PIITAISTAKIS-SOUTH LIVINGSTONE SPRING 2010
WITH REPORTS AND ANALYSES FROM MOUNT LORETTE AND STEEPLES

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Summary and highlights

This was the 3rd consecutive spring count at Piitaistakis-South Livingstone which provided the lowest Golden Eagle (2185) and combined species (3039) count there so far with 15 of 18 species occurring in below average numbers. Immature:adult ratios for both Bald and Golden Eagles were low and compare very closely with those at Mount Lorette. This was the 3rd consecutive extended comparison count at Mount Lorette, and the 18th since complete counts started there in 1992. It produced the first increase in Golden Eagle numbers in 4 years, but the projected count of 1289 birds is still only 31% of the average 1993-5 counts at the site, and the strong declining trend for the species since 1996 is unaffected. A first extended spring reconnaissance count at Steeples Ridge in BC on the western flanks of the Rocky Mountains at the same latitude as Piitaistakis-South Livingstone yielded high age ratios for both Bald and Golden Eagles so different from those of the Alberta sites that it raises fundamental questions about the relationship of eagles moving on the western and eastern flanks of the Rockies.

Introduction

The Piitaistakis-South Livingstone site is located at the southern culmination of the north-south oriented Livingstone Range, which is itself the southernmost range of a series of Front Range ridges that originates near the Yukon/BC border in NE British Columbia. The site is north of Bellevue and east of Frank, both towns in the Municipality of The Crowsnest Pass in SW Alberta. The map reference is 0691258 5498619 and the elevation of the site is 1900 m above sea level. Starting in 1998 reconnaissance counts of 3 to 9 days were conducted at the site in the fall by Doug and Teresa Dolmen, and a single day count there on October 8 2000 yielded 1071 Golden Eagles which remains the world single-day record count for the species. I conducted the first season-long fall count at the site in 2006 which yielded 7217 migrant raptors of 17 species including 4400 Golden Eagles. A 30-day comparison count at our traditional site at Mount Lorette yielded significantly fewer migrants of all species and as a result we decided to repeat the Piitaistakis-South Livingstone count in 2007 and subsequently made it the principal RMERF observation site in both spring and fall. The 2007 fall count produced 8289 migrant raptors of 17 species which is the highest count ever conducted in western Canada, and included a world-record season count of 5445 Golden Eagles. In 2007 we decided to add the name Piitaistakis to South Livingstone, the name that we had used

previously, to recognize the traditional Piikani (Blackfoot) name for the ridge which means, appropriately, Place of the Eagles.
Members of the Crowsnest Conservation Society conducted reconnaissance counts in the spring of 2007 that established the practicality of conducting spring surveys at the site, and in 2008 the first season-long systematic count was conducted with 4204 migrant raptors of 18 species counted in 84 days (975.5 hours) including 2981 Golden Eagles. The spring 2009 count at the site yielded 3,837 migrant raptors of 18 species in 87 days (993 hours) of which total 2737 were Golden Eagles. The spring 2010 count was the 3rd season-long count at the site and was conducted on 88 of a possible 96 days (1,105 hours) between February 15 and May 21. The number of days and hours are 2.92% and 3.1% above the 2008-9 average for the site and both are records for the site. The count yielded 3039 migrant raptors of 18 species which is by far the lowest of the 3 spring counts at the site and 24.41% below the average of the previous two years. Extended periods of high winds and thick snow cover meant that only 5 days, May 12-13 and 17-20, were spent on the Piitaistakis Ridge. On the remaining 83 days (February 15-May 11, May 14-16 and May 21) counts were conducted from the Valley View site located west of the ridge at 0688713 5499273 at 1425 m in the Valley Ridge Estates development in the community of Frank. For the 3rd year in a row an extensive comparison count was conducted at Mount Lorette where 46 days (519 hours) of observation yielded 1312 migrant raptors including 1160 Golden and 88 Bald Eagles, and for the first time an extensive spring reconnaissance count was conducted at Steeples Ridge on the western flank of the Rocky Mountains at almost the same latitude as the Piitaistakis-South Livingstone site. This count lasted 48 days (213 hours) and yielded 816 migrant raptors of which 534 were Golden Eagles and 218 Bald Eagles.

Weather
Of the 96 possible observation days, 8 full days were missed because of inclement weather (snow fell all day on February 17, 25, March 9, April 12, 13, 28 and 29, and May 5 and 6) and a further 7 days (March 29, April 11, 14, 23, and May 3, 4 and 8) were significantly reduced by snow. A total of 15 days (15.62%, compared to last year's record 18%) were therefore either lost or significantly reduced. On 33 active observation days (38.37%) we experienced some form of precipitation which was principally snow but also included hail, rain, and a thunderstorm on May 18. The predominant wind directions at ridge level on active observation days were W-NW (35.2%), W (29.5%), W-SSW (8%), N (5.7%), E-S (5.7%), E-N (4.5%) variable (8%) and undetermined (3.4%). On active observation days wind speeds were moderate to strong (11-80+ km/h) 30.7% of the time, moderate (11-40 km/h) 25%, light to moderate (1-40 km/h) 23.9%, light (1-10 km/h) 8%, strong (41-80+ km/h) 6.8%, light to strong (1-80+ km/h) 3.4% and undetermined (2.3%). Temperatures ranged from a low of -9.5°C on February 22 to a high of 20.5°C on April 17. On only 2 days did the temperature fail to rise above freezing (compared to 17 such days last year). Seven active observation days (8%) had maximum cloud cover of 40% or less including 2 days (March 6 and April 21) when it was cloudless all day. A total of 76 active observation days (86.4%) experienced a cloud cover of between 70 and 100% all day, including 6 (6.8%) with 100% cloud cover all day, and 25 days (28.4%) experienced at least 1 hour of cloudless conditions. In general it appeared that the weather conditions did not significantly affect raptor migration during

February and March, but had a significant negative affect on movement during April and May.

General flight dynamics

During the spring 2010 season observers counted a total of 3039 migrant raptors of 18 species on 88 days (1015 hours) of a possible 96 days between February 15 and May 21. This is the third consecutive spring at the site that all 18 species of diurnal raptor occurring in Alberta have been recorded. The combined species total is the lowest ever at the site and is 24.4% lower than the 2008-9 average. Migrant raptors were recorded on 81 of the 88 active field days with February 15, 19, 20, March 29, April 11 and May 4 and 8 lacking migrant raptors. Only 7 days saw the passage of at least 100 migrants compared with 16 in 2008 and 8 last year, and the highest single-day count was 259 on March 23 compared to a maximum count of 201 in 2008 and 364 last year. The combined-species monthly counts were a site-high150 in February (+31.58% compared to the 2008-9 average), 2149 in March (-14.86%), 498 in April (-50.42%) and 242 in May (-35.98%). The March total reflects a poor Golden Eagle passage (-18.75%), but above average passage of most other species, while the April and May totals reflect poor numbers for nearly all species.

The percentage composition of the flight with the 2008-9 average in brackets was Turkey Vulture 0.23% (+31.43%), Osprey 0.66% (+20%), Bald Eagle 13.03% (+17.28%), Northern Harrier 0.66% (-19.02%), accipiters 6.02% (-22.67%), buteos 5.99% (-9.04%), Golden Eagle 71.9% (+1.1%), falcons 1.15% (-15.75%) and unidentified raptors 0.36% (-28.71%). It is interesting to note that despite the low count of Golden Eagles, the species comprised about the same percentage of the total flight as in the previous two counts. Of the other groups only Bald Eagle formed a significantly higher percentage of the total flight, while accipiters and buteos were significantly lower. Only 2 species had their highest spring counts at the site this spring: Broad-winged Hawk (13, +73.3%) and Rough-legged Hawk (39, +85.7%), while Turkey Vulture (7) equaled the average count at the site. All other species occurred in lower than average numbers, with 13 species registering their lowest spring counts ever at the site: Osprey 20 (-9.09%), Bald Eagle 396 (-11.2%), Northern Harrier 20 (-38.5%), Sharp-shinned Hawk 82 (-49.4%), Cooper's Hawk 17 (-41.4%), Northern Goshawk 84 (-32.8%), Red-tailed Hawk 121 (-45%), Ferruginous Hawk 5 (-54.5%), Golden Eagle 2185 (-23.58%), Merlin 11 (-47.6%), Gyrfalcon 1 (-80%), Peregrine Falcon 4 (-42.9%) and Prairie Falcon 14 (-12.5%), the other species being Swainson's Hawk 4 (-11.1%) and American Kestrel 5 (-9.09%).

The combined species median passage date of March 21 is 3 days earlier than the average of the last 2 years, with 10 species occurring earlier than average, 4 occurring later, 1 coincident with average and 3 species having insufficient numbers (<5) to calculate a median date.

The final count was Turkey Vulture 7, Osprey 20, Bald Eagle 396, Northern Harrier 20, Sharp-shinned Hawk 82, Cooper's Hawk 17, Northern Goshawk 84, *Accipiter* sp. 6, Broad-winged Hawk 13, Swainson's Hawk 4, Red-tailed Hawk 121, Ferruginous Hawk 5, Rough-legged Hawk 39, *Buteo* sp. 2, Golden Eagle 2185, eagle sp. 3, American Kestrel 5, Merlin 11, Gyrfalcon 1, Peregrine Falcon 4, Prairie Falcon 14, *Falco* sp. 0, indeterminate raptor 0 for a total of 3039 migrant raptors.

Species Accounts

Golden Eagle A total of 2185 birds were counted on 76 days between February 16 and May 21, with a highest single-day count of 218 on March 23 (Figure 1). The total is the lowest ever at the site (-23.57%) and is 244 less than that of last year (-8.19%). It is the second lowest ever complete RMERF count (the lowest being 2141 at Mount Lorette in 2007) and is 34% below the 1993-2007 average for the species at Mount Lorette. 2010 was the 8th consecutive RMERF spring count below 3000 for the species, and 8 of the 10 counts of less than 300 birds since 1993 have occurred since 2003. The highest daily count of 218 is 45.8% below the Mount Lorette 1993-2007 average high count and is the second lowest ever recorded after 192 at this site in 2008. Only 4 days had counts exceeding 100 birds (and 2 of these were counts of 101) and only the highest count day saw passage of over 200 birds. The monthly counts (with variance from last year in brackets) were 56 in February (+13.13%), 1783 in March (-18.75%), 258 in April (-48.04%) and 88 in May (-25.74%). Adverse weather probably accounts for much of the low counts in April and May when most raptor species occurred in significantly lower than average numbers, but during March (which usually accounts for around 80% of the total Golden Eagle count), Golden Eagle was the only species that occurred in significantly lower than average numbers. The highest hourly cumulative count (Mountain Standard Time) was1500-1600 (342 birds) followed by 1400-1500 (299) and 1600-1700 (291). The highest single-hour count was a relatively low 54 between 1500 and 1600 on March 23. Only 2 birds moved before 0700 and none were recorded after 1900 (Figure 2). The flight comprised 1809 adults, 189 subadults, 161 juveniles and 13 birds of indeterminate age yielding an immature:adult ratio of 0.2 which is 12.5% lower than the 2008-9 average and results mainly from the low number of juvenile birds counted this year. This is the first time ever that subadult birds have outnumbered juvenile birds on an RMERF spring count and the juvenile:adult ratio of 0.09 is 37.93% lower than the average of the last two years. The median passage date for the species was March 20 (1 day earlier than average), for adults March 18 (2 days earlier) and immatures April 6 (13 days earlier). As with last year the lower age ratio and the significantly earlier immature median passage date may both probably be related to the low April count (a month when most of the immature birds migrate) which could suggest that birds may have been taking a different route during this period. Relative to the Mount Lorette long-term (1993-2007) data the age classes were 2 days early (species), 3 days early (adults) and 9 days early (immatures) suggesting that the overall flight dynamic for the species and adult birds may, in fact, have been close to average for all but immature birds.

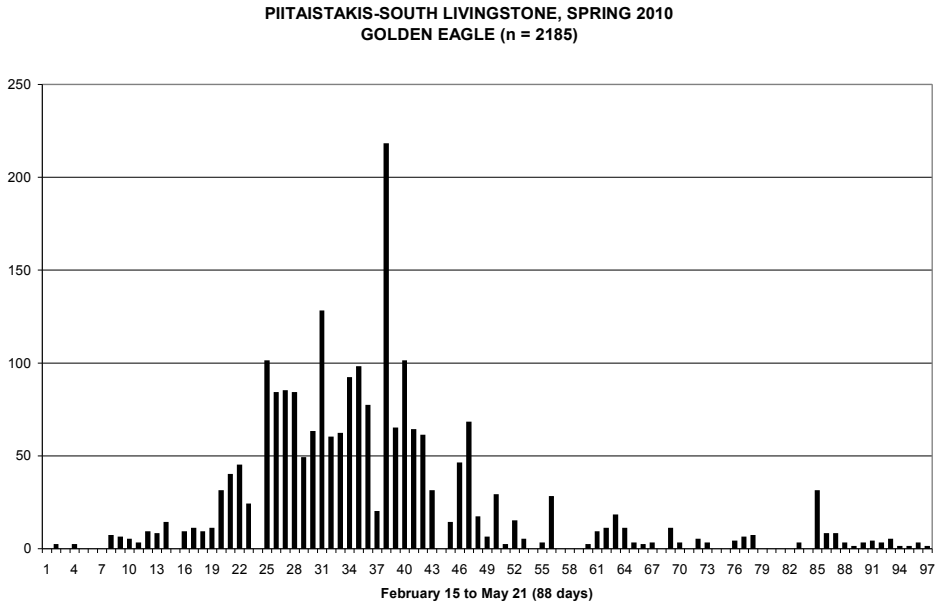

Figure 1

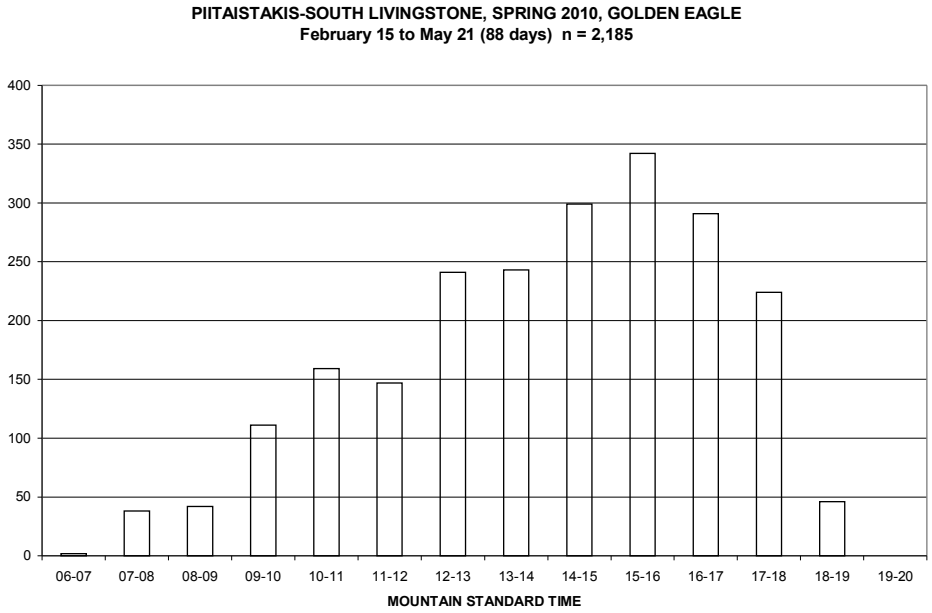

Figure 2

Bald Eagle The total count of 396 counted on 66 days between February 18 and May 21 is the lowest ever at the site and 11.21% below the 2008-9 average even though the occurrence days were 2.33% above average and the highest count of 29 on March 23 was only -6.9% below average. The monthly counts (with variance from average in brackets) were a record 75 in February (+33.9%), 240 in March (+6.19%), 61 in April (-57%) and 20 in May (-9.09%) suggesting that weather in April and May diminished the latter part of the movement. The flight comprised 286 adults, 59 subadults, 47 juveniles and 2 indeterminate immature birds giving an immature:adult ratio of 0.37 almost identical to last year's ratio and 8.82% higher than average. The median passage date for the species

was March 16 (9 days earlier than average), for adults March 13 (6 days earlier) and for immatures March 23 (13 days earlier), the dates mainly reflecting the poor April passage.

Turkey Vulture The count of 7 adult birds on 6 days between April 21 and May 16 was the second highest RMERF count ever behind the 8 counted here in 2008, with 2 of the birds occurring on April 29. The species median passage date of April 29 was 11 days earlier than average, reflecting a record count of 5 birds in April.

Osprey The count of 20 birds on 11 days between April 19 and May 14 was the lowest ever at the site but only 11.21% below average. It is of note that the first occurrence of the species here for the last three years has been April 20, 18 and 19 respectively. The highest single-day count was 7 on May 9, which is the highest ever recorded on a RMERF count, and coincides with the species median passage date which is 9 days later than average.

Northern Harrier After last year's record count of 37 birds, this year's total of 20 was by far the lowest at the site and 38.46% below the average of the last 2 years. Birds moved on 17 days between March 24 and May 18 with a highest single-day count of only 3 on April 18. The flight comprised 10 adults (6 males, 4 females), 1 undifferentiated female/juvenile bird and 9 juveniles giving an age ratio of 0.9, and the highest single-day count was 3 on April 18. The species median passage date was April 21, 9 days earlier than average, adults were 15 days earlier than average on April 10, and juveniles were 11 days later than last year on May 10. The monthly counts were 2 in March (+300%), 10 in April (-41.2%) and 8 in May (-46.7%).

Sharp-shinned Hawk We counted a site low 82 birds on 29 days between February 28 (the earliest record ever at the site) and May 21 which is 49.07% below average. The monthly counts were 1 in February, 6 in March (+50%), 35 in April (-50.7%) and 40 in May (-53.5%). The highest single-day count was only 12 on April 17 (47.83% below the average high count of the last two years). The flight comprised 35 adults, just 14 juveniles and 33 birds of indeterminate age, and the immature:adult ratio of 0.4 is 45.21% below average. The median passage date for the species was April 26, 8 days earlier than average, for adults April 22, 8 days early and for juveniles May 16, 2 days early.

Cooper's Hawk This was also a record low count for the site, with just 17 birds recorded on 11 days between April 15 and May 19 (-41.38%) with a daily high count of only 3 on April 17 and 23. The April count of 12 was actually 14.3% above average, but the May count of just 5 birds was 72.2% below average. The flight comprised 9 adults, 4 juveniles and 4 birds of indeterminate age gave an immature:adult ratio of 0.44, 6.02% above the average of the last two years. The median passage date for the species was April 23, 12 days earlier than average, adults were 7 days early on April 22 and there were not sufficient juvenile birds to establish a median date. The early median passage dates reflect the extremely low May passage.

Northern Goshawk This was by far the lowest count at the site (-32.8%) with only 84 birds recorded on 39 days between February 16 (the earliest ever at the site by 2 days)

and May 15. The highest single-day count was 8 on March 25 and 26. The flight comprised 70 adults, 8 juveniles and 6 birds of indeterminate age, giving an immature:adult ratio of 0.11 which is 52.17% below the average of the last two years. As with the previous two species the median passage dates were all much earlier than average, the species being 12 days early on April 6, adults 4 days early on March 28 and juveniles 22 days early on May 9. This again reflects poor late season movement with a record 7 birds moving in February (+180%), 57 in March (+9.62%, and only 1 less than the highest monthly count), 17 in April (-64.6%) and only 3 in May (-86.7%).

Broad-winged Hawk There was a remarkably concentrated movement of 13 birds between May 10 and 15 to produce the highest ever spring RMERF count which was 73.33% above the site average. The highest daily count was a record 5 on May 10. The flight comprised 10 light morph birds (7 adults, 1 juvenile and 2 of indeterminate age) and 3 dark morph adult birds, giving an age ratio of 0.1%, 80% below the average ratio of the last two years. The species median passage date was May 11, coincident with the average date, with adults1 day late on May 11: there were insufficient juvenile birds to establish a median date.

Swainson's Hawk Four light morph birds (3 adults and 1 of indeterminate age) moved on 4 days between May 9 and 17. The count is the second highest at the site but is 11.11% below average following last year's record count of 7 birds. There were insufficient birds to establish an age ratio or median passage dates.

Red-tailed Hawk It was another record low count for the site with just 121 birds passing on 37 days between March 22 and May 19, the total being 45% below the average of the last two years. The highest single-day total was only 8 on March 31 and April 17 which is 72.41% below the average high count at the site. The flight comprised 107 birds ascribed to the race *calurus* ("Western Red-tailed Hawk") of which 95 were light morphs (74 adults, 16 juveniles and 5 indeterminate), 1 adult intermediate ("rufous") morph and 11 dark morphs (9 adults, 1 juvenile and 1 indeterminate); 9 birds were ascribed to the race *harlani* ("Harlan's Red-tailed Hawk") of which all were adults. The number of Harlan's Hawks was 10% below average. A further 4 birds were of indeterminate race and age, and 3 of these were dark morph birds. The overall immature:adult ratio was 0.18, 16.28% below the average ratio at the site. Monthly passage was a record 26 in March (+30%), and record lows in April (70: -53.9%) and May (25: -47.9%). The median passage date for the species was 2 days later than average on April 16, adults were 4 days early on April 7 and juveniles were 7 days late on May 15 at 14 of the total 19 juvenile birds recorded moved between May 9 and 19.

Ferruginous Hawk After two consecutive years of counts of 11 birds, this year's count of 5 on 3 days between March 14 (the earliest ever at the site) and May 17 was the lowest recorded at the site and 54.55% below average. The flight comprised 4 light morph birds (2 adults and 2 juveniles) and 1 dark morph adult bird, with the 2 juvenile birds recorded on May 17, 36 days after the last 2 adult birds were seen on April 1 which was also the species median passage date. The immature:adult ratio of 0.67 is the same as last year and 67.5% above the 2008-9 average ratio.

Rough-legged Hawk This was only one of two species recording site record counts this spring with 39 birds (+85.71%) moving on 24 days between February 21 (equaling last year's earliest ever date) and May 9 (equaling last year's latest ever date). The highest single-day count was 5 on February 26, the species median passage date was 1 day later than average on March 24, and the dark:light morph ratio was 30.91% below average at 0.19. The monthly counts were a record 9 in February (+100%), a record 17 in March (+88.9%), a record 12 in April (+71.4%) and 1 in May (+100%) equaling last year's total.

American Kestrel Only 5 birds were recorded on 4 days between May 9 and 17 with 2 of the birds occurring on May 17. The total is 9.9% below the average of the last two years, and the species median passage date of May 11 is 3 days later than last year. Four of the birds were female and 1 was a male.

Merlin Another record low count for the site with only 11 birds (-47.62%) moving on 8 days between March 23 and April 15. The flight comprised 5 birds assigned to the subspecies *F.c.columbarius* (2 adult males, 1 adult female, and 1 undifferentiated female/juvenile), 4 to the subspecies *F.c richardsonii* (3 adult males and 1 undifferentiated female/juvenile), 1 female/juvenile of undetermined race and 1 bird of undetermined race, age and sex. The median passage date of April 15 was 2 days earlier than average. Monthly passage was 3 in March (-25%), a record low 6 in April (-60%) and 2 in May is the same as the May count for the last two years.

Gyrfalcon Despite recording a record total of 10 birds last fall, only a single bird was seen this spring, an adult grey morph on April 18. The total was 80% below average at the site with the previous two spring counts having yielded 5 birds each.

Peregrine Falcon This was yet another record low count for the site, with only 4 birds (3 adults and 1 juvenile) moving on 4 days between May 7 and May 8. The total is 42.86% below average. The flight was too low to calculate median passage dates or an age ratio, but the 3 adult birds moved between May 7 and May 11, while the juvenile bird flew north on May 18.

Prairie Falcon Observers counted a site low total of 14 birds (-12.5%) that were considered as migrants, on 12 days between February 28 and May 19, with a highest single-day count of 2 birds on March 25 which was also the species median passage date, 12 days earlier than average. Once again the presence of at least one pair of resident birds near the site made distinguishing migrant birds difficult.

Mount Lorette Comparison Count This season RMERF members conducted a count at the Mount Lorette site between March 1 and April 15 to make a comparison with the concurrent season-long Piitaistakis-South Livingstone count. Observation occurred on all of the 46 days with only April 8 and 12 being significantly curtailed by snow. On four days the obscuring by low cloud of the ridges at the Hay Meadow site necessitated a move to the Lusk Creek site for part of the day: March 13 to 1200, March 30 to 1100, April 3 after 1030 and April 8 from 1100 to 1300. Snow or flurries persisted all day or for

most of the day on 8 days, and a further 3 days saw snow or flurries for part of the day. On March 24 fog developed after 1300 and persisted into the morning of March 25. The temperature low was -12°C on March 10 and 14, and on April 11 and on no days did the temperature remain below freezing although it only reached a high of 0°C on March 9, 10 and 28; the highest temperature recorded was 14°C on April 14 and 15 which were the last two days of the count. Ridge winds blowing between NW and SW predominated 87% of the time: W 34.8%, SW 26.1%, and NW, NW-SW, W-SW all 8.7%, while winds from N-E prevailed for only 13% of the time: N-NE 8.7% and E 2.2%; conditions were calm 2.2% of the time. These winds were assessed as moderate (11-40 km/h) 28.3% of the time, moderate to strong (11-80+ km/h) and light to moderate (1-40 km/h) both 26.1%, strong (41-80+ km/h) 10.9%, light to strong (1-80+km/h) 4.3%, light (1-10 km/h) 2.2% and calm 2.2%. Only 6 days (13.04%) had maximum cloud cover at or less than 40%, and 4 of these days (March 5, 6, 10 and April 10) were 0-10% (8.7%). Nine days (34.7%) experienced a cloud cover of between 70 and 100% all day, including only 2 (4.3%) with 100% cloud cover all day; the comparative figures at Piitaistakis-South Livingstone over the same period were 37% and 13% which included 3 full days lost to bad weather.

The 46 days (518.99 hours) at the site produced 1312 migrant raptors of 10 species of which 1160 (88.4%) were Golden Eagles and 88 (6.7%) were Bald Eagles. Including unidentified eagles the two eagle species comprised 96.01% of the total flight. It is interesting to note that the comparative figures for the 2009 count were a remarkably similar 88.29%, 7.61% and 96.4%. The other 7 species comprised only 3.89% of the flight (compared to 4.1% last year).

Migrant Golden Eagles were seen on 42 days (91.3%), and the count exceeded 100 birds on March 12 (129), March 15 (146) and March 23 (106). The highest daily count of 146 is the second lowest recorded at the site since 1993, the lowest being the107 recorded last year. The 3 lowest maximum counts have been recorded in the last 3 years all of which have been less than 200 birds, while the counts in 2006 (252) and 2007 (271) are the only other counts with maximum totals below 300 birds. On 4 other days the Golden Eagle count exceed 50 birds: 95 on March 21, 78 on March 14, 70 on March 17 and 53 on March 24.
The hourly cumulative distribution of Golden Eagle movement was atypical with the most productive cumulative hour 1200-1300 (MST) which saw the passage of 178 Golden Eagles, followed by 156 from 1300-1400, 143 from 1600-1700 and 134 from 1400-1500 (Figure 3). The most productive hour was 45 from 1200-1300 (MST) on March 15.

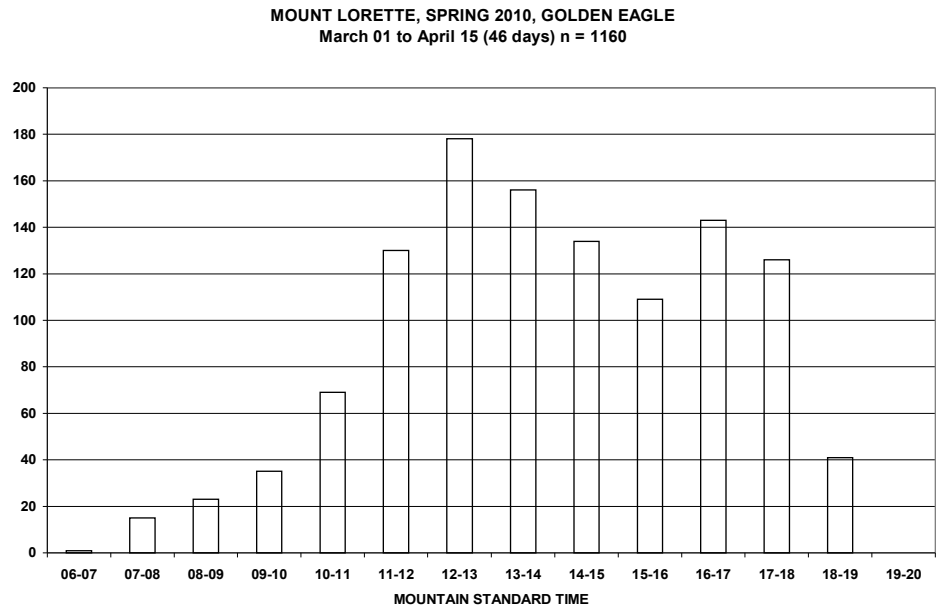

Figure 3

The Golden Eagle total of 1160 comprised 966 adults, 40 subadults, 33 juveniles and 121 birds of indeterminate age giving an immature:adult ratio of 0.08 and a juvenile:adult ratio of 0.03. The same time period at Piitaistakis-South Livingstone yielded 1967 Golden Eagles of which 1751 were adults, 145 were subadults, 63 juveniles and 8 were of indeterminate age, yielding an immature:adult ratio of 0.12 and a juvenile:adult ratio of 0.04. The age ratios between the two sites are closely comparable. Observers at Mount Lorette counted 88 Bald Eagles comprising 68 adults, 7 subadults, 7 juveniles, 5 undifferentiated immature birds and 1 bird of indeterminate age giving an age ratio of 0.28. At Piitaistakis-South Livingstone the 278 Bald Eagles counted in the same period comprised 208 adults, 35 subadults and 31 juveniles and 4 undifferentiated immature birds giving an identical age ratio of 0.28. No other species occurred in high enough numbers to make meaningful comparisons with Piitaistakis-South Livingstone.

The final count (with Piitaistakis-South Livingstone totals for the same period in parentheses) was 45 (43)days, 519 (503) hours: Turkey Vulture 0 (0), Osprey 0 (0), Bald Eagle 88 (278), Northern Harrier 1 (5), Sharp-shinned Hawk 1 (12), Cooper's Hawk 0 (1), Northern Goshawk 21 (61), unidentified *Accipiter* 1 (3), Red-tailed Hawk 14 (59), Rough-legged Hawk 7 (22), unidentified *Buteo* 2 (0), Golden Eagle 1160 (1967), unidentified eagle 12 (3), American Kestrel 0 (0), Merlin 1 (6), Gyrfalcon 1 (0), Prairie Falcon 1 (9), unidentified falcon 0 (0), unidentified raptor 0 (0), for a total of 1312 (2431) migrant raptors.

Projected Count and Discussion

Taking the ratio of Golden Eagles counted at Piitaistakis-South Livingstone from March 1 to April 15 (1967) to the final count total (2185) and applying it to the Golden Eagle sample count at Mount Lorette (1160), it yields a projected full count total of 1289 birds, which would be the second lowest count at the site ahead of the projected count of 997

last year. The average Golden Eagle count from March 1 to April 15 during full spring counts at Mount Lorette from 1993-2007 is 3143 so this year's count is 41% of the average 1993-2007 count for the period. As the average Lorette count over that time span represents 92.22% of the final total, the projected total for 2009 would be 1258 birds, 31 birds less than projecting from the Piitaistakis-South Livingstone count ratio. Either way a total of 1289 or 1258 Golden Eagles represent the second lowest count for the site in 18 years.

The projected totals of the last three years of reconnaissance counts at the site are the lowest 3 counts in 18 years. Do these counts represent the continuation of a spring declining trend seen at Mount Lorette since 1996 (see Figure 7) or can other factors be involved? Weather was not considered to be a significant factor in the 2008 count, and despite periods of bad weather in 2009 and especially during the first 9 days of the count, 21 of the 40 active days were described as having "Good viewing conditions". Counts at Piitaistakis-South Livingstone in 2008 and 2009 confirmed that around 93% of the Golden Eagle movement should be captured within the sample count period based on the 1993-2007 average for the period at Mount Lorette. For comparison in 1997 and 1999 the weather at Lorette was much worse than in 2009 and using comparisons from the Windy Point count conducted by Wayne Smith near the mountain front in the Sheep River Valley, it was clear that a much higher than average percentage of the population was diverted to the east. The counts on those two years, however, were 2461 and 2817 and represented the first counts ever under 3,000 birds. We have now gone 8 consecutive years (5 at Mount Lorette and 3 at Piitaistakis-South Livingstone) without a count exceeding 3000 birds and this year at Piitaistakis-South Livingstone the count was below 2200. The protocols and time spent at the site are unchanged in the last 3 years, the only difference being that I conducted most of the counts myself whereas during the last 3 years the principal observer duties have been shared between 16 observers whose experience and detection abilities obviously vary to a certain extent, but all of whom can be considered as competent observers. Some observers have been involved with the count for all 18 years of the project, and there appears to be no significant and systematic difference in the detection rates of the different observers. One difference, however, which may be significant, is that there was an increase in the number of single-observer days in 2008 and 2009 which may have lowered the detection rate of high-flying birds. In 2010, however, most days had 1 or 2 observers in addition to the Principal Observer at the site, and this may have contributed to the slight increase in the number of Golden Eagles this year. The close tallying of Golden and Bald Eagle age ratios between the two sites also strongly suggests that observer competence is not significantly affecting the count. The weather at Mount Lorette this year was also generally better than at Piitaistakis-South Livingstone, which probably contributed to the relatively higher count there this year.

The fact remains that during the first 3 full spring counts when all the observers (including myself) were relatively inexperienced, there were not many of us, our optical equipment was only average and the time spent in the field was much less than it is today, we counted 4140, 4213 and 4143 Golden Eagles. Even though the 2010 projected count of 1289 was this 292 more than last year (when the observation period was 2 days shorter) it still only represents 41% of the average March 1 to April 15 count at the site

(3143) between 1993 and 2007. Even if some birds continue to be missed it is difficult to believe that they are being systematically missed on such a massive scale.

Comparison of the spring 2008 counts at Piitaistakis-South Livingstone and Mount Lorette, March 1 to April 13

During the 46-day comparison period the Mount Lorette site recorded more Golden Eagles than at Piitaistakis-South Livingstone on 13 days with the most significant differences occurring on March 12 (129 cf 85), March 14 (78 cf 49) and March 15 (146 cf 63). On the other 10 days differences were small and often involved low counts at both sites. It is interesting to note that the ratio of the numbers of Golden Eagles counted at the sites in March (1051 cf 1783) and April (109 cf 184) is 0.59 in both cases. The overall 2010 ratio of 0.59 is the highest recorded in the 3 years of spring reconnaissance counts at Lorette and compare to ratios of 0.4 in 2008 and 0.36 in 2009. This year's high ratio can be ascribed to relatively poorer weather at Piitaistakis-South Livingstone which may have diverted a higher percentage of birds to east of the Livingstone Ridge than average, and possibly to a higher detection rate at Mount Lorette. It should be noted that April counts at both sites were well below normal. Throughout the period the peaks in the movement generally coincide at both sites, but are usually more weakly expressed at the Mount Lorette site. The hourly passage rate at Mount Lorette was 2.24 compared to 3.91 at Mount Lorette. In 2009 it was 1.92 compared to 5.61 and in 2008 it was 2.37 compared to 5.07. The 2010 count therefore saw the highest passage rate in the last three years at Mount Lorette and the lowest passage rate in the same period at Piitaistakis-South Livingstone (Figure 4).

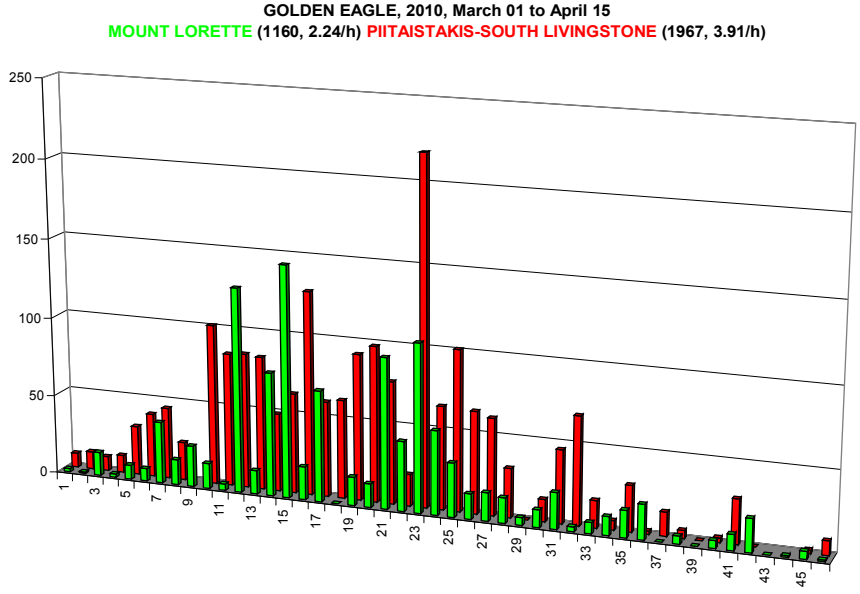

Figure 4

As with the last two year's counts, the difference between the sites is even more marked when non-Golden Eagle raptors are compared (Figure 5), with observers at Mount

Lorette counting 32.76% (152) of the Piitaistakis-South Livingstone total (464) at a rate of 0.29/hour compared to 0.92/hour at Piitaistakis-South Livingstone. This is the lowest differential between the two sites in the three years of comparison counts, the differential being 21.43% in 2009 and 17.43% in 2008 At both sites the most common non-Golden Eagle migrant was Bald Eagle, which comprised 57.89% (88) of the non-Golden Eagle total at Lorette compared to 59.91% (278) at Piitaistakis-South Livingstone, while the rest were made up of 10 other species at Mount Lorette and 11 other species at Piitaistakis-South Livingstone.

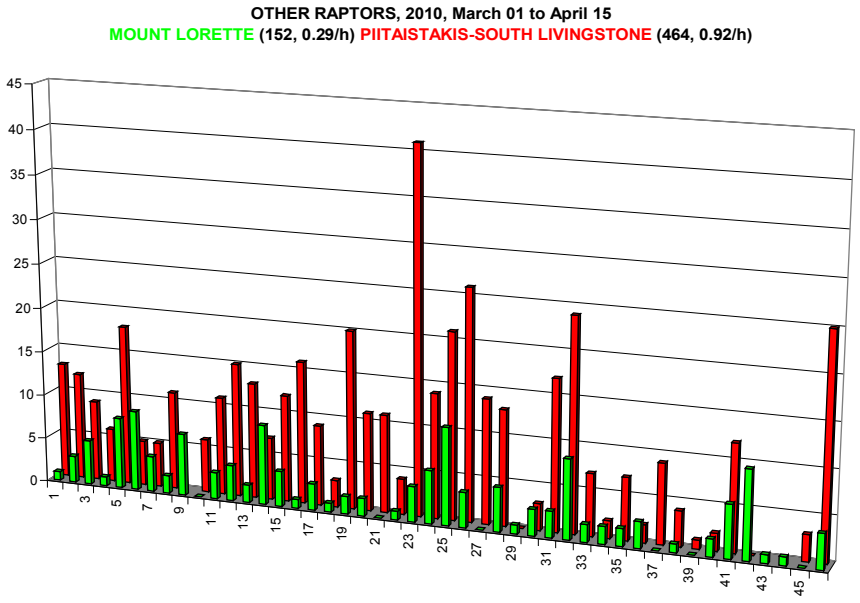

Figure 5

Steeples Ridge extended reconnaissance count, British Columbia

In the fall of 2009 Vance Mattson conducted the first extended reconnaissance count at or near the Steeples Ridge which is located on the east side of the Kootenay Valley (Rocky Mountain Trench) 25 km slightly NE of Cranbrook, British Columbia. Three sites were used to monitor raptor movement along, or just north of, the NNW-SSE oriented Steeples ridge which forms the southern part of the Hughes Range on the western flank of the Rocky Mountains. Of significance is that it is located about 80 km almost due W of the Piitaistakis-South Livingstone site giving the possibility of simultaneously monitoring movement along the eastern and western flanks of the Rocky Mountains at the same latitude. Vance spent 41 partial days (148 hours) at 3 sites between September 18 and November 12 with 95% of the time being spent between 1300 and 1800: September 6 days (21 hours), October 24 days (89.5 hours) and November 11 days (37.5 hours). During this time he recorded a total of 453 migrant raptors of which 226 (49.89%) were Golden Eagles and 146 (32.33%) were Bald Eagles, so with the addition of 1 unidentified eagle, eagles comprised 82.34% of the total flight (compared to 94.09% at Mount Lorette and 69.71% at Piitaistakis-South Livingstone during the same season). A further 80 raptors (17.66%) of 10 species were also recorded: Turkey Vulture 2, Osprey 1, Northern Harrier 7, Sharp-shinned Hawk 37, Cooper's Hawk 4, Northern Goshawk 5, Red-tailed Hawk 9, Rough-legged Hawk 13, American Kestrel 1 and Merlin 1.

His time was distributed among 3 sites that he designated South Lakit (27 days), Scarface (Bill Nye) (13 days) and Steeples (1 day)

South Lakit (49º 35' 45.45'N, 115º 35' 30.50''W, 1080m)
The South Lakit Site is located approximately 6km north on the Fort Steele-Wildhorse Forest Service Road and is accessed from Wardner-Fort Steele Road. The Wardner-Fort Steele Road joins Highway 93 near Wardner in the southeast to Highway 93 near Fort Steele in the northwest. This road also runs along the east side of the Kootenay River with the Steeples Ridge (the location of the Steeples Site) immediately to the east. The Wildhorse Forest Service road is located just east of the Fort Steele Gas Station at the junction of Highway 93. The site itself is located off the Wildhorse Road, and sits at the southern base of the Lakit Range, with Lone Peak to the SSE and the Steeples Range commencing just beyond this point.
Observation from this site, especially in the fall, is very favourable as the birds generally appear at low altitudes as they follow the natural descent of the Lakit Range, which descends from 2400m to just 1300m at the "Mound" at its Southern end. The site itself is located just south of the Mound.

Scarface/Bill Nye (49º 45' 11.10''N, 115º 38' 49.14"W, 1041m)
The Scarface site (named due to a prominent 'scar' on the face of the mountain), is a convenient option from Wasa Lake. Following Lazy Lake Road east toward Lazy Lake, the site is located south of an unmarked back road approximately 10km from the Lazy Lake Road turn off on Wasa Lake Park Drive on the southern edge of Wasa Lake. The site is located about 5km southeast from the back road turnoff, although it may require detailed instructions and a 4WD to arrive there.
The site offers views of the birds as they pass over, or in front of, the ridge though can cause neck strain from the relatively high angle of observation as the site nestles up against the steep wall of 'Scarface Peak'. 'Scarface Peak' (2400m) is the most westerly and visibly craggy peak of Mount Bill Nye (2600m).

Steeples Site (49º 32' 45.10''N, 115º 28' 51.83''W, 844m)
The Steeples Site is located at the Norbury Lake Provincial Park Day Use Area, on the Wardner-Fort Steele Road joining Highway 93 southeast of Wardner to Highway 93 near Fort Steele. The site runs on the east side of Kootenay River, providing broad views of the Steeples Ridge, including Bull Mountain (2600m), the most southerly peak of the ridge.

During the spring 2010 season Vance Mattson conducted a 48 day (213 hour) extended reconnaissance count out of a possible 55 days between February 22 and April 18. Twenty-three days were spent at the South Lakit site and 25 at the Scarface/Bill Nye site, and 95% of the observations were conducted between 1230 and sundown. A total of 7 days (March 12, 29-31, April 3, 7 and 8) were completely lost with low cloud enveloping the ridges, and February 24 was lost owing to a prior commitment although the weather appeared to be conducive to movement. Although systematic weather data were not gathered, the following observations were made. In February the temperature ranged from highs of 3ºC on the 22nd to 10ºC on the 28th , in March high temperatures ranged

from 0°C on the 6th to 11°C on the 18th and 20th and in April ranged from 4°C on the 9th to 20°C on the 16th. On active observation days ridge winds with a westerly component prevailed 50% of the time (NW 4.17%, W 20.83%, W-SW 4.17%, SW 16.67%, SW-S 2.08% and SSW 2.08%); those with an easterly component 12.5% of the time (NE 6.25%, E 2.8%, SE 4.17%), from the N 8.33%, from the S 2.08% and variable 4.17%. Calm to light conditions when wind direction could not be discerned occurred 14.58% of the time and wind direction was not noted on 8.33% of the days. On active observation days ridge wind speeds were assessed as moderate (11-40 km/h) 31.25% of the time, strong (41-80+ km/h) 22.91%, moderate to strong (11-80+ km/h) 12.5%, calm-light (0-10 km/h) 12.5%, light (1-10 km/h) 8.33%, light to moderate (1-40 km/h) 2.08% of the time, and unnoted 10.47. Cloud cover of between 70 and 100% was noted on 45.83% of days, while 14.58% of days had 0-30% cloud cover and 52.08% of days had sunny or partially sunny conditions. On active observation days rain or flurries were reported on only 6.25% of days. In summary migration conditions were mainly favourable for much of the count, with the only prolonged period of poor weather being from March 28 to April 13 (with the exception of April 10).

The count produced 816 migrant raptors of 11 species with a high single day count of 147 birds on March 18.Of this total 534 (65.44%) were Golden Eagles and 218 (40.82%) were Bald Eagles. Including 2 unidentified eagles the two eagle species together comprised 92.4% of the total flight which is similar to the 96.01% eagles recorded at Mount Lorette. Other migrants were Turkey Vulture 13 (which is a record for a RMERF count), Osprey 2, Northern Harrier 2, Sharp-shinned Hawk 7, Northern Goshawk 8, Red-tailed Hawk 20, Rough-legged Hawk 7, American Kestrel 2 and Peregrine Falcon 1.
A total of 534 migrant Golden Eagles were recorded on 42 of a possible 48 active field days (87.5%) with a highest single day count of 101 on March 18 which was also the longest field day of the season (7.5 hours). No other day exceeded the second highest count of 34 birds recorded on April 15. Of the total of 534, 388 were counted in March and 126 in April which suggests a relatively stronger April movement here than at either Mount Lorette or Piitaistakis-South Livingstone. The flight comprised 372 adults, 29 subadults, 103 juveniles and 30 birds of indeterminate age giving an immature:adult ratio of 0.35 and a juvenile:adult ratio of 0.31. Both these ratios are significantly higher than those at both Piitaistakis-South Livingstone. For direct comparison with the Alberta sites the ratios from the period March 1 to April 15 at Steeples are 0.31 and 0.24 respectively, compared to 0.12 and 0.04 at Piitaistakis-South Livingstone and 0.08 and 0.03 at Mount Lorette over the same period. These are very significant differences, the interpretation of which should await further and more complete surveys at the site to establish the relationship between the Golden Eagle movement on the eastern and western flanks of the Rocky Mountains. Are they sub-populations of a single population, or are they more or less discreet? Do the birds moving on the eastern flanks breed farther north than those moving on the western flanks, or do birds elect to move on one side or the other depending on weather or just stochastically? Do juvenile birds preferentially move in spring along the western flanks? Further work and combining count data with ongoing telemetry studies might answer these fascinating questions. A total of 218 migrant Bald Eagles were recorded on 39 days with a single day count of 43 on March 18 (coinciding with the highest Golden Eagle count), which exceeds by 1 the highest previous single day

RMERF count of 42 at Mount Lorette in the spring of 1996. The flight comprised 103 adults, 46 subadults, 64 juveniles and 5 birds of indeterminate age giving an immature:adult ratio of 0.92 which is again substantially higher than those of the two Alberta sites. During the period March 1 and April 15 the ratio at Steeples was 0.97 compared with 0.28 at both Piitaistakis-South Livingstone and at Mount Lorette over the same period. Again the magnitude of this difference defies easy explanation.
A comparison of Golden Eagle daily counts with Piitaistakis-South Livingstone over the period February 22 to April 18 (Figure 6) shows no obvious correlation except in the most general sense. The peak at Steeples on March 18, for example, did not coincide with a period of poor weather at Piitaistakis-South Livingstone which might have indicated a shifting of the movement to the west. The movement at Steeples appears to be much more sporadic than at Piitaistakis-South Livingstone with peaks lasting for a few days, 4 of which occurred in March, interspersed with several days of relatively low numbers, the peaks probably being associated with the amelioration of poor weather to the south. April at Steeples saw a significant late Golden Eagle movement (specifically young birds) on April 10 and after April 15, after a period of poor conditions stretching back to March 28. The overall Golden Eagle counts at the two sites for the period were 543 at a rate of 2.5/h at Steeples compared to 2059 at a rate of 3.32/h at Piitaistakis-South Livingstone.

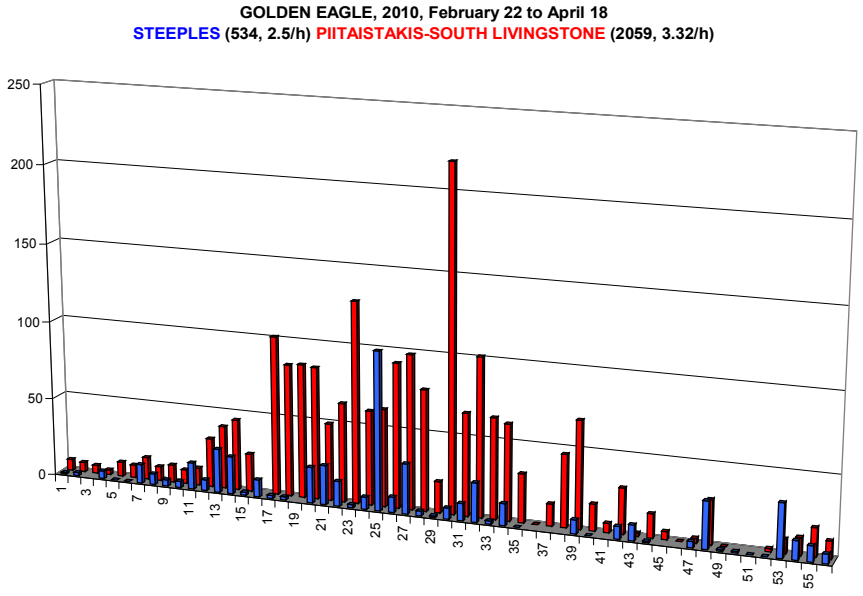

Figure 6

Spring Golden Eagle Trend at Mount Lorette
Figure 7 shows a general declining fall trend for Golden Eagles at Mount Lorette starting in 1996 after the first 3 counts at the site yielded 4140, 4213 and 4143 birds respectively. The years 1997 and 1999 were poor weather years when a westward shifting of the movement could be demonstrated but they still produced 2461 and 2817 birds respectively. Apart from a slight recovery to 2918 birds in 2006 the trend has generally been sharply downwards since 2002 with the last full season count at the site in 2007 yielding only 2141 birds. The last 3 years of substantial comparative counts projected

from the Piitaistakis-South Livingstone counts (see above) have continued and perhaps accelerated the downward trend with a slight recovery to 1289 (projected) in 2010 which still only represents 31% of the average count between 1993 and 1995.

The apparent stability in Golden Eagle numbers over the last 4 years of fall counts probably reflects high breeding success and significant recruitment into the population during this period. Age analysis of the data from Piitaistakis-South Livingstone in fall 2009 and spring 2010 (see below) indicates a significant reduction in juvenile numbers which indicates that the northern Snowshoe Hare population, which appears to be the main factor controlling northern Golden Eagle breeding success, is again beginning to cyclically decline. If this model is correct and the current apparent high rate of winter Golden Eagle mortality is maintained, we should expect to see a further decline of numbers similar to what was observed following the peak year of 2000 which was the year when the last hare decline began and which is probably analogous to this current period.

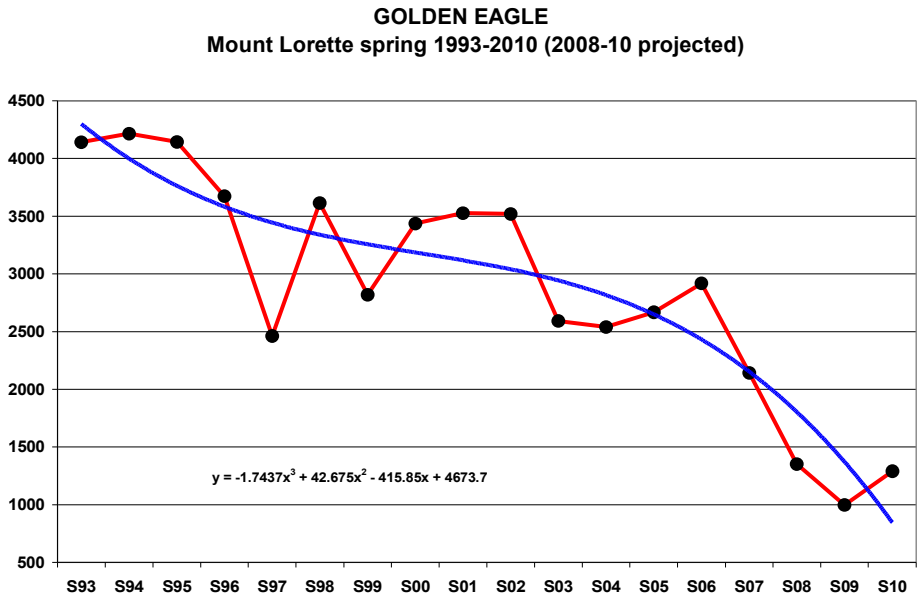

Figure 7

Figure 8 shows the trend of immature:adult ratio analysis of both spring and fall data since 1995. Note that 2006-9 fall counts and the 2008-10 spring counts were conducted at Piitaistakis-South Livingstone with the rest conducted at Mount Lorette, with the exception of fall 1997 when the count was conducted at Plateau Mountain. The fall counts are plotted above the following year's spring count to graphically compare the age ratios. Both spring and fall trends strongly indicate a generally increasing trend to 1999, followed by a decrease to 2002, then a steady increase to fall 2008. Adding the fall 2009 Piitaistakis-South Livingstone age ratio of 0.34 gave a sharp decrease to the fall trend. These trends almost certainly reflect the population cycles of the northern Snowshoe Hare population. It is interesting to note that the fall 2000 spike in numbers occurred a year after the apparent peak in the snowshoe hare cycle and may represent a more complete southward movement of a population at its peak resulting from an increasing

dearth of a fall and winter prey species. This also raises the possibility that part of the apparent decline may result from progressively more birds wintering north of the counting sites as hare numbers recover ("shortstopping"), but even allowing for this it appears that numbers counted during the second cycle (i.e. after 2000) are significantly lower than the first (<1993-1999). It appears that fall 2009 marks the start of the declining phase of the hare cycle, 9 or 10 years after the previous peak. The decline in immature birds between spring 2009 and spring 20010 is particularly sharp, and appears to involve mainly the loss of juvenile birds: this spring for the first time ever on an RMERF count subadult birds outnumbered juvenile birds, the subadults being the survivors of the 4 years of high northern productivity. It is also apparent from Figure 7 that the Golden Eagle age ratios recorded on the Steeples count do not in any way fit into these trends, which may suggest that they are a distinct population whose breeding population is not so intimately tied to the northern Snowshoe Hare population.

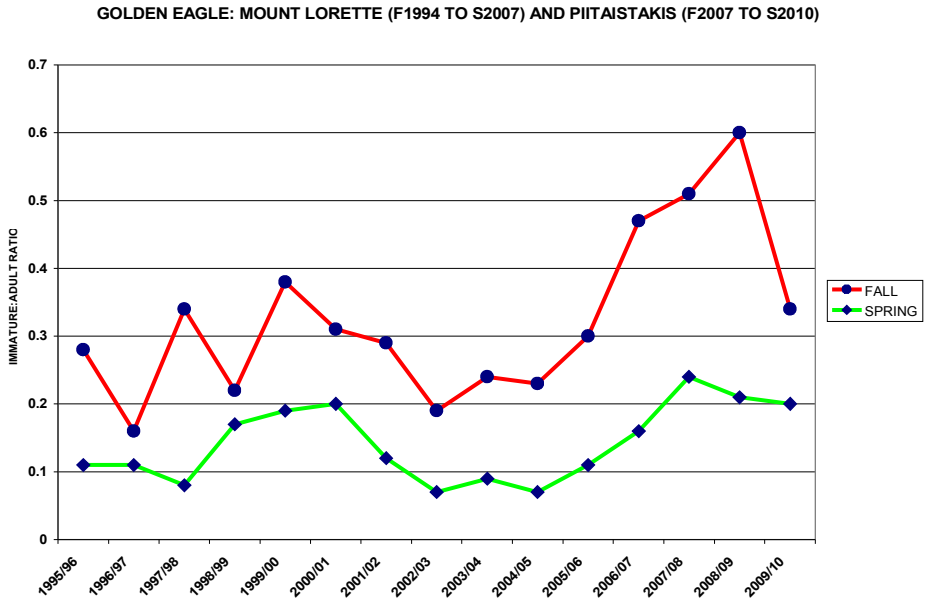

Figure 8

Observers

Piitaistakis-South Livingstone

Principal Observers: Peter Sherrington (73 days and 7 partial days), Bill Wilson (6 days), Denise Coccioloni-Amatto (1 day and 4 partial days), Doug and Teresa Dolman (1 day), and Dawn Hall (3 partial days), with assistance from Keith McClary (40 days), Nel Van Kamer (32 days), Denise Coccioloni-Amatto (32 days), David Thomas (24 days), Dawn Hall (8 days), Pat Lucas (3 days), Doug and Teresa Dolmen (2 days), Phil Nicholas (2 days), Jan Aikins (1 day), Karole Michalsky (1 day), Paul Vandervelde (1 day), Wilber Tripp (1 day), Patricia Wagenaar (1 day), Jocelyn Thomas (1 day), Elizabeth Miles (1 day) and Bob Simons (1 day).

Mount Lorette

Principal observers Cliff Hansen (9.5 days), Joel Duncan (6.5 days), George Halmazna (6 days), Bill Wilson (6 days), Jim Davies (5.5 days), Brian McBride (5 days), Alan Hingston (5 days), Ron Dutcher (3 days), with assistance from Kevin Barker, Hugh Brook, Cliff Hansen, Chris Hunt, Leslie Johnson, Ed McCullough, Nancy and Terry Waters, and Percy Zaloski.

Steeples
Principal observer Vance Mattson (48 days)

Acknowledgements

Piitaistakis-South Livingstone
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Mount Lorette
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