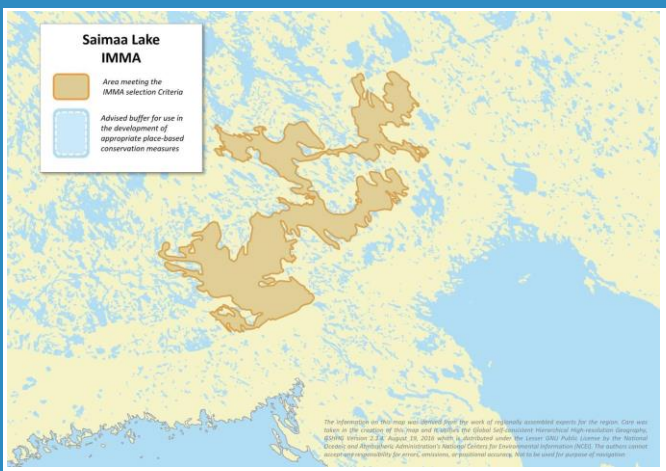

Area Size

6 363 km²

Qualifying Species and Criteria

Saimaa ringed seal – *Pusa hispida saimensis*

Criterion A; B (1); D (1)

Summary

Lake Saimaa in Finland hosts an isolated endemic population of the Saimaa ringed seal (*Pusa hispida saimensis),* a freshwater seal subspecies. The Saimaa subspecies has been genetically isolated from the other ringed seals (*Pusa hispida*) at least around 9,500 years. With less than 500 seals left, the Saimaa ringed seal population is endangered but slowly increasing. The subspecies is affected by climate change, bycatch in fishing gear, recreational use of the region and industrial development.

Saimaa Lake IMMA

Description:

Lake Saimaa, in Finland lies between the cities of Lappeenranta in the south and Joensuu in the north. The lake consists of numerous large basins connected by narrower glacier-carved channels. It includes almost 14,000 islands and has a coastline length over 14,500 km. The total surface area of the lake is ca. 4,400 km². The lake is relatively shallow with an average depth of 12 m, and a maximum depth of 86 m. It is mostly covered with ice between December and early May.

Criterion A: Species or Population Vulnerability

The Saimaa ringed seal (*Pusa hispida saimensis*) is listed as endangered (D, ver 3.1) on the IUCN Red List (Hyvärinen et al. 2019). It is endemic to Lake Saimaa, Finland, a freshwater lake isolated from other ringed regions. Therefore, the IMMA is the crucial and only available habitat for this endangered subspecies of ringed seals. It has been estimated that seal population dropped from thousands of individuals, to a low of 200 animals in around 1980 (Kokko et al., 1999; Sipilä & Hyvärinen, 1998; Kunnasranta et al., 2021). Due to active conservation efforts (Kunnasranta et al., 2021) the population is currently increasing by 3 % per year with a recent count of ~500 individuals (Metsähallitus, 2020). The population is, however, still threatened by high by-catch mortality, especially juveniles are vulnerable for by-caught by gill nets. In addition, the genetic diversity of the population is very low, making its viability questionable in the long term (Sundell et al., 2023; Valtonen et al., 2014; Heino et al. 2023). The population is subdivided (Löytynoja et al., 2023), making inbreeding a realistic threat (Sundell et al., 2023). Climate change is one of the

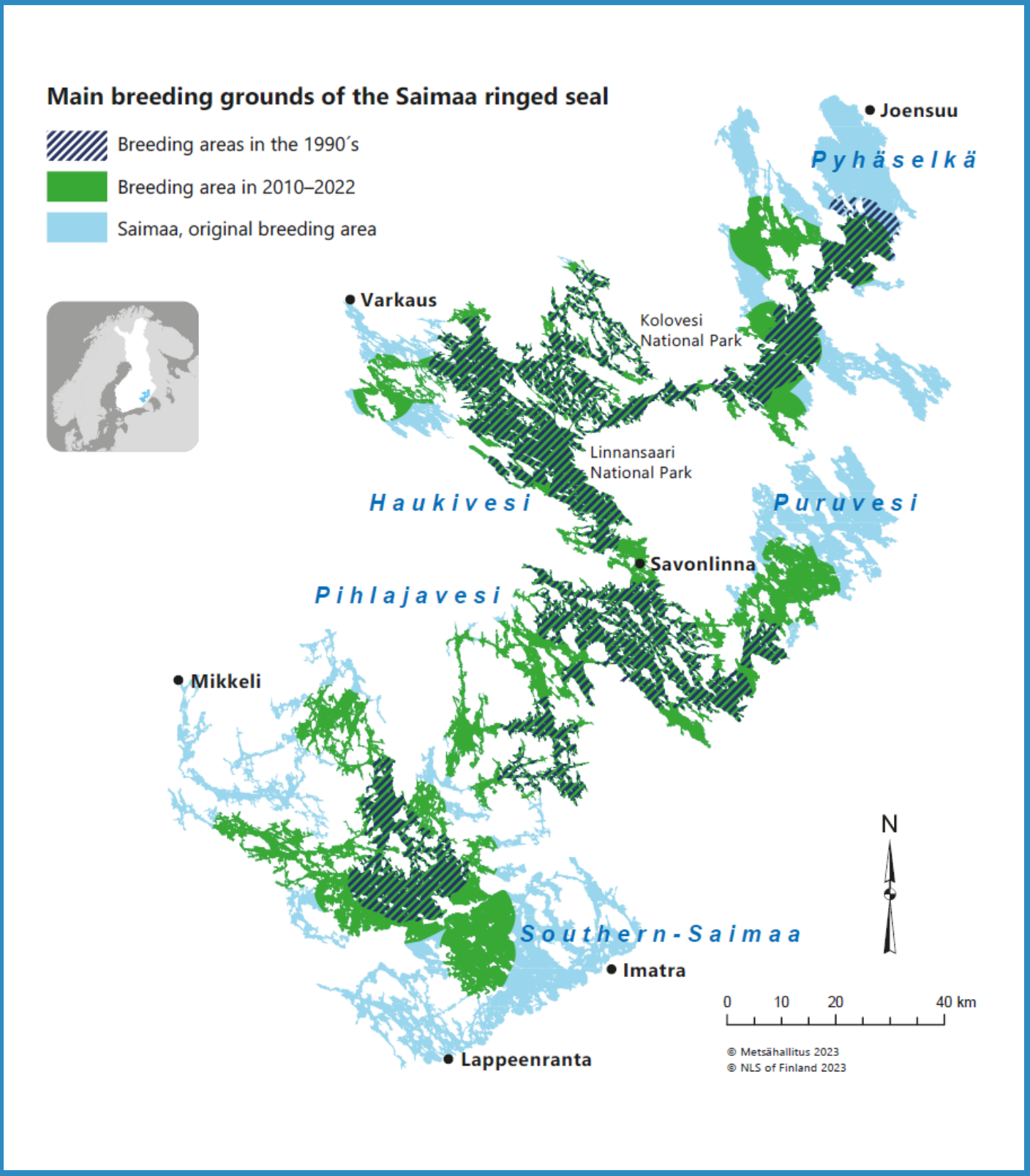

Figure 1: Main breeding grounds of the Saimaa ringed seal (*Pusa hispida saimensis*). Excerpt from Metsähallitus (2023) - https://www.metsa.fi/en/project/our-saimaa-seal-life/ and NLS of Finland (2023).

major threats that affects the viability of the population, which depends on lake ice for breeding, which is questionable for the long term given climate warming (Auttila et al., 2015; Kunnasranta et al., 2021). Scientists are currently performing explorative use of piled snow and also artificial nest boxes to help Saimaa ringed seals reproduce successfully under the diminishing ice conditions observed in recent years (Auttila et al., 2015; Kunnasranta et al., 2022).

Figure 2: Saimaa ringed seal (*Pusa hispida saimensis*). Photo credit: Miina Auttila / Metsähallitus

Criterion B: Distribution and Abundance Sub-criterion B1: Small and Resident Populations

The Saimaa ringed seal is resident to a single lake system, Lake Saimaa, Finland. The subspecies is pagophilic (ice-breeding), giving birth in mid February to mid March. Saimaa ringed seals prefer to dig their subnivean lairs along the shoreline of small islands and islets, the only places in Lake Saimaa where the snow piles up in drifts (Sipilä et al., 1990).

The Saimaa ringed seal population consists of about 500 animals endemic to the Lake Saimaa area with some 100 pups born annually (Metsähallitus, 2020). The population in the lake is furthermore subdivided into smaller aggregations showing slowly decreasing individual heterozygosity in microsatellite loci, threatening the long-term viability of the subspecies (Valtonen et al., 2014; Heino et al., 2023; Sundell et al., 2023), especially when facing a largely unknown future due to climate change-induced losses of breeding opportunities. Sundell et al. (2023) suggest that a translocation within the lake may be necessary to keep genetic diversity at a sustainable level.

The subspecies is a feeding generalist, preying mainly on smaller schooling fish. Saimaa ringed seals exhibit a high site fidelity, but can travel longer distances, especially juveniles (e.g. Liukkonen et al., 2018; Niemi et al., 2013, 2019; Biard et al., 2022).

Criterion D: Special Attributes
Sub-criterion D1: Distinctiveness

The Saimaa ringed seal population is small, and genetically and geographically isolated. The subspecies' adaptation to a freshwater ecosystem makes it exceptional among the pinnipeds, which are primarily marine.

Figure 3: Saimaa ringed seal (*Pusa hispida saimensis*) mother and pup. Photo credit: Miina Auttila / Metsähallitus

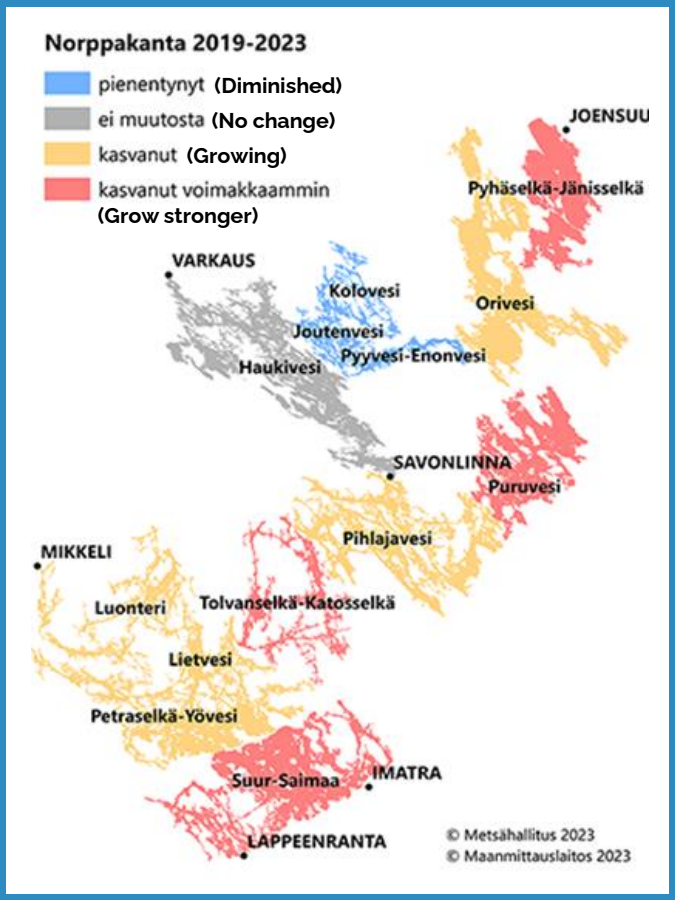

Figure 4: Saimaa ringed seal (*Pusa hispida saimensis*) population growth in different population monitoring areas. Excerpt from Metsähallitus (2023) - https://www.metsa.fi/luonto-ja-kulttuuriperinto/lajien-suojelu/saimaannorppa/norppakannan-seuranta/ and Maanmittauslaitos (2023).

Supporting Information

Auttila, M., Niemi, M., Skrzypczak, T., Viljanen, M., and Kunnasranta, M. 2014, Estimating and mitigating perinatal mortality in the endangered Saimaa ringed seal (*Phoca hispida saimensis*) in a changing climate. In Annales Zoologici Fennici (Vol. 51, No. 6, pp. 526-534). Finnish Zoological and Botanical Publishing Board.

Biard, V., Nykänen, M., Niemi, M., and Kunnasranta, M. 2022. Extreme moulting site fidelity of the Saimaa ringed seal. Mammalian Biology, 102(4), pp.1483-1495.

Heino, M.T., Nyman, T., Palo, J.U., Harmoinen, J., Valtonen, M., Pilot, M., Översti, S., Salmela, E., Kunnasranta, M., Väinölä, R., Hoelzel, A.R., and Aspi, J. 2023. Museum specimens of a landlocked pinniped reveal recent loss of genetic diversity and unexpected population connections. Ecology and Evolution, 13, e9720. https://doi.org/10.1002/ece3.9720.

Hyvärinen, E., Juslén, A., Kemppainen, E., Uddström, A., and Liukko, U-M. 2019. Suomen lajien uhanalaisuus : Punainen kirja 2019. (*Endangered species in Finland: Red Book 2019*). Ympäristöministeriö & Suomen ympäristökeskus. https://helda.helsinki.fi/items/2ec69a48-d943-488c-927f-19bbf9f92cb5.

Kokko, H., Helle, E., Lindström, J., Ranta, E., Sipilä, T., and Courchamp, F. 1999. Backcasting population sizes of ringed and grey seals in the Baltic and Lake Saimaa during the 20th century. In Annales Zoologici Fennici (pp. 65-73). Finnish Zoological and Botanical Publishing Board.

Kunnasranta, M., Niemi, M., Auttila, M., Valtonen, M., Kammonen, J., and Nyman, T. 2021. Sealed in a lake—Biology and conservation of the endangered Saimaa

ringed seal: A review. Biological Conservation, 253, 108908.

Kunnasranta, M., Niemi, M. and Auttila, M. 2022. Developing artificial nest boxes for a large aquatic mammal. Aquatic Conservation: Marine and Freshwater Ecosystems, 32(8), 1365 1371. https://doi.org/10.1002/aqc.3851.

Liukkonen, L., Ayllón, D., Kunnasranta, M., Niemi, M., Nabe-Nielsen, J., Grimm, V., and Nyman, A.-M. 2018. Modelling movements of Saimaa ringed seals using an individual-based approach. Ecological Modelling 368:321-335.

Löytynoja, A., Rastas, P., Valtonen, M., Kammonen, J., Holm, L., Olsen, M.T., Paulin, L., Jernvall, J., and Auvinen, P. 2023. Fragmented habitat compensates for the adverse effects of genetic bottleneck. *Current Biology*, *33*(6), pp.1009-1018.

Metsähallitus, 2020. Saimaannorppakannan seuranta. https://www.metsa.fi/luonto-ja-kulttuuriperinto/lajien-suojelu/saimaannorppa/norppakannan-seuranta/.

Niemi, M., Liukkonen, L., Koivuniemi, M., Auttila, M., Rautio, A., and Kunnasranta, M. 2019. Winter behavior of Saimaa ringed seals: Non-overlapping core areas as indicators of avoidance in breeding females. PLoS One 14, e0210266.

Niemi, M., Auttila, M., Viljanen, M., and Kunnasranta, M. 2013. Home range, survival, and dispersal of endangered Saimaa ringed seal pups: Implications for conservation. Marine mammal science, 29(1), 1-13.

Sipilä T., Helle E. and Hyvärinen H. 1990. Distribution, population size and reproductivity of the Saimaa ringed seal (*Phoca hispida saimensis* Nordq.) in Finland, 1980–84. Finnish Game Research, 47, 3-10.

Sipilä, T. and Hyvärinen, H. 1998. Status and biology of Saimaa (*Phoca hispida saimensis*) and Ladoga (*Phoca hispida ladogensis*) ringed seals. NAMMCO Scientific Publications. 1, (Jun. 1998), 83–99. DOI: https://doi.org/10.7557/3.2982.

Sundell, T., Kammonen,, J.I., Mustanoja, E., Biard, V., Kunnasantra, M., Niemi, M., Nykänen, M., Nyman, T., Palo, J.U. Valtonen, M., Paulin, L., Jernvall, J., and Auvinen, P. 2023. Genomic evidence uncovers inbreeding and supports translocations in rescuing the genetic diversity of a landlocked seal population. Conservation Genetics 24: 155-165. https://doi.org/10.1007/s10592-022-01497-9.

Valtonen, M., Palo, J.U., Aspi, J., Ruokonen, M., Kunnasranta, M., and Nyman, T. 2014. Causes and consequences of fine-scale population structure in a critically endangered freshwater seal. *BMC Ecology* 2014 14: 22.

Acknowledgements

We would like to thank the participants of the 2023 IMMA Regional Expert Workshop for the identification of IMMAs in the North East Atlantic Ocean. Funding for the identification of this IMMA was provided by the Water Revolution Foundation. Other sponsors for the workshop included OceanCare and ORCA (orca.org.uk), and substantial administrative support to the IMMA Secretariat was provided by the Tethys Research Institute and Whale and Dolphin Conservation.

Suggested Citation: IUCN-MMPATF (2024) Saimaa Lake IMMA Factsheet. IUCN Joint SSC/WCPA Marine Mammal Protected Areas Task Force, 2024.

PDF made available for download at ***https://www.marinemammalhabitat.org/factsheets/saimaa-lake-imma/***