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Seabirds and Marine Plastic Debris in the A Northeastern Atlantic



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Marine Plastic Pollution

- An estimated 4.8 to 12.7 million metric tons of plastic enters the oceans annually
- Over 690 marine species have been affected by marine debris, the majority involving plastic (Gall & Thompson 2015)







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The plight of Grassholm's gannets, in pictures



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Seabirds 'blighted by plastic waste'

By Jonathan Amos BBC Science Correspondent

🕐 31 August 2015 | Science & Environment 🕴 🕈 🎽 😒 🔀 < Share



Plastic ingestion leads to gut impaction, weight loss and sometimes even death

About 90% of seabirds have eaten plastic and are likely to retain some in their gut, a new analysis estimates.

NAT GEO SITES 🗸

NATIONAL LATEST STORIES TV PHOTO OF THE DAY

Nearly Every Seabird on Earth Is Eating Plastic

Plastic trash is found in 90 percent of seabirds. The rate is growing steadily as global production of plastics increases.

By Laura Parker, National Geographic PUBLISHED SEPTEMBER 2, 2015











Marine Plastic Pollution - what don't we know?

- To what extent are different species impacted by plastic debris?
- And does this vary over space and time?
- We do have a better understanding of plastic and seabirds in Canadian waters thanks to a recent comprehensive review (Provencher *et al.* 2015)



REVIEW

Marine birds and plastic debris in Canada: a national synthesis and a way forward

Jennifer F. Provencher, Alexander L. Bond, and Mark L. Mallory





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Aims of our research

- > To determine what we currently know about seabirds and marine plastic, focusing on nest incorporation and ingestion
- Identify knowledge gaps and make recommendations for future monitoring to improve our understanding of how marine plastic affects seabirds in the northeastern Atlantic Ocean







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Seabirds and Marine Plastic Pollution in the northeastern Atlantic

- Internationally important numbers of seabirds and over 350 Important Bird and Biodiversity Area (IBAs) in marine habitats (Birdlife 2017)
- Plastic, particularly micro-plastic (< 5 mm), is widespread in the region with a mean of 2.46 particles m³ (Lusher *et al.* 2014)
- Agreements: EU Marine Strategy Framework Directive and the United Nations Sustainable Development Goals #cleanseas initiative
- The Northern Fulmar is the OSPAR EcoQO indicator species for monitoring plastic debris in the North Sea (van Franeker & Meijboom 2002)
 Northern Fulmar stomach contents (van Franeker, Wageningen Marine Research)





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Methods: Synthesis of the literature

- > Extensive review of the peer-reviewed and grey literature up to 28th February 2017
- Key words searches: plastic, diet, plastic ingestion, nest, nest incorporation, nest material and marine debris
- For each study, we recorded the species, location, year of sampling, sampling method, and the frequency of occurrence (%) of plastic ingestion or nest incorporation
- > Where provided, we also recorded all metrics referring to the number, mass, size, type, and colour of plastic identified













inland

Methods: Species and area of interest 🖌

➤ 69 seabird species –

Tubenoses Gannets Skuas Terns Loons Mergansers Cormorants Phalaropes Gulls Auks Seaducks

Non-continental European countries and autonomous territories within northeastern Europe Greenland

Svalbard

Norwegian Sea

Iceland Norway

Faroe Islands, Scotland

Republic N. Ireland of Ireland





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Results: Seabirds and plastic ingestion

Ye found a total of 56 studies which reported plastic ingestion











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→ We found a total of 56 studies which reported plastic ingestion

Plastic ingestion was found in 25 (36%) seabird species















Results: Seabirds and plastic ingestion

→ We found a total of 56 studies which reported plastic ingestion

Plastic ingestion was found in 25 (36%) seabird species

(or 74% of those examined!)



35 (51%) seabird species have not been examined for plastic ingestion









Results: Seabirds and plastic ingestion

There was spatial and temporal bias in coverage - 61% of data was collected prior to 2000







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Results: Seabirds and plastic ingestion

Only eleven species had data on plastic ingestion from multiple countries and years

Species	Studios	Countries	Year Range		Sample S	ize	Prevalence		
Species	Studies	countries		Total	Range	Median	Mean ±SD	Range	
Northern Fulmar	18	10	1972-2016	2247	2-699	35	66 ± 35	7-100	
Little Auk	9	4	1982-2014	506	3-184	44	21 ± 34	0-100	
Common Eider	5	3	1982-2012	402	1-241	20	0	0	





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Seabirds and plastic ingestion

Recommended reporting guidelines for plastic ingestion studies

As a minimum all studies should report:

- Location and timing of sampling
- Method of sampling
- Sample Size
- Frequency of occurrence of ingested plastics
- Mean (with standard deviation/error), median and range of plastic mass by debris category

Additional information to be provided:

- Size of plastics reported by size classes
- Colour reported in 8 broad colour groups







Provencher et al. (2017)





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Results: Seabirds and plastic ingestion

Percentage of the 46 <u>published</u> studies that met the standardised metric recommendations for recording plastic ingestion











Results: Seabirds and nest incorporation

- > Only 3 studies reported quantitative data on nest incorporation!
 - ➤ Northern Gannet, Wales (1)
 - Solution Black-legged Kittiwake, Denmark (2)
- > Not because it doesn't occur but because it is under-recorded















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Discussion points

 \succ Highest prevalence of plastic ingestion occurred in the fulmars / shearwaters



- Y Prevalence in other surface feeders (skuas, gulls, terns, and phalaropes) was more variable
- > Lowest prevalence in the diving species (loons, seaducks and cormorants)
- There is low spatial and temporal coverage of studies with small sample sizes for many species or no information at all
- Y We know virtually nothing about nest incorporation of plastic by seabirds













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Studies should report metrics as recommended by Provencher et al. (2017) especially mass



The collection of large sample sizes at regular intervals is necessary to detect changes





A standardised, repeatable, protocol is required to obtain quantified data on nest incorporation of plastic





Collaborate effort is required to collect data from multiple locations over time in a standardised way





Thank you and any questions?

- Plastic ingestion was recorded in 36% of 69 seabird species
- However, 51% of these species have not been investigated for plastic ingestion
- Only 2 species had published data on nest incorporation
- Low spatial and temporal coverage of data
- Co-ordinated effort in collecting data is required so trends can be monitored over time and space



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