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Wintering Gyrfalcon *Falco rusticolus* Habitat Utilization in Washington

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ABSTRACT

Washington State is a wintering area for Gyrfalcons *Falco rusticolus*, which occur here each winter, although in very low numbers. This is a preliminary report of studies in progress on habitat and prey utilization. Radio-telemetry was used to assist observation. Three Gyrfalcons were radio-tagged in different parts of the state, reflecting different kinds of habitat. Results show that Gyrfalcons in western Washington use agricultural areas near estuaries, where they feed primarily on waterfowl. In eastern Washington they use agricultural areas which support large numbers of upland birds and/or Rock Doves *Columba livia* which the Gyrfalcons select for prey. Home range was determined using harmonic mean measure of activity for each radio-tagged Gyrfalcon.

INTRODUCTION

The Gyrfalcon *Falco rusticolus* is the largest species of falcon in the world. It breeds in the Arctic, generally above 60°N latitude. While not as migratory as the arctic Peregrine Falcon *Falco peregrinus tundrius*, some Gyrfalcons do move into southern Canada and northern USA during the winter. The species occurs in very low numbers in Washington State.

Nevertheless, its presence is not irregular. A Gyrfalcon collected on 18 December 1896 (Sloanaker 1926) was the first known Washington record and reports of sightings have continued up to the present. Although in some winters the number of reports is very small, evidence suggests that Gyrfalcons occur in Washington each year.

Little work has been published on the Gyrfalcon in North America, especially on its wintering habits. No studies have been published on the wintering habitat utilization in the southern limits of its range and the importance of southern winter habitat is not known.

Platt, in his studies of the Arctic winter Gyrfalcon population (1976), showed that only a portion migrates. Some remained at the nest sites in the Yukon throughout the winter despite apparently extreme conditions (-40°C). Of 31 nests known to have been active in the Yukon in summer 1973 or 1974, 17 were occupied in January and/or February 1975. Of 18 Gyrfalcons seen in that study, all but one could be aged and were found to be adults. Of those seen in January, 6 were males and 1 a female. In February, 6 males and 5 females were seen. So it appears that both adult males and females may stay in the Arctic, although Platt suggested that adult females may move away from the nest site before January and return in February.

Platt further suggested that most of the Gyrfalcons moving south are non-breeding juveniles and subadults. He showed that 77% of 31 sightings reported from southern British Columbia and the United States were juveniles. He explained that Gyrfalcons may gain an advantage over other raptors competing for nest sites by remaining for the winter in the Arctic and thereby being first at the nest site when weather permits breeding. The adults are able to subsist on Ptarmigan, but the less experienced juveniles benefit by going south, where prey is more abundant and conditions less severe. It then follows that a large proportion of the non-breeding Gyrfalcon population may be supported in winter by habitats south of 60°N latitude.

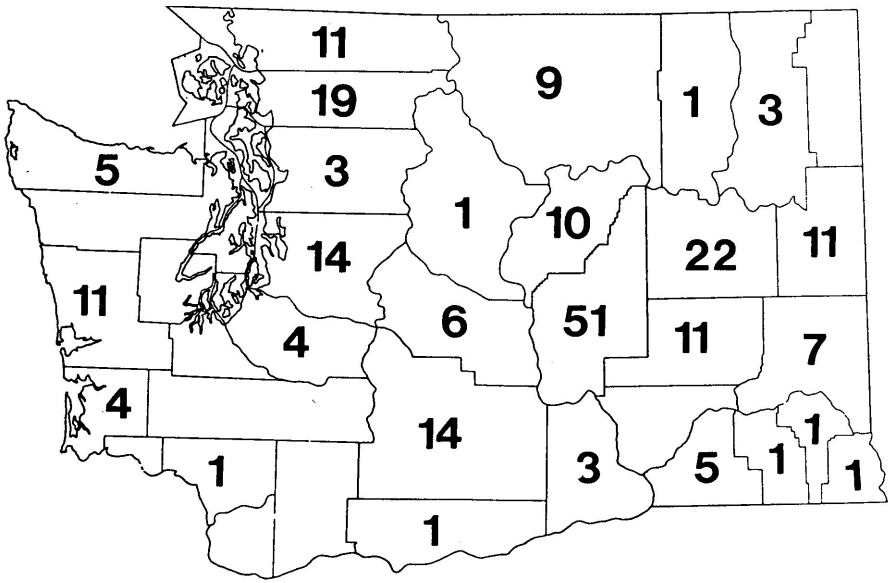


Figure 1: Distribution of all Gyrfalcon sightings reported for Washington 1896 to 1985. Numbers are county totals.

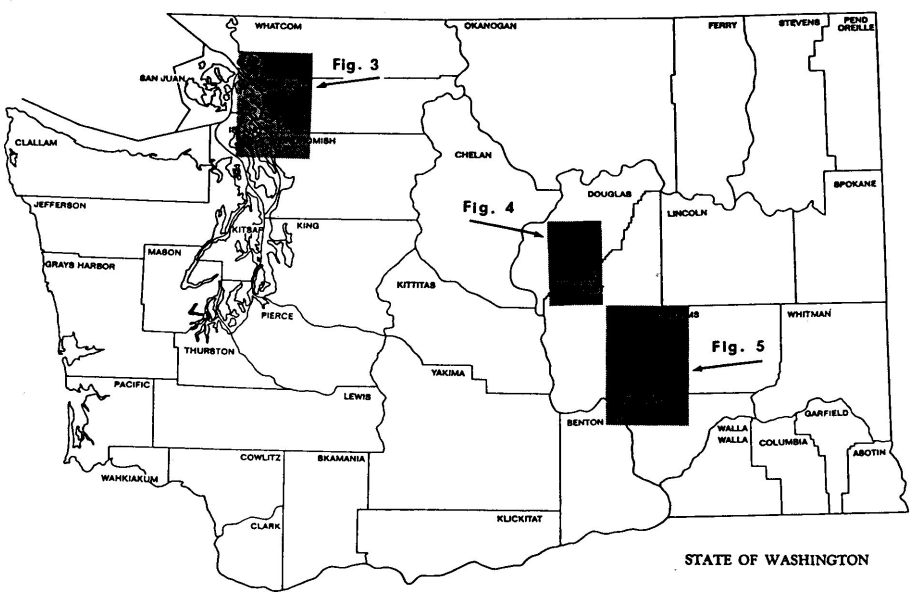


Figure 2: Map of Washington showing the areas of study. The shaded areas are the locations of Figs 3-5.

Incidental sightings compiled by the Washington Wildlife Department Data Storage and Retrieval System show that the Gyrfalcon is found in many parts of the state. Figure 1 shows the distribution of 230 sightings reported between 1896 and 1985. On the basis of their frequency, the major Gyrfalcon habitat is found in the Columbia Basin in the eastern counties, and in the Puget Trough in the western counties. Wahl (1972), describing wintering Gyrfalcon habitat in western Washington, stated that Gyrfalcons are found near open river deltas where waterfowl and gallinaceous birds are available. Gardner (1975) suggested that in eastern Washington the Columbia Basin irrigation project has created Gyrfalcon wintering habitat, stating that the agricultural lands and the new ponds and waterways formed by the irrigation runoff provide food and cover for waterfowl and upland birds.

This study used radio-telemetry to study wintering Gyrfalcons in Washington. The objectives were to determine movements of wintering Gyrfalcons, the kinds of habitats selected, the kinds of prey selected, and the size of the home range of individual birds. This report gives a preliminary summary of two years of data. At least one more year of study is planned.

STUDY AREA

Washington State is located at 47°N latitude in the north-western corner of the United States. It is divided east and west by the Cascade Mountains. The western part is characterized by moist forests and dominated by the Puget Sound - a body of saltwater reaching 150km inland and surrounded by many rivers and streams, estuaries and lowlands. The eastern part is largely a cold desert surrounded by pine forest in highlands north and east. The Columbia River winds through the desert, and flat plains and rugged canyons combine to form a varied landscape. Irrigation has facilitated the transformation of much natural habitat into cropland and has added many small ponds, lakes and wasteways.

The purpose was to study Gyrfalcons in different kinds of habitat in different parts of the state. The actual study area was determined in large part by where Gyrfalcons could be found and captured. Figure 2 shows the areas where this was done.

METHODS

Gyrfalcons were located by searching likely habitat. Standard falconry techniques were used to capture the birds (Beebe & Webster 1964), each of which was weighed, measured and fitted with a tail-mount transmitter glued to a single central rectrice with quick setting epoxy cement, a modification of the technique used by Dunstan (1973). Two of the tail-mount packages weighed about 12g each. One tail-mount package weighed about 20g. One bird was also fitted with a backpack transmitter after it dropped the tail-feather package five days into the study. The backpack weighed 29g and was held on by teflon tape in a manner similar to Dunstan (1972, 1977).

The radio-tagged birds were followed by use of radio-telemetry, their activities recorded and the times noted. Any sighting was considered a unique "observation" when separated by at least 5 minutes from the previous sighting. When a Gyrfalcon was seen with prey, an attempt was made to collect the prey remains after it had finished and departed.

Home ranges for the radio-tagged birds were calculated using the harmonic mean measure of activity method (Dixon & Chapman 1980) and the computer programme developed by Samuel *et al.* (1983). Calculations were weighted by time, with a maximum of one record for each half-hour interval within an observation. Each observation was given at least one record, regardless of its duration.

RESULTS

Three Gyrfalcons were radio-tagged and studied. All were females - two adults and one immature. Table 1 shows the capture dates and last location for each of the three. Table 2 gives the measurements taken from the birds at the time of capture.

Table 1: Capture dates and duration of study for each of the three Gyrfalcons studied.

ID Number	Sex	Age	Capture date	Final date	Total
4738	F	Ad	7.1.85	5.2.85	29 days
5097	F	Ad	10.1.86	21.2.86	43 days
5022	F	Imm	4.2.86	28.3.86	52 days

Table 2: Measurements of Gyrfalcons captured in Washington. Length in centimetres, weight in grams.

ID Number	Wing Chord	Tail	Middle Toe	Weight
4738	40.7	23.1		1819
5097	40.2	21.2	4.2	1554
5022	38.8	21.6	4.0	1588

Patterns of use

Each of the three Gyrfalcons studied was located in a separate area. Figures 3-5 show the location of their home ranges. In each case the total home range contained 95% of the records. The core area (contour A in Figures 3-5) is defined as the maximum area where the observed utilization distribution exceeds a uniform utilization distribution (Samuel *et al.* 1983).
A rigorous evaluation of the habitat component for each home range has not been completed but the areas are described in general terms in this preliminary report.

Gyrfalcon 5022 was found on a major estuary in northern Puget Sound. Figure 3 shows the home range occupied by this bird. The core area equalled 13,639ha and the total home range 35,430ha. This area is largely agricultural land, with much dairy farming and large pastures, bordered by salt water and tidal marsh and divided by the Samish and Skagit Rivers.

Gyrfalcon 5097 was found using the canyon lands in part of one of eastern Washington's major coulees. Figure 4 shows the home range occupied by this bird. The core area equalled 1,708 ha and the total home range equalled 5,753ha. While some agriculture is carried on here, the area is primarily range and pasture. A large cattle feed lot is located in the coulee and attracts several thousand Rock Doves *Columba livia.* The home range of this falcon is shown in Figure 4 as three disjunct areas. This is likely an artifact related to the problems associated with tracking in roadless canyon land, and the area between should be considered part of this bird's home range, thereby somewhat increasing its size.

Gyrfalcon 4738 was found using an agricultural area in what is probably one of the best Gyrfalcon habitats in the state. Figure 5 shows the home range occupied by this bird. The core area equalled 27,012 ha and the total home range 73,117 ha. It is largely composed of irrigated cropland broken by ditches and wasteways. The croplands include cornfields that provide food for a large number of Ring-necked Pheasant *Phasianus colchicus.* The wasteways often provided abundant cover of Cattail *Typha latifolia* near the croplands, increasing and concentrating the number of pheasants.

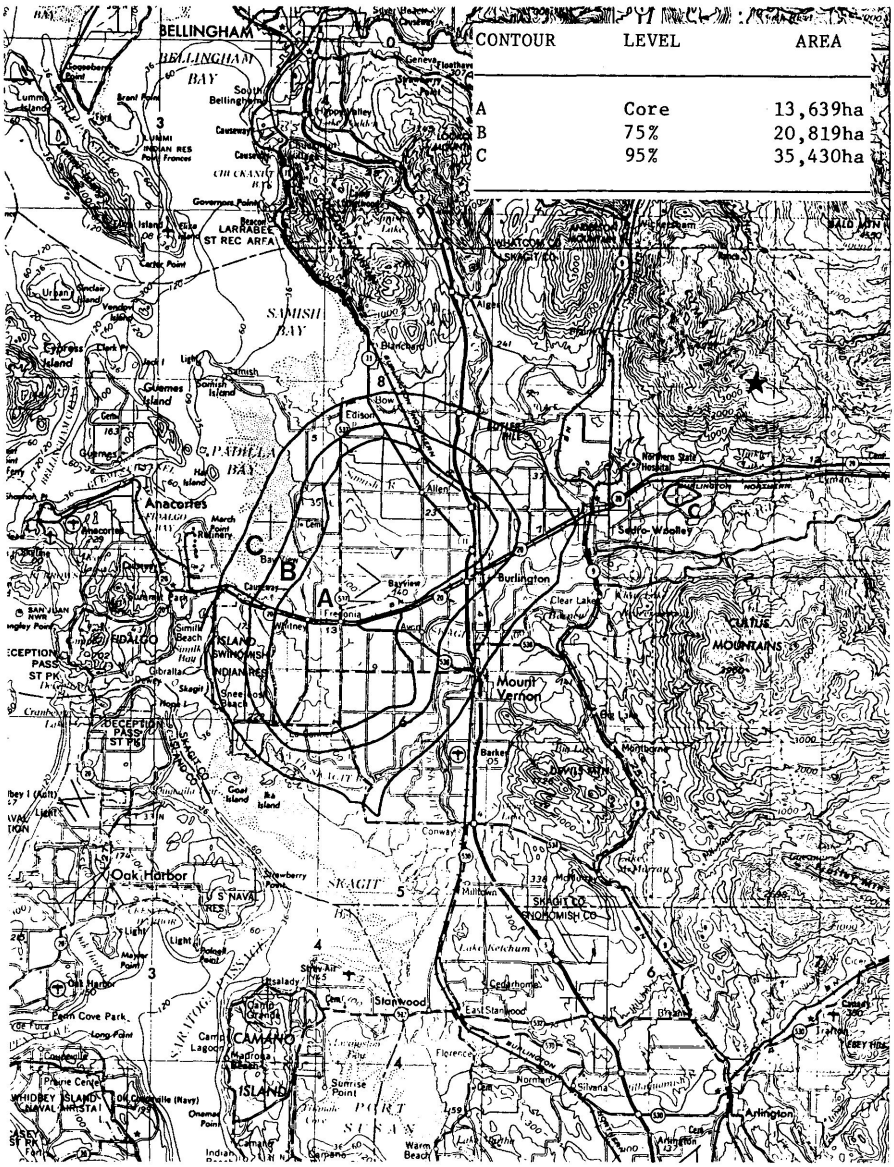


Figure 3: Home range of Gyrfalcon 5022. The star shows the area used regularly as a night roost.

Perches

Figure 6 shows the perches used. Each bird showed different perch selection patterns. Bird 4738 used utility poles 67% of the time; Bird 5022 used fence posts over 54% of the time; the remaining bird, 5097, used utility poles 36%, fence posts 28% and cliffs 23% of the time. This last bird frequently used one particular fence post on the top of the 150m high canyon wall. This perch was included in the fence post classification.

Prey

Figure 7 shows the prey selected by each Gyrfalcon. Both successful and unsuccessful hunting attempts were combined in the figure. Bird 4738 selected pheasants 50% of the time. The only

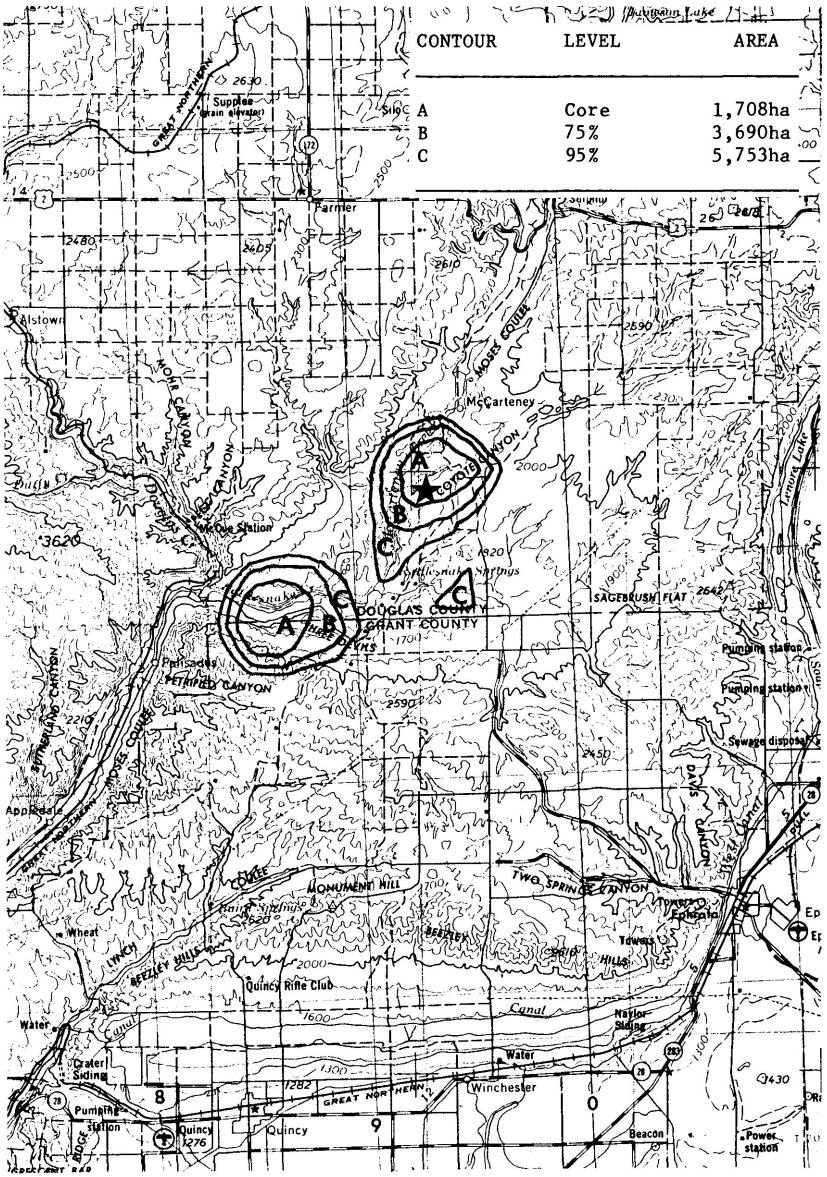


Figure 4: Home range of Gyrfalcon 5097. The star shows the area used regularly as a night roost.

other species with over 10% occurrence for this bird was the Rock Dove. Bird 5022 showed a definite preference for waterfowl, with all waterfowl species combined making up 71% of the hunting attempts. Bird 5097 was difficult to observe and most of its hunting attempts could not be followed, so that most of the time the species selected was unknown. In cases where the species was known, Gray Partridge *Perdix perdix* and Rock Dove occurred with equal frequency.

Piracy

Piracy was an important factor for two of the birds studied. It was a rare thing to observe Bird 4738 feeding on a kill. However when this occurred it was common for pirates to be on the scene within

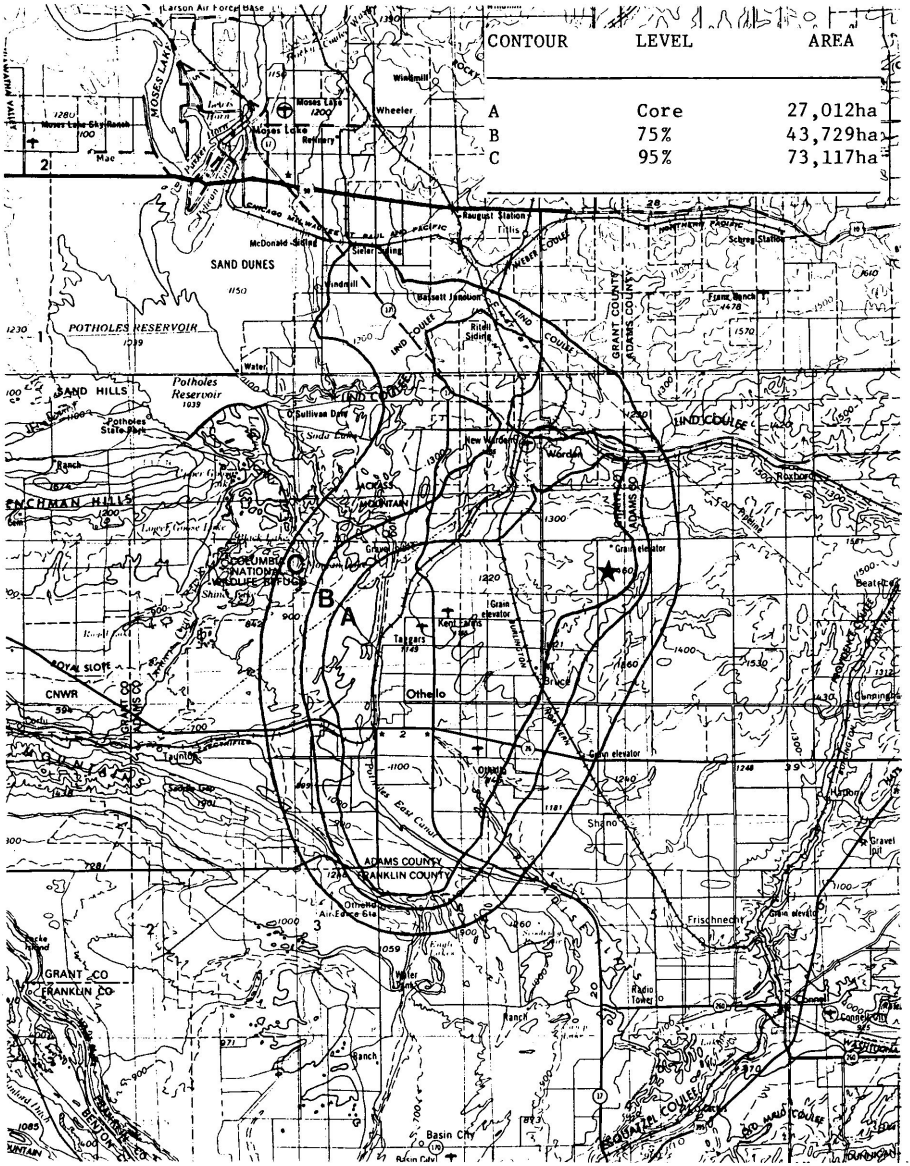
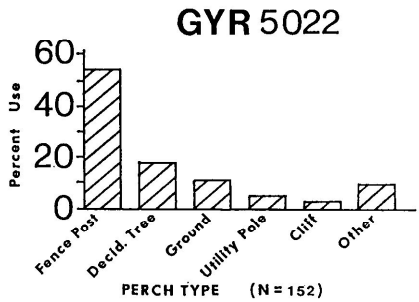
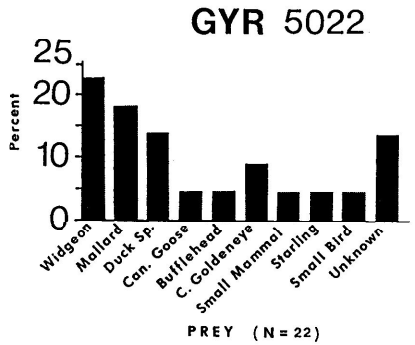


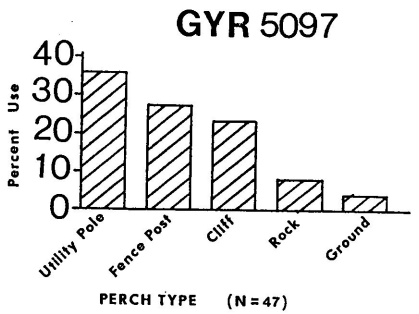
Figure 5: Home range of Gyrfalcon 4738. The star shows the area used regularly as a night roost.

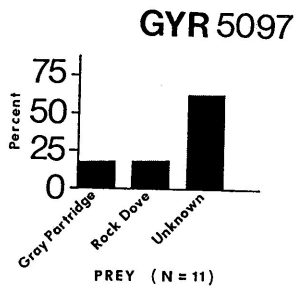
a few minutes. Successful piracy of 4738 was observed on three occasions, twice by Red-tailed Hawks *Buteo jamaicensis* and once by a Rough-legged Hawk *Buteo lagopus.* While an individual Rough-legged Hawk was able to take prey from 4738, more often several Rough-legged Hawks would gather around and each attempt to take the prey. The Red-tailed Hawk showed more confidence and aggression when pirating prey than did the Rough-legged Hawk.

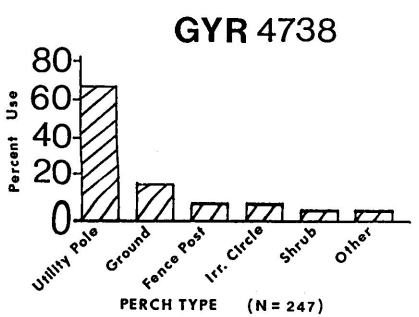
For Bird 5022 the same scenario applied, although the Bald Eagle *Haliaeetus leucocephalus* was also a dominant factor and could take prey from her or any other raptor without much show of resistance. In one case 5022 caught a common Goldeneye *Bucephala clangula.* Within 3 minutes two Rough-legged Hawks were present and one took the kill. One minute later a Bald Eagle took the duck from the Buteo. Within minutes a second Bald Eagle took the prey from the first. Piracy of











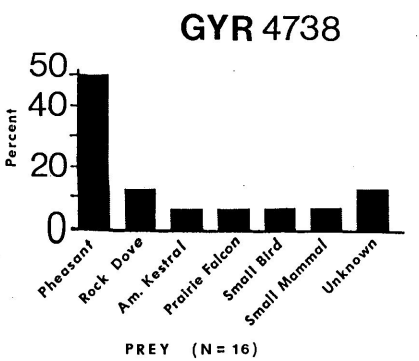


Figure 6: Perches selected by each of the Gyrfalcons studied in Washington. The Y axis is percentage use determined separately for each individual.

Figure 7: Prey selected by each of the Gyrfalcons studied in Washington. The Y axis is percentage occurrence determined separately for each individual.

the duck from the Buteo. Within minutes a second Bald Eagle took the prey from the first. Piracy of 5022 was observed six times; three times by Rough-legged Hawks, one time each by a Red-tailed Hawk, a Bald Eagle and another Gyrfalcon.

The remaining bird, 5097, although only observed on a kill a few times, evidently was not bothered by pirates. It is likely that the area was not conducive to piracy.

Roosts

Figures 3-5 show the known roost locations for each of the radio-tagged Gyrfalcons. The night roost used most often by Bird 4738 was a winter wheatfield, where she perched on the ground. She returned to the same location night after night and would fly to an area near the boundary of a ploughed field and a stubble field. Although her exact position was difficult to discern, she some-

times perched in the ploughed field, sometimes in the stubble. Neither offered much obvious protection, although the field contours formed a slight gully. On several occasions she spent the night on an irrigation circle. This was not typical for her, and may have been chosen to allow her to return early to a kill site, as appeared to be the case in at least one incident.

Bird 5022 travelled about 20 miles from her hunting area to reach her preferred roost site, a hilltop on a ridge north of the Skagit River. The exact location was never determined with certainty, so the micro-habitat type is unknown. The area was forest land, with extensive clear cuts. It is likely that she roosted in a cut-over area above the snowline. The snow made close approach impossible. Several times she remained within her hunting area and roosted on a fence post.

Bird 5097 was located only two times on a roost site - a cliff within the coulee used as a hunting area.

DISCUSSION

Gyrfalcons in Washington use a variety of habitats, ranging from broad coastal estuaries to steep eastern Washington canyon lands. Like other raptor wintering areas in Washington, their common feature is the abundance of prey. The prey selected by the Gyrfalcons generally exceeded 500g and were found in situations which allowed the falcon to capitalize on its formidable power of direct pursuit.

When hunting pheasant or other upland game, a Gyrfalcon typically would watch a cornfield, or similar area, from a perch a mile or more away. Seeing a pheasant, it would begin a long low flight to where the pheasant was seen, flush it, sometimes changing direction in the process, and then pursue and overtake the fleeing bird.

Waterfowl were often pursued in a similar manner. The hunt might begin with a Gyrfalcon leaving a perch as the duck flew overhead. The Gyrfalcon would fly after it, closing the distance, and attempt to snatch it from behind.

Rock Doves were pursued by Bird 4738 as they were passing the canyon walls of the steep coulee on their way to feed at the cattle yard. When this occurred, the Gyrfalcon would attempt to outfly a selected victim, with climbing flights and vertical stoops, as the dove tried its best to outmanoeuvre it.

The size of the home range varied widely for the different habitats. The largest was 73,100ha; the smallest less than one-tenth the size, 5,700ha. One reason for this considerable difference relates to prey distribution.

In both the coastal estuary (habitat for Bird 5022) and the agricultural area (habitat for Bird 4738), the habitat was to some degree locally "homogeneous". Waterfowl in the coastal estuary, and pheasants in the agricultural area, could be found throughout most of the respective localities. The Gyrfalcons radio-tagged in these two areas had home ranges of comparable size.

By contrast, the bird using the canyon land was feeding on prey concentrated into a very narrow area. Not only were the Rock Doves being drawn into the cattle feed lot, but extreme weather had forced the upland birds out of the surrounding rangeland. The Gray Partridge and Chukar *Alectoris graeca* were concentrated along the coulee. Here grain was available, while the snow was not as deep as above and was broken up somewhat by livestock. Very little prey were available away from the canyon, and prey near it were vulnerable and abundant.

One important finding is worth noting. While the home ranges of at least two of the birds were very large, and while the ability of the Gyrfalcon to cover distance very rapidly was clearly demonstrated, each radio-tagged bird showed no tendency to abandon its wintering area. From the time of capture to the time when they could no longer be found, their activities conformed to a consistent pattern, each remaining in the general area of its original capture. Two of the birds, and likely all three, returned most nights to the same preferred roosting area. Within this pattern, hunting activities would shift to capitalize on prey availability, but only within the bird's individual home range.

The study ended for two of the birds (4738 and 5022) when the transmitters were lost. An airplane search for 5097 was unproductive a few days after the last known observation of it. While not the only possibility, it is likely that this bird, an adult, had left the area shortly after February 22 1986, perhaps on its northward migration.

The data so far collected in this study indicate that the Gyrfalcon in Washington is not a wandering vagrant, but a winter resident which selects a home range in an area of prey abundance and remains until late February or later. It is found in widely different habitat in the state, from coastal estuaries to desert canyons. An individual Gyrfalcon may hunt over a very large area, but will typically return at night to the same roosting area.

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