Dusky shrew

Class: Mammalia
Order: Eulipotyphla

Sorex obscurus

Note: Previously recognized as Sorex monticola (sometimes misspelled as Sorex monticolus).

Review Status: Peer-reviewed **Version Date:** 20 November 2018

Conservation Status

NatureServe:	*Agency:*		
G Rank: G5	ADF&G: Species of Greatest Conservation Need	IUCN: Least Concern	Audubon AK:
S Rank: S4	USFWS:	BLM:	

Final Rank

Conservation category: **V. Orange**

unknown status and either high biological vulnerability or high action need

Category	Range	Score
Status	-20 to 20	0
Biological	-50 to 50	-38
Action	-40 to 40	32

Higher numerical scores denote greater concern

Status - variables measure the trend in a taxon's population status or distribution. Higher status scores denote taxa with known declining trends. Status scores range from -20 (increasing) to 20 (decreasing). **Score**

Population Trend in Alaska (-10 to 10) 0

Unknown.

Distribution Trend in Alaska (-10 to 10) 0

Trends over the past 50 years are unknown. Modeling studies estimate that the distribution of S. obscurus (previously S. monticola) in Alaska has increased since the Last Glacial Maximum (~21,500 years ago; Hope et al. 2015), but models disagree as to whether habitat will increase (Baltensperger and Huettmann 2015a; Hope et al. 2015) or decrease (Marcot et al. 2015) in the future.

Status Total: 0

Biological - variables measure aspects of a taxon's distribution, abundance and life history. Higher biological scores suggest greater vulnerability to extirpation. Biological scores range from -50 (least vulnerable) to 50 (most vulnerable). **Score**

Population Size in Alaska (-10 to 10) -6

Unknown, but suspected large. S. obscurus is considered "common and sometimes abundant" (MacDonald and Cook 2009) and is widespread across most of Alaska.

Range Size in Alaska (-10 to 10) -10

Found across most of Alaska from southeast Alaska north to the Brooks Range and from the eastern

Aleutian Islands east to the Canadian border (MacDonald and Cook 2009; Hope 2012). Also found on several islands in southeast and southcoastal Alaska (MacDonald and Cook 2009). Estimated range size is >400,000 sq. km.

Population Concentration in Alaska (-10 to 10) -10

Does not concentrate (Smith and Belk 1996).

Reproductive Potential in Alaska

Age of First Reproduction (-5 to 5) -5

< 2 years (Smith and Belk 1996).

Number of Young (-5 to 5) -3

Average litter size ranges from five to eight (Smith and Belk 1996). Females have two or more litters per year (Smith and Belk 1996).

Ecological Specialization in Alaska

Dietary (-5 to 5) 1

Eats primarily small insects and invertebrates, though in certain habitats items such as conifer seeds and fungi comprise >1/3 of their diet (Gunther et al. 1983; Eckrich et al. 2018; O'Brien et al. 2018). Because invertebrates are an ephemeral and potentially unpredictable food source, we rank this question as B- Moderately adaptable with key requirements common.

Habitat (-5 to 5) -5

Found in several habitat types across Alaska, including forests, shrub thickets, wetlands, riparian, and tundra meadows (Nolan and Peirce 1996; Cook and MacDonald 2006; MacDonald and Cook 2009; Hope 2012). In the coastal forests of southeast Alaska, S. obscurus has been reported from a variety of stand ages including old- and young-growth forests, clearcuts, and thinned stands (Eckrich et al. 2018; O'Brien et al. 2018).

Biological Total: -38

Action - variables measure current state of knowledge or extent of conservation efforts directed toward a given taxon. Higher action scores denote greater information needs due of lack of knowledge or conservation action. Action scores range from -40 (lower needs) to 40 (greater needs). **Score**

Management Plans and Regulations in Alaska (-10 to 10) 10

Listed as unclassified game in Alaska with no bag limit and no closed season (ADFG 2020a).

Knowledge of Distribution and Habitat in Alaska (-10 to 10) 2

Distribution and habitat associations have been documented (Cook and MacDonald 2009; see Habitat section). Recent surveys have been conducted in northern and western Alaska (Cook and MacDonald 2006; Hope 2012) and on islands of southeast Alaska (Eckrich et al. 2018; O'Brien et al. 2018). Additional collection efforts are needed in Alaska and in British Columbia to resolve the taxonomic status and genetic lineages of subspecies and populations (MacDonald and Cook 2009; Sawyer 2014; A. Hope, pers. comm.).

Knowledge of Population Trends in Alaska (-10 to 10) 10

Not currently monitored.

Knowledge of Factors Limiting Populations in Alaska (-10 to 10) 10

Little is known about the ecology of dusky shrews in Alaska. A study on Prince of Wales Island documented high winter mortality and found an inverse relationship between densities of dusky shrews and Keen's mice (Eckrich et al. 2018). The authors suggest that food competition between the

two species may limit population densities in certain habitats (Eckrich et al. 2018). O'Brien et al. (2018) similarly suggested that food competition may occur between S. monticola and S. cinereus, though they did not explicitly test this hypothesis. Studies have investigated the phylogeography and evolution of this species (e.g. Cook et al. 2001; Demboski and Cook 2001; Sawyer 2014), but additional research is needed to understand genetic diversity among populations and resolve taxonomic designations (A. Hope, pers. comm.). Endo- and ectoparasites have been collected (Murrell et al. 2003; Lynch and Duszynski 2008; Greiman et al. 2013; Cook et al. 2017), but their effects on population dynamics are unknown. Climate change is predicted to impact this species' distribution, but models disagree as to whether habitat will increase (Baltensperger and Huettmann 2015a; Hope et al. 2015) or decrease (Sawyer 2014; Marcot et al. 2015) in the future.

Action Total: 32

Supplemental Information - variables do not receive numerical scores. Instead, they are used to sort taxa to answer specific biological or management questions.

Harvest:	Not substantial
Seasonal Occurrence:	Year-round
Taxonomic Significance:	Monotypic species
% Global Range in Alaska:	>10%
% Global Population in Alaska:	25-74%
Peripheral:	No

References

Alaska Department of Fish and Game (ADFG). 2020a. 2020-2021 Alaska hunting regulations. Alaska Department of Fish and Game. Juneau, AK, USA.

Baltensperger, A. P., and F. Huettmann. 2015a. Predicted shifts in small mammal distributions and biodiversity in the altered future environment of Alaska: an open access data and machine learning perspective. PLoS ONE 10(7):e0132054. DOI: 10.1371/journal.pone.0132054

Cook, J. A., and S. O. MacDonald. 2006. Mammal inventory of Alaska's National Parks and Preserves, Arctic Network [...]. Report NPS/AKRARCN/NRTR-2004/01. National Park Service, Alaska Region, Anchorage, AK, USA.

Cook, J. A., A. L. Bidlack, C. J. Conroy, J. R. Demboski, M. A. Fleming, ..., S. O. MacDonald. 2001. A phylogeographic perspective on endemism in the Alexander Archipelago of Southeast Alaska. Biological Conservation 97(2):215-227. DOI: 10.1016/S0006-3207(00)00114-2

Cook, J. A., K. A. Galbreath, K. C. Bell, M. L. Campbell, S. Carrière, ... , E. P. Hoberg. 2017. The Beringian Coevolution Project: Holistic collections of mammals and associated parasites reveal novel perspectives on evolutionary and environmental change in the North. Arctic Science 3(3):585-617. DOI: 10.1139/as-2016-0042

Demboski, J. R., and J. A. Cook. 2001. Phylogeography of the dusky shrew, Sorex monticolus (Insectivora, Soricidae): insight into deep and shallow history in northwestern North America. Molecular Ecology 10(5):1227-1240. DOI: 10.1046/j.1365-294X.2001.01260.x

Eckrich, C. A., E. A. Flaherty, and M. Ben-David. 2018. Functional and numerical responses of shrews to competition vary with mouse density. PLoS ONE 13(1):e0189471. DOI: 10.1371/journal.pone.018947

Greiman, S. E., V. V. Tkach, and J. A. Cook. 2013. Description and molecular differentiation of a new Staphylocystoides (Cyclophyllidea: Hymenolepididae) from the Dusky Shrew Sorex monticolus in Southeast Alaska. Journal of Parasitology 99(6):1045-1049. DOI: 10.1645/13-302.1

Gunther, P. M., B. S. Horn, and G. D. Babb. 1983. Small mammal populations and food selection in relation to timber harvest practices in the western Cascade Mountains. Northwest Science 57(1):32-44.

Hope, A. G. 2012. High shrew diversity on Alaska's Seward Peninsula: community assembly and environmental change. Northwestern Naturalist 93(2):101-110.

Hope, A. G., E. Waltari, J. L. Malaney, D. C. Payer, J. A. Cook, and S. L. Talbot. 2015. Arctic biodiversity: increasing richness accompanies shrinking refugia for a cold-associated tundra fauna. Ecosphere 6(9):159. DOI: 10.1890/ES15-00104.1

Lynch, A. J., and D. W. Duszynski. 2008. Species of coccidia (Apicomplexa: Eimeriidae) in shrews from Alaska, U.S.A., and northeastern Siberia, Russia, with description of two new species. Journal of Parasitology 94(4): 883-888. DOI: 10.1645/GE-1506.1

MacDonald, S. O., and J. A. Cook. 2009. Recent mammals of Alaska. University of Alaska Press, Fairbanks, AK, USA.

MacDonald, S. O., and J. A. Cook. 2009. Recent mammals of Alaska. University of Alaska Press, Fairbanks, AK, USA.

Marcot, B. G., M. T. Jorgenson, J. P. Lawler, C. M. Handel, and A. R. DeGange. 2015. Projected changes in wildlife habitats in Arctic natural areas of northwest Alaska. Climate Change 130(2):145–154. DOI: 10.1007/s10584-015-1354-x

Murrell, B. P., L. A. Durden, and J. A. Cook. 2003. Host associations of the tick, Ixodes angustus (Acari : Ixodidae), on Alaskan mammals. Journal of Medical Entomology 40(5):682-685. DOI: 10.1603/0022-2585-40.5.682

Nolan, K. S., and J. M. Peirce. 1996. A survey of small mammals in Wood-Tikchik State Park, Alaska. Northwestern Naturalist 77(2):44–45. DOI: 10.2307/3536618

O'Brien, S. L., J. A. Cook, and S. D. Newsome. 2018. Niche differentiation among small mammals of the Alexander Archipelago in southeastern Alaska. Journal of Mammalogy 99(1):108-116. DOI: 10.1093/jmammal/gyx141

Sawyer, Y. E. 2014. Living on the edge: A comparative phylogeographic study of refugial and insular fragmentation. PhD thesis, University of New Mexico, Albuquerque, NM, USA. Available online: https://digitalrepository.unm.edu/biol_etds/99

Smith, M. E., and M. C. Belk. 1996. Sorex monticolus. Mammalian Species 528:1-5. DOI: 10.2307/3504177

Woodman, N. 2018. American recent eulipotyphla: Nesophontids, solendons, moles, and shrews in the New World. Smithsonian Institution Scholarly Press, Washington, D.C., USA.

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