

PREFACE

RESPONDING TO THE CHANGING CLIMATE may be one of the world's most important and complex endeavors of the 21st Century. Climate change modeling predicts large alterations in species distributions and the potential for extinctions, but phenological factors involving predator-prey interactions and interspecific competition add levels of complexity that make forecasting more difficult. Gathering empirical evidence of these relationships and monitoring changes over time may greatly improve overall predictions, and offer wider choices for the conservation of biodiversity.

Nowhere are the ecological effects of climate change on biodiversity, ecology, and biotic interactions likely to be more measurable than in the Arctic, a region where the earliest responses are expected, and one where the relative simplicity of the environment and its biota can reveal processes in advance of those occurring elsewhere. Arctic conservation managers are now seeking solutions and strategies on how to measure and mitigate climate change effects, and how to respond to other anthropogenic impacts in this rapidly changing ecosystem.

Top predators, such as birds of prey, are often sensitive to environmental disturbance, and can sometimes serve as early indicators of threat and as models for conservation intervention. Gyrfalcons and their principal prey, ptarmigan, are widely distributed in the arctic ecosystem, and are therefore candidates for measuring, understanding, and potentially mitigating current and predicted changes in their world. Because ptarmigan are virtually the only prey available during Gyrfalcon courtship and incubation in most regions, the response of ptarmigan populations to climate change and other modern disturbances may determine the future of Gyrfalcon populations.

In February 2011, The Peregrine Fund, together with co-organizers Boise State University and the United States Geological Survey, convened an international conference on the ecology and conservation of the Gyrfalcon, with special emphasis on the three species of ptarmigan with which this falcon has a close predator-prey relationship. Emphasis was placed on predicting the impacts of global climate change on the Gyrfalcon and those species that will most influence its ecology in

this century, including *Homo sapiens*. Based on what is known about the biology and ecology of the Gyrfalcon, its principal competitors (Peregrine, Golden Eagle, Common Raven), and its main food resources (ptarmigan, seabirds, waterfowl, and mammals), the conference considered what predictions could be made about changes in their distribution and abundance in the face of climate change and a range of other impacts.

The conference brought together experts from around the world to share information and to develop a common purpose toward (1) understanding local, regional, and global factors affecting population dynamics of Gyrfalcons, ptarmigan, and other prey, (2) looking for changing patterns of abundance throughout their circumpolar distributions, and (3) establishing a global strategy and plan of action for research and conservation of these species. Invited speakers included world experts on Gyrfalcons, their prey, competitors, and habitat, as well as on climate change and associated alterations in arctic and alpine biotas, contamination, resource extraction, diseases, and other factors influencing the ecosystems in which these species occur.

The conference was attended by 120 experts in the fields of climate change, the arctic ecosystem, the natural history and ecology of Gyrfalcons, other raptors, ptarmigan, sea birds, and mammals, and the conservation management and monitoring of these species. The conference experience was enhanced with superb photographic and video displays contributed by artists working in the circumpolar north. It opened with a lecture by Polar Bear expert Steven Amstrup, which was attended by over 400 university students and the general public. Amstrup's contribution to this proceedings underscored the dire consequences of climate warming for sea-ice dependent species.

The study areas of many of the conferees were widely separated in the vastness of the north-

ern arctic, and yet the habitat and biota of those study sites are so similar that biologists in North America, Russia, and Fennoscandia could discuss and compare the ecology of the same species assemblages. This series of geographically discrete but functionally parallel phenomena offered revealing comparisons of similarities and differences in the context of global climate and other factors of change. The resulting proceedings include 52 peer-edited papers, four republished papers, six extended abstracts, eight program abstracts, and three oral paper transcripts, including a conference summary by Ian Newton. Some of the oral presentations were given in Russian with simultaneous oral translation provided by Marina Bell, and yet almost all the contributors submitted their manuscripts in English, a kindness for which the editors were most grateful. Many of the papers contain discussions of natural history and offer commentary that extends the scope of these proceedings beyond the strict economy of most journal articles. Readers looking for an overall summary of the conference and synthesis of ideas and concepts should start with Ian Newton's Conference Summary, transcribed from his oral summation at the end of the conference.

Gyrfalcons and Ptarmigan in a Changing World, the proceedings of the conference, has been a collaborative effort. We thank our co-editors, Tom Cade of The Peregrine Fund, Mark Fuller of the United States Geological Survey and Boise State University's Raptor Research Center, and Eugene Potapov of Bryn Athyn College for their critical partnership as peer-editors of the proceedings and as colleagues on the Scientific Program Committee of the conference. Their expert advice, experience in the field, and contacts over the year of work leading up to the conference were crucial for bringing together a unique variety of professionals from fields that normally never meet. The depth, breadth, and diversity of conference participants were keys to its success.

We deliberated the choice between publishing papers in a recognized, abstracted scientific journal versus a book that may not receive the same level of readership and exposure. We chose to publish the proceedings as a book because we recognize the great value of the diversity of contributions from conference participants, and the likelihood that only a few would meet the relevance criteria of any one journal. The value of these proceedings resides in the mix of contributions, which ranges from invited reviews to empirical studies and descriptive accounts. Some extended abstracts have either been published elsewhere in full, or are slated for future publication with additional data. Four papers were reprinted with permission from Arctic, Ibis, and Oecologia. The editorial team reviewed and edited all contributions for scientific and factual content. To expedite access to the important information in these papers, contributions were first published online using the system of DOI numbers to permanently reference the online publication with the printed volume.

The Conference Organizing Committee included Marta Curti, Linda Behrman, Kathy Bledsoe, Joell Brown, Patricia Burnham, Tom Cade, Bill Heinrich, Grainger Hunt, J. Peter Jenny, Amy Siedenstrang, Richard Watson, and Susan Whaley. We are grateful to the many volunteers and assistants for capably organizing the logistics of the conference. We thank Sherri Haley for transcribing several oral presentations, Amy Siedenstrang who typeset the text, tables and graphics of the proceedings, and Terry Hunt who proof-read the entire book. We also express our sincere appreciation to the conference co-organizers, Boise State University and the US Geological Survey. Tom Cade made the pivotal suggestion during the planning phase in asserting that the dependence of Gyrfalcons upon ptarmigan demanded an equal focus upon the two.

Of critical importance for the success of this conference was the financial sponsorship from the Environment Agency — Abu Dhabi, Prince Albert II of Monaco Foundation, Trust for Mutual Understanding, National Park Service, and the US Fish and Wildlife Service. Their support for travel assistance to bring delegates to the conference in Boise, Idaho from all around the Arctic, for general conference costs, and for publication of the proceedings in a timely manner, was essential and very much appreciated. *Gyrfalcons and Ptarmigan in a Changing World* would also not have been possible without the enthusiastic participation of each and every contributor to the conference and its proceedings. The contents of this document are the sole responsibility of the Peregrine Fund and can under no circumstances be regarded as reflecting the position of the Prince Albert II of Monaco Foundation or other sponsors thanked above.

Gyrfalcons and Ptarmigan in a Changing World can be regarded as an important step toward a globally collaborative understanding of the ecology and conservation of avian predators and their prey within the context of the changing arctic ecosystem. Scientific perspective gained by the interaction of conference participants and reflected upon by the readers of these proceedings will form the foundation for follow-up investigations essential in resolving the remaining mysteries of Gyrfalcon and ptarmigan ecology. These integrative endeavors, as well as those relating to the function of the larger ecosystem, are clearly germane to human well-being and wildlife survival in a changing world.

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