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

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**Abstract:** The western subspecies of the purple martin (*Progne subis arboricola*: Behle 1968)<sup>1</sup>, the largest North American member of the swallow family (Hirundinidae), is red-listed in British Columbia because of ongoing loss of nesting habitat and severe competition for nest cavities from two introduced bird species, the European starling (*Sturnus vulgaris*) and the house sparrow (*Passer domesticus*). By 1985, this subspecies had been reduced to about 5 breeding pairs in British Columbia, all of which were nesting in natural cavities in offshore pilings. The population has since rebounded to over 200 nesting pairs in 2003. This increase was entirely the result of nest boxes being built, erected, monitored, and maintained, mainly by volunteers, at many marine coastal locations along southeast and east Vancouver Island, the British Columbia Lower Mainland, the Gulf Islands, and the Sunshine Coast within the Georgia Basin.

Due to changes in provincial government funding and management priorities in 2002, the Georgia Basin Ecological Assessment and Restoration Society (a Nanaimo-based nonprofit conservation organization) agreed to provide ongoing overall project coordination and management for the continuation of the British Columbia Purple Martin Nest Box Stewardship and Recovery Program. This program consists of a long-term nest box colony monitoring and maintenance component, an ongoing annual nest box inspection and nestling banding component to provide reliable abundance estimates and productivity information needed for adaptive management of the recovery program, and a public awareness and education component.

In 2003, the British Columbia Purple Martin Stewardship and Recovery Program included 18 known occupied breeding colonies and another 35 unoccupied nest box sites distributed throughout the Georgia Basin, and involved about 1100 nest boxes in various stages of repair, some of which needed replacement. This program could not be maintained over such a large geographic area without the ongoing dedication and support of about 70 volunteer stewards and assistants, and many local businesses. The costs of coordinating and implementing the annual nesting colony stewardship program over this large geographic area has involved 2430 hours of volunteer labour and about \$10,000 of donated materials and equipment use, as well as student

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<sup>1</sup>Currently, the BC Species and Ecosystems Explorer (September 2004) and NatureServe Explorer (version 4.0, July 2004) do not list subspecies for the purple martin.

summer employment. Motivation of volunteers was achieved through the use of personal contacts; site visits; communications via phone, fax and email; brochures; a program newsletter; and volunteer appreciation certificates.

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

### **A Red-listed Species in British Columbia**

The purple martin (*Progne subis*) is the largest North American member of the swallow family (Hirundinidae). The western subspecies (*Progne subis arboricola*: Behle 1968) is the only member of its genus that occurs regularly and breeds in British Columbia (B.C.) (Fraser et al. 1997; Cannings 1998; Copley et al. 1999), nesting only within the Georgia Depression Ecoprovince, or 'Georgia Basin' (Campbell et al. 1997). This subspecies nests along the western edge of North America from southern California to southwestern British Columbia, entirely isolated from the eastern subspecies (*P. s. subis*) which breeds east of the Rocky Mountains (Brown 1997). Both subspecies are migratory and spend the winter in South America.

The purple martin is at risk in B.C. because of its small breeding population size, historic decline in numbers and range, continuing 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 B.C., the purple martin is entirely dependent on human-supplied housing for nesting cavities.

Purple martins disappeared from Vancouver after 1948 and the B.C. Lower Mainland after 1972. By 1985, the B.C. purple martin population had been reduced to about 5 breeding pairs. The only known remaining breeding birds were 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 B.C. *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 B.C. *Wildlife Act* and the federal *Migratory Bird Convention Act*.

### **Where Did They Nest in B.C.?**

The western purple martin 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 B.C. (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).

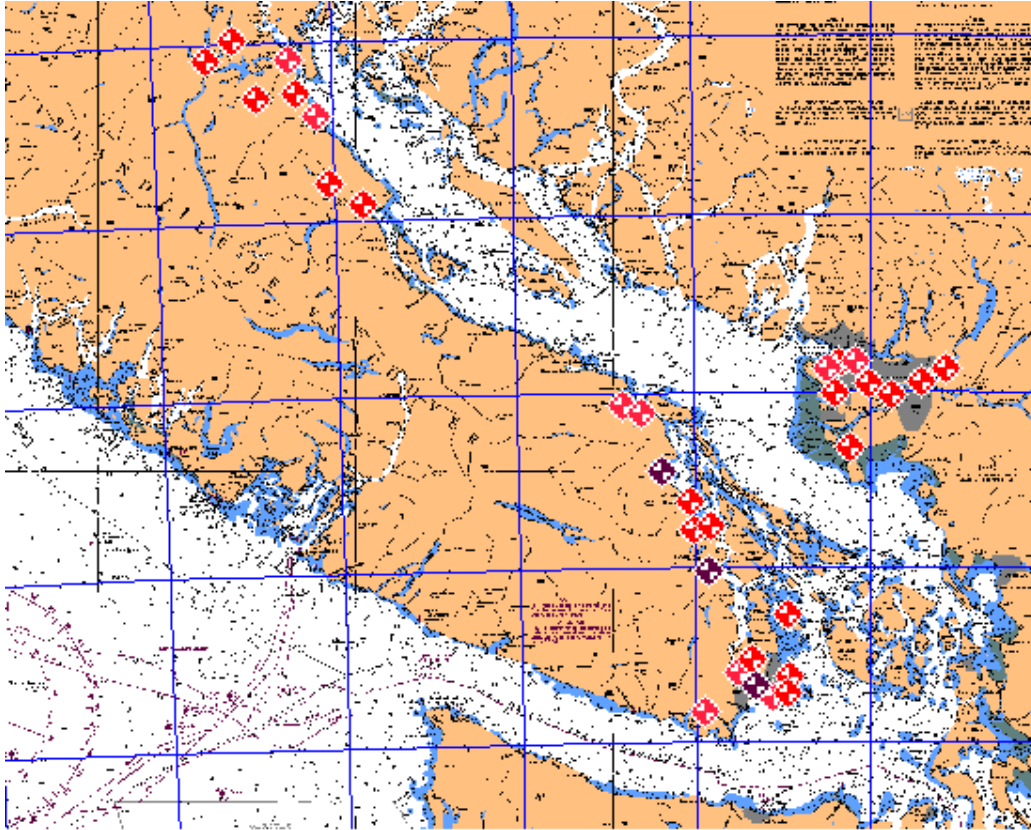


Fig. 1 Historic Purple Martin nesting sites (~1900-1985) in the Strait of Georgia.  
 Only sites in purple still in use by 1985, some others re-colonized since (Fraser et al, 1997).  
 UTM grid interval = 50 km. B. Cousens, Feb./2004

**Figure 1. Historic purple martin nesting sites (~1900–1985) in the Strait of Georgia, B.C.**

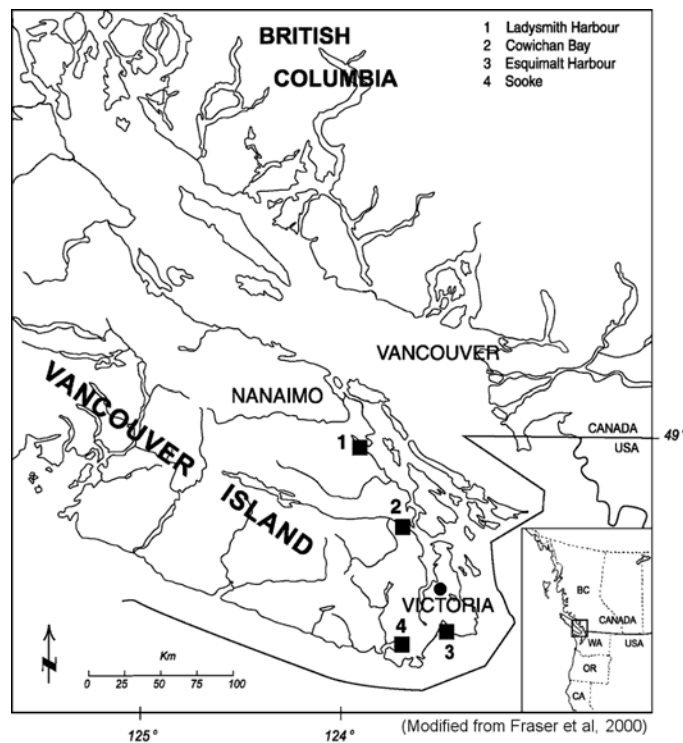
Purple martins also nested in the elaborate exteriors of tall, older buildings in downtown Vancouver until the late 1940s and in Victoria until the late 1960s. Ongoing competition from European starlings and house sparrows, as well as modern building construction, which lacks the many nooks and crannies 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 B.C. prior to ~1940 are poorly documented, but 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.

## Stewardship Program Begins—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 man-made box was at Cowichan Bay in 1985 (Plath 1994; Copley et al. 1999). A few boxes were also installed in the Victoria Harbour area but 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 martin 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 martin nest box and natural cavity sites by 1989.**

### Stewardship Program Continues—1990s

A major effort to re-establish purple martins in B.C. 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 B.C. Lower Mainland (Plath 1994; Copley et al. 1999). Nest boxes were placed primarily at marine piling sites where purple martins had reportedly nested previously. More boxes were added at most sites in later years. D. Copley installed a few vertical 5-compartment boxes ('penta-towers') at some sites on Vancouver Island, most of which received at least partial use.

As information about the nest box program spread and purple martin numbers slowly increased in the mid-1990s, interested naturalists installed nest boxes at 6 locations on eastern Vancouver Island between Nanaimo and Campbell River, the historic northern breeding range limit in B.C., and at 3 sites on the Sunshine Coast.

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 13 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 martin activity, checked nest boxes, and banded nestlings (Walters et al. 1990; J.C. Finlay, pers. obs.). 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).

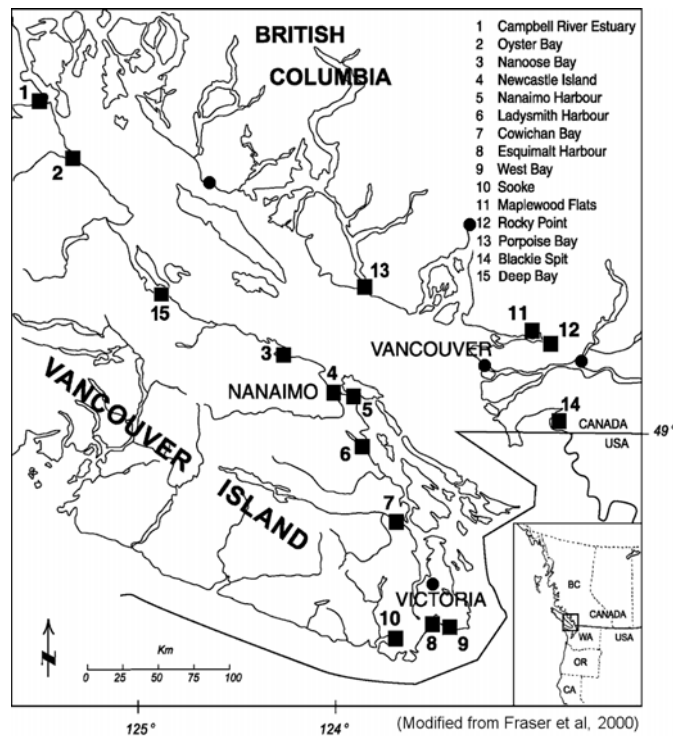


Figure 3. Active (square) and inactive (circle) purple martin nest box colony sites by 1999.

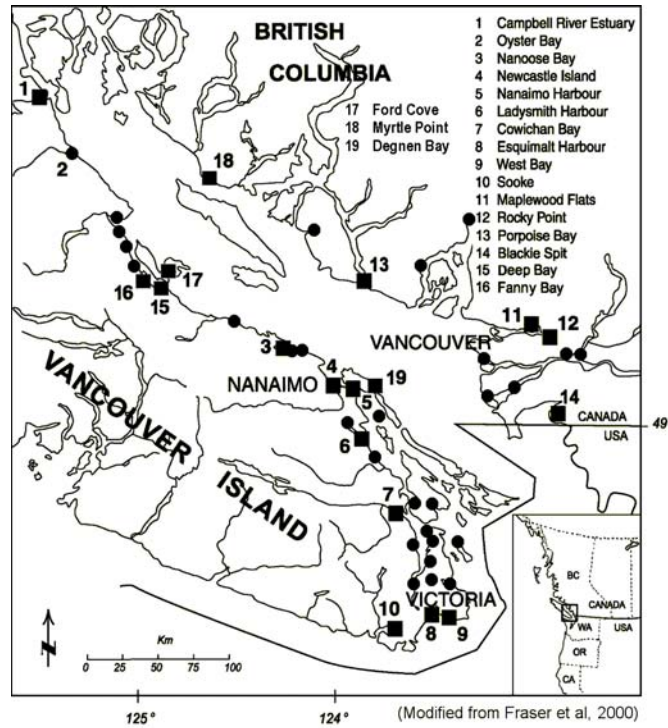
## Stewardship Program in the New Millennium

Nestling banding studies undertaken since 1996 showed that the B.C. 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 B.C. population. In 2000–2001, the B.C. provincial government funded the construction and installation of about 500 additional boxes at new and existing colony sites by contractor and naturalist Kevin Storey, which thereby doubled the number of boxes and sites available for purple martins.

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

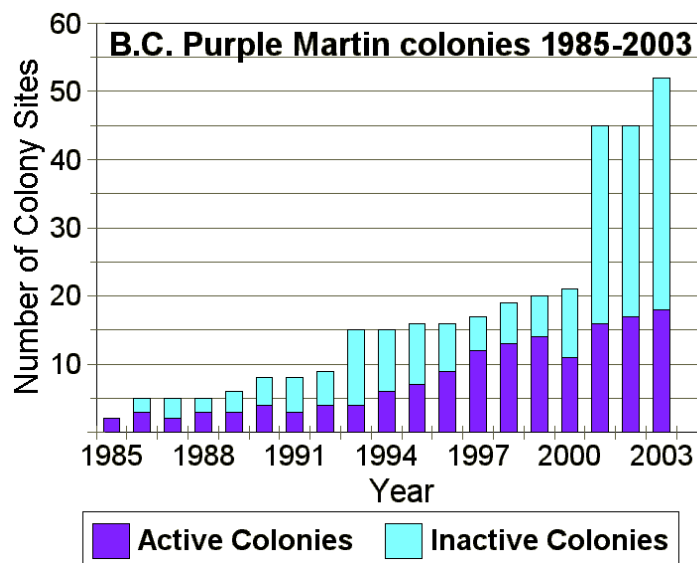
In 2003, the Georgia Basin Ecological Assessment and Restoration Society established 7 new nest box sites—5 sites between Nanaimo and Courtenay to further facilitate recolonization of the northern portion of Georgia Basin, and 2 sites south of Nanaimo. Nest boxes were also installed at 6 small existing 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. Of these sites, 18 were occupied by 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.



**Figure 4. Active (square) and inactive (circle) purple martin nest box colony sites by 2003.**

Currently, there are about 35 inactive nest box locations which are providing considerable nesting habitat for future population expansion (Figs. 5 and 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 Lower Mainland, the Gulf Islands, and the Sunshine Coast.



**Figure 5. B.C. purple martin active and inactive colony sites, 1985 - 2003.**

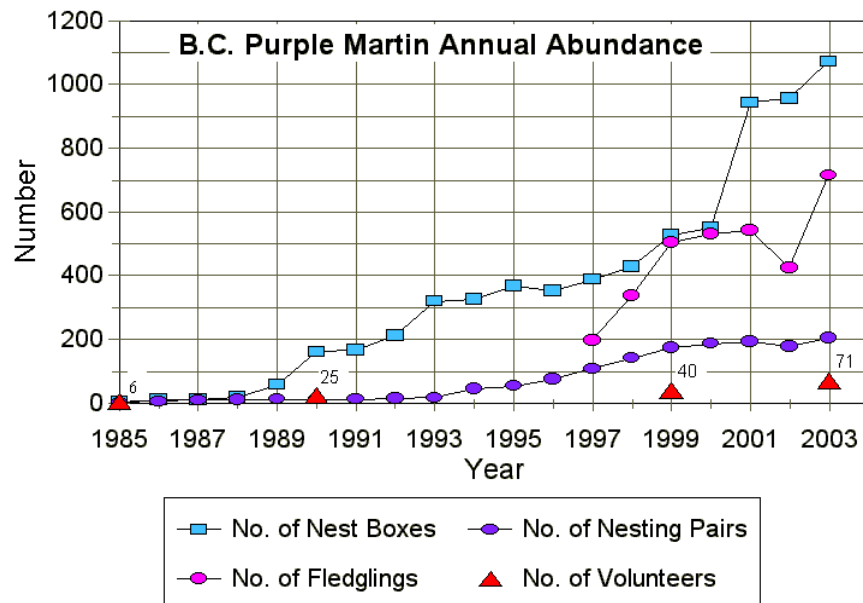


Figure 6. B.C. purple martin annual abundance and volunteer effort, 1985-2003.

### What Does This Program Involve?

The B.C. 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
- public awareness and education (necessary to sustain public interest and support).

As the western purple martin is completely dependent on humans for its nesting habitat, colonies must be monitored and maintained to ensure the survival of this population in B.C. Maintenance involves cleaning boxes annually and removing any nests of introduced species such as European starlings and house sparrows. At West Bay, 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.

All box entrances should be rectangular, oval, or crescent shaped with a width of 2 ¾–3" (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). 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 has decreased from 35 to 21 nesting pairs in about 5 years, which may be due to a lack of nest box maintenance.

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.

Ongoing annual nest box inspection and nestling banding provides reliable abundance estimates and productivity information. To date, about 3500 nestlings have been banded and over 500 bands have been read. The information gathered from the nest box inspections and nestling banding is needed to ensure that the B.C. 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 B.C. population growth and new nest box site colonization during the 2000–2002 period.

Public awareness and education are essential to publicize the vulnerable nature of the purple martin population in B.C. 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 and Financial and In-kind Support**

The costs of coordinating 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 2003 stewardship program involved about 70 people who contributed 2430 hours. Financial sponsors contributed \$14,883, and the value of volunteer labour and donated materials and supplies totalled \$33,071.

In 2003, the B.C. Purple Martin Stewardship and Recovery Program was financially supported by Environment Canada EcoAction, the Human Resources Development Canada Summer Career Placement Program, the Habitat Conservation Trust Fund's Public Conservation Assistance Fund, Coastal Community Credit Union, and the James L. Baillie Memorial Fund of Bird Studies Canada. Donations of materials, supplies, and labour were received from Mike Gogo Cedar Products, Weyerhaeuser Canada (Island Phoenix), EcoWood Enterprises, many local hardware businesses, Dover Bay Secondary School (Nanaimo), Centennial High School (Port Moody), and many volunteers.

## **Sustaining Volunteer Involvement**

While financial support for the project coordinator, student assistants, and travel costs are essential for sustaining the B.C. 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 the stewards become better informed. Regular communications and reminder notices, a program newsletter, and volunteer appreciation certificates and plaques, 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 B.C.**

The immediate future of the western purple martin in British Columbia is promising given the considerable success of the recovery effort so far—i.e., the average population growth rate has been 10% per year over 20 years. Comparable increases in abundance have 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 if an adequate supply of available nest boxes at newly established and as yet unoccupied colony sites is provided, and assuming that favourable levels of nesting success and survival are achieved. 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; thus 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 B.C., the subspecies' 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, as has likely been the case for the duration of the current climate regime. 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. This has resulted in the urban development of coastal and lakeshore areas, a very limited supply of snag trees with suitable natural nest cavities, 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 500 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 and nesting success and productivity in order 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.

## **Acknowledgments**

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dedication, time commitments and nest box building skills have made this program the success that it is.

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