

An aerial photograph showing a vast, dense field of green jellyfish covering the water's surface. A person wearing a red life vest and dark clothing is seen from above, floating in the water and surrounded by the jellyfish. The water is a deep blue-green color, and the jellyfish appear as numerous small, translucent green spheres.

Jellyfish Blooms

Presented by Felicia Holman, Kilie
Jacquez, and Joe Barria

Introduction

In the ongoing discussion on climate change and global warming, it has become depressingly common to read about how increasing ocean temperatures, ocean acidification, and marine pollutants are testing the resilience of marine species, pushing them dangerously close to a precipice that it is unknown if they can recover from. However! Jellyfish enter the scene with a different response to our changing underwater world (though whether this uncommon response is a welcome change of pace is yet to be determined). It turns out that the shift in oceanic conditions that are so unfavorable to most species that us humans love, are actually ideal for jellyfish. The warming waters and increased productivity of the oceans allow jellyfish to multiply at a startling rate, resulting in Jellyfish blooms that are increasing both in frequency and size/severity over the last few decades. Jellyfish blooms, although good for the jellies, have been shown to have negative impacts economically, ecologically, and industrially. The increasing frequency of jellyfish blooms is leading many researchers to ask the questions, why is this happening, what are the consequences now and down the line, and most importantly – what can we do about it?

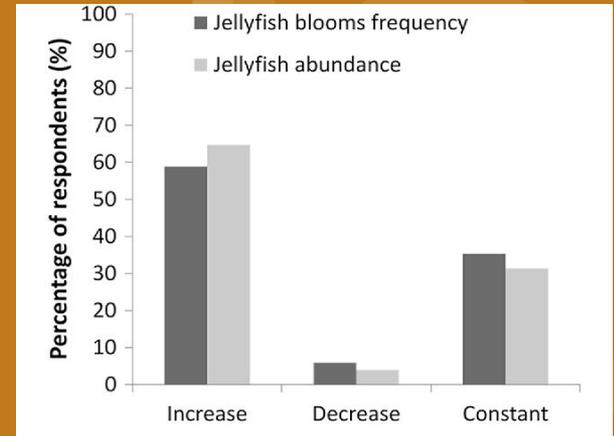
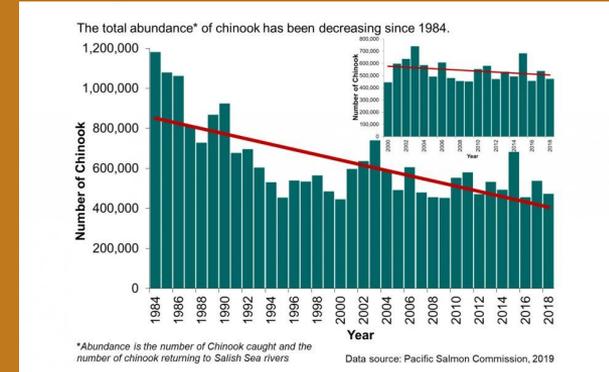


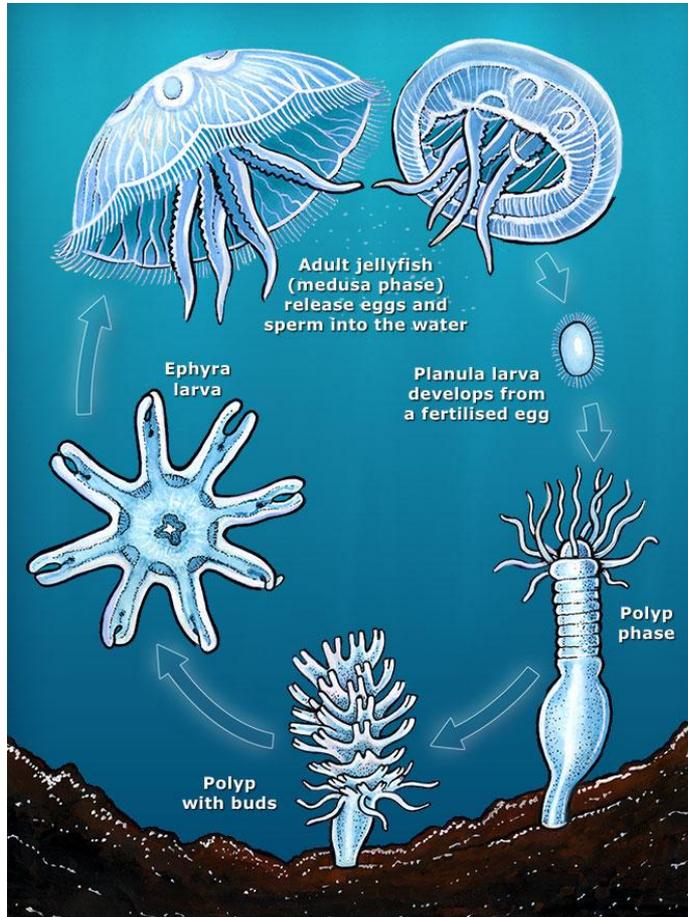
Fig. 2. Fish farmers' perception on jellyfish blooms frequency (A) and jellyfish density (B) variations in the last 10 years (represented by percentages).

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*Abundance is the number of Chinook caught and the number of chinook returning to Salish Sea rivers

Data source: Pacific Salmon Commission, 2019



When discussing the reproduction of jellyfish which creates jellyfish blooms, it is beneficial to understand the life cycle of jellyfish as well.

In the early stages of a jellyfish's life, they are in a stage called a polyp, during which they attach themselves to a solid surface and reproduce asexually by budding. This is an immature stage, and the jelly can remain in this state for years, waiting for ideal conditions to mature and sexually reproduce quickly, frequently, and efficiently.

This ability to selectively mature contributes to the sheer size of jellyfish blooms, because as conditions become favorable, multiple generations of polyps decide to mature.

Artwork by Bruce Mahalski

What they are composed of?



*Jellyfish are one of the most resilient animals in the ocean, but also one of the simplest. Their simple anatomy allows them to adapt to their environment extremely well. They lack a brain, heart, blood, and features that most other living creatures have and need to keep them alive. In fact, jellyfish are 95% water. they have protective layers that help them survive.

*Just like our skin that protects our bones and nerves, they have nerve nets that help them detect the light to know their surroundings and then respond to other stimuli in the area(such as other marine life).

Reason to why they move.

-Jellyfish usually do not live for very long. They could live up to 8-12 months if they are not in a suitable condition. There are several factors such as human interaction, competition, or habitat disturbances, which limits the size of their populations and sometimes causes them to move to areas outside of their normal range.

-If they like a new habitat the conditions of their life cycle also helps them survive through unfavorable conditions. Depending on the species, jellies can remain in their polyp stage - in which they are not free floating and reproduce asexually- for years. This allows the jelly to wait for perfect conditions to mature when conditions are suitable for large numbers of their species to spawn before moving onto their final adult form. It is this lack of complexity that makes them so resilient to environmental changes that would devastate the populations of other marine species. Jellyfish are able to adapt easily to even sudden and drastic changes in temperature, salinity, and acidity, and are able to survive in a wide range of habitats because of their indifference to light.



What are Jellyfish blooms?

Jellyfish are extremely good at identifying prime conditions for reproducing, and adapting to changing environmental conditions. As global warming and climate change continue to change the makeup of our global oceans, jellyfish are finding more and more areas that are ideal for them to eat, grow, and reproduce in staggering numbers.

Jellyfish blooms occur when large numbers of jellyfish find one of these prime habitats, and congregate to reproduce and create even more jellyfish. If they have an abundance of food and a suitable habitat, they can mature quickly and reproduce frequently.

Why are they increasing?

Natural cause or human cause?

They occur due the increasing global temperatures and human influence on the seas.

HUMANS

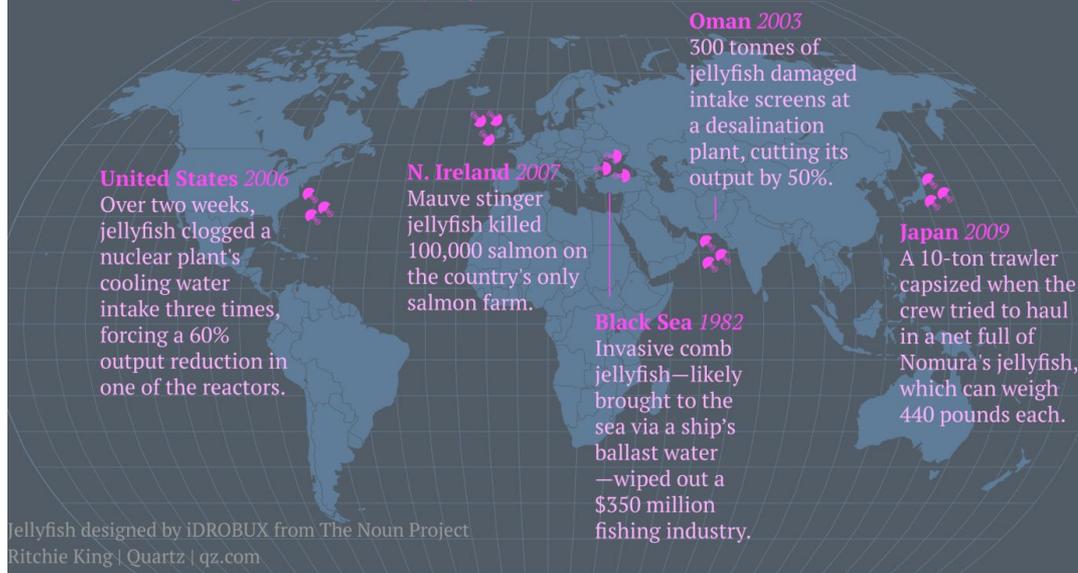
- Fishing down the food web
- Overharvesting of competition and predator species
- Nutrient run off fueling blooms

ENVIRONMENT

- Carbon Dioxide
- Rising Sea Surface Temperature
- Ocean acidification
- Less trophic competition

Lack of consensus

The human impact of major jellyfish blooms



“Whereas a robust apportioning of the variance between oscillations and the linear trend from 1970 to 2011 is not possible because of analytical limitations imposed by the nature of the data(...), results showed that the oscillation signal is much stronger than the linear trend.”



Lack of consensus

It is tempting to blame humans for the issue of jellyfish blooms, as it is true for so many other marine species, but some studies suggest that there is not enough evidence to make such a claim. One study published by the National Academy of Sciences conducted one of the first and only analyses of long-term jellyfish fluctuation trends, which concluded that one particularly strong fluctuation which happened during the 1990s is what captured the attention of the public and created the perception of “the rise of the jellyfish”. However, by comparing and analyzing population fluctuations over a longer scale spanning several decades, the authors found that while there is a slight linear increase in jellyfish populations, most of the short term increases that the public is seeing are the result of regular fluctuations that span every decade or so. Although there is limited data available to analyze, these authors confidently claim that although rising jellyfish populations are something that we may very well see in the coming decades and that we should be prepared for, it is not as dramatic of an increase as the public seems to believe.

The Consequences of jellyfish blooms

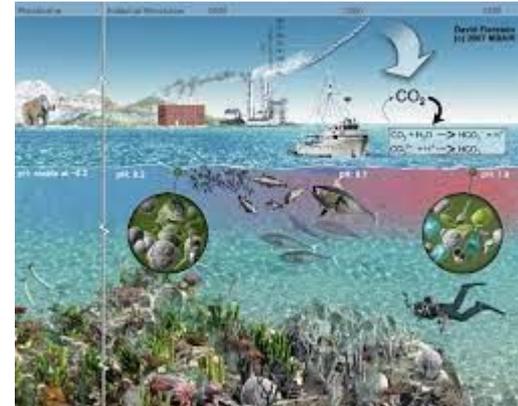
For humans: The humans have the aquaculture systems in place that are in open waters which is shared with the jellyfish habitat, so the jellyfish can flood into the fish farm and ruin the farm. The jellyfish can get into the nets and the equipment to run these fish farms.

For other animals: Most likely when the jellyfish takeover the area of the fish farm, they can take over the resources that was essentially for the fish species that the humans were producing. The jellyfish can take the resource of the oxygen and the food from the fish, which eventually leads the fish in the farm dying off and the baby fish don't have a place to grow, so they die off too.



Recommendations to solve the jellyfish bloom problem...

- Help the overall bicatch and aquaculture contamination and set up nets to keep the jellyfish out of the area.
- Regulate the amount of greenhouse gases that go into the atmosphere
- Or building commercial buildings in less acidic areas(they thrive in these areas.)





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