

WINTER BEHAVIOR OF RAVENS AT TOMALES BAY, CALIFORNIA

By JOHN E. CUSHING, JR.

The Raven (*Corvus corax*) is a common bird along the coast of Marin County, California, particularly in the vicinity of Point Reyes and Tomales Point. Here during the breeding season it is to be found nesting either on the ocean cliffs or in small trees, as in the brushy ravines along Drake's Estero. At this season ravens usually occur in pairs, creating the impression of a solitary and individualistic way of life.

For several years the author had noticed a regular flight of ravens in the fall and winter in the vicinity of Tomales Bay. This was particularly marked on Tomales Point where every evening ravens could be seen and heard calling as they flew northward to cross the bay in the vicinity of Hamlet. In the morning ravens would pass southward along the point. Such a habit suggested obviously enough that the birds were roosting gregariously somewhere to the north and east of the bay.

On August 4, 1937, an attempt was made to verify this supposition by driving along the line of evening flight where it left Hamlet. At 3:30 p.m. ravens were heard calling near Hamlet, but could not be seen because of heavy fog. At 3:45 five were flushed from the highway near the town of Tomales (see fig. 28). These flew off to the south, soon to be lost in the fog. At 5:30 several were seen flying northeast under the fog three miles south of Valley Ford, Sonoma County. Shortly after this, at 5:45, one hundred birds were seen in a field on the Alfonso Ranch one mile east of Valley Ford. The birds were in two bunches when first seen; they were lying down or walking and doing little else. Other ravens joined these groups, arriving from the southwest, uttering single notes and flying under the fog about seventy-five feet above the ground. By 5:50 the number of ravens had increased to 160 and no more birds were seen coming in. Then, at 5:55, twenty-four more arrived, flying leisurely and giving the same single notes mentioned above.

The birds now began a gradual drift toward the northwest end of the field where a flock of fifty birds was finally assembled by 6:05. At 6:10 a total of two hundred birds was counted. A few crows could be heard calling, but the ravens were quiet. At 6:22 p.m. birds began to leave the field and fly off toward the southeast, disappearing into the fog. As it was becoming too dark to see very well, I flushed the main flock and they too vanished to the southeast. A few crows were mixed with them.

Opportunity for further investigation did not present itself until September 4, 1940, when the drive from Hamlet was retraced. At 3:10 p.m. two ravens were seen flying about near Hamlet and giving single call notes as had the other birds three years before. When I arrived at the field on the Alfonso Ranch at 3:30 p.m., no ravens were to be seen. At 4:45 two were observed flying south along the crest of a bare hill. No more were seen, and the situation was discouraging until at 5:49 twenty-five to thirty birds were discovered on the bare hill just mentioned. They were in sight of the Alfonso field, but about three-fourths of a mile to the southeast of it (the direction taken by the flock three years ago). As I watched, one bird joined this group. Ten minutes later another flock of about seventy birds was discovered a hundred yards or so to the south of the first on the same hill, in a plowed field. A count of the other group showed them to be now about fifty strong.

At this time I drove down to the Lepori Ranch, at which place the birds were situated, and walked over the hill, attempting to come upon the first flock from the east. At 6:00 p.m., while climbing the hill, nine birds flew over in a group from the east toward the big flocks, uttering the single caw and in addition gurgling. At 6:12 a single

bird came in from the east, followed by two more. Three minutes later I flushed the first flock, counting fifty birds. These flew off to the larger bunch, still out of sight over the hill.

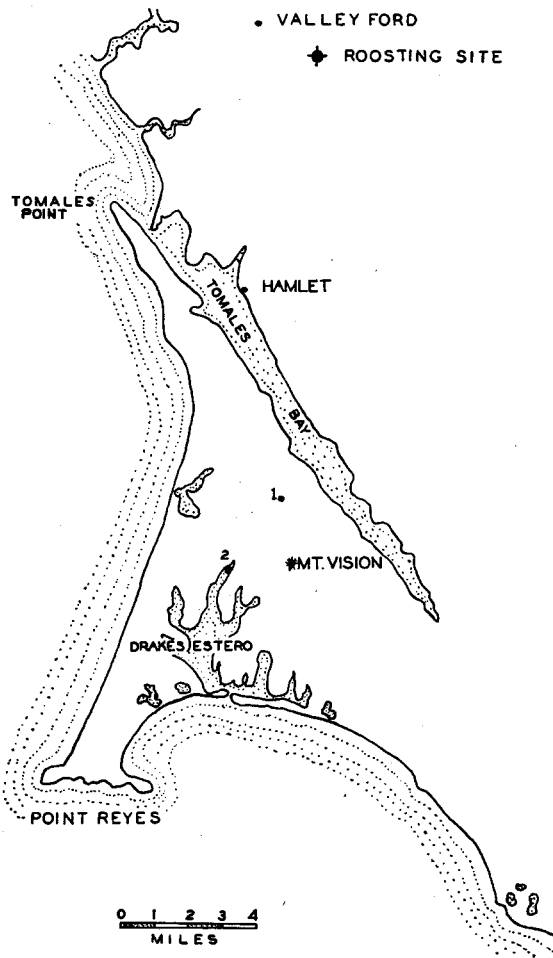


Fig. 28. Map of Tomales Point and vicinity, Marin County, California, showing location of Raven roost.

The birds had been standing in an old hay field. Along the fence forming its southern boundary were quantities of raven feathers. At 6:20 the other flock, now about two hundred, flew over me although I had not startled it. As usual, the birds were uttering the characteristic single note. They were relatively tame, passing several times within easy shot-gun range. By 6:35 they had again settled down, this time out of sight on the northern slopes of the hill, and they were making little noise.

The hill mentioned several times above is a "bald" elevation, about five hundred feet high, situated two and one-half miles east and a little south of Valley Ford. The country about the hill forms a rough basin, and the hill is the highest ground within two or three miles in any direction. The nearest forested country is about four miles to the north. The hill itself is steepest on the east and north face, with a small brush-covered canyon on the north in which the ravens roost. At the head of this canyon are

two or three eucalyptus trees, the only trees of any size on the hill. Two hay fields have been made on the hilltop, which is a little less than one-half mile at its greatest diameter. In general, there seems to be nothing outstanding about the location of the roosting grounds.

Returning to the story of the ravens of September 4, 1940, at 6:50 about sixty birds had returned to the hay field, almost all of them facing west and making no noise. Birds also appeared flying low over the brushy canyon, apparently settling there to roost as at this time it was almost dark. Some birds flew into the trees at the head of the canyon and, after much restless moving about accompanied by low, strange noises, started to settle down. The birds from the hay field began to fly over and drop from sight into the canyon and their numbers dwindled from sixty to twenty-five and finally to ten. During this interval, many faint caws could be heard coming from the trees. The ten birds finally left the field at 7:05 and vanished into the canyon when it was so dark they could hardly be seen. At this time I left, although noises were still audible from the heavy brush as I passed along the canyon.

From the above observations, it seems probable that the ravens in the vicinity of Tomales Bay do roost together during the winter and that this roosting place is of a permanent nature and has been used for a long time. A similar habit is recorded for the Raven (*C. c. corax*) of England by Witherby, Jourdain, Ticehurst, and Tucker (Handbook of British Birds, 1, 1938:8): "Pairs associate throughout the year, but reputation for solitary habits largely due to comparative scarcity in many districts. Where sufficiently numerous may congregate in flocks for foraging purposes and roost gregariously on suitable rock ledges, etc., sometimes in large numbers (over 100 apparently normal in O. Hebrides); also in tall trees. Parents roost away from nest soon after young hatched. . . . Social gatherings like those of other *Corvidae* occur where birds are common enough, chiefly in autumn and winter. . . ."

The following notes indicate something of the daytime dispersal from the roosting site. On February 21, 1937, these observations were made on Tomales Point opposite Hamlet: At 7:15 a.m. eight ravens passed along the point, flying south, to be followed by two birds three minutes later. At this time the first rays of sunlight were visible on the higher hills of the point. At 7:23 a single bird appeared, and by 7:44 twelve more birds in threes, twos and as singles had moved southward, flying in a straight course. At 7:50 birds were heard calling over the bay and again at 8:06 ravens called high in the air. At 8:17 three flew by me, low and near the bay, this time moving north. Another single bird went southward, and the last ravens were seen at 10:20 when two flew south quite high, moving very fast and croaking repeatedly.

That same evening a small return flight occurred at the same place, three birds crossing the bay two miles below Hamlet at 5:22 and three flying north over the bay at 5:40. A morning flight was observed next day, similar to the one just discussed.

Further observations were made from Inverness Ridge on September 6, 1940. Here a stand was taken on a broad shallow saddle about two miles wide, that seemed to offer a natural crossing for ravens coming from Point Reyes (see 1 on map, fig. 28). From this saddle the land flattens out to the west and south in the vicinity of Drake's Estero and the point. From here, on a clear day, one can easily see the Farallones and Mount St. Helena.

At 4:00 p.m. three birds came flying steadily toward the saddle from along the western side of Mt. Vision, to cross near me and pass northward up Tomales Bay. Two of these birds often dove at each other as if in play, although they continued their course. At this time four birds were seen on the ground not far from my stand. Two of these soon moved to a field about a mile to the west, a third disappeared, and one remained.

Within five minutes of the time that the three flying birds had been first sighted, a flock of twenty-three birds was located (at point 2 on the map) as it came up the eastern arm of the estero high in the air and moving forward in a progressive circle. At 4:10 the first calls from this flock could be heard above the wind and at this same time the two ravens in the field flew away. As the flock rapidly passed over me and out above the bay, the single raven on the ground was still feeding. At that time I lost sight of the flock and turned to look at the single bird, only to find that it had left. At 4:15 in a line with the eastern arm of the estero and the saddle, a large group of birds was seen just as it dropped from sight behind the eastern hills of Tomales Bay. Probably this was the same flock of ravens, for the line of flight was roughly toward the roosting place.

At 4:40 p.m. birds were heard, but not seen. Shortly afterwards I left the ridge. At 5:25 on the highway at a point one mile east of where it touches the estuary, two ravens flew up the canyon toward the east, flying low and calling repeatedly.

These observations show that some of the birds in the winter assemblage make a daily round trip of over forty miles (for example, those observed coming up Drake's Estero). It is almost certain, considering the homogeneity of the country southwest of Mt. Vision, that some birds make a daily trip to Point Reyes, some twenty-three miles in a straight line from the rookery. In view of the fact that ravens have nested on the Farallones and that these islands are easily seen from Point Reyes on a clear day, being only twenty miles south of it, it is possible that a few birds may cross over to them and return in the course of a day. Another possible area of daily foraging is down the coast of Drake's Bay toward the Golden Gate. How far the Tomales birds may go in this direction is still unknown, although I have at various times seen ravens in small numbers along this entire coast-line.

A scattering of observations are to be found in my notes, confirming the above data upon the manner and extent of the colony's daily dispersal. There is no need, however, to publish these in detail.

In regard to the length of time the Valley Ford site has been in use, my earliest note was made on February 18, 1933, at Tomales Point when three ravens were seen at evening flying north. Accompanying this record is the statement that ravens have been seen to do this before, suggesting the possibility of a winter roosting site. Further notes taken that same spring show a definite flight similar to that described for 1937. Therefore, the ravens have probably been using the Valley Ford roosting grounds for at least nine years.

The two counts that have been made at the roost show that the number of ravens was about two hundred in 1937 and in 1940.

Although several extensive stands of eucalyptus occur close to the roosting grounds, one even at the eastern base of the hill, the majority of the ravens, as far as was determined, appear to prefer to roost in the brushy canyon on the hill. As eucalyptus is not a native tree in California, it is possible that the birds are adhering to a custom originating at a time before the groves were in existence. That this custom may become changed, in a manner paralleling that of the crows of New York (Emlen, Ecology, 19, 1938:274), is suggested by the fact that some of the birds are using the few eucalyptus growing at the canyon head.

In connection with these observations on ravens, we may consider some of the evolutionary aspects of colonial behavior such as they display. Emlen (Condor, 42, 1940: 287-294) has shown that the Western Crow (*Corvus brachyrhynchos hesperis*) has not extended its winter range in California in the past fifty years. This is true in spite of the facts that crows have increased in some areas and that much territory that appar-

ently is suitable ecologically is and has been available for such an extension. Emlen presents evidence (p. 294) "for the existence of an innate affinity or homing reaction to established territory which, independent of environmental factors, acts in delimiting the winter distribution of the crow in California." This explanation would seem to apply also to Bryan's statement (Natural History of Hawaii, 1915:335) that the Hawaiian Crow (*Corvus hawaiiensis*) "having originally gained a foothold in the Kona and Kau districts of Hawaii, . . . seems . . . unwilling to extend its range to the windward forests that adjoin i[t]s habitat, even though they are known to abound in suitable food." Likewise this homing reaction may conceivably be the causal mechanism that brings the Tomales Bay ravens to the same roost from winter to winter.

If we accept such a homing reaction as the force that maintains the individuality of crow and raven roosts year after year, we can see in it a potential isolating mechanism that will be effective in just the proportion to which it tends to prevent the exchange of genes between populations. This effectiveness will, of course, have to be determined for each population involved, but at least the possibility that such a mechanism is at work must be considered.

An analysis of the homing reaction into its hereditary and non-hereditary aspects may show that the latter aspects are the significant ones wherever any isolation is taking place. That is, it is probable that an individual acquires rather than inherits its special attachment for a particular roosting site, even though it probably inherits the ability to form this attachment. With this the case, if we are to consider the homing reaction as a potential isolating mechanism, it may be classifiable as on a par with geographic isolation (see Dobzhansky, Genetics and the Origin of Species, 1937:230), although itself physiological in nature. Such non-genetic mechanisms, while presumably of relatively temporary nature, theoretically precede the rise of genetic isolation within populations (*op. cit.*:256).

Whereas the foregoing discussion has been focused on the homing reactions of certain corvids in winter, the widespread occurrence of homing phenomena suggests that similar isolating mechanisms may occur in other species.

SUMMARY

The ravens in the vicinity of Tomales Bay, Marin County, California, roost together in a brushy canyon on a small hill near Valley Ford, Sonoma County, during the fall and winter months. During the day the birds disperse over the surrounding country, some of them apparently travelling at least forty miles in a day. The colony numbered about 200 birds on the two times that counts were made. It has probably been in existence for at least nine years, quite possibly much longer.

The maintenance of the colony as a unit is attributed to a homing reaction similar to that postulated by Emlen as limiting the mid-winter distribution of crows.

The possibility that such a reaction may act in some cases as a non-genetic isolating mechanism was raised and briefly discussed.

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