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Forsmark site investigation

Benthic macrofauna, plant associated macrofauna and benthic vegetation in shallow lakes

Results from sampling 2004

Roger Huononen, Sveriges Vattenekologer AB

September 2005

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Keywords: Benthic macrofauna, Benthic vegetation, Lake Bolundsfjärden, Lake Fiskarfjärden, Ekman grab sampler, Plant associated macrofauna, AP PF 400-04-63.

Abstract

Benthic macrofauna, plant associated macrofauna and benthic vegetation were sampled and analyzed from two shallow lakes within the site investigation area of Forsmark. The sampling was done in August and September 2004 as an activity performed within the site investigation at Forsmark.

The aim of the study was to survey two lakes in the Forsmark area, Lake Bolundsfjärden and Lake Fiskarfjärden, concerning:

- The distribution, biomass, density and functional groups of benthic and plant associated macrofauna.
- The distribution and biomass of benthic vegetation.

The results of the study will be a part of the data to describe characteristics and function of the aquatic ecosystems in the investigation area.

The samples were taken from two different habitats in each lake, littoral zone 1 and littoral zone 3 /1/:

- Littoral zone 1: The littoral habitat with emergent and floating-leaved vegetation. This habitat is developed in wind-sheltered, shallow areas where the substrate is soft and allows emergent and floating-leaved vegetation to colonise.
- Littoral zone 3: The littoral habitat with submerged vegetation. This habitat is found in deeper areas of the lakes, where light enough to sustain photosynthetic primary production penetrates down to the sediment. As the lakes in the Forsmark area generally are very shallow and have clear water, this is a common habitat that covers large parts of the bottom areas.

Benthic macrofauna was sampled with an Ekman grab sampler. Plant associated macrofauna and benthic vegetation were sampled by a diver equipped with a scraper and an open iron frame with an attached net bag.

In both Lake Bolundsfjärden and Lake Fiskarfjärden, the benthic fauna is probably dominated by carnivores (*Tanypodinaes*). The bottoms of the lakes are nearly totally covered with benthic vegetation and have an extremely high plant biomass, consisting mostly of Stoneworths (*Chara spp*). The ecological status of the lakes is fairly similar, but these types of lakes are not common in Sweden.

Sammanfattning

Bottenfauna, växtassocierad fauna och undervattensvegetation insamlades och analyserades från två grunda sjöar inom platsundersökningsområdet i Forsmark. Provtagningen utfördes under perioden augusti 2004 till och med september 2004. Provtagningarna ingår som en del i platsundersökningen i Forsmark.

Syftet med undersökningen var att i sjöarna Bolundsfjärden och Fiskarfjärden kartlägga:

- Bottenfaunans och den växtassocierade faunans utbredning, biomassa, abundans och funktionella grupper.
- Undervattensvegetationens utbredning och biomassa.

Resultaten från undersökningen är en del av de data som skall beskriva det akvatiska ekosystemets utmärkande egenskaper och funktion i platsundersökningsområdet. Proverna togs från litoralzon 1 och 3 /1/.

- Litoralzon 1: Strandnära habitat med framträdande flytbladsvegetation. Habitaten finns i vindskyddade, grunda områden med löst bottensubstrat.
- Litoralzon 3: Strandnära habitat med undervattensvegetation. Habitatet återfinns i mindre grunda områden där ljuset är tillräckligt för att skapa fotosyntetisk aktivitet ända ner till botten. Sjöarna i Forsmarksregionen är både grunda och klara. Habitatet är därigenom vanligt och täcker stora delar av sjöbottnarna.

Provtagning av bottenfaunan utfördes med Ekmanhämtare. Provtagningen av den växtassocierade faunan och undervattensvegetationen utfördes av en dykare utrustad med skrapa och en öppen metallram med vidhängd nätpåse.

Båda sjöarnas bottenfauna bestod till stor del av karnivorer (*Tanypodinaes*). Sjöarnas bottnar är nästan helt täckta av kransalger (*Chara spp*) och har en extremt hög växtbiomassa. Sjöarnas ekologiska status är ganska snarlika men sjötypen bedöms som ganska ovanlig i Sverige.

Contents

1 Introduction

This document reports the results gained by sampling benthic macrofauna, plant associated macrofauna and benthic vegetation in two shallow lakes. This is one of the activities performed within the site investigation at Forsmark. The work was carried out in accordance with Activity Plan AP PF 400-04-63. In Table 1-1, controlling documents for performing this activity are listed. The Activity Plan is SKB's internal controlling document.

The aim of the activity was to survey the composition of benthic and plant associated macrofauna and benthic vegetation in two lakes within the Forsmark investigation area, Lake Bolundsfjärden and Lake Fiskarfjärden (Figure 1-1). The samplings were performed in two different habitats in each lake, littoral zone 1 and littoral zone 3 (Figure 1-2 and Figure 1-3) /1/. Areas with reeds were excluded in this survey. The results will be part of the data describing the function of the ecosystems in the investigation area. The field study was performed during August to September 2004. All data generated were stored in the database SICADA and are traceable by the activity plan (AP PF 400-04-63).

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

Activity plan	Number	Version
Undersökning av bottenfauna och bottenvegetation i sjöar och grunda havsvikar	AP PF 400-04-63	1.0
Method descriptions		
See References /1, 3, 4/		

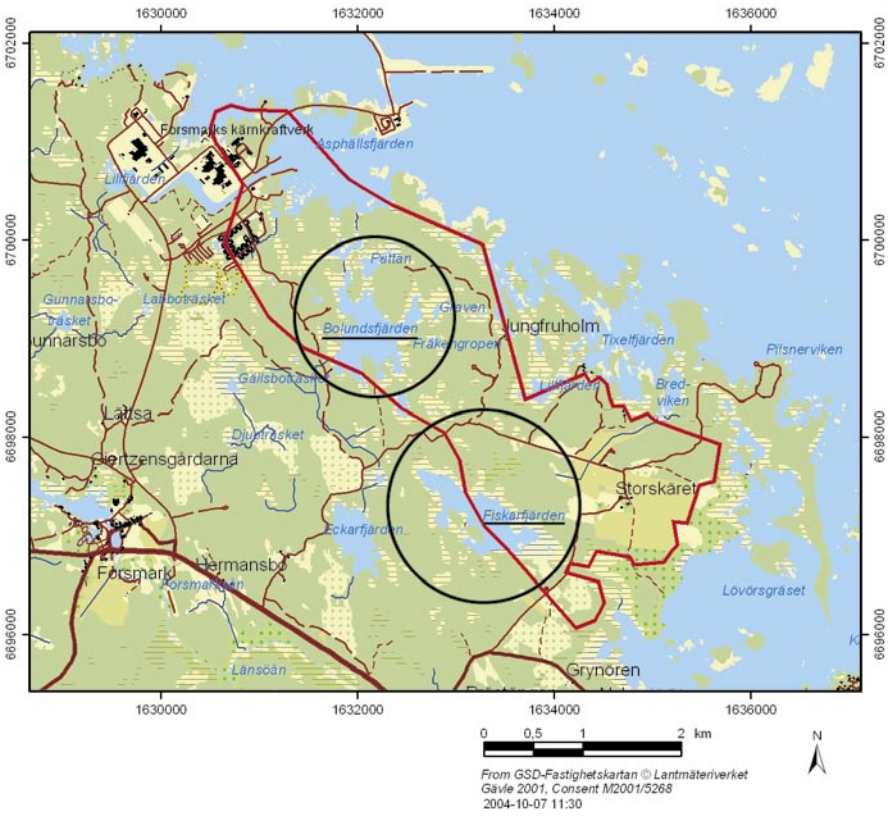

Figure 1-1. *Location of investigated lakes.*

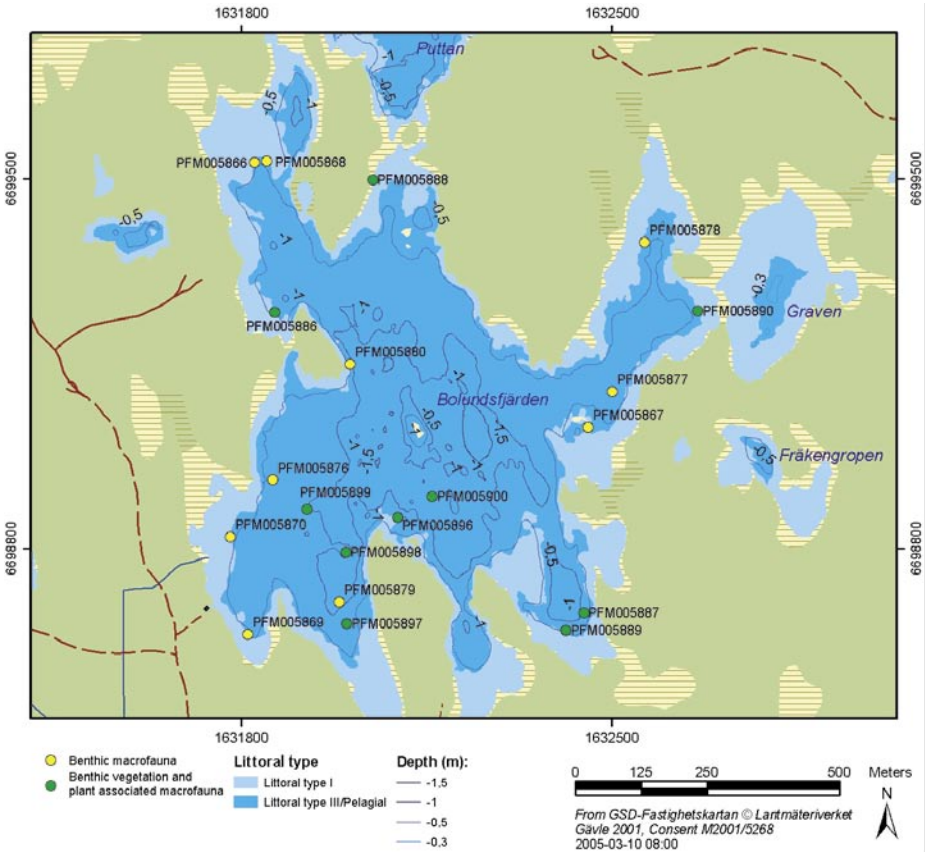

Figure 1-2. *Sampling points in Lake Bolundsfjärden.*

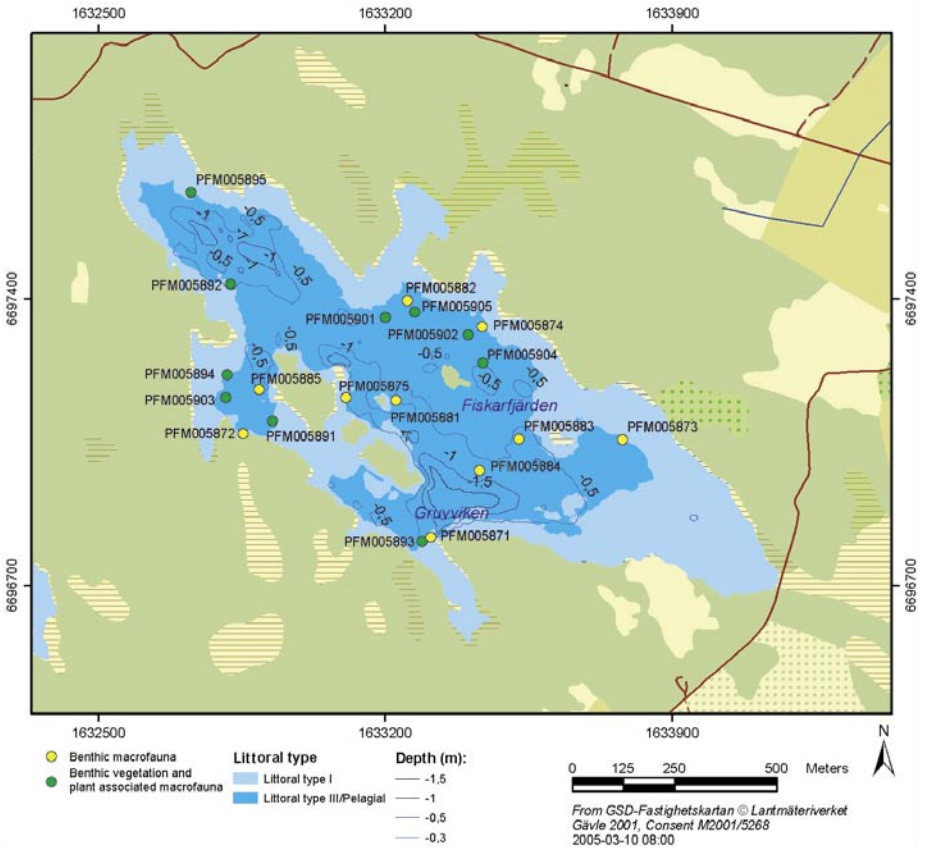

Figure 1-3. *Sampling points in Lake Fiskarfjärden.*

2 Objective and scope

The aim of this activity was to survey two lakes concerning the following, in order to enable characterization of the aquatic ecosystems of the site investigation area:

- Distribution, biomass, density and functional groups of benthic and plant associated macrofauna.
- Distribution and biomass of benthic vegetation.

Samples were taken from Lake Bolundsfjärden and Lake Fiskarfjärden. The samples were collected from two different habitats in each lake.

3 Equipment

3.1 Description of equipment/interpretation tools

3.1.1 GPS

The sampling point position was given from a Garmin 176C GPS /2/.

3.1.2 Depth gauge

Divers used a calibrated depth gauge with an average accuracy of ± 0.1 m. For water depth measurements from ship, an echo sounder with an accuracy of ± 0.5 m was employed.

3.1.3 Ekman grab sampler and sieve

An Ekman grab sampler with a sampling area of 0.0225 m^2 (size 0.15×0.15 m) was used to sample benthic macrofauna (Figure 3-1). The samples from the Ekman grab sampler were sifted in the field through a sieve with a mesh size of 0.5×0.5 mm.

Figure 3-1. *Sampling with an Ekman grab sampler.*

3.1.4 Scraper, frame and net bag

A diver equipped with a scraper and an open iron frame (size 0.2×0.2 m) with an attached net bag was used to sample plant associated macrofauna and benthic vegetation (Figure 3-2 and Figure 3-3).

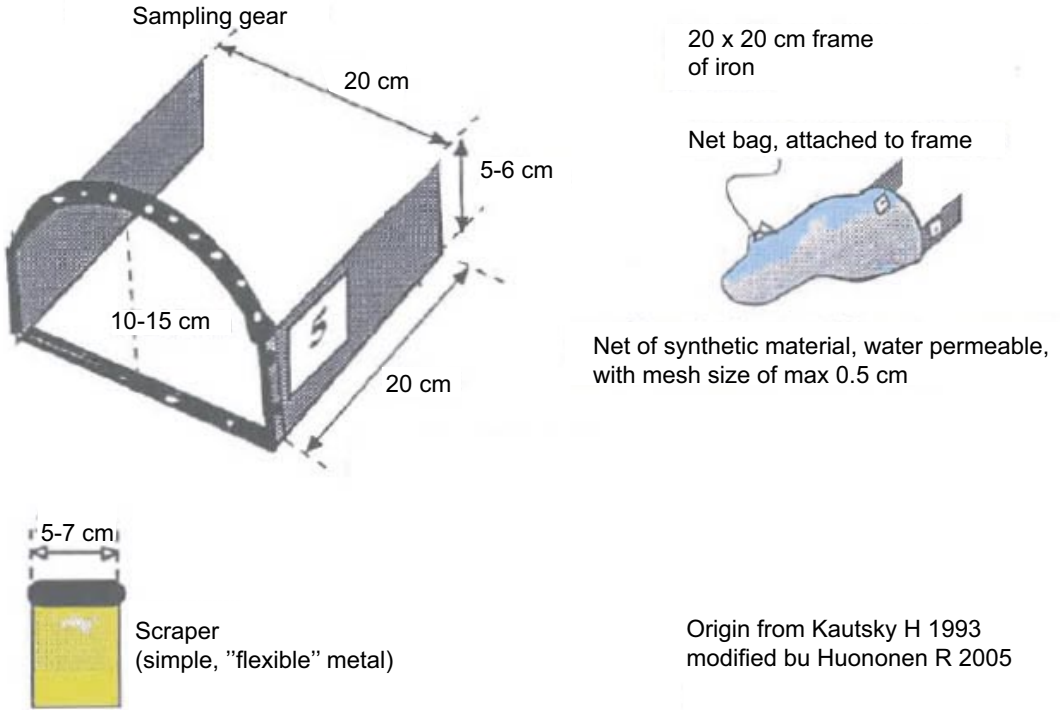

Figure 3-2. *The sampling gear for plant associated macrofauna and submerged vegetation.*

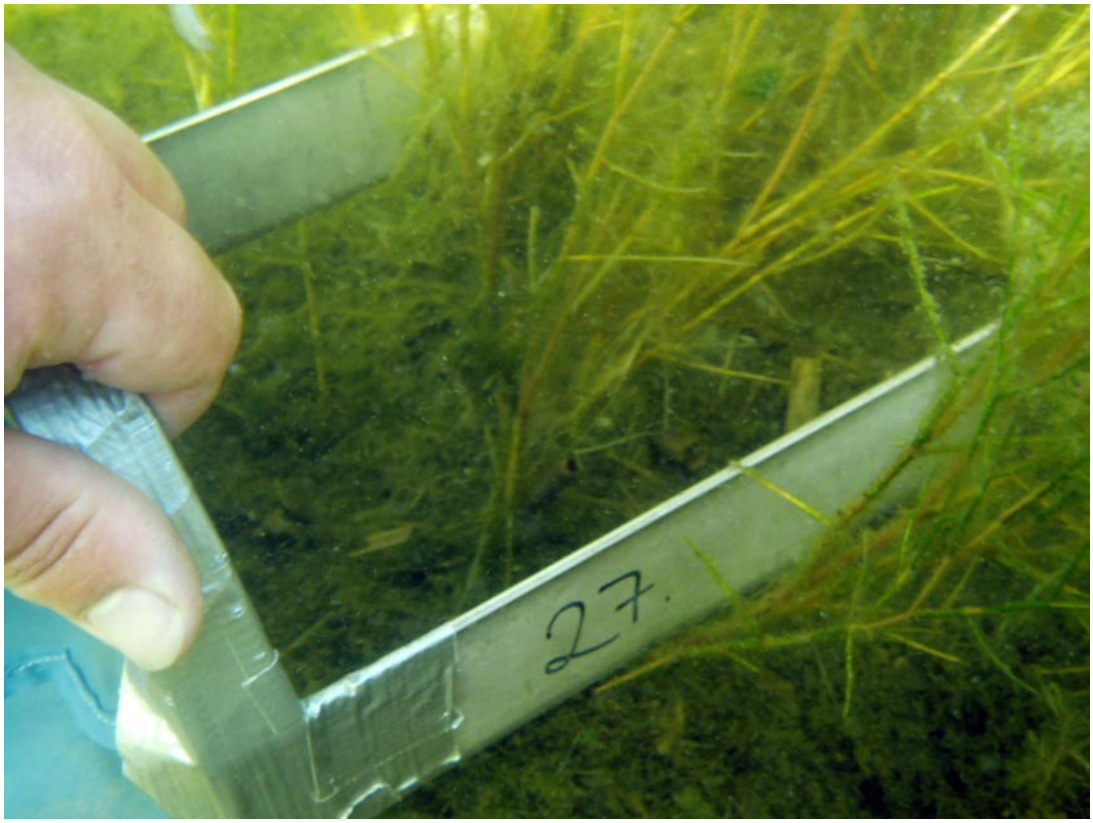

Figure 3-3. *Frame.*

3.1.5 Laboratory equipment

In the laboratory, the organisms were sorted out from the material using a magnifying glass and a stereo microscope. The latter was used also for species identification. However, for some species a light microscope was used. Drying of organisms was done in 60°C in a desiccator. The biomass was measured on an analytical balance with an accuracy of ± 0.1 mg.

4 Execution

4.1 General

Samples of benthic macrofauna, plant associated macrofauna and benthic vegetation were collected during August and September 2004 in two shallow lakes, Lake Bolundsfjärden and Lake Fiskarfjärden (Figure 1-1). The sampling was done from two different habitats in each lake, littoral zone 1 and littoral zone 3 (Figure 1-2 and Figure 1-3) /1/. The extent of the investigation is described in Table 4-1. The identification codes, samplings points, sampling type and the coordinates are presented in Appendix 1. While sampling, field notes were taken at each sample site. Field notes are to be found in SICADA and are traceable by the activity plan number. Analyses are presented as tables in Appendix 2. Selected data are presented in tables (Table 5-1 to Table 5-6).

Table 4-1. The extent of the investigations.

Organism	Parameters	Performance	Number of sample/lake	Reference
Benthic macrofauna	Species Biomass Functional groups Density	Ekman grab sampler	5 Sample/littoral zone 1 5 Sample/littoral zone 3	/3/
Plant associated macrofauna	Species Biomass Functional groups Density	Frames 0.20×0.20 m	5 Sample/littoral zone 1 5 Sample/littoral zone 3 (In the same frame as sub-merged vegetation)	/4/
Benthic vegetation	Species Biomass	Frames 0.20×0.20 m	5 Sample/littoral zone 1 5 Sample/littoral zone 3 (In the same frame as plant associated macrofauna)	/4/

4.2 Preparations

Prior to the field investigations, the sampling equipment and diving gear was checked.

A field protocol was copied on plastic papers for field notes.

The GPS-units were calibrated at a special reference point in the area. The accuracy had to be within ± 5 m to be accepted.

4.3 Execution of field work

4.3.1 Sampling points

Within each lake and littoral zone, five sampling points were randomized for Ekman grab sampling and five sampling points for frame sampling (the same frame point was used for plant associated macrofauna and benthic vegetation). The position was then identified using a GPS. Sometimes the randomized point ended up in an area with reed (*Phragmites australis*). The point was then moved the shortest distance as possible to an area free from reed (see Appendix 1).

4.3.2 Sampling of benthic macrofauna with Ekman grab sampler

The sampling of benthic macrofauna was performed from a boat with an Ekman grab sampler according to the Swedish industrial standard SS 02 81 90 /3/. One sample was taken at each sampling point. Each sample was sifted through a sieve and transferred into an individually marked plastic can with lid. The samples were preserved in 70% ethanol and transported to the laboratory. Field notes embrace: date, time, performer, coordinates, water depth, bottom structure and submerged vegetation cover in percentage.

4.3.3 Sampling of plant associated macrofauna and benthic vegetations with frames

Sampling of plant associated macrofauna and benthic vegetation was performed by a diver equipped with a scraper and an open iron frame with an attached net bag. One sample was taken at each sampling point. Quantitative samples were collected by frames (Figure 3-2 and Figure 3-3). The diver placed the frame at a given sampling point by throwing the frame randomly on the bottom. The entire content within the frame was scraped into a bag attached to one open side of the frame. The technique applied was mainly[1] according to Swedish Environmental Protection Agency method standards /4/. The field notes taken by the diver under the water included: water depth, bottom structure and submerged vegetation cover in percentage. The remaining notes taken at the surface concerned: date, time, performer and coordinates. After termination of the field activity, the samples were transferred to plastic bags and frozen for later sorting in the lab.

4.4 Data handling/post processing

After termination of the activity, the field/dive protocols were quality checked by the responsible personnel. Data from diving measurements and estimates, as well as background data, are incorporated in the database at SKB (SICADA).

4.5 Analyses and interpretations

4.5.1 Macrofauna analysis

Analysis of benthic and plant associated macrofauna was performed by Christina Ekström, Ekströms Hydrobiologikonsult. The sorting and measuring of biomass was performed by Cecilia Journath, Sveriges Vattenekologer AB. The method applied was in compliance with Swedish industrial standard SS 02 81 90 /3/.

[1] See Chapter 4.6 Nonconformities.

If possible, the animals were determined to species level using stereo and light microscopes. The samples were analysed by sorting each species separately. The biomass was then measured as dry weight (DW) on an analytical balance after drying in 60°C to constant weight (at least 2 weeks). The biomass is given in g dry weight m^2, including shells when present.

4.5.2 Vegetation analysis

Sorting, measuring and analysis of benthic vegetation were performed by Cecilia Journath and Micke Borgiel, Sveriges Vattenekologer AB. The technique was according to Swedish Environmental Protection Agency method standards /4/.

If possible, the plants were determined to species levels using stereo and light microscopes. The samples were analysed by sorting each species separately. The biomass was then measured as dry weight (DW) on an analytical balance after drying in 60°C to constant weight (at least 2 weeks). The biomass is given in g dry weight m^2.

4.6 Nonconformities

The applied sampling technique with frames was mainly according to method standards /4/ but the sampling points positions were not following transects. Within each lake and littoral zone, five sampling points were randomly placed for frame sampling. For sampling with both Ekman grabber and frames, the randomly placed sampling point sometimes ended up in an area with reed (*Phragmites australis*). The point was then moved the shortest distance as possible to an area free from reed (see Appendix 1).

5 Results

Analyses are present as tables in Appendix 2. Selected data are presented in the tables below (Table 5-1 to Table 5-6).

5.1 Lake Bolundsfjärden

5.1.1 Benthic macrofauna

When sampling benthic fauna in Lake Bolundsfjärden, zone 1, one large *Anodonta* was found. If the sampled *Anodonta* is included in the count, the biomass in littoral zone 1 increases from 0.33 gDW/m^2 to 59 gDW/m^2 and the filter feeders biomass increases from 11% to 99%. Therefore, Table 5-1 and Table 5-4 contain both combinations, one including the *Anodonta* and one excluding it.

Littoral zone 3 has the larger number of taxa and the highest density of benthic macrofauna (Table 5-1). If the only specimen of large *Anodonta* is included, littoral zone 1 shows the highest biomass value (Table 5-1). However, if the *Anodonta* is excluded, littoral zone 3 displays the highest amount of biomass (Table 5-1).

If the large *Anodonta* is included, the biomass of littoral zone 1 is totally dominated by filter feeders (Table 5-4). If the *Anodonta* is excluded, littoral zone 1 is dominated by carnivores (Table 5-4). Littoral zone 3 is dominated by omnivores (Table 5-4).

5.1.2 Plant associated macrofauna

Littoral zone 1 is characterized by the highest number of taxa and the highest density and biomass of plant associated macrofauna (Table 5-2). Both littoral zone 1 and 3 are dominated by carnivores (Table 5-5).

5.1.3 Benthic vegetation

Table 5-3 demonstrates that the highest biomass value is represented by littoral zone 3, whereas littoral zone 1 displays the largest number of taxa. Both littoral zone 1 and 3 are dominated by Stoneworths (*Chara spp*), see Table 5-6.

5.2 Lake Fiskarfjärden

5.2.1 Benthic macrofauna

Littoral zone 1 is characterized by the largest number of taxa and the highest density and biomass of benthic macrofauna (Table 5-1). Both littoral zone 1 and 3 are dominated by carnivores (Table 5-4).

5.2.2 Plant associated macrofauna

Littoral zone 1 shows the largest number of taxa and the highest density and biomass of plant associated macrofauna (Table 5-2). Littoral zone 1 is dominated by carnivores (Table 5-5). Littoral zone 3 is dominated by filter feeders (Table 5-5).

5.2.3 Benthic vegetation

Littoral zone 1 exposes the highest biomass value for benthic vegetation (Table 5-3). Equal number of taxa were found in both littoral zones (Table 5-3). Both littoral zone 1 and 3 are dominated by Stoneworths (*Chara spp*), see Table 5-6.

5.3 Tables

5.3.1 Tables with general view

Table 5-1. Number of different benthic macrofauna taxa, density and biomass in different littoral zones. Within each lake and littoral zone, five replicates were taken with an Ekman grabber. Values in parenthesis represent samples excluding one large *Anodonta.* The values represent a calculated mean value.

Lake Bolundsfjärden	Taxa	Density (number/m²)	Biomass (gDW/m²)
Littoral zone 1	13 (12)	2,871 (2,862)	58.55 (0.33)
Littoral zone 3	16	11,938	0.80

Lake Fiskarfjärden	Taxa	Density (number/m²)	Biomass (gDW/m²)
Littoral zone 1	14	6,089	0.96
Littoral zone 3	12	1,778	0.19

Table 5-2. Number of different plant associated macrofauna taxa, density and biomass in different littoral zones. Within each lake and littoral zone, five replicates were taken with a frame. The values represent a calculated mean value.

Lake Bolundsfjärden	Taxa	Density (number/m²)	Biomass (gDW/m²)
Littoral zone 1	43	13,095	2.06
Littoral zone 3	27	7,220	2.00

Lake Fiskarfjärden	Taxa	Density (number/m²)	Biomass (gDW/m²)
Littoral zone 1	30	8,210	0.90
Littoral zone 3	22	5,870	0.59

Table 5-3. Number of different benthic vegetation taxa and biomass in different littoral zones. Within each lake and littoral zone, five replicates were taken with a frame. The values represent a calculated mean value.

Lake Bolundsfjärden	Taxa	Biomass (gDW/m²)
Littoral zone 1	3	97.85
Littoral zone 3	2	681.12

Lake Fiskarfjärden	Taxa	Biomass (gDW/m²)
Littoral zone 1	3	219.35
Littoral zone 3	3	85.77

5.3.2 Tables with particular view

Table 5-4. Density and biomass of different functional groups of benthic macrofauna in different littoral zones. Within each lake and littoral zone, five replicates were taken with an Ekman grabber. The values represent a calculated mean value. Values in parenthesis represent samples excluding one large *Anodonta.*

Lake Bolundsfjärden Littoral zone 1						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	27 (18)	24	0.93 (0.62)	58.55 (0.03)	131	99.50 (10.63)
Herbivores	0		0.00 (0.00)	0.00 (0.00)		0.00 (0.00)
Carnivores	1,084	1,206	37.77 (37.89)	0.18 (0.18)	0.20	0.30 (55.31)
Omnivores	551	479	19.20 (19.25)	0.03 (0.03)	0.03	0.05 (9.81)
Detrivores	1,209	1,471	42.11 (42.24)	0.08 (0.08)	0.06	0.13 (24.25)
Sum Animals	2,871 (2,862)	3,103	100.00	58.84 (0.33)	131	100.00

Lake Bolundsfjärden Littoral zone 3						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	187	238	1.56	0.09	0.13	10.62
Herbivores	27	24	0.22	0.03	0.03	3.76
Carnivores	1,200	1,169	10.05	0.13	0.14	16.15
Omnivores	6,791	11,159	56.89	0.41	0.64	50.66
Detrivores	3,733	5,032	31.27	0.15	0.178	18.81
Sum Animals	11,938	16,921	100.00	0.80	0.939	100.00

Lake Fiskarfjärden Littoral zone 1						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	62	97	1.02	0.02	0.04	2.42
Herbivores	9	20	0.15	0.003	0.006	0.28
Carnivores	2,364	1,644	38.83	0.81	1.15	84.66
Omnivores	1,138	773	18.69	0.03	0.02	3.65
Detrivores	2,516	906	41.31	0.09	0.04	8.99
Sum Animals	6,089	1,878	100.00	0.96	1.16	100.00

Lake Fiskarfjärden Littoral zone 3						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	27	60	1.50	0.01	0.01	2.87
Herbivores	0		0.00	0.00		0.00
Carnivores	596	568	33.50	0.11	0.14	58.79
Omnivores	373	475	21.00	0.03	0.03	18.16
Detrivores	782	739	44.00	0.04	0.04	20.18
Sum Animals	1,778	1,743	100.00	0.19	0.20	100.00

Table 5-5. Density and biomass of different functional groups of plant associated macrofauna in different littoral zones. Within each lake and littoral zone, five replicates were taken with a frame. The values represent a calculated mean value.

Lake Bolundsfjärden Littoral zone 1						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	275	232	2.10	0.14	0.11	6.65
Herbivores	390	322	2.98	0.31	0.29	15.12
Carnivores	2,005	1,317	15.31	0.93	0.85	45.16
Omnivores	2,700	3,416	20.62	0.32	0.28	15.37
Detrivores	7,725	8,360	58.99	0.36	0.37	17.70
Sum Animals	13,095	12,076	100.00	2.06	1.23	100.00

Lake Bolundsfjärden Littoral zone 3						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	500	439	6.93	0.14	0.11	7.10
Herbivores	310	369	4.29	0.46	0.66	23.18
Carnivores	905	343	12.53	0.94	1.33	47.23
Omnivores	1,595	2,362	22.09	0.15	0.23	7.45
Detrivores	3,910	4,480	54.16	0.30	0.33	15.05
Sum Animals	7,220	5,136	100.00	2.00	2.14	100.00

Lake Fiskarfjärden Littoral zone 1						
Animal trophic groups	**Density (ind/m²)**	**Density (SD)**	**Rel density (%)**	**Biomass (gDW/m²)**	**Biomass (SD)**	**Rel biomass (%)**
Filter feeders	285	197	3.47	0.12	0.06	13.78
Herbivores	130	74	1.58	0.19	0.26	21.37
Carnivores	2,470	1,351	30.09	0.36	0.21	40.40
Omnivores	285	102	3.47	0.03	0.01	3.52
Detrivores	5,040	3,047	61.39	0.19	0.08	20.93
Sum Animals	8,210	4,214	100.00	0.90	0.36	100.00

Lake Fiskarfjärden Littoral zone 3 Animal trophic groups	Density (ind/m²)	Density (SD)	Rel density (%)	Biomass (gDW/m²)	Biomass (SD)	Rel biomass (%)
Filter feeders	650	428	11.07	0.23	0.07	39.49
Herbivores	50	40	0.85	0.04	0.07	6.74
Carnivores	2,230	1,536	37.99	0.20	0.11	33.47
Omnivores	635	413	10.82	0.04	0.01	6.23
Detrivores	2,305	1,322	39.27	0.08	0.04	14.07
Sum Animals	5,870	2,566	100.00	0.59	0.15	100.00

Table 5-6. Biomass of different plant groups of benthic vegetation in different littoral zones. Within each lake and littoral zone, five replicates were taken with a frame. The values represent a calculated mean value.

Lake Bolundsfjärden Littoral zone 1 Plant groups	Biomass (gDW/m²)	Biomass (SD)	Rel biomass (%)
Chara spp	80.85	127.46	82.62
Potamogeton spp	17.00	38.02	17.38
Other phanerogams	0.00		0.00
Sum Plants	97.85	119.40	100.00

Lake Bolundsfjärden Littoral zone 3 Plant groups	Biomass (gDW/m²)	Biomass (SD)	Rel biomass (%)
Chara spp	679.84	871.69	99.81
Potamogeton spp	1.27	2.84	0.19
Other phanerogams	0.00		0.00
Sum Plants	681.12		100.00

Lake Fiskarfjärden Littoral zone 1 Plant groups	Biomass (gDW/m²)	Biomass (SD)	Rel biomass (%)
Chara spp	205.35	409.00	93.62
Potamogeton spp	13.64	25.54	6.22
Other phanerogams	0.36	0.81	0.16
Sum Plants	219.35	401.66	100.00

Lake Fiskarfjärden Littoral zone 3 Plant groups	Biomass (gDW/m²)	Biomass (SD)	Rel biomass (%)
Chara spp	84.22	136.84	98.19
Potamogeton spp	1.55	2.58	1.81
Other phanerogams	0.00		0.00
Sum Plants	85.77	136.76	100.00

6 Summary and discussions

In both Lake Bolundsfjärden and Lake Fiskarfjärden, the benthic fauna is probably dominated by carnivores (*Tanypodinae*). The bottoms of the lakes are nearly totally covered with benthic vegetation and have an extremely high plant biomass, consisting mostly of Stoneworths (*Chara spp*). The ecological status of the lakes is fairly similar, but these types of lakes are not common in Sweden.

Lake Bolundsfjärden

Benthic macrofauna: Littoral zone 3 has the largest number of taxa and the highest density. If the only sampled large *Anodonta sp* is included, littoral zone 1 has the highest biomass whereas if the *Anodonta sp* is excluded, littoral zone 3 has the highest biomass. If the large *Anodonta sp* is included, littoral zone 1 is totally dominated (biomass) by filter feeders. If the *Anodonta sp* is excluded, littoral zone 1 is dominated by carnivores. Littoral zone 3 is dominated by omnivores.

Plant associated macrofauna: Littoral zone 1 has the largest number of taxa and the highest density and biomass. Both littoral zone 1 and 3 are dominated by carnivores.

Benthic vegetation: Littoral zone 3 exhibits the highest biomass. The highest number of taxa was found in littoral zone 1. Both littoral zone 1 and 3 are dominated by Stoneworths (*Chara spp*).

Lake Fiskarfjärden

Benthic macrofauna: The largest number of taxa as well as the highest density and biomass was found in littoral zone 1. Both littoral zone 1 and 3 are dominated by carnivores.

Plant associated macrofauna: Littoral zone 1 has the largest number of taxa and the highest density and biomass. Littoral zone 1 is dominated by carnivores and littoral zone 3 by filter feeders.

Benthic vegetation: Littoral zone 1 shows the highest biomass. Equal numbers of taxa were found in both littoral zones. Both littoral zone 1 and 3 are dominated by Stoneworths (*Chara spp*).

Uncertainties

A large part of the samples often consists of carnivores. For example, the biomass of the benthic fauna in littoral zone 1 in Lake Fiskarfjärden comprises 85% carnivores (dominated by *Tanypodinae*), Table 5-4 and Appendix 2. A closed ecosystem is normally characterized by a much smaller share of carnivores.

The high proportion of carnivores among macrofauna in the investigated lakes may be caused by one or several of the following factors:

- The results of the analysis do not represent a closed ecosystem.
- Certain species of insects have gone from being water living larva to flying insects and by doing so, they are not represented in the water ecosystem of the lakes at the time of sampling.
- Certain species are omnivores, making it difficult to group them into the correct functional groups. At the same time, there is little knowledge concerning what kind of food the species prefer.
- The *Tanypodinaes* are often freely swimming predators and eat, among other things, zooplankton (zooplankton and phytoplankton are not included in the samples).
- The first larva stage of *Tanypodinaes* might belong to the herbivores.
- Small organisms (< 0.5 mm) are sifted out when sampling.

The estimations of biomass must for some time be considered as uncertain. The reason for this is that large mussels (*Anodonta sp*) have a considerably higher biomass than the other species. When sampling benthic fauna in Lake Bolundsfjärden and zone 1, one large *Anodonta* was found. For example, if the sampled *Anodonta* is included in the count, the biomass in littoral zone 1 increases from 0.33 gDW/m^2 to 59 gDW/m^2.

The lakes seem to have an extremely high plant biomass consisting of mostly Stoneworths (*Chara spp*). It is also possible that patchiness is frequent. Five frames per littoral zone might therefore be on the low end to make an accurate survey of the lakes.

References

/1/ **Brunberg A, et al. 2004.** Identification of catchments. Lake related drainage parameters and lake habitats. Forsmark Site Investigation. SKB P-04-25. Svensk Kärnbränslehantering AB.

/2/ **Garmin GPS MAP. 176C/176 2001.** Svensk Handbok.

/3/ **SS 028190, 1986**. Vattenundersökningar - Provtagning med Ekmanhämtare av bottenfauna på mjukbottnar. SIS. 1986. (Svensk standard; SS 028190).

/4/ **Naturvårdsverket, 2004.** Handbok för miljöövervakning. Kust och hav**.** Vegetationsklädda bottnar. Ostkust Version 1: 2004–04-27.

Appendix 1

Sampling points

				Sampling point			Randomized point	
ID code	**Lake**	**Littoral zone**	**Sampling type***	**Latitud**	**Longitud**	**Comments**	**Latitud**	**Longitud**
PFM005889	Bolundsfjärden	1	PF and BV	1632414	6698646	Moved becaused of reeds (Phragmites australis)	1632413	6698617
PFM005887	Bolundsfjärden	1	PF and BV	1632448	6698679	Moved becaused of reeds (Phragmites australis)	1632453	6698588
PFM005890	Bolundsfjärden	1	PF and BV	1632663	6699249	Moved becaused of reeds (Phragmites australis)	1632686	6699247
PFM005886	Bolundsfjärden	1	PF and BV	1631864	6699247	Moved becaused of reeds (Phragmites australis)	1631827	6699214
PFM005888	Bolundsfjärden	1	PF and BV	1632049	6699497		Same as sampling point	
PFM005897	Bolundsfjärden	3	PF and BV	1632000	6698659		Same as sampling point	
PFM005898	Bolundsfjärden	3	PF and BV	1631998	6698793		Same as sampling point	
PFM005899	Bolundsfjärden	3	PF and BV	1631925	6698875		Same as sampling point	
PFM005896	Bolundsfjärden	3	PF and BV	1632096	6698859		Same as sampling point	
PFM005900	Bolundsfjärden	3	PF and BV	1632161	6698899		Same as sampling point	
PFM005869	Bolundsfjärden	1	BF	1631813	6698639	Moved becaused of reeds (Phragmites australis)	1631807	6698608
PFM005870	Bolundsfjärden	1	BF	1631780	6698823	Moved becaused of reeds (Phragmites australis)	1631762	6698825
PFM005866	Bolundsfjärden	1	BF	1631826	6699530	Moved becaused of reeds (Phragmites australis)	1631760	6699570
PFM005868	Bolundsfjärden	1	BF	1631849	6699533	Moved becaused of reeds (Phragmites australis)	1631770	6699628
PFM005867	Bolundsfjärden	1	BF	1632456	6699030	Moved becaused of reeds (Phragmites australis)	1632427	6698970
PFM005878	Bolundsfjärden	3	BF	1632563	6699379		Same as sampling point	
PFM005877	Bolundsfjärden	3	BF	1632502	6699097		Same as sampling point	
PFM005880	Bolundsfjärden	3	BF	1632006	6699149		Same as sampling point	
PFM005876	Bolundsfjärden	3	BF	1631860	6698930		Same as sampling point	
PFM005879	Bolundsfjärden	3	BF	1631986	6698700		Same as sampling point	

				Sampling point			Randomized point	
ID code	**Lake**	**Littoral zone**	**Sampling type***	**Latitud**	**Longitud**	**Comments**	**Latitud**	**Longitud**
PFM005893	Fiskarfjärden	1	PF and BV	1633291	6696809	Moved becaused of reeds (Phragmites australis)	1633407	6696636
PFM005895	Fiskarfjärden	1	PF and BV	1632727	6697659		Same as sampling point	
PFM005892	Fiskarfjärden	1	PF and BV	1632822	6697435		Same as sampling point	
PFM005894	Fiskarfjärden	1	PF and BV	1632814	6697214	Moved becaused of reeds (Phragmites australis)	1632733	6697318
PFM005891	Fiskarfjärden	1	PF and BV	1632926	6697101	Moved becaused of reeds (Phragmites australis)	1632950	6697080
PFM005901	Fiskarfjärden	3	PF and BV	1633200	6697355		Same as sampling point	
PFM005905	Fiskarfjärden	3	PF and BV	1633272	6697368		Same as sampling point	
PFM005902	Fiskarfjärden	3	PF and BV	1633402	6697312		Same as sampling point	
PFM005904	Fiskarfjärden	3	PF and BV	1633439	6697244		Same as sampling point	
PFM005903	Fiskarfjärden	3	PF and BV	1632811	6697159		Same as sampling point	
PFM005871	Fiskarfjärden	1	BF	1633312	6696819	Moved becaused of reeds (Phragmites australis)	1633408	6696567
PFM005873	Fiskarfjärden	1	BF	1633779	6697056	Moved becaused of reeds (Phragmites australis)	1633845	6697092
PFM005872	Fiskarfjärden	1	BF	1632854	6697071		Same as sampling point	
PFM005875	Fiskarfjärden	1	BF	1633105	6697158	Moved becaused of reeds (Phragmites australis)	1633087	6697164
PFM005874	Fiskarfjärden	1	BF	1633437	6697331	Moved becaused of reeds (Phragmites australis)	1633483	6697347
PFM005884	Fiskarfjärden	3	BF	1633430	6696981		Same as sampling point	
PFM005883	Fiskarfjärden	3	BF	1633526	6697058		Same as sampling point	
PFM005885	Fiskarfjärden	3	BF	1632893	6697179		Same as sampling point	
PFM005881	Fiskarfjärden	3	BF	1633226	6697152		Same as sampling point	
PFM005882	Fiskarfjärden	3	BF	1633255	6697395		Same as sampling point	

* Plant associated macrofauna sampled with frames = PF, Benthic vegetation sampled with frames = BV, Benthic fauna sampled with an Ekman grab sampler = BF.

Appendix 2

Results

Lake Bolundsfjärden
Primary data. SKB Forsmark 2004. Sampling data 04-09-08.
Ekman grabber
Abundance (specimens/m²)

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5866	5867	5868	5869	5870					5876	5877	5878	5879	5880				
Depth (m)	0.3	0.4	0.2	0.4	0.3					0.8	0.5	0.5	1.2	1.1				
ANIMALS																		
ANNELIDAE																		
Erpobdella sp			89			17.8	39.8	19.9	0.6									
Naididae	222		89	44		71.1	92.2	46.1	2.5									
Stylaria lacustris	267					53.3	119.3	59.6	1.9		311	178			97.8	141.9	71.0	0.8
MOLLUSCA																		
Lymnaea spp													44		8.9	19.9	9.9	0.1
Pisidium sp	44		44			17.8	24.3	12.2	0.6		133		533		133.3	230.9	115.5	1.1
Anodonta sp				44		8.9	19.9	9.9	0.3									
CRUSTACEANS																		
Cyclops sp	978	222	1,111		222	506.7	501.5	250.7	17.6		133	489	44		133.3	206.1	103.0	1.1
INSECTA																		
Chironomidae		222				44.4	99.4	49.7	1.5	44	5,644	25,822	1,556	89	6,631.0	10,968.2	5,484.1	55.5
Tanytarsinae	400		489	44	44	195.6	230.1	115.0	6.8			133			26.7	59.6	29.8	0.2
Tanypodinae	2,889	222	1,644	222	178	1,031.1	1,210.8	605.4	35.9	800	2,089	1,511	178	89	933.3	861.8	430.9	7.8
Ceratopogonidae												711	44		151.1	313.6	156.8	1.3
Cyrnus sp											89	133	44		53.3	57.9	29.0	0.4
Leptoceridae													133		26.7	59.6	29.8	0.2

Sample no Habitat Sample ID code PFM Depth (m)	6 littoral 1 5866 0.3	7 littoral 1 5867 0.4	8 littoral 1 5868 0.2	9 littoral 1 5869 0.4	10 littoral 1 5870 0.3	Mean	Stdv	SE	%	16 littoral 3 5876 0.8	17 littoral 3 5877 0.5	18 littoral 3 5878 0.5	19 littoral 3 5879 1.2	20 littoral 3 5880 1.1	Mean	Stdv	SE	%
Caenis sp				44		8.9	19.9	9.9	0.3		5,733				1,146.7	2,564.0	1,282.0	9.6
Caenis horaria	2,622	267	1,289	89	133	880.0	1,091.1	545.5	30.7			11,200	933	133	2,453.3	4,904.9	2,452.5	20.6
Caenis lactea												44			8.9	19.9	9.9	0.1
Sialis lutaria			44			8.9	19.9	9.9	0.3									
Haliplus sp (larv)										44		44			17.8	24.3	12.2	0.1
ARACHNIDAE												44			8.9	19.9	9.9	0.1
ACARINA																		
Hydracarinae				89	44	26.7	39.8	19.9	0.9		444	89			106.7	192.7	96.4	0.9
Abundance (specimens/m²)	7,422	933	4,800	578	622	2,871.1	3,102.6	1,551.3	100	889	14,578	40,400	3,511	311	11,937.7	16,921.2	8,460.6	100
Number of taxa	7	4	8	7	5	6.2	1.6	0.8		3	8	12	9	3	7.0	3.9	2.0	
Animal trophic groups																		
filter feeders	44		44	44		26.7	24.3	12.2	0.9		222	133	578		186.7	238.1	119.0	1.6
herbivores										44		44	44		26.7	24.3	12.2	0.2
carnivores	2,889	222	1,778	311	222	1,084.4	1,206.4	603.2	37.8	800	2,533	2,356	222	89	1,200.0	1,168.7	584.4	10.1
omnivores	978	444	1,111		222	551.1	479.3	239.6	19.2	44	5,778	26,311	1,733	89	6,791.0	11,158.7	5,579.3	56.9
detrivores	3,511	267	1,867	222	178	1,208.9	1,471.2	735.6	42.1		6,044	11,555	933	133	3,733.3	5,031.5	2,515.8	31.3
Abundance (specimens/m²)	7,422	933	4,800	578	622	2,871.1	3,102.6	1,551.3	100	889	14,578	40,400	3,511	311	11,937.7	16,921.2	8,460.6	100
Total number of taxa	13									16								

Lake Bolundsfjärden
Primary data. SKB Forsmark 2004. Sampling date 04-09-08.
Ekman grabber
Biomass dw (g/m²)

Sample no Habitat Sample ID code PFM Depth (m)	6 littoral 1 5866 0.3	7 littoral 1 5867 0.4	8 littoral1 5868 0.2	9 littoral 1 5869 0.4	10 littoral1 5870 0.3	Mean	Stdv	SE	%	16 littoral 3 5876 0.8	17 littoral 3 5877 0.5	18 littoral 3 5878 0.5	19 littoral 3 5879 1.2	20 littoral 3 5880 1.1	Mean	Stdv	SE	%
ANIMALS																		
ANNELIDAE																		
Erpobdella sp			0.031			0.006	0.014	0.007										
Naididae	0.018		0.013	0.013		0.009	0.008	0.004										
Stylaria lacustris	0.018					0.004	0.008	0.004			0.018	0.018			0.007	0.010	0.005	0.9
MOLLUSCA																		
Lymnaea spp													0.058		0.012	0.026	0.013	1.4
Pisidium sp	0.044		0.031			0.015	0.021	0.011			0.067		0.293		0.072	0.127	0.064	9.0
Anodonta sp				292.584		58.517	130.847	65.424	99.4									
CRUSTACEANS																		
Cyclops sp	0.049	0.018	0.067		0.022	0.031	0.026	0.013	0.1		0.009	0.022	0.018		0.010	0.010	0.005	1.2
INSECTA																		
Chironomidae		0.004				0.001	0.002	0.001		0.027	0.342	1.498	0.076	0.013	0.391	0.633	0.316	48.6
Tanytarsinae	0.022		0.036	0.018	0.018	0.019	0.013	0.006				0.009			0.002	0.004	0.002	0.2
Tanypodinae	0.204	0.049	0.196	0.040	0.049	0.108	0.085	0.042	0.2	0.040	0.129	0.187	0.022	0.009	0.077	0.077	0.039	9.6
Ceratopogonidae												0.093	0.036		0.026	0.041	0.020	3.2
Cyrnus sp				0.098		0.020	0.044	0.022			0.022	0.036	0.009		0.013	0.015	0.008	1.7
Leptoceridae													0.031		0.006	0.014	0.007	0.8
Caenis sp											0.293				0.059	0.131	0.066	7.3
Caenis horaria	0.120	0.022	0.062	0.018	0.018	0.048	0.044	0.022	0.1			0.329	0.062	0.009	0.080	0.142	0.071	10.0
Caenis lactea												0.018			0.004	0.008	0.004	0.4
Sialis lutaria			0.289			0.058	0.129	0.065	0.1									
Haliplus sp (larv)										0.027		0.067			0.019	0.029	0.015	2.3

Sample no Habitat Sample ID code PFM Depth (m)	6 littoral 1 5866 0.3	7 littoral 1 5867 0.4	8 littoral1 5868 0.2	9 littoral 1 5869 0.4	10 littoral1 5870 0.3	Mean	Stdv	SE	%	16 littoral 3 5876 0.8	17 littoral 3 5877 0.5	18 littoral 3 5878 0.5	19 littoral 3 5879 1.2	20 littoral 3 5880 1.1	Mean	Stdv	SE	%
ARACHNIDAE												0.053			0.011	0.024	0.012	1.3
ACARINA																		
Hydracarinae				0.022	0.022	0.009	0.012	0.006			0.067	0.013			0.016	0.029	0.014	2.0
sum ANIMALS dw (g/m²)	0.476	0.093	0.724	292.793	0.129	58.843	130.782	65.391	100	0.093	0.947	2.342	0.604	0.031	0.804	0.939	0.470	100
Number of taxa	7	4	8	7	5	6.2	1.643	0.822		3	8	12	9	3	7	3.937	1.969	
Animal trophic groups																		
filter feeders	0.044		0.031	292.682		58.551	130.883	65.441	99.5		0.089	0.036	0.302		0.085	0.127	0.063	10.6
herbivores										0.027		0.067	0.058		0.030	0.031	0.016	3.8
carnivores	0.204	0.049	0.516	0.062	0.071	0.180	0.198	0.099	0.3	0.040	0.196	0.347	0.058	0.009	0.130	0.141	0.070	16.1
omnivores	0.049	0.022	0.067		0.022	0.032	0.026	0.013	0.1	0.027	0.351	1.520	0.124	0.013	0.407	0.637	0.318	50.6
detrivores	0.178	0.022	0.111	0.049	0.036	0.079	0.065	0.032	0.1		0.311	0.373	0.062	0.009	0.151	0.177	0.089	18.8
sum ANIMALS dw (g/m²)	0.476	0.093	0.724	292.793	0.129	58.843	130.782	65.391	100	0.093	0.947	2.342	0.604	0.031	0.804	0.939	0.470	100
Total number of taxa	13									16								

Lake Bolundsfjärden
Primary data. SKB Forsmark 2004. Sampling date 04-09-07.
Abundance (specimens/m²)

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5886	5888	5887	5889	5890					5896	5898	5897	5899	5900				
Frame no	29	30	27	26	28					24	22	21	23	25				
Depth (m)	0.5	0.2	0.6	0.6	0.3					1	1.1	0.8	0.8	1.3				
ANIMALS																		
ANNELIDAE																		
Helobdella stagnalis		50				10.0	22.4	11.2	0.1			25			5.0	11.2	5.6	0.1
Erpobdella octoculata		50				10.0	22.4	11.2	0.1									
Piscicola geometra			25			5.0	11.2	5.6										
MOLLUSCA																		
Gyraulus albus			250	75	50	75.0	103.1	51.5	0.6									
Lymnaea stagnalis					75	15.0	33.5	16.8	0.1									
Lymnaea peregra	50				75	25.0	35.4	17.7	0.2		25		75		20.0	32.6	16.3	0.3
Planorbidae				25		5.0	11.2	5.6										
Planorbis cavinatus			75			15.0	33.5	16.8	0.1									
Valvata cristata			425	100		105.0	184.1	92.0	0.8				50		10.0	22.4	11.2	0.1
Valvata sp											250				50.0	111.8	55.9	0.7
Physa fontinalis			25			5.0	11.2	5.6			225				45.0	100.6	50.3	0.6
Pisidium sp		275	25	25	225	110.0	129.4	64.7	0.8	400		200		100	140.0	167.3	83.7	1.9
Sphaerium spp					25	5.0	11.2	5.6										
CRUSTACEANS																		
Cyclops sp	25	1,000	375		525	385.0	411.0	205.5	2.9	575				100	135.0	249.8	124.9	1.9
Chydoridae		25				5.0	11.2	5.6										
Diaphanosoma brachyurum				25		5.0	11.2	5.6										
Eurycercus lamellatus	25		25			10.0	13.7	6.8	0.1				25		5.0	11.2	5.6	0.1
Ophryoxus gracilis					50	10.0	22.4	11.2	0.1									
Ostracoda		25				5.0	11.2	5.6										
Asellus aquaticus	25			50		15.0	22.4	11.2	0.1									

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5886	5888	5887	5889	5890					5896	5898	5897	5899	5900				
Frame no	29	30	27	26	28					24	22	21	23	25				
Depth (m)	0.5	0.2	0.6	0.6	0.3					1	1.1	0.8	0.8	1.3				
INSECTA																		
Chironomidae	7,150	50	75	50	2,325	1,930.0	3,078.7	1,539.4	14.7	175		5,650	1,375	25	1,445.0	2,418.9	1,209.4	20.0
Chironomus anthracinus											3,075		1,975		1,010.0	1,436.6	718.3	14.0
Tanytarsinae	25	75	75		50	45.0	32.6	16.3	0.3	50					10.0	22.4	11.2	0.1
Tanypodinae	950	3,850	1,075	500	1,950	1,665.0	1,329.7	664.8	12.7	1,275	75	525		725	520.0	519.7	259.9	7.2
Orthocladinae	200		25		225	90.0	112.6	56.3	0.7		25	50	25		20.0	20.9	10.5	0.3
Ceratopogonidae	150		25			35.0	65.2	32.6	0.3			25			5.0	11.2	5.6	0.1
Ephydridae	25					5.0	11.2	5.6										
Aeshnidae		25	75			20.0	32.6	16.3	0.2									
Libellulidae					200	40.0	89.4	44.7	0.3									
Cordulidae aena											75				15.0	33.5	16.8	0.2
Coenagrionidae					75	15.0	33.5	16.8	0.1		325		250		115.0	159.7	79.8	1.6
Platycnemis pennipes	100		75		25	40.0	45.4	22.7	0.3		550	25	75		130.0	236.8	118.4	1.8
Cyrnus sp	600	50	50		100	160.0	248.5	124.2	1.2	175		625	1,000		360.0	439.7	219.8	5.0
Athripsoides sp	50					10.0	22.4	11.2	0.1									
Mystacides sp											25				5.0	11.2	5.6	0.1
Mystacides longicornis					125	25.0	55.9	28.0	0.2			175	25		40.0	76.2	38.1	0.6
Oecetis sp	25					5.0	11.2	5.6										
Phryganea sp			25		25	10.0	13.7	6.8	0.1		25		25		10.0	13.7	6.8	0.1
Caenis horaria	20,650	8,475	250	250	8,650	7,655.0	8,369.6	4,184.8	58.5	1,200	1,475	1,850	9,375	325	2,845.0	3,693.4	1,846.7	39.4
Caenis robusta		25				5.0	11.2	5.6										
Cloeon sp	1,125				550	335.0	501.7	250.9	2.6			50			10.0	22.4	11.2	0.1
Lepidoptera			25			5.0	11.2	5.6										
Dyticidae			25		25	10.0	13.7	6.8	0.1									
Donacia sp			50			10.0	22.4	11.2	0.1									
Haliplus sp (larv)	25				75	20.0	32.6	16.3	0.2		575	50	200		165.0	243.4	121.7	2.3

Sample no Habitat Sample ID code PFM Frame no Depth (m)	6 littoral 1 5886 29 0.5	7 littoral 1 5888 30 0.2	8 littoral 1 5887 27 0.6	9 littoral 1 5889 26 0.6	10 littoral 1 5890 28 0.3	Mean	Stdv	SE	%	16 littoral 3 5896 24 1	17 littoral 3 5898 22 1.1	18 littoral 3 5897 21 0.8	19 littoral 3 5899 23 0.8	20 littoral 3 5900 25 1.3	Mean	Stdv	SE	%
Haliplus sp (imago)											25				5.0	11.2	5.6	0.1
ARACHNIDAE	25				275	60.0	120.7	60.3	0.5				50		10.0	22.4	11.2	0.1
ACARINA																		
Hydracarinae	175		75	100	50	80.0	64.7	32.4	0.6	50	75	250	50	25	90.0	91.2	45.6	1.2
Abundance (specimens/m²)	31,400	13,975	3,150	1,200	15,750	13,095.0	12,075.7	6,037.9	100	3,900	6,825	9,500	14,575	1,300	7,220.0	5,136.1	2,568.1	100
Number of taxa	19	12	22	10	23	17.2	5.9	2.9		8	15	13	15	6	11.4	4.2	2.1	
Animal trophic groups																		
filter feeders	600	325	75	25	350	275.0	232.5	116.3	2.1	575		825	1,000	100	500.0	439.1	219.6	6.9
herbivores	325		800	200	625	390.0	322.4	161.2	3.0		900	275	375		310.0	369.4	184.7	4.3
carnivores	1,425	3,975	1,400	600	2,625	2,005.0	1,317.4	658.7	15.3	1,325	1,150	850	450	750	905.0	343.0	171.5	12.5
omnivores	8,350	1,100	525	75	3,450	2,700.0	3,415.6	1,707.8	20.6	750		5,700	1,400	125	1,595.0	2,361.6	1,180.8	22.1
detrivores	20,700	8,575	350	300	8,700	7,725.0	8,359.8	4,179.9	59.0	1,250	4,775	1,850	11,350	325	3,910.0	4,479.8	2,239.9	54.2
Abundance (specimens/m²)	31,400	13,975	3,150	1,200	15,750	13,095.0	12,075.7	6,037.9	100	3,900	6,825	9,500	14,575	1,300	7,220.0	5,136.1	2,568.1	100
Total number of taxa	43									27								

Lake Bolundsfjärden
Primary data, biomass dw (g/m²). SKB Forsmark 2004. Sampling date 04-09-09.

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5886	5888	5887	5889	5890					5896	5898	5897	5899	5900				
Frame no	29	30	27	26	28					24	22	21	23	25				
Depth (m)	0.5	0.2	0.6	0.6	0.3					1	1.1	0.8	0.8	1.3				
PLANTS																		
CHARACEAE																		
Chara baltica	291.458					58.292	130.344	65.172	59.6									
Chara tomentosa					112.780	22.556	50.437	25.218	23.1	10.618	1,998.808	253.750	1,136.038		679.843	871.692	435.846	99.8
Potamogeton pectinatus			85.015			17.003	38.020	19.010	17.4		6.363				1.273	2.845	1.423	0.2
Sum Plants, biomass dw (g/m²)	291.458	0	85.015	0	112.780	97.851	119.395	59.698	100	10.618	2,005.171	253.750	1,136.038	0	681.115	874.100	437.050	100
Number of taxa	1	0	1	0	1	0.6	0.5	0.3		1	2	1	1	0	1.0	0.7	0.4	
ANIMALS																		
ANNELIDAE																		
Helobdella stagnalis		0.063				0.013	0.028	0.014	0.6			0.018			0.004	0.008	0.004	0.2
Erpobdella octoculata		1.033				0.207	0.462	0.231	10.0									
Piscicola geometra			0.013			0.003	0.006	0.003	0.1									
MOLLUSCA																		
Gyraulus albus			0.308	0.070	0.128	0.101	0.127	0.064	4.9									
Lymnaea stagnalis					0.343	0.069	0.153	0.077	3.3									
Lymnaea peregra	0.043				0.135	0.036	0.059	0.029	1.7		0.653		0.373		0.205	0.298	0.149	10.3
Planorbidae				0.030		0.006	0.013	0.007	0.3									
Planorbis cavinatus			0.028			0.006	0.012	0.006	0.3									
Valvata cristata			0.208	0.058		0.053	0.090	0.045	2.6				0.040		0.008	0.018	0.009	0.4
Valvata sp											0.158				0.032	0.070	0.035	1.6
Physa fontinalis			0.023			0.005	0.010	0.005	0.2		0.438				0.088	0.196	0.098	4.4
Pisidium sp		0.270	0.048	0.025	0.168	0.102	0.114	0.057	5.0	0.218		0.105		0.060	0.077	0.090	0.045	3.8
Sphaerium spp					0.015	0.003	0.00670	0.00335	0.1									

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5886	5888	5887	5889	5890					5896	5898	5897	5899	5900				
Frame no	29	30	27	26	28					24	22	21	23	25				
Depth (m)	0.5	0.2	0.6	0.6	0.3					1	1.1	0.8	0.8	1.3				
CRUSTACEANS																		
Cyclops sp	0.001	0.038	0.018		0.018	0.0147	0.01532	0.00766	0.7	0.033				0.010	0.0085	0.01409	0.00704	0.4
Chydoridae		0.008				0.002	0.003	0.002	0.1									
Diaphanosoma brachyurum				0.008		0.002	0.003	0.002	0.1									
Eurycercus lamellatus	0.001		0.013			0.003	0.006	0.003	0.1				0.015		0.003	0.007	0.003	0.2
Ophryoxus gracilis					0.001	0.000	0.000	0.000										
Ostracoda		0.008				0.002	0.003	0.002	0.1									
Asellus aquaticus	0.001			0.015		0.003	0.007	0.003	0.2									
INSECTA																		
Chironomidae	0.633	0.068	0.013	0.073	0.103	0.178	0.256	0.128	8.6	0.033		0.548	0.050	0.048	0.136	0.231	0.116	6.8
Chironomus anthracinus											0.253		0.145		0.080	0.115	0.058	4.0
Tanytarsinae	0.003	0.008	0.010		0.003	0.005	0.004	0.002	0.2	0.008					0.002	0.003	0.002	0.1
Tanypodinae	0.058	0.200	0.058	0.113	0.093	0.104	0.059	0.029	5.0	0.055	0.015	0.040		0.070	0.036	0.029	0.014	1.8
Orthocladinae	0.003		0.008		0.015	0.005	0.006	0.003	0.2		0.010	0.010	0.013		0.007	0.006	0.003	0.3
Ceratopogonidae	0.005		0.010			0.003	0.004	0.002	0.1			0.005			0.001	0.002	0.001	0.1
Ephydridae	0.020					0.004	0.009	0.004	0.2									
Aeshnidae		0.015	0.253			0.054	0.111	0.056	2.6									
Libellulidae					1.485	0.297	0.664	0.332	14.4									
Cordulidae aena											1.250				0.250	0.559	0.280	12.5
Coenagrionidae					0.133	0.027	0.059	0.030	1.3		0.883		0.883		0.353	0.483	0.242	17.7
Platycnemis pennipes	0.010		0.008		0.005	0.005	0.004	0.002	0.2		0.738	0.158	0.123		0.204	0.307	0.153	10.2
Cyrnus sp	0.098	0.015	0.013		0.035	0.032	0.039	0.019	1.6	0.065		0.110	0.153		0.066	0.067	0.034	3.3
Athripsoides sp	0.025					0.005	0.011	0.006	0.2									
Mystacides sp											0.010				0.002	0.004	0.002	0.1
Mystacides longicornis					0.013	0.003	0.006	0.003	0.1			0.023	0.015		0.008	0.011	0.005	0.4

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5886	5888	5887	5889	5890					5896	5898	5897	5899	5900				
Frame no	29	30	27	26	28					24	22	21	23	25				
Depth (m)	0.5	0.2	0.6	0.6	0.3					1	1.1	0.8	0.8	1.3				
Oecetis sp	0.005					0.001	0.002	0.001										
Phryganea sp			0.010		0.005	0.003	0.004	0.002	0.1		0.158		0.023		0.036	0.069	0.034	1.8
Caenis horaria	0.940	0.343	0.013	0.020	0.443	0.352	0.381	0.190	17.1	0.060	0.078	0.133	0.375	0.018	0.133	0.142	0.071	6.6
Caenis robusta		0.005				0.001	0.002	0.001										
Cloeon sp	0.065				0.035	0.020	0.029	0.015	1.0			0.010			0.002	0.004	0.002	0.1
Lepidoptera			0.003			0.001	0.001	0.001										
Dyticidae			0.003		0.003	0.001	0.001	0.001										
Donacia sp			0.465			0.093	0.208	0.104	4.5									
Haliplus sp (larv)	0.098				0.048	0.029	0.043	0.022	1.4		0.660	0.040	0.315		0.203	0.287	0.144	10.2
Haliplus sp (imago)											0.105				0.021	0.047	0.023	1.1
ARACHNIDAE	0.493				0.500	0.199	0.272	0.136	9.6				0.108		0.022	0.048	0.024	1.1
ACARINA																		
Hydracarinae	0.058		0.013	0.008	0.008	0.017	0.023	0.012	0.8	0.015	0.038	0.018	0.018	0.008	0.019	0.011	0.006	1.0
Sum Animals, biomass dw (g/m²)	2.556	2.070	1.530	0.418	3.729	2.060	1.226	0.613	100	0.485	5.443	1.215	2.645	0.213	2.000	2.143	1.072	100
Number of taxa	19	12	22	10	23	17.2	5.9	2.9		8	15	13	15	6	11.4	4.2	2.1	
Plant groups																		
characeae	291.458				112.780	80.848	127.461	63.731	82.6	10.618	1,998.808	253.750	1,136.038		679.843	871.692	435.846	99.8
Potamogeton spp			85.015			17.003	38.020	19.010	17.4		6.363				1.273	2.845	1.423	0.2
other phanerogams																		
Sum Plants, biomass dw (g/m²)	291.458	0	85.015	0	112.780	97.851	119.395	59.698	100	10.618	2,005.171	253.750	1,136.038	0	681.115	874.100	437.050	100
Animal trophic groups						Mean	Stdv	SE	%						Mean	Stdv	SE	%
filter feeders	0.098	0.285	0.060	0.025	0.218	0.137	0.110	0.055	6.7	0.283		0.215	0.153	0.060	0.142	0.114	0.057	7.1
herbivores	0.168		0.553	0.158	0.680	0.312	0.290	0.145	15.1		1.490	0.073	0.755		0.464	0.656	0.328	23.2
carnivores	0.628	1.310	0.365	0.120	2.230	0.931	0.852	0.426	45.2	0.070	3.185	0.238	1.153	0.078	0.945	1.330	0.665	47.2

Sample no	6	7	8	9	10	Mean	Stdv	SE	%	16	17	18	19	20	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5886	5888	5887	5889	5890					5896	5898	5897	5899	5900				
Frame no	29	30	27	26	28					24	22	21	23	25				
Depth (m)	0.5	0.2	0.6	0.6	0.3					1	1.1	0.8	0.8	1.3				
omnivores	0.720	0.120	0.508	0.080	0.156	0.317	0.282	0.141	15.4	0.065		0.558	0.065	0.058	0.149	0.230	0.115	7.5
detrivores	0.944	0.355	0.045	0.035	0.445	0.365	0.372	0.186	17.7	0.068	0.768	0.133	0.520	0.018	0.301	0.327	0.164	15.1
Sum Animals, biomass dw (g/m²)	2.556	2.070	1.530	0.418	3.729	2.060	1.226	0.613	100	0.485	5.443	1.215	2.645	0.213	2.000	2.143	1.072	100
Total number of taxa: Plants/Animals	3/43									2/27								

Lake Fiskarfjärden
Primary data. SKB Forsmark 2004. Sampling date 04-09-09.
Ekman grabber
Abundance (specimens/m²)

Sample no	1	2	3	4	5	Mean	Stdv	SE	%	11	12	13	14	15	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5871	5872	5873	5874	5875					5881	5882	5883	5884	5885				
Depth (m)	0.5	0.3	0.2	0.3	0.3					0.6	0.4	0.6	0.6	0.5				
ANIMALS																		
NEMERTINI																		
Nematoda											89				17.8	39.8	19.9	1.0
ANNELIDAE																		
Erpobdella octoculata	89		44			26.7	39.8	19.9	0.4									
Naididae	489	44	44	44		124.4	204.6	102.3	2.0		44		44		17.8	24.3	12.2	1.0
Stylaria lacustris			89			17.8	39.8	19.9	0.3									
CRUSTACEANS																		
Cyclops sp	44	89	1,111	489	44	355.6	461.9	230.9	5.8	44	133	44	267		97.8	106.1	53.1	5.5
INSECTA																		
Chironomidae	400	1,778	667	844	133	764.4	627.3	313.6	12.6		1,022	89	222		266.7	432.0	216.0	15.0
Tanytarsinae	622	489	667	133	222	426.7	238.5	119.3	7.0	400	178		267		168.9	173.3	86.6	9.5
Tanypodinae	1,956	1,911	4,933	1,822	622	2,248.9	1,599.6	799.8	36.9	311	711	267	1,244		506.7	484.4	242.2	28.5
Orthocladinae			44			8.9	19.9	9.9	0.1									
Ceratopogonidae				44		8.9	19.9	9.9	0.1									
Platycnemidae			44			8.9	19.9	9.9	0.1									
Cyrnus sp	222		89			62.2	97.4	48.7	1.0		133				26.7	59.6	29.8	1.5
Phryganeidae	44	44				17.8	24.3	12.2	0.3									
Caenis sp													1,067		213.3	477.0	238.5	12.0
Caenis horaria	2,356	2,622	667	1,467	2,622	1,946.6	858.6	429.3	32.0	400	1,333	44		44	364.4	565.2	282.6	20.5
Zygoptera											44				8.9	19.9	9.9	0.5
Donacia sp										44					8.9	19.9	9.9	0.5

Sample no Habitat Sample ID code PFM Depth (m)	1 littoral 1 5871 0.5	2 littoral 1 5872 0.3	3 littoral 1 5873 0.2	4 littoral 1 5874 0.3	5 littoral 1 5875 0.3	Mean	Stdv	SE	%	11 littoral 3 5881 0.6	12 littoral 3 5882 0.4	13 littoral 3 5883 0.6	14 littoral 3 5884 0.6	15 littoral 3 5885 0.5	Mean	Stdv	SE	%
ACARINA																		
Hydracarinae		178	89	44	44	71.1	67.4	33.7	1.2		356		44		80.0	155.2	77.6	4.5
Abundance (specimens/m²)	6,222	7,155	8,489	4,889	3,689	6,088.8	1,878.5	939.3	100	1,200	4,044	444	3,156	44	1,777.8	1,743.0	871.5	100
Number of taxa	9	8	12	8	6	8.6	2.2	1.1		5	10	4	7	1	5.4	3.4	1.7	
Animal trophic groups																		
filter feeders	222		89			62.2	97.4	48.7	1.0		133				26.7	59.6	29.8	1.5
herbivores			44			8.9	19.9	9.9	0.1									
carnivores	2,044	2,089	5,111	1,911	667	2,364.4	1,643.9	822.0	38.8	311	1,111	267	1,289		595.5	567.9	284.0	33.5
omnivores	489	1,911	1,778	1,333	178	1,137.8	772.7	386.4	18.7	89	1,156	133	489		373.3	475.2	237.6	21.0
detrivores	3,467	3,156	1,467	1,644	2,844	2,515.5	905.7	452.9	41.3	800	1,644	44	1,378	44	782.2	739.4	369.7	44.0
Abundance (specimens/m²)	6,222	7,155	8,489	4,889	3,689	6,088.8	1,878.5	939.3	100	1,200	4,044	444	3,156	44	1,777.8	1,743.0	871.5	100
Total number of taxa	14									12								

Lake Fiskarfjärden
Primary data. SKB Forsmark 2004. Sampling date 04-09-09.
Ekman grabber
Biomass dw (g/m²)

Sample no	1	2	3	4	5	Mean	Stdv	SE	%	11	12	13	14	15	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5871	5872	5873	5874	5875					5881	5882	5883	5884	5885				
Depth (m)	0.5	0.3	0.2	0.3	0.3					0.6	0.4	0.6	0.6	0.5				
ANIMALS																		
NEMERTINI																		
Nematoda											0.013				0.003	0.006	0.003	1.4
ANNELIDAE																		
Erpobdella octoculata	0.373		0.364			0.148	0.202	0.101	15.4									
Naididae	0.013	0.001	0.009	0.001		0.005	0.006	0.003	0.5		0.001		0.013		0.003	0.006	0.003	1.5
Stylaria lacustris			0.009			0.002	0.004	0.002	0.2									
CRUSTACEANS																		
Cyclops sp	0.009	0.009	0.044	0.004	0.001	0.014	0.018	0.009	1.4	0.022	0.004	0.004	0.004		0.007	0.009	0.004	3.8
INSECTA																		
Chironomidae	0.018	0.027	0.022	0.009	0.004	0.016	0.009	0.005	1.7		0.027	0.009	0.049		0.017	0.021	0.010	9.1
Tanytarsinae	0.013	0.009	0.027	0.004	0.001	0.011	0.010	0.005	1.1	0.009	0.013		0.013		0.007	0.007	0.003	3.8
Tanypodinae	0.071	2.809	0.262	0.084	0.013	0.648	1.212	0.606	67.8	0.018	0.209	0.004	0.236		0.093	0.118	0.059	50.2
Orthocladinae			0.013			0.003	0.006	0.003	0.3									
Ceratopogonidae				0.004		0.001	0.002	0.001	0.1									
Platycnemidae			0.036			0.007	0.016	0.008	0.7									
Cyrnus sp	0.098		0.018			0.023	0.042	0.021	2.4		0.027				0.005	0.012	0.006	2.9
Phryganeidae	0.022	0.004				0.005	0.010	0.005	0.6									
Caenis sp													0.036		0.007	0.016	0.008	3.8
Caenis horaria	0.116	0.084	0.031	0.040	0.071	0.068	0.034	0.017	7.2	0.013	0.062	0.009		0.004	0.018	0.025	0.013	9.6
Zygoptera											0.018				0.004	0.008	0.004	1.9
Donacia sp										0.049					0.010	0.022	0.011	5.3

Sample no Habitat Sample ID code PFM Depth (m)	1 littoral 1 5871 0.5	2 littoral 1 5872 0.3	3 littoral 1 5873 0.2	4 littoral 1 5874 0.3	5 littoral 1 5875 0.3	Mean	Stdv	SE	%	11 littoral 3 5881 0.6	12 littoral 3 5882 0.4	13 littoral 3 5883 0.6	14 littoral 3 5884 0.6	15 littoral 3 5885 0.5	Mean	Stdv	SE	%
ACARINA																		
Hydracarinae		0.009	0.001	0.004	0.013	0.006	0.006	0.003	0.6		0.053		0.009		0.012	0.023	0.012	6.7
sum ANIMALS dw (g/m²)	0.733	2.952	0.837	0.152	0.104	0.956	1.164	0.582	100	0.111	0.428	0.027	0.360	0.004	0.186	0.195	0.098	100
Number of taxa	9	8	12	8	6	8.6	2.190	1.095		5	10	4	7	1	5.4	3.361	1.680	
Animal trophic groups																		
filter feeders	0.098		0.018			0.023	0.042	0.021	2.4		0.027				0.005	0.012	0.006	2.9
herbivores			0.013			0.003	0.006	0.003	0.3									
carnivores	0.444	2.818	0.663	0.093	0.027	0.809	1.153	0.576	84.6	0.018	0.280	0.004	0.244		0.109	0.140	0.070	58.8
omnivores	0.049	0.040	0.067	0.013	0.005	0.035	0.025	0.013	3.6	0.071	0.031	0.013	0.053		0.034	0.029	0.014	18.2
detrivores	0.142	0.094	0.076	0.045	0.072	0.086	0.036	0.018	9.0	0.022	0.090	0.009	0.062	0.004	0.038	0.037	0.019	20.2
sum ANIMALS dw (g/m²)	0.733	2.952	0.837	0.152	0.104	0.956	1.164	0.582	100	0.111	0.428	0.027	0.360	0.004	0.186	0.195	0.098	100
Total number of taxa	14									12								

Lake Fiskarfjärden
Primary data. SKB Forsmark 2004. Sampling date 04-09-09.
Abundance (specimens/m²)

Sample no	1	2	3	4	5	Mean	Stdv	SE	%	6	7	8	9	10	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5891	5895	5894	5893	5892					5905	5901	5903	5902	5904				
Frame no	30	26	28	25	27					22	21	29	23	24				
Depth (m)	0.1	0.1	0.2	0.6	0.4					0.3	0.3	0.2	0.3	0.5				
ANIMALS																		
ANNELIDAE																		
Helobdella stagnalis		600	75	25	25	145.0	255.8	127.9	1.8	25	25	75			25.0	30.6	15.3	0.4
Erpobdella octoculata		100		25		25.0	43.3	21.7	0.3									
Glossosiphonia heteroclita		25				5.0	11.2	5.6	0.1									
MOLLUSCA																		
Bithynia tentaculata													25		5.0	11.2	5.6	0.1
Lymnaea stagnalis		75				15.0	33.5	16.8	0.2									
Valvata sp				25		5.0	11.2	5.6	0.1									
Pisidium sp		25	125		75	45.0	54.2	27.1	0.5	150	75	50	300	50	125.0	106.1	53.0	2.1
Sphaerium spp														25	5.0	11.2	5.6	0.1
CRUSTACEANS																		
Cyclops sp		125	225	75	175	120.0	87.3	43.7	1.5	100	250	50	100	50	110.0	82.2	41.1	1.9
Eurycercus lamellatus		100				20.0	44.7	22.4	0.2				25		5.0	11.2	5.6	0.1
Sida crystallina												25		25	10.0	13.7	6.8	0.2
INSECTA																		
Chironomidae	150	100	150	300		140.0	108.4	54.2	1.7	750	1,000	325	325	150	510.0	352.0	176.0	8.7
Chironomus anthracinus				25		5.0	11.2	5.6	0.1					250	50.0	111.8	55.9	0.9
Tanytarsinae		75	325	25	25	90.0	134.2	67.1	1.1	25	75	25			25.0	30.6	15.3	0.4
Tanypodinae		2,675	2,950	1,700	3,075	2,080.0	1,281.8	640.9	25.3	1,475	3,225	4,075	1,675	250	2,140.0	1,512.6	756.3	36.5
Orthocladinae			200		25	45.0	87.3	43.7	0.5	25	100		50	25	40.0	37.9	19.0	0.7
Muscidae		25				5.0	11.2	5.6	0.1									
Aeshnidae	50					10.0	22.4	11.2	0.1									
Libellulidae	75					15.0	33.5	16.8	0.2									

Sample no Habitat Sample ID code PFM Frame no Depth (m)	1 littoral 1 5891 30 0.1	2 littoral 1 5895 26 0.1	3 littoral 1 5894 28 0.2	4 littoral 1 5893 25 0.6	5 littoral 1 5892 27 0.4	Mean	Stdv	SE	%	6 littoral 3 5905 22 0.3	7 littoral 3 5901 21 0.3	8 littoral 3 5903 29 0.2	9 littoral 3 5902 23 0.3	10 littoral 3 5904 24 0.5	Mean	Stdv	SE	%
Cordulidae	50					10.0	22.4	11.2	0.1		25				5.0	11.2	5.6	0.1
Platycnemidae/Coenagrionidae	25					5.0	11.2	5.6	0.1				25		5.0	11.2	5.6	0.1
Platycnemis pennipes				150		30.0	67.1	33.5	0.4		25				5.0	11.2	5.6	0.1
Cyrnus sp	250	225		625	100	240.0	237.6	118.8	2.9	275	625	50	475	1,175	520.0	425.1	212.6	8.9
Holocentropus sp	75					15.0	33.5	16.8	0.2									
Mystacides sp														25	5.0	11.2	5.6	0.1
Oecetis sp											25				5.0	11.2	5.6	0.1
Phryganeidae	25					5.0	11.2	5.6	0.1									
Phryganea sp				25		5.0	11.2	5.6	0.1									
Caenis horaria	1,475	9,100	6,225	2,750	5,125	4,935.0	2,991.4	1,495.7	60.1	1,200	3,475	3,575	775	2,025	2,210.0	1,282.3	641.1	37.7
Caenis robusta					50	10.0	22.4	11.2	0.1		100				20.0	44.7	22.4	0.3
Lepidoptera		25		100		25.0	43.3	21.7	0.3									
Dyticidae		25				5.0	11.2	5.6	0.1									
Haliplus sp (larv)	200					40.0	89.4	44.7	0.5									
ARACHNIDAE	25					5.0	11.2	5.6	0.1					25	5.0	11.2	5.6	0.1
ACARINA																		
Hydracarinae	25	75	150	25	275	110.0	105.5	52.7	1.3	50	25	25	75	25	40.0	22.4	11.2	0.7
Abundance (specimens/m²)	2,425	13,375	10,425	5,875	8,950	8,210.0	4,214.5	2,107.3	100	4,075	9,050	8,275	3,850	4,100	5,870.0	2,565.7	1,282.9	100
Number of taxa	12	16	9	14	10	12.2	2.9	1.4		10	14	10	11	13	11.6	1.8	0.9	
Animal trophic groups																		
filter feeders	250	250	125	625	175	285.0	197.3	98.7	3.5	425	700	100	775	1,250	650.0	427.6	213.8	11.1
herbivores	200	100	200	125	25	130.0	73.7	36.9	1.6	25	100		75	50	50.0	39.5	19.8	0.9
carnivores	325	3,525	3,175	1,950	3,375	2,470.0	1,351.0	675.5	30.1	1,550	3,350	4,175	1,775	300	2,230.0	1,535.6	767.8	38.0
omnivores	175	325	375	375	175	285.0	102.5	51.2	3.5	850	1,250	400	450	225	635.0	412.9	206.5	10.8
detrivores	1,475	9,175	6,550	2,800	5,200	5,040.0	3,046.8	1,523.4	61.4	1,225	3,650	3,600	775	2,275	2,305.0	1,322.3	661.2	39.3
Abundance (specimens/m²)	2,425	13,375	10,425	5,875	8,950	8,210.0	4,214.5	2,107.3	100	4,075	9,050	8,275	3,850	4,100	5,870.0	2,565.7	1,282.9	100
Total number of taxa	30									22								

Lake Fiskarfjärden
Primary data, biomass dw (g/m²). SKB Forsmark 2004. Sampling date 04-09-09.

Sample no	1	2	3	4	5	Mean	Stdv	SE	%	6	7	8	9	10	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5891	5895	5894	5893	5892					5905	5901	5903	5902	5904				
Frame no	30	26	28	25	27					22	21	29	23	24				
Depth (m)	0.1	0.1	0.2	0.6	0.4					0.3	0.3	0.2	0.3	0.5				
PLANTS																		
CHARACEAE																		
Chara intermedia											38.133			326.523	72.931	142.720	71.360	85.0
Chara tomentosa	933.855	4.183		88.733		205.354	409.000	204.500	93.6	9.385			47.050		11.287	20.401	10.200	13.2
PHANEROGAMS																		
Najas marina		1.808				0.362	0.808	0.404	0.2									
Potamogeton pectinatus		58.743		9.433		13.635	25.545	12.772	6.2			5.948		1.815	1.553	2.580	1.290	1.8
Sum Plants biomass dw (g/m²)	933.855	64.733	0	98.165	0	219.351	401.665	200.832	100	9.385	38.133	5.948	47.050	328.338	85.771	136.761	68.380	100
Number of taxa	1	3	0	2	0	1.2	1.3	0.7		1	1	1	1	2	1.2	0.4	0.2	
ANIMALS																		
ANNELIDAE																		
Helobdella stagnalis		0.160	0.048	0.048	0.008	0.053	0.064	0.032	5.9	0.018	0.030	0.025			0.015	0.014	0.007	2.5
Erpobdella octoculata		0.043		0.015		0.012	0.019	0.009	1.3									
Glossosiphonia heteroclita		0.023				0.005	0.010	0.005	0.5									
MOLLUSCA																		
Bithynia tentaculata													0.138		0.028	0.062	0.031	4.7
Lymnaea stagnalis		0.583				0.117	0.261	0.130	13.0									
Valvata sp				0.015		0.003	0.007	0.003	0.3									
Pisidium sp		0.018	0.195		0.138	0.070	0.090	0.045	7.8	0.220	0.118	0.090	0.210	0.060	0.140	0.072	0.036	23.8
Sphaerium spp														0.053	0.011	0.023	0.012	1.8
CRUSTACEANS																		
Cyclops sp		0.015	0.025	0.015	0.010	0.013	0.009	0.005	1.5	0.013	0.015	0.005	0.020	0.005	0.012	0.007	0.003	2.0
Eurycercus lamellatus		0.010				0.002	0.004	0.002	0.2				0.010		0.002	0.004	0.002	0.3
Sida crystallina												0.003		0.008	0.002	0.003	0.002	0.3

Sample no	1	2	3	4	5	Mean	Stdv	SE	%	6	7	8	9	10	Mean	Stdv	SE	%
Habitat	littoral 1	littoral 1	littoral 1	littoral 1	littoral 1					littoral 3	littoral 3	littoral 3	littoral 3	littoral 3				
Sample ID code PFM	5891	5895	5894	5893	5892					5905	5901	5903	5902	5904				
Frame no	30	26	28	25	27					22	21	29	23	24				
Depth (m)	0.1	0.1	0.2	0.6	0.4					0.3	0.3	0.2	0.3	0.5				
INSECTA																		
Chironomidae	0.015	0.013	0.023	0.020		0.014	0.00876	0.00438	1.6	0.025	0.025	0.020	0.028	0.008	0.021	0.00802	0.00401	3.6
Chironomus anthracinus				0.063		0.0125	0.02795	0.01397	1.4					0.020	0.004	0.00894	0.00447	0.7
Tanytarsinae		0.010	0.028	0.013	0.003	0.011	0.011	0.005	1.2	0.008	0.008	0.008			0.005	0.004	0.002	0.8
Tanypodinae		0.125	0.165	0.093	0.138	0.104	0.064	0.032	11.6	0.143	0.203	0.135	0.060	0.025	0.113	0.071	0.035	19.3
Orthocladinae			0.018		0.015	0.007	0.009	0.004	0.7	0.013	0.013		0.028	0.003	0.011	0.011	0.005	1.9
Muscidae		0.013				0.003	0.006	0.003	0.3									
Aeshnidae	0.455					0.091	0.203	0.102	10.2									
Libellulidae	0.038					0.008	0.017	0.008	0.8									
Cordulidae	0.035					0.007	0.016	0.008	0.8		0.135				0.027	0.060	0.030	4.6
Platycnemidae/Coenagrionidae	0.080					0.016	0.036	0.018	1.8				0.020		0.004	0.009	0.004	0.7
Platycnemis pennipes				0.105		0.021	0.047	0.023	2.3		0.013				0.003	0.006	0.003	0.4
Cyrnus sp	0.035	0.065		0.140	0.028	0.054	0.054	0.027	6.0	0.065	0.115	0.028	0.083	0.118	0.082	0.037	0.019	13.9
Holocentropus sp	0.043					0.009	0.019	0.010	0.9									
Mystacides sp														0.005	0.001	0.002	0.001	0.2
Oecetis sp											0.003				0.001	0.001	0.001	0.1
Phryganeidae	0.013					0.003	0.006	0.003	0.3									
Phryganea sp				0.025		0.005	0.011	0.006	0.6									
Caenis horaria	0.080	0.273	0.205	0.103	0.155	0.163	0.078	0.039	18.2	0.055	0.110	0.100	0.030	0.063	0.072	0.033	0.017	12.2
Caenis robusta					0.008	0.002	0.003	0.002	0.2		0.013				0.003	0.006	0.003	0.4
Lepidoptera		0.020		0.018		0.008	0.010	0.005	0.8									
Dyticidae		0.010				0.002	0.004	0.002	0.2									
Haliplus sp (larv)	0.290					0.058	0.130	0.065	6.5									
ARACHNIDAE	0.048					0.010	0.021	0.011	1.1					0.115	0.023	0.051	0.026	3.9
ACARINA																		
Hydracarinae	0.013	0.015	0.023	0.010	0.038	0.020	0.011	0.006	2.2	0.010	0.005	0.010	0.033	0.001	0.012	0.012	0.006	2.0

Sample no	1	2	3	4	5	Mean	Stdv	SE	%	6	7	8	9	10	Mean	Stdv	SE	%
Habitat	**littoral 1**	**littoral 1**	**littoral 1**	**littoral 1**	**littoral 1**					**littoral 3**	**littoral 3**	**littoral 3**	**littoral 3**	**littoral 3**				
Sample ID code PFM	**5891**	**5895**	**5894**	**5893**	**5892**					**5905**	**5901**	**5903**	**5902**	**5904**				
Frame no	**30**	**26**	**28**	**25**	**27**					**22**	**21**	**29**	**23**	**24**				
Depth (m)	**0.1**	**0.1**	**0.2**	**0.6**	**0.4**					**0.3**	**0.3**	**0.2**	**0.3**	**0.5**				
Sum Animals biomass dw (g/m²)	1.143	1.393	0.728	0.680	0.538	0.896	0.357	0.179	100	0.568	0.803	0.423	0.658	0.481	0.586	0.150	0.075	100
Number of taxa	12	16	9	14	10	12.200	2.864	1.432		10	14	10	11	13	11.6	1.8	0.9	
Plant groups																		
characeae	933.855	4.183		88.733		205.354	409.000	204.500	93.6	9.385	38.133		47.050	326.523	84.218	136.848	68.424	98.2
Potamogeton spp		58.743		9.433		13.635	25.545	12.772	6.2			5.948		1.815	1.553	2.580	1.290	1.8
other phanerogams		1.808				0.362	0.808	0.404	0.2									
Sum Plants biomass dw (g/m²)	933.855	64.733	0	98.165	0	219.351	401.665	200.832	100	9.385	38.133	5.948	47.050	328.338	85.771	136.761	68.380	100
Animal trophic groups																		
filter feeders	0.035	0.083	0.195	0.140	0.165	0.124	0.064	0.032	13.8	0.285	0.233	0.118	0.293	0.230	0.232	0.070	0.035	39.5
herbivores	0.290	0.603	0.018	0.033	0.015	0.192	0.258	0.129	21.4	0.013	0.013		0.165	0.008	0.040	0.070	0.035	6.7
carnivores	0.710	0.388	0.235	0.295	0.183	0.362	0.209	0.104	40.4	0.170	0.388	0.170	0.113	0.141	0.196	0.110	0.055	33.5
omnivores	0.028	0.038	0.048	0.035	0.010	0.032	0.014	0.007	3.5	0.038	0.040	0.028	0.058	0.020	0.037	0.014	0.007	6.2
detrivores	0.080	0.283	0.233	0.178	0.165	0.188	0.076	0.038	20.9	0.063	0.130	0.108	0.030	0.083	0.083	0.039	0.019	14.1
Sum Animals biomass dw (g/m²)	1.143	1.393	0.728	0.680	0.538	0.896	0.357	0.179	100	0.568	0.803	0.423	0.658	0.481	0.586	0.150	0.075	100
Total number of taxa: Plants/Animals	3/30									3/22								