Hawk Mountain Sanctuary Association 10th Annual Award for Raptor Research - The Hawk Mountain Sanctuary Association is accepting applications for its 10th annual award for raptor research. To apply for the $750 award, students should submit a brief description of their research program (5 pages maximum), a curriculum vitae, and 2 letters of recommendation **by 15 October 1986 to Stanley E. Senner, Executive Director, Hawk Mountain Sanctuary Association, Route 2, Kempton, Pennsylvania 19529.** The Association's Board of Directors will make a final decision early in 1987. Only students enrolled in a degree-granting institution are eligible. The award will be granted on the basis of a project's potention to improve understanding of raptor biology and its ultimate relevance to the conservation of North American raptor populations.

Leslie Brown Memorial Grant (Deadline Extended) — The Raptor Research Foundation, Inc., announces the availability of a $500 grant to provide financial assitance to promote the research, or the dissemination of information, on birds of prey. applicants must send a resume (vitae), specific study objectives, an account of how funds will be spent, and a statement indicating how the proposed work would relate to other work by the applicnat and to other sources of funds. Proposals concerning African raptors will receive highest priority between proposals of otherwise equal merit.

Application material must be received by **7 November 1986.** Proposals, donations and inquiries about tax-exempt contributions to the fund should be sent to: **Dr. Jeff Lincer, Chairman, RRF Leslie Brown Memorial Fund, 4718 Dunn Drive, Sarasota, FL 33583, U.S.A.**

THESIS ABSTRACTS

The Biogeochemistry of Peregrine Falcon Feathers

Secondary remiges were collected from 92 Peregrine Falcon *(Falco peregrines)* nestlings in the summer of 1979 and 1980 at 1 West Greenland and 4 North American breeding localities. This study's purpose has been to determine if natal origin of peregrines could be identified using feather trace element quantities obtained by instrumental neutron activation analysis (INAA). Gamma-ray spectra analysis of irradiated feather samples identified 14 trace element quantities present in the distal most feather portion. Multivariate discriminant function analysis of spectral data provided a means of separating Peregrine Falcons from 5 breeding localities into groups of similar natal origin.

Twenty-two additional feather samples were collected from migrant peregrines at South Padre Island, Texas and Mobile Point, Alabama during autuminal migration periods. Trace element analysis of migrant peregrine feather samples and comparison with nestling peregrine feather sample analyses provided a method potentially useful in predicting natal origin of North American migrant peregrines with substantial accuracy. Variation in prediction capability results when groupings of selected traced element quantities are utilized in formulating predictive multivariate discriminant functions.

Trace element analysis of feathers using INAA provided an effective means of identifying levels of environmentally harmful elements such as Mercury which could adversely affect population densities in remote regions of the peregrine's range. As peregrine wintering locality studies by others expand in Latin America, similar "ground truth" data from feathers grown by peregrines in these regions will enhance isolating discrete wintering localities of remote northern breeding populations, information vital to overall management of this endangered species. **Parrish, J.R., M.S. Thesis, Univ. of Alabama, Tuscaloosa. Thesis directed by D.T. Rogers, Jr., 1983.**

Some Aspects of the Reproductive Biology of Tundra Peregrine Falcons

A dense, productive population of tundra peregrine falcons *(Falco peregrinus tundrius)* was studied over five years on a 450 km^2 study area located along the northwest coast of Hudson Bay. The number of territorial pairs varied over the years from 17 to 26. A mean internest distance of 3.3 km represents a nesting density for the population that is among the highest on record for the species. Morphometric and plumage characteristics of adults in the study population

suggest clinal variation between populations of *F.p.tundrius* from north and *F.p. anatum* to the south. Pairs of falcons nested on cliffs of less than 30 m in height. Most nest cliffs had a southern exposure, but pairs nesting at north-facing sites did not suffer lower reproductive success. Falcons arrived on the breeding grounds before most migratory prey species (mid-May) and left the area before October. Mean date of clutch initiation over three years was June 7, but this date was significantly delayed in one year of poor spring weather (relatively lower temperatures and high precipitation).

Nineteen species of birds and three species of mammals were used as prey by the study population; however, in most years the bulk of the diet consisted of six species of birds and one mammal. A dramatic increase in the number of territorial pairs of falcons, coupled with changes in various measures of reproductive performance, in a year of high microtine rodent abundance suggests that the use of mammals by falcons can be siginficant in some years.

In most years, successful pairs produced about 35 young, or about two young per occupied territory per year. The sex ratio of nestlings was not significantly different from equality. Despite changes in reproductive performance noted in a year of high prey abundance, there were no significant differences among years in clutch size, brood size, or number of young fledged per territorial pair.

Mean clutch size (3.62± 0.59) was comparable to that for peregrine populations from both arctic and more temperate latitudes. Mean brood size (2.79± 0.78) was most similar to that reported for populations in the central Canadian arctic and Greenland, but was also similar to, and even greater than, that from other populations at more temperate latitudes. Earlier suggestions by some authors that peregrines lay fewer eggs in the arctic part of their range was not supported by data from the study population.

Twenty-nine separate nesting territories were used in the five years of the study. Territories were held by adult peregrines in all cases. The oldest female on territory was at least five years old, the youngest was three. The oldest male was at least five years old, the youngest was two. Annual turnover of adults was estimated to be 25% (males 16%, females 30%). Maximum annual mortality was estimated to be 23% (males 16%, females 27%). Peregrines showed a high degree of fidelity to previously used nest sites; movement between territories was recorded only once.

Peregrines competed intensively for nesting territories early in the spring, but competition dropped off as breeding commenced. For the most part, territorial interactions were sex specific. Males were more territorial than females in terms of interaction rate and in the distance to which they would pursue intruders. Observation of territorial interaction, and evidence of the existence of non-breeding, non-territorial adults, suggested that the breeding density of the falcon population was limited by a shortage of nesting habitat created through territoriality. Apparent change in territory size in a year of high prey abundance supports the hypothesis that expressions of territoriality and territory size in birds are often mediated by food supply.

Total and partial nesting failures were recorded in the study population. Ten percent of all territorial pairs failed to lay. Failure of territorial pairs to lay accounted for 41% of all failures. Losses of entire clutches accounted for 48% failures, while losses of complete broods made up only 11% of failures. Seventy-four percent of all territorial pairs were successful in fledging young. Peregrines managed a full hatch with 44% of all clutches. At successful nests, hatching success (% of all eggs to hatch) was 87% and nestling mortality (% of all young hatched that do not fledge) was 14%.

Female peregrines on nesting territories for the first time appeared to lay later, had significantly smaller clutches, but did not show a difference in the number of young fledged when compared to females with greater experience on nesting territories. Falcon pairs nesting in close proximity or in areas of higher intraspecific nesting density did not show lower clutch size, hatch success, or number of young fledged, suggesting that the effect of intraspecific strife on reproductive success was negligible.

Asynchronous hatching was commonly observed in the study population. An investigation of the effects of hatch asynchrony on reproductive success, conducted over two years, showed that 7% of all chicks produced died as a result of brood reduction associated with asynchronous hatching. Most chicks that died were the last-hatched in asynchronous broods of four; about half of the last-hatched members of these broods died within their first five days of life. Mortality occurred through starvation. Surviving last-hatched members of asynchronous broods of four did not show significantly different growth rates compared to other chicks from different hatch positions. Mortality did not appear related to the food available to the parents, but to the inability of last-hatched young to compete with older siblings during feedings. Differential survival of last-hatched chicks in asynchronous broods was linked to differences in the attentiveness of adult females (feeding rate and time spent brooding), prey size, and possibly, nest ledge size. Asynchrony of hatching and brood reduction observed in the study population did not suggest an adaptation in keeping with the brood reduction hypothesis.

Court, Gordon S. 1986. Thesis. Department of Zoology, University of Alberta, Alberta T8A, IV7, CANADA. Present address: 913 Alder Avenue, Sherwood Park, Alberta, CANADA T8A 1V7.