

Ovis aries 

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Artiodactyla	Bovidae

Common name sheep (English), mouflon (English)

Synonym *Ovis aries musimon* , Pallas, 1762
Ovis aries ophion , Blyth, 1841
Ovis musimon , Pallas, 1762
Ovis musimon musimon , Pallas, 1762
Ovis musimon ophion , Blyth, 1841
Ovis ophion , Blyth, 1841
Ovis orientalis , Gmelin, 1774

Similar species

Summary *Ovis aries* (sheep) are an ungulate mammal believed to have originated in Europe. While humans have domesticated the majority of sheep, feral populations exist. These populations are causing impacts on the native diversity of plant species, especially on islands. The impact their grazing has on vegetation is known to cause declines in rare and endangered bird species and other native ungulate species.



[view this species on IUCN Red List](#)

Species Description

There exist over 200 distinct breeds of sheep *Ovis aries*. The breeds differ in their physical characteristics. Female sheep tend to be smaller than males by a quarter to one third of male size- head and body length 1,200-1,800mm and shoulder height 650-1,270mm. *O. aries* have a vertical cleft and narrow snout completely covered with short hair except on the margins of the nostrils and lips. Wild *O. aries* have tails between 70-150mm but in domestic *O. aries* tails may be larger and used as a fat reserve, although these long tails are removed on most commercial farms. The skulls of domesticated *O. aries* differ from those of wild sheep in that the eye socket and brain case are reduced. The genus *Ovis* is characterized by the presence of glands situated in a shallow depression in the lacrimal bone, the groin area, and between the two main toes of the foot. These glands secrete a clear semi-fluid substance that gives domestic *O. aries* their characteristic smell. Selection for economically important traits has produced domestic *O. aries* with or without wool, horns and external ears. Colouration ranges from milky white to dark brown and black (Reavill, 2000).

Uses

Reavill (2000) observes that, "Sheep (*Ovis aries*) is one of the most economically significant species on the planet. Since their domestication between 9000 and 11000 years ago they have been a source of meat, milk, wool and hides in nearly every country. In some cultures *O. aries* are considered highly useful as a sacrificial animal. The versatility of the species contributes to its economic significance as large herds of animals can be maintained in many environments at relatively low costs. Besides their usefulness in an agricultural sense, *O. aries* have become important as a tool for scientific research. Because of their large size and low maintenance costs they make an ideal model for a great deal of scientific research."

Habitat Description

Sheep (*Ovis aries*) are extremely versatile and exist in a wide variety of habitats worldwide ranging from temperate mountain forests to desert conditions (Grzimek 1990, MacDonald 1984 in Reavill, 2000).

Reproduction

Sheep (*Ovis aries*) breeds on a seasonal basis, determined by day length, with females (ewes) first becoming fertile in the early fall and remaining fertile through midwinter. Estrus cycles range between 14 and 20 days with 17 as the average. Females are in heat on average for 30 hours. Males (rams) are fertile year round and most domestic sheep breeders use 1 ram to 25 to 35 ewes. Gestation averages 148 days with most lambs born in mid spring. One or two lambs, which are able to stand and suckle within a few minutes of birth, are born to each ewe. Both male and female lambs reach sexual maturity within one year. (Ensminger 1965 in Reavill 2000).

Réale *et al.* (2000) states that, "Although humans have modified the rutting and lambing seasons of *O. aries*, some feral populations show highly synchronized estrus and lambing periods that relate to latitude (Jewell 1989). These herds were assumed to have recovered that synchrony because of the high adaptive value of spring lambing."

Nutrition

Sheep (*Ovis aries*) are extremely hardy animals and can survive on a diet consisting of only cellulose, starch or sugars as an energy source and a nitrogen source which need not be protein. In general, *O. aries* feed mainly on grasses while in pastures and can be fed a wide variety of hays and oats. Considerable research has been done on sheep nutritional requirements, and feed substitution tables are present in Ensminger's 1965 "The Stockman's Handbook". Grazing *O. aries* ingest a large amount of food in a short time, then retire to rest and rechew the ingested matter. *O. aries* spend their day alternating between these periods of grazing and ruminating. *O. aries* has a large and complex stomach which is able to digest highly fibrous foods that can not be digested by many other animals. Its modest nutritional requirements contribute to its economic significance.(Hecker 1983, Ensminger 1965 in Reavill 2000).

General Impacts

Establishment of feral herbivores like sheep (*Ovis aries*) have had significant ecological impacts on island ecosystems. Island ecosystems are particularly vulnerable to herbivores as insular plants in these ecosystems evolved largely in the absence of large herbivores, therefore lacking in defences against them. Increased bare ground followed by increased erosion are some of the other impacts (Van Vuren and Coblentz, 1987). Van Vuren and Coblentz (1987) in their study on the ecological effects of feral sheep on Santa Cruz Island, California observe that feral sheep are forage generalists when compared to domestic sheep on mainland. Feral sheep diet include annual grasses, forbs and also a substantial quantity of shrubs. The authors summarise the ecological impacts of feral sheep: consumption of endemic species by feral sheep could potentially cause decline in their population levels; loss of vegetation due to trampling while grazing; compaction of the soil and therefore changes in the soil structure; soil erosion due to removal of vegetation and denudation of the soil; removal of herbaceous vegetation caused changes in the grassland community, reduction of litter and a decline in the recruitment of seedlings. Alteration in the plant community led to decrease in species diversity. Grazing and browsing of herbaceous vegetation, and stripping of bark by feral sheep and other introduced mammals (cattle (*Bos taurus*), Mouflon sheep (*Ovis musimon*), and feral goats (*Capra hircus*)) have led to exposure of soil to erosion and degradation of forests on Mauna Kea (Scowcroft and Sakai 1983). Welsh (2002) adds that, "O. aries are extensive and destructive herbivores. They have been found to decrease populations of the mamane (*Sophora chrysophylla*), an endemic leguminous tree, by stripping the bark off thus facilitating damage from insects and other disease causing organisms". Results of a study (Scowcroft and Giffen 1983) which evaluated the regeneration of vegetation and forests inside and outside sheep exclosures located in heavily browsed portions of the mamane forest of Mauna Kea, indicated feral sheep browsing suppresses regeneration of mamane and three other endemic species, Hawai'ian bent, heu-pueo, and aheahea. Liu and Jiang (2004) report that, "The most important food competitor of the critically endangered Przewalski's gazelle (see [Procapra przewalskii](#) in IUCN Red List of Threatened Species) is the domestic Tibetan sheep (*O. aries*) in the steppe and deserts around Qinghai Lake on the Qinghai-Tibet Plateau." Kirby *et al.* (2004) state that, "The sheep tick *Ixodes ricinus* (L.) is an ectoparasite of major economic and pathogenic importance in Scotland. Its distribution in the Scottish uplands is assumed to be governed by the abundance and distribution of its definitive hosts (deer and *O. aries*) and climatic variables such as temperature and rainfall.

Management Info

Preventative measures: Risk Assessment models for assessing the risk that exotic vertebrates could establish in Australia have been further explored by the Western Australia Department of Agriculture & Food (DAFWA) to confirm that they reasonably predict public safety, establishment and pest risks across a full range of exotic species and risk levels.

The [Risk assessment for the Domestic Sheep \(*Ovis aries*\)](#), has been assigned a VPC Threat Category of **EXTREME**.

Mammals and birds were assessed for the pest risk they pose if introduced to Australia, by calculating Vertebrate Pests Committee (VPC) Threat Categories. These categories incorporate risk of establishing populations in the wild, risk of causing public harm, and risk of becoming a pest (eg causing agricultural damage, competing with native fauna, etc). The 7-factor Australian Bird and Mammal Model was used for these assessments.

Physical: Management strategies for sheep (*O. aries*) include hunting and the use of fencing to keep animals out (Welsh, 2002). Due to the behavioural similarities between sheep and goats (see [Capra hircus](#)), management strategies and hunting techniques for goats work equally well for sheep, although some minor variations may be required for each technique (this is also the case with goats, depending on vegetation, terrain, naivety). Please see Campbell & Donlan, 2005; Parkes *et al.* 1996 and Daly & Goriup, 1987 for more details on management strategies and hunting techniques for goats. Trapping of sheep at waterpoints or other limited resources (e.g. salt licks in some areas) can be highly effective. Please see O'Dempsey, 1993 for methods.

The use of Judas sheep as a hunting method could be applied quite easily; sheep are highly social animals and will search for conspecifics when isolated. Techniques like sterilisation, termination of pregnancy and inducing a prolonged estrus in goats for increasing their efficacy as Judas goats could be adapted for sheep.

Epididymectomy can be conducted efficiently in rams with the procedures indicted for male goats. Tubal occlusion could similarly be applied in ewes as described for does. Pregnancy termination in the ewe isn't as straight-forward as it is in goats. In the first 55 days of pregnancy, abortion can be induced with prostaglandins (6 mg PGF2alpha / 58kg body weight), after 55 days pregnancy termination with prostglandins is unlikely (Stellflug *et al.* 1997). Incorporating cesarean section with sterilisation procedures may be the most effective means of ensuring pregnancy is terminated prior to deployment of Judas sheep. The procedure for cesarean section on sheep is outlined by Mobini *et al.* 2002.

(Karl Campbell., pers.comm., September 2005).

Principal source: Van Vuren, D. and B.E. Coblentz. 1987. Some ecological effects of feral sheep on Santa Cruz Island.

Compiler: IUCN SSC Invasive Species Specialist Group

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Review: Dr Dirk Van Vuren Professor and Department Chair Wildlife, Fish, & Conservation Biology University of California Davis USA

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ALIEN RANGE

[1] AFRICA	[1] ASIA
[1] AUSTRALIA	[1] CHINA
[1] FALKLAND ISLANDS (MALVINAS)	[1] FRENCH POLYNESIA
[1] FRENCH SOUTHERN TERRITORIES	[1] MEXICO
[1] NEW ZEALAND	[1] NORTH AMERICA
[1] PORTUGAL	[2] SAINT HELENA
[1] SAINT LUCIA	[1] SOUTH AMERICA
[2] SPAIN	[1] UNITED KINGDOM

[2] UNITED STATES

Red List assessed species 103: EX = 3; EW = 2; CR = 22; EN = 35; VU = 16; LR/nt = 1; NT = 20; DD = 2; LC = 2;

[Androcymbium psammophilum](#) VU
[Antechinomys laniger](#) LC
[Aratinga brevipes](#) EN
[Argyroxiphium kauense](#) CR
[Atelognathus praebasalticus](#) EN
[Begonia samhaensis](#) EN
[Brassica oleracea](#) DD
[Brassica villosa](#) NT
[Calyptorhynchus latirostris](#) EN
[Certhilauda burra](#) VU
[Cicer canariense](#) EN
[Ctenomys sociabilis](#) CR
[Darevskia unisexualis](#) NT
[Echium handiense](#) CR
[Frankenia portulacifolia](#) VU
[Fritillaria epirotica](#) EN
[Helix valentini](#) EN
[Hymenolaimus malacorhynchus](#) EN
[Juniperus standleyi](#) EN
[Ledebouria insularis](#) EN
[Leontodon siculus](#) NT
[Leporillus conditor](#) VU
[Macaca sylvanus](#) EN
[Masticophis anthonyi](#) CR
[Microtus guatemalensis](#) NT
[Minuartia dirphyia](#) CR
[Myadestes obscurus](#) VU
[Oldenlandia adscensionis](#) EX
[Oreomystis mana](#) EN
[Pardalotus quadragintus](#) EN
[Pelargonium insularis](#) CR
[Plebejus trappi](#) NT
[Podiceps gallardoi](#) EN
[Pomarea mendozae](#) EN
[Potentilla emilii-popi](#) DD
[Procellaria westlandica](#) VU
[Pteris adscensionis](#) CR
[Pterodroma sandwichensis](#) VU
[Puffinus opisthomelas](#) NT
[Rupicapra rupicapra](#) LC
[Salvia herbanica](#) CR
[Silene nocteolens](#) CR
[Solenanthus albanicus](#) EN
[Sorbus arranensis](#) VU
[Sterna albobriata](#) EN
[Todiramphus godeffroyi](#) CR
[Troglodytes sissonii](#) NT
[Tymanuchus cupido](#) VU
[Vermivora crissalis](#) NT
[Vipera darevskii](#) CR

[1] VIRGIN ISLANDS, BRITISH

[Anogramma ascensionis](#) CR
[Aphelocoma insularis](#) NT
[Ardeotis australis](#) NT
[Argyroxiphium sandwicense](#) VU
[Atelognathus reverberii](#) EN
[Bencomia exstipulata](#) VU
[Brassica rupestris](#) NT
[Cabalus modestus](#) EX
[Centaurea princeps](#) EN
[Chaeropus ecaudatus](#) EX
[Corvus hawaiiensis](#) EW
[Darevskia clarkorum](#) EN
[Diomedea epomophora](#) VU
[Ferula sadleriana](#) EN
[Fritillaria conica](#) EN
[Haematopus chathamensis](#) EN
[Horstrissea dolinicola](#) CR
[Iguana delicatissima](#) EN
[Lasiornis krefftii](#) CR
[Leipoa ocellata](#) VU
[Leporillus apicalis](#) CR
[Loxioides bailleui](#) CR
[Marattia purpurascens](#) NT
[Microcavia shiptoni](#) NT
[Mimus graysoni](#) CR
[Montivipera bornmuelleri](#) EN
[Neraudia ovata](#) CR
[Onychogalea fraenata](#) EN
[Origanum cordifolium](#) VU
[Parvilacerta fraasii](#) EN
[Perameles gunnii](#) NT
[Pluvianellus socialis](#) NT
[Polytelis alexandrae](#) NT
[Portulaca samhaensis](#) EN
[Procapra przewalskii](#) EN
[Pseudomys australis](#) VU
[Pterodroma madeira](#) EN
[Puffinus auricularis](#) CR
[Ribes sardoum](#) CR
[Ruprechtia apetala](#) LR/nt
[Sceloporus exsul](#) CR
[Sminthopsis douglasi](#) NT
[Somuncuria somuncurensis](#) CR
[Stemmacantha cynaroides](#) EN
[Thinornis rubricollis](#) NT
[Torreornis inexpectata](#) EN
[Turnix castanotus](#) NT
[Urosaurus auriculatus](#) EN
[Vini ultramarina](#) EN
[Vipera erivanensis](#) VU

[Vipera lotievi](#) NT
[Zenaida graysoni](#) EW

[Zavattariornis stresemanni](#) EN

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Bellchambers, K., 2004. Improving the development of effective and humane trapping systems as a control method for feral goats in Australia.

[BirdLife International 2006. Species factsheet: *Puffinus auricularis*. Downloaded from <http://www.birdlife.org> on 13/11/2006](#)

Summary: The World Bird Database provides the information management tool through which the BirdLife Partnership manages, analyses and reports on the breadth of its scientific knowledge - Species, Important Bird Areas (IBAs) and Endemic Bird Areas (EBAs) - much of these data are available through the Data Zone. You can search for detailed information on Species, Sites and EBAs, see examples of recent analyses and download subsets of the database. Information on some 10,000 species of bird, over 8,000 IBAs and 218 EBAs is managed through the WBDB, together with BirdLife's spatial data, multimedia files, other documents and links. The database is available from: <http://www.birdlife.org/datazone/index.html>

This page is available from: <http://www.birdlife.org/datazone/species/index.html?action=SpcHTMDetails.asp&sid=3938&m=0> [Accessed 10 September 2006]

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Carlile, N., Priddel, D., Zino, F., Natividad, C and Wingate, D. B., 2003. A review of four successful recovery programmes for threatened sub-tropical petrels. Marine Ornithology 31: 185-192.

Daly, K & Goriup, P 1987, Eradication of feral goats from small islands, 17, International Council for Bird Preservation, Cambridge, England.

[IUCN/SSC Invasive Species Specialist Group \(ISSG\), 2010. A Compilation of Information Sources for Conservation Managers.](#)

Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.

Kirby, A. D., A. A. Smith, T. G. Benton, and P. J. Hudson. 2004. Rising burden of immature sheep ticks (*Ixodes ricinus*) on red grouse (*Lagopus lagopus scoticus*) chicks in the Scottish uplands.. Medical and Veterinary Entomology 18(1):67-70.

Summary: A study documenting the transmission of tick born diseases by sheep.

[Klinger, R. C.; P. Schuyler, and J. D. Sterner., 2002. The response of herbaceous vegetation and endemic plant species to the removal of feral sheep from the Santa Cruz Island, California. In *Turning the tide: the eradication of invasive species*: 381-388. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

Summary: Eradication case study in Turning the tide: the eradication of invasive species.

[Massam M, Kirkpatrick W and Page A., 2010. Assessment and prioritisation of risk for forty introduced animal species. Invasive Animals Cooperative Research Centre, Canberra.](#)

Summary: This report documents work contributing to a project commissioned by the Invasive Animals Cooperative Research Centre to validate and refine risk assessment models used in decisions to import and manage introduced vertebrate species. The intent of the project was to: a) increase predictive accuracy, scientific validation and adoption of risk assessment models for the import and keeping of exotic vertebrates, and b) reduce the risk of new vertebrate pests establishing introduced populations in Australia.

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Meurk, Colin D., 1982. Regeneration of Subantarctic plants on Campbell island following exclusion of sheep. New Zealand Journal of Ecology 5: 51-58.

Mobini, S., Heath, A.M & Pugh, D.G 2002, Theriogenology of sheep and goats, in D.G Pugh (ed.), Sheep and goat medicine, W. B. Saunders Company, Philadelphia, pp. 129-86.

O Dempsey, N 1993, Sheep self mustering - muster in your sleep, Information series Q193026. Agdex 430/75, Queensland Department of Primary Industries, Charleville, Queensland.

[Page, Amanda; Win Kirkpatrick and Marion Massam, February 2009, Domestic Sheep \(*Ovis aries*\) risk assessment for Australia. Department of Agriculture and Food, Western Australia.](#)

Summary: Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003; Bomford 2006, 2008), reptiles and amphibians (Bomford 2006, 2008; Bomford *et al.* 2005). These Risk Assessment models have been further explored by Western Australia Department of Agriculture & Food (DAFWA) to confirm that they reasonably predict public safety, establishment and pest risks across a full range of exotic species and risk levels. Mammals and birds were assessed for the pest risk they pose if introduced to Australia, by calculating Vertebrate Pests Committee (VPC) Threat Categories. These categories incorporate risk of establishing populations in the wild, risk of causing public harm, and risk of becoming a pest (eg causing agricultural damage, competing with native fauna, etc). The 7-factor Australian Bird and Mammal Model was used for these assessments.

Parke, J., Henzell, R. and Pickles, G. 1996. Managing Vertebrate Pests: Feral Goats. Australian Government Publishing Service: 129pp.

Summary: A comprehensive review of the history and biology of feral goats in Australia, the damage they cause, and community attitudes to feral goat management. A wide range of strategies for goat control are discussed and recommended.

Rudge, M. R., 1986. The decline and increase of feral sheep (*Ovis aries* L.) on Campbell Island. New Zealand Journal of Ecology 9: 89-100.

Tummons, P. 1999. Hunters, State Stir Up Legal Action Over Removal of Sheep from Mauna Kea. Environment Hawai'i, Inc. 10 (4) HOOF BEAT column.

Summary: A newspaper article documenting legal barriers and problems that occurred in Hawaii eradicating populations of feral sheep. U.S. Fish and Wildlife Service, undated. Determination of Endangered Status for *Argyroxiphium kauense* (Ka'u Silversword). U.S. Fish and Wildlife Service Division of Endangered Species: 50 CFR Part 17 RIN: 1018-AB42.

Summary: Official U.S. document placing *Argyroxiphium kauense* on the endangered species list. Includes the impacts sheep have had on the species.

Van Driesche, Jason and Roy Van Driesche, Fall 2000. Nature Out of Place: Biological Invasions in the Global Age by (Island Press, Fall 2000).

[Varnham, K. 2006. Non-native species in UK Overseas Territories: a review. JNCC Report 372. Peterborough: United Kingdom.](#)

Summary: This database compiles information on alien species from British Overseas Territories.

Available from: <http://www.jncc.gov.uk/page-3660> [Accessed 10 November 2009]

[Welsh, R. 2002. Ovis aries. Earlham College: Senior Seminar 2002 Introduced Species in Hawaii.](#)

Summary: A brief species account documenting distribution and management actions.

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Summary: Available from: <http://www.iucnredlist.org/apps/redlist/details/106001458/0> [Accessed 16 January 2012]

Chapuis, J., Boussès, P., & Barnaud, G. 1994. Alien mammals, impact and management in the French Subantarctic Islands. Biological Conservation, 67, 97-104.

Summary: Cet article présente la situation actuelle et les impacts des populations introduites de mammifères dans les îles subantarctiques françaises. Les moyens de contrôle en place ou planifiés sont également présentés.

[CONABIO. 2008. Sistema de información sobre especies invasoras en México. Especies invasoras - Mamíferos. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.](#)

Summary: English:

The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (<http://www.conabio.gob.mx/invasoras/index.php/Portada>), under the section Novedades for information on updates.

Invasive species - mammals is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Mam%C3%ADferos [Accessed 30 July 2008]

Spanish:

La lista de especies del Sistema de información sobre especies invasoras de México cuenta actualmente con información acerca de nombre científico, familia, grupo y nombre común, así como hábitat, estado de la invasión en México, rutas de introducción y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la página de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualización, por favor consulte la portada

(<http://www.conabio.gob.mx/invasoras/index.php/Portada>), en la sección novedades, para conocer los cambios.

Especies invasoras - Mamíferos is available from:

http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Mam%C3%ADferos [Accessed 30 July 2008]

Liu, B., and Z. Jiang. 2004. Dietary overlap between Przewalski's gazelle and domestic sheep in the Qinghai Lake region and implications for rangeland management. Journal of Wildlife Management 68(2): 241-246.

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Summary: Brief overview and history of feral sheep in New Zealand.

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Summary: An indepth study on the reproductive cycle of sheep.

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[Reavill, C. 2000. Ovis aries. Animal Diversity Web.](#)

Summary: A general species account that covers the history, description, biology, and impacts of species.

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Scowcroft, Paul. G and Sakai, Howard F., 1983. Impact of Feral Herbivores on Mamane Forests of Mauna Kea, Hawaii: Bark Stripping and Diameter Class Structure. Journal of Range management 36(4)

Van Ripper, C., and J. M. Scott. 2001. Limiting factors affecting Hawaiian native birds. Studies in Avian Biology 22:221-233.

Summary: A study documenting the impacts sheep are having on a threatened Hawaiian species of bird.



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Ovis aries*

Van Vuren, D. and B.E. Coblentz. 1987. Some ecological effects of feral sheep on Santa Cruz Island, California USA. *Biological Conservation* 41:253-268