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# OPEN ACCESS FISHERIES MODELS CONSIDERING DEPENDSATORY GROWTH FUNCTIONS IN THE EXPLOITED RESOURCE

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## ABSTRACT

In this work we study two classes of continuous-time deterministic bioeconomic models that represent the exploitation of a resource in an open-access fishery, assuming that:

- i) The population growth of the exploited biomass is affected by the phenomenon called *depensation* or *Allee effect* [1].
- ii) The resource harvesting function is based on the Schaefer hypothesis, that is, the catch per unit effort (CPUE) is proportional to the biomass.
- iii) Fishing effort varies continuously over time as does population size as postulated in Smith's bioeconomic model [2].

Besides, in the first model, we will use the *Pella and Tomlinson growth function* [3] an asymmetric curve describing the exploited biomass growth.

A modification of the Smith model is considered, where the exploited resource is affected by depensation or the Allee effect. We will describe this effect with two different growth functions, obtaining that autonomous bidimensional ordinary differential systems represent the models.

We conjecture the dynamical behavior of the models to be analyzed has marked differences, particularly on the number of limit cycles surrounding a positive equilibrium point.

**Keywords** Bioeconomic model · depensation · CPUE · stability · limit cycles

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