

CENSUSES OF BREEDING BIRDS ON SABLE ISLAND

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The species of birds nesting on Sable Island

Over 340 species of birds have been observed on Sable Island (McLaren 1981 plus subsequent additions), and records continue to be kept by residents and visitors to the island (regularly by Zoe Lucas in recent years). Among this diversity of birds at least 28 species have nested there (McLaren 1881, plus subsequent additions). These include eight landbirds that have nested occasionally or rarely, or that depend on nest sites in buildings or other structures, such as Starlings, *Sturnus vulgaris*), occasional Tree [Iridoprogne bicolor] or Barn Swallows [*Hirundo rustica*], and the extirpated House Sparrow [*Passer domesticus*]). One introduced species (Ring-necked Pheasant, *Phasianus colchicus*) disappeared with cessation of poultry raising. Among the breeding landbirds, only the endemic Ipswich Sparrow (*Passerculus sandwichensis princeps*) can be considered to be established and of continuing conservation interest (COSEWIC 2002 category, “special concern”).

Several species of waterfowl nest or have nested, including most commonly the Am. Black Duck (*Anas rubripes*), Red-breasted Merganser (*Mergus serrator*), and in recent years the Northwern Pintail (*Anas acuta*). The island is of little significance in any wider conservation concerns for these species, although the could add to the diversity and perhaps ultimately the attractiveness of the island for summer tourism.

Several species of shorebirds nest or have nested. One, the Piping Plover (*Charadrius melodus*) is of considerable conservation concern throughout its range, including Nova Scotia, but has apparently not nested on the island since 1964. Most other shorebird species have nested only occasionally or rarely, but there are generally a few nesting Semipalmated Plovers (*Charadrius semipalmatus*) and larger numbers of Least Sandpipers (*Calidris minutilla*). These are the largest and most persistent populations breeding at the southern limit of their ranges. As such, they are of special concern in the island context.

Finally, eight species of seabirds nest or have nested on the island. Herring (*Larus argentatus*) and Great Black-backed Gulls (*L. marinus*) and Common (*Sterna hirundo*), Artic (*S. paradisaea*), and the endangered (COSEWIC 2002) Roseate Terns (*S. dougallii*) were listed in McLaren (1981). Since then, the Roseate Tern has virtually disappeared (Horn et al. 2003), and numbers of Leach’s Storm-Petrels (*Oceanodroma leucorhoa*), a single pair of Laughing Gulls (*Larus articilla*) and a small, unsuccessful colony of Black-legged Kittiwake (*Rissa tridactyla*) have been found nesting on the island. Although these more recently nesting birds are worth monitoring, only the larger

gulls and the terns and the interactions between them are of present conservation concern on the island.

General purposes and principles of counting breeding bird populations on Sable Island

Given that a particular bird species on the island is of conservation concern, censuses may serve three broadly different purposes requiring different approaches. We have also suggested some associated biological studies on these species, which could help to validate the census information;

Periodic assessments for evidence of continuing biodiversity

Such counts would be based on general observations made on species presence on the island without regard for statistical design or estimation of total abundance.

Censuses to assess long-term trends

Such censuses produce justifications for considering management options for the species of concern. If the species is perceived to be in serious decline, or in danger of becoming so, formal censuses are needed to confirm or quantify this decline. The same justification can be given if the species is perceived to be increasing to the detriment or decreasing to the benefit of some other species of greater conservation concern. Such censuses need to be designed to detect the desired level of statistical accuracy required to measure the decline over a given number of years, and need to carefully consider the randomization of sampling effort with respect to the distribution of the species over the whole island. Alternatively, given the relatively small size of the island, it may be possible to obtain complete counts of some species. Such censuses, generally of adults or their nests, would be carried out at most once per year. The annual frequency of such censuses may be determined by prior perceptions of the rate of decline or increase of the species in question, although more frequent censuses initially may be justified to assess possible magnitudes of trends and year-to-year variability to establish requirements for longer-term censuses.

Censuses to assess reproductive or mortality rates or management options

Merely demonstrating that a population of birds on the island is changing does not produce information on causes of this change, and accordingly on specific management procedures that might be tested or implemented. To do this generally requires knowledge of reproductive or survival rates of the species, not only on the island, but also throughout its annual cycle, often largely elsewhere. Some information on such rates might be gathered by more focussed sampling of numbers in selected areas of the island at different times of the breeding season. In such sampling, there may not be as much need for random spatial representation of samples from the entire island as much as for consistency of protocols and census (or index) areas from year to year.

Counting specific breeding bird populations on the Island

Waterfowl

The fate of a relatively small numbers of ducks on the island has little or no significance for the status of their widespread populations. Nor is it likely that their populations on Sable Island are isolated from trends that occur elsewhere. Nevertheless, because they nest in the vicinity of the island's ponds, which they and their broods also use for feeding, it would be relatively easy to maintain regular counts of the birds by SIPT employees or visitors engaged in other activities the along length of the island during the duck breeding season. Indeed, such counts have been made in recent years (Zoe Lucas, unpubl. Data).

Biodiversity counts. Continuation of regular (up-to-annual) counts, as described above, would serve, even without attention to statistical or logistical niceties, might give notice of changes of local interest or concern, for example, deterioration of the productiveness of particular ponds.

Productivity estimates. It would be useful to attempt, in one or more seasons, to estimate duck productivity on the island relative to other parts of their ranges. This would require counting female ducks on the ponds before initiation of nesting and of broods at various states of their development using established techniques by NS DNR, CWS, etc.

Although such annual counts of productivity estimates counts could easily be made by a SIPT employee or employees on the island, it might be useful to solicit outside advice on techniques, and perhaps field involvement of experts in government agencies or academia for design of counts.

Sempalmated Pover

There appears to be no urgency with respect to population trends in the Semipalmated Plover population nesting on Sable Island. It has always been uncommon there, and cessation of nesting on the island would have no significance within the bird's vast overall range, including various sites in the Maritimes (Erskine 1992). Nevertheless, biodiversity counts (see above) would signal any major change in status.

Least Sandpiper

The Lease Sandpiper population on the island is more substantial, and it nests only rarely elsewhere in the Maritimes (Erskine 1992). Although decline or extirpation as a nesting bird on the island would have little consequence for its overall status, it might be of interest in the context of long-term environmental change on the island, or indeed of global change, given that this species is at the southernmost extremity of its breeding range. While Miller (1983) was able to measure productivity of the Least Sandpiper in selected areas of the island during more intensive research, the usefulness for this purpose of wider censuses of fledged young at the end of the breeding season is questionable given the early immigration/emigration of this species on the island (McNeil and Burton 1974).

Abundance trends. Some estimates or indices of Least Sandpiper population change would be worth accumulating over the years. Because nesting females of this species and their chicks are very cryptic, it would be difficult to undertake formal censuses of the total population. However, standardized counts of flight-singing males in spring (see Miller 1979) could be used as an index of breeding populations over the years. As most singing by males occurs over more richly vegetated areas of the island, usually with freshwater ponds, the counting could be carried out by SIPT employees or visitors, perhaps in connection with surveys of the island ponds for waterfowl numbers (above).

Associated studies. Before or while gathering and analysing such long-term information, it may be useful to carry out some research on the relationship between estimated numbers of the Least Sandpiper in selected areas and overall distributions on the island, and on seasonal indicators, weather conditions, etc., that determine singing by males and that might help standardize year-to-year estimates.

Gulls

As noted above, the Herring and Great Black-backed Gulls have been implicated in predation of the eggs and young of terns on the island and elsewhere. There is some evidence of a decline in recent years of breeding success, and possibly numbers, of large gulls in the western North Atlantic with reductions in fishing wastes and unprocessed garbage (Howes and Montevocchi 1993, Kress and Hall in prep.). Although a number of counts of the breeding gull populations have been made over the years on Sable Island (Lock 1973, McLaren 1997, Horn and Shepherd 1999, Horn and Taylor 2000), the methods have not been standardized. Therefore it is uncertain that this decline has also occurred on Sable Island, where the breeding gull populations may be only sustained by immigration (Lock 1973). Therefore periodic counts should be undertaken to assess the Sable Island situation relative to mainland colonies. The two species are readily distinguished visually or in photographs.

Abundance trends. Given the complex requirements of sampling of scattered gull colonies of different sizes and non-randomly distributed on the island, infrequent complete counts may be logistically simpler and less expensive. Then consideration should be given to whether flush-counts of adults, or counts of nests, or even of adults on the nest by aerial photography (Dolbeer et al. 1997), would be most efficient.

Associated Studies. It would also be useful to obtain information on the breeding success of the gulls on the island relative to other regions. This could be done, without implementing detailed studies of individual colonies, by following a census of adults or nests at the beginning of the breeding season with an assessment of numbers of fledged young at it close. This might have to take into account the possible extent of departure of young from the island and be standardized with respect to date or phenology. Since year-to-year variation is expected in breeding success, it would be worth assessing more frequently, even in a more restricted part of the island, to give insights into possible effects of weather or general oceanographic conditions.

Other research on gulls and their interactions with nesting terns could involve a variety of techniques of counting them in local situations. It would also be desirable to obtain some measures of the rates of replenishment or turnover of the Sable Island colonies, perhaps through marking or banding programs on an extensive scale. Such numerical assessments, however, would be in the context of specific scientific projects or management assessments, and beyond purposes of the report.

Terns

Substantial research has been carried out on the terns breeding on the island (Horn and Shepherd 1999, Horn and Taylor 2000, Taylor et al. 2001, Horn et al. 2003) and has included censuses of the population. The surveys in 2000 (2241 terns) and 2001 (2041 terns) suggested that the tern populations have been stable over recent years, but that the census techniques used would probably not detect a decline of less than 15%. The count in 2002 was estimated as only about 1715 terns, mostly Common Terns, with at least 139 Arctic Terns and, for the first time in the past few years, none of the endangered Roseate Tern. However, “growth in the largest colony, at East Light, has made flush counts, even from photographs, problematic” (Horn et al. 2003). The most recent analysis (Horn et al. 2003) supports earlier indications that “colony success is a complex interaction between a colony’s ability to fend off gull intrusions (a function of colony size), foraging success (which may affect willingness to defend the colony, and settlement away from gulls.” The aim of tern research and management throughout Atlantic Canada is not merely to enumerate, but to increase, tern populations (Horn 2002), so there may be little further value in carrying out regular censuses of the tern populations simply for monitoring purposes. Rather, any counting should be related to assessing the success of local management initiatives, such as attempting to improve productivity by increasing the sizes of individual colonies (Horn et al. 2003).

Productivity Estimates. It might be useful to explore the possibility of assessing overall annual success of the island colonies by establishing standardized counts of loafing young terns that gather on the island beaches at the close of the breeding season. While this information would not provide abundance trends, it might be possible to infer productivity trends from inter-annual comparisons. These data could readily be collected by SIPT personnel or visitors.

Ipswich Sparrow

Attempts to estimate the total population of sparrows on the island have used complete counts in representative areas of vegetated terrain (Stobo and McLaren 1975; McLaren 1979). These have the limitation of permitting no calculation of variances of these estimates, although a complete count of sparrows in one year agreed quite well with the estimate from sampled areas. For this reason, a more rigorous approach using stratified, random transects was used in estimating the total population in 1998 (Smith et al. in press). The 1998 census (Smith et al. in press) gives no cause for alarm; their more accurate sampling estimate considerably exceeds all those from earlier years (Stobo and McLaren 1975), including the presumably accurate total count in 1971. Accordingly, there does not appear to be a pressing need to seek such trends at present as a basis for management decisions.

Existing research (Stobo and McLaren 1975, McLaren 1979, McLaren 1975, Ross and McLaren 1981) also suggests that sparrow productivity on the island is not limited by available habitat, but rather largely by weather conditions from year-to-year. Winter survival may, by contrast be both density-dependent influenced by weather on the wintering grounds (McLaren 1979, Horn 1999). This suggests that the short-term (and longer-term) fate of the sparrow may depend more on management decisions in its largely US wintering range.

Abundance trends. Future attempts to estimate the total population size should be based on the approach of Smith et. al. (in press). The usefulness of censuses for the purpose of tracking long-term trends will depend on a number of factors. The investment of effort (5 days by 3 people in Smith et al. in press) is reasonable. The year-to-year variation in the sizes of the populations, however, appear to be quite large (Stobo and McLaren 1975, McLaren 1979, Horn 1999), so that many widely spaced annual censuses might be required to detect a trend. These data could be collected by SIPT staff during occasional years.

Associated studies. Increased classification of the vegetation characteristics of the selected transects and the island as a whole would improve the accuracy of the estimation method of Smith, et. al. (in press) and could be incorporated if resources allow. The ACAP-SIPT mapping project through the Geographical College, Lawrencetown, NS, may aid in developing such modifications. Although stratified random sampling (Smith et al. in press) remains the most rigorous means of obtaining total numbers, and even more labour-sparing approach could be investigated to obtain the *ratios* of spring and fall counts in selected, representative, areas of habitat. Also, as an adjunct of any existing banding programs on the island, it may be possible to design approaches that would give population estimates that would supply capture-recapture data for estimating population sizes and mortality rates.

The above suggestions related to factors affecting the population abundance of the sparrow are hypotheses that need further testing. Estimating productivity requires censuses to be performed in both spring (to count adults) and in fall before migration (to count adults, presuming virtually full survival, plus recruited young) of the same breeding year. Estimating overwinter survival requires counts in fall and again in the following spring of adjacent breeding years.

Summary of Recommendations to The Sable island Preservation Trust

The following are recommendations for the short term of activities and projects that might be supported by SIPT on Sable Island.

1. Because of Sable Island's reputation for hosting a remarkable variety of birds, visitors and island employees (particularly one in any position of "warden" or the like) should be encouraged to keep records of birds seen for documentation in

- regional (e.g. “Nova Scotia Birds”) and national and international journals (e.g. “North American Birds”). Rare vagrant species should be confirmed by detailed descriptions, photographs, and by freezing corpses for deposition in museums.
2. Should a position of “warden” the like be envisaged for the island, one duty should be carrying out or organizing counts of certain breeding species that require little investment of time or personnel. These would include counts of waterfowl, including brood production, on the island’s ponds, and of Least Sandpipers through counts of singing males. The techniques used for these censuses should be developed with input from such agencies as NS DNR and CWS.
 3. The use of aerial surveys to obtain complete counts of brooding gulls should be tested by using high-flying (to prevent flushing), island-length passes of a supply flight at the appropriate season, possibly in April or May 2003. Simple camera equipment could be used to enumerate large, less-easily counted, colonies. The timing of such a count should be determined by assessment of the time when all, or nearly all, adults will be brooding, and carried out under the direction of SIPT island personnel. During the same season, a flush-count estimate should also be made to establish the accuracy and efficiency of the latter.
 4. It is unlikely, given their skittishness, that terns can be counted in the same way. If during such high passes by aircraft the extent of flushing by terns should be observed that terns to assess the possibility of future aerial counts.
 5. Counts of “loafing” gull and tern fledglings on the island (with perhaps some attempt to account for late fledglings) should be carried out by SIPT personnel or others in years in which nesting populations are estimated. These could give estimates of overall productivity of these species for comparison with that in other regions.
 6. A contract (perhaps via ACAP) or a volunteer subcommittee should be struck to assess the statistical efficiencies and logistical investments of estimating population ratios of Ipswich Sparrows between seasons using either representative plots or strip-censuses (which would also accurately estimate the total population).

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