Adaptive Management of Uncertainty in Bioeconomic Models of Evolution

Research emphasis:

Dr. Brown's research focuses on bioeconomics with an emphasis on analyzing the social and economic implications of evolutionary dynamics. He uses dynamic economic optimization techniques (optimal control and dynamic programming) applied to biomathematical models of resistance evolution and gene drive spread. Given significant uncertainty about the biological parameters involved in the underlying biomathematical models, Dr. Brown has a particular interest in assessing the ‘value of information’ and adaptive management of reduced parameter (and model) uncertainty.

Application:

- Optimal control of insecticide resistance, e.g. in malaria vectors, agricultural insect pests.
- Estimating the value of information from reduced parameter uncertainty in the evolutionary models of insecticide resistance.
- Adaptive management of resistance to Bt toxins with uncertain evolutionary fitness costs of resistance.
- Economic analysis of biomathematical models of malaria transmission.

Collaboration potential:

- Adaptive management of resistance (e.g. pesticide resistance, antibiotic and drug resistance).
- Economic optimization and control of biomathematical models (e.g. gene drives, Wolbachia).

Selected publications:


Z.S. Brown. Estimating Pigovian subsidies for household participation in mosquito control programs to prevent malaria [working paper].