Good afternoon. My name is Henry Sharpe. I am the President of Frenchman Bay United, a coalition opposing the plan by American Aquafarms to use unproven, heavily polluting technology for the largest salmon farm in North America located just 2000 feet from Acadia National Park.

That project consisted of two lease applications, each with its own DEP MEPDES application. The two facilities would have discharged 4 billion gallons of untreated effluent (3x the *treated* effluent from the 14 municipal sewage treatment plants serving all of Manhattan). Each of the two facilities would have discharged nearly 1.2 tons of nitrogen (think fertilizer) per day.

The American Aquafarms project exposed some costs and risks that suggest some consideration going forward.

- After 30 years of heavy investments and pursuit of the practice, ocean-based salmon farming has been banned on North America's entire west coast. Argentina has banned the practice entirely. A month ago, Nova Scotia put a moratorium on all new applications for net pen salmon farming while it engages in a process estimated to take three years to evaluate suitable locations. And, in January 2023, Norway imposed a 40% resource use tax on any income derived from ocean-based, net pen farming. These bans, moratoriums, and taxes guarantee that Maine will be subject to huge financial pressures to develop the industry in territory that's closest to the world's largest market, the US. Since all these regions have heavily engaged in fin-fishing only to ban or reconsider the practice suggests that Maine (which has far less experience) has much to learn. The lessons learned from around the world suggest that the long-term costs and risks to the community as a whole outweigh any short-term benefits to investors seeking to profit by extracting our resources.

- One key provision of the Clean Air and Water Acts is the intent to produce zero discharge. Another key provision is that permitted projects must be reassessed every five years to use the "*best practicable*" technology in pursuit of producing zero discharge. For salmon farming specifically, and for finfish production in general, land-based facilities demonstrate proven technologies that produce no nutrient, chemical, pharmaceutical, pesticide, bacterial or viral discharges, no wild escapes, that can be renewably powered (instead of by diesel, among the dirtiest fossil fuels), and that withdraw groundwater once without taxing aquifers. Importantly, these land-based facilities can be located at the source of consumer demand, thereby eliminating the significant climate impact of transportation. That sets the standard of practice for use of the "*best practicable technology*" that should be required, and which therefore should ban ocean-based fin-fishing. As Maine considers fin-fish aquaculture, it should limit production to land-based production, and should consider not only ways to sell fish, but the technology needed to raise it sustainably on land.

- At 2.35 tons/day, the total nitrogen discharged by the American Aquafarms project – think fertilizer -- depending on the expert you believe, would have been equivalent to the nitrogen discharged by Maine's four to ten largest cities combined: So, at a minimum, more nitrogen than Portland, Lewiston, Bangor, and South Portland combined would produce, and perhaps, on the upper end, more nitrogen than Auburn, Biddeford, Sanford, Westbrook, and Augusta would also have added. All into a small bay that two independent oceanographic models say does not flush. The scale of this project, the speed, consequence, and multiple mechanisms for failures that could manifest despite efforts to monitor them, the unproven nature of the underlying technology, and the limited disclosure of financial capacity to avert harm were all not considered during the application process. That should change as we consider aquaculture in the future.

- American Aquafarms filed two separate MEPDES applications. Neither application disclosed that the other sister project would be discharging the same volume of untreated effluent just 2.2 miles away. Both in terms of the *proposed nitrogen load* (that's the load that would have been discharged), and the *permitted nitrogen loads* (that's the load that would supposedly use 20% of the remaining assimilative capacity), current DEP regulations make it legal to ignore combined impacts. These ignored combined impacts include not only discharges from multiple, but related MEPDES discharges as described, but also from other sources like discharges to air and water from diesel generators, or from ship and truck traffic, or from fish processing facilities that might be part of the same large project, or from other unrelated, perhaps existing projects in the area. Additionally, DEP regulations currently have no way to evaluate the carrying capacity of an estuarine water body. If we want to assure the abundance of our marine habitats needed to support the Public Trust vested in our regulatory agencies, understanding both combined impacts, and overall carrying capacity is essential.

- To detail one aspect of this idea a bit further, the DEP's permitting process didn't consider the potential adverse impacts from transporting, storing, and burning the proposed 80,000 gallons of diesel fuel that would have been required every 7-10 days to generate the power needed to pump water for the American Aquafarms project. Although a so-called "new minor source" permit may have been required for generator's air emissions, emissions into the water from this activity were not considered. Once again, current regulations provide no way to consider the combined, cumulative impacts of these air and water emissions in the scope of the whole project.

- In both MEPDES applications, American Aquafarms assumed that fresh, unpolluted water would continually move across the lease sites to transport waste away as it would in a river-based flow system. This is a flawed assumption that yields erroneous results. Why? Because the proposed discharges are in a coastal estuary where currents don't simply flow downstream. Instead, they are driven by complex, time-varying tidal flows, and by fresh and saltwater density gradients that produce recirculating current gyres. Instead of flushing, these recirculating current gyres act to both concentrate waste, and transport it further inland to higher, more sensitive embayments where it then threatens sensitive eelgrass populations in nursery habitat areas where nitrogen concentrations are already near, and in some cases, already exceeding maximum limits. In summary, conventional methods used by the DEP for estimating and regulating far-field dilution that were appropriate for river-based flows are inadequate for understanding the temporal and spatial distribution of nutrients in coastal, estuarine environments.

- Modeling and analysis by American Aquafarms' water quality consultant was limited to 2D Cormix software simulations. They acknowledged that this tool only provided a 15 second planar snapshot of nutrient mixing and that it provides virtually no 3D insight into either the temporal or spatial distribution of effluent across the bay. Modern, 4D (space and time) hydrodynamic modeling tools are available that are cost-effective, well-tested, widely recognized across the industry, and open-sourced. They are used in many regions but are not required in Maine. If employed, they provide insight into the cumulative impacts of not only individual, but multiple projects producing chemical and or nutrient discharges. My former colleague Chris Kincaid, from the University of Rhode Island's Graduate School of Oceanography and I used the Regional Ocean Modelling System (ROMS) to definitively demonstrate that discharges from the American Aquafarms project would not flush from the bay. 4D modeling tools like ROMS should be a prerequisite for any Maine MEPDES application in tidal estuaries.

- The DEP currently uses two nutrient concentration thresholds to determine a parameter called the remaining assimilative capacity that forms the basic criteria evaluated in MEPDES applications: the less-stringent "*total nitrogen threshold*" of (0.32 mg/L), and the more-stringent "*eelgrass nitrogen threshold*" (0.45mg/L) that applies when discharges are in proximity to eelgrass populations. Our hydrodynamic modeling in both Frenchman's Bay and other locations suggests that in tidal estuaries like the sites proposed by the American Aquafarms project, nutrients are transported away from discharge sites to areas that are higher in bays and further inland. When the initial discharge occurs in areas without eelgrass, the less stringent "total nitrogen" threshold is applied. However, because data suggests that nutrients are frequently transported from the original discharge sites to more sensitive eelgrass areas before they can be consumed by biological activity, we therefore recommend elimination of the less stringent, (0.32 mg/L) non-eelgrass total nitrogen threshold, so that only the more stringent (0.45 mg/L) eelgrass nitrogen threshold is used to calculate remaining assimilative capacity.

- As our climate becomes warmer and wetter, nitrogen delivered into tidal estuaries from both land-based freshwater sources, and from deep ocean currents that intrude into all of Maine's bays are anticipated to rise significantly. This will exacerbate the algal blooms and eutrophication that we've already seen increasing along our coastlines. In the short term, we won't be able to control those sources so we should limit the nutrient discharges from sources like aquafarms and sewage treatment plants that we can control. MA, RI, CT, and NY have protected their waters from algal blooms and eutrophication by requiring removal of nitrogen from municipal sewage discharges. We should do the same.