Update on Purple Martin Stewardship and Recovery in British Columbia, 2006

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Abstract

The western Purple Martin (*Progne subis arboricola* Behle 1968) is Blue-listed (until recently Red-listed) in British Columbia and a Species of Special Concern throughout its breeding range in Washington, 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 and House Sparrows. The population has rebounded from 5 known breeding pairs nesting in offshore pilings at 2-3 sites within BC in 1985 to over 600 pairs in 2006, with an unprecedented tripling in the past 4 years, entirely as a result of nest boxes built, erected, monitored and maintained mainly by volunteers at ~60 marine coastal locations. This highly successful recovery program now includes 45 occupied nesting colonies and 15 unoccupied nest box sites distributed throughout the Georgia Basin, involving a total of ~1200 nest boxes, plus 100 nest boxes at 20 fresh water sites (one occupied). This program could not be maintained over this large geographic area without the ongoing dedication and support of 130+ volunteer stewards and assistants and support from many local businesses, sponsors and funding organizations. Success of this recovery effort and costs of co-ordinating and implementing the annual stewardship program are documented and discussed.

Key words: Purple Martins, *Progne subis arboricola*, nest boxes, volunteers, stewardship, recovery, British Columbia, blue-listed species

Introduction

Purple Martins (*Progne subis*) are the largest member of the swallow family (Hirundinidae) 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 breeds along the western coast of North America from southern California to south-western British Columbia, as far north as Campbell River on eastern Vancouver Island and Powell River on the BC mainland and is considered at risk throughout this range. Western Purple Martins are geographically and reproductively 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.

Western Purple Martins were Red-listed (Threatened) under the *BC Wildlife Act* in BC from 1985 to 2005 because of their small breeding population size, historic decline in numbers and range, and ongoing loss of nesting habitat. They were in danger of potential extirpation within the province if their specific nesting requirements were not met (Fraser et al. 1997; Fraser et al. 2000). Only 5 known breeding pairs were recorded in BC by 1985, nesting in cavities in offshore pilings on southeast Vancouver Island. They had disappeared from the Lower Mainland after 1970 (Fraser et al. 1997; Copley et al. 1999). Within BC, Purple Martins have shown a strong recovery response to provision of nest boxes placed in clusters on marine pilings (as in adjacent Puget Sound, Washington), but remain entirely dependent on human-supplied boxes for nesting cavities.

With 4 years of significant population increases to over 600 breeding pairs by 2006, the status of BC Purple Martins has been re-evaluated and changed to Blue-listed (Vulnerable). Vulnerable species are identified as at risk because of characteristics that make them particularly sensitive to human activities or natural events. 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*.

In BC Purple Martins once nested in loose colonies in cavities in old trees and snags in lowland areas throughout the Georgia Basin as far north as Campbell River, the documented historic northern limit of the breeding range in BC. These colonies were either in open treed areas with little undergrowth, such as recently burned areas, or bordering freshwater, harbours or estuaries (Campbell et al. 1997; Fraser et al. 1997; Copley et al. 1999). This traditional nesting habitat in BC may have been gradually disappearing for well over a century as logging activities, agricultural land clearing and urban development continued along coastal areas. Forest fire suppression has also played a role in reducing open stands of fire-killed snags. Purple Martins also experienced competition for remaining nest cavities from two introduced bird species, European Starlings and House Sparrows.

A volunteer nest box program was started in 1985 to re-establish nesting habitat for the last few Purple Martins remaining in the Georgia Basin. The first record of Purple Martins nesting in a human-supplied box was at Cowichan Bay in 1985 (Plath 1994; Copley et al. 1999). Once Purple Martins were observed using the boxes here and at a few locations in the Victoria area, and the population numbers started to increase, nest boxes were placed at coastal sites throughout the Strait of Georgia.

Purple Martin numbers increased slowly but steadily since 1985 as a result of these nest boxes built, installed and maintained by as many as 130 volunteers at an increasing number of marine coastal locations. In addition, good weather conditions throughout the breeding season between 2003 and 2006 have resulted in a tripling of the Purple Martin population in BC from about 200 to over 600 nesting pairs.

In the early 2000s this program was expanded and renamed the BC Purple Martin Stewardship and Recovery Program. This program includes long term stewardship of colony sites, scientific monitoring and adaptive management, banding and band re-sight studies, and public awareness and education components (Cousens et al. 2005).

Methods

In 1985, the first nest boxes for Purple Martins were made and installed at Cowichan Bay where a few Purple Martins were observed nesting in cavities in offshore pilings (Fraser et al. 1997). By the mid-late 1980s about 60 nest boxes were installed at 4 marine piling sites on southern Vancouver Island and were monitored on a casual basis by a few dedicated volunteer naturalists. Other piling sites on southern Vancouver Island were also casually monitored for Purple Martin activity.

A major effort to re-establish Purple Martins in BC began in the 1990s and about 530 single nest boxes were installed at about 20 locations on southern and eastern Vancouver Island as far north as Campbell River, the Sunshine Coast, and 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. A nest monitoring and nestling banding program was also initiated in 1996 to investigate dispersal and recruitment range, population mixing, survival, and nesting success and productivity (Darling et al. 2005; Darling et al. in prep.). The efforts of 30-40 volunteers were co-ordinated by several BC provincial government personnel. Volunteers 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.).

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. This initiative was started after a 4-year nestling banding study showed that the BC Purple Martin population was genetically well mixed. There was no apparent risk of causing localized inbreeding, and nesting success in boxes was promising (J.C. Finlay, unpublished data; Darling et al. 2005; Darling et al. in prep.).

In 2002, Georgia Basin Ecological Assessment and Restoration Society took on the overall project coordination and management for continuation of the BC Purple Martin Nest Box Stewardship and Recovery Program and an annual monitoring and maintenance regime was initiated (Cousens et al. 2005). The nest monitoring and nestling banding program initiated in 1996 (Darling et al. 2005) was continued and expanded as the population increased. A public awareness and education program was started in 2003.

By the end of 2003, there were about 1100 nest boxes distributed at 52 sites around the Georgia Basin. Seven new nest box sites were established - 5 between Nanaimo and Courtenay to further facilitate recolonization of the northern portion of Georgia Basin, and 2 south of Nanaimo. Nest boxes were also installed at small existing colonies that were in need of expansion and where boxes were missing or in need of repair. 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 2005 and 2006, when the capacity of the 12-15 largest colonies was reached and colonization of adjacent unoccupied marine sites was occurring, nest boxes were installed at suitable remaining historic and freshwater sites on Vancouver Island and the BC Lower Mainland.

By 2006, over 1200 nest boxes were distributed at 60 marine coastal sites and 100 boxes were installed at 20 freshwater locations. Approximately 130 volunteers were involved in the Recovery Program and helped a Project Coordinator, Program Administrator and 2 Summer Students monitor and maintain colony sites, collect productivity data, and band nestlings.

Objectives

The objectives of the BC Purple Martin Stewardship and Recovery Program, developed co-operatively through the international Western Purple Martin Working Group (WPMWG), are to build the BC population of Purple Martins to a minimum of 800 breeding pairs by 2010. Longer term objectives are to re-introduce a significant portion of this population to original or equivalent nesting cavity situations in the wild and to re-develop as far as practical a sustainable wild-nesting population.

Results

Purple Martin Population Recovery

The first record of western Purple Martins nesting in a human made nest boxes in BC was in 1985 at Cowichan Bay where the first nest boxes were installed (Copley et al. 1999). By the end of the 1980s, low numbers of Purple

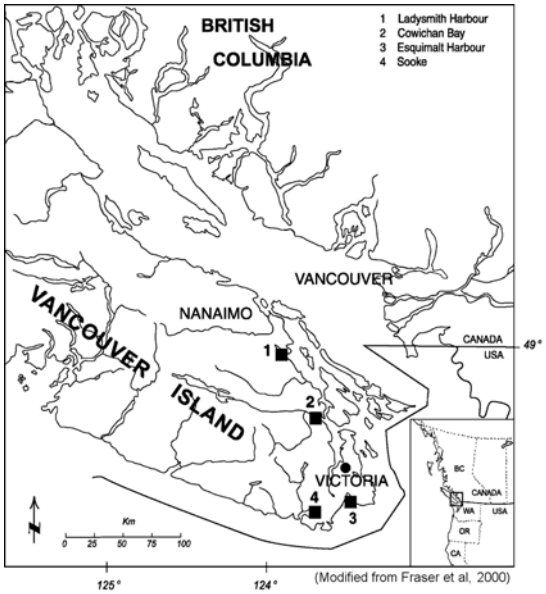

Figure 1. Active (square) and inactive (circle) Purple Martin nest box and natural cavity sites by 1989.

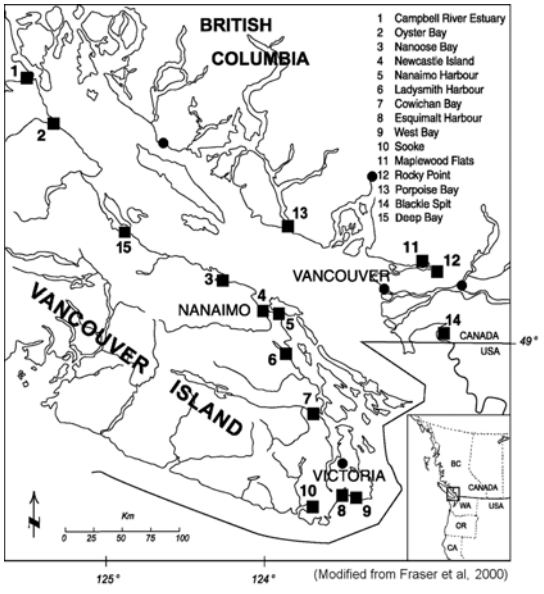

Figure 2. Active (square) and inactive (circle) Purple Martin nest box sites by 1999.

Martins were observed nesting in nest boxes at Cowichan Bay (6 pairs) and in pilings at Ladysmith Harbour (3 pairs) and Sooke Harbour (1 pair), and in port holes in decommissioned ships at Esquimalt (6 pairs) (Fig. 1).

The BC Purple Martin population increased slowly through the 1990s and by 1999, there were 175 pairs nesting at 15 colony sites (Fig. 2). The two largest colonies were at Esquimalt (36 pairs) and Cowichan Bay (35 pairs) on Vancouver Island. Medium-sized colonies at Newcastle Island, Ladysmith, and West Bay on Vancouver Island and Maplewood Flats in North Vancouver had between 15 and 25 breeding pairs. The remaining active sites had 6 pairs or less.

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 Purple Martins were nesting successfully in boxes (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. As a result, additional boxes were installed at new and existing colony sites throughout the Georgia Basin in 2000-2001.

The BC Purple Martin population continued to grow in 2000 and 2001 but decreased slightly in 2002 (Fig. 5) likely due to cool, damp weather conditions and subsequent reduction in flying insect availability during the breeding season resulting in reduced fledgling production. In 2003, the Purple Martin population rebounded slightly to over 200 breeding pairs nesting at 18 of the available 52 nest box sites (Cousens et al 2005). The three largest colonies were at Ladysmith (36 pairs), Esquimalt (32 pairs) and Maplewood Flats (29 pairs). Medium-sized colonies at Newcastle Island, Cowichan Bay, West Bay and Porpoise Bay on the Sechelt Peninsula had between 15 and 20 pairs. As in 1999, the majority of active sites had 6 breeding pairs or less. About 720 young were produced of which 697 were banded. A total of 91 leg bands from previous years were read, including several from Puget Sound.

In 2006, over 600 breeding pairs occupied 45 marine and 1 freshwater colony sites (Fig. 3 & 4). The BC Purple Martin population tripled between 2003 and 2006, which is unprecedented in the 20-year history of the BC recovery effort (Fig. 5). This was 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 27 new colonies were started since 2003, 15 of which were newly occupied in 2006.

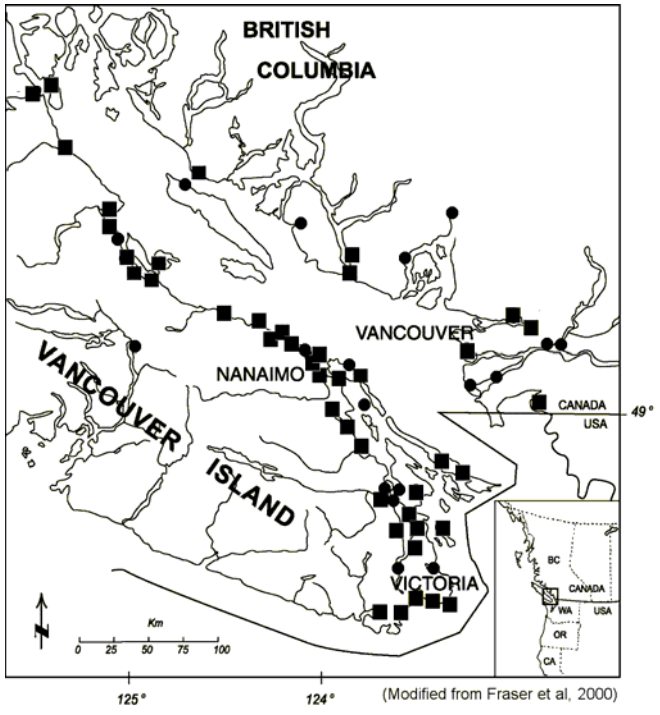

Fig. 3. Active (square) and inactive (circle) Purple Martin nest box colonies by 2006.

The five largest colonies in 2006 were Ladysmith (66 pairs), Maplewood Flats (66 pairs), Cowichan Bay (55 pairs), Esquimalt (45 pairs) and Porpoise Bay (40 pairs). There were 8 medium-sized colonies with 15-30 pairs and about 40 % of the colonies had 6 pairs or less. At least 1620 young were produced in 2006, of which 1272 were banded. A total of 300 bands were read from previous years and at least 22 were seen from Puget Sound.

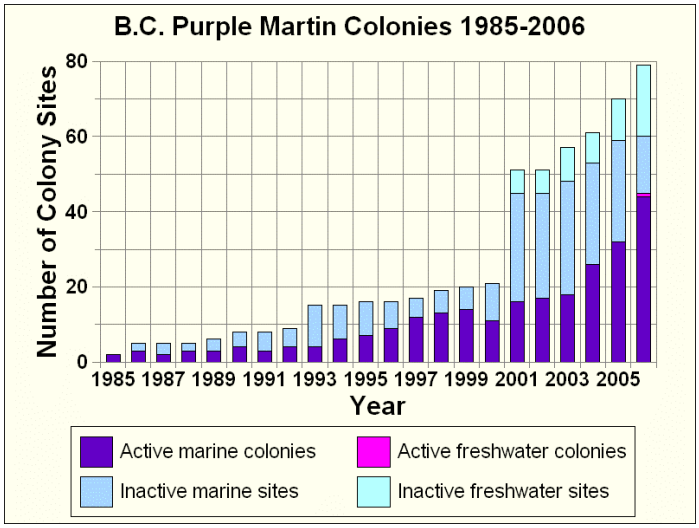

Fig. 4. BC Purple Martin active and inactive marine and freshwater colonies and nest box sites.

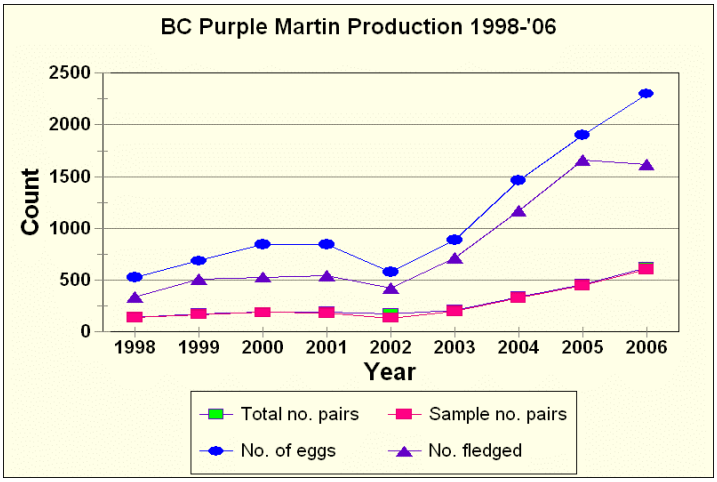

Fig 5. BC Purple Martin annual abundance.

Stewardship

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

When European Starlings and House Sparrows are present at colony sites special measures are needed. The impact of starlings can be controlled by the use of rectangular, oval, or crescent shaped box entrances with a width of 2 3/4–3″ (7–7.6 cm) and height of 1 3/16″ (3 cm). Where House Sparrows are present, 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 and weather). At previously unoccupied sites the nest boxes should be opened about a month later, in mid May. Removal of starling and especially House Sparrow nests during the early nesting season (prior to egg laying) may also be needed. However, martins at well-established colonies have proven capable of evicting starlings as colonies become full and taking over their nests or claiming and re-using them immediately after the starling young fledge. Therefore, removal of starling nests early in the season may simply delay nesting if the starlings re-use the cavity, preventing this time series of events from occurring. (Nest box plans are available at <http://www.georgiabasin.ca/puma.htm>)

Nest boxes require replacement as they deteriorate over time. At Cowichan Bay, nest boxes had not been cleaned for some years, and decaying and missing nest boxes had not been replaced. The colony size had decreased from 35 to 21 nesting pairs in about 5 years, mainly due to a lack of nest box maintenance. After a majority of the boxes were cleaned out and repaired or replaced in the fall of 2003 and later years, the number of nesting pairs increased to 31 in 2004, 45 in 2005, and 55 in 2006.

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 several times since 2003. At this site two steel pilings were added in 2004 in conjunction with other piling replacement activities in the estuary. The possibility of moving active martin colonies from deteriorating pilings to adjacent marina and wharf sites is currently being tried at several locations.

Scientific Monitoring and Adaptive Management

Ongoing annual nest box inspection and nestling banding provides reliable abundance and productivity data as well as recruitment and dispersal information. To date, 7100 nestlings have been banded and over 1000 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 programs are essential to publicise the vulnerable nature of the Purple Martin population in BC and the current success of the nest box program. These 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, video 'nest-cam' displays, program brochures, newspaper articles, a program newsletter, presentations, table displays and open houses 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. In the late 1980s a few dedicated naturalists contributed an estimated $2-5000 annually in time and materials. By 2006 the stewardship program involved 130 volunteers who contributed 3200 hours from April to September. Financial sponsors contributed $35,000 and the value of volunteer labour and donated materials and supplies totalled $40,000.

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 can continually erode the level of volunteer involvement and support. 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. The introduction of a program t-shirt in 2005 was also well received by the volunteers. The significant increase of martin numbers at active colonies and the colonization of 27 previously inactive sites in the last 4 years has also rekindled and sustained volunteer enthusiasm and participation throughout the Georgia Basin area.

Conclusions

The use of a co-ordinated volunteer recovery program and nest boxes installed at marine coastal areas throughout the Georgia Basin area have proven to be a successful management approach to bring Purple Martins back from the brink of extirpation in BC. Continued population growth is anticipated over the next few years with an adequate supply of available marine and freshwater nest boxes assuming continued favourable levels of nesting success and survival. However, nesting success, productivity, and natural mortality rates of Purple Martins (and other obligate aerial insectivores in the swallow family) are closely linked to the occurrence of adverse weather conditions. Extended periods of adverse weather conditions can limit their flying insect food supply and 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.

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. More years of monitoring are required to determine whether this management approach will work equally well in re-introducing Purple Martins to freshwater sites and then into cavities in snags at freshwater locations.

A small paid staff and modest funds for travel and material expenses are essential to successfully coordinate and maintain this substantial volunteer recovery program over a large geographic area such as the Georgia Basin.

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