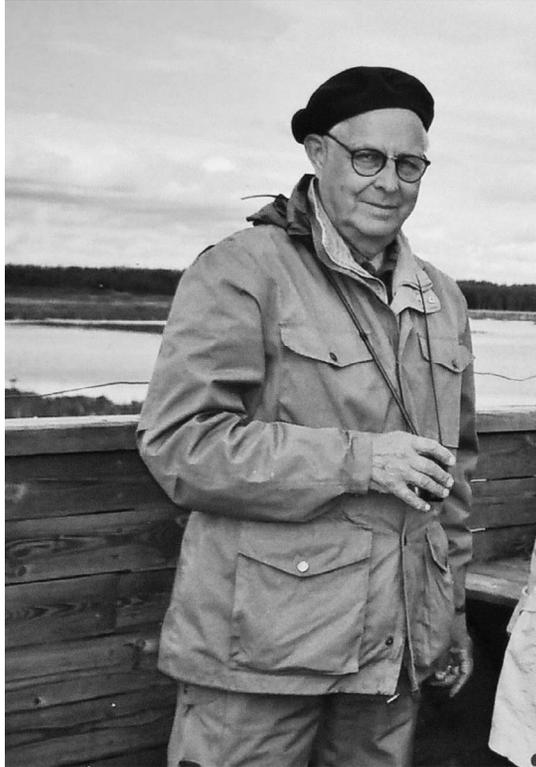


IN MEMORIAM
SEPPO SULKAVA
1931–2019



Seppo Sulkava, Professor of Zoology (Emeritus) passed away at the age of 87 years at home in Espoo, Finland, in January 2019. He was born on 30 September 1931 in Ilmajoki, western Finland. He had an extensive and productive career starting in 1961 at the newly formed University of Oulu in northern Finland as a researcher, and later working as a curator of the Zoological Museum and Professor of Zoology after 1968. From 1987 he concurrently acted as a Professor and the head of the Department of Zoology until his retirement in 1994.

Seppo Sulkava was a versatile researcher, with fields of study including raptor ecology, small mammal ecology, and winter ecology. He specialized in field research on the foraging ecology of birds of prey including almost all diurnal raptors and owls breeding in northern Europe. He represented the old "German-Dutch raptor school" launched by early ornithologists including Otto Uttendörfer and Lucas Tinbergen, in which the study of the raptor ecology primarily consisted of studies of diet composition (e.g., Uttendörfer 1952). Seppo brought ideas from this perspective to Finland, later becoming a pioneering raptor researcher there. His Ph.D. thesis on the Northern Goshawk (*Accipiter gentilis*; Sulkava 1964) included a careful description and development of study methods to determine the goshawk's diet during nest-building, egg-laying, incubation, and the nestling period in two large areas of southern Finland. He also analyzed among-year diet variation in relation to the main food resources (the grouse species of the family

Tetronidae) and the red squirrel (*Sciurus vulgaris*). His Ph.D. thesis also dealt with the regional variation in the diet composition in Europe. Finally, he studied the effects of the yearly diet variation on clutch size, brood size, and natal dispersal of goshawks.

A particularly interesting part of his Ph.D. thesis was his analysis of the crash of Northern Goshawk populations in Finland after an extremely cold winter. Estimates of populations of small game species (Tetraonids), the main foods of the goshawk in Finland at that time, were available to allow Sulkava to determine the probable cause for the dramatic goshawk population collapse. As a testament to his acumen as a scientist, more than 50 years later he repeated part of the prey collections, and showed how goshawks had replaced their previous diet with corvids, pigeons, and thrushes (Sulkava et al. 2006).

In his later works and especially while teaching, Professor Sulkava brought the classic ecology of birds of prey into modern times. Species including the Peregrine Falcon (*Falco peregrinus*), Golden Eagle (*Aquila chrysaetos*), White-tailed Eagle (*Haliaeetus albicilla*), and Eurasian Eagle-Owl (*Bubo bubo*) became the focus of his research in the 1960s when these species were threatened in Finland and elsewhere in Europe. He also studied diet composition and its among-year variation in Rough-legged Hawks (*Buteo lagopus*), Gyrfalcons (*Falco rusticolus*), and several owl species including the Snowy Owl (*Bubo scandiacus*), Great Gray Owl (*Strix nebulosa*; Mikkola and Sulkava 1970, Sulkava and Huhtala 1997), Ural Owl (*Strix uralensis*; Korpimäki et al. 1990), Short-eared Owl (*Asio flammeus*; Mikkola and Sulkava 1969), and Boreal Owls (*Aegolius funereus*; Sulkava and Sulkava 1971). Persecution of birds of prey influenced species' populations until the late 1960s when several species were still unprotected in Finland and other countries of Europe (Pohja-Mykrä et al. 2012). By publishing diets of many species, he showed how harmless owls and most diurnal raptors were for small game, which led to a scientific basis for Finnish and European raptor protection laws. Recently, persecution of raptors in Europe has greatly diminished.

Seppo Sulkava had enormous skill in identifying prey remains such as mammalian hair and bones, bird feathers, small pieces of insects, and scales of fish. As such, his collaboration was highly desired by many research teams even after his retirement. These late investigations included several separate studies of the White-tailed Eagle and Eurasian Eagle-Owl diet in the Finnish Archipelago, and southern Finland (Sulkava et al. 1997, 2008, Ekblad et al. 2016). He also participated in studies on long-term changes of Golden Eagle diet composition relative to declines in forest grouse populations (Sulkava et al. 1998), food of the Snowy Owls in the Finnish Lapland (Hakala et al. 2006), and diet composition of the goshawk in rural and urban areas near Helsinki (Solonen et al. 2019). One of his most recent publications was an international cooperative study of breeding-season diets of Ural Owls throughout their European breeding range (Vrezec et al. 2018).

Seppo Sulkava's second primary interest was small mammals. North Finland was an ideal study area due to the many arctic and subarctic species found there but not in the southern part of the country. He developed identification systems for mammals from bones and hairs and included these findings when revising Professor Lauri Siivonen's book *Mammals of Northern Europe* (Siivonen and Sulkava 1994). He also wrote a book of winter ecology with Professor of Botany Paavo Havas, *Winter of Finnish Nature* (Havas and Sulkava 1987) and a guidebook for identifying tracks in snow with Lauri Siivonen and Kalevi Heikura (Siivonen et al. 1982). All three books are in Finnish.

We well remember his enthusiastic attitude toward studies of the ecology of birds of prey. After retirement, he compiled all his long-term food studies of Eurasian Eagle-Owls, Northern Goshawks, and Ural Owls, starting in the 1950s and 1960s. Based on these datasets, researchers were able to analyze and document the declining numbers of forest-dwelling Siberian flying squirrels (*Pteromys volans*) and red squirrels in boreal forests of Finland from the 1950s to 2000s (Selonen et al. 2010).

Seppo Sulkava was known as a gentleman who always had time for his students. He offered time for research but never forgot his absolute sense of duty in daily and often routine work. As the leader of the Department of Zoology at Oulu University, Seppo supervised hundreds of M.S. and Ph.D. students, and inspired many people who later became noted raptor ecologists. He always made time to comment on draft manuscripts, and to provide thoughtful and constructive comments, which greatly improved their scientific content. He was dedicated scientist who continued his ground-breaking work with owl and raptor diet analyses literally until he died working at his desk at home. We foresee that his decades of exemplary work will continue to support contemporary ecological research in Finland, and throughout Europe and the world. Seppo Sulkava will remain influential in the future development of ecological studies on birds of prey and on

the animal ecology in Finland and elsewhere in Europe.—**Erkki Korpimäki, Department of Biology, University of Turku, Finland, Heimo Mikkola, Department of Biology, University of Eastern Finland, Finland, and Risto Tornberg, Department of Ecology and Genetics, University of Oulu, Finland**

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