

# Beach pollution on the south coast and Central Newfoundland.

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Picture 1: Location of Rencontre East (Red) and Eastport (blue) on Newfoundland map.



Picture 2: Eastport Beach

The land and sea are constantly being polluted with waste every single day. Much of this waste washes up or blows onto beaches. So, a study was done on two different beaches in different areas, to see how much waste actually ends up on the beach.

A similar experiment was done on the Rencontre East beach last year (December 17, 2019 to January 6, 2020). This year, however, we wanted to know if there were any differences based on location.

Given the pandemic and the use of disposable masks, gloves and eyewear, we wanted to see if there was a lot of waste in that particular category (PPE)



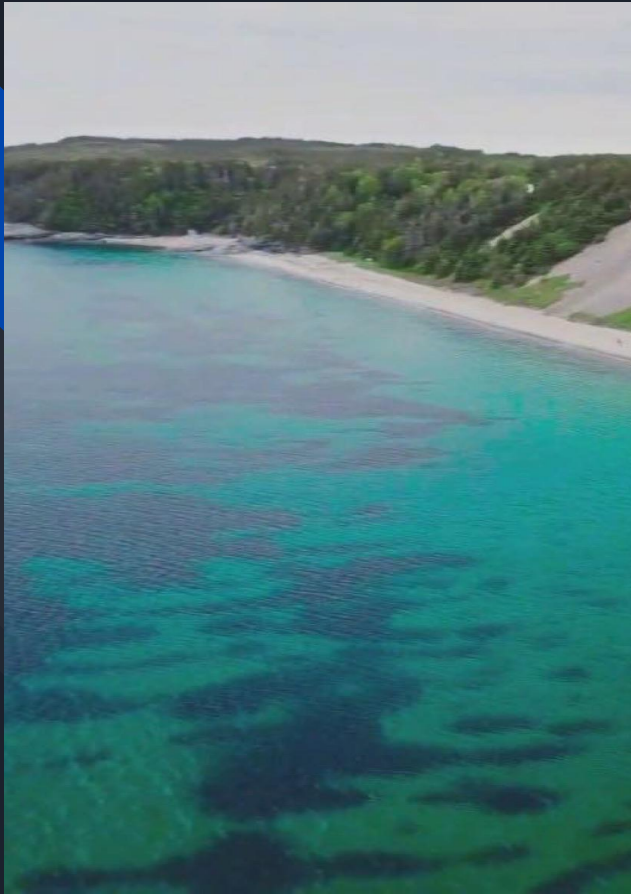
Picture 3: taken from boat looking back at Rencontre East.

## Purpose:

To compare the types and amounts of ocean waste that covers 2 different beaches in 2 Newfoundland Coastal communities. (One beach located in Rencontre East, the other in Eastport).

## Question:

What is the most common type of solid waste and how much waste covers the beaches in 2 coastal communities?



Picture 4: Picture of Eastport beach from afar.

# Hypothesis:

Plastic will be the most common type of waste on both beaches. While finding background information, many sites stated that plastic is the most commonly found waste, and during the Rencontre East beach and waste study last year, plastic was the most commonly found waste then too.



# Variables (Controlled):

- The Area studied
- The collection was done during the afternoon (Daytime, afternoon)
- Same app to classify the waste.

Picture 5: Rencontre East beach, taken on January 24th 2021.





Picture 6: Picture of Eastport during winter 2021

# Materials:

- Logbook to record the amount and type of waste collected each week
- Clipboard
- Pen and/or pencil (To record)
- Garbage bags to collect and remove the waste from the beach
- Mobile device with Marine Debris Tracker app
- Gloves

# Procedure



Picture 7: Rencontre East beach, taken on January 3rd 2021.

1. Create a chart in the logbook to record the amount and type of waste found of both beaches.
2. Use the Marine Debris Tracker app to classify the waste.
3. Visit the beach to collect the waste: record the type and amount of each type of waste: plastics (plastic PPE, and plastic fishing gear, other plastics), metals, glass, rubber, cloth, paper & lumber, fishing gear, PPE.
4. Record exactly what the object is, how many there are, and what category it would fall into (plastic, metal, etc)
5. Repeat this process once a week for 4 weeks (Jan 3rd 2021 - Jan 24th 2021)
6. Compare the results collected in Rencontre East to that from a beach located in central Newfoundland, (Eastport)

# Results and Analysis

Table 1: Amount of different types of waste collected on a local beach in Eastport over 4 weeks

	Plastic	Plastic PPE	Plastic fishing gear	Fishing gear	metal	Glass	Paper/ lumber	Other
Week 1	30	4	0	2	20	23	9	22
Week 2	23	6	0	1	13	9	6	6
Week 3	13	2	0	3	15	10	2	18
Week 4	11	3	0	0	16	7	2	9
Total	77 (27%)	15 (5.3%)	0 (0%)	6 (2.1%)	64 (22.5%)	49 (17.2%)	19 (6.7%)	55 (19.3%)



Table 2: Amount of different types of waste collected on a local beach in Rencontre East over 4 weeks (Jan 3rd 2021 - Jan 24th 2021)

Types of waste	Plastic	Plastic PPE	Plastic fishing gear	Fishing gear	Metal	Glass	Paper/ lumber	Other
week 1	147	11	6	37	92	108	41	17
week 2	113	5	4	21	64	72	26	10
week 3	75	2	6	8	52	43	19	12
week 4	89	8	2	17	36	23	16	6
<b>Total</b>	424 (35.7%)	26 (2.2%)	18 (1.5%)	83 (70%)	244 (20.5%)	246 (20.7%)	102 (8.6%)	45 (3.8%)

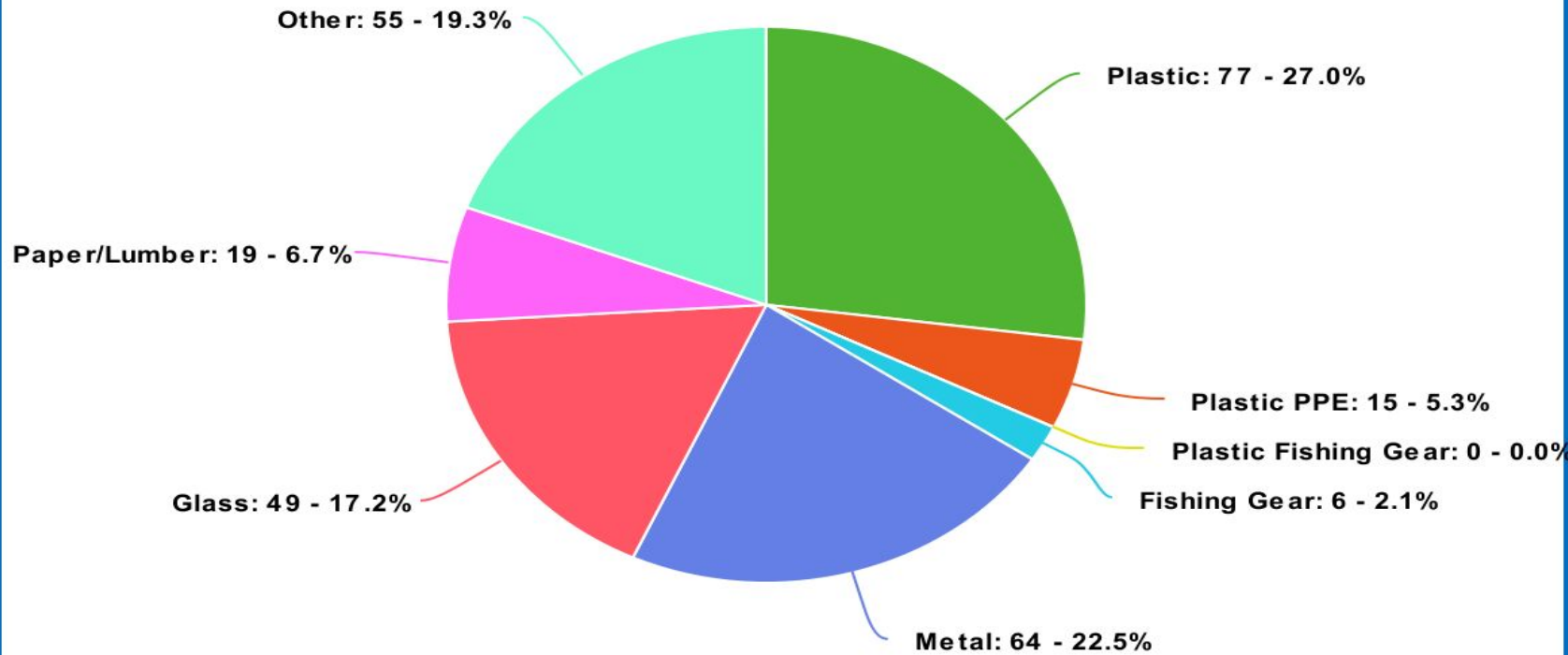


Figure 1: Amount of different types of solid waste collected as a percent of the total amount collected over 4 weeks in Eastport

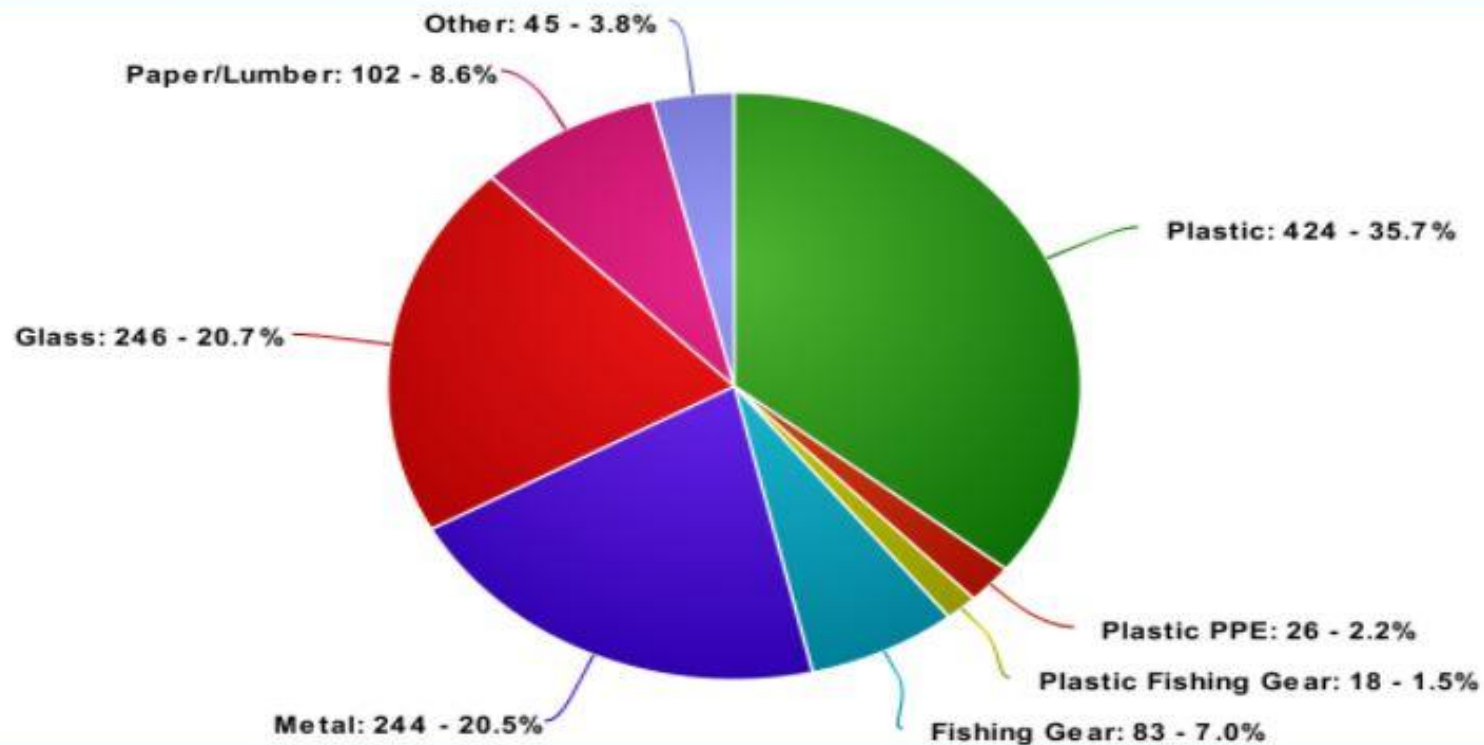


Figure 2: Amount of different types of solid waste collected as a percent of the total amount collected over 4 weeks in Rencontre East

Amount of solid waste collected



Figure 3: Number of different types of solid waste collected on a beach in Eastport over 4 weeks (Jan 4th 2021 - Jan 23rd 2021)

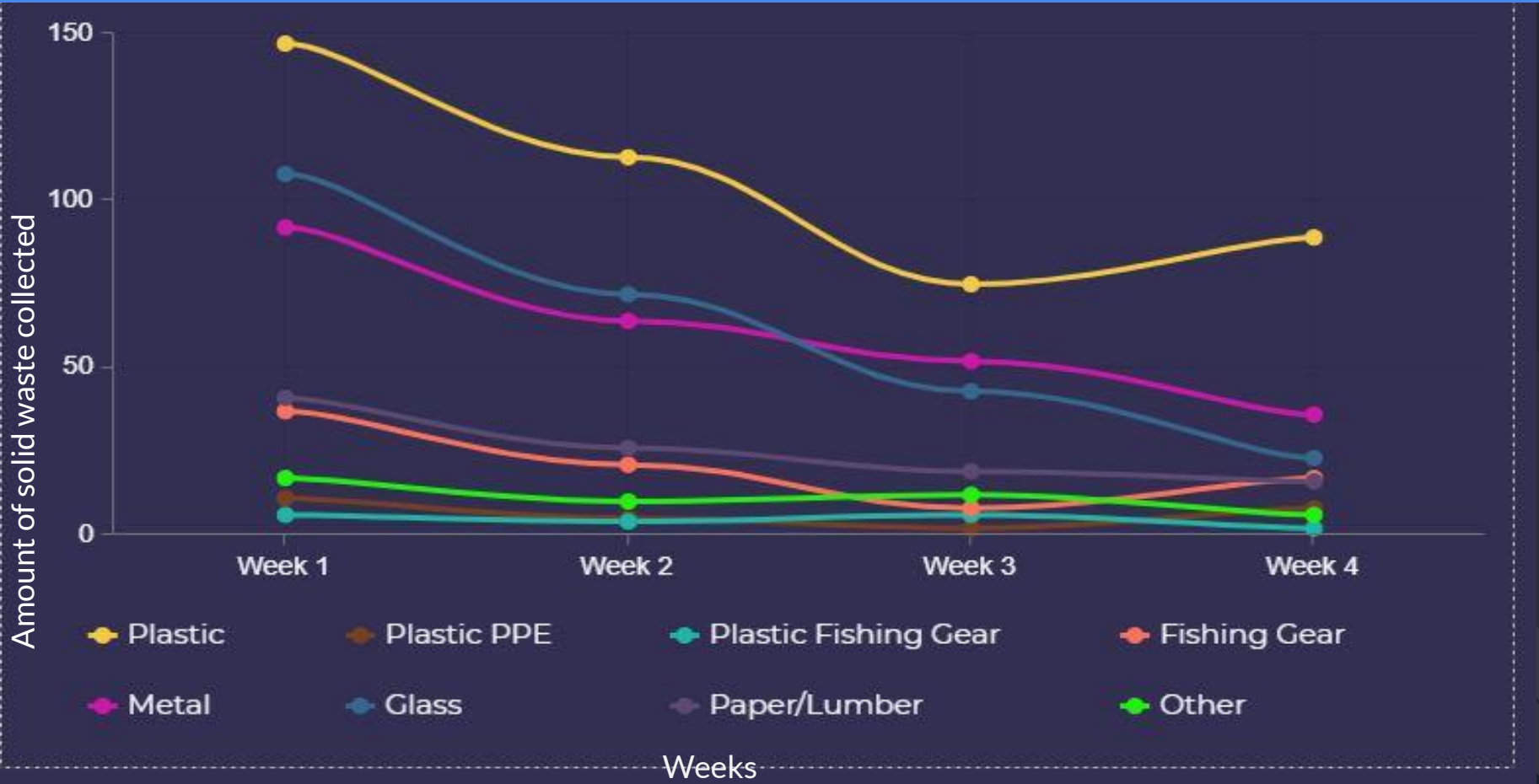


Figure 4: Number of different types of solid waste collected on a beach in Rencontre East over 4 weeks (Jan 4th 2021 - Jan 23 2021)



Table 3: Comparison of the amount of each type of waste (pieces /metre squared) on Rencontre East beach and Eastport Beach

Type of waste	Plastic	Plastic PPE	Plastic Fishing Gear	Fishing Gear	Metal	Glass	paper/lumber	Other
Rencontre East	0.1400	0.0086	0.0059	0.0274	0.0804	0.0811	0.0336	0.0148
Eastport	0.0068	0.0013	0.0000	0.0005	0.0056	0.0043	0.0017	0.0049

Eastport beach is 750 m long and 15 m wide;  
Total beach area is 11 250 metres squared

Rencontre East beach is 140 m long and 22 m wide;  
Total beach area is 3 080 metres squared

# Results and Analysis



Picture 8: Rencontre East beach, taken on Jan. 10th 2021

There was a total of 1398 pieces of waste on the beaches of Rencontre East and Eastport (1188 in Rencontre East, 285 in Eastport).

Most waste was collected during the first week. This makes sense because it's waste that would have accumulated over many months. To my knowledge, the last time waste was collected on the Rencontre East beach would have been during the summer while the student workers cleaned the beach, five months before this experiment was conducted. Another reason why the most of the waste was collected during the first week for Rencontre East, would be because there wasn't any snow covering the beach in the first week. So it was much easier to see, count and collect waste.

The beach in Rencontre was more polluted than the beach located in Eastport.

# Discussion



Picture 9: Eastport Community

The results show that there was a large amount of waste collected on both beaches over the 4 weeks of this study. However the Eastport beach had only about 20% of that of the Rencontre East beach. This is despite the fact that the Eastport beach is almost three times the size of the Rencontre East beach.



## Discussion



Picture 10: Ocean surrounding Rencontre East.

These differences may be due to a number of observations. For example, Eastport beach is a popular tourist destination, while the beach in Rencontre East is more remote and less accessible thus it is not frequented by many tourists. During the summer, students are hired to look after Eastport beach which includes picking up any waste. Also, there are a number of garbage cans available for the public to use. Rencontre East does have summer students, however, they do many jobs around town. A full cleanup of the beach was done in August. However, there are no garbage cans located on the Rencontre East beach.

## Discussion



Picture 12: Eastport beach, winter 2021

Many online sources claimed that fishing gear was the main waste in Newfoundland. However our results do not support this claim. This year, plastic was very noticeably the most common type of waste found on both beaches, while plastic fishing gear was the least common.

Last year, when a similar project was done on the Rencontre East beach, plastic was also the most common type of waste, while fishing gear was the least common.

Although there wasn't an experiment done on the Eastport beach last year, we suspect that fishing gear wouldn't have been a big problem then either since there was very little collected this year.

There are several reasons why fishing gear may not be commonly found on these beaches. One reason would be that not many people fish nearby due to shallow shores and not many fish being in that specific area. Another reason would be that the experiment was done during the winter time which is not fishing season.



# Discussion



Picture 10: Rencontre East beach, photo taken from government wharf.

As mentioned previously, a similar experiment was done on the Rencontre East beach last year (December 17, 2019 to January 6, 2020). The purpose of the project was to investigate what types of solid waste and how much of each type washes up on a beach in Rencontre East.

The results from that study included a total of 1618 pieces of waste being collected. Plastic was the most common type of waste, while fishing gear was the least common. As with the present project, most of the waste was collected during the first week.

A similar procedure was used last year but there are some important differences. Besides collecting from two different communities this year, two new categories of waste were included (plastic PPE and plastic fishing gear). Also, in addition to counting total pieces of waste, the total physical area of each beach was determined in order to compare the density and distribution of each type of waste on the 2 beaches.

This year, I had taken into consideration some of the sources of error from last year and was able to fix two. This year, I measured the beach in order to compare to Eastport and to have a better understanding of how much waste was on the Rencontre East. Secondly, I collected the waste every Sunday in January for a more accurate count of waste found on the Rencontre East beach. While last year I just went to the beach once a week between December 17, 2019 to January 6, 2020. I didn't go down the same day each week, which could have caused inaccurate data.

## Discussion



Picture 13: Eastport Beach, taken Jan 24th 2021

Despite the differences in amount of waste between the two beaches, the results show that plastic is still the main source of pollution on both, thus the hypothesis is supported. This agrees with the article, “Better Meets Reality,” on Feb. 16th, 2019, (but was recently updated on January 10th, 2021), which indicated that plastic such as bottle caps, bottles, food wrappers and bags are the main sources of beach pollution.

# Sources Of Error



Picture 14: Rencontre East beach, taken Jan. 17, 2021

- Parts of the beach were covered in snow, meaning pieces of garbage were most likely missed.
- The waste was only collected for 4 weeks in total (1 month).
- Pieces of waste were collected and the sizes of the pieces varied.
- It is highly possible that not all of the waste was collected because it was a large area of beach to cover.



## Conclusion



Picture 15: Full view of Eastport beach.

There was a lot of solid waste present on the beaches of Rencontre East (1188 total pieces of waste) and Eastport (285 total pieces of waste).

While there is a wide variety of types of solid waste found, the most common type of waste collected for both beaches was plastic and the least common was plastic fishing gear.



# Acknowledgment

Thanks to:

Amy's sister, Emma Gillard, who helped with the collection of waste on the beach of Rencontre East.

Amy's Grandfather, Randy Evans, who helped with the measuring of the area of the beach of Rencontre East.

Our CDLI Chemistry 2202 Teacher, Yvonne Dawe, who gave us advice on many parts of this project.

Ethan's brother, Noah Woodfine, who helped with the collection of waste on Eastport beach.





# References

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<https://www.cbc.ca/news/canada/newfoundland-labrador/ocean-plastic-newfoundland-1.4724682>

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Bird, L.B. (Oct 17th, 2016) Marine Microplastics Problem In N.L.: MUN Scientist

<https://www.cbc.ca/news/canada/newfoundland-labrador/marine-microplastics-in-nl-mun-scientist-1.3169174>

Better Meets Reality. (Feb.16 2019) Most Common Types Of Waste Found In Oceans & On Beaches

<https://www.bettermeetsreality.com/most-common-types-of-waste-found-in-oceans-on-beaches/#:~:text=Summary%20%E2%80%93%20Common%20Waste%20%26%20Rubbish%20of%20waste%20found%20on%20beaches>

# Appendix: Log Book (Rencontre East Collection)

<p>Page 1</p> <p><u>Garbage Collection</u> Jan. 3<sup>rd</sup> 2021</p> <p><u>Week 1</u></p> <p>★ <u>Plastic</u></p> <ul style="list-style-type: none"> <li>Bottles</li> <li>Bottle caps</li> <li>Food wrappers</li> <li>Straws</li> <li>bags</li> </ul> <p>147 Pieces</p> <p>★ <u>Plastic PPE</u></p> <ul style="list-style-type: none"> <li>Gloves</li> <li>Masks</li> </ul> <p>11 Pieces</p> <p>★ <u>Plastic Fishing Gear</u></p> <ul style="list-style-type: none"> <li>Fish Lures</li> <li>Pieces of a buoy</li> </ul> <p>6 Pieces</p> <p>★ <u>Fishing gear</u></p> <ul style="list-style-type: none"> <li>Rope</li> <li>hooks</li> <li>nets</li> </ul> <p>37 Pieces</p> <p>★ <u>Metal</u></p> <ul style="list-style-type: none"> <li>Cans</li> <li>Tags</li> <li>Nails/screws</li> <li>Coins</li> </ul> <p>92 Pieces</p>	<p>Page 2</p> <p><u>Garbage Collection</u> Jan. 3<sup>rd</sup> 2021</p> <p><u>Week 1</u></p> <p>★ <u>Glass</u></p> <ul style="list-style-type: none"> <li>beer bottles shards</li> <li>Coke bottles shards</li> </ul> <p>108 Pieces</p> <p>★ <u>Lumber/Paper</u></p> <ul style="list-style-type: none"> <li>Planks</li> <li>logs</li> <li>Paper bag</li> </ul> <p>91 Pieces</p> <p>★ <u>Other</u></p> <ul style="list-style-type: none"> <li>Siding</li> <li>Shingles</li> </ul> <p>17 Pieces</p> <p>147 + 11 6 37 92 108 41 17 459</p> <p>459 total pieces of garbage in Week 1.</p>	<p>Page 3</p> <p><u>Garbage Collection</u> Jan. 10<sup>th</sup> 2021</p> <p><u>Week 2</u></p> <p>★ <u>Plastic</u></p> <p>113 Pieces</p> <p>★ <u>Plastic PPE</u></p> <p>5 Pieces</p> <p>★ <u>Plastic Fishing Gear</u></p> <p>4 Pieces</p> <p>★ <u>Fishing Gear</u></p> <p>21 Pieces</p> <p>★ <u>Metal</u></p> <p>64 Pieces</p> <p>★ <u>Glass</u></p> <p>72 Pieces</p> <p>★ <u>Lumber/Paper</u></p> <p>26 Pieces</p> <p>★ <u>Other</u></p> <p>10 Pieces</p> <p>113 + 5 + 4 + 21 + 64 + 72 + 26 + 10 = 315</p> <p>315 pieces of garbage in week 2.</p>
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# Appendix: Log Book (Rencontre East Collection)

Page 4

Garbage Collection Jan. 17<sup>th</sup> 2021

Week 3

★ Plastic  $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||||} \text{||||}$   
 = 75 pieces

★ Plastic PPE  $\text{||}$   
 = 2 pieces

★ Plastic Fishing Gear  $\text{||||}$   
 = 6 pieces

★ Fishing gear:  $\text{||||} \text{|||}$   
 = 8 pieces

★ Metal  $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||||} \text{||||} \text{||||} \text{||}$   
 = 52 pieces

★ Glass  $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||||} \text{|||}$   
 = 43 pieces

★ Lumber/Paper  $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 = 19 pieces

★ Other  $\text{||||} \text{||||} \text{||}$   
 = 12 pieces

$75 + 2 + 6 + 8 + 52 + 43 + 19 + 12 = 217$   
 (Total pieces of garbage)

Page 5

Garbage Collection Jan. 24<sup>th</sup> 2021  
 Week 4

★ Plastic  $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||||} \text{||||}$   
 = 89 pieces

★ Plastic PPE  $\text{||||} \text{||}$   
 = 8 pieces

★ Plastic Fishing gear  $\text{||}$   
 = 2 pieces

★ Fishing Gear  $\text{||||} \text{||||} \text{||||} \text{||}$   
 = 17 pieces

★ Metal  $\text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||} \text{||||}$   
 $\text{||||} \text{||}$   
 = 36 pieces

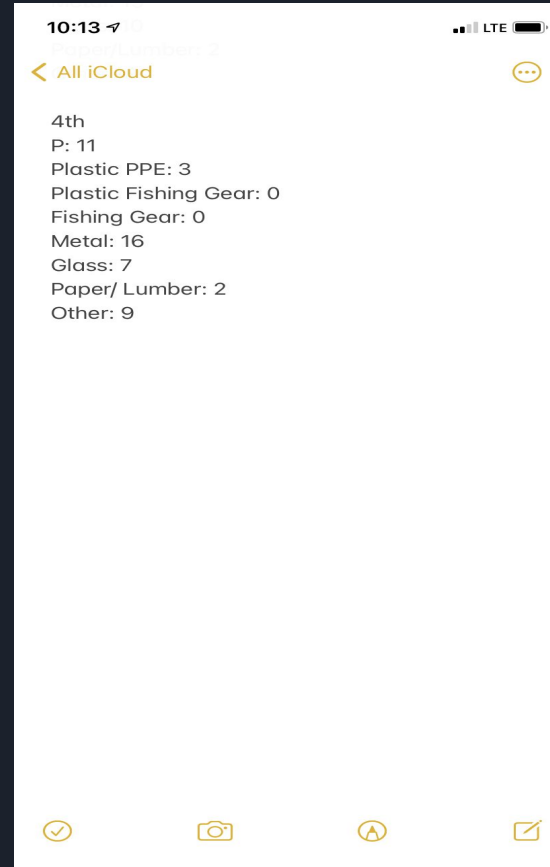
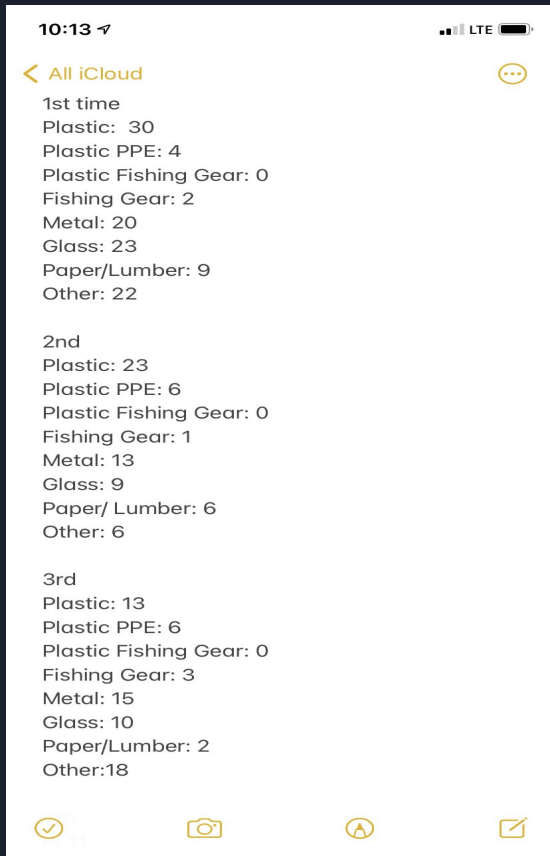
★ Glass  $\text{||||} \text{||||} \text{||||} \text{||||} \text{|||}$   
 = 23 pieces

★ Lumber/paper  $\text{||||} \text{||||} \text{||||} \text{||}$   
 = 16 pieces

★ Other  $\text{||||} \text{||}$   
 = 6 pieces

$89 + 8 + 2 + 17 + 36 + 23 + 16 + 6 = 197$   
 (Total pieces of garbage)

# Appendix: Log Book (Eastport Collection)





## About: Rencontre East



Rencontre East is a small town located on the south coast of Newfoundland. There is a population of approximately 140 people. To get to Rencontre East, people will have to board a ferry in Bay L'argent or Pools cove, both rides being over an hour long.

In town, there are two small shows, a park, two churches, and 1 k-12 school with only 20 students. There are no cars or any paved roads in Rencontre East.

Overall, it's a pretty friendly place. Everybody knows each other.

Picture 16: Rencontre East during the summer of 2020



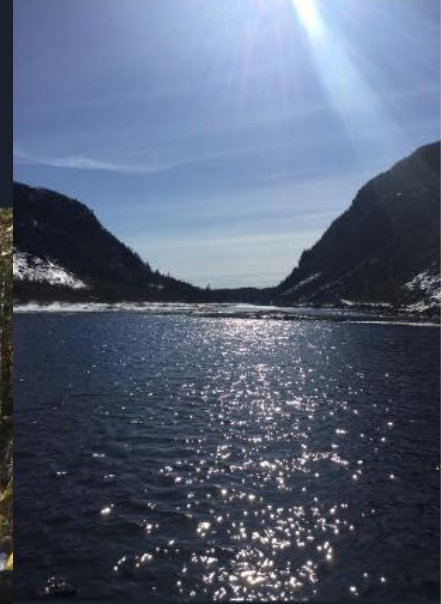
# Pictures: Rencontre East

Picture 17 Rencontre East  
beach Winter 2021



Picture 18  
Rencontre East,  
Downton's pond

Picture 19  
Rencontre East trail,  
towards the pond



Picture 20  
Rencontre East, up  
Sholes.

# About: Eastport



Eastport is a small community located in central Newfoundland. There is a population of approximately 500 people. The Eastport peninsula is a popular vacation spot for many people around the world. This is due to the beautiful beaches and other tourists attractions around the area. In town, there's 1 gas station, a couple of restaurants, a k-12 school with about 100 students and a few other nice places. Overall it's a peaceful, nice environment to live in.

Picture 21: Eastport

# Pictures: Eastport



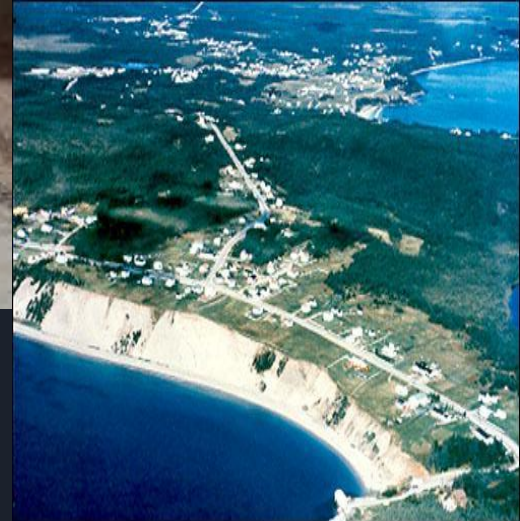
Picture 22:  
Eastport beach taken  
in winter 2020

Picture 23: Eastport church



Picture 24: Eastport  
firehall

Picture 25:  
Eastport peninsula





Thank you!