

CHAPTER 8

RESTORATION TECHNIQUES: PREREQUISITES

The development and implementation of *all* seabird restoration plans involve general information needs or requirements. A plan's suitability and chances of success will increase to the extent that these requirements or information needs are satisfied. We discuss these general requirements in temporal sequence.

BASELINE AND HISTORIC DATA

Baseline data on population trends, demographic parameters, and factors that may limit population growth are essential for identifying spill-related injuries (see Chapter 4), helping to determine causes of population trends (see Chapters 3, 4, and 12), designing and implementing restoration plans (including setting restoration goals; see Chapter 6), and evaluating the need for direct restoration (human intervention) activities. Where these data are not currently available for populations that are at risk to oil spills, we recommend that natural resource agencies initiate baseline studies. Baseline time-series data will help demonstrate the variability of a population over time, evaluate injury, and provide an indication of the probability of natural recovery.

Demographic information is also needed to assess the probability of natural recovery as well as the probability of success for a particular restoration project. Nevertheless, prespill demographic information for many populations will be unavailable. Parameters from conspecific populations can be substituted, but we caution that these values may not be appropriate for the environment under consideration. Finally, information on which resources or demographic parameters may be limiting population growth (see Chapters 3b, 12) is essential in designing a restoration plan. If population growth is constrained by a limiting resource (e.g., food near a colony) or demographic parameter (e.g., low breeding population resulting from gillnet bycatch), restoration plans must address these factors to be successful.

INJURY ASSESSMENT

An accurate identification of oiled birds and an estimate of the number of birds killed directly by a spill are essential to estimate injury to populations and to set restoration goals. Total mortality will be estimated by extrapolating from carcass counts using models that include a spill trajectory and data on the at-sea distribution of the affected species. The demographic composition (i.e., age and sex) of the carcasses should be determined and used with demographic models to estimate effects at the population level and the probability that the birds will recover without human intervention. Finally, genetic, morphometric, or plumage analyses of the

carcasses may provide data on the area of origin of the birds killed by the spill. These data are required to help identify the geographic areas affected by the spill (which for seabirds may extend well beyond the spill zone defined by the physical extent of the spilled oil) and, therefore, the areas most appropriate for direct restoration and monitoring activities.

POSTSPILL, PRERESTORATION MONITORING

Identifying the need for direct restoration and the appropriate techniques, if restoration is warranted, requires postspill monitoring of abundance and demographic parameters (in particular, breeding productivity and survivorship). If a population is not recovering from a decline associated with a spill, the reasons for the lack of recovery need to be determined or at least estimated. The natural and anthropogenic effects that may be hampering recovery need to be ascertained so that the restoration plan can attempt to address these effects.

EVALUATION OF RESTORATION TECHNIQUES

If a population is not recovering (based on postspill monitoring) and the reasons for the lack of recovery have been identified or estimated, potential restoration techniques need to be evaluated. The evaluation procedure should include (1) the development of models to test the potential effect of each technique on the population, (2) a cost-benefit analysis to determine which technique promises the most benefits to the population given the biological, social, and financial costs, (3) the development of a suite of strategies, including deciding whether the technique(s) will be implemented singly, sequentially, or in combination, and (4) consideration of site-specific issues (e.g., native subsistence, tourism).

CONTINUING MONITORING

Following the implementation of the restoration plan, abundance and demographic parameters at target and reference populations need to be monitored for the duration of the plan. These data will help evaluate the success of the restoration technique and may indicate the need for alternate or additional restoration efforts.