

THE STATUS OF WINTERING CANADA GEESE AT QUAIL HILL*

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ABSTRACT

The Quail Hill/Sand Canyon Reservoir area in Irvine is an important wintering ground for two subspecies of Canada geese, *Branta canadensis moffitti* and *B. c. taverneri*. Except for a flock at Seal Beach in 1986, this is the only population of Canada geese wintering recently in Orange County. The birds roost at the reservoir and forage during the day at Quail Hill and several other nearby sites. Urbanization has destroyed most nearby goose habitat and potential habitat, and continued alteration or destruction by developments, some already proposed, could seriously affect the population. From 4,150 geese in 1988, the population declined to 1,350 in 1989, possibly from habitat loss here or from changing conditions along migration routes. Management of the area should include preserving the known roosting and feeding sites, eradicating invasive exotic plants, restricting places and times for public access, and weighing the potential impact of proposed developments nearby. Banding and tagging should be initiated to allow monitoring and in-depth investigation, and foraging preferences should be determined.

INTRODUCTION

Quail Hill and the adjacent Sand Canyon Reservoir form an important foraging area for a wintering population of Canada geese. Two subspecies have been observed there, Western, or Great Basin, Canada geese (*Branta canadensis moffitti*)

and Taverner's Canada geese (*B. c. taverneri*), the former more common.

Canada geese in North America are divided into twelve subpopulations, based on their primary regions of breeding and wintering (Bellrose, 1980). In addition, there are eleven subspecies, or races, differentiated by size, coloration, variations in vocalization, and location of breeding areas (Bellrose, 1980). Canada Geese wintering in Southern California are part of the intermountain population, consisting mostly of *B. c. moffitti*. The subspecies breeds throughout central and southeast British Columbia, Washington, Oregon, northern Utah and Nevada, and northeast California. Primary wintering areas for this population include central California, western Nevada, Washington, and Oregon (Hanson, 1965; Bellrose, 1980).

The Western Canada goose is distinguished from other subspecies by its relatively light coloration and its large size, males averaging 10 lb (4.5 kg). The Taverner's Canada goose averages 6 lb (2.7 kg) and has a darker back and breast (Yocum, 1972).

The Sand Canyon Reservoir/Quail Hill population of Canada geese is one of only two groups wintering recently in Orange County (Nelson, 1986). The number using the study area is believed to have increased between 1976 and 1986, although no figures are recorded (Nelson, 1986). Another flock, of approximately 2,000 geese, wintered on the Seal Beach Naval Weapons Center in 1986 (Nelson, 1986).

Because of the importance of this area to wintering Canada geese, the Irvine City Council is considering plans for future management of the Quail Hill area (Bowler et al., 1988). Although as a species Canada geese are not threatened, increased habitat destruction has altered and reduced historic wintering and breeding areas.

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Continued urban development and agricultural expansion threaten many small regional populations that may be forced to seek less disturbed areas for feeding and nesting.

The purpose of this study was to census Canada geese intering in Irvine and to identify sites of primary use for foraging and night-time roosting. It was not a comprehensive study of the Sand Canyon Reservoir/Quail Hill Canada goose population, but was designed to add to the baseline data for this population and to help provide a basis for future investigations and management.

STUDY AREA

The principal area of interest, Quail Hill, covers approximately 100 to 120 hectares (ha) located north of Sand Canyon Reservoir in Irvine, California (Figure 1). This area, between the Sand Canyon Avenue and University Drive exits of Interstate-405 (San Diego Freeway), was until recently mostly pasture.

The Quail Hill area and land extending south along the eastern side of the Sand Canyon Reservoir are owned and managed by the Irvine Company. Cattle grazed on all parts of the study area during our census. Non-native grasses were the dominant plants, presumably as a result of past

cultivation and disturbance (Bowler et al., 1988). Wild artichoke (*Cynara cardunculus*), an invasive exotic species, has multiplied rapidly over the past several years (Fred Roberts, University of California at Irvine, personal communication).

Sand Canyon Reservoir, managed by the Irvine Water District, is a 19-ha impoundment bordered on the west by the Turtle Rock housing development and by Irvine Company land on the south and east. Other areas included in the study's regular census route were the Laguna Reservoir, William Mason Park and adjacent golf courses, the San Joaquin Marsh Wildlife Refuge, Upper Newport Bay, and other pasture or cultivated fields between Sand Canyon Reservoir and Upper Newport Bay.

METHODS AND MATERIALS

Counts and searches were conducted at various times of the day between 14 January and 19 March 1989. Direct observations were made with 7 X 35 binoculars and a 20X spotting telescope. Weekly dawn counts were made at Sand Canyon Reservoir. In addition, the other likely foraging areas were checked for geese.

Weekly observations at Sand Canyon Reservoir typically began a half hour before the first morning light. Counts were made as relatively small groups

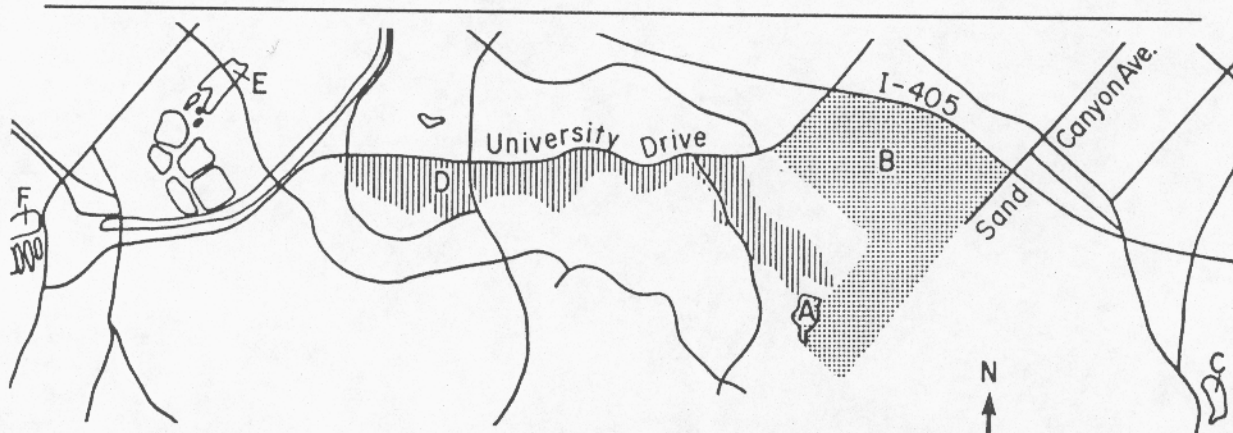


FIGURE 1. Canada goose wintering areas in Irvine, California, 1989. A, Sand Canyon Reservoir; B, Quail Hill; C, Laguna Reservoir; D, William Mason Park; E, San Joaquin Marsh Wildlife Refuge; F, Upper Newport Bay. A and B were the primary foraging sites of wintering geese in 1989.

of geese flew off the reservoir to foraging sites. By beginning observations before departure and continuing until all geese were gone, we believe fairly accurate counts were obtained, more so than from those counts made when the entire population was dispersed, moving and foraging across the fields.

RESULTS AND DISCUSSION

Census

The Sand Canyon Reservoir/Quail Hill population peaked at approximately 1,350 geese between 29 January and 12 February (Table 1). Since this study was not initiated until mid-January, the arrival date of the geese in Orange County is not known. Previous studies, however, have suggested that arrival on wintering grounds occurs mid-November (Nelson, 1986; Garrett and Dunn, 1981). Departure of the majority of the population occurred between 27 February and 3 March, after which approximately 50 geese remained in the area. By 8 March, just three geese were left.

Peak numbers were significantly lower than those previously reported. Nelson (1986) observed high counts of approximately 2,500 geese in the same study area in 1986. The 1988 census of the California Department of Fish and Game recorded a high of 4,150 geese (Bowler et al., 1988).

The decline in the 1989 winter population could reflect several factors. The entire study area was used for cattle grazing at times between January and March. Whether the presence of cattle adversely affected goose foraging is unknown. However, geese were observed actively feeding in the vicinity of cattle several times and did not appear disturbed by their presence. Cattle grazing may have reduced the availability of forage crops if they fed on the same plant species as the geese or if the cattle trampled or destroyed preferred forage plants.

Loss of other nearby wintering habitats may also explain the reduction in numbers of Canada geese in 1989. Agricultural expansion between Sand

Canyon Avenue and Laguna Canyon Road has caused geese to abandon historic goose-foraging areas (Nelson, 1986). Sand Canyon Reservoir was the only night-resting area used by geese in 1989, although Nelson (1986) had previously identified Laguna Reservoir as a secondary night-resting area. New farms and a new tree-and-shrub nursery probably disturbed the habitat enough for the geese to abandon the area. Garrett and Dunn (1981), who attributed the decline of California bird populations mainly to habitat loss or altera-

TABLE 1. Counts of Western Canada Geese in the Sand Canyon Reservoir/Quail Hill area of Orange County, California, 1989

Date of Count	No. of Geese Observed
14 Jan	935 ²
15 Jan	418 ²
18 Jan	785 ²
19 Jan	0 ³
21 Jan	1,102 ¹
26 Jan	0 ³
28 Jan	180 ³
29 Jan	1,330 ¹
04 Feb	948 ²
06 Feb	70 ³
10 Feb	31 ³
12 Feb	1,350 ¹
19 Feb	250 ³
20 Feb	1,045 ¹
25 Feb	1,030 ¹
26 Feb	600 ³
03 Mar	51 ³
08 Mar	3 ¹

¹Numbers are believed to reflect accurate counts of all geese in the Sand Canyon Reservoir/Quail Hill population.

²Census figures reflect incomplete counts resulting from departure of some geese from Sand Canyon Reservoir before observations began.

³Census figures underestimate the population as a result of unlocated foraging flocks, incomplete searches, or both.

tion, noted a general decrease in the numbers of wintering birds the state's coastal slope since the early 1900s. In 1989, groups of only 30 to 50 geese were observed at other Orange County sites, including the Bolsa Chica wetlands in Huntington Beach; the agricultural fields at the Seal Beach Naval Weapons Center, where 2,000 Canada Geese were recorded in 1986 (Nelson, 1986); and Rattlesnake and Siphon Reservoirs in the El Toro area (Esther Burkett, personal communication).

Other possible explanations for the reduced population were unusual weather and habitat conditions along the migration corridor. Mild weather in northern locations may have allowed geese to obtain food where, normally, low temperatures and snow cover make this impossible. Other researchers have found that weather conditions affect timing of migration onset and migration patterns (Koerner et al., 1974; Grieb, 1970; Craighead and Stockstad, 1956). Utah, a possible breeding area for the Irvine geese, experienced a mild fall followed by an early winter, with snow and low temperatures. All geese left the breeding area after the snowfall (Tom Aldrich, Utah Division of Wildlife Research, personal communication). Aldrich, reporting large numbers of geese in Arizona, suggested that some geese may have overwintered in Arizona rather than completing the migration to Orange County. "Short-stopping," remaining at areas along the migration route, is a fairly common phenomenon among other migratory populations of Canada geese (Raveling, 1978).

Raveling (1978) also noted that geese respond to creation or restoration of habitat along migration routes, altering typical timing or paths of traditional migrations. Bellrose (1968) suggested that the ability of geese to adapt to new refuges and new foraging areas had resulted in dramatically altered migration routes, and he predicted that changes would continue to occur.

To what degree any of these possible explanations were a factor in the low numbers of the 1989 Canada goose population in Irvine remains unknown without further investigation.

Locations of Night-Resting and Foraging Sites

As mentioned above, Sand Canyon was the only Orange County night-resting area for Canada geese in 1989. After morning departures from the reservoir, the majority of the flock flew directly to pasture fields along the north side of Quail Hill, between the University Drive and Sand Canyon Avenue exits of Interstate-405. This (Figure 1) was the most heavily used foraging site.

Several times, small flocks flew south and southeast from Sand Canyon Reservoir to pasture fields and hillsides along the southeast edge of the reservoir (Figure 1). This group may have been a subflock made up of family groups; family unity in wintering populations and loyalty of family groups to traditional foraging sites have been well documented in other populations (Raveling, 1969a; Raveling, 1969b). Other daytime foraging areas included an abandoned crop field at the San Joaquin Marsh Wildlife Refuge (on the northeast side of Campus Drive) and, once, the Rancho San Joaquin Golf Course (at the corner of University Drive and Harvard Avenue) (Figure 1). Twice, flocks of 30 geese were observed at mid-day at Upper Newport Bay (Kevin Cavanaugh, Environmental Field Studies Program, Orange County Department of Education, personal communication). And on several mornings, flocks departed from the south end of the reservoir and flew west between the hills. We could not determine their destinations, but the San Joaquin Marsh Wildlife Refuge and Upper Newport Bay are in that general direction.

Movements of foraging geese during the day were not well followed. Since not all geese were readily seen during mid-day searches, some secondary foraging sites were probably overlooked. At least some geese returned to the reservoir during the day to rest and forage nearby. From physical evidence in the field and from several later observations, it seems likely that hillside pastures east of the reservoir's south end (Figure 1) were important foraging sites.

Daily Activity Patterns

Daily activity patterns were consistent with those observed by Nelson (1986). Geese spent the night along the shorelines of Sand Canyon Reservoir, and as the sky grew light, groups congregated out in open water. At the same time, vocalizations and wing stretching occurred. Within approximately 30 minutes the first flock of geese took flight, the initial departure triggering others until all were gone. The last departure took place 20 to 45 minutes after the first. Between 2 and 125 birds made up each flock. Other investigators have reported correlations between weather conditions (e.g., the amount of cloud cover and temperature) and the time and duration of morning departure. According to Raveling et al. (1972), overcast skies delay the time of the first departure and extend the duration of the subsequent departure period.

The geese spent most of each day foraging in pasture fields, but some daytime movement occurred between the foraging sites and the reservoir. As observed by Nelson (1986), returning flights of varied-sized flocks began at sunset and continued into darkness.

Tagged Geese

Many Sand Canyon Reservoir/Quail Hill geese had leg-bands, probably attached at their nesting grounds. Unfortunately, it was not possible to read the numbers on the leg bands. One goose, bearing a yellow plastic neck collar with black coding YC38, had been banded, neck-collared and identified as an immature female on nesting grounds in Farmington Bay, Utah (at the south end of the Great Salt Lake) in June 1988 (Tom Aldrich, personal communication). As geese generally exhibit a high degree of cohesiveness to their regional flocks, it is probable that a number of the Sand Canyon Reservoir/Quail Hill geese came from the same nesting area of Utah.

MANAGEMENT

The Sand Canyon Reservoir/Quail Hill area supports a relatively large population of wintering

Canada geese because it can provide both a night-resting site and adequate nearby foraging areas. These geese represented the only significant wintering group in Orange County in 1989 (Esther Burkett, personal communication). As wintering populations of Canada geese have been declining on California's coastal slope (Garrett and Dunn, 1981), the preservation of even small flocks is vitally important. The relatively undisturbed reservoir, with its restricted public access and large expanses of nearby open space, offers refuge and food for wintering geese. However, the apparent decline in the 1989 population may be a response to increased urban development and habitat loss to agriculture. Proper resource management of the Sand Canyon Reservoir/Quail Hill area is essential if the area is to continue supporting wintering Canada geese.

In addition to providing habitat for Canada geese, this area supports other wild birds, including ducks and waterfowl, ospreys, raptors, warblers, and cormorants. Two white pelicans, unusual in Southern California except at the Salton Sea, were observed using the reservoir for at least 2 weeks. The area is, indeed, an important resource for Orange County wildlife at a time when open space and green corridors in urban areas are rapidly disappearing.

Continued alteration or destruction of habitat in the study area could seriously affect the overwintering goose population. Restriction of public access to forage sites and to the reservoir from mid-November to late March is essential for minimizing disturbance of goose flocks.

Proposed developments, such as golf courses on the study areas (Bowler et al., 1988), should be considered with extreme care. Not only would such a development cause further habitat loss to the geese, but it may also invite the well-known problem of "nuisance geese" that exploit the fertilized golf courses, parks, and lawns of cities (Laycock, 1982; Conover and Chasko, 1984).

The inclusion of an observation site in the area's management plan is strongly recommended. Wintering geese in Irvine are a source of pride to

many residents, and during every period of observation at the Sand Canyon Avenue off-ramp, the investigator was approached by at least one person who had come to observe them. These people were curious about the birds and about the research project, sometimes relating stories about the geese of past years. Some watched the geese every week. Reporters and photographers also responded positively to the presence of the geese, and articles about the birds appeared in two regional newspapers.

Much research is still needed to answer questions about the Sand Canyon Reservoir/Quail Hill Canada geese. The origin of the flock, its status, and its migration routes all affect management of the geese. It is also necessary to learn more about the food and space requirements for a goose population of this size. An inventory of plants on the study area has been conducted (Bowler et al., 1988), but a study of foraging preferences is necessary to determine whether the habitat meets all nutritional requirements of a wintering population.

Leg-banding and tagging with visible identification codes (e.g., neck collars) would allow researchers to monitor movements on the wintering grounds more easily and to identify other foraging sites. Sightings of neck collars would also provide information about migration routes and breeding sites. The California Department of Fish and Game would like to trap and tag geese next winter in a cooperative effort with the City of Irvine (Greg Gerstenberg, California Department of Fish and Game, personal communication). Knowledge gained from such an effort would allow a more informed management of this valuable resource.

SUMMARY

1) About 1,350 western Canada geese (*Branta canadensis moffitti*) overwintered in Irvine in 1989. Sand Canyon Reservoir was the only site used for night-resting; adjoining pastures and nearby fields of Quail Hill provided the main foraging sites.

2) The wintering population at Sand Canyon Reservoir/Quail Hill declined from 2,500 in 1986 and 4,150 in 1988 to the present size of 1,350. Possible causes of decline include habitat loss from development and agricultural expansion, and altered migration patterns from climatic or habitat conditions on migration routes.

3) The San Joaquin Marsh Wildlife Refuge and Upper Newport Bay provided secondary foraging sites.

4) There is significant public interest in Irvine's Canada geese.

5) Future efforts should involve banding and tagging, to allow in-depth investigation and monitoring of movements on the wintering area. Tagging would also provide useful information about the source of the flock, its migration routes, and its breeding grounds. It is also important to identify foraging preferences of wintering geese, to allow proper management of the area. The California Department of Fish and Game has expressed an interest in a cooperative research project with the City of Irvine to provide a basis for management plans.

6) Management efforts should concentrate on maintaining and preserving habitat components essential to the geese. Exotic plants (e.g., wild artichoke) that threaten to alter the pastures should be eradicated, while preferred grains and grasses should be encouraged. Foraging areas need to be protected and public access prohibited during winter months. A public observation site would minimize disturbance while allowing increased public appreciation for Irvine's unusual wildlife resource. Any proposed developments (i.e., golf courses, houses, etc.) on the foraging grounds surrounding and adjacent to the Sand Canyon Reservoir should be considered carefully. Such developments would no doubt have a detrimental affect on Irvine's wintering goose population.

7) The Sand Canyon Reservoir/Quail Hill site provides an important habitat at a time when open spaces are rapidly disappearing. This site

provides habitat essential to an uncommon Orange County wildlife species, the Western Canada goose. The area also supports many other interesting wildlife species.

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