum fæti, en hún segir miklu minna um áhrif svæðanna á efnahagsumsvif á landinu öllu.

Þess vegna verður höfuðathyglin hér á eftir á tengslum friðaðra svæða og starfa í næsta nágrenni, en um annað er vísað í umfjöllun Jukka Siltanens í viðauka.

Líkanið, sem nýtt er til þess að meta áhrif friðlýstra svæða á atvinnu og tekjur í nágrenninu, er nefnt MGM2-líkan (e. Money Generation Model). Það er ættað frá Bandaríkjunum og er mikið notað þar, en það hefur einnig til dæmis verið nýtt til þess að leggja mat á áhrif finnskra þjóðgarða á atvinnulíf í nánasta umhverfi þeirra.⁸ Í líkaninu eru margfölduð saman útgjöld hvers ferðamanns, fjöldi þeirra á hverjum stað og sérstakur margfaldari. Útkoman sýnir mat á áhrifum af útgjöldum ferðamanna á framleiðslu og atvinnu í næsta nágrenni staðanna sem nefndir eru á mynd 1. Nágrenni er hér talið ná 50 km í burtu.

⁷ Sjá til dæmis Carl Christ (1955). A Review of input-Output analysis í Input-Output Analysis: An Appraisal. Útg. Princeton University Press og Milton Friedman, (1955), Comment við grein Christs.

⁸ Sjá til dæmis Thomas, C.C. & Koontz, <L. (2015). United States Case Study. Presentation at International Workshop on Economic Impacts of Tourism in Protected Areas, 21-25 September 2015 at the UNESCO-Wadden Sea World Heritage Visitor Centre in Wilhelmshaven, Germany. National Park Service, U.S. Department of the Interior - og umfjöllun í kafla 4.3 í viðauka.



MYND 1. SVÆÐI SEM SKOÐUÐ ERU. Í VIÐAUKA 9 VIÐ GREINARGERÐ JUKKA SILTANENS MÁ SJÁ KORT AF NÁNASTA UMHVERFI STAÐANNA, SEM SVARENDUR SÁU.

Ekki er víst að allir svarendur geri sér nákvæmlega grein fyrir því hvað 50 km ná langt, en svarendum var sýnt kort af nágrenninu og má vera að margir hafi haft það í huga. Kortin má sjá í viðauka 9 í greinargerð Jukka Siltanens. Engu að síður er ólíklegt að allir hafi landafræðina á hreinu. Sérstaklega er óvíst að útlendingar séu alltaf vissir um hvaða staðir eru í „næsta nágrenni“. Þá vafðist það fyrir sumum svarendum að gera grein fyrir útgjöldum í næsta nágrenni og annars staðar á landinu – hvorum fyrir sig. Það veldur líka ruglingi að peningar, sem eytt er á svæðinu sem er til umræðu, renna stundum til fyrirtækja úr öðrum landshlutum. Fyrirtæki sem selur jöklaferðir í Skaftafelli getur til dæmis verið með aðalstöðvar í Reykjavík. Ef starfsfólkið er þaðan og það staldrar stutt við í Skaftafelli, þegar ferð á jökulinn er frátalin, hafa ferðirnar aðallega áhrif á efnahagslíf í höfuðborginni.⁹

Rætt við ferðamenn á 12 stöðum

Í greinargerð Jukka Siltanens hér á eftir er gagnaöflun og aðferðum lýst. Tölur um fjölda ferðamanna á hverjum stað eru langflestar frá Rögnvaldi Ólafssyni og Gyðu Þórhallsdóttur, en þau hafa um árabíl talið ferðamenn í þjóðgörðum og mörgum öðrum vinsælum stöðum í náttúru Íslands. Útgjöld ferðamanna á hverjum stað voru könnuð með viðtölum frá 6. júní til 10. september 2018. Alls var rætt við ríflega 3.000

⁹ Sjá kafla 4.7.3.1-4.7.3.6 í skýrslu Jukka Siltanens.

ferðamenn, 200-350 á hverjum stað. Úrtakið er í minni kantinum miðað við það sem mælt er með.¹⁰ Skoða hefði þurft útgjöld á öðrum árstíma, en aðeins gafst tími til þess að ræða við ferðamenn að sumri til. Fyrri athugun Siltanens meðal ferðamanna í Snæfellsjökulspjóðgarði bendir til þess að vetrarferðamenn eyði meira fé en aðrir.¹¹ Þeir sofa ekki í tjöldum og þeir nýta skipulagðar rútuferðir fremur en bílaleigubíla.¹² Útgjöldatölur eru ekki leiðréttar vegna þessa. Erfitt að meta óvissu í bjöguðum gögnum, en líklegra er að útgjöldin séu vanmetin en ofmetin.

Gerður er greinarmunur á beinum áhrifum og öðrum áhrifum ferðamennsku. Bein áhrif eru kaup ferðamanna á vörum og þjónustu. Ferðamenn veittu sjálfir upplýsingar um kaupin. Óbein áhrif eru útgjöld starfsmanna ferðaþjónustufyrirtækja og útgjöld fyrirtækjanna sjálfra. Þessi áhrif eru ekki talin með í úttektinni, nema það sé sérstaklega tekið fram.¹³ Setja má líkanið fram þannig:

$$Efnahagsleg\ áhrif = Fjöldi\ ferðamanna * Meðalútgjöld\ á\ mann * Margfaldari$$

Venjulega er margfaldarinn metinn með hjálp svæðisbundinna aðfanga- og afurðatafla.¹⁴ Því miður eru slíkar töflur ekki til fyrir Ísland og varð því að grípa til annarra ráða. Var notast margfaldara úr erlendum könnunum á svæðisbundnum áhrifum. Þegar notaðar eru niðurstöður frá öðrum löndum er óvissa í raun óþekkt, en dregið er eins og hægt er úr hættu á ofmati með því að nota lægstu margfaldara sem fundust í könnunum með MGM2-tækni.¹⁵

TAFLA 1. SVÆÐI SEM VORU TIL ATHUGUNAR OG FJÖLDI FERÐAMANNA Á ÁRI Í ÞÚSUNDUM, 2017.

Þjóðgarðar	Önnur vernduð svæði	Svæði án sérstakrar verndunar
Vatnajökulspjóðgarður: - Ásbyrgi / Jökulsárgljúfur, 124 - Laki, 8 - Skaftafell, 736 Þingvallabjóðgarður, 1.527 Snæfellsjökulspjóðgarður, 392	Dynjandi, 80 Hraunfossar, 282 Landmannalaugar, 67 Mývatn, 409 Þórsmörk, 40	Hengifoss, 64 ¹⁶ Hvítserkur, 113

TÖLUR UM FJÖLDA FERÐAMANNA ERU FRÁ RÖGNVALDI ÓLAFSSYNI OG GYÐU ÞÓRHALLSDÓTTUR, NEMA HVÆÐ TÖLUR UM FERÐAMENN Í SNÆFELLSJÖKULSPJÓÐGARÐI OG VIÐ HENGIFOSS ERU FRÁ ÞJÓÐGÖRÐUM.

Í töflu 1 og á mynd 1 sést hvaða staðir voru skoðaðir. Þeir eru um allt land og af ýmsu tagi, misaðgengilegir og misvel verndaðir. Sjónum er beint að friðlýstum svæðum, en einnig var horft á umferð við Hvítserk á Vatnsnesi og Hengifoss, af því að friðlýstir staðir voru ekki nærri. Miklu munar á því

¹⁰ Sjá Kafjala (ritstj.), (2007). Visitor monitoring in nature areas: A manual based on experiences from the Nordic and Baltic countries. Nordic Council of Ministers, og umfjöllun Jukka Siltanens hér á eftir.

¹¹ Siltanen, J. K. (2017). *Economic Impact of National Parks in Iceland; Case Study of Snæfellsjökull National Park* (M.Sc. dissertation). University of Iceland.

¹² Sjá kafla 4.7.1 í greinargerð Jukka Siltanens hér á eftir.

¹³ Sjá greinargerð Jukka Siltanens í viðauka.

¹⁴ Sjá kafla 4.1 í viðauka. .

¹⁵ Sjá kafli 6.1 í viðauka.

¹⁶ Hengifoss er ekki í Vatnajökulspjóðgarði, en starfsmenn garðsins sinna umferð að fossinum á ýmsan hátt.

hvað margir koma á hvern stað. Árið 2017 lagði á áttunda þúsund ferðamanna leið sína að Laka, en 1½ milljón kom til Þingvalla (sjá töflu 1). Staðirnir eru því ágætis þverskurður af náttúrutengdum ferðamannastöðum á Íslandi. Sem fyrr segir var rætt við 200-350 ferðamenn á hverjum stað. Á sjö stöðum af tólf voru mjög fáir eða engir Íslendingar í úrtakinu. Miklu munar á því hvað fólk notar af þjónustu í nánd við staði sem skoðaðir eru. Til að mynda gista einungis um 10% ferðamanna í Jökulsárgljúfrum á hóteli eða gistiheimili í grennd en um 70% ferðamanna á Þingvöllum og í Skaftafelli. Grennd telst sem fyrr segir vera allt sem er minna en 50 km í burtu. Höfuðborgarsvæðið telst því vera í grennd við Þingvöll.¹⁷ Í töflu 2 hér fyrir neðan kemur fram að af þeim sem gista á annað borð í grennd við friðlýst svæði dvelst þriðjungur í gistihúsi, 11% í einkagistingu (Airbnb og fleira), en 10% í fjallakofum, farfuglaheimilum og þess háttar.

TAFLA 2. HVAR DVELJAST ÞEIR SEM GISTA Í GRENND VIÐ FRIDLÝST SVÆÐI?

Tegund gistingar (%)	Hraunfossar	Þingvellir	Landmanna-laugar	Jökuls-ár-gljúfur	Mývatn	Hengi-foss	Skafta-fell	Hvít-serkur	Þórs-mörk	Laki	Dynj-andi	Vegið meðaltal
Annað	5 %	0 %	1 %	4 %	0 %	0 %	0 %	1 %	0 %	0 %	0 %	2 %
Hótel/gistihús	44 %	36 %	23 %	23 %	36 %	31 %	56 %	38 %	9 %	40 %	28 %	32 %
Farfuglaheimili/skálar	6 %	10 %	21 %	6 %	2 %	9 %	1 %	5 %	37 %	8 %	1 %	10 %
Bændagisting	7 %	1 %	1 %	2 %	0 %	5 %	2 %	3 %	0 %	0 %	1 %	2 %
Einkagisting (Airbnb og fleira)	14 %	28 %	4 %	11 %	5 %	10 %	4 %	10 %	2 %	5 %	26 %	11 %
Tjaldsvæði	15 %	18 %	43 %	35 %	42 %	37 %	30 %	37 %	47 %	34 %	35 %	33 %
Sumarhús	8 %	3 %	5 %	5 %	12 %	7 %	7 %	4 %	4 %	9 %	1 %	6 %
Ættingjar, vinir	1 %	3 %	0 %	13 %	0 %	1 %	0 %	2 %	0 %	4 %	6 %	2 %
Í bíl	1 %	1 %	2 %	1 %	2 %	0 %	1 %	0 %	0 %	1 %	4 %	1 %

Fólk dvelst 1-2 daga á hverjum stað, eða í nágrenni hans. Fólk hefur skamma viðdvöl við Hvítserk, en er lengur í grennd við Dynjanda og á Þingvöllum. Margir virðast ekki gera sér grein fyrir útmörkum svæðisins og ofmeta því dvölinu. Stundum má líka deila um hvernig afmarka skal svæðin. Í könnuninni eru Landmannalaugar og Þórsörk talin vera tvö svæði, þó að gönguleiðin þar á milli sé innan við 50 km. Svarendur sem ganga Laugavegin lita margir á hann sem eitt svæði.¹⁸ Hér eru svörin leiðrétt þannig að gert er ráð fyrir að enginn sé lengur en tvo daga á hverjum stað – sjá neðri línuna í töflu 3.¹⁹ Leiðréttar tölur eru nýttar við mat á útgjöldum ferðamanna.²⁰

¹⁷ Sjá mynd 2 í greinargerð Jukka Siltanens.

¹⁸ Sjá kafla 4.7.4.6 hjá í greinargerð Jukka Siltanens.

¹⁹ Sjá kafla 4.7.4.6 í kafla Jukka Siltanens.

²⁰ Sjá umfjöllun í kafla 5.2 í greinargerð Jukka Siltanens.

TAFLA 3. LENGÐ DVALAR Á HVERJUM STAÐ.

	Hraunfossar	Þingvellir	Landmannalaugar	Jökulsárgljúfur	Mývatn	Hengi-foss	Skaftafell	Hvítserkur	Þórs-mörk	Laki	Dynjandi	Snæfellsjökull ²¹	Meðaltal
Meðaltal	1,1	2,3	2,1	1,9	1,7	1,7	2	0,9	1,2	1,6	2,4	2	1,7
Leiðrétt	1	1,4	1,5	1,5	1,5	1	1,4	0,9	1,1	1,3	1	1,6	1,3

Í töflu 4 sést hvað ferðamaður eyðir að meðaltali í næsta umhverfi hvers staðar og í ferðinni í heild. Tölurnar sýna útgjöld undanfarinn sólarhring. Miserfitt er að komast á staðina og það kemur fram í útgjöldum ferðamanna. Ferðamenn eyddu langmestu í grennd við Laka, eða tæpum 20.000 krónum á dag, en aðeins ríflega 5.000 krónum á dag í ferð að Hvítserk og í Þórsmerkurferðum.²² Að meðaltali eru útgjöldin rúmlega 10 þúsund krónur á dag. Merkilegt er að Íslendingar eyða um það bil jafnmiklu og þeir sem koma lengra að.

TAFLA 4. MEÐALÚTGIÖLD FERÐAMANNS Á DAG Í KRÓNUM.

		Á bensínstöðvum	Flutningar	Ferðir og afþreying	Menning	Gisting	Kaffihús, veitingahús	Matvörur	Minjagripir	Önnur smásala	Summa
Dagferðafólk	Nær-umhv.	1.205	903	1.164	89	2.410	1.080	391	201	39	7.482
	Alls	2.321	4.843	4.388	233	5.719	2.619	1.137	560	74	21.893
Hótelgestir	Nær-umhv.	1.074	842	1.981	54	5.514	2.147	696	336	106	12.750
	Alls	1.641	3.508	8.827	129	7.215	3.372	1.159	481	308	26.641
Gestir á tjaldstæðum	Nær-umhv.	1.285	1.235	1.484	53	1.808	1.253	718	143	148	8.128
	Alls	2.141	4.742	2.085	117	2.083	1.645	1.457	264	201	14.735
Íslendingar	Nær-umhv.	2.440	177	535	119	2.646	1.633	2.412	71	415	10.450
	Alls	3.350	390	535	159	2.817	1.823	3.435	71	598	13.179
Meðaltal	Nær-umhv.	1.217	931	1.595	65	3.688	1.637	699	243	113	10.187
	Alls	2.005	4.021	5.671	153	5.347	2.680	1.324	427	235	21.865

Spurt var hvort ferðinni væri heitið á fleiri staði. Langoftast var hugmyndin að skoða marga staði í ferðinni (hér er ekki átt við Íslandsferðina, heldur það ferðalag sem fólk var á þann daginn). Undantekningar voru Þórsmörk, en tæpur helmingur sagði hana aðaláfangastað ferðarinnar, Landmannalaugar (tæp 30%) og Dynjandi (20%). Ef svarendur kváðust vera á aðalákvörðunarstað ferðar

²¹ Snæfellsjökull NP figures provided here as adjusted length of stay is a new variable needed for the alignment with this study.

²² Sjá kafla 5.3.2.1. í viðauka.

voru öll ferðaútgjöldin tengd við hann. Ef staðurinn var einn af nokkrum áfangastöðum var deilt í útgjöldin með fjölda áfangastaða. Ef fólk hafði ekki ráðgert að fara á staðinn sem um ræðir voru ferðaútgjöld ekki tengd við hann.²³

Tölur um atvinnu í grennd eru sums staðar háar, en í heildina virðist matið varlegt

Í töflu 5 hér á eftir má sjá hvernig MGM2-líkanið túlkar áhrif af útgjöldum ferðamanna. Eins og áður var nefnt er hæpið að það sem hér er kallað *efnahagsleg áhrif* sé hrein viðbót við hagkerfið. Ferðaþjónustan ryður annarri starfsemi burt. Ruðningurinn eykst eftir því sem hagkerfið hitnar. Svipað má segja um heildarfjölda starfa sem hér eru tengd við friðuð svæði. Staðbundin störf og staðbundnar tekjur eru líklega nær því að vera hrein viðbót við annað atvinnulíf, einkum þar sem lítil önnur vinna er í boði. Staðbundin áhrif friðlýstra svæða eru metin með því að margfalda tölur um útgjöld ferðamanna í grennd við áfangastaði. Eins og fram hefur komið eru margfaldarar, sem hér er stuðst við, ekki reistir á íslenskum gögnum. Tölur um útgjöld ferðamanna eru líka bjagaðar, þar sem útgjöldin voru aðeins könnuð að sumri. Í þriðja lagi er ekki vitað hve mörg störf víkja fyrir vinnu sem tengist friðlýstum svæðum. Mjög erfitt er þess vegna að meta óvissu í mati á áhrifum friðlýstra svæða á umsvif í grennd. Benda má á að stuðst er við lægstu margfaldara úr erlendum athugunum sem nýta sama líkan,²⁴ útgjaldatölur eru að öllum líkindum bjagaðar niður á við og að ruðningsáhrif starfa sem tengjast friðlýstum störfum eru líklega lítil þar sem byggð stendur höllum fæti. Vegna þess að erfitt er að meta óvissu eða bjögun með tölfræðilegum aðferðum er látið nægja að skoða hvort niðurstöðurnar virðast vera innan skynsamlegra marka. Þær eru bornar saman við tölur úr skattagögnum og niðurstöður könnunar meðal fyrirtækja í ferðaþjónustu sem gerð var til þess að sannreyna niðurstöður líkansins.

Þjóðgarðurinn í Skaftafelli hefur langmest áhrif á atvinnu í grennd samkvæmt athuginni. Alls hafa 840 manns í 50 km fjarlægð frá þjóðgarðinum eða minna atvinnu af því að taka á móti gestum þar, ef útreikningarnir eru réttir. Talan er býsna há í ljósi þess að ætla má að af íbúum Skaftárhrepps og Hornafjarðar, utan þéttbýlisins á Höfn, séu um 780 manns á vinnumarkaði.²⁵ Erfitt er að skýra þetta nema með því að margir, sem sinna ferðamönnum í þjóðgarðinum og nágrenni hans, eigi lögheimili annars staðar. Forsvarsmenn ferðaþjónustufyrirtækja sögðust flestir nær eingöngu ráða heimamenn til starfa, en í 17% fyrirtækjanna voru 80% starfsmanna eða fleiri utansveitarfólk.²⁶ Þessar niðurstöður eiga við allt landið, en hlutfall utansveitarmanna kann að vera hærra í Skaftafelli en annars staðar. Líklega eru mörg fyrirtæki sem sinna ferðamönnum í Skaftafelli með aðalstöðvar í höfuðborginni. Könnun meðal ferðaþjónustufyrirtækja bendir til þess að 232 starfsmenn í nágrenni við Mývatn sinni ferðamönnum. Þetta eru rúm 24% af 914 íbúum Mývatnssveitar og Þingeyjarsveitar, sem ætla má að séu á vinnumarkaði, miðað við tölur um íbúafjölda í þessum hreppum og atvinnuþátttöku utan höfuðborgarinnar. Hér verður að hafa í huga að margir sem vinna hluta úr ári að ferðamennsku við Mývatn eiga þar ekki lögheimili. Þá eru 344 manns í grennd við þjóðgarðinn undir Jökli á Snæfellsnesi taldir hafa atvinnu af því að taka á móti ferðamönnum. Þetta eru 13% af rúmlega 2.500 íbúum á

²³ Nánari grein er gerð fyrir aðferðum þegar farið er til margra staða í kafla 4.7.4.9

²⁴ Sjá greinargerð Jukka Siltanens, 8. kafla, Discussion.

²⁵ Heimild: Heimasiða Hagstofu. Atvinnuþátttaka utan höfuðborgarsvæðisins er um 80%.

²⁶ Sjá kafla 7.2 í viðauka.

Snæfellsnesi, sem eru á vinnumarkaði. Þá má nefna að 24 störf í grennd við Hvítserk eru talin tengjast komu ferðamanna þangað, um 2½% fólks á vinnumarkaði í Húnaþingi vestra og Húnavatnshreppi.

TAFLA 5. NIÐURSTÖÐUR ATHUGUNAR Á EFNAHAGSLEGUM ÁHRIFUM FRÍÐLÝSTRA SVÆÐA.

Staður	Gestir (2017)	Bein staðbundin störf	Bein störf - heild	Staðbundin sala - bein (þús. kr.)	Staðbundin bein efnahagsleg áhrif (þús. kr.)	Heildarsala - bein (þús. kr.)	Heildar efnahags- áhrif (þús. kr.)	Heildar skattgreiðslur (þús. kr.)
Dynjandi	80.473	26	60	135.340	134.523	293.081	295.293	123.430
Hengifoss	64.376	17	39	99.484	102.584	209.558	211.110	84.412
Hraunfossar	281.592	99	237	557.656	553.202	1.291.680	1.312.068	513.529
Hvítserkur	112.855	24	58	122.626	123.115	302.684	311.475	148.693
Jökulsárgljúfur	123.770	98	153	472.122	456.459	757.524	745.121	320.897
Laki	7.836	15	21	75.283	77.291	104.388	106.827	40.302
Landmanna- laugar	67.100	96	201	538.047	527.812	1.085.984	1.061.560	429.173
Mývatn	409.091	232	469	1.367.036	1.257.592	2.561.350	2.444.192	1.038.301
Snæfellsjökull	392.168	344	670	1.875.626	1.934.763	3.469.519	3.606.061	1.426.234
Skaftafell	735.728	840	1 887	4.857.767	4.703.866	9.908.332	9.700.025	3.428.526
Þingvellir	1.526.523	n/a	1 806	n/a	n/a	13.134.525	13.393.505	4.918.874
Þórsmörk	40.390	23	66	136.171	118.665	312.370	287.331	97.308
Summa/Bein áhrif	3.841.902	1 814	5 668	10.237.157	9.989.872	33.430.994	33.474.568	12.569.679
Ígildi fullra starfa		1542	4818					
Margfaldarar		1,17	1,18	1,28	1,22	1,29	1,23	
Afleidd áhrif (e. secondary ef.)		308	1020	2.866.404	2.197.772	9.694.988	7.699.151	
Heildaráhrif		2122	6688	13.103.561	12.187.643	43.125.983	41.173.719	

Í töflu 6 má sjá upplýsingar úr skattagögnum um ársverk í atvinnugreinum sem tengjast ferðaþjónustu árið 2016 í grennd við staðina sem nefndir eru. Ársverkin eru áætluð með því að deila í launatölur með 400 þúsund króna launum á mánuði, auk launatengdra gjalda. Þessi aðferð gefur um 14% færri störf en ársverkatölur sem lesa má beint úr skattagögnum. Algengt er að hlutastörf séu skráð sem heil ársverk í skattagögnum. En þar sem 400 þúsund króna mánaðarlaun eru í lægri kantinum, miðað við meðaltöl Hagstofu, verður að líta á töluna sem hámark. Störfin snúast líka bæði um að þjóna ferðamönnum og heimamönnum. Þá fara ferðamenn um af ýmsu tilefni og ekki alltaf til þess að skoða friðlýst svæði. Ekki fengust launatölur frá ríkisskattstjóra um atvinnugreinar þar sem fimm fyrirtæki eða færri starfa og eru tekjur þar blásnar upp í samræmi við tölur fyrir landið allt í hverri grein og allar atvinnugreinar í hreppnum. Í töflunni má meðal annars sjá hvaða þjónusta er í boði á svæðunum og næsta nágrenni. Alls staðar má kaupa veitingar eða gistingu af fleiri en fimm fyrirtækjum í 50 km fjarlægð eða minna og alls staðar, nema í grennd við Laka, bjóða fleiri en fimm fyrirtæki ferðir. Þar sem fimm eða færri bjóða þjónustu eru engar upplýsingar gefnar – og ekki er ljóst hvort fimm fyrirtæki starfa í greininni eða ekkert.

Skattagögn um lágmarksfjölda starfa í ferðaþjónustu í grennd við Þingvelli sýna meðal annars veltu ferðaþjónustufyrirtækja á höfuðborgarsvæðinu, en það er um það bil 50 km frá Þingvöllum. Augljóslega tengjast fæst störf in þjóðgarði á Þingvöllum. Hámarksfjöldi starfa í ferðaþjónustu samkvæmt skattagögnum var víðast hvar yfir forspá MGM2-líkansins og sums staðar vel yfir henni, nema á tveim stöðum, í Skaftafelli og Snæfellsjökulsþjóðgarði. Munurinn er sérstaklega mikill í Skaftafelli og nágrenni. Nokkrar skýringar koma til greina. Eins og fyrr kom fram er líklegt að mörg fyrirtæki sem veita þjónustu í Skaftafelli séu með aðsetur í höfuðborginni og hið sama á líklega við í Snæfellsjökulsþjóðgarði. Þá verður að hafa í huga að skattagögnin eru frá 2016, en ferðamönnum fjölgaði töluvert 2017.²⁷ Samkvæmt skattagögnunum eru störf í hreinustu ferðamannagreinunum, flutningum og ferðum og gistihúsum og veitingastarfsemi, víðast hvar fleiri en störf samkvæmt MGM2-líkaninu. Aðeins á Mývatni gefur MGM2-líkanið hærri tölu, auk Skaftafells og Snæfellsness. Í heildina verður ekki séð að skattagögn bendi til þess að MGM2-líkanið ofmeti fjölda starfa sem tengjast friðlýstum svæðum og eru í næsta nágrenni við þau. Tvennt verður að vísu að hafa í huga. Í fyrsta lagi sýna tölur úr skattagögnum hámarksfjölda starfa, því að deilitalan (400 þúsund krónur á mánuði) er í lægri kantinum miðað við gögn um meðaltekjur hér á landi. Í öðru lagi segja skattagögnin ekkert um ruðningsáhrif ferðaþjónustu.

TAFLA 6. SAMANBURÐUR Á ÁRSVERKUM Í NÆRUMHVERFI SAMKVÆMT SKATTAGÖGNUM OG ÁRSVERKUM ÚR MGM2-LÍKANI.

Ársverk (2016)	Smásala	Flutningar	Gisting og veitingar	Leiga	Ferðir	Menning, íþróttir og tómstundir	Summa ²⁸	Hlutfall af heild	Hámark ársverka, skatti ²⁹	MGM2 bein störf í grennd 2017 ³⁰
Dynjandi	35	26	75	7	16	n/a	159	90 %	176	22
Þingvellir ³¹	8.664	1.208	6.998	827	3.026	611	21333	99 %	21.571	1.535
Skaftafell	5	28	252	n/a	47	n/a	332	92 %	361	714
Mývatn	n/a	n/a	152	1	10	n/a	163	68 %	239	197
Landmannalaugar	4	1	109	n/a	16	n/a	130	77 %	168	81
Laki	n/a	n/a	92	n/a	n/a	n/a	92	50 %	184	13
Jökulsárgljúfur	16	17	69	n/a	82	n/a	184	71 %	261	83
Þórsmörk	n/a	13	53	n/a	35	n/a	100	78 %	128	20
Hraunfossar	25	14	137	n/a	7	n/a	183	91 %	202	84
Hvítserkur	n/a	n/a	15	n/a	30	n/a	45	39 %	115	20
Hengifoss	36	35	139	14	30	n/a	255	79 %	322	14
Snæfellsjökull	19	n/a	65	n/a	4	n/a	88	43 %	205	292

²⁷ Sjá kafla 6.1.1. og 6.1.2 í viðauka.

²⁸ Byggt á skattagögnum, miðað er við að starfsfólk eigi heima á svæðinu.

²⁹ Miðað við upplásin skattagögn.

³⁰ Bein störf samkvæmt MGM2-greiningu geta verið skráð annars staðar.

³¹ Þingvöllum er sleppt úr greiningunni, þar sem nágrenni þeirra nær meðal annars yfir höfuðborgarsvæðið.

Niðurstöður MGM2-líkansins voru einnig sannreyndar með *könnun meðal fyrirtækja í ferðaþjónustu*. Sendar voru fyrirspurnir um starfsemina til 3.224 fyrirtækja á lista Ferðamálastofu. Meðal annars var spurt um heilsárgildi starfa. Gild svör bárust frá 415 fyrirtækjum eða um 13% þeirra sem spurð voru. Hjá þeim vinna um 4.360 manns, eða 14,4% starfsmanna í „einkennandi atvinnugreinum ferðaþjónustu“ í ágúst 2018, samkvæmt Hagstofu. Svörin voru flokkuð eftir landsvæðum og svör fyrirtækja í grennd við friðuð svæði voru skoðuð sérstaklega, eins og sjá má í Töflu 7. Rétt er að geta þess að fyrirtæki geta tengst fleiri en einu svæði. Óvíst er hvort vegur þyngra, lágt svarhlutfall, eða það að ferðaþjónusta tengist víða fleiri en einu svæði, en á nokkrum stöðum sýnir MGM2-líkanið nokkru hærra tölu en lesa má úr svörum starfsmanna ferðaþjónustufyrirtækja (gulmerkt í töflu 7). Mestur er munurinn í Skaftafelli og nágrenni, en einnig munar miklu nálægt Jökulsárgljúfurum. Lágt svarhlutfall virðist geta skýrt muninn á þessum svæðum, eins og annars staðar í töflunni. Svarhlutfallið er raunar sérstaklega lágt við Jökulsárgljúfur. Þegar er allt er skoðað verður niðurstaðan svipuð og í samanburði við skattagögn hér að framan. Ekki verður lesið úr könnun meðal fyrirtækja í ferðamennsku að MGM2-líkanið ofmeti fjölda starfa í grennd við friðlýst svæði. Hér verður að vísu að hafa sama fyrirvara og áður: Könnunin segir ekkert um ruðningsáhrif ferðaþjónustunnar.

TAFLA 7. SAMANBURÐUR Á ATVINNUÁHRIFUM SAMKVÆMT KÖNNUN MEÐAL ATVINNUREKENDA OG MGM2- GREININGAR

Litur:			
Hærra tala skv. MGM2	Könnun meðal vinnuveitenda³²	Svarhlutfall, %³³	MGM2 bein atvinna í grennd við staði³⁴
Dynjandi	76	15 %	22
Þingvellir ³⁵	1.352	2 %	1.535
Skaftafell	196	23 %	714
Mývatn	100	26 %	197
Landmannalaugar	51	12 %	81
Laki	84	57 %	13
Jökulsárgljúfur	21	4 %	83
Þórsmörk	78	27 %	20
Hraunfossar	215	23 %	84
Hvítserkur	72	31 %	20
Hengifoss	177	12 %	14
Snæfellsjökull	122	14 %	292

32 Hér er gert ráð fyrir að fyrirtæki sé skráð á svæðinu.

33 Heildarfjöldi fyrirtækja í ferðamennsku, miðað við skattagögn.

34 Bein störf á svæðinu samkvæmt MGM-greiningunni, gætu verið skráð hvar sem er.

35 Mat á efnahagslegum áhrifum Þingvallabjórðgarðs er meðal annars byggt á útgjöldum ferðamanna þar á höfuðborgarsvæðinu. Því er höfuðborgin einnig talin með í tölum úr skattagögnum.

Ályktanir

Niðurstöður þessarar athugunar eru að friðlýst svæði víða um land séu mikilvæg fyrir atvinnulíf í næsta nágrenni þeirra. Fjöldi starfa sem tengja má við friðlýst svæði var metinn á grunni upplýsinga um útgjöld ferðamanna sem þeir létu sjálfir í té í samtölum. Alls vinna um 1.800 manns við að taka á móti ferðamönnum á 11 friðlýstum svæðum og öðrum fjölsóttum svæðum í náttúru Íslands (auk þess voru útgjöld ferðamanna á Þingvöllum skoðuð, en fjöldi fólks sem starfar við að taka á móti ferðamönnum þar var ekki áætlaður). Í sumum sveitum má tengja tugi prósentu allra starfa friðlýstum svæðum. Forsvarsmenn ferðaþjónustufyrirtækja sögðust flestir aðallega ráða heimamenn, þó að hitt þekktist einnig. Samanburður við gögn frá Ríkisskattstjóra og svör formælenda ferðaþjónustufyrirtækja á friðlýstum svæðum bendir ekki til þess að áhrif á atvinnu séu ofmetin í líkaninu sem hér er stuðst við, en erfitt er að leggja mat á ruðningsáhrif. Líkanið hefur meðal annars verið notað í sams konar athugunum í Bandaríkjunum og Finnlandi.

Viðauki: Greinargerð Jukka Siltanens



Laki. (cc-by-2.0) Jukka Siltanen

Economic impact of Iceland's protected areas and nature-based tourism sites

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Executive summary

This study presents the first overall assessment of the impact of Iceland's national parks (NPs) and protected areas (PAs) to the economy and employment both locally and on a national level. The results have been verified by a comparison to tax records, results from an employer survey, and to other similar international studies. The study was conducted for 12 different protected areas and nature-based tourism sites selected by the Ministry Environment and Natural Resources who also commissioned the study: Ásbyrgi, Laki and Skaftafell within Vatnajökull National Park, Þingvellir National Park, Dynjandi, Hraunfossar, Landmannalaugar, Mývatn, Hengifoss, Hvítserkur and Þórsmörk. Updated results for Snæfellsjökull National Park from a pilot study were also included in the results. Results are based on a sample of visitor spending of 3.506 people and annual visitor numbers to the parks and protected areas in 2017.

Overall, the direct annual economic impact of visitor spending of 12 sites covered in this study is ca. 10 billion ISK locally in the vicinity of the protected areas and 33,5 billion ISK nationwide. The visitor spending supports ca. 1.800 full-time and part-time jobs near the protected areas and respectively over 5.500 jobs nationwide in sectors related to tourism. In full-time equivalents during the summer season these figures would be ca. 1.500 and 4.800. With secondary effects to other sectors included, an estimate of the total economic impact of the sites is over 12 billion ISK locally and 41 billion ISK nationwide. Secondary effects bring the job impacts to a range of 2.100-6.500 jobs between the local and national impacts including part-time and seasonal jobs. The protected areas themselves can generate significant local employment effects, employing almost 200 people annually including seasonal and part-time workers. However, the distribution of the staff between the protected areas is currently uneven with the PAs under the Environmental Agency having only one-third of the staff resources in proportion to the visitor numbers.

The scale of the economic impacts is largely determined by the number of visitors to each site, as the overall daily spending of visitors was relatively uniform around 21.743 ISK per visitor per day, or 12.683 ISK accrued for the protected area visit only. Respectively, visitors spent overall 10.187 ISK per day in the local economy, and 5.625 ISK related to the protected area visit only. Largest economic impacts were generated by Þingvellir and Vatnajökull National Parks (13,4 and 10,8 billion ISK respectively), followed by Snæfellsjökull NP and Mývatn area (3,6 and 2,4 billion ISK respectively). The overall economic impact to cost -ratio was 23:1, meaning the protected areas generate 23 króna in personal income and business added-value impacts for each króna contributed by the state. Comparing tax revenue generated by the visitor spending to the annual state contributions, the ratio is 8:1 suggesting the parks would be self-sufficient even with much higher funding. These figures follow the findings of the pilot study by Siltanen (2017) carried out at Snæfellsjökull NP and overall indicate a high return for the annual investments put into the national parks and protected areas.

Main limitations of this study are due to the lack of regional input-output tables and short timeframe of the study allowing us to collect visitor data only from the summer season, leading to seasonally unbalanced site samples below 95 % confidence interval. Lack of local input-output tables causes some uncertainty in the economic impacts, which we have attempted to overcome with the verification to the tax data and conservative assumptions on sectoral capture rates and secondary impacts. Lack of winter data primarily generates a positive bias on the camper segment, which in turn decreases the overall impacts as the spending of the campers is the lowest of the foreign visitor segments.

The results of the analysis are comparable with the international studies reviewed in Chapter 4.3. In general, the impacts are higher compared to most reported studies mainly due to the high share of foreign tourists visiting Iceland's protected areas and also due to the high cost of living and services in Iceland. 98 % of all the visitor spending in this study was carried out by foreigners. Further questions raising from the study concern the benefits of protected area designations under increasing visitor pressures in Iceland; how can the protected areas contribute to sustainable recreational use, better visitor experience and rural livelihoods?

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1 Introduction

The impacts of protected area designations are a topic of increasing interest across the world; on one hand combating loss of biodiversity and natural habitats, and on the other as a driver for economic and regional development, especially in rural and peripheral settings in decline due to urbanization and industrialization (e.g. Briedenhann & Wickens, 2004). The World Conservation Union (IUCN) has defined recreation and local economic development as one of the key objectives of National Parks in their classification of protected areas (Dudley, 2008), and this has often become the central political argument for new protected area designations (March, 2000).

Booming tourism is also gearing up this development in Iceland. It is well-recognized that tourists come to Iceland mainly for the nature; 92,4 % stating that it is the main reason for the visit on the most recent surveys (Icelandic Tourist Board, 2018). As a result of the rapid increases in tourism, Iceland's economy has transformed from a resource-based economy relying on fisheries and heavy industries into a service-based economy in a scope of just a few years. According to the Icelandic Chamber of Commerce (2018), tourism accounted for 42 % of all exports in 2017, while industries that used to be the largest, aluminium (17 %) and fishery products (16 %), were less combined. Currently approximately 15 % or 30.000 people of the total work force is employed in the tourism industry (Statistics Iceland, 2017). These structural changes in the economy have started to change to the way Icelanders view nature as a resource and more people are nowadays in favour of conservation - for example, 60 % of Icelanders supported and only 12 % opposed the Central Highland National Park in a recent poll (Hálendið, 2016).

Rapid increase in tourism doesn't come without problems in Iceland or anywhere else. It has caused both environmental and social challenges, especially around popular sites where high numbers of visitors have affected the sites via trail erosion, litter, congestion etc. and caused strain on the surrounding communities. Sæþórsdóttir & Ólafsdóttir (2017) have also raised concerns on the paradox of tourism development in the remaining wilderness areas. While latest reports on the visitor numbers (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir, 2018) are starting to show a slow or slight decline, the challenge of managing high numbers of visitors, especially during peak months and hours of the day, is still apparent in many of Iceland's iconic natural attractions.

On the positive side, tourism has provided significant economic opportunities for depopulating rural regions in Iceland and offered new sources of livelihoods in terms of providing services and local products for visitors. Farms have been converted to homestays and bed & breakfasts, hotels have been built in the open and nearly unpopulated areas of the country, and locals have taken up guiding visitors and established companies providing excursions for tourists.

A pilot study on the economic impacts of Iceland protected areas was published last year (Siltanen, 2017), using Snæfellsjökull National Park (SJNP) as a case study. The results of the study indicated that the economic impact of SJNP was high at 3.9 billion ISK annually, contributing to over 700 indicative jobs, and compared to its operating budget the park provided economic impacts over 50-fold. The study was based in the MGM2 or 'Money Generation Model, which has originally been developed with the US National Park Service. Nowadays many protected areas around world are conducting such studies using different variants of this methodology (see 4.3). The pilot study concluded that the methodology can be applied in the Icelandic context as well, but due to unavailability of certain important regional economic statistics, the results need to be evaluated conservatively.

Following the results of the pilot study of Snæfellsjökull National Park, the Ministry of Environment and Natural Resources commissioned this study to explore the economic and employment effects of Iceland's popular protected areas and natural attractions on a larger scale to evaluate the overall economic impact of protected areas to Iceland's economy. In the words of Prof. Paul F.J. Eagles (Kajala et al., 2007, p. 6), Chair of the Task Force on Tourism and Protected Areas at the World Commission on Protected Areas World Conservation Union (IUCN):

"Any phenomenon that is not measured and reported does not exist politically. Governments, societies, communities and individuals place more value on that which is documented."

2 Objectives of the study

Following objectives were agreed upon between Ministry of Environment and Natural Resources and the Institute of Economic Studies for this study:

1. Survey tourist spending at each location, use available visitor counter data and calculate economic impact using MGM2 methodology.
2. Verify results by surveying travel services in each area via tax records.
3. Survey local employment effects, length of contracts and seasonality.
4. Summarize results of nature tourism's employment impact on national level.
5. Summarize local employment effects based on visitor numbers to local employees and estimate similar effects on other sites.
6. Conduct overall preliminary assessment on impact of national parks in Iceland to local economy and employment.

3 Research locations

The Ministry of Environment and Natural Resources selected locations in Table 1 for this study. The selected sites cover a wide variety of nature-based tourism sites in terms of visitor access, seasonality, geographical location (see Figure 1), access and protection status. They also have reliable long-term visitor counter data available, which is critical for accurate results in the economic impact analysis.

Table 1. Research sites in this study.

National Park sites	Other protected areas ¹	Without protected status
Vatnajökull National Park: - Ásbyrgi / Jökulsárgljúfur - Laki - Skaftafell Þingvellir National Park Snæfellsjökull National Park ²	Dynjandi Hraunfossar Landmannalaugar Mývatn Þórsmörk	Hengifoss ³ Hvítserkur

1 Þórsmörk (with Goðaland) is protected from grazing under protection of the Icelandic Forest Service (Skógræktin). The rest of the protected areas in this category are under the Environmental Agency of Iceland (Umhverfisstofnun).

2 Economic impact results from the 2017 pilot study at Snæfellsjökull National Park are updated and aligned with this study. Primary data regarding visitor spending data is based on last year. Snæfellsjökull NP is managed the Environmental Agency of Iceland.

3 Hengifoss is outside the boundary of Vatnajökull National Park, but managed by the park.

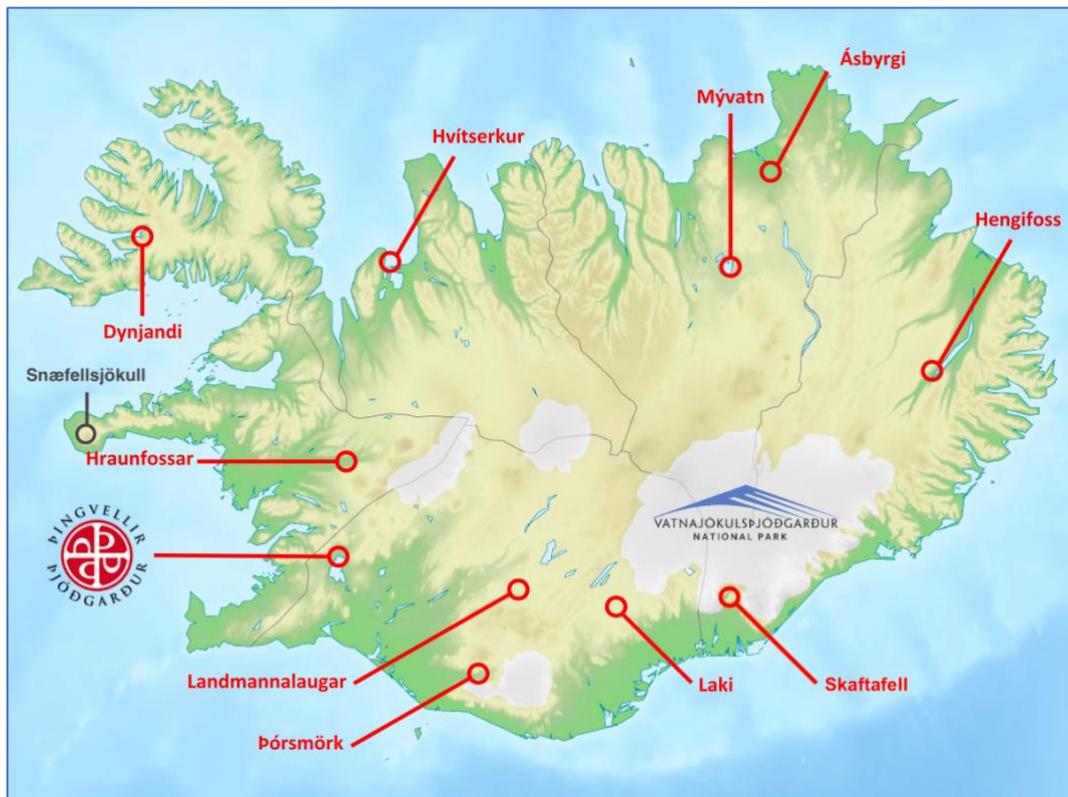


Figure 1. Map of the research sites⁴.

4 Research methodology

In order to calculate the economic and employment impacts of the protected areas in Iceland, this study uses a combination of visitor spending surveys at the study locations, visitor number data provided by existing visitor counters, MGM methodology for calculating the economic impacts, an online survey to extract opinions of the tourism businesses related to nature-based tourism and verify the job impacts, and analysis of the regional tax records to verify the results of the economic impact analysis.

4.1 Overview of MGM methodology

The following introduction to the MGM or 'Money Generation Model', is largely based on the final report of the pilot study at Snæfellsjökull National Park (Siltanen, 2017). In terms of methodological overview there are no changes from the pilot study, but a summary is provided below to introduce the methodology and key concepts.

There are several approaches to assessing the economic value of park systems (NRPA, 2015). The most common is generally termed as an economic impact analysis. Economic impact analyses provide estimates of the value of spending, as money for goods and services moves through the economy. Economic impact analyses provide information on how to allocate resources among competing projects, assess the potential returns to public or private investments and policies, and put 'hard numbers' to political strategies. Economic impacts are measured in terms of sales, income, jobs, tax receipts and value added. A distinction between direct, indirect and induced effects of visitor spending can also be made. Direct effects are composed of goods and services purchased by visitors. Indirect effects are comprised of goods and services bought by tourism companies from their suppliers. Induced effects represent the spending of employees and companies in the tourism sector through wages and profits from tourism businesses. (Stynes et al., 2000)

⁴ Source: [iceland location map.svg](http://iceland.location-map.svg). CC BY-SA 3.0: NordNordWest, derivative work: Виктор.

The Tourism Satellite Accounts (TSA) is a “method of measuring the direct economic contributions of tourism consumption to a national economy” that draws its data from the System of National Accounts (Frechtling, 2010, p. 136). TSA is concerned with direct effects of tourism demand (or spending), and does not attempt to elicit indirect or induced effects. TSA methodology has been used in a similar, although not protected area-specific, context in Iceland (Lilja Berglind Rögnvaldsdóttir, 2014 & 2016) and has been adopted as a reporting standard on the national level by Statistics Iceland (2015). Stynes (2001a) compared satellite accounts (such as TSA) and survey/I-O (such as MGM) approaches and summarized that in the comparison both models yielded similar results and could be used to verify each other. Frenç (2016) has recommended to avoid using TSA for economic impact analysis, suggesting it should rather be used as a tool for evaluating the macroeconomic importance of the tourism. As MGM methodologies had been more commonly applied in connection with protected areas, the pilot study decided to apply them in the Icelandic context.

In the context of national parks and protected areas, economic impact analyses determine the contribution of inbound tourism activity to the economy of the region by answering the following questions (Stynes 1999):

- How much do tourists spend in the area?
- What portion of sales by local businesses is due to tourism?
- How much income does tourism generate for households and businesses in the area?
- How many jobs in the area does tourism support?
- How much tax revenue is generated from tourism?

Economic impact analysis is completed with input-output (I-O) models, which capture the structure of the local, regional or national economy. This is done by describing the sale and purchase relationships between producers and consumers in each sector within an economy, and illustrating flows of money between different actors, sectors and regions (OECD, 2018). The models describe what each sector must purchase from other sectors to produce one monetary unit of goods and services. I-O models provide a foundation for deriving multipliers, which are needed to estimate the secondary impacts of visitor spending through the economy. Multipliers represent the secondary effects as a ratio of the total change in economic activity relative to the direct change, and express how different sectors relate to the economy of the region. Two main types of multipliers are used economic impact analysis of recreational spending: sales and employment multipliers (Stynes, 2005).

The MGM model yields reasonable estimates of economic impact of national parks and protected areas at a low data collection cost by forming an aggregate figure based on number of visits, average spending per visitor and economic multipliers through the following simplified equation:

$$\text{Economic impact} = \text{Number of visitors} * \text{Average spending per visitor} * \text{Economic multiplier}$$

By carefully researching the parameters, the original MGM model was expected to yield reasonable estimates at minimal data collection cost; however, since it doesn't account for the type of spending, it gives little information on the sectors benefiting from the activity or about the secondary effects (Stynes et al., 2000).

The MGM2 model (Stynes et al., 2000) suggests making the calculations by visitor segments to capture the differences in spending by visitor types. Spending averages of different segments may also be used with certain reservations across different national parks without having to repeat the entire visitor spending survey in each park. The MGM2 model computes spending by multiplying per unit average spending values by the number of visitor units (Stynes et al., 2000). These calculations can be made by visitor segments, such as local and non-local day users, overnight visitors staying at campsites, hotels, hostels, campervans or Airbnbs. The economic impacts of visitor spending are then calculated by sector-specific multipliers for each spending vector. Multipliers convert spending to jobs and income, and estimate the secondary effects of spending. In the MGM2 model, multipliers are both sector- and region-specific as for example spending on accommodation has a different impact than spending on retail. The economic size of the region also affects the secondary impacts, hence the different local or regional multipliers.

The MGM2 model uses Type II SAM (Social Accounting Matrix) multipliers for sale and employment impacts. The type I sales multiplier describes the ratio between sum of direct and indirect sales divided by direct sales. The type II sales multiplier also includes induced sales in the sum. For example, if a restaurant purchase has a Type II sales multiplier of 1.5, a sale of 10.000 ISK would yield a total sale effect of 15.000 ISK, with 10.000 ISK in direct sales and for example 3.000 ISK in indirect sales and 2.000 ISK in induced sales. According to Stynes (2001b), SAM multipliers are more conservative Type II multipliers, which account for visitor spending-related income to local service providers that is not immediately re-spent (e.g. commuting workers, income that is saved in the bank or contributed to retirement funds).

Employment multipliers are defined (Stynes, 2001b) as the ratio of total employment to direct sales, describing how many direct, indirect and induced jobs (Jobs Type II multiplier) are needed to produce a certain total amount in sales in a certain sector (1 million USD by default). Job multipliers include part-time and seasonal jobs, assume linear dependencies (e.g. increased visitor nights mean that more workers are needed in the accommodation sector in linear proportion) and do not account for economies or diseconomies of scale (e.g. increased or decreased efficiency in services due to innovation or change in visitor number). For example, in the rural reference multiplier set, ca. 22 jobs are needed to serve annual sales of 100 million ISK in grocery stores. Thus, if the annual spending by national visitors in groceries is 50 million ISK, 11 jobs would be necessary to satisfy this demand according to the employment multiplier.

An important concern regarding the sales multipliers is the capture rate which measures how large a part of the spending is retained. For example, for imported products such as fuel, the capture rate is very low, typically only a small sales margin such as 10 % while rest of the spending leaks abroad. On the other hand, the capture rate of services is typically high, up to 100 %, unless the service relies heavily on imports to operate. (Stynes, 2001b)

Iceland doesn't yet produce regional input-output tables needed to calculate the local economic multipliers. Thus, the usage of generic multipliers is subject to criticism because of the potential for errors. However, as discussed by Stynes et al. (2000), multipliers generally generate small errors, whereas sampling errors in visitor counting and spending surveys may introduce much higher errors. Mayer et al. (2010) came to the same conclusion in their sensitivity analysis concerning the economic impacts of 6 German National Parks, explaining how 10% variation in visitor days causes a direct 10 % difference in the results as a simple factor, while for the same effect the economic multipliers would have vary by more than 20% implying massive (and unlikely) changes in the regional economic structures.

In this study, the key results are presented without indirect effects to minimize uncertainty from the missing localized secondary effect multipliers. For comparability to other studies, indicative reference figures are provided for the secondary effects using the most conservative set of reference multipliers in the MGM2 application. These secondary effect multipliers are in the range of 1,17-1,29 compared for example to the 1,50-1,78 multipliers used for rural areas in the recent studies on Finnish National Parks and Protected Areas (Vatanen & Kajala, 2015). Latest studies on the economic impacts of US National Parks (Thomas & al., 2018) use secondary effect multipliers of over 2,0 meaning over half of all the economic impacts derive from indirect spending and effects. Additionally, as a new verification measure compared to the pilot study, the economic and employment impacts indicated by the MGM2 methodology will be verified from the regional tax records and compared against on employer survey concerning the employment effects.

4.2 Other values from the natural environment

This study focuses solely on the economic impacts of protected areas and nature-based tourism, and it is important to note that other values associated with the natural environment that are beyond the scope of this study. Barbier (1994) distinguishes values from the natural environment in three main categories:

- 1) Direct use values; derived from direct interaction (extractive or recreational) with natural resources - *this study only measures a part of the direct use values*

- 2) Indirect use values; described as the ecosystem services (e.g. cleaning, regulating, biological) from the natural environment - *this study does not attempt to measure any indirect use values*
- 3) Non-use values; representing the remaining non-direct or indirect values from a natural environment, such as the value in our minds that an area 'exists' - *this study does not attempt to measure non-use values.*

National parks and protected areas often provide value in all these three categories. Visitors gain direct use value by exploring the parks by car, hiking, camping, visiting the visitor centres and exhibitions etc. Parks and protected areas also provide indirect use value, for example health benefits to people, providing living and breeding areas for various species, supplying the region with a variety of ecosystem services and binding carbon from the atmosphere. National parks and protected areas also provide non-use value by conserving area 'for future generations', highlighting our needs to protect the existence of places of historical, cultural or natural significance. (Siltanen, 2017)

Driver et al. (1991) divide the benefits of protected areas and nature-based recreation into four categories: personal, social, economic and environmental. Personal benefits are tied to issues of health and psychological well-being, self-image, and self-satisfaction. Social benefits include family stability, community pride, and cultural identity. Environmental benefits result from environmental health and protection, attitudes, and investment in natural areas. Finally, economic benefits that are tied to productivity, tourism and recreational goods are the focus of this study.

4.3 International findings

To put the results of this study in perspective, key findings of similar studies from the US and other European countries are briefly presented here. Varying assumptions and differences in the methodologies are also highlighted to demonstrate that even though the economic impacts or outputs are often reported in a similar way, the numbers are not directly comparable in most cases.

The U.S. Department of Interior (USDI) National Park Service (NPS) is the precursor of economic impact analysis of protected areas, measuring visitor numbers since 1904, reporting visitor spending and economic effects since 1988, having developed the original MGM model in 1998 and subsequent more detailed Visitor Spending Effects (VSE) model in 2012 (Thomas & Koontz, 2015). Originally the USDI Park Service conducted their economic research mainly through academic contacts at Michigan State University, especially with Prof. Daniel Stynes who developed the MGM methodology with his colleagues. Nowadays the economic research of the USDI Park Service is carried out by Headwaters Economics, a non-profit research group focusing on community development and land management decisions (Headwaters Economics, 2018).

In latest report concerning the economic impact of National Parks in the US, Thomas et al. (2018) present that visitor spending of \$18,2 billion by 331 million visits to the US national parks in 2017 supported 306.237 jobs, \$11,9 billion in labour income, \$20.3 billion in value added, and \$35,8 billion in economic output in the national economy. Visitors' average spending per night per person varied between \$14-140 in visitor segment averages. Average size of the party was 3.0, and overall average spending \$45 per person per night. The economic impact studies and related visitor monitoring have been institutionalized since 1988. It should be noted in comparison to this and many other studies referenced here that the VSE model doesn't currently omit non-NP related expenses of visitors on multi-destination trips, tour packages etc., and as a result all costs reported by these visitors are accounted towards the national parks, creating a likely over-attribution for example in lodging and transportation. Also, the employment effects are reported as a contribution to employment including any kind of part-time and seasonal jobs, and added work effort that may also be covered with overtime by existing employees.

In Finland, the first assessment of the economic impact of national parks, state-owned hiking areas and some other protected areas was conducted in 2009 and updated in 2014 (Huhtala et al., 2010; Kajala, 2012; Vatanen & Kajala, 2015) using a VSE method based on the MGM2 methodology. The analysis has shown that input-output ratio of investments into Finnish national parks and recreational protected areas is very favourable: 1 euro investment

returns on average over 10 euros to the local economy. Total income and job impacts of Finland's 40 national parks in 2017 were 206,5 million euros and ca. 2.055 full-time equivalent jobs in based on 3,1 million visits (Metsähallitus Parks & Wildlife Finland, 2018). The Finnish assessments exclude all spending by multi-destination visitors and those who visited the national park as a non-planned destination thus including only people for whom the national park was the main purpose of the visit.

Mayer et al. (2010) conducted the first study of economic impacts of tourism in six national parks in Germany in 2007. Due to lack of regional input-output or computable general equilibrium (CGE) models, the study used a Keynesian multiplier approach and acquired the regional and sectoral multipliers from a research consultancy company. The researchers also employed a novel way to discern spending related to the national park from non-intended visits by determining the 'national park affinity' of the visitors in their surveys; an approach German visitor surveys have used since. Daily expenditures varied between 7-13 € for day-visitors and 37-57 € for overnight visitors. Total income from the parks to the regional economy varied between 1,9-525 million euros, while income from 'high-affinity visitors only' varied between 0,5-58 million euros. While their approach was similar in principle and somewhat different in practise, the results aligned with results from Finnish and Swiss national parks, and were below the results from the US national parks. The authors accounted the differences to the US mainly resulting from lower visitor numbers, fewer international tourists, lack of entrance fees and in general a lower degree of commercialization of the studied parks compared to their US counterparts.

In another study from Germany (Scheder, 2015; Steingrube & Jeschke, 2011), 11,6 million visitor days in the Mecklenburg-Vorpommern region's 3 national parks and 2 biosphere reserves generate annually 728 million euros in turnover, 384 million euros as total income in the region and 25.782 full-time equivalent jobs. If calculated only for the 'high-affinity' visitors, these numbers are 131 million euros, 69 million euros and 4.442 jobs respectively. In the most recent study, Mayer & Woltering (2018) used the visitor data collected in all the other German studies from 2004-2015, and carried out a comprehensive zonal travel cost method (TCM) analysis of the value of recreational ecosystem services (RES) of Germany's national parks. In this study, the lower end of consumer surplus was between 385,3-621,8 million euros for 'high-affinity' visitors and the higher end between 1.690-2.751 million euros for all visitors. They also highlighted the importance of always using onsite visitor data and argue that as the value of RES is created as co-products of the environment and visitors' perceptions and valuations, benefit transfer approaches to context-specific RES data is discouraged.

In a related study, Mayer (2014) completed a cost-benefit analysis on Germany's oldest and most well-known Bavarian Forest National Park, asking whether the designation of the national park could be economically justified, and whether the revenue from park tourism can compensate for its costs. The results suggested that the national park was economically favourable land use option under most scenarios having a benefit-cost ratio over 1 in over half of the national scenarios and over 1 in all the regional scenarios.

National Parks in the UK have also been studying the economic impacts over the past decade. Currently the three Welsh national parks receive over 12 million visitors each year, spending an estimated £1 billion on goods and services (Hyde & Midmore, 2006; Brecon Beacons National Park, 2013). Interestingly, while most national parks are typically mainly uninhabited, the national parks in Wales have over 80.000 people living within their boundaries and providing employment to ca. 30.000 people. Similarly, at Cairngorms, Scotland's largest national park, 43 % of the ca. 18.500 people living within the park boundaries are employed in tourism, and the park contributes to 30 % of the region's economy (Cogentsi, 2010). The total economic impact of the park's 1,85 million visitors in 2017 was £245,5 million, supporting 5784 full-time equivalent jobs. Average spending per visitor per day/night was £67, ranging between £27-127 (Global Tourism Solutions (UK) Ltd, 2017).

La Garrotxa Volcanic Zone Natural Park in Catalonia has studied the economic impacts on a longer timescale between 2001-2010. During this period, different stakeholders invested ca. 99 million euros into the national park, generating ca. 706 million euros in regional income, 160 million euros in taxes and 8600 jobs with approximately 300.000 annual

visitors during the study period. Average daily budget of the visitors was ca. 86 euros. The park has direct relationship with over 60 businesses operating within the park. (Prats, 2014)

Many more examples of similar studies could be presented here; for example, Belgium, New Zealand, Australia, Canada and Brazil have been actively measuring the economic impacts of their protected areas, and individual studies have been conducted for example in India and Kenya. However, the purpose of this chapter has been to highlight recent varied European examples in addition to crediting the US Park Service for setting this research field in motion. A general issue that has emerged concerning this field in the last 20 years is harmonizing the collection of visitor counting and spending data, and perhaps to a slightly lesser extent the economic impact analysis methodologies (e.g. Hornback & Eagles, 1999; Schägner et al., 2017; Kajala et al., 2007).

Countries where the relevant national park and protected area authorities have institutionalized recurring collection of visitor spending data and economic impact analysis at regular intervals are still very few based on this literature study, but there is indication that this is about to change both from the new economic impact studies emerging from various countries and on the other hand from the EUROPARC Federation memberships of many European national parks and protected areas. EUROPARC is a representative body of Europe's Protected Areas and 'the collective voice for all nature and landscape areas' (EUROPARC Federation, 2018a). EUROPARC has developed the 'European Charter for Sustainable Tourism in Protected Areas' as a practical management tool for protected areas to operate sustainably. Some of the binding key objectives in the Charter are strengthening the economic performance and viability of local tourism businesses and measuring the economic impacts of the protected areas (EUROPARC Federation, 2018b). Such requirements to the Charter signatories provide further impetus for research into the economic impacts of tourism in Europe and the Federation members are regularly audited to ensure they fill their obligations to the Charter. In Iceland, Vatnajökull National Park and the Environmental Agency are members of the EUROPARC Federation (2018c).

4.4 Description of the study sites

Based on the experiences of the pilot study (Siltanen, 2017), methods outlined above and the locations selected by the Ministry of Environment, this study concerning the economic impacts of Iceland's national parks, selected protected areas and certain unprotected areas was carried out during June-September 2018. Field work related to the study was conducted during the summer months June-August 2018 when all the sites are accessible. As indicated by Figure 1, the sites cover Iceland geographically comprehensively, located in vicinity of 35 municipalities with a combined population of 242.052 people (see 11.4). Table 2 gives a detailed overview of the research sites in terms of size, visitor numbers, key features and visitor profiles.

Table 2. Detailed overview of the research sites.

Location / PA size / no. visitors ⁵	Key feature(s)	Survey collection location	Region	Visitor profiles
Ásbyrgi / Jökulsárgljúfur (VNP) 120 km ² 123.770 visitors	Ásbyrgi canyon. Hiking and walking routes. Dettifoss to the south.	Visitor center, parking lot in the bottom of the canyon	North	Independent travellers by car, some cruise tour buses from Akureyri. Mainly day trips and hikes, some hiking to Dettifoss.
Dynjandi 6,44 km ² 80.473 visitors	Most famous waterfall in the Westfjords. Road to the area is usually closed in the winter.	Parking lot, trailhead to the waterfall	Westfjords	Independent travellers by car. Cruise tour buses from Ísafjörður. Sightseeing location.

5 Rögvaldur Ólafsson & Gyða Þórhallsdóttir. (2018, August)

Location / PA size / no. visitors ⁵	Key feature(s)	Survey collection location	Region	Visitor profiles
Hengifoss <i>No protected area designated, trail length 2,5 km.</i> 64.376 visitors	One of the highest waterfalls in Iceland. Unusual colouring on the rock wall. Most famous waterfall in the East.	Parking lot, trailhead to the waterfall	East	Independent travellers by car. Cruise tour buses from Seyðisfjörður. Sightseeing location, hike to the waterfall.
Hraunfossar <i>0,36 km²</i> 281.592 visitors	One of the most famous waterfalls in the West. Water flows through a lava field into the river.	Trailhead to the waterfalls	West	Independent travellers by car. Tour buses from Reykjavik. Sightseeing location.
Hvítserkur <i>No protected area designated.</i> 112.855 visitors	Popular volcanic rock monolith in the sea by the shore. Next to one of the largest seal colonies in Iceland.	Parking lot	North	Independent travellers by car. Some tour groups and buses. Sightseeing location.
Laki (VNP) <i>No separate area designation from VNP. Crater row 25 km long, trails in small core area.</i> 7.836 visitors	A unique row of craters from Iceland's most devastating volcanic eruption. Only accessible by F-road ⁶ during summer.	Visitor center	Southern highlands	Independent travellers by car. Some tour groups and scheduled highland buses. 3 short hikes marked by the park.
Landmannalaugar <i>446 km² (entire Fjallabak Nature Reserve)</i> 67.100 visitors	Popular hiking area and starting point of the Laugavegur trail. Located in Fjallabak Nature Reserve. Known for colourful rhyolite mountains, volcanic landscapes and geothermal activity. Generally accessible by F-road only during summer.	'Visitor center' / facilities	Southern highlands	Mainly hikers starting/finishing Laugavegur hiking trail and several day hikes available too. Considerable number of day trip visitors on the scheduled highland buses and 4x4s. Some guided tour groups.
Mývatn <i>37 km² plus 200 m wide lake shore and riverbank area.</i> 409.091 visitors	Protected wetland area around a lake. Very rich in vegetation and birdlife. Several volcanic and geothermal attractions surrounding the lake.	Visitor center; parking lots at Dimmuborgir, Hverfjall and Höfði	North	Independent travellers by car driving around the ring road. Tour buses from Akureyri. Mainly sightseeing location but also day hikes available.
Skaftafell (VNP) <i>4.807 km² (before it merged to VNP). Total area of VNP 14.141 km².</i> 735.728 visitors	Largest visitor center to Vatnajökull NP, near the glacial lagoons and several glacial outlets. Many hiking routes to the surrounding mountains and glacier edges.	Visitor center, camp site	South	Independent travellers by car. Tour buses from Reykjavik. Both day visitors sightseeing the glacier edge, and hikers staying in the area longer. Lots of organized tour activity in the area.
Snæfellsjökull National Park <i>170 km²</i> 392.168 ⁷ visitors	Snæfellsjökull glacier and volcano. Unique volcanic landscapes by the sea.	<i>Spending data collected in 2017:</i> Malarrif visitor center, parking lot at Djúpálónssandur	West	Independent travellers by car. Tour buses from Reykjavik. Mainly sightseeing location but also day hikes available.

6 Term used by the Icelandic Road Authority for mountain roads that require 4x4 vehicles

7 Visitor number provided by the Snæfellsjökull National Park (2018)

Location / PA size / no. visitors ⁵	Key feature(s)	Survey collection location	Region	Visitor profiles
Þingvellir National Park 237 km ² 1.526.523 visitors	Historical parliament site, and rift valley between tectonic plates. A world Heritage site.	Visitor center (Hakið), information center camp site, parking lots P5 and Silfra	West / Capital	Independent travellers by car. Tour buses from Reykjavik. Typically, part of Golden Circle tour and sightseeing visitors, but also hiking trails provided.
Þórsmörk <i>Protected from grazing under the Icelandic Forest Service. Length of valley behind grazing fences is ca. 10 km.</i> 40.390 visitors	Popular forested hiking area in a mountain valley surrounded by glaciers. Start/end of Laugavegur and Fimmvörðuháls trails. Only accessible by F-road during summer.	Langidalur hut & campsite	South	Mainly hikers starting/finishing Laugavegur and Fimmvörðuháls trails. Several day hikes available too. Some day-visitors on scheduled buses and on tours.

4.5 Other locations in Iceland

This study focuses on the above-mentioned sites selected by the Ministry of Environment and Natural Resources. As indicated in Table 2, their combined visitor numbers (ca. 3,8 million) cover majority of the visits of the ca. 2 million annual tourists to Iceland. Figure 1 also demonstrates how the selected sites cover different regions in the country apart from the central highland. There are many other nature-based tourism sites that could be included in the study, however for practical purposes in terms of time and associated costs some limitations need to be made. As such, the results of this study regarding the national-level economic impacts of parks and protected areas should be considered a comprehensive subset of the overall value.

Countries with many national parks and protected areas such as United States and Finland have generated generic visitor profiles to represent the spending of different visitor segments across the country - these are typically collected from a sample of PAs and then updated on a recurring basis (Huhtala et al., 2010). Since this study presented the first comprehensive collection of visitor spending data from different national parks, protected areas and nature sites in Iceland, the economic analysis of each site is conducted with primary data from each location as we did not know beforehand whether there were major differences in the spending and segmentation of the visitors.

For future reference, however, we have generated generic spending profiles based on the whole spending survey dataset collected as part of this study (see 5.3.1.4). This allows other studies to estimate the economic impact of other sites based on the generic profiles together with site-specific visitor numbers and visitor segment information. Sampling visitors into the visitor segments is significantly simpler, faster and cheaper compared to collecting a representative sample of their spending at a new location; and there is a considerable number of other locations where visitor numbers are already being collected (see 11.5). As always, results from such benefit transfer approaches should be interpreted carefully and conservatively.

4.6 Visitor counting data

Having accurate visitor counter data was a prerequisite for the selected research sites as visiting numbers are a direct multiplier in the results and a major factor in calculating the economic impacts. Rögnvaldur Ólafsson & Gyða Þórhallsdóttir (2018) have been installing visitor counters over the past few years in all national parks and many other nature sites in Iceland, and publishing detailed visitor numbers annually. Most of the counters count vehicles on the road, and the vehicle numbers are converted to visitor numbers by a multiplier (typically between 2,5-3,5) based on how many people are on average in the cars or buses. The multipliers are determined at each site by manual hand-counting during a calibration period (Gyða Þórhallsdóttir & Rögnvaldur Ólafsson, 2017).

4.7 Visitor spending data collection

In general, visitor studies need to cover approximately 500 people for a balanced and statistically significant sample. For example, Kajala et al. (2007, p.90) recommends “300–500 observations as a target sample size, depending of course on the area and time frame (i.e. seasonality), number of visitors, and available resources...” but also continues “...in visitor surveys, the demands of statistical science are met modestly, since the number of visitors and the visitor profile are often unknown in advance and the sampling cannot be performed with complete randomness, given the available resources.” Vaske (2008) recommends using the Dillman’s equation for estimating the sample at a desired statistical significance. In this study, based on the different sites’ annual visitor populations, Dillman’s sample sizes would be between 262-271 visitors (90 % confidence interval, ± 5 % sampling error) and 366-384 visitors (95 % confidence interval, ± 5 % sampling error).

Ideally, for a balanced seasonal coverage and statistically significant sample, this study would have followed the pilot study at Snæfellsjökull NP last year, where a sample of circa 500 visitors was collected from the winter (ca. 200) and summer (ca. 300). However, the timeframe of this study didn’t allow winter sampling; all visitor spending data was collected between June 6th - September 10th, 2018. Thus, a compromise target of collecting a seasonal sample of 200-300 people from each site (equivalent of the seasonal sample in the pilot study) was set, also based on the experiences of the pilot study where Siltanen (2017) pointed out that the samples showed signs of saturating after 200 people, i.e. further responses didn’t show new patterns or significant variation.

Statistical significance of the samples was not set as a target as the summer sample was expected to be heavily biased towards the campers (discussed further in 4.7.1, 5.1 and 8); even if the samples had been statistically significant, true sampling error due to one-sided seasonal representation would have been much higher than the 5 % indicated by the calculated statistical significance. Sample sizes from different sites excluding the pilot study varied between 209-351 visitors (see Table 5), and incidentally would meet the Dillman’s sample size recommendation apart from Ásbyrgi, Laki, Skaftafell and Dynjandi at 90 % confidence interval.

Due to the limitations above, we recommend considering site-based samples only as indicative representations of the annual visitors. Seasonality aside, an alternative approach to the statistical significance would be to use visitor segment spending averages from the whole dataset as the spending figures, and then localize them by site-specific visitor segment ratios and visitor numbers. This approach is used for example by the Finnish and US National Parks where the spending surveys are conducted only at a few locations and then generalized to the other sites. This allows much more efficient data collection and a larger base sample. However, as this was the first nationwide study in Iceland, we didn’t have baseline data to make assumptions on which locations would represent certain other sites well and which ones would not. As we discuss in 5.3.2, there are significant variations in visitor spending between the sites, thus we believe that the individual site-specific samples will provide a better basis for the economic analysis than a larger generalized sample, even though the samples are not strictly statistically significant.

The exact survey collection locations are indicated in Table 2. The researcher collected the spending surveys at sites where there are no rangers or park staff generally present (Hvítserkur, Þórsmörk, Hengifoss). At the other sites, the researcher trained the rangers to collect the data, and the surveys were collected either as a combined effort (Ásbyrgi, Hraunfossar, Mývatn, Landmannalaugar, Þingvellir) or mainly by the rangers or park managers (Dynjandi, Laki, Skaftafell). The survey collection took place between 9am-6pm at each site, and lasted typically 2-3 days. However, at Dynjandi and Laki with limited human resources and fewer daily visitors it took up to 4 weeks.

The main principle during the survey collection periods at the research sites was, if possible, to engage with every adult visitor walking through the parking lot, trailhead or visitor centre, and invite him or her to participate in the survey unless the interviewer / survey collector was already engaged with another visitor. The idea was to create a snapshot of the different types of visitors during the surveying period. Following the remarks from Kajala et al. (2007) above, the sampling method is called non-probability convenience sampling (e.g. Etikan et al., 2016) as we are

focusing on a sample of visitors that is available to us at a certain moment and willing to participate. Convenience sampling is subject to potential biases; for example, language issues may prevent non-fluent English speakers to participate, visitors on tightly timed bus tours may not feel that they have the time to participate, time of the data collection may exclude some people due to incompatible holiday periods, etc.

For probability sampling, we would need to know the exact population visiting all the research sites, and then wait at the sites long enough to reach a proportionate share of each part of the population. In a study such as this, we don't know descriptive statistics from the total visitor population to formulate the representative groups, and the time and resources needed to collect representative samples are prohibitively high. In this sense, the results are not directly generalizable to the total population visiting the national parks and protected areas in Iceland, but the results should be considered a fair representation of the visitors as an attempt has been made to cover as much of the heterogeneity as possible by approaching nearly all people visiting the sites at a given time. In that sense, the sampling method has purposive sampling features (Etikan et al., 2016).

4.7.1 Summer vs. winter data

Within the timeframe provided for this study, collection of separate samples in the winter was not possible, nor would all research sites have been accessible, so the annual results are based on the spending during summer. This is not expected to be a source of positive bias in the final results due to the following reasons:

- Research sites that are only accessible in the summer are represented accurately in terms of spending data.
- Study at Snæfellsjökull NP (Siltanen, 2017) showed, that visitors in the winter spent on average considerably more money per day than in the summer (26.364 ISK vs 20.962 ISK) due to mainly two reasons: lack of camper segment in the winter that spends the least amount of money per day of all the foreign visitor segments, and visitors participating more in guided bus tours instead of self-driving. Thus, by using summer spending data to cover the entire year, we likely underestimate the overall spending as the visitor segment that is spending the least is essentially cut out in the winter.
- Siltanen (2017) also noted that during the winter visitors spent less time at the national park (on average 1,6 days compared to 2,1 during the summer). To adjust the time spent at the sites conservatively to include the winter period, all length of stay responses over 2 days were downscaled to 2 days, and typical day-visit locations downscaled to 1 day, further explained in 4.7.4.6.

4.7.2 Survey form design

The visitor spending survey form, originally based on Huhtala et al. (2010, p. 6), was used essentially unchanged from the Snæfellsjökull study as it provided all the necessary information for the study and complies with the World Tourism Organization (UNTWO) recommendations for tourism statistics (United Nations, 2010). In this study, the surveys were provided in English and Icelandic, which proved to be a good decision and increased the response rates from locals as some who initially were not willing to participate, changed their mind when the form was provided in Icelandic. For future reference, as noted already last year by Siltanen (2017), German, Italian and French survey forms would have been useful as well. However, each language obviously adds effort to generating the different versions. In addition to having a base version of the survey in each language, additional translation work is needed for the other nearby sites and activities for each location.

Paper-based survey forms were used at Laki and Dynjandi (see 11.1) due to poor mobile data connections. At all other sites the responses were collected with an electronic version (see 11.2) of the survey and a weather-proof Android-tablet with an internet connection. In the electronic version of the survey, the most popular nearby attractions were listed as checkboxes so minimize the need to write anything on the touch keyboard, whereas on the paper version they were provided just a blank line. The online survey tool 'SurveyMonkey' didn't allow input columns side by side for the visitor spending in different categories, so they were placed one after another in the electronic version.

As most of the visitors travel in a group of 2-4 people (couples, families, small group of friends, etc.), they have nearly always have paid certain expenses related to the trip together (accommodation, rental car, joint dinners, grocery shopping, etc.). If they were answering the survey together, the form allowed them to sum up their expenses to one reply for joint expenses plus individual expenses in each spending category. In the data harmonization phase, the joint expenses of were divided by the number of people for each spending category to get per-person spending. These per-person spending figures were weighted by the number of respondents behind each entry in the final averages.

There are many benefits to this approach:

- 1) It is more efficient than asking 2 or 4 people each to fill a same survey when they can do it together.
- 2) It eliminates the need for people who have paid for things together (vast majority of respondents) to divide the expenses in their head, which has potential for a lot errors, especially when done in foreign currencies.
- 3) Related to the previous point, often only one person in the group or couple has paid for and knows the actual shared expenses. This approach ensures that that person is involved in writing down the expenses and they get appropriately divided between the participants in post-processing.
- 4) It's more engaging: people are more likely to fill one survey together than several separately.
- 5) Filling out one sheet allows the researcher to verify the submission and ask additional questions or clarifications as necessary - verification can be done for one sheet but not for four as participants are ready to walk away.
- 6) Reduces costs as less tablets (or paper sheets) are needed for data collection.

While this approach allowed more efficient data collection, no assumptions were made about anyone's spending. All visitors represented in the surveys had to be present to be able to be counted into the responses. If they were not, or the person filling the survey did not feel knowledgeable or confident in entering others' expenses, they were advised by the form and survey collector to select the option that the survey represents only him/her, and enter his/her personal share of the groups' expenses into the survey.

Overall, the results represent 3.005 visitors, collected via 1.141 valid surveys. On average 2,6 people responded together, matching closely our experience of 2-4 people typically travelling as a group. For the pilot study (Siltanen, 2017), there figures were 501 visitors, 215 surveys and 2,3 visitors per survey.

4.7.3 Experiences from the survey collection

As this is the first study into the economic impacts of protected areas in Iceland on a country-wide scale, this report also aims to document the challenges that were observed due to the study setup, unexpected visitor behaviour and special issues related to individual sites, so that these issues can be addressed or prepared for in future studies. A brief discussion and recommendations for the future studies concerning these issues are provided in the following subchapters.

4.7.3.1 Separating local expenses from expenses paid elsewhere

The issue of studying local vs. national economic impacts was discussed already at length in the pilot study (Siltanen, 2017; Chapter 5.4). Originally the MGM methodologies have focused on visitor spending in the local surroundings of protected areas and it has not been necessary to consider visitor spending outside of the park or PA surroundings. This is logical when visitors come to spend entire days in the parks. However, in Iceland this issue warrants a closer look as travel patterns of many visitors include a lot of driving through different areas in a short period of time, and sightseeing trips to the protected areas from the capital region and other hubs, for example ferry ports. Visitors like this may end up spending very little time around a particular site or protected area, but their daily spending is still driven by the visits to different nature sites or protected areas. They may even end up staying overnight at the 'next protected area' to visit it the following day outside of the bounds of the site they visited for the spending survey. Due to these unusual protected area visitation patterns, it was decided in the beginning of this study to collect spending

data related to the research sites also outside of the immediate vicinity to be able to form an overall estimate of the economic impact. This was also a request from the Ministry of Environment and Natural Resources that commissioned this research.

Capturing expenses paid locally and elsewhere requires two sets of spending questions in the visitor spending survey; the paper version used two columns side by side and the electronic version separate questions due to technical limitations (see 11.1 vs. 11.2). In both cases this question setup proved to be difficult for many participants in particular if they filled the survey unattended. Based on the overall results of this study, it makes sense in the Icelandic context to collect visitor spending separately for the vicinity of parks and protected areas and elsewhere in the country. However, it generates an overhead of added complexity and time required for the survey collection. If the visitor spending survey can be collected by a surveyor personally interviewing the respondents, or the survey setup allows checking the responses and asking additional questions, the format used in this study can be used in the future. If there are plans to collect visitor information (including spending surveys) autonomously by kiosks, tablets, mobile surveys etc., the recommendation of this study would be to drop the current survey format, and either ask for all spending (local or other) in the different spending categories, or focus only on the local spending.

4.7.3.2 Geographical difficulties

Some respondents had trouble discerning what counts as local spending. The form provides a map of the local surroundings in roughly 50 km radius (see Appendix 11.9) with major towns and points of interest as a reference but visitor may still have difficulty to recognize where they have spent money.

4.7.3.3 Telescoping error

Asking the visitor to include spending elsewhere easily blurs the time-frame of the survey in the visitors' mind and increases telescoping error by prompting them to add costs beyond the defined time-frame. Even though the instructions in the survey clearly stated that all spending should take place in the last 24 hours or during one full day, it was not uncommon for visitors to include the spending of their whole trip in the elsewhere column - if caught, the survey collector asked them to correct this on the spot, otherwise spending that could not be broken down to 24 h period was simply removed in the data harmonization phase.

4.7.3.4 Pre-paid expenses

Asking visitors to provide expenses they've paid elsewhere also prompts them to include pre-paid expenses online, via tour agents etc. If these are associated with the visits to the research sites either in the local vicinity or elsewhere, they are relevant and should be included - focusing on onsite spending only would give an incomplete picture. However, at the same time including these expenses adds complexity to filling out the surveys and difficulty in remembering the paid expenses exactly as they may have taken place months ago. Many visitors took the time to find receipts and booking confirmations from their mobile phone emails to be able to provide accurate information. A pre-paid expense that participants often forgot was their means and cost of transport. The surveyors often needed to ask whether visitor had any costs for rental cars etc. to get to the site. As the expenses were surveyed for 24 h period only, respondents either calculated longer-term bookings down to one day, or if that was not possible, length and contents or tour packages was recorded in the 'additional information' field and processed in the data harmonization phase.

4.7.3.5 Role of the survey collector

The issues above are covered here to highlight the challenges that are associated with attempting to separate the local and national impacts. It's not surprising that Huhtala et al. (2010) dropped a similar early design in favour of one column / local spending -oriented format due to it being confusing to the respondents. However, it should be noted that majority of the respondents had no problems filling out the survey form correctly, and in most cases, all that was needed was a quick check of the completed form by the survey collector that information was appropriately filled. On

the paper form corrections are of course easy to make, and the electronic form also allowed returning to the filled survey and re-submitting it if there were mistakes.

The role of the survey collector is crucial to properly-filled quality data. Respondents don't generally read instructions - or even the actual questions - carefully, and it makes a significant difference if the surveyor tells the key points to the respondent as he/she hands the tablet or paper survey. It has a major impact for consistency of the data and reduced need to clean and harmonize data, if the survey collector has time to check filled surveys and ask further questions if needed. Surveyor may also choose to conduct the survey as an interview and fill in the survey him/herself. The result is data that is almost instantly ready for analysis, but drawback is of course longer time needed to collect the surveys as the surveyor is focused on one person/group at a time.

The visitor spending survey data was collected both by the main researcher and park staff (e.g. rangers, managers) at different locations. At all locations where park staff was used, they received a brief training for their role as a survey collector concerning the key points that the data is collected for, how to instruct survey participants, and what common issues or mistakes to look for when checking the filled forms. Overall, the most useful part of the training was collecting the surveys together at least for a couple of hours to get experience and encounter different issues related to the survey and visitors' situations. A written set of instructions was also provided reference for the survey collectors.

4.7.3.6 Not all local spending is captured locally

An issue that needs to be addressed in discussing the local impacts of visitor spending is the fact that not all companies are registered in the local municipality. For example, a visitor spends money on glacial hike tour near Skaftafell - if the company is registered in the capital region, the economic impacts would be realized mainly there. However, the MGM2 analysis would calculate the impacts for the local area. This issue affects to some degree all main tourism sectors, and generates a potential positive bias towards the local impacts. The visitors can't be expected to know such details when they fill the surveys, and there are not many options in the methodology itself either to compensate for this. Verifying the results from the MGM analysis against the regional tax data is the main way in this study to recognize this issue. For future studies, a solution - albeit a time-consuming one - could be to ask the visitors which hotels or tour operators they booked their services with and then in the data harmonization phase check the registered locations of the companies to place the economic impacts in the right place. Approaches like this would need further research before wide-scale implementation to ensure that they don't skew the results in other ways.

4.7.3.7 Remaining issues / local spending around Þingvellir

Most of the challenges described above regarding the visitor spending surveys were either resolved onsite by the check of the filled survey, or by the data harmonization procedure outlined in the following Chapter. However, a closer analysis of Þingvellir's visitor spending data showed that it was not possible to separate the spending reliably between the Park's immediate surrounding municipalities and the capital region. An attempt at this was made in the survey design by cutting the capital region out of the map that provides a reference for the 'local surroundings' for the respondent. Despite this effort, it was obvious from the results that majority of the visitors had accounted expenses for the vicinity of the park also from the capital region. As Reykjavik is within 50 km radius from the National Park, this does correspond to the way data was collected from the other sites, but prevents separate analysis of the park's economic impacts to the immediate local surroundings, e.g. Laugarvatn and towards Selfoss.

4.7.4 Harmonization and cleaning of data

As explained above, both during the data collection last year at Snæfellsjökull and this year around the research sites, visitors tend to make certain common mistakes when filling the survey form. Usually these are relatively easy to notice from the results, and steps to harmonize the data can be taken to remove the any effects that might cause a potential bias. Following paragraphs outline the procedure that was used to clean and harmonize the visitor spending

data from each research site.

4.7.4.1 Currency conversions

All expenses given by survey participants in other currencies were converted to ISK using the Central Bank of Iceland mid-rate for the time of the data collection at each site. Currency rates have not been harmonized to a single point in time, however during the survey collection period June-August 2018, the Icelandic krona remained relatively stable throughout the period around 108 per USD and 125 per EUR (July 15th).

4.7.4.2 Expenses entered twice

If respondents entered locally paid expenses also to 'paid elsewhere' column, these were removed to prevent expenses being counted twice. Additionally, if respondents provided the cost of one-night accommodation both for local and 'elsewhere' location (their logic being to include the night before and current night), the local night was kept and 'elsewhere-night' was removed regardless of which one was higher or lower to acknowledge the fact they did spend a night near the protected area.

4.7.4.3 Package tours

For participants who were part of a package tour, the total day cost of the tour package excluding flights was placed in the 'paid elsewhere' -column to account for accommodation, transport, guide and food services in Iceland, but no attempt was made to break it down to the different services as this would have been impossible to know apart from simple assumptions. In these cases, the costs of accommodation and transportation of these participants was excluded from the spending averages used in the analysis but the spending counted towards the total economic impact of the visitor.

This results in a slight bias towards the total impacts and makes the local impacts more conservative, as at least part of the accommodation and food services likely took place in the local surroundings of the sites. Many of these tour packages are also paid into foreign tour agents' accounts abroad - and only a part of the package price is then later transferred to Iceland to pay for the local services here. This issue was covered by using a 50 % capture rate for tours, essentially cutting out more than a 20 % share for the foreign agent or booking service from the economic impact analysis as this doesn't reach the Icelandic economy.

Passengers on cruise ships have been a regular topic of discussion in Iceland regarding their economic contribution to the country and the areas around the regional ports. In this study, no special treatment was applied to cruise passengers mainly for two reasons. First, the survey form didn't have a separate field for visitors to indicate that they are on a cruise tour, so we can't reliably separate them from the responses; some visitors at Mývatn did volunteer this information to the survey collectors and it was recorded in the notes. Second, the cruise passengers visit the sites on specific days when the ship docks nearby, so it's difficult to get an accurate representative share in the survey population using convenience sampling for a couple to few days at each site. We believe that using a low capture rate all tours and tour packages accommodates for some of the spending of the cruise passengers that does not contribute to Icelandic economy.

4.7.4.4 Other tours and activities elsewhere during the 24-hour period

Any other tours or recreational activities that respondents participated 'elsewhere in the last 24 hours' were removed from the data before analysis as they generally are not related to the economic impact of nature site / protected area in question.

4.7.4.5 Omission of expenses

If there was a reason to suspect that respondents had forgotten or didn't know to provide a value for cost of accommodation or transportation, these figures were excluded from spending averages used in the analysis. For

example, respondent selecting 'hotel' for type of accommodation but not providing any cost for the night of accommodation. In these cases, the rest of the spending data was still used in the analysis.

4.7.4.6 Downscaling the length of stay

An adjusted length of stay variable was created to make the time spent at the site more conservative as explained above regarding winter period spending and stays. Respondents were asked how long they spent around the vicinity of the nature-site in question. Even if they answered more than two days, all replies were maxed at 2 to consider that they might have been doing other non-PA activities around the sites on the following days as well.

This approach also worked particularly well with the typical travel pattern of visitors hiking the Laugavegur trail between Landmannalaugar and Þórsmörk - many of them responded staying 4-5 days in the area, not realizing that they leave the Landmannalaugar area (Fjallabak Nature Reserve) typically on the second hiking day, and spend the last two days around or close to Þórsmörk, which was another site in the study. Thus, scaling the length of stay down to 2 prevents double-counting as the 'other end' is captured by another survey.

Only exception to downscaling the length of visit were school or research groups we knew spend longer time at a certain site - for example a group of geology students staying longer than a week at Þingvellir.

Additionally, average times spent on typical day visit sites such as Hraunfossar, Hengifoss and Dynjandi were further scaled down to 1 day as these sites don't provide opportunities for visitors to spend several days at the site - visitors typically stop for a short period of time and continue to another location. As the same survey form and methodology was used for consistency at all sites, it was possible for people to reply that they stayed longer than a day 'in the surrounding area' of the site, even though they would have only visited the site in question briefly. This would generate a positive bias towards the economic impact of the site if it was not handled. Similarly, Hvítserkur would have been scaled down to 1 day as well, but the average time visitors spent there was already 0,9 days due to large share of the visitors marking it as a half-day (0,5) trip.

In the MGM2 analysis, the number of visitors was multiplied by the average stay based on the survey to establish the number of visitors' nights at the site.

4.7.4.7 Mistakes in entering currencies

Obvious mistakes in the visitors' spending figures were screened and corrected. For example, if respondent had said they used "100.000 ISK" (ca. 1.000 USD) for accommodation per person per night when they most likely meant 10.000 ISK (ca. 100 USD). Similarly, if they had chosen one currency but obviously used another, this was corrected.

4.7.4.8 Including and excluding zero-spending cells; weighed averages

Average spending per segment per spending category were calculated for the full spending figures with ('average spending across services') and without zeroes ('average spending on a category, e.g. average cost of a hotel night'). All spending averages are weighted respective to the respondents behind each entry, and average spending figures used in the MGM2 analysis include zeroes.

Overall averages describing the sample (e.g. between visitor segments or across all sites) are weighted based on the relative sample sizes giving each visitor in the survey an equal effect in the results. We also considered and tested weighing the overall averages in descriptive statistics with total visitor numbers instead of the sample sizes to evaluate the effect of the 'true weight' of the site, but chose not to include these results in the report as this approach renders the results and surveys from smaller sites essentially meaningless (e.g. weighing averages with Þingvellir's ca. 1,5 million vs. Laki's ca. 7800 visitors). Additionally, the differences from such comparison were surprisingly small; for example, comparing the average daily visitor spending accrued to the PAs between the two weighing methods, the difference was only 300 ISK from 12.056 ISK (see 5.3.2.2).

4.7.4.9 Multi-destination spending and exclusion of non-PA destinations

As discussed in Siltanen (2017), typical visitor travel patterns in Iceland include visiting several different sites each day - some possibly protected and others not - as they are driving around or visiting a part of the country. This kind of pattern is not very typical for national park and protected area tourism in general; in other countries visitors tend to spend more time and complete days in the parks.

This study followed the pilot study (Siltanen, 2017) in the way it handles multi-destination spending: include all spending for those visitors for whom the national park was the only or most important destination, divide the spending of those visitors for whom it was one among many planned destinations by the number of sites visited, and exclude all visitor spending for whom the national park was a non-planned destination. The approach suggested by Huhtala et al. (2010) and used in the economic impact analysis of the Finnish NPs and PAs - excluding all spending of visitors for whom the NP or PA is not the most important destination - was considered too strict in the Icelandic context in the pilot study.

For majority of the visitors, protected areas are one of many visited sites during a day (see 5.2.1). In such cases, the visitors' spending is divided by total number of visits in the 24h period, using only a fraction of the spending for the nature-site in question. For example, if the visitor spent 30.000 ISK in the 24h period, and visited two other sites outside the PA, only one third, or in this case 10.000 ISK of the visitor's spending was used in the economic impact analysis towards the PA.

As we don't know the details of visitors' visits between the PA and other sites within a day, this procedure is a rough and conservative estimate of the spending and impact related to the PA. The PA is dealt as 'one site' even if there are multiple locations within a day in the PA since to keep the survey form as short and quick to fill as possible, only visited sites outside the PA were enquired for. In practise this means that if a visitor visited 4 locations within the PA and 1 outside, the 50 % (not 80 %) of the daily spending will be considered towards the PA.

4.7.4.10 Visitor segmentation

Visitor segments were created based on following logic:

- If a visitor answered *Yes* to being a local resident in the surrounding municipalities - he/she became 'a local resident'.
- If a visitor answered *No* to being a local resident in the surrounding municipalities, but Iceland to the country of residence - he/she became 'a local'.
- If a visitor was neither above, and answered being on a half-day/day-trip at the site - he/she became 'a day visitor'.
- If a visitor was none of the above, and answered to be camping including campervans or sleeping in the car - he/she became 'a camping visitor'.
- If a visitor was none of the above - he/she became 'a hotel visitor' (including all other types of indoor accommodation).

Local residents from the surrounding municipalities were excluded from the economic impact analysis as per recommendations of Stynes (2000) and the general practice in this kind of economic impact studies due to the fact that their spending doesn't increase economic activity in the area - they would likely spend the money in their own municipality anyway. This methodological decision doesn't imply that their spending would be any less valuable to the businesses around the PAs. As the focus of this study is the local economic impacts of visitors to PAs, the spending of Icelandic residents from other parts of the country was included in the analysis as their spending represents 'new' income to the study area. With the same reasoning, their spending could be excluded from the national-level economic effects, as they would otherwise likely spend that money somewhere else in Iceland, but for simplicity it was included in the national-level economic effects as well to account it for the PAs as they could also spend it on non-PA activities.

Minimum number of respondents to form a visitor segment was considered to be n=20. Two exceptions to this were made (n=15 and n=19) as the data in these samples matched spending figures from other sites. Huhtala et al. (2010) mention n=10 as the absolute minimum for a segment size, though n=30 is recommended.

4.8 Assumptions for MGM2 analysis

As explained in 4.1, capture rates measure how large share of the visitor spending is retained in the local economy and will be included in the economic impact analysis. Tax rates for different kinds of services are needed to calculate the tax revenue generated by the visitor spending. Table 3 on the following page presents the capture and tax rates used in the MGM2 analysis in this study.

Table 3. Capture rates and tax rates used in the analysis.

Category	Capture rate	Tax rate	Source / rationale
Accommodation	80 %	11 %	Capture rate is based on up to 20 % booking fee some major internet booking engines charge for using the service. Not all bookings are subject to these fees, but accommodation services also procure some equipment and services from abroad. Standard lower VAT rate.
Camping fees	100 %	11 %	Campsites are assumed to capture 100 % locally as they are generally not part of international booking systems and utilize local supplies and construction services. Standard lower VAT rate.
Restaurants & bars	75 %	11 %	According to Statistics Iceland, ~25 % of food products in Iceland are imported, forming a conservative base for the capture rate. Standard lower VAT rate.
Transportation	30 %	24 %	Transportation category covers both public transport (e.g. highland buses) and rental cars, latter being the major source of spending between the two in the study. Transport sector in Iceland is based largely on imported goods as there is no local vehicle or fuel production. Fleets account for 60 % ⁸ of the cost structure of rental car companies in USA, likely more in Iceland as cars are much more expensive, and internet rental car booking engines can charge up to 20 % fees on bookings. Thus, an average of 30 % capture rate is used to cover profits, salaries and local facilities and services. Standard VAT rate.
Tours, tour packages, recreational and cultural activities	50 %	11 %	Many Icelandic tour companies run largely on imported goods: cars, fuel and outdoor/sports equipment. Additionally, internet booking engines and international tour agencies add booking fees up to 20 %. However, the value added (prices) in tours are also higher compared to transportation, so capture rate of 50 % is used. Standard lower VAT rate.
Retail sales	15-30 %	24 %	Capture rate of retail sales is based on regional sectoral tax data retrieved from RSK for this study. It conservatively assumes that all retail goods are produced abroad, and only employee salaries and taxable net revenue are captured in the local economy ⁹ . Standard VAT rate for retail goods. For tax collection purposes, all petrol station purchases are assumed to be petrol or diesel. 58 % of the price petrol ¹⁰ in Iceland is composed of various taxes.
Petrol stations		58 %	
Taxes on direct income		29 %	Based on Statistics Iceland ¹¹ on average individuals paid 29 % taxes on salary and capital income in 2017. Based on the tax data supplied for this study by RSK, companies in tourism sector paid similarly 29 % in various taxes compared to their taxable net revenue.

8 [How to explain car rental to banks and investors](#). (2011). Auto Rental News. [online]. Accessed Sep 26th, 2018.

9 Huhtala et al. (2010) calculated the retail margins for the Finnish study by comparing retail sector's output and turnover, but arrived at a similar range 22-36 %. Slightly lower capture rates can be explained by our assumption that all goods here are imported.

10 [Hlutur ríkisins í bensínverði aldrei stærri](#). (Jan 17th, 2017). Kjarninn. [online] Accessed Sep 26th, 2018.

11 Statistics Iceland. (2018). [Income by sex and age 1990-2017](#). [online]. Accessed Sep 26th, 2018.

5 Descriptive statistics

This chapter outlines the results from this study at all research sites with descriptive statistics focusing on the visitor categories, travel patterns and spending as these are most relevant to understanding the results of the economic impact analysis. Updated economic impact results are included for Snæfellsjökull National Park to align the results with the methodological updates in this study, but the descriptive statistics are not included as there are no changes to the results reported by the pilot study (Siltanen, 2017).

5.1 Description of samples

The visitor spending data samples from the 11 research sites were collected during June-August 2018 and distributed to visitor segments used in the economic impact analysis as described in 4.7.4.10. Table 4 presents the total number of visitors interviewed in each segment and the shares between the segments. The largest segment (~45 %) in the dataset were foreign overnight visitors staying in indoor accommodation - 'hotel visitors' in short, followed by almost equally-sized segments of campers (~26 %) and daytrip visitors (~25 %). Icelandic residents formed ca. 4 % of the sample. Total number of people surveyed in the approved responses was 3.005. Due to missing spending data or inconsistent answers that could not be cleaned or harmonized, responses from 70 visitors were discarded - these are not included in Table 4 or following analysis.

These results align closely in some segments with the sample (N=501) collected last year at Snæfellsjökull NP (Siltanen, 2017): the shares of 'hotel visitors' and locals were essentially same¹² between the two samples as illustrated in Table 4. Comparing the samples as whole, the distribution to visitor segments is different¹³. The share of day visitors was higher and the share of campers lower at Snæfellsjökull NP compared to this study, but these differences can be explained by the nature of Snæfellsjökull NP as a typical day-trip destination from Reykjavik, and with the fact that nearly half of the sample from Snæfellsjökull NP was collected during winter when there were essentially no campers.

Table 4. Visitor segment overview.

Segment	Number of visitors	%-share	%-share from SNJP pilot
DAY: Non-local day-trip visitor	728	24,6 %	41 %
HOTEL: Non-local overnight visitors in indoor accommodation, e.g. hotel, guesthouse, farm, mountain hut, AirBnb, cottage, friends, ...	1378	44,9 %	46 %
CAMP: Non-local overnight camping visitors, e.g. campsites, campervans, sleeping in the car, ...	775	26,2 %	10 %
LOCAL: Icelandic residents excluding residents of the local municipality	124	4,4 %	4 %
Total	3005	100 %	100 %

Table 5 describes the samples sizes and visitor segmentation at each site and Figure 2 provides a visual comparison. It is notable that at some of the sites we did not encounter or get any responses from Icelandic locals. Also, at a couple of the sites we received too few responses (<15) to form a visitor segment for the locals, so these responses had to be excluded from the analysis.

¹² Logistic regression; likelihood of same segment share between samples for 'hotel visitors' p=0.95 and locals p=0.73

¹³ Logistic regression; likelihood of same segment shares overall between samples p<0.001

The shares of visitor segments show interesting and statistically significant¹⁴ differences between the sites. Sites with a large share (> 30 %) of day visitors are Hraunfossar, Hvítserkur and Laki, with Jökulsárgljúfur and Laki almost at same numbers. We would have expected also Þingvellir to show a large number of day visitors due to the popularity of the Golden Circle tour, but only 13 % of the visitors fell into this category with the segmentation procedure used in this study (i.e. answering they were on a half-day/day-trip in the survey). This is likely due to the same issue as already described in 4.7.3.7 that visitors counted Þingvellir to the vicinity of the capital region, and answered staying in the area for example for 1 whole day, which places them in the hotel (or camper) category.

Table 5. Sample sizes and visitor segment shares at the research sites.

	Hraunfossar	Þingvellir	Landmannalaugar	Jökulsárgljúfur	Mývatn	Hengifoss	Skaftafell	Hvítserkur	Þórsmörk	Laki	Dynjandi	Total
DAY	103	44	52	60	33	70	19	151	46	81	69	728
	31 %	13 %	19 %	27 %	12 %	25 %	8 %	53 %	15 %	39 %	28 %	25 %
HOTEL¹⁵	177	249	109	19	139	128	157	73	111	104	112	1378
	54 %	71 %	40 %	9 %	51 %	46 %	66 %	26 %	37 %	50 %	46 %	45 %
CAMP	29	58	111	90	102	46	63	46	142	24	64	775
	9 %	17 %	41 %	41 %	37 %	16 %	26 %	16 %	47 %	11 %	26 %	26 %
LOCAL	19	0	0	53	0	36	0	16	0	0	0	124
	6 %			24 %		13 %		6 %				4 %
Total (100%)	328	351	272	222	274	280	239	286	299	209	245	3005

Locations with particularly high shares (ca. 40 % or more) of overnight campers were Landmannalaugar, Jökulsárgljúfur, Mývatn and Þórsmörk. For Landmannalaugar and Þórsmörk this result is to be expected as these are hiking destinations, perhaps for Ásbyrgi (Jökulsárgljúfur) as well as it's off the main tourism track, but it is interesting to compare Mývatn for example to Skaftafell or Hengifoss, which have a clearly lower proportion of campers. Skaftafell and Hengifoss may be visited in higher proportion by people on organized tours, whereas most visitors at Mývatn told the survey collectors that they were driving around the country. Mývatn area also has so many sites to visit that it encourages visitors with time to stay longer, as is evident from the low share of visitors on a day-trip (12 %) compared for example to Hvítserkur, who are likely mainly the same visitors, but at Hvítserkur they respond as being on a half-day/day-trip to the site and finishing the day somewhere else.

14 Sum of squares / goodness of fit test, 95 % confidence interval.

15 Mountain huts (*skáli*) at Landmannalaugar and Þórsmörk included in the 'HOTEL' category as it covers any indoor accommodation.

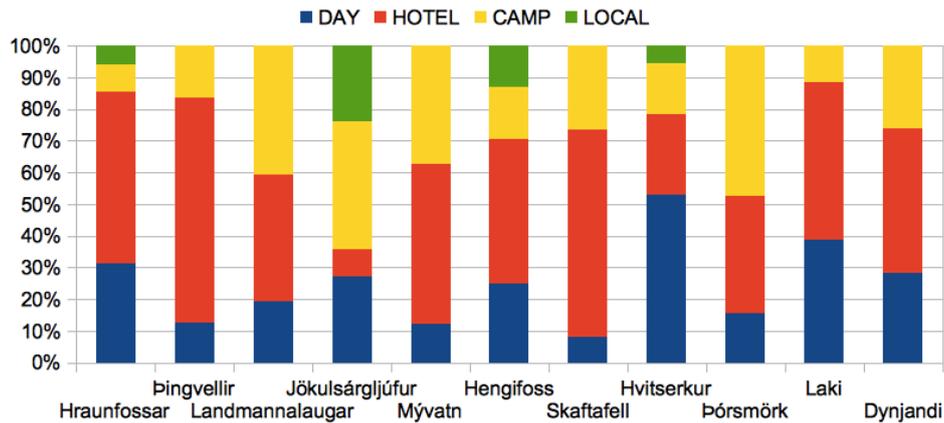


Figure 2. Comparison of visitor segment shares between locations.

To better understand how visitors are segmented, we can look at the choices of accommodation. Table 6 presents the shares of accommodation categories across all sites. Overall, the largest share of visitors (33 %) were camping (campervans included), 32 % of the visitors stayed in hotels or guesthouses and 11 % stayed at private rentals such as Airbnbs. Furthermore, 10 % stayed in dormitory accommodation such as hostels and mountain huts, 6 % stayed at summer cottages and the rest on farms, with friends or family, or sleeping in the car. It should be noted that since day-trip visitors in Table 4 account for both campers and people staying in indoor accommodation based on their length of stay around the research site, the shares between visitor segments and accommodation types are not directly comparable.

It is a significant finding that according to our study the largest group of visitors seem to be camping based on their choice of accommodation. There are a couple of obvious reasons for this. The first one is the time of the survey collection, June-August, which is the height of the camping season. If we had the opportunity to collect visitor spending data over the whole year, the campers' share would naturally be much lower, perhaps around 10-15 %. Another likely reason for the high share of camping visitors is the bias that convenience sampling generates towards visitors who are on a more relaxed schedule and have time to answer the survey - in comparison to the visitors on organized tours who are mostly staying in indoor accommodation. It may also be that the share of campers and campervan passengers is increasing as a cost-saving strategy as tourists are becoming aware of the high costs of accommodation and other services in Iceland.

Potential effects to the economic impact analysis from the positive bias in the share of the campers are mitigated with the fact that since they are the lowest-spending group of the foreign visitors, their over-representation in the sample generates a negative bias in the overall economic impacts. A positive bias in the local impacts may however be generated from the fact that campers tend to spend more time near the protected areas compared visitors on organized tours.

Other points worth noting from Table 6 are the relatively high shares of Airbnb accommodation around Þingvellir, Dynjandi, Hraunfossar and Jökulsárgljúfur. This is not surprising for Þingvellir as it depicts the accommodation choices and availability in the capital region, but for the other sites it may suggest a lack of other accommodation options. Dynjandi also has an usually high share of visitors (4 %) sleeping in their cars compared to the other sites regardless of having several campsites nearby. The high share of hotel and guesthouse accommodation at Laki depicts places of stay of the day-trippers around Kirkjubaejarklaustur. Jökulsárgljúfur had the highest share of domestic visitors, also represented by the highest share (13 %) of people staying at friends and relatives.

Table 6. Visitors' choice of accommodation at different research sites.

Type of accommodation (%)	Hraunfossar	Pingvellir	Landmannalaugar	Jökulsárgljúfur	Mývatn	Hengifoss	Skaftafell	Hvítserkur	Þórsörk	Laki	Dynjandi	Average (weighted)
Other	5 %	0 %	1 %	4 %	0 %	0 %	0 %	1 %	0 %	0 %	0 %	2 %
Hotel / guesth.	44 %	36 %	23 %	23 %	36 %	31 %	56 %	38 %	9 %	40 %	28 %	32 %
Hostel / hut	6 %	10 %	21 %	6 %	2 %	9 %	1 %	5 %	37 %	8 %	1 %	10 %
Farm	7 %	1 %	1 %	2 %	0 %	5 %	2 %	3 %	0 %	0 %	1 %	2 %
Private rental	14 %	28 %	4 %	11 %	5 %	10 %	4 %	10 %	2 %	5 %	26 %	11 %
Camping	15 %	18 %	43 %	35 %	42 %	37 %	30 %	37 %	47 %	34 %	35 %	33 %
Summer cabin	8 %	3 %	5 %	5 %	12 %	7 %	7 %	4 %	4 %	9 %	1 %	6 %
Family / friends	1 %	3 %	0 %	13 %	0 %	1 %	0 %	2 %	0 %	4 %	6 %	2 %
Sleeping in car	1 %	1 %	2 %	1 %	2 %	0 %	1 %	0 %	0 %	1 %	4 %	1 %

Figure 3 presents a comparison of the four main choices of accommodation (accounting for 88 % of visitors' choices and scaled to 100 %) across all the study sites. Accommodation options with marginal shares (farm, summer cabins, family & friends, sleeping in the car and other) have been left out from the figure. Skaftafell area interestingly has the highest share of hotel and guesthouse visitors of all the research sites, and essentially everyone else there is camping. Almost all sites have at least a small share of visitors in all the four main categories. Landmannalaugar, Þórsörk, and to a lesser degree Laki, are the only sites with a significant share of visitors using the mountain huts. The same category at the other sites mainly represents hostels.

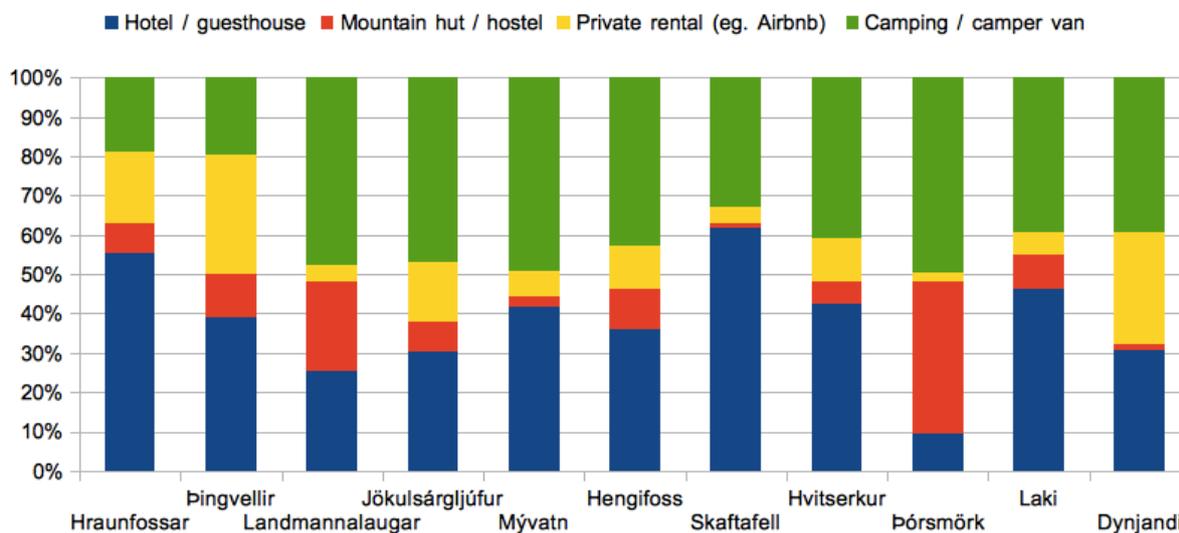


Figure 3. Visitors' main choices (over 10 %) of accommodation across research sites.

5.2 Visitor travel patterns

This Chapter explores the key figures describing the visitors' travel patterns and importance of the research sites to their travel plans.

Table 7 shows the average length of stay based on the visitors' answers to the visitor survey and the more conservative adjusted figures used in the economic impact calculations. Average length of stay varied between 0,9

days at Hvítserkur to Dynjandi's 2,4 days. Average of all the answers was 1,7. Especially the average stays of Dynjandi and Þingvellir show how visitors included the time they spent in the vicinity of some of the sites, not only at the site itself.

Thus, it was necessary to employ the two factors of conservativeness already described in 4.7.4.6 to focus the spending more closely on the sites: all stays over two days were downscaled to 2,0 before calculating the site-specific averages. For sites such as Dynjandi, Hengifoss, Hraunfossar and Hvítserkur the length of stay was further downscaled to 1,0 as visitors typically stop at these sites during one day only and have limited opportunities to camp or otherwise stay at the site. Average for Hvítserkur was already below 1 before the conservativeness factors as many visitors answered being on a half-day trip there. Average length of stay was 1,3 days after the conservativeness factors were applied.

In the national parks and protected areas, where visitors have opportunities to stay overnight (Þingvellir, Landmannalaugar, Jökulsárgljúfur, Mývatn, Skaftafell, Laki and Snæfellsjökull), the average length of stay was generally around 1,5 days. At Þórsmörk it averaged only 1,1 days due to some day-trip groups and people arriving from Laugavegur hike and taking the bus back either on the same or following day. Based on the visitor interviews it seemed that Þórsmörk is more often the finish than the starting point for Laugavegur.

Table 7. Average length of stay at different sites in days.

	Hraunfossar	Þingvellir	Landmannalaugar	Jökulsárgljúfur	Mývatn	Hengifoss	Skaftafell	Hvítserkur	Þórsmörk	Laki	Dynjandi	Snæfellsjökull ¹⁶	Combined average
Average	1,1	2,3	2,1	1,9	1,7	1,7	2	0,9	1,2	1,6	2,4	2	1,7
Adjusted	1	1,4	1,5	1,5	1,5	1	1,4	0,9	1,1	1,3	1	1,6	1,3

5.2.1 Multi-destination spending

Multi-destination spending shares allow us to target the economic impact of the visitors' spending more accurately where it was intended and limit the economic impact of spending connected to the park or protected area, if it was only a part of the visitors' activities on that day. Non-planned visits were excluded from the economic impact analysis altogether.

Overall, 80 % of the visitors visited the sites as one among other intended destination. 12 % visited the site was the only or most important reason to visiting the area, and 8 % of the visits were non-planned. These figures are very similar to the results from the pilot study, and follow the general travel patterns of visitors as discussed in 4.7.4.9. However, different sites have quite marked differences compared to the degree of importance of each site to the visit. Figure 4 demonstrates the differences.

Þórsmörk and Landmannalaugar have the highest shares of visitors stating that the area was the only or the most important destination for their trip. Together with Laki, these are areas at the edges of the highlands, and it's generally not feasible to visit other areas during the same day or trip, so in that sense these results are not surprising. However, many people at all these locations say that they are visiting other sites on the same trip, so they are not the only reasons for coming to the area either.

¹⁶ Snæfellsjökull NP figures provided here as adjusted length of stay is a new variable needed for the alignment with this study.

Comparing the other sites, Dynjandi has the highest rate (20 %) of being the most important reason to visiting the area in visitors' plans. In comparison with the other 'day-visit waterfalls' in the study such as Hraunfossar and Hengifoss, the numbers for Dynjandi are very high, and it seems to have an effect in drawing visitors to the area. Also, non-planned visits are much fewer to Dynjandi compared to Hraunfossar and Hengifoss.

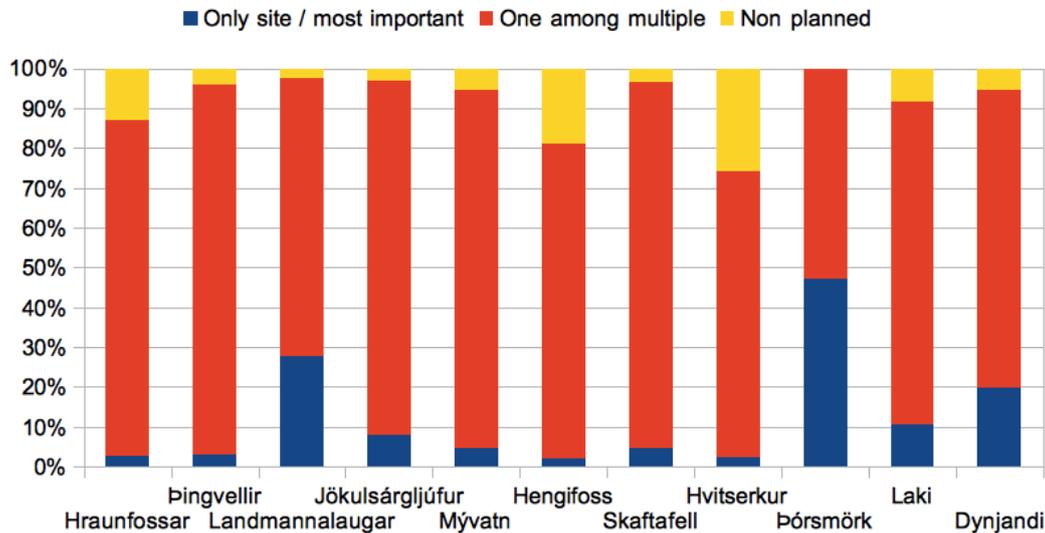


Figure 4. Importance of research site to the visitor (%).

This comparison is taken a step further in Figure 5, combining all the data collected between protected and non-protected areas related to this question (including data from the Snaefellsjökull NP pilot study). It shows that there is a clear difference in the perceived importance of the site to the visitor between protected and unprotected sites. The difference is also statistically significant (logistic regression model; $p < 0.001$).

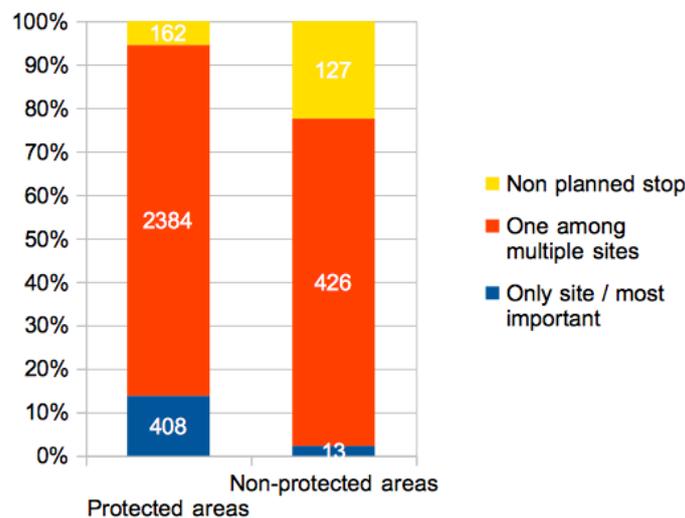


Figure 5. Importance of the protection status to the visitor (Number of respondents in each category in white.)

However, conclusions on the issue should be taken cautiously, as there might be other underlying site or context specific issues why people answer the way they do, that are unrelated to the protected status and did not surface with the used survey setup.

5.3 Visitor spending

5.3.1 Spending by visitor segments

In economic impact analysis using the MGM methodology, visitor spending is averaged by visitor segments, and these figures are then used to calculate the economic impacts. The visitor segments also offer opportunities to explore the data and see how spending decisions of visitors differ. All averages presented in this chapter are weighted to account for the different sizes of the visitor segments and samples from different sites. As the aim is to describe and compare the results between the visitor segments in the sample, the results are not weighted to account for differences in the total visitor numbers between the different sites.

5.3.1.1 Comparison between spending categories

Table 8 presents the average per-day spending of each visitor segment by the spending categories excluding zeroes - thus these numbers answer the question *'how much money did a particular visitor spend on a certain service on average, if they spent money on it'*. The spending is further separated to the money visitors spent locally in the vicinity of the protected area / research site, or in total anywhere in Iceland. Average spending on tours by day-trip visitors and foreign overnight 'hotel' visitors is high, almost 20.000 ISK overall. Spending by Icelandic locals is also high in comparison to the foreign visitors for fuel and groceries. Average cost of accommodation for overnight 'hotel' visitors was ca. 9.000 ISK per person, with locals paying almost similar prices if they paid for accommodation. Average total cost of daily cafe and restaurant purchases for all segments apart from campers was between 4.000-5.000 ISK.

Table 8. Average overall spending per visitor per day for each segment excluding zeroes in ISK.

		Fuel and gas station purchases	Transportation	Tours and recreation	Cultural activities	Accommodation	Cafes and restaurants	Groceries	Souvenirs	Other retail
DAY n=728	Local	2430	2395	6738	1704	6063	2944	1601	2048	523
	Total	3144	6590	11932	2278	7307	4577	2022	2699	1733
HOTEL n=1378	Local	1927	4591	8260	1102	8948	3979	1908	2104	1860
	Total	2542	5691	19499	1379	9023	5008	2285	2277	3906
CAMP n=775	Local	2512	4517	5877	1266	2279	2780	1864	1195	2279
	Total	3164	7588	6092	1660	2394	3114	3412	1860	1904
LOCAL n=124	Local	3956	1277	3137	1525	7846	4284	3676	1425	1798
	Total	4313	2421	3137	2291	8053	4225	4065	1425	2313
Average n=3005	Local	2283	3903	7065	1308	6484	3432	1895	1828	1642
	Total	2922	6263	13533	1707	6858	4383	2586	2237	2798

5.3.1.2 Overall spending

Table 9 presents the same data as the previous table including zeroes, so these are spending averages that could be used to calculate economic impacts if all daily spending is included (as per for example the US Park Service). Since they include zeroes, they are not so relevant for making conclusions from the numbers in each spending category. However, as they represent the entire spending of the visitors, the sums by visitor segments are very interesting as they show how much money in total visitors used while visiting the sites in the study.

In the vicinity of the protected area / research site, the overall spending per day varied between 7.482-12.750 ISK for the day-trippers and foreign overnight 'hotel' visitors. Average overall local spending per day was 10.187 ISK (ca. 81 €), which is high but comparable to the international studies presented in 4.3. However, when we keep in mind that in order to be able to travel in Iceland, many costs associated with the trips are either pre-paid or paid to the capital region in terms of car rentals, transportation services, tours, travel packages etc., thus we also need to look at the overall total spending associated with the visits. Including all spending, the range of daily spending becomes 13.179-26.641 ISK between Icelandic residents and overnight 'hotel' visitors. Average overall per-visitor spending per day is 21.865 ISK (ca. 175 €), which is significantly higher than generally reported in similar international studies.

Table 9. Average overall spending per visitor per day for each segment including zeroes in ISK.

		Fuel and gas station purchases	Local transportation	Tours and recreation	Cultural activities	Local accommodation	Cafes and restaurants	Groceries	Souvenirs	Other retail	Sum
DAY n=728	Local	1205	903	1164	89	2410	1080	391	201	39	7482
	Total	2321	4843	4388	233	5719	2619	1137	560	74	21893
HOTEL n=1378	Local	1074	842	1981	54	5514	2147	696	336	106	12750
	Total	1641	3508	8827	129	7215	3372	1159	481	308	26641
CAMP n=775	Local	1285	1235	1484	53	1808	1253	718	143	148	8128
	Total	2141	4742	2085	117	2083	1645	1457	264	201	14735
LOCAL n=124	Local	2440	177	535	119	2646	1633	2412	71	415	10450
	Total	3350	390	535	159	2817	1823	3435	71	598	13179
Average n=3005	Local	1217	931	1595	65	3688	1637	699	243	113	10187
	Total	2005	4021	5671	153	5347	2680	1324	427	235	21865

Figure 6 provides an interesting comparison of the overall total and local spending by segment based on Table 9. In terms of local overall spending, Icelandic residents spend more money than foreign day-trip visitors and campers, only slightly surpassed by the overnight 'hotel' visitors. Difference is mainly due to the Icelanders' high spending in fuel and groceries. Even in terms of total spending, Icelandic residents spend only slightly less than foreign camping visitors. However, the overall spending for foreign day-visitors and overnight 'hotel' visitors is much higher compared to the campers and locals.

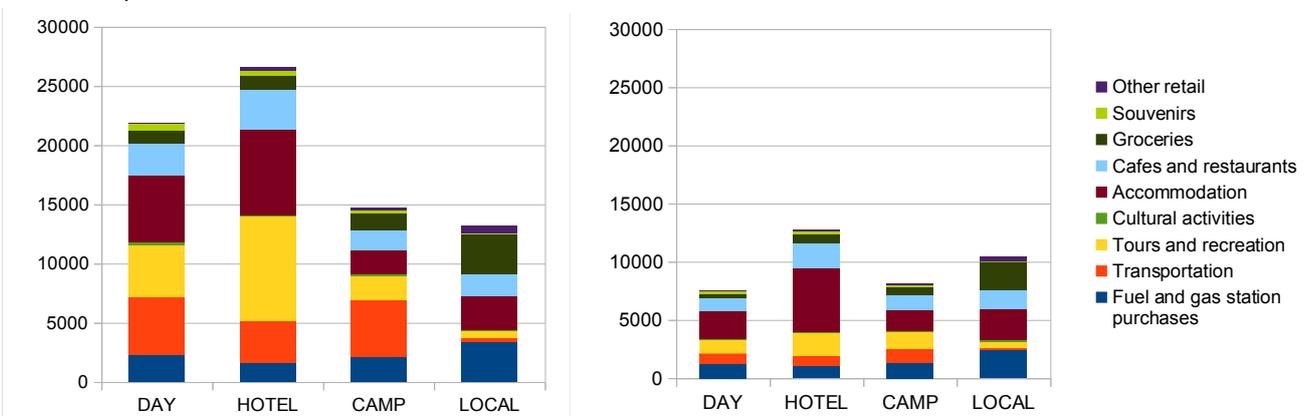


Figure 6. Total (left) and local (right) overall spending by segment.

5.3.1.3 Spending accrued for the protected areas only

In the previous Chapter, we looked at visitors' overall spending in connection with the visits to the protected areas and research sites. As discussed, overall the spending is high, and in most cases higher than in other similar studies. However, due to the multi-destination character of tourism in Iceland (see 4.7.4.9), the effect of other visited sites during the visitation days was removed and only the part of spending accrued to the protected area / research site considered, subsequently referred to as 'PA-only'. Additionally, all spending was removed if the visit to the site was non-planned. After these adjustments, Table 10 presents the final 'PA-only' spending figures by visitor segments that are used in the economic impact analysis.

The 'PA-only' local spending varies between 3.174-7.236 ISK per day between the Icelandic residents and foreign overnight 'hotel' visitors. Overall 'PA-only' spending varies between 5.271-15.535 ISK between the same segments. Respectively, averages for PA-only spending per visitor per day are 5.625 ISK (ca. 45 €) locally and 12.683 ISK (ca. 101 €) in total. These figures are comparable to the international figures presented 4.3, local spending slightly below figures presented in some countries, but total spending higher reported elsewhere in general.

Table 10. Average 'PA-only' spending per visitor per day for each segment in ISK.

		Fuel and gas station purchases	Local transportation	Tours and recreation	Cultural activities	Local accommodation	Cafes and restaurants	Groceries	Souvenirs	Other retail	Sum
DAY n=728	Local	653	910	627	65	1304	666	233	84	19	4560
	Total	1295	3245	3763	139	3596	1618	748	296	35	14734
HOTEL n=1378	Local	510	763	1141	25	3124	1114	387	118	54	7236
	Total	794	2083	5720	60	4039	1846	637	188	168	15535
CAMP n=775	Local	506	927	669	29	964	634	300	72	53	4153
	Total	885	2254	865	56	1074	841	675	157	64	6872
LOCAL n=124	Local	806	33	420	71	665	363	746	15	56	3174
	Total	1413	440	609	87	681	545	1390	18	87	5271
Average n=3005	Local	556	811	865	37	2025	851	342	94	45	5625
	Total	964	2341	3783	80	3028	1478	705	199	106	12683

Graphs in Figure 7 are generated from Table 10 to show the differences between the visitor segments, and to provide a comparison to the overall spending in Figure 6. In general, there is very little difference in the total overall spending and total 'PA-only' spending between the visitor segments, only the scale is lower for the PA share. Regarding the local spending, the figures are almost identical for the foreign visitor segments, again only the scale is different. However, in this comparison the Icelandic residents' spending becomes the lowest group, suggesting that their visits to the PAs / research sites are non-planned to a higher degree.

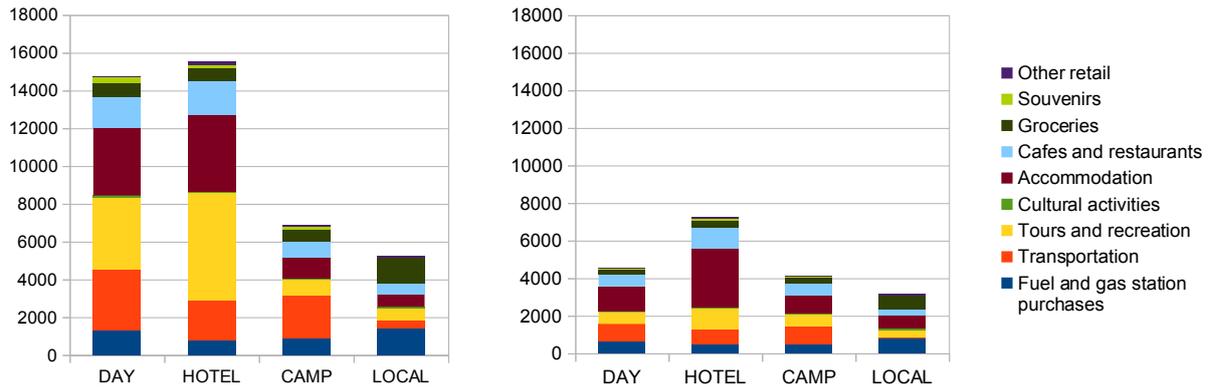


Figure 7. Total (left) and local (right) PA-only spending by segment.

5.3.1.4 Generic visitor spending profiles

As discussed in 4.5, based on the visitor spending data collected in this study, we set out to provide generic visitor spending profiles for Iceland that could be used in subsequent studies. Overall 'PA-only' spending figures from Table 10 are the best general reference for this, simplified in Table 11. Local 'PA-only' spending from Table 10 can also be used to estimate local economic effects of other protected areas of nature-based tourism sites, but in that case potentially flawed assumptions need to be made about the visitor behaviour and spending in a new local context.

For example, if a new location analysed using the generic visitor profiles is in the Central Highland where infrastructure or tourism services are not present in the same way as sites in this study, the local spending surveyed here can't be expected to accurately represent such a scenario since the visitor spending data in this study was collected around established destinations.

Table 11. Recommended generic visitor spending profiles to estimate total economic impact in ISK.

	Fuel and gas station purchases	Local transportation	Tours and recreation	Cultural activities	Local accommodation	Cafes and restaurants	Groceries	Souvenirs	Other retail
DAY	1295	3245	3763	139	3596	1618	748	296	35
HOTEL	794	2083	5720	60	4039	1846	637	188	168
CAMP	885	2254	865	56	1074	841	675	157	64
LOCAL	1413	440	609	87	681	545	1390	18	87

5.3.2 Spending by location

In addition to exploring the differences in spending by the visitor segments, it is also interesting to compare the differences in spending between the different locations. As with the visitor segments, first we describe findings on the overall visitor spending, and then the spending accrued for the 'PA-only'. Full tables associated with the figures in this chapter are provided as appendices 11.6 and 11.7.

5.3.2.1 Overall spending

The overall daily spending at the different sites was relatively even as illustrated by Figure 8. Average overall spending varied between 16.725-28.515 ISK (Dynjandi vs. Laki) with an average of 21.743 ISK (ca. 174 €). Sites with higher than average overall spending (ca. 25.000 ISK or over) were Þingvellir, Landmannalaugar, Skaftafell and Laki. This can be expected for Landmannalaugar and Laki, where visitors incur higher transportation costs getting there compared to

sites that are accessible by regular roads. Higher than average overall spending at Þingvellir is explained by the highest cost of eating out at restaurants and cafes, and second highest cost of accommodation, which are both likely connected to high costs of living and visiting Reykjavik compared to the rest of the country.

At Skaftafell the share of visitor spending on tour activities is much higher compared to other sites, on average ca. 12.000 ISK per visitor per day, and almost half of all their spending. Also, at Þórsmörk the share of tours in visitor spending was particularly high (ca. 11.000 ISK), almost as high as Skaftafell. However, this is due to the fact that a high percentage of the people that participated in the survey were part of organized Laugavegur hiking tours where they had paid a fixed tour price including guide, accommodation in the huts, food and necessary transport - we didn't break down the tours to these subcategories as we don't know the cost structures behind them.

Overall visitor spending was lower (under 20.000 ISK) at Jökulsárgljúfur, Hvítserkur, Þórsmörk and Dynjandi; not because of any particular reason in a specific spending category, but generally lower costs overall.

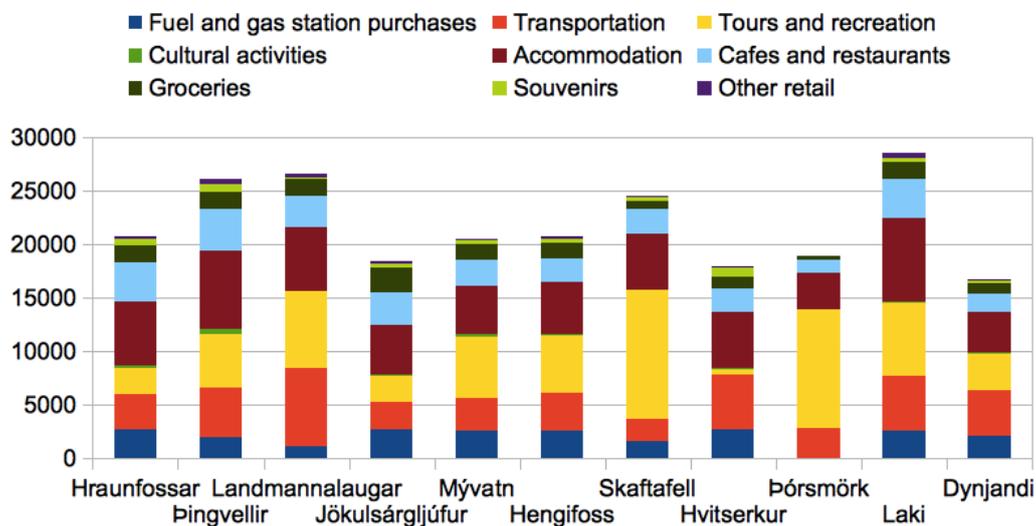


Figure 8. Total overall daily visitor spending at the research sites in ISK.

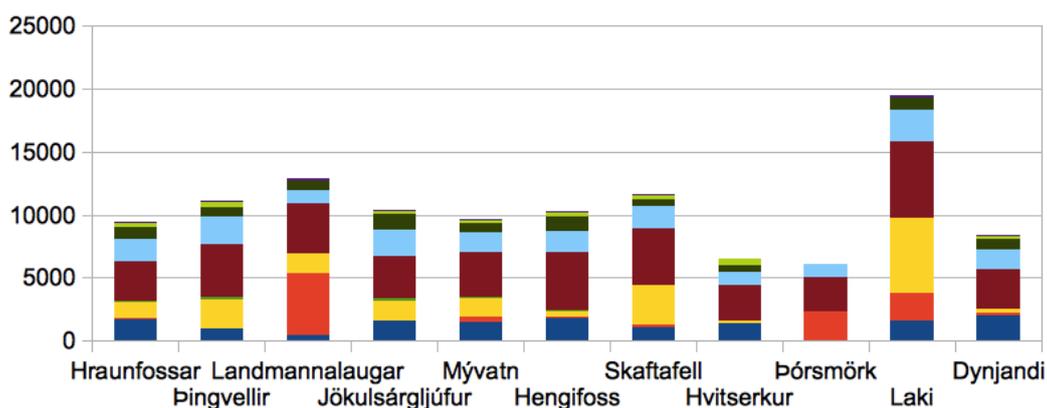


Figure 9. Local overall daily visitor spending at the research sites in ISK.

Figure 9 shows the overall local spending by the visitors around the research sites. In general, the local overall spending is even more evenly spread across the sites compared to total spending - at most of the sites, visitors spent around 10.000 ISK (ca. 80 €) in the local economy per day. Most notable exception is Laki, where the local spending was almost double at 19.000 ISK. Most of this spending is based on tours and accommodation, and it is accrued in the vicinity as it is generally not feasible to visit Laki and do other activities elsewhere during the same day. Services

acquired from Kirkjubæjarklaustur are included as local spending for Laki as it is within the 50 km radius, though the distance by road is longer. Comparing Laki and Landmannalaugar, we see that while the overall spending in Figure 8 is very similar, Laki retains most of it in the local economy whereas only about half is retained by Landmannalaugar. Especially the spending in tours to Landmannalaugar leaks out of the area while it is mostly captured for Laki - good example of the effect of proximity to the capital region.

Þórsmörk is also an interesting comparison to Laki with the lowest overall local spending (ca. 6.100 ISK); a similar site in the way that it generally takes the whole day to visit Þórsmörk and time-wise there would be opportunities for local spending. The difference is likely both the lack of services offered apart from huts and campsites, and the high share of visitors with pre-paid day or multi-day tour packages. Hvítserkur also had distinctly low local overall spending - most likely since it is generally a day-trip destination; visitors drive through the area without staying there.

While we make comparisons on the differences in visitors' spending, we should always keep in mind the visitor numbers, which have a much higher effect on the economic impacts than generally any differences in the visitor spending. For example, related to the previous example, in 2017 Laki had 7.836 visitors while Landmannalaugar had 67.100.

5.3.2.2 Spending accrued for the protected areas only

As in 4.7.4.9 with the visitor segments, when we remove the effect of other sites visited during the day, the visitor spending at different sites looks very different. Figure 10 and Figure 11 illustrate how the differences in 'PA-only' spending between the sites are much more pronounced than when comparing the total overall spending. The share of spending accounted for the research site from total spending is much higher at Landmannalaugar, Skaftafell, Þórsmörk and Laki compared to the other sites. This is mainly due to the fact that at all these sites there are few other sites visitors visit during the same day, so a higher share of their spending accrues to the site in question. The daily total 'PA-only' spending varies between 15.531-21.340 ISK at these four sites, with visitors spending on average ca. 18.500 ISK (ca. 150 €) per day in connection to the protected area / research site.

At Skaftafell and Þórsmörk especially the share of tours is very high in terms of overall spending. At Þórsmörk this is due to the day-trip visitor groups and Laugavegur hikers on a package tour. At Skaftafell the share of tours is high because glacial hike tours and glacial lagoon tours were included. Though they don't all take place at Skaftafell per se, they are within 50 km radius and take place in the Vatnajökull National Park. One economically significant tour aspect is also missing from this study due to the summer-only data collection: the ice cave tours taking place in the park at the edges of the Vatnajökull glacier. The ice cave tours cost around 20.000 ISK per person, and recent visitor counts on the trails to the ice caves place an estimation of the number of visitors around 100.000 per year (Þorvarður Árnason, interview, October 1st 2018). This indicates that this study may be missing a potential additional sales effect of ca. 2 billion ISK annually, since the other tours in the area generally run all-year-round.

The visitors' spending accrued to the other locations is relatively uniform between 6.293-11.455 ISK - half to one-third of their total spending during the day, at an average of ca. 8.100 ISK (ca. 65 €). Average total 'PA-only' spending across all the sites is 12.056 ISK (ca. 96 €) when weighted by the annual visitor numbers at each site.

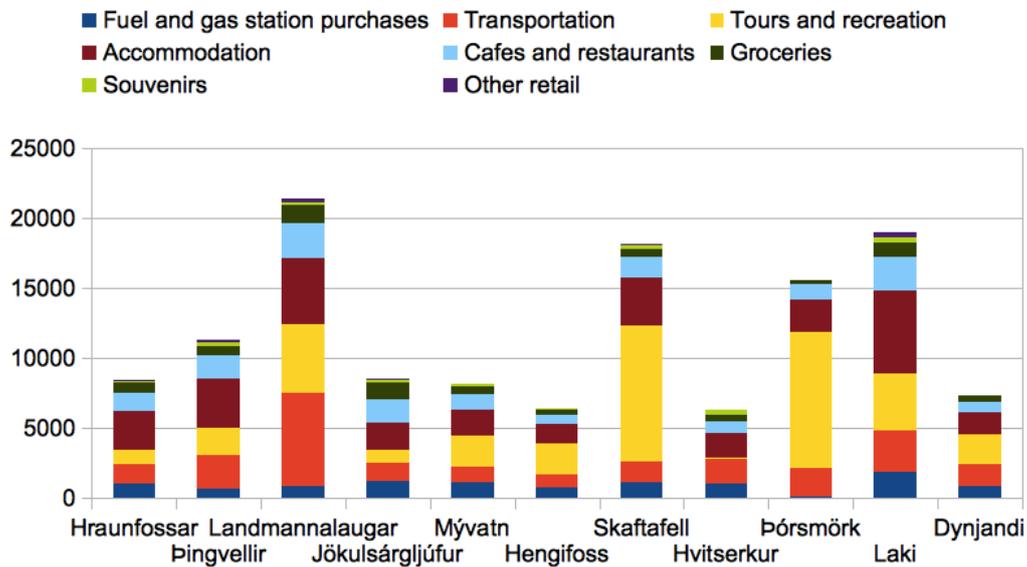


Figure 10. Total 'PA-only' visitor spending at the research sites.

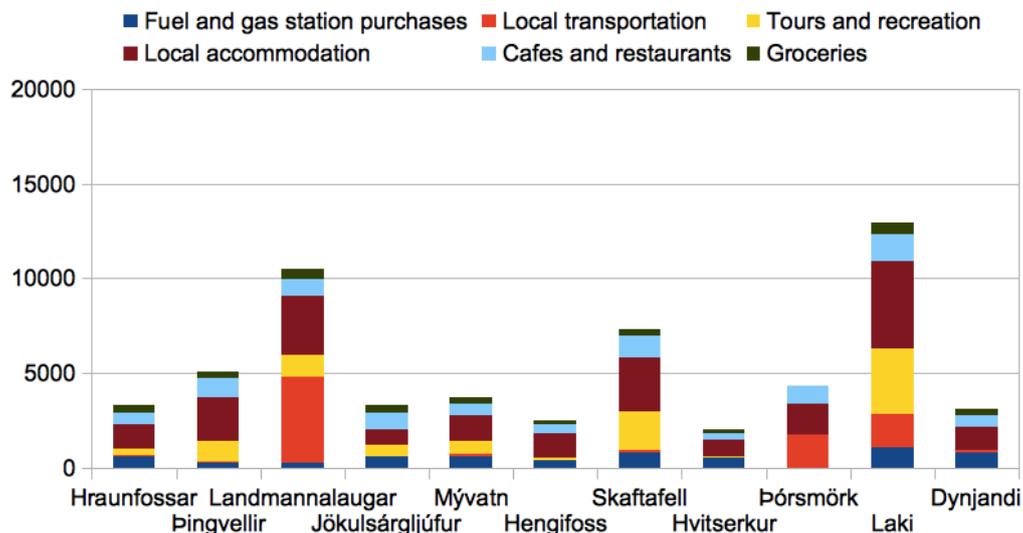


Figure 11. Local 'PA-only' visitor spending at the research sites.

Figure 11 presents the local spending accrued to the protected area / research site, and largely follows the total spending in Figure 10 just on a lower scale. Þórsmörk is a notable exception to this, as all the spending in tours takes place outside of the area. This is not the entire truth on the matter as the tour operators do pay the local accommodation providers and bus companies for the fees of their tour customers. However, as most of these are registered in the capital region, that spending tends to leak out of the area in most cases anyway. This issue is not only limited to Þórsmörk, but perhaps the most evident there.

Hengifoss and Hvítserkur had the highest incidence of non-planned visits and lowest rates of being the most important visit of the day, thus they also exhibit the lowest visitor spending accrued to the site in both total and local spending - it would be interesting to study further whether the fact of not having protection status affects visitors' travel decisions?

As analysis here is based on where the visitors spend the money, it can't directly address questions as to where in the economy that money ends up due to business registrations etc. We will return to this issue in 6.1.1. However, knowing where and how visitors do spend money in connection to visiting protected areas and nature-based tourism sites is important because it provides information on the business opportunities also for local entrepreneurs.

5.3.2.3 Differences in local spending between the research sites

Finally, we take a closer look on how the visitor spending is distributed between the vicinities of the protected areas / research sites, and elsewhere in the country. It is often touted in Iceland that the proceeds from tourism only make the capital region wealthier and the rest of the country is left behind. If we look at the visitor spending in this study in Figure 12 that does not seem to be the case. In fact, the visitor spending is distributed almost in half between the localities and other parts of the country - on average (weighted by annual visitor numbers) 45 % of the overall visitor spending in this study took place near the protected areas / research sites.

This is the same share as was reached in the pilot study at Snæfellsjökull NP (Siltanen, 2017), now verified by a much larger and geographically more distributed sample. 45 % is a relatively high share considering the limited number of points of entry to Iceland, which tend to force the visitors to procure some of the key services especially in terms of transportation and tours from those areas. It should also be noted that as the research sites were around the country, a significant share of the 'spending elsewhere' refers to the locations the visitors had come from, or spent the night at, before the reaching the site where their spending was surveyed. As such it also represents other localities outside of the capital region - especially regarding fuel, accommodation, cultural activities, cafes and restaurants, groceries and souvenirs.

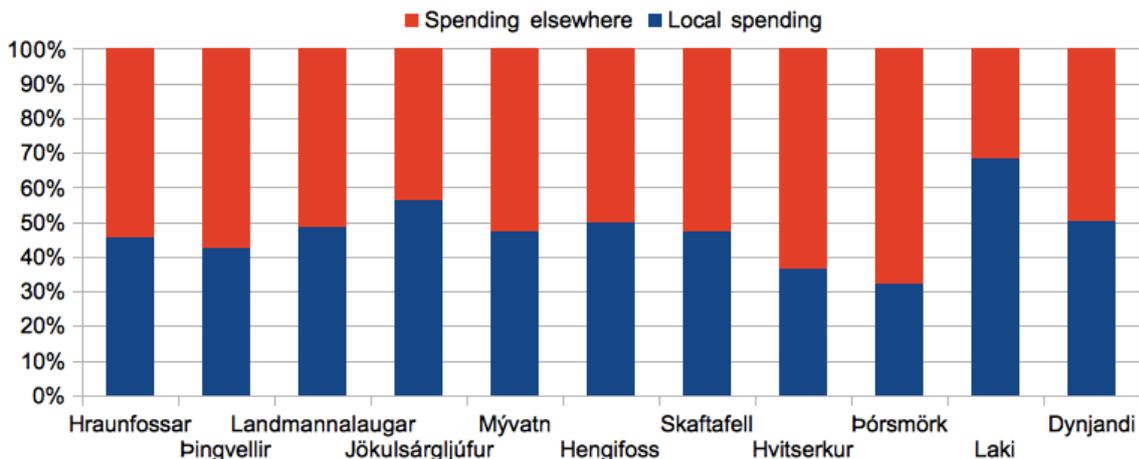


Figure 12. Share of local spending from overall spending between the research sites.

6 Economic impact analysis

6.1 Overall results

The MGM2 methodology calculates the economic impacts based on visitor spending in different services / sectors, number of visitors and their length of stay, and sectoral multipliers that calculate how much personal income, value-added to businesses and taxes for the state are generated from the spending. Each spending category / sector has capture rates, which represent the share of spending that doesn't leak abroad, and only the amount indicated by the capture rate is used in the economic impact analysis.

The detailed outputs of the MGM2 analysis for each research site are included in appendix 11.8. Table 12 presents a summary of the overall effects across all research sites. As the results are highly dependent on the number of visitors, the annual visitor numbers from 2017 are also provided as a reference. The results are focused on the direct economic impacts as Iceland lacks the regional input-output tables necessary to calculate the secondary impacts accurately. However, for reference a conservative estimate of the secondary impacts is also provided based on the lowest multiplier in each category and site. Job impacts reported by the MGM2 methodology are reported as a contribution to generated jobs including full-time, part-time and seasonal jobs. Based on the data from our employer survey (see 7.4), we have calculated full-time equivalents (FTE) for the jobs indicated by MGM2 methodology – on average 85 % of the total jobs. We expect these full-time equivalents to be accurate within winter and summer tourism seasons, but not necessarily across the whole year, as the employment data they're based on was collected seasonally.

Overall, the 12 sites in the study (with an update for Snæfellsjökull National Park included) had ca. 3,8 million visits in 2017. As there were ca. 2,2 million visitors to Iceland during the same year, it is obvious that many visitors visit more than one site on their trip, and the ones driving around the country likely several. The total number of visits compared to the number of visitors suggests that the sites chosen for this study provide a comprehensive overview of the economic impacts of protected area tourism and recreation. The annual direct economic impact of visitor spending in the vicinity of the sites is ca. 10 billion ISK and nationwide in total ca. 33,5 billion ISK. The spending supports ca. 1.800 jobs locally around the protected areas / research sites, and over 5.500 jobs nationwide. In full-time equivalents during the summer season these figures would be ca. 1.500 and 4.800 respectively. These impacts are all generated directly in the sectors supported by tourism (e.g. accommodation, tours, transport, food services, retail).

Secondary effects represent how the income from visitors' spending is used further down the value chain - how people who get their salaries from tourism and recreation use the money, how companies in the above-mentioned sectors purchase goods and services for their operations, and invest their profits. These effects generally cover a wider range of sectors in the society. Since we don't have the input-output tables that would describe these relations in the Icelandic economy, multipliers used to calculate these effects were the lowest reference multipliers (between 17-29 %) provided by the MGM2 application, originally calculated with the IMPLAN model for rural USA. With these indicative secondary effects included, the total economic impact of the protected areas and other sites in the study is over 12 billion ISK locally, 41 billion ISK altogether. Secondary spending generates further 300 jobs in the vicinity of the sites and ca. 1.000 jobs in total, bringing the job impacts to ca. 2100 locally and over 6500 in total including part-time and seasonal jobs. FTE equivalents for these impacts are not calculated as they include other sectors that we don't have reference data for.

In terms of economic impact of individual sites, the most popular sites with hundreds of thousands of visitors are by far the largest contributors to the Icelandic economy. Þingvellir, Skaftafell, Snæfellsjökull and Mývatn together contribute almost 30 billion ISK in direct economic impacts. Landmannalaugar and Hraunfossar also reach over billion ISK overall in direct impacts. The remaining sites generate ca. 2 billion ISK combined in direct economic impacts

nationwide. Table 12 also presents a total of the sales, personal income and company taxes generated by the sales and economic impacts. Overall the taxes to the state amount to ca. 12,6 billion ISK. Similarly, the largest contributors to the tax revenue are Þingvellir, Skaftafell, Snæfellsjökull and Mývatn region, together accounting for ca. 10,7 billion or nearly 90 % of the total tax revenue.

Table 12. Summary of economic impacts across the research sites.

Site	Visitors 2017	Direct Local jobs ¹⁷	Direct Total jobs	Local direct sales (tISK)	Local direct economic impact ¹⁸ (tISK)	Total direct sales (tISK)	Total direct economic impact ¹⁹ (tISK)	Total taxes ²⁰ (tISK)
Dynjandi	80.473	26	60	135.340	134.523	293.081	295.293	123.430
Hengifoss	64.376	17	39	99.484	102.584	209.558	211.110	84.412
Hraunfossar	281.592	99	237	557.656	553.202	1.291.680	1.312.068	513.529
Hvítserkur	112.855	24	58	122.626	123.115	302.684	311.475	148.693
Jökulsárgljúfur	123.770	98	153	472.122	456.459	757.524	745.121	320.897
Laki	7.836	15	21	75.283	77.291	104.388	106.827	40.302
Landmannalaugar	67.100	96	201	538.047	527.812	1.085.984	1.061.560	429.173
Mývatn	409.091	232	469	1.367.036	1.257.592	2.561.350	2.444.192	1.038.301
Snæfellsjökull ²¹	392.168	344	670	1.875.626	1.934.763	3.469.519	3.606.061	1.426.234
Skaftafell	735.728	840	1.887	4.857.767	4.703.866	9.908.332	9.700.025	3.428.526
Þingvellir ²²	1.526.523	n/a	1.806	n/a	n/a	13.134.525	13.393.505	4.918.874
Þórsmörk	40.390	23	66	136.171	118.665	312.370	287.331	97.308
Sum/Direct effects	3.841.902	1.814	5.668	10.237.157	9.989.872	33.430.994	33.474.568	12.569.679
FTE ²³		1.542	4.818					
Multipliers ²⁴		1,17	1,18	1,28	1,22	1,29	1,23	
Secondary effects		308	1.020	2.866.404	2.197.772	9.694.988	7.699.151	
Total effects ²⁵		2.122	6.688	13.103.561	12.187.643	43.125.983	41.173.719	

Table 12 allows interesting comparisons between the sites. For example, the economic impact of Laki is disproportionately high compared to other sites with 5-10 more visitors such as Dynjandi, Hengifoss and Þórsmörk. With only a fraction of visitors, Laki can reach generally 50 % or more of the economic impacts of these much more visited sites and generate a comparable number of jobs locally. The visitor spending data doesn't provide all answers to the reasons behind these discoveries, but at least in part this is likely due to the high share of local spending for Laki visitors, and focusing mainly on Laki as the main purpose of the visit. However, Fagfirfoss, Fjaðrárgljúfur canyon

17 Including part-time and seasonal jobs apart from FTE-totals. Direct job impacts of visitor spending at Þingvellir was calculated using a capital region multiplier set since tourism there is generally based from the capital - the market is more efficient (i.e. bigger hotels and buses, less staff per visitor) so the job impacts are lower compared to rural areas. Similarly, direct job impacts of Skaftafell, Snæfellsjökull, Hraunfossar, Landmannalaugar, Hengifoss and Mývatn were calculated using small regional center job multipliers as tourism services in these areas are in part concentrated to surrounding towns leading to somewhat higher job efficiency.

18 Combined value of personal income and business value-added.

19 Combined value of personal income and business value-added.

20 Combined value of sales taxes, personal income taxes and company taxes.

21 Updated analysis to pilot study based on visitor numbers provided by SJNP and methodological alignment.

22 As explained in 4.7.3.7, it was not possible to separate the local impact of Þingvellir from the effect of visitor spending in the capital region, thus only total impacts for Þingvellir as published and the sum of direct local jobs is missing Þingvellir's contribution.

23 FTE (full-time equivalent) ratios based on the employer survey (N=405), valid within season.

24 Lowest reference multipliers for rural areas used in calculating secondary effects across all sites.

25 Taxes are calculated only for direct sales and economic impacts.

and Kirkjubæjarklaustur were also relatively common stops for Laki visitors during the same day. In addition to Laki, also Jökulsárgljúfur generates most of the jobs in the vicinity of the park. According to the analysis, Landmannalaugar, Mývatn and Snæfellsjökull generate approximately half of the jobs near the protected areas; high numbers compared to the local populations - we will return to this in 6.1.2.

The high economic impacts of Hraunfossar are also notable in Table 12. Vicinity to the capital and popular day tour destinations (e.g. lava caves and Langjökull glacier tours) contributes to high visitor numbers, which in turn further the economic impacts. For example, in comparison to Jökulsárgljúfur area, the sheer volume of visitors at Hraunfossar generate 70 % higher economic impacts based on revenue and taxes, though only about the same number of jobs locally. As discussed earlier in 5.2.1, Dynjandi has a strong effect in drawing visitors to the area, but similarly to Hengifoss, challenges in turning these visits into economic impacts in the area as visitor spending associated with the visits is low.

6.1.1 Verification of regional economic impacts from tax data

Since this is the first comprehensive study in Iceland regarding the economic impacts of protected areas and selected nature-based tourism sites, it is important to attempt to verify the results provided by the MGM2 methodology. Do the assumptions built-in to the MGM2 application and made by the researchers produce reasonable results? Verifying the results is especially important since we cannot conduct the MGM2 analysis based on local regional input-output tables due to lack thereof.

Our primary means of verifying the results of the MGM2 analysis is based from 2016 end-of-year tax reports (RSK - Ríkisskattstjóri, 2018) from companies based in the municipalities of the research sites and key tourism sectors studied in the visitor spending and the employer survey. Tax data for the study was provided by the Directorate of Internal Revenue in Reykjavik. The tax data is based on tax year 2016 as tax reports for 2017 were not yet closed during this study. According to Icelandic Tourist Board (2018), the annual number of visitors rose 24.3 % between 2016-2017 from 1.792.200 to 2.224.600. Thus, assuming no major changes in the spending and behaviour of the visitors, the tax figures are likely somewhat of an underestimation for 2017 but nonetheless suitable for use as references for verification. We also conducted an online survey to tourism businesses to triangulate and verify the results from multiple angles. Results from the employer survey are presented in Chapter 7.

Tax data was used to provide regional sectoral boundaries for the economic and employment effects of visitor spending, essentially to alert if the results by the MGM2 analysis were higher than recorded in company tax reports from the area. Thus, it is important to emphasize that this study in no way suggests that the combined operational revenues (Table 13) or employee man-years (Table 14) from the tax reports would be entirely due to the economic impacts of the research sites. As discussed earlier, there are many other sites that visitors visit around the sites studied here, and not all tourism is based on the natural attractions. Retail companies in the tax data naturally also serve the locals' needs, not only tourists.

Overall, total sales impacts by the MGM2 analysis are well below the total revenues reported by companies in taxes for each location, as indicated by Table 13. A detailed comparison of the reported revenues for each sector with the individual site-based MGM2 outputs in Appendix 11.8 highlights a few differences:

- For Skaftafell area, the retail sales effects of the MGM2 analysis (93 million ISK) are relatively close to boundary indicated by the tax data (130 million ISK), especially considering that sales indicated by MGM2 are 'captures sales' with very conservative assumptions²⁶. Comparing this finding with the spending data, we see that the retail sales effects are driven by relatively high spending on souvenirs by visitors, on average ca. 300 ISK by every visitor and ca. 1.700 ISK between those who spent money on souvenirs (zeroes excluded).

26 Retail capture rate based on: no retail goods produced in Iceland, only salaries and profits captured from sales.

Comparing the results to the tax data, there are two explanations: either the sample is positively biased towards visitors who happened to spend money on souvenirs - a possibility since the surveys were collected near the visitor center with souvenir sales - or some of the souvenir spending is caught and masked by other sectors (such as souvenir sales at hotels, restaurants, tour offices, etc.). Reported revenue for taxes from travel and tours (991 million ISK) is below captured sales effects indicated by the MGM2 analysis (1.068 million ISK). A simple reason for this difference would be that many of the large tour companies organizing activity tours in the Skaftafell area are registered to Reykjavik instead of Hornafjörður, so even though visitors pay for the tours and activities locally, in the tax records that spending shows up in the capital area.

- For Landmannalaugar, the MGM2 analysis indicates nearly 138 million ISK of sales of transport services, but tax data shows a revenue of only up to 32 million ISK. As in Skaftafell, this is since nearly all companies offering highland bus or other transport services to Landmannalaugar are registered to the capital region.
- For Snæfellsjökull, the MGM2 sales effects of accommodation and food services are almost 1.550 million ISK combined, while tax data suggests a maximum of 1.163 million ISK (2017 growth-corrected 1.446 mISK). Similarly, MGM2 sales effects for travel services are ca. 154 mISK while tax data suggests a cap of 118 mISK (2017 growth-corrected 147 mISK) for travel and tour services on the Snæfellsness Peninsula. In both cases the growth-corrected figure is close to the MGM2 analysis outputs, but suggests that some of the accommodation or tour provides may be registered elsewhere, or the visitor sample has a positive bias to visitors who spent money on these services compared to the actual visitor population.

Table 13. Comparison of sectoral revenue data from tax reports to the MGM2 sales effects.

Legend:										
minor difference										
major difference										
Total revenue (million ISK, 2016)	Retail	Transport	Accommodation and food	Rental activities	Travel and tours	Arts, entertainment and recreation	Sum	Tax data coverage²⁷	Calculated max revenue²⁸	MGM2 direct sales (mISK, 2017)²⁹
Dynjandi	1.042	973	1 299	144	541	n/a	3.998	90 %	4.427	135
Þingvellir ³⁰	343.368	26.701	112.144	25.496	104.689	15.586	627.984	99 %	634.989	13.135
Skaftafell	130	713	4 593	n/a	991	n/a	6.427	92 %	6.983	4.858
Mývatn	n/a	n/a	2 435	46	215	n/a	2.696	68 %	3.968	1.367
Landmannalaugar	122	32	1 487	n/a	308	n/a	1.950	77 %	2.526	538
Laki	n/a	n/a	1 307	n/a	n/a	n/a	1.307	50 %	2.613	75
Jökulsárgljúfur	691	338	978	n/a	1.709	n/a	3.715	71 %	5.263	472
Thorsmörk	n/a	281	992	n/a	696	n/a	1.969	78 %	2.510	136
Hraunfossar	783	427	2.437	n/a	137	n/a	3.784	91 %	4.157	558
Hvitserkur	n/a	n/a	270	n/a	424	n/a	694	39 %	1.784	123
Hengifoss	1.057	789	2.260	221	684	n/a	5.011	79 %	6.340	99
Snæfellsjökull	741	n/a	1.163	n/a	118	n/a	2.022	43 %	4.704	1.876

27 To protect the anonymity of the businesses, tax data was only provided if there were more than 5 companies per given municipality and sector. Tax data was then provided for each variable as a sum of all companies' data for each sector / municipality.

28 Calculated maximum revenue for 100 % tax data cover, assuming linear relationship

29 Sales reported by MGM2 analysis are 'captured sales', i.e. shares of total sales that stay in the Icelandic economy. Thus, these are not directly comparable to the operational revenues in tax reports as (foreign) goods and services have not been subtracted yet.

30 Economic impact of Þingvellir is analysed based on spending including the capital region, so it is also included in tax data.

6.1.2 Verification of regional employment impacts from tax data

A similar comparison to the tax data vs. MGM2 analysis is provided in Table 14 for the man-years based on employer tax reports. It is common that employers don't report full-time and part-time staff as man-years very accurately in the tax reports - often part-time employees are reported as full-time employees creating a positive bias in the reported man-years, so an alternative approach was taken to provide the tax data cap on man-years. We calculated the man-years based on paid salaries for each location and sector with an assumption of average employee salary of 400.000 ISK per month. These man-years are provided in Table 14. Overall, this approach generated 86 % (weighted average) of the reported man-years by the tax reports, thus a lower more conservative cap for the man-years. If we include all the tax data from the capital region as Þingvellir's vicinity, the man-years generated by our calculation are 95 % of the reported by the tax years, suggesting the reported man-years are accurate overall. We used regional locally calculated man-years in the verification.

As explained in connection with Table 13, tax data was provided only in cases of more than 5 companies in a given sector registered to a single municipality to protect the anonymity of the companies. This creates gaps in the tax data for comparison of employment effects to the MGM2 analysis. Coverage of the provided tax data varied significantly between the rural municipalities (e.g. 39 % around Hvítserkur, 50 % around Laki) and the sites near larger regional centres (e.g. 99 % for Þingvellir, 92 % for Skaftafell). A reference figure for the maximum man-years was calculated to 100 % data cover assuming linear relationship, and this figure was used to compare the total direct local job impacts generated by the MGM2 analysis. It should be noted that the job effects generated by MGM2 analysis are not full man-years; they include contributions to seasonal and part-time jobs as well. We are using calculated FTE figures for the comparison, but they are valid only seasonally based on summer season, as we don't have the necessary data to convert them to whole year man-years. Thus, the seasonal FTE-equivalents are likely overestimations for the whole year man-years. No corrections have been made to the tax-based man-years to account for the tourism growth between 2016-2017, but it can be assumed that the 2016 man-years are likely below the actual figures for 2017.

Differences between the man-years indicated by the tax data and MGM2 analysis are largely linked to the sales-related findings in the previous table, and highlighted in Table 14:

- In the Skaftafell area, retail jobs based on tax data are slightly lower than suggested by the MGM2 analysis, but the difference is only a few jobs. However, in accommodation and food services as well as in tours, the jobs indicated by the tax data are only half of the direct local jobs indicated by the MGM2 analysis. Some of this difference is likely due to the growth unaccounted for growth between 2016-2017 and the differences in calculating the FTE figures, but the actual difference is still likely around 200 jobs. As these jobs are primarily in accommodation, food services and tours, it is likely that some of them are generated from services bought by visitors onsite from companies registered to the capital region and not to the local municipality.
- Mývatn area has a similar situation as Skaftafell in travel and tours. The MGM2 analysis suggests ca. 40 jobs (including part-time and seasonal) in the area for travel and tour services, while the tax data accounts for only about 10 (full-time). Observing the primary visitor spending data, it seems that most visitors who have marked local spending in 'tours and recreation' have visited the Mývatn Nature Baths or taken part in the Lofthellir lava cave tour. It may be that some of the lava cave tour operators are not registered locally. Also, we found out afterwards that Mývatn Nature Baths is registered under 'health and fitness' and not 'travel and tours' in tax reports so our tax data sample doesn't cover them. The visitor sample may also have a slight positive bias on visitors participating in these activities, as the survey collection method tends to favour visitors with more time in the area.
- At Landmannalaugar, jobs in the transport sector have a major difference between the municipal tax data and MGM2 analysis (1 vs 30), which can be explained with the same reasoning as above regarding sales of

transport services; the highland bus companies servicing Landmannalaugar are registered to the capital region instead of the local municipality.

- In the vicinity of Hraunfossar, a small difference is indicated in tours, 7 full-time jobs registered by tax data and 13 suggested by the MGM2 analysis. These are almost within the 2016-2017 growth margin and FTE figure differences, but again suggesting that the popular lava and ice cave tours in the area are not necessarily registered to in the municipality.
- Finally, at Snæfellsjökull there is a significant difference (ca. 100 jobs in total) between local accommodation & food services, and travel and tours between the MGM2 results and the tax data. Some of the difference is likely due to reasons above (2016-2017 growth, FTE figure differences, company registrations), but in this case, we should also consider the effect of the new visitor counting method. In the pilot study, we used a visitor counter at Djúpalónssandur to represent the total number of visitors to the park. Djúpalónssandur is one of the most popular sites in the park but also a dead-end road where all visitors do not stop. The park is now also using calibrated counter data from the main road counters to account for all the visitors to the park. This may mean that the share of visitors just driving through the park has increased, and they don't spend as much time and money in the area as the visitors surveyed last year. Without additional studies, we have no means of verifying this, but it may mean that some of the local visitor spending and related impacts should now be calculated for elsewhere in Iceland, primarily the capital, instead. This may also highlight the need to think locally of ways to reduce the through-traffic and encourage visitors to spend more time in the park and its vicinity.

Table 14. Comparison of employment effects between tax data and MGM2 analysis.

Legend:											
minor difference											
major difference											
Man-years (2016)	Retail	Transport	Accommodation and food	Rental activities	Travel and tours	Arts, entertainment and recreation	Sum ³¹	Tax data coverage	Max man-years ³²	MGM2 direct local (FTE, 2017) ³³	
Dynjandi	35	26	75	7	16	n/a	159	90 %	176	22	
Þingvellir ³⁴	8.664	1.208	6.998	827	3.026	611	21.333	99 %	21.571	1.535	
Skaftafell	5	28	252	n/a	47	n/a	332	92 %	361	714	
Mývatn	n/a	n/a	152	1	10	n/a	163	68 %	239	197	
Landmannalaugar	4	1	109	n/a	16	n/a	130	77 %	168	81	
Laki	n/a	n/a	92	n/a	n/a	n/a	92	50 %	184	13	
Jökulsárgljúfur	16	17	69	n/a	82	n/a	184	71 %	261	83	
Þórsmörk	n/a	13	53	n/a	35	n/a	100	78 %	128	20	
Hraunfossar	25	14	137	n/a	7	n/a	183	91 %	202	84	
Hvítserkur	n/a	n/a	15	n/a	30	n/a	45	39 %	115	20	
Hengifoss	36	35	139	14	30	n/a	255	79 %	322	14	
Snæfellsjökull	19	n/a	65	n/a	4	n/a	88	43 %	205	292	

31 Based on tax data: assumes employees registered to surrounding municipalities

32 Calculated maximum man-years for 100 % tax data cover, assuming linear relationship

33 Direct jobs in the area from MGM analysis, can be registered anywhere

34 Economic impact of Þingvellir is analysed based on spending including the capital region, so it is also included in tax data.

Overall, we find that the MGM2 outputs are generally well in line with the regional sectoral tax data. There are a few discrepancies as pointed out above, but also sensible explanations based on the structure of tourism services in certain areas, and acknowledging the fact that visitor spending data and tax data approach the same issue from opposite ends and making a perfect match is an unlikely result. Considering the overall nation-wide impacts of visitor spending, our findings and results are well-within the boundaries of the tax data.

6.2 Employment effects of the PAs themselves

A common question that is often asked related to the national parks and protected areas is how much they themselves employ people in the areas where they are established. The economic impact analysis doesn't generally include these numbers as most of the services provided by the protected areas such as visitors centres, ranger services etc. are generally free and thus do not show in the sectors included in the economic analysis. The visitor spending data does contain some parking and toilet fees, in addition to souvenir and cafe purchases from the visitor centres, but in the scale of the other spending, these are marginal and would not show as full jobs comparable to parks' employment in the resulting analysis. To provide an overview of the employment effects of the parks themselves, we contacted park managers and directors, and asked how many people they employ full-time, part-time and seasonally, and how large part of the year the seasonal workers are employed. Results for the ongoing year (2018) are provided in Table 15.

Overall, the number of people employed by the national parks and protected areas covered in this study is 59 full-time staff members and 136 part-timers and seasonal workers; ca. 120 in total in full-time equivalent. In comparison to the employer survey (see Chapter 7), we received responses for individual tourism companies in Iceland that employ more people than the entire staff of the protected areas. These rangers, managers, specialists, customer service agents, maintenance and other staff manage ca. 3,7 million annual visits to the locations listed in the table. That's approximately 30.000 visitors a year per full-time employee. If we exclude Vatnajökull and Þingvellir which together cover 90 % of all the PA employment for the study locations, that ratio would be around 95.000 visitors a year per full-time employee for the rest of the sites.

Table 15. Employment by the national parks and protected areas in Iceland.

National park or protected area	Full-time staff	Part-time / seasonal staff		Staff in total	Staff in total FTE ³⁵
		In total	FTE over full year		
Snæfellsjökull NP	2	6	2	8	4
Vatnajökull NP	21	101	50	122	71
Þingvellir NP	31	14	7	45	38
Dynjandi	1	2	0,5	3	1,5
Hraunfossar	0	1	0,5	1	0,5
Landmannalaugar ³⁶	1	3	1	4	2
Mývatn	2	6	2	8	4
Þórsmörk ³⁷	1	(70) ~3	(4,5) 0,2	4	1,2
<i>Total</i>	<i>59</i>	<i>136</i>	<i>63,2</i>	<i>195</i>	<i>122,2</i>

As Table 15 further indicates, there are dramatic differences between staff numbers and employment effects between the different parks and protected areas. Vatnajökull National Park employs 122 people annually; ca. 100 of

35 Full-time equivalent

36 Employment numbers for Landmannalaugar include the whole Fjallabak Nature Reserve.

37 Seasonal trail restoration work in Þórsmörk is carried out by ca. 70 volunteers or 4,5 FTE *volunteer* man-years (in brackets) and additional 0,2 man-years by other employed staff. Thus, in total employed staff resources from the Icelandic Forest Service are ca. 1,2 FTE man-years.

them are seasonal and work approximately half a year. Þingvellir National Park employs ca. 30 people all year round and ca. 15 seasonal staff members. These numbers signal relatively significant regional employment effects, but the same cannot be said for the other locations. Though Snæfellsjökull National Park receives less visitors than Vatnajökull or Þingvellir, it's staffing is remarkably low in comparison, only 2 people full-time and 8 people including seasonal workers. Mývatn has similar number of visitors and reported exactly same numbers of staff as Snæfellsjökull.

Comparing visitor numbers to staff managing the site, Hraunfossar is the most extreme example in this study: ca. 282.000 annual visitors are catered to by one part-time ranger. Additionally, the management of the site is under Snæfellsjökull National Park office, spreading the thin resources of the park further. Visitor activity at Hraunfossar is concentrated in a small area by the parking lot and trails to the waterfalls, which can ease the site management in terms of necessary resources. Dynjandi is similarly set up with a small core area that visitors visit, but has more staff compared to Hraunfossar for the management of the area. On the other hand, Landmannalaugar is contained in the Fjallabak Nature Reserve, which is a large relatively difficult-to-access area in the highlands. In such areas, ranger duties are markedly different. For example, rangers inform hikers of the trail and weather conditions, monitor the area for environmental damage and carry out infrastructure and restoration projects. Fjallabak Nature Reserve has one full-time staff member in the office, and three seasonal part-time rangers.

The protected area at Þórsmörk is managed by the Icelandic Forest Service, and operated somewhat differently from the others. Originally in 1920, the area was protected from grazing and intensive reforestation efforts were carried out for the first 70 years. Nowadays trail management and restoration in the area is the main task of the Forest Service, and the work is carried out by volunteers, managed essentially by one full-time employee. Visitor services in the area are provided by hiking associations and travel companies with permission from the Forest Service.

As a final remark concerning Table 15, it should be noted that Þingvellir and Vatnajökull National Parks are autonomous self-governing entities, and the other locations including Snæfellsjökull National Park are managed by the Environmental Agency of Iceland apart from Þórsmörk. Even combined, the staff of the locations managed by the Environmental Agency is a fraction of either of the two larger national parks, suggesting that the resources of the Agency are perhaps spread too thin. As preparations are currently underway for the new 'national park service' organization to manage Iceland's all national parks and protected areas under one roof, ensuring sufficient resources across all the protected areas will be critical issue for successful management of the parks.

6.3 Economic impact vs investments in the parks

To put the scale of economic impacts into perspective, we will compare the impacts and generated tax revenue to the annual operating budgets and investments to the national parks and protected areas.

Table 16 outlines the key figures and shows the ratios of state contributions compared to the direct economic impacts and tax effects as calculated in this study. Secondary economic impacts are not included in this analysis nor the ratios as the regional input-output table data is not available in Iceland to calculate them reliably. It should be kept in mind that the secondary impacts do nonetheless exist and are well documented in other studies.

Table 16. Economic impacts and generated taxes vs. operational and investment budgets.

Location	Operational budget 2017 (mISK)	Budget with investments 2017 (mISK)	Direct economic impact by MGM2 (mISK)	Economic impact to cost -ratio ³⁸	Tax revenue generated by MGM2 (mISK)	Generated taxes to state contribution - ratio
Pingvellir NP ³⁹	751	1.229	13.394	25:1	4.919	9:1
Vatnajökull NP ⁴⁰	351	725	10.763	15:1	3.874	5:1
Snæfellsjökull NP ⁴¹	39,7	75,0	3.606	48:1	1.426	19:1
Landmannalaugar ⁴²	20,0	35,5	1.062	30:1	429	12:1
Dynjandi	4,3	28,2	295	10:1	123	4:1
Mývatn	42,7	47,1	2.444	52:1	1.038	22:1
Hraunfossar	7,0	8,2	1.292	158:1	514	63:1
Þórsmörk	15,0	15,0	312	21:1	97,3	6:1
<i>Total</i>	<i>1.230</i>	<i>2.163</i>	<i>33.168</i>	<i>23:1</i>	<i>12.420</i>	<i>8:1</i>

Annual budgets of the parks and protected areas are divided in terms of operational costs that are relatively stable year-to-year and full budgets with non-recurring investments in Table 16. In response to the tourism boom, several protected areas in the study have had significant construction projects to improve the infrastructure and services to better cope with the increased visitor flows. For example, approximately half of the annual budget of Vatnajökull, Snæfellsjökull and Landmannalaugar is currently comprised of improvement projects, and Pingvellir is not far behind. At Dynjandi investments in 2017 were six-fold compared to the operational budget. It is notable that the state contribution for Pingvellir's operational budget covers only 9 % of the operational costs and the rest is covered by sales, services and fees by the park itself; the investment budget is however fully state-funded.

We have calculated economic impact to cost -ratios based on comparing the economic impacts generated by each protected area to their total budget for 2017. Since total budgets include also non-recurring investments, the ratios are likely to vary between budget years. The current intensive investment phase also makes the ratios more conservative than if only the recurring operational budgets were used. However, since the data on the original founding costs of the protected areas was not available, including the ongoing investments provides a more realistic figure for comparing the costs to the impacts. This issue was discussed already in the context of the pilot study (Siltanen, 2017) where the ratios were also calculated against the total annual costs including investments and improvements.

Overall, the national parks and protected areas in this study generate economic impacts on a ratio of 23:1 compared to the costs, meaning that each króna from the state treasury to the protected areas generates 23 in economic impacts such as personal income and business value-added. The range of the ratios varies between 158:1 of Hraunfossar to 10:1 at Dynjandi. These two are examples of smaller sites with low operational funding, for which the ratios are likely to fluctuate more with the annual investments. The ratios for Pingvellir and Vatnajökull National Parks are 25:1 and 15:1 respectively, which are generally in line with international findings, for example with the 10:1 ratio of the Finnish national parks discussed earlier. Comparatively low funding of Snæfellsjökull National Park produces a much higher ratio of 48:1. Landmannalaugar and Mývatn are in similar range with 30:1 and 52:1 respectively. Despite the different management strategy of using largely volunteer work and focusing mainly on trail

38 Rounded to closest full integer; calculated against budget with investments.

39 State contribution Pingvellir NP's operational budget was 86,1 mISK; rest of the operational finances are sourced from sales and services at the park. Investments to the expansion of the guesthouse and exhibitions (452,8 mISK) are contributed by the state. Ratios are calculated against total state contribution (538,1 mISK).

40 Economic impact of VNP is based on sum of impacts of Skaftafell, Laki, Jökulsárgljúfur and Hengifoss

41 Budget figures and ratios updated from the pilot study to match the results from the updated MGM2 analysis and realized budget for 2017

42 Budget figures for Landmannalaugar cover the entire Fjallabak Nature Reserve.

management, Þórsmörk aligns in the middle of the pack with 21:1 economic impact to cost -ratio.

Table 16 also provides similar ratios between tax revenue generated by the visitor activity in the protected areas compared to the state contributions to the park, and the results are quite different from the general economic impact to cost -ratios. All protected areas in the study currently generate many times revenue in taxes compared to the state contributions with the overall ratio at 8:1 - one tax króna generating eight tax krónas. Þingvellir National Park generates 9 times tax revenue compared to its state budget, however this is mainly due to the current intensive investments, otherwise the ratio would be much higher. Similarly, for Vatnajökull NP this ratio is 5:1 due to the large scale investments in the park. Also Dynjandi's ratio is 4:1 due to current ongoing investments. Þórsmörk has a similar ratio of 6:1 though its budget is 100 % operational. Snæfellsjökull NP and Mývatn generate higher ratios, 19:1 and 22:1 respectively. Hraunfossar again has the highest ratio of 63:1 due to high number of visitors and low annual budget.

7 Employer study

In addition to comparing the results of the MGM2 analysis with tax data, we conducted an employer survey for companies in the tourism sectors in collaboration with the Icelandic Tourist Board to collect further information about the jobs generated by nature-based tourism. Main purpose of the survey was to provide additional data to verify the regional job effects, and study the length of contracts and seasonality of the jobs in tourism. The study also featured some statements measuring employers' views about nature-based tourism and employment. Finally, we offered the participating companies an opportunity to provide open answers on ideas and improvements on how the government, municipalities and other stakeholders could support businesses and entrepreneurs related to nature-based tourism.

7.1 Overview

The study was conducted as an online survey available in English and Icelandic in the beginning of September 2018 - online survey form is available as Appendix 11.3. Invitation emails were sent to 3.224 businesses and other organizations were registered by the Icelandic Tourist Board in 2017. One reminder email to participate was sent a week after the original invitation. We received in total 415 valid answers and a 13 % response rate. Though the response rate is low, the total number of employees in the companies and organizations that responded is quite significant at ca. 4360 jobs (summer season, including part-time). This incidentally corresponds to 14,5 % of the total workforce in tourism and suggests a relatively linear relationship between the number of companies and employees represented.

The invitation was sent to all companies and organizations in the Icelandic Tourist Board's registry to have an overview of nature-based tourism from the employers' perspective, and companies were then matched with the research sites based on the postal code they provided for their registration. Figure 13 presents the regional distribution of survey responses from the research sites, capital area and otherwise. We received 14-21 responses from companies around all the research sites apart from Jökulsárgljúfur, Laki and Landmannalaugar (3, 8 and 7 respectively). 94 companies from the capital area responded to the survey. Rest of the responses (157) came from companies registered outside the vicinities of the research sites.

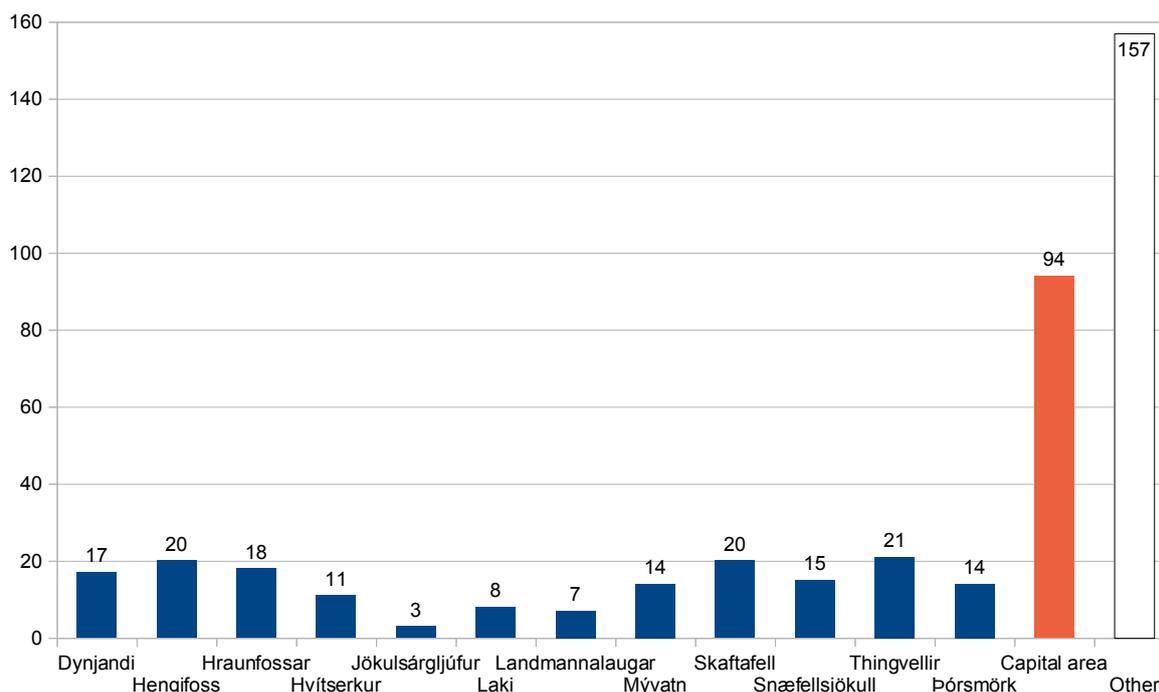


Figure 13. Number of responses to employer survey from different areas.

Table 17 presents the types of the companies that responded to the survey. Companies could choose more than one category to represent the services they offered. 30 % of the companies in the survey represented accommodation, 27 % tours, recreation and transportation, 15 % restaurant and cafes, 10 % museums, exhibitions and cultural activities, and 5 % campsites. Overall, these shares match the visitor spending distribution well, only petrol stations, supermarkets and car rental agencies are under-represented in the employer sample. This is somewhat an expected result as companies in these categories may not view themselves to be in the target group of a survey concerning nature-based tourism, or be registered with the Icelandic Tourist Board to begin with.

Table 17. Types of companies in the employer survey.

Type of business	N	%
Accommodation	168	30.3 %
Tours and recreational activities	115	20.7 %
Restaurant, cafe	81	14.6 %
Museums, exhibitions, cultural activities	53	9.5 %
Transportation	33	5.9 %
Campsite	30	5.4 %
Sports services	22	4.0 %
Information services	17	3.1 %
Other	14	2.5 %
Retail store	8	1.4 %
Petrol, service station	7	1.3 %
Supermarket	5	0.9 %
Car rental	2	0.4 %

Table 18 presents an overview of the seasonality of the companies in the survey; 80 % operate all-year round, and 20 % seasonally, almost exclusively during the summer.

Table 18. Operating season of the companies.

Seasonality	N	%
Operating only during summer season	80	19.1%
Operating only during winter season	3	0.7%
All-year	336	80.2%

Figure 14 presents an overview of the size of the companies and organizations that responded to the survey. Majority of the companies were small, employing less than 10 people and in many cases only 1-2. A good number of mid-size companies between 10-20 and 21-51 employees answered the survey - ca. 70 companies combined employing 10-50 people full-time. Approximately 10 large companies employing over 50 people full-time answered the survey. The bars in the figure contain overlap as the same company may appear in several columns based on the number of full-time / part-time employees in different seasons.

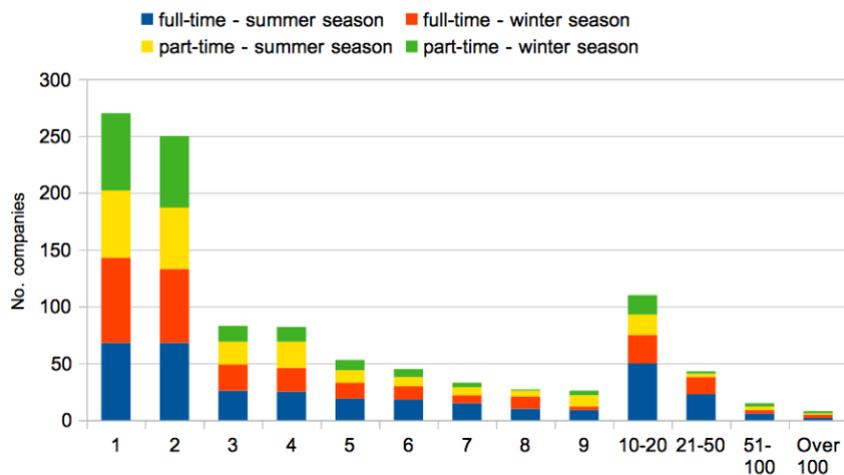


Figure 14. Number of employees in companies represented by the employer survey.

7.2 Seasonality, locality and gender

Figure 15 (left) presents the share of local residents of the companies' employees, and a majority is registered locally; 65 % of the companies have 80-100 % locally registered employees. On the other hand, 17 % of the companies responding to the survey had 0-20 % local resident employees, which can also be viewed as a relatively high number, and may explain some of the differences referenced in the analysis above regarding the discrepancies between local employment effects and man-years registered locally in the tax data. In this study we didn't look at the citizenship of the workers - foreign nationals that are registered locally are considered local employees.

Figure 15 (right) presents the average length of seasonal contracts. We were surprised that 139 companies responded that their seasonal contracts are for 12 months; 40 % of all answers to this question. However, this may simply indicate that the same employees work both in the summer and winter season as 80 % of the companies operated all-year round. Seasonal contracts stand out clearly in the figure between 3-6 months, shorter contracts being more common.

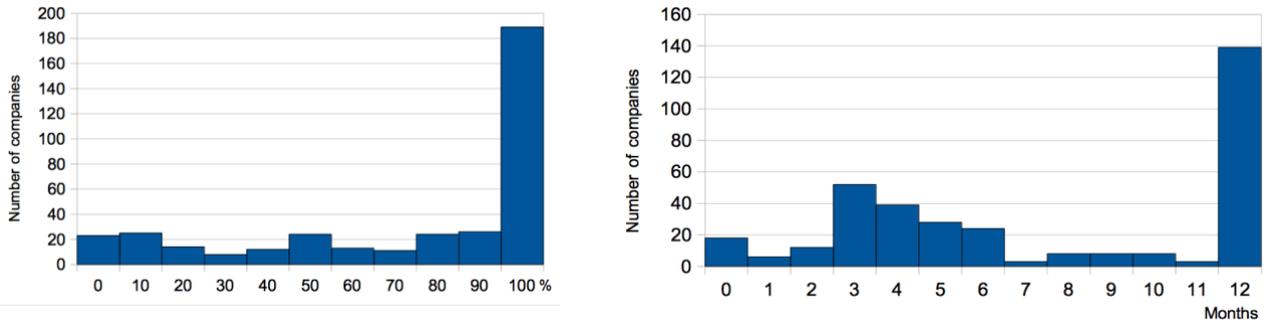


Figure 15. Share of local residents as employees (left) and average length of seasonal contracts (right).

We also looked for gender effects regarding employment and seasonality of the employees. Figure 16 presents the share of the female staff of the companies' employees between permanent and seasonal staff. As in the tourism industry in general, majority of the employees were women, accounting for over half of the permanent and seasonal staff in approximately 65 % of the companies participating in the survey. There were only marginal differences in the gender distribution among permanent and seasonal staff as indicated by Figure 16.

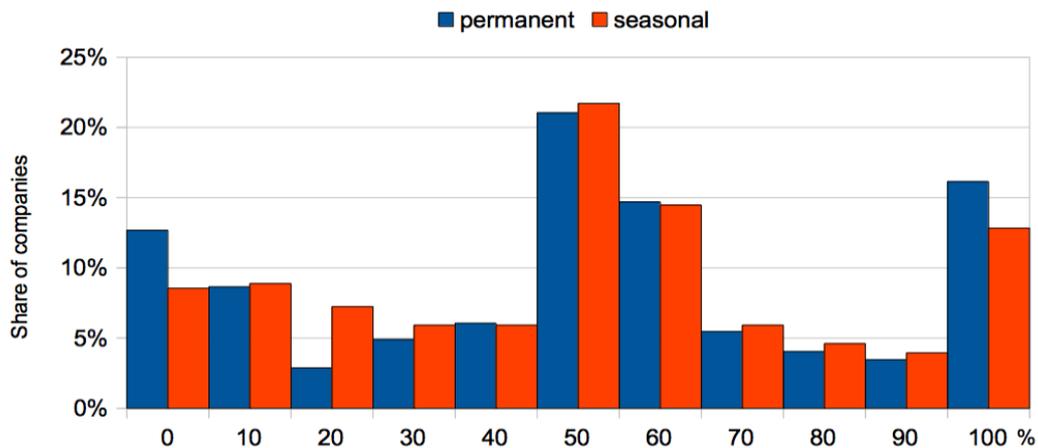


Figure 16. Share of female employees of companies' permanent and seasonal staff.

7.3 Employer poll

We included seven statements related to skilled and seasonal employment, seasonality, importance of nature-based tourism and revenue from tourism to poll opinions from the participating companies on these themes. Summary of the answers is presented in Figure 17. Regarding the ease of finding seasonal workers, companies are centred around the middle with some having difficulties and an equal share finding it easy. However, difficulties are more pronounced when considering finding skilled workers with only ca. 20 % finding skilled workers with relative ease, and 40 % having difficulties. Seasonality has a significant effect on most businesses with 76 % saying that it affects the business somewhat or strongly. Similarly, 75 % of the companies find proximity to nature-based attractions significant to the business, and 76 % agree that revenue from nature-based tourism is important. Companies' attitudes to importance of nature to tourism seem to reflect the views of the visitors, albeit at a slightly lower level.

Overall, 89 % of all companies agreed that revenue from both domestic and foreign tourism are important to the business. Considering the results in this study, it is very interesting finding that companies rate domestic and foreign tourism equally important. Of course, it can be argued that every krona of revenue is important to all businesses, but the scales of domestic and foreign tourism are very different based on the results of the visitor spending survey. In terms of overall total visitor spending accrued to the parks and protected areas in this study, local residents contributed 2 % of the total revenue while foreign tourists spent the remaining 98 %. On a national level, these

figures are likely unique in the context of nature-based and protected area tourism in Europe and Americas, and similar figures may only be found linked to nature-based tourism in the developing world where the services are aimed for foreign visitors and generally out-of-reach for the local populations. It is also a stern reminder how volatile the nature-based tourism industry in Iceland is, as practically all revenues of the tourism companies are dependent e.g. on currency fluctuations, accessibility by air travel which may be subject to restrictions and/or cost increases in the future due to the rising cost of carbon, and general trends in people's travel behaviour globally.

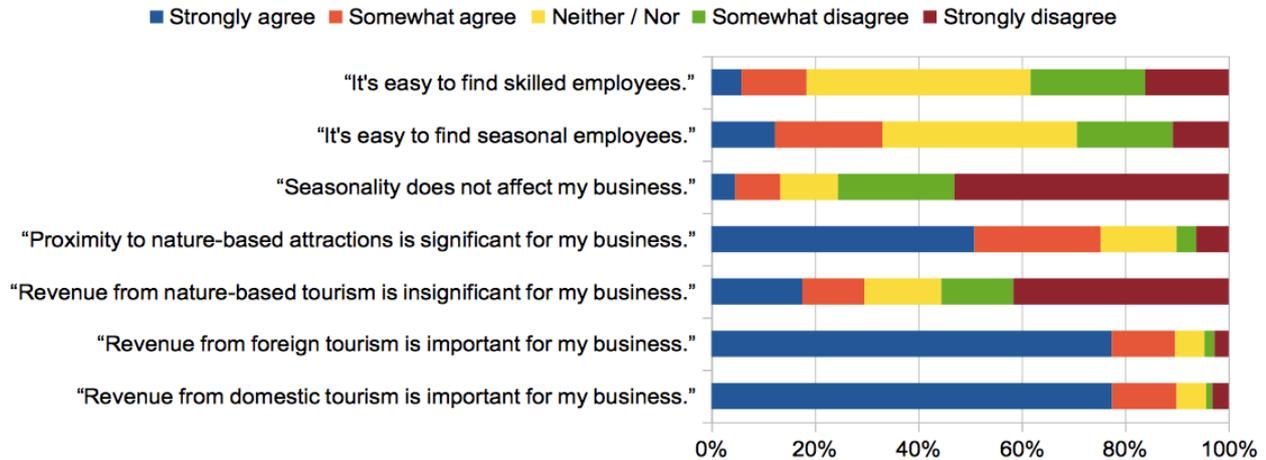


Figure 17. Employer responses to the opinion poll question.

7.3.1 Importance of the protected areas to businesses

So far, we have presented general findings from the employer survey. We also asked the companies to name the three most important nearby natural attractions to see how highly businesses rank the protected areas and research sites in this study. No pre-written options or other guidance was given, and the survey didn't mention the research sites in any way to ensure unbiased results. The results are presented in Figure 18.

Most of the sites were mentioned at least in half of the companies' responses, and only Laki, Þingvellir and Þórsmörk were left below the 50 % mark. Jökulsárgljúfur, Mývatn and Skaftafell were mentioned by all responding companies in the area. Low ranking of Laki is particularly interesting as it was the site with by far the highest share of local visitor spending; however, in terms of scale it also has low visitor numbers compared to other attractions - companies in the Laki area rated Fjaðrárgljúfur canyon as the most important site in the area.

Dynjandi is rated important by most businesses in the area; Hraunfossar is similarly only a few percent behind. Hengifoss is less recognized in the area compared with the other two waterfalls. Þórsmörk is dwarfed by the importance of Skógafoss and Seljalandsfoss in the area, but arguably also enjoys a very different form of tourism. Þingvellir's results include both the surrounding municipalities and the capital region as with the economic impact analysis, so the responses are more spread out as well. Mentions of the Golden Circle are not included in the results for Þingvellir; if they were partially accounted for the ranking would be somewhat higher.

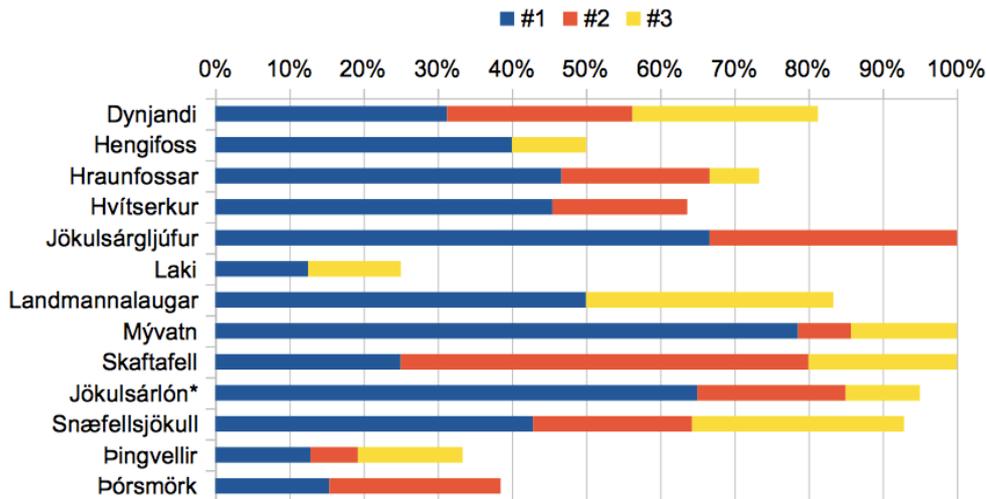


Figure 18. Importance of the research sites to tourism companies in the area.

(*) Jökulsárlón was provided a separate bar in the figure from Skaftafell as it was mentioned in nearly all answers, and is managed by the Vatnajökull National Park together with the Skaftafell area.

7.4 Comparison of employment effects

In order to provide an additional angle of verification concerning the employment effects of the MGM2 analysis, we asked companies to provide a number of full-time, part-time and part-time in full-time equivalent (FTE) employees during summer and winter season. We used this data to calculate an indicative FTE ratio for the results of the MGM2 analysis as the outputs include also part-time and seasonal jobs. As presented earlier (see 6.1), this ratio was 85 % based on the results of the employer survey; in other words, 100 jobs in the tourism industry equal to 85 full-time equivalent jobs -- within the same season as the data doesn't allow us to extend this reliably to whole year equivalent at this point.

Table 19 presents a similar comparison between the local employment effects at the research sites between the employer survey data and the MGM2 analysis, as Table 14 did with the man-years from tax data. However, the low response rates to the employer survey cause more uncertainty in the verification compared to the tax data as we can't assume the companies that responded to accurately represent the missing ones in terms of scale and employment. Thus, the verification exercise from the employer survey should be considered indicative.

Sites where the MGM2 analysis indicates higher or close-to employment number compared to the employer data have been highlighted in yellow. Supporting our earlier findings, the sites - and likely the reasons behind - are essentially identical to the tax data comparison. The only difference is Jökulsárgljúfur, which shows a potential additional difference in this comparison; however, it is particularly poorly represented in the study with only 4 % of the companies in the area responding to the employer survey, so no conclusions concerning it can be made. In the tax data analysis, employments effects at Jökulsárgljúfur were well within boundaries of the tax data.

Table 19. Comparison of employment effects between employer survey data and MGM2 analysis.

Legend:	Employer survey:	Employer survey coverage %	MGM2 direct local employment
potential difference	Summer (FTE)⁴³	⁴⁴	(FTE, 2017)⁴⁵
Dynjandi	76	15 %	22
Pingvellir ⁴⁶	1352	2 %	1535
Skaftafell	196	23 %	714
Mývatn	100	26 %	197
Landmannalaugar	51	12 %	81
Laki	84	57 %	13
Jökulsárgljúfur	21	4 %	83
Þórsmörk	78	27 %	20
Hraunfossar	215	23 %	84
Hvitserkur	72	31 %	20
Hengifoss	177	12 %	14
Snæfellsjökull	122	14 %	292

7.5 Open responses

At the end of the survey, an open question was provided to collect ideas on how the government, municipalities and other stakeholders could support businesses and entrepreneurs related to nature-based tourism. Main points from the open responses are summarized below. Numbers in brackets count instances of the issue mentioned.

The most common remarks in the open responses of the employer survey concerned complaints, remarks or worries regarding poor infrastructure as well as areas being under distress. Several (10) mentions were of the road system, most concerning poor maintenance, etc. Both the ring road and smaller roads need to be in good shape and well maintained. Specific roads were mentioned (3), most in the Westfjords, Eastfjords and NE-Iceland. Better all-around transport was also mentioned, for example cheaper flights (2). Several respondents also mentioned facilities at popular nature sites, especially restroom shortage (6); at some places there are too few and at others none. Poor conduct was also mentioned (2), especially tourists defecating out in public. Tourists need to be better informed about the code of conduct in Iceland. In general, investments in facilities are crucial before areas are damaged, not after.

Participants think that spreading tourism more evenly across the country is important (7). A few (4) mention the possibility of putting other international airports than Keflavik to use. They also think that navigation can be too difficult because of few and hard-to-read signs (4). Spreading tourism temporally, especially by increased winter tourism, is also important. In addition, some (2) felt that more rangers were needed.

Participants want clear goals and policies regarding tourism (3). Tourism should be treated in accordance with its status as the main export of Iceland. Natural resource laws should reflect this. Better all-around cooperation was also mentioned (4), between the government, landowners, institutions, municipalities and workers. Some also felt that the government should control access to nature sites, for example set quotas on the total number of visitors (2). Finally, concerns regarding the high exchange rate of the ISK were expressed (2).

43 Assumes employees are registered to surrounding municipalities, coverage of employer survey ~10-25%

44 Total number of companies in the tourism sectors based on tax data

45 Direct jobs in the area from MGM analysis, can be registered anywhere

46 Economic impact of Pingvellir is analysed based on spending including the capital region, so it is also included in tax data.

8 Discussion

As the first nation-wide study on the economic impacts of national parks and protected areas in Iceland, the overall findings of this study provide unquestionable support to the importance of the country's protected areas to nature-based tourism. The study was conducted at 11 different sites selected by the Ministry Environment and Natural Resources: Ásbyrgi, Laki and Skaftafell within Vatnajökull National Park, Þingvellir National Park, Dynjandi, Hraunfossar, Landmannalaugar, Mývatn, Þórsmörk, Hengifoss and Hvítserkur. The last two don't currently have a protected area status, though Hengifoss is managed by Vatnajökull National Park, but they were included in the study to increase geographical coverage and diversity between the sites. Additionally, the findings from the pilot study at Snæfellsjökull National Park last year were updated to align with the methodological updates and added verification measures, bringing the total number of sites for reported economic impacts to 12.

Combined, these sites accounted for 3,8 million visits in 2017, suggesting that many tourists visit several sites on their trip as there were 2,2 million foreign visitors in Iceland during the same year. The visitation numbers also indicate a good coverage of the study regarding popular nature-based tourism sites, but it should be noted that many popular sites are still left out of this study due to time and resource constraints, and the results do not cover the total economic impacts of all protected (or unprotected) nature-based tourism sites. We used existing visitor counter data for the visitor numbers at the sites, and conducted an onsite visitor survey to determine the spending and visitor segmentation at all sites. The sample size for each site varied between 209-351 people; in total, we had valid responses from 3.005 people to calculate the spending averages. If we include the visitor surveys from the pilot study at Snæfellsjökull NP, the total sample size is 3.506 people.

The sample from Snæfellsjökull NP pilot study in 2017 was collected during winter and summer, and is statistically significant at 95 % confidence interval. The samples collected for this study in summer 2018 are biased towards the summer visitors and while statistically significant at 90 % confidence interval apart from Ásbyrgi, Laki, Skaftafell and Dynjandi, such be considered only indicative representations of the annual visitors.

For interpretation of the results, it's important to note that 96 % of the visitors surveyed in this study were foreign, which shows how strongly the protected area tourism is linked to the boom of foreign tourists. Furthermore, 98 % of all the money spent in connection with the protected area visits was spent by foreigners and only 2 % by Icelandic residents. The difference is due to the higher daily spending of foreigners - on average almost twice to that of the locals - and due to the way we calculated the accrued spending to the protected area from other destinations on the same day - the sites in the study had a higher importance to foreigners than locals in their trip plans. Nevertheless, these figures highlight how volatile nature-based tourism in Iceland is, as nearly all tourism revenues are dependent on international trends and subject to currency and market regulation fluctuations.

Based on the visitor spending survey, we discovered that overall visitors spent 10.187 ISK (ca. 81 €) per visitor per day in the vicinity of the sites and in total 21.865 ISK (ca. 175 €) if all spending related to the visit was factored in. However, as it is very typical for visitors in Iceland to visit several destinations during the same day ('multi-destination spending'), we calculated the share of daily spending accrued only for the protected area / research site separately. Respectively, the averages for the 'PA-only spending' per visitor per day were 5.625 ISK (ca. 45 €) in the vicinity of the sites and in total 12.683 ISK (ca. 101 €). According to the surveys, on average visitors spent 1,7 days around the parks and protected areas, but due to the popularity of the day-trip tourism and multi-destination visits, we adjusted the length of stays conservatively with an adjusted average of 1,3 days across all sites.

In comparison with similar studies in other countries, the spending figures are generally higher than average, and the length of stay lower. Majority of the higher than average spending can be attributed to the high share of foreign tourists, but some of it also for the high cost of living and services in Iceland - among the highest in the world (Numbeo, 2018). The local 'PA-only' spending is within the range of other countries' protected areas, for example

similar to local 'PA-only' spending in connection with the park visits in Finland and Germany, and lower compared to the averages in the UK. As the local spending figures from USA don't separate 'PA-only' spending, the overall local spending here is twice of that in the US (\$95 vs. \$45). There is no direct match for the total 'PA-only' spending in the literature, as other studies generally don't include spending related to the visit outside of the local area. However, we feel that due to the limited points of entry to Iceland, and the due to the typical travel patterns of visitors, we should also include their spending outside of the area that is relevant to making the visit to a particular PA possible. As discussed at length in 4.7.3.1, this creates some challenges in the data collection phase that can generally be overcome with the help of the survey collector or in the data cleaning phase, but it also adds relevant data for analysis on how the economic impacts of visitor spending are distributed between the localities and other parts of the country.

One of the resulting important findings was that 45 % of all of visitor spending took place in the vicinity of the research sites; a considerable share considering how focused availability of many services in Iceland is to the capital area and regional centres. The results were also quite uniform with most sites between 40-50 %, Hvítserkur and Þórsmörk slightly below, and Laki, Jökulsárgljúfur and Dynjandi at or above 50 % in the share local spending. The data allowed us also to calculate local economic impacts separately for each site in addition to the overall national figures. The main driver of the local economic impact is naturally the number of people visiting, but local spending in combination with the length of stay have a significant effect. For example, Laki achieves 75 % of the local economic impact of Hengifoss with only ca. 7.800 vs. 64.400 visitors due to the above reasons. In comparison to Hvítserkur this ratio is 63 % with only 7 % of the visitors. These are encouraging examples of how even sites with low visitor numbers can be developed to have a significant local impact; visitors to Laki contribute much more in terms of local accommodation, guiding and transportation services compared to the other two.

Overall, the direct annual economic impact of visitor spending of 12 sites covered in this study is ca. 10 billion ISK (80 million euros) locally in the vicinity of the protected areas and 33,5 billion ISK (268 million euros) nationwide. The visitor spending supports approximately 1.800 jobs locally in the vicinity of the protected areas, and over 5.500 jobs nationwide. In full-time equivalents during the summer season these figures would be ca. 1.500 and 4.800 respectively. These direct impacts measure effects within the tourism sectors and account for one-sixth of all ~30.000 jobs in tourism in Iceland. With secondary effects to other sectors included, an estimate of the total economic impact of the sites in the study is over 12 billion ISK (96 M€) locally and 41 billion ISK (328 M€) nationwide. Secondary effects generate further 300 jobs in the vicinity of the sites and ca. 1.000 jobs in total, bringing the job impacts to ca. 2.100 locally and over 6.500 in total (including part-time and seasonal jobs). The secondary effects are calculated with the lowest economic multipliers (17-29%) available in the MGM2 methodology. However, as the regional economic input-output tables are not available in Iceland, we don't have means of verifying them, thus they have been presented separately and subordinate to the direct impacts.

These results are in line with international studies, though direct comparisons are difficult to make due to some differences in the calculation methods. For example, compared to the 3,1 million visits to Finland's 40 national parks and protected areas generating 206,5 million euros (secondary effects included), the 3,8 million visits to the 12 sites in this study generated in 96-328 million euros between the local and nationwide effects. In Finland, these visits generated ca. 2.055 full-time equivalent jobs, while the range of generated full-time equivalent (direct) jobs in Iceland is 1.500-4.800 between local and nationwide effects. In Germany 11,6 million visitor days to Mecklenburg-Vorpommern region's 3 NPs and 2 biosphere reserves generated annually 384 million euros in local income, 728 million euros in turnover and 25.782 full-time equivalent jobs. For the 'high-affinity' visitors only (equivalent to our 'PA-only' visitors), these numbers were 69 M€ in local income, 131 M€ in turnover and 4.442 jobs respectively. Compared to the visitor numbers, the German studies show significantly lower economic impacts per visitor, but the German studies also reported lower daily spending figures in comparison with the Finnish and Icelandic studies, only 7-13 € for day-visitors and 37-57 € for overnight visitors, which puts the results in perspective. The authors of the German studies also cited fewer international visitors and low degree of commercialization as reasons for the lower impacts compared to PAs in the US for example.

In addition to the employment impacts generated by the visitor spending, we looked at the jobs created by the protected areas themselves. Overall, the protected areas in this study employ ca. 200 people including part-time and seasonal staff, or ca. 120 people in full-time equivalent. These numbers show that the parks and protected areas can have significant local employment effects as well. However, overall the figures are relatively low compared to the number of visitors - each full-time (equivalent) staff member employed by the PAs attends on average to approximately 30.000 visitors in a year or 80 visitors per day. Employment numbers also vary dramatically between the protected areas. Vatnajökull and Þingvellir National Parks employ almost 90 % of all the staff of the protected areas in this study, and PAs under the management of the Environmental Agency have only one-third of the staff relative to the visitor numbers for the rest in comparison. Ensuring sufficient staff resources across all the protected areas will be critical issue in the preparation of the upcoming 'national park service' organization that plans to cover management of all of Iceland's protected areas.

We compared the annual budgets of the protected areas to the economic impacts and tax revenue generated by the visitors. In 2017, the sum of the total budgets of the protected areas in this study was ca. 2,1 billion ISK, of which ca. 1,5 billion was state contribution. Compared with the combined direct economic impact of ca. 33 billion ISK, the economic impact to cost -ratio of the Icelandic national parks and protected areas in 2017 was 23:1 calculated against the state contributions. The protected areas generated 12,4 billion ISK in taxes, thus generating ca. 8 krónas for each invested tax króna (8:1 ratio). This means that even if the annual state funding to the protected areas was 8 times the current budget, the tax investment would pay itself back and still generate ca. 3:1 economic impacts for each króna in residents' personal income and business value-added - assuming no change in visitor numbers or spending.

It's important to keep in mind that having high ratios for economic impacts or generated tax revenue should not be regarded as a goal or a competition between the sites. After all, unprotected sites that have no annual management or protection budget would win that game easily by generating in a sense 'free revenue' to the state and businesses. For example, according to this study Hvítserkur generated 0,3 billion ISK in 2017 without any protected area management activity. A much better question would be how can management of the protected areas contribute to sustainable recreational use, better visitor experience and rural livelihoods?

The results of the economic impact analysis were cross-referenced and verified with regional tax records based on sales and employment data as reported by employers in the tourism sector in end-of-year tax reports. Overall, our results from the MGM2 analysis were within the boundaries of the tax data. Some exceptions were found in local economic effects of tours, accommodation and transportation services in Skaftafell, Mývatn, Snæfellsjökull and Landmannalaugar, and the majority of the differences are likely due to company registrations to the capital instead of the local municipalities. This results in a situation where the effects of local visitor spending don't appear in the local tax records but in the capital area (or other regional center) where the company headquarters is registered. These discrepancies don't have an impact on the overall nationwide economic effects, but they may generate some positive bias to the local economic and employment effects. On the other hand, in these cases the visitor has spent the money in the vicinity of the protected area or nature site and this may indicate an opportunity for local entrepreneurs, even if the spending in the case of this study wouldn't be captured locally.

As additional means of verification, we conducted an employer survey to companies in the tourism sector to verify the employment impacts and gather additional information on the views of the companies on nature-based tourism. We received valid responses from 405 companies representing ca. 4.360 employees. The findings of the regional employment figure comparison were in line with the tax data and our study, but the sample of companies was not sufficient around all research sites for conclusions. Other than the verification purposes, the survey also provided interesting findings about the sector. Even though the visitor numbers between winter and summer season have been balancing significantly in the last couple of years with the winter season growing faster (Icelandic Tourist Board, 2018), seasonality still plays a major role in tourism in Iceland. 80 % of the participating companies operate all-year round, the rest mostly in the summer season, and clear majority said seasonality strongly affects the business.

Seasonal contracts are generally between 3-6 months, but most companies responded recruiting their seasonal employees with annual contracts - it would be interesting to find out in more detail what they mean by this - perhaps simply having same employees for summer and winter seasons. Majority of the employees in the sector are women, and most companies had primarily locally registered employees; however, 17 % reported having almost no locally registered employees. This is significant percentage, and may have some effect in the verification of the man-years from tax data compared to the employment effects reported by the MGM2 analysis. Finding skilled employees was also a difficulty for ca. 40 % companies.

Companies in the tourism sector seem to align relatively well with the overall findings of this study. 70 % stated that proximity to nature-based attractions was significant to their business, and 50 % stated that revenues from nature-based tourism were significant for their business. The importance of the sites covered in this study for tourism in the area were generally well recognized; Jökulsárgljúfur, Mývatn and Skaftafell were mentioned by all companies in the respective areas, and most other sites were mentioned by 50-95% of the companies. Only Laki, Þingvellir and Þórsmörk were below the 50 % mark.

Main limitations of this study are the lack of regional input-output tables and the time-frame allowing us to collect visitor spending data from the summer season only. If the regional input-output tables were available in Iceland, there would be little uncertainty in the economic impact multipliers that govern how the economic impact analysis calculates visitor spending into personal income, added-value and employment effects. We would also be able to present the secondary effects into other sectors as part of the main results instead of subordinate conservative estimates. We believe that by using conservative capture rates in all sectors and verifying the results from the tax records, we have controlled the uncertainty resulting from the missing input-output tables. However, the size and distribution of the Icelandic economy is quite unique, and it would be very valuable to have those tables available for future economic analyses on this and other topics.

During the pilot study last year, visitor spending data was collected both during winter and summer seasons. A key finding was that during the winter, visitors spent more money per day but less time overall for the visit. The timeframe for this study didn't allow us to collect a separate dataset during winter, so we have assumed that the higher spending but shorter stay in the winter cancel out each other's effect overall. We also adjusted the length of stays conservatively from what visitors reported. Furthermore, we had a very high share of campers responding to our spending survey this summer. 33 % of all respondents were camping, which denotes a positive bias on this segment as for example the Icelandic Tourist Board (2018) reports an overall share of campers generally well below 10 % in annual figures from the Keflavik airport departure surveys. Naturally, these figures are not directly comparable as we surveyed people only at the protected areas and nature sites, and the departure surveys cover everyone departing from the airport, including winter passengers and people on stopovers and weekend stays in Reykjavik. However, as the campers are the lowest spending foreign visitor segment and during winter in marginal numbers compared to summer, this creates a negative bias in the overall results.

Potential over-representation of the campers suggests an under-representation of the organized bus tour passengers who are often on tight schedule and may feel they don't have time to answer surveys. Based on the results of the pilot study and this study, they generally spend more money per day overall but less locally, so this may mean further negative bias on the overall results but a positive bias on the local impacts, as self-driving travellers tend to spend more money locally. Also, there are certain cases of winter tourism that may exceed the spending data collected during the summer. For example, the winter ice cave tourism near Jökulsárlón may present an additional 2 billion ISK in direct sales effects attributable to the south part of Vatnajökull NP that would generally be added on top of the year-round tours in the area.

Overall, in comparison to the pilot study, the results of the study this summer concur strongly with the results from last summer, suggesting that the methodology and sampling produce consistent results. For example, average spending figures during summer are within a thousand krona between the studies. The share of local spending

between the pilot study and overall average in this study are identical. Importance of the site to the visitor are also virtually identical between annual averages at Snæfellsjökull and the sites in this study. The results of the economic impact analysis align mainly based on the visitor numbers, however, Snæfellsjökull does show somewhat higher local impacts compared to Mývatn with similar visitor numbers. This may indicate a positive bias of local impacts from visitors at Snæfellsjökull NP in relation to the main road visitor counter used in this study - the counter used in the pilot study counted people who had stopped in the park, thus the local economic impacts should be viewed with some caution.

An interesting question that can be raised in relation to studies of this kind is the value of the national park or protected area designations. Sometimes people ask what kind of economic impacts would be realized if none of the areas were protected? This is generally a difficult question to answer conclusively as it would need either speculative data from the visitors (e.g. *'Would you have visited this site if it was not part of a protected area?'*) or historical comparative data from similar locations where one site is protected and another is not. Some of the visitor counting data (see Appendix 11.5) provided for different sites in Iceland could be useful for such analysis, but it would still be difficult to reliably separate the reasons behind different rates of visitor increases between the sites without knowing how the visitors perceive the designation.

There are some international studies supporting the reasoning that the protected area category or 'the name' of the designated area matters. For example, Weiler & Seidl (2004) showed that protected area conversions to national parks had a strong and statistically significant impact on expected long-term visitations. Cline et al. (2011) developed a model to estimate the impact of designating areas as national monuments or national parks, the latter ones having up to four times the economic and employment impacts. Similarly, Reinius & Fredman (2007) saw an increase especially in foreign visitors to a newly designated national park in Sweden. Related to the theme, Kayahan & Vanblarcom (2012) determined a UNESCO World Heritage site designation to be economically very favourable in a cost-benefit study.

Regarding our study, we can approach this question mainly from the importance of the site to the visitor, and from the actual visitor spending at different sites. Overall, comparing the importance of the destination to the visitor between protected and unprotected areas had a significant effect; protected areas were more likely to be the main destinations and less likely as non-intended stops. Between individual sites, unprotected Hengifoss and Hvítserkur had the lowest importance as a destination to the visitors and by far highest incidence of non-planned visits. As a result, also the spending accrued to these sites was the lowest in the study. In the employer study these sites also received relatively low importance ratings from the tourism businesses. However, without further studies and insight into the reasoning behind the visitors' answers, these results should be taken cautiously - there might be other underlying factors that didn't surface with our survey setup as we didn't focus on this issue. Again, perhaps a more relevant question is what the protected area designation can contribute to a site or a nature area?

Obvious benefits of protected area designations are the stewardship functions laid on the responsibility of the protected area authorities in ensuring protection, preventing degradation, managing and informing visitors, enhancing experience, providing services, and so on based on the protected area categories (Dudley, 2008). Especially in areas where tourism boom and visitor pressures threaten the environmental and ecological features of the protected areas, the park authority's role is especially important in ensuring the future natural, social and economic value of the sites. As this issue currently affects nearly all popular sites in Iceland, this issue should be researched further to look for solutions on how tourism could be part of the solution and not the problem. Weaver and Lawton (2017, pp. 140-141) discuss this particularly aptly also for the Icelandic context:

"... Chronic underfunding [of the PAs] leads [...] to increased operational reliance on visitor-based revenue despite the potential of increased visitation to further undermine the vital ecological functions of protected areas. Much of this revenue, as a result, is allocated to the management and satisfaction of visitors rather than environmental stewardship. [...] combined with [...] parallel growth in demand, [these considerations] suggest that visitation pressures will intensify, particularly in protected areas close to major population

centres, transportation corridors and hubs, and/or areas of concentrated tourist activity. Current approaches to visitation in protected areas [...] focused on management and monitoring of visitors and their environmental impacts, are suboptimal."

Another issue, which warrants further research from this study, is how to support the local communities in increasing their share of the revenue linked to protected area and nature-based tourism. This study has largely focused on describing the visitor travel patterns, spending and related economic effects, but cannot answer directly how this kind of tourism could be developed to benefit local communities more. Combined with the previous question, how to develop the national parks and protected areas in Iceland further to ensure environmental sustainability, and local social and economic gains in all regions of Iceland? As the researchers working for the US Park Service (Headwater Economics, 2017; p. 3) remind us:

"It is important to note that natural amenities are not the only element needed for economic success. Other factors such as access to markets and education levels also are important. How local leaders combine these assets along with investments, marketing, and policy decisions will play a significant role in determining future economic prosperity."

9 Conclusions

The main objective of this study was to conduct the first overall assessment of the impact of Iceland's national parks and protected areas to the economy and employment both locally and on a national level. The results were verified by a comparison to tax records, results from an employer survey, and to other similar international studies. The study was conducted at 11 different protected area and nature-based tourism sites selected by the Ministry Environment and Natural Resources who also commissioned the study: Ásbyrgi, Laki and Skaftafell within Vatnajökull National Park, Þingvellir National Park, Dynjandi, Hraunfossar, Landmannalaugar, Mývatn, Hengifoss, Hvítserkur and Þórsmörk. Updated results for Snæfellsjökull National Park from a pilot study were also included in the results.

The economic impact analysis was conducted using Money Generation Method (MGM2) developed originally for the US Park Service. Annual 2017 visitor numbers were provided by Rögnvaldur Ólafsson & Gyða Þórhallsdóttir (2018, August) using existing visitor counters at the research sites. Visitor spending and segmentation data was collected by an onsite survey at each location. Overall results are generated based on a sample of 3.506 people. Surveys were collected during June-August 2018 apart from Snæfellsjökull NP where the data was collected as part of the pilot study in January-June 2017.

Overall, the direct annual economic impact of visitor spending of 12 sites covered in this study is ca. 10 billion ISK locally in the vicinity of the protected areas and 33,5 billion ISK nationwide. The visitor spending supports approximately 1.800 jobs locally in the vicinity of the protected areas, and over 5.500 jobs nationwide. With secondary effects to other sectors included, an estimate of the total economic impact of the sites is over 12 billion ISK locally and 41 billion ISK nationwide. Secondary effects bring the job impacts to a range of 2.100-6.500 jobs in total between the local and national impacts including part-time and seasonal jobs. The protected areas themselves can also generate significant local employment effects, employing almost 200 people annually including seasonal and part-time workers. However, the distribution of the staff between the protected areas is currently uneven with the PAs under the Environmental Agency having only one-third of the staff resources in relation to the visitor numbers. Each full-time protected area employee has on average about 80 visitors to attend to per day across all the protected areas in this study.

The scale of the economic impacts is largely determined by the number of visitors to each site, as the overall daily spending of visitors was relatively uniform around 21.743 ISK (ca. 174 €) per visitor per day or 12.683 ISK (ca. 101 €) accrued for the protected areas only. Largest economic impacts were generated by Þingvellir and Vatnajökull National Parks (13,4 and 10,8 billion ISK respectively), followed by Snæfellsjökull NP and Mývatn area (3,6 and 2,4 billion ISK

respectively). The overall economic impact to cost -ratio was 23:1, meaning the PAs overall generate 23 króna in income and added-value impacts for each króna in their budget. Comparing tax revenue generated by the visitor spending to the annual state contributions, the ratio is 8:1 suggesting the parks would be self-sufficient even with much higher funding. These figures follow the findings of the pilot study (Siltanen, 2017) carried out at Snæfellsjökull NP and overall indicate a high return for the annual investments put into the national parks and protected areas.

The results of the analysis are also comparable with the international studies; in general somewhat higher due to the high share of foreign tourists - 98 % of all the visitor spending in connection with the protected areas was carried out by foreigners - and due to the high cost of living and services in Iceland. Comparison of the economic impacts to regional tax data suggests that the results are overall feasible. Main differences noted were related to tours, accommodation and transportation services in areas where companies providing these services are not registered to the municipality thus causing a disconnect with the local spending and realization of that spending in the tax data.

Main limitations of this study are due to the lack of regional input-output tables and short timeframe of the study allowing us to collect visitor data only from the summer season, leading to seasonally unbalanced site samples below 95 % confidence interval. Lack of local input-output tables causes some uncertainty in the economic impacts, which we have attempted to overcome with the verification to the tax data and conservative assumptions on sectoral capture rates and secondary impacts. Lack of winter data primarily generates a positive bias on the camper segment, which in turn decreases the overall impacts as the spending of the campers is the lowest of the foreign visitor segments. However, their higher than overall presence may generate a small positive bias on the local impacts, scale of which we cannot determine from the data.

Further questions raising from the study concern the benefits of protected area designations under increasing visitor pressures in Iceland; how can the protected areas contribute to sustainable recreational use, better visitor experience and rural livelihoods? Can tourism be part of the solution instead of contributing further to the environmental and social pressures? How can the local communities in practise increase their share of the revenues linked to protected area tourism and become more involved in the development and management of protected areas and nature-based tourism sites around them?

10 References

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11 Appendices

11.1 Appendix: Example of paper-based visitor spending survey forms

Visitor Spending Survey 2018: Dynjandi

This survey is conducted by the Institute of Economic Studies at University of Iceland as part of a research project commissioned by the Ministry of Environment and Natural Resources of Iceland. Aim of the survey is to study the economic impact of protected areas and nature-based tourism sites in Iceland, and to provide information for decision-making and policies regarding the development of protected areas. Answering this short questionnaire will only take a couple of minutes and all answers will be treated anonymously. We are grateful for your time and participation in this study.



1. On this trip, Dynjandi is...

- your only or the most important destination?
- one among other intended destinations?
- a non-planned destination along your route?

2. What other sites in the surrounding area have you visited in the last 24 hours or one day?

3. How many days are you going to stay altogether around Dynjandi or its surroundings? _____

4. How many people are travelling in your party? _____
Party is defined as your family, friends, partners, etc. you're travelling with... Please do not include other participants of an organized tour.

5. In the following section we will ask you to estimate your spending in connection to visiting the Dynjandi and its surroundings. Please indicate whether you will estimate:

- your personal expenses only (1 person)
- total expenses of your party (for the number of people indicated above).

6. Please select the currency you're most comfortable estimating the expenses in:

ISK EUR USD GBP Other _____

7. In the following questions, indicate your total expenses for the **last 24 hours or one day** on this trip in column **a** for Laki and its surroundings (map area), and column **b** for elsewhere in Iceland during the same 24h time period.

	a	b
Fuel and other purchases from service stations?		
Costs for transportation?*		
Guided tours and other recreational activities?*		
Cultural activities?		
Accommodation?*		
Cafe and restaurant purchases?		
Groceries?		
Souvenirs?		
Other retail purchases? Eg. clothing, goods, ...		
Other spending? Specify type _____		

*Please include any pre-paid expenses on a per-day basis.

7c. Type of accommodation if overnight stay:

- Hotel / guesthouse
- Hostel / mountain hut
- Farm accommodation
- Private rental (eg. Airbnb)
- Camping / camper van
- Summer house / cottage
- At family / friends / home
- Sleeping in the car
- Other: _____

8. Are you a local resident living in the municipality surrounding Dynjandi? Yes No

9. Gender? Female Male Non binary

10. Age < 18 18-24 25-34 35-44 45-54 55-64 65+

11. Country of residence _____

Thank you for your time!  UNIVERSITY OF ICELAND

Könnun á útgjöldum ferðamanna 2018: Dynjandi

Hagfræðistofnun stendur fyrir þessari könnun. Hún er þáttur í rannsókn sem gerð er fyrir Umhverfisráðuneytið. Markmiðið er að skoða áhrif náttúru-verndarsvæða á efnahag og atvinnu í næsta nágrenni. Rannsóknin mun vonandi koma að gagni þegar teknar eru ákvarðanir um náttúruverndarsvæði hér á landi. Minna en fimm mínútur tekur að svara könnuninni. Einstök svör eru trúnaðarmál.



1. Dynjandi er...

- aðaláfangastaður ferðarinnar?
- meðal áfangastaða í þessari ferð?
- ekki fyrirhugaður áfangastaður - þeir voru bara í leiðinni?

2. Hvar annars staðar í grenndinni hefurðu verið undanfarinn sólarhring?

3. Hvað gerirðu ráð fyrir að verða marga daga í nágrenni Dynjanda? _____

4. Hvað eru margir í þínum ferðahópi? _____
Átt er við þig sjálfan, fjölskyldu, vini - ekki aðra aðila í hópferð.

5. Nú bið ég þig um að meta útgjöld sem tengjast ferð þinni að Dynjanda og nágrenni. Segðu til hvort um er að ræða...

- þín eigin útgjöld eða þinn hlut í heildarútgjöldum vegna ferðarinnar
- heildarútgjöld ferðahópsins.

6. Hver voru heildarútgjöld þín (ISK) síðastiðinn sólarhring a) í nágrenninu (sjá kort), og b) annars staðar á landinu, sem runnið hafa til þess sem talið er upp hér á eftir:

	a	b
Innkaup á bensinstöðvun, þar með talið bensín		
Fargjöld, bílaleiga*		
Skoðanarferðir og skemmtanir*		
Menning		
Gisting*		
Veitingahús		
Matvörur		
Minjagripir		
Önnur innkaup		

* Teljið með gistingu og annað sem borgað hefur verið fyrirfram, deilt niður á einstaka daga.

6c. Hvar gistirðu?

- Á hóteli
- Farfuglaheimili / skála
- Bændagistingu
- Leigi í heimahúsi
- Húsbíl, hjólhýsi, tjaldi
- Sumarbústað
- Hjá sættingjum / vinum / í eigin húsnæði
- Í bílnum
- Annað: _____

Um svaranda

7. Áttu heima í nærliggandi sveitarfélagi? Já Nei

8. Kyn? Kona Karl Annað

9. Aldur < 18 18-24 25-34 35-44 45-54 55-64 65+

10. Hvert er dvalarland þitt? _____

Kærar þakkar fyrir að taka tíma til þess að svara spurningunum!  HÁSKÓLI ÍSLANDS

11.2 Appendix: Example of electronic visitor spending survey forms

 UNIVERSITY OF ICELAND

Visitor Spending Survey 2018: Dyrnjandi

This survey is conducted by Institute of Economic Studies at the University of Iceland as part of a research project commissioned by the Ministry of Environment and Natural Resources of Iceland. Aim of the survey is to study the economic impact of protected areas and nature-based tourism sites in Iceland, and to provide information for decision-making and policies regarding the development of protected areas.

Answering this short questionnaire will only take a couple of minutes and all answers will be treated anonymously. We are grateful for your time and participation in this study.

[Fylltu kinnunnin á íslensku](#)

* 1. On this trip, Dyrnjandi is...

your most important destination
 one among other intended destinations
 a non-planned destination along your route onwards

2. What other sites in the surrounding area have you visited in the last 24 hours or one day?

<input type="checkbox"/> Horseback riding	<input type="checkbox"/> Rauðasandur beach
<input type="checkbox"/> Svalvogar circle	<input type="checkbox"/> Vatnesfjörður Nature Reserve
<input type="checkbox"/> Samúel Jónsson's Museum	<input type="checkbox"/> Patreksfjörður
<input type="checkbox"/> Seal watching	<input type="checkbox"/> Bíldudalur
<input type="checkbox"/> Reykjarfjörður swimming pool	<input type="checkbox"/> Ísaþjörur
<input type="checkbox"/> Þingeyri village / Viking museum	<input type="checkbox"/> Flateyri
<input type="checkbox"/> Látrabjarg cliffs	

Other (please specify)

Map: Dyrnjandi and surrounding areas



* 3. How many days are you going to stay altogether around Dyrnjandi or its surroundings?

Half-day / day-trip
 1 day
 2 days
 3 days
 More (please specify)

* 4. How many people are travelling in your party?
 Party is defined as your family, friends, partners, etc. you're travelling with. Please do not include other participants of an organized tour.

1 person / only me
 2 people
 3 people
 4 people
 More (please specify)

* 5. In the following questions we will ask you to estimate your spending related to visiting Dyrnjandi and its surrounding area.

Please select whether you will indicate

your personal expenses only (1 person)
 total expenses of your party (for the number of people indicated above)

* 6. Please select the currency you're most comfortable estimating the expenses in

Icelandic Krona (ISK)
 Euro (EUR)
 US Dollar (USD)
 British Pound (GBP)
 Other currency (enter country or currency code)

7. Please indicate the sum of your expenses in the surrounding areas (see map) for the last 24 hours or one day in the following categories using your selected currency:
 *Please include any pre-paid expenses on a per-day basis.

Fuel and gas station purchases

Local transportation

Tours and recreation*

Cultural activities

Local accommodation*

Cafes and restaurants

Groceries

Souvenirs

Other retail

8. Please indicate the sum of your expenses elsewhere in Iceland during the same 24h time period using your selected currency:
 *Please include any pre-paid expenses on a per-day basis.

Fuel and gas station purchases

Transportation (eg. rental car)*

Tours and recreation*

Cultural activities

Accommodation*

Cafes and restaurants

Groceries

Souvenirs

Other retail

* 9. Type of accommodation for overnight stay?

Hotel / guesthouse
 Hostel / mountain hut
 Farm accommodation
 Private rental (eg. Airbnb)
 Camping / camper van
 Summer house / cottage
 At home / family / friends
 Sleeping in the car
 Other (please specify)

Background information
Based on the person filling the survey

* 10. Are you a local resident living in the municipality surrounding Dyrnjandi?
 Yes
 No

11. If "No" in Q10, what is your country of residence?

12. Age

13. Gender
 Male
 Female
 Non binary

14. Additional information (optional)
 Clarification to answers above, for example description of multi-day tour packages; notes by survey supervisor, etc.

Könnun á útgjöldum ferðamanna 2018: Dynjandi

Hagfræðistofnun stendur fyrir þessari könnun. Hún er þáttur í rannsókn sem gerð er fyrir Umhverfisstofnuneytlið. Markmiðið er að skoða áhrif náttúru-verndarsvæða á efnahag og atvinnu í næsta nágrenni. Rannsóknin mun vonandi koma að gagni þegar tekið er ákvæði um náttúruverndarsvæði hér á landi.

Mína er fimm mínútur tekur að svara könnuninni. Einstök svör eru trúnaðarmál. Kerar þakkið fyrir að taka tímu til þess að svara spurningunum sem hér koma á eftir.

[Switch to English](#)

* 1. Dynjandi er ...

- aðalífangastaður ferðarinnar
- aðalífangastaða í þessari ferð
- ekki fyrirhugaður ífangastaður - þeir voru bara í leiðinni

2. Hvar annars staðar í grenndinni hefurðu verið undanfárin sölurhring?

- Á hestbaki
- Á Rauðasandur
- Í listasafninu Samúels Jónssonar
- Í friðlandi Vatnsfjarðar
- Á Svalvegum
- Í Patreksfróli
- Í selaskoðum
- Á Bíldudal
- Í Reykjarfirði
- Á Isafirði
- Á Þingeyri
- Á Flateyri
- Á Látrabjargi

Annað (vinsamlegast tilgreinið)

6. Hver voru heildarútgjöld þín (ISK) í nágrenninu (sjá kort) *sölustíðinn sölurhring*, sem runnið hafa til þess sem talið er upp hér á eftir:

*Talið með gistingu og annað sem borgað hefur verið fyrirfram, deilt niður á einstaka daga.

Innkaup á bensinstöðvun, þar með talið bensin

Fargjöld, bílaleiga*

Skoðunarferðir og skemmtanir*

Menning

Gisting*

Veitingahús

Matvörur

Mínjagripir

Önnur innkaup

Kort: Dynjandi og nágrenni



* 3. Hvað gerirðu ráð fyrir að verða marga daga í nágrenni Dynjanda?

- Hluta úr degi
- 1 dag
- 2 daga
- 3 daga
- Lengur (segðu hversu lengi)

7. Hver voru heildarútgjöld þín (ISK) annars staðar á landinu *sölustíðinn sölurhring*, sem runnið hafa til þess sem talið er upp hér á eftir:

*Talið með gistingu og annað sem borgað hefur verið fyrirfram, deilt niður á einstaka daga.

Innkaup á bensinstöðvun, þar með talið bensin

Fargjöld, bílaleiga*

Skoðunarferðir og skemmtanir*

Menning

Gisting*

Veitingahús

Matvörur

Mínjagripir

Önnur innkaup

* 8. Hvar gistirðu?

- Á hóteli
- Farfuglahemili / skála
- Bændagistingu
- Leigi í heimahúsi (til dæmis Airbnb)
- Húsbíli, hjólnýsi, tjaldi
- Sumarbústað
- Hjá ættingjum/vinum/í eigin húsnæði
- Í bílnum
- Annað (vinsamlegast tilgreinið)

* 4. Hvað eru margir í þínum ferðahópi?

Átt er við þig sjálfan, fjölskyldu, vini -ekki aðra aðila í hóperð.

- Einn - bara ég
- Tveir
- Þrír
- Fjórir
- Fleiri (þve margir?)

* 5. Nú bið ég þig um að meta útgjöld sem tengjast ferð þinni að Dynjanda og nágrenni.

Segðu til hvort um er að ræða...

- Þín eigin útgjöld eða þínn hluti í heildarútgjöldum vegna ferðarinnar
- Heildarútgjöld ferðahópsins

Um svaranda

Um þann sem spókur er

* 9. Áttu heima í nærliggandi sveitarfélagi?

- Já
- Nei

10. Ef svarið er *nei* í 9. spurningu, hvert er dvalarland þitt?

11. Kyn

- Karl
- Kona
- Annað

12. Aldur

13. Annað (ef við á)

Skýringar á vörðum hér að framan, athugasemdir frá upprjanda o.fl.

11.4 Appendix: Municipalities in vicinity of the research sites

#	Municipality	Postal code	Central town	Population 01.01.2018	Research site
4200	Ísafjarðarbær	400	ÍSAFIRÐI	3 707	Dynjandi
4607	Vesturbyggð	450	PATREKSFIRÐI	1 024	Dynjandi
7000	Seyðisfjarðarkaupstaður	710	SEYÐISFIRÐI	676	Hengifoss
7300	Fjarðabyggð	730	FJARÐABYGGÐ	4 777	Hengifoss
7505	Fljótisdalshreppur	701	EGILSSTÖÐUM	76	Hengifoss
7620	Fljótisdalhérað	700	EGILSSTÖÐUM	3 547	Hengifoss
3609	Borgarbyggð	310	BORGARNESI	3 745	Hraunfossar
5508	Húnaþing vestra	530	HVAMMSTANGA	1 193	Hvítserkur
5612	Húnavatnshreppur	541	BLÖNDUÓSI	383	Hvítserkur
6100	Norðurþing	640	HÚSAVÍK	3 234	Jökulsárgljúfur
6601	Svalbarðsstrandarhreppur	601	AKUREYRI	483	Jökulsárgljúfur
6611	Tjörneshreppur	641	HÚSAVÍK	58	Jökulsárgljúfur
8509	Skaftárhreppur	880	KIRKJUBÆJARKLAUSTRI	560	Laki
8614	Rangárþing ytra	850	HELLU	1 610	Landmannalaugar
6607	Skútustaðahreppur	660	REYKJAHLÍÐ	493	Mývatn
6612	Þingeyjarsveit	650	LAUGUM	962	Mývatn
7708	Sveitarfélagið Hornafjörður	780	HÖFN	2 306	Skaftafell
0	Reykjavíkurborg	101	REYKJAVÍK	126 041	Þingvellir
1000	Kópavogsbær	200	KÓPAVOGI	35 970	Þingvellir
1100	Seltjarnarnesbær	170	SELTJARNARNESI	4 575	Þingvellir
1300	Garðabær	210	GARÐABÆ	15 709	Þingvellir
1604	Mosfellsbær	270	MOSFELLSBÆ	10 556	Þingvellir
1606	Kjósarhreppur	276	MOSFELLSBÆ	221	Þingvellir
8200	Sveitarfélagið Árborg	800	SELFOSSI	8 995	Þingvellir
8716	Hveragerðisbær	810	HVERAGERÐI	2 566	Þingvellir
8719	Grímsnes- og Grafningshreppur	801	SELFOSSI	479	Þingvellir
8721	Bláskógabyggð	801	SELFOSSI	1 115	Þingvellir
8722	Flóahreppur	801	SELFOSSI	644	Þingvellir
8613	Rangárþing eystra	860	HVOLSVELLI	1 798	Þórsmörk
3709	Grundarfjarðarbær	350	GRUNDARFIRÐI	877	Snæfellsjökull
3710	Helgafellssveit	340	STYKKISHÓLMI	58	Snæfellsjökull
3711	Stykkishólmsbær	340	STYKKISHÓLMI	1177	Snæfellsjökull
3713	Eyja- og Miklaholtshreppur	311	BORGARNESI	129	Snæfellsjökull
3714	Snæfellsbær	360	HELLISSANDI	1641	Snæfellsjökull
3811	Dalabyggð	370	BÚÐARDAL	667	Snæfellsjökull

Source: Icelandic Association of Local Authorities. (2018). [Sveitarfélögin](#). [online]. Accessed Oct 31st 2018.

11.5 Appendix: Opportunities for studying economic impact at other locations

As presented in 5.3.1.4, we calculated generic visitor spending profiles based on the entire visitor spending survey sample. These can be used to estimate the economic impacts of other nature-based tourism sites where localized spending data is not available. Information about visitor numbers and localized visitor segmentation is still needed.

The visitor segmentation used in this study can be probed with four simple questions:

- Are you a resident in the surrounding municipalities? [Yes >> Local resident]
- Are you a resident in Iceland? [Yes >> Local i.e. 'Icelandic tourist']
- Are you here on a day trip? [Yes >> Day-tripper]
- Are you camping? [Yes >> Camper] [No >> Overnight 'hotel' visitor]

Additionally, the surveyor should record the number of people in each surveyed group.

Visitor numbers are available for many other sites and areas in Iceland. For example, Rögnvaldur Ólafsson and Gyða Þórhallsdóttir⁴⁷ have visitor counters at many of the following locations (+), and the Icelandic Tourist Board⁴⁸ has been surveying the locations (o) where visitors have been with departing passenger survey at the Keflavik airport:

- Dyrhólaey/Reynisfjara (+)
- Geysir/Gullfoss (o)
- Reykjadalur (+)
- Hvalfjörður (o)
- Hornstrandir (o)
- Látrabjarg (o, +)
- Kverkfjöll (o, +)
- Lónsöræfi (+)
- Askja (o, +)
- Hveravellir/Kjölur (o,+)
- Spengisandur (o, +)
- Eldgjá (+)
- Snæfell mountain (+)
- Dettifoss (o, +)
- Skógar (o)
- Seltun (+)
- Borgarfjörður eystri (o)
- Vestmannaeyjar (o)
- Blue Lagoon (o)

The MGM2 analysis application (Stynes et al., 2007) is an Excel worksheet that calculates the results once the capture and taxes rate, and spending and visitor data has been entered.

47 Rögnvaldur Ólafsson and Gyða Þórhallsdóttir. (2018). Summary of counter locations, Spring 2018. Unpublished.

48 Ferðamálastofa. (2018). Áætlaður fjöldi á svæðum og stöðum. [online] Accessed Sep 26th, 2018.

11.6 Appendix: Overall visitor spending averages at research locations

		Fuel and gas station purchases	Transportation	Tours and recreation	Cultural activities	Accommodation	Cafes and restaurants	Groceries	Souvenirs	Other retail	Sum
Hraunfossar	Local	1683	116	1238	86	3148	1819	904	285	141	9420
	Total	2706	3233	2490	241	5991	3586	1661	549	225	20682
Þingvellir	Local	926	50	2338	138	4200	2219	728	413	128	11140
	Total	1959	4598	5049	403	7378	3855	1535	779	529	26087
Landmannalaugar	Local	443	4954	1538	8	3972	1044	689	22	195	12865
	Total	1102	7313	7198	8	5946	2910	1527	188	370	26560
Jökulsárgljúfur	Local	1605	5	1585	147	3368	2050	1250	205	169	10384
	Total	2718	2582	2350	190	4572	3007	2412	289	302	18422
Mývatn	Local	1464	485	1464	69	3575	1494	724	283	102	9659
	Total	2532	3095	5742	162	4571	2438	1435	382	126	20483
Hengifoss	Local	1794	78	430	85	4592	1712	1102	319	163	10276
	Total	2583	3511	5370	128	4846	2209	1433	419	167	20666
Skaftafell	Local	1107	203	3105	43	4434	1749	583	316	47	11587
	Total	1552	2125	12006	43	5223	2243	852	333	153	24530
Hvitserkur	Local	1398	12	227	7	2743	1126	483	529	19	6545
	Total	2689	5087	496	150	5214	2211	1116	819	67	17849
Þórsmörk	Local	0	2291	0	0	2721	1093	0	2	10	6116
	Total	89	2759	11056	0	3369	1248	392	2	10	18925
Laki	Local	1615	2223	5854	5	6093	2480	928	55	204	19457
	Total	2632	5041	6800	135	7847	3597	1622	352	491	28515
Dynjandi	Local	2023	244	232	89	3108	1533	861	148	183	8423
	Total	2109	4253	3455	116	3678	1709	970	245	189	16725
Average	Local	1086	1104	1632	53	3623	1526	672	204	114	10292
	Total	2039	3977	5568	151	5352	2658	1346	412	238	21743

11.7 Appendix: 'PA-only' visitor spending averages at research locations

		Fuel and gas station purchases	Transportation	Tours and recreation	Cultural activities	Accommodation	Cafes and restaurants	Groceries	Souvenirs	Other retail	Sum
Hraunfossar	Local	639	14	398	33	1229	656	369	72	42	3451
	Total	1016	1389	978	139	2788	1331	685	154	69	8551
Þingvellir	Local	297	18	1084	100	2314	1032	329	133	53	5360
	Total	669	2364	1930	211	3552	1634	645	272	178	11455
Landmannalaugar	Local	276	4565	1097	4	3106	875	591	22	97	10635
	Total	842	6649	4894	4	4742	2524	1292	148	245	21340
Jökulsárgljúfur	Local	586	5	622	84	851	865	420	66	64	3563
	Total	1204	1261	905	93	1944	1724	1151	202	114	8598
Mývatn	Local	603	170	627	28	1388	625	308	110	47	3905
	Total	1065	1146	2256	73	1859	1029	570	173	54	8225
Hengifoss	Local	394	13	109	27	1327	464	218	57	30	2637
	Total	690	1015	2166	41	1426	627	356	86	30	6438
Skaftafell	Local	819	117	2067	38	2849	1100	356	256	23	7624
	Total	1065	1551	9692	38	3421	1485	528	270	79	18130
Hvitserkur	Local	530	4	51	3	883	394	177	171	2	2214
	Total	1017	1722	135	28	1760	806	462	354	10	6293
Þórsmörk	Local	0	1755	0	0	1656	938	0	2	10	4361
	Total	89	2041	9694	0	2297	1094	305	2	10	15531
Laki	Local	1085	1782	3430	5	4588	1433	599	33	140	13095
	Total	1823	3017	4011	64	5977	2386	1050	328	393	19049
Dynjandi	Local	794	123	0	24	1219	625	343	38	23	3190
	Total	799	1566	2198	40	1538	739	420	63	24	7386
Average	Local	520	752	790	33	1893	805	326	88	46	5252
	Total	898	2150	3456	71	2804	1374	661	184	104	11701

11.8 Appendix: Detailed economic impact analysis for each site

Dynjandi

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	75 119	15	12	32 765	53 199	95 214	19	16	41 530	67 430
Camping fees	4 206	0	0	477	1 147	4 772	1	0	541	1 301
Cafes and restaurants	37 703	8	7	14 267	16 102	44 645	10	8	16 894	19 067
Tours, recreation & culture	0	0	0	0	0	90 057	22	19	32 708	54 707
Transportation	2 979	0	0	1 610	1 803	37 803	6	5	20 430	22 879
Groceries	4 388	1	1	1 679	2 244	6 629	1	1	2 537	3 389
Gas station purchases	10 167	1	1	3 640	4 731	12 595	2	1	4 510	5 861
Other retail	776	0	0	358	500	1 366	0	0	629	880
Total Direct Effects	135 340	26	22	54 797	79 726	293 081	60	51	119 779	175 514
Secondary Effects	38 471	5	4	11 059	20 253	84 369	11	9	24 684	44 818
Total Effects	173 810	31	27	65 856	99 979	377 450	71	61	144 464	220 332
Multiplier	1,28	1,19	1,19	1,20	1,25	1,29	1,18	1,18	1,21	1,26

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
43 779	15 891	59 670	88 694	34 736	123 430

Hengifoss

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	66 427	10	9	28 974	47 043	71 163	11	9	31 040	50 397
Camping fees	2 667	0	0	302	727	2 847	0	0	323	776
Cafes and restaurants	22 397	5	4	8 475	9 565	30 241	6	5	11 444	12 915
Tours, recreation & culture	4 376	1	1	1 589	2 658	71 038	15	13	25 800	43 153
Transportation	243	0	0	131	147	19 592	5	4	10 588	11 858
Groceries	1 051	0	0	402	537	4 498	1	1	1 721	2 300
Gas station purchases	1 902	0	0	681	885	8 706	1	1	3 117	4 051
Other retail	422	0	0	194	272	1 472	0	0	678	948
Total Direct Effects	99 484	17	14	40 749	61 835	209 558	39	33	84 711	126 399
Secondary Effects	27 417	5	4	7 904	14 506	59 714	7	6	17 452	31 718
Total Effects	126 901	22	18	48 653	76 340	269 271	46	39	102 163	158 117
Multiplier	1,28	1,18	1,18	1,19	1,23	1,28	1,17	1,17	1,21	1,25

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
24 264	11 817	36 082	59 846	24 566	84 412

Hraunfossar

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	271 597	43	46	118 464	192 342	611 275	96	104	266 622	432 898
Camping fees	6 953	1	1	789	1 896	19 043	2	2	2 160	5 192
Cafes and restaurants	138 566	36	26	52 435	59 178	280 539	60	53	106 160	119 812
Tours, recreation & culture	60 796	13	13	22 080	36 931	156 990	34	33	57 017	95 366
Transportation	1 151	0	0	622	696	117 066	27	17	63 268	70 852
Groceries	25 852	5	5	9 893	13 218	38 063	7	7	14 566	19 461
Gas station purchases	44 741	6	5	16 021	20 822	56 403	7	7	20 196	26 248
Other retail	7 999	2	2	3 269	4 547	12 302	3	2	5 121	7 130
Total Direct Effects	557 656	99	84	223 572	329 630	1 291 680	237	201	535 109	776 959
Secondary Effects	157 851	18	15	45 452	83 165	368 703	43	36	106 927	195 095
Total Effects	715 507	117	99	269 023	412 796	1 660 383	279	237	642 036	972 054
Multiplier	1,28	1,18	1,18	1,20	1,25	1,29	1,18	1,18	1,20	1,25

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
147 901	64 836	212 737	358 348	155 182	513 529

Hvitserkur

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	69 412	14	12	30 276	49 157	139 087	27	23	60 666	98 500
Camping fees	2 875	0	0	326	784	4 821	1	0	547	1 315
Cafes and restaurants	29 975	7	6	11 343	12 802	61 380	13	11	23 227	26 214
Tours, recreation & culture	2 739	1	1	995	1 664	8 235	2	2	2 991	5 002
Transportation	126	0	0	68	76	52 469	9	7	28 357	31 756
Groceries	3 524	1	1	1 348	1 802	9 199	2	2	3 520	4 703
Gas station purchases	10 538	1	1	3 773	4 904	20 243	3	2	7 249	9 421
Other retail	3 437	1	1	1 583	2 214	7 250	2	1	3 339	4 670
Total Direct Effects	122 626	24	20	49 713	73 402	302 684	58	49	129 895	181 580
Secondary Effects	34 502	4	4	9 943	18 222	88 007	11	10	25 690	46 775
Total Effects	157 129	28	24	59 655	91 625	390 691	70	59	155 585	228 355
Multiplier	1,28	1,18	1,18	1,20	1,25	1,29	1,19	1,19	1,20	1,26

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
38 381	14 417	52 797	111 024	37 670	148 693

Laki

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	36 225	7	6	15 800	25 654	47 544	9	8	20 738	33 670
Camping fees	1 463	0	0	166	399	1 463	0	0	166	399
Cafes and restaurants	10 950	2	2	4 144	4 676	18 228	4	3	6 898	7 785
Tours, recreation & culture	17 493	4	4	6 353	10 626	20 756	5	4	7 538	12 608
Transportation	5 445	1	1	2 943	3 295	9 220	2	1	4 983	5 580
Groceries	1 196	0	0	458	612	2 096	0	0	802	1 072
Gas station purchases	2 166	0	0	776	1 008	3 641	1	0	1 304	1 694
Other retail	344	0	0	159	222	1 440	0	0	663	928
Total Direct Effects	75 283	15	13	30 798	46 493	104 388	21	18	43 091	63 736
Secondary Effects	21 104	3	2	6 161	11 232	29 565	4	3	8 609	15 695
Total Effects	96 387	18	15	36 959	57 725	133 952	25	21	51 701	79 431
Multiplier	1,28	1,18	1,18	1,20	1,24	1,28	1,18	1,18	1,20	1,2

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
18 061	8 931	26 993	27 806	12 496	40 302

Landmannalaugar

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	194 825	30	25	84 978	137 973	316 445	48	41	138 025	224 103
Camping fees	69 208	7	6	7 849	18 869	81 807	8	7	9 278	22 305
Cafes and restaurants	66 068	14	12	25 001	28 216	190 559	39	34	72 110	81 384
Tours, recreation & culture	55 414	11	10	20 126	33 662	246 568	51	43	89 550	149 781
Transportation	137 838	31	27	74 494	83 424	200 734	46	39	108 486	121 490
Groceries	8 805	2	1	3 369	4 502	25 500	5	4	9 758	13 038
Gas station purchases	4 112	1	0	1 472	1 913	16 605	2	2	5 946	7 728
Other retail	1 777	0	0	819	1 145	7 766	1	1	3 577	5 002
Total Direct Effects	538 047	96	81	218 108	309 705	1 085 984	201	171	436 730	624 830
Secondary Effects	160 219	20	17	47 567	85 876	320 571	38	32	94 055	170 273
Total Effects	698 266	116	98	265 675	395 581	1 406 555	239	203	530 785	795 103
Multiplier	1,30	1,21	1,21	1,22	1,28	1,30	1,19	1,19	1,22	1,27

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
158 051	63 251	221 302	302 521	126 652	429 173

Jökulsárgljúfur

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	198 084	39	33	86 399	140 281	293 845	58	49	128 167	208 098
Camping fees	18 872	2	2	2 140	5 145	20 571	2	2	2 333	5 609
Cafes and restaurants	133 096	29	25	50 366	56 843	198 071	44	37	74 953	84 592
Tours, recreation & culture	82 793	20	17	30 069	50 294	89 416	22	19	32 475	54 317
Transportation	259	0	0	140	157	64 933	11	9	35 093	39 299
Groceries	15 014	3	3	5 746	7 677	39 292	8	7	15 036	20 089
Gas station purchases	18 893	3	2	6 765	8 792	41 664	6	5	14 919	19 389
Other retail	5 109	1	1	2 353	3 291	9 734	2	2	4 483	6 270
Total Direct Effects	472 122	98	83	183 979	272 480	757 524	153	130	307 458	437 662
Secondary Effects	134 833	17	15	38 677	70 691	220 131	28	24	63 588	115 922
Total Effects	606 955	115	98	222 656	343 171	977 655	181	154	371 047	553 585
Multiplier	1,29	1,18	1,18	1,21	1,26	1,29	1,19	1,19	1,21	1,26

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
112 812	53 354	166 166	231 735	89 163	320 897

Mývatn

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	532 459	83	70	232 245	377 081	759 065	118	100	331 085	537 561
Camping fees	186 096	19	16	21 106	50 739	191 706	20	17	21 743	52 268
Cafes and restaurants	287 827	61	52	108 918	122 925	473 865	100	85	179 317	202 377
Tours, recreation & culture	200 916	42	36	72 970	122 049	701 665	148	126	254 836	426 237
Transportation	31 322	7	6	16 928	18 957	211 020	49	41	114 045	127 716
Groceries	36 993	7	6	14 156	18 914	68 579	13	11	26 243	35 063
Gas station purchases	72 501	9	8	25 961	33 740	128 086	16	14	45 864	59 608
Other retail	18 922	4	3	8 715	12 188	27 364	5	4	12 603	17 626
Total Direct Effects	1 367 036	232	197	500 998	756 593	2 561 350	469	398	985 735	1 458 457
Secondary Effects	396 374	44	37	115 421	209 796	745 001	84	72	217 414	394 525
Total Effects	1 763 410	276	235	616 420	966 389	3 306 351	602	512	1 203 150	1 852 981
Multiplier	1,29	1,19	1,19	1,23	1,28	1,29	1,18	1,18	1,22	1,27

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
355 636	145 290	500 926	752 437	285 863	1 038 301

Skaftafell

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	2 072 983	320	272	904 182	1 468 063	2 518 639	389	331	1 098 566	1 783 672
Camping fees	342 540	35	30	38 850	93 393	374 954	39	33	42 526	102 231
Cafes and restaurants	849 919	178	152	321 621	362 982	1 146 887	241	205	433 998	489 810
Tours, recreation & culture	1 068 142	224	191	387 936	648 859	4 995 992	1 049	892	1 814 481	3 034 889
Transportation	36 239	8	7	19 585	21 933	479 576	110	94	259 184	290 254
Groceries	119 545	22	19	45 746	61 121	106 509	20	17	40 758	54 456
Gas station purchases	275 111	34	29	98 509	128 030	215 094	27	23	77 019	100 099
Other retail	93 287	17	15	42 966	60 089	70 682	13	11	32 554	45 529
Total Direct Effects	4 857 767	840	714	1 859 395	2 844 471	9 908 332	1 887	1 604	3 799 086	5 900 939
Secondary Effects	1 375 713	151	128	400 412	729 610	2 808 301	321	273	821 874	1 490 978
Total Effects	6 233 480	991	842	2 259 807	3 574 081	12 716 633	2 208	1 877	4 620 960	7 391 917
Multiplier	1,28	1,18	1,18	1,22	1,26	1,28	1,17	1,17	1,22	1,25

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
1 039 630	539 225	1 578 855	2 326 791	1 101 735	3 428 526

Snæfellsjökull

Economic impacts of Snæfellsjökull NP are updated from pilot study (Siltanen, 2017) to align with the more accurate methodology used in this study on basis of visitor numbers provided by the National Park.

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	1 125 891	185	157	491 085	797 343	1 675 387	275	234	730 761	1 186 490
Camping fees	6 844	1	1	776	1 866	9 189	1	1	1 042	2 505
Cafes and restaurants	425 966	95	81	161 192	181 921	686 147	153	130	259 648	293 039
Tours, recreation & culture	153 925	34	29	55 904	93 504	365 081	82	69	132 593	221 774
Transportation	28 830	7	6	15 581	17 449	466 047	114	97	251 873	282 065
Groceries	40 733	8	7	15 587	20 826	88 543	17	15	33 883	45 270
Gas station purchases	76 408	10	9	27 359	35 558	116 483	15	13	41 709	54 208
Other retail	17 028	3	3	7 843	10 968	62 641	12	11	28 851	40 350
Total Direct Effects	1 875 626	344	292	775 327	1 159 436	3 469 519	670	569	1 480 359	2 125 702
Secondary Effects	520 901	62	53	150 143	275 312	991 507	121	102	288 536	526 212
Total Effects	2 396 527	405	345	925 469	1 434 748	4 461 026	858	729	1 768 895	2 651 914
Multiplier	1,28	1,18	1,18	1,19	1,24	1,29	1,18	1,18	1,19	1,25

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
403 488	224 845	628 333	996 930	429 304	1 426 234

Pingvellir

Sector/Spending category	Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	5 785 071	650	552	2 523 299	4 096 922
Camping fees	271 751	25	22	30 821	74 093
Cafes and restaurants	2 588 065	462	392	979 360	1 105 306
Tours, recreation & culture	2 261 504	300	255	821 350	1 373 784
Transportation	1 497 548	273	232	809 343	906 360
Groceries	267 091	39	34	102 207	136 558
Gas station purchases	277 057	28	23	99 206	128 935
Other retail	186 438	29	25	85 869	120 091
Total Direct Effects	13 134 525	1 806	1 535	5 451 455	7 942 050
Secondary Effects	3 755 692	325	276	1 092 436	1 990 424
Total Effects	16 890 217	2 131	1 811	6 543 891	9 932 475
Multiplier	1,29	1,18	1,18	1,20	1,25

Overall generated taxes (tISK)		
Sales	Income	Total
3 337 952	1 580 922	4 918 874

Pórsmörk

Sector/Spending category	Local					Total				
	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)	Direct Sales (tISK)	Jobs	Jobs (FTE)	Personal Income (tISK)	Value Added (tISK)
Accommodation	30 772	6	5	13 422	21 792	45 638	9	8	19 906	32 320
Camping fees	35 070	4	3	3 978	9 562	38 158	4	4	4 328	10 404
Cafes and restaurants	31 259	7	6	11 829	13 350	32 882	7	6	12 443	14 043
Tours, recreation & culture	0	0	0	0	0	168 775	41	35	61 297	102 525
Transportation	38 987	7	6	21 070	23 596	24 001	4	3	12 971	14 526
Groceries	0	0	0	0	0	2 387	0	0	913	1 221
Gas station purchases	0	0	0	0	0	418	0	0	150	195
Other retail	83	0	0	28	39	111	0	0	37	52
Total Direct Effects	136 171	23	20	50 327	68 339	312 370	66	56	112 046	175 285
Secondary Effects	42 707	6	5	12 624	22 693	90 839	12	10	26 757	48 282
Total Effects	178 878	29	24	62 951	91 032	403 209	78	66	138 803	223 567
Multiplier	1,31	1,24	1,24	1,25	1,33	1,29	1,18	1,18	1,24	1,28

Locally generated taxes (tISK)			Overall generated taxes (tISK)		
Sales	Income	Total	Sales	Income	Total
26 610	14 595	41 205	64 815	32 493	97 308

11.9 Appendix: Site reference maps used in the visitor surveys

Pórmörk



Pingvellir



Dynjandi



Landmannalaugar



Jökulsárgljúfur



Mývatn



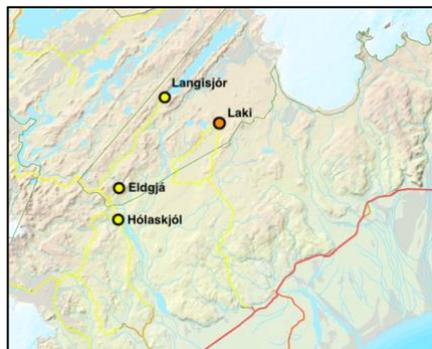
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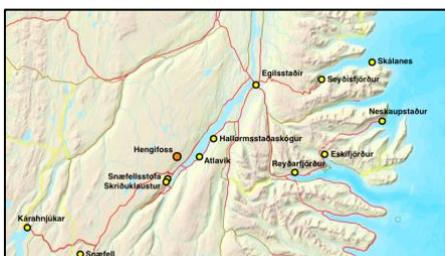
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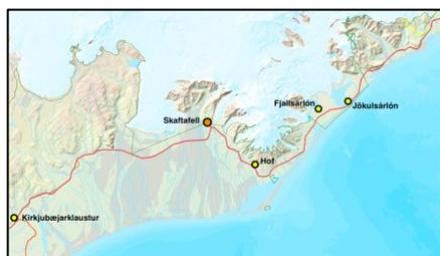
Laki



Hengifoss



Skaftafell



Basemaps obtained from the web service of National Land Survey of Iceland (*Landmælingar Íslands*).