

Two Decades of Purple Martin Stewardship and Recovery in British Columbia - Successes and Challenges

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Keywords: Purple Martin, *Progne subis arboricola*, nest box, volunteers, stewardship, recovery

Abstract: The western subspecies of the Purple Martin (*Progne subis arboricola* Behle 1968) is Red-listed (Threatened) in British Columbia, a Candidate Species for listing in Washington and a Species of Special Concern in Oregon and California. These designations were assigned because of severe range-wide population declines in the mid-1900s resulting from ongoing loss of cavity nesting opportunities both in the wild and in cities and severe competition for nest cavities from two introduced bird species, European Starlings (*Sturnus vulgaris*) and House Sparrows (*Passer domesticus*). This subspecies has rebounded from 5 known breeding pairs nesting in offshore pilings at 2-3 sites within BC in 1985 to over 300 pairs in 2004, entirely as a result of nest boxes built, erected, monitored and maintained primarily by volunteers at ~ 50 marine coastal locations.

In 2004, this recovery program included 26 known occupied nesting colonies and the remaining unoccupied nest box sites distributed throughout the Georgia Basin, involving a total of ~1100 nest boxes. This program could not be maintained over such a large geographic area without ongoing dedication and support of 50-70 volunteer stewards and assistants and support from many local businesses, sponsors and funding organizations. The costs of co-ordinating and implementing the annual nesting colony stewardship program over this large geographic area has involved 2500 hours of volunteer labour and about \$10,000 of donated materials and equipment use, as well as student summer employment. Motivation of volunteers was achieved through the use of personal contacts; site visits; ongoing communications via phone, fax and email; brochures; program newsletter; and appreciation awards.

Key Words: Purple Martins, *Progne subis arboricola*, *Progne subis*, population, nest boxes, volunteers, stewardship, recovery, British Columbia, red-listed species

A Red-listed Species in British Columbia

Purple Martins (*Progne subis*) are the largest member of the swallow family (Hirundinidae) found in North America. The western subspecies (*Progne subis arboricola* Behle 1968) is the only member of this genus that breeds in British Columbia (BC) (Fraser et al. 1997; Cannings 1998; Copley et al. 1999) and nests only within the Georgia Depression Ecoprovince, or 'Georgia Basin' (Campbell et al. 1997). This subspecies nests along the western coast of North America from southern California to southwest British Columbia and is entirely isolated from the eastern subspecies (*P. s. subis*) which breeds east of the Rocky Mountains (Brown 1997). Both of these migratory subspecies overwinter in South America.

Purple Martins are at risk in BC because of their small breeding population size, historic decline in numbers and range, ongoing loss of nesting habitat, and potential extirpation throughout its range within the province if its specific nesting requirements are not met (Fraser et al. 1997). Within BC, Purple Martins are entirely dependent on human-supplied boxes for nesting cavities.

Purple Martins were last seen nesting in downtown Vancouver in 1948 and at sites on the BC Lower Mainland in 1972. The BC Purple Martin population had been reduced to about 5 breeding pairs by 1985 with the only known remaining breeding birds observed on southeastern Vancouver Island (Fraser et al. 1997; Copley et al. 1999).

Low population numbers resulted in this subspecies being placed on the provincial Red List as a candidate for Threatened or Endangered status under the BC *Wildlife Act* (Fraser et al. 1997; Fraser et al. 2000). Purple Martins are also protected from being injured, killed, or collected by provisions in the BC *Wildlife Act* and the federal *Migratory Bird Convention Act*.

Where Did Purple Martins Nest in BC?

Western Purple Martins formerly nested in loose colonies in cavities in old trees, snags, and pilings throughout the Georgia Basin as far north as Campbell River, the documented historic northern limit of its breeding range in BC (Fig. 1). These colony sites were either in open treed areas with little undergrowth, such as recently burned areas, or bordering freshwater, estuaries, and harbours (Campbell et al. 1997; Fraser et al. 1997; Copley et al. 1999).

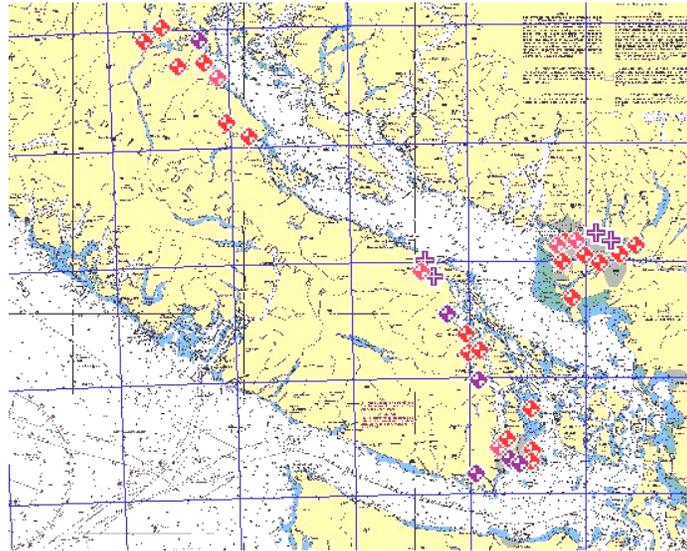


Figure 1. Historic Purple Martin nesting sites (~1900-1985) in the Strait of Georgia. Only sites in purple still in use by 1985. (UTM grid interval = 50 km)

Purple Martins also nested in the exteriors of tall, older buildings in downtown Vancouver until the late 1940s and in Victoria until the late 1960s. Ongoing competition from European Starlings and House Sparrows, as well as modern building construction, which lacks the many nooks and crannies of older buildings, likely contributed to the local elimination of martins from these locations (Campbell et al. 1997; Fraser et al. 1997; Copley et al. 1999).

The abundance, population trends, and natural history of Purple Martins in BC prior to ~1940 are poorly documented. The population may have been in decline for a century or more due to a combination of habitat loss (especially nesting sites) from logging, fire suppression, snag removal, and agricultural and urban development, and from severe competition for nest cavities from introduced European Starlings and House Sparrows.

A Stewardship Program Begins in the 1980s

In the mid 1980s, members of the Victoria Natural History Society started a nest box program at Cowichan Bay on southern Vancouver Island where Purple Martins were known to have nested since at least 1972 (Fraser et al. 1997). Although martins originally nested in natural cavities in pilings on both sides on the bay, the birds took to the single nest boxes once they were erected. The first record of Purple Martins nesting in a human-supplied box was at Cowichan Bay in 1985 (Plath 1994; Copley et al. 1999). The few boxes installed in the Victoria Harbour area were not used until the early 1990s.

During the mid to late 1980s, low numbers of Purple Martins were also observed nesting in pilings at Ladysmith Harbour (3 pairs) and Sooke Harbour (1 pair), and in port holes in decommissioned ships in Esquimalt Harbour (6 pairs). By the end of the 1980s, there were about 60 single nest boxes installed at 4 locations on southern Vancouver Island, with about 10 pairs of Purple Martins nesting in boxes and 3 pairs using cavities in pilings (Fig. 2). The nest boxes were made, installed, and monitored by a few dedicated volunteer naturalists.

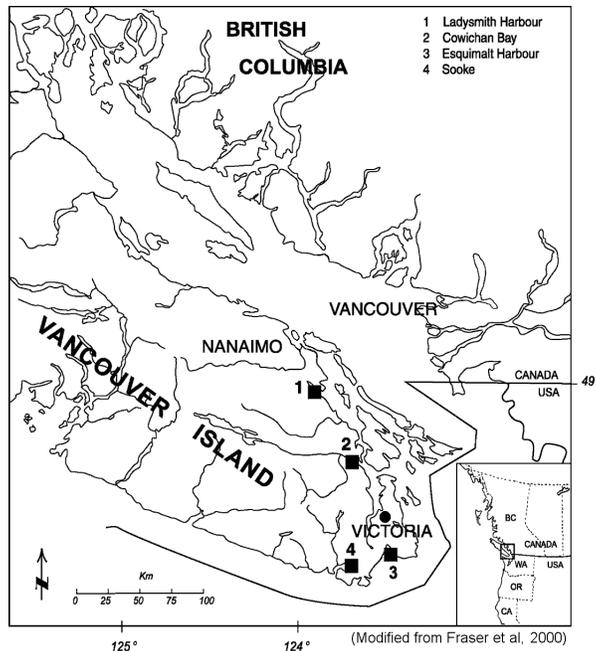


Figure 2. Active (square) and inactive (circle) Purple Martins nest box and natural cavity sites by 1989.

The Stewardship Program Expands in the 1990s

A major effort to re-establish Purple Martins in BC began in the early 1990s when about 300 single nest boxes were installed at 7 sites on southern Vancouver Island and 5 sites on the BC Lower Mainland (Plath 1994; Copley et al. 1999). Nest boxes were placed primarily at marine piling sites where Purple Martins were reported to have nested previously. More boxes were added at most active colony sites in later years. A few vertical 5-compartment boxes ('penta-towers') were installed at some sites on Vancouver Island and received at least partial use. These penta-towers are still in use by martins at Newcastle Island, Ladysmith, and West Bay on Vancouver Island.

As information about the nest box program spread and Purple Martins numbers slowly increased in the mid 1990s, interested naturalists installed nest boxes at 6 locations on eastern Vancouver Island between Nanaimo and Campbell River, and at 3 sites on the Sunshine Coast. A nest monitoring and nestling banding program was initiated in 1996 to investigate dispersal and recruitment range, population mixing, survival, and nesting success and productivity (Darling et al. 2005).

By the end of the 1990s, there were about 530 nest boxes distributed between 20 sites in the Georgia Basin area. Purple Martins were nesting at 15 colony sites and about 175 boxes were being used (Fig. 3). It is estimated that the program involved as many as 30-40 volunteers who made, installed, and maintained nest boxes as well as monitored colony sites for Purple Martins activity, checked nest boxes, and banded nestlings (Walters et al. 1990; J.C. Finlay, pers. obs.).

The Stewardship Program Continues to Grow in the New Millennium

Nestling banding studies undertaken since 1996 showed that the BC Purple Martin population was genetically well mixed due to the wide dispersal of returning recruits among colony sites throughout the Georgia Basin area, and that nesting success in boxes was promising (J.C. Finlay, unpublished data; Darling et al. 2005). Therefore, placing additional nest boxes at established and potential new colony sites could prove beneficial to the recovery of the entire BC population. In 2000-2001, the BC provincial government funded the construction and installation of about 500 additional boxes at new and existing colony sites, which doubled the number of boxes and sites available for Purple Martins.

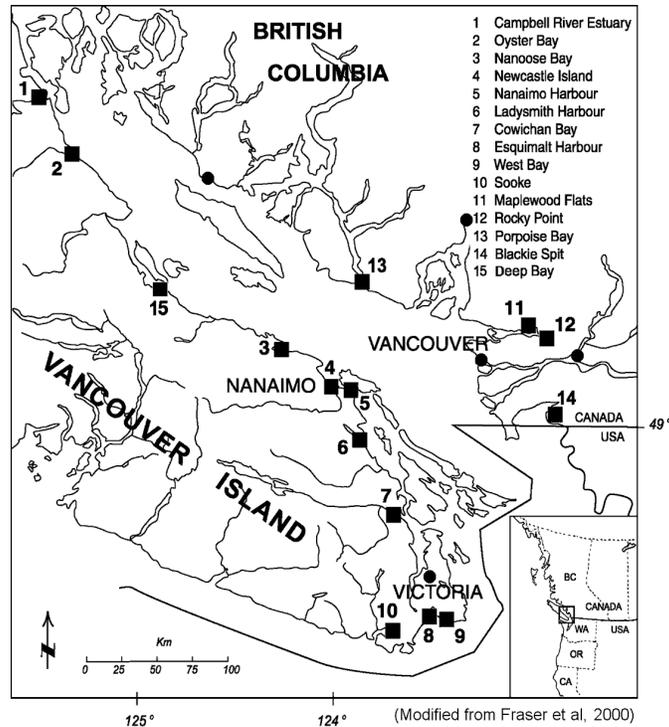


Figure 3. Active (square) and inactive (circle) Purple Martins nest box colony sites by 1999.

In 2002, changes in the BC provincial government resulted in the loss of funding and management for coordination of the recovery program. A Nanaimo-based non-profit conservation organization, the Georgia Basin Ecological Assessment and Restoration Society, agreed to provide ongoing overall project coordination and management for continuation of the BC Purple Martin Nest Box Stewardship and Recovery Program, and to attempt to secure funding necessary to sustain this program in the future.

In 2003, the Georgia Basin Ecological Assessment and Restoration Society established 7 new nest box sites - 5 sites between Nanaimo and Courtenay to further facilitate recolonization of the northern portion of Georgia Basin, and 2 sites south of Nanaimo. Nest boxes were also installed at 6 small existing colonies that were in need of expansion and where boxes were missing or in need of repair.

By the end of 2003, there were about 1100 nest boxes distributed at 52 sites around the Georgia Basin and 18 of these sites were occupied by over 200 breeding pairs of Purple Martins (Fig. 4). Approximately 70 volunteers helped a Project Coordinator and 2 Summer Students make and install boxes, monitor and maintain colony sites, collect productivity data, and band nestlings.

In 2004, 8 new sites were colonized by Purple Martins along southeastern Vancouver Island from Victoria to Oyster Bay, south of Campbell River. There are now a total of 26 active colonies occupied by 350 nesting pairs. This is a 60% growth rate in one year that is unprecedented in the 20-year history of the BC recovery effort. This is likely due to a surplus of available predator and starling resistant nest boxes, and good weather conditions during both the spring and summer with an abundant supply of flying insects on which Purple Martins feed. A total of 1170 young were produced of which 1121 were banded. Approximately 50 volunteers helped a Project Coordinator and 3 Summer Students monitor and maintain colony sites, collect productivity data, and band nestlings.

Currently, there are about 26 inactive nest box locations that are providing considerable nesting habitat for future population expansion (Figs. 5 & 6). This is entirely a result of nest boxes being built, erected, and maintained by volunteers at marine coastal locations on east and southeast Vancouver Island, the BC Lower Mainland, the Gulf Islands, and the Sunshine Coast.

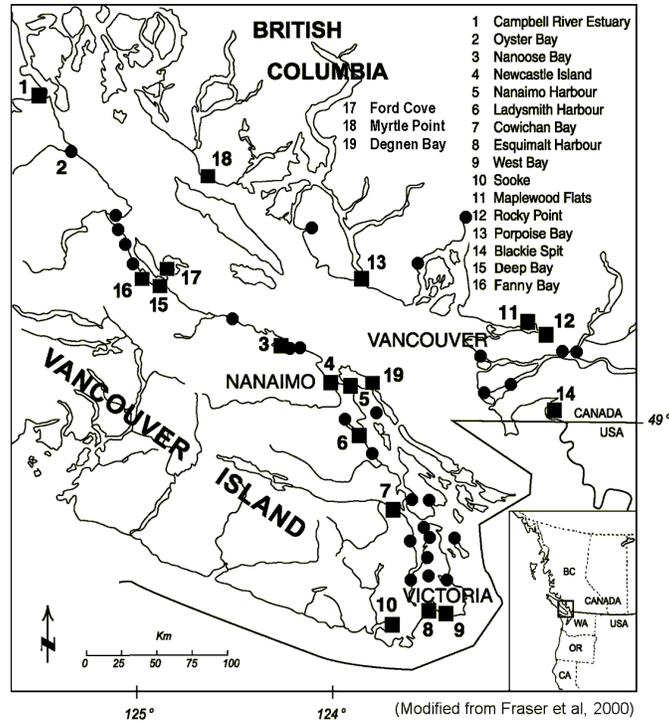


Figure 4. Active (square) and inactive (circle) Purple Martin nest box colony sites by 2003.

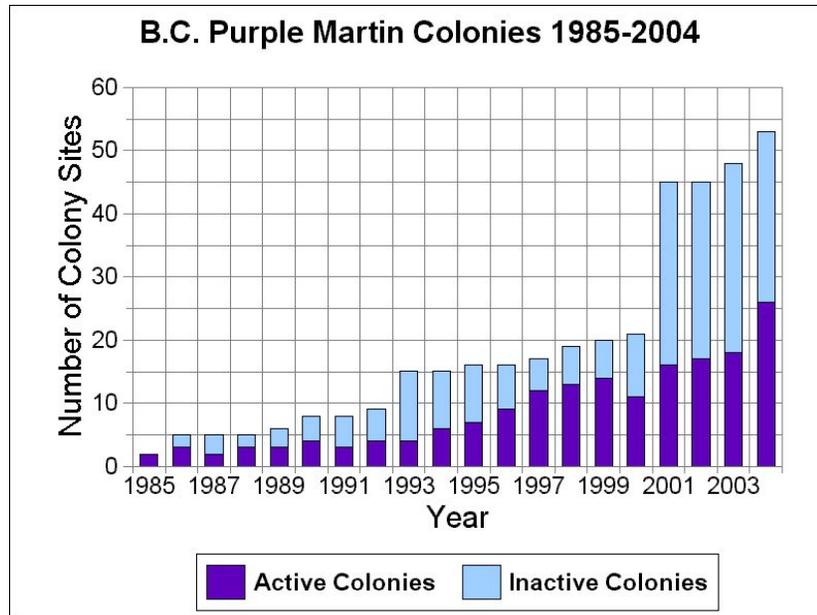


Figure 5. BC Purple Martin active and inactive colony sites, 1985-2004

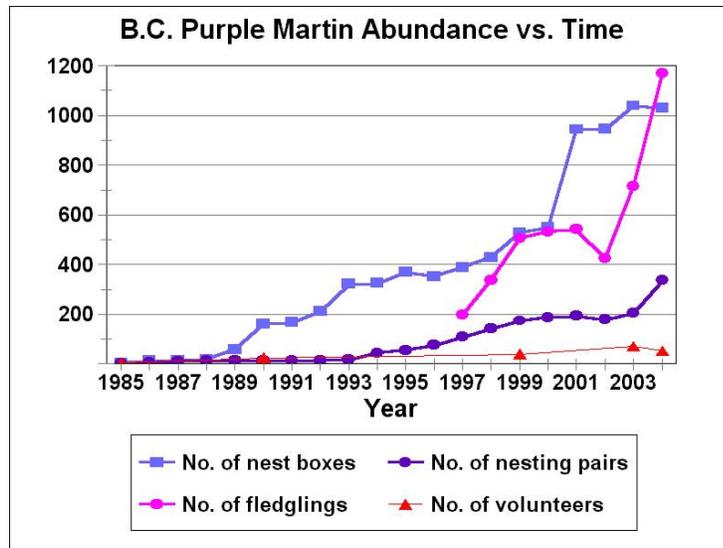


Figure 6. BC Purple Martin annual abundance and volunteer effort, 1985-2004.

What Does This Recovery Program Involve?

The BC Purple Martin Stewardship and Recovery Program consists of three major components:

- long-term nest box colony provision, monitoring, and maintenance (stewardship),
- ongoing annual nest box inspection and nestling banding (scientific monitoring and adaptive management of the recovery program), and
- continued public awareness and education (necessary to sustain public interest and support).

Stewardship

As the western Purple Martin is completely dependent on humans for its nesting habitat in BC, colonies must be monitored and maintained to ensure the survival of this population. Maintenance involves cleaning boxes annually, where required, and removing any nests of introduced species such as European Starlings and House Sparrows. At the West Bay site in Victoria, House Sparrows filled half the available nest boxes and the number of Purple Martin pairs nesting there had declined accordingly. When these nests were eliminated, the number of nesting pairs of Purple Martins began to increase.

When European Starlings and House Sparrows are a problem at colony sites special measures are needed. The impact of starlings can be controlled by the size of the box entrance. All box entrances should be rectangular, oval, or crescent shaped with a width of 2 3/4–3" (7–7.6 cm) and height of 1 3/16" (3 cm) to exclude most starlings. Where House Sparrows present a problem, entrances should be plugged after the martins' nesting season (mid-September) and opened again just before the martins arrive in spring (early to late April depending on latitude). At previously unoccupied sites the nest boxes should be opened about a month later, in mid May. Removal of starling and House Sparrow nests during the early nesting season (prior to egg laying) may also be needed. (Nest box plans are available at <<http://www.georgiabasin.ca/puma.htm>>)

Nest boxes also need to be replaced as they deteriorate over time. At Cowichan Bay, nest boxes have not been cleaned for some years, and decaying and missing nest boxes have not been replaced. The colony size had decreased from 35 to 21 nesting pairs in about 5 years, which may have been due to a lack of nest box maintenance. After a majority of the boxes were cleaned out in the fall of 2003, the number of breeding pairs increased to 31 in 2004.

Some colonies have been established on pilings left over from commercial activities in harbours and estuaries in the early 1900s. These old pilings are no longer maintained and are rotting and falling down, as occurred at the Nanaimo River estuary site late in 2003. The feasibility of having these old pilings replaced in conjunction with other piling replacement activities is being explored.

Scientific Monitoring and Adaptive Management

Ongoing annual nest box inspection and nestling banding provides reliable abundance estimates and productivity information. To date, about 4600 nestlings have been banded and over 700 bands have been read. The information gathered from the nest box inspections and nestling banding is needed to ensure that the BC Purple Martin population continues to respond to the current nest box recovery approach, and that adaptive management can be applied to the recovery program. This information is also essential to understand variations in population abundance and growth rate over time, such as occurred with the apparently adverse weather-related stalling of BC population growth and new nest box site colonization during the 2000–2002 period.

Public Awareness and Education

Ongoing public awareness and education are essential to publicise the vulnerable nature of the Purple Martin population in BC and the current success of the nest box program. Education and awareness programs are also necessary to sustain the enthusiasm and interest of naturalists and the general public, and to encourage the participation of sponsors and volunteers in the nest box program. Interpretative signs at easily accessible colonies, a video ‘nest-cam’ display, brochures, newspaper articles, and a program newsletter have all contributed to public awareness and education.

Program Costs - Financial and In-kind Support

The costs of co-ordinating and implementing the annual stewardship and monitoring program throughout the Georgia Basin have increased substantially over time as the number of colony sites has increased and their geographic distribution has expanded. The 2004 stewardship program involved about 50 volunteers who contributed 2500 hours between April and September. Financial sponsors contributed \$15,450 and the value of volunteer labour and donated materials and supplies totalled \$30,000.

In 2004, the BC Purple Martin Stewardship and Recovery Program was supported by the Human Resources Development Canada Summer Career Placement Program, the UVic Coop Program Service Learning Internship Grant, the Habitat Conservation Trust Fund’s Public Conservation Assistance Fund, Coastal Community Credit Union, City of Nanaimo, NorskeCanada, TimberWest, Weyerhaeuser Canada, the James L. Baillie Memorial Fund of Bird Studies Canada, local businesses, and many volunteers.

Sustaining Volunteer Involvement

While financial support for the Project Coordinator, Student Assistants, and travel costs are essential for sustaining the BC Purple Martin Stewardship and Recovery Program, motivating and maintaining the interest of volunteers is critical. There is an ongoing process of natural attrition due to human aging (many of our stewards and volunteers are seniors), other competing interests, and lack of positive feedback that continually erodes the level of volunteer involvement and support. This loss of volunteers has resulted in some colony sites becoming neglected over the past decade such that they are now in a state of disrepair or decline.

Ongoing communication between the Project Coordinator and Site Stewards through personal contacts, site visits, and the use of phone, email, and fax is required to assist the stewards in their site monitoring and maintenance tasks. This contact also conveys appreciation and helps them become better informed. Regular communications and reminder notices, a program newsletter, and volunteer appreciation awards, all initiated in 2003, as well as the distribution of brochures about the program all contribute to maintaining volunteer interest and motivation.

Prospects for the Future of the Western Purple Martin in BC

The immediate future of the western Purple Martin in British Columbia is promising given the considerable success of the recovery effort so far. Although the BC population grew an unprecedented 60% in 2004, the average population growth rate has been 10% per year over 20 years. Comparable increases in abundance have also occurred in response to nest box-based recovery programs in Washington and Oregon over 20–30 years (Minutes of the Western Purple Martin Working Group, unpublished; Darling et al., in preparation).

Continued population growth is anticipated over the next few years with an adequate supply of available nest boxes at newly established and as yet unoccupied colony sites, and continued favourable levels of nesting success and survival being reached. Nesting success, productivity, and natural mortality rates of Purple Martins (and other obligate aerial insectivores in the swallow family) are linked to the occurrence of adverse weather conditions, which can cause food shortages or starvation during the breeding season and during migration and overwintering in South America. Therefore, annual variation in population growth rate is likely to continue, and temporary declines in overall abundance may occur occasionally. An increase in predation mortality may also occur as Purple Martin numbers increase and colony sites become increasingly attractive to aerial and nest predators. There is no evidence yet to suggest there is a systematic limiting of abundance other than by the number of available nest cavities in suitable habitat. We also note that the entire British Columbia population is equivalent to a single moderately large colony of the eastern subspecies, which suggests resources are unlikely to limit abundance at current population levels.

However, the longer-term future of this subspecies within British Columbia remains uncertain because of an apparent lack of natural nest cavities in suitable habitat, and thus a total dependence upon a continued managed supply of artificial housing for suitable nest sites for the foreseeable future. Within BC, the western Purple Martin's breeding range is restricted to the coastal lowlands of the Strait of Georgia, Gulf Islands, and lower Fraser River by its northern breeding range limit and by surrounding densely forested habitat at higher elevations. These coastal lowland areas are the most heavily populated in the province and have been permanently altered by human development, timber harvest, and fire suppression. Coastal and lake shore areas have been changed by urban development and the supply of snag trees with suitable natural nest cavities has been seriously reduced. There is an almost complete absence of open fire-killed forest stands which may have once provided abundant nest sites (as in parts of Oregon today) and an abundance of resident introduced European Starlings (and House Sparrows in urban areas) which aggressively compete with Purple Martins for available nest cavities.

The conditions that resulted in the shift to nesting in natural cavities in marine coastal pilings and, more recently, to almost exclusive use of human-provided nest boxes in these locations are unlikely to change. *Thus, the future of the Purple Martin in British Columbia will depend on the continued provision of suitable nesting colony sites through a robust and ongoing volunteer stewardship program for another decade or two, at least.* To be self-sustaining in the long term, this program will require both overall coordination and modest financial support. As the Purple Martin population continues to increase and supplied housing becomes saturated, it may be possible, with hard work, ingenuity, and luck, to return a proportion of the population to nesting in natural cavities or some other structure that is more permanent than single wooden nest boxes. One current management objective which may be achievable is to reach a target population of 800 nesting pairs in British Columbia by 2010, ideally with at least 10% of these nesting in natural cavities (Minutes of the Western Purple Martin Working Group, unpublished). Similar management objectives have been proposed for Washington and Oregon where the subspecies is more abundant, though the method of achieving the shift back to natural cavity use is still uncertain.

In the meantime, continued monitoring of nest boxes will be necessary to document annual abundance, nesting success and productivity. This information will help us to better understand the population dynamics of this subspecies near its northern range limit, to explain future fluctuations in abundance and population growth, and to allow for adaptive management of the recovery program.

Acknowledgements

We would like to thank the agencies and organizations listed above in the program costs section for their valued contributions and ongoing support of the Western Purple Martin Stewardship and Recovery Program. Without their participation the program would not proceed. Thank you as well to all the dedicated volunteers, past and present. Your efforts, observations, dedication, time commitments and nest box building skills have made this program the success that it is.

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