



The following letter was written as an invited response to a Zoom meeting held in late January 2024, during which unsupported statements regarding the scaling and fisheries co-benefits of ocean iron fertilization were challenged by Ken Buesseler.

This letter is being publicly shared to express the larger view that ExOIS supports more comprehensive field studies, and our caution against overstating the possible impacts of ocean iron fertilization at scale.

25 January 2024

Dear Peter Fiekowsky and Colleagues,

In a recent Zoom call, I made my points to your group that ExOIS and its members are opposed to conducting “low cost” field studies that are not scientifically rigorous. This is in the opposite direction as the foundational premise of ExOIS as laid out in our Paths Forward [report](#). Since written comments were encouraged, I will try to summarize the main reasons to oppose these plans.

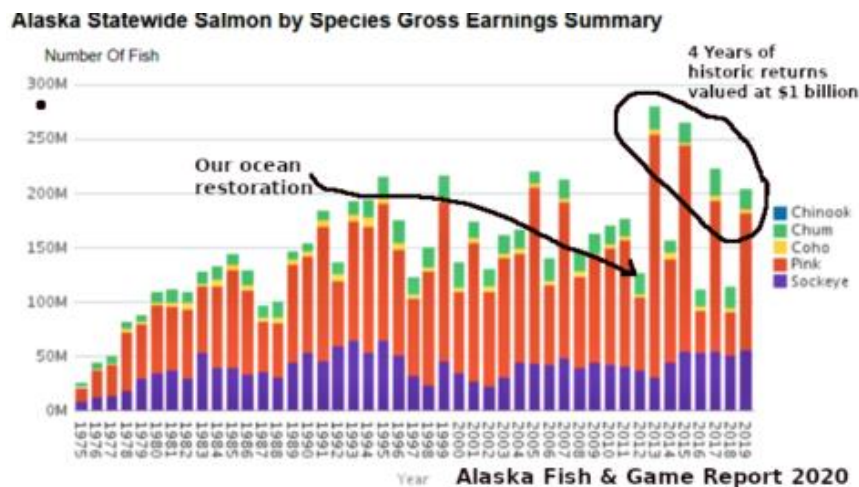
In short, this is [Haida Gwaii](#) all over again and a setback for rigorous consideration of marine carbon dioxide removal (mCDR) and ocean iron fertilization (OIF) as a possible climate solution. This simply can't be done with a small boat, a satellite image and a few measurements of CO₂ and unsupported claims of fisheries enhancement. As noted at the ExOIS forum, the 20 Gt scaling you suggest from Pinatubo is impossible to attribute to OIF. Combined, the fisheries and Pinatubo stories motivate the wrong thinking and lead to counterproductive demonstration efforts.

Let me address the “Pinatubo pause” first. There is no scientific evidence to suggest that the magnitude of carbon sequestration that you cite is correct or could come from ocean phytoplankton response to iron from volcanic ash. We reach this conclusion from a thorough understanding 13 prior mesoscale iron enrichment experiments, published studies of the scale of enhancement from other volcanic eruptions e.g. the Kasatoshii eruption off Alaska in 2008, and the inescapable fact that there are insufficient macro-nutrients in the surface waters of the ash impacted area to support 20 Gt of phytoplankton growth and durable C sequestration.

I contacted a colleague, Galen McKinley (Lamont-Doherty Earth Observatory), who recently published a [paper](#) on the effects of the Pinatubo eruption on global ocean air-sea CO₂ balances. Galen has long been studying CO₂ air-sea exchanges and her group finds a $\approx 0.3 \text{ Pg C / y}$ ($\approx 1 \text{ Gt CO}_2 / \text{y}$) anomalous input of CO₂ into the ocean for 1992, which presumably was associated with the Pinatubo event. This is 1/20 of the impact you have attributed to OIF from volcano ash. Furthermore, Galen and her colleagues conclude that most of the CO₂ sink was driven by stratospheric aerosols and physical effects on climate and oceans, and that iron fertilization is not required to explain what was observed.

That is just one such finding, and additional studies of Pinatubo and other more recent volcanic events do not support such a massive ocean iron response. You would need to present much more compelling evidence to sway scientific opinion. For example, after your recent Pinatubo pause presentation at an ExOIS forum, you were asked to support your claims that require a doubling of global ocean primary production. The marine scientists on that Zoom reminded you that there is no evidence to suggest that this could ever have happened.

As to the fisheries. The figure below is often shown by you and some others as evidence of fisheries enhancement after the 2012 Haida Gwaii iron addition.



I ran this figure by several University of Washington fisheries and salmon experts, and they did not reach the same conclusions. This figure doesn't show a fisheries response that can be attributed to the Haida dump (wrong timing for juvenile returns; why only Pink Salmon; why statewide fish returns impacted; etc.). The lack of a demonstrated fisheries response to OIF was my conclusion reading the literature around this, including other OIF studies/events, and that was reviewed and is reported in the 2021 National Academies [report](#).

Even if there was evidence suggesting a direct link between OIF and fisheries enhancement, studying fisheries impacts takes years of careful efforts – not the shorter “low cost” experiment that you are proposing. Aside from the scientifically tenuous linkage here, fisheries enhancement effects using OIF is a Red Herring because it counters mCDR; eating fish reduces the amount of durable carbon storage.

More fish and the single silver (I guess iron) bullet deploying OIF for mCDR to counter our entire fossil fuel emissions is a simple story we'd all like to believe, but it is not supported by facts. What we have learned over a decade ago, is that good things get shut down when bad things happen.

I recognize that we both are sincere in our wishes to address climate change to reduce human suffering and environmental loss. ExOIS is a group of international experts who are in favor of rigorous, transparent, [responsible](#) science to explore OIF for mCDR. We strongly encourage you to discontinue your planned field experiments and instead help us find support for more rigorous field studies that will build both the scientific foundation and regain the public trust that is essential for assessing OIF for mCDR.

Ken Buesseler

Executive Director - [ExOIS](#)