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## **Arctic Freshwater Monitoring Plan Annual Report 2015**

Annual report on the implementation of the Circumpolar Biodiversity  
Monitoring Program's Arctic Freshwater Biodiversity Monitoring Plan



## Acknowledgements

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- Directorate for Nature Management, Trondheim, Norway
- Environment and Climate Change Canada
- Faroese Museum of Natural History, Tórshavn, Faroe Islands (Kingdom of Denmark)
- Finnish Ministry of the Environment, Helsinki, Finland
- Icelandic Institute of Natural History, Reykjavik, Iceland
- The Ministry of Housing, Nature and Environment, Greenland
- Russian Federation Ministry of Natural Resources, Moscow, Russia
- Swedish Environmental Protection Agency, Stockholm, Sweden
- United States Department of the Interior, Fish and Wildlife Service, Anchorage, Alaska

### CAFF Permanent Participant Organizations:

- Aleut International Association (AIA)
- Arctic Athabaskan Council (AAC)
- Gwich'in Council International (GCI)
- Inuit Circumpolar Council (ICC) – Greenland, Alaska, Canada and Russia
- Russian Indigenous Peoples of the North (RAIPON)
- Saami Council

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Cover photo: Peel Plateau, Northwest Territories, Canada with a stream cutting through. Photo Jen Lento.

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## Introduction

The Arctic Freshwater Biodiversity Monitoring Plan (CBMP-Freshwater Plan) details the rationale and framework for improvements related to the monitoring of Arctic freshwaters, including ponds, lakes, rivers, their tributaries and associated wetlands. The framework aims to facilitate circumpolar assessments by providing Arctic countries with a structure and a set of guidelines for initiating and developing monitoring activities that employ common approaches and indicators. The CBMP-Freshwater Plan is part of the Circumpolar Biodiversity Monitoring Program (CBMP) of the Conservation of Arctic Flora and Fauna (CAFF) that is working with partners to harmonize and enhance long-term Arctic biodiversity monitoring efforts. A major goal is to facilitate detection and communication of environmental and biological change in the Arctic, and stimulate societal responses to significant trends and pressures.

The CBMP-Freshwater Plan, developed by the Freshwater Expert Monitoring Group (FEMG) of the CBMP, is the result of work undertaken during workshops held in Uppsala, Sweden (2010) and Fredericton, New Brunswick, Canada (2011). Both workshops included freshwater experts with a broad range of expertise as well as FEMG leads for each Arctic nation (Canada, Sweden, Denmark, Finland, Iceland, Norway, Russia (first workshop only), and USA). These workshops included a preliminary assessment of the spatial and temporal coverage of available monitoring data and identified important elements, i.e., stressors, Focal Ecosystem Components (FECs: biotic or abiotic elements, such as taxa or key abiotic processes, which are ecologically pivotal, charismatic and/or sensitive to changes in biodiversity), parameters, and indicators, to be incorporated into the pan-Arctic Freshwater Plan. The mechanistic link between an environmental or anthropogenic stressor and the FECs was identified through “Impact Hypotheses,” i.e., predictive statements that outline the potential ways in which selected stressors might impact the structure or function of FECs. Preliminary information on the spatial and temporal coverage of available monitoring data for FECs was summarized, and will form the basis for the first assessment of freshwaters in the Arctic.

The CBMP-Freshwater Plan was endorsed by the CAFF board in 2012, and represents an agreement among the Arctic nations on the approach to be taken to monitor and assess freshwater biodiversity across the pan-Arctic region. By establishing common approaches for monitoring and assessment, the plan is intended to improve our ability to detect changes to biodiversity and evaluate stressor-impact relationships on a circumpolar scale, thus facilitating more effective management of these systems. The first status and trends assessment of Arctic freshwater biodiversity (planned for completion in 2017) will evaluate existing data and identify gaps in monitoring efforts and scientific knowledge of Arctic freshwaters. This first assessment report will also provide recommendations and guidance for more effective, i.e., coordinated and stressor-targeted, future monitoring activities.



Members of the Freshwater Steering Committee and the CAFF Secretariat after the October 2015 Inter-FEN meeting Hvalsø Denmark. Photo: Tom Christensen

Implementation of the CBMP-Freshwater Plan began in December 2012 with the activation of a governing structure establishing the Freshwater Steering Group (Freshwater SG) and national Freshwater Expert Networks (FENs). The Freshwater SG is a continuation of the FEMG, with representation from each Arctic nation, Permanent Participants, and Arctic Council Working Groups (e.g., Arctic Monitoring and Assessment Program). A FEN has been established for each currently participating Arctic nation (Canada, Sweden, Denmark/Greenland, Finland, Iceland, Norway, and USA), with members selected to maximize the coverage of expertise and to incorporate multiple affiliations (e.g., government, academia). FENs are tasked with collecting and analyzing national monitoring data to assess the status of Arctic freshwater biodiversity, detect trends, and determine the causes of any changes. The Freshwater SG is responsible for implementing the CBMP-Freshwater Plan, coordinating and overseeing the work of the national FENs, and developing the first State of Arctic Freshwaters Report in 2017.

## Updates from the CBMP-Freshwater Plan Implementation Teams

The Freshwater SG designed a series of six projects to facilitate the completion of a circumpolar assessment of Arctic freshwaters. During the third year of implementation, the national FENs completed Project 2, which provided an assessment of the national metadata from contemporary, post-industrial, and pre-industrial time periods (collected in fulfillment of Project 1). National and circumpolar summary reports for Project 2 focused on the spatial and temporal coverage of metadata, and identified high-quality datasets that should form the basis of the circumpolar assessment of biodiversity.

The Freshwater SG held an Inter-Freshwater Expert Network (Inter-FEN) workshop in October 2015 to facilitate expert consultation and collaboration while determining the focus of the national and circumpolar assessments of status and trends in biodiversity. The workshop brought together members of all the national FENs to review the circumpolar metadata summary, make decisions about the scope of national and circumpolar assessments, and discuss strategies and timelines for the dissemination of information. Workshop participants developed a plan for a journal special issue in addition to the CAFF State of Arctic Freshwater Biodiversity Report, which is to be completed in 2017.

National FENs used the information from the Project 2 summary reports and discussions held during the Inter-FEN workshop to begin Project 3, which entails the collection of monitoring data. Data collection efforts will begin with high-quality datasets, as identified in the summary reports. Data collection will continue through April 2016, after which analysis of monitoring data will begin.

The Freshwater SG and FENs also began work in 2015 on Project 4, which is intended to identify sample harmonization needs and data comparison limitations. Metadata provided preliminary information regarding sampling methods and possible data comparison constraints. As data are collected in Project 3, more detailed information about requirements for sample harmonization will be identified.

## Status of Work Plan

Milestone	Activities & Deliverables	Status
1. Plan published	a. Final plan endorsed by CAFF board	Completed 2012
	b. Plan published by CAFF	Completed 2012
2. Governing structure activated	a. Freshwater SG established	Completed 2013 (awaiting Russian representation)
	b. Adoption of Terms of Reference	Completed 2013
	c. Freshwater SG leads confirmed	Completed 2013
	d. National FENs established and membership recorded	Completed 2013 (awaiting Russian FEN)
	e. Support involvement by all Arctic countries	Ongoing
3. Data management	a. FENs review/revise existing contemporary metadata file and add missing data (Project 1)	Completed December 2014
	b. FENs search for and add data from post-industrial period and pre-industrial (paleo) period to the metadata file (Project 1)	Completed December 2014
	c. Metadata added to Polar Data Catalogue	Metadata for some countries need to be adjusted to fit Polar Data Catalogue format. Batch upload of metadata to PDC to be completed in 2016
	d. FENs create summary maps for the FECs for the contemporary, post-industrial, and pre-industrial (paleo) periods (Project 2)	Completed August 2015
	e. FENs complete summary reports describing existing data (Project 2)	Completed September 2015
	f. FENs acquire data and conduct QA/QC (FSG Project 3)	Started and ongoing through April 2016
4. Indicator development	a. Existing data sets identified	Completed December 2014
5. Reporting and coordination	a. 2015 Annual Performance Report submitted to CAFF	Completed December 2015
	b. 2016 work plan submitted to CAFF	Draft completed December 2015 and included in 2015 Annual Performance Report
	c. General communications	National one-page updates produced by FENs  Presentation to CAFF Board at CAFF meeting in Tromsø, Norway, September 2015
	d. Freshwater SG members secure funding from country authorities to support implementation of plan according to Table 13 of the CBMP-Freshwater Plan	Funding opportunities continue to be explored for each country; details on funding provided below

Milestone	Activities & Deliverables	Status
	e. Freshwater SG meetings (in-person or teleconference)	9 teleconferences held during 2015 (February, March, April, June, July, August, September, November, and December).  In-person meeting held in Copenhagen, Denmark in May, 2015  In-person meetings held in conjunction with Inter-FEN workshop in Sonnerupgaard, Denmark in October, 2015
	f. National FEN meetings (in-person or teleconference)	In-person and teleconference meetings for FENs ongoing  In-person meeting for all FENs (Inter-FEN workshop) held in Sonnerupgaard, Denmark in October, 2015 (attendees from all FENs)
	g. Scientific publications	In progress and see CAFF website
	h. 2016 Work Plan	Preliminary plan presented below; plan to be finalized at 2016 Freshwater SG Annual Meeting

The Freshwater SG work has been coordinated through monthly telephone meetings (except in January, May, and October) and in-person meetings (May and October) where progress and directions of work were communicated. Country one-pagers, i.e., information flyers that inform about the status of work, were produced for each of the countries. The co-lead of the Freshwater Steering Group, Willem Goedkoop, presented an update on the status of work in CBMP-freshwater at the CAFF-meeting in Tromsø, Norway, 15–17 September 2015.



Guðni Guðbergsson, Icelandic FSG Member. Annual monitoring of Arctic charr in Lake Mývatn, Iceland. Fish are caught in gillnet series with mesh size 16,5-50mm. Photo: Leó Alexander Guðmundsson



## Freshwater Steering Group Update

### Membership

The Freshwater Steering Group (Freshwater SG) continued to be co-led by Canada and Sweden in the third year of implementation. National representatives were:

- ▶ Joseph Culp (Canada; Environment Canada and Canadian Rivers Institute, University of New Brunswick),
- ▶ Willem Goedkoop (Sweden; Swedish University of Agricultural Sciences),
- ▶ Kirsten S. Christoffersen (Denmark/Greenland; University of Copenhagen and the University Centre in Svalbard),
- ▶ Petri Liljaniemi (Finland; Ministry of the Environment),
- ▶ Guðni Guðbergsson (Iceland; Institute of Freshwater Fisheries),
- ▶ Steinar Sandøy (Norway; Norwegian Environmental Agency), and
- ▶ Christian Zimmerman (USA; USGS Alaska Science Center).
- ▶ Jennifer Lento (Canada; Canadian Rivers Institute, University of New Brunswick) continued to act as secretariat to the Freshwater SG for the third year

The Freshwater SG also had participation in the third year of implementation from

- ▶ Jan René Larsen (Arctic Monitoring and Assessment Program).

The Freshwater SG is lacking representation from Russia and Permanent Participants, and is endeavoring to resolve this issue.

### Challenges

The most significant challenges to the Freshwater SG in the second year of implementation were securing funding and ensuring representation from all Arctic nations. These are ongoing issues, and efforts will continue to be made in 2015 to overcome these challenges.

#### 1. Funding

Freshwater SG members are responsible for securing funding for Freshwater SG and FEN operations each year. In the third year of implementation, Freshwater SG members secured modest funding from national sources to cover the FEN budget, which included metadata synthesis, data collection, and travel to the Inter-FEN workshop in Denmark in October. The Freshwater SG also secured funding from the Nordic Council of Ministers to support meeting costs associated with the inter-FEN workshop.

With increasing project responsibilities in 2016, including completion of data collection, analysis of monitoring data, and development of a journal special issue (including some 12-15 papers highlighting regional and circumpolar assessments) and the State of Arctic Freshwater Biodiversity Report, there is a need for additional funding from national sources and other sources such as the Nordic Council of Ministers. FEN Project 3 requires collection of data identified in Projects 1 and 2, organization and management of those data in a national database, and quality assurance/quality control of the data. The increased work load and complexity of this project will require additional assistance, and thus funding, in many countries. Furthermore, coordination of analysis and writing efforts among Arctic nations, as well as drafting of the circumpolar State of Arctic Freshwater Biodiversity Report by the Freshwater SG members from national/regional data assessments will require continued writing support and Freshwater SG secretariat support. Currently no projected funding for this work in 2016 is available. Freshwater SG members will therefore continue to apply for funding from national and international organizations, seeking assistance from the CAFF Secretariat and national CAFF representatives where appropriate.

#### 2. Representation

Early efforts of the FEMG to design the CBMP-Freshwater Plan were strengthened by participation from members of all Arctic nations. However, there is currently no formal Russian representative on the Freshwater SG nor a Russian FEN, despite a need for Russian participation in the implementation and assessment process. The Freshwater SG will continue to work with members of the CBMP and

CAFF in 2016 to secure Russian representation, assist in the formation of a Russian FEN, and ensure full participation of all Arctic nations in the implementation process. Besides these efforts, we will also explore the possibilities to get Russian freshwater experts involved in the CBMP-Freshwater work through a bi-lateral project financed by the Swedish EPA.

## Freshwater Expert Network (FEN) Update

### a. Canada

#### Membership

The Canadian FEN was comprised of Arctic scientists from government, academia and non-government organizations. Members in 2015 included Joseph Culp (Lead, Environment Canada and Canadian Rivers Institute), Krista Chin (Government of Northwest Territories), Jennie Knopp (Inuvialuit Settlement Region-Community Based Monitoring Program, Trent University, and APECS), Jennifer Lento (Canadian Rivers Institute, University of New Brunswick, and APECS), Michael Power (University of Waterloo), Milla Rautio (Université du Québec à Chicoutimi), and Heidi Swanson (University of Waterloo).



#### Accomplishments and Challenges

The Canadian FEN met in Copenhagen, Denmark in October 2015 prior to the Inter-FEN workshop to discuss progress on Canadian FEN products. This meeting was held jointly with the US FEN so the two groups could discuss North American collaborations with respect to data assessment and reporting. The Canadian FEN revised national metadata, filling gaps where possible with additional academic sources, and finalized the Canadian Project 2 metadata synthesis report. The FEN began collecting monitoring data from focal sites identified in the metadata synthesis report and began building a database. The primary challenge for the Canadian CBMP-FEN remains the ongoing search for secure funding to support the Canadian FEN, as the current funding model requires annual renewal of support. Funding to support the acquisition of Traditional Ecological Knowledge remains a challenge and should be addressed in future years.

### b. Denmark and Greenland

#### Membership

The Danish/Greenland FEN is unchanged and includes the following freshwater experts: Senior researcher Torben L. Lauridsen (Dept. of Bioscience – Arctic Research Centre, University of Aarhus), Ass. Professor Dean Jacobsen (Department of Biology, Freshwater Biology, University of Copenhagen), Senior researcher Nikolaj Friberg (Norwegian Institute for Water Research, Oslo, Norway), Senior Scientist Ole Geertz-Hansen (Greenland Institute of Natural Resources, Department of Birds and Mammals), Senior Scientist Frank F. Riget (Department of Bioscience - Arctic Research Centre, University of Aarhus) and Professor Kirsten S. Christoffersen (Dept. of Biology, Freshwater Biology, University of Copenhagen).



#### Accomplishments and Challenges

There has been one physical meeting in January where the group was informed about the ongoing activities within the CBMP-freshwater network, reviewed the collected metadata, and discussed potential new initiatives that could be carried out by the Danish-Greenland FEN. At this meeting the FEN members helped identify additional data sources, and those are being added to the database. It is recognized that the data will provide a valuable resource for publications. The FEN has also discussed how to ensure funding to the various activities including the stream pilot project that was initiated in 2014 and writing of papers. This remains to be solved. Three FEN members (Ole Geertz-Hansen, Frank Riget and Kirsten S. Christoffersen) participated in the Inter-Freshwater Expert Network Workshop that was held in Denmark during 6-8 October.

### c. Finland

#### Membership

The members of Finnish Expert Network have not changed since the end of 2014 and include Petri Liljaniemi (lead, Ministry of the Environment), Jaakko Erkinaro (Finnish Game and Fisheries Research Institute), Laura Forsström (University of Helsinki), Jani Heino (Finnish Environment Institute), Seppo Hellsten (Finnish Environment Institute) and Satu-Maaria Karjalainen (Finnish Environment Institute).

**Accomplishments and Challenges**

The activities of the group have been restricted by the small project budget, but the financial situation should improve in 2016 due to granted project funding. The FEN completed a list of monitoring projects and studies carried out in the Finnish subarctic areas and continue to make additions to the list as necessary. Identification of existing datasets is nearly completed, but the collection and storing of the data will continue. The challenges for the data compilation include the varying data formats and the lack of digital data for older material. Old data must be digitized manually which requires considerable labor and funding for salaries.

**d. Iceland****Membership**

There are five experts in the Icelandic FEN: Arni Einarsson (Myvatn Research Station), Hilmar Malmquist (Icelandic Museum of Natural History), Thora Hrafnstottir (Natural History Museum of Kopavogur) a new member from 2015, Jon S. Olafsson (Institute of Freshwater Fisheries) and Gudni Gudbergsson (Institute of Freshwater Fisheries) who is also a member of the CBMP freshwater steering group.

**Accomplishments and Challenges**

The Icelandic FEN had four formal working meetings in 2015. The Icelandic FEN revised national metadata to fill in available information for the metadata synthesis report for Project 2. Three FEN members took part in the Inter-FEN meeting in Denmark in October. The Icelandic FEN had a formal meeting with the other Icelandic CBMP steering group members, i.e., CBMP-Marine and CBMP-Terrestrial, as well as the Icelandic CAFF board member. At the meeting the need for secure funding for further work of the CBMP-FEN was addressed as well as the need for at least part time assistance from a qualified person. Further funding will be needed for data collection, analyses and writing of the Regional Arctic Freshwater Biodiversity Assessment for Iceland.

**e. Norway****Membership**

The members of the Norwegian FEN are similar to 2014 and include Steinar Sandøy (lead, Norwegian Environment Agency), John Brittain (Coordinator, University of Oslo and Norwegian Water Resources & Energy Directorate), Marit Mjelde (Norwegian Institute for Water Research), Ann Kristin Schartau (Norwegian Institute for Nature Research), Jan Idar Solbakken (Sami University College) and Martin Svenning (Norwegian Institute for Nature Research, FRAM - High North Research Centre on Climate)

**Accomplishments and Challenges**

During 2015 the Norwegian FEN met twice, in March and again in September to prepare for the inter-FEN workshop in October. Four FEN-members participated at the inter-FEN workshop in Copenhagen. The FEN completed the metadata-list representing freshwater data from the Norwegian Arctic. From the total list the FEN prioritized the data series for the future work on freshwater biodiversity assessment in Norwegian Arctic. Assessment of the existing data series will also be an important basis for the selection of future monitoring sites in Norwegian Arctic. The priority list was made separately for lakes and rivers and was based on the following criteria: data quality, number and distribution of years with data, combination of FECs from the same site and geographical distribution. Based on these metadata, maps were produced showing the geographical location of the datasets. A primary challenge for the group will be the organization of the monitoring data as well as their preparation for analysis. This portion of the work will be time consuming and it will be a challenge to gain the economic resources necessary to complete these tasks.

**f. Sweden****Membership**

The Swedish FEN consists of the following freshwater experts: Jan Karlsson and Danny C.P. Lau (both Umeå University, Department of Ecology and Environmental Science), Johan Östergren (Swedish University of Agricultural Sciences – SLU, Department of Aquatic Resources), and of Maria Kahlert and Tobias Vrede (both SLU, Department of Aquatic Sciences and Assessment). Willem Goedkoop, the Swedish co-lead for CBMP-freshwater, leads the Swedish FEN.

**Accomplishments and Challenges**

The Swedish FEN met in conjunction with the Inter-Fen Workshop held in Denmark in early October 2015. FEN members have continued to collect and compile historic and paleolimnological data during 2015, and discussed possibilities for scientific output. For example we have received a palaeolimnological data set of multiple lakes in the Arctic/alpine ecoregion of Sweden, kindly provided by Peter Rosén. For several reasons, funding from the Swedish Authority for Marine and Water Management was made available late in 2015. However, during 2015 a contract for 2015-2016 was received. Additional travel support is received from the Swedish Environmental Protection Agency.

**g. USA****Membership**

In 2015 there was one addition to the US FEN. Previous members of the FEN included: Christian Zimmerman (U.S. Geological Survey - Fish), Matthew Whitman (Bureau of Land Management - Fish), Christopher Arp (University of Alaska Fairbanks – Hydrologic and Ice Regimes), Benjamin Jones (U.S. Geological Survey – Remote Sensing), and Trey Simmons (National Park Service – Benthic Invertebrates). Sarah Laske (University of Alaska Fairbanks – Fish and Benthic Invertebrates) joined in November of 2015.

**Accomplishments and Challenges**

The US FEN met via email to gather metadata and continue report preparation. Two members of the US FEN (Zimmerman and Whitman) attended the Inter-FEN workshop in Denmark in October 2015.

Lack of secured funding to support FEN activities continued to be an issue in 2015.



Víðidalstunguheiði, Myvatn and Laxá. Photo Guðni Guðbergsson.



## Financial Report

### Status of Funding for 2014 and Outlook for 2015

#### a. Canada

Environment Canada supported Canada's participation as the Freshwater SG Co-lead on the project and provided funding (total approx. USD\$70K) for Freshwater SG secretariat support through a grant to the Canadian Rivers Institute (CRI). Secretariat funding expires at the end of Fiscal Year 2015-16 and needs to be addressed in upcoming budget discussions. The Canadian High Arctic Research Station (CHARS) provided approximately US \$40K to have the CRI and the Canadian Polar Commission search for and document all available sources of Canadian metadata for Projects 1 and 2 (i.e., finding data sources on freshwater focal ecosystem components). For 2015, the Canadian FEN received an additional USD\$15K contribution from Environment Canada to subsidize travel associated with the Inter-FEN writing workshop in October 2015. This workshop provides important information for the State of the Arctic Freshwater Biodiversity Assessment.



#### b. Denmark and Greenland

Funding for 2015 was provided from the Danish Environmental Research Agency through the DANCEA program (approx. USD\$28K). The funding covers some of manpower needed to pull data out of papers, reports and monitoring sources the metadata base (project 2) as well as some basic expenses for the annual FSG meeting that was held in Copenhagen during 18-20 May 2015. A joint application from the national CBMP-group leads to cover basic activities in 2016 was submitted to the Danish Environmental Research Agency in November 2015.



#### c. Finland

In 2015, the Finnish Ministry of the Environment could only support Freshwater CBMP work by granting funding to cover travel expenses. The Ministry for Foreign Affairs of Finland supports CBMP work in 2016 with USD \$33K as a part of larger Arctic funding (ARWAT-project). Further, the sum of USD\$12K has been applied from the ministry to cover the salary and meeting costs in 2016.



#### d. Iceland

In 2015 the (USD\$5,1K) travel cost of the Icelandic SG and FEN were covered by the Icelandic CAFF budget given to the Icelandic Institute of Natural History. Apart from the travel cost the Icelandic CBMP-freshwater, SG and FEN, members have not had any special funding. Their work has been covered according to the budget of their institutes. For 2016 there is funding to cover 1 – 2 steering group meetings. The work scheduled for 2016 will give more workload than in previous years and it is likely to be more than the courtesy tolerance for the FEN member's institutes and will therefore depend on external funding.



#### e. Norway

The Ministry of Climate and Environment supported the Norwegian activities of the Freshwater SG in 2015 by funding travel and meeting costs for the Freshwater SG meeting and for the two meetings in the Norwegian Freshwater Expert Network (FEN). The work-hour costs for the FEN members were partly supported by the Ministry of Environment, in addition to internal financing in the participating institutes. The total budgets available from the Ministry of Climate and Environment for the Norwegian FEN work for 2015 were approximately USD\$50K. The work-hour costs for the Freshwater Steering Group member from Norway are covered by the Norwegian Environment Agency (NEA). The work of the Norwegian FEN will continue in 2016. Due to budget cuts NEA will apply for USD\$25K from the Ministry of Climate and Environment for the freshwater work in 2016. Other potential funding sources will be considered for the FEN work.



#### f. Sweden

In 2015, the Swedish FEN and CBMP work was financed with USD\$53K from the Swedish Agency for Marine and Water Management (SWAM), and additionally support of USD\$35K from the "authority support", i.e., university funding aimed at supporting SWAM and the Swedish EPA with specific expertise in water issues.



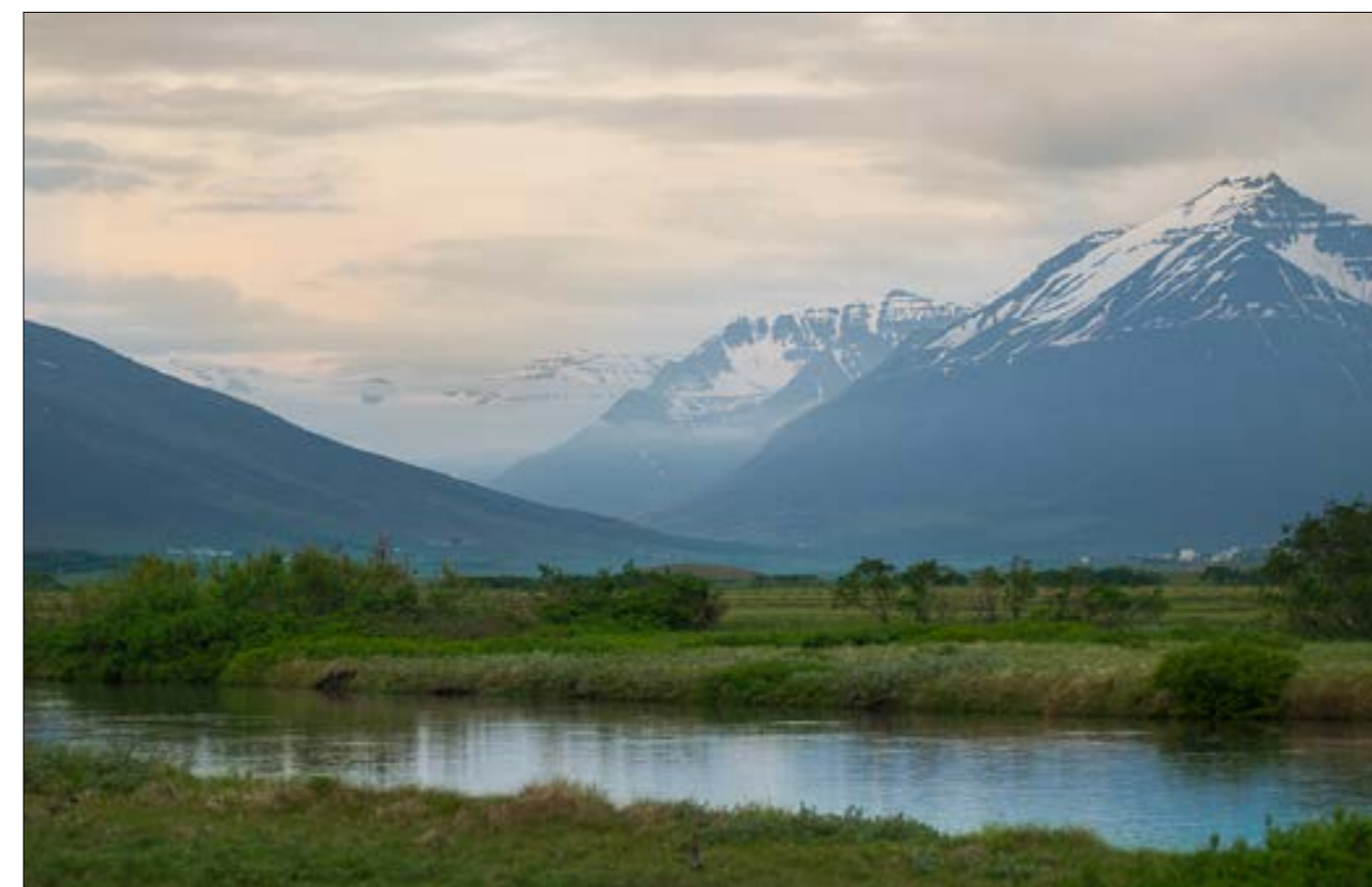
#### g. USA

There was no specific funding in 2015 for involvement in the Freshwater SG from US authorities. The US Geological Survey provided in-kind personnel support for Freshwater SG member activities and travel support for two to attend the Inter-FEN workshop. In 2016, US Geological Survey will continue to provide in-kind personnel support and travel support so the US representative can participate in Freshwater SG meetings and activities.



#### h. Others (as applicable)

The CAFF secretariat is coordinating an application for CBMP freshwater to the Nordic Council of Ministers. The funding applied for is particularly needed to provide support for a science coordinator to continue Freshwater SG secretariat work and coordinate writing of the SAFBR.



Towards Svarvaðardalur Iceland. Photo: Kári Fannar Lárusson

## Budget

Note: the costs outlined in the table are focused on efforts to harmonize freshwater biodiversity monitoring, data management and reporting. They do not reflect the actual ongoing monitoring costs.

Milestone	Activities & Deliverables	Total Cost (USD)	Cost Details	Responsibility	Status
1. Governing and operational structure activated	a. 2013 Inaugural meeting of CBMP-FSG	50K (10 people at 5K each) plus 5K venue costs per year	Meeting costs (travel support for CBMP-FSG members and venue costs) and conference call costs	Arctic nations for travel support for their members. Lead FSG country for venue costs.	2016: Funded
	b. Annual meeting of CBMP-FSG				
	2. Data management structures established	a. Data nodes and hosts, web-entry interfaces, and data standards established	2013: 30K (data node establishment) 2014 onwards: 10K per year (data node management)	Web-entry interface and web-based databases and nodes and data entry manuals established	CAFF secretariat /CBMP
3. Indicator development	b. Data nodes linked to web portal and analytical tools developed	2013 onwards: 20K (web portal maintenance)	Data Portal linked to data nodes via XML and canned analysis tools developed	CAFF secretariat /CBMP	2016: In-kind
	c. Metadata added to ABDS	2013 onwards: 0K (CAFF Data Manager)	Metadata entry	CAFF secretariat /CBMP	2016: In-kind
	a. Identification of existing data sets and historical data, and collection of metadata (Project 1). Spatial and temporal assessment of data coverage for national report (Project 2)	2013-2015: 30-60K per country	Costs for 1 person for 3-6 months per country (depending on country).	Arctic nations	2016: N/A
	b. Aggregation of existing data, national and regional dataset compilations, QA/QC, data agreements, and formatting (Project 3)	2015-2016: 30-60K per year per country	Costs will vary depending on state of national datasets. Costs for 1 person for 3-6 months per year per country (depending on country).	Arctic nations	2016: Partially funded for some countries; details in 7.1
	c. Description of sampling methods for each country and completion of circumpolar report summarizing sampling methods (Project 4)	2016: 5-10K per country	Costs for 1 person for 1-2 month per country (depending on country).	Arctic nations	2016: Partially funded for some countries; details in 7.1
d. Analysis of indicator baseline status for each nation, summarized in national report (Project 5)	2016-2017: 30-60K per year per country	Costs for 1 person for 3-6 months per year per country (depending on country).	Arctic nations	2016: Partially funded for some countries; details in 7.1	

Milestone	Activities & Deliverables	Total Cost (USD)	Cost Details	Responsibility	Status
4. Reporting	e. Dataset compilations archived	Minimal cost (10K). CAFF Data manager staff time.	All datasets compiled and used to be archived at CAFF Secretariat.	CAFF Secretariat	2016: In-kind
	f. Accumulation of links to national/regional protocols, identification of inter-calibration needs, and definition of indicator comparison limits (Project 4)	2015-2016: 30K	Costs for 1 person for 3 months.	CBMP-FSG	2016: Partially funded for some countries; details in 7.1
5. Program Review and adjustments	a. Annual performance reports and work plans	0K - costs reflected above	Performance report/work-plan layout and digital publication	CBMP-FSG	2016: In-kind
	b. Compilation of national reports to create State of Arctic Freshwater Biodiversity Report	2016-2017: 50K (10 people at 5K each) plus 5K venue costs per year	Meeting costs (travel support for CBMP-FSG members and venue costs) and conference call costs	Arctic nations for travel support. Lead FSG country for venue costs.	2016: Partially funded for some countries; details in 7.1
TOTALS	a. Review of parameters and sampling approaches.	0K - costs reflected above.		CBMP-FSG	2016: Partially funded for some countries; details in 7.1
	b. Independent review of data management approach, analysis, and reporting using performance measures	30K every 10 years starting in 2016	Contract independent review of Monitoring Program	CBMP Office	2016: N/A
		2013: 35-65K per country 2014-2017: 65-125K per year per country			



## Looking Ahead

The third year of implementation of the CBMP-Freshwater Plan was primarily spent summarizing and assessing metadata on a national and circumpolar scale to select high-quality datasets that will form the basis for the assessments of the state of Arctic freshwaters. Under the direction of the Freshwater SG, the national FENs took significant steps towards the assessment of national trends by completing summary reports detailing the availability of freshwater monitoring data for the pre-industrial, post-industrial, and contemporary time periods, including description of the spatial and temporal coverage of those data in the fulfillment of Project 2. In the coming year, the national FENs will continue to collect monitoring data that were identified as high quality in the Project 2 summary reports and conduct quality assurance/quality control on those data for Project 3. FENs will evaluate sample harmonization needs to identify the limits of data comparisons, and will begin data analysis to assess the status and trends in freshwater biodiversity. Assessment of trends will be coordinated on both national and international levels, and will be a vital first step in the completion of the circumpolar State of Arctic Freshwater Biodiversity report (to be completed in 2017). The Freshwater SG will support the national FENs in their 2016 efforts by securing funding for data collection and analysis activities, and by working to increase involvement by all Arctic countries, Permanent Participants, and CAFF working groups during the coming year. The Freshwater SG will work to enhance recognition of the CBMP-Freshwater Plan through general communications, scientific publications, and contributions to national and international efforts. Freshwater SG members will increase and coordinate their efforts to secure funding from national and international organizations to cover the costs of the time associated with data collection and assessment. The Freshwater SG and FENs will also continue to collaborate with organizations such as the Association of Polar Early Career Scientists (APECS) to enhance capacity and facilitate project completion. A draft work plan for 2016 is presented below; work plan details will be finalized by the Freshwater SG during their annual meeting in 2016. The proposed budget for this work plan follows that which was presented in the CBMP Freshwater Plan, with specific details to be determined at the Freshwater SG annual meeting.



Frozen river. Photo Shutterstock, Robert Hoetnick.

## Work Plan for 2016

Milestone	Activities & Deliverables	Timeline
1. Plan published	a. Final plan endorsed by CAFF board	Completed 2012
	b. Plan published by CAFF	Completed 2012
2. Governing structure activated	a. Freshwater SG established	Completed 2013 (awaiting Russian representation)
	b. Adoption of Terms of Reference	Completed 2013
	c. Freshwater SG leads confirmed	Completed 2013
	d. National FENs established and membership recorded	Completed 2013 (awaiting Russian FEN)
	e. Support involvement by all Arctic countries	Ongoing
3. Data management	a. FENs review/revise existing contemporary metadata file and add missing data (Project 1)	Completed 2014
	b. FENs search for and add data from post-industrial period and pre-industrial (paleo) period to the metadata file (Project 1)	Completed 2014
	c. Metadata added to Polar Data Catalogue	2016
	d. FENs create summary maps for the FECs for the contemporary, post-industrial, and pre-industrial (paleo) periods (Project 2)	Completed 2015
	e. FENs complete summary reports describing existing data (Project 2)	Completed 2015
	f. FENs acquire data and conduct QA/QC (FSG Project 3)	October 2014 - April 2016
	g. FENs summarize sample methodology in data and create recommendations (Project 4)	October 2014 - April 2016
	h. FSG determines areas of sampling methodology compatibility and incompatibility and creates recommendations for sample methodology and frequency (Project 4)	October 2015 - February 2016
	i. FENs assess freshwater monitoring data for national State of Arctic Freshwaters report (Project 5)	April 2016 – December 2016
	4. Indicator development	a. Existing data sets identified
5. Reporting and coordination	a. 2015 annual performance report submitted to CAFF	January 2016
	b. 2016 work plan submitted to CAFF	August 2016
	c. General communications	Ongoing
	d. Freshwater SG members secure funding from country authorities to support implementation of plan according to Table 13 of the CBMP-Freshwater Plan	Ongoing
	e. Freshwater SG meetings (in-person or teleconference)	Ongoing
	f. National FEN meetings (in-person or teleconference)	Ongoing
	g. Scientific publications	Ongoing

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