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Arctic Biodiversity Data Service (ABDS)
Progress Report 2019-2021

1. Introduction

Comprehensive biodiversity data can inform decision- and policy-making. While many such data already exist, the challenge lies in finding, accessing, and making sense of existing, but dispersed pieces of data. Data are not always encoded in accordance with international data standards and best practices and often lack the necessary contextual metadata required to correctly apply and interpret it. Accessing Arctic biodiversity data from a range of sources and in variable formats can require a lot of effort from users to gather and assemble information.

In response, the Conservation of Arctic Flora and Fauna (CAFF), the Arctic Council's biodiversity working group, initiated the development of the Arctic Biodiversity Data Service (ABDS) to serve as the data management system for biodiversity data generated via its monitoring and assessment activities. Each time a new report or product is released by CAFF, the datasets involved are archived and made accessible via the ABDS.

The goal of the ABDS is to **increase access to Arctic biodiversity data** for the common good of scientists, policy makers and other stakeholders. ABDS is intended to:

- Facilitate access, integration, analysis, and display of biodiversity information for scientists, practitioners, managers, policy makers and others working to understand, conserve and manage the Arctic's biodiversity and ecosystems; and
- Ensure that biodiversity data provided to CAFF are organized to guarantee a lasting legacy in a manner that facilitates data discovery; increased understanding; more informed and rapid decision-making; and ongoing research.

2. Partners

CAFF works with a range of partners including relevant national and international organisations to further develop cooperation, access to and management of biodiversity data. Key partners include the Arctic Spatial Data Infrastructure (Arctic SDI);, Global Biodiversity Information Facility (GBIF), Ocean Biogeographic Information System (OBIS), Group on Earth Observations Biodiversity Observation Network (GEOBON), International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT), Protection of the Arctic Marine Environment (PAME) Arctic Council Working

Group and NatureServe (Figure 1). In 2014 the ABDS was recognised as the Arctic node within OBIS and as a node within GBIF, reflecting growing awareness of its potential to enhance access to Arctic biodiversity data.

3. ABDS

The ABDS contains datasets from CAFF's monitoring and assessment activities. New data are regularly added, particularly from CAFF's Circumpolar Biodiversity Monitoring Programme (CBMP). These are data derived from CBMP products, each of which is a fully referenced and independently reviewed collaborative effort by experts from across the Arctic. These sources produce baseline and time series data that can be used in regional and global assessments and contribute information into the baseline and trends of what we know about the Arctic's biodiversity.
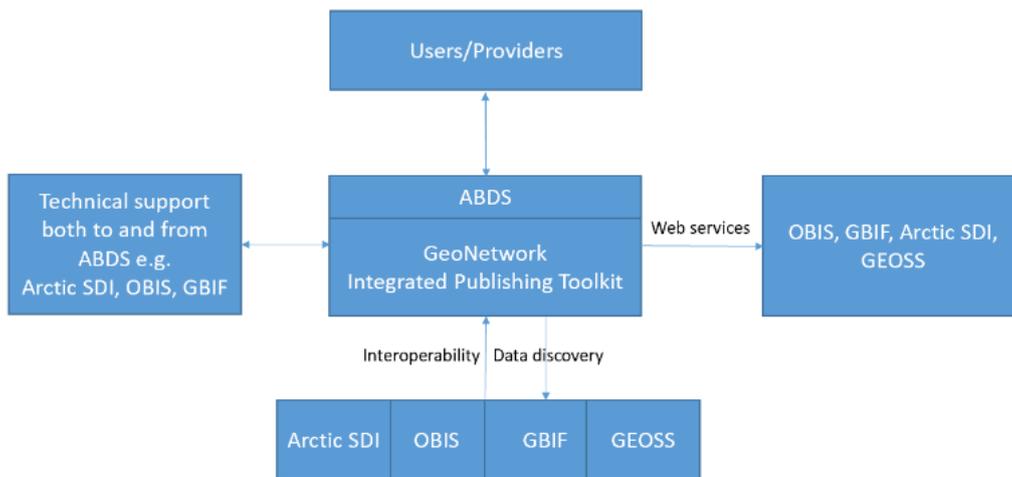

Figure 1: ABDS structure

3.1. Data

Data in ABDS are available in a variety of formats including spatial data, tabular data, and infographics. Users have the option to download data directly or via Web Map Services (a standardized approach to sharing geospatial data on the internet). As of January 2021, ABDS contains 315 datasets and more than 370,000 individual data records (Fig 2).The significant increase in in records as of 2015 reflects when ABDS became an Arctic node within GBIF and OBIS. (ABDS currently serves 371,663 data occurrence records into OBIS and GBIF.)
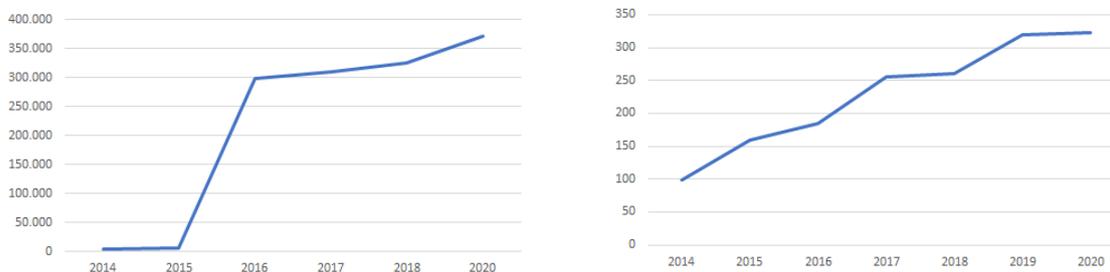

Figure 2 ABDS data records   *Numbers of datasets in ABDS*

Figure 3 shows the distribution of these records; and a breakdown of the types of data found. GBIF has the ability to show trends in numbers of papers which cite specific datasets; and figure 3 shows a marked increase since 2018 in the numbers of papers citing ABDS data holdings, reflecting a growing awareness of the ABDS and increasing data holdings.
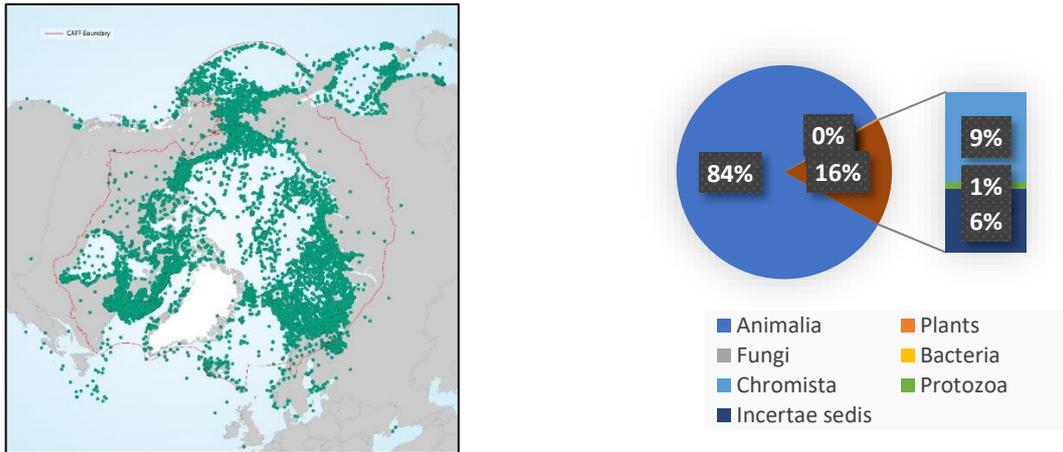
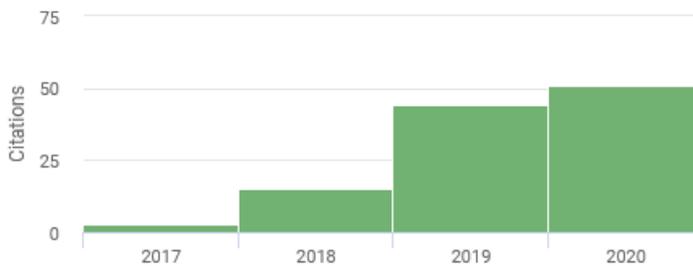*Figure 3: Distribution and types of ABDS data occurrence records and data type found in OBIS and GBIF.*

Figure 3: Numbers of papers citing ABDS data records in GBIF.

3.2. Structure

The ABDS is built using open-source solutions designed to facilitate sharing of information, search geospatial data, combine distributed map services, publish geospatial data, and schedule metadata harvesting from other catalogues. The ABDS data life cycle is as follows:

- Data collection: Data are collected, synthesised via CAFFs monitoring and assessment programmes;

- Data integration: Data are checked, quality controlled, and Darwin Core Standards applied by the CAFF Secretariat; and

- Data publication: Data are then deposited in the ABDS and published from where it can be discovered and downloaded free of charge; and served to partners (GBIF, OBIS, Arctic SDI, GEOSS).

3.3. Services

Key services CAFF provides in implementing ABDS include supporting network data management; assigning metadata; establishing interoperable links via the ABDS with relevant data portals;

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hosting relevant datasets that are not accessible elsewhere; and rescuing datasets and working to ensure that appropriate standards are applied. Activities during 2019-2021 included:

- Facilitating data transfer and publishing from CAFF monitoring and assessment activities;
- Developing ABDS to ensure system integrity, security, and interoperability;
- Increasing understanding, and profile of the ABDS amongst target audiences and partners;
- Expanding partnerships to ensure integration and interoperability with ABDS;
- Expanding the funding base to ensure sustainability; and
- Increasing decision maker support for the ABDS including engagement in identifying partners with complimentary mandates for cost and benefit sharing.

3.4. Policy

The ABDS data policy is, where possible, in accordance with the Conservation Commons and International Polar Year (IPY) data policies. In its implementation of ABDS, CAFF promotes free and open access to data, information and knowledge for conservation and management purposes generally, though there are cases where compelling reasons may exist for restricting data availability, (e.g., to avoid revealing sensitive sites of endangered species). Such cases require the application of appropriate safeguards.

- Ownership of the data rests with the data collector, publisher and/or holder.
- Unless requested otherwise, the data collector (or the representative of the organization that is the property owner) is acknowledged as owner of the data.
- Data collectors can, if they wish, transfer their rights to CAFF. It will also be possible to release data conditionally (e.g., based on use agreements).

Users of data from ABDS are expected to comply, in good faith, with the ABDS terms of use i.e., to cite formally the data provider and source of the data in question.

4. Development

Rapid and accelerating pressures on biodiversity in the Arctic demand new ways to deliver current and credible data to policymakers.

4.1.   Reporting and visualization

Data visualization allows us to shorten the gap between data and decision making by increasing flexible access to the most-up-to-date and relevant data for measuring biodiversity status and trends. Integrating existing data housed in the ABDS with data held by international institutions (e.g., GBIF) to deliver customized and updated biodiversity indicators and reference data layers would significantly increase the ability for data interpretation for a wide range of stakeholders, including scientists, policymakers and the public. This would help shorten the gap between data and decisions by streamlining the reporting and assessment of regional and national biodiversity target tracking and measuring biodiversity trends.

In response, CAFF is working with NatureServe to build a data visualization extension to the ABDS i.e., the Arctic Biodiversity Dashboard. The dashboard will be a user/policy-friendly interactive platform that harnesses and visualizes current datasets to streamline regional target tracking and reporting (e.g., for tracking progress towards attaining global biodiversity targets and the Sustainable Development Goals CBD helping to:

- Determine if the Arctic region is moving towards or away from key global biodiversity targets, using local, regional, or global data accessible through Arctic organizations (e.g., CAFF) or international institutions (e.g., GBIF);

- Utilize Application Programming Interfaces (API) to allow for automated updates to indicators on the Arctic Biodiversity Dashboard to ensure sustainability and efficiency of the platform visualizations;

- Provide tracking of important biodiversity trends while allowing users to select or de-select various features, functions, and indicators; and

- Streamline access to indicators in customizable scales to facilitate more effective and relevant national, regional, and global biodiversity assessments.

This is based on previous work involving Biodiversity Indicators Partnership (BIP) Dashboard (a global platform used for streamlining National Reporting to the CBD) and current work to develop regional (e.g. Association of Southeast Asian Nations Biodiversity Dashboard) and global visualization platforms (e.g. post-2020 Global Target Tracker). Aligning the development of the Arctic Biodiversity Dashboard with these efforts will achieve efficiencies and help ensure interoperable alignment to global data and indicator libraries and reporting approaches being used in other regions of the world. This can, in turn, facilitate more streamlined reporting by the Arctic States with regard to implementation of the new targets. This is particularly important given the focus on a more streamlined and scaled reporting system for the new post-2020 Global Biodiversity Framework.

The first phase of this work, in 2020-2021, entails creation of a prototype visualization extension for the ABDS containing a range of selected biodiversity indicators and reference data layers drawn from data in the ABDS and global data sources. It is being developed via a user-driven design process involving a Panel of likely platform users to ensure that the Dashboard produces relevant information in the right formats to meet these varied needs.

4.2.   Remote sensing

Data collection in the Arctic is logistically challenging and resource intensive, and as a result, data are sparse and disparate. There is an increasing desire to utilise remote sensing as means address this challenge. While remote sensing has frequently been used for specific studies at focused locations few large-scale studies, at the landscape or pan-Arctic scale, have been conducted. Recognizing these challenges and the need for a more comprehensive understanding of change across the Arctic, CAFF is undertaking a number of efforts to explore how remote sensing data might support CAFF work:

Through the **Land Cover Change Initiative**, a set of physical and ecological parameters were developed that represent key elements dictating seasonal processes in Arctic terrestrial ecosystems. These were analysed between 2001 and 2017 using a standard remote sensing platform (MODIS) to help understand changes occurring and evaluate remote sensing for use in Arctic biodiversity monitoring and assessment. A key challenge is to translate what these mean on the ground for Arctic biodiversity and how this assessment coupled with the CBMP can help improve our understanding of biotic responses to these broad-scale drivers.

As part of the CAFF Resilience & Management of Arctic Wetlands initiative, the Arctic SDI in cooperation with CAFF is working on a 3-year initiative to enhance the state of knowledge on the status of Arctic wetlands through creation of a **Pan-Arctic Wetland Inventory Map**. This process entails using Google Earth Engine to process data from Sentinel1 -2 to create an Arctic Wetland Inventory Map. This product will allow users to track and measure changes in extent and coverage of Arctic wetlands areas which will enhance efforts to assess and respond to climate change impacts in the Arctic.

4.3. Integration

Data generated through Arctic monitoring and assessment often consists of discrete datasets; and a challenge is transforming these into the integrated databases. Ongoing activities designed to support CAFF monitoring and assessment activities include:

- Finalization of the Circumpolar Freshwater Biodiversity Database and securing of data use permissions;
- Release of the Seabird population trends and breeding database, including an accompanying user manual; and the Marine Mammals database.
- Release of an interactive map of Passive Acoustic Monitoring sites, including metadata on who owns the instruments, deployment period, recording settings: *Pan-Arctic Passive Acoustic Monitoring* (PAM); and
- Updating the 2017 Arctic Protected Areas database; and alignment with the World Protected Areas database.

5. Next steps 2021-2023

Activities during 2021-2023 will include:

- Continuing to facilitate data transfer and publishing from the CBMP monitoring groups and headline indicators;
- Continuing developing ABDS to ensure system integrity, security, and interoperability;
- Increase the understanding and profile of the ABDS amongst target audiences and partners;
- Expanding partnerships to ensure integration and interoperability with ABDS;
- Expanding the funding base to ensure sustainability; and
- Increased decision maker support for the ABDS including engagement in identifying partners with complimentary mandates for cost and benefit sharing.

www.abds.is