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# COMMON RAVEN AND STARLING RELIANCE ON SENTINEL COMMON CROWS

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During January, February and March, 1973 we observed interactions of three avian species on 20 days at the Montgomery County sanitary landfill near Blacksburg, Virginia. Sixty-two hours of observation at the landfill were made from the concealment of a blind located on the edge of the landfill trench. On a typical day, Common Crows (*Corvus brachyrhynchos*), the first species to arrive, appeared at the landfill shortly after dawn around 06:30 EST. Common Ravens (*C. corax*) were the next species to arrive, followed later by Starlings (*Sturnus vulgaris*). The number of individuals per species varied from day to day: 35 to 90 crows, 2 to 25 ravens, and 50 to 150+ starlings.

Four to seven sentinel crows always were in position before the appearance of the majority of the flock and before any crows entered or fed in the landfill trench. It was common to see several sentinel crows post themselves in trees near the trench while others stood on high points of the earthen berms on both sides of the trench. The sentinel crows called frequently from their perches, even in the absence of any threat. Common Ravens never entered the trench unless the sentinel crows were in position and the other crows were actively feeding within the trench. These conditions met, ravens would first fly over the trench, land on high ground up from the trench, and after surveying the landfill, fly or walk into it to feed. Neither raven nor starling sentinels were ever observed, though on occasion, a raven gave a low-pitched, stacatto alarm call while flying over the landfill. Such calling induced all the ravens in the trench to fly out abruptly, but only about half the crows would leave. This sequence also occurred when a raven feeding in the trench gave an alarm call in response to an audible stimulus such as the sound of a diesel engine on a main highway about 350 m away from the landfill. Most often, the three species would flush when sentinel crows intensified their "cawing" in response to their detection of an approaching hazard. All the ravens and most of the crows and starlings flushed in these instances.

Another corvid, perhaps inadvertently, augmented the sentinel system at the landfill. Whenever Blue Jays (*Cyanocitta cristata*) issued alert calls in the woods adjacent to the landfill, all the corvids in the trench promptly became alert, especially the sentinel crows and the ravens. On no occasion did Blue Jay alert calls elicit an immediate flight response by any species in the trench.

After the three species were flushed from the landfill trench, we noticed a definite reinvasion sequence. Starlings were invariably the first species to return, followed by the sentinel crows. With the sentinels in position, other crows began descending into the trench. The ravens waited until crow sentinels were in position and crows were actively foraging before flying to the trench or descending into it. Since starlings entered the trench prior to the arrival of the sentinel crows, they apparently depended less on the corvid warning system, or were less cautious than the ravens.

Behavioral adjustments of ravens and possibly starlings by depending on crow sentinels perhaps enables them to exploit more safely a potentially hazardous food source, and possibly increases overwinter survival of participating individuals for the next breeding season.

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