Three Computer Simulation Games for the Instruction of Population Dynamics

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Computer simulated gaming has been suggested by several scientists as a training device for students of resource management (Paulik 1969; Schreck and Everhart 1973; Titlow and Lackey 1974). Through this type of interaction, students begin to appreciate concepts upon which management strategies are based. We have developed three games—TUNA, SALMON, and PLAICE—that simulate the dynamics of Eastern Pacific tropical tuna, Skeena River sockeye salmon, and North Sea plaice. The games are based upon Schaefer's (1954) surplus yield model, Ricker's (1958) spawner-recruit model, and Beverton and Holt's (1957) dynamic pool model, respectively. Economic data for the models were taken from the National Marine Fisheries Service's Statistical Digest series. The primary objective of the games is to place the student in a situation where decisions governing the exploitation of a fishery are made in a realistic setting. Cultural factors influencing management decisions have been incorporated into the games in order to expose the student to the multiplicity of interactions that influence fisheries policy. However, we consciously decided to give only a flavor of the real world so that the students would base most of their decisions upon biological factors. Students are encouraged to test the sensitivity of the population's dynamics to different factors in the game by varying one component while holding others constant. By doing so, the students learn more about the assumptions upon which the models are based.

Students enter into the game in a realistically blind situation; that is, the student has to decide upon a management strategy. Students can learn how to optimize exploitation empirically, but soon realize that understanding the theoretical model increases their efficiency. Each game iterates a given number of times the length of the resource manager's contract. At the end of the game, data are also presented in graphical form. The student receives additional feedback in forms of "memos" and "directives" from "superiors." We have found that time-share games eliminate or reduce the frustrations of the punch card or batch approach. Extensive background in computers or computer languages is unnecessary to play these games.

The games are written in BASIC and FORTRAN IV. Complete listings, documentation, and additional information are available from the authors.

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