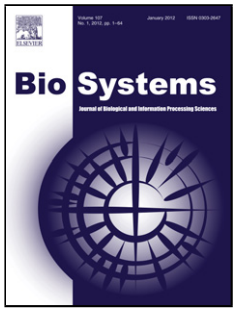

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PII: S0303-2647(17)30093-X
DOI: https://doi.org/doi:10.1016/j.biosystems.2018.05.005
Reference: BIO 3849

To appear in: *BioSystems*

Received date: 9-3-2017
Revised date: 20-6-2017
Accepted date: 25-5-2018

Please cite this article as: Xinxin Liu, Qingdao Huang, The dynamics of a harvested predator-prey system with Holling type IV functional response, *<![CDATA[BioSystems]]>* (2018), https://doi.org/10.1016/j.biosystems.2018.05.005

The dynamics of a harvested predator-prey system with Holling type IV functional response

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Abstract

The paper aims to investigate the dynamical behavior of a predator-prey system with Holling type IV functional response in which both the species are subject to capturing. We mainly consider how the harvesting affects equilibria, stability, limit cycles and bifurcations in this system. **We adopt the method of qualitative and quantitative analysis, which is based on the dynamical theory, bifurcation theory and numerical simulation**. The boundedness of solutions, the existence and stability of equilibrium points of the system are further studied. Based on the Sotomayor's theorem, the existence of transcritical bifurcation and saddle-node bifurcation are derived. **We use the normal form theorem to analyze the Hopf bifurcation**. Simulation results show that the first Lyapunov coefficient is negative and a stable limit cycle may bifurcate. Numerical simulations are performed to make analytical studies more complete. This work illustrates that using the harvesting effort as control parameter can change the behaviors of the system, which may be useful for the biological management.

Keywords: predator-prey, Holling type IV, harvesting, bifurcations

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