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Subjugation, subsistence and interdependence: tracing resource claim networks across Iceland's post-reformation landscape

--Manuscript Draft--

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Abstract:	Even the most dispersed, individuated societies have dense ties of interdependence driving modes of production. This is readily apparent in early modern Iceland, where systems of resource claims can be mapped from a profoundly detailed early 18th century land survey. This paper presents these claims as a system articulated at three scales, and argues that they played a key role in providing access to essential resources for farmsteads in the early 18th century, and likely much earlier.
Response to Reviewers:	Responses to reviewers Thank you for the encouraging comments. I made major revisions based on the feedback. As reviewer #4's comments were more substantive I tried to have them guide the direction of the structural changes. I removed superfluous references to theoretical frameworks like assemblage theory that did not play a significant role in the paper. As for the paper's descriptive character, it's hard to avoid that as it is an exploration of a new dataset with very little prior investigation, particularly with the approach I have taken. I think it is important to have statistical tests in these sorts of papers, as it allows researchers to make general statements about large datasets. Without correlation tests, there is no way for the reader to check whether statements made about the data ring true. For that reason I think it is essential to keep the references to correlations and p-tests of significance. I reworked the references to Ostrom, thanks to both reviewers for pointing this out. I also made a number of corrections to grammar and argumentation. I expanded the conclusions to drive home the 'take home message' of the paper, as well as clarifying its rationale. I hope the changes are sufficient to pass muster. Warm regards, GP

Figure 1

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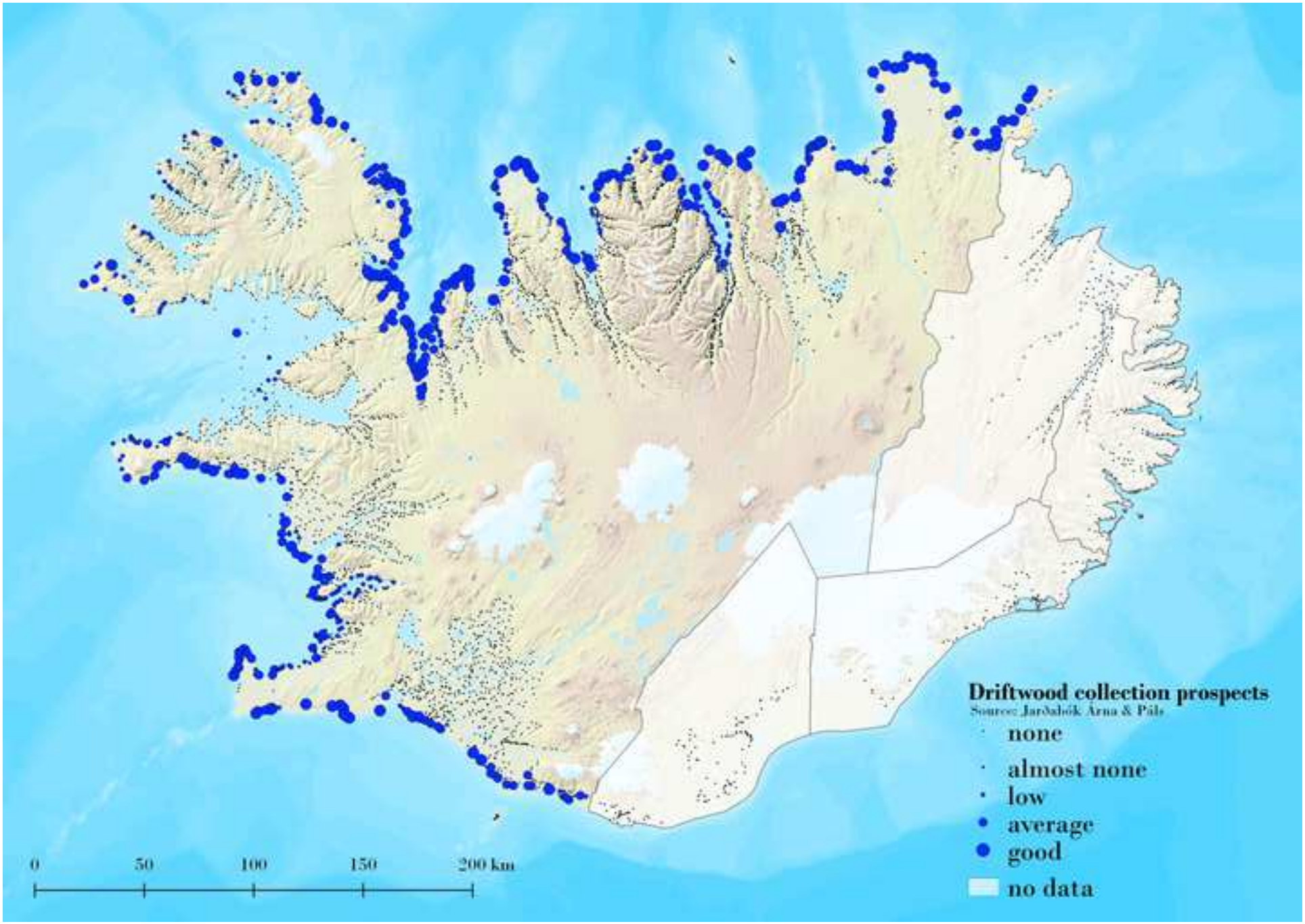

Figure 2

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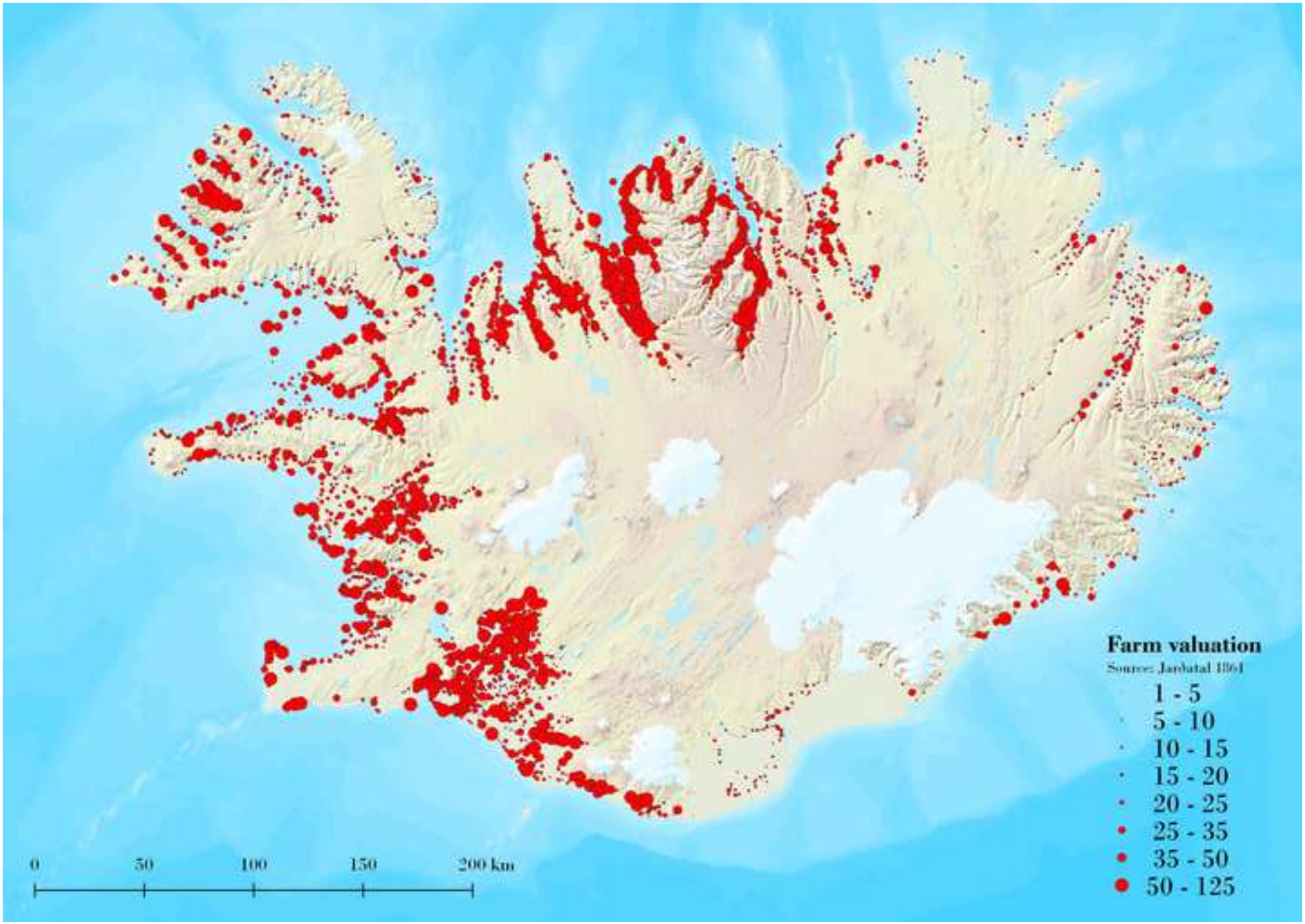

Figure 4

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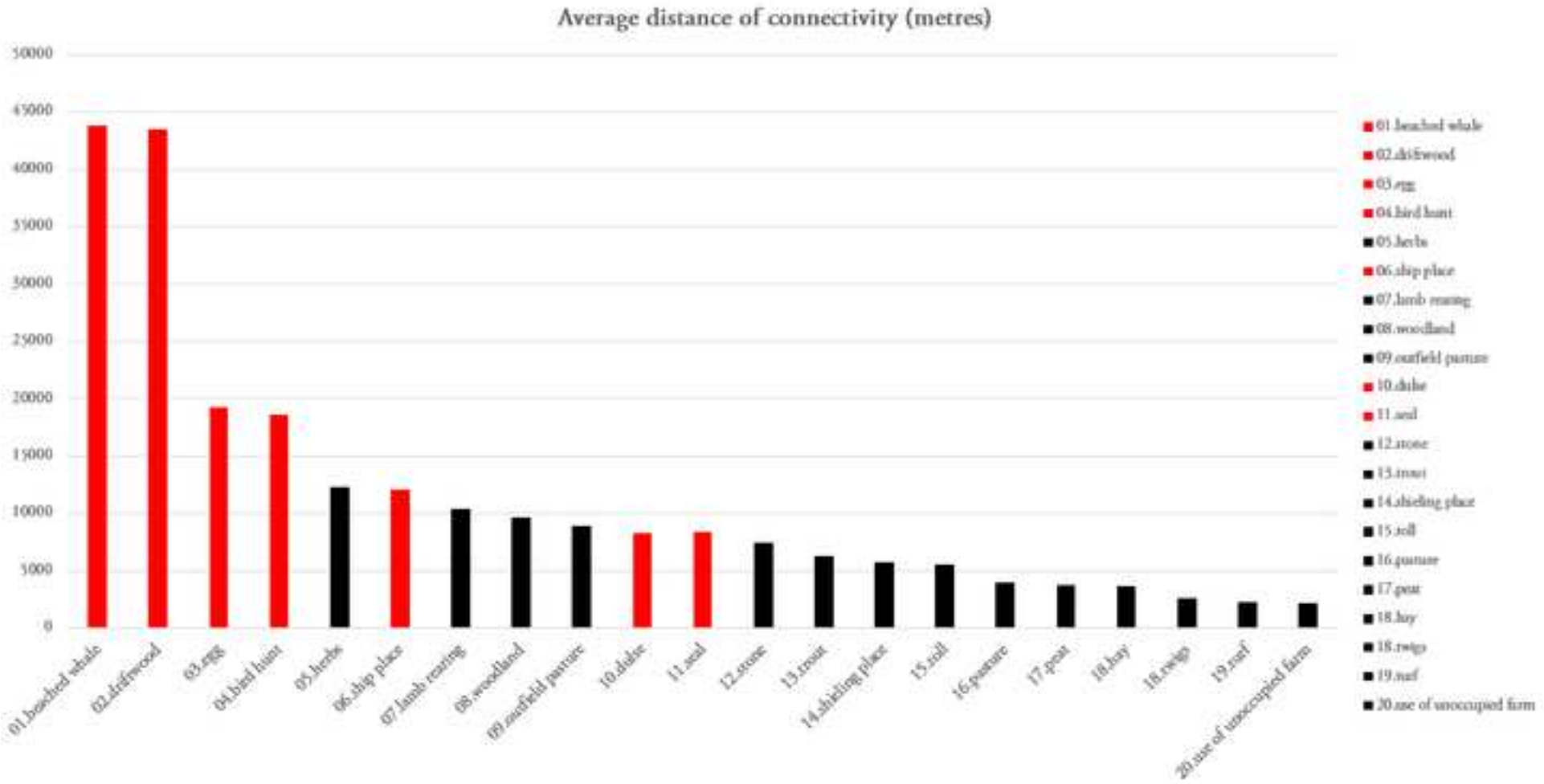

Figure 5

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Figure 6

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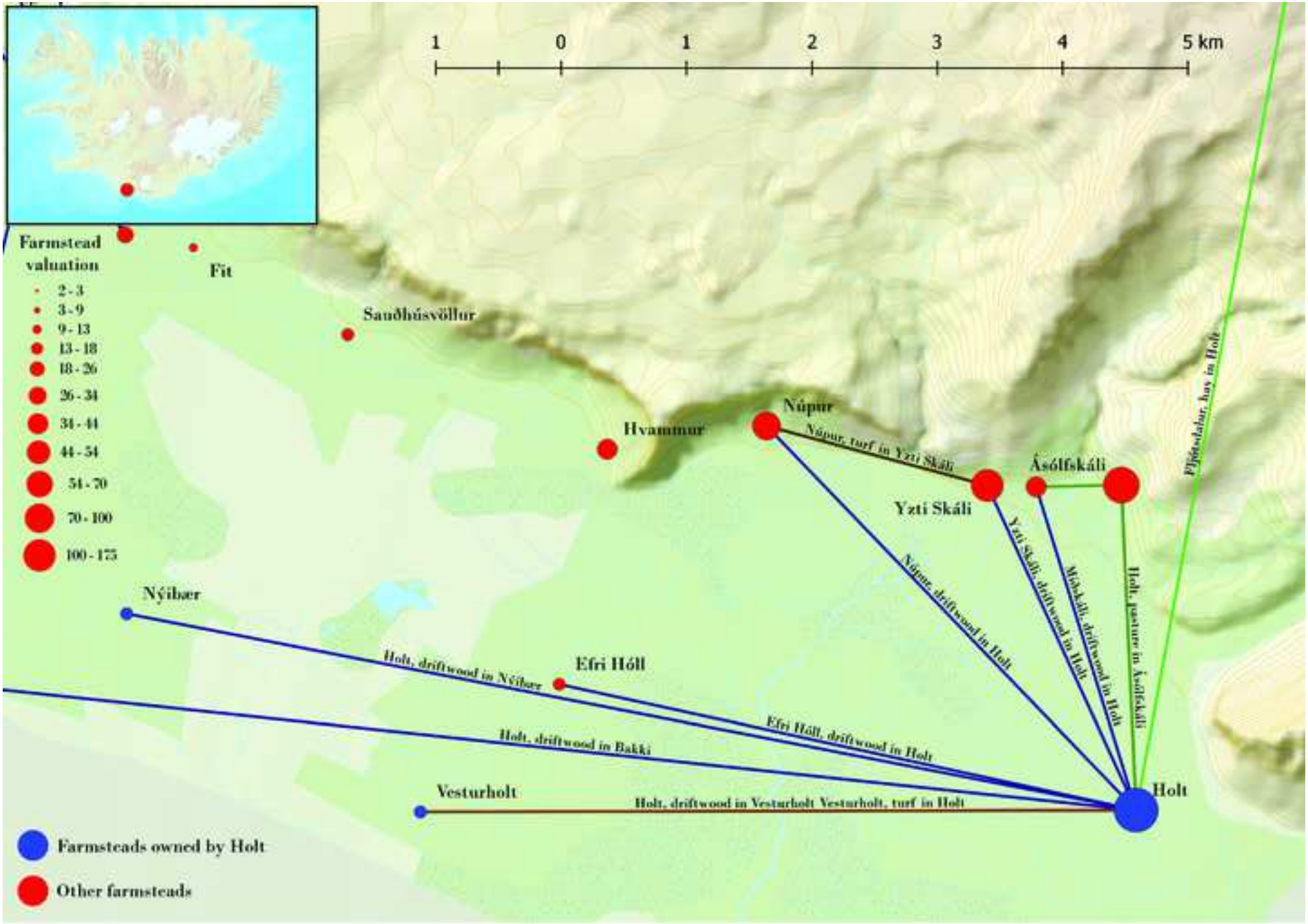

Figure 7

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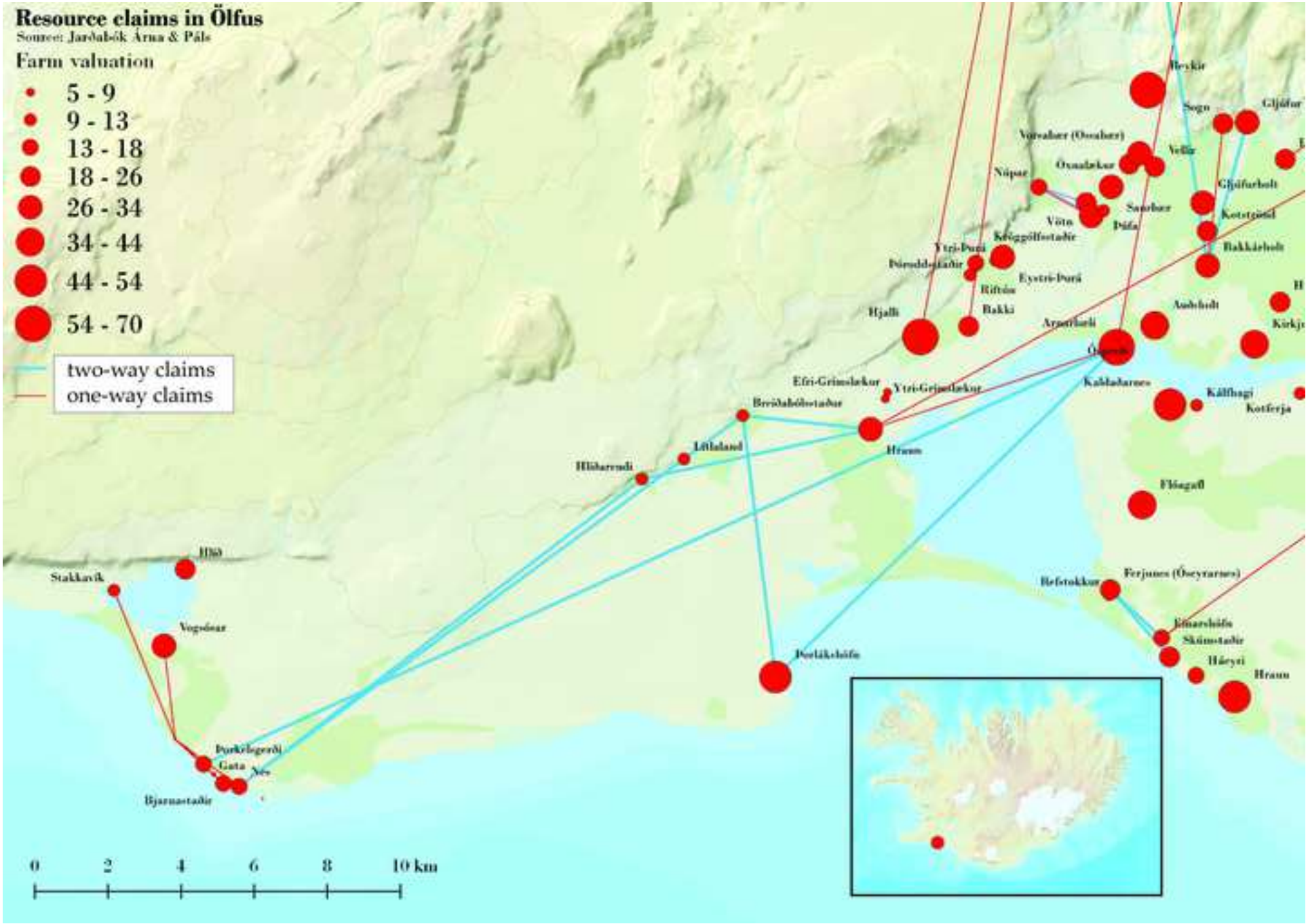

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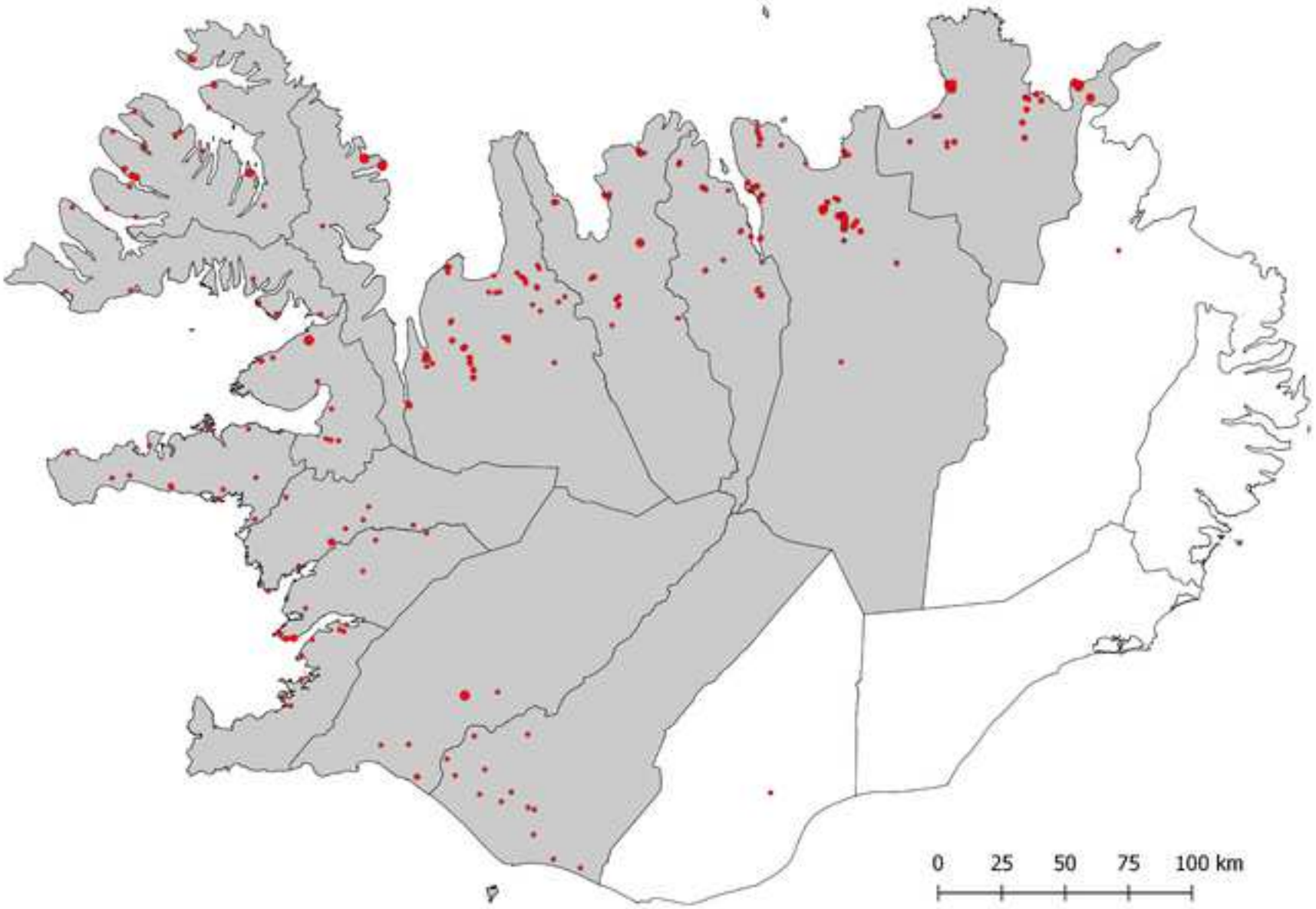

Figure 10

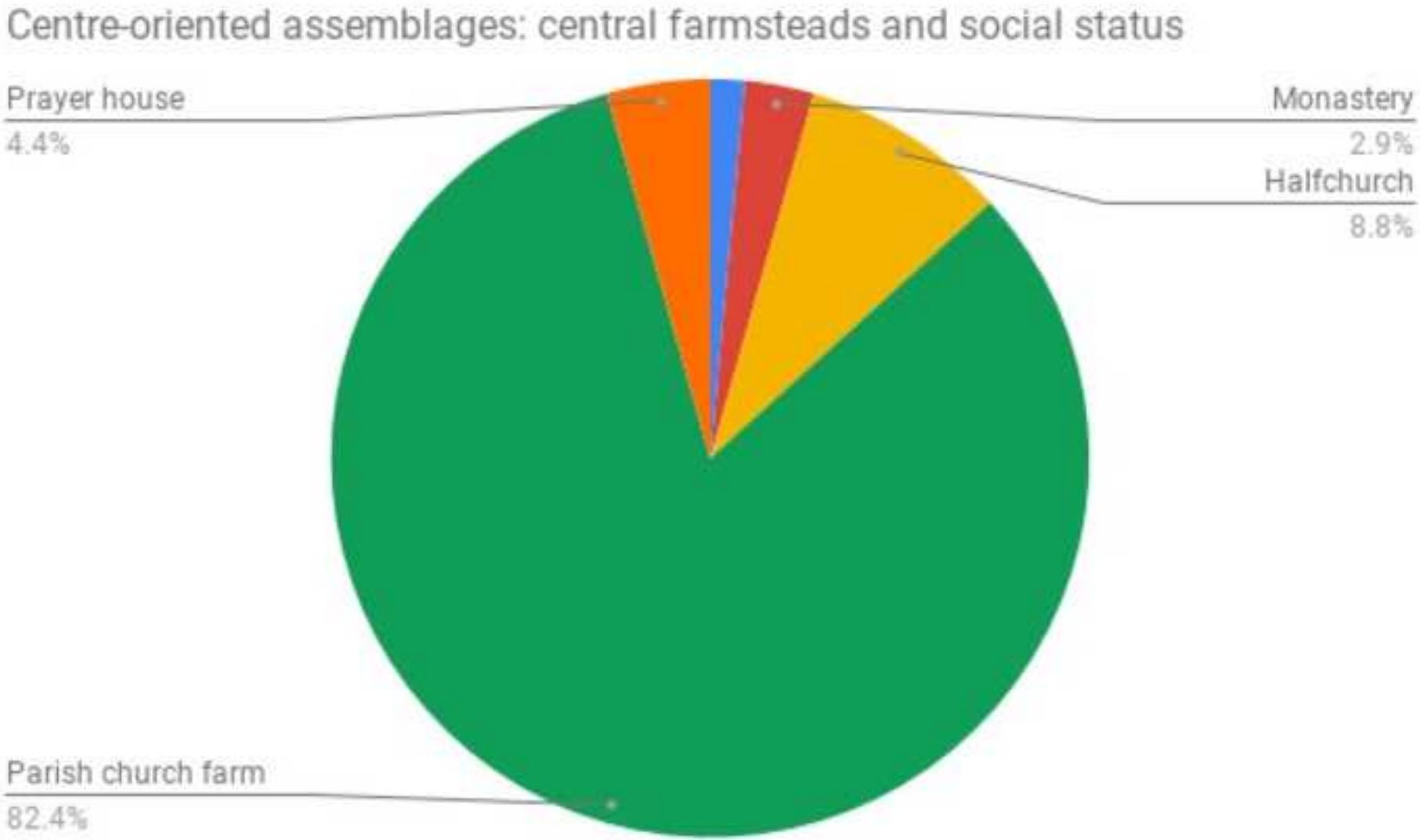

Figure 11 Click here to access/download;Line Figure;figure_11.jpg

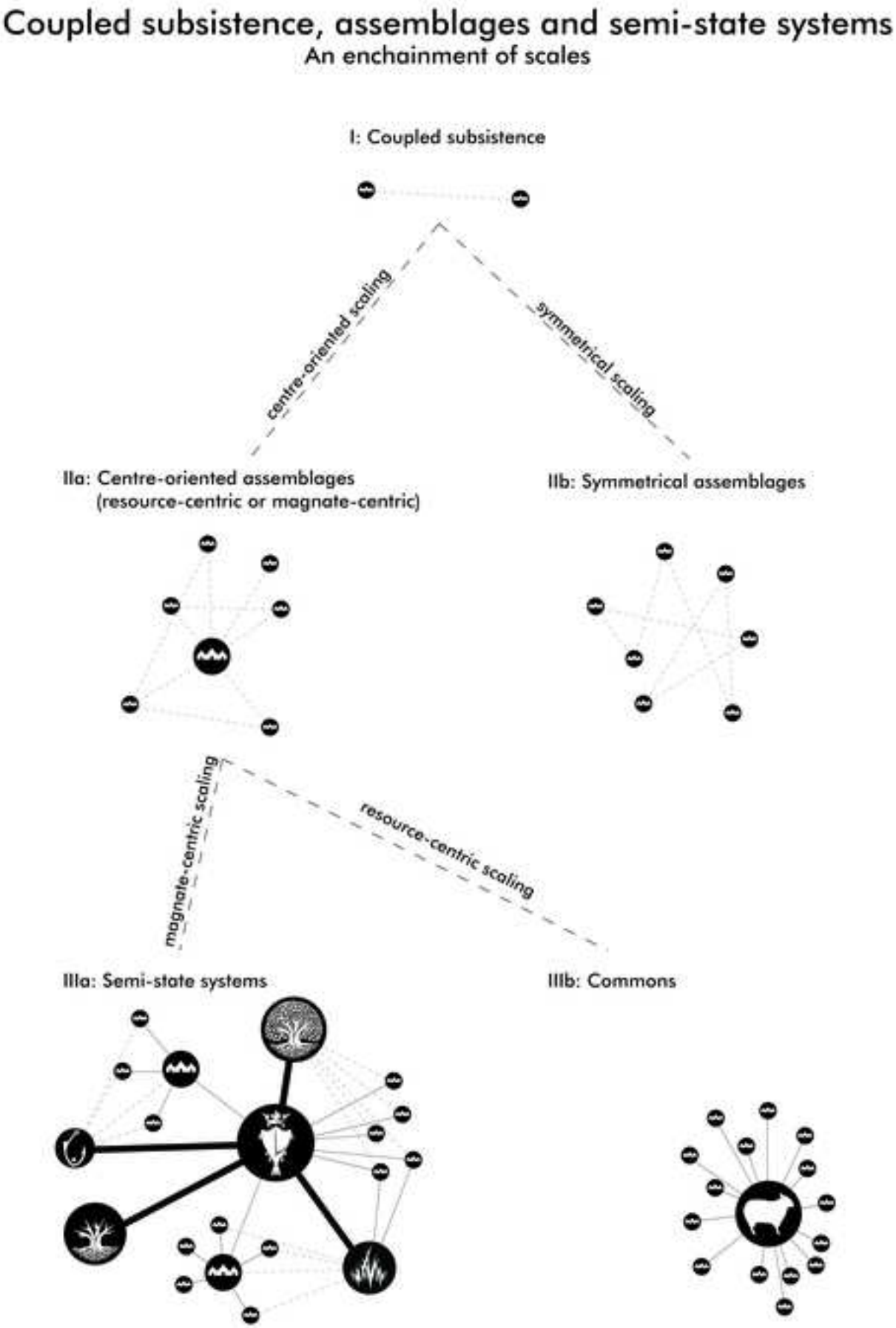

Figure 1: Driftwood collection prospects.

Figure 2: Farm settlement pattern and valuation in the 19th century.

Figure 3: Resource claims in the 18th century.

Figure 4: The average distance of claims, ordered by resource type. Red bars indicate predominately marine and coastal resources while black bars indicate terrestrial resources.

Figure 5: Northern Iceland is characterised by a high number of resource exchanges between neighbouring farmsteads.

Figure 6: Claims centred on Holt.

Figure 7: Resource claims in Ölfus.

Figure 8: Laxfoss and its claimants.

Figure 9: Centres of claim assemblages.

Figure 10: Centres of claim assemblages ordered by ecclesiastical status. Less than 2% (shown in blue) had no ecclesiastical affiliation.

Figure 11: The relationship between claim assemblages at different scales.

Table 1

Item	Census text
Farm name	Skrida (í Skriðuhverfi) *Skriða (in the Skriðuhverfi region)*
Ecclesiastical status	Hálfkirkja eður bænhús hefur hjer að fornu verið, og stendur húsið enn, ekki hefur hjer embættað verið í manna minni. *The farm formerly had a half-church or a prayer house, and the structure still stands, but no services have been held here in living memory*.
Value and tithe	Jarðardýrleiki tíutíu hundruð með Skriðulandi, og so tíundast fjórum tíundum. *Value 100 hundreds including the tenant farm Skriðuland, and is tithed on all four parts*[1]
Owner	Eigendur Sr. Guðmundur, Sr. Ámundi og Torfi synir Sr. Páls sáluga Ámundasonar, sem hjelt Kolfreyjustað í Fáskrúðsfirði. *Proprietors Rev. Guðmundur, Rev. Ámundi and Torfi, sons of the late Rev. Páll Ámundason, formerly of Kolfreyjustaður in Fáskrúðsfjörður.*
Occupant	Ábúandinn Hallur Jónsson. *Occupant Hallur Jónsson.*
Rent	Landskuld lx álnir nú og tvö fyrirfarandi ár, fyrir 12 árum ii C undir 30 ár, fyrir 40 árum iii C og ekki meiri so hjer undirrjettist. Betalast í landaurum nú sem stendur, og so atla menn að oftast hafi verið, og þykjast ekki vita að hjer hafi með jafnaði fiskatal verið áskilið. *Rent 60 ells the past three years, 240 ells twelve years ago, and so for 30 years prior. 360 ells forty years ago. Paid in land produce currently, and it is believed that was usually the case, although it is not known whether the proprietors ever demanded payment in fish.*
Rented livestock	Leigukúgildi vi inn til næstu 12 ára, nú i og næstu 2 ár, en þess í milli vita nálægir ekki grant að undirrjetta um kúgildisfjöldan. Leigan betalast í smjöri, og so var áður þá kúgildin voru vi. *Rented livestock 6 cow equivalents twelve years ago, and 1 for the past two years. Those nearby do not know the situation during the intervening years. The dues are paid in butter, both now and when the rented livestock numbered 6 cows.*
Social obligations	Kvaðir öngvar. *No further tenant obligations.*
Livestock	Kvikfje iiii kýr, i kvíga veturgömul, xxxvii ær, xiii sauðir tvævetrir og eldri, xviii veturgamlir, xx lömb, i hestur, i hross, i foli þrevetur, iii geitur, ii hauðnur. *Livestock 4 cows, 1 additional cow a winter-old, 37 sheep, 13 two-winter old rams and older, 18 winter-old rams, 20 lambs, 1 colt, 1 mare, 1 three-winter old foal, 3 goats, 2 kids.*
Hay production	Fóðrast kann vi kúa þúngi, so sem nálægir þykjast næst komast eftir sinni hyggju, en áður hefur þetta sæmileg heyskapargjörð verið, en afskaplega fordjörfuð af órækt bæði til túns og engja. *The farm can fodder 6 cow equivalents according to the estimates of those nearby, but the infield and the meadows are rather poorly due to improper management.*
Local resources	Útigángur góður meðan niðri nær, en mjög svipull fyrir fannlögum, og þarf roskið fje hey nærri til helminga, og lömb mesta part fóður. Hestagánga í lakara lagi. Skógur til kolgjörðar að mestu eyddur, en til eldiviðar bjarglegur. Torfrista og stúnga bjargleg. Reiðíngsrista hefur verið, meinast eydd. Víðirrif nokkurt, brúkast til heystyrks. *Ranging and grazing for sheep is good when they can reach through the snow, but heavy snows are frequent, and for that reason mature sheep require fodder during winter amounting to nearly half their feed, and lambs are reared mostly on hay. Grazing for horses is on the poorer side. Woodland for charcoal making mostly destroyed, but woodland provides adequate firewood. Turf cutting is also adequate. The farm used to be able to cut saddle turf, but no more. Willow branches are used for firewood.*

[1] Tithe was traditionally divided in four, with one part going to the bishop, one to the parish priest, one to support paupers in the parish, and a final one to maintain the church property.

External resource rights	Reka á jörðina fyrir utan Litlufjöru milli Hellirs og Svínár og kallast Skriðureki. Rekavon þar í minna lagi, því festifjara er engin. Engjatak á jörðin takmarkað, þó lítið sje, í Hraunkots landi, sem Engibakki heitir, og hefur lengstum brúkast átölulaust. Ekki vita nálægir að undirrjetta greinilega um fleiri ítök jarðarinnar, þó rómur sje á að hún hafi í fyrstunni víðar náð, þá er það fyrir lángvarandi brúkunarleysi mönnum fornt orðið, og verður ekki því um þau fleira skrifað. *The farm has driftwood claims by Litlufjara between Hellir and Svíná, called Skriðureki. The area has poor driftwood prospects due to the lack of a good shore for the wood to settle in. The farm has a small claim on Hraunkot's pasture, called Engibakki, and has been used without dispute for a long time. Those present and nearby are not sure about other resource claims, although it is rumoured that in the first times they extended further. But, through persistent disuse, these have been made ancient in the minds of men, and for that reason will not be described further.*
Pasture quality	Túnið er fordjarfað af órækt og sprettur lítt, sem orsakast af leysingavatni, sem jetur úr rótina. Engið þornar upp og sprettur lítt og er mjög víða mosavaxið og graslítið. Úthagarnir eru miklir og sæmilega grösugir, og ljær ábúandi beit til Jódísarstaða sem áður segir. *The infield is poorly maintained and grows but slowly, caused by water affecting the roots. The pasture is dry and grows slowly, and is mossy in many places. There are large and rather grassy outfields, and the occupant provides pasture to nearby Jódísarstaðir.*
Varia (risks to livestock, reservoir quality and church road condition)	Hætt er kvikfje fyrir Álfasíki og nokkrum lækjum. Vatnsból er erfitt fyrir fannlögum. Kirkjuvegur til Múla gagnvænn. *Livestock is threatened by Álfasíki mire and some springs. Water springs can be difficult to access due to snow cover. Church road to Múli in good condition.*
Subsidiary tenant farm (unoccupied, listing several features that were also listed for the main farmstead, such as value and rent when it was last occupied)	Skriðuland, partur af Skriðu. Bygð niður frá heimatúninu fyrir manna minni, en eyðilagðist í bólunni, afdeilt að túni og engjum og reiknaðist fjórðúngur allrar jarðarinnar meðan bygðin varaði, að dýrleika xxv C, og só tíundast ut supra. Landskuld lxx álnir, seinast bygt var, og so að fornu. Betalaðist með landaurum til heimabóndans eður fiskatali. Leigukúgildi iii. Leigan í smjöri til heimabóndans. Kvaðir öngvar. Fóðrast kunni, seinast bygt var, ij kýrþúngi. Aftur má hjer byggja, ef fólk til fengist. *Skriðuland, part of Skriða. Built by the infield before living memory, but abandoned during the recent smallpox (1707-1709), considered a quarter of the primary property while occupied, valued at 15 hundreds and tithed accordingly.* *Rent 70 ells while occupied, and so in former times. Paid with land produce or fish to the tenant on Skriða.* *Rented livestock 3 cow equivalents. Rent paid in butter to the tenant on Skriða.* *No further tenant obligations.* *The farm could fodder 2 cow equivalents when it was last occupied.* *Can be reoccupied if potential tenants are found.*
A subsidiary tenant farm, abandoned for over 40 years	Skriðu Sel, forn eyðihjáleiga hjér í landinu út í skóginum, sem hefur í eyði legið vel 40 ár, og veit því enginn nálægur um hennar byggingarkosti að undirrjetta. Ekki má hjer aftur byggja, því túnið er víði vaxið en heyskapur enginn. *Skriðusel, ancient farm mound on the property by the woodland, which has been abandoned for at least 40 years, and for that reason no one present or nearby remembers the affordances of the farm. Not suitable for reoccupation as the infield is overgrown with willow, and very little hay cutting is possible here.*
Archaeological features on the farmstead's lands.	Steinstader kallast örnefni sunnarlega í Skriðu landi, þar atla menn að í fyrndinni hafi bygt verið, þó þess sjáist mjög lítil merki tóftaleifa og girðinga, því þetta pláss er mestallt í blauta mýri komið og má því hjer ekki aftur byggja. *Steinstaðir is a place name in the southern part of the Skriða property. Men believe that it was inhabited in ancient times, although there is little in the way of ruins to support that belief, and this place is mostly mired nowadays and can therefore not be reoccupied.*

Table 1: The structure and contents of an entry in the early 18th century land census Jarðabók Árna Magnússonar & Páls Vídalín.

County	Claims	Farmsteads	Ratio	Mean character length of farmstead descriptions
Barðastrandarsýslur	24	172	0.139535	2075
Eyjafjarðarsýsla	112	344	0.325581	1547
Árnessýsla	140	355	0.394366	2045
Rangárvallasýsla	111	258	0.430233	2034
Dalasýsla	79	180	0.438889	1710
Suður-Þingeyjarsýsla	112	242	0.46281	1817
Mýrarsýsla	118	245	0.481633	1946
Borgarfjarðarsýsla	125	210	0.595238	1920
Húnavatnssýsla	190	350	0.542857	2256
Strandarsýsla	75	122	0.614754	1970
Skagafjarðarsýsla	240	339	0.707965	1494
Ísafjarðarsýslur	195	255	0.764706	2141
Snæfells- og Hnappadalssýsla	155	179	0.865922	2702
Gullbringu- og Kjósarsýsla	182	196	0.928571	3202
Norður-Þingeyjarsýsla	105	82	1.280488	2264
Total	1963	3532		

Table 2: the number of claims and farmsteads ordered by county.

	Bishop	Church	King	Individual
Total properties	646	604	632	1804
Average properties per proprietor	323	3.6	632	2
Properties involved in exchange claims	68	33	62	110
Percentage of farmsteads involved in exchange claims	10.5%	5.5%	9.8%	5.9%

Table 3: Properties by proprietor type.

Table 4

Farm 1	Farm 2	Resource	Notes
Arnarbæli	**Þorlákshöfn**	ship place	Engjatak á jörðin á Arnarbælisengjum, og er það kallað Tiuaura engi, aðrir nefna Stakksengi. Það brúkar Þorlákshöfn árlega, en staðurinn Arnarbæli þar í mót áttærings skipsstöðu í Þorlákshöfn, og er ekki fyrir goldið þó stærri skip gángi. *Þorlákshöfn has access to Arnarbæli's meadows, called both Tiuaura meadow and Stakks meadow. Þorlákshöfn uses it yearly, and in return Arnarbæli rows to sea from Þorlákshöfn's harbours.*
Arnarbæli	**Þorkelsgerði**	ship place	Annað skipsuppsátur að Þorkelsgerði i Selvogi fyrir tólfæring. *Ship place in Þorkelsgerði in Selvogur for a 12-oared boat.*
Breiðabólsstaður	**Þorlákshöfn**	ship place	Skipsuppsátur á jörðin í Þorlákshöfn fyrir selstöðu í heimalandi. *Breiðabólsstaður has a ship place in Þorklákshöfn in exchange for a shieling place.*
Breiðabólsstaður	**Hraun**	hay	Engjatak á jörðin og brúkar árlega á Hraunsengi, þar sem heita Lambeyrar. Þar í mót segja menn, að Hraun eigi lýngrif á 30 hesta annaðhvort ár í Breiðabólstaðarlandi NB, vide Hraun supra. *Breiðabólsstaður has access to Hraun's meadows, in a place called Lambeyrar. In exchange it is said that Hraun can harvest enough twigs to load 30 horses, every other year, in Breiðabólsstaðir's land.*
Breiðabólsstaður	**Nes**	dulse	Sölvafjöru á jörðin í Selvogi fyrir Neslandi fyrir hrossabeit um sumur. Enginn segir hjer hvað margra. Hitt vita menn, að sölvaítakið brúkast árlega. *Breiðabólsstaður owns a dulse beach in Nes' land in exchange for summer grazing for horses. No one is sure how many horses can graze, but the dulse is picked every year.*
Hlíðarendi	**Nes**	dulse	Sölvafjöru á jörðin i Selvogi fyrir Neslandi, þar sem kallast Hliðarendabás. Þar i mót eiga Selvogs ábúendur frí að láta reka búsmala sinn yfir Hlíðarendaland til brynníngar að Hlíðarendalæk, skamt frá túninu, og þetta um sumartíma frá Nesseli, sem stendur á Selvogsheiði.
Hlíðarendi	**Hraun**	hay	Engjatak á jörðin i Hraunslandi takmarkað þar sem kallað eí Hlíðarendaengi. Hjer i mót, segja menn, að Hraun eigi á 12 hesta lýngrif á vor og aðra 12 á haust í Hlíðarendalandi, hefur þó sjaldan brúkast, en engjatakið frá Hlíbarenda árlega.

Hraun	**Hlíðarendi**	pasture	Engjatak á jörðin i Hraunslandi takmarkað þar sem kallað eí Hlíðarendaengi. Hjer i mót, segja menn, að Hraun eigi á 12 hesta lýngrif á vor og aðra 12 á haust í Hlíðarendalandi, hefur þó sjaldan brúkast, en engjatakið frá Hlíbarenda árlega.
Hraun	**Breiðabólsstaður**	twigs and branches	Engjatak á jörðin og brúkar árlega á Hraunsengi, þar sem heita Lambeyrar. Þar í mót segja menn, að Hraun eigi lýngrif á 30 hesta annaðhvort ár í Breiðabólstaðarlandi NB, vide Hraun supra. *Breiðabólsstaður has access to Hraun's meadows, in a place called Lambeyrar. In exchange it is said that Hraun can harvest enough twigs to load 30 horses, every other year, in Breiðabólsstaðir's land.*
Nes	**Hlíðarendi**	spring water	Sölvafjöru á jörðin i Selvogi fyrir Neslandi, þar sem kallast Hliðarendabás. Þar i mót eiga Selvogs ábúendur frí að láta reka búsmala sinn yfir Hlíðarendaland til brynníngar að Hlíðarendalæk, skamt frá túninu, og þetta um sumartíma frá Nesseli, sem stendur á Selvogsheiði. *Hlíðarendi owns a dulse beach in Nes' land, called Hlíðarendi's booth. In exchange, Nes are allowed to send their cowboy to water the animals in Hlíðarendi's brook, nearby the infield. This occurs in summer, with the animals coming from Nes' shieling in Selvog's heath.*
Nes	**Breiðabólsstaður**	pasture	Sölvafjöru á jörðin í Selvogi fyrir Neslandi fyrir hrossabeit um sumur. Enginn segir hjer hvað margra. Hitt vita menn, að sölvaítakið brúkast árlega. *Breiðabólsstaður owns a dulse beach in Nes' land in exchange for summer grazing for horses. No one is sure how many horses can graze, but the dulse is picked every year.*
Þorkelsgerði	**Arnarbæli**	hay	Engjatak á jörðin i Arnarbælislandi i Ölvesi, þar sem heita Nautaeyrar, það er þrír fjórðúngar þingmannaleiðar til að sækja og er þó flæðiengi, so sæta þarf sjáfarföllum þegar hey skal á hestum þaðan færa, en verkamenn í fári ef stórflæði tilfalla, so sem oft hefur að skaða orðið. Hjer í mót á staðurinn skipsstöðu fyrir Þorkelsgerði, vide Arnarbæli. *Þorkelsgerði has access to Arnarbæli's meadows, in a place called Nautaeyrar, in a tidal zone, so that care must be taken when bringing hay from there by horseback, or else the workers will be left moored by the tide, which has often happened. In turn, Arnarbæli rows a single boat to sea on Þorkelsgerði's shores.*

Þorlákshöfn	**Arnarbæli**	hay	Engjatak á jörðin á Arnarbælisengjum, og er það kallað Tiuaura engi, aðrir nefna Stakksengi. Það brúkar Þorlákshöfn árlega, en staðurinn Arnarbæli þar í mót áttærings skipsstöðu í Þorlákshöfn, og er ekki fyrir goldið þó stærri skip gángi. *Þorlákshöfn has access to Arnarbæli's meadows, called both Tiuaura meadow and Stakks meadow. Þorlákshöfn uses it yearly, and in return Arnarbæli rows to sea from Þorlákshöfn's harbours.*
Þorlákshöfn	**Breiðabólsstaður**	shieling place	Skipsuppsátur á jörðin í Þorlákshöfn fyrir selstöðu í heimalandi. *Breiðabólsstaður has a ship place in Þorklákshöfn in exchange for a shieling place.*

Table 4: Resource claims in Ölfus.

Domination, subsistence and interdependence: tracing resource claim networks across Iceland's post-reformation landscape

Abstract:

Even the most dispersed, individuated societies have dense ties of interdependence driving modes of production. This is readily apparent in early modern Iceland, where systems of resource claims can be mapped from a profoundly detailed early 18th century land survey. This paper presents these claims as a system articulated at three scales, and argues that they played a key role in providing access to essential resources for farmsteads in the early 18th century, and likely much earlier.

ADD A COUPLE MORE LINES

Keywords: landscape archaeology, historical archaeology, network analysis, land use

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> Kong. Mayt. Tilsetter Commissarii á Islande, vid Arne Magnusson og Paall Jonsson Widalin, giörum hier med kunnigt, ad á medal annara erenda, sem hæhstnefnd Kongleg Maiestat ockur allra nádugast befalad hefur hier i lande ad utrietta, er ad samanntaka eina rigtuga og fullkomna jardabok yfer allt landed ... Þvi tilseigest hier med ollum og sierhvorum jardareigendum hier á lande, andlegum og veraldlegum, upp ad teikna allar sijnar jarder, med þeirra dijrleika, landskulld og kugildum, item hiaaleigur og búder, þar sem þær eru.

- Árni Magnússon, *Embedsskrivelser, 1916, p. 20-21.*

In the above passage, Árni Magnússon and Páll Vídalin declare their intention to produce ‚the most perfect' land use survey of Iceland's early 18th century society. Their subsequent efforts can hardly be faulted. Over the next 13 years they travelled across the country gathering Iceland's community of farmers and recorded their accounts of farming practices, farm valuation, rent, livestock, quarrels over contested lands, nearby antiquities and a wealth of other information to compile the survey that would become known as *Jarðabók Árna Magnússonar og Páls Vídalín* (for a detailed account of the content see Pálsson (2018) & Guðmundsson (1993)). The descriptions do not only detail the affordances of the farmsteads themselves, but also any claim that a farmstead had on the resources of other farms. These claims, called *ítök*, suggest an agricultural society that is both highly interconnected and interdependent. The claims have not been explored at a scale that reveals the magnitude of this connectedness, and in that light, this paper considers *ítök* in their entirety as they were recorded in the early 18th century. Due to the complexity of these claim systems it is not my intention to examine them diachronically at this stage, but the early 18th century affords the best opportunity to study the breadth of these resource claims due to the highly detailed census documents mentioned above. The paper will begin with a brief description of these, followed by a characterisation of these claim. The paper will end with a discussion of the implications of these claims.

Hin rigtuga og fullkomna jarðabók[1]

The methodology of *Jarðabók* is outlined in a document signed by the two surveyors at Öxará, 18.7.1702 (Magnússon, 1916, p. 21), and it was to include information of the ownership, value, tithe, property tax, rental fees, livestock numbers, tenant farms and seafaring operations, pasture and grassland quality, environmental resources, access to external resources, as well as a host of other information. The survey was part of a larger programme to document land use, living conditions, population and livestock numbers undertaken by the Danish king in response to a call for assistance by the Icelandic parliament *Alþingi* after a series of harsh winters at the end of the 17th century had severely impacted Icelandic society (Guðmundsson, 1993, p. xix). The land survey covers almost the entire country – the records for the four easternmost counties were

[1] "The correct and complete land census"

lost in the Copenhagen fire of 1728, leaving records for 3560 of the roughly 4000 primary farms in the country.

Table 1 shows the items listed for every farm in the census. Paragraphs are always ordered in the same manner and a single paragraph is devoted to a single element of information: entries begin with the name of the farm; the first paragraph notes religious structures (if present), the second notes ownership, and so on.

TABLE 1 NEAR HERE

These farmsteads, known as *lögbýli*, were the social units through which Iceland's administrative landscape was organized, and their status as such was neither gained nor lost easily. Fishing stations, trading sites and harbour sites developed within a fixed structure of farmsteads that kept urbanization in check and under the control of Iceland's elite – the landowners (Karlsson, 2000; for a discussion of village and community formation in Iceland, see (Vésteinsson, 2006)). The *lögbýli* farm formed the core of Icelandic society from at least as early as the 11th century (Gunnarsson, 1987). Voting rights, marriage rights and a host of other rights were dependent on whether an individual was associated with a farmstead; only the primary tenant or owner of a farm was allowed to vote at assemblies and, in several circumstances, to marry (Gunnarsson, 1987, pp. 18-19). While the settlement structure expanded with additional farms, fishing stations, monasteries and proto-industrial enterprises, these were always considered subsidiary units of a recognized *lögbýli*. On the surface, this society appears, then, to consist of atomized farmsteads in a fairly flat hierarchy; in truth, however, these farms were interconnected and interdependent in a multitude of ways. The *ítök* were one of these ways.

Ítök: background

A number of factors must be considered to understand these claims. Firstly, Iceland's agricultural landscape is highly variegated, with farms located on the coastline and valley bottoms, and ascending well into highland areas. It stands to reason that a farm, by virtue of its location, would have lacked certain environmental resources, and that certain farmsteads may have a surplus of some resources while lacking others. In addition, a number of environmental resources were necessary to keep a farmstead operational. Let's look at these in some detail.

Iceland never developed an agronomy based on cereal cultivation, although there is evidence for early reliance on the practice (Steindórsson, 1948). Instead, Icelandic farmers primarily reared sheep, horses and cattle and occasionally goats, although earlier farming practices were notably different, including, for instance, pigs

(Amorosi, Buckland, Dugmore, Ingimundarson, & McGovern, 1997; McGovern et al., 2007; Vésteinsson, McGovern, & Keller, 2002). Sheep and horses require more or less the same kind of feed, and both animals were kept outdoors for most of the year although hay fodder was required when conditions forbade this. Sheep also grazed seaweed through the winter in certain parts of the country, notably in the north east and the western counties of Dalasýsla and Barðastrandarsýsla. Cows require more fodder and were kept close to the farm, or taken to shielings for a number of weeks in the summer. Practically every farm in the country had a mixture of these three livestock, and so would have required productive infields for cow grazing and hay making, meadows for hay, and outfield pastures for summer and winter grazing.

Many farmsteads also supplemented their food production with fish. Dried stockfish was also a common trade good, and hence an important produce to fund purchases of essential goods that were not produced locally, such as whetstones, ropes and iron tools (Gunnarsson, 1987, pp. 52-53). The majority of farmsteads did not have access to good landing sites by the sea, and so had to negotiate access with those farmers who had. Certain areas also developed into fishing stations for whole communities, such as Hjallasandur in Snæfellsnes. More commonly, though, farms with good natural harbours sold or traded access to them to individuals who constructed boathouses and sent farmhands to row out before the harvesting season.

Farmsteads also required a source of fuel, and the source is recorded in the land census for the majority of the approximately 3600 farmsteads listed. The two most common sources of fuel were charcoal, made from woodland, and peat. Some coastal farms used driftwood or seaweed, and those without access to any of the above resorted to using livestock manure for fuel. The census indicates that the last two were less effective than the first two (e.g. Magnússon & Vídalín, 1913-1943, III, pp 26-34), and recent research on seaweed (Mooney, 2018) show how poorly it performs as a fuel source.

Most farmstead structures at the time were made using three main materials: timber, turf and sod. A typical house consisted of thick outer walls of sod lined with turf on both sides, sometimes laid on a stone foundation. Inside, a timber frame supported a roof made of branches, beams and turf strips. Lighter timber, skins or textiles could then be used to segment the internal space of the house (Ágústsson, 1998).

Iceland had lost much of its native woodland by the 18th century (Þórhallsdóttir, 2001), and in any case the native *betula pubescens* was not very suited to the typical internal frame of a turf house. Instead most houses were built using driftwood, with native wood species used for roofing and insulation. Figure 1 shows the assessment of driftwood prospects in the census. The best areas for driftwood were the northern shores and in particular the northwestern and northeastern extremes, where

driftwood settled primarily from Siberia (Eggertsson, 1993). By contrast, Iceland's settlement reached far inland (Figure 2).

FIGURE 1 NEAR HERE

Turf was much easier to access for most of the farmsteads in the early 18th century. But it is by no means trivial. Ideal building turf comes from mires as sedge grasses, particularly *carex nigra*, form a dense root structure that does not crumble once the turf dries (Stefánsson, 2013, p. 17). While most farmsteads had access to wetlands – certainly a higher number than those with ready access to driftwood – hundreds of farms did not, and those relied on nearby farms for the resource. Figure 3 shows a diagram of these essential resources. As I will illustrate later, the resource claim system is overwhelmingly tuned to ensure access to these resources. The form it takes is by no means straightforward, however.

Another factor to consider is that Iceland had a somewhat unusual economy throughout the middle ages and early modern periods. During this time, Iceland famously had no minted money, aside from insubstantial amounts of Danish coin in circulation (Karlsson, 2000). This is somewhat of an illusion, however. While it is true that Iceland did not have a monetary economy until well into the 19th century, there was a well-established system of valuation that, at least in the 18th century was ubiquitously used throughout the country. This was a hexagesimal system that equated one cow to six sheep, 120 ells (roughly a metre each) of woven wool, and 240 kg of fish. This system operated very much like a monetary system; as Graeber (2011) argues, money is in some ways simply a mathematical abstraction of the relative prices of things, although societies without currency tend to rely on debt rather than direct exchange, and there is evidence that medieval Iceland fits that model.[2] What is more important for the purposes of this paper is that Iceland barely had anything that could be called an open market for domestic trade.

FIGURE 2 NEAR HERE

The Danish crown kept a monopoly on foreign trade in the early 18th century but the merchants at these market harbours traded imported goods for local produce (Gunnarsson, 1987). Anyone looking to trade one domestic good for another could have found potential trading partners at these harbours; a mid-18th century account notes that during the annual sorting of sheep brought down from the uplands at the end of summer, a number of people from coastal settlements brought dried fish and

[2] E.g. *Diplomatarium Islandicum XV*, pp. 473-545.

other goods and that the sheep fold formed „something resembling a market" (Ólafsson and Pálsson 1974, p. 105). In addition, early 13th century references to price standardization and laws regulating the length of units of spun wool (is. *vaðmál*) show that trade took place at assemblies.[3] It is not unreasonable to assume that similar practices occurred at the market harbours. Neither it is unreasonable to assume that people used the opportunity afforded by communal events to trade goods, as Ólafsson and Pálsson noted. That has yet to be conclusively borne out in the archaeological record, however, although investigations of the practice is limited. The only one to date is Mehler's investigation of trade practices at the national assembly site at Þingvellir, where she makes a strong argument that trade did not play a significant role (Mehler, 2015).

I would like to suggest that a good deal of domestic trade was negotiated directly between one farm or another, although third party mediation, usually from large landholders, was common. I will return to discuss the evidence we have for such instances of mediation, but for now I will stress that the lack of marketplaces where farmers were able to purchase required portable goods like firewood and building timber led to specific arrangements of exchange. Moreover, as indicated above, many of the required resources listed above, like pasture and turf cutting, were not durable resources that could be stockpiled easily.

Iceland's 18th century society was an agricultural one, made of farmers on fairly small, individuated farms that relied on the land for various resources to feed their livestock, construct their houses and keep them warm. A shortcoming of any of these required dealings with those who had a surplus of needed resources. The *ítak* system is a manifestation of this character.

FIGURE 3 NEAR HERE

Ítök: overview

Figure 3 shows every resource claim listed in *Jarðabók Árna Magnússonar & Páls Vídalín*. There are 1963 claims listed for the 3556 farmsteads, or roughly two claims for every three farms. As Table 2 shows, the distribution by county varies considerably. At one end, the total number of claims in Barðastrandarsýsla is only 14% of the number of farms in the county, whereas it is 128% in Norður-Þingeyjarsýsla. This might due to differences in recording methodologies between the different counties or a variability in thoroughness. For instance, there is a positive correlation between the length of a

[3] E.g. *Diplomatarium Islandicum I,* pp. 308-318.

description, averaged per county, and the number of claims listed.[4] The longer the description, the more likely it is to include references to resource claims. It is also possible that these differences are due to regional variation, although I am not going to explore that further in this paper.

TABLE 2 NEAR HERE

211 of the 1963 claims are relict. Many of these have become disused for two reasons. Firstly, a claimed resource may have become used up by the early 18th century. In addition, many claims simply involved too much effort to enact. It is interesting to note that the claims are listed regardless and dated roughly to when they were last enacted. This temporal phasing in the *Jarðabók* text is divisible into four phases: *now, recently, in living memory* and *before living memory.* The last phase indicates that many of these claims were written down, mostly in church inventories (is. *máldagi*). Further explanation is needed here. The claims were recorded at gatherings where every farmer in a given community was expected to be present. This was done to ensure that a farmer's description of his or her lands could be verified by neighbouring farmers, and disputes certainly occurred. Some claims were not being enacted as an inhabitant contested a claim on his or her land, and those assembled did not always pick sides. The more common reasons for disputes was a discordance between the information written down in church registers and what the society of farmers considered to be rightful. For instance, the priest at Stafholt in western Iceland insisted that the parish church had fishing rights to the nearby river Þverá, based on church records dating back to the 12th century and repeatedly listed in later documents. The farmers by the river, however, disputed the claim and the surveyors noted that the claim had rarely been enacted in living memory (Magnússon & Vídalín, 1913-1943, IV, pp. 333-335). Disputes of this kind indicate that Icelandic society had a form of adverse possession, whereby anyone using a resource uncontested for 20 years would gain rights to it, and anyone who failed to enact a claim for 20 years would lose rights to the claim (see, for instance Kristjánsson, 1980, p. 224).

The land census was done in a transitional period where written sources were clearly considered legitimate evidence for claims, but there are plenty of cases where local farmers express displeasure about these due to continued disuse. Many of the written sources have also clearly been copied from older church registers, and so the claims described in them may not have been used for centuries. Nevertheless, it is tempting to think that continuing to assert the legitimacy of claims had some value, even if it was clear that they would never be enacted again. The claims represent a degree of

[4] Corr: 0.5135901 t = 2.1582, df = 13, p-value < 0.05.

control that one farm asserts on another, and perhaps that control could be leveraged in other ways than directly enacting the claim itself.

FIGURE 4 NEAR HERE

Characterising connectivity

This section introduces a tentative categorisation of the claims. I'm not suggesting that these are mutually exclusive – quite the contrary – but there are general trends in the dataset that lead to fairly useful divisions.

1. Coupled subsistence

Roughly 350 of the claims represent some sort of exchange between two farms. These farms, totalling 274, are usually either direct neighbours or nearby one another. These exchanges generally involved trades that align well with the abovementioned variegated character of Iceland's landscape. For instance, a coastal farm might have traded sea access on their land for pasture access from a neighbouring inland farm. There were many instances of farms with good meadows engaged in a resource exchange with farms that had good pastures. These binary systems could have arisen for a variety of reasons. They may indicate that the two farms in question formed a larger unit earlier, which was then divided into two or more properties. This is a common practice in Iceland, especially in the first few centuries of settlement (Vésteinsson & McGovern, 2012). It may also be an example of the spreading of risk between two farms as a way of counteracting Iceland's notoriously capricious environment and climate. The final, and most straightforward explanation is that this practice made eminent sense considering Iceland's landscape. In any event, by the 18th century it is clear that a significant number of farms were tied to one or more neighbours through dynamics of symmetrical interdependence. Living off the land relied on coupling, in order to both extend by proxy the area of the farm to include all of the vital resources needed to survive, as well as hedging some risk in case disaster struck.

It is worth exploring who owned these 274 farmsteads. The land census contains ownership information for every farmstead, including where the owner is based. I have mapped this as a network (see Pálsson, 2018) and categorised the ownership type into four categories - private, episcopal, royal and ecclesiastical ownership. Table 3 shows a frequency table of exchange claims on farms sorted by ownership category.

There is a statistically significant[5] difference between exchange claims sorted by the four ownership types, with roughly 10% of the farmsteads owned by the king and either of the two bishoprics engaged in resource exchange, while only 5.5% and 5.9% of the farmsteads owned by churches and individuals, respectively. The bishopric and Danish Crown were the three largest landowners in Iceland by a major margin throughout the post-Reformation period, with the Danish crown owning 632 farmsteads and the two bishoprics a combined 646 farmsteads. The 168 landholding church farms, in contrast, owned a combined 604 farmsteads, or 3.59 farmsteads each on average. The rest of the just over 1800 farms were owned by 904 individuals, or 2 farmsteads on average.[6]

The much more frequent occurrence of exchange claims in the royal and episcopal property assemblages suggests that, rather than being a practice between small landholders, exchange claims are predominately found as a mechanism employed by the two bishoprics and the royal holdings. This is a clever tactic. Quite a number of the royal and episcopal properties must have had a shortage of some resource, but that resource may have been in abundance at another property, and by orchestrating a resource exchange between its properties, the proprietor could increase the sustainability of a number of its properties. It was a double bind for the tenant, however – not only did he or she have to pay rent, but had to also participate in this material dispersal across their lord's properties. There are recorded complaints about this type of obligation, and I will return to that later.

TABLE 3 NEAR HERE

FIGURE 5 NEAR HERE

2. Centre-oriented assemblages

The next category includes more complex arrangements as they involve more than two farmsteads. Several clusters of claims centred on a single farm. These centres were predominately large farmsteads that played an important role for much of Iceland's history before the 18th century (and in many cases well into the present). An example of this is Holt in Rangárvallasýsla (see Figure 6). Holt is a large property, likely settled

[5] Pearson's Chi-squared test: X-squared = 23.764, df = 3, p-value = 0.00002798.

[6] The total number of farms by this measure is slightly higher than the 3532 listed above, as some farms are partly owned by two or more owners, leading to some farmsteads being counted twice when comparing ownership types and claim types.

in Iceland's settlement age in the 9th century (Buckland, *et al.*, 1991). A 13th century church register lists its resource claims (*Diplomatarium Islandicum II, pp. 84-86,* translation by author*)*:

> The holy church of Holt owns … half of Syðstu-Vesturholt's shores, same at Bakki, woodland in Þórsmörk … pasture in Vesturholt, pasture in Lambafell.

FIGURE 6 NEAR HERE

These claims are still listed in the 18th century land census, although Holt had increased its claims somewhat. The main difference between the medieval church inventories and the 18th century land census is the number of claims that neighbouring lands had on Holt, however. As Figure 6 shows, almost all of the neighbouring farms had a claim on Holt's driftwood, and nearby Vesturholt had rights to turf cutting in Holt. Holt was not only in a position to extract resources from nearby farms, but it also provides resources to its neighbours – most notably a supply of driftwood. This is not surprising given its historic role in the area as a magnate farm that quickly secured driftwood rights to significant stretches of the nearby coastline and woodland rights in the forests in the uplands to the north. It became the parish church when the parish system was established late in the 12th century, and remained the largest farm in the region until at least the 19th century.

Holt also owned many of the farms that have driftwood claims on it, although not all of them. In fact, Holt owns the farmsteads by the sea, whereas the driftwood claimants that Holt does not own sit higher in the landscape, at the foot of the Eyjafjöll mountain range to the north. They are also considerably more valuable farms than Holt's subsidiary properties. One suggestion for this arrangement is that Holt and the farms to the north were initially part of one large land claim, reminiscent of the so-called *Skallagrím effect*, named after the colonizing party led by Skallagrímr that claimed a vast area in western Iceland and positioned farmsteads in strategic locations nearby key resources, while maintaining the farmstead Borg as a central place within the land claim (Smith, 1995; Vésteinsson et al., 2002). According to that interpretation, Holt may have been the centre of an internally coordinated area including the northern farms of Núpur, Yzti Skáli, Miðskáli and Ásólfskáli, from which the sourcing and dispersal of driftwood for every farm in the area was organized.

It is also possible to think of the Holt assemblage as a scaled-up version of the first category. In fact, the driftwood claims of the southern farms Nýibær, Bakki and Vesturholt is something of an accounting trick. It is really Holt that owned driftwood rights to the entire shoreline of these farms. These farms had limited access to

driftwood that drifts onto their own land, and because this resource was ultimately owned by Holt, the land census records these as claims by Nýibær, Bakki and Vesturholt on Holt. Setting aside the awkward wording, the agency of resource control lay predominately with Holt. The other exchange that took place, between Holt and its neighbours to the north, resembles a version of the *coupled subsistence* category writ large, whereby one side – Holt and its subsidiaries – control a coastal resource, while the other – the moderately large farmsteads positioned at the foot of Eyjafjöll – control an upland resource.

FIGURE 7 NEAR HERE

TABLE 4 NEAR HERE

A thorough discussion of these assemblages would easily take up the length of this article, but I will mention a few more to give a sense of the variety. In some cases there wasn't a clear central farm to speak of. The farmsteads along the southern coast by Ölfus were connected by several two-way resource exchange claims. By scale they don't quite fit into the first category, but again the function is quite similar. The Ölfus case may have formed early, although there are unfortunately no written records that mention these claims before the 18th century. Whether it developed out of an initial land claim or not, it is clear that by the 18th century the Ölfus farms had developed an extensive system of resource dispersal involving eight farms (See Figure 7 and Table 4). Similar to Holt, this is a picture of terrestrial and marine resource exchange, but flowing in an irregular fashion in contrast to the barycentric flows of the Holt example.

In other cases the centre was a resource rather than a farmstead. At the smaller end of the scale, a valuable resource may have been managed cooperatively by a number of nearby farmsteads. The cascades Laxfoss in Laxá í Kjós, famous for its salmon fishing to this day, was managed by five farmsteads, three of which had access to it once a week and the other two twice a week. What's interesting to note is that these did not include all of the farms whose land enveloped the river, nor does the influential nearby church farm Meðalfell have any claims to Laxfoss (see Figure 8). In other words, two key assumptions in historical network reconstruction – proximity and social influence (see Brughmans 2012, 629-630) do not appear to be primary drivers behind the formation of the Laxfoss resource network.

FIGURE 8 NEAR HERE

Commons (is. *Almenningar*) were found throughout the country and usually operated in one of two ways. Some were owned by a single magnate farm and used at their discretion, often for a fee (akin to a common property regime, see Ostrom, 1990). Others were managed and or used by farm communities (is. *hreppur*), the main example being upland grazing areas used in summer (is. *afréttur*), and subject to various restrictions recorded in Iceland's law codes (e.g. Karlsson *et al.*, 1992, 321-324). Most of the farms in the south-west Reykjanes peninsula produced charcoals in the same commons, and shared uplands were the norm across the country although in some instances the uplands were owned and leased out by magnate farms (e.g. Svínavatn in Húnavatnssýsla). These are similar phenomena to the resource-centric assemblages, but operating at a much larger scale.

Figure 9 shows a distribution of farmstead centre-oriented assemblages, defined provisionally as those farmsteads with four or more claims on other properties combined with claims on the farmstead itself. The distribution is fairly even across the study area, with notable clusters in the north east and a somewhat higher density throughout the north. It is clear that the overwhelming majority of these farmsteads are the historic power centres in the country. Figure 10 bears this out: over 75% of the farmsteads in question are parish church centres, influential farmsteads that dominated Iceland's political landscape for most of its history.[7] What we are seeing in these resource claim assemblages is the way that power influences land use.

FIGURES 9 & 10 NEAR HERE

3. Magnate/semi-state systems

Occasionally, centre-oriented systems grew so large in scale that they merit their own category. There were only a handful of these in 18th century Iceland. By far the largest were the two bishoprics, Skálholt and Hólar, followed by the royal stewardships centred on Bessastaðir in the south and the pre-Reformation properties of the monasteries, claimed by the Danish crown in the mid-16th century (see Karlsson, 2000). They operated both as the seat of their respective sees of over 2500 and 1500 farms respectively, as well as directly owning vast amounts of property (Hólar owned 344

[7] These numbers do not include claims that have been relict for a long time by the 18th century. Even so, it is possible that this number is skewed by a representative bias, as the main sources for *ítak* claims before the 18th century are church registers. In fact we have very scant records of *ítak* claims not involving church farms before the 18th century. In any case, it is likely that the writing down of claims meant that claims involving church farms were much less likely to become forgotten or disused, as priests could (and did) continue to claim rights to resourced by referencing centuries-old church documents.

properties in the early 18th century whereas Skálholt owned 309). Much like the preceding category, a full explanation of these systems is well beyond the scope of a single paper. A study of Skálholt from a systems perspective is currently underway by the author, and I will let a brief summary of that work suffice here.

Skálholt was the spiritual and secular centre of roughly three quarters of the country, stretching clockwise from Langanes in the north east to Hrútafjörður in the northwest. In addition to the vast amounts of rent and tithe that Skálholt generated from its parishioners and tenants, it played an important role in managing the wider landscape through a stewardship of resource claims. Skálholt had grazing rights for its animals on many of its nearby tenant farms and oversaw, through a network of bailiffs, the transport of driftwood from the shoreline to Skálholt, or wherever the timber was needed (Grímsdóttir, 2008).

Skálholt's tenants were also tied together through resource claims. In addition to frequent instances of tenant farmers exchanging one resource for another – most often meadow access for pasture access – certain farms acted as suppliers of limited resources to nearby tenants. This was an arrangement that was, at times, to the detriment of the supplier farm itself. For instance, the census record for the tenant farms Fell and Efstidalur in Árnessýsla indicate that woodland was being over utilized for charcoal making by nearby tenant farmers whose access appears to be sanctioned by the bishopric (Magnússon & Vídalín, 1913-1943, II). Similar records suggest that resource access between tenant farmers regularly did not suit either party, often due to complicated logistics involved or to undue environmental pressures on fragile resources. These arrangements were arguably made to suit Skálholt's wider interests instead, dispersing resources across its properties which often required significant output of unpaid labour from its tenant farmers.

Examples from the northern bishop in Skagafjörður show that episcopal tenant farmers facing a shortage of a vital resource could approach the bishop to address this shortage, likely through his bailiffs. For instance, Hóll in Norður-Þingeyjasýsla in the north east of the country harvested hay in Keldunes, which the census records indicate was rather hard to access by the Hóll tenants, but Keldunes was the closest farmstead also owned by Skálholt (Magnússon & Vídalín, 1913-1943, XI, p. 36). Similarly, the tenant farm Hraun í Fljótum (Magnússon & Vídalín, 1913-1943, IX, p. 339) did not have adequate turf and needed to collect turf from another farm. It did not trade with any of its neighbours, however. Instead, occupants travelled south to Hamar, which according to the text is an arduous journey that takes over a week every year. The reason for this unlikely source of turf is that the arrangement has been made by Hólar's bailiff in the region. It is likely that Hamrar was the closest farm owned by the bishop that had an abundance of turf. Whether or not that was the case, the broader point is that this particular arrangement did not arise from a logical interaction

between neighbours, but from the decision-making of a regional power, most likely benefiting the entire assemblage of properties under the bishopric, even if it led to a particularly cumbersome arrangement for the tenants at Hraun.

Discussion: an enchainment of scales

FIGURE 11 NEAR HERE

This paper presents the Icelandic *ítak* as a series of overlapping networks, and shows that in the absence of a fixed, market infrastructure for domestic trade, farmers in 18th century Iceland relied on negotiated access to resources on other farms, in arrangements that often lasted generations. 18th century Iceland was an agricultural society of individuated and dispersed farmsteads that were nevertheless highly interdependent. Taking a cue from Knappett (2013), I've ordered the *ítak* categories suggested here according to three scales – the micro, meso, and macro. Figure 11 shows a diagram of this ordering. I'd like to stress that the phenomena at these different scales are by no means distinct or independent. As I noted earlier, the simplest resource claim category – the coupled subsistence – is most commonly found as a feature of the semi-state systems managed by the two bishoprics and the Danish crown.

It is rather that these categories are enchained across scales. Site to site interaction through shared and claimed resources traverse the scales from binary engagements to large systems spanning the entire island. As farmsteads entangle at ever larger scales, we see an emergence of mechanisms needed to enact material flows involving long distances and several agents. The fundamental role of the *ítak* (pl. *ítök*) remains relatively unchanged, however. It is just that as resource claims articulate at ever greater scales, they begin to show more complex forms. These three scales are enchained, as any given resource claim interaction may be influenced by patterns taking place at other scales. Moreover, these resource claims are highly dependent on other site to site interactions – property networks, community networks, trade networks, and so on. For that reason, the resource claim networks cannot be fully understood without reference to other socio-dynamics. But by focusing on one dimension of connectivity it is possible to begin to build toward an interpretation of a farmstead site with full awareness of its high degree of connectivity, and to move, step by step, toward a release from proximity.

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Ethical Approval
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Informed Consent
Informed consent was obtained from all individual participants included in the study.

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Colour Figure

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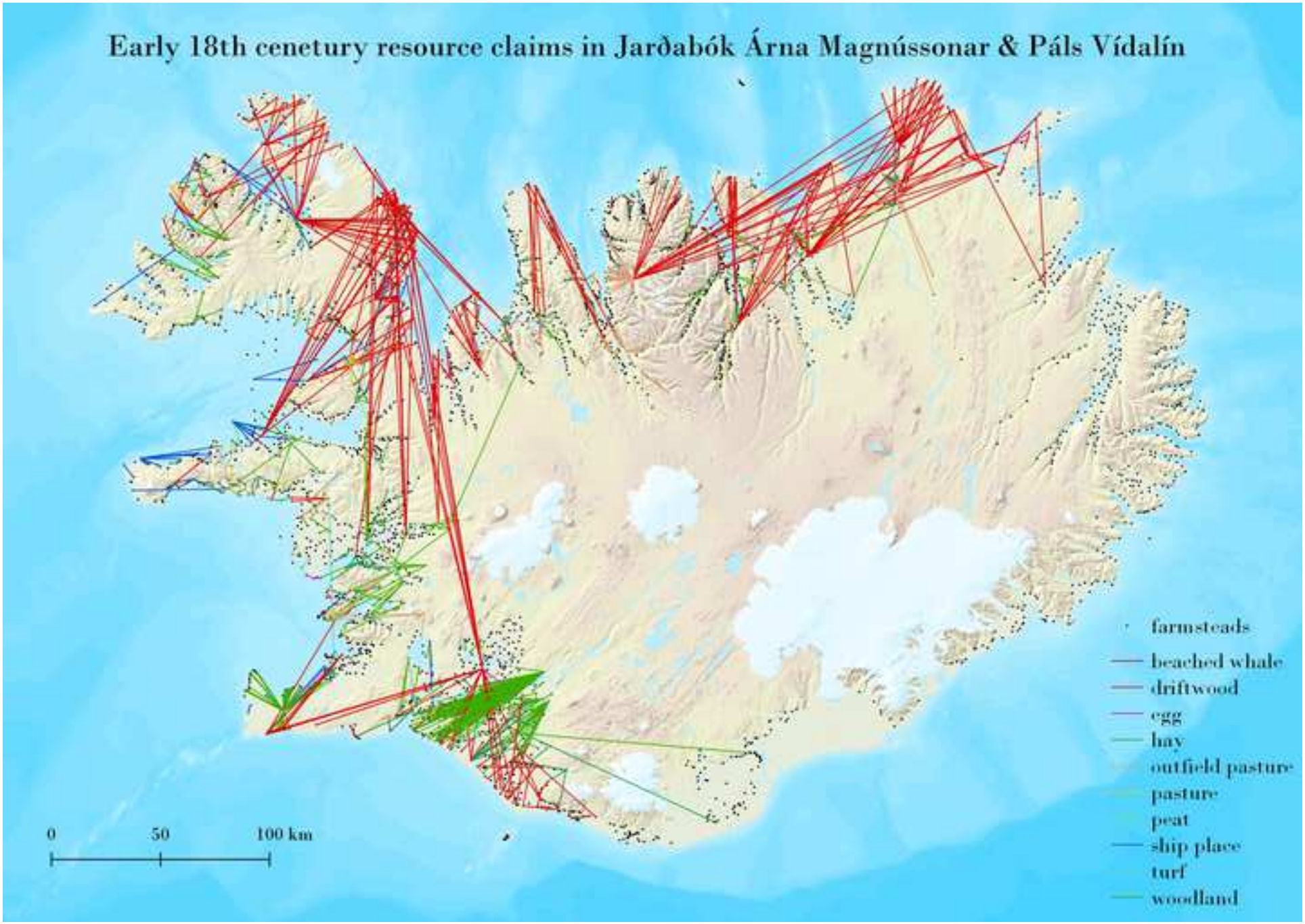

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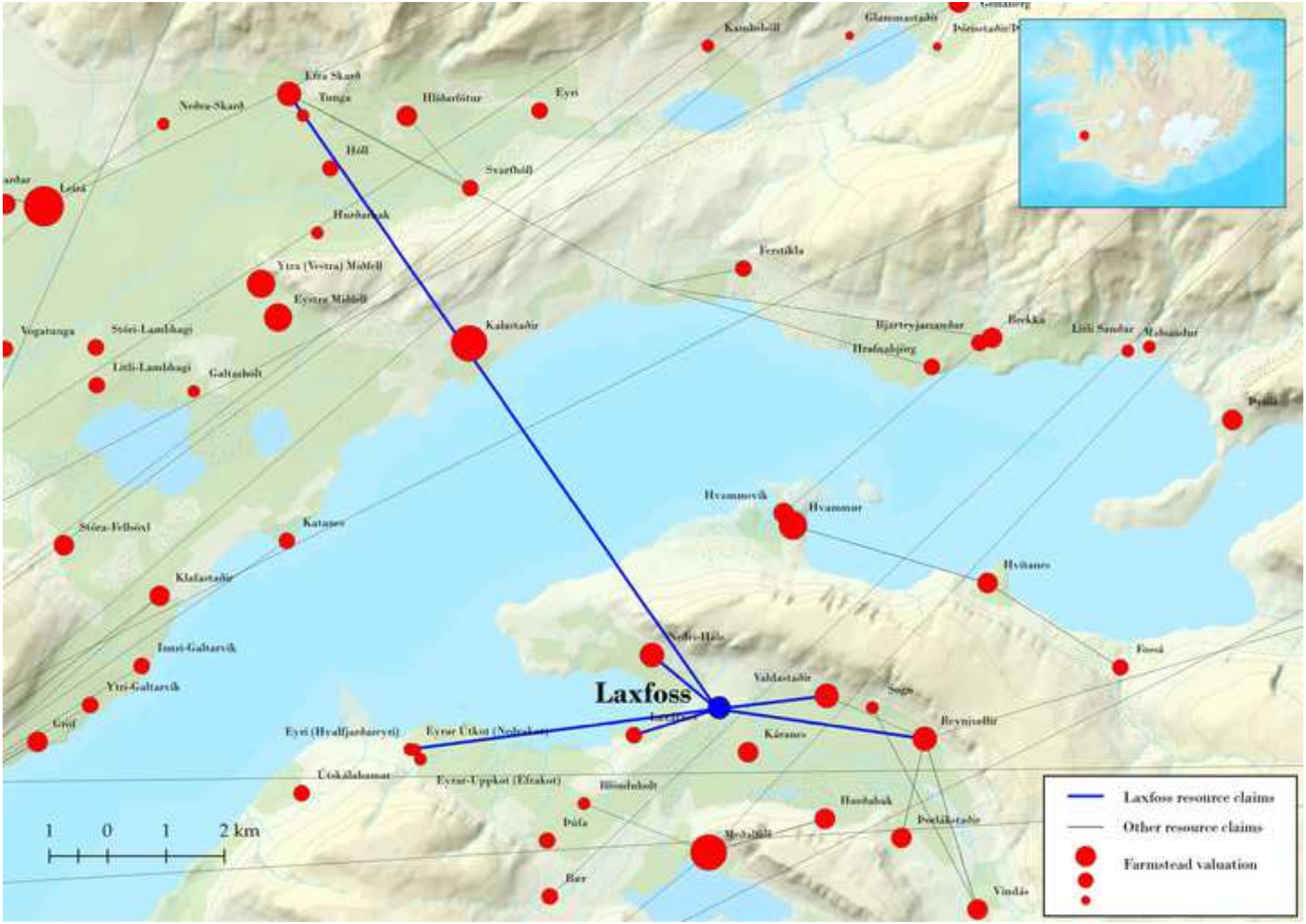

Responses to reviewers

Thank you for the encouraging comments. I made major revisions based on the feedback. As reviewer #4's comments were more substantive I tried to have them guide the direction of the structural changes. I removed superfluous references to theoretical frameworks like assemblage theory that did not play a significant role in the paper. As for the paper's descriptive character, it's hard to avoid that as it is an exploration of a new dataset with very little prior investigation, particularly with the approach I have taken. I think it is important to have statistical tests in these sorts of papers, as it allows researchers to make general statements about large datasets. Without correlation tests, there is no way for the reader to check whether statements made about the data ring true. For that reason I think it is essential to keep the references to correlations and p-tests of significance.

I reworked the references to Ostrom, thanks to both reviewers for pointing this out. I also made a number of corrections to grammar and argumentation. I expanded the conclusions to drive home the 'take home message' of the paper, as well as clarifying its rationale. I hope the changes are sufficient to pass muster.

Warm regards,

GP