GALAPAGOS REPORT 2011-2012

BIODIVERSITY AND ECOSYSTEM RESTORATION

GONE, GONE … GOING: THE FATE OF THE VERMILION FLYCATCHER ON DARWIN'S ISLANDS

GODFREY MERLEN

How to cite this document
GNPS, GCREG, CDF, and GC. 2013. Galapagos Report 2011-2012. Puerto Ayora, Galapagos, Ecuador.

How to cite this article
Merlen G. 2013. Gone, gone…going: The fate of the vermilion flycatcher on Darwin's Islands. Pp. 180-188. In: Galapagos Report 2011-2012. GNPS, GCREG, CDF and GC. Puerto Ayora, Galapagos, Ecuador.

*The **Galapagos National Park Service** has its headquarters in Puerto Ayora, Santa Cruz Island, Galapagos and is the Ecuadorian governmental institution responsible for the administration and management of the protected areas of Galapagos.*

*The **Governing Council of Galapagos** has its headquarters in Puerto Baquerizo Moreno, San Cristóbal Island, and is the Ecuadorian governmental institution responsible for planning and the administration of the province.*

*The **Charles Darwin Foundation**, an international non-profit organization registered in Belgium, operates the Charles Darwin Research Station in Puerto Ayora, Santa Cruz Island, Galapagos.*

***Galapagos Conservancy**, based in Fairfax, Virginia USA, is the only US non-profit organization focused exclusively on the long-term protection of the Galapagos Archipelago.*

Photograph: Judy Molinaro

Gone, gone…going: The fate of the Vermilion Flycatcher on Darwin´s Islands

Godfrey Merlen

Independent Scientific Assessor, Galapagos

The Vermilion Flycatcher (*Pyrocephalus rubinus*) is rapidly disappearing from the human inhabited islands of the Galapagos Archipelago. Already thought extirpated from Floreana and San Cristóbal (pers. com. - Galapagos National Park rangers, tourist guides, residents), a few individuals still remain on Santa Cruz. The IUNC Red List, however, currently classifies it as being a species of "Least Concern." This article reviews historical records of Vermilion Flycatchers in the Galapagos Islands, discusses potential threats on inhabited islands and presents preliminary data on observations or lack of observations of Vermilion Flycatchers on San Cristóbal, Floreana and Santa Cruz, as well as uninhabited islands. This work was completed with the goal of catalyzing both researchers and natural resource managers to focus on the decline of the Vermilion Flycatcher and potentially other small bird populations, study the reasons for these declines and implement conservation actions to save these species.

A widely distributed species with 12 recognized subspecies from the New World Tyrannidae, Vermilion Flycatchers range from the southwest United States and Mexico to Argentina and Peru, with a hiatus in Central America (Figure 1). It is considered the most striking of the New World flycatchers, with coloration of the males being solid black and bright red; in Galapagos it is the only truly bright land bird (Figure 2).

While Darwin's finches are the most famous species demonstrating adaptive radiation in the Galapagos Islands, many other organisms have also undergone speciation, are in the process of speciation, and/or experience genetic drift and founder effects, inducing reduced genetic variability. Amongst these is the Vermilion Flycatcher, with two subspecies endemic to Galapagos: *P. r. rubinus* and *P. r. dubius*. Debate is on-going whether these should be considered as separate species from those on the continent or indeed from each other.

Harris (1974) reported that Vermilion Flycatchers were present on all of the major islands of Galapagos. Today two populations are considered extirpated (San Cristóbal and Floreana) and a third is in serious decline (Santa Cruz). All of these are on human inhabited islands and the declines have occurred over the last half century. At a time when biodiversity loss on a world scale is of major concern, these unstudied disappearances suggest a lack of attention to portions of the unique biodiversity on Darwin's Islands.

Life history of Vermilion Flycatchers

Vermilion Flycatchers live approximately five years, reaching sexual maturity at two years (Alvarez, 2002). They are insectivorous, territorial and monogamous (Harris, 1974). A cup nest of moss or lichen is built 3 to 6 m high in a tree generally

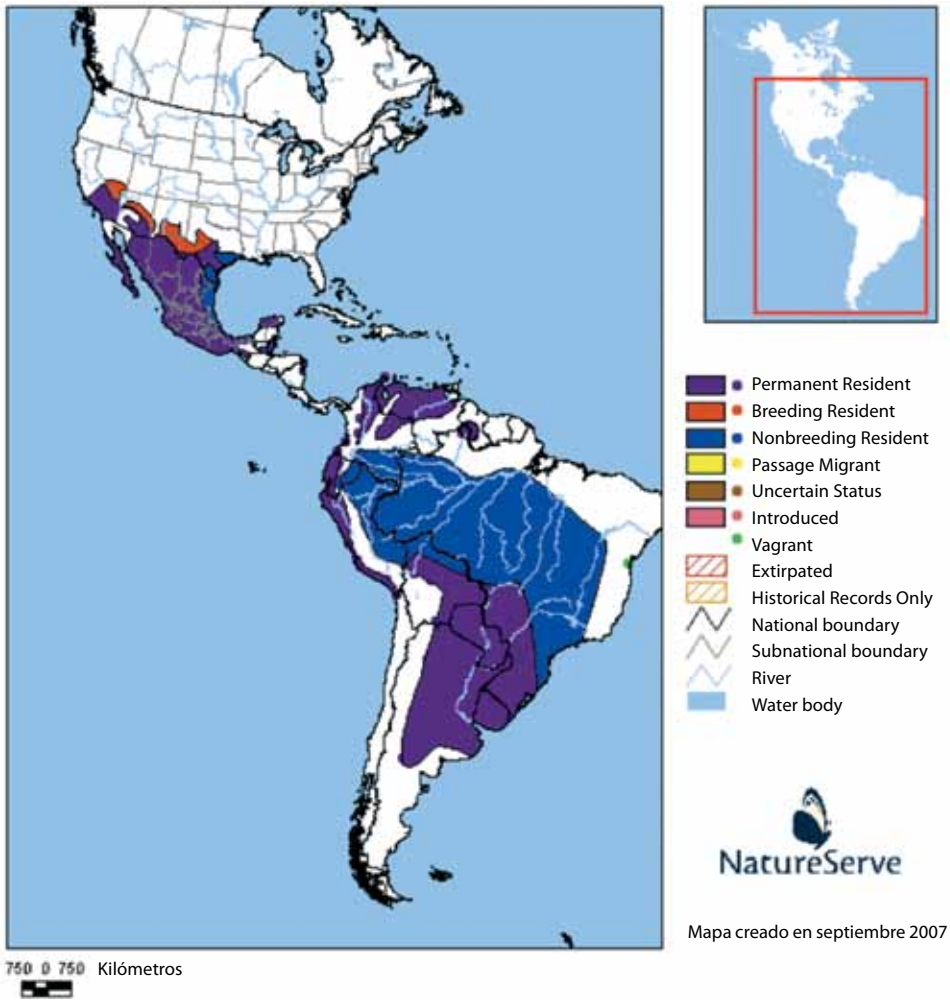


Figure 1. Distribution of Vermilion Flycatchers (range data provided by Inonatura/Natureserve; Ridgely *et al.*, 2005).

with three eggs laid each year. Breeding occurs during the warm season. In Galapagos, Vermilion Flycatchers are found from the coast to 1400 m in elevation (volcanoes of Isabela and Fernandina Islands). Their typical habitat is *Scalesia*, *Tournefortia*, and *Zanthoxylum* forest; these are the primary forests that have largely disappeared from the inhabited islands due to clearing for agriculture.

Potential threats

Changed land use, with the loss of much of the *Scalesia* zone and the formation of monocultures of the introduced raspberry (*Rubus niveus*), cinchona (*Cinchona succirubra*) or open grassland with no trees and bushes, may be creating habitat unsuitable for the Vermilion Flycatcher. In recent times, semi-abandoned farmland has become a festering ground for invasive plants, further reducing the native, more complex ecosystems to monocultures. Introduced animals, however, are likely the greatest threat. Introduced mammals that could impact Vermilion Flycatcher populations include Norwegian and black rats (*Rattus norvegicus* and *R. rattus*), house mice (*Mus musculus*), feral cats (*Felis catus*), and domestic/semi-feral dogs (*Canis lupus*). Introduced birds that could influence these populations include Smooth-billed Anis (*Crotophaga ani* - in low numbers until El Niño 1982-83 when the population exploded), cattle egrets (*Bubulcus ibis* - very abundant in the farm zone with nightly migrations to the coast), semi-wild chickens (*Gallus gallus* - present in the farmlands), and domestic doves (*Columba livia* - once present in the villages but now eradicated).

Of particular concern is the introduced parasitic fly *Philornis downsi*, which is known to cause mortality of nestlings in many of the endemic land birds of Galapagos (Causton *et al.,* this volume). The mosquito *Culex quinquefasciatus*, the vector for avian malaria and West Nile virus, has also been introduced. Global climate change may bring wetter conditions and worsen the effects of mosquitoes over the long term.

An additional threat may be the increase in the use of chemicals for fumigation, such as Deltamethrin and Permethrin. As landowners increase the frequency of applications and the overall volume of chemicals to control introduced plagues, such as fruit flies and mosquitoes, the risks to native biodiversity also increase. Other chemicals that may impact Vermilion Flycatchers, such as Combo, are used to control introduced plants, including guava (*Psidium guajava*) and cinchona.

Figure 2. Male (red) and female (yellow) Vermilion Flycatchers on Santa Cruz, Galapagos. Photos: Godfrey Merlen

Taxonomic confusion of *Pyrocephalus*

In the intense collecting period of Galapagos (1835-1915), many specimens of *P. rubinus* were gathered. As scientists focused on the process of speciation, the smallest changes in morphology were enough to spur the naming of separate species.

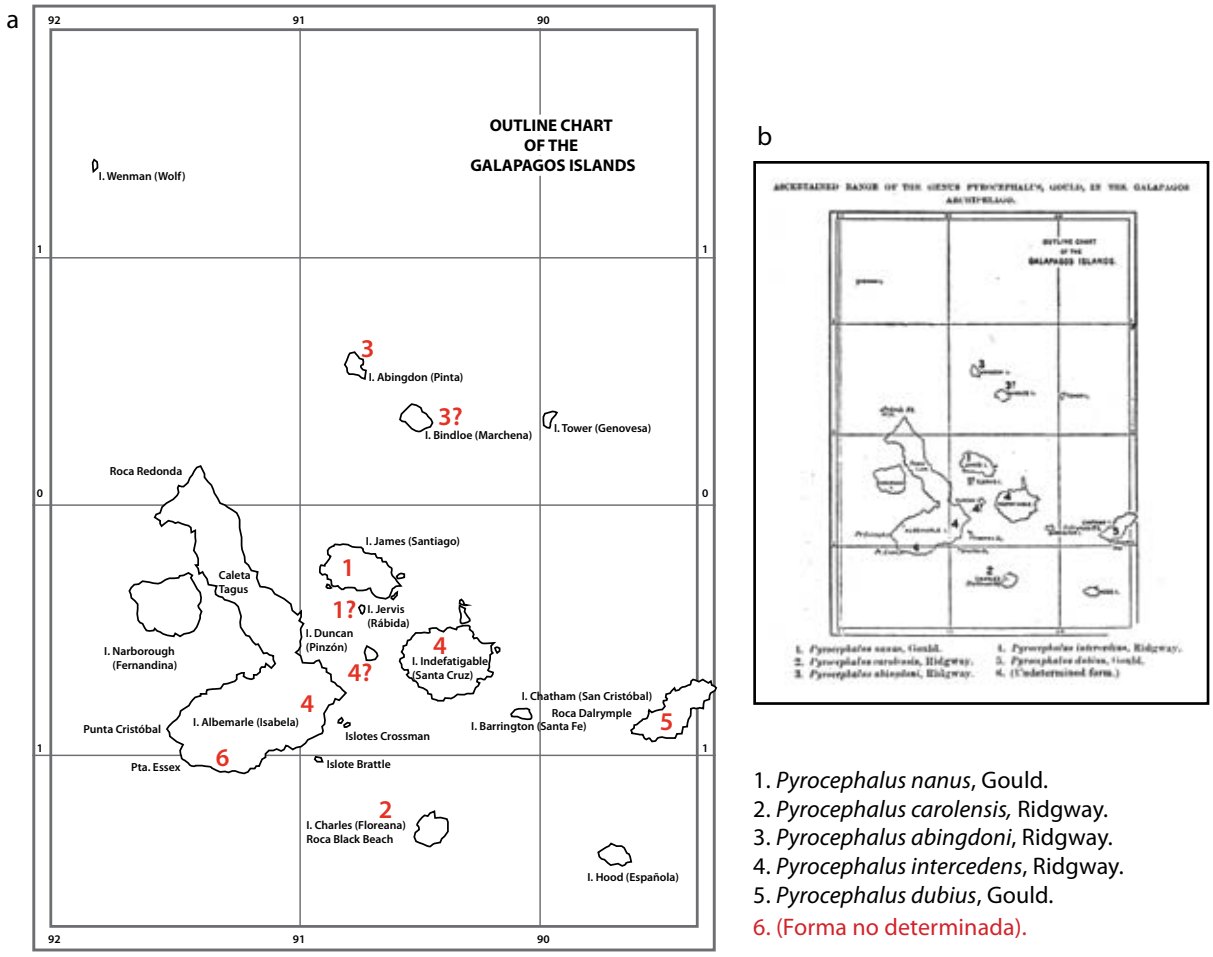
1839. Gould (1839) examined Darwin's specimens and named two species, *P. nanus* and *P. dubius*.

1896. Ridgway (1896) recorded the distribution of five or six species of Vermilion Flycatchers in Galapagos (Figure 3); although he considered that most populations were local races of *P. nanus*, apart from *P. dubius*.

1974. Harris (1974) placed all Vermilion Flycatchers in a single species, *P. rubinus*, with records from all the major islands except Genovesa, with only single records from Española and Wenman. He indicated that they are extinct on Santa Fe and Rábida (two islands with extreme aridity during the dry season). However in the last two years several have been seen on Rábida (F. Cunninghame, pers. com.; D. Geist, pers. com.).

1988. The paleontologist Steadman (1988) referred to two endemic species, *P. nanus* and *P. dubius*, following two of the species recorded by Ridgway and thus going back to Darwin's specimens. His account of Vermilion Flycatchers in Galapagos follows:

> The Galapagos Vermilion Flycatcher exists in two races: one is confined to San Cristóbal, the other is found on other islands of the archipelago.
>
> It has evolved from the Vermilion Flycatcher, *Pyrocephalus rubinus*, a species commonly found in the Americas.
>
> The Galapagos species has been isolated from its mainland counterpart long enough to have developed significant differences: shorter wings and tails, a lighter and duller shade of red in the adult male plumage, and yellow under-parts in adult females rather than the creamy pink, streaked under-parts of mainland females. The song of the Galapagos Vermilion Flycatcher also differs from that of its mainland counterpart.
>
> The San Cristóbal Vermilion Flycatcher is smaller and a lighter color in both males and females.



1. *Pyrocephalus nanus*, Gould.
2. *Pyrocephalus carolensis,* Ridgway.
3. *Pyrocephalus abingdoni*, Ridgway.
4. *Pyrocephalus intercedens*, Ridgway.
5. *Pyrocephalus dubius*, Gould.
6. (Forma no determinada).

Figure 3. Ranges of populations following Ridgway, 1896. a) copy, b) original map.

Historical collections and present-day observations on Santa Cruz, San Cristóbal and Floreana

Due to the undocumented but apparent decline in the Vermilion Flycatcher populations on the inhabited islands of Galapagos, I completed a review of the literature and compiled both historical data on Vermilion Flycatcher collections (Table 1) and more recent observations by various individuals. In addition, I retraced the steps of one of the collectors (S. L. Billib in 1961-62) on Santa Cruz and Floreana to highlight significant changes in the populations.

For the three inhabited islands under consideration the historical totals are: 90 from Santa Cruz; 151 from Floreana, and 134 from San Cristóbal. None of the other islands with Vermilion Flycatcher collections has exceeded these numbers, suggesting that these islands, which now have severely reduced or extirpated populations, may have been the most densely populated of all the Galapagos Islands. Given sufficient rainfall and age these islands developed substantial forests and a variety of habitats, providing ideal conditions for this species.

Local park rangers have indicated that they believe the Vermilion Flycatcher to have been extirpated from San Cristóbal a few decades ago. David Steadman (1988) stated that they were "extremely rare" when he visited the island, but added that records from 1929 indicate that they were "all along the main trail" from the coast to the highlands at that time.

Vermilion Flycatchers were extirpated from Floreana more recently, perhaps just a few years ago [pers. com. – Galapagos National Park (GNP) personnel and C. Cruz, a resident farmer].

On Santa Cruz, Vermilion Flycatchers are currently unseen in many places where they were consistently present 20 or more years ago (author, pers. obs.; R. Sievers, pers. com.). In 2010-2011, Mandy Trueman walked the perimeter of the agricultural zone (approximately 64 km), the length of which is all potential *Pyrocephalus* habitat, and saw only one Vermilion Flycatcher (CDRS, pers. com.). In July 2012, Volker Koch repeated the same walk, also with only a single sighting (CDRS, pers. com.). Present day distribution on Santa Cruz appears to be peripheral to the farming zone, with the greatest abundance on the north and northwest side of the central ridge where there is a remnant *Scalesia* forest (author, pers. obs.; T. de Roy, pers. com.; M. Dvorak, pers. com.).

Table 1. Number of Vermilion Flycatcher specimens collected by Habel in 1868 (Sclater & Salvin, 1870), Baur in 1888-1891 (Ridgway, 1896), and by the California Academy of Sciences (CAS, online). The islands listed include only those where *P. rubinus* were collected. Collection numbers are separated into adult or immature males and adult or immature females where such information is available. No juveniles were collected. The three inhabited islands that are the focus of this article are highlighted.

Collection years - Island	Total	Adult male	Immature male	Adult female	Immature female
1868	Dr. Habel – collected in 1868 from a vessel gathering "orchilla" (a lichen used in dying textiles)				
Santa Cruz	**24**				
Marchena	3				
Pinta	0				
Unidentified	1				
TOTAL	**28**				
1888-1891	Dr. G. Baur and the United States National Museum				
Santiago	6	2	2	2	
Santa Cruz	**5**	**3**	**2**		
Floreana	**7**	**4**	**1**	**2**	
Pinta	12	7	1	4	
S. Cristóbal	**20**	**12**	**2**	**5 (1?)**	
N. Isabela	2	2			
TOTAL	**52**	**30**	**8**	**13 (1?)**	
1898-1962	**California Academy of Sciences (CAS)** collection. The majority of the 419 Vermilion Flycatcher specimens were collected during the 1905-6 expedition (n=344); Snodgrass & Heller collected in 1898-99 (n=39); Crocker in 1932 (n=2); Swarth & Crocker in 1932 (n=2), and **Billib** in 1961-62 (n=32). See Reference: CAS, online.				
S. Cristóbal	**114**	**60**		**40**	**14**
Floreana	**133 CAS+10 Billib 1962**	**80**		**36**	**17**
Santa Cruz	**40 CAS+21 Billib 1961**	**28**		**6**	**6**
Isabela	45	30		12	3
Santiago	22	9		11	2
Pinzón	10	6		3	1
Marchena	7	5		1	1
Pinta	5	4		1	
Fernandina	4	3		1	
Rábida	3	1		2	
Isla Wolf	1			1	
Baltra	1	1			
Guayaquil – continental Ecuador	2				
TOTAL	**418**	**227**		**114**	**44**

Colonization and its effect on historical collections

Colonization of the Galapagos Islands began in 1832 on Floreana. The first permanent settlement on San Cristóbal began in 1851, on Isabela in 1893, and on Santa Cruz in the 1920s. The principal activity of these early colonists was farming, which could only be practiced in the wetter "highlands" where some soil was available. This resulted in the settlers blazing trails through the dense, spiny, and waterless coastal zone, up through the transitional vegetation, to the green uplands where people then

Figure 4. Billib´s collection path on Santa Cruz from the coast to the highlands.

lived. Settlers cleared the land, established villages and introduced many domestic animals and plants, all of which resulted in major ecological changes to the primary habitat of the Vermilion Flycatcher. This "invasion" of the highland areas made access easy for collectors and no doubt was responsible for the large collections made by CAS in 1905-6 on Floreana and San Cristóbal but not on Santa Cruz, an island that had not yet been settled. For example, the CAS only collected 30 specimens in 1905-6 from Santa Cruz where there were no established trails into the highlands, while they collected well over 100 on both Floreana and San Cristóbal where well-worn trails existed. Billib's collection of 21 Vermilion Flycatchers in 14 days on one trail on Santa Cruz suggests that their numbers remained high on Santa Cruz even 50 years ago.

Retracing the steps of Billib

Billib collected Vermilion Flycatcher specimens in 1961-62 on both Santa Cruz and Floreana (Table 2). Given that his collection path on Santa Cruz was from the coast (Puerto Ayora) along the early donkey trail to Fortuna (Bellavista) and then followed the Media Luna trail alongside the Horneman and Kastdalen farms (Figure 4), I was able to follow in his footsteps to look for birds. I also made a visit to the Wittmer farm, where Billib collected his specimens on Floreana, to make comparative observations.

In April 2012, during the Vermilion Flycatcher breeding season when there is an abundance of insects, I walked the trails on Santa Cruz exactly as I perceived Billib did. I stopped every 200 yards to observe and to call a "wishing" noise that attracts birds, and logged altitude at each stop using a Garmin Legend GPS. I watched carefully for the distinct flight of the male vermilion flycatcher – a slow climb singing, followed by a vertical fall. *Neither perching nor flying Vermilion Flycatchers were located anywhere along the 9.6-km transect.*

The old trail is still intact through a semi-open forest to about 120 m, where it opens out with occasional houses and probably more grass than previously. Bellavista is a small village but the Horneman and Kastdalen farms (established in 1935, at 220-276 m) are mostly grassy with occasional stands of trees. Mari Kastdalen stated that there are no longer any Vermilion Flycatchers around the farmhouse (254 m or 826 ft). I proceeded northward through the farm to the national park boundary at 507 m (1663 ft) with no sightings. I then continued down the Media Luna trail back to Bellavista. Two farmers I encountered at 246 m (800 ft) remembered having seen "los brujitos" (Vermilion Flycatchers) but could not recall the year.

On 22 September 2012, I visited the Wittmer farm at Asilo de la Paz (319 m = 1000 ft indicated by Billib), where Billib made his collections on Floreana. Nestled between extinct volcanic cones, the farm was cut out of the highland *Scalesia* forest. The farm has been split in two by the road that accesses the fresh water spring at Asilo de la Paz. Today it is covered with grass and a few trees; perhaps not so different from 1962. While unsure of the original boundaries of the farm, I quartered the present acreage from every angle over approximately four hours and extended the search at all cardinal points. The weather was a mix of rain, low cloud, and some sunshine. *Net result: not a single bird.*

Table 2. Records of the Vermilion Flycatcher specimens collected by Billib in 1961-62, indicating catalogue number at the California Academy of Science (CAS), date, sex and location and elevation on Santa Cruz and Floreana. See reference: CAS, online.

Catalogue No. CAS	Date	Sex	Location	Elevation (feet)
86201	13 Nov 1961	F	3 miles (4.8 km) N of Puerto Ayora (PA)	500
02	"	M	"	500
03	"	M	"	500
04	"	M	"	500
05	"	M	"	500
06	"	M	"	500
07	16 Nov 1961	M	Trail to Fortuna	350
08	21 Nov 1961	M	½ mile N PA	Coastal
09	22 Nov 1961	F	½ mile N PA	Coastal
10	25 Nov 1961	M	Trail to Fortuna	300
11	"	F	"	300
12	"	M	"	300
13	"	F	"	350
14	"	F	"	350
15	"	M	"	400
16	"	F	"	400
17	"	M	"	450
18	27 Nov 1961	M	Kastdalen farm	800
19	28 Nov 1961	M	Horneman farm	775
20	"	F	"	775
21	"	M	"	775
22	24 Jan 1962	M	Wittmer farm, Floreana	1000
23	"	F	"	1000
24	"	M	"	1000
25	26 Jan 1962	M	"	1000
26	27 Jan 1962	M	"	1000
27	"	M	"	1000
28	28 Jan 1962	M	"	1000
29	29 Jan 1962	M	"	1000
30	30 Jan 1962	M	"	1000
31	"	M	"	1000
32	"	?	Floreana - complete skeleton collected by RI Bowman - in collection of SL Billib	1000

* Fortuna was identified by Carmen Angermeyer as the present village square of Bellavista. The Kastdalen, Horneman, and Wittmer farms are at well-known locations.

Vermilion Flycatcher observations on uninhabited islands

For comparison purposes, I collected information on personal observations of Vermilion Flycatchers on some of the uninhabited islands from scientists, GNP personnel and others, as well as my own observations on some of these islands. This information indicates that the species is still common or abundant on Fernandina (author, pers. obs.), Pinta (S Blake, pers. com.), Alcedo volcano on Isabela - with 1.5 birds/km seen bordering the *Scalesia* forest (S Blake, pers. com.), and Wolf volcano on Isabela (W Tapia, pers. com.).

Francesca Cunninghame (CDF) also kindly provided me with her data on the remarkable abundance of Vermilion Flycatchers on Pinzón in 2012 (Table 3), collected while making an intensive survey of hawks. This is all the more impressive for the altitudinal range and the survival of the population amongst a high population of introduced rats and the presence of Smooth-billed Anis, two of the predators most often suggested as the potential cause of the decline of Vermilion Flycatchers on inhabited islands. Although the species appears to be abundant, we have no assurance that this island will not be next in line to lose this species, especially given its proximity to Santa Cruz and the general lack of knowledge of the real reason for the population declines on the inhabited islands.

Table 3. Abundance of Vermilion Flycatchers on Pinzón in August of 2012 (F Cunninghame, pers. com., 2012).

Date	Pairs	Males	Females	Zone
8 June 2012		1		Arid coastal
8 July 2012	2			Arid
		2		Transition
	1			Humid
8 August 2012	1	4	2	Arid
8 September 2012	3	2	2	Humid
8 October 2012	2	3	3	Arid
TOTAL*	**9**	**12**	**7**	

*Could include the same birds as the observations are in different months.

Conclusions

The combination of personal observations from scientists, park rangers and local residents on Santa Cruz, San Cristóbal and Floreana, along with my own observations on Santa Cruz and Floreana, in comparison with historical data, provide strong evidence of the decline of Vermilion Flycatchers on these three islands, in stark contrast with the abundant populations on many of the uninhabited islands. Key conclusions of this review include:

1. Vermilion Flycatchers on the inhabited islands of San Cristóbal, Floreana, and Santa Cruz were abundant 110 years ago, probably even 50 years ago. They were probably extirpated from San Cristóbal a few decades ago and more recently on Floreana. Currently the population is in steep decline on Santa Cruz, with the remaining population centered on the areas peripheral to the farming zone. The reason(s) for the declines is not determined.

2. Although Vermilion Flycatchers seem to be in decline, other species of small insectivorous birds on both inhabited and uninhabited islands, particularly Yellow Warblers (*Dendroica petechia*) and Galapagos Flycatchers (*Myiarchus magnirostris*) appear to be ubiquitous and common.

3. Although many have suggested that the decline of Vermilion Flycatchers on the inhabited islands is due to predation by Smooth-billed Anis, this is not substantiated by recorded fact or by stomach contents from anis. Nevertheless the explosion in the ani population after the 1982-83 El Niño (the three records of anis listed in Harris, 1974, which were considered to be Groove-billed Ani, *Crotophaga sulcirostris*, were probably Smooth-billed Anis that were misidentified) coincides with the rapid decline of Vermilion Flycatchers on Santa Cruz and Floreana. However the Vermilion Flycatcher population on San Cristóbal was already low by that time. In addition, Vermilion Flycatchers are still relatively abundant on Pinzón, an island sometimes frequented by Smooth-billed Anis.

Recommendations

The situation of the Vermilion Flycatcher on inhabited islands is critical. A series of studies and conservation actions are urgently needed to ensure that this species does not go extinct on Santa Cruz and to try to re-establish it on both San Cristóbal and Floreana. Based on this review, the following is recommended:

1. Study the current decline of *P. rubinus* and determine the cause(s). It may be a good indicator species for

ecological changes; documenting and understanding the declines of Vermilion Flycatcher populations may help save both this species as well as others.

2. Initiate a long-term monitoring program for small bird populations (all species), especially on the inhabited islands, to provide timely information on population declines and the potential for immediate action on part of researchers and managers.

3. Expand research to determine potential and existing threats to small bird species on human-inhabited islands – including introduced species, the use of chemicals, habitat destruction, etc.

4. Carry out a nesting study of Vermilion Flycatchers on Pinzón in 2013 to gain data on reproductive success in the presence of *Crotofaga ani* and following the rat eradication efforts in November 2012.

5. Increase protection of pristine or near pristine islands to ensure the long-term protection of Galapagos biodiversity.

6. Perform a threat status evaluation of *P. rubinus* in Galapagos, including a review of its taxonomy, for the IUCN Red List; ensure that both the Charles Darwin Foundation and GNP websites clarify the status of these birds.

Acknowledgments

I would like to thank the following individuals for their willingness to share information concerning sightings of Vermilion Flycatchers in order that these small birds of Galapagos are given the attention they deserve: Mandy Trueman, Steve Blake, Mikael Dvorak, Rolf Sievers, Noémi d'Ozouville, Volker Koch, Mari Kastdalen, Carmen Angermeyer, and Tui de Roy. Galapagos Conservancy provided funding for this review.

References

Alvarez T. 2002. "*Pyrocephalus rubinus*" (On-line), Animal Diversity Web. Accessed 28 July 2012 at: http://animaldiversity.ummz.umich.edu/site/accounts/information/Pyrocephalus_rubinus.html

California Academy of Sciences (CAS). Online. CAS Ornithology Collection Data Base. Galapagos Vermilion Flycatcher. http://researcharchive.calacademy.org/research/bmammals/BirdColl/Index.asp

Gould J. 1839. Birds, Part 3 (2). In C Darwin (ed.), 1839. The zoology of the voyage of HMS Beagle. Smith Elder and Co, London.

Harris M. 1974. A field guide to the birds of Galapagos. Taplinger Publishing Co., Inc. New York. 160 pp.

Ridgely RS, TF Allnutt, T Brooks, DK McNicol, DW Mehlman, BE Young & JR Zook. 2005. Digital Distribution Maps of the Birds of the Western Hemisphere, version 2.1. NatureServe, Arlington, Virginia, USA.

Ridgway R. 1896. Birds of the Galapagos Archipelago. Proceedings of the United States National Museum Volume XIX, No. 1116.

Sclater PL & O Salvin. 1870. Characters of new species collected by Dr Habel in the Galapagos Islands. Proc. Zool. Soc. London 1870:322-327.

Steadman DW. 1988. Galapagos: discovery on Darwin's Islands. Smithsonian Institution Press. Washington DC.