

Western Ecological Research Center

Publication Brief for Resource Managers

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Cardiac Response of Free-living Tule Greater White-fronted Geese to Human Disturbance

Wildlife may incur energetic costs when disturbed by humans; therefore, spatial buffer zones are commonly used by managers to separate wildlife from human activities. Buffer zones often are determined from the distance at which a species flushes in response to human activities. However, wildlife may have more subtle physiological responses to disturbances, such as increased heart rate, that also have energetic consequences. Heart rate, rather than flushing distance, may be a better indicator of a stress response by wildlife to human disturbance. A USGS study published in a recent issue of *The Wilson Bulletin* examined the cardiac response of tule greater white-fronted geese (hereafter tule geese) to human disturbance.

The authors implanted radio transmitters into the abdominal cavities of tule geese (wild birds that were captured and released) and monitored their heart rates as an observer disturbed each bird by approaching it at a constant walking speed. On average, tule geese flew from the ground (flushing) when observers were 47 meters away (range: 25–100 meters). The authors used change point regression to identify the precise point in time when heart rate abruptly increased prior to flushing and when heart rate began to level off in flight after flushing. Heart rate increased as the observer approached the radio-marked goose, from 114.1 ± 6.6 beats per minute during the observer's initial approach to 154.8 ± 7.4 beats per minute just prior to flushing.

On average, tule goose heart rates began to increase most rapidly 5 seconds prior to taking flight, and continued to increase rapidly for 4 seconds after flushing until reaching flight speed. Heart rate was 456.2 ± 8.4 beats per minute immediately after flushing and

Management Implications:

- Tule goose heart rates increased by 36% from the observer's initial approach to the abrupt increase in heart rate that occurred 5 seconds before flushing.
- The largest increase in heart rate occurred during a 9-second period immediately before and after flushing when heart rates nearly tripled.
- Flushing distance is a reasonable measure for creating waterfowl buffer zones when disturbances are likely to be short in duration (e.g., vehicle or aircraft noise), but alert distance should be used when disturbances are likely to persist (e.g., bird-watching or hiking).

448.3 ± 9.5 beats per minute one minute later during flight. Although tule goose heart rates increased as an observer approached, the largest physiological change occurred during a 9-second period (range: 1.0–15.7 seconds) immediately before and after flushing when heart rates nearly tripled.

*Ackerman, J. T., J. Y. Takekawa, K. L. Kruse, D. L. Orthmeyer, J. L. Yee, C. R. Ely, D. H. Ward, K. S. Bollinger, and D. M. Mulcahy. 2004. Using radiotelemetry to monitor cardiac response of free-living tule greater white-fronted geese (*Anser albifrons elgasi*) to human disturbance. *Wilson Bulletin* 116(2):146–151.*