CHAPTER 2. IMPACTS OF INVESTIGATOR PRESENCE

A. Overview

Research activities of field ornithologists, including the mere presence of researchers, can influence the phenomena and animals they observe. Ornithologists have an obligation to assess their research for potential negative effects on their study subjects, on other animals in the research area, and on the environment in general, and to minimize such effects. Investigators should weigh the potential gain in knowledge against the consequences of disruption. In assessing the consequences of disruption resulting from research activities, it should be recognized that individuals and populations usually recover rapidly from short-term adverse effects and that research often yields long-term positive effects for the affected populations. Nisbet and Paul (2004) discuss the balancing of knowledge of value to be gained against potential impacts, stressing the need for objective measures of impacts.

Investigator presence is a necessary component of a wide variety of observational studies that entail little more than walking through an area or remaining stationary in the vicinity of a bird or nest. Investigator presence is also commonly associated with nest visits, aircraft surveillance, and the use of boats to access observation points. Investigator presence is also a component of studies involving capture, handling, marking, and other forms of manipulation that are discussed in later sections.

Federal Endangered Species Act take permits are required to survey endangered species. Virtually every state requires state permits. See the Ornithological Council Permits guides.

The term “disturbance” is often used to describe the impacts associated with researcher presence. Nisbet (2000) proposed that human disturbance for colonial waterbirds be defined as “any human activity that changes the contemporaneous behavior or physiology of one or more individuals within a colony”. These Guidelines follow that definition because as Nisbet (2000) noted, unless the birds actually respond to the human activity, there is no disturbance. This definition then allows the focus to change to the issues of concern: the nature and extent of the effects. Nisbet (2000) points out that human disturbance is not always adverse, and that what should be minimized are *adverse effects of disturbance.* If the effects are negative and significant in kind and/or duration, more effort is required to avoid or minimize those effects, including potential changes in methodology, provided that the alternate methods are capable of generating the necessary data.

Two important aspects of observer-caused disturbance can be recognized. First, disturbances may create biases that affect both the gathering and analysis of data. Second, research activities affect the status and well-being of the study subjects. Both effects vary along a continuum from obvious to subtle (MacArthur et al. 1982; Jordan and Burghardt 1986).

Responses to any activity vary from species to species, and what may be anathema for one is inconsequential for another. Therefore, neither blanket rules on the part of regulators nor universal research protocols on the part of investigators are appropriate. A substantial part of the literature reporting the effects of human disturbance on birds has focused on colonial waterbirds (Nisbet 2000). Fyfe and Olendorff (1976) review observer-caused disturbances primarily with raptors with many suggestions worth reviewing on minimizing impacts to nesting sensitive species.

B. Preliminary studies to assess impacts

It may be possible to conduct a preliminary study to determine the impacts of researcher presence. However, numerous scientific, ethical, and practical concerns arise. For instance, birds may display differing responses at different times of year or at different points in the breeding cycle. Observations made during a preliminary study during the nonbreeding season may not be applicable to the same research protocol during the breeding season, when birds may be more sensitive to human presence. This in turn raises a practical issue in that the investigator may not be able to wait a full year after conducting a preliminary study at the time of year when the primary research is to take place. Additionally, it is difficult to document the effects of investigator presence because the measurement of impacts on wildlife requires investigator intrusion into the breeding habitat or non-breeding territory and virtually always involves capture, handling, and marking. In other words, it is impossible to assess impacts without conducting the very activities that are needed to collect the data to answer primary study questions. Confounding the problem is the phenomenon of habituation.

Nisbet (2000) discusses the development of tolerance to human presence, which he defines as "the intensity of disturbance that an individual bird tolerates without responding in a defined way." Noting that tolerance can be measured easily, he suggests that demonstrating that disturbed colonies are more tolerant than undisturbed colonies strongly suggests habituation but that only repeated measures of tolerance among the same group of individuals can prove habituation. Whether some level of tolerance or full habituation, the presence of an investigator for a preliminary study of impacts may provoke a stronger response than will subsequent, repeated visits.

Finally, the preliminary study itself raises ethical concerns. While recognizing the importance of exploratory research, non-exploratory studies of wild birds with clear hypotheses and design are ultimately preferred so that any impacts investigators may have on birds will be in pursuit of more rigorous science that answers the question(s) at hand.

C. Impacts associated with investigator presence

Many field studies involve essentially the same activities as birdwatching, which is the act of observing and identifying birds in their native habitat and is often used for citizen science projects such as bird censuses. In a review of some of the observed impacts of birdwatching, Sekercioglu (2002) described some of the practices of birdwatchers that disturb birds, including photography, the use of playback, and flushing birds. The use of playback is considered in the section on Minor Manipulations. Although researcher presence and associated non-manipulative activities may occasionally have severe effects (see reviews by Duffy and Ellison 1979; Anderson and Keith 1980; Fetterolf and Blokpoel 1983), in other instances, detrimental effects are negligible (Willis 1973). The variation may depend on local conditions, including structure of the habitat (Brown and Morris 1995), or the precise point in the breeding cycle (Fyfe and Olendorff 1976; Griere and Fyfe 1987).

Adverse effects of investigator disturbance have been of concern in colonial-nesting birds, where the impacts have been documented for a variety of families (Fetterolf 1983; Boellstorff et al. 1988). In two experiments developed to quantify effects of human disturbance on foraging and parental care in European Oystercatchers (*Haematopus ostralegus*) it was found that disturbance reduced the amount of parental care. However, investigator activities had no impact on the survival of Snowy Egrets (*Egretta thula*) (Davis and Parsons 1991). In addition, it has been reported that nightlighting may minimize investigator disturbance for colonial-nesting birds (Bowman et al. 1994). Tolerance to human intrusion in forest birds can has been found to differ with species and other social factors (Gutzwiller et al. 1998)

Nest visits

The potential for detrimental effects of visits to nests have long been known (Evans and Wolfe 1967). Problems from nest visitation have resulted in potentially biased data and decreased reproductive success in both terrestrial birds (Willis 1973; Mayfield 1975; Howe 1979; Lenington 1979; Westmoreland and Best 1985) and aquatic birds (Hunt 1972; Gillett et al. 1975; Kury and Gochfeld 1975; Robert and Ralph 1975; Fetterolf and Blokpoel 1983; Rodway et al. 1996; see also reviews by Manuwal 1978; Anderson and Keith 1980; Burger 1981a, b; Hockey and Hallinan 1981). However, there are studies reporting that nest visitation produced no evident adverse effects in a variety of bird species (Götmark 1992; Schreiber 1994; Schreiber 1996; Skagen et al. 1999).

Predators following investigators or their smell to a nest can lead to greater predation rates, particularly when repeated nest visits are needed. Because the types of predators in a study area and habitat structure may differ, it is prudent to consider investigator impacts on predators before assuming that rates of predation on nests are unaffected by human visits (Hendricks and Reinking 1994). Bird eggs and hatchlings in the nest are particularly vulnerable to human disturbance because their survival depends on parental care. The two principal causes for bird nest failure are nest desertion by the parents and predation (Götmark 1992). With the likelihood of nest desertion decreasing with time post-hatch, depending on the species, it is advisable to visit nests after hatching. Low or ground-level nests should be approached tangentially, with a 3- to 4-meter detour to the nest. The investigator should return along the detour to the tangential path and continue in the same direction. Spreading naphthalene crystals along the detour segment can discourage some mammalian (?) ground predators (Redmond 1986). If flagging is used to mark nest sites, care should be taken that the flags neither impede the parents' access to the nest nor draw the attention of predators. Where flagging may result in increased predation, it is recommended that nests not be marked with flagging and that natural objects and GPS coordinates be used to aid in nest relocation (Hein 1996).

Aircraft overflights

Low-flying aircraft may be used in censusing birds. Although such flights may disrupt bird activities, especially in colonial and open-nest species, Dunnet (1977) showed that regular movements of fixed- and rotary-wing aircraft in non-research activities had no observable effect on cliff-nesting seabirds, and Kushlan (1979) observed only minimal effects from carefully conducted helicopter censusing of wading bird colonies. Burger (1981a) showed that Herring Gulls (*Larus argentatus*) respond differently to various aircraft-related stimuli and that they seem to be more sensitive away from breeding colonies than at the colonies themselves. On the other end of the disturbance continuum, American White Pelicans (*Pelecanus erythrorhynchos*)were seriously affected by low-flying aircraft, indicating that their population status could be affected by chronic disturbance (Bunnell et al. 1981). Kushlan (1979) recommended the following procedures to minimize the impacts of aircraft overflights: gradual approach by first circling the study subjects at a distance, flying around the periphery of the sensitive area rather than directly over it, slow and quiet flight, and continual attention for signs of disturbance. Guidelines developed for aircraft operations near concentrations of birds such as in Antarctica (Harris 2005) can be used to help design census studies and mitigations for reducing the impacts of aircrafts on birds or from similar studies of the impacts of boats on birds (Bellefleur et al. 2009).

Boats

Boats are used to access study sites on islands or in wetlands and to census waterbirds, seabirds, or other species that use waterside habitat (Gerrard et al.1990; Gaston et al.1987). All manner of watercraft have been used, from canoes to small motorized watercraft and even large ocean-going ships (Tasker et al. 1984). Most studies of the impact of watercraft on birds involve recreational watercraft and are intended to guide management decisions. Burger (1998) examined the effect of watercraft type, speed and route. During the most sensitive time of year – the early part of the reproductive cycle – the type of craft, speed, and route explained 95% of the variation in flight behavior. Personal watercraft (i.e., jet skis and wave runners) had the greatest impact because they moved faster and could came closer to the breeding birds and in some cases, even ran over nests. Larger motorized watercraft moved more slowly and tended to stay in marked channels. Overall, the type, speed, and location of watercraft accounted for 66% of the variation in response by the birds. Some seabird studies have documented boat avoidance behavior by loons and grebes, including flying and diving (Henckel et al. 2007). However, as the alternate method is aircraft overflight, the impact on birds may be less an issue than the accuracy of the count. The effect of avoidance behavior on overwintering fitness is also of concern but has been little studied. Peters and Otis (2006) looked at this issue in the context of recreational boating and determined that flushing responses to watercraft varied among species and did not affect site occupancy. Only Yellow-crowned Night Heron (*Nyctanassa* *violacea*) and Great Egret (*Ardea herodias*) appeared to avoid high-traffic creeks. Boat-based research would, in places where recreational boating occurs, account for a very small fraction of boat traffic, but regardless of the presence or absence of other boats, researchers should consider speed and distance when using boats to study birds and particularly breeding birds.

Approach and nearness to sensitive areas

Individuals not under study, including individuals of other species in the study area, may also be affected by investigator presence. Hockey and Hallinan (1981) found that both near-approach and passage by people had detrimental effects in penguin colonies. Human passage disturbance led to egg loss through predation by Kelp Gulls (*Larus dominicanus*) and frightened nest-prospecting penguins away from the colony. Burger and Gochfeld (1981) demonstrated that Herring Gulls and Great Black-backed Gulls (*L. marinus*) can discriminate between direct and tangential approaches by investigators, and that these birds more readily abandon nests when investigators looked directly at them. This suggests that an investigator's specific behavior may have an effect in creating or minimizing disturbances. Birds are less sensitive to observers if they are shielded from them (Knight and Temple 1995), and it may help to wear inconspicuous clothing (Gutzwiller and Marcum 1993; Riffell and Riffell 2002). Other ways to minimize shielding include blinds, vegetation, or vehicles (Larson 1995).

Researchers' activities may draw the attention of curious persons. Unfortunately, considerable disturbance may result from the innocent attempts of members of the public to determine what a researcher is doing. Tourists and photographers may present special problems. When observation by the public is likely, researchers should consider diplomatic means to discourage invasion of the research area.

D. Suggestions for field researchers

Investigators should monitor their studies for adverse effects of disturbance. Wherever possible, action should be taken to minimize detrimental activities or alleviate their impacts. Research activities should be consistent with the gathering of adequate samples for valid research results, yet be balanced to minimize adverse effects. A general system of nest checking is outlined for colonial birds that minimizes investigator disturbance while maximizing data yield (Mineau and

Weseloh 1981). Safina and Burger (1983) recommended minimizing visits by use of telescopic observation to look into a colony or sensitive area rather than entering it. Such methods may include the use of powerful lenses, other remote-sensing devices, and, if necessary, blinds that provide a nondisturbance entrance (Shugart et al. 1981). Other researchers suggest that visits be timed (within and between days), for example, to minimize loss of regurgitated food by young birds, to avoid disturbance of nests during their most sensitive phenological stages (such as egg laying), and to avoid actions that might cause a chick to become separated from its parents (Parsons and Burger 1982). Consideration must also be given to naïve individuals that have had little previous experience with humans as there may be a more substantial impact (Blackmer et al. 2004).

Interspecific differences in response to disturbance require that field investigators be familiar with their study species such that they can reasonably predict reactions to certain field activities. Personal experience is desirable but familiarity with the literature and consultation with others may suffice. Because some habituation to investigator disturbance is possible (Parsons and Burger 1982), consistency in timing and intensity of visits may alleviate some problems. Selection of a study population already habituated to human activity sometimes may eliminate unwanted side effects of scientific research (Burger and Gochfeld 1981). Finally, investigators should monitor the effects of their activities on a continual basis.

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