Western Purple Martin Recovery Status in BC (and Puget Sound, WA) - 2010

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Summary: The western Purple Martin (*Progne subis arboricola*[*]) population in British Columbia, for which we have reliable population-wide monitoring data for abundance, nesting success and fledgling production since 1997, had a growth surge between 2003 and 2006 and peaked at ~650 nesting pairs in 2007. By 2009 it had declined to ~500 pairs (25%) due to several years of poor weather conditions resulting in low production and subsequent recruitment. A modest population increase to ~585 pairs was recorded for 2010, as forecast in fall 2009. Due to particularly favourable weather conditions in summer of 2010, nesting success and fledgling production were exceptionally high and the forecast from our population growth modeling study indicates abundance will likely increase to 750-800 pairs (unadjusted forecast 810 pairs) in 2011 as a result of higher subadult recruitment (Fig. 1).

Details: The unprecedented tripling of the population from ~200 pairs to ~650 pairs between 2003 and 2006-07 was due to unusually high nesting success and fledgling production (~3.5 young/active nest) in 2003-05. This resulted from the unusually warm dry late spring and summer weather with abundant food for nestlings in three consecutive years, producing high levels of recruitment in 2004-06. In the three subsequent years (2007-09) population growth stalled and martin numbers declined by 25% in BC due to periods of cool and/or wet weather during the nestling rearing period in late June – August, causing temporary low availability of flying insect food supplies and resulting in increased nestling mortality, reduced nesting success and fledgling production, and subsequent low subadult recruitment.

This trend began to reverse with higher fledging success (3.3 young/pair) in 2009 and the BC martin population increased moderately as predicted, from 512 nesting pairs in 2009 to 585 pairs in 2010, an increase of 6%, as a result of higher production the previous summer. This was only slightly (7.5%) below the expected return of 630 pairs from the age-independent population forecast model, based on known fledgling production and long-term average survival rates. Annual post breeding survival (all age classes combined) was 43% (as in 2009), slightly below the 13-yr mean of 46%, possibly due to skewing of the population age structure towards older birds more subject to senescence with the low subadult recruitment rates in 2008-09.

A prolonged cool wet spring delayed early nesting by ~3 weeks until mid-June, as also occurred in 2008, again resulting in a relatively synchronized late nesting period with adult and most subadult birds nesting at about the same time. This can be a recipe for disaster, as occurred in 2008 when a period of wet weather during the early nestling rearing period caused severe losses, resulting in a population decline the following year. However, due to a fortunate combination of uninterrupted dry warm weather and consistent and abundant flying insect food supplies throughout the compressed nestling rearing period in July and August, nestling survival and fledging success in 2010 were unusually high. Fledging success overall was 4.0 young/active nest (egg-to-fledgling ratio ~95%), the highest we have seen in the prior 13 year history of the monitoring program. This is well above the ~2.5 young/nest needed to offset average post-breeding losses and winter and spring mortality and a substantial population increase to ~750-800 pairs is expected in 2011.

With the significant increase in production in 2010 there is a good possibility that the interim Population Management Objective of 800 pairs by 2012, as established by the Western Purple Martin Working Group (modified 2009) will be met. Figure 1 indicates recent progress of population growth

[*] A separate subspecies genetically isolated from the eastern martin, *P. s. subis* (Baker et al, 2008)

and recovery since the start of the monitoring program in 1998, with the forecast return (810 pairs) expected in 2011.

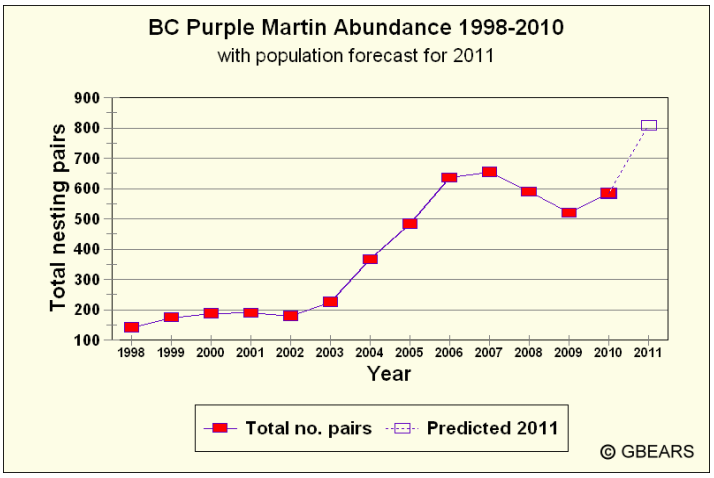

Figure 1. Recent and predicted Purple Martin abundance.

Banding Program: Our ongoing nestling colour banding and band reading program allows identification of individual birds to natal year class based on band colour, leg and band code as well as monitoring of migration, dispersal, recruitment, longevity and population age class composition. Results from this program show that the proportion of subadult recruits in the population has declined steadily from ~60% at the start of rapid population growth in 2004 to ~13% in 2009, mainly due to recent low productivity and recruitment. In 2010 the proportion of subadult recruits increased to ~30% as a result of higher fledgling production in 2009. The large older 5+ year classes that are more likely to die due to aging (the last of the 2003-05 'boomer' age classes) still formed a large proportion of the population in 2010 (~25%, vs. 20% in 2009). The successful nesting season in 2010 with high fledgling production (4.0 young/nest) will reverse this cyclic trend and restore a higher proportion of subadult birds. However, it is possible that the population could experience lower growth than expected due to under-estimation of mortality with accelerated loss (senescence) of these large older age classes. Thus the initial 2011 return forecast (810 pairs) was adjusted downward to 750-800 pairs.

New western martin migration tracking study: In 2009 a study was initiated to track BC Purple Martins on their fall and spring migrations and determine their stopover points and wintering areas, using tiny 1 gm "geolocator" light intensity data loggers attached with a leg-loop "backpack" harness. These units, with a battery life of 1.5-2 years, continuously monitor light intensity at 10-min. intervals and record light intensity and time for sunrise and sunset threshold light levels, allowing determination of local day length and sunrise and sunset times, from which location can be determined within 100-200 miles. We attached 20 geolocators to martins in 2009 and this year observed 4 of these birds (2 without their geolocators) and were able to capture one of the two birds seen with geolocators, recover the data logger and successfully download and analyze the migration tracking data. Preliminary analysis of the tracking data indicates the bird flew south through the western states, spent some time at a fall roost in Arizona, then flew through Central America and on through northern South America and the Amazon Basin to spend the winter in southeast Brazil, returning by the reverse route in spring of 2010, a one way distance of ~11,000 km.

Puget Sound, WA: The pattern of rapid growth and recent decline seen in BC also holds true for the contiguous western Purple Martin population using nest boxes in Puget Sound, WA. We have only limited monitoring data from a small sample of 10-15 northern colonies (vs. 47 of the current 51 active colonies in BC, representing >90% of the regional population), so abundance estimates involve much greater uncertainty. A recent overall population estimate for Puget Sound or all of WA is not available.

In 2006 and 2008 the northern Puget Sound population experienced far more severe losses due to adverse weather than in BC, with fledging success of only ~1 young/nest in both years (and only 2.1 young/nest in 2007) (Stan Kostka, unpub. data). This population was expected to decline in 2009 after the very low production in 2008, but instead increased slightly, likely due to an overestimation of adult mortality due to severe adverse spring weather in 2008, resulting in adult birds that failed to breed (so were not included in the annual total) but survived to return and nest in 2009. (An influx of

recruitment from south Puget Sound may also have occurred, where nesting success and production may have been higher in 2008). While a small population increase was expected in 2010 after high nesting success and fledgling production in 2009, a small decrease was observed (Stan Kostka, unpub. data). The expected increased subadult recruitment was apparently more than offset by increased mortality among the high proportion of older (5+ year old) adult birds making up the dominant age classes of this strongly age-skewed population after high production, recruitment and rapid population growth in 2003-06, followed by low production and gradual population decline thereafter. As a result, if the sample colony data are representative, the Puget Sound population is currently estimated to be <40% of peak abundance in 2006 (Stan Kostka, unpub. data).

Production data for 2010 were not available, but based on the high production observed in the adjacent and contiguous BC population in 2010 (above), a small population increase is expected in Puget Sound in 2011, again at least partially offset by accelerated mortality of 5+ year old birds in the dominant age classes as the population age structure is re-balanced.

References Cited:

Baker, A.J., A.Greenslade, L. Darling and J. Finlay. 2008. High genetic diversity in the blue-listed BC population of the Purple Martin maintained by multiple sources of immigrants. Conserv. Genetics 9(3): 495-505.

Western Purple Martin Working Group. 2005. Interim Population Objective for the Pacific Population of the Western Purple Martin. <http://cain.ice.ucdavis.edu/prbo/orwapif/pdf/puma_interim_objective.pdf >.

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