



Management of deer in Norway's cultural landscape

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The Norwegian Institute for Nature Research

The Norwegian Institute for Nature Research (NINA) is an independent, not-for-profit institute working in the areas of fish and game management, monitoring, biodiversity, ecosystems services, sustainability, and community development of natural resource management.

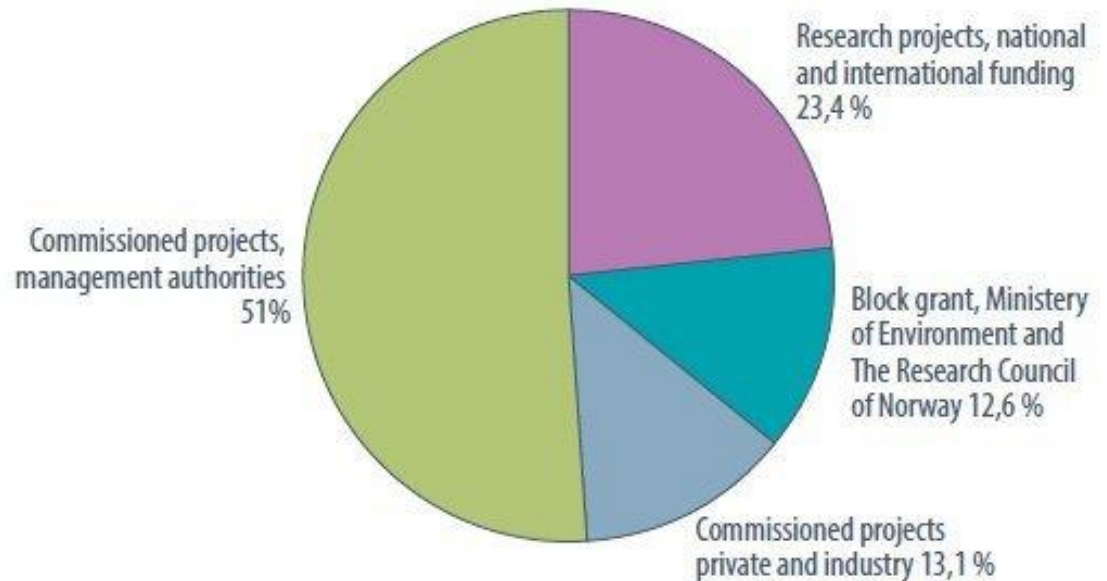
NINA's key statistics for 2014

Number of publications	2014
Scientific papers	201
NINA reports	124
External lectures and presentations	600
Media coverage	2548
News stories published at nina.no	79
Unique visitors to nina.no website	90902

Number of employees (full-time equivalents)	2014
Total	216,5
- scientific staff	143,7

www.nina.no

NINA's turnover 2014



Total turnover: 36,7 mill. EUR



Nyhets Viltren 10. november 2015

Ønsker velkommen til boklansering

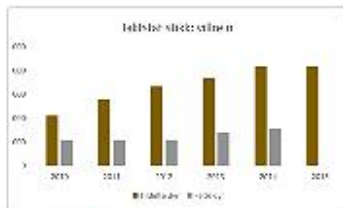
I 50 000 år har mennesker og villrein levd i tett relasjon med hverandre. Nå har vi for første gang anledning til å ta en titt inn i villreins personlige fotoalbum. [Les saken...](#)



Nyhets Viltren 09. november 2015

Hvilke etapper hadde en hjort vunnet i triathlon?

I forrige uke gikk Naturdats villkonferanse av stabelen. Der fikk tilhørerne nyte et variert program som tok for seg både utvidet jakttid på elg og hjortens ferdigheter i triathlon. [Les saken...](#)



Nyhets Viltren 27. oktober 2015

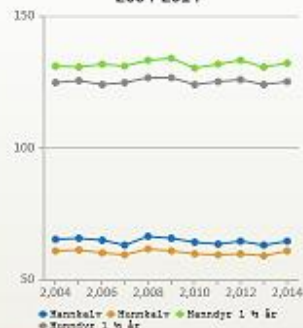
Dobling i fellingstillatelser på villrein på fem år

I 2015 ble det totalt tildelt en kvote 20 912 villrein fordelt på de 23 villreinområdene. Det er en dobling fra 2010, da tildelingen var på 10 521 dyr. [Les saken...](#)



Gå til HJORTEVILTREGISTERET

Slaktevektutvikling for elg i Norge 2004-2014



Vis større diagram

Slaktevektene for elgen på landsbasis har hatt en nedadgående trend fra starten av perioden (2004) og frem til 2013. Imidlertid så ser vi at i enkelte fylker og på landsbasis er det en oppgang i vektene fra 2013 til 2014. For å se tallene for din kommune, besøk [Hjorteviltregisteret.no](#)

Kontakt oss

Har du tips til saker du vil at vi skal skrive om på Hjorteviltportalen?

Send en e-post til post@hjortevilt.no

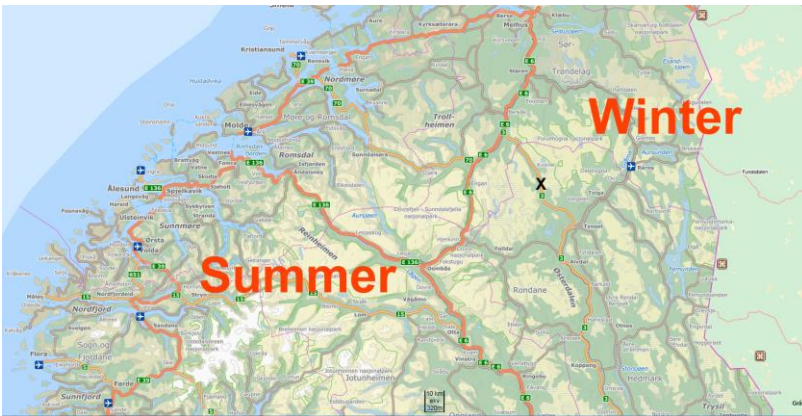
Årshjul

Frister og perioder i jaktåret for hver enkelt art:

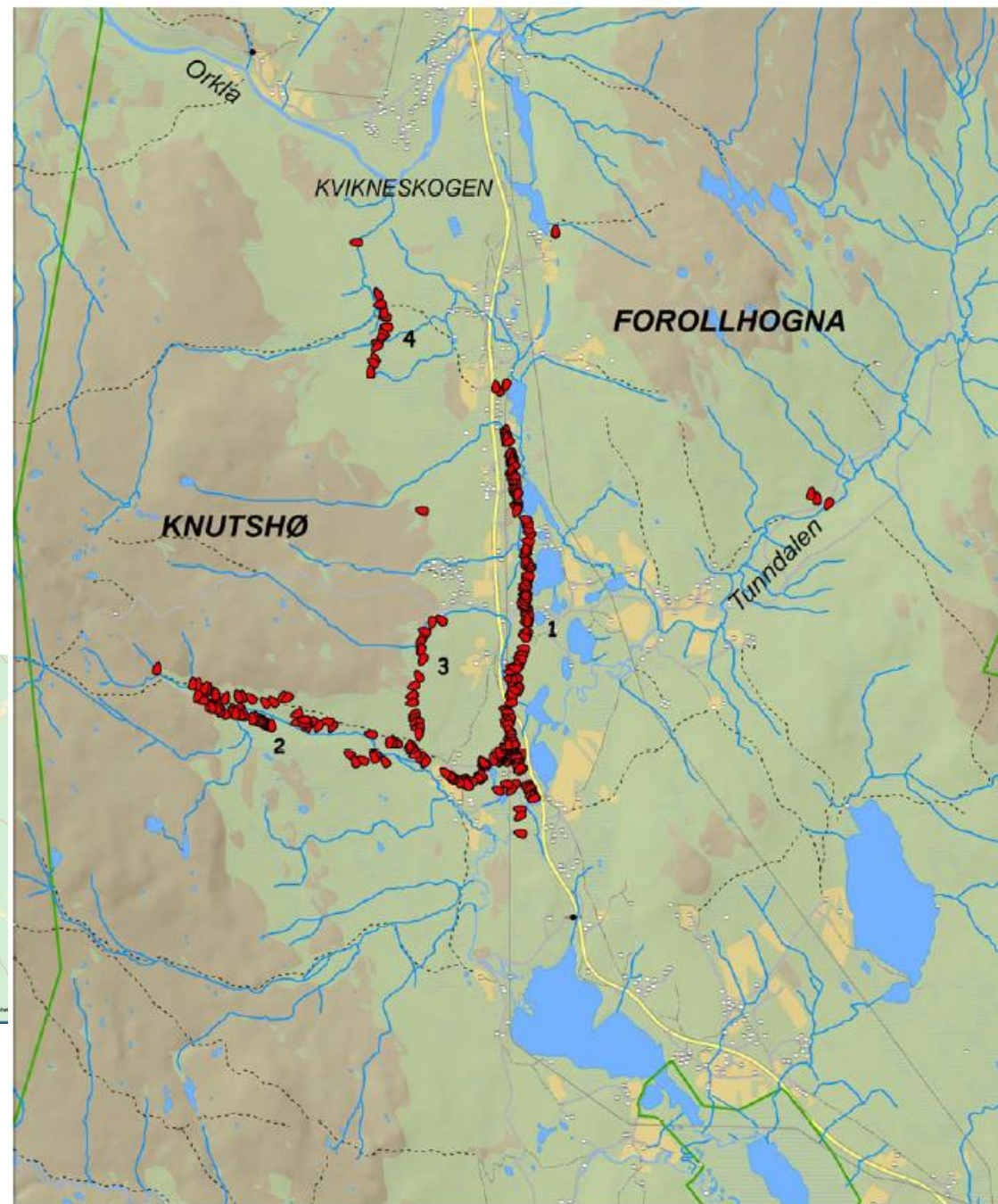




Remains of pit trap lines for reindeer, moose, and red deer are widespread in Norway



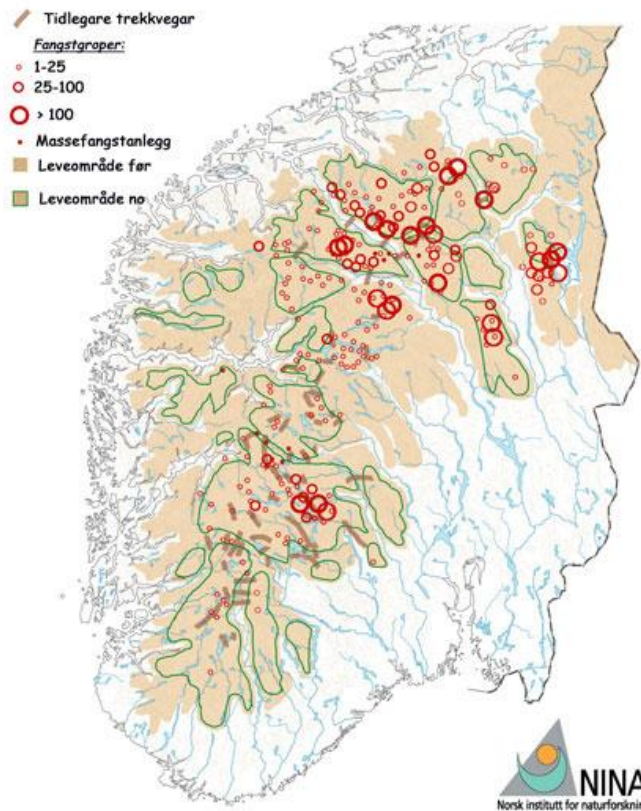
X = Location of Kvikneskogen reindeer pit-trap lines - a natural migration bottleneck between summer and winter pastures.





A deer trapping pit on Deeside?
Photo: David Hetherington

Hovudkonsentrasjonar av kjente fangstgroper for rein i Sør-Noreg



Circles: Main concentrations of known pit-trap lines for reindeer in southern Norway.

Dots: Known mass trapping constructions.



A mass trapping construction. Dots are rows of post holes revealed by archaeological investigation. A modern road and power line are indicated.

Sami semi-domestic reindeer pastoralism in N. Norway









History of cervids in Norway

- Before Bronze Age (5000 years ago): Moose, red deer, roe deer common in woodlands throughout country, though apparently no red deer N of Arctic Circle. Reindeer above conifer treeline throughout.
- Moose disappear from coastal west Norway about this time, probably because extensive woodland removed due to agriculture and grazing.
- By 1274 considered necessary to – attempt – to regulate hunting (Law of Magnus Lagabøter). Trapping installations regulated, hunting moose on skis forbidden.
- Kristian IV's law of 1604 introduces regulation for red deer and moose; however all landowners have right to take two deer a year. By this period, Norway is a country of many 'odaller' (freehold family farmstead) landowners. Each odaller was required by law to own a musket, powder, and ammunition.
- 1730s-40s: strong resistance to attempts by Dano-Norwegian crown to regulate hunting (including 3 year ban on all moose hunting); attempts abandoned in 1744.
- At the beginning of the 19th century population increase was rapid. The great majority lived on the land and access to weapons and traps was general. Resistance to any regulation was strong. Populations of all cervids except reindeer were very low; and reindeer (which live in remoter areas) strongly depressed.
- «Everyone has considered himself entitled to kill and trap game at any time, and in whatever way he most desired or was capable of, or in other words, he has been a complete beast of plunder» (Halvor Rasch to the Norwegian Parliament, 1845).



c.1900:

Red deer 'low hundreds' total, in c.6 small isolated groups along the west coast.

Moose: c. 5000 in eastern Norway only.

Roe deer: extinct.

Wild reindeer: confined to southern Norway, in danger of extinction. Populations increasingly fragmented by road, railways, and other infrastructure.



20th century

- 1899: Hunting law passed by Norwegian Parliament introducing landowner ownership of hunting rights and setting (very short) close seasons. Controversial and ineffective; deer populations remain low.
- 1946: Hunting associations invited to recommend a new hunting system, in atmosphere of postwar consensus.
- 1951: Hunting Law passed, establishing modern monitoring and quota-based, licence-funded hunting system, with rights to the quota owned by landowners.
- 1981: Wildlife Law passed, replacing the Hunting Law and integrating hunting and nature protection law.
- Protection is general unless specific provision is made for harvesting, and hunting is regulated within this framework.
- Management of animals, including game, which causes unnecessary suffering is prohibited. Hunting must be conducted so as to pose no risk to humans, livestock, or property.

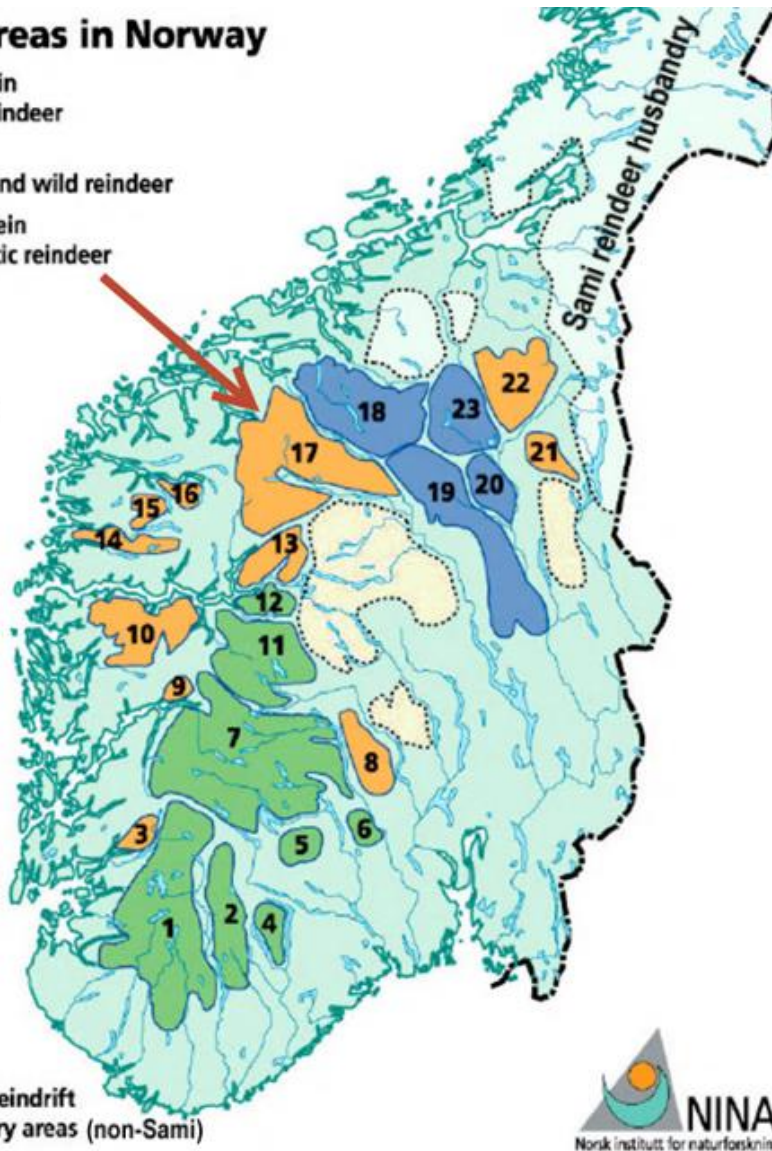
Wild reindeer areas in Norway

- Opprinnelig villrein
Originally wild reindeer
- Tam- og villrein
Mixed domestic and wild reindeer
- Opprinnelig tamrein
Originally domestic reindeer

Villreinområder Wild reindeer areas

- 1 Setesdal - Ryfylkeheiene
- 2 Setesdal Austhei
- 3 Skaulen - Etnesfjell
- 4 Våmur - Roan
- 5 Brattefjell - Vindeggen
- 6 Blefjell
- 7 Hardangervidda
- 8 Norefjell - Reinsjøfjell
- 9 Oksenhalvøya
- 10 Fjellheimen
- 11 Nordfjella
- 12 Lærdal - Årdal
- 13 Vest - Jotunheimen
- 14 Sunnfjord
- 15 Førdefjella
- 16 Svartebotnen
- 17 Ottadalsområdet
- 18 Snøhetta
- 19 Rondane
- 20 Sølnekletten
- 21 Tolga Østfjell
- 22 Forollhogna
- 23 Knutshø

- Område med tamreindrift
Reindeer husbandry areas (non-Sami)



Wild reindeer extinct in N. Norway since 19th century.

20th century attempts to establish reindeer herding in non-Sami areas of S. Norway largely abandoned by 1970s; most stocks returned to a wild state, or mixed with always-wild populations.



Figur 2. Rødyret spredde seg fra Övedkloster farm i Sør-Sverige i 1850. Linjene viser rødyrets spredningsfront i ulike tiår⁴⁷.

The modern Scandinavian population spread naturally from a small group surviving at the southern tip of Sweden in the mid 19th century.
Source: Bjørneraas et al 2012

Distribution of roe deer in Norway in 2016



Distribution of moose in Norway in 2013



1900:
c. 5000, in
eastern
Norway only

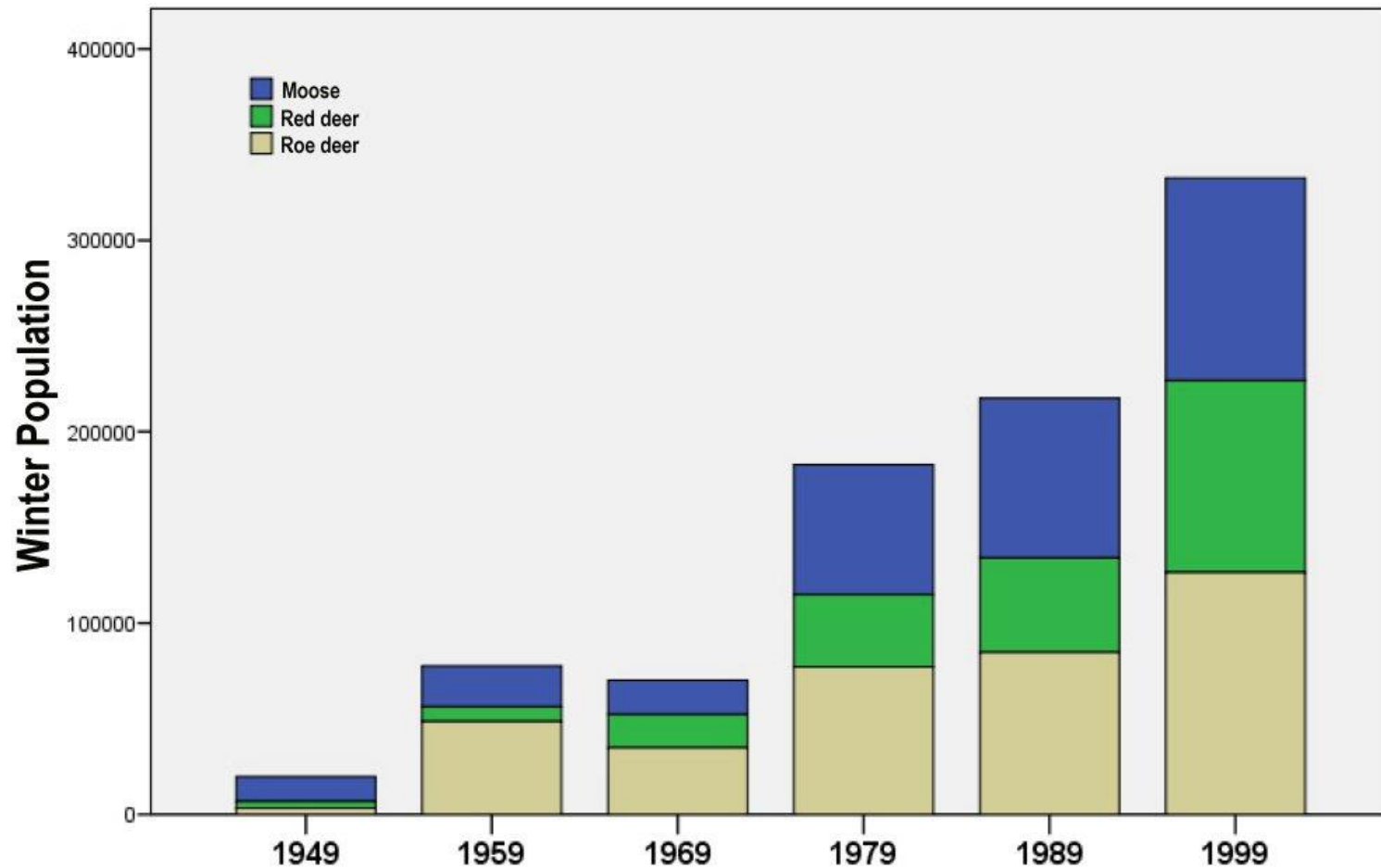
Distribution of red deer in Norway c. 1900



Distribution of red deer in Norway in 2013

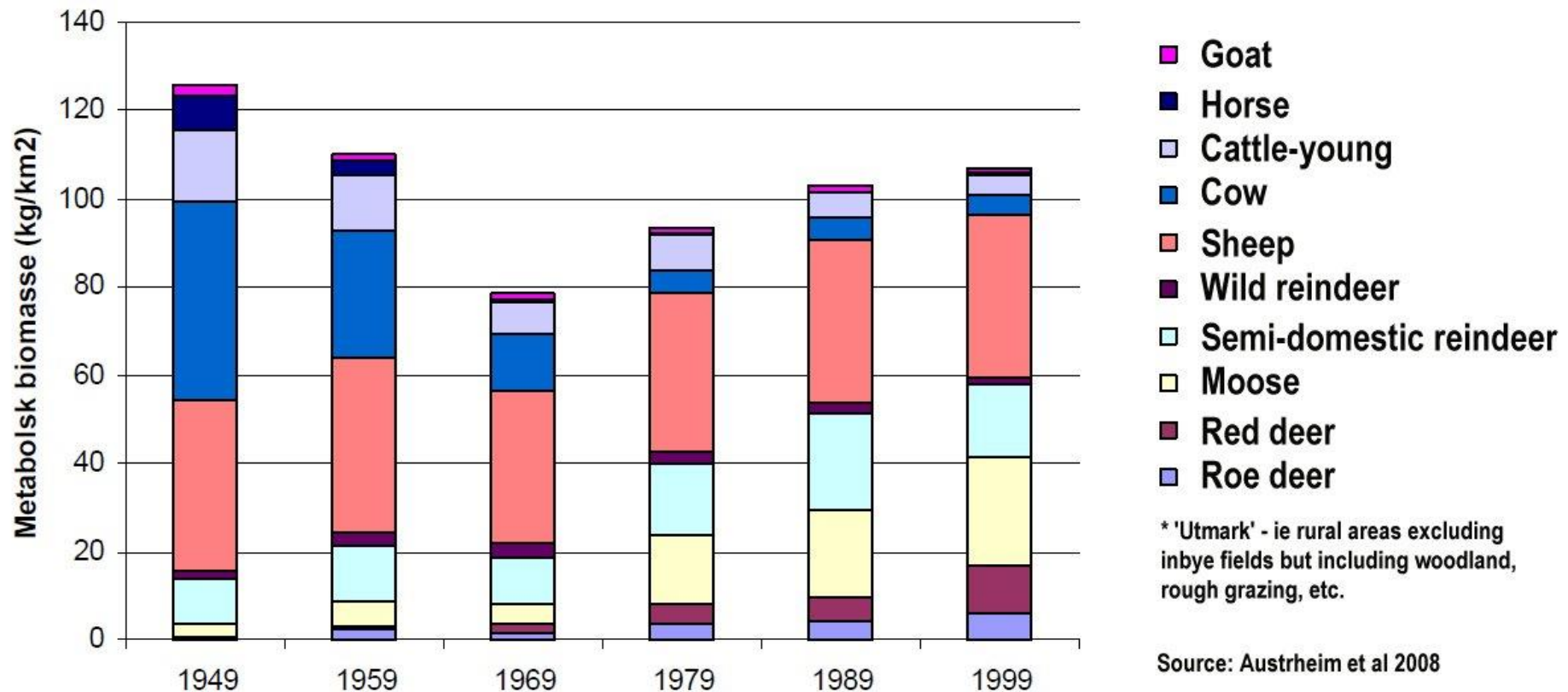


Estimated Winter Population of Moose, Red Deer, and Roe Deer in Norway



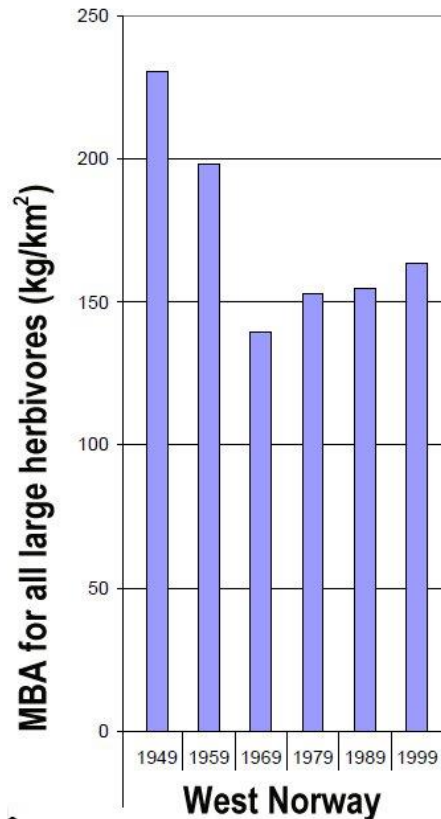
Source: Austrheim et al 2008

Grazing/browsing pressure, all large herbivores in Norway, 1949-1999. Metabolic biomass per square kilometre (kg/km²)*



Source: Austrheim et al 2008

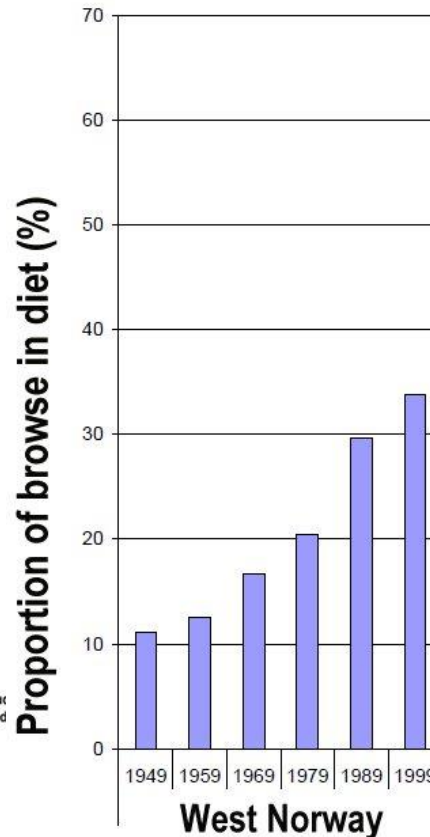
**Metabolic biomass per sq km
all large herbivores.*
West Norway 1949-1999**



Source: Austrheim et al 2008

* 'Utmark' - ie rural areas excluding fields but including woodland, rough grazing, etc.

**Proportion of browse in diet
all large herbivores,
West Norway, 1949-1999**



Source: Austrheim et al 2008

- 1949 levels sufficient to inhibit woodland regeneration
- 1969 levels allowed woodland to regenerate from an unwooded state
- Later increases in metabolic biomass of herbivores were not sufficient to inhibit woodland regeneration over time
- Even though proportion of browse in overall herbivore diet increased
- This appears to have been due to increased levels of regeneration (ie, more seedlings), plus soil development (ground more fertile)
- NB minimum pressures 1969, but rate of woodland spread apparently peaking now
- Probably related to availability of seed source, plus soil development effects. However, research would be useful.

Hunting in modern Norway

Hunting and Trapping of Game Act 1981 (as amended 2009)

§ 1. (purpose of the Act)

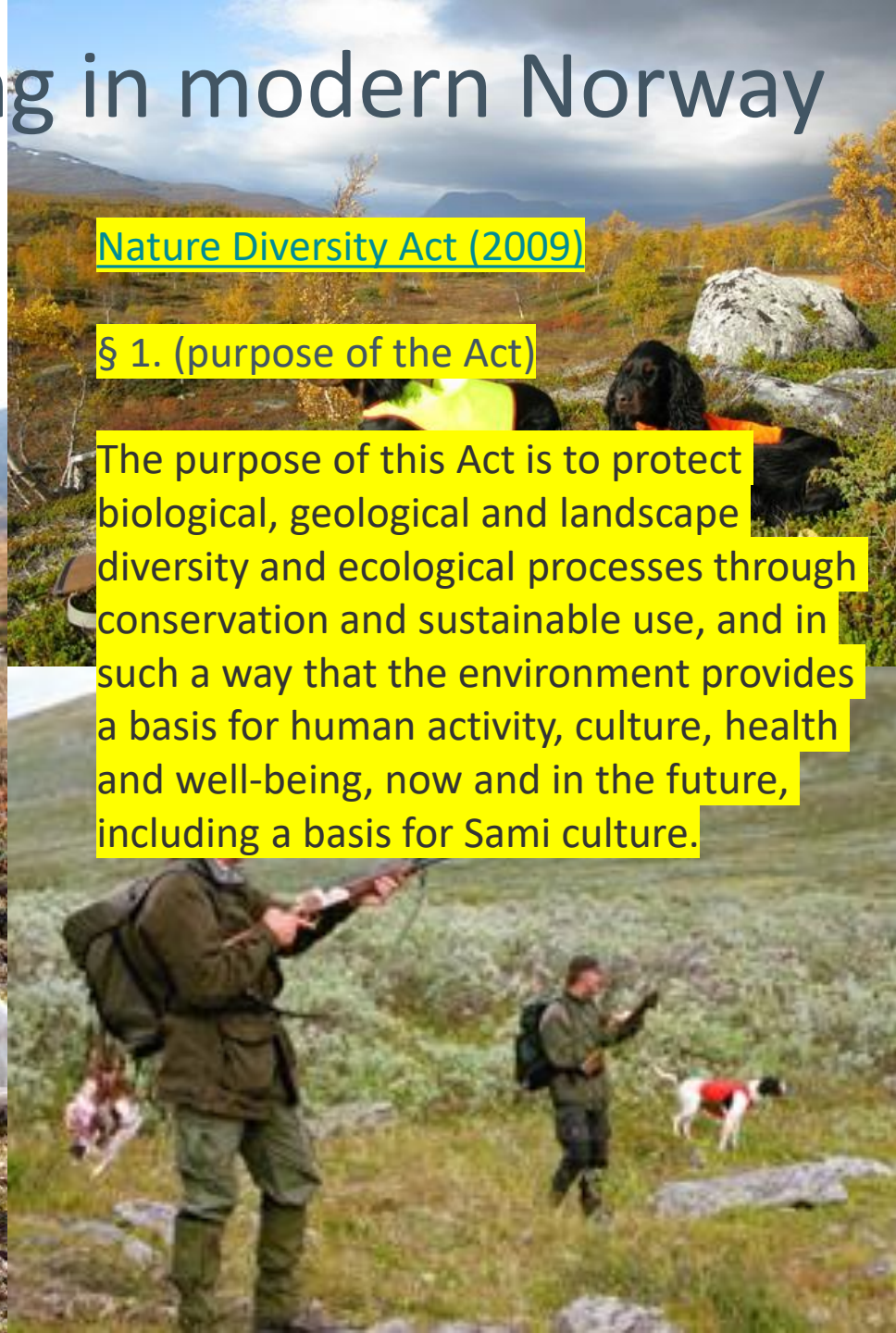
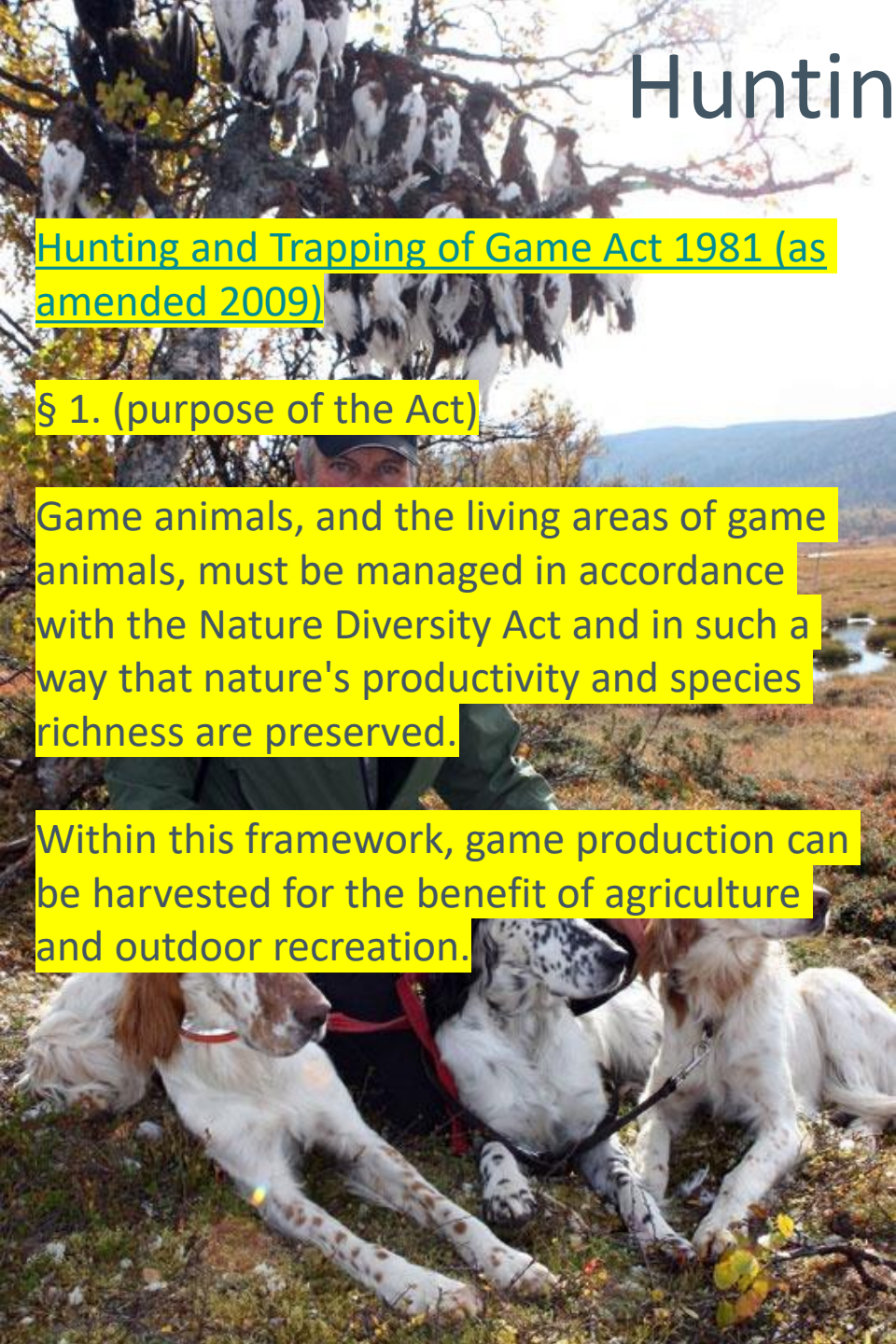
Game animals, and the living areas of game animals, must be managed in accordance with the Nature Diversity Act and in such a way that nature's productivity and species richness are preserved.

Within this framework, game production can be harvested for the benefit of agriculture and outdoor recreation.

Nature Diversity Act (2009)

§ 1. (purpose of the Act)

The purpose of this Act is to protect biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now and in the future, including a basis for Sami culture.



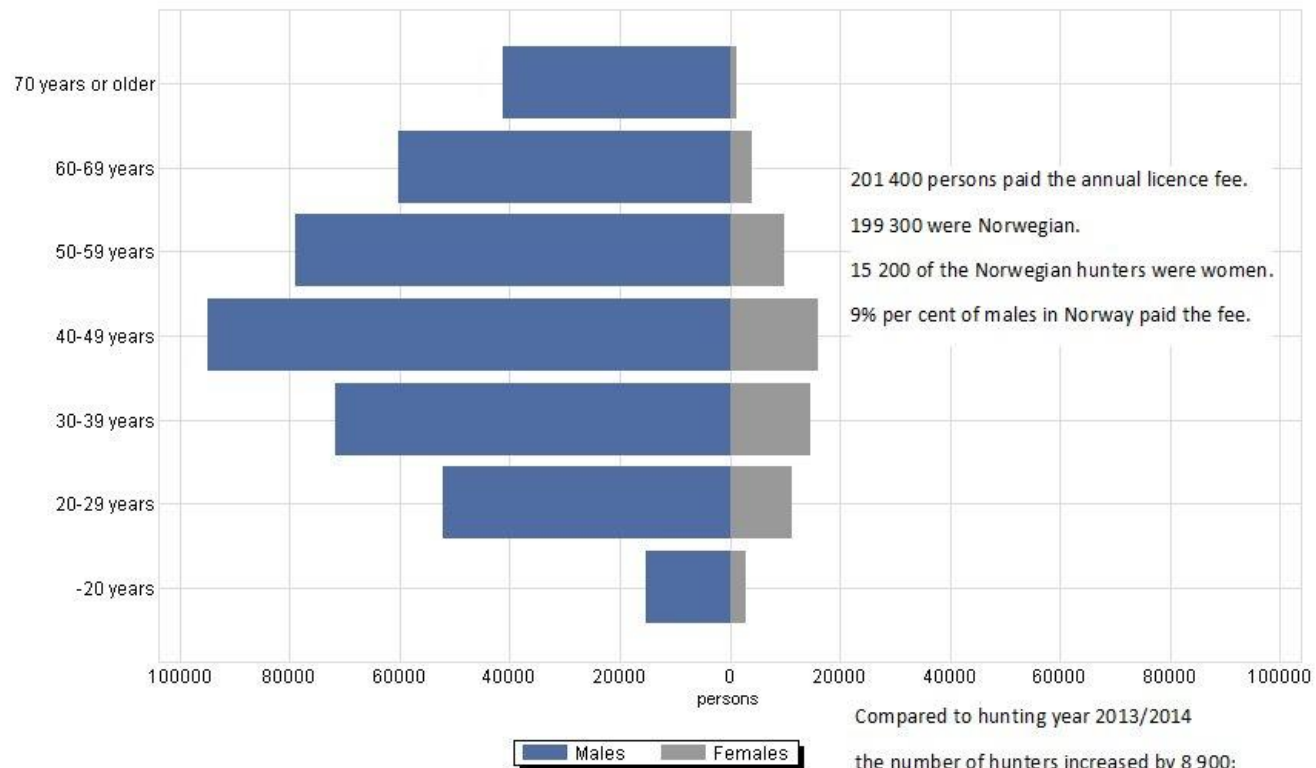
Social and economic background



Norway – a hunting culture

Hunters by age and sex, Norway, 2014-15

(number of persons paying the annual hunting licence fee to government)





- Voluntary hunting and angling associations are established at national, regional, and local level
- They have about 120 000 members
- They do much of the training work
- They participate in framing hunting regulations with the authorities
- They are a significant political lobby group

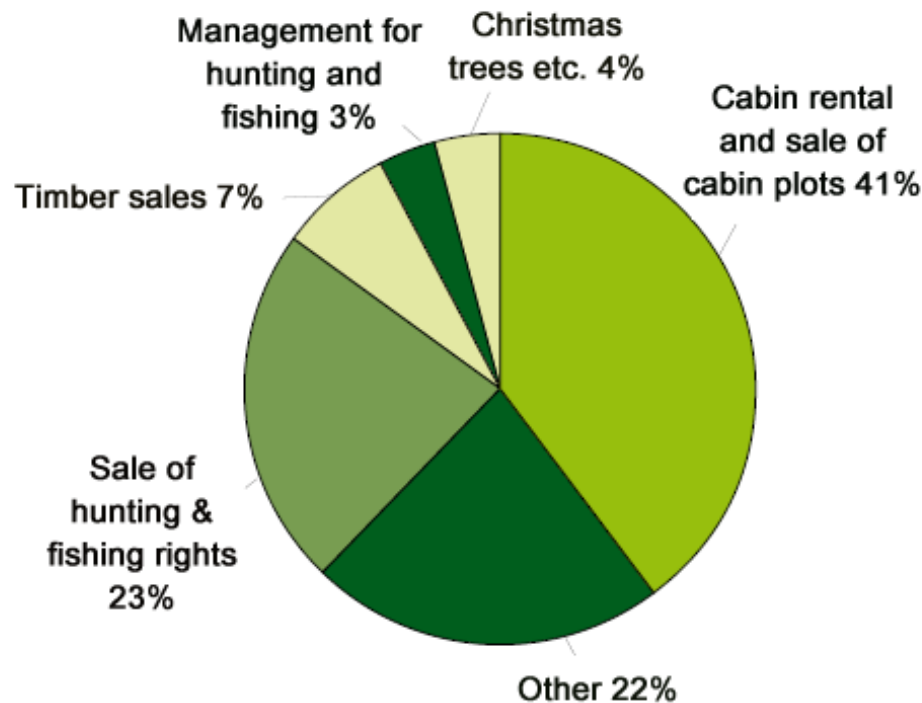


Hunting has an important social role in Norway



Hunting is a significant source of income for forest landowners

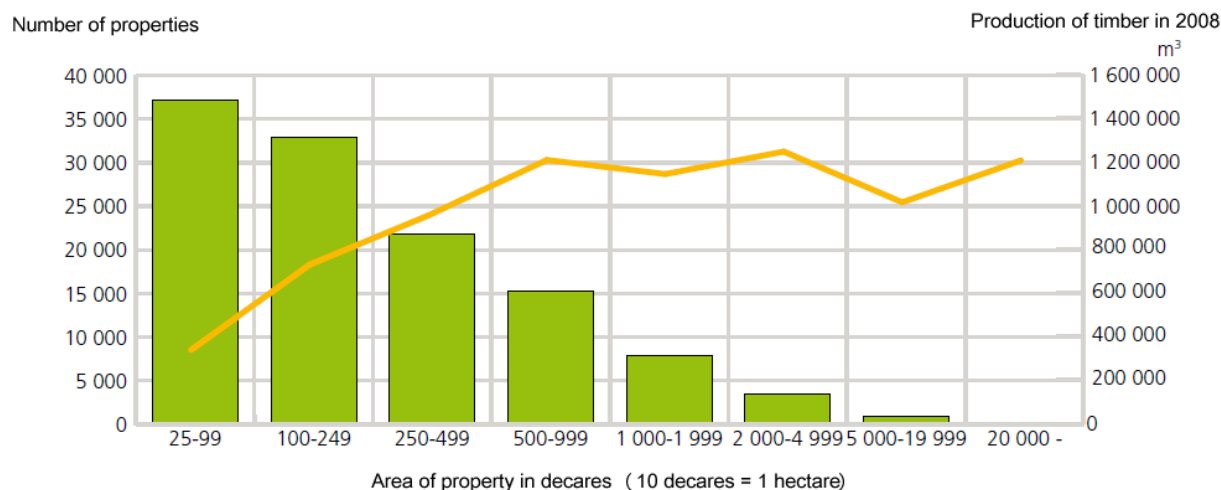
% gross income sources from forest in 2007



Properties with at least 2.5ha productive forest
Source: Statistisk sentralbyrå

Forest landownership and so income from deer hunting is widespread

- 119600 woodland proprietors in 2008 (Total population: 4.9 million)
- Average property 58 hectares 'productive woodland'*
- 97% of owners private individuals
- 80% of area owned by private individuals
- 20% of area owned by forestry companies, state, etc.

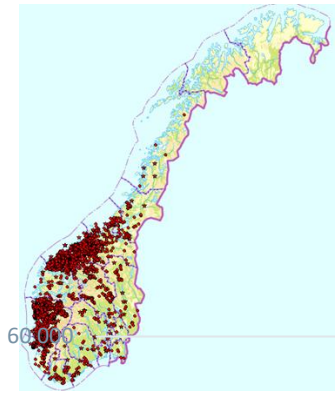


Kjelde: Strukturstatistikk for skogbruket, Statistisk sentralbyrå.

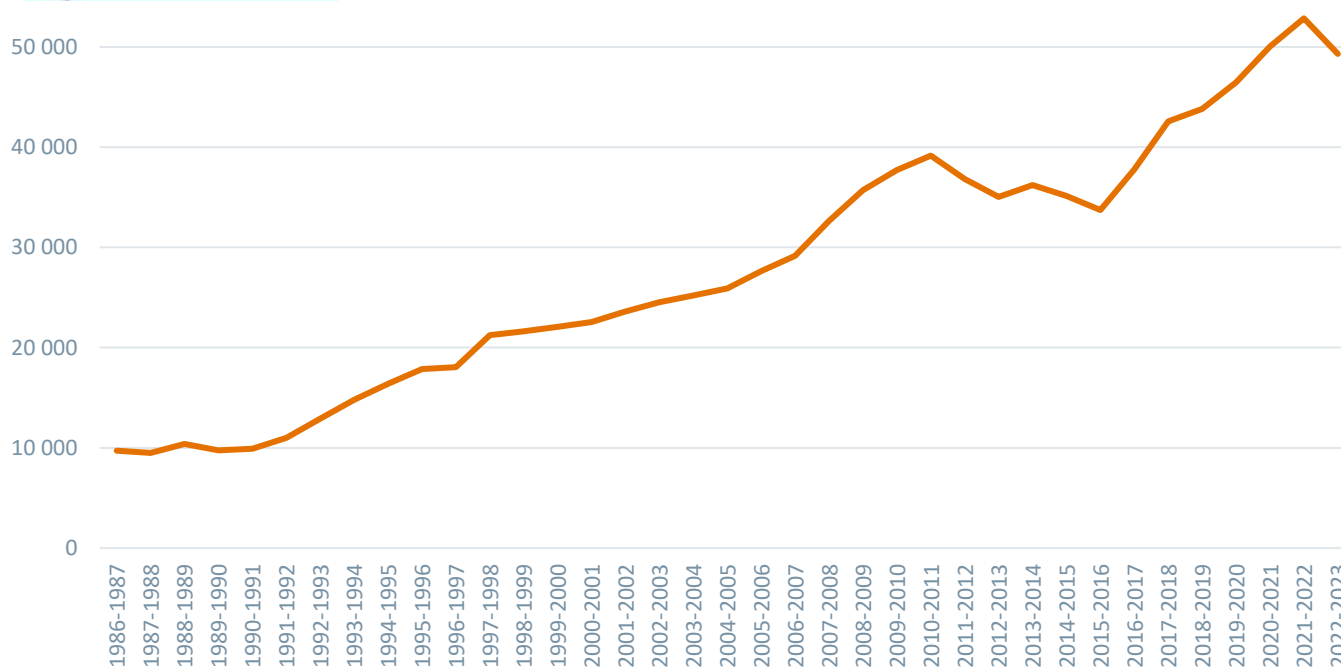
Management system -Basics

- Wildlife in Norway, including wild deer, is not owned by anyone (as in Scotland).
- But the hunting rights are owned by landowners (as in Scotland).
- These quotas may be used by the landowner, or sold by them in a free market.
- But the landowner remains responsible for ensuring that the quota is not significantly underachieved, even if he sells the hunting rights.
- The core of the system is therefore a *partnership* of government, landowners, and hunters, each with a defined role.

Red deer harvest, Norway



Red deer harvest, Norway



Source: Statistics Norway

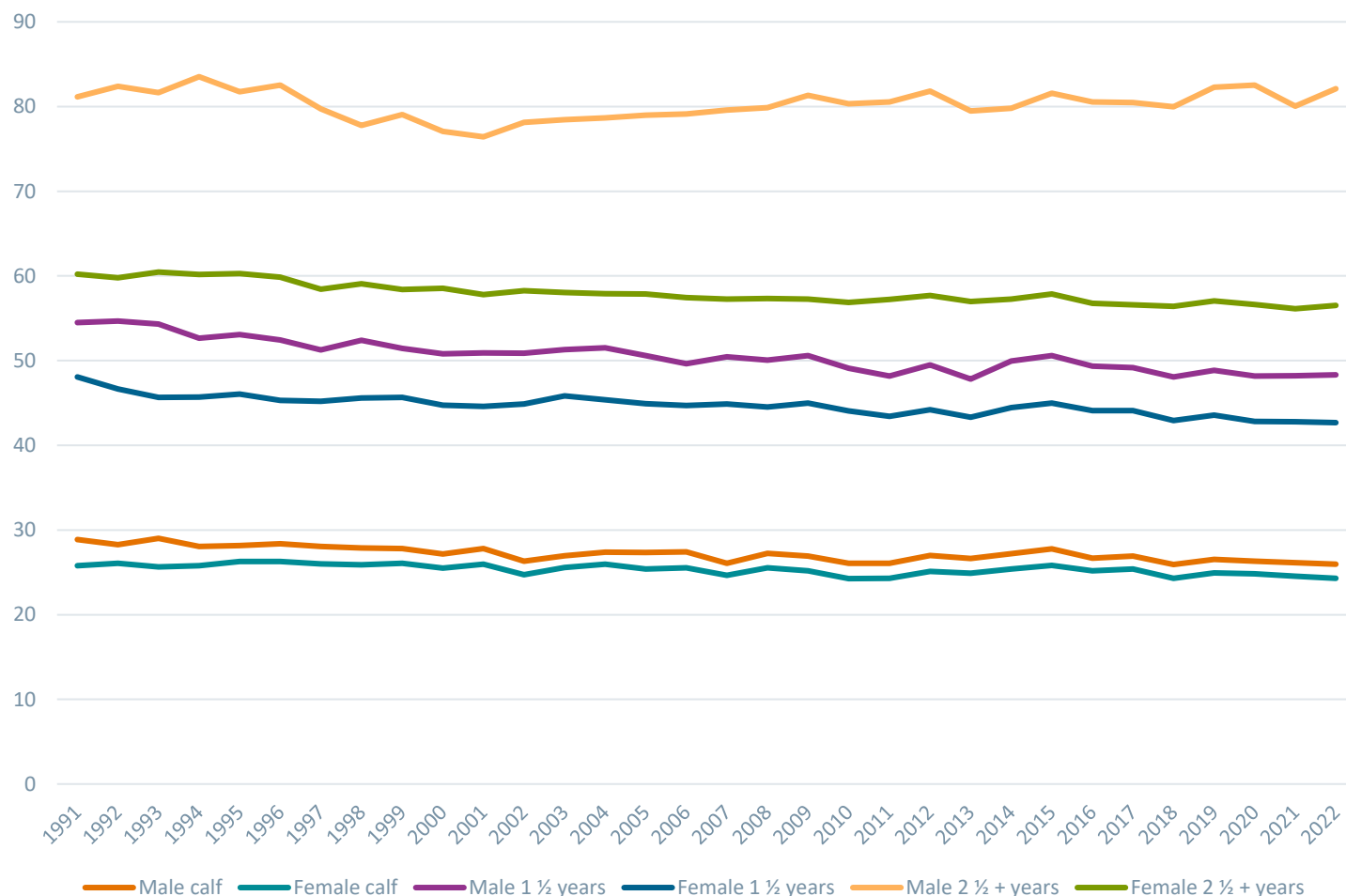
(NB harvest numbers, not population index)

Management system - metrics

- Research into metrics for managing the red deer harvest has been underway for decades.
- Results indicated that *dressed carcass weights** are the best indicator of population condition.
- If these are kept at or near the genetic potential for red deer (also desirable on animal welfare grounds), data indicates that other management goals such as ensuring natural woodland regeneration, limiting road accidents, reducing damage to crops etc, are also attained.
- The metric is cheap and easy to collect, from returns by hunters to www.hjorteviltregisteret.no.

* Gralloched, head & lower limbs removed, skinned (NB in Scotland, 'dressed carcass weight' is with skin on).

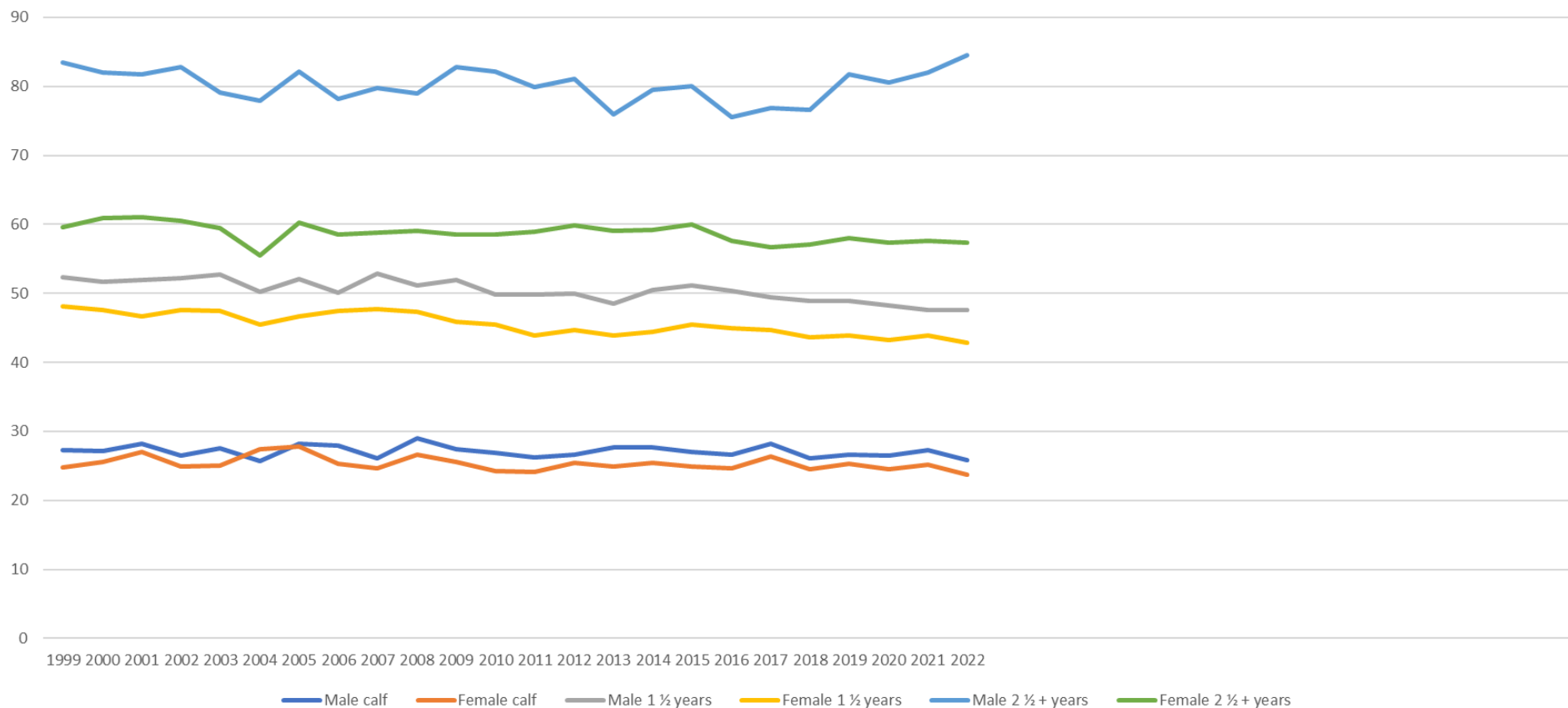
Average dressed carcass weight, red deer Norway



Slight overall drift lower in average dressed carcass weights, except in adult stags, appears to be largely due to more and more populations in the expanding range reaching maturity. Intraspecific competition becomes significant, and regulation by hunting to maintain condition is required.

Source: www.hjorteviltregisteret.no/Statistikk/Hjort

Mean dressed carcass weight harvested red deer, Sunnfjord district, Vestlandet, 1999-2022



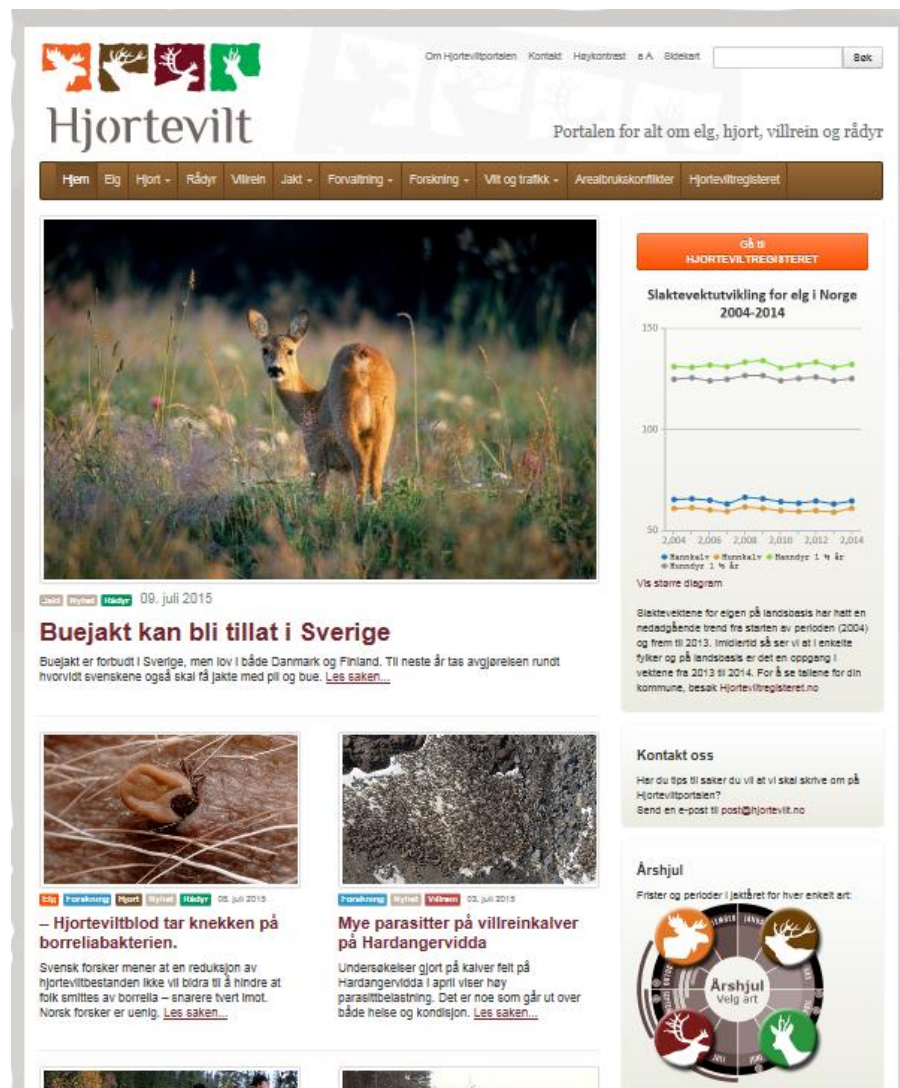
(Sunnfjord has had a mature red deer population since before 1999)

Who does what?

1. Central Government

- The Norwegian Environment Agency oversees the regulation of the system
- It determines and finances research and monitoring requirements
- It determines the normal hunting seasons
- It owns a comprehensive website on deer, their hunting, and their management (the website is run by NINA):

<http://hjortevilt.no/>



The screenshot shows the homepage of the Norwegian Environment Agency's deer hunting portal, Hjortevilt. The header features the agency's logo and navigation links. The main content area includes a large image of a deer, a news article titled 'Buejakt kan bli tillat i Sverige' (Bow hunting can be allowed in Sweden), and a section for 'Slaktevektutvikling for elg i Norge 2004-2014' (Slaughter weight development for elk in Norway 2004-2014). The sidebar contains a contact form and a calendar for hunting seasons.

Hjortevilt
Portalen for alt om elg, hjort, villrein og rådyr

Slaktevektutvikling for elg i Norge 2004-2014

150
100
50
2,004 2,006 2,008 2,010 2,012 2,014

● Kvernkalv ● Hvernkalv ● Hænder 1 ½ år
● Hænder 2 ½ år

Vis større diagram

Slaktevektene for elgen på landsbasis har hatt en nedadgående trend fra starten av perioden (2004) og frem til 2013. Imidlertid så ser vi at i enkelte fylker og på landsbasis er det en oppgang i vektene fra 2013 til 2014. For å se tallene for din kommune, besøk Hjorteviltregisteret.no

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Årshjul

Frister og perioder i jaktåret for hver enkelt art:

Årshjul
Velg art



SØR-TRØNDELAG
FYLKESKOMMUNE

2. Regional Government

The fylke (Province):

- gives guidance on population management at a regional level in accordance with wider societal goals such as biodiversity, prevention of overgrazing, and road safety
- oversees coordination among hunting rights owners and local councils, so as to attain regional management goals

4. Landowners

- Landowners apply for a 'vald', a defined area of land for which a *named individual* is responsible for relations with the authorities. They may band together in a group if their property is too small for a single vald.
- If they do not (which is rare), a vald can be imposed on them; or their land becomes a 'reservoir', permitting larger quotas elsewhere.
- A population management plan for up to 5 years ahead is obligatory and can be for one or more (contiguous) valds. It must specify annual harvests (males and females by age group). The authorities must approve these plans. In practice there is cooperation/negotiation when plans are being prepared.
- Landowners may then use the quota themselves, or sell part or all of it.
- Landowners remain responsible for achieving the quota (and so usually structure prices to encourage hunters to make the full quota).
- Each vald must report annually offtake levels broken down by age and sex, within 14 days of the end of the hunting season. These are publically available in the National Deer Register.

5. Hunters



- Must pass a written exam on hunting law and regulation, species identification, and firearms safety. They must also pass a test of shooting accuracy every year at an approved firing range.
- Purchase an annual Hunter's Fee Card from the central government. This is separate from any fees paid to the owner of hunting rights.
- Register data (such as dressed carcass weights) and provide if required specified animal parts (typically one side of the lower jaw) for verification of harvest levels, population monitoring, and research purposes.
- Hunters also pay tag fees for each moose or red deer harvested to the kommune



Støren Jeger- og Fiskerforening



JEGERPRØVEKURS

START: ONSDAG 25/2. KL: 18.00

STED: STØREN BARNESKOLE

KURSET VIL GÅ MED 9 SAMLINGER.

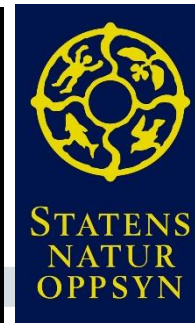
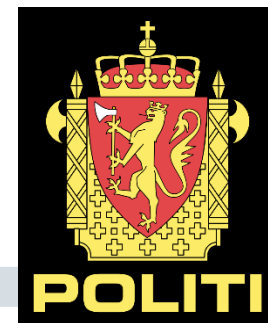
SKYTINGA VIL FOREGÅ I FURUKOLLEN SKYTEANLEGG.

KURSAVGIFT KR: 2000.- INKL. KURSMATERIELL –
BØKER, AMUNISJON OG EN PRØVEAVGIFT.

PÅMELDING PR. SMS ELLER TELEFON TIL:
SVEIN GRANØIEN 900 87 277.



6. Police and National Nature Inspectorate



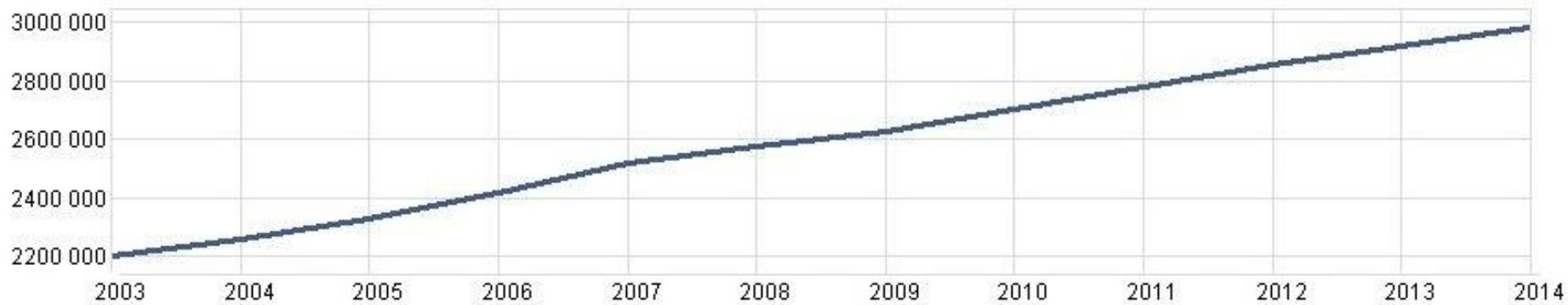
- Both organisations have a legal right to inspect hunters in the field (to check licences, etc.)
- This may be delegated to hunting monitors from the kommune



Conflicts : Road and rail collisions



Number of cars and vans registered in Norway

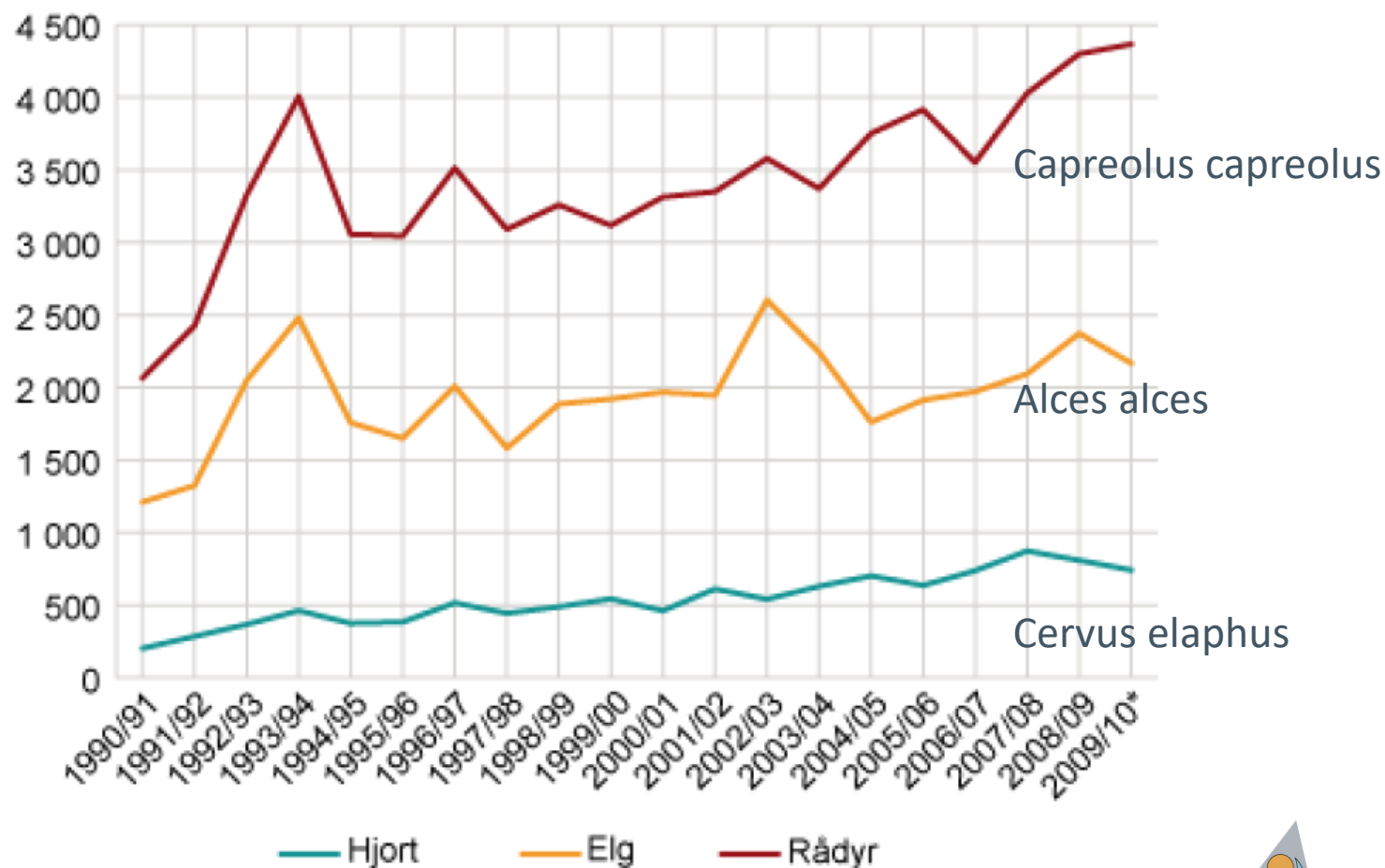


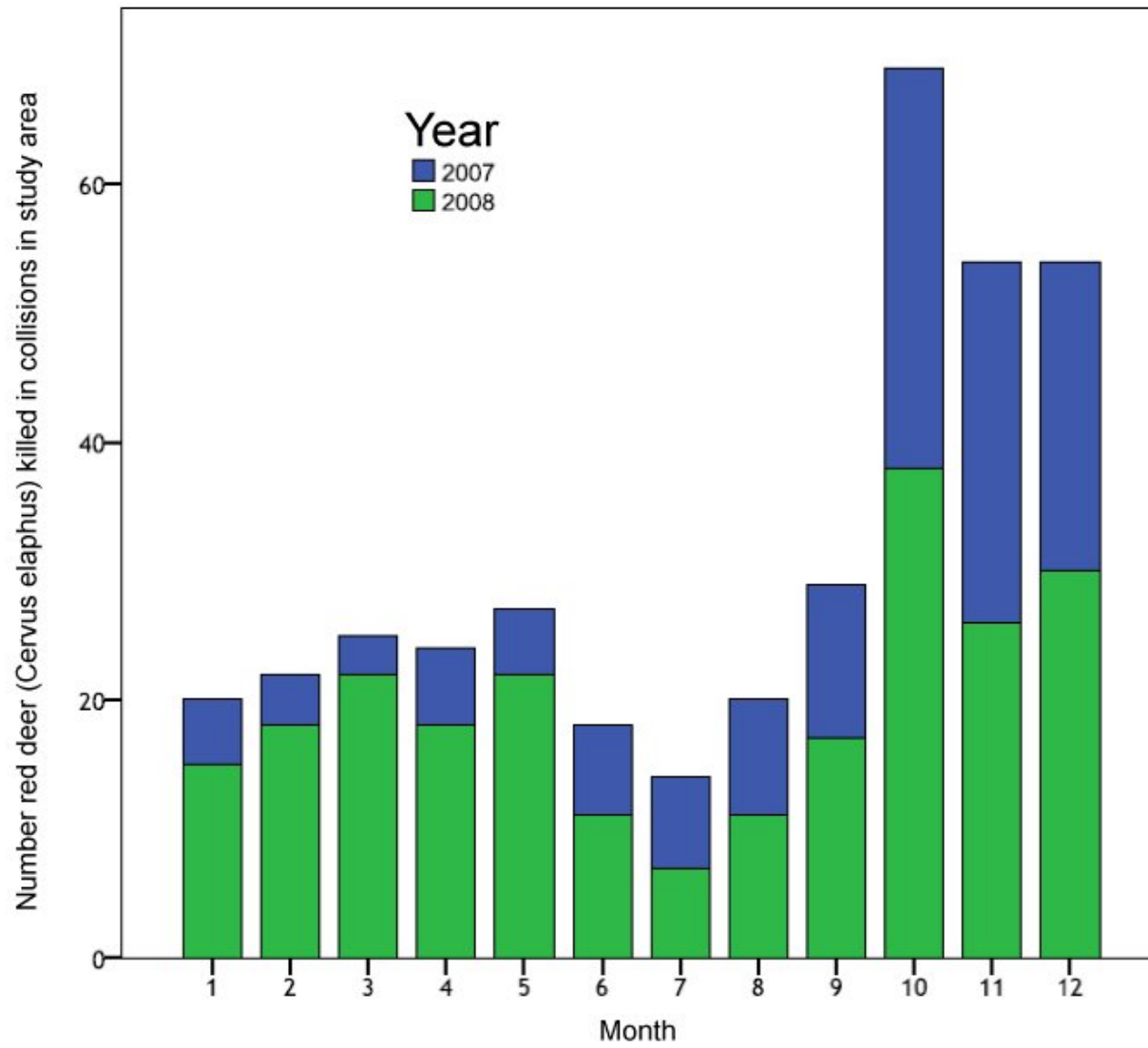
Source: Statistics Norway



Deer killed by cars or trains 1990-2010

Rådyr, elg og hjort drept av bil eller tog. 1990/91-2009/10*





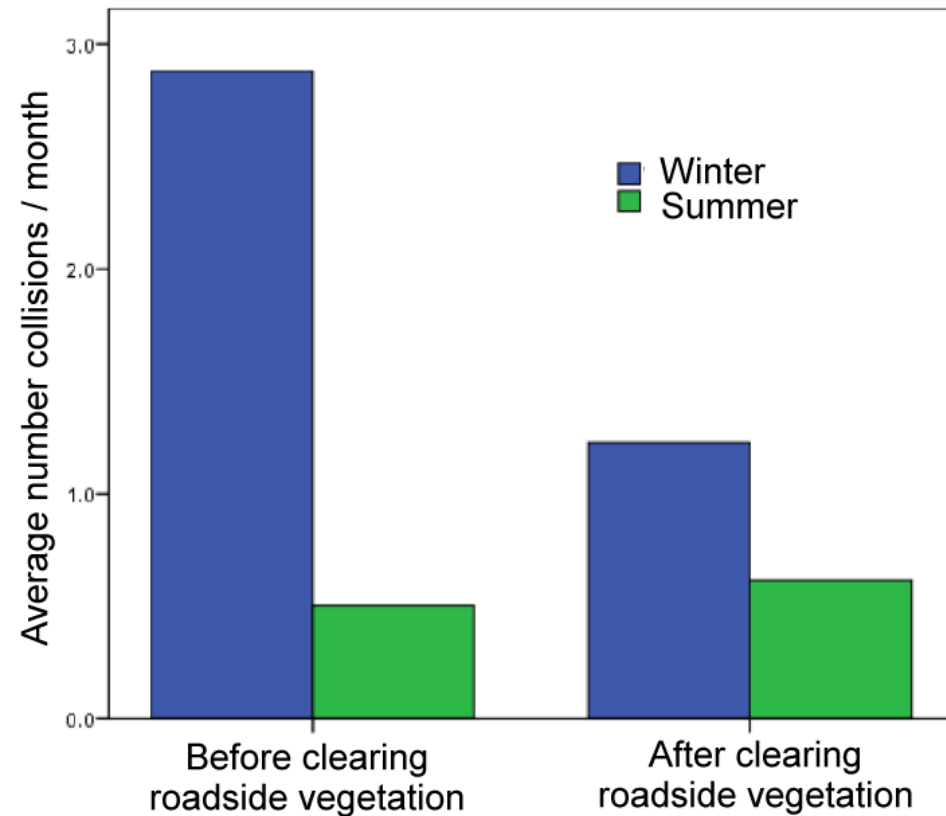


Mitigation:
Roadside
fencing
with
deer
passage
bridges/
underpasses.



Effectiveness of
crossings is highly
variable and
causes of
variation
complex

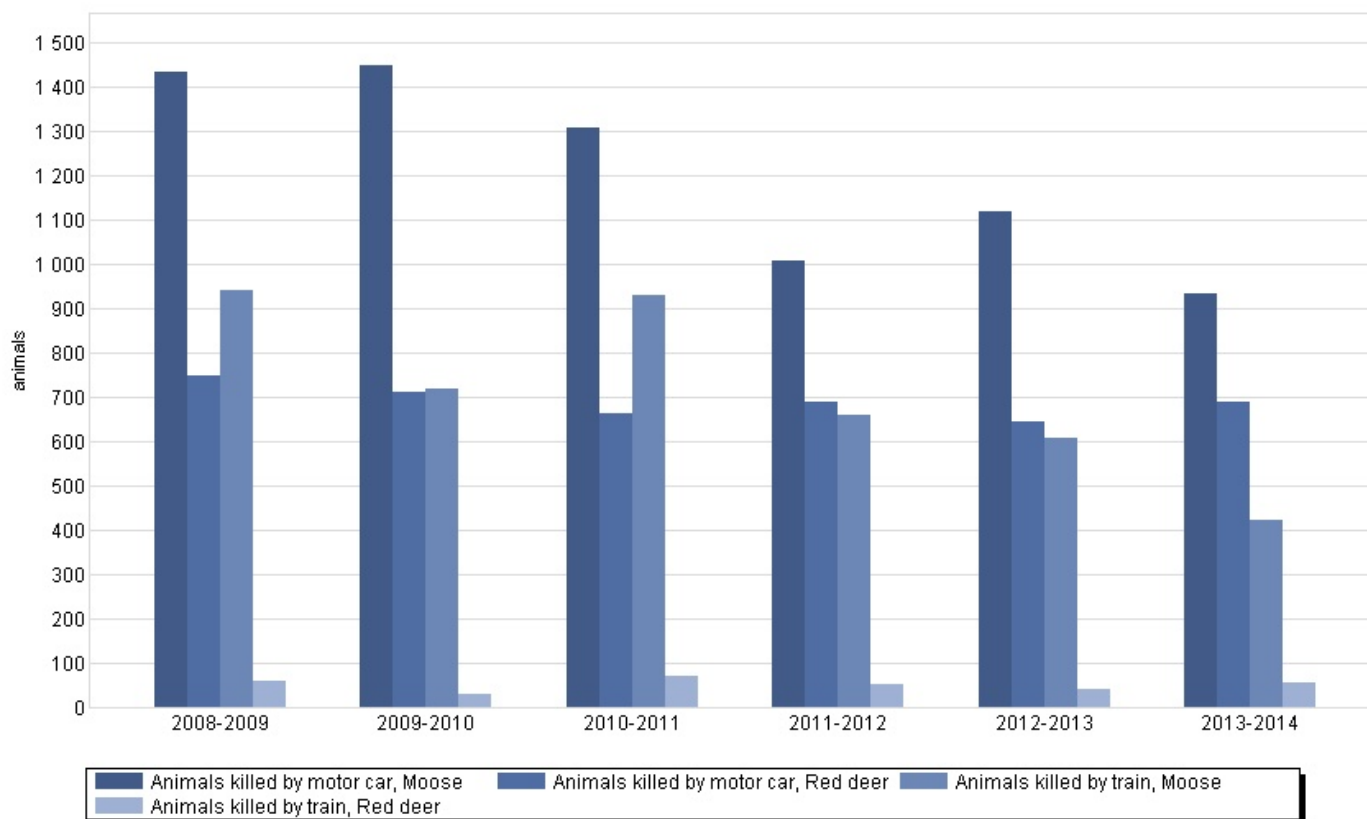
Mitigation: Clearing roadside vegetation



Mitigation: directed hunting

- Reduce overall population in area
- Larger quotas in areas near roads
- Decided at kommune level in consultation with all local stakeholders

Road and railway collision mortality of moose and red deer, 2008-2014



Source: Statistics Norway

Conflicts: forestry damage



- Variable regionally
- Only practical method for reducing forestry damage is deer population regulation
- Needs balanced with income from hunting/sales of deer meat.
- Personal recreation through hunting and non-monetary income through consumption of deer meat shot are also typically significant to the landowner
- Is managed locally through the hunting system at kommune level

Summary

- The management system has been developed over many years.
- It works, in part, because it is part of a strong culture of the use of nature in Norway, important to the Norwegian sense of identity.
- And also because the system is widely considered fair and equitable ([e.g. Hoffmann & Flø 2016](#)).
- Deer are a significant asset, as well as causing some conflicts – particularly damage to forestry and collisions with vehicles.
- Population regulation is almost always done through the hunting system.
- The major day-to-day decisions are made at local government level (the kommune) in consultation with landowners, hunters, and other local stakeholders. In country districts these have populations of only a few thousand and are part of a long-established rural society.
- This facilitates consensus-based local management, BUT is informed by a detailed framework of national law and regulation.
- It is also informed by solid data on harvests and population structure and condition, analysed by the central government and publically available on comprehensive internet sites (<https://www.hjorteviltregisteret.no/>)

Condition, welfare, and management: Scotland and Norway compared

Frontispiece

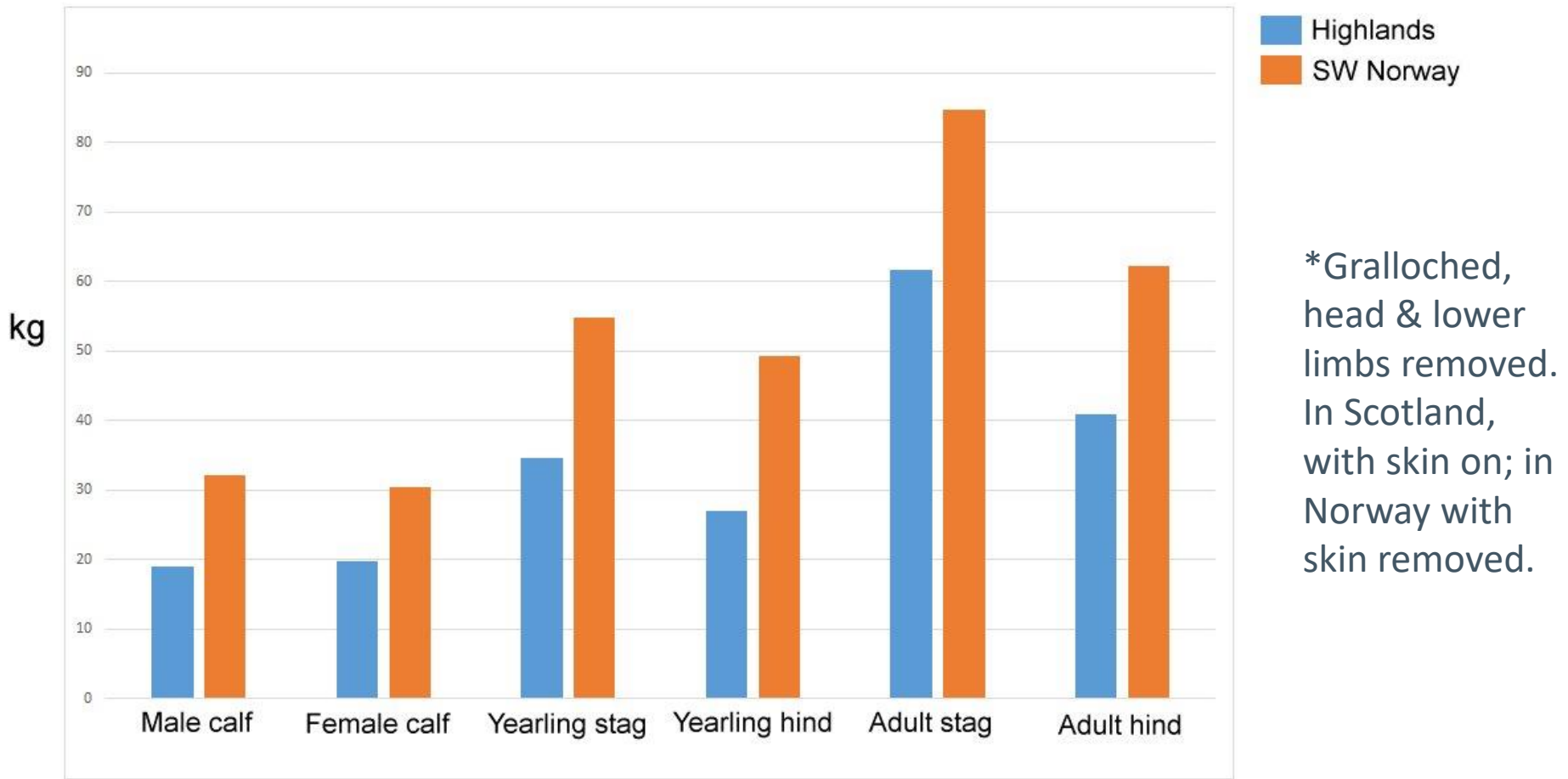


SCOTTISH RED DEER IN PREHISTORIC TIMES AND TO-DAY

The Stag to the left represents the prehistoric Red Deer of the Scottish peat mosses, which lived in low-country forests even to the sea coast; to the right is placed for comparison a modern Royal Stag—the difference in size can be traced to the interference of man (see p. 333 *et seq.*).

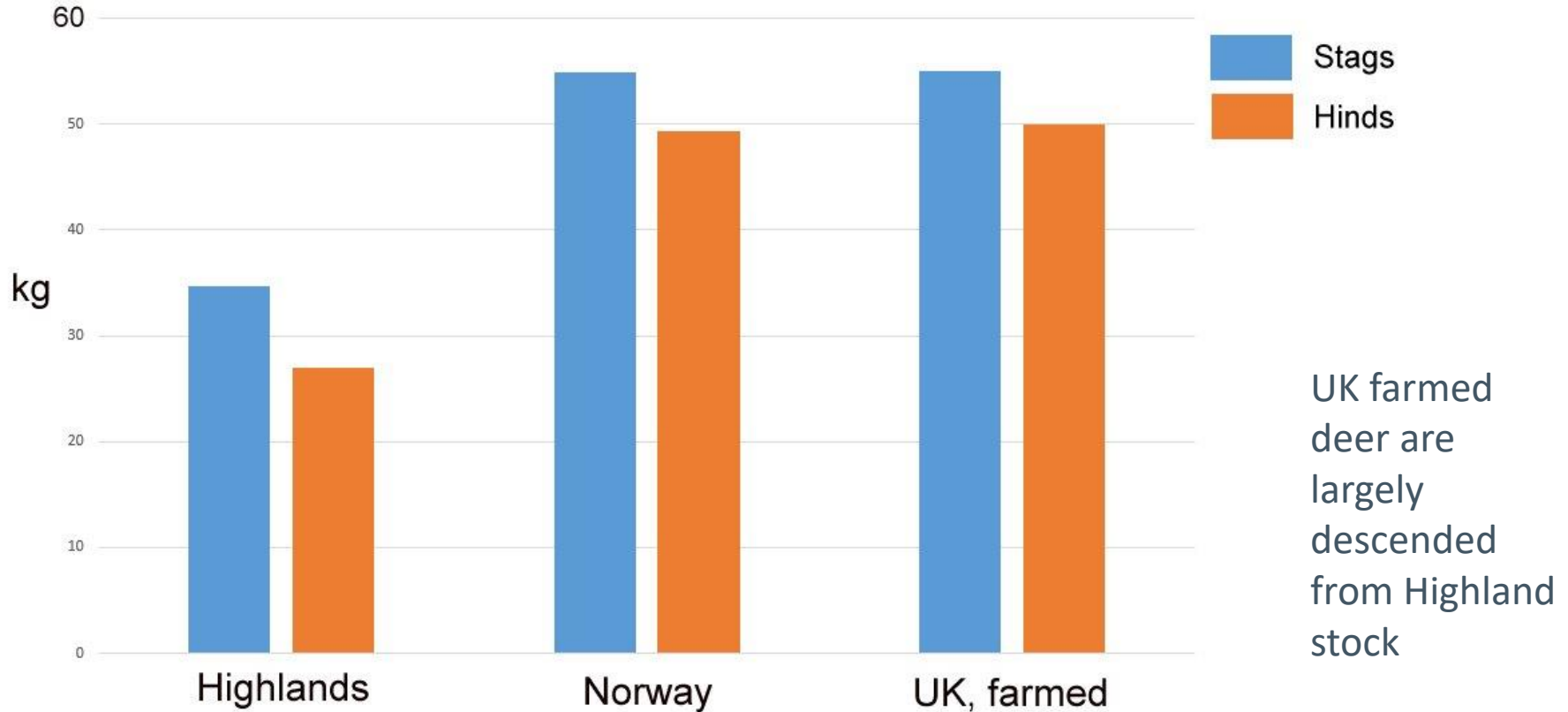
Source: Ritchie, J. 1920.
The influence of man
on the animal life of
Scotland.

Dressed carcass weights of red deer *

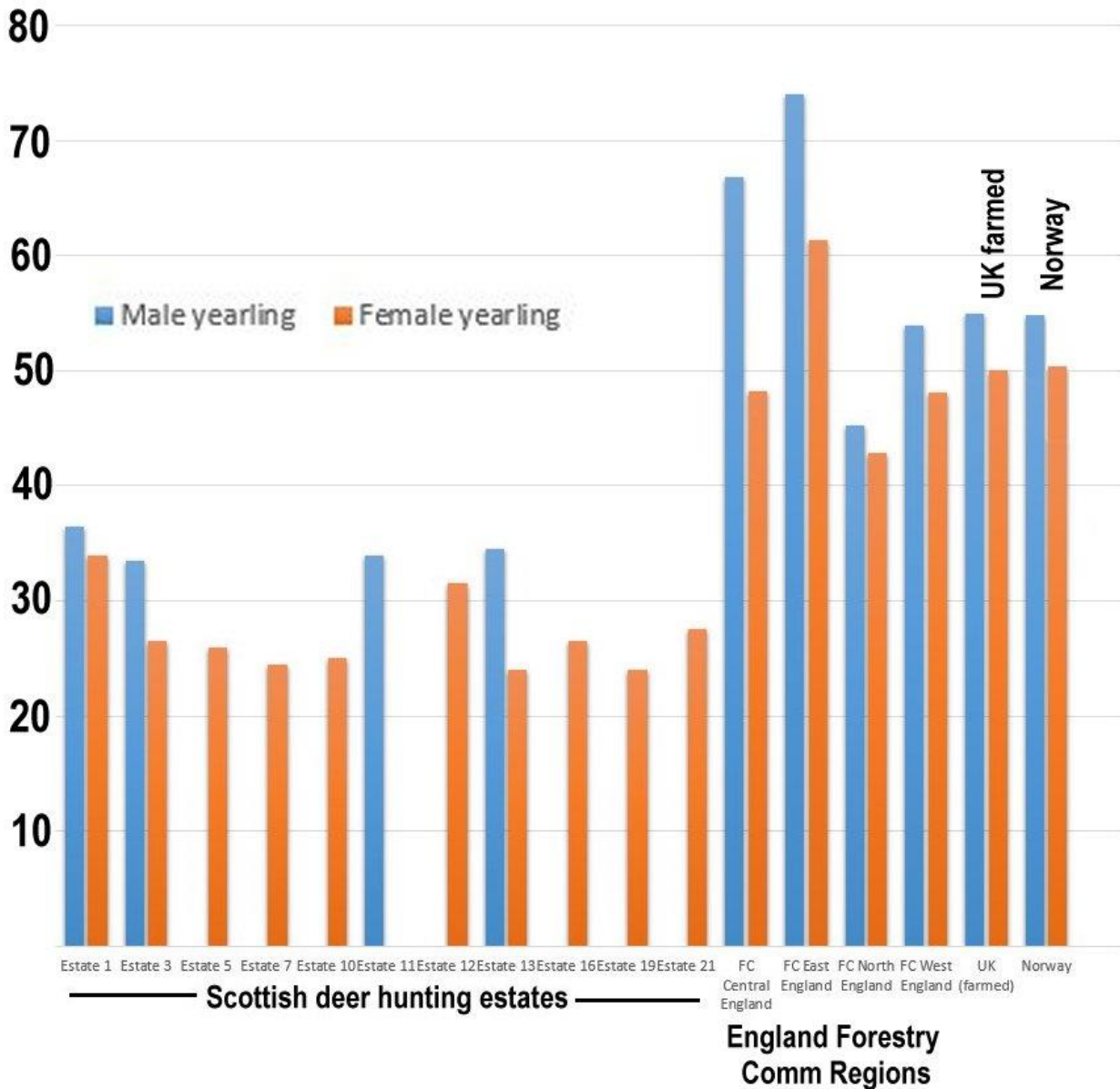


Data: Highlands James Hutton Institute; Norway: www.hjortevilt.no

Dressed Carcass Weights of 1 1/2 year old red deer



Data: Highlands James Hutton Institute; Norway: www.hjortevilt.no; UK farmed University of Bangor

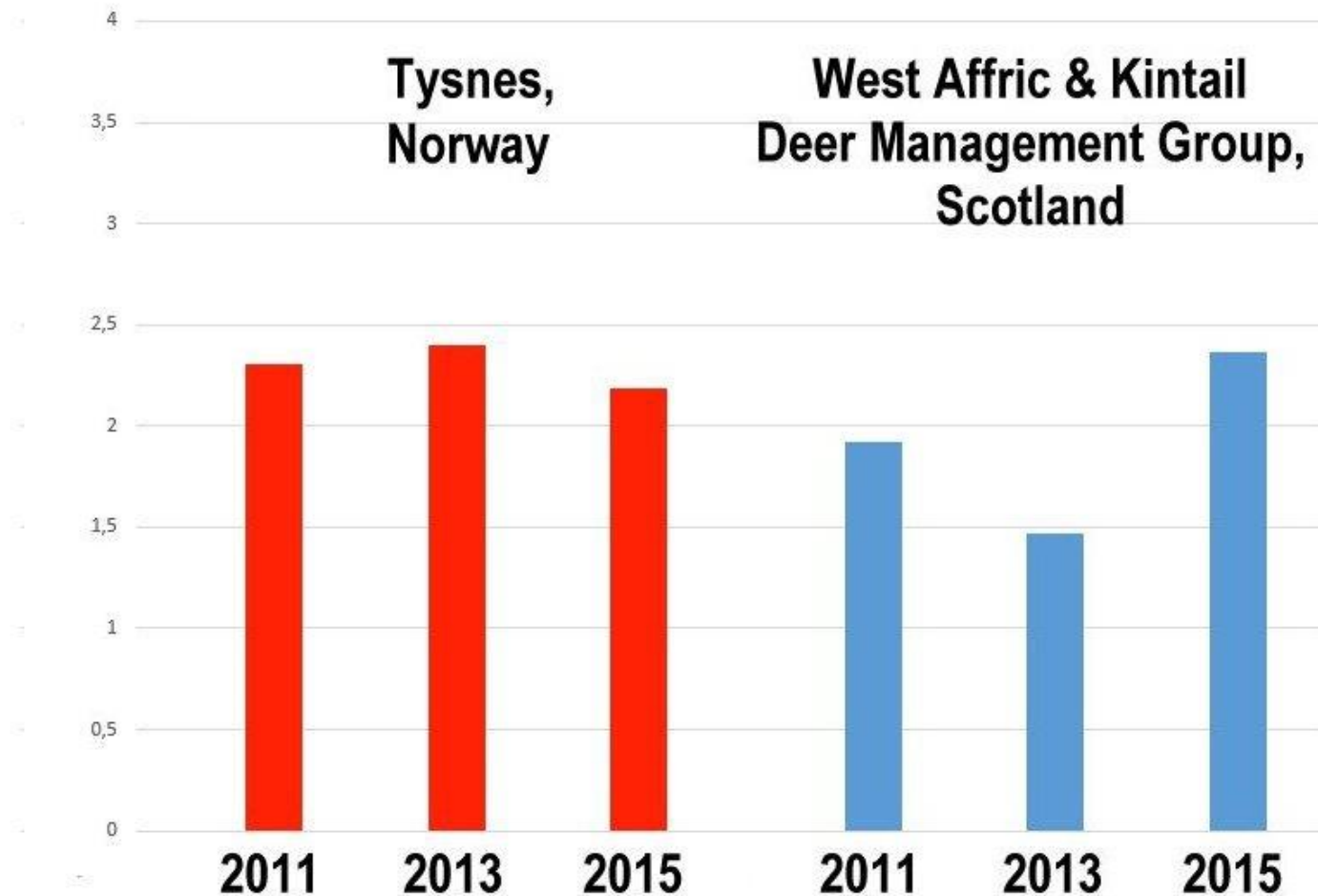


Red deer dressed carcass weights, yearlings

Sources:
James Hutton Institute
Forestry Commission
University of Bangor
Hjorteviltregisteret

Game management research indicates yearlings provide the best index of population condition: <http://www.hjortevilt.no/>

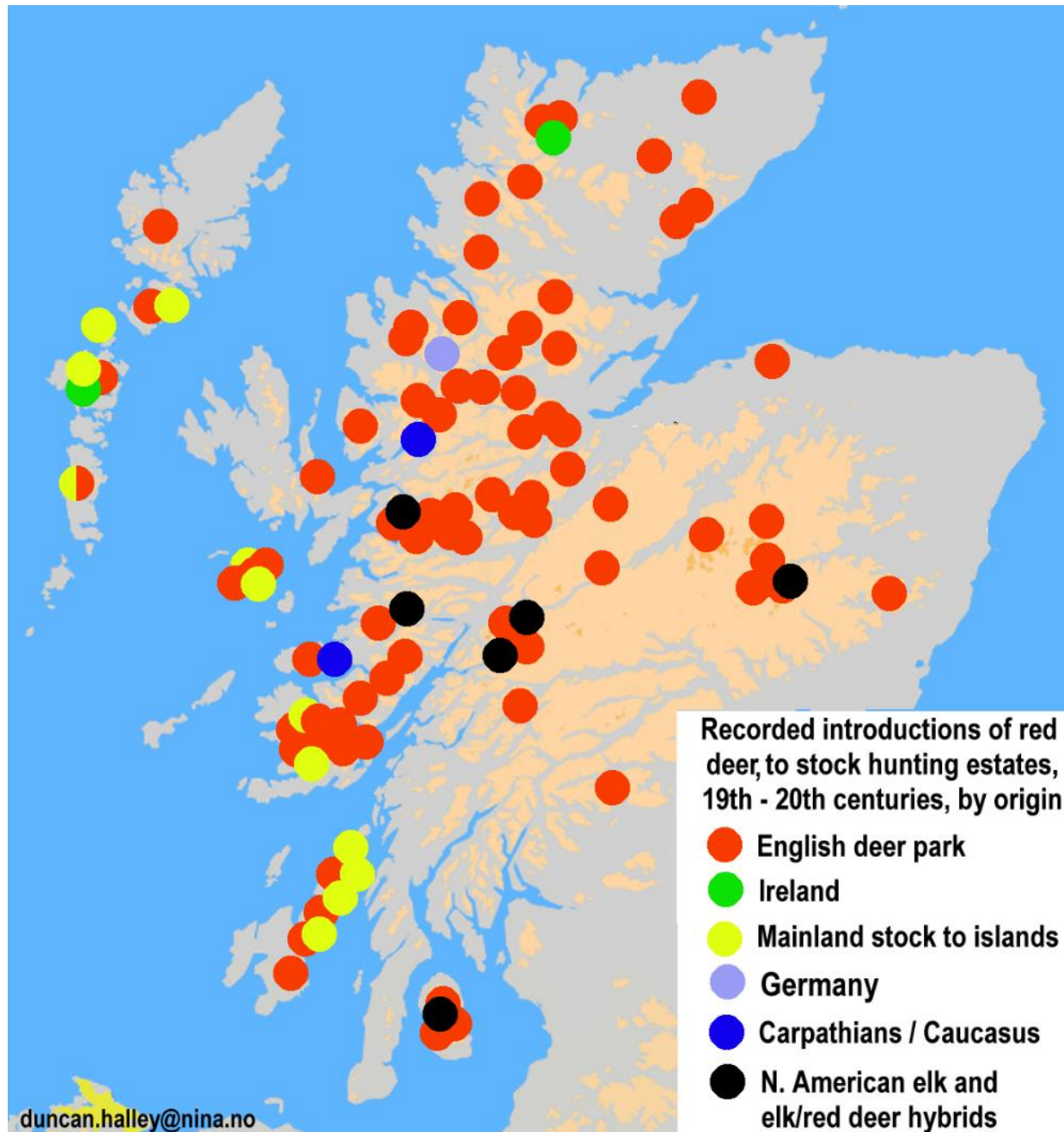
Red deer harvested/sq. km.



NB Tysnes red deer > 30% larger than W.Affric/Kintail red deer

Data: www.hjorteviltregisteret.no; <http://affrickintaildmg.deer-management.co.uk>

Year given is year hunting season began (ie 2011 = 2011-12 hunting season)

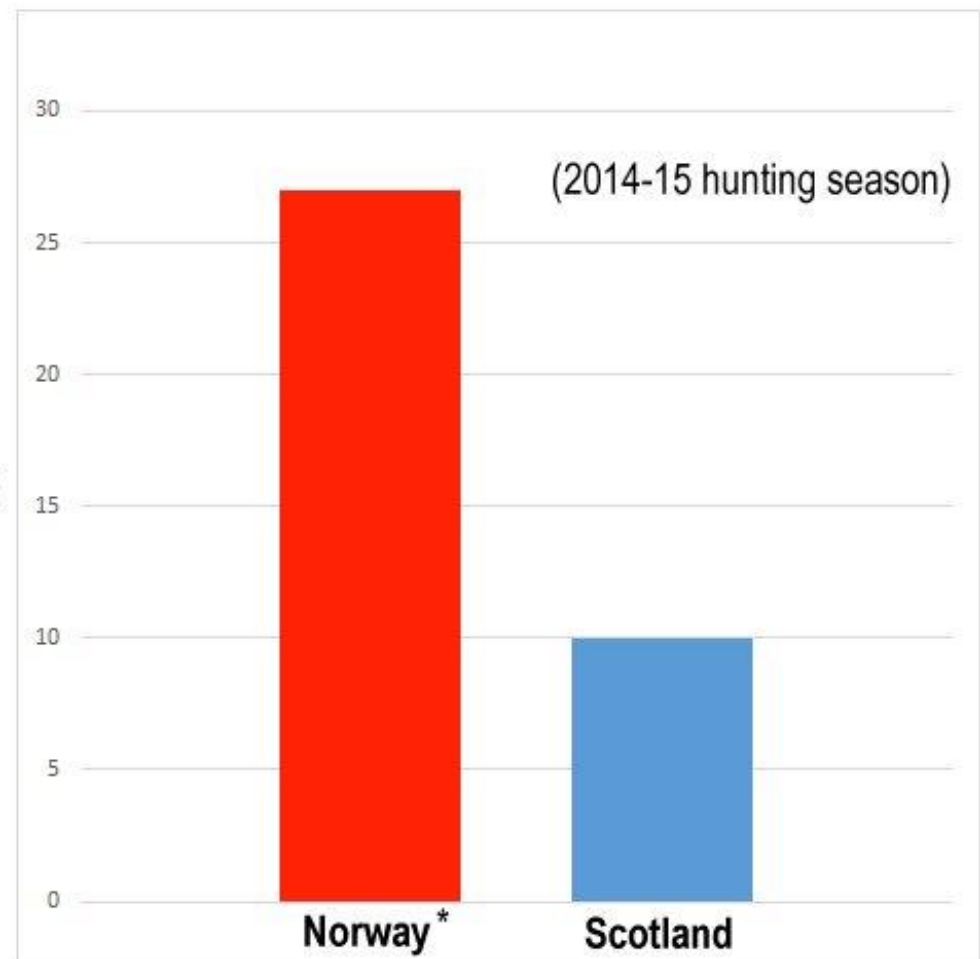


Degree to which imported red deer impacted genetic composition of Scottish red deer disputed (though on Rum and Islay, populations mainly derive from English park stock).

Scottish-stock red deer moved to English deer parks and to New Zealand reach Norwegian/English park weights in two generations (1st generation affected by maternal size)

- Red deer are the main deer species hunted in the Highlands and in SW Norway.
- The two areas are closely similar in climate, geology, and landforms.
- Both used to be strongly deforested.
- Woodland in red deer areas of SW Norway now regenerates by natural means.
- While woodland in red deer areas of the Highlands generally does not.
- Red deer offtake in deer hunting areas, per unit area, is similar in the two regions.
- How does Norway achieve the same harvest levels per unit area as Scotland, but still get woodland regeneration?
- The key to understanding this is the higher **%** offtake levels in Norway.
- Population densities are *lower*, allowing regeneration, but harvests are sustainably *higher* per unit area, in both venison weight and trophy head quality terms.
- This is because red deer in SW Norway and elsewhere are very much larger than in the Highlands (and this is not for genetic reasons).
- And because well-nourished deer breed more rapidly, and non-hunting deaths (eg winter starvation) are rare.
- The result is just as many, but much bigger, deer are harvested - from land which has multiple other economic uses in addition.

Red Deer harvest as % of estimated population



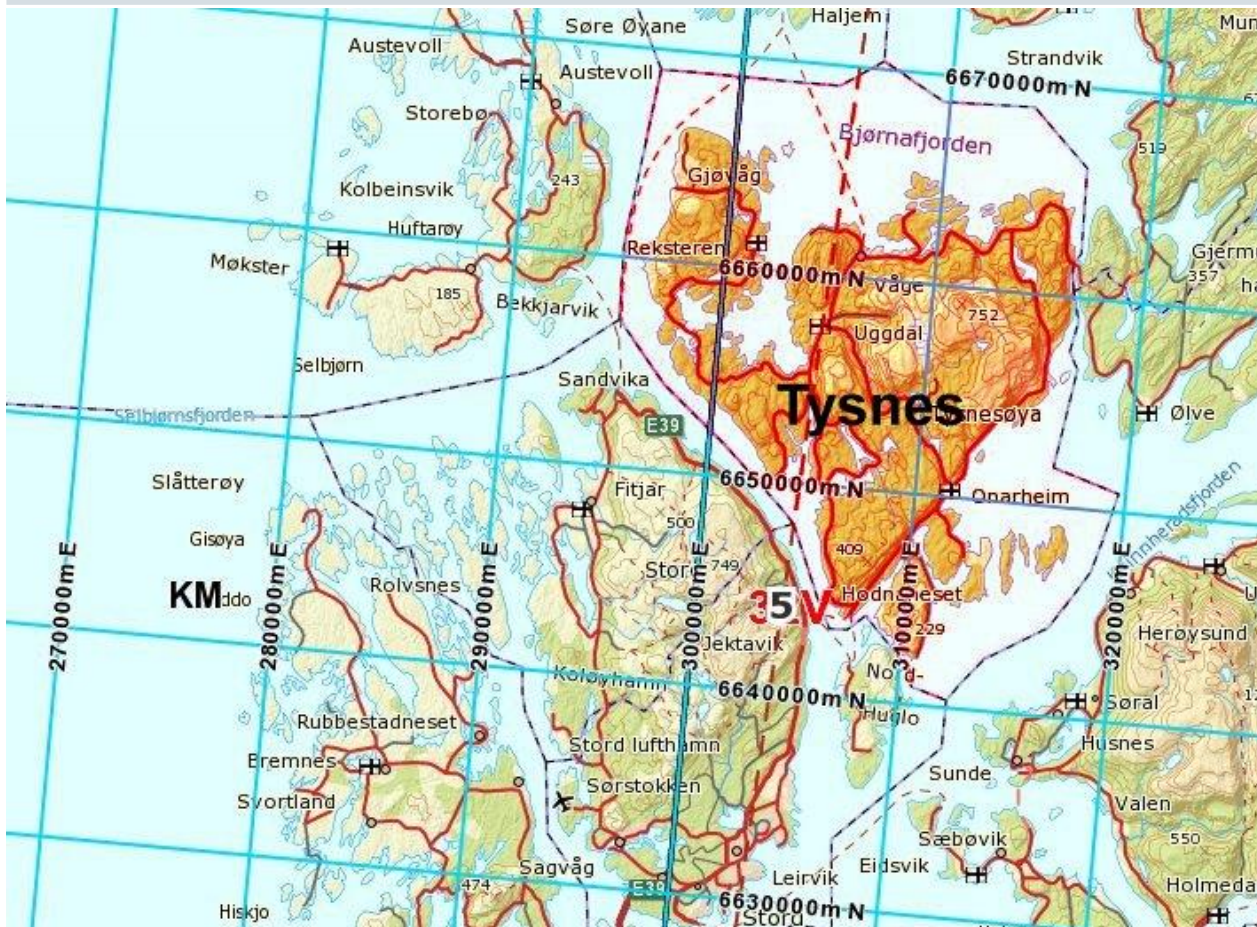
Data

Norway: www.naturindeks.no; www.hjortevilt.no
 Scotland: SNH Deer Management Review 2016

*Of which 47% hinds or hind calves. No sex ratio data Scotland.

Tysnes: an example of red deer hunting & management at local level



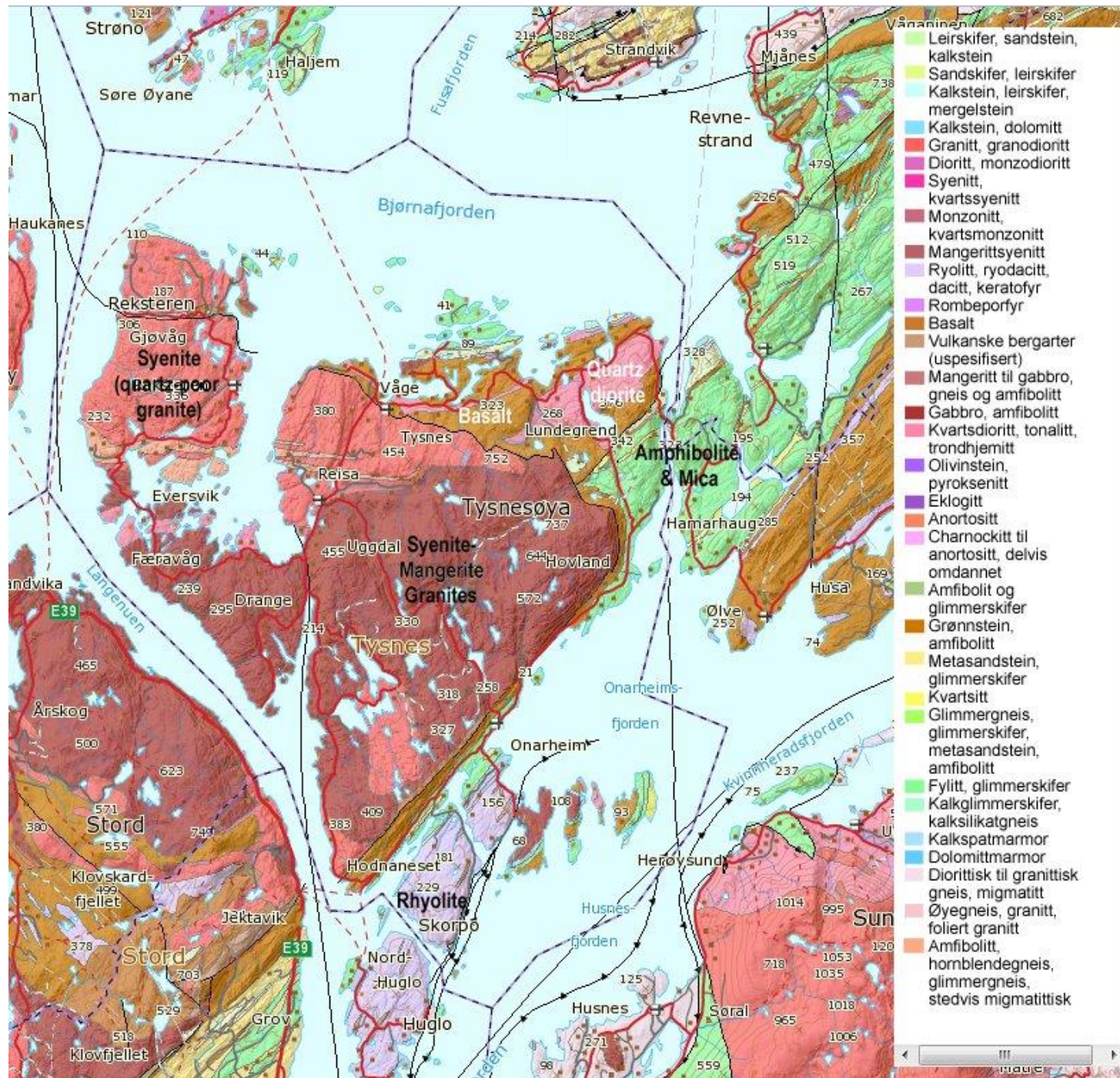


Area: 25510ha

(Comparisons: Atholl - Forest Lodge, West Hand, Bruar, Clunes, Dalnamein beats: 33909ha; Invermark (deerstalking area) 17700ha)

Population: 2782

(10.9/km².; Highland region excluding Inverness: 5.95/km²)



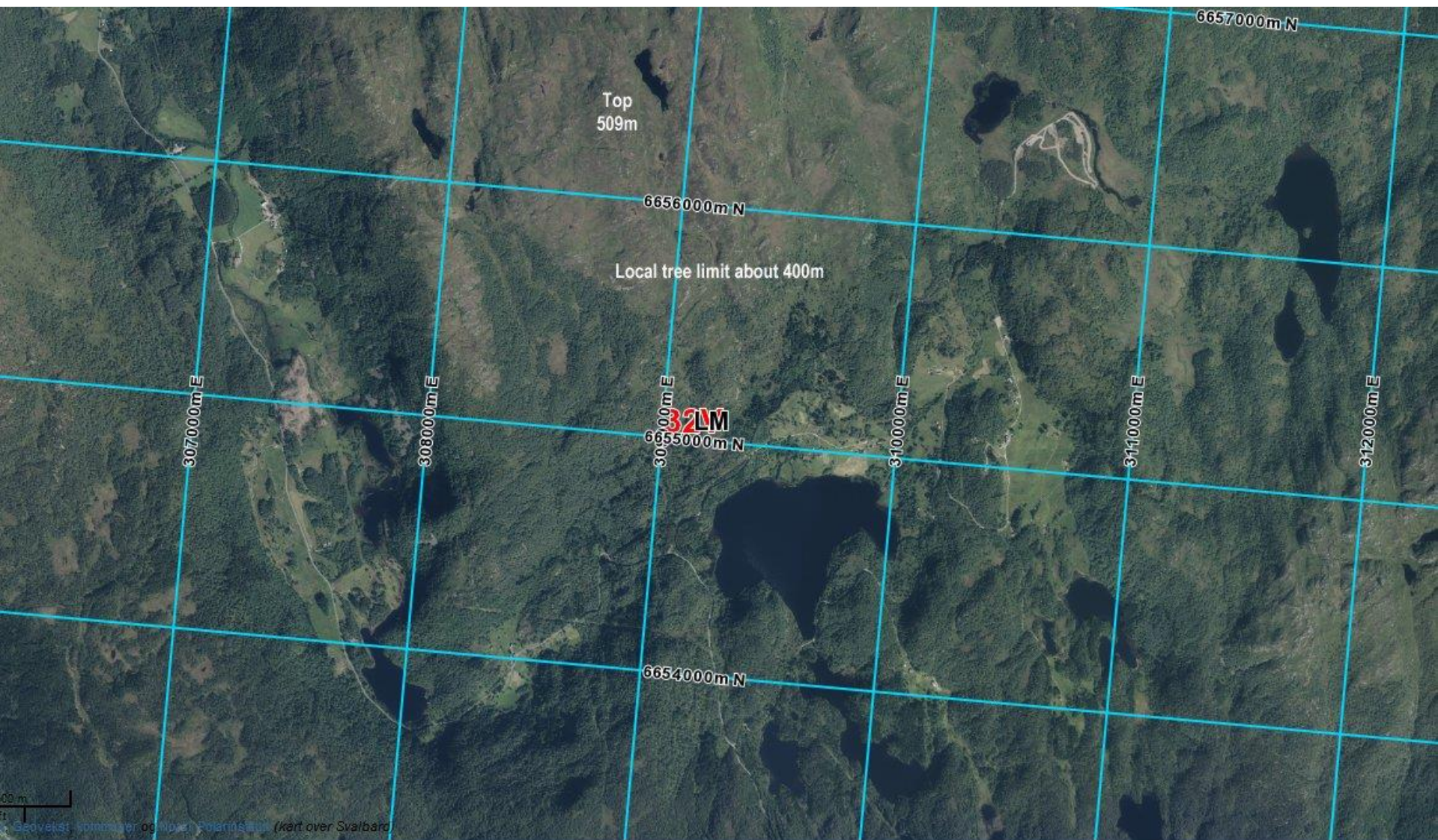


1913

2013



2013

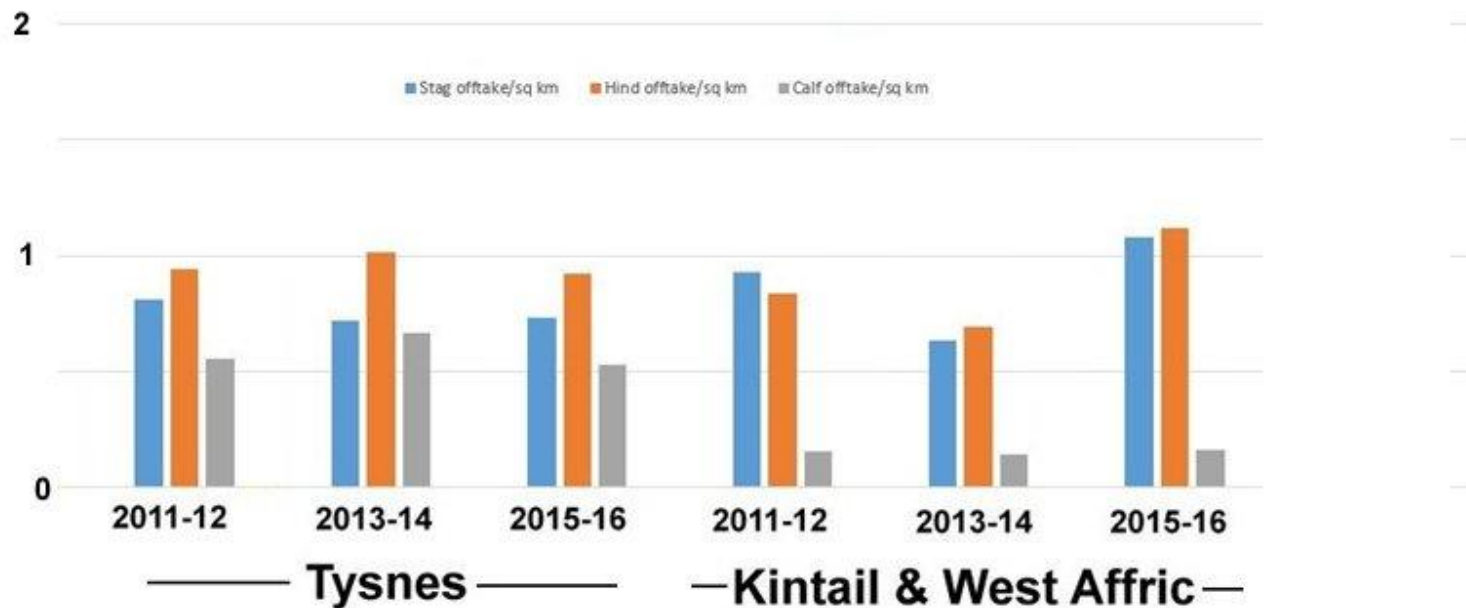








Red deer offtake per square km, Kintail & West Affric and Tysnes

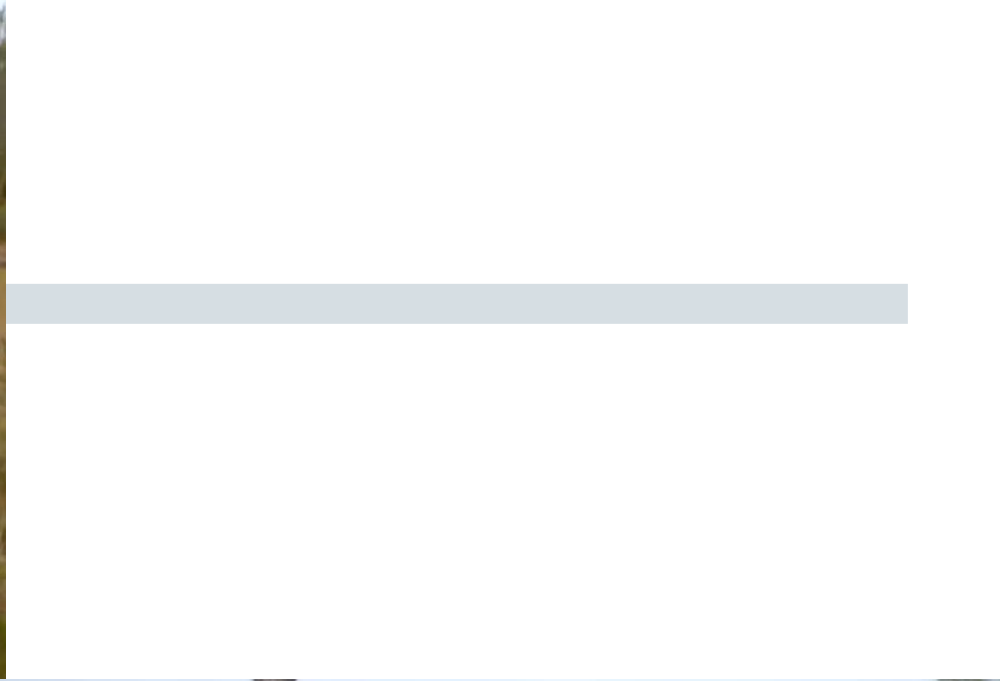


Data: www.hjorteviltregisteret.no/
<http://affrickintaildmg.deer-management.co.uk/>

Categories 'stags' and 'hinds' include yearlings and older (age class 2+) animals

Optimising for stags

- In Norway, the age and sex balance of the annual red deer harvest is primarily adjusted to optimise venison production.
- In Scotland, trophy heads are often the primary concern. Population sex ratios and harvest levels can be adjusted accordingly.
- For example, for a sustainable cull of 50 stags a year in Scotland, research indicates that the post-cull (ie late winter) population would be 300 1+ stags (ie 1-year-old or older); 150 1+ hinds, and 100 calves (assuming a hind cull of yields/immatures only); or a total population of 550 red deer. Other hind culling strategies yield total required populations of 600 and 650 ([Buckland et al 1996](#)).
- The authors state *"Suppose a deer manager is responsible for 3000 adult deer, and 50 mature stags are stalked each year. Our modelling suggests that **the population could be reduced fivefold, and still 50 mature stags could be stalked per year**"* ([Buckland et al 1996](#)).



Stalking ('snikjakt',
literally 'sneak
hunting')
in West Norway
(Stag is about 3 years old)

www.nina.no





A 'good average' adult stag, with a dressed carcass weight of about 90kg

Summary

- In 1900, wild reindeer in Norway were strongly reduced in numbers. Red deer and moose were very rare and range restricted. Roe deer were extinct. This was due mainly to hunting pressure from the general human population, who lived on the land; through habitat loss (deforestation); and through competition with domestic stock.
- Legislation dating from the later 1940s introduced modern game management methods based on an adaptive-management quota system.
- Deer, as wild animals, are part of the national patrimony and managed as such.
- Landowners have the right to the harvest quotas determined by the system. They may use them, give them away, or sell them in a free market.
- Since the new system was instituted, wild reindeer populations have generally increased. Red deer, moose, and roe deer populations have increased enormously, and ranges expanded very considerably. Red deer range continues to expand rapidly. Moose and roe deer ranges are expanding slowly into the fjords, which have many internal barriers to spread.
- Red deer and moose quotas are issued by 'vald' (hunting beat). Smaller landowners may have to group together to produce an area large enough to constitute a vald. Roe deer are treated as small game. Reindeer have a special system.
- Hunting is a widespread activity; 20% of men and 2% of women over 16 have passed the hunting licence test (akin to a driver's licence). Social acceptance of hunting is very high.
- Managed reductions of reindeer, moose and red deer populations have been carried out in some regions in recent years. The primary reason has been reductions in average carcass weights, fecundity, and nonhunting mortality due to intraspecific competition for food. Reducing collisions with traffic have been another motive.
- Research indicates that if deer weights are kept around the natural weights for the species through population management, other desired benefits (e.g. maintaining tree regeneration, reducing road accidents, animal welfare) normally follow.
- Harvest levels of red deer per unit area in Tysnes, a typical red deer district in west Norway, are similar to Scottish deer forests, though animals are much larger (yielding more venison and better trophy heads). The modern landscape is well wooded, there is abundant natural regeneration, and the same land supports several other economic uses in addition to deer harvesting.
- Non-hunting mortality (e.g. through starvation/exposure) is low, and fecundity higher than in Scotland.