Western Purple Martin Recovery Status in BC (and Puget Sound, WA) - 2009

Bruce Cousens, M.Sc., R.P.Bio., (Jan. 2010)

Summary: The recent growth surge of 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, has stalled for two consecutive years. The BC population peaked at ~650 nesting pairs in 2007 and declined to ~570 pairs in 2008 and ~500 pairs in 2009 due to poor weather conditions and low production in each of the previous years. With the increase in production in 2009, the forecast from our population growth modeling study indicates abundance will increase to ~600 pairs in 2010 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 strong subadult recruitment in 2004-06.

Growth has stalled since and as expected, in 2009 the population declined for the second year since the peak (~650 pairs) in 2007, from ~570 to ~500 nesting pairs, a decline of 13% this year (25% for both years), mainly as a result of low subadult recruitment (10-15%) after poor reproductive success last summer. Annual post breeding survival (all age classes combined) was 43%, slightly below the 12-yr mean of 46%, possibly due to below-normal condition of last year's fledglings and/or skewing of the population towards older birds more subject to senescence with recent low subadult recruitment rates.

However, the 2009 Purple Martin nesting season was one of the more successful we have seen in recent years, thanks to mostly excellent weather throughout the breeding season, in marked contrast to the unusual adult and heavy nestling losses and poor reproductive success documented in 2008.

With unusually warm dry sunny weather for most of the spring and summer, flying insects were again in good supply. Most martins nested early in the season, laying eggs in late May and early June (in sharp contrast to 2008, when no eggs were laid until after mid-June). This resulted in the earliest hatching, banding and fledging periods seen in over a decade. However, the normally protracted (variably asynchronous) nesting season was again unusually compressed for most of the population, similar to last summer, but early in the season rather than late and for quite different reasons. The favourable weather and good food supply early in the season encouraged very early nesting by adult birds and after low production in 2008 there was only a small component of later-arriving subadult recruits, many of which also nested relatively early.

With adult and some later-arriving subadult birds sharing similar nesting timing, they were again vulnerable to an ill-timed period of cool wet weather, which occurred at the end of June and beginning of July during the critical peak hatching and early rearing period at many colonies. This resulted in a temporary depression of the flying insect food supply and significant nestling losses due to starvation. An estimated 20-25% of nestlings were lost during this brief period, though impact varied widely between colonies depending on minor differences in nesting timing and local weather conditions, with a total of ~1700 nestlings fledged instead of over 2200, for an egg-to-fledgling ratio of ~70%.

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

This fledgling production was much higher than in 2008 (egg-to fledgling ratio ~50%) and overall average fledging success was ~3.3 young/nest, well above the ~2.5 young/nest required to offset normal annual post-breeding mortality during migration, over winter and the following spring, to provide sufficient recruitment to maintain a stable breeding population. As a result, a predicted population increase to ~600 pairs in 2010 is expected. The population trend thereafter is largely dependent on the success of the 2010 nesting season, which is as always highly weather dependent.

The interim Population Management Objective of 800 pairs by 2010, as established by the Western Purple Martin Working Group (2005), will not be met, although this objective appeared readily achievable prior to the 2008 nesting season. At the 2009 Western Purple Martin Working Group meeting the date for achieving this population objective was advanced to 2012. Figure 1 indicates progress of population growth and recovery since the start of the monitoring program in 1998, with the forecast return for 2010.

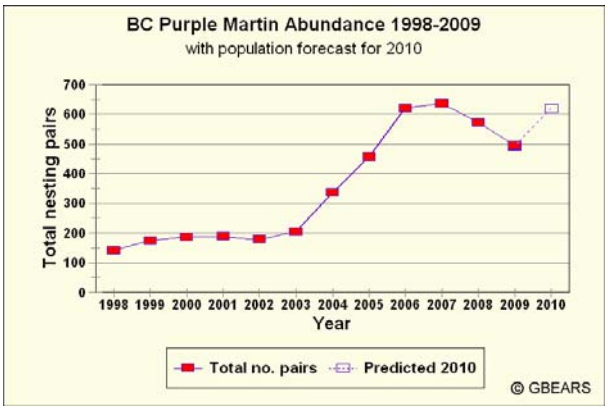

Figure 1. Recent and predicted Purple Martin abundance.

Banding Program: Our ongoing nestling colour banding and band reading (by scope) 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 and longevity. 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 period in 2004 to ~13% in 2009, mainly due to recent low productivity and recruitment. As a result, the large older (5+) year classes that are more likely to die due to aging (senescence) form an increasingly larger proportion of the population (20% in 2009). A successful nesting season with good fledgling production (>3 young/nest) will help reverse this trend and restore a higher proportion of young birds. However, it is still possible that the population could experience lower growth due to accelerated loss of these large older age classes without sufficient recruitment of young birds for replacement.

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. Tiny 1 gm "geolocator" light intensity data loggers attached with a leg-loop "backpack" harness were used. 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 during the late nestling rearing period and hope to recover any that return next season for data download and analysis.

Puget Sound: The pattern of rapid growth and recent decline seen in BC also holds true for the once larger contiguous western Purple Martin population using nest boxes in Puget Sound, Washington. We have only limited monitoring data from a sample of 10-15 colonies (<20% of the population, vs. 43 of the current 44 active colonies in BC, representing >95% of the regional population). A recent overall population estimate for Puget Sound or all of WA is not available.

In 2006 and 2008 the 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 2.1 young/nest in 2007) (Stan Kostka, unpub. data). This population has been in substantial decline since 2006 and was

expected to decline further and to a greater extent than in BC this year, based on the low fledgling production in 2008. However, the population appeared to increase slightly in 2009, likely due to over-estimation of adult mortality caused by severe adverse spring weather in 2008, when some adult birds may have failed to breed (and thus were not included in the annual total) but survived to return and nest this year. (There *may* also have been increased recruitment due to immigration of subadult birds from the South Sound, where nesting success and production may have been higher in 2008 due to more favourable weather conditions and food availability – there is insufficient data to apportion the observed increase in northern Puget Sound between these two hypotheses so far.) However, if the sample colony data are representative, the Puget Sound population remains at ~40% of the peak abundance recorded in 2006.

Fledgling production was high in 2009 (4.3 young/pair; Stan Kostka, unpub. data.) and an increase in population numbers is expected in Puget Sound in 2010, though the increase may be partially offset by increased mortality of large older age classes with very low recent recruitment and a population age composition skewed heavily toward older adult birds from the 2003-05 population growth boom.

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 >

Bruce Cousens, Program Coordinator, BC Purple Martin Stewardship and Recovery Program – Jan., 2010