

A Simple Model for the Simultaneous Management of Seabird Populations and Discards at Sea

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Abstract

In the past decade the numbers of seabirds worldwide have increased. This has been widely attributed to the increased availability of discards from fishing vessels. As a result, seabirds have over the years learned to depend on this enormous food supply as a major source of food. However, discards are viewed as a loss of potential food for man. In addition, the practice of discarding at sea may in the long-term lead to the loss of marine biodiversity. Coastal managers seek to promote the wise and sustainable use of coastal resources such as fish and seabirds. Because a growing tourist trade depends on seabird sightings, suggestions of reducing the amount of discard raise fears that seabird populations will be adversely affected. The dilemma is how to reduce discards and maintain reasonable sizes of seabird populations. A simple compartment model was developed to track changes in size of tern population through time. Processes modeled include birth, death, immigration and emigration of terns. The model is found to be useful in determining levels of discards that maintain tern populations, and months within a year that discard levels could be reduced without adversely affecting tern population. It is found that a reduction in discards from 75% of catch to 45% of catch between October and December of each year will not adversely reduce tern population size.

Introduction

The past decade has witnessed tremendous increases in the numbers of seabirds worldwide. The success of seabirds has been attributed to the increased availability of discards ('that amount of gross catch that is not directly utilized by man but thrown back into the sea as whole organism' – Saila, 1983) from trawlers at sea. Commercial fishery discards in the North Sea is believed to support an estimated 5.9 million of seabird community (Garthe, Camphuysen & Furness, 1996). Also, Ghanaian ships discard about 75% by weight of their catch at sea, a proportion of which is consumed by seabirds including Common tern, *Sterna hirundo* and Sandwich tern, *Sterna sandvicensis* (Nunoo, 1997). As a result of this discarding practice, seabirds have, over the years, learned to depend on this enormous food supply as a major source of

food to sustain increasing populations (Furness, 1982). It is, therefore, not surprising that interest in bird watching has increased, giving a boost to tourism in many coastal nations including Ghana.

Simultaneously, the past decade has seen an upsurge in global concern about the loss to man of a vast potential of valuable food through discarding at sea by trawlers (Andrew & Pepperell, 1992; FAO, 1999). By-catch and subsequent discards inevitably occur in fisheries because most fishing gears and practices are not perfectly selective for the species and sizes targeted and because target species exist in habitats occupied by a wide range of other species. Between 50-90% of the catch by weight of shrimps are discarded at sea worldwide (Alverson *et. al.*, 1994).

FAO (1999) believe that a reduction of post-harvest losses including discards at sea