

Wing Length and Mass Ranges of Resident Birds at Two Sites in Costa Rica

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ABSTRACT

At two sites in Costa Rica, we banded 3,200 individuals of 137 resident species: 2,647 of 103 species at Las Caletas (2002-2008) and 553 of 66 species at La Selva (2011-2012). Thirty-three species were captured at both sites. We present summary statistics for wing length and body mass for 133 species. We analyze both metrics by sex class where sample sizes permit. Data are presented by species in three ways: (1) the interquartile range (IQR: range of the middle 50% of the data), (2) the range of all data, and (3) plus-or-minus two standard deviations (SD) of the mean (intended to capture the middle 95% of wing lengths). For most species our mass ranges are more variable compared to Dunning (2008). Male wing was longer than female wing for 8 of 11 species for which we had sufficient data for comparison. Body mass differences were evenly split between the sexes for 10 species at Las Caletas whereas at La Selva males were heavier than females for both species for which we had sufficient data. Slightly over half (56.8%) of the birds captured at Las Caletas were aged as adult, whereas 4.4% were juvenile, and 43.2% were of unknown age; at La Selva, it was 86.3%, 10.6% and 3.1%, respectively. While published data for tropical resident species have been accumulating, morphometrics should be recorded at more localities because of the high level of both intra- and inter-specific variation within landscapes that result in isolation (e.g. mountain ranges, islands).

INTRODUCTION

Morphometric data are frequently used to determine age and sex-related differences, for physiological, ecological and evolutionary

studies (Clark 1979), and to quantify geographic variation in birds. Wing length may be highly sexually dimorphic in some species, but this may be confounded by age. Body mass reflects the overall size of an organism (Dunning 2008), and mass may vary intraspecifically, sometimes widely, between sexes and seasonally. It is commonly used to calculate the “condition” of a bird (Mulvihill et al. 2004).

While data for tropical resident birds have been accumulating (Sealy and Neudorf 2017), recording morphometrics from different localities is important because of the high level of both intra- and interspecific variation within landscapes that result in isolation (e.g., mountain ranges, islands) (Buckley et al. 1985). We report wing length and body mass for resident species banded during spring migration at two sites in Costa Rica. When sample size permitted, we analyzed our data with respect to sex and age class.

METHODS

Study sites. The first study site, Las Caletas, was located on the Pacific Coast of southwest Costa Rica (Fig. 1), on the Osa Peninsula approximately 10 km north of Corcovado National Park, on the grounds of Las Caletas Lodge. It is located on the south coast of Drake Bay, a few kilometers southwest of the village of Agujitas, and is accessible by a two-hour boat trip from the town of Sierpe, down the Sierpe River, and then down the Pacific Coast. The lodge is on a hill looking north over the Pacific Ocean. The monitoring station (08°41'N, 83°41'W) was located 200 m farther uphill, south of the lodge buildings. The average elevation of the site was



Fig. 1. Location of the two study sites in Costa Rica.

about 25 m above sea level (a.s.l.). The forest in this region is premontane wet forest and tropical wet forest (Sanchez-Azofeifa et al. 2002). The 3-ha site was situated primarily within secondary forest (15-25 years of age) with two small areas of banana and pineapple plantations (Wilson et al. 2011). To the east of the study site the habitats were a mix of open agricultural areas within secondary forest fragments, whereas to the south and west was a larger expanse of secondary and primary forest. To the north, the lodge area itself had a mix of secondary forest fragments and open areas.

The second study site, La Selva (10°26'N, 83°59'W), is located within the La Selva Biological Station (LSBS), which is operated by the Organization for Tropical Studies, a non-profit consortium of about 50 worldwide research institutions. The LSBS is located where the foothills of the central volcanic mountain chain transition to the Caribbean coastal plain that abuts Braulio Carrillo National Park to the south (McDade and Hartshorn 1994). With the exception of the corridor leading to the park, and the park itself, the forest around LSBS, has mostly been converted to agricultural use. This site is within the “succession plots,” a set of five similar-sized adjacent patches, at an elevation of about 35 m a.s.l., within the wet lowland tropical forest

which are managed for research, each of which are clear-cut every fifth year. Although each patch is in a different 5-year successional state, the study area contains habitat in each of the successional states each year and, therefore, is considered stable and in a condition of “dynamic equilibrium” (Collister et al. 2014).

Capture and banding. Our study was conducted annually at Las Caletas, from 2002 through 2008, during migration monitoring, predominantly from mid-March to the end of April (except in spring 2006). In addition, from mid-December 2005 until early February 2006, and again in December 2006, we conducted a pilot MoSI (Monitoreo de Sobrevivencia Invernal) program (Saracco et al. 2009). La Selva migration monitoring was conducted daily from 26 March to 24 April in 2011, and 16 April to 15 May in 2012. We operated 12-15 mist nets (12-m long x 2.6-m high x 30-mm mesh) at Las Caletas and up to 20 mist nets of the same size at La Selva. Weather permitting, nets were operated for six hours per day, beginning at sunrise.

All birds captured were identified to species (Stiles and Skutch 1989), aged, and sexed, and, if unbanded, were banded with a uniquely-numbered aluminum leg band, purchased by the Calgary Bird Banding Society (made by the National Band and Tag Co.). Each bird captured was aged using plumage characteristics and sexed using plumage and/or morphometric differences and/or presence of a brood patch or cloacal protuberance (Pyle 1997). Unflattened wing chord was recorded to the nearest mm, whereas body weight (mass) was recorded to the nearest 0.1 g using a digital scale.

Data analyses. Data were cleaned by deleting all records that either did not include wing chord or mass for their respective analyses, or the measurement was likely in error. We present wing and mass data for all species for which they were collected, and present females separate from males and adults separate from juveniles (hatch years) whenever sample size was sufficient for analyses, but all sex and age classes were also combined unless otherwise noted. Wing length and mass data are presented by species in three ways: 1) the interquartile range

(IQR: the range of the middle 50% of the data), 2) the range of all data for that species, and 3) plus-or-minus two standard deviations (SD) of the mean, which is intended to capture 95% of the variation in wing lengths (Pyle 1997, French et al. 2016). We include data from small sample sizes because many of these species are seldom captured and thus under-reported in the literature. Body masses were then compared with those in Dunning (2008).

When comparing wing length or mass by sex or age class, if one class had at least 20 individuals, we included the other class, as long as there were at least 10 individuals. Where sample sizes met these criteria, comparisons were made using t-tests assuming unequal variances (Fowler and Cohen 1996). All data were normally distributed, and results were considered significant if $P < 0.05$.

Common and scientific names, and order, follow the list of bird species found in North and Middle America compiled by the North American Classification Committee of the American Ornithological Union (Chesser et al. 2025).

RESULTS

During six years of study (2002-2008) at Las Caletas we banded 2,647 individuals of 103 resident species during 17,200 net hours of effort, and in two years of study (2011-2012) at La Selva we banded 553 birds of 66 species during 5,262 net hours of effort. Thirty-three of the 137 species were banded at both sites.

We present summary statistics for wing length and body mass for 85 species banded at Las Caletas (Table 1) and 53 species banded at La Selva (Table 2) that met our criteria. Table 3 presents wing length and body mass for species for which we only captured one individual: 14 species at each site. We also captured four species at Las Caletas for which we recorded no morphometric data: two Fiery-billed Aracari (*Pteroglossus frantzii*), one Eye-ringed Flatbill (*Rhynchocyclus brevirostris*), one Great Antshrike (*Taraba major*), and one Ruddy Foliage-gleaner (*Clibanornis rubiginosus*).

Wing length and mass comparisons. Wings

were longer in males than females for seven out of 10 species (70%) at Las Caletas for which we had sufficient data for comparison (Table 4), significantly so for three species: Band-tailed Barbthroat, Crowned Woodnymph, and Charming Hummingbird. Of the three species for which wing length was longer in females, Orange-collared and Red-capped Manakins were significantly longer. At La Selva, Variable Seedeater wing length was significantly longer in males than in females (Table 4).

Differences in mass were evenly split between the sexes for 10 species at Las Caletas (Table 4). Male Crowned Woodnymph, Rufous-tailed Hummingbird, Charming Hummingbird, and Orange-collared Manakin had significantly greater mass than females, while only Velvety Manakin females had greater mass than males. At La Selva mass was greater for males than females for both Scarlet-rumped Tanager and Variable Seedeater.

Over half (56.8%) of the birds captured at Las Caletas were adults, while 4.4% were juveniles, and 43.2% were of unknown age; at La Selva, it was 86.3%, 10.6% and 3.1%, respectively. We had sufficient sample size to compare adult and juvenile wing length for three species (Table 5). At Las Caletas, wing length of juveniles was greater than in adults for Red-capped Manakin and Ochre-bellied Flycatcher, but neither difference was significant; adult mass was only significantly greater for Red-capped Manakin. At La Selva, both wing length and mass of Variable Seedeater were significantly greater for adults than for juveniles.

We quantified differences in body size between the two subspecies of Scarlet-rumped Tanager found in Costa Rica: Passerini’s at La Selva and Cherrie’s at Las Caletas. For all comparisons Cherrie’s had longer wings and greater mass, but only female wing length was significant (Table 6).

DISCUSSION

Our species list reflects a diverse suite of 137 species (15%) that comprised a broad range of ecological and behavioral traits representative of the avian diversity of Costa Rica (895 species; IUCN

2024), and differences in species captured reflect the biogeographical separation between our two sites. Of the 77 species on the IUCN Red List for Costa Rica, we only captured the near-threatened Black-cheeked Ant-Tanager (IUCN 2024), which was banded in reasonable numbers (52 individuals) at Las Caletas, and whose population is considered stable.

We had sufficient sample sizes to analyze wing length and mass, by sex, for 10% of the species captured at Las Caletas, and 1.5% (wing length) and 3% (mass) of the species at La Selva. Overall, data on mass varied more than those reported in Dunning (2008). This may reflect geographical differences, as Dunning’s data were derived from various regions of Central America, the Caribbean, and South America; many of the studies were conducted in geographically specific populations that may have significantly variable weights. In addition, body mass can vary considerably depending on the breeding condition of the individual bird, particularly for females. Body mass can also vary between adults and juveniles (Alatalo et al. 1984); more data on the size differences between age classes would be enlightening.

Where we had sample sizes to compare, wing length was greater for males than females, while body mass was split equally. Sexual size dimorphism in birds may be influenced by several factors, including geographic region, clutch size, nest characteristics, competition for prey, sperm competition and migratory status, but some of the strongest evidence reflects different social mating systems, particularly between monogamous and polygynous taxa (see review in Dunn et al. 2001).

As there were some changes in personnel over the years of our study, we cannot rule out possible inter-observer variability in measurements. Any variance due to observers should be small as both wing chord and mass measurements are relatively easy to replicate accurately. Some caution should be exercised in comparing our data to other studies, particularly for species with smaller sample sizes (Barrett et al. 1989).

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Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with $\pm$ SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean $\pm$ 2SD	Range	Dunning
Ruddy Ground Dove (<i>Columbina talpacoti</i>)	Wing	All	5	91	89	N/A	9.6	86-90	72-111	84-108	
	Mass	Female	2	99	99	N/A	12.7	95-104	74-124	90-108	
Ruddy Quail-Dove (<i>Geotrygon montana</i>)	Wing	All	5	48.8	47.0	N/A	11.7	46.7-47.3	25.4-72.3	35.4-67.8	35.5-56.5
		Female	2	57.4	57.4	N/A	14.7	52.2-62.6	28.0-86.8	47.0-67.8	
	Mass	All	14	138	139	132	4.3	134-142	130-147	132-145	
		Female	3	134	134	N/A	1.5	133-135	131-137	132-135	
Gray-chested Dove (<i>Leptotila cassini</i>)	Wing	Male	9	139	140	137	3.8	137-141	131-146	132-143	
		All	13	125.0	123.1	N/A	5.1	121.5-128	114.8-135.2	118.9-135	121.0-165.0
	Mass	Female	3	127.1	123.2	N/A	6.8	123.2-129.1	113.4-140.8	123.1-135	
		Male	9	124.7	122.7	N/A	4.8	121.5-128.0	115.1-134.4	118.9-133.2	
White-tipped Dove (<i>Leptotila verreauxi</i>)	Wing	All	26	132	132	133	4.6	130-135	123-141	124-144	
	Mass	All	23	159.8	158.3	N/A	12.6	151.4-168.4	134.5-185.0	138.0-186.0	132.0-179.0
White-necked Jacobin (<i>Florisuga mellivora</i>)	Wing	All	4	134	134	N/A	4.4	132-136	126-143	130-140	
	Mass	All	3	154.2	156.2	N/A	14.4	147.6-161.9	125.3-183.1	138.7-167.3	96.0-276.0
	Wing	All	19	66	67	68	2.5	64-68	61-71	62-71	
		Female	10	65	65	63	2.0	63-66	61-69	63-69	
Bronzy Hermit (<i>Glaucis aeneus</i>)	Wing	Male	9	67	68	68	2.7	67-68	62-73	62-71	
		All	17	6.9	6.9	6.9	0.3	6.8-7.0	6.2-7.5	6.1-7.7	7.4 $\pm$ 0.6
	Mass	Female	8	6.7	6.8	6.9	0.3	6.5-6.9	6.0-7.3	6.1-7.0	
		Male	9	7.0	6.9	6.9	0.3	6.9-7.0	6.5-7.6	6.8-7.7	
Band-tailed Barthroat (<i>Threnetes ruckeri</i>)	Wing	All	14	55	54	54	2.8	54-57	50-61	51-61	
	Mass	All	14	5.5	5.5	5.8	0.3	5.2-5.7	4.9-6.0	5.0-5.8	4.0-5.4
	Wing	All	59	58	59	59	2.6	56-61	53-64	51-64	
		Female	23	57	57	57	2.3	56-59	53-62	54-62	
Long-billed Hermit (<i>Phaethornis longirostris</i>)	Wing	Male	12	59	59	56	2.2	58-60	55-64	56-63	
		All	56	6.3	6.3	6.5	0.5	6.0-6.5	5.3-7.2	5.1-7.5	4.5-6.0
	Mass	Female	20	6.2	6.1	6.1	0.5	5.9-6.5	5.3-7.2	5.5-7.5	
		Male	12	6.2	6.3	6.2	0.3	6.2-6.3	5.7-6.7	5.6-6.5	
Long-billed Hermit (<i>Phaethornis longirostris</i>)	Wing	All	91	62	62	62	2.0	60-64	58-66	57-66	
	Mass	All	85	6.1	6.1	6.1	0.4	5.8-6.4	5.2-7.0	5.2-8.3	6.0

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Stripe-throated Hermit (<i>Phaethornis strigularis</i>)	Wing	All	26	38	39	39	1.4	37-39	36-41	36-40	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	37
	Mass	All	21	2.5	2.5	2.5	0.1	2.5-2.7	2.3-2.8	2.3-2.8	3.0
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.4
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.8
Crowned Woodnymph (<i>Thalurania colombica</i>)	Wing	All	43	52	52	52	2.3	50-53	47-56	45-57	
		Female	24	51	51	52	1.8	50-52	47-54	46-54	
		Male	15	53	53	52	1.5	52-54	50-56	51-57	
	Mass	All	39	4.4	4.4	4.7	0.4	4.1-4.7	3.7-5.1	3.8-5.1	4.5 ± 0.5
		Female	22	4.2	4.4	4.0	0.3	4.0-4.3	3.6-4.7	3.8-4.7	
		Male	14	4.7	4.7	4.4	0.3	4.5-4.9	4.2-5.2	4.2-5.2	
Rufous-tailed Hummingbird (<i>Amazilia tzacatl</i>)	Wing	All	48	56	56	58	2.5	54-58	51-61	50-60	
		Female	30	55	55	53	2.4	53-57	51-60	51-59	
		Male	13	57	58	59	2.7	56-59	51-62	50-60	
	Mass	All	41	4.7	4.6	4.4	0.5	4.4-5.0	3.8-5.7	3.7-5.8	4.0-5.5
		Female	25	4.6	4.5	4.4	0.5	4.3-4.8	3.6-5.6	3.7-5.8	
		Male	12	5.0	5.0	5.4	0.4	4.7-5.3	4.2-5.7	4.4-5.5	
Charming Hummingbird (<i>Polyerata decora</i>)	Wing	All	124	52	51	50	2.0	50-53	48-55	48-57	
		Female	88	51	51	50	1.8	50-52	48-55	48-57	
		Male	34	52	53	54	2.1	51-52	48-57	48-56	
	Mass	All	110	4.1	4.1	4.0	0.3	3.9-4.3	3.5-4.7	3.4-5.1	4.7
		Female	75	4.1	4.0	4.0	0.3	3.9-4.3	3.5-4.6	3.4-4.8	
		Male	33	4.3	4.3	4.2	0.3	4.2-4.5	3.7-4.9	3.7-5.1	
Blue-throated Goldentail (<i>Chlorestes eliciae</i>)	Wing	All	98	48	48	47	2.1	47-49	44-52	40-54	
		Female	12	48	47	47	1.9	47-49	44-52	46-51	
		Male	84	48	48	47	2.1	47-49	44-52	40-54	
	Mass	All	87	3.6	3.6	3.7	0.3	3.4-3.8	3.0-4.3	3.1-4.9	3.6
		Female	12	3.6	3.6	3.5	0.2	3.5-3.8	3.2-4.0	3.3-3.9	
		Male	74	3.7	3.6	3.7	0.4	3.4-3.8	3.0-4.4	3.1-4.9	
Tiny Hawk (<i>Microspizias superciliosus</i>)	Wing	All	4	141	141	N/A	11.0	133-148	119-162	128-152	
	Mass	All	2	76.8	76.8	N/A	2.8	75.8-77.8	71.1-82.5	74.8-78.8	61.5-152.0

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Graceful Black-throated Trogon (<i>Trogon tenellus</i>)	Wing	All	9	109	108	113	3.4	106-111	102-115	104-113	
		Female	4	111	112	113	2.9	109-113	105-116	107-113	
		Male	4	107	106	N/A	3.1	105-107	100-113	104-111	
	Mass	All	7	49.2	49.5	N/A	2.4	48.2-49.9	44.4-54.0	45.5-53.3	46.0-69.5
		Female	3	51.0	50.0	N/A	2.0	49.9-51.7	47.1-55.0	49.8-53.3	
		Male	3	47.9	48.7	N/A	2.1	47.1-49.1	43.7-52.1	45.5-49.5	
Lesson's Motmot (<i>Monotus lessonii</i>)	Wing	All	6	137	135	135	4.6	134-140	128-146	132-144	
	Mass	All	7	130.8	126.3	N/A	10.4	123.8-138	110-151.5	118.6-147	133.0
American Pygmy Kingfisher (<i>Chloroceryle aenea</i>)	Wing	All	4	57	58	N/A	2.3	57-59	53-62	54-59	
		Female	2	56	56	N/A	3.2	55-57	50-63	54-59	
		Male	2	58	58	N/A	1.1	58-59	56-60	58-59	
	Mass	All	3	15.2	15.0	N/A	0.5	15.0-15.4	14.2-16.2	14.9-15.8	11.7-16.9
		Female	2	15.2	15.0	N/A	0.1	14.9-15.0	14.8-15.1	14.9-15.0	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	15.8	
Green Kingfisher (<i>Chloroceryle americana</i>)	Wing	All	8	79	79	81	1.9	78-80	75-83	76-81	
		Female	3	80	80	N/A	1.5	79-81	77-83	78-81	
		Male	5	78	78	N/A	2.1	77-80	74-83	76-81	
	Mass	All	8	34.8	35.0	N/A	2.3	33.0-36.1	30.2-39.5	31.5-38.5	28.0-36.5
		Female	3	37.1	37.0	N/A	1.4	36.4-37.8	34.4-39.8	35.8-38.5	30.0-36.5
		Male	5	33.5	33.0	N/A	1.6	32.8-34.5	30.3-36.6	31.5-35.5	28.0-32.5
Rufous-tailed Jacamar (<i>Galbula ruficauda</i>)	Wing	All	4	80	80	N/A	2.3	79-81	75-84	77-83	
		Female	2	81	81	N/A	2.5	80-82	76-86	79-83	
		Male	2	79	79	N/A	2.1	78-79	74-83	77-80	
	Mass	All	4	26.5	26.3	N/A	1.4	25.5-27.3	23.7-29.4	25.2-28.3	
		Female	2	26.8	26.8	N/A	2.2	26.0-27.5	22.4-31.1	25.2-28.3	
		Male	2	26.3	26.3	N/A	1.0	26.0-26.7	24.3-28.3	25.6-27.0	24.0-33.5
White-whiskered Puffbird (<i>Malacoptila panamensis</i>)	Wing	All	4	87	86	85	2.4	85-88	82-91	85-90	
		Female	2	89	89	N/A	2.1	88-89	84-93	87-90	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	85
	Mass	All	4	43.1	43.6	N/A	3.0	42.0-44.7	37.1-49.2	39.1-46.3	42.6 ± 4.8
		Female	2	45.3	45.3	N/A	1.5	44.7-45.8	42.3-48.2	44.2-46.3	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	39.1	

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Olivaceous Piculet (<i>Picumnus olivaceus</i>)	Wing	All	6	51	52	52	1.3	51-52	49-54	49-52	
		Female	3	51	52	52	1.7	51-52	48-54	49-52	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	50	
	Mass	All	6	10.7	10.8	10.7	0.3	10.7-10.8	10.2-11.2	10.2-10.9	10.6
		Female	3	10.6	10.7	N/A	0.4	10.5-10.8	9.9-11.3	10.2-10.9	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	10.8	
Golden-naped Woodpecker (<i>Melanerpes chrysauchen</i>)	Wing	Male	2	113	113	N/A	3.5	111-114	105-120	110-115	
	Mass	Male	2	62.1	62.1	N/A	4.5	60.5-63.7	53.1-71.2	58.9-65.3	58.6
Velvety Manakin (<i>Lepidothrix velutina</i>)	Wing	All	49	60	59	60	1.6	58-61	56-63	57-63	
		Female	21	59	59	60	1.5	58-60	56-62	57-63	
		Male	14	61	61	60	1.7	60-62	57-64	57-63	
	Mass	All	43	10.9	10.9	10.6	0.8	10.6-11.5	9.3-12.4	9.2-12.8	8.0-8.7
		Female	19	11.2	11.4	11.5	0.7	10.8-11.5	9.9-12.5	9.9-12.8	8.7
		Male	12	10.4	10.6	10.5	0.7	9.9-10.8	8.9-11.8	9.2-11.5	8.0
Orange-collared Manakin (<i>Manacus aurantiacus</i>)	Wing	All	109	48	49	49	1.2	48-49	46-51	45-51	
		Female	51	48	49	49	1.2	48-49	46-51	45-51	
		Male	19	47	48	48	1.6	46-49	44-50	45-49	
	Mass	All	94	14.7	14.7	15.0	1.0	14.1-15.3	12.7-16.6	11.3-16.8	15.5
		Female	49	14.5	14.4	14.3	0.9	14.1-15.0	12.6-16.3	11.3-16.7	
		Male	16	15.6	15.6	14.9	0.7	15.1-15.9	14.3-16.9	14.5-16.8	
Red-capped Manakin (<i>Ceratopipra mentalis</i>)	Wing	All	193	60	60	60	1.3	60-61	58-63	55-64	
		Female	71	61	60	60	1.0	60-61	59-63	58-62	
		Male	66	60	60	60	1.5	59-61	57-63	55-63	
	Mass	All	171	16.6	16.6	16.5	0.9	16.3-17.2	14.9-18.3	14.4-19.1	12.5-17.2
		Female	64	16.9	16.8	16.2	0.9	16.2-17.3	15.1-18.6	15.1-19.1	
		Male	55	16.7	16.6	16.5	0.8	16.3-17.2	15.2-18.2	14.8-18.4	
Northern Schiffornis (<i>Schiffornis veraepacis</i>)	Wing	All	10	87	88	88	1.8	86-88	83-91	84-89	
	Mass	All	10	32.6	32.6	N/A	1.3	31.7-33.1	30.0-35.2	31.0-35.3	31.7
Ruddy-tailed Flycatcher (<i>Terenotriccus erythrus</i>)	Wing	All	14	48	47	49	3.0	46-49	42-54	45-57	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	45	
		All	12	6.6	6.7	7.2	0.7	6.0-7.1	5.3-7.9	5.6-7.6	6.9-8.0
	Mass	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	7	

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Sulphur-rumped Flycatcher (<i>Myiobius sulphureipygius</i>)	Wing	All	19	61	60	65	2.9	59-65	55-67	58-65	
		Female	2	63	63	N/A	2.8	62-64	57-69	61-65	
		Male	2	65	65	65	0.0	65-65	65-65	65-65	
	Mass	All	17	10.9	11.1	12.4	1.3	9.6-12.1	8.3-13.4	9.2-13.0	11.9 ± 1.1
		Female	2	11.4	11.4	N/A	0.1	11.3-11.4	11.2-11.5	11.3-11.4	
		Male	2	12.7	12.7	N/A	0.4	12.6-12.9	11.9-13.5	12.4-13.0	
Black-tailed Flycatcher (<i>Myiobius auricaudus</i>)	Wing	All	2	60	60	N/A	2.8	59-61	54-66	58-62	
	Mass	All	1	N/A	N/A	N/A	N/A	N/A	N/A	11.90	10.0 ± 1.1
Golden-crowned Spadebill (<i>Playrinchus coronatus</i>)	Wing	All	24	52	53	53	2.9	51-53	46-58	42-57	
		Female	3	52	52	N/A	1.5	51-53	49-55	50-53	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	54.00	
	Mass	All	23	8.7	8.7	8.3	0.7	8.3-9.0	7.3-10.1	6.6-9.9	9.4 ± 0.6
		Female	3	8.3	8.3	N/A	0.5	8.1-8.6	7.3-9.3	7.8-8.8	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	9.40	
Ochre-bellied Flycatcher (<i>Mionectes oleagineus</i>)	Wing	All	109	59	59	59	2.4	57-60	54-64	48-66	
		Female	16	57	57	57	2.9	56-58	51-62	48-61	
		Male	7	60	59	59	1.3	59-60	57-62	58-62	
	Mass	All	102	11.4	11.4	11.3	0.8	10.8-11.9	9.8-13.0	9.8-13.6	7.5-14.8
		Female	14	11.5	11.6	11.6	0.5	11.2-11.9	10.5-12.6	10.6-12.5	
		Male	7	11.7	11.9	11.9	0.4	11.5-11.9	10.8-12.6	11.0-12.3	
Northern Bentbill (<i>Oncostoma cinereigulare</i>)	Wing	All	18	45	45	42	2.6	42-46	40-50	41-49	
	Mass	All	16	6.6	6.6	6.6	0.4	6.4-6.9	5.9-7.4	5.9-7.2	4.3-11.0
Yellow-olive Flatbill (<i>Tolmomyias sulphurescens</i>)	Wing	All	3	61	61	N/A	1.5	60-62	58-64	59-62	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	59	
		All	3	13.7	13.5	N/A	0.5	13.4-13.9	12.6-14.8	13.3-14.3	9.0-20.0
	Mass	All	1	N/A	N/A	N/A	N/A	N/A	N/A	14.3	
		All	22	82	83	80	3.6	80-85	75-89	75-88	
		Female	3	84	83	N/A	4.0	82-86	76-92	80-88	
Bright-rumped Attila (<i>Attila spadiceus</i>)	Wing	All	20	36.2	36.4	34.1	2.9	33.9-38.4	30.4-42.1	31.7-42.2	35.0-43.9
		Female	3	37.0	37.4	N/A	3.3	35.5-38.8	30.5-43.6	33.6-40.1	
Rufous Mourner (<i>Rhytipterna holerythra</i>)	Wing	All	7	98	98	100	3.1	96-100	92-104	94-103	
		Mass	6	34.6	35.5	N/A	2.8	32.4-36.1	29.0-40.2	30.9-38.1	36.8

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Dusky-capped Flycatcher (<i>Myiarchus tuberculifer</i>)	Wing	All	8	73	74	70	2.4	72-74	69-78	70-77	
	Mass	All	7	18.5	17.8	N/A	1.3	17.6-19.2	15.9-21.0	17.3-20.7	10.3-27.0
Black-hooded Antshrike (<i>Thamnophilus bridgesi</i>)	Wing	All	25	72	71	70	1.8	70-73	68-75	69-75	
		Female	13	71	70	70	1.6	70-72	68-74	69-75	
		Male	12	72	73	73	1.8	71-73	69-76	70-75	
	Mass	All	21	26.4	26.4	26.7	1.7	25.2-27.6	23.0-29.8	22.5-30.2	27.0
	Mass	Female	8	25.5	25.6	N/A	1.6	25.0-25.9	22.2-28.8	22.5-28.2	
		Male	12	27.1	27.1	N/A	1.5	26.3-27.7	24.1-30.0	24.9-30.2	
Russet Antshrike (<i>Thamnistes anabatinus</i>)	Wing	All	4	63	63	64	1.0	63-64	61-66	62-64	
	Mass	All	3	17.3	17.5	N/A	0.8	17.0-17.7	15.7-18.8	16.4-17.9	19.0-23.6
Slaty Antwren (<i>Myrmotherula schisticolor</i>)	Wing	All	13	53	54	52	2.0	52-55	49-58	50-57	
		Female	6	52	52	52	1.9	51-54	49-56	50-55	
		Male	5	55	54	54	1.9	54-56	51-58	52-57	
	Mass	All	12	8.7	8.7	8.7	0.7	8.3-8.9	7.3-10.1	7.7-10.0	9.6
Dot-winged Antwren (<i>Microhoplias quixensis</i>)	Wing	Female	6	8.6	8.8	N/A	0.6	8.3-9.0	7.5-9.8	7.7-9.3	
		Male	4	8.8	8.6	N/A	1.1	8.4-8.8	6.6-11.0	7.8-10.3	
		All	37	49	49	48	2.7	48-50	44-54	42-60	
		Female	13	49	48	48	0.9	48-49	47-50	48-50	
Chestnut-backed Antbird (<i>Poliocrania exsul</i>)	Wing	Male	24	49	49	50	3.2	48-50	43-56	42-60	
		All	32	8.4	8.3	8.2	0.6	8.0-8.6	7.1-9.6	7.4-11.0	
	Mass	Female	10	8.4	8.1	7.9	0.9	7.9-8.4	6.7-10.1	7.7-10.5	
		Male	22	8.4	8.4	8.0	0.5	8.0-8.6	7.4-9.4	7.4-9.9	
Bicolored Antbird (<i>Gymnophithys bicolor</i>)	Wing	All	51	64	64	64	2.0	63-65	60-68	60-68	
		Female	18	64	64	65	2.4	62-65	59-69	60-68	
		Male	27	65	65	65	1.9	64-66	61-69	61-68	
	Mass	All	43	25.7	25.8	24.6	1.4	24.3-26.1	22.8-28.5	22.2-28.6	22.5-30.0
	Mass	Female	13	25.2	25.5	26.8	1.5	24.4-26.6	20.5-28.3	22.2-27.9	
		Male	24	26.1	26.2	26.9	1.3	25.3-26.8	23.4-28.7	22.6-28.6	
		All	51	72	72	72	2.5	71-73	67-77	60-76	
		Female	14	72	72	72	2.0	71-74	68-76	68-75	
	Wing	Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72.00
		All	47	29.3	28.9	27.4	2.4	27.3-30.2	24.4-34.1	25.1-36.8	28.0-37.0
	Mass	Female	13	29.8	29.3	29.5	2.9	27.7-30.6	24.1-35.6	26.2-36.8	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27.2

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Streak-chested Antpitta (<i>Hylopezus perspicillatus</i>)	Wing	All	2	79	79	79	0.0	79-79	79-79	79-79	
	Mass	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79
		All	2	43.3	43.3	N/A	3.4	42.1-44.5	36.5-50.1	40.9-45.7	43.0
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40.9
Black-faced Anthrush (<i>Formicarius analis</i>)	Wing	All	8	91	92	92	2.3	90-92	86-95	87-94	
	Mass	All	8	63.7	64.3	N/A	4.5	63.0-92.0	54.6-72.7	53.7-68.9	56.5-67.8
Scaly-throated Leafhopper (<i>Sclerurus guatemalensis</i>)	Wing	All	12	89	89	89	2.0	88-90	84-93	85-91	
	Mass	All	12	37.0	37.0	37.0	2.5	36.3-37.3	33.9-40.1	34.9-40.3	34.7 ± 3.3
Long-tailed Woodcreeper (<i>Deconychura longicauda</i>)	Wing	All	8	93	94	93	5.8	92-97	81-105	82-99	
	Mass	All	8	23.0	24.0	N/A	2.7	20.6-24.9	17.6-28.3	19.0-26.1	23.8 ± 2.0
Tawny-winged Woodcreeper (<i>Dendrocincla anabatina</i>)	Wing	All	18	93	94	95	4.8	91-95	83-103	82-102	
	Mass	Female	2	94	94	N/A	1.4	94-95	91-97	93-95	
		All	14	37.0	37.3	N/A	2.6	35.1-38.5	31.9-42.1	33.1-42.9	28.8-42.4
		Female	2	36.3	36.3	N/A	1.3	35.8-36.7	33.6-38.9	35.3-37.2	28.8-34.1
Wedge-billed Woodcreeper (<i>Glyphorhynchus spirurus</i>)	Wing	All	69	71	70	70	2.9	69-73	65-77	66-78	
		Female	2	70	70	70	0.0	70-70	70-70	70-70	
		Male	2	72	72	N/A	2.8	71-73	66-78	70-74	
		All	61	14.9	14.7	14.5	1.1	14.2-15.6	12.8-17.1	12.8-18.9	12.2-16.9
Northern Barred-Woodcreeper (<i>Dendrocolaptes sanctithomae</i>)	Mass	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17.8
		Male	2	16.1	16.1	N/A	0.3	16.0-16.2	15.5-16.7	15.9-16.3	
	Wing	All	8	122	122	N/A	5.6	118-126	111-133	114-130	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	130
Cocoa Woodcreeper (<i>Xiphorhynchus susurrans</i>)	Mass	All	8	72.7	72.7	N/A	4.1	69.6-74.3	64.6-80.8	67.8-80.2	58.5-74.0
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	68.8
	Wing	All	20	98	96	95	5.9	94-103	86-109	88-108	
		Male	16	42.8	43.0	46.1	3.7	40.1-45.5	35.5-50.2	37.1-48.9	41.0-52.0
Northern Plain-Xenops (<i>Xenops mexicanus</i>)	Wing	All	29	63	63	63	2.4	61-65	58-68	59-67	
	Mass	All	28	11.8	11.8	11.7	0.8	11.2-12.3	10.2-13.3	10.2-12.9	8.2-11.4

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Chiriqui Foliage-gleaner (<i>Automolus exsertus</i>)	Wing	All	13	84	84	84	2.4	83-85	79-88	78-87	
	Mass	All	13	37.3	37.9	37.9	2.8	36.0-39.2	31.7-43.0	32.6-41.9	40.2 ± 2.5
Tawny-crowned Greenlet (<i>Tunchiornis ochraceiceps</i>)	Wing	All	29	56	57	58	1.6	55-58	53-60	53-60	
		Female	3	58	57	N/A	2.1	57-59	54-62	56-60	
		Male	2	58	58	N/A	0.7	57-58	56-59	57-58	
	Mass	All	27	11.9	11.8	11.6	0.8	11.6-12.6	10.4-13.5	10.2-13.4	11.6 ± 0.7
Lesser Greenlet (<i>Pachysybia decurtata</i>)	Wing	Female	2	12.3	12.3	N/A	0.9	11.9-12.6	10.4-14.1	11.6-12.9	
		Male	2	12.5	12.5	N/A	1.3	12.1-13.0	10.0-15.0	11.6-13.4	
	Mass	All	8	50	50	48	2.1	48-51	46-54	48-53	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	48
Yellow-green Vireo (<i>Vireo flavoviridis</i>)	Wing	Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	53
		All	8	8.5	8.3	8.4	0.8	8.1-8.7	6.9-10.0	7.4-9.7	6.6-10.3
	Mass	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.4
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.7
Long-billed Gnatwren (<i>Ramphocaelus melanurus</i>)	Wing	All	31	76	76	75	2.6	75-78	71-81	72-84	
	Mass	All	21	18.7	18.3	19.7	1.8	17.4-19.7	15.1-22.2	15.7-22.1	16.0-21.1
	Wing	All	23	49	49	50	1.9	47-50	45-52	45-52	
		Female	6	49	50	50	1.9	48-50	45-53	46-51	
White-browed Gnatcatcher (<i>Polioptila bilineata</i>)	Wing	Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	47
		All	22	10.2	10.3	9.6	0.7	9.6-10.6	8.8-11.5	8.6-11.3	9.7 ± 0.9
	Mass	Female	6	10.4	10.3	N/A	0.6	10.1-10.7	9.2-11.6	9.6-11.3	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.4
Scaly-breasted Wren (<i>Microcerculus marginatus</i>)	Wing	All	5	44	44	44	1.1	44-44	42-46	43-46	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	44
	Mass	Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	46
		All	4	5.8	5.8	N/A	0.3	5.6-6.0	5.1-6.5	5.4-6.2	4.8-7.0
Sealy-breasted Wren (<i>Microcerculus marginatus</i>)	Wing	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.7
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.4
	Mass	All	4	58	58	N/A	2.3	57-59	53-63	55-61	
		All	n.d.								

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Black-bellied Wren (<i>Phlegopedius fasciatoventris</i>)	Wing	All	6	65	65	N/A	4.2	61-68	56-73	60-70	
	Mass	All	5	25.5	25.4	N/A	2.4	24.6-27.6	20.7-30.2	22.0-27.7	24.0
Riverside Wren (<i>Cantorchilus semibadius</i>)	Wing	All	42	60	61	61	2.3	59-62	56-65	54-64	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	64
	Mass	Male	2	64	64	N/A	0.7	63-64	62-65	63-64	
		All	36	18.8	18.7	17.4	1.6	17.6-19.7	15.6-22.1	15.3-23.2	17.0
Southern House Wren (<i>Troglodytes musculus</i>)	Wing	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	19.8
		Male	2	19.8	19.8	N/A	0.9	19.4-20.1	17.9-21.6	19.1-20.4	
	Mass	All	7	52	51	51	1.7	51-53	48-55	49-54	
		All	6	12.6	12.6	12.4	0.5	12.7-13.0	11.6-13.6	11.9-13.2	9.9-13.0
Clay-colored Thrush (<i>Turdus grayi</i>)	Wing	All	11	117	117	115	4.6	115-120	107-126	109-123	
		Female	4	113	112	109	4.1	109-116	104-121	109-117	
	Mass	Male	2	122	122	N/A	2.1	121-122	117-126	120-123	
		All	11	68.0	66.3	64.1	4.3	64.6-72.0	59.4-76.5	62.4-74.2	57.3-100.0
White-throated Thrush (<i>Turdus assimilis</i>)	Wing	Female	4	67.0	65.9	N/A	3.6	65.1-67.8	59.8-74.3	64.1-72.3	
		Male	2	74.0	74.0	N/A	0.4	73.8-74.1	73.2-74.7	73.7-74.2	
	Mass	All	5	116	115	N/A	4.4	113-118	107-125	112-123	
		All	5	64.0	64.4	N/A	4.6	62.5-64.9	54.9-73.1	57.8-70.4	61.0-80.0
Spot-crowned Euphonia (<i>Euphonia imitans</i>)	Wing	All	6	56	57	57	1.2	56-57	54-59	54-57	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	54
	Mass	Male	5	57	57	57	0.5	56-57	56-58	56-57	
		All	6	12.6	12.7	N/A	0.3	12.5-12.8	12.1-13.2	12.2-13.0	14.0
Black-striped Sparrow (<i>Arremonops conirostris</i>)	Wing	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12.8
		Male	5	12.6	12.6	N/A	0.3	12.5-12.7	12.0-13.2	12.2-13.0	
	Mass	All	15	71	71	69	2.8	69-74	66-77	67-75	
		All	11	35.7	35.7	33.1	2.2	33.8-36.9	31.3-40.1	32.9-39.5	39.8 ± 2.2

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Orange-billed Sparrow (<i>Arremon aurantirostris</i>)	Wing	All	101	72	72	71	3.6	71-75	65-80	50-80	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	50	
		Male	8	73	74	71	4.4	71-75	64-82	65-80	
Mass		All	85	30.2	30.0	31.3	1.9	28.8-31.4	26.4-34.0	25.5-35.5	34.5 ± 2.3
		Female	n.d.								
		Male	7	30.9	31.3	N/A	1.4	30.0-31.8	28.0-33.8	28.7-32.8	
Scarlet-rumped Cacique (<i>Cacicus uropygialis</i>)	Wing	All	2	120	120	N/A	14.1	115-125	92-148	110-130	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	110	
	Mass	All	n.d.								
Buff-rumped Warbler (<i>Myiothlypis fulvicauda</i>)	Wing	All	2	60	60	N/A	1.4	60-61	57-63	59-61	
	Mass	All	2	13.1	13.1	N/A	0.1	13.0-13.0	12.8-13.4	13.0-13.2	14.9
Black-checked Ant-Tanager (<i>Driophlox arimaxillaris</i>)	Wing	All	52	89	90	85	4.7	86-92	80-99	81-99	
		Female	12	89	88	87	3.7	87-90	81-96	85-99	
		Male	7	95	96	98	4.7	93-98	85-104	86-99	
	Mass	All	47	37.9	36.8	34.8	4.9	35.0-40.2	28.1-47.8	33.0-64.3	48.9
		Female	10	38.7	36.3	N/A	9.2	35.5-37.2	20.4-56.9	33.0-64.3	
		Male	7	40.7	40.8	41.8	2.1	40.2-41.8	36.6-44.9	36.8-43.5	
Blue-black Grosbeak (<i>Cyanoloxia cyanoides</i>)	Wing	All	31	78	79	79	3.0	76-79	72-84	68-84	
		Female	12	77	77	79	3.2	76-79	70-83	68-80	
		Male	13	79	79	79	2.7	78-81	74-85	75-84	
	Mass	All	29	32.5	32.3	32.3	1.9	31.7-33.1	28.8-36.3	28.5-36.5	32.5
		Female	11	32.5	32.4	N/A	1.5	31.5-33.0	29.4-35.5	30.5-35.5	
		Male	12	32.2	32.3	32.3	1.8	31.8-32.8	28.5-35.9	28.5-36.5	
Golden-hooded Tanager (<i>Stilpnia larvata</i>)	Wing	All	3	69	68	68	1.2	68-69	66-71	68-70	
	Mass	All	2	18.2	18.2	18.2	0.0	18.2-18.2	18.2-18.2	18.2-18.2	17.1-23.9
Bay-headed Tanager (<i>Tangara gyrola</i>)	Wing	All	5	72	73	73	1.6	71-73	69-75	70-74	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	70	
		Male	4	73	73	73	1.3	73-73	70-75	71-74	
	Mass	All	5	20.7	20.8	N/A	1.5	19.5-21.1	17.8-23.6	19.2-22.9	17.5-26.5
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	19.5	
		Male	4	21.0	21.0	N/A	1.5	20.4-21.1	18.0-24.0	19.2-22.9	

Table 1 (continued on next page). Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Green Honeycreeper (<i>Chlorophanes spiza</i>)	Wing	All	18	68	68	68	3.3	67-69	61-74	58-74	
		Female	4	66	67	67	1.9	65-67	62-70	63-67	
		Male	14	68	68	68	3.5	68-69	61-75	58-74	
	Mass	All	18	18.3	18.5	20.2	1.9	17.4-19.6	14.4-22.2	12.3-21.0	14.0-23.0
		Female	4	19.1	19.3	N/A	1.8	17.4-19.6	15.5-22.6	16.7-21.0	
Blue-black Grassquit (<i>Volatinia jacarina</i>)		Male	14	18.1	18.3	20.2	2.0	17.4-19.3	14.1-22.0	12.3-20.2	
	Wing	All	3	45	45	N/A	1.0	45-46	43-47	44-46	
		Female	2	45	45	N/A	0.7	44-45	43-46	44-45	
	Mass	All	3	8.6	8.4	N/A	1.0	8.1-9.0	6.6-10.5	7.7-9.6	8.0-12.0
		Female	2	8.1	8.1	N/A	0.5	7.9-8.2	7.1-9.0	7.7-8.4	
Gray-headed Tanager (<i>Eucometis penicillata</i>)	Wing	All	56	86	86	85.0	3.0	84-88	80-92	79-92	
		Female	2	86	86	N/A	2.8	85-87	80-92	84-88	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	86	
	Mass	All	51	31.2	31.1	32.5	1.8	29.9-32.5	27.6-34.7	28.0-34.9	22.5-35.0
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	32.5	
White-shouldered Tanager (<i>Loriotus luctuosus</i>)		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	33.1	
	Wing	All	30	64	62	62	2.7	62-66	58-69	60-68	
		Female	13	62	62	62	1.5	61-62	59-65	60-66	
		Male	12	66	67	68	2.0	65-68	62-70	62-68	
	Mass	All	28	16.0	16.2	17.5	1.4	14.9-17.3	13.3-18.7	13.6-17.8	11.5-15.0
White-throated Shrike-Tanager (<i>Lanio leucothorax</i>)		Female	12	15.4	15.3	15.6	1.1	14.8-16.1	13.1-17.6	13.6-17.4	
		Male	11	17.2	17.4	17.5	0.5	16.9-17.5	16.2-18.2	16.2-17.8	
	Wing	All	7	91	91	91	1.7	91-91	88-95	90-95	
		Female	4	91	91	91	0.5	91-91	90-92	90-91	
	Mass	All	6	30.6	31.0	31.0	1.3	30.2-31.0	28.1-33.1	28.5-32.2	40.0
Scarlet-rumped Tanager (<i>Ramphocelus costaricensis</i>)		Female	3	31.0	31.0	31.0	0.0	31.0-31.0	31.0-31.0	31.0-31.0	
	Wing	All	46	74	74	73	2.5	73-76	69-79	65-79	
		Female	19	74	73	73	1.9	73-75	70-77	70-77	
		Male	19	75	76	77	3.0	74-77	69-81	65-79	
	Mass	All	42	28.9	28.8	27.4	1.5	27.6-29.7	25.9-31.9	26.5-32.3	25.5-37.0
		Female	17	28.6	28.3	27.5	1.4	27.5-29.1	25.8-31.4	27.2-32.3	
		Male	17	29.7	29.6	28.2	1.2	28.0-30.3	27.2-32.1	27.8-32.1	

Table 1. Wing length (mm) and body mass (g) statistics for 85 species banded at Las Caletas, 2002-2008. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species		Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Shining Honeycreeper (<i>Cyanerpes lucidus</i>)	Wing		Male	2	56	56	N/A	0.7	55-56	54-57	55-56	
	Mass		Male	2	11.1	11.1	11.1	0.0	11.1-11.1	11.1-11.1	11.1-11.1	11.4
Red-legged Honeycreeper (<i>Cyanerpes cyaneus</i>)	Wing	All	All	8	62	62	60	1.4	61-62	59-64	60-64	
		Female	Female	3	60	60	60	0.6	60-61	59-61	60-61	
		Male	Male	4	63	63	62	1.0	62-63	61-65	62-64	
	Mass	All	All	7	13.2	13.1	12.4	0.8	12.6-13.9	11.7-14.8	12.4-14.2	11.0-18.3
		Female	Female	2	13.4	13.4	N/A	0.9	13.0-13.7	11.5-15.2	12.7-14.0	
Bananaquit (<i>Coereba flaveola</i>)	Wing		All	49	51	51	49	2.3	49-53	46-55	46-55	
	Mass		All	42	8.5	8.6	8.7	0.7	8.2-8.8	7.2-9.9	7.2-10.1	6.4-14.2
Thick-billed Seed-Finch (<i>Sporophila funerea</i>)	Wing	All	All	35	55	55	57	1.7	54-57	52-59	51-58	
		Female	Female	12	55	55	55	1.7	54-55	51-58	51-57	
		Male	Male	11	57	57	57	0.8	57-57	55-58	55-58	
	Mass	All	All	30	12.4	12.5	11.5	0.7	11.9-12.9	10.9-13.7	10.8-13.4	12.3 ± 0.9
		Female	Female	10	12.0	11.9	11.5	0.6	11.6-12.2	10.9-13.2	11.5-13.2	
Variable Seedeater (<i>Sporophila corvina</i>)	Wing	All	All	71	51	50	50	1.8	49-52	47-54	48-57	
		Female	Female	10	50	50	50	1.1	49-50	48-52	48-52	
		Male	Male	33	51	51	52	1.7	50-52	48-55	49-57	
	Mass	All	All	57	10.0	9.9	10.0	0.8	9.5-10.3	8.5-11.4	8.4-12.4	10.7 ± 1.1
		Female	Female	8	9.8	9.9	10.0	0.3	9.6-10.0	9.2-10.5	9.4-10.4	
Yellow-bellied Seedeater (<i>Sporophila nigricollis</i>)	Wing	All	All	6	51	51	52	1.3	50-52	48-53	49-52	
		Female	Female	4	51	51	N/A	1.0	50-51	49-53	50-52	
		All	All	6	8.7	9.5	N/A	2.0	8.9-9.8	4.7-12.7	4.7-9.9	8.5-11.2
	Mass	Female	Female	4	9.4	9.5	N/A	0.5	9.2-9.8	8.5-10.4	8.8-9.9	
		All	All	24	96	95	100	4.0	93-98	88-104	88-105	
Buff-throated Saltator (<i>Saltator maximus</i>)	Wing		Male	4	99	100	100	1.0	99-100	97-101	98-100	
	Mass	All	All	22	45.6	45.5	46.5	3.1	43.7-47.0	39.3-51.8	40.0-52.5	47.7 ± 2.4
		Male	Male	4	47.2	46.9	N/A	2.2	45.4-48.7	42.8-51.5	45.3-49.7	46.2 ± 1.7

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Blue Ground Dove (<i>Claravis pretiosa</i>)	Wing	All	2	117	117	N/A	7.1	115-120	103-131	112-122	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	112	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	122	
	Mass	All	2	75.1	75.1	N/A	3.4	73.9-76.3	68.3-81.9	72.7-77.5	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	72.7	
Ruddy Quail-Dove (<i>Geotrygon montana</i>)		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	77.5	41.0-103.0
	Wing	All	2	129	129	N/A	2.8	128-130	123-135	127-131	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	131	
	Mass	All	2	107.7	107.7	N/A	42.6	92.7-122.8	22.6-192.8	77.6-137.8	121.0-165.0
		Female	n.d.								
Gray-chested Dove (<i>Leptotila cassini</i>)	Wing	All	8	131	132	132	3.4	130-132	124-137	124-135	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	132	
	Mass	All	8	156.9	157.0	N/A	14.8	148.0-170.8	127.2-186.5	132.6-174.2	132.0-179.0
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	156.1	
Groove-billed Ani (<i>Crotophaga sulcirostris</i>)	Wing	All	4	127	126	N/A	4.1	125-128	119-135	124-133	
		Female	3	125	125	N/A	1.0	125-126	123-127	124-126	
	Mass	All	5	70.0	74.4	N/A	9.0	65.8-75.2	51.9-88.1	56.2-78.5	58.7-96.1
		Female	3	65.5	65.8	N/A	9.1	61.0-70.1	47.3-83.7	56.2-74.4	58.7-96.1
Common Squirrel-Cuckoo (<i>Piaya cayana</i>)	Wing	All	2	145	145	N/A	6.4	142-147	132-157	140-149	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	140	
	Mass	All	n.d.								
Graceful Black-throated Trogon (<i>Trogon tenellus</i>)		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	130.3	73.0-137.0
	Wing	Male	3	112	113	N/A	2.1	112-114	108-116	110-114	
	Mass	Male	3	56.0	56.4	N/A	2.1	55.1-57.1	51.8-60.1	53.7-57.8	46.0-69.5
American Pygmy Kingfisher (<i>Chloroceryle aenea</i>)	Wing	Female	2	57	57	N/A	2.8	56-58	51-63	55-59	
Rufous-tailed Jacamar (<i>Galbula ruficauda</i>)	Mass	Female	2	15.8	15.8	N/A	0.2	15.7-15.8	15.3-16.2	15.6-15.9	11.7-16.9
	Wing	All	3	81	82	82	1.2	81-82	79-84	80-82	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	80	
		Male	2	82	82	0	82	82-82	82-82	82-82	
	Mass	All	n.d.								
		Female	n.d.								
		Male	2	25.5	25.5	N/A	0.1	25.4-25.5	25.3-25.6	25.4-25.5	

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
White-whiskered Puffbird (<i>Malacoptila panamensis</i>)	Wing	All	4	83	83	83	0.5	83-83	82-84	82-83	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	82
		Male	3	83	83	83	0.0	83-83	83-83	83-83	
	Mass	All	4	43.6	43.6	N/A	4.2	42.0-45.2	35.2-52.0	38.5-48.7	42.6 ± 4.9
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	48.7
		Male	3	41.9	43.2	N/A	3.0	40.9-43.6	36.0-47.8	38.5-44.0	
White-collared Manakin (<i>Manacus candei</i>)	Wing	All	51	54	54	55	1.3	53-55	52-57	51-57	
		Female	28	54	55	55	1.3	54-55	52-57	51-56	
		Male	4	54	54	54	0.5	54-54	53-55	53-54	
	Mass	All	50	18.2	18.1	17.9	2.4	17.6-19.2	13.4-23.0	11.9-28.9	
		Female	28	18.6	18.6	17.9	2.7	17.8-19.0	13.2-24.0	11.9-28.9	20.9 ± 2.1
		Male	4	20.2	20.3	N/A	0.5	20.1-20.4	19.3-21.1	19.6-20.7	18.8 ± 3.1
Red-capped Manakin (<i>Ceratopipra mentalis</i>)	Wing	All	4	57	57	57	0.8	57-57	55-59	56-58	
		Female	2	57	57	N/A	0.7	57-58	55-58	56-57	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	58	
	Mass	All	4	14.1	14.1	N/A	0.2	13.9-14.2	13.6-14.5	13.8-14.3	12.5-17.2
		Female	2	14.1	14.1	N/A	0.2	13.9-14.1	13.6-14.5	13.9-14.2	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	13.8	
Cinnamon Becard (<i>Pachyrhamphus cinnamomeus</i>)	Wing	All	2	73	73	N/A	1.4	73-74	70-76	72-74	
	Mass	All	2	20.9	20.9	N/A	0.3	20.8-21.0	20.3-21.5	20.7-21.1	18.7-22.0
White-winged Becard (<i>Pachyrhamphus polychopterus</i>)	Wing	All	2	66	66	N/A	3.5	64-67	58-73	63-68	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	68
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	63	
	Mass	All	2	20.0	20.0	N/A	0.5	19.8-20.1	19.0-20.9	19.6-20.3	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	19.6	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	20.3	18.0-25.5
Royal Flycatcher (<i>Onychorhynchus coronatus</i>)	Wing	Male	2	86	86	N/A	0.7	85-86	84-87	85-86	
	Mass	Male	2	22.4	22.4	N/A	0.5	22.2-22.5	21.4-23.3	22.0-22.7	9.7-16.2
Ochre-bellied Flycatcher (<i>Mionectes oleagineus</i>)	Wing	All	38	60	60	58	3.7	58-62	53-67	47-68	
		Female	8	58	58	58	1.1	57-58	56-60	57-60	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63
	Mass	All	36	12.5	12.6	12.6	1.1	11.8-13.0	10.2-14.7	10.4-15.2	7.5-15.0
		Female	8	11.9	11.8	11.8	0.5	11.8-12.2	10.9-12.9	11.1-12.7	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	14.4	

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Black-capped Pygmy-Tyrant (<i>Myiornis atricapillus</i>)	Wing	All	2	35	35	N/A	0.7	34-35	33-36	34-35	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35
	Mass	All	2	5.3	5.3	N/A	0.1	5.2-5.3	5.1-5.4	5.2-5.3	5.5-6.0
Northern Bentbill (<i>Oncostoma cinereigulare</i>)	Wing	All	2	48	48	N/A	2.1	47-48	43-52	46-49	
	Mass	All	2	7.3	7.3	N/A	0.4	7.1-7.4	6.5-8.0	7.0-7.5	4.3-11.0
Yellow-winged Flatbill (<i>Tolmomyias flavotectus</i>)	Wing	Female	2	59	59	59	0.0	59-59	59-59	59-59	
	Mass	Female	2	16.9	16.9	N/A	0.5	16.7-17.0	15.9-17.8	16.5-17.2	17.0
Yellow Tyrannulet (<i>Capsiemiis flaveola</i>)	Wing	All	10	49	49	47	2.5	47-51	43-54	44-52	
		Female	2	49	48	N/A	0.7	47-48	46-49	47-48	
	Mass	All	11	7.8	7.6	7.4	1.0	7.4-7.8	4.8-9.7	6.8-11.0	7.7
Bright-rumped Attila (<i>Attila spadiceus</i>)	Wing	All	7	86	86	N/A	4.7	83-90	77-96	80-93	
		Female	4	84	83	N/A	3.4	82-85	77-90	80-88	
	Mass	All	7	40.4	39.6	38.9	2.7	38.9-42.0	34.9-45.8	36.5-44.7	35.0-43.9
Rufous Mourner (<i>Rhytipterna holerythra</i>)	Wing	Female	4	94	99	99	8.8	94-99	77-112	81-99	
		Female	2	99	99	99	0.0	99-99	99-99	99-99	
	Mass	All	4	35.7	37.9	N/A	5.8	34.0-39.6	24.0-47.4	27.3-39.7	36.8
Social Flycatcher (<i>Myiozetetes similis</i>)	Wing	Female	2	39.7	39.7	N/A	0.1	39.6-39.7	39.5-39.8	39.6-39.7	
		All	2	84	84	N/A	4.2	83-86	76-92	81-87	
	Mass	All	2	31.6	31.6	N/A	2.3	30.7-32.4	26.9-36.2	29.9-33.2	28.0
Black-crowned Antshrike (<i>Thamnophilus atrinucha</i>)	Wing	All	6	65	65	65	4.0	62-66	56-73	59-71	
		Female	3	65	65	65	0.6	65-66	64-66	65-66	
		Male	2	65	65	N/A	8.5	62-68	48-82	59-71	
	Mass	All	6	22.2	23.0	N/A	3.0	20.2-23.7	16.2-28.2	18.1-26.2	23.6
		Female	3	24.1	23.2	N/A	1.9	23.0-24.7	20.4-27.8	22.8-26.2	
		Male	2	21.6	21.6	N/A	3.2	20.4-22.7	15.2-27.9	19.3-23.8	

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Dusky Antbird (<i>Cercomacroides tyrannina</i>)	Wing	All	5	62	61	N/A	4.0	59-63	54-69	58-67	
		Female	2	59	59	N/A	0.7	58-59	57-60	58-59	
	Mass	Male	2	62	62	N/A	1.4	62-63	59-63	61-63	
		All	4	19.2	19.3	N/A	1.4	18.6-19.8	16.5-21.9	17.5-20.8	12.0-18.7
Chestnut-backed Antbird (<i>Poliocrania exsul</i>)	Wing	Female	2	64	64	64	0.0	64-64	64-64	64-64	
		All	3	27.3	27.3	N/A	1.3	26.8-27.7	24.6-29.9	26.3-28.2	
	Mass	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	26.3	22.5-30.0
		All	3	108	106	N/A	5.3	105-106	97-119	104-114	
Wedge-billed Woodcreeper (<i>Dendrocincla fuliginosa</i>)	Wing	All	3	49.2	50.3	N/A	3.4	47.9-51.1	42.4-56.0	45.4-51.9	31.0-54.5
		Female	3	69	67	N/A	5.3	68-73	58-80	65-75	
	Mass	All	17	15.7	15.3	15.9	1.4	14.8-15.9	13.0-18.4	14.1-19.7	12.2-16.9
		Female	3	15.2	15.6	N/A	1.0	14.6-15.5	13.3-17.1	14.1-15.9	
Northern Barred-Woodcreeper (<i>Dendrocolaptes sanctithomae</i>)	Wing	All	3	128	128	N/A	2.0	127-129	124-132	126-130	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	128	
	Mass	All	3	70.9	70.7	N/A	3.1	68.7-70.0	64.8-77.0	68.0-74.1	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	74.1	58.5-74.0
Cocoa Woodcreeper (<i>Xiphorhynchus susurrans</i>)	Wing	All	2	89	89	N/A	2.1	88-89	84-93	87-90	
		All	2	47.3	47.3	N/A	7.9	44.5-50.0	31.6-62.9	41.7-52.8	35.0-59.0
	Mass	All	2	49	49	49	0.0	49-49	49-49	49-49	
		All	2	8.7	8.7	N/A	0.3	8.6-8.8	8.1-9.3	8.5-8.9	6.6-10.3
Lesser Greenlet (<i>Pachysylvia decurtata</i>)	Wing	All	6	76	78	78	2.7	75-78	71-82	72-78	
		All	5	19.0	19.4	N/A	1.6	18.0-19.5	15.7-22.3	16.9-21.2	16.0-21.1
	Mass	All	3	50	50	N/A	1.0	50-51	48-52	49-51	
		All	3	10.1	10.2	10.2	0.2	10.1-10.2	9.8-10.4	9.9-10.2	9.7 ± 0.9

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Black-throated Wren (<i>Phengopedius atrogularis</i>)	Wing	All	4	64	62	N/A	4.5	61-65	54-73	60-70	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	63	
	Mass	All	4	23.5	24.0	N/A	2.5	22.3-25.2	18.5-28.4	20.2-25.7	24.3-27.3
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	25.7	
Stripe-breasted Wren (<i>Cantorchilus thoracicus</i>)	Wing	All	2	58	58	N/A	0.7	57-58	56-59	57-58	
		All	2	16.4	16.4	16.4	0.0	16.4-16.4	16.4-16.4	16.4-16.4	17.6
	Mass	All	13	64	64	63	2.0	63-65	60-68	60-68	
		Female	2	64	64	N/A	0.7	63-64	62-65	63-64	
Bay Wren (<i>Cantorchilus nigricapillus</i>)	Wing	All	13	24.2	23.7	N/A	1.7	23.0-25.4	20.8-27.5	22.0-27.1	19.0-27.0
		Female	2	22.6	22.6	N/A	0.5	22.4-22.7	21.6-23.5	22.2-22.9	
	Mass	All	4	55	55	55	2.1	54-56	51-59	52-57	
		All	4	16.0	16.3	16.3	1.0	15.9-16.4	14.1-17.9	14.6-16.8	12.2-17.0
Southern House Wren (<i>Troglodytes musculus</i>)	Wing	All	4	49	50	50	1.0	49-50	47-51	48-50	
		All	4	11.5	11.2	11.0	0.8	11.0-11.7	10.0-13.0	11.0-12.6	10.0-13.0
	Mass	All	6	118	118	N/A	4.8	115-119	108-127	112-126	
		Female	2	113	113	N/A	1.4	113-114	110-116	112-114	
Clay-colored Thrush (<i>Turdus grayi</i>)	Wing	Male	2	123	123	N/A	5.0	121-124	113-132	119-126	
		All	6	72.5	74.1	N/A	4.0	69.5-75.0	64.6-80.4	67.0-76.7	57.3-100.0
	Mass	Female	2	71.0	71.0	N/A	5.7	69.0-73.0	59.7-82.3	67.0-75.0	
		Male	2	74.1	74.1	N/A	1.1	73.7-74.4	71.9-76.2	73.3-74.8	
Orange-billed Sparrow (<i>Arremon aurantirostris</i>)	Wing	All	9	73	73	69	3.6	69-75	66-80	68-78	
		Female	1	N/A	N/A	N/A	N/A	N/A	N/A	69	
	Mass	Male	4	76	76	N/A	2.2	75-77	71-80	73-78	
		All	9	32.3	31.8	30.4	3.5	30.4-35.5	25.4-39.2	26.3-37.0	34.5 ± 2.3
Scarlet-rumped Cacique (<i>Cacicus uropygialis</i>)	Wing	Female	1	N/A	N/A	N/A	N/A	N/A	N/A	35.5	
		Male	4	32.6	31.6	30.4	3.1	30.4-33.8	26.4-38.8	30.4-37.0	
	Mass	All	4	124	124	117	8.4	117-131	107-141	117-132	
		Female	2	117	117	117	0.0	117-117	117-117	117-117	
Scarlet-rumped Cacique (<i>Cacicus uropygialis</i>)	Wing	All	4	66.4	66.8	N/A	7.7	60.2-73.0	51.1-81.8	59.0-73.1	50.0-71.7
		Female	2	59.8	59.8	N/A	1.1	59.4-60.2	57.5-62.1	59.0-60.6	50.0-57.6

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Black-cowled Oriole (<i>Icterus prosthemelas</i>)	Wing	Male	3	85	85	N/A	4.5	83-87	76-94	80-89	
	Mass	Male	3	31.9	31.4	N/A	1.2	31.2-32.4	29.4-34.4	31.0-33.3	22.9-32.1
Olive-crowned Yellowthroat (<i>Geothlypis semiflava</i>)	Wing	All	6	56	56	56	1.9	55-56	52-60	53-59	
		Male	5	56	56	56	2.1	56-56	52-60	53-59	
		All	7	15.3	15.0	16.1	1.0	14.7-16.1	13.3-17.3	13.9-16.6	17.0-17.5
	Mass	Male	6	15.4	15.6	16.1	1.1	14.7-16.1	13.3-17.5	13.9-16.6	
Buff-rumped Warbler (<i>Myiothlypis fulvicauda</i>)	Wing	All	2	62	62	N/A	2.1	61-62	57-66	60-63	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	60	
	Mass	All	2	14.4	14.4	N/A	0.1	14.3-14.4	14.2-14.5	14.3-14.4	14.9
Red-throated Anti-Tanager (<i>Driophlox fuscicauda</i>)		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	14.4	
	Wing	All	6	90	88	87	5.9	87-93	79-102	85-100	
		Female	3	87	87	N/A	1.5	86-88	84-90	85-88	
		Male	2	98	98	N/A	3.5	96-99	90-105	95-100	
		All	6	40.0	37.4	N/A	8.4	34.9-40.0	23.2-56.7	34.0-56.3	29.0-46.5
		Female	3	36.2	37.0	N/A	2.0	35.5-37.4	32.3-40.2	34.0-37.7	29.0-44.0
		Male	2	48.5	48.5	N/A	11.0	44.6-52.4	26.4-70.6	40.7-56.3	32.9-46.5
		All	8	79	80	77	2.2	77-80	74-83	75-81	
Blue-black Grosbeak (<i>Cyanoloxia cyanoides</i>)	Wing	Female	3	77	77	N/A	2.0	76-78	73-81	75-79	
		Male	5	80	80	81	1.6	80-81	77-83	77-81	
	Mass	All	8	31.2	31.3	N/A	1.8	29.8-32.3	27.6-34.7	28.7-34.0	32.5
		Female	3	31.8	32.3	N/A	2.4	30.8-33.2	27.0-36.7	29.2-34.0	
		Male	5	30.7	30.9	N/A	1.5	30.0-31.7	27.8-33.6	28.7-32.4	
		Male	4	87	87	85	2.9	85-89	82-93	85-91	
Dusky-faced Tanager (<i>Mitrospingus cassini</i>)	Wing	Male	4	87	87	85	2.9	85-89	82-93	85-91	
	Mass	Male	4	42.3	41.8	N/A	1.5	41.5-42.6	39.3-45.2	41.0-44.4	40.4 ± 2.9
Green Honeycreeper (<i>Chlorophanes spiza</i>)	Wing	All	3	66	65	65	2.3	65-67	62-71	65-69	
		Female	2	65	65	65	0.0	65-65	65-65	65-65	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	69	
	Mass	All	3	18.0	18.0	N/A	0.6	17.7-18.3	16.9-19.1	17.4-18.5	14.0-23.0
		Female	2	18.3	18.3	N/A	0.4	18.1-18.4	17.5-19.0	18.0-18.5	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	17.4	

Table 2 (continued on next page). Wing length (mm) and body mass (g) statistics by sex class for 53 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with ± SD when given) in Dunning (2008). “IQR” represents the interquartile range, and “SD” refers to the standard deviation. All = all sex and age classes together. Data for only single individuals of a class are placed in the “Range” row. n.d. = no data recorded.

Species	Morphometric	Sex	No of Obs.	Mean	Median	Mode	SD	IQR	Mean ± 2SD	Range	Dunning
Blue-black Grassquit (<i>Volatinia jacarina</i>)	Wing	All	10	46	46	46	0.9	46-47	44-48	44-47	
		Female	3	45	46	46	1.2	45-46	43-48	44-46	
		Male	6	46	47	47	0.8	46-47	45-48	45-47	
	Mass	All	10	9.4	9.4	9.5	0.5	9.1-9.6	8.4-10.5	8.8-10.6	8.0-12.0
		Female	3	9.3	9.3	N/A	0.3	9.2-9.4	8.8-9.8	9.0-9.5	
		Male	6	9.6	9.6	N/A	0.5	9.3-9.8	8.6-10.7	9.1-11.0	
Scarlet-rumped Tanager (<i>Ramphocelus passerinii costaricensis</i>)	Wing	All	29	74	74	72	2.0	72-75	70-78	70-79	
		Female	9	72	72	72	1.2	71-72	70-74	70-74	
		Male	17	74	74	75	1.8	73-75	71-78	72-79	
	Mass	All	30	28.8	28.6	27.1	1.8	27.8-29.7	25.1-32.4	25.0-34.5	25.5-37.0
		Female	10	28.4	28.0	27.1	2.6	27.1-29.2	23.3-33.5	25.0-34.5	
		Male	17	28.8	28.7	28.8	1.4	28.1-29.3	25.9-31.6	26.1-32.2	
Thick-billed Seed-Finch (<i>Sporophila funerea</i>)	Wing	All	35	54	54	53	1.5	53-55	51-57	51-57	
		Female	11	53	53	54	1.1	53-54	51-55	51-55	
		Male	10	55	55	55	1.1	55-56	53-57	53-57	
	Mass	All	34	12.5	12.5	11.9	1.0	11.8-13.0	10.5-14.5	11.1-15.1	12.3 ± 0.9
		Female	10	12.9	12.7	11.9	1.2	12.0-13.4	10.4-15.3	11.2-15.1	
		Male	10	12.5	12.3	11.8	1.1	11.8-12.6	10.3-14.7	11.1-14.4	
Variable Seed eater (<i>Sporophila corvina</i>)	Wing	All	125	52	52	52	2.3	51-53	47-57	32-55	
		Female	25	51	52	52	1.4	52-53	48-54	48-54	
		Male	72	53	53	53	1.2	52-53	50-55	49-55	
	Mass	All	125	11.0	11.0	10.6	0.8	10.6-11.4	9.4-12.6	8.9-15.5	10.7
		Female	25	10.7	10.6	10.6	0.9	10.6-11.5	9.0-12.5	8.9-13.2	
		Male	72	11.2	11.1	10.8	0.8	10.8-11.5	9.6-12.7	10.0-15.5	
Black-headed Saltator (<i>Saltator atriceps</i>)	Wing	All	2	116	116	N/A	9.2	112-119	97-134	109-122	
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	122	
	Mass	All	2	81.2	81.2	N/A	7.1	78.6-83.7	66.9-95.4	76.2-86.2	63.0-116.0
		Male	1	N/A	N/A	N/A	N/A	N/A	N/A	86.2	
Buff-throated Saltator (<i>Saltator maximus</i>)	Wing	Male	9	95	94	92	4.5	92-96	86-104	89-104	
	Mass	Male	8	45.8	44.2	N/A	5.3	43.2-45.1	35.2-56.3	42.4-58.5	47.7

Table 3. Wing length (mm) and body mass (g) for 14 species for which only one individual was banded (except for one species with two individuals) at Las Caletas, 2002-2008 and for 14 species banded at La Selva, 2011-2012. Mass is compared to ranges (or means, along with $\pm$ SD when given) in Dunning (2008). Sex is unknown (U), male (M) or female (F), and n.d. = no data recorded.

Species (<i>Las Caletas</i>)	Sex	Wing	Mass	Dunning
Blue Ground Dove (<i>Claravis pretiosa</i>)	U	110	66.0	41.0-103.0
White-tipped Sicklebill (<i>Eutoxeres aquila</i>)	U	68	10.2	8.6-14.5
Purple-crowned Fairy (<i>Heliothryx barroti</i>)	F	63	5.4	5.5 $\pm$ 0.2
Snowy-bellied Hummingbird (<i>Saucerottia edward</i>)	U	56	5.2	4.7 $\pm$ 0.2
Double-toothed Kite (<i>Harpagus bidentatus</i>)	U	207	181.4	165.0-305.0
White-necked Puffbird (<i>Notharchus hyperrhynchus</i>)	U	115	102.5	95.9
Barred Forest-Falcon (<i>Micrastur ruficollis</i>)	F	161	n.d.	196.0
	M	n.d.	167.5	161.0
Rufous Piha (<i>Lipaugus unirufus</i>)	U	119	67.1	69.0-87.2
White-winged Becard (<i>Pachyramphus polychopterus</i>)	M	69	17.3	18.0-25.5
Scale-crested Pygmy-Tyrant (<i>Lophotriccus pileatus</i>)	U	45	7.4	6.9-8.1
Black-striped Woodcreeper (<i>Xiphorhynchus lachrymosus</i>)	U	116	50.5	50.7-66.0
Nightingale Wren (<i>Microcerculus philomela</i>)	U	59	17.8	16.4-21.5
Yellow-billed Cacique (<i>Amblycercus holosericeus</i>)	U	101	7.5	30.0-68.0
Blue Dacnis (<i>Dacnis cayana</i>)	M	63	13.5	10.0-15.5
Species (<i>La Selva</i>)	Sex	Wing	Mass	Dunning
Little Tinamou (<i>Crypturellus soui</i>)	U	126	276.2	165.0-268.0
White-throated Crake (<i>Laterallus albigularis</i>)	U	75	49.3	47.4 $\pm$ 6.1
Great Kiskadee (<i>Pitangus sulphuratus</i>)	U	109	68.6	74.0
Gray-capped Flycatcher (<i>Myiozetetes granadensis</i>)	F	82	29.8	29.3
Tropical Pewee (<i>Contopus cinereus</i>)	U	79	11.3	8.5-13.5
Fasciated Antshrike (<i>Cymbilaimus lineatus</i>)	M	73	39.8	31.0-44.0
Barred Antshrike (<i>Thamnophilus doliatus</i>)	M	66	26.2	22.0-30.5
Spotted Antbird (<i>Hylophylax naevioides</i>)	M	61	17.0	15.8-20.0
Ocellated Antbird (<i>Phaenostictus mcleannani</i>)	F	87	49.5	51.1 $\pm$ 2.7
Streak-headed Woodcreeper (<i>Lepidocolaptes souleyetii</i>)	U	94	30.9	25.7
Olive-backed Euphonia (<i>Euphonia gouldi</i>)	M	52	12.1	10.9-16.0
Crimson-collared Tanager (<i>Ramphocelus sanguinolentus</i>)	M	86	35.3	34.7-48.1
Bananaquit (<i>Coereba flaveola</i>)	U	52	9.0	6.4-14.2
Cinnamon-bellied Saltator (<i>Saltator grandis</i>)	U	90	47.0	46.0-67.0



Table 4. Statistical comparison between sexes of mean wing length and body mass for 10 species at Las Caletas and two species at La Selva for which sex could be determined, and sample size was >10 . *T*-statistic, degrees of freedom (df), and two-tailed *P*-value (< 0.05 in bold type) for each comparison are shown. A positive *t*-statistic indicates that male wing length was longer or male mass greater, while a negative number indicates that female wing length was longer or female mass greater. n.d. = no data recorded.

Species (<i>Las Caletas</i>)	Morphometric	<i>t</i> -stat	df	<i>P</i>
Band-tailed Barbthroat (<i>Threnetes ruckeri</i>)	Wing	2.37	23	0.03
	Mass	-0.38	30	0.71
Crowned Woodnymph (<i>Thalurania colombica</i>)	Wing	4.58	33	<0.01
	Mass	5.59	30	<0.01
Rufous-tailed Hummingbird (<i>Amazilia tzacatl</i>)	Wing	1.82	20	0.08
	Mass	2.24	28	0.03
Charming Hummingbird (<i>Polyerata decora</i>)	Wing	2.91	55	<0.01
	Mass	2.70	60	<0.01
Blue-throated Goldentail (<i>Chlorestes eliciae</i>)	Wing	-0.43	15	0.67
	Mass	-0.22	25	0.83
Velvety Manakin (<i>Lepidothrix velutina</i>)	Wing	1.84	25	0.08
	Mass	-3.47	22	<0.01
Orange-collared Manakin (<i>Manacus aurantiacus</i>)	Wing	-3.25	27	<0.01
	Mass	5.14	35	<0.01
Red-capped Manakin (<i>Ceratopipra mentalis</i>)	Wing	-2.72	115	<0.01
	Mass	-1.23	117	0.22
Dot-winged Antwren (<i>Microrhopias quixensis</i>)	Wing	0.98	31	0.34
	Mass	-0.14	12	0.90
Chestnut-backed Antbird (<i>Poliocrania exsul</i>)	Wing	1.14	31	0.27
	Mass	1.57	22	0.13
Species (<i>La Selva</i>)	Morphometric	<i>t</i> -stat	df	<i>P</i>
Scarlet-rumped Tanager (<i>Ramphocelus passerinii costaricensis</i>)	Wing	n.d.	n.d.	n.d.
	Mass	0.39	12	0.70
Variable Seedeater (<i>Sporophila corvina</i>)	Wing	3.96	31	<0.01
	Mass	2.06	38	0.05



Table 5. Statistical comparison of mean wing length and body mass between age classes (adult vs. juvenile) for two species at Las Caletas and one species at La Selva for which age could be determined, and sample size was >10. *T*-statistic, degrees of freedom (df), and two-tailed *P*-value (< 0.05 in bold type) for each comparison are shown. A positive *t*-statistic indicates that adult wing length was longer or adult mass greater, while a negative number indicates that juvenile wing length was longer or juvenile mass greater.

Species (<i>Las Caletas</i>)	Morphometric	<i>t</i> -stat	df	<i>P</i>
Red-capped Manakin (<i>Ceratopipra mentalis</i>)	Wing	-0.19	22	0.85
	Mass	2.80	24	0.01
Ochre-bellied Flycatcher (<i>Mionectes oleagineus</i>)	Wing	-1.03	33	0.31
	Mass	-0.34	31	0.73
Species (<i>La Selva</i>)	Morphometric	<i>t</i> -stat	df	<i>P</i>
Variable Seedeater (<i>Sporophila corvina</i>)	Wing	2.29	28	0.03
	Mass	2.81	59	<0.01

Table 6. Statistical comparison of mean wing length and body mass of the two subspecies of Scarlet-rumped Tanager: Cherrie’s (*Ramphocelus passerinii costaricensis*) at Las Caletas and Passerini’s (*R. p. passerinii*) at La Selva. T-statistic, degrees of freedom (df), and two-tailed P-value (< 0.05 in bold type) for each comparison are shown. A positive t-statistic indicates that Cherrie’s wing length was longer or mass greater, while a negative number indicates that Passerini’s wing length was longer or mass greater.

Scarlet-rumped Tanager Subspecies	Morphometric	<i>t</i> -stat	df	<i>P</i>
Cherrie’s vs Passerini’s (all)	Wing	1.03	69	0.31
	Mass	0.36	55	0.72
Cherrie’s vs Passerini’s (females)	Wing	3.09	24	<0.01
	Mass	0.18	12	0.86
Cherrie’s vs Passerini’s (males)	Wing	1.04	31	0.31
	Mass	1.80	27	0.08

