

Title: **Hooker's Sea Lion Bycatch in New Zealand**

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Abstract: With a value of NZ\$ 85 million the seasonal squid fishery represents one of New Zealand's main export earners. The majority of catch is taken by trawl from the Auckland Islands, 350 km south of New Zealand, which coincides with the main breeding and foraging range of the rare Hooker's sea lion. Currently the government constrains the incidental capture of sea lions by closing the seasonal fishery once a specified number of sea lion deaths is reached. This results not only in significant financial losses but also provides an incentive to fishermen to circumvent regulation, i.e. the calculated number of sea lion deaths is based on an estimated mortality rate per standard unit of effort but recently trawl vessels are observed to expand the capacity of such a standard unit. This paper formalises the current situation analytically by constructing a bioeconomic model that captures the idiosyncracies of the squid fishery and the imposed regulation. By reducing the regulatory constraint to a simple isoperimetric problem I am able to show analytically how the current management regime leaves fishermen with no avenue other than to increase the capacity of a standard unit of effort in order to increase profits. I suggest an alternative management approach where the government may place a fee on each unit of effort as a function of the radial distance to the Auckland Islands. By internalising sea lion bycatch as a space-dependent cost whilst still retaining the regulatory mortality limit, the incentive for fishermen to increase profits is redirected to the choice of distance from the sea lions breeding grounds.