We've all seen the pictures of polar bears stranded on sea ice. They're all too often used as the iconic poster animals of a rapidly changing climate.

Every now and again, claims emerge in the media that polar bears' plight might not be so serious after all. Just recently, Peter Hitchens said in the Mail on Sunday polar bears are "doing extremely well right now" and that claims otherwise are "just hot air".

Carbon Brief has dug through the literature and spoken to polar bear experts. While little is known about some remote polar bear populations, it's clear there's no scientific basis for such optimism. As temperatures rise, polar bears face a bleak future ahead, scientists tell us.

**Claims about polar bears on the up**

The crux of Hitchens' argument is that polar bear numbers are rising around the world, not falling. He quotes biologist Dr Susan Crockford, who says:

"On almost every measure, things are looking good for polar bears ... It really is time for the doom and gloom about polar bears to stop."
This stems from a report authored by Crockford and published last week by the Global Warming Policy Foundation, a climate skeptic think tank. Entitled, "20 good reasons not to worry about polar bears", the report describes itself as a "resource for cooling the polar bear spin".

The Times quoted the report's conclusion that:

"Polar bears are not currently threatened with extinction due to declining sea ice, despite the hue and cry from activist scientists and environmental organisations."

Similarly, a Mail on Sunday article from last September, also featuring Crockford, claimed: "The poster boys of climate change thrive in the icy Arctic: Polar bears defy concerns about their extinction."

So, what is the evidence for the claims? And do other scientists agree there's no cause for alarm?

As temperatures rise, polar bear habitat falls

Polar bears' primary habitat is sea ice. They use it as a platform to hunt seals. The map below shows the 19 different regions where polar bears live around the Arctic region.
Crockford's claim is simple: there are more polar bears now than there used to be. She says:

"With a global population estimate almost certainly greater than 25,000, we can say for sure that there are more polar bears now than there were 40 years ago."

In support, Crockford cites her own blog post. However, a recent review summing up all the available peer-reviewed and published literature comes to a different conclusion. It says:

"Polar bears still inhabit the majority of their historical range in 19 subpopulations, with a total population estimated at 20,000 - 25,000 … However, 8 of the 19 subpopulations are probably declining, primarily or partially because of the negative effects of climate warming."
A study of Western Hudson Bay polar bears shows a decline from 1,194 in 1987 to 935 in 2004, a drop of more than 20 per cent. In the Beaufort Sea, the survival rate among adult females was about 75 per cent in 2002 and 2003, compared to 95 per cent in previous years, for example.

Unusually warm weather in winter can cause dens to collapse, which females build to birth and protect their young. Creative Commons

A decline in declining populations?

Since the 2012 review paper, three of the eight populations that were in decline have now been classified as "stable" by the International Union for the Conservation of Nature (IUCN) Polar Bear Status Group (PBSG), largely because of conservation efforts. Crockford makes the point herself that polar bears are "a conservation success story".

Two other populations are newly deemed to have insufficient data to determine whether numbers are, in fact, going up or down. This leaves three populations still in decline.

Crockford uses a different source. She cites a 2014 report published by Environment Canada, showing only two subpopulations are 'likely in decline'.

But such categories don't capture the challenges faced from climate change, explains Prof Andrew Derocher, expert in polar bear ecology and conservation at the University of Alberta and co-author of the 2012 review paper. The categories were developed when the main threat to populations was from hunting. So, while a population can be classified as stable in a particular year, it could still have been declining over the longer term.
The argument that recent conservation efforts have been successful "doesn't address the globally recognised current threat to polar bears from climate change", notes Derocher.

He also tells Carbon Brief the Environment Canada report was "heavily flawed". The presentation of polar bear status contained biases that were based on keeping polar bears off the threatened list, he says.

The Environment Canada conclusions are at odds with official reports released by the IUCN/PBSG, Dr Steven Amstrup, researcher and past chairman of the group, tells Carbon Brief. In 2008, the IUCN designated polar bears as "vulnerable", meaning the global population has declined by more than 30 per cent in 40 years.

So, why are so many polar bear populations declining?

**Critical sea ice loss**

Temperatures in the Arctic are rising at least twice as fast as the global average and sea ice cover is diminishing by nearly four per cent per decade.

A ringed seal, polar bears' prey, poking its head through the sea ice. Creative Commons

The loss of sea ice affects polar bears' ability to find food, studies show. Polar bears feed on ringed seals at the ice edge, getting two thirds of the energy they need for the entire year in late spring and early summer. With the ice retreating earlier in spring and forming later in winter, the bears have less time to hunt prey and have to go without food for longer.
Scientists have found this results in a decline in body condition and lower average weight in adult females. Fewer cubs survive and the ones that do are smaller, research suggests.

While polar bears have shown some ability to adapt to changes in their surroundings - for example, by foraging for food on land - scientists project the bears will become more food-stressed as sea ice diminishes and populations will decline. Derocher tells Carbon Brief:

"Without sea ice, there is no sea ice ecosystem and losing that ecosystem includes losing polar bears".

**Dire projections**

One study predicts declining sea ice could see two thirds of the world's polar bears become extinct by the middle of the 21st century. Another study using 10 global climate models projects a drop in Beaufort Sea polar bears of 50 to 99 per cent by the end of the century.

To keep polar numbers relatively healthy, though still lower than today, scientists suggest global temperatures should not exceed 1.25 degrees Celsius above the 1980-1999 average.
Decline in polar bear habitat (a), decrease in sea ice over continental shelves (b), increase in number of months when shelves are sea ice-free (c) and change in the distance from ice shelf to edge of sea ice (d) as global temperature rises. Source: Amstrup et al., (2010)

But sea ice conditions and prey abundance vary across the Arctic, so not all polar bear populations will respond in the same way. Models suggest populations in the Chukchi and Barents seas will be most vulnerable, while those in northern Greenland less so.

This is why it's important not to draw conclusions about polar bears as a species from a single population, scientists warn.

There are other impacts of climate change on polar bears, too. Warming has been linked to increases in contamination and exposure to diseases. Unusually warm weather in winter can cause dens to collapse, which females build to birth and protect their young. Declining snow depths mean ringed seals can't build their snow dens, threatening their survival.

**Hard to reach data**
Scientists know more about some polar bear populations than others. The most studied is the Western Hudson Bay, but for several others, data is either outdated or non-existent.

This means it's possible the number of declining populations could be higher, say Derocher and co-author Dr Ian Sterling, a leading expert in polar bears in the Canadian Arctic, in their 2012 review paper. Crockford appears to take a different view, suggesting:

"[W]ith several subpopulations still uncounted the actual figure [for the total polar bear population] is almost certainly a good deal higher [than 20,000 - 25,000]."

As an example, Crockford cites a 2014 study that was the first to collect data on polar bears in the Kara Sea, one of the least studied polar bear habitats. The GWPF report says:

"A first-ever Kara Sea population estimate completed in late 2014 potentially adds another 3200 or so bears to the global total."

A Russian icebreaker research ship, The Yamal. Creative Commons

The study in question counted polar bears sighted from icebreaker ships between 1997 and 2013. From this, the scientists estimated that the number of bears in the Kara Sea has been between 3,100-3,300 in recent years.

It's worth noting the study estimates the number of polar bear in the Kara Sea by scaling up the number of sightings from less than one per cent of the total area. In fact, between April 1997 to May 2013, the scientists in fact only counted 277 individuals.

While new data is helpful in understanding polar bear numbers, Derocher tells Carbon Brief:
"This is the first attempt at estimating abundance here so there is no means of knowing if it is growing."

**Peer review**

The scientists we spoke to tell us Crockford has never led any research on polar bears, nor has she published any papers on the topic. Amstrup tells Carbon Brief:

"[The GWPF report] is a collection of statements [Crockford] has made and conclusions she has drawn without any support from the refereed literature."

Derocher points out Crockford's specialism is not, in fact, in the field of polar bears:

"[Crockford's] expertise is the archaeology of dead dogs and the identification of animal remains … In general, her views are tainted by a lack of understanding of polar bear ecology, Arctic marine ecosystem, and sea ice."

Other scientists pointed out that Crockford receives money from the Heartland Institute to work on projects designed to "undermine" the United Nation's official climate reports.

**A species in decline**

There are polar bear populations about which scientists still know very little, and the total number of polar bears worldwide remains uncertain. But the populations for which there is data together clearly point to a species in decline. And with the impacts of warming on polar bear habitat and feeding practices well documented, scientists who work in the field are clear that polar bears face a profound threat to their survival in the coming decades.

*Update: This article was updated at 16:50 on the 4th March to include the most recent polar bear subpopulation map from the IUCD/PBSG and further explanation.*