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The Birding Wire

Digital and Audio Recordings Help Quantify Shorebird Disturbance

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As human populations and associated development increase, human-wildlife conflicts are occurring with greater frequency. How human activity affects wildlife, particularly species with declining populations, is of great interest to ecologists, land managers, and natural resource policymakers. The American Oystercatcher (Haematopus palliatus), a species of federal and state management concern, nests on coastal beaches where they are subject to various forms of anthropogenic disturbance. The North Carolina Cooperative Fish and Wildlife Research Unit has been studying the effects of a variety of human activities on nesting American Oystercatchers at Cape Lookout and Cape Hatteras National Seashores on the Outer Banks of North Carolina since 1997. Using low cost, low power, digital audio and video recording devices, the researchers have been able to quantify animal behavior in ways that were not previously possible.

Human activities that may disturb nesting birds on our National Seashores include aircraft overflights, off-road vehicles, and park visitors. A study funded by the United States Navy to examine the effects of lowering the minimum altitude at which high-speed military aircraft can fly through the airspace above Cape Lookout National Seashore provided an opportunity to study the effects of military overflights and other types of human activity on nesting birds. Researchers used three metrics to assess these effects on nesting American Oystercatchers: behavior, physiology, and reproductive success. The study expanded on-going monitoring of American Oystercatchers at Cape Lookout by supplementing visual observations with continuous 24-hour video, audio, and heart rate recording at nests during the nest incubation period. In all, over 48,000 hours of digital audio and video recordings was collected. The digital format of the data allowed the researchers to automate data analyses using image recognition and other digital image processing technologies. Audio recorders monitored ambient sound levels and noise events; video recorders monitored oystercatcher incubation behavior, beach activity, and nest fate; and microphones embedded in artificial eggs monitored the heart rates of incubating birds.

CRU scientists quantified the behavioral responses of oystercatchers as the proportion of time they were on versus off their nests before and during human activity events, the number of times oystercatchers departed from their nests each day, and the proportion of the day oystercatchers were attending their nests. Average daily nest attendance was higher for successful nests than for failed nests, and researchers found no significant correlation between the number of human activity events per day and the proportion of the day oystercatchers were attending their nests. The number of ATVs driving by nests each day was weakly associated with the total number of times oystercatchers left their nests per day. Aircraft overflights were not associated with changes in oystercatcher incubation behavior. However, oystercatchers were on their nests significantly less during off-road vehicle and pedestrian events than they were during control periods before the events. The study found no significant correlation between the number of human activity events per day and daily nest attendance, and also found no evidence that aircraft overflights influenced oystercatcher reproductive success. In contrast, the number of off-road vehicles passing a nest during incubation was consistently associated with significant reductions in daily nest survival and hatching success.

The researchers used heart rate to measure the physiological response of incubating American Oystercatchers to various forms of human activity. Artificial eggs with embedded microphones were placed in 42 oystercatcher nests to continuously record the heart rate of incubating birds for up to 27 days. Video and audio recordings collected simultaneously at nests were used to relate variations in heart rate to human activities. Military and civilian aircraft, off-road vehicles, and pedestrians around nests were observed. With the exception of high-speed, low-altitude military overflights, the scientists found little evidence that other types of human activity influenced oystercatcher heart rates. Low-altitude military overflights were the only human activity to significantly increase the average heart rates of incubating oystercatchers (12 percent above baseline). Although statistically significant,

this increase was not considered biologically significant because elevated rates were of short duration, and they were well within the range of natural variation.

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