
Afterwards: an agenda for managing seabirds and islands

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Nature's instructions are always slow, those of men are generally premature
J.-J. Rousseau, 1762

WITH the completion of this workshop on seabirds and island management and the publication of two previous technical reports on the status and conservation of seabirds (Croxall *et al.* 1984, Croxall 1991), we have a fairly complete *ad hoc* agenda for what we need to do now to conserve the world's seabirds. In these three volumes we have 70 chapters on particular seabird species, regions or island groups and 11 chapters on threats and solutions. I would like to use this chapter to try to provide an overview.

THE FUTURE FOR SEABIRD CONSERVATION

How do we know what to manage for?

Should we in fact use our skills to manage seabirds and island ecosystems? Haven't humans done enough damage? Should we rather not protect seabirds and islands from further outside influences and leave them alone to evolve or to exist?

I believe that it is too late for this latter option for any but perhaps the polar regions and a few of the most isolated of islands, such as Fernandina in the Galapagos Islands, Inaccessible in the South Atlantic, and Prince Edward in the southern Indian Ocean. Certainly these few pristine islands should be protected from intrusion with every resource possible. Elsewhere, significant seabird sites must be protected from further degradation.

For most seabird sites, the feral animals and diseases have already come ashore, the forests or other resources have already been exploited, and we humans are resident or have left our mark. The eco-

systems have been changed and events have been set in train that continue to the present day. I believe that we have a responsibility to deal with the problems we have unleashed.

Unfortunately, this is not easy. In most cases, we have little idea of how the original ecosystems functioned. The first European visitors may have noted a few birds or mammals, or the occurrence of grasslands and forests, but we have absolutely no idea of the 'nuts and bolts' of the original ecology of New Zealand, Madeira, Hawaii, or anywhere else (Crosby 1986). We cannot put the Humpty Dumpty of an island ecosystem back together because we don't know what the original Humpty looked like, nor do we have all the pieces.

In the absence of such information, we cannot really restore island ecosystems, yet we cannot leave them alone. We are left to make value judgements as to how the ecosystem should be 'improved'. Unfortunately, this is exactly what caused the problem in the first place, as our predecessors unleashed mongoose to control rats, introduced goats for food, and literally rearranged whole ecosystems for their convenience (Crosby 1986).

We might hope to avoid the disasters of our predecessors by managing not for ourselves or for any one species, but rather for the ecosystem or the landscape (Leopold 1949) or for the goal of sustainable development (IUCN/UNEP/WWF 1991).

Managing for the ecosystem or landscape means we manage for an array of species, habitats and ecological processes, so that no one species or environmental value drives our efforts. For example, if we wish to manage an island with an endangered species

that requires bare ground for nesting, we would not destroy all the vegetation to create such nesting habitat. Nor would we eradicate predators just to increase a prey population. We wouldn't rearrange the landscape for ourselves, but rather would try to maintain natural habitats as much as possible and ensure that the ecological processes that generate such habitats are maintained.

Unfortunately, managing for landscapes is still in its infancy. We can measure the abundance of a few species and see if their numbers are moving in the direction we wish and this can provide very effective 'seat of the pants' guidance in simple ecosystems (Jordan and Packard 1989). More often, we cannot really demonstrate a statistically significant effect of our management practices because so many different and varying factors affect whatever we are trying to measure (cf. Butterworth *et al.* 1987).

Managing for sustainable ecosystems has become a popular concept: if we teach people how to exploit sensibly, they will exploit sustainably (IUCN/UNEP/WWF 1991). Presumably, all we need is enough basic research to give us the information we need to proceed (Lubchenco *et al.* 1991).

Sustainable development has come under attack because human history shows such sustainability is the exception and because the mechanisms necessary to reach or maintain sustainability are too often vague, as are proofs of sustainability (Ludwig *et al.* 1993). In addition, there is a concern that sustainable development and maintenance of biodiversity are fundamentally incompatible and that current approaches to reconciling them are Utopian, combining the weakest of ecology and economics (Robinson 1993).

From a strictly scientific point of view, it is impossible to 'prove' exploitation of a resource or ecosystem is sustainable, just as stability of ecosystems is a problematic concept in ecology (Peters 1991). Sustainability is thus a political claim. We can, however, prove a resource has not been managed sustainably once it collapses (Ludwig *et al.* 1993), so science-based sustainable management would appear to be most successful through hindsight. Unfortunately, even then scientists will often bicker over why the collapse occurred (Ludwig *et al.* 1993), so it is not clear we can learn much from our failures.

If we cannot manage resources at the ecosystem or landscape level or if sustainable development has more to do with people than with resources, then how do we decide what to do with seabirds? We probably haven't reached the level where we can manage for something, be it a certain ecosystem or sustainable development, but perhaps at present we can manage against things that we have learned are harmful, such as disturbance, pollution, feral animals, or obviously

unsustainable exploitation by humans. This may not be as glamorous a means of managing as is sustainable development, but I suspect it will save a great many more seabirds and island ecosystems.

In our management, we should be careful that we don't make things worse. Ludwig *et al.* (1993) suggest a common-sense approach:

'We must consider a variety of plausible hypotheses about the world; consider a variety of possible strategies; favour actions that are robust to uncertainties; hedge; favour actions that are informative; probe and experiment; monitor results; update assessments and modify policy accordingly; and favour actions that are reversible.'

In other words, look at the options, consider the consequences, start cautiously, monitor the effects and be willing to stop and try something else. All this is not to say that we won't make mistakes; the record shows otherwise. But at least we can learn from them and perhaps we can avoid additional problems by sharing our insights and experiences with others.

Can we apply insights and solutions from one system to another?

The almost 300 species of seabirds range from polar polynas in the Arctic to the blue-water tropics. Seabirds breed almost everywhere from the most isolated of oceanic islands such as St Paul's Rocks in the Atlantic to rooftops in urban areas of Europe and North America. Corresponding to this, there is a vast array of problems confronting seabirds. Each breeding site or feeding ground would seem a unique case, from which we can learn little that we can generalize. Nevertheless, as shown by Burger and Gochfeld (this volume), a few problems are pervasive, which suggests that solutions to them may find wide application.

For example, feral mammals are a widespread problem at seabird colonies, yet methods exist to control cats (Veitch 1985), rats (Moors 1985, Cruz and Cruz 1987, Zino and Biscoito this volume), cats (Ashmole *et al.* this volume), goats (Daly and Goriup 1987), dogs (Kruuk 1979), pigs (Coblentz and Baber 1987), and cattle (Jouventin this volume). In our meeting in New Zealand, the Seabird Specialist Group proposed international 'hit teams' that would travel to islands with feral problems and undertake control or eradication efforts, while passing their expertise on to their local counterparts. These local teams would in turn attack the problems of additional islands. Given sufficient support, such an effort over a decade might make more of a contribution to the preservation of seabirds and of island biodiversity in general than just about anything else that can be suggested.

Guano extraction is a serious problem for seabirds in the Xisha islands of China (Hsu and Melville this

volume), yet both the Peruvians (Duffy this volume) and South Africans and Namibians (Rand 1952) have almost a century each of experience with guano extraction that has little effect on seabirds. A single visit by a manager from one of these countries might be the beginning of a solution.

Nature tourism ('ecotourism') has often been proposed as a way to justify the conservation of natural ecosystems in developing countries, yet implementation has often led to disturbance of seabirds (e.g. Gulf of California, Velarde and Anderson this volume; Chatham Island, Bell and Robertson this volume; Seychelles, Diamond this volume). Effective means of allowing tourists access to seabirds exist in Galapagos (Cepeda and Cruz this volume) and many other parts of the world (Burger and Gochfeld this volume) and such tourism can make substantial contributions to local economies. For example, in Australia, the nightly parade of Little Penguins *Eudyptula minor* on Phillip Island attracts more tourists than does Ayers Rock (Stahel and Gales 1987)!

Tourism can be compatible with seabirds, but we need seabird managers from areas with beginning seabird tourism to visit sites such as Galapagos or Tairaroa Head in New Zealand, so that they can learn from past successes and failures, rather than having to repeat them in isolation. Similarly, a workshop, bringing together managers and biologists from sites with apparently sustainable seabird tourism could distill those experiences into written form, so that they can be shared more widely.

Education is critical to the conservation of seabirds. There are too many isolated colonies that can never be protected by force, so they will continue to survive only because of educated 'enlightened self-interest' and tolerance of their human neighbours (Blanchard and Nettleship 1992, Blanchard this volume).

While education efforts depend on local cultural values and thus are not simple to move from one culture to another (Blanchard this volume), the basic framework of an education programme can generally be used (Blanchard and Nettleship 1992). On the other hand, I worry that education has become an afterthought, something seabird scientists and managers feel they should do and, worse, something they can do. We should consider that perhaps there is more to education than meets the eye. We wouldn't ask educators to do our research for us or to manage our colonies, so perhaps we should ensure that environmental educators run education programmes. This might avoid some of the problems that Blanchard (this volume) cautions against:

'Unfortunately, wildlife agencies often use information materials as a substitute for education programmes in an attempt to change attitudes. Just because wildlife regula-

tions are printed in a brochure doesn't mean that local populations will read, understand or follow them. Moreover, compliance will be problematic if regulations go against local norms.'

Funding for a few internships to allow educators from developing countries to learn firsthand of the programmes of The Quebec-Labrador Foundation on the North Shore of Quebec or similar intensive efforts elsewhere is essential. This support could spawn effective education programmes in countries where critical needs exist, such as Greenland (Kampp *et al.* this volume), Cape Verde (Hazevoet this volume), Madeira (Zino and Bischoito this volume), and Indonesia (de Korte and Silvius this volume).

Education probably does not stop exploitation of seabirds for food, but it can encourage people to limit their harvest (Blanchard and Nettleship 1992). I suspect that education is also a necessary precursor to effective law enforcement (cf. Reith 1956). Educating the public in turn requires information on what level of harvest can be sustained (Williams 1984). Based on the life-history characteristics of seabirds, Burger and Gochfeld (this volume) suggest that eggs and young can be exploited with more likelihood of the harvest being sustainable than can adult seabirds. As human populations increase, and as international organizations champion sustainable development (Clarke and Munn 1986, IUCN/UNEP/WWF 1991), seabirds may come under more pressure for harvesting. For example, on the Chatham Islands, there is talk of reviving the harvest of adult albatrosses (Bell and Robertson this volume).

We urgently need simple life-history models that provide managers with some idea of the relative cost of different management schemes, such as whether exploitation of a population is best done by taking seabird eggs or adults, or whether it is better to take one egg from each three-egg clutch in a colony, 33% of all nests, or to harvest only one-third of the colonies.

Ridley and Percy (1958) and Feare (1976) in the Seychelles and Nørrevang (1986) in the Faroes provide studies of the harvest of eggs and adults. Haynes (1987) showed in Jamaica that education and concentrating protection at a seabird sanctuary could be an effective strategy where resources are limited and dispersed, inshore breeding sites makes protection impossible. Bell and Robertson (this volume) suggest that reintroduction and 'farming' of seabirds in the Chatham Islands may reduce pressure on other bird species. We need similar studies and strategies from many other areas, and documentation of the damage caused by unrestrained exploitation. A workshop comparing and contrasting different methods of regulating exploitation would be a significant contribution to the tactics of seabird conservation.

What solutions are missing?

Treaties

Conservationists have shown relatively little interest in international law as a means of conserving seabirds. Exceptions include designation by the International Maritime Organization (IMO) of critical sites such as Smalls Lighthouse and Grassholm Islands (U.K.) and the North-west Hawaiian Islands (U.S.A.) as 'areas to be avoided' by tankers; The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) of 1980 which designates protected species and special areas for conservation and scientific study; and bilateral and regional treaties (e.g. for the North Pacific: Harrison *et al.* 1992, for Europe, the European Economic Community (EEC) Directive on the Conservation of Birds of 1979: Tasker *et al.* 1990).

We have only just begun to use such legal designations to protect seabirds. For example, *The Law of the Sea* (Article 211.6 (c)) and the *MARPOL Treaty* both call for designation by national governments of 'special' and 'particularly sensitive' marine areas on the basis of their ecological value or vulnerability to pollution (IMO, Resolution A 720 (17), 1991). Transit of tankers or other vessels through such areas can be restricted or prohibited.

Article 211.6 (c) could be a very powerful tool for seabird conservation. We need an international effort to identify critical areas, for seabirds and other organisms. At present, the criteria for such sites are haphazard, yet standards for the designation of significant seabird sites exists (Lloyd 1984, Tasker *et al.* 1990, Duffy in press). Sites that hold a certain percentage of a species' national, regional or total populations should be designated as nationally, regionally or internationally important and receive protected status.

Unfortunately, many nations simply don't know their own seabird riches. If we provide this information, national conservation groups can then press their governments to petition the IMO for protected status for internationally significant sites. Again, a relatively small investment of resources would have significant conservation pay-off, if it kept tankers away from critically important seabird sites.

We also need to push more for international treaties or agreements to regulate fishery practices, such as United Nations General Assembly Resolution 44/225 of 1989 which banned pelagic drift netting in the Pacific Ocean. A similar ban on net-sondes, already in place in New Zealand, should be mandated at the regional if not global level, ideally with World Bank assistance for countries to change over to more modern net systems, those less lethal for seabirds.

Agreements such as Directive 91/414 of the EEC require 'clear, unequivocally defined trigger and cut-

off values' for the regulation of pesticides (Klein *et al.* 1993). Seabird monitoring could play an important role in such an effort.

The United Nations Convention on the Law of the Sea (1982) offers a number of other opportunities for creative conservation that need to be explored, especially Articles 194 [5] and 119 [1][b] (Harrison *et al.* 1992). These will probably be most profitable when undertaken as a collaboration between biologists and legal experts.

Fisheries

Inclusion of seabird data may help refine fisheries management which may in turn help prevent over-fishing and fish stock collapses that affect seabirds (Cairns 1992). Unfortunately, fisheries management has a rather dismal record. Fish stocks continue to collapse with disturbing regularity, while scientists argue about whether politics, over-fishing or climate change was responsible, e.g. the anchoveta *Engraulis ringens* in Peru in 1972 (Duffy, this volume), or the cod *Gadus morhua* on the Grand Banks of Canada in 1992 (Gorham 1992).

Multi-species management, which incorporates birds and other predators into models, may improve the future record (e.g. Rice 1992, Mehlum and Bakken this volume), but one of the most basic problems with fisheries management has been that it tends to ignore fishermen and their motivations (McGoodwin 1990, Ludwig *et al.* 1993). However scientifically defensible and logical, fisheries management and science that ignore fishermen are often, or even routinely, either ignored in turn by fishermen or overridden by politicians responding to their interests.

Since seabirds are affected by the behaviour of fishermen, whether used as alternate food or as bait, or as competitors for fishermen, management that manages for fishermen will require information on their relation with birds. Despite numerous ecosystem-level research efforts on food consumption (e.g. Furness 1978) and net mortality (Atkins and Heneman 1987, Jones and DeGange 1988), we have relatively few smaller-scale investigations of seabird/fishermen interactions (e.g. Hudson and Furness 1988, Brothers 1991). We need to take a closer look at such questions as (1) the importance of collecting eggs or of hunting adults as alternative foods for fishermen when fish are unavailable; (2) how much seabirds interfere with fishery operations; and (3) how often seabirds are used to guide fishermen to prey (Johannes 1981). Essentially, we need to study seabirds from a fisherman's perspective.

In the meantime, we have to deal with fishery management within its existing limits. Seabirds can provide important information for monitoring fish-

ery trends or for refining models of fish mortality (Berruti 1985, Cairns 1992). Seabird biologists need to contribute more to regional marine fishery commissions that set fishing levels (Bailey 1989) and to ask what sorts of information might be helpful to such efforts.

Changing societies

A number of the cases in this book reflect seabird conservation as a problem in the wider context of the local society. For example, on Christmas Island, Indian Ocean, there is a 70% unemployment rate following the closing of the phosphate mining operations which had threatened the island's endemic seabirds (Reville and Stokes this volume). Nature tourism may help the economy, but such tourism is limited by the high cost of air travel to the island. Conservationists find themselves supporting the opening of a gambling casino which will increase nature tourists by reducing the cost of travel, because of the greater volume of passengers to the casino.

Unfortunately, the situation is much less favourable for the Black-capped Petrel *Pterodroma hasitata* which, if it still nests on Hispaniola, is probably being swept away in the search for protein by Haitians (Gochfeld *et al.* this volume). At an ecosystem level, it is hard to see how seabirds and the marine environment in Peru can be managed successfully in a society that has come so close to collapse, except to note that, the worse the situation, the more enthusiastic young researchers and managers appear in Peru, giving us grounds for optimism (Duffy this volume).

At a global level, we have William Vogt's sombre warning (1948: 279): 'All possible conservation measures are futile unless human breeding is checked'. The concept of sustainable development is popular now, but as Vogt so forcefully pointed out, no natural environment can sustain an ever-increasing human population. Sustainable development is at best a lubricant between humans and the environment, it is not a blank cheque for further growth or abuse. It may buy us some time, but, in the end, the future of seabirds and their environments will only be assured in a future where people reproduce more like seabirds and less like rodents. As scientists, conservationists, and citizens, we need to work toward such a future if we are serious about seabird conservation.

How are we going to detect new problems as these arise?

To detect problems, we need regional collaborative efforts to monitor seabird colonies, diets and reproductive success consistently over the years (Nettleship 1991, Duffy 1993, in press). No individual or research group can do this alone. Studies

of single colonies or short-term studies simply do not operate at a scale that will detect competition with fisheries (Duffy and Schneider this volume), effects of pollutants (Nisbet this volume), hunting, or climate change (Duffy 1993). Oceanographers successfully pool their data to look at 'bigger' questions. Seabird biologists and managers should be able to do the same. With standardized databases on electronic networks, where the data can be extracted and evaluated using simple computer programmes to model populations in relation to environmental problems, we can revolutionize seabird management (Nettleship 1991, Duffy and Nettleship 1992, Duffy in press). The technologies exist; we need to start collecting the data.

Where are we going to get the human, scientific and economic resources to address problems?

If our colleagues in developing countries lack the resources to make a living and to function, we can think great thoughts and lay great plans for conservation, but they will surely fail.

Students need fellowships for overseas study. Our colleagues need access to literature, to meetings, to sabbaticals, to opportunities to publish, and to funds to do research or management. They don't need them just when a problem occurs, but year in and year out so that they can develop and maintain their skills. Unfortunately, we know that for many of our colleagues, access to resources does not exist, or they survive on a small, erratic trickle (Cooley and Golley 1989, Duffy this volume). Obtaining literature and maintaining good working libraries is financially impossible (Duffy and Cooley 1990), so too often our colleagues can neither reference their papers in an acceptable way or even read them if they get published (Duffy 1988).

We need a global effort by seabird biologists and conservationists to share resources with our colleagues in developing countries. We need electronic bulletin boards for discussions of problems and solutions; we need (and the technology exists) on-line computer access to the scientific literature and to data banks (Duffy in press). We need exchanges of journals and we need ecologists, who despite all the frustrations (Pearson 1985), are willing to build lasting research commitments and collaborations with colleagues in other countries.

Plea for a seabird secretariat

There are few birds more international than seabirds, but too often we are so caught up in our local problems that we miss their global implications. We can save local colonies and still lose species. We can stop local poaching and still find species exterminated.

New threats will emerge; new solutions will be created to deal with them. Unless we think globally, we may not detect the problems until too late, and we cannot share the solutions in time.

S. Dillon Ripley once suggested we need a seabird equivalent of the International Whaling Commission (Ripley 1978). I agree. I would like to challenge BirdLife International, biologists, managers, and conservationists to think and act globally. Let us find the resources for a small secretariat for seabird conservation and monitoring that can help track the fate and futures of the birds of two-thirds of our planet.

Such a centre could undertake the following.

- Facilitate exchange of information on techniques for the conservation and management of seabirds and their breeding sites by correspondence and by sponsoring electronic bulletin boards.
- Monitor data from various sources, to detect emerging threats and vulnerable species, again perhaps by electronic bulletin board.
- Coordinate the logistics of programmes addressing local issues, such as eradication of feral animals on islands or education programmes.
- Help ensure the inclusion of seabirds in international treaties and law.
- Assemble human and financial resources to achieve these goals.

CONCLUSIONS

I have argued elsewhere that seabird species usually do not go extinct, they just fade away, so that a few birds remain, without playing whatever role they may have had in the original ecosystems (Duffy 1992). Many of the world's seabird populations may already have reached this point, but we don't know for sure. We cannot know because our knowledge of the past is so poor and, what we do know, we often don't use. Our knowledge of the present is quite good and well documented so that future scientists and conservationists will be able to judge the success of our efforts against the present.

This volume, *Seabirds on Islands*, and its two predecessors (Croxall *et al.* 1984, Croxall 1991) have given us clear marching orders about seabird conservation. If we cannot conserve seabirds, the most obvious and easiest to monitor of all the organisms of two-thirds of our planet's surface, then how do we plan to conserve the rest of Earth?

'Accuse not nature! She hath done her part.
Do thou but thine!
John Milton, 1667

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