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Article Abstract: A variety of growth curves have been developed to model both unpredated, intraspecific population dynamics and more general biological growth. Most successful predictive models are shown to be based on extended forms of the classical Verhulst logistic growth equation. We further review and compare several such models and calculate and investigate properties of interest for these. We also identify and detail several previously unreported associated limitations and restrictions.

A generalized form of the logistic growth curve is introduced which is shown incorporate these models as special cases. The reported limitations of the generic growth model are shown to be addressed by this new model and similarities between this and the extended growth curves are identified. Several of its properties are also presented. We furthermore show that additional growth characteristics are accommodated by this new model, enabling previously unsupported, untypical population dynamics to be modelled by judicious choice of model parameter values alone.

The paper presents an historical development of the logistic equation in its various forms, including Verhulst, Pearl and Reed, Gompertz, Bertalanffy, Richards, and others. For each type of equation there is a section on analysis to include broad general behaviors and qualitative discussions. The issues usually are around the variations and justifications as well as resulting analyses for different functional response terms, *f*(*N*), in the general logistic equation: $N(t) = rN(t)f(N(t))$.

A number of graphics are offered to display concepts in terms of different parameters.