COMMENTARY

Toward a World Strategy for Seabird Sanctuaries

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Abstract.—The long-term conservation of seabirds requires that we identify and protect globally significant seabird breeding and foraging sites. This paper proposes a revised classification of seabird breeding sites that distinguishes between significance at the national, regional, and international levels. It also discusses the information required for such classification and examines possible means of acquiring and ensuring the protection of such sites as sanctuaries. *Received 5 July 1994, accepted 3 October, 1994.*

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Perhaps more than any other group of organisms, seabirds are truly international. Few seabird species are confined to the boundaries of a single nation; the majority may breed in one country, winter in another, and migrate through still others. Several seabirds spend much of the year in international waters. In addition, many seabird problems extend beyond country boundaries. Oil tanker disasters in international waters, overfishing of open-ocean or migratory fish stocks, and the spread of pollutants are global problems. To manage seabirds, we must address their problems at appropriate scales, including those beyond national boundaries. This paper brings together developments from different fields such as marine ornithology, information science, and international law which could be used to develop an international effort to ensure the long-term protection of important seabird sites as seabird sanctuaries (areas where seabirds can nest, rest or forage with minimal disturbance by humans).

While important seabird sites already tend to be effectively protected in developed nations, this is not the case in many developing nations. Failure to protect sites in developing countries may render efforts elsewhere futile. Objective standards are needed that identify a site as critical to certain species as well as worth establishing and maintaining as a sanctuary for seabirds. To achieve this, three actions are necessary: 1) identification of critical sites for seabirds; 2) provision of protected status for these sites; and 3) continued protection and management of the sanctuaries once established.

IDENTIFICATION OF CRITICAL SITES

The majority of existing seabird sanctuaries were probably created for reasons other than seabird protection, as the presence of seabirds and other wildlife is but one of numerous criteria for establishment of protected areas (e.g., Ledec and Goodland 1988). Location within a protected area may then not ensure protection, if the site is managed for other objectives or if resources are unavailable for protection. Such vulnerable seabird colonies need to be identified.

Other seabird colonies may coexist with government activities, without enjoying for-

mal protection. A great number of seabird colonies are on private lands, uninhabited islands, or economically marginal habitats such as cliffs. Should these lands become useful for humans in the future, the seabirds would enjoy little or no protection. Such sites need to be protected now, while they are still 'worthless', rather than when development threatens.

Given limited resources, we need some form of ranking of sites so that resources can be used where they will do the most good. To identify critical sites, we need accurate information on seabird distributions and numbers, and we need selection criteria. Both have to function at appropriate scales. We have to be able to determine the importance of a particular site at national, regional, and international scales to determine the level of protection needed. For example, a site may represent 90% of the population of a seabird within a country, so the site is worth national designation as a sanctuary; however, the 90% may represent but a trivial part of the global population of the same species, so that international designation as a sanctuary and dedication of international resources to its protection are not justified.

Information Needs

Information on populations of seabirds and their breeding sites is available for many regions (Cramp *et al.* 1974, Erwin and Dorschgen 1979, Croxall *et al.* 1984, Croxall 1991, and Lloyd *et al.* 1991), but surveys vary greatly in their methodology and detail of coverage. We also have extensive information on concentrations of birds at sea (Brown *et al.* 1975, Powers 1983, Anonymous 1985, Tasker *et al.* 1990, Webb *et al.* 1990, and Woehler *et al.* 1990), but for many other areas, investigations are only just beginning or are too limited to be useful.

We will need much more complete coverage, but to achieve this we need a change in how we store and use data on seabird populations. We also need to be able to assess populations across different geographic scales, from the individual colony level, through regional populations, all the way to global populations. Finally, we should be able to share and exchange data as rapidly as possible, rather than the process taking months or even years.

Because of advances in computer hardware and electronic communications such as the Internet, I believe that we can meet the need for change. Until recently, we had only used printed atlases of seabirds' breeding sites. These are obsolete the day they are printed, as they cannot be updated. Previous electronic data sets have been expensive to prepare and have usually been nearly inaccessible on mainframe computers once created, which discourages further contributions of data (Engstrom 1990). Such data archives could rarely be mapped, except as crude latitude and longitude coordinates because computer programs for mapping were expensive and difficult to use.

However, there now exist inexpensive computer programs that can store and retrieve massive spatial-information data sets on inexpensive computers, presenting census data graphically on navigation charts or coastal maps (Folse *et al.* 1990). Other programs can also call up life history data and integrate them into the census data (e.g., NOAA 1991). For example, the NOAA model for the North Pacific can plot the distribution of single species, all alcids, all diving-bird colonies, or look for all colonies larger than 10% for an individual species.

Once seabird data sets are created, they can then either be stored on ROM (Read Only Memory) discs or made available over electronic networks such as the Internet so that they could be consulted or updated by many workers simultaneously. Imagine how much more our studies would achieve if we could follow such important events as El Niño (ENSO) or regional breeding failures of seabirds on regional maps, as they happen, or if we could call up the breeding ranges of different seabirds for the last several decades and compare them with the distribution of pollutants or introduced animals on nesting islands.

Some computer information systems produce digitized copies of aerial or other photographs of the colonies. For example, the

spatial analysis computer programs known as Geographic Information Systems (Folse *et al.* 1990) can compare seabird maps with others showing such features as seabird food supplies, distribution of feral mammals, oil developments, marine mammal pupping zones, and marine turtle nesting beaches, to identify biologically important and vulnerable areas for seabirds. In addition, with metapopulation computer models that examine the consequences of populations divided into colonies of variable sizes and life history characteristics (Buckley and Downer 1992), we can manipulate existing data sets and models to look at such things as the consequences for an overall population of losing a colony to an oil spill or to development, or of cutting nesting productivity in half because of competition with the fishing industry. In time, these models can be used for management (e.g., Loh and Rykiel 1992), such as determining the ranking of seabird colonies discussed above.

It is probably unrealistic, given human nature, variation in species' ecologies, and the research histories of different areas, to expect regions or governments to converge on a standard means of gathering or storing information on seabird breeding sites, although there have been some encouraging exceptions (e.g., Anonymous 1969, Nettleship 1976). Nevertheless, seabird conservationists of the near future, including ourselves, would benefit if we could achieve some lowest common denominator of data gathering and storage. Minimally, any data set should list the latitude/longitude, local geographic name, names of census takers, date, census methods, nesting stages (nest building, eggs, young), and breeding populations (in pairs to the nearest level of precision) for each species of seabird.

Criteria for Critical Sites

Based on earlier work by Atkinson-Willes (1976), Lloyd (1984) suggested using a one-percent rule to identify seabird colony sites that merit protection: a colony would be significant for conservation at the national, regional, or international level if it contained at least one percent of the population of a seabird species at the appropriate scale. These criteria were adopted by the European Economic Community, which mandated that areas with more than one percent of the community's seabirds be designated as Special Protection Areas (Tasker *et al.* 1990).

At a world level, with 283 species of seabirds (Croxall *et al.* 1984), a one-percent criterion could theoretically involve up to 28,300 sites, although in reality there would be much overlap, as many colony sites would be significant for more than one species and many species are concentrated into a relatively few breeding sites. Still, in such a system, we might be dealing with as many as 10,000 potential areas in need of protection.

From a practical point of view, at present we lack the ability to monitor so many sites except along the shores of a few of the richer nations. Even then, changes in budgets and political priorities make it unlikely that such monitoring will extend over long periods. Politically, such a large number of sites would make it difficult to defend single sites from development.

I suggest a formal system of designation of sites that should receive national, regional or international protection, based on 10% of the relevant populations. This level is essentially arbitrary, but it represents a tradeoff between need and available information and conservation resources.

World Seabird Sites: 10% or more of the known breeding population of a single species.

Regional Seabird Sites: 10% or more of the known breeding population of a single species in a particular region (e.g., eastern North Atlantic; Mediterranean; north-eastern Pacific).

National Seabird Sites: 10% or more of the known breeding population of a single species in a particular nation.

The documentation needed for regional and international sites should be much more extensive than for national sites. National designations could, for example, be made from working lists of sites and could be updated as more information becomes available or as populations change. However,

designation as an international site should be based on clear evidence that the site is of consistent importance to at least one seabird species.

National and Regional Seabird sites should be designated by national and regional seabird groups respectively, working in conjunction with, but independently of, government agencies and non-governmental conservation groups. International Seabird Sites would be proposed by national and regional seabird groups and confirmed by a committee appointed from members of the Bird Life International Seabird Specialist Group and/or the Standing Committee on Seabird Research of the International Ornithological Congress.

OBTAINING PROTECTED STATUS FOR SITES

Acquisition of sites to be protected usually must come through the political process: identifying a site as important, building a constituency for it, and gathering the resources for its acquisition and preservation. While regional or international efforts may identify a site as important, most of the politics of acquisition are local, at the governmental level having jurisdiction over the land. Even the best list of seabird sites is ultimately useless unless the importance of these sites is known to local conservationists. Unfortunately, with a few exceptions (e.g, Blanchard and Nettleship 1992), public education concerning seabirds receives relatively little attention from seabird researchers, even though it may ultimately be the most important thing that we can do.

While the 'traditional' form of creating a seabird sanctuary is to have a government declare the area a park or reserve, there are other approaches. Local conservation groups can acquire the land or rights to the land, as has happened so successfully in Britain with the Royal Society for the Protection of Birds, and in the United States with the Nature Conservancy. Conservation groups could acquire easements or even buy the egging or exploitation rights to a colony from a local town or land-owner, to compensate for any local economic losses caused by protecting the colony.

Internationally, there are a number of uninhabited islands whose sovereignty is disputed. Since the dispute usually centers on the 200-mile fishing zones around such islands, rather than on the islands themselves, the nations involved might be convinced to allow these islands to be designated as seabird sanctuaries, administered in trust by a single nation or by the United Nations (Harrison *et al.* 1992). Similarly, major foraging areas in international waters, such as the Pacific Convergence Zone (Ashmole and Ashmole 1967) could be declared marine reserves, with human activity in respect to seabirds and their food resources regulated by all nations under the authority of the United Nations (Duffy and Nettleship 1992).

Even if an area cannot be declared a legal seabird sanctuary, it can still be protected as a sensitive zone on national development maps or on navigation charts under Law of the Sea Article 211.6 (c) and International Maritime Organization Resolution A 720 (17) of 1991 (Duffy 1994).

ENSURING PROTECTION OF CRITICAL SITES

It is not always enough to acquire seabird sites and to designate them as sanctuaries; inevitably some must be managed. Human disturbance must be limited, feral animals controlled or removed, and seabird populations monitored to detect problems (Nettleship *et al.* 1994). Additionally, if sanctuaries are to continue decades or even centuries into the future, there must exist at the national and international level constraints that prevent governments from closing sanctuaries and that will ensure some minimal level of resources necessary to protect the areas from incompatible land or marine uses (Silva and DeSilvestre 1986).

At the local and national level, education of those who pay for the sanctuaries is essential if they are to continue to bear the costs. Controlled disturbances to a breeding colony may be a price well paid if they expose school children, taxpayers, or local opinion-makers to the seabirds, or if they generate sufficient local income to establish a vested interest in the colony's continued well-being

(Boo 1990). An isolated, very protected colony may have no political supporters because it simply doesn't exist for anyone except a few biologists.

Even with the best of political intentions, management and conservation of seabird populations in many nations can be difficult because these are usually lower priorities than other government activities such as public health, food production, and industrial development. Seabird conservationists in many nations labor under extraordinary conditions of low pay, lack of resources and funds for operations, as well as lack of access to the scientific and management literature (Cooley and Golley 1990).

Regional and international conservation and seabird groups can perhaps make their greatest contributions by undertaking the long-term building of scientific and managerial infrastructures, such as libraries, scientific societies, and computers, in nations with significant seabird sites. This aid could consist of collaborative projects, exchange visits, donation or exchange of field equipment, computers, and scientific literature, and training of graduate students (Duffy 1989).

Internationally, designation of a park as a World Heritage Site or Man and Biosphere Reserve or as a wetland of international importance under the Ramsar Treaty places a government under an obligation to maintain and protect it. Bilateral or multilateral treaties such as those protecting migratory birds may also place nations under constraint concerning management of seabird reserves. The Law of the Sea Convention (Articles 194 [5] and 119 [1][b]) "requires fishing nations to 'protect and preserve' the habitat of endangered species and to consider the effects of fishing on species 'associated with or dependent on harvested species'" (Harrison *et al.* 1992). International treaties on oil and plastic pollution may also regulate national actions at sanctuaries. Finally, the European Economic Community Directive on the Conservation of Wild Birds of 1979 provides special status and protection for many seabird sites. Seabird conservationists need to bring these international agreements to the attention of their national and local governments and press for their observance. Ultimately, seabird and conservation groups should seek protection of such sites through an international seabird convention, much like the Ramsar Treaty protects wetlands of international importance.

DISCUSSION

This proposal to systematically identify and to protect important seabird areas has several shortcomings. First, it does not provide a way to impartially assess seabird foraging areas at sea, or wintering grounds along coasts. Both these might be approached by comparisons of counts of birds in such areas with the known totals of breeding birds. This would require systematic surveys of wintering and feeding areas using standardized methods of data collection. Numbers of feeding seabirds vary seasonally and at shorter time-intervals than do counts of breeding birds (Hunt and Schneider 1987), so many more surveys would be necessary to locate and assess the importance of such areas. We may find that we can never identity such feeding sites as clearly as we can the terrestrial ones, so criteria different from the 10% rule may prove more useful, such as probability of occurrence of a certain number of birds per visit.

This approach does not address the issue of seabird biodiversity but focuses on single species. For example, a potential sanctuary might have a great diversity of seabird species but only small numbers of each, so it would not be protected under this system. This has advantages and disadvantages. Sanctuaries are likely to attract tourists and birders, because many species can be seen in a small area, so that it is easier to justify the costs of their conservation. On the other hand, the smaller populations may be highly variable over time and susceptible to single natural disasters, so that the long-term viability of the colony would be decreased.

This system of international designations may not function well for species that nest only in small, dispersed colonies, none of which reaches 10% of the population. On the other hand, the very number of nesting

sites of such species would make them difficult to protect in the first place and the dispersed nature of the population might make them less vulnerable to single massive disasters.

Finally, there is the question of who will identify, acquire, protect and manage seabird sites. Governments, at least in the northern hemisphere, have the resources to manage sanctuaries, but we must wonder if political realities will allow them to monitor seabirds over decades or beyond their national borders, or to withstand political pressures to use sanctuaries for other purposes in the future.

Regional seabird groups have the personnel and the expertise to monitor seabird populations, but so far have undertaken few concerted actions at the appropriate scales of time and space. Resources for such efforts will always be limited, but many long-term monitoring efforts should require little in the way of resources beyond the time and effort volunteered to carry them out. Equally, most groups have not really begun the slow process of 'selling' seabirds to the public. Perhaps, as a consequence, local and international conservation groups that rely on public support have too often tended to ignore seabirds and other marine organisms except for the more 'charismatic' whales, seals, and seaturtles.

We hear much about the deforestation of the Amazon, but relatively little about the systematic and often more-advanced destruction of most of our planet's marine ecosystems through overfishing, pollution, and loss of island and estuarine ecosystems. We clearly need to change this. Such change can best come through a concerted campaign for seabird conservation, rather than a string of *ad hoc* actions.

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