



Ariel Smith, Coastal and Marine Team Lead with the LADI Trawl Sampling in the LaHave River

# ATLANTIC CANADA MICROPLASTIC RESEARCH PROJECT

Surface Water Results Summary (2018)

LED BY COASTAL ACTION



This project was undertaken with the financial support of:  
Ce projet a été réalisé avec l'appui financier de :



Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada

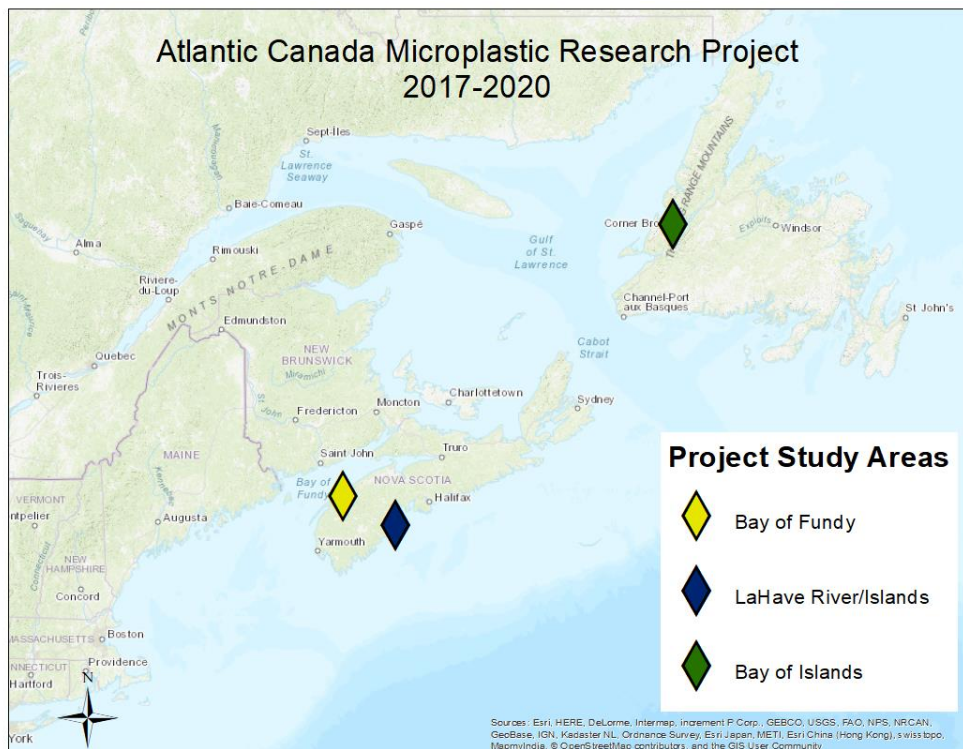


**COASTAL ACTION**  
CONSERVATION AT WORK



## MICROPLASTICS SURFACE WATER RESULTS 2018 SUMMARY

The purpose of the Atlantic Canada Microplastic Research Project (2017-2020) is to determine the quantity of microplastics in 3 near-shore communities of Atlantic Canada (Fig. 1). Data will be used to better inform the conversation and solutions around plastic pollution in the region. The project is funded by Environment and Climate Change Canada and is in partnership with Clean Annapolis River Project (CARP), ACAP Humber Arm, and Dr. Max Liboiron at the Civic Laboratory for Environmental Action Research (CLEAR) out of Memorial University of Newfoundland (MUN). Dr. Max Liboiron is our chief academic advisor on the 3-year project, assisting with project development, methods and protocol, and sampling design. The project included sampling both surface water and beach sediment at all three study locations. The surface water trawling equipment was built using CLEAR's low-aquatic debris instrument (LADI) design. This document contains the results from the 2018 surface water samples. Sediment data results for 2018 and hot-spot data from 2019 will be available in 2020.



*Figure 1. Three near-shore study locations were sampled as part of the project: LaHave River and Islands (Coastal Action), the Bay of Fundy, NS (CARP), the Bay of Islands (ACAP-Humber Arm).*

Plastics found in the samples are categorized into 8 types (Table 1) and are classified into 3 size groups: macro (>25 mm), meso (5-25 mm) and micro (<5 mm) (Table 2).

Table 1. Terminology used to describe types of plastic found in samples and used in analysis.

Terminology	Definition
Microfibers	Microfibers are thinner and kinked compared to threads - usually from synthetic fabrics
Threads	Threads are thick filaments, such as fishing line
Fragments	Hard plastic fragments, though they can be flexible
Foam	Such as Styrofoam - bounces back to the touch, has air pockets
Film	Sheet plastics, such as plastic bags. However, not synonymous with plastic bags
Microbeads	Small spheres from cosmetics
Pellets	Industrial pre-production pellets, or nurdles
Named item (Macro)	If an item is large in size (macro plastic) and can be identified, i.e. cigarette butt, which is technically many hundreds of thousands of microfibers
Total plastics	Total number of plastics in a trawl sample

Table 2. Total plastics found in surface water at sampled sites in Lunenburg (5 sites, sampled June through August 2018 by Coastal Action), Bay of Fundy (6 sites, sampled June through August 2018 by CARP) and in Newfoundland (8 sites, sampled July 2018 by ACAP Humber Arm). Analysis completed by CLEAR. Size classifications for plastics are macro (>25 mm), meso (5-25 mm) and micro (<5 mm).

Location	Site	Macro	Meso	Micro	Total Plastics
LaHave, NS	1 – Green Bay, LaHave	0	0	13	15
	2 – Mouth of River, LaHave	4	3	15	22
	3 – Hartling Bay, LaHave	1	6	20	27
	4 – LaHave River	2	7	16	24
	5 – Lunenburg	0	0	11	12
	Total	9	19	75	100
Bay of Fundy, NS	1 – Above Causeway	1	7	17	25
	2 – Bear River	2	8	8	18
	3 – Below Causeway	1	1	4	6
	4 – Digby	1	4	2	7
	5 – Goat Island	0	7	12	19
	6 – Victoria Beach	3	8	35	46
	Total	8	35	78	121
Bay of Islands, NL	1 – Corner Brook	13	6	31	53
	2 – Mont Moria / Curling	0	0	3	3
	3 – Summerside	5	17	31	53
	4 – Gillams / Meadows	2	4	7	13
	5 – Frenchman's Cove	0	0	4	4
	6 – Benoit's Cove	3	9	38	50
	7 – York Harbour	0	1	6	7
	8 – Lark Harbour	0	3	1	4
	Total	23	40	121	187

At the LaHave location, the Hartling Bay surface water samples had the most plastic. The LaHave River and the Mouth of the River had similar amounts of plastic, slightly less than Hartling Bay

which is in the LaHave watershed (Table 2; Fig. 2). In the Bay of Fundy, the Victoria Beach surface water samples had the most plastic, with other sites containing approximately 50% less than the Victoria Beach amount (Table 2; Fig. 2). In the Bay of Islands, Corner Brook and Summerside surface water samples had the most plastic, and Benoit's Cove had similar results. All other sampled sites had much less plastic (Table 2; Fig. 2). For sizing, microplastic composed the largest proportion of total plastics in all sampled areas (Fig. 2).

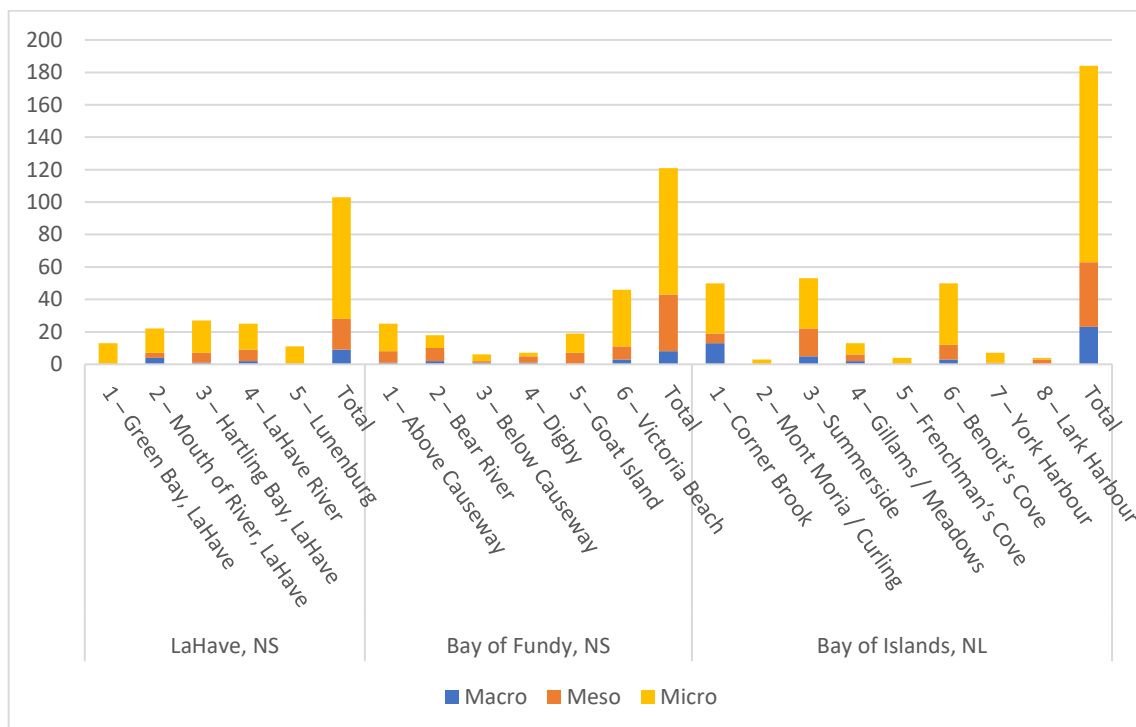


Figure 2. Graph showing total plastics found in surface water at sampled sites in Lunenburg (5 sites, sampled in June through August 2018 by Coastal Action), Bay of Fundy (6 sites, sampled in June through August 2018 by CARP) and in Newfoundland (8 sites, sampled in July 2018 by ACAP Humber Arm). Analysis completed by CLEAR Laboratory. Size classifications for plastics are macro (>25 mm), meso (5-25 mm) and micro (<5 mm).

**Important Note:** These sums do not account for the volume of water sampled and are not directly comparable. A comparable density measure will include the total area per trawl divided by the surface area sampled.

## LAHAVE RIVER ESTUARY, NOVA SCOTIA 2018 SURFACE SAMPLING BY COASTAL ACTION

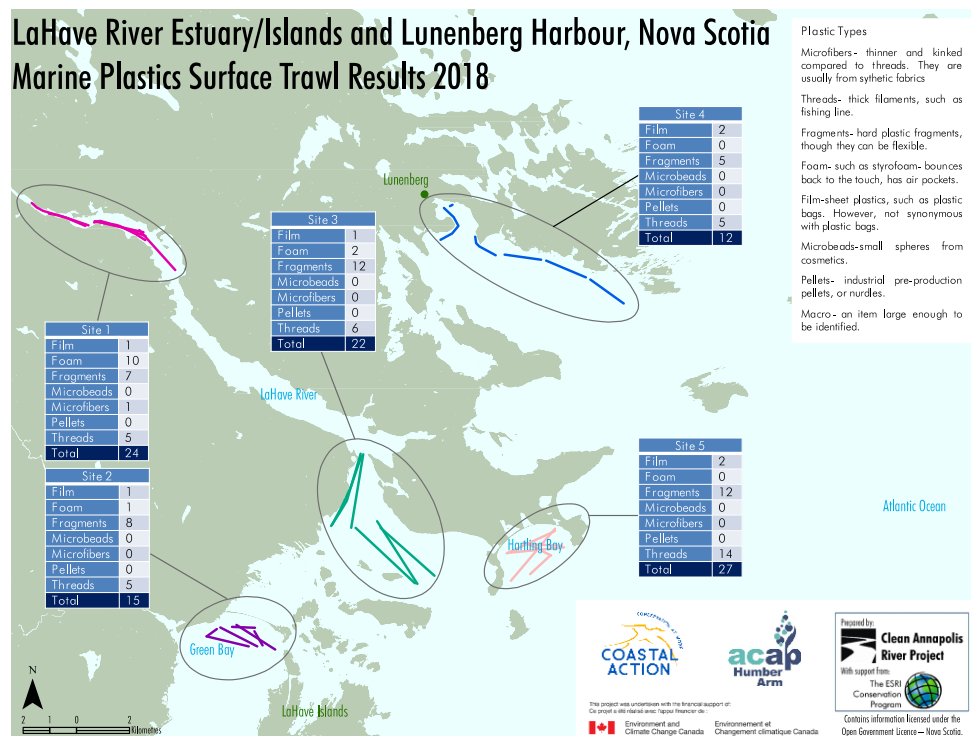


Figure 3. Map of surface water sampling sites in LaHave River Estuary/Islands and Lunenburg taken in August 2018 by Coastal Action.

Surface water sampling in LaHave River Estuary/Islands and Lunenburg Harbour occurred in August of 2018 at 5 different sites. All sites had plastic film, fragments and thread present in the samples (Table 3). The LaHave River samples had the most amount of foam in comparison to surface waters at other sampled sites (Table 3), composing 71.4% of all foam found. Hartling Bay surface water samples had the most amount of threads in comparison to other samples (Table 3), composing 38.2% of all threads found.

Table 3. Breakdown of plastic type found in surface water at each site in Lunenburg, summarized by category. Samples were collected by Coastal Action in June through August of 2018, analysis completed by CLEAR Laboratory.

Site	Film	Foam	Fragments	Microbeads	Microfibers	Pellets	Threads	Named Items	Total Plastics
1 – Green Bay, LaHave	1	1	8	0	0	0	5	0	15
2 – Mouth of River, LaHave	1	3	12	0	0	0	6	0	22
3 – Hartling Bay, LaHave	2	0	12	0	0	0	13	0	27



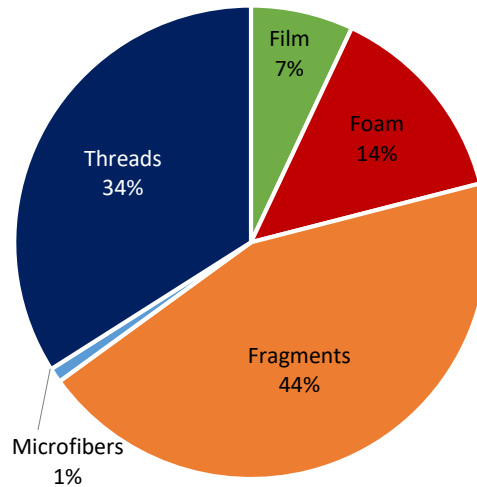
## MICROPLASTICS SURFACE WATER RESULTS 2018 SUMMARY



**COASTAL ACTION**  
CONSERVATION AT WORK

4 – LaHave River	1	10	7	0	1	0	5	0	24
5 – Lunenburg	2	0	5	0	0	0	5	0	12
<b>Total</b>	<b>7</b>	<b>14</b>	<b>44</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>34</b>	<b>0</b>	<b>100</b>

Plastic fragments (44%) and threads (34%) made up most of the total plastics found (Fig. 4).



*Figure 4. Proportion of plastics found in all surface water samples in Lunenburg: film 7%, foam 14%, fragment 44%, microbeads 0%, microfibers 1% and threads 34%. Samples were collected by Coastal Action in June through August of 2018, analysis completed by CLEAR Laboratory.*

## ANNAPOLIS BASIN, BAY OF FUNDY, NOVA SCOTIA SURFACE SAMPLING BY CLEAN ANnapolis RIVER PROJECT (CARP)

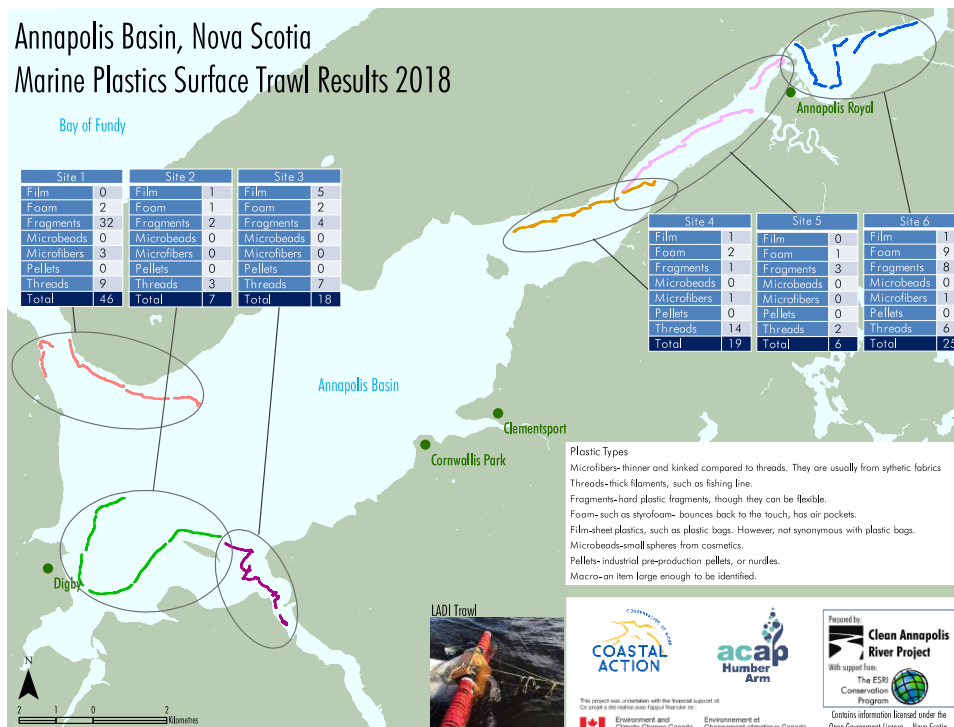


Figure 5. Map of surface water sampling sites in the Bay of Fundy taken in June through August 2018 by Clean Annapolis River Project (CARP).

Surface water sampling in the Bay of Fundy occurred June through August of 2018 at 6 different sites. All sites had plastic fragments and thread in their samples (Table 4). Victoria Beach surface water samples had the greatest number of fragments in comparison to other sampled sites, composing 67% of all fragments found.

Table 4. Breakdown of plastic type found in surface water at each site in the Bay of Fundy, summarized by category. Samples were collected by CARP in June through August of 2018, analysis completed by CLEAR Laboratory.

Site	Film	Foam	Fragments	Microbeads	Microfibers	Pellets	Threads	Named Items	Total Plastics
1 – Above Causeway	1	9	8	0	1	0	6	0	25
2 – Bear River	5	2	4	0	0	0	7	0	18
3 – Below Causeway	0	0	1	3	0	0	2	0	6
4 – Digby	1	1	2	0	0	0	3	0	7
5 – Goat Island	1	2	1	0	1	0	14	0	19
6 – Victoria Beach	0	2	32	0	3	0	9	0	46

Total	8	16	48	3	5	0	41	0	121
-------	---	----	----	---	---	---	----	---	-----

Plastic fragments (40%) and threads (34%) made up most of the total plastics in Bay of Fundy surface water sites (Fig. 6).

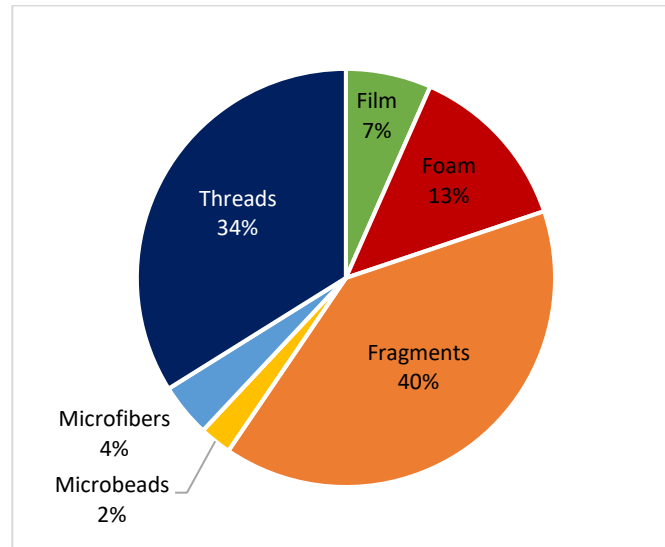


Figure 6. Proportion of plastics found in all surface water samples in the Bay of Fundy: film 7%, foam 13 %, fragment 40%, microbeads 2%, microfibers 4% and threads 34%. Samples were collected by CARP in June through August of 2018, analysis completed by CLEAR Laboratory.



## BAY OF ISLANDS, NEWFOUNDLAND SURFACE SAMPLING BY ACAP HUMBER ARM

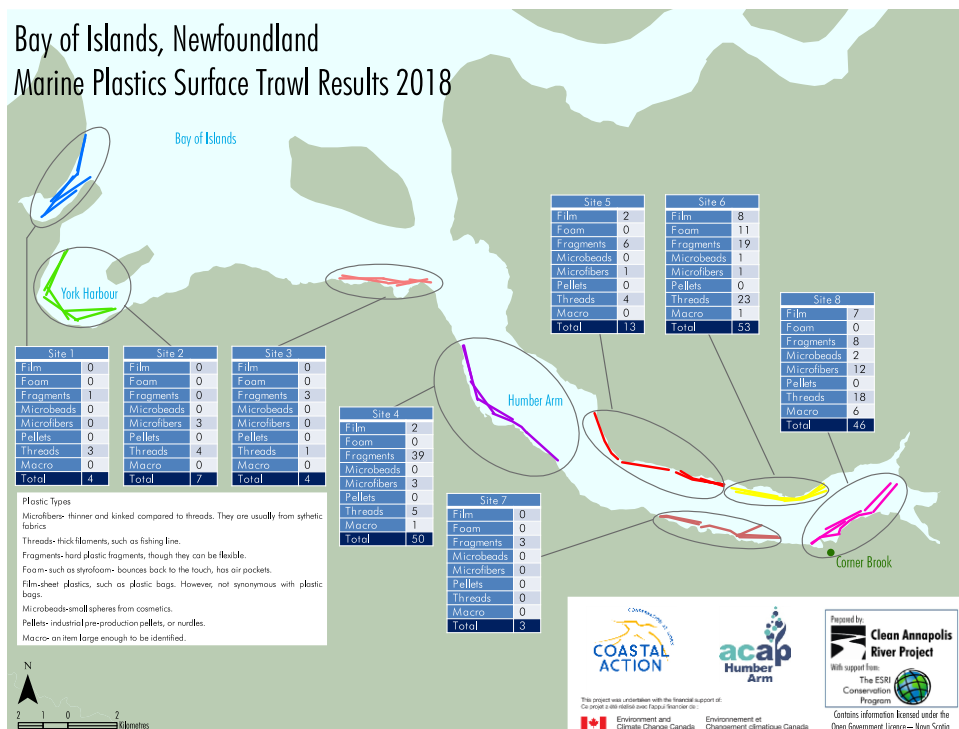


Figure 7. Map of surface water sampling sites in the Bay of Islands, Newfoundland, taken in July 2018 by ACAP Humber Arm.

Surface water sampling in the Bay of Islands, Newfoundland occurred in July of 2018 at 8 different sites. All sites had plastic fragments and threads (Table 5), making up most of the total plastics found (42% and 25% respectively; Fig 5). Benoit's Cove surface water samples had the greatest number of fragments in comparison to other sampled sites, composing nearly half of all fragments found (49%). Summerside surface water samples had the second most, composing a quarter of all fragments found (24%). Corner Brook surface water samples had the greatest number of threads in comparison to other sampled sites, followed by Summerside samples.

Table 5. Breakdown of plastic type found in surface water at each site in Newfoundland, summarized by category. Named items in Corner Brook included fishing line, tape, synthetic cloth and garage bag; in Summerside the item was a medical object; in Benoit's Cove the item was a condom. Samples were collected by ACAP Humber Arm in July 2018, analysis by CLEAR Laboratory.

Site	Film	Foam	Fragments	Microbeads	Microfibers	Pellets	Threads	Named Items	Total Plastics
1 – Corner Brook	7	0	8	2	12	0	18	6	53
2 – Mont Moria / Curling	0	0	3	0	0	0	0	0	3
3 – Summerside	8	11	19	1	1	0	12	1	53
4 – Gillams / Meadows	2	0	6	0	1	0	4	0	13

## MICROPLASTICS SURFACE WATER RESULTS 2018 SUMMARY



**COASTAL ACTION**  
CONSERVATION AT WORK

5 – Frenchman's Cove	0	0	3	0	0	0	1	0	4
6 – Benoit's Cove	2	0	39	0	3	0	5	1	50
7 – York Harbour	0	0	0	0	3	0	4	0	7
8 – Lark Harbour	0	0	1	0	0	0	3	0	4
<b>Total</b>	<b>19</b>	<b>11</b>	<b>79</b>	<b>3</b>	<b>20</b>	<b>0</b>	<b>47</b>	<b>8</b>	<b>187</b>

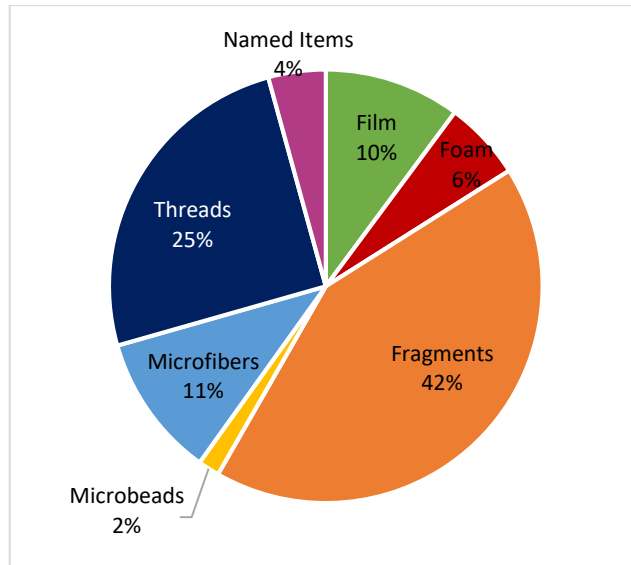


Figure 8. Proportion of plastics found in all surface water samples in the Newfoundland: film 10%, foam 6%, fragment 42%, microbeads 2%, microfibers 11%, threads 25 % and named items (macro) 4%. Named items in Corner Brook included fishing line, tape, synthetic cloth and garage bag; in Summerside the item was a medical object; in Benoit's Cove the item was a condom. Samples were collected by ACAP Humber Arm in July 2018, analysis by CLEAR Laboratory.