

Steller's Sea Eagle

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BOOK REVIEWS

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Steller's Sea Eagle. By Vladimir Masterov, Michael Romanov, and Richard Sale. 2018. Snowfinch Publishing, Gloucestershire, UK. Appendices, references, index, figures, tables, numerous color photos and illustrations by the authors and others. ISBN 978-0-9571732-3-1. Hardback, \$65.

Having spent most of my professional career studying the Bald Eagle (*Haliaeetus leucocephalus*) in the western USA, I have always been curious about its largest congeneric that lives across the Pacific Ocean. *Steller's Sea Eagle* provides a portal into the haunts and habits of this remarkable eagle with “snow-capped wings” that I and many others may never get the opportunity to see in person.

The first thing that strikes the reader upon leafing through the book is the remarkable display of photographs peppered throughout this publication, both of the Steller's Sea Eagle (*H. pelagicus*) and the diverse habitats it occupies. This publication is a translation of an earlier Russian work by the first two authors, with changes including additional photographs and a chapter examining flight dynamics, presumably led by coauthor-physicist Richard Sale. The lead author, Vladimir Masterov, has compiled his publications, experience, and stories of more than thirty years studying the Steller's Sea Eagle along with extensive other sources for this work, and Michael Romanov's mathematical ecology modeling is apparent throughout.

The book reads like an ornithological textbook of raptor ecology, focusing on the sea eagle genus *Haliaeetus*, combined with a comprehensive and contemporary Steller's Sea Eagle species account. It is divided into 14 chapters covering all aspects of Steller's Sea Eagle ecology and management in its range, and includes: General Characteristics; Energy Balance; Hunting Methods and Diet; Distribution, Abundance and Migration; Habitats; Breeding Biology; Biology of the Chicks; Sakhalin Island and the Lower Amur Region; Reproduction; Modeling Population Dynamics; Genetic Diversity of the Sakhalin Population; Adverse Factors; Sea Eagle Protection Measures; and Conclusions.

The translation from Russian to English is imperceptible, with very few proofreading errors, and with British spellings and usage throughout. Examples of the latter include the use of juvenile instead of juvenal for that plumage, and Goosander for the Common Merganser (*Mergus merganser*). The many charts and tables designed to

clarify sometimes complicated data will be appreciated by all readers. The literature cited is extensive, with over 500 references, including contemporary Steller's Sea Eagle documents (many in Russian). However, I found the Bald Eagle literature is mostly older research. My chief complaint was that more maps are needed for international readers to follow along with all the unfamiliar places referenced, although one can easily search maps on the internet these days for details.

Above each chapter title is a small, finely detailed drawing by Evgeny Koblik, who also penned many other illustrations. In Chapter 1, field-guide-quality colored drawings depict the various Steller's Sea Eagle age-specific plumages, and the accompanying narrative descriptions are backed up with an appendix detailing determinative traits over ten body areas for each year of life up to the definitive plumage. Comparisons are made to the other sea eagles, including a nifty figure comparing the skull of the Steller's Sea Eagle with its massive and arching culmen contrasted to the Bald Eagle, White-tailed Sea-Eagle (*H. albicilla*), and Pallas's Fish-Eagle (*H. leucoryphus*).

The authors explore several tangential topics of interest to raptor specialists. For example, Chapter 2 examines the bioenergetics and flight dynamics of the species in considerable depth, with particular focus on the challenges and advantages of the Steller's Sea Eagle's large size. The authors discuss metabolism, time-energy budget, thermoregulation, and flight of this large eagle, and point out the importance of nest proximity to prey sources in a landscape where nesting substrate is often limited. A captive Steller's Sea Eagle was used to demonstrate the benefits of soaring and the high cost of flapping flight to the wild eagles while migrating and hunting, as revealed by an onboard IMU (inertial measurement unit) that recorded location, altitude, flight speed, and acceleration.

Chapter 3 was devoted to Steller's Sea Eagle foraging ecology and pleasingly aligned with my own fascination with the food habits of sea eagles, their being both opportunistic scavengers and adroit predators. A diversity of known Steller's Sea Eagle prey is tabulated in an extensive appendix. The authors provide vivid descriptions of hunting methods, including the various ways Steller's Sea Eagles capture cliff-dwelling Thick-billed Murres (*Uria lomvia*), and Harlequin Ducks (*Histrionicus histrionicus*) at sea. What is most interesting to me is how these behaviors relate to adaptation and survival of this largest of sea eagles. A feature of particular specialty is its massive beak, adapted to tear into large, tough-skinned prey and carrion in dynamic marine, estuarine, riverine, and lacustrine ecosystems populated with salmon, seabirds, seals, and other offerings. The authors make a good case that the Steller's

Sea Eagle is adapted to exploit relatively large prey in a changing environment.

There were a few questionable claims or speculations. For example, a Russian citation maintains that large birds could survive without food for 25 d (page 118). The book includes the often-repeated interpretation of adult sea eagles linking talons and spiraling to the ground as a courtship maneuver; however, I have only witnessed this behavior once over four decades in the field with North American eagles, and I would argue that such risk of injury or death is better explained as fighting between rivals for territory ownership. Also, in a discussion of foraging selectivity for adjacent pairs specializing on differing prey species, the authors suggest that prey preference may form during ontogeny, from young “imprinting” on prey delivered to their nest.

The authors describe numerous accounts of Steller’s Sea Eagle behavior derived from many hours in the field. For instance, detailed descriptions of nest-building and nestling behavior are also accompanied by close-up photographs. For one large portion of Steller’s Sea Eagles’ range—Sakhalin Island and adjacent mainland (Lower Amur)—the authors present extensive reproductive data collected from hundreds of nesting territories between 1998 and 2014. Figures detailing brood size, number of young per occupied territory, nest predation, breeding activity (an index of nesting attempts), egg-laying dates, brood size, and breeding experience help explain what is known about Steller’s Sea Eagle productivity. The authors indicate that there has been a long-term reduction in the breeding activity index, particularly in areas affected by abnormal climatic conditions.

I found the population dynamics section (Chapter 10) hard to follow and with some apparent deficiencies in data and interpretation, though entirely understandable given the difficulty and expense of accumulating useful demographic information in such a vast and remote region. The authors give respectable estimates of reproduction (i.e., fledglings per territorial eagle) for two study areas, but then mistakenly parametrize fledglings per adult (including floaters) in a standard matrix model that projects a declining population rather than correctly using the fledglings per territorial adult. The latter estimates for the two study areas may actually reach or exceed the value they say is required for minimum population stability. Adult survival rates appear only marginally useful, being extrapolated from data from captive populations. Survival for juvenile and subadult age classes appears somewhat tortuously derived, despite some available information on band encounters and satellite radiotelemetry gathered during various collaborations with M. J. McGrady. Observations of juvenile and subadult age-ratios suggest the possibility of very much lower juvenile survival rates than reported in studies of congeners elsewhere, although the authors do qualify their assessment by mentioning the possible effect of age-differences in ranging (e.g., post-fledging dispersal beyond detection limits). Despite such

ambiguities, the book reveals many challenges to the survival and reproduction of these eagles, including starvation during migration and wintering for young birds (e.g., trapped by frozen seas), illegal shooting, and an extremely high incidence of brown bear (*Ursus arctos*) predation of nestlings.

The final three chapters detail the adverse effects of human activity, some practical protective and enhancement measures, and known contingencies possibly affecting the future of Steller’s Sea Eagle populations. Various threats are listed, including human-caused forest fires and their harmful effect of reducing wooded areas and the availability of older trees most suitable for nesting. Also described is an ongoing, multinational captive-breeding program aimed at developing a reserve genetic bank with the potential to supply any future repatriation efforts. Successful strategies for creating artificial perches and nests to expand Steller’s Sea Eagle breeding and foraging ranges as mitigation and enhancement are also highlighted.

The authors acknowledge that much of their work was funded by the expanding oil and gas industry, and that fossil fuel development is a threat to this vulnerable species. The Russian biologists are actively collaborating with the oil and gas companies to minimize impacts of exploration and extraction. One key protective measure outlined in the book is the establishment of buffer zones limiting human activity around active nests, something that Bald Eagle managers have been implementing in the USA for many years. Bald Eagles, after their recent expansion and recovery, have become more habituated to human activity than before (Guinn 2013). The National Bald Eagle Management Guidelines (USFWS 2007) accordingly propose smaller buffer zones around nests than those previously recommended both in the USA and in this book for Steller’s Sea Eagles. The book’s authors acknowledge that certain Steller’s Sea Eagle pairs have become habituated to human activities; however, the remoteness and unfamiliarity of most Steller’s Sea Eagles with humans in areas only now being impacted by fossil fuel extraction warrant those conservative protections presented in Chapter 13.

Threats to the Steller’s Sea Eagle and its habitat conservation are discussed or implied throughout the book, including references to the current and potential effects of climate change. For example, the authors believe that global warming has increased the water level and duration of spring floods in riverine habitats, with associated water turbidity obscuring the ability of hunting eagles to see fish. Climate change has also apparently reduced the southerly extent of sea ice near Hokkaido, Japan, which has reduced a human source of fish-processing waste historically left on the ice for the eagles. The authors point out that this loss of sea ice in the Sea of Okhotsk could also reduce the availability of ringed seals (*Phoca hispida*); seal rookeries, newborns, and placentas are important seasonal foods for Steller’s Sea Eagles. Also, warming sea temperatures there could result in the

disappearance of chum salmon (*Oncorhynchus keta*), a species that sea eagles regularly consume. Further, increasing ocean acidification resulting from CO₂ absorption is expected to damage zooplankton essential to the development and growth of all Pacific salmon species.

All in all, this comprehensive monograph is an important contribution that will stand as a historic chronicle of a magnificent, apex species and an icon of wildness in the western Pacific. My hat is off to the authors and others for having learned so much in such challenging conditions. I recommend this book for anyone interested in raptor ecology or just the opportunity to explore this beautiful landscape through the eyes of an amazing sea eagle.—**Ronald E. Jackman (email address: threesalt@gmail.com), Garcia and Associates, 1 Saunders Avenue,**

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