

**BEAUFORT REGIONAL
ENVIRONMENTAL ASSESSMENT**

Atlas of the Birds of
the Offshore Canadian
Beaufort Sea

ATLAS OF THE BIRDS OF THE OFFSHORE CANADIAN BEAUFORT SEA

by

Upun - LGL

LIMITED

for

Beaufort Regional Environmental Assessment
Northern Petroleum and Mineral Resources Branch
Aboriginal Affairs and Northern Development Canada
25 Eddy Street
Gatineau, Quebec

Upun-LGL Project No. UA0009

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ATLAS OF THE BIRDS OF THE OFFSHORE CANADIAN BEAUFORT SEA

by

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INTRODUCTION

There has been increased exploration activity by the oil and gas industry in the Canadian Beaufort offshore in recent years. Two outcomes of that exploration activity have been the collection of data on the offshore occurrence of birds, and the recognition of the need to be able to better assess the potential effects of possible future oil and gas industry activities on those bird populations. The goals of this project were to address both of those outcomes by creating a geo-referenced database that brings together and organizes the existing bird survey information. That database then could facilitate the assessment of the potential effects of offshore oil and gas activities on offshore bird populations.

This project also supports the primary goal of the BREA program — to build a strong knowledge base for informed decisions on oil and gas activity in the Canadian Beaufort Sea. Birds are the group of organisms most at risk from the direct and indirect effects of an oil spill. Aside from supporting basic research, this information can be used to assess potential effects quantitatively, conduct spill analyses, identify sensitive areas and time periods, and provide baseline information for future project-level environmental assessments. The project also establishes a framework for collecting, organizing, and managing future data.

It has been difficult to efficiently and, especially, quantitatively assess the effects of oil and gas activity on bird populations in the offshore Canadian Beaufort Sea, even though useful data are available. That was largely a consequence of limited and disorganized information. Aerial surveys were conducted of some areas during the 1970s and 1980s, but there have been few aerial surveys of the far offshore. The best datasets are from recent (post-2005) ship-based surveys of the offshore, conducted during the open-water season as part of research and seismic exploration programs. Those are among the first extensive and intensive bird surveys offshore. The results of those surveys have been scattered among unpublished reports and/or limited to unanalyzed lists of sightings. The data were not readily available to all stakeholders or synthesized in a form that facilitated comprehensive and quantitative assessment. Given that there are active offshore leases, ongoing seismic exploration, and interest in offshore exploratory drilling, the environmental assessment process would benefit from the amalgamation, standardization, organization, analysis, and reporting of this information. Data on marine birds of the offshore Beaufort are of interest to regulators, the oil and gas industry, Inuvialuit co-management agencies, the people of the Inuvialuit Settlement Region, NGOs, and researchers.

There are three products resulting from this project: the geo-referenced database, a database manual, and this atlas report. All three products are housed with the Polar Data Catalogue. This report describes the development of the database, and presents some of the results.

There is a companion report and database that covers bird use of the coastal waters of the Canadian Beaufort. It is being prepared by the Canadian Wildlife Service.

METHODS

The database of the Birds of the Offshore Canadian Beaufort Sea is a compilation of data collected during multiple offshore cruises that were conducted by numerous companies and agencies. None of the cruises was devoted entirely to surveying bird populations. Nevertheless, some good data were collected, each of them contributing to the overall data set. The original data were provided by the companies and agencies listed in the Acknowledgements section.

Four primary tasks were involved in this project: the design of a database, the identification and collection of data, the incorporation of those data into the database, and the analyses and mapping of the data. Those tasks are described in more detail below.

Task 1: Design of the Database

The database for the Birds of the Offshore Canadian Beaufort Sea is designed around a field protocol for pelagic seabird surveys that has been used offshore eastern Canada for several years — Eastern Canada Seabirds At Sea, or ECSAS. The current iteration of ECSAS is described by Gjerdrum et al. (2012). Some of the seabird surveys conducted in the Canadian Beaufort Sea, and included in the database, were conducted using this or very similar field protocols. ECSAS itself evolved from PIROP (Programme Intégré de Recherches sur les Oiseaux Pélagiques), which was conducted offshore eastern Canada from the late 1960s through to the early 1990s. Gjerdrum et al. (2012) and Fifield et al. (2009) summarize the history of those survey protocols and the evolution and structure of the ECSAS database.

The ECSAS database is a relational database that uses Microsoft Access. The design of the ECSAS database and the associated data entry system are customized to match closely the ECSAS ship-based field observation protocols, and to facilitate the organization, management, and analyses of the resulting data. This close association between field methodology and database design proved problematic for directly incorporating the variety of seabird survey data collected in the Canadian Beaufort. The existing data for the Canadian Beaufort were collected using a variety of survey methods, and from aerial as well as ship-based survey platforms. Consequently, a somewhat separate course was taken for the Canadian Beaufort database.

The database of the Birds of the Offshore Canadian Beaufort Sea uses Microsoft Excel rather than Microsoft Access. To facilitate possible future incorporation into a revised ECSAS database, however, the overall organization of the Beaufort database and all of the fields were retained from ECSAS. New fields were added to incorporate additional categories of information.

The structure of the database corresponds to the structure of the surveys — grouping data into cruise, watch, and sighting information categories. Cruise data include general information about the overall survey program, such as the name and type of survey platform, and cruise start and end dates. As most seabird surveys in the Beaufort have been conducted from ships, the term cruise is used even though some surveys have been conducted from aircraft. A “watch” in ECSAS terminology refers to a brief period of continuous observation — typically a 5- or 10-minute period for a survey from a moving ship, or a “snapshot” scan from a stationary survey platform (see Gjerdrum et al. 2012). Watch data include information about start and end times and locations, observers, the survey platform (e.g., speed, heading), and sea surface and weather conditions. Sightings data pertain to any birds seen during the watch (e.g., species identification, number of individuals, and behaviour). The cruise, watch, and sighting categories, and the specific fields within each, are discussed in more detail in the database manual (Harris 2013).

Task 2: Identification and Collection of the Data

Concurrent with the development of the database structure were the identification and collection of bird survey data. Most of the original data resided with government, industry, and consultants. The data were assembled with the cooperation of those stakeholders. The names of the companies and agencies that provided data are listed in the Acknowledgements. Bird surveys conducted during marine seismic exploration programs in the Canadian Beaufort, beginning in 2006, provided most of the information. Data also came from research cruises conducted by Fisheries and Oceans Canada and the Canadian Wildlife Service.

Task 3: Incorporation of the Data into the Database

The data were provided in a variety of file types and with different fields of information. All were converted to Excel files. The data then were organized into the database structure developed in Task 1, above. This process turned out to be an immense and very time-consuming task. Data sets came in various states of quality and organization, but all had to be interpreted, reviewed, cleaned, and re-organized into the standardized format of the database.

In most cases, these were not dedicated surveys conducted by experienced field ornithologists. Instead they more often were occasional observations by people with unknown skill identifying birds. Consequently, the database has inherent limitations; for example, many species identifications were 'reduced' to a higher taxonomic category, such as Red-throated Loon converted to Loon. The identification skills of most observers were not known or recorded in the original data, so a conservative approach was necessary.

Task 4: Data Analyses and Preparation of the Maps

The data were collected either using strip transect methodology (moving surveys in Gjerdrum et al. 2012), or simply as incidental sightings (not associated with survey effort). The locations of incidental sightings were plotted directly onto maps. Data from moving surveys were analyzed to provide densities (number of birds per km²) by computing the area surveyed. During moving surveys or watches, bird sightings were recorded for a defined period of time (usually 10 minutes) and within a set transect width (usually 300 m) along the route sailed by the ship. The distance travelled by the ship during that period depended on the ship's speed. Survey effort for a watch thus was the area surveyed in km². Densities were determined based on that survey area.

For the mapping of the density data, the study area was divided into a grid of cells. Each cell was one degree of longitude tall by 15 minutes of latitude wide. The total survey effort (total area surveyed) and total number of birds were computed for each cell, and the overall density for that cell calculated. Those calculations were done for all birds, for species groups, and for individual species. Densities on the maps are presented as birds per 100 km² because densities of birds are very low in the Beaufort.

RESULTS

The database contains 9606 records. Most of the records are of moving watches (7590 records), for which it is possible to derive densities of birds by calculating area surveyed. The balance of the records is of incidental sightings (2016 records). Observations and survey effort are widely scattered throughout the Canadian Beaufort Sea, from the Yukon-Alaska border east well into Amundsen Gulf and north to M'Clure Strait (see the Appendix). The central Canadian Beaufort, offshore north from the Mackenzie River delta and Yukon coast, is where most of the moving watches have been conducted. Observations are available for the months of February, and May through November, but the vast majority of the survey effort and sightings occurred during August and September.

Of the 3780 records of sightings, the majority were of gulls, terns, and jaegers (2315 records or 61%). Sightings of Glaucous Gulls accounted for the largest proportion of those sightings (1459 of 2315, 63%). The other groups of birds, in order from most records to least, are: loons (660 records), waterfowl (469), unidentified birds (139), landbirds (66), alcids and tubenoses (50 records each), and shorebirds (31).

Maps of survey effort, all birds, and selected species and groups are presented in the Appendix.

RECOMMENDATION

Many data sets were reviewed in the course of preparing the database and this atlas. Two important shortcomings of the existing data soon became obvious — inconsistent survey methodology, and poorly skilled observers (or observers of unknown skill). All future surveys should use the same methodology, and competent field ornithologists knowledgeable and experienced in the identification of the birds of the region should conduct the surveys.

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APPENDIX: MAPS















































