Terrestrial Mammal Conservation

Global evidence for the effects of interventions for terrestrial mammals excluding bats and primates

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Cover image: Cape mountain zebra (*Equus zebra zebra*), De Hoop Nature Reserve, South Africa. Photograph by Rebecca K. Smith, CC-BY.

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11. Threat: Climate change and severe weather

Background

Climate change, extreme weather and geological events can be very large-scale threats. Most interventions used in response to them, therefore, are general conservation interventions, such as providing artificial den sites, discussed in *Habitat restoration and creation*, and translocations and captive breeding, discussed in *Species Management*.

11.1. Retain/provide migration corridors

https://www.conservationevidence.com/actions/2551

- We found no studies that evaluated the effects on mammals of retaining or providing migration corridors.

'We found no studies' means that we have not yet found any studies that have directly evaluated this intervention during our systematic journal and report searches. Therefore, we have no evidence to indicate whether or not the intervention has any desirable or harmful effects.

https://doi.org/10.11647/OBP.0234.11

Background

Some mammals undertake long-distance migrations between sites occupied in different seasons. Some routes are used for such migrations by mammal populations over many generations. The availability of these routes may become especially important in the face of climate change, which may alter the duration over which some parts of an animal's range are suitable. Habitat destruction and fragmentation may make some routes less suited for migrations, but their provision or retention may become increasingly important as climate change drives changes in seasonal land-use or migrations of mammal populations.

See also: *Habitat Restoration and Creation — Create or maintain corridors between habitat patches*.

11.2. Protect habitat along elevational gradients

https://www.conservationevidence.com/actions/2552

- We found no studies that evaluated the effects on mammals of protecting habitat along elevational gradients.

'We found no studies' means that we have not yet found any studies that have directly evaluated this intervention during our systematic journal and report searches. Therefore, we have no evidence to indicate whether or not the intervention has any desirable or harmful effects.

Background

Global warming is prompting poleward and uphill shifts in species' range (e.g. Chen *et al*. 2011, Myers *et al.* 2009, Rowe *et al.* 2010). Species reliant on particular habitats may suffer population declines if they are unable to move towards higher latitudes and if there is no suitable habitat available at higher altitudes. Protecting habitat along elevational gradients may help to enable shifts in range.

Chen I.C., Hill J.K., Ohlemüller R., Roy D.B & Thomas C.D. (2011) Rapid range shifts of species associated with high levels of climate warming. *Science*, 333, 1024–1026, https://doi.org/10.1126/science.1206432

Myers, P., Lundrigan, B. L., Hoffman, S. M., Haraminac, A. P., & Seto, S. H. (2009). Climate-induced changes in the small mammal communities of the Northern Great Lakes Region. *Global Change Biology*, 15, 1434-1454, https://doi.org/10.1111/j.1365-2486.2009.01846.x

Rowe, R. J., Finarelli, J. A., & Rickart, E. A. (2010). Range dynamics of small mammals along an elevational gradient over an 80-year interval. *Global Change Biology*, 16, 2930-2943, https://doi.org/10.1111/j.1365-2486.2009.02150.x

11.3. Translocate animals from source populations subject to similar climatic conditions

https://www.conservationevidence.com/actions/2553

- **One study** evaluated the effects of translocating mammals from source populations subject to similar climatic conditions. This study was in the USA[1].

COMMUNITY RESPONSE (0 STUDIES)

POPULATION RESPONSE (1 STUDY)

- **Reproductive success (1 study):** A study in the USA[1] found that bighorn sheep translocated from populations subject to a similar climate to the recipient site reared more offspring than did those translocated from milder climatic areas.

BEHAVIOUR (0 STUDIES)

Background

As human-induced climate change leads to increasing temperatures, species shift their distributions to higher latitudes and elevations (Hickling *et al*. 2006). However, some species cannot disperse quickly enough, or may not be able to cross human or man-made barriers (Thomas 2011). This results in some animals being present in areas that represent poor quality habitat, resulting in increased mortality rates that may risk local or even global extinction. One solution that has been suggested for this problem is the translocation of animals to areas where climatic conditions are similar to those formerly found in their natural ranges (Thomas 2011).

Hickling R., Roy D.B., Hill J.K., Fox R. & Thomas C.D. (2006) The distributions of a wide range of taxonomic groups are expanding polewards. *Global Change Biology*, 12, 450–455, https://doi.org/10.1111/j.1365-2486.2006.01116.x

Thomas C.D. (2011) Translocation of species, climate change, and the end of trying to recreate past ecological communities. *Trends in Ecology & Evolution*, 26, 216–221, https://doi.org/10.1016/j.tree.2011.02.006

A study in 2006–2011 of scrubland across a large area in North Dakota, USA (1) found that bighorn sheep *Ovis canadensis* translocated from populations subject to a similar climate to the recipient site reared more offspring, compared to those translocated from areas with a milder climate. Sheep from an area with a climate similar to the recipient site had a higher average annual recruitment (0.6 juveniles/adult female) than did sheep originating from a milder climate area (0.2 juveniles/adult female). Thirty-nine bighorn sheep originating from Montana, where climate was similar to the recipient site, were release in North Dakota in 2006–2007. Their annual recruitment was compared with that of sheep released between 1956 and 2004, which originated from stock from British Columbia, Canada. Recruitment was assessed by direct observations of radio-tracked sheep, annually, in late summer and the following March of 2006–2011.

(1) Wiedmann B.P. & Sargeant G.A. (2014) Ecotypic variation in recruitment of reintroduced bighorn sheep: implications for translocation. *The Journal of Wildlife Management*, 78, 394–401, https://doi.org/10.1002/jwmg.669

11.4. Provide dams/water holes during drought

https://www.conservationevidence.com/actions/2554

- We found no studies that evaluated the effects on mammals of providing dams or water holes during drought.

'We found no studies' means that we have not yet found any studies that have directly evaluated this intervention during our systematic journal and report searches. Therefore, we have no evidence to indicate whether or not the intervention has any desirable or harmful effects.

Background

Climate change may increase the frequency of droughts. Populations of some mammal species that are reliant on availability of water may be buffered against effects of drought by artificial provision of water. This could be through digging holes down to the water table or building dams, to store water for use in times of drought.

For cases where provision of water as an intervention is a response to water shortage caused by other human-induced activities, rather than directly via climate change, see *Natural system modifications — Provide artificial waterholes in dry season*.

11.5. Apply water to vegetation to increase food availability during drought

https://www.conservationevidence.com/actions/2555

- **One study** evaluated the effects on mammals of applying water to vegetation to increase food availability during drought. This study was in the USA[1].

COMMUNITY RESPONSE (0 STUDIES)

POPULATION RESPONSE (0 STUDIES)

BEHAVIOUR (1 STUDY)

- **Use (1 study):** A controlled, before-and-after study in the USA[1] found that watering scrub during drought increased its use by adult Sonoran pronghorns for feeding.

Background

Drought can cause plants to die as a result of a lack of water. Dieback of vegetation may in turn negatively affect mammal populations by reducing the availability of food. Applying water during a drought may help to reduce some of these negative consequences.

A controlled, before-and-after study in 2005 in a desert enclosure in Arizona, USA (1) found that watering scrub during drought increased its use for feeding by adult Sonoran pronghorns *Antilocapra american sonoriensis*. In winter (January–March), before plots were watered, pronghorns selected plots to be watered and unwatered in proportion to their availability. After watering commenced, pronghorns fed more in watered plots than their availability in spring (April–June), summer (July–September) and autumn (October–December). Use of watered plots was highest in autumn, when 48% of observations were in these plots, which covered 5% cover of the enclosure. Seven adult pronghorns were held in a 130-ha enclosure. Eight desert scrub plots, c.8,000 m^2 each, were watered at least once every two weeks from April–December 2005, by applying c.13 cm of water. Autumn rainfall during the study period was low (4 mm, compared to average of 16 mm). Pronghorn feeding area selection was determined by watching from a partially concealed viewpoint, from 23 January to 2 December 2005. Observations were recorded at 2-minute intervals, four to five days/week during either first light to noon or noon to last light, giving 38,900 individual observations.

(1) Wilson R.R., Krausman P.R. & Morgart J.R. (2010) Forage enhancement plots as a management tool for Sonoran pronghorn recovery. *The Journal of Wildlife Management*, 74, 236–239, https://doi.org/10.2193/2009-191

11.6. Remove flood water

https://www.conservationevidence.com/actions/2557

- We found no studies that evaluated the effects on mammals of removing flood water.

'We found no studies' means that we have not yet found any studies that have directly evaluated this intervention during our systematic journal and report searches. Therefore, we have no evidence to indicate whether or not the intervention has any desirable or harmful effects.

Background

Climate change increases the risk of extreme weather events, including flooding. Flood waters may cover habitat normally used by mammal species. For example, more than half of China's mammal species were found to be exposed to risks from flooding (Ameca y Juárez & Jiang 2016). In addition to direct casualties from effects of water (such as drowning) flood water may alter the habitat, for example through changes to vegetation. Furthermore, mammal mortality may be higher when flood water persists for longer (Wuczyński & Jakubiec 2013). Enabling rapid removal of flood water, such as through creating drainage routes, may lessen such impacts.

Ameca y Juáreza E.I. & Jianga Z. (2016) Flood exposure for vertebrates in China's terrestrial priority areas for biodiversity conservation: Identifying internal refugia. *Biological Conservation*, 199, 137–145, https://doi.org/10.1016/j.biocon.2016.04.021

Wuczyński A. & Jakubiec Z. (2013) Mortality of game mammals caused by an extreme flooding event in south-western Poland. *Natural Hazards*, 69, 85–97, https://doi.org/10.1007/s11069-013-0687-x