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Traditional seabird fowling in Iceland

Aevar Petersen

Traditional seabird fowling is still very much practiced in Iceland today. Seabirds have undoubtedly been utilized since the country was settled over 1100 years ago. Archaeological excavations in middens have started to reveal the remains of seabirds, such as from 1944 one in mid downtown Reykjavik[1]. This dates from about 900, and may be the midden from the alleged first permanent settlement in Iceland. This included among others bones of the extinct Great Auk. The first documented reference dates from 1179, mentioning fowling at the seabird cliff at Ingólfshöfði in SE-Iceland[2]. The earliest Icelandic law books, Grásíða, Járnsíða, and Jónsbók, written in the 12th century (and include law provisions from as early as the 9th century), also refer to seabird fowling.

Icelandic seabird species and harvested cohorts

Altogether 23 species in Iceland are categorized as seabirds. Most of these have been hunted through the ages. The extent has varied according to species and what aspect of their life history has been used, i.e. their eggs, young, or the fullgrown birds (Table 1).

Four species have hardly been used to speak of (Manx Shearwater, Storm Petrel, Leach´s Petrel, and Common Gull, which is a newcomer). One species (Great Auk) is extinct since 1844[4]. Others, particularly the gulls and skuas, are presently looked upon as vermin, but were formerly harvested, and their eggs still are to some extent. The most important traditional harvest species are presently Eider (for down), Puffin (fullgrowns), Kittiwake, Common Guillemot, Razorbill and Arctic Tern (eggs). Other species are less important but may still be of some value locally; Gannet, Cormorant and Shag (young); Fulmar, which is primarily used in mid S-Iceland (young) and at some

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Table 1. An overview of Icelandic seabird species, and which are or have been hunted or harvested. Also shown are, which cohort of the life history has been taken (+) or not (-). Signs in parentheses refer to insignificant use. Adapted from (3).

Species	Fullgrowns	Young	Eggs
Fulmar *Fulmarus glacialis*	+	+	+
Gannet *Morus bassana*	-	+	-
Shag *Phalacrocorax aristotelis*	+	+	+
Cormorant *P. carbo*	+	+	+
Leach´s Petrel *Oceanodroma leucorrhoa*	-	-	-
Storm Petrel *Hydrobates pelagicus*	-	-	-
Manx Shearwater *Puffinus puffinus*	-	-	-
Common Eider *Somateria mollissima*	+	-	+
Great Skua *Stercorarius skua*	+	(+)	(+)
Arctic Skua *S. parasiticus*	+	-	-
Arctic Tern *Sterna paradisaea*	-	-	+
Black-headed Gull *Larus ridibundus*	+	-	+
Common Gull *L. canus*	-	-	-
Great Black-backed Gull *L. marinus*	+	+	+
Lesser Black-backed Gull *L. fuscus*	+	-	+
Herring Gull *L. argentatus*	+	-	+
Glaucous Gull *L. hyperboreus*	+	+	+
Kittiwake *Rissa tridactyla*	+	(+)	+
Puffin *Fratercula arctica*	+	+	-
Razorbill *Alca torda*	+	-	+
Common Guillemot *Uria aalge*	+	-	+
Brünnich´s Gullemot *U. lomvia*	+	-	+
Black Guillemot *Cepphus grylle*	+	+	+

colonies elsewhere (eggs); gulls (eggs at various colonies). Hunting using shotgun takes place at sea, outside the breeding season, and focuses mainly on the auks, principally the larger ones.

A number of changes have taken place in how seabird resources have been utilized through the ages. This has come about for different reasons, such as the abolition of the more strenuous methods (unless new technology has made their application easier such as vehicles for lowering fowlers down cliffs), changes in the general attitude towards individual species

(from quarry to vermin), ban on the use of certain catching methods (as an animal welfare issue or conservation measures), ban on use (for different reasons; disease, protection of individual colonies, etc.), changes in what is sought after, and degree of perceived palatability. The Eider is economically the most important seabird species at present, for the highly praised down.

Magnitude of the harvest

Complete overviews of harvests are rare, while Iceland is fortunate to have a country-wide farm-to-farm overview from the beginning of the 17th century. This is the so-called Jarðabók, or The Land Register of Iceland, compiled by Árni Magnússon and Páll Vídalín[5], listing the natural resources available at each farm, the livestock, coastal resources such as driftwood, beached whales and seals, and other assets of individual farms. One example is given, of the colonies where Puffins were taken (Fig. 1).

A comparison to the present-day distribution of Puffin colonies shows a considerable increase in locations (Fig. 2). This probably represents an overall increase in the Icelandic Puffin population, despite centuries of utilization as a resource, indicating this has led to no long-term harm to the population. However, there may have been local effects.

Actual figures for the magnitude of the harvest of seabirds in Iceland are available for single colonies, smaller areas, or certain species from earlier times, while harvest statistics were officially collected between 1898 and 1939 (by the Icelandic Statistics Bureau through local sheriffs). This compilation stopped but resumed in 1995, upon revision of the bird hunting act[7], and the introduction of a hunting licence system, now supervised by the Wildlife Management Unit. Egg and Eiderdown collecting are exempted from these statistics. Table 2 shows the extent of the current hunt, during which around 380 thousand seabirds are taken annually.

Considerable numbers of the birds in the hunting statistics are shot, rather than taken by the more traditional harvest methods. This varies however between species, and the most commonly

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harvested species, the Puffin, is mainly taken with a *háfur*, a triangular hand net on a long rod. This method has only about 130 years of history in Iceland, although of much longer standing in the Faeroes[9]. The other auks, Common Guillemot, Brünnich´s Guillemot, and Razorbill, are runners-up in numbers taken for human use. A number of species, notably the gulls, are nowadays primarily killed as vermin, in order to guard some other economic or non-economic resources, not the least the highly valued Eider[10]. In earlier times Glaucous and Great Black-backed Gulls were taken for food, especially the eggs and the chicks.

Examples of harvest changes

Two examples, Puffin and Fulmar, are given of the changes, which have taken place in the numbers taken and what cohort has been targeted. During 1898-1939, on average, 184912 Puffins were harvested. Numbers varied considerably, from about 50 to 370 thousand, or nearly by a factor of eight. These were both taken in pole nets (fullgrown birds) or with hooked sticks (mainly young in burrows). In the 1995-1999 period similar numbers were taken (average 183816 birds), but these were by and large fullgrown birds. Long-lived seabirds, with high adult survival like Puffins, are impacted more by killing of the older cohorts than the young ones. Hence, the impact of the present-day catch is likely to be greater than in the early 20th century, although there is no indication that the Icelandic Puffin population is declining as a result of the magnitude of this harvest. The distribution of the catch according to colony is however of importance in this respect, and there are previous examples of local overexploitation[3].

The other example, the Fulmar, shows a different history of exploitation. In the 1898-1939 period, on average, 42693 birds were killed, varying by a factor of three between years. By the 1995-1999 period the catch had dropped to only about a fifth of the previous level, to an average of 8725 birds. Nowadays primarily young are taken, while previously the catch was made up of both young and fullgrowns. The population impact has therefore not only diminished in numbers but also by what cohort is taken. This does not mean the Fulmar hunt ever influenced the

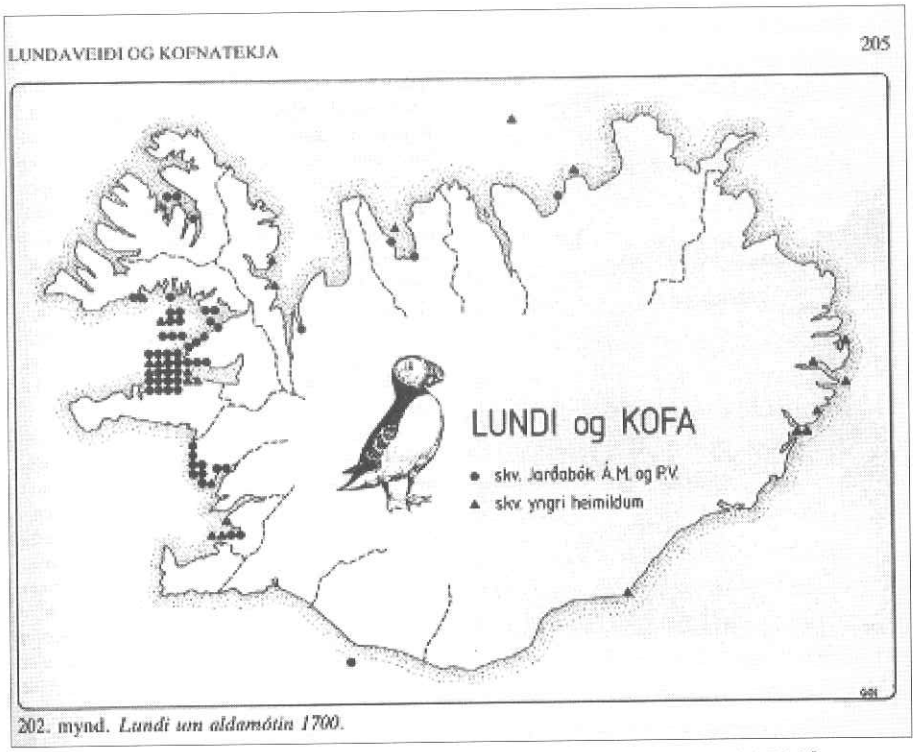
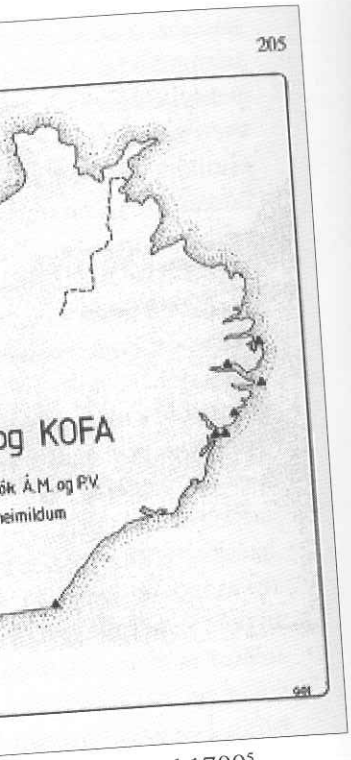


Fig. 1. The distribution of the Puffin harvest at colonies around 1700[5]. Map taken from[6].

breeding population in Iceland. In fact Fulmars have been continually increasing in Iceland for the past 250 years or so[11,3,12]. Reservations have to be made however for possible impacts on individual colonies. Even in cases of seemingly stable colonies, their stability may be an illusion, if only maintained by immigration from other colonies. The decline in the Fulmar harvest can primarily be contributed to two factors; a disease in the North-Atlantic Fulmar population as from the 1930s[11] and changes in human palatability. Fulmars are very fat birds and such food is favoured by relatively few people nowadays but used to be highly desired. North Atlantic Fulmars contracted the pulmonary disease *psittacosis*, leading to deaths in some humans. This resulted in a



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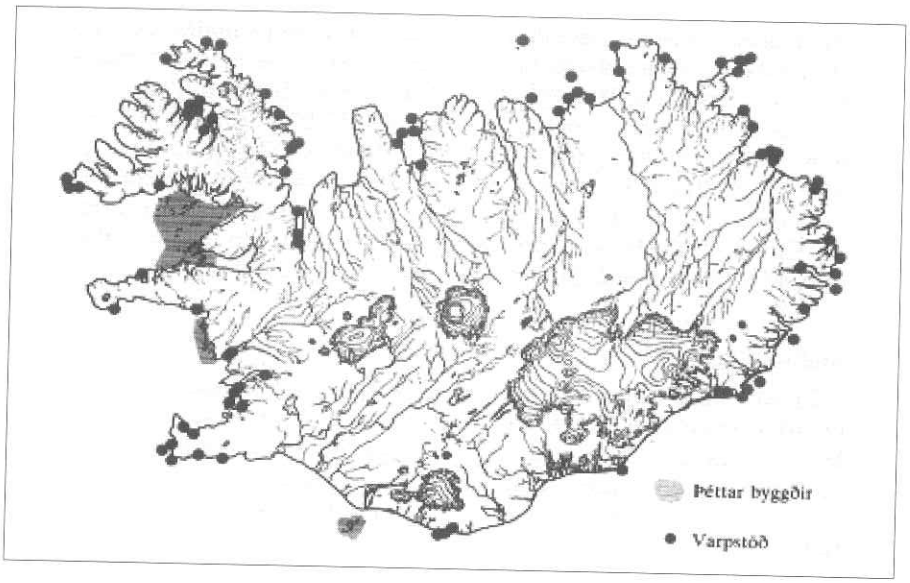

Fig. 2. The current breeding distribution of Puffins in Iceland; individual colonies (dots), multiple colonies (hatched areas). Map from[3].

ban on harvesting Fulmar young[13], lasting from 1940 to 1956[14,15]. By the time the ban was lifted, considerable societal changes had taken place as a result of the Second World War, and a human generation had grown up basically without Fulmars as a food source and the general taste for Fulmars had dwindled. At present Fulmars are primarily harvested in mid-South Iceland, where earlier this tradition was also strongest and never really died out, as in so many other areas in the country[16].

The larger auks and the Kittiwake

Birds of the auk family (Alcidae) have long been among the most important group of birds harvested in Iceland. Puffins are also of

Table 2. The magnitude of the hunt of seabirds in Iceland 1995-1999. Information from the Wildlife Management Unit (in (8)).

Species	1995	1996	1997	1998	1999	Average
Fulmar *Fulmarus glacialis*	8059	8920	10093	8937	7618	8725
Gannet *Morus bassana*	707	994	636	686	433	691
Shag *Phalacrocorax aristotelis*	5128	6499	4410	2253	2237	4105
Cormorant *P. carbo*	2550	2975	2678	1890	1627	2344
Arctic Skua *Stercorarius parasiticus*	2617	2292	1993	1752	1287	1988
Black-headed Gull *Larus ridibundus*	2958	2696	2853	2306	1908	2544
Great Black-backed Gull *L. marinus*	35787	32785	29738	32328	24802	31088
Lessar Black-backed Gull *L. fuscus*	22340	22390	27257	34030	19809	25165
Herring Gull *L. argentatus*	5998	4798	4881	7868	6278	5965
Glaucous Gull *L. hyperboreus*	3942	4546	3771	3187	5496	4188
Kittiwake *Rissa tridactyla*	1371	1461	2324	1433	1596	1637
Puffin *Fratercula arctica*	215517	232936	184664	159700	126261	183816
Razorbill *Alca torda*	18461	27573	20708	25113	27806	23932
Common Guillemot *Uria aalge*	52867	65099	59031	65378	59460	60367
Brünnich´s Gullemot *U. lomvia*	15114	20479	15339	18294	21673	18180
Black Guillemot *Cepphus grylle*	3424	4077	3932	3817	4870	4024

this family, while the three larger relatives, the Common Guillemot, the Brünnich´s Guillemot and Razorbill, have traditionally been grouped together as *svartfugl*, or "auks", by Icelandic hunters. These are cliff-nesting birds, which together with Kittiwakes, another bird cliff breeder, called for specialized fowling techniques. These were predominantly harvested using a rope for descending the cliffs, together with hand-held snares for catching birds or hand-picking (or a scoop) for the eggs. At present killing auks on the cliff in summer hardly takes place any more, while egg-picking is still much practised. Fig. 3 shows the location of the about 30 auk colonies in Iceland in 1982 (but since then a few new colonies have been formed). Most of the larger ones are visited annually for harvesting.

Nowadays there are around 250 Kittiwake colonies in Iceland (Icelandic Seabird Colony Registry). Many new ones have been formed during the 20th century, presumably with corresponding increase in population size [17,18,12]. Kittiwake

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colonies, which have been in place for centuries, are particularly those inhabited by the large auks as well, and these are the prime source of Kittiwake eggs today.

Seabird numbers

The numbers of seabirds in Iceland are little known from older times. Present-day populations are also variably well known, although estimates have been attempted for their breeding numbers; these are shown in Table 3.

Puffins and Fulmars are the commonest of Icelandic seabirds, with breeding populations in low millions of pairs. Runners-up are Common Murre (Guillemot), Kittiwake, Brünnich´s Guillemot, Arctic Tern, Razorbill, and Common Eider, all with between 100,000 and a million breeding pairs.

Hunting methods

The most common current hunting methods are shotgun (all seabird species; mainly used in the non-breeding season), pole nets (primarily for Puffins at colonies in summer; Fig. 4), clubs (for Fulmar, Gannet, Cormorant and Shag chicks), scoops or ladles (for auk and Kittiwake eggs) often used in combination with a descending rope (Figs 5-6), and direct picking by hand (eggs of Fulmar, Eider, Arctic Tern, gulls, and auks).

A number of different fowling methods were used in the past, now illegal upon Iceland joining the Paris Convention of 1950 of Bird Protection (in 1956) and the Bern Convention of 1979 (in 1993). Some methods were banned prior to Iceland joining these international conventions. These include, among others, hooked sticks, nets, floating snare boards (Fig. 7), handheld snares or nooses (Figs 8-9), and set snares.

Snaring of fullgrown birds on cliffs was a common fowling method in Iceland and used over a long period of time. This was aimed at the adult breeding birds on the ledges, and as such was unusually detrimental to the colony survival.

On the other hand, shooting on cliffs has always been considered damaging to seabird colonies in Iceland and not considered good fowling practice. This would be aimed at the

adult breeders, as well as other fullgrown, yet immature, birds attending the colony. Unlike snaring, shooting also allows for mass mortality, as well as creating unusually much disturbance at colony. The current bird protection law gives a certain no-shooting zone around seabird colonies[7].

The use of hooks has been illegal since 1923[20]. This ban may have prompted or accelerated the decrease in harvesting Puffin young in burrows. Besides there was an easier method to catch fullgrown Puffins available (the pole net). The Westmann Islands fowlers had already staopped using hooks by 1875 in favour of pole nets.

Nets were of different kinds; one type was used for spreading over Puffin burrows at colonies, another floating with bait for Eiders (Fig. 10). The Eider nets or traps were never particularly common, but were banned by the decree of 1847[21].

The Puffin nets were extremely detrimental to the colonies, and examples exist of colonies being extirpated. One of the better documented cases of overexploitation comes from using Puffin nets on the Westmann Islands south of Iceland[22]. Between 1850 and 1870 nets were commonly used for catching Puffins, but during that period a continued decline was observed in the population, since the hunt was aimed at the adult breeding birds. The Westmann Islands fowlers realized this would only lead to a total extermination of the Puffin population and could not continue. They banned the nets but five years later, in 1875, introduced the triangular pole net from the Faeroe Islands. Interestingly this took place without intervention by the authorities, but based on this experience a general ban by law on using nets was introduced with the 1882 bird protection act[23].

The use of seabirds

The principal use of seabirds in Iceland has been for the flesh, their eggs, and the feathers and down, less so for oil. There have been certain changes in their use with time. Previously eggs were more commonly harvested than the case is nowadays. With the advent of shotguns, hunting for the flesh became an even greater option than before when hunters had to rely entirely on snares,

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Fig. 3. Auk colonies in Iceland. From[6] after[3].

floating boards, etc. for catching birds. Feathers were a secondary product, used for quilts and pillows. In later centuries (especially 17th) feathers became a valued export commodity, as reflected in Iceland´s old trade laws[24].

Changes in the utilization of Eiders have followed the overall trend in demand. In the early centuries the eggs were the prime Eider product, as reflected in the old law books (Jónsbók,[25]) of the 12th century. The birds were also caught in traps for the flesh, but with time the Eiderdown became the principal product. Like feathers, these were reflected in trade laws of the 16th and

Table 3. The numbers of breeding seabirds in Iceland. From (19).

Species	Estimated no of breeding pairs	Year	References
Fulmar *Fulmarus glacialis*	1-2 mill.	1995	Asbirk *et al.* 1997
Gannet *Sula bassana*	25.400	1994	Gardarsson 1995a
Shag *Phalacrocorax aristotelis*	8-9.000	1995	Gardarsson 1979; Petersen 1998a
Cormorant *P. carbo*	2.539	1994	Gardarsson 1996a
Leach´s Petrel *Oceanodroma leucorrhoa*	80-100.000	1995	Asbirk *et al.* 1997
Storm Petrel *Hydrobates pelagicus*	50-100.000	1995	Asbirk *et al.* 1997
Manx Shearwater *Puffinus puffinus*	7-10.000	1995	Asbirk *et al.* 1997
Eider *Somateria mollissima*	300.000	1995	Asbirk *et al.* 1997
Great Skua *Stercorarius skua*	5.400	1984-85	Lund-Hansen & Lange 1991
Arctic Skua *S. parasiticus*	5-10.000	1995	Asbirk *et al.* 1997
Arctic Tern *Sterna paradisaea*	250-500.000	1995	Asbirk *et al.* 1997
Black-headed Gull *Larus ridibundus*	25-30.000	1995	Asbirk *et al.* 1997
Common Gull *L. canus*	350-450	1995	Asbirk *et al.* 1997
Great Black-backed Gull *L. marinus*	15-20.000	1998	A. Petersen unpubl.
Lesser Black-backed Gull *L. fuscus*	25.000	1995	Asbirk *et al.* 1997
Herring Gull *L. argentatus*	5-10.000	1995	Petersen 1998a
Glaucous Gull *L. hyperboreus*	8.000	1995	Asbirk *et al.* 1997
Kittiwake *Rissa tridactyla*	630.000	1983-85	Gardarsson 1996b
Puffin *Fratercula arctica*	2-3 mill.	1995	Asbirk *et al.* 1997
Razorbill *Alca torda*	378.390	1983-85	Gardarsson 1995b
Common Guillemot *Uria aalge*	992.340	1983-85	Gardarsson 1995b
Brünnich´s Guillemot *U. lomvia*	579.450	1983-85	Gardarsson 1995b
Black Guillemot *Cepphus grylle*	10-15.000	1998	Petersen in prep.

17th century. Eiderdown became such a sought-after product that Eiders and their colonies became protected much earlier than any other bird species in Iceland. The first protective measures for Eider date back to 1787[26]. Full protection was offered with a decree of 1847[21], while commercial sale in Eider eggs and the use of bycatch was forbidden in 1890[27]. Presently, Eiders are fully protected and no hunting allowed. Landowners can take eggs but this practice is minimal and dwindling. Landowners can have their colonies declared protected from human disturbance, and Eider predators generally have a low protective status in the current Icelandic bird protection act[7]. At present Eiderdown is

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995	Asbirk *et al.* 1997
994	Gardarsson 1995a
995	Gardarsson 1979; Petersen 1998a
994	Gardarsson 1996a
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995	Asbirk *et al.* 1997
995	Asbirk *et al.* 1997
984-85	Lund-Hansen & Lange 1991
1995	Asbirk *et al.* 1997
1995	Asbirk *et al.* 1997
1995	Asbirk *et al.* 1997
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1998	A. Petersen unpubl.
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collected at about 400 colonies around Iceland[10], and ca. 3000 kilos of cleaned down is exported annually, making Eiders economically the most important seabird species in Iceland.

Currently, besides the Eider, seabirds are still much utilized (cf. Table 2). Around 11 thousand hunting licences are issued annually, or to about 4% of the Icelandic human population. The law requires all licence holders to report their catch, creating important hunting statistics to help ensuring sustainable harvest[8]. The seabird cliffs are principally used by teams of individuals, mainly those brought up with seabird fowling, or by voluntary rescue teams, using cliff-climbing as part of its training but partly as a source of income in selling eggs (principally of the larger auks and Kittiwake). All the larger bird cliffs are visited each year, while the main seabird fowling regions are those of the Westmann Islands (off S-Iceland), Breiðafjörður islands (in the west), the Northwest peninsula (principal town Ísafjörður), and Skagafjörður, Grímsey island and the Langanes peninsula (in the north-northeast).

Ownership and fowling rights

Ownership of land with fowling rights is of different kinds in Iceland; principally by individuals, churches, local authorities and the state presently, in earlier times to much greater extent by churches and closters. The resident sites of these early ecclesiastical authorities could be a long way away from the fowling locations, indicating the importance of seafowl resources in the sustenance of the early Icelanders. Although the ownership and fowling rights of seabird cliffs were usually undisputed, some cliffs had commons, where poor people or people who owned no land could fowl without charge.

Utilizing bird cliffs called for cooperation, which in manpower normally extended outside the realms of one farm. Therefore certain rules developed in how the catch should be divided. The exact details may have differed slightly between localities, but the principal parts were that of the landowner, owner of the descending rope, the climber, and the assistants, according to certain formulae.

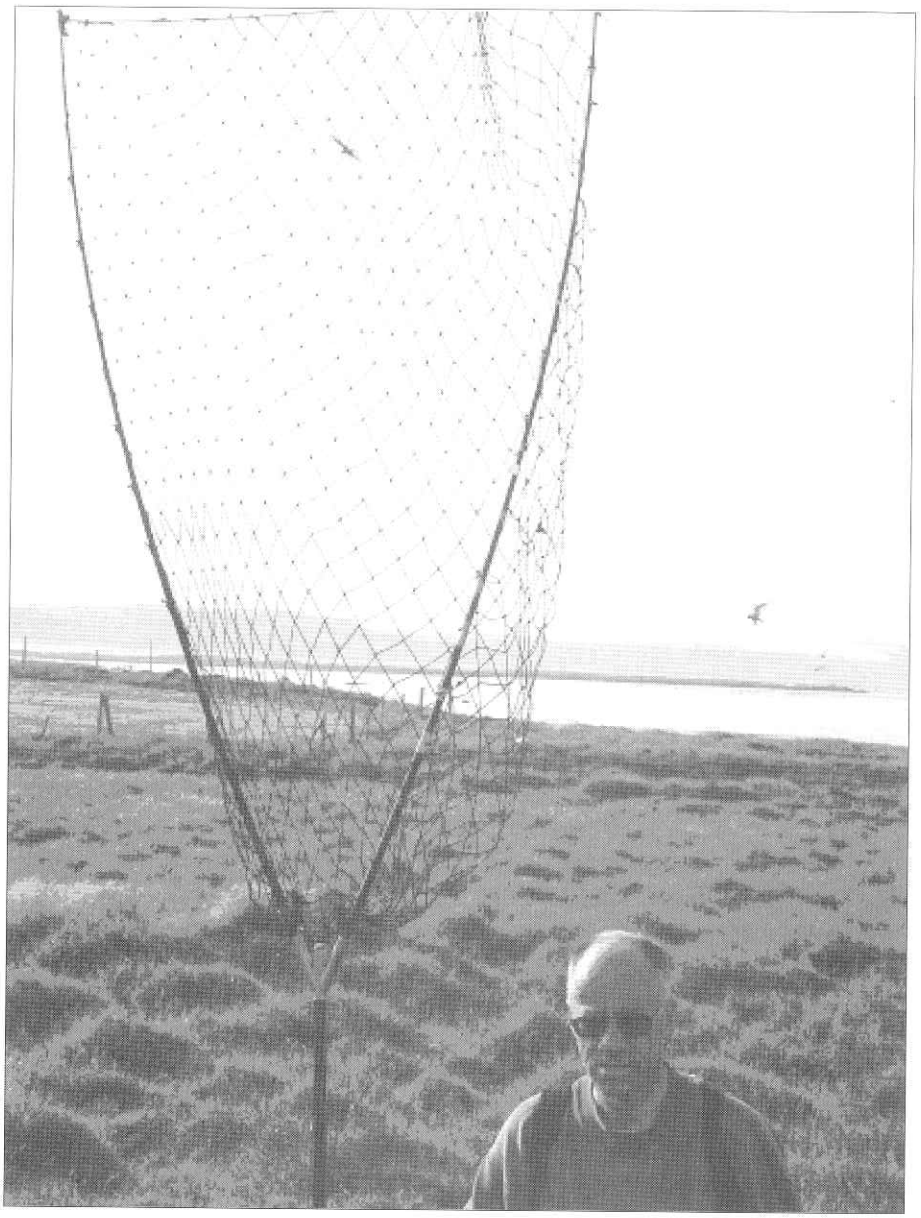

Fig. 4. A typical pole net for catching Puffins. Photo: A. Petersen, Flatey in Breiðafjörður, 24.7.2003.

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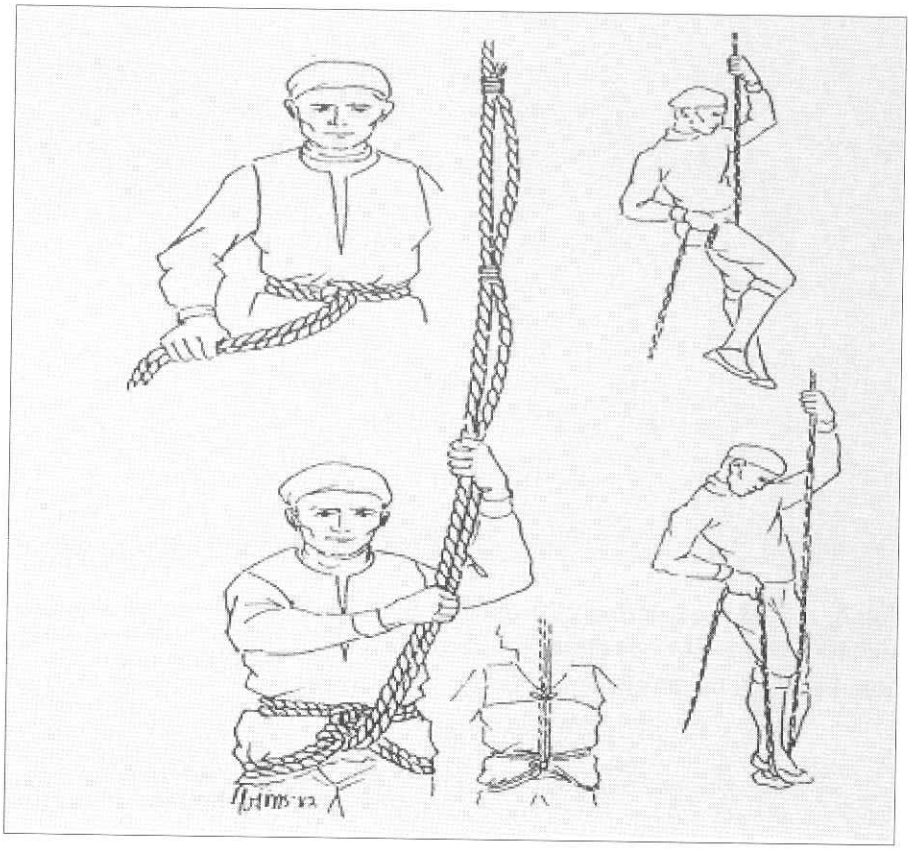


Fig. 5. A traditional seabird fowling technique, a rope used for descending the bird cliffs. Four different ways to use the rope are shown, two where the rope is attached to the climber and two during which the climber is loose. From[6].

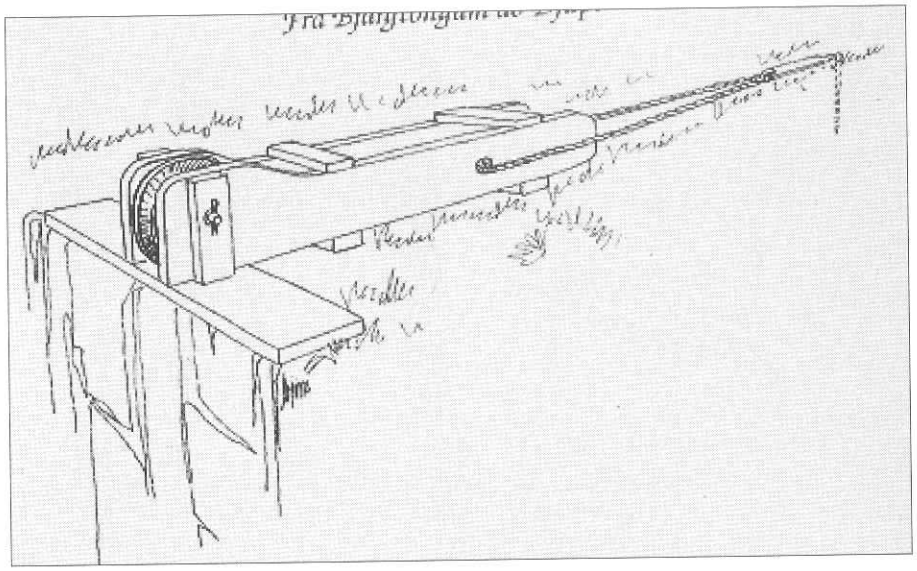
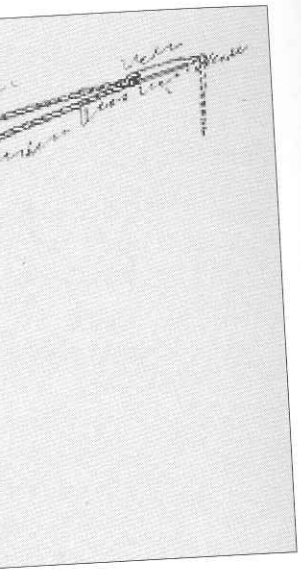


Fig. 6. A tool used during cliff descent for seabird fowling. The wheel protects the rope from being cut by the cliff edge. From[6].

Some seabird concerns

Seabird fowling inevitably puts a certain strain on seabird populations, in addition to those imposed by the natural environment itself. The major challenge must be to make sure the harvest is sustainable, hence not endangering the populations in question in the long run. There can be both direct influence of the take (eggs are taken and birds are killed) and indirect (disturbance, changes in the structure of the seabird communities through removing birds both the quarry species and any potential predator or



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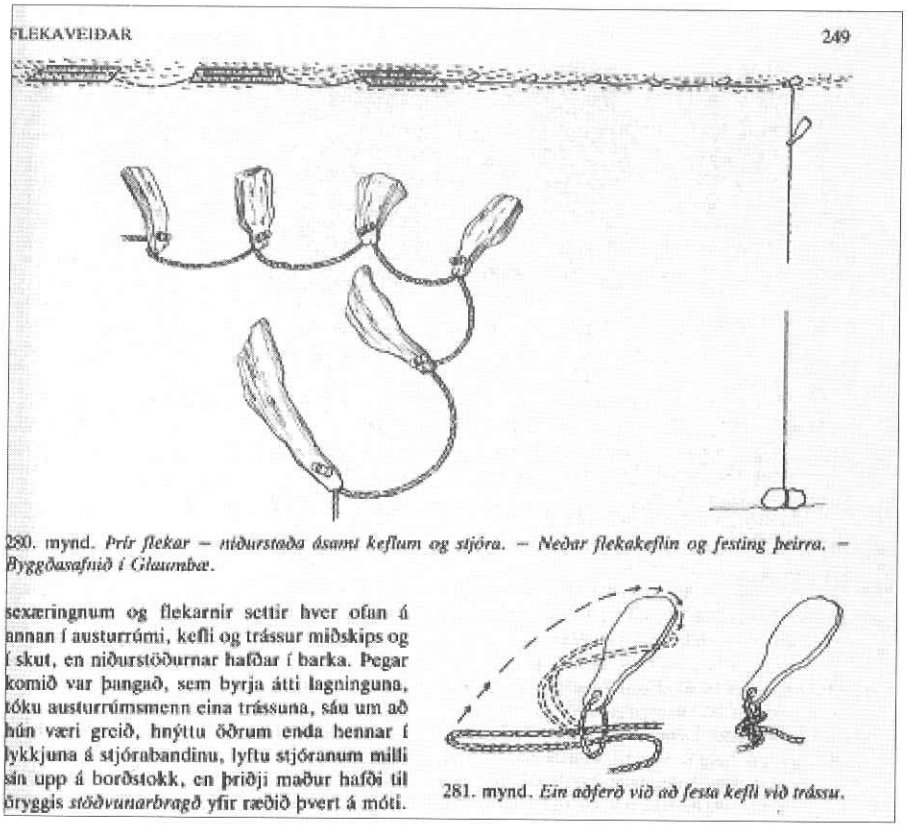

Fig. 7. Seabird fowling technique using floating boards with snares. Here three boards are tied together, with wooden floats and a stone anchor. From[6].

competitor, introduction of alien species, by catch, competition by fisheries, etc.). Indirect effects of the seabird hunt are more difficult to handle and generally less clear.

It is a common misconception that traditional fowling has always been carried out in a sustainable manner. There is no doubt that a certain amount of trial and error took place in early times when harvesting was a relatively recent practice, but also by newcomers to fowling. A certain irresistible hunting urge is often felt by fowlers, with the danger of being overzealous. Clear

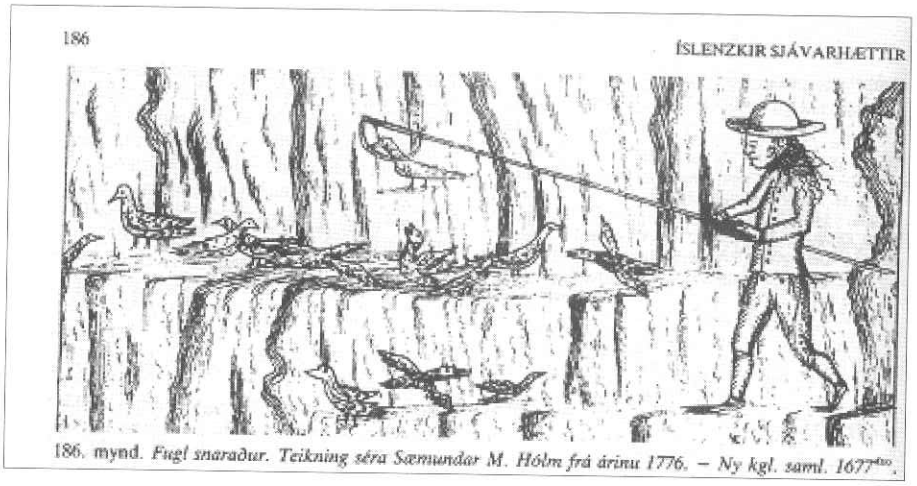

Fig. 8. Seabird fowling on a bird cliff, a drawing from 1776. The technique involves a long pole and a snare on the end (see also Fig. 10). From[6].

ownership of the resources has provided certain constraints on the harvesters, since the long-term, sustainable view becomes more important than temporary gain. There is also no doubt that geographical accessibility has provided considerable protection to the birds against too much take, such as those breeding on cliffs or remote skerries. The access to seabird colonies has however changed over time. So have the available techniques to some but variable extent, as well as the means of getting to and from the colonies. The remote stack of Eldey off SW-Iceland, was visited in late 1800s to early 1900s for harvesting Gannet young but weather and primitive vessels prevented or interrupted the harvest in some years. An animal welfare issue on the last harvest visit to the island in 1939 resulted in full protection of this largest of Gannet colonies in Iceland, in 1940[28].

There are examples of malpractice during harvesting. Cases of uncontrolled harvesting include among others some Arctic Tern colonies, which are located on communal land, where no one in particular is in charge of the magnitude of the harvest,

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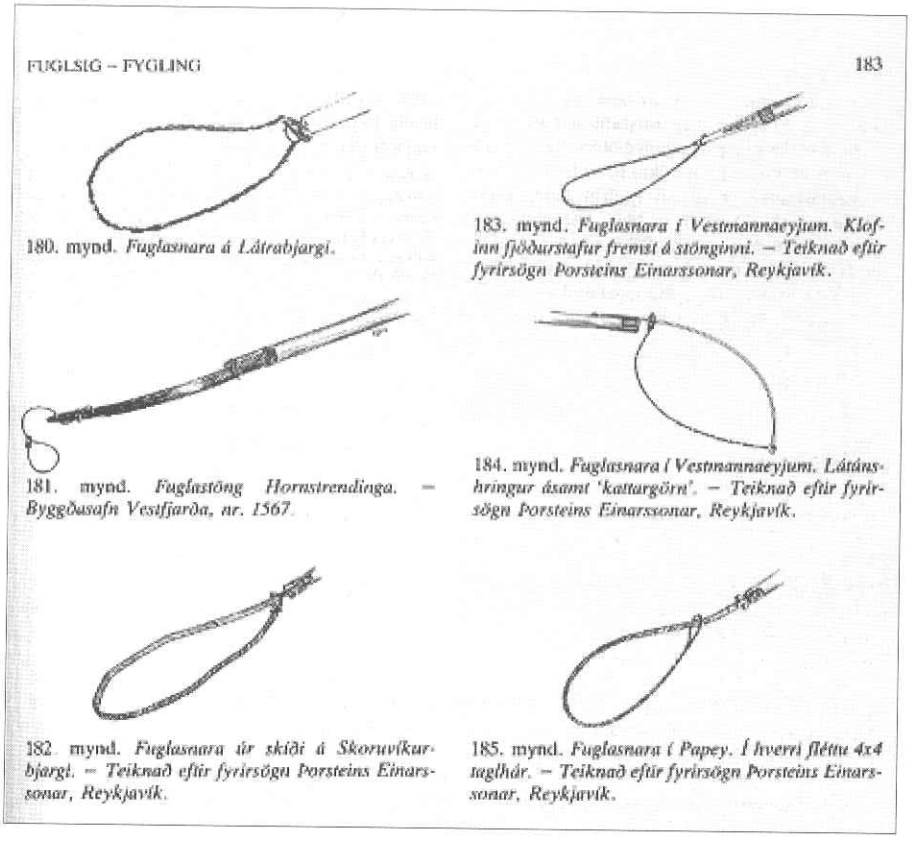


180. mynd. *Fuglasnara á Látrabjargi.*

183. mynd. *Fuglasnara í Vestmannaeyjum. Klofinn fjöðurstafur fremst á stönginni. – Teiknað eftir fyrirsögn Þorsteins Einarssonar, Reykjavík.*

181. mynd. *Fuglastöng Hornstrendinga. – Byggðasafn Vestfjarða, nr. 1567.*

184. mynd. *Fuglasnara í Vestmannaeyjum. Látúnshringur ásamt 'kattargörn'. – Teiknað eftir fyrirsögn Þorsteins Einarssonar, Reykjavík.*

182. mynd. *Fuglasnara úr skíði á Skoruvíkurbjargi. – Teiknað eftir fyrirsögn Þorsteins Einarssonar, Reykjavík.*

185. mynd. *Fuglasnara í Papey. Í hverri fléttu 4x4 taglhár. – Teiknað eftir fyrirsögn Þorsteins Einarssonar, Reykjavík.*

Fig. 9. Snares of different types used on the end of a long pole. The materials were of as variable material as cat´s intestine, whale baleen, and horse hair. From[6]

rather eggs are collected by whoever is interested and disregarding what has been taken by earlier harvesters. Puffin colonies have been decimated by the use of nets spread over the burrows, and there are indications of over-harvesting of Puffin colonies where these have been temporarily leased. The effect from the use of nets spread over the Puffin colonies in the Westmann Islands in the 18th century was mentioned earlier, with a subsequent change

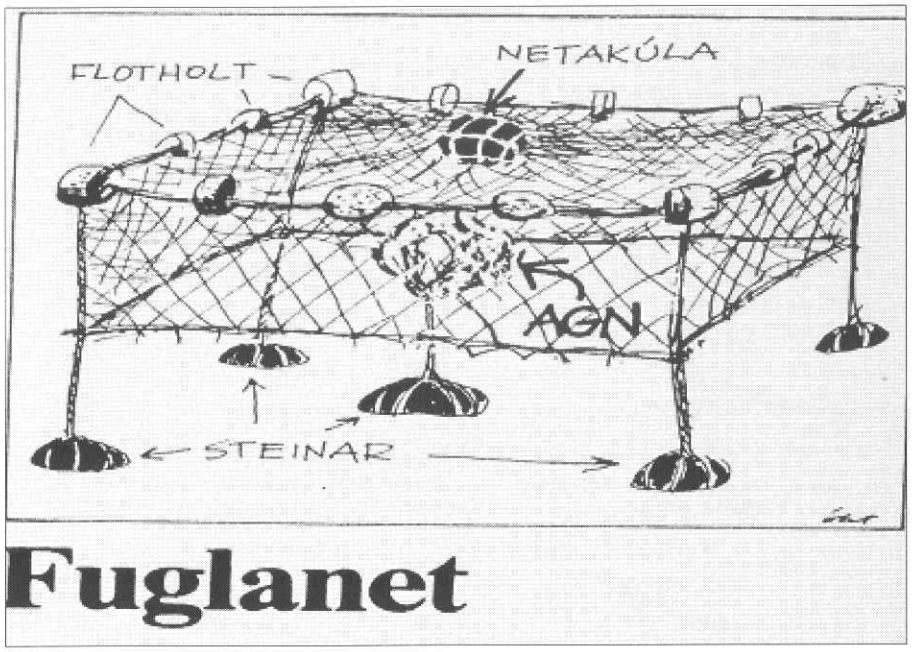
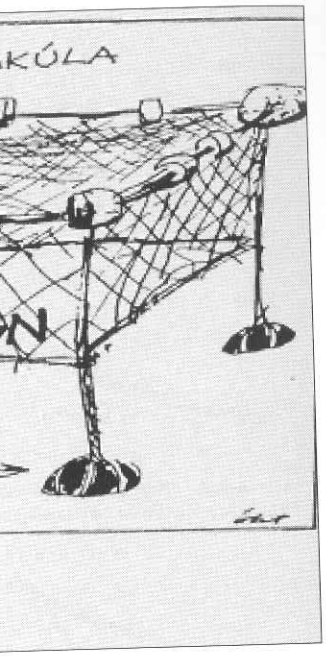


Fig. 10. A baited floating bird net, principally used for catching diving Eiders. From[6].

in fowling practice. The practice of using floating boards with snares to capture auks at sea was principally laid off because of the welfare issue. Sometimes weather prevented the fowlers to visit the boards to collect the catch, resulting in live birds floating around for days entangled by the legs.

Although cases of malpractice can be cited, the fowlers also had certain codes of conduct or rules, in order to minimize over-exploitation. For instance, Puffin-hunters do not kill birds carrying food in their beak, as these are chick-caring adults. The tradition developed of not removing all the eggs from Eider nests, and this is now reflected in the present bird protection and hunting act. Hunters for Cormorant, Shag and Gannet young do not take the small chicks, allowing some young of the raided colonies to survive. Some parts of bird cliffs are never worked, primarily for



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the sheer danger of the rope being cut by cliff edges or from rock fall, but also in order to allow undisturbed breeding. Although auk eggs are taken more than once on the same ledges in same season, the birds re-lay and are thereafter allowed to proceed with incubation and raising of young.

Disturbance at colonies inevitably leads to some waste, such as eggs falling off cliff edges, broken by the fowlers, greater exposure of eggs or young to predators, delay in breeding, etc. More conscious impact actions by fowlers include the removal of potential predators, such as gulls, Ravens, Arctic Fox, Mink and others, for the benefit of the targeted resource. There are very clear examples of this regarding the eiderdown harvest, where Eider predators, such as foxes, Mink, gulls, and Arctic Skua, are actively removed[29]. There is little doubt that the distribution of breeding Eiders would be considerably different nowadays, if it was not for the protection offered by man[12]. At some seabird colonies where Puffins (by pole-netting) or the larger auks (for their eggs) are the principal sought-after resources, eggs from expanding colonies of Fulmars and Gannets are systematically removed to prevent permanent colonization. A clause existed in previous bird laws allowing breeding Puffins encroaching on Eider breeding territory, to be eradicated, but this is now illegal. Colonies of species, which are looked upon as vermin such as the gulls, have been raided in Iceland for a long time, whereby eggs and young are destroyed and fullgrown birds killed. In the early decades of the 19th century, fur-farming became very popular. On some seabird islands in the Breiðafjörður (W-Iceland) region foxes were released onto seabird islands, with devastating results for these seabird colonies[30]. Seabirds such as Gannets were also harvested to provide food for fur-farms[28].

The effects of fowling on seabirds in Iceland have not been studied at all. Any use of natural resources places the demand on the fowlers and authorities to make sure the harvest or hunting is done in a sustainable manner[8]. Studies need to be carried out to make sure the Icelandic harvest can stand up to scrutiny.

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TRADITIONS OF SEA-BIRD FOWLING IN THE NORTH ATLANTIC REGION

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