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Forsmark site investigation
Collection of archive samples

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This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the author and do not necessarily coincide with those of the client.

Data in SKB's database can be changed for different reasons. Minor changes in SKB's database will not necessarily result in a revised report. Data revisions may also be presented as supplements, available at www.skb.se.

A pdf version of this document can be downloaded from www.skb.se.

Abstract

The site investigations at Forsmark were finished on June 30, 2007. The examination of the vast amount of acquired data will continue during some period to come, and questions or requests of complementing data may be asked by SKB's analysers as well as by authorities and other external examiners. It is essential that SKB is alerted to provide quick and relevant answers to such questions if and when they are asked.

As a means to anticipate the work that may be necessary in order to address different types of questions within the discipline of ecosystems and to prepare answers to them, we have tried to foresee which archive samples that can be of use and then carried out a field sampling survey. In this report the collection of samples identified as important, but for different reasons previously not included in SKB archives, is described. It includes peat/sediment from a bog, lake sediments from three lakes, water moss from three locations in the area, and fish and bottom vegetation from the bay Asphällsfjärden. The report describes collection procedures, the character of the collected samples and data from the sampling.

Sammanfattning

Platsundersökningarna i Forsmark avslutades den 30:e juni 2007. Granskningen av SKB:s arbete och de stora datamängder som insamlats kommer dock att pågå under en längre tid, och det är inte uteslutet att det kommer att ställas frågor eller att kompletterande data begärs av såväl SKB:s egen analyspersonal som av myndigheter och andra externa granskare. Det är väsentligt att SKB har hög beredskap för att snabbt ge relevanta svar på sådana frågor om och när de ställs.

I syfte att förekomma och underlätta det arbete som kan bli nödvändigt för att förbereda svar på eventuella framtida frågor inom det ytekologiska ämnesområdet, har vi försökt förutse vilka arkivprover som kan vara av nytta för att smidigt kunna besvara framtida frågor och därefter genomfört en insamlingsinsats av dessa prover. I denna rapport beskrivs insamlingen av de prover som identifierats som viktiga men av olika anledningar tidigare inte inkluderats i SKB:s arkiv. Det gäller torv/sediment från en mosse, sjösediment från tre sjöar, bäckmossa från tre lokaler i området samt fisk och bottenvegetation från viken Asphällsfjärden. I rapporten beskrivs insamlingsteknik, de insamlade provens karaktär samt metadata från insamlingen.

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1 Introduction

This document reports the data gained by the activity “Collection of archive samples”, which is one of the activities performed within the site investigation at Forsmark. The work was carried out in accordance with activity plan AP PF 400-07-014. In Table 1-1 controlling documents for performing this activity are listed. Activity plans are SKB’s internal controlling documents.

Original data from the reported activities are stored in the primary database Sicada. Data are traceable in Sicada by the Activity plan number (AP PF 400-07-014). Only data in databases are accepted for further interpretation and modelling. The data presented in this report are regarded as copies of the original data. Data in the databases may be revised, if needed. Such revisions will not necessarily result in a revision of the P-report, although the normal procedure is that major revisions entail a revision of the P-report. Minor revisions are normally presented as supplements, available at www.skb.se.

Table 1-1. Controlling documents for performance of the activity.

Activity plan	Number	Version
Collection of archive samples	AP PF 400-07-014	1.0

2 Objective and scope

The site investigations at Forsmark were finished on June 30, 2007, but data analysis and modeling will continue during some period to come. It is possible, even probable, that different kinds of questions may be asked by SKB's analysers as well as by external examiners. It is important for SKB to be prepared to provide quick and relevant answers to such questions if and when they are brought up for discussion.

As a means to anticipate the work that may be necessary in order to address different types of questions brought up for discussion within the discipline of ecosystems and to prepare answers to them, we have tried to foresee which archive samples that can be of use, and after that carried out a sampling survey in the field. In this report the collection of samples identified as important, but for different reasons previously not included in the SKB archives, is described together with the character of collected samples.

The sampling was divided into four different parts:

- Sediment and peat in wetland.
- Sediment from lakes and marine environment.
- Moss from streams.
- Aquatic biota from marine environment.

3 Equipment

The equipments used when collecting all samples are described in the text below.

3.1 Sediment and peat in wetland

The sampling of sediment and peat was conducted with a Russian peat corer (length 1 m and width 5 cm), see Figure 3-1.

3.2 Sediment from lakes and marine environment

In order to obtain undisturbed samples of the whole sediment profile, two different samplers were used. The uppermost sediment was sampled using a freeze corer, see Figure 3-2, whereas the deeper samples were collected using a Russian peat corer described in the section above.

The freeze corer consists of a thermos connected to a rather thin freeze wedge. The latter is made of stainless steel sheeting. It is filled with 95% ethanol. The thermos is made of stainless steel and double walled with insulation of polyurethane. Dry ice is filled in the thermos through a lid in the top onto which a gas-outlet is mounted. In an extension at the bottom of the thermos a trapdoor is assembled. This keeps the dry ice in the thermos until coring is initiated. The trapdoor is connected to the messenger-operated opening mechanism on the top of the thermos by a thin steel rod that runs inside the thermos. When the dry ice comes in contact with the alcohol an endothermic reaction occurs and the sediment freezes on the freeze wedge. The freezing process takes about 20–25 minutes.



Figure 3-1. Russian peat corer.



Figure 3-2. Freeze corer, before use (left), with sample (right).

Two stabilizers with fins are used to make sure that the corer is not rotating when the bottom tip of the freeze wedge penetrates the sediment surface during descent. The equipment is designed for coring from ice. To melt loose the sample hot water is filled into the freeze wedge when the sampler has been pulled out of the water, see Figure 3-3. For more details about the freeze corer the reader is directed to /Renberg and Hansson in manus/.

3.3 Water moss from streams

Water moss was hand sampled using plastic gloves.

3.4 Aquatic biota from marine environment

For sampling of fish benthic multi-mesh gillnets of Nordic type were used. They are made of uncoloured nylon, and composed of 12 different mesh-sizes ranging between 5–55 mm. Each gillnet was 30 m long and 1.5 m wide, and each mesh panel was 2.5 m wide. The diameter of the thread varied between 0.10 mm for the 5 mm mesh to 0.23 for the 55 mm mesh.

Sampling of submerged vegetation was performed using a rake.



Figure 3-3. Detaching of the sediment sample. 1) Poring hot water into the freezing wedge (left), 2) lifting out the wedge (right).

4 Execution and results

The sampling was performed by different staff and at different locations. The sampling and the result of the sampling are described in the following text. The sampling locations are shown on the maps presented in Figure 4-1 and 4-2.

4.1 Sampling in wetland

The aim of the sampling was to obtain two additional parallel cores of the complete clay/gyttja/peat succession from the wetland at Rönningarna. Previous investigations had indicated depths to till of approximately 3 m /Lokrantz and Hedenström 2006/. Glacial clay is overlain by a patchy sand cover which in turn is overlain by clayey gyttja, algae gyttja, reed peat and sphagnum peat.

The sampling was performed by Joachim Albrecht from SGU and Annika Berntsson from University of Stockholm on March 28, 2007. The cores collected were shorter than expected and therefore a new sampling was performed on April 2. At that occasion somewhat longer cores were collected, although not as long as 3 m. Attempts were made at seven different locations in the wetland; however, none of them reached glacial clay due to refusal in the sand/gravel layer at approximately 2 m depth. The samples from both sampling occasions have been stored.

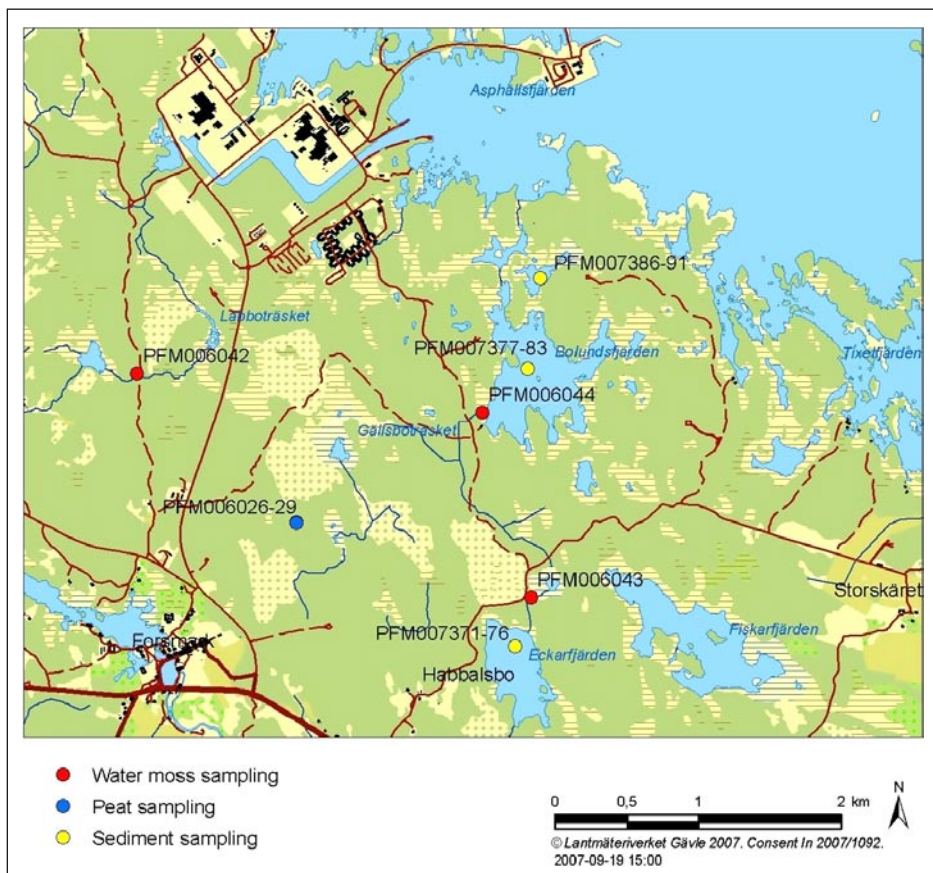


Figure 4-1. Locations for sampling of water moss, sediment and peat, respectively.

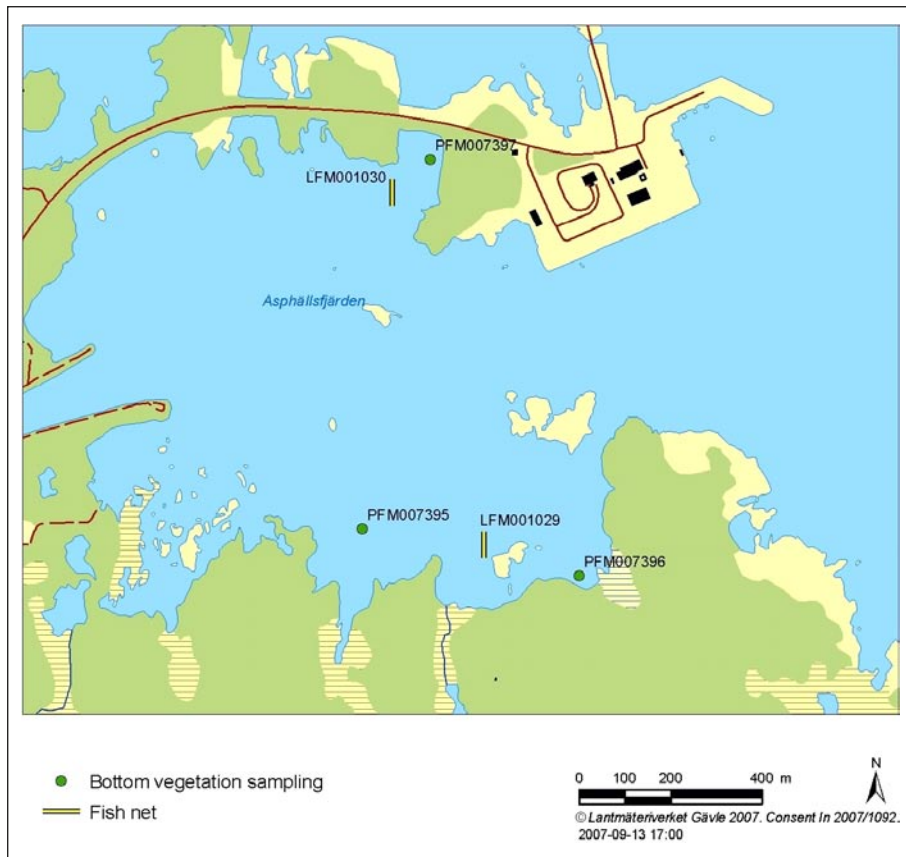


Figure 4-2. Locations for sampling of submerged vegetation and fish, in the sea bay Asphällsfjärden.

The recovered stratigraphical succession includes (generalised, from top to bottom): more than 1.5 m poorly humified *Sphagnum* peat with increasing amount of reed (*Phragmites*), 5 to 10 cm reed peat, 30 to 40 cm gyttja (algal gyttja with *Carex* and *Phragmites* remains), 20 cm clayey gyttja and finally sand and gravel, which was not penetrated. The coring spots were marked with wooden poles and their locations estimated with a hand-held GPS receiver. The positions are shown on the map in Figure 4-1.

Three of the parallel cores (PFM006026, PFM006027 and PFM006029) have been stored cooled (c 5°C), while the last one (PFM006028) has been sliced into 2 cm thick samples which were freeze dried and thereafter stored dry and dark in small plastic jars. Some of the samples were weighed before and after the freeze drying in order to register the water content. Freeze drying took place at the University of Stockholm. The cool cores are stored in 1 m long plastic half-tubes and wrapped in plastic to prevent contamination.

Photos of the sampled cores are presented in Appendix 1 together with other important information (stratigraphy, water content).

4.2 Sampling of lake sediment

The sampling was performed by Mårten Strömgren and Fredrik Lindgren from University of Umeå between March 7 and 12, 2007. As described earlier two different sampling equipments were used for the uppermost and the deeper sediments, respectively. The collected samples were collected ensuring overlap. Sediment was collected from the lakes Bolundsfjärden, Eckarfjärden and Puttan, see Figure 4-1. Attempts to find collectable sediment was also performed in the lake Norra bassängen but without success.

The weather conditions were very harsh and therefore only two parallel samples could be collected from Puttan (two freeze sample cores and two Russian peat corer sequences). From Eckarfjärden three parallel cores were sampled whereas four freeze samples and three Russian peat corer samples were collected in Bolundsfjärden.

At the sampling occasion in March no ice was present on the bay Asphällsfjärden and therefore no attempts were performed to sample sediment there. Earlier mapping of Quaternary deposits on the sea floor of the bay Asphällsfjärden /Ising 2005/ revealed few areas with soft sediment. No such area was found when sampling biological samples (see section 4.4).

One of each parallel cores (PFM007371, PFM007372, PFM007377, PFM007380, PFM007387, PFM007390) has been sliced into 2 cm thick samples which were freeze dried and thereafter stored dry and dark in small plastic jars. The other samples collected with the freeze corer (PFM007373, PFM007375, PFM007379, PFM007381, PFM007382, PFM007386, PFM007388) are aimed to be stored frozen whereas the other Russian peat corer sequences (PFM007374, PFM007376, PFM007378, PFM007383, PFM007389, PFM007391) are aimed to be stored cooled (c 5°C). Some of the samples were weighted before and after the freeze drying in order to register the water content. Freeze drying took place at the University of Stockholm. The cool cores are stored on wooden deals in specially designed wooden boxes. The same kinds of boxes was also used for storage of the frozen sediment samples.

Photos of the sampled cores are presented in Appendix 2 together with other important information (stratigraphy, water content, water depth).

4.3 Collection of water moss from streams

The sampling of water moss (*Fontinalis sp.*) was performed by Sara Nordén, SKB, on May 21, 2007. The samples were collected at three different stream locations in the area, see Figure 4-1. The moss was sampled by hand using plastic gloves. At each location water moss from an area of approximately 5 m of the stream stretch was collected. Other species, as well as small stones and debris entangled in the moss, were removed and the moss was gently rinsed in the stream water. At one of the locations (South of Lake Stocksjön) the water level was very low and it was hard to rinse the moss. The water moss was put in a plastic bag and these were weighed on a balance with 0.2 g accuracy (see Table 4-1). The samples were thereafter stored in a freezer. Photographs from the sampling sites are presented in Appendix 3.

Table 4-1. Weight of the sampled water moss.

Idcode	Sampling site	Weight (g)
PFM006042	Gunnarsbo	384.7
PFM006043	South of Lake Stocksjön	319.5
PFM006044	Inlet to Lake Bolundsfjärden	294.5

4.4 Sampling of marine biota

Sampling of marine biota was performed in the sea bay Asphällsfjärden between September 5 and 6, 2007. The sampling was performed by Sara Nordén, Niklas Heneryd and Björn Söderbäck at SKB. Bottom vegetation was sampled at three different locations, see map in Figure 4-2.

At two of the locations Eurasian water milfoil (sw. Axslinga), *Myriophyllum spicatum*, was sampled and at the third location the species collected was Fennel Pondweed (sw. Borstnate), *Potamogeton pectinatus*. The samples were washed in the sea water and placed in plastic bags. They were later weighed and frozen. The weights of the samples are presented in Table 4-2.

Four fishing nets were fastened to each other two and two so that two c 60 m long nets were gained. Each long net was placed in the bay Asphällsfjärden, see map in Figure 4-2, at the afternoon on September 5 and fetched the following morning. A list of all species caught can be seen in Table 4-3. A selection of the catch was weighed, put into plastic bags and then frozen. The table shows weight information for the archived specimens. The aim was to collect samples from the following functional groups; Zooplanktivorous fish (Z), Benthivorous fish (B) and Piscivorous fish (P). However, no piscivorous species were caught in the net fishing.

Table 4-2. Bottom vegetation sampled in Asphällsfjärden on September 5, 2007.

Idcode	Species English name	Species Latin name	Species Swedish name	Weight (g)
PFM007395	Eurasian water milfoil	<i>Potamogeton pectinatus</i>	Borstnate	170
PFM007396	Fennel Pondweed	<i>Myriophyllum spicatum</i>	Axslinga	185
PFM007397	Fennel Pondweed	<i>Myriophyllum spicatum</i>	Axslinga	200

Table 4-3. Fish species caught during the net fishing in the bay Asphällsfjärden during September 5–6, 2007. The fishes selected for freezing were weighed and their individual weights are given in gram. Species for which the weights are written on the same line have been placed together in one plastic bag.

Idcode	Species English name	Species Latin name	Species Swedish name	Weight (g) and functional group
LFM001029	Ide	<i>Leuciscus idus</i>	Id	–
	Perch	<i>Perca fluviatilis</i>	Abborre	–
	Roach	<i>Rutilus rutilus</i>	Mört	–
	Ruffe	<i>Gymnocephalus cernuus</i>	Gärs	–
	Bream	<i>Abramis brama</i>	Braxen	–
	Baltic herring	<i>Clupea harengus</i>	Strömming	31.4+26.5+31.4+13.4 (Z)
LFM001030	Perch	<i>Perca fluviatilis</i>	Abborre	165.8 (1) (B)
	Perch	<i>Perca fluviatilis</i>	Abborre	245.8 (2) (B)
	Baltic herring	<i>Clupea harengus</i>	Strömming	45.1+28.6+20.2+42.2+23.9+34.7+27.0+22.6+19.1 (Z)
	Roach	<i>Rutilus rutilus</i>	Mört	–
	Bream	<i>Abramis brama</i>	Braxen	121 (B)
	Bullhead	<i>Cottus sp.</i>	Simpa	–
	Ruffe	<i>Gymnocephalus cernuus</i>	Gärs	12.9+23.5+29.8 (1) (B)
	Ruffe	<i>Gymnocephalus cernuus</i>	Gärs	4.4+6.3+17.0+38.4 (2) (B)
	Bleak	<i>Alburnus alburnus</i>	Benlöja	–



Figure 4-3. Fish caught during the net fishing in Asphällsfjärden. Above perch and below herring.

4.5 Data and sample handling

Data for the collected archive samples have been stored in the database Sicada. Photos have been stored in the file archive of Sicada. The physical samples (sediment, plant material and fish) are stored at different locations in Oskarshamn. SKB has a special database, the Max database, where the location of all samples is registered.

4.6 Nonconformities

At the sampling of peat and sediment from the bog Rönningarna the cores collected were shorter than expected and therefore a new sampling was performed. At that occasion somewhat longer cores were collected, although not 3 m as expected. Attempts were made at seven different locations in the wetland; however, none of them reached glacial clay due to refusal in the sand/gravel layer at approximately 2 m depth.

No soft sediment which could be sampled by the equipment used was found in the lake Norra bassängen. Archive samples from this lake are therefore missing.

At the sampling occasion in March 2007 no ice was present on the bay Asphällsfjärden, which prevented sampling. Therefore archive sediment samples from this bay are missing.

According to the plan mussels should have been sampled in the bay Asphällsfjärden. During the sampling campaign in September 2007 attempts were performed with an Ekman grab sampler, but no mussels were found. Archive samples of marine mussels are therefore missing.

No piscivorous fish species were caught in the net fishing in Asphällsfjärden so this kind of sample is also missing.

References

Ising J, 2005. Forsmark site investigation. Mapping of Quaternary deposits on the bottoms of shallow bays outside Forsmark. SKB P-06-88. Svensk Kärnbränslehantering AB.

Lokrantz H, Hedenström A, 2006. Forsmark site investigation. Description, sampling and analyses of Quaternary deposits in connection with groundwater monitoring wells, pumping wells and BAT filter tips. SKB P-06-92. Svensk Kärnbränslehantering AB.

Renberg I, Hansson H. Department of Ecology and Environmental Science, Umeå University, Sweden. In manus.

Samples from the wetland Rönningarna

Table A1-1. Stratigraphy of the peat samples. The sample state at storage are given as C = cooled or FD = freeze-dried.

Idcode	From length (m)	To length (m)	Layer no	Content	State at storage	Comments
PFM006026	0.00	0.16	1	mossetorv	C	soil and vegetation
PFM006026	0.16	1.27	2	mossetorv	C	yellow-brown low-humified Sphagnum peat, hiatus between 0.78 and 0.86 due to compaction during coring
PFM006026	1.27	1.32	3	kärtrorv	C	yellow brown Phragmites peat
PFM006026	1.32	1.51	4	algyttja	C	red brown algal gyttja, rich in coarse detritus
PFM006026	1.51	1.67	5	leryttja-gyttjelera	C	greenish brown clayey gyttja with some detritus
PFM006026	1.67	1.74	6	leryttja-gyttjelera	C	greenish grey clayey gyttja with sparse detritus
PFM006027	0.00	0.05	1	mossetorv	C	
PFM006027	0.05	0.16	2	mossetorv	C	dark brown Sphagnum peat
PFM006027	0.16	0.18	3	mossetorv	C	as above but darker
PFM006027	0.18	1.27	4	mossetorv	C	yellow brown low-humified Sphagnum peat, single herb roots, hiatus between 0.83 and 1.00 due to compaction during coring
PFM006027	1.27	1.38	5	mossetorv	C	yellow reddish brown low-humified Sphagnum peat, single Carex roots, Phragmites detritus, wet
PFM006027	1.38	1.42	6	kärtrorv	C	yellow brown Phragmites peat
PFM006027	1.42	1.52	7	algyttja	C	red brown algal gyttja, rich in coarse detritus
PFM006027	1.52	1.76	8	gyttja	C	red brown gyttja with some detritus
PFM006027	1.76	1.82	9	leryttja-gyttjelera	C	greenish grey clayey gyttja
PFM006028	0.00	0.27	1	mossetorv	FD	Soil and vegetation
PFM006028	0.27	0.34	2	mossetorv	FD	Dark brown Sphagnum peat
PFM006028	0.34	1.21	3	mossetorv	FD	Yellow brown low-humified Sphagnum peat, single herb roots, hiatus between 0.94 and 1.00 due to compaction during coring
PFM006028	1.21	1.44	4	mossetorv	FD	Yellow reddish brown low-humified Sphagnum peat, single Carex roots, wet
PFM006028	1.44	1.58	5	mossetorv	FD	Reddish brown low-humified Sphagnum peat, Carex roots, hiatus between 1.55 and 1.58

Idcode	From length (m)	To length (m)	Layer no	Content	State at storage	Comments
PFM006028	1.58	1.67	6	kärrtorv	FD	Yellow brown Phragmites peat
PFM006028	1.67	1.90	7	algyttja	FD	Red brown algae gyttja, rich in coarse detritus (Phragmites)
PFM006028	1.90	1.93	8	leryttja-gyttjelera	FD	Greenish brown clayey gyttja with some detritus (Phragmites)
PFM006028	1.93	2.10	9	leryttja-gyttjelera	FD	Greenish grey clayey gyttja with sparse detritus (Phragmites)
PFM006028	2.10	2.15	10	ishavs-/issjösediment	FD	Grey coarse sand
PFM006029	0.00	0.35	1	mossetorv	C	Soil and vegetation
PFM006029	0.35	0.42	2	mossetorv	C	Dark brown Sphagnum peat
PFM006029	0.42	1.47	3	mossetorv	C	Yellow brown low-humified Sphagnum peat, single herb roots, hiatus between 0.87 and 0.97 due to compaction during coring
PFM006029	1.47	1.60	4	mossetorv	C	Brown low-humified Sphagnum peat, single Phragmites roots and leaves
PFM006029	1.60	1.65	5	kärrtorv	C	Yellow brown Phragmites peat
PFM006029	1.65	1.88	6	algyttja	C	Red brown algae gyttja, rich in coarse detritus (Phragmites)
PFM006029	1.88	1.92	7	leryttja-gyttjelera	C	Greenish brown clayey gyttja with some detritus (Phragmites)
PFM006029	1.92	2.11	8	leryttja-gyttjelera	C	Greenish grey clayey gyttja
PFM006029	2.11	2.15	9	ishavs-/issjösediment	C	Grey coarse sand

Table A2-2. Water content of peat samples.

Idcode	From length (m)	To length (m)	Water quotient (water loss per dry sample)	Water content (water loss per wet sample)	Comment
PFM006028	0.08	0.10	1.886	0.654	From peat core PFM006028:1
PFM006028	0.18	0.20	7.079	0.876	From peat core PFM006028:1
PFM006028	0.28	0.30	6.188	0.861	From peat core PFM006028:1
PFM006028	0.38	0.40	9.574	0.905	From peat core PFM006028:1
PFM006028	0.48	0.50	12.265	0.925	From peat core PFM006028:1
PFM006028	0.58	0.60	10.520	0.913	From peat core PFM006028:1
PFM006028	0.68	0.70	11.376	0.919	From peat core PFM006028:1
PFM006028	0.78	0.80	12.110	0.924	From peat core PFM006028:1
PFM006028	0.88	0.90	12.000	0.923	From peat core PFM006028:1
PFM006028	1.08	1.10	14.790	0.937	From peat core PFM006028:2
PFM006028	1.18	1.20	14.091	0.934	From peat core PFM006028:2
PFM006028	1.28	1.30	11.039	0.917	From peat core PFM006028:2
PFM006028	1.48	1.50	9.021	0.900	From peat core PFM006028:2
PFM006028	1.58	1.60	9.339	0.903	From peat core PFM006028:2
PFM006028	1.68	1.70	14.141	0.934	From peat core PFM006028:2
PFM006028	1.78	1.80	13.781	0.932	From peat core PFM006028:2
PFM006028	1.88	1.90	12.215	0.924	From peat core PFM006028:2
PFM006028	1.98	2.00	2.412	0.707	From peat core PFM006028:2
PFM006028	1.38	1.40	9.517	0.905	From peat core PFM006028:3
PFM006028	2.08	2.10	2.094	0.677	From peat core PFM006028:3



Figure A1-1. Part of the core from PFM006026.



Figure A1-2. Part of the core from PFM006027.



Figure A1-3. Part of the core from PFM006029.

Samples from the lakes Bolundsfjärden, Eckarfjärden and Puttan

Table A2-1. Stratigraphy of the lake sediment samples. The sample state at storage are given as C = cooled, F = frozen or FD = freeze-dried.

Lake	Idcode	From length (m)	To length (m)	Layer no	Sampling equipment	Content	State at storage	Comments
Eckarfjärden	PFM007371	0.00	1.93	1		water		
	PFM007371	1.93	2.50	2	Freeze corer	gyttja	FD	
Eckarfjärden	PFM007372	0.00	1.93	1		water		
	PFM007372	1.93	2.95	2	Russian peat corer	gyttja	FD	PFM007372:1
	PFM007372	2.73	3.72	2	Russian peat corer	gyttja	FD	PFM007372:3
	PFM007372	3.72	3.76	3	Russian peat corer	sand/gravel	FD	PFM007372:2
	PFM007372	3.34	3.70	2	Russian peat corer	gyttja	FD	PFM007372:3
	PFM007372	3.70	3.73	3	Russian peat corer	sand/gravel	FD	PFM007372:3
	PFM007372	3.73	4.36	4	Russian peat corer	clay	FD	Completely rigid to underlying till. Observe that the Russian peat corer has a 15 cm long tip. As a result c 15 cm of the clay have not been included in the sediment core. PFM007372:3
Eckarfjärden	PFM007373	0.00	1.92	1		water		
	PFM007373	1.92	2.44	2	Freeze corer	gyttja	F	
Eckarfjärden	PFM007374	0.00	1.93	1		water		
	PFM007374	1.93	2.95	2	Russian peat corer	gyttja	C	PFM007374:1
	PFM007374	2.73	3.68	2	Russian peat corer	gyttja	C	PFM007374:2
	PFM007374	3.68	3.70	3	Russian peat corer	sand/gravel	C	PFM007374:2
	PFM007374	3.70	3.75	4	Russian peat corer	clay	C	PFM007374:2
	PFM007374	3.39	3.69	2	Russian peat corer	gyttja	C	PFM007374:3
	PFM007374	3.69	3.71	3	Russian peat corer	sand/gravel	C	PFM007374:3
	PFM007374	3.71	4.41	4	Russian peat corer	clay	C	Completely rigid to underlying till. Observe that the Russian peat corer has a 15 cm long tip. As a result c 15 cm of the clay have not been included in the sediment core. PFM007374:3

Lake	Idcode	From length (m)	To length (m)	Layer no	Sampling equipment	Content	State at storage	Comments
Eckarfjärden	PFM007375	0.00	1.92	1		water		
	PFM007375	1.92	2.52	2	Freeze corer	gyttja	F	
Eckarfjärden	PFM007376	0.00	1.93	1		water		
	PFM007376	1.93	2.95	2	Russian peat corer	gyttja	C	PFM007376:1
	PFM007376	2.73	3.69	2	Russian peat corer	gyttja	C	PFM007376:2
	PFM007376	3.69	3.71	3	Russian peat corer	sand/gravel	C	PFM007376:2
	PFM007376	3.71	3.75	4	Russian peat corer	clay	C	PFM007376:2
	PFM007376	3.28	3.71	2	Russian peat corer	gyttja	C	PFM007376:3
	PFM007376	3.71	3.74	3	Russian peat corer	sand/gravel	C	PFM007376:3
	PFM007376	3.74	4.30	4	Russian peat corer	clay	C	Completely rigid to underlying till. Observe that the Russian peat corer has a 15 cm long tip. As a result c 15 cm of the clay have not been included in the sediment core. PFM007376:3
Bolundsfjärden	PFM007377	0.00	1.72	1		water		
	PFM007377	1.72	2.47	2	Freeze corer	gyttja	FD	
Bolundsfjärden	PFM007378	0.00	1.77	1		water		
	PFM007378	1.77	2.34	2	Russian peat corer	gyttja	C	
Bolundsfjärden	PFM007379	0.00	1.47	1		water		
	PFM007379	1.47	2.37	2	Freeze corer	gyttja	F	
Bolundsfjärden	PFM007380	0.00	1.72	1		water		
	PFM007380	1.72	2.41	2	Russian peat corer	gyttja	FD	
	PFM007380	2.41	2.42	3	Russian peat corer	sand/gravel		Completely rigid to underlying till. The 15 cm tip of the Russian peat corer also penetrated a shallow layer of sand/gravel. Nothing of that layer has been collected in the sediment core though.
Bolundsfjärden	PFM007381	0.00	1.71	1		water		
	PFM007381	1.71	2.21	2	Freeze corer	gyttja	F	
Bolundsfjärden	PFM007382	0.00	1.40	1		water		
	PFM007382	1.40	2.06	2	Freeze corer	gyttja	F	
Bolundsfjärden	PFM007383	0.00	1.75	1		water		
	PFM007383	1.75	2.37	2	Russian peat corer	gyttja	C	

Lake	Idcode	From length (m)	To length (m)	Layer no	Sampling equipment	Content	State at storage	Comments
Puttan	PFM007386	0.00	0.82	1		water		
	PFM007386	0.82	1.46	2	Freeze corer	gyttja	F	
Puttan	PFM007387	0.00	0.82	1		water		
	PFM007387	0.82	1.84	2	Russian peat corer	gyttja	FD	PFM007387:1
	PFM007387	1.35	2.37	2	Russian peat corer	gyttja	FD	Completely rigid to underlying till. The 15 cm tip of the Russian peat corer also penetrated a shallow layer of sand/gravel. Nothing of that layer has been collected in the sediment core though. PFM007387:2
Puttan	PFM007388	0.00	0.80	1		water		
	PFM007388	0.80	1.43	2	Freeze corer	gyttja	F	
Puttan	PFM007389	0.00	0.82	1		water		
	PFM007389	0.82	1.84	2	Russian peat corer	gyttja	C	PFM007389:1
	PFM007389	1.35	2.37	2	Russian peat corer	gyttja	C	Completely rigid to underlying till. The 15 cm tip of the Russian peat corer also penetrated a shallow layer of sand/gravel. Nothing of that layer has been collected in the sediment core though. PFM007389:2
Puttan	PFM007390	0.00	0.80	1		water		
	PFM007390	0.80	1.44	2	Freeze corer	gyttja	FD	
Puttan	PFM007391	0.00	0.82	1		water		
	PFM007391	0.82	1.84	2	Russian peat corer	gyttja	C	PFM007391:1
	PFM007391	1.33	2.35	2	Russian peat corer	gyttja	C	Completely rigid to underlying till. The 15 cm tip of the Russian peat corer also penetrated a shallow layer of sand/gravel. Nothing of that layer has been collected in the sediment core though. PFM007391:2

Table A2-2. Water content of lake sediment samples.

Lake	Idcode	From length (m)	To length (m)	Water quotient (water loss per dry sample)	Water content (water loss per wet sample)	Comment
Eckarfjärden	PFM007371	1.90	1.92	150.884	0.993	
Eckarfjärden	PFM007371	2.00	2.02	55.875	0.982	
Eckarfjärden	PFM007371	2.10	2.12	55.081	0.982	
Eckarfjärden	PFM007372	2.20	2.22	23.061	0.958	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.30	2.32	23.010	0.958	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.40	2.42	22.124	0.957	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.50	2.52	21.083	0.955	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.60	2.62	22.671	0.958	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.70	2.72	23.277	0.959	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.80	2.82	22.442	0.957	From sediment core PFM007372:1
Eckarfjärden	PFM007372	2.90	2.92	20.026	0.952	From sediment core PFM007372:1
Eckarfjärden	PFM007372	3.00	3.02	7.248	0.879	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.10	3.12	22.634	0.958	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.20	3.22	21.921	0.956	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.30	3.32	15.521	0.939	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.40	3.42	11.735	0.921	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.50	3.52	10.134	0.910	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.60	3.62	3.782	0.791	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.70	3.72	0.280	0.219	From sediment core PFM007372:2
Eckarfjärden	PFM007372	3.80	3.82	1.343	0.573	From sediment core PFM007372:3
Eckarfjärden	PFM007372	3.90	3.92	0.845	0.458	From sediment core PFM007372:3

Lake	Idcode	From length (m)	To length (m)	Water quotient (water loss per dry sample)	Water content (water loss per wet sample)	Comment
Eckarfjärden	PFM007372	4.00	4.02	1.091	0.522	From sediment core PFM007372:3
Eckarfjärden	PFM007372	4.10	4.12	1.169	0.539	From sediment core PFM007372:3
Eckarfjärden	PFM007372	4.20	4.22	1.187	0.543	From sediment core PFM007372:3
Eckarfjärden	PFM007372	4.30	4.32	1.109	0.526	From sediment core PFM007372:3
Bolundsfjärden	PFM007377	1.76	1.78	29.024	0.967	
Bolundsfjärden	PFM007377	1.86	1.88	18.827	0.950	
Bolundsfjärden	PFM007377	1.96	1.98	13.111	0.929	
Bolundsfjärden	PFM007377	2.06	2.08	7.380	0.881	
Bolundsfjärden	PFM007377	2.16	2.18	9.835	0.908	
Bolundsfjärden	PFM007377	2.26	2.28	16.489	0.943	
Bolundsfjärden	PFM007377	2.36	2.38	34.330	0.972	
Bolundsfjärden	PFM007377	2.46	2.48	21.437	0.955	
Bolundsfjärden	PFM007380	1.76	1.78	9.748	0.907	
Bolundsfjärden	PFM007380	1.86	1.88	7.763	0.886	
Bolundsfjärden	PFM007380	1.96	1.98	5.073	0.835	
Bolundsfjärden	PFM007380	2.06	2.08	9.693	0.906	
Bolundsfjärden	PFM007380	2.16	2.18	6.462	0.866	
Bolundsfjärden	PFM007380	2.26	2.28	7.617	0.884	
Bolundsfjärden	PFM007380	2.36	2.38	3.604	0.783	
Puttan	PFM007387	1.00	1.02	7.421	0.881	From sediment core PFM007387:1
Puttan	PFM007387	1.10	1.12	8.010	0.889	From sediment core PFM007387:1
Puttan	PFM007387	1.20	1.22	7.750	0.886	From sediment core PFM007387:1
Puttan	PFM007387	1.30	1.32	7.829	0.887	From sediment core PFM007387:1
Puttan	PFM007387	1.40	1.42	6.937	0.874	From sediment core PFM007387:1

Lake	Idcode	From length (m)	To length (m)	Water quotient (water loss per dry sample)	Water content (water loss per wet sample)	Comment
Puttan	PFM007387	1.50	1.52	7.831	0.887	From sediment core PFM007387:1
Puttan	PFM007387	1.60	1.62	8.218	0.892	From sediment core PFM007387:2
Puttan	PFM007387	1.70	1.72	7.453	0.882	From sediment core PFM007387:2
Puttan	PFM007387	1.80	1.82	4.199	0.808	From sediment core PFM007387:2
Puttan	PFM007387	1.90	1.92	6.631	0.869	From sediment core PFM007387:2
Puttan	PFM007387	2.00	2.02	6.080	0.859	From sediment core PFM007387:2
Puttan	PFM007387	2.10	2.12	6.449	0.866	From sediment core PFM007387:2
Puttan	PFM007387	2.20	2.22	5.037	0.834	From sediment core PFM007387:2
Puttan	PFM007387	2.30	2.32	5.430	0.844	From sediment core PFM007387:2
Puttan	PFM007390	0.80	0.82	53.886	0.982	
Puttan	PFM007390	0.90	0.92	35.246	0.972	
Puttan	PFM007390	1.00	1.02	21.326	0.955	
Puttan	PFM007390	1.10	1.12	12.405	0.925	
Puttan	PFM007390	1.20	1.22	10.425	0.912	
Puttan	PFM007390	1.30	1.32	10.797	0.915	
Puttan	PFM007390	1.40	1.42	9.471	0.905	

Photos of the lake sediment samples



PFM007371 (Eckarfjärden)



PFM007372_1 (Eckarfjärden)



PFM007372_2 (Eckarfjärden)



PFM007372_3 (Eckarfjärden)



PFM007373 (Eckarfjärden)



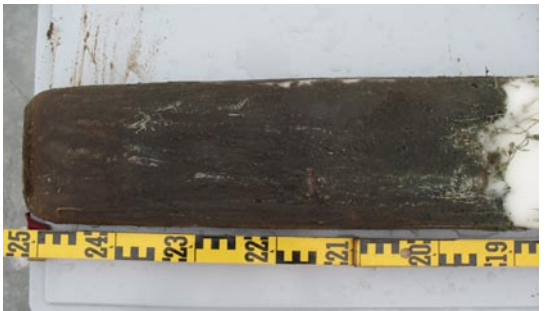
PFM007374_1 (Eckarfjärden)



PFM007374_2 (Eckarfjärden)



PFM007374_3 (Eckarfjärden)



PFM007375 (Eckarfjärden)



PFM007376_1 (Eckarfjärden)



PFM007376_2 (Eckarfjärden)



PFM007376_3 (Eckarfjärden)



PFM007377 (Bolundsfjärden)



PFM007378 (Bolundsfjärden)



PFM007379 (Bolundsfjärden)



PFM007380 (Bolundsfjärden)



PFM007381 (Bolundsfjärden)



PFM0073782 (Bolundsfjärden)



PFM007383 (Bolundsfjärden)



PFM007386 (Puttan)



PFM007387_1 (Puttan)



PFM007387_2 (Puttan)



PFM007388 (Puttan)



PFM007389_1 (Puttan)



PFM007389_2 (Puttan)



PFM007390 (Puttan)



PFM007391_1 (Puttan)



PFM007391_2 (Puttan)

Water moss samples from streams

Photos of the sampling sites.



Figure A3-1. The water moss sampling site PFM006042 (Gunnarsbo).



Figure A3-2. The water moss sampling site PFM006043 (South of Lake Stocksjön).



Figure A3-3. The water moss sampling site PFM006044 (inlet to Lake Bolundsfjärden).