

ABSTRACT

**Bioeconomics of an Exotic Plant that Invades Rangelands: Hound's Tongue
(*Cynoglossum officinale*) and Livestock Production in British Columbia**

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Hound's tongue (*Cynoglossum officinale*) is an exotic plant that invades rangelands in British Columbia and creates a social welfare loss to ranchers as a result of declining rangeland productivity. In addition to diminishing grazing profitability, hound's tongue releases "burrs" that infest cattle and reduce their market value. Invasion and dispersal of hound's tongue is a dynamic process that is conditioned by the habitat and biogeoclimatic conditions in the host rangelands. However, if these areas are subject to climate change then there is an added dynamic dimension. Our research involves modeling the interaction between seasonally grazing cattle and the invasion of the grazing area by hound's tongue within an environment subject to climate change, to determine the true welfare loss from the invasion and to inform management and control of the invader. We assume that a representative rancher maximizes profit in each grazing season, subject to the growth of hound's tongue on their rangeland. The management problem involves deciding on the optimal allocation of seasonal labour to control hound's tongue and supplementary feeding to replace lost productivity. With respect to control of the "burrs" from hound's tongue, ranchers indicate that they consider three options, of which cleaning infested animals seems to be the best option for ranchers who maximize profit. At the present time, we are concentrating on developing a bio-economic model to capture these relationships and deriving the relevant steady state solutions, e.g. optimal allocation of labour for control of hound's tongue, optimal supplementary feeding and the optimal area of infested land. As a next step, this model will be used to obtain estimates of the change in the producers' surplus (profits) of a representative rancher due to an invasion by hound's tongue when the invasion process is influenced by climate change.
