

Course > Section... > 1.1 Intr... > 1.1.0 In...

1.1.0 Introduction

☐ Bookmark this page

In this section, we'll explore how dramatic outbreaks in a population can be the result of a bifurcation. John Wesley (Wes) Cain, a bio-mathematician, shows how increasing the carrying capacity of the spruce budworm species can cause a bifurcation which results in an outbreak of the population and serious deforestation.

In this section, you will:

- Build a differential model of the spruce budworm population to capture the effect of predation and carrying capacity;
- Use graphical representations of differential equations to determine the equilibrium solutions and the long-term behavior of the budworm population for different carrying capacities;
- Determine the **bifurcation** and critical value of the carrying capacity which corresponds to outbreaks of budworms.

Note: The model in this section and its analysis are based on the following paper: Qualitative Analysis of Insect Outbreak Systems: The Spruce Budworm and Forest by D. Ludwig; D. D. Jones, C. S. Holling in **The Journal** of Animal Ecology, Vol. 47, No. 1. (Feb., 1978), pp. 315-332.



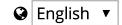


For this section, you'll need to have completed Section 5: Population Dynamics I, and Section 7: Bifurcation I.

Learn About Verified Certificates

© All Rights Reserved





© 2012–2018 edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open edX logos are registered trademarks or trademarks of edX Inc. | 粤ICP备17044299号-2















