

# 5 Small facts about balloon litter



Balloon releases during festivities are frequently in the spotlights. In the Netherlands, with 'King's Day' coming up on the 27th of April, fierce debates are going on about the damage that balloons may yes or no cause in nature. How can latex, made from natural rubber and thereby 'degradable', be harmful? Unfortunately, there is no doubt that some animals die by latex balloons, with others experiencing less obvious damage. Science cannot offer full facts and figures on how frequent such events are or the damage involved. In the end, subjective decisions are unavoidable, weighing the expected fun of a release against a poorly quantified risk of harmful consequences. With a listing of 'small facts', IMARES Wageningen UR aims to provide some background for such decisions.

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## Contact

Jan van Franeker  
IMARES  
P.O.Box 167  
1790 AD Den Burg (Texel)  
The Netherlands  
E: [jan.vanfraneker@wur.nl](mailto:jan.vanfraneker@wur.nl)



King's Day on the beach: a beached plastic toy crown and balloon ribbon found side by side on the beach of Texel

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# 1. Balloons travel over great distances

In early May 2007, a work visit of IMARES researchers to French colleagues became quite embarrassing! Following Dutch Queensday (then on 30 April), strong northeasterly winds brought a lot of Dutch party balloons all the way down to Normandy, at least 800km away from the point of release. In the vicinity of Le Havre, more than 10 balloons per kilometer coastline were recovered. Most originated from companies advertising their business. However, also charity organizations were involved, but here sending out the wrong message.



## Examples of Dutch balloons, beached in Normandy following Queensday in the Netherlands in 2007



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**In the Netherlands there is also balloon debris found from neighboring countries**



These balloons found on the island of Texel, in the northwest of the Netherlands, had their origin without doubt in Belgium, where French and Dutch languages overlap. The bilingual text 'Dag van de Netheid / Journée Propreté' translates to 'Day of tidiness'. Organisers had apparently overlooked the litter problem from balloons!



Also British balloons are frequently found on Texel beaches: here a balloon from the UK shoe supplier 'Shoe Zone'.

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## 2. Balloons are a danger to wildlife

Debris from balloons represents a danger, because animals may become entangled in ribbons preventing normal foraging activity. Animals also mistake balloon debris for food and ingest the material, which may block the stomach or intestines and lead to starvation.



This Guillemot (*Uria aalge*) became entangled in a ribbon with remains of the latex balloon and plastic valve



Northern Fulmar (*Fulmarus glacialis*), entangled in balloon ribbon.



Plastic ribbons, balloon valves and washers end up as debris in nature.



Playful behaviour, in this case by a Jackass Penguin (*Spheniscus demersus*) in South Africa, can lead to entanglement or ingestion.



Great Skua (*Catharacta skua*) with apparently ingested balloon and the ribbon hanging from the mouth. Photographed central North Sea by Hans Verdaat.

### 3. Degradable balloons are not the solution

Animals mistake remains from balloons for food, which may cause blockage of stomach and intestines and may lead to starvation. Latex rubber, in spite of its natural origin, does not degrade quickly enough to avoid ingestion by marine wildlife and potential damage to their digestive system.



Stomach content of a Northern Fulmar that had ingested a large piece of a weather balloon (greyish) as well as a normal party balloon (light purple) and all sorts of other plastics. In extreme cases like this a balloon completely blocks the digestive system.

**Latex degrades faster than synthetic plastics, but nevertheless remains intact long enough for negative consequences to occur**



Fulmars have two stomachs: the first is a large glandular stomach (proventriculus, in top of the photo), which has a narrow passage into the second smaller and muscular stomach (gizzard, the bulbous organ at the lower right). In this bird, several pieces of balloon rubber had filled the proventriculus to the extent that passage of food to the gizzard and intestines had become impossible. The latex rubber, in particular the thicker ring is clearly visible through the thin wall of the proventriculus. The bird was found starved to death.



Example of remains of a fragmented latex party balloon from the stomach of a beached dead Fulmar.



The sorted contents of the Fulmar stomach shown above, with lots of latex balloon remains. Above the petri dishes is the opened stomach (left proventriculus, right gizzard). The large petri dish to the left shows a large piece of latex from a weather balloon, and partly digested remains of a light purple latex party balloon, plus a bundle of fibrous synthetic debris. The smaller petri-dish shows contents from the gizzard with small plastic particles and some natural materials.



Quantities of latex rubber in stomachs are not always of spectacular size. This photograph shows a stomach content with a range of plastic debris, including two pre-production industrial pellets (top left), threadlike materials, foams, fragments and sheetlike plastics. The orange object at bottom right is a shriveled piece of latex balloon. Although such a piece may not be the sole and direct cause of death, and probably passes the digestive system more rapidly than the plastics, negative impacts cannot be excluded.



Only when fully stretched out, the size of the above mentioned latex rubber items becomes apparent.

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## Scientific research into degradability and harm from balloon latex

Surprisingly little scientific research has been done to investigate the degradability and potential harm from latex balloons in natural environments.



A bundle of advertising balloons, of which some seem to have exploded high in the atmosphere, while others have descended almost unchanged.

### Report of the industry

A regularly cited, 'scientific' report is:

*Burchette, D.K. 1989. A study of the effect of balloon releases on the environment. Unpublished report to the Environmental Committee National Association of Balloon Artists. 26 pp.*

This is a study by the balloon industry. It is argued that latex balloons almost all explode into small fragment in the freezing low pressure conditions of the high atmosphere. It also states that the degradation of the small rubber bits, once back on earth, would be as fast as that of oak leaves, suggesting that this can present no danger. The oak leaf comparison is taken on board because experiments showed that balloon rubber had only lost a few percent of its original mass after 6 weeks. Oak leaves take a long time to decompose!



Remains of balloons that have likely exploded high in the atmosphere, with missing parts probably falling down as smaller pieces of latex.

### Report on eating latex by animals

A recent report, regularly cited as evidence for the 'harmless' character of latex balloon debris after ingestion by animals, is:

*Irwin, S.W. 2012. Mass latex balloons releases and the potential effects of wildlife. PhD Dissertation Graduate School of Clemson University, South Carolina, USA. 87pp.*

The first chapter from this study contradicts the conclusions of Burchette. Only 12% of balloons released exploded into small fragments: 81% returned as large pieces of latex of at least half the original balloon mass. The question of size of rubber particles returning to the ground is really not so relevant: different

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sized pieces may have different effects or may impact other species of wildlife. Irwin's experiments showed that latex exposed to air became brittle after 8 to 10 weeks. In water, latex kept its original flexible character for over 5 months, with associated duration of wildlife encounters.

The second chapter of Irwin's report is being considered as evidence that the ingestion of pieces of latex balloon rubber has no harmful consequences to animals. A council member of the city of Utrecht was even triggered to consume a small piece of latex balloon. It is evident that such demonstration has no scientific significance.

In no way, the Irwin report provides evidence for lack of harm from latex ingestion. Only four weeks of experiments were conducted with quails, fish and freshwater turtles. No control experiments (animals not fed plastics) were conducted which can be seen as a severe scientific omission. Results are unclear about the quantities of rubber actually consumed by different individuals. Potential negative effects were measured from stress-hormones in blood without clarity how latex ingestion would lead to measurable stress. Effects were also investigated by looking at body mass changes, showing increases in quail and fish, and no clear lasting effect in turtles. However, all experimental animals were still in a life stage of growth and were offered unlimited good quality food: thus body mass changes are not really a good indicator for impacts. Importantly, after the experiments, 20% of the turtles showed accumulations of rubber particles in their digestive tract, plus average body mass in the last 2 weeks decreased. This suggests initial stages of blockage of the digestive system leading to insufficient uptake of food. But the experiments did not run long enough for a good evaluation. The author is aware of such issues, and only ventures a rather non-specific conclusion of his study: *"Results of this study suggest that consumption of latex balloon fragments may not pose a threat to many wildlife species"*

In short this means that an interpretation of this report as giving no evidence for negative effects is not correct. Maybe this explains that this University report has not yet been published in peer reviewed scientific literature, in spite of the fact that the report states that such publication is intended. Anyway, the study was inadequate to show absence of negative effects from latex ingestion. It is absolutely incorrect to interpret the lack of such findings as an evidence for 'no effect'.

### **Research by IMARES Wageningen UR**

IMARES research of plastics in stomach contents of Northern Fulmars does not make specific records of presence or absence of latex balloon rubber. Often latex remains are insufficiently recognisable as originating from balloons. In clear situations only, under notes, there may be mentioning that the rubber seen is considered to have a balloon origin (see photographs and short video). Balloon latex is described in about 2 percent of the stomachs that have been investigated. We do not know the precise consequences, not do we know if and how other wildlife species may be impacted. All that remains then to take decisions, is the non-scientific balance between the fun of a balloon release and the knowledge about a few percent of dead animals with balloon remains in their stomachs.

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## 4. How many animals die because of balloons?

It is impossible to give figures for the number of animals dying from entanglement or ingestion of latex balloon remains. Occasionally we find wildlife that died from entanglement or a blocked digestive system. At least 2% of fulmar stomachs investigated has remains of balloons. We have no idea about such figures for other wildlife species.



The stomach of a Northern Fulmar that died from latex balloon remains. Fulmars have two stomachs: firstly a large glandular stomach (top part on photo) with a narrow passage into the next smaller and muscular stomach (lower right part).

In this bird, several pieces of balloon latex had filled the glandular stomach to the extent that further passage of food had completely blocked. This bird was found dead from starvation (for further detail, see mall fact nr.3: 'Degradable balloons are not the solution').



This Northern Fulmar died from starvation because a balloon ribbon had wrapped itself around wing and leg, preventing normal foraging activity.

Although it is difficult to find out the frequency, it is absolutely clear that a number of animals dies because of balloon debris, not just because of the ribbons, but also from latex rubbers that do not degrade quickly enough to prevent ingestion by wildlife.

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## 5. Choices: usefulness and necessity of balloons

The risk of wildlife suffering or dying from balloons may be best balanced against usefulness or necessity of balloons released. Latex weather-balloons are an essential element for reliable weather forecasts to the extent that human life may be affected. But the short joy of a mass of party balloons disappearing into the sky? It is also an option to fix balloons as a decoration at the location, enjoy them for the full duration of the festivity, and in the end take them down to be discarded properly.



The aftermath of balloon releases on the beach: the photograph shows the balloon remains collected on just 500 meters of tidelines on the North Sea beach of island of Ameland in the Netherlands (2012). Besides ribbons and latex parts, on the right side the photograph shows a number of plastic foil ('Mylar') balloons, that don't degrade at all!



Many weather stations all around the globe release on a daily basis large latex balloons with various data recording systems attached. High in the atmosphere (20-30 km), with reducing air-pressure and cold temperatures, the balloons burst and remains fall down.

Remains of weather balloons can be found regularly on our beaches.

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### **More about litter and consequences for the natural environment?**

Wageningen UR investigates the problems related to plastic litter in marine-, fresh water- and other natural environments. This ranges from plastic debris in the sea ('Plastic Soup') to invisible small plastic particles in rivers. Researchers of IMARES WUR have been monitoring the abundance of plastic debris in stomachs of Northern Fulmars in the North Sea for over 30 years. That research forms the basis for monitoring programs also in other European marine areas. In part this concerns plastic ingestion by other bird species, but also by for example marine turtles, mammals and fishes in European waters and elsewhere.

[www.wageningenur.nl/plastics-fulmars](http://www.wageningenur.nl/plastics-fulmars)

**Previously published articles on balloon latex:** Published on 15 april 2013

#### **Balloons: release of hold on?**

Direct link: [www.wageningenur.nl/en/show/Balloons-release-or-hold-on.htm](http://www.wageningenur.nl/en/show/Balloons-release-or-hold-on.htm)

#### **Downloads on balloon debris:**

- [Queensday in France](#) (in Dutch with English summary)
- [Balloons as marine litter](#) (in Dutch with English summary)