

# Population Viability Analysis of the Florida Manatee (*Trichechus manatus latirostris*), 1976–1991

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**Abstract:** Recent development of age-determination techniques for Florida manatees (*Trichechus manatus latirostris*) has permitted derivation of age-specific data on reproduction and survival of a sample of 1212 carcasses obtained throughout Florida from 1976–1991. Population viability analysis using these data projects a slightly negative growth rate ( $-0.003$ ) and an unacceptably low probability of persistence (0.44) over 1000 years. The main factors affecting population projections were adult survival and fecundity. A 10% increase in adult mortality would drive the population to extinction over a 1000-year time scale, whereas a 10% decrease in adult mortality would allow slow population growth. A 10% decrease in reproduction would also result in extinction. We conclude that management must focus on retaining and improving the conditions under which manatee demography operates. The major identified agent of mortality is boat-manatee collisions, and rapidly increasing numbers of humans and registered boats portend an increase in manatee mortality. Zoning of manatee-occupied waters for reductions in boating activity and speed is essential to safeguard the manatee population. If boating regulations being implemented by the state of Florida in each of 13 key coastal counties are completed, enforced, and effective, manatees and human recreation could coexist indefinitely. If regulation is unsuccessful, the Florida manatee population is likely to decline slowly toward extinction.

Análisis de Viabilidad Poblacional del Manatí de Florida (*Trichechus manatus latirostris*), 1976–1991

**Resumen:** El reciente desarrollo de técnicas para la determinación de edad para manatí de Florida *Trichechus manatus latirostris* ha permitido la generación de datos sobre reproducción y supervivencia con edad específica de una muestra de 1212 cadáveres obtenidos en Florida de 1976 a 1991. El análisis de viabilidad poblacional de estos datos proyecta una ligera tasa de crecimiento negativa ( $-0.003$ ) y una inaceptable baja probabilidad de persistencia (0.44) a lo largo de 1000 años. Los factores más importantes que afectan las proyecciones de la población fueron la sobrevivencia de los adultos y la fecundidad. Un incremento del 10% en la mortalidad de los adultos podría derivar en la extinción de la población en una escala de tiempo de 1000 años, mientras que una disminución del 10% en la mortalidad de los adultos podría permitir un crecimiento poblacional lento. Una disminución del 10% en la reproducción de los adultos podría resultar también en la extinción de la especie. Concluimos que el manejo se debe enfocar en mantener y mejorar las condiciones bajo las cuales la demografía del manatí funciona. La más importante causa de mortalidad identificada son las colisiones de botes con manatí, sumado a esto, el rápido incremento en el número de humanos y botes registrados augura un incremento en la mortalidad de los manatí. La zonificación de aguas ocupadas por manatí para la reducción de la actividad y velocidad de botes es esencial para salvaguardar la población de manatí. Si la regulación de botes implementada por el Estado de Florida en cada uno de los 13 condados

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# Population Biology Of The Floria Manatee

**L Darling-Hammond**



## **Population Biology Of The Florida Manatee:**

*Population Biology of the Florida Manatee* Thomas J. O'Shea, Bruce Bennet Ackerman, Henry Franklin Percival, 1995 This is a collection of papers presented at a 1992 technical workshop on manatee population biology sponsored by the U S Fish and Wildlife Service and the Florida Department of Natural Resources Topics covered include manatee research programs techniques for studying manatee population biology and reports of completed studies The book concludes with recommendations from the workshop and a brief synopsis of pertinent work that has been published since the workshop

*Population Biology of the Florida Manatee* United States. National Biological Service, 1995 The Florida manatee *Trichechus manatus latirostris* is a unique element of the U S fauna It is a distinct subspecies of the West Indian manatee Domning and Hayek 1986 and one of the largest inshore mammals of the continent reaching weights to 1 650 kg Rathbun et al 1990 Annual migratory circuits of some individuals through the intracoastal waterways of the Atlantic Coast are 1 700 km round trips at seasonal travel rates as high as 50 km day Reid and O Shea 1989 Reid et al 1991 resulting in one of the longest remaining intact mammalian migrations in the eastern United States Manatees are the only living North American representatives of the small mammalian Order Sirenia and are therefore the only embodiment of the unique suite of biological features that define the distinctive adaptive syndrome at the ordinal level of the taxonomic hierarchy Features of this adaptive syndrome can be directly related to the lifestyle of aquatic herbivory O Shea and Reep 1990 In manatees these features include unique aspects of morphology pachyostosis horizontal unilobular lungs and diaphragm indeterminate numbers of molars undergoing continuous replacement dexterous forelimbs and prehensile lips and a hind gut as long or longer than 30 m physiology in particular an unusually low metabolic rate and a high thermal conductance that lead to energetic stresses in winter ameliorated by migrations and aggregations in warm water refugia and behavioral ecology lack of a rigid social organization seasonal migrations absence of strong circadian rhythms

**Age determination and population biology of the Florida manatee, *Trichechus manatus latirostris*** Miriam Marmontel, 1993 Population Biology of the Florida Manatee Thomas J. O'Shea, Bruce Bennet Ackerman, Henry Franklin Percival, 1995 This is a collection of papers presented at a 1992 technical workshop on manatee population biology sponsored by the U S Fish and Wildlife Service and the Florida Department of Natural Resources Topics covered include manatee research programs techniques for studying manatee population biology and reports of completed studies The book concludes with recommendations from the workshop and a brief synopsis of pertinent work that has been published since the workshop **Florida Manatees** John E. Reynolds, 2021-05-04 A photographic guide that focuses on the beauty grace and vulnerability of these herbivores but it also covers other sea mammals and their habitats The Biologist Named a Choice Outstanding Academic Title In this book manatee expert John E Reynolds III and famed photographer Wayne Lynch join forces to reveal the clearest portrait of manatees ever published Florida Manatees is a song for the manatee a celebration of the lives of these majestic creatures Reynolds s

concise informative text shares what scientists know about manatees while Lynch's beautiful photographs instantly demonstrate how special these potatoes with whiskers really are By encouraging an appreciation of manatees the authors hope to help ensure a future in which Floridians can find ways to coexist with and continue to enjoy these uniquely wonderful sirenian inhabitants of their state Included in this book How manatees first came to Florida waters How manatees fit into the ecosystems of Florida What and how much manatees eat How manatees behave and communicate with one another Why manatees look the way they do Why manatees have whiskers How manatee mothers feed their young and much more A lovely book that sounds as though it would appeal primarily to scientists but which offers inviting color photos and history that make it accessible to lay audiences both within Florida and outside the state Donovan's Literary Services **Information and Technology Report**, 1995 *Our Living Resources*, 1995 Report provides information on distribution abundance and health of birds mammals reptiles and amphibians fishes invertebrates plants terrestrial ecosystems aquatic ecosystems coastal and marine ecosystems riparian ecosystems the Great Plains Interior West Alaska and Hawaii It also discusses special issues global climate change human influences non native species and habitat assessments **Proposed Rulemaking for the Incidental Take of Small Numbers of Florida Manatees (*Trichechus Manatus Latirostris*) Resulting from Government Programs Related to Watercraft Access and Watercraft Operation in the State of Florida**, 2003

*The Florida Manatee* Roger L. Reep, Robert K., 2021-04-14 From two scientists who have been at the forefront of manatee research for over three decades *The Florida Manatee* offers an engaging accessible introduction to manatee biology including communication diet long distance migration and much more This second edition is updated with new scientific research as well as discussions of recent conservation efforts largely driven by manatee injuries and deaths resulting from boat collisions that have contributed to the robust growth of manatee numbers in Florida It also includes the latest predictions for manatee populations and health in the future both in Florida and worldwide This is the perfect book for anyone seeking the most comprehensive current information on this fascinating marine mammal **Beach Nourishment Project, Town of Nags Head**, 2010 [CRC Handbook of Marine Mammal Medicine](#) Leslie Dierauf, Frances M.D. Gulland, 2001-06-27 *CRC Handbook of Marine Mammal Medicine* Second Edition is the only handbook specifically devoted to marine mammal medicine and health With 66 contributors working together to craft 45 scientifically based chapters the text has been completely revised and updated to contain all the latest developments in this field Building upon the solid foundation of the previous edition the contents of this book are light years ahead of the topics presented in the first edition See what's new in the Second Edition Marine mammals as sentinels of ocean health Emerging and resurging diseases Thorough revision of the Immunology chapter Diagnostic imaging chapters to illustrate new techniques Quick reference for venipuncture sites in many marine mammals Unusual mortality events and mass strandings New topics such as a chapter on careers Wider scope of coverage including species outside of the United States and Canada Filled with captivating

illustrations and photographs the Handbook guides you through the natural history of cetaceans pinnipeds manatees sea otters and polar bears Prepared in a convenient easy to use format it is designed specifically for use in the field Covering more than 40 topics this one of a kind reference is packed with data The comprehensive compilation of information includes medicine surgery pathology physiology husbandry feeding and housing with special attention to strandings and rehabilitation The CRC Handbook of Marine Mammal Medicine Second Edition is still a must for anyone interested in marine mammals

**Improving the Regulatory Process in Southwest Florida, Lee and Collier Counties, Florida** ,2000 U.S.  
Atlantic and Gulf of Mexico Marine Mammal Stock Assessments--2002 ,2002 Biology of Marine Mammals John E.

Reynolds,2013-08-06 Taking an integrated approach to the biology of marine carnivores cetaceans and sirenians twenty two prominent researchers compare marine mammals with one another and with terrestrial mammals providing a framework for fundamental biological and ecological concepts They describe functional morphology sensory systems energetics reproduction communication and cognition behavior distribution population biology and feeding ecology They also detail the physiological adaptations for such activities and processes as diving thermo regulation osmoregulation and orientation that enable marine mammals to exploit their aquatic environment

**An Introduction to Marine Mammal Biology and Conservation** Simmonds, M.P,Bauer, A,Parsons, ECM,Wright, A.J,McCafferty, D,2013 The charismatic mammals that live in the ocean are a constant source of interest both for scientists and our society at large Their biology behavior and conservation are of utmost importance as a vast number of species are currently threatened Intended for the upper level undergraduate or graduate student within biology marine biology or conservation environmental science An Introduction to Marine Mammal Biology and Conservation provides a broad introduction to marine mammal biology using cutting edge information and student friendly learning tools The text begins with chapters on the evolution and classification of marine mammals and their general biology It moves on to discuss the behavior and ecology of different groups of marine mammals such as polar bears otters and cetaceans Part 3 dives into many different conservation issues facing marine mammals as well as discussions on how they can be addressed Closing chapters provide information on how scientists study marine mammals how society can enjoy observing the animals while making sure they are preserved and a word to students looking to pursue a career with marine mammals Helpful Sidebars are included throughout to refresh basic biological information Includes hot topic discussion boxes written by top researchers in the field Point Counterpoints on controversial issues make for great in class discussion Intended for the upper level undergraduate or graduate course within biology marine biology or conservation environmental science 2013 350 pages

**Ecology and Conservation of the Sirenia** Helene Marsh,Thomas J. O'Shea,John E. Reynolds III,2011-12-01 Dugongs and manatees the only fully aquatic herbivorous mammals live in the coastal waters rivers and lakes of more than 80 subtropical and tropical countries Symbols of fierce conservation battles sirenian populations are threatened by multiple global problems Providing comparative information on all four surviving

species this book synthesises the ecological and related knowledge pertinent to understanding the biology and conservation of the sirenia It presents detailed scientific summaries covering sirenian feeding biology reproduction and population dynamics behavioural ecology habitat requirements and threats to their continued existence Outlining the current conservation status of the sirenian taxa this unique study will equip researchers and professionals with the scientific knowledge required to develop proactive precautionary and achievable strategies to conserve dugongs and manatees Supplementary material is available online at [www.cambridge.org/9780521888288](http://www.cambridge.org/9780521888288) Endangered Animals Brian Miller, Richard P. Reading, 2000-09-30 Explore the multiple issues that surround species declines and conservation efforts through the only reference source to examine the conflicting conservation issues of 49 endangered species While the causes of endangerment are relatively easy to understand the ultimate or underlying factors are often far more complex and difficult to address An introduction to these issues and how to resolve them is provided in this unique collection of case studies of animal species that have been pushed to the brink of extinction Each case study provides the following information Common name Scientific name Order Family Status Threats Habitat Distribution Natural history Conflicting Issues Future and Prognosis Conservationists are increasingly recognizing that the ultimate causes of extinction are primarily socio economic and political yet biological approaches to recovery continue to dominate More inclusive interdisciplinary conservation programs are explored here to offer better prospects for managing problems and conflicts In addition to the case studies trends and common themes are explored to provide a comprehensive interdisciplinary approach to conservation Students and teachers can explore a wide variety of endangered species programs and the conflicting issues common to recovery efforts which will enable them to evaluate conservation practice and to draw their own conclusions for improvement

**Biogeography of the West Indies** Charles A. Woods, Florence E. Sergile, 2001-06-27 As a review of the status of biogeography in the West Indies in the 1980s the first edition of Biogeography of the West Indies Past Present and Future provided a synthesis of our current knowledge of the systematics and distribution of major plant and animal groups in the Caribbean basin The totally new and revised Second Edition Biogeography Encyclopedia of Marine Mammals Bernd Würsig, J.G.M. Thewissen, Kit M. Kovacs, 2017-11-27 The Encyclopedia of Marine Mammals Third Edition covers the ecology behavior conservation evolution form and function of whales dolphins seals sea lions manatees dugongs otters and polar bears This edition provides new content on anthropogenic concerns latest information on emerging threats such as ocean noise and impacts of climate change With authors and editors who are world experts this new edition is a critical resource for all who are interested in marine mammals especially upper level undergraduate and graduate students researchers and managers and is a top reference for those in related fields from oceanographers to environmental scientists Significant content and topic updates as well as the addition of new topics in such areas as anthropogenic disturbance Visual maps of the oceans and seas mentioned in contributions helping to place the geographical features described in the text with clear

consistent species illustrations Written to help users learn new information or brush up on a topic quickly with the references at the end of each entry to help guide readers into more specialist literature      **Sirenian Conservation** Ellen Hines, John E. Reynolds III, 2012-05-20 This important scientific volume comprehensively explores the biology and ecological status of manatees and dugongs in all of the geographic regions where they can be found today from the Caribbean to Eastern Africa from Arabia to the Amazon and from Japan through the South Pacific to Australia Many of these dwindling populations are situated in developing countries locales that have previously received little attention in the scientific literature In these areas people occupying rivers or coastlines still capture sirenians for food and other uses oil bones for carving leather In addition disruption erosion or complete loss of sirenian habitat occurs because of dredge and fill coastal run off chemical pollution and damage from boat propellers Sirenian Conservation features contributions from an international group of scientists who are working to address the many challenges to manatee and dugong food supply environment reproduction and survival They share stories of programs that rescue rehabilitate release and monitor these animals offer reports on practical replicable and cost effective management techniques and summarize current research strategies

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