Cal/Ecotox
Exposure Factors for Song Sparrow (Melospiza melodia)*

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Age at Fledging, Metamorphosis, Weaning			9-11	d	B	Fledgling	CANADA	a	1
Age at Fledging, Metamorphosis, Weaning	17			d	B	Fledgling	CANADA	b	2
Age at Fledging, Metamorphosis, Weaning	30			d	NR	Fledgling	CANADA	c	3
Body Weight - Mean	3.12			g	B	Adult	CANADA	d	4
Body Weight - Mean			22.1-22.9	g	F	Adult	CANADA	e	5
Body Weight - Mean	3.08		2.2-3.75	g	F	Adult	CANADA	f	2
Body Weight - Mean			24.2-24.7		M	Adult	CANADA	g	5
Body Weight - Mean			23.40-26.25	g	F	Both Adult and Juv.	CANADA	h	6
Body Weight - Mean			25.15-25.68	g	M	Both Adult and Juv.	CANADA	i	6
Body Weight - Mean	16.69			g	NR	Chick	CANADA	j	5
Body Weight - Mean	15.43			g	NR	Chick	CANADA	k	5
Body Weight - Mean	4.43	0.31 SE		g	NR	Nestling	CANADA	l	2
Body Weight - Mean	16.81	0.3 SE		g	NR	Nestling	CANADA	m	2
Body Weight - Mean	15.55	0.31 SE		g	NR	Nestling	CANADA	n	2
Body Weight - Mean	4.2	0.17 SE		g	NR	Nestling	CANADA	o	2
Body Weight - Mean	see table 1				NR	Nestling	CA	p	7
Clutch or Litter Size	3.2	0.6 SD		eggs	NR		Contra Costa; CA	q	8
Clutch or Litter Size	8.2		7.5-9.1	eggs/pair/year	B	Adult	Contra Costa; CA	r	9
Clutch or Litter Size	3.14		2.91-3.42	eggs/nest	B	Adult	Contra Costa; CA	s	9
Clutch or Litter Size	3.28			eggs/nest	B	Adult		t	10
Clutch or Litter Size			3.05-4.17	eggs/nest	B	Adult	CA	u	10
Clutch or Litter Size	2.77	0.15 SE		eggs/clutch	B	Adult	CANADA	v	2
Clutch or Litter Size	3.31	0.11 SE		eggs/clutch	B	Adult	CANADA	w	2
Clutch or Litter Size	3.58; 3.42	0.1; 0.19			B	Adult	CANADA	x	11
Clutch or Litter Size	11.1	0.76		numbers of eggs laid	F	Adult	CANADA	y	12
Clutch or Litter Size	4.22	0.94		eggs/clutch	F	Adult	CANADA	z	13
Clutch or Litter Size	10.1	0.97		number of eggs fertilized	F; M	Adult; Both Adult and Juv.	CANADA; CANADA	aa	12
Clutch or Litter Size	10.1	0.97		number of eggs fertilized	F; M	Adult; Both Adult and Juv.	CANADA; CANADA	ab	12
Clutch or Litter Size	2.41	0.17		young/nest	NR	Chick	CANADA	ac	5
Clutch or Litter Size	1.64	0.13		young/nest	NR	Chick	CANADA	ad	5
Clutches or Litters per year	2			clutches/year	B	Adult	NY	ae	14
Clutches or Litters per year	2			clutches/year	B	Adult	CANADA	af	12
Clutches or Litters per year	2-3			broods/year	NR	Adult	CANADA	ag	3
Duration of Incubation or Gestation	13			d	B	NR	CANADA	ah	1
Fledging or Weaning Rate	0.44				B	Adult	IL	ai	15
Fledging or Weaning Rate	3.88	1.22		fledglings/nest	B	Fledgling	CANADA	aj	13

Exposure Factors for Song Sparrow (Melospiza melodia)*

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Food Ingestion Rate	412 (foxtail); or 468 (smartweed); or 85 (hemp); or 3943 (pigweed)			seeds/hour	NR	Adult	Lab	ak	16
Hatching Success			45.9-82.3	%	B	Adult	CANADA	al	4
Hatching Success	29.4%			%	B	Both Adult and Juv.	CANADA	am	13
Home Range	review				B	Adult	CA	an	17
Home Range	162			m	F	Adult	Marin	ao	18
Home Range	125			m	M	Adult	Marin	ap	18
Longevity	up to 7			years	B	Adult	Contra Costa; CA	aq	9
Longevity	6			years	M	Chick; NR	CANADA	ar	12
Population Density	4 (+/-4)			nests/100 ha	B	Adult	IA	as	19
Population Density	8-10		8.2-10.5	pairs/acre	B	Adult	Contra Costa; CA	at	9
Population Density			87-124	pairs/100 acres	B	Adult	Contra Costa; CA	au	9
Population Density	16.6-32.4 (salt marsh), 10.6-13.1 (altered salt marsh), 16.6-24.7 (brackish marsh), 9.1-17.5 (altered brackish marsh)			pairs/ha	B	Adult	Contra Costa; CA	av	20
Population Density	20.5-41.0 (salt marsh), 9.9-20.5 (alterned salt marsh), 5.9-11 (fringe vegetation)			pairs/ha	B	Adult	Contra Costa; CA	aw	20
Population Density	15.6-27.4 (brackish marsh), 9.1-20.5 (altered brackish marsh)			pairs/ha	B	Adult	Contra Costa; CA	ax	20
Population Density	24.5; 15.4; 5.4			nesting pairs/ha	B	Adult	Sonoma; CA	ay	21
Population Density	see table 1				B	Adult	Alameda; Contra Costa; CA	az	22
Population Density	see table 1				B	Adult	Alameda; Contra Costa; CA	ba	22
Population Density	see table 1				B	Adult	Alameda; Contra Costa; CA	bb	22
Population Density	1.69 (40)			pairs/square mile	B	Adult	ND	bc	23
Population Density	0.02			nests/ha	B	Adult	IL	bd	15
Population Density	7.8			females/ha	F	NR	CANADA	be	1
Survival/ Mortality	80-85			%	B	Adult	Contra Costa; CA	bf	9
Survival/ Mortality	45			%	B	Adult	Marin	bg	18
Survival/ Mortality			2.8-18.2	%	NR	Chick	Contra Costa; CA	bh	8
Survival/ Mortality	0.98	0.17		young/pair	NR	Chick	CANADA	bi	5
Survival/ Mortality	73			%	B	Fledgling	CANADA	bj	2
Survival/ Mortality	83			%	B	Fledgling	CANADA	bk	2
Survival/ Mortality	3.87	0.68 SE	young/pair		NR	Fledgling	CANADA	bl	5
Survival/ Mortality	20			%	B	Juvenile	Marin	bm	18
Territory Size	9.1			m	B	Adult	Contra Costa; CA	bn	20
Territory Size	387; 498; 644			m2	B	Adult	Sonoma; CA	bo	21
Territory Size	0.21;0.26			ha	B	Adult	MA	bp	24

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Territory Size	1745	406 SD		m^2	M	Adult	CANADA	bq	25
Territory Size	3956	611 SD		m^2	M	Adult	CANADA	br	25
Time of Mating/ Laying	late Feb/Mar-June				NR		Contra Costa; CA	bs	8
Time of Mating/ Laying	early Feb.-July				B	Adult	CA	bt	10
Time of Mating/ Laying	24 Feb-19 April				B	Adult	CANADA	bu	4
Time of Mating/ Laying	review				B	Adult	CA	bv	17
Time of Mating/ Laying	Mar-July				B	NR	CANADA	bw	1
Time of Molt	June-September				B	Adult	CANADA	bx	26
Time of Molt	9 August-10 November				B	NR	NY	by	14
Water Ingestion Rate	review				NR	NR	CA	bz	17

Notes

a	N=15 years; Mandarte island
b	N=16 pairs with suppl. food; Mandarte island; obtained suppl. food
c	N=NR; Mandarte island; age when young independent of parental care
d	median egg weight; N=387 eggs; Condition=breeding; Mandarte island
e	with & without supplemental food; N=27; Age=56-108 d; Mar-Jul 1985
f	egg mass; no difference between fed and non-fed fenales; N=15 fed and 34 non-fed females; Mandarte island
g	with & without suppl. food; N=23; Age=56-108 d; Mar-Jul 1985
h	N=2-17 birds; Age=9 - >90 wks; Mandarte island; No statistical differences in body weight were observed among hatching year, yearling and adult birds.
i	N=11-37 birds; Age=9 - >90 wks; Mandarte island; No statistical differences in body weight were observed among hatching year, yearling and adult birds.
j	with supplemental food at d 6; N=31; Age=6 d; Mar-Jul 1985
k	without suppl. food d 6; N=44; Age=6 d
l	mean mass of nestlings with suppl. food 1 d old;; N=13 nestlings; Feb-July; Mandarte island; table 3 shows incremental weight to 6 d old
m	mean mass of nestlings with suppl. food 6 d old; N=48 nestlings; Feb-July; Mandarte island; table 3 shows incremental weight to 6 d old
n	mean mass of nestlings 6 d old; no suppl. food; N=60 nestlings; Feb-July; Mandarte island; table 3 shows incremental weight to 6 d old
o	mean mass of nestlings 1 d old; no addtn. food; N=14 nestlings; Feb-July; Mandarte island; table 3 shows incremental weight to 6 d old
p	N=6-33 nestlings; Age=0-11 days; Feb.-June; San Miguel Island
q	seasonal mean; N=157 nests; March -July 1; San Pablo Marsh; data from 1950-1955
r	N=NR; Condition=breeding; San Pablo Marsh; San Francisco Bay
s	N=NR; San Pablo Marsh; San Francisco Bay
t	N=90 records
u	oological collections; N=545 records; from Baja California to Alaska; author decribes variation in clutch size with changing latitude, altitude, and decreasing longitude
v	no suppl. food; N=56 pairs without suppl. food; Mandarte island
w	suppl. food; N=16 pairs with suppl. food; Mandarte island
x	N=140; 89; May; June; Mandarte Island
y	N=79 females; Mandarte Island
z	mean clutch size of nests in control plots; N=32 nests; southwestern Ontario
aa	N=96 males; Mandarte Island
ab	N=96 males; Mandarte Island
ac	brood size with supplemental food; N=34 nests; Age=6 d; Mar-Jul 1985; Mandarte island
ad	no supplemental food; N=44 nests; Age=6 d; Mar-Jul 1985; Mandarte Island
ae	N=about 5 each; April 27-May 19 laying 1st clutch; 30 June-25 July laying 2nd clutch; Rockefeller University field research center
af	N=NR
ag	N=NR; Mandarte island
ah	for clutches with 1-5 eggs; N=15 years; Mandarte island
ai	proportion of nests that fledged at least one young; N=4 nests; April-August; airports in east-central IL

aj	mean number of young fledged per successful nest; N=32 nests; southwestern Ontario
ak	estimated number of seeds per hour required at 0 degrees C for active individuals; N=NR; Condition=active; winter; Estimate is calculated using: body weight-based estimate of daily caloric requirement (23 Kcal/bird/day), wintertime daylight foraging period of 10 hours, and caloric contents of seeds (determined with oxygen bomb calorimetry).
al	N=4733 eggs; Mandarte Island; 15 year observations
am	proportion of successful nests containing unhatched eggs; N=32 nests; southwestern Ontario
an	N=NR; review of home range and population density with seasonal variations
ao	median; N=nr; Point Reyes National Seashore
ap	median; N=nr; Point Reyes National Seashore
aq	N=6 animals (from 1000); San Pablo Marsh; San Francisco Bay
ar	N=2 males out of 51 male and female; 7 year study; May each year; Mandarte island
as	mean nest densities in strip cover along fields; N=35 fields; spring; Adair County
at	N=NR; San Pablo Marsh; San Francisco Bay
au	N=NR; Condition=breeding; San Pablo Marsh; San Francisco Bay; 5 year study
av	breeding population densities; N=26 sample areas; Condition=breeding; February-October; Suisun Bay; San Francisco Bay; San Pablo Bay
aw	breeding population densities; N=27 sample areas; Condition=breeding; February-October; Suisun Bay; San Francisco Bay; San Pablo Bay
ax	breeding population densities; N=11 sample areas; Condition=breeding; February-October; Suisun Bay; San Francisco Bay; San Pablo Bay
ay	depending on habitat type; N=4 (nesting pair density); March; Petaluma marsh
az	N=64 sites; Condition=breeding; all year; San Francisco Bay region; good overview
ba	N=64 sites; Condition=breeding; all year; San Francisco Bay region; good overview
bb	N=64 sites; Condition=breeding; all year; San Francisco Bay region; good overview
bc	mean density of breeding birds (maximum density in parentheses); N=130 sample units (160 acres/unit); April-July
bd	nest density; N=4 nests; April-August; airports in east-central IL
be	median density; 10 fold fluctuation over 15 yr period; N=19 years; spring; Mandarte island
bf	1 year or younger; N=NR; San Pablo Marsh; San Francisco Bay
bg	annual survival rates of adult song sparrows at Point Reyes; N=539 birds; Point Reyes National Seashore
bh	mortality of young birds based on number of eggs/season; in relation to high tides; N=349 eggs; March -June; San Pablo Marsh
bi	young raised to independence; N=34 nests; Mar-Jul 1985; Mandarte Island
bj	survival; no suppl. food; survival fledgling to independence; N=29 pairs without suppl. food; Mandarte island
bk	suppl. food; fledgling surviving to independence; N=13 pairs with suppl. food; Mandarte island; not sig. diff. compared to control
bl	young raised to independence; N=34 nests; Mar-Jul 1985; Mandarte Island
bm	known minimum survival rates of juveniles; 1966-69; N=nr; Point Reyes National Seashore
bn	territory width across sloughs; N=64 sample areas; Condition=breeding; Suisun Bay; San Francisco Bay; San Pablo Bay
bo	depending upon habitat type; N=8-11; March; Petaluma marsh
bp	rural; suburban; N=10 territories; Late May-early June; Amherst MA, 42 deg.22' N., 72 deg. 30' W
bq	mean territory size, measured by song playbacks and observations of border disputes; N=6 birds; fall; Reifel Island, Delta, British Columbia
br	mean territory size, measured by song playbacks and observations of border disputes; N=6 birds; spring; Reifel Island, Delta, British Columbia
bs	March -June; San Pablo Marsh
bt	N=NR; California to Washington
bu	N=NR; Mandarte island
bv	N=NR
bw	N=15 years; Mandarte island
bx	N=69; Mandarte Island
by	includes prebasic molt; N=about 10; Aug-Nov; Rockefeller University field research center
bz	N=NR; Suisun Bay

References

1 Arcese, Peter, James N. M. Smith, Wesley M. Hochachka, Christopher M. Rogers, and Donald Ludwig. 1992. Stability, regulation, and the determination of abundance in an insular song sparrow population. Ecology. 73(3):805-822.

2 Arcese, Peter and James N. M. Smith. 1988. Effects of population density and supplemental food on reproduction in song sparrows. J. Anim. Ecol. 57:119-136.

3 Hochachka, Wesley, and James N. M. Smith. 1991. Determinants and consequences of nestling condition in song sparrows. J. Anim. Ecol. 60(3):995-1008.
4 Smith James N. M. and Peter Arcese. 1994. Brown-headed cowbirds and an island population of song sparrows: a 16-year study. Condor. 96(4):916-934.
5 Smith, James N. M. and Peter Arcese. 1988. Effects of supplemental food on growth and adult size in the song sparrow. Int. Ornithol. Congr. Proc. 19:1416-1423.
6 Smith, James N. M., Peter Arcese, and Dolph Schluter. 1986. Song sparrows grow and shrink with age. Auk. 103:210-212.
7 Sogge, Mark K., Michael D. Kern, Robert Kern and Charles Van Riper III. 1991. Growth and development of the thermoregulation in nestling San Miguel Island song sparrow. Condor. 93:773-776.
8 Johnston, Richard F. 1956. Population structure in salt marsh song sparrows part I. Environment and annual cycle. Condor. 58:24-44.
9 Johnston, Richard F. 1956. Population structure in salt marsh song sparrows Part II: Density, Age Structure, and Maintanance. Condor. 58:254-272.
10 Richard F. Johnston. 1954. Variation in breeding season and clutch size in song sparrows of the pacific coast. Condor. 56:268-273.
11 Smith, James N. M. and Derek A. Roff. 1980. Temporal spacing of broods, brood size, and parental care in song sparrows (Melospiza melodia). Can. J. Zool. 58(6):1007-1015.
12 Smith, James N. M. 1988. Determinants of lifetime reproductive success in the song sparrow, Ch. 10. In: Clutton-Brock, T.H., eds. Reproductive Success: Studies of Individual Variation in Contrasting Breeding Systems. Chicago, IL: University of Chicago Press. p 154-172.
13 Knapton, Richard W., and Pierre Mineau. 1995. Effects of granular formulations of terbufos and fonofos applied to cornfields on mortality and reproductive success of songbirds. Ecotoxicology. 4:138-153.
14 Wingfield, John C. 1984. Environmental and endocrine control of reproduction in the song sparrow, Melospiza melodia. I. Temporal Organization of the breeding cycle. Gen. Comp. Endocrinol. 56(3):406-416.
15 Kershner, Eric L., and Eric K. Bollinger. 1996. Reproductive success of grassland birds at east-central Illinois airports. Am. Midl. Nat. 136:358-366.
16 Willson, Mary F., and Janet C. Harmeson. 1973. Seed preferences and digestive efficiency of cardinals and song sparrows. Condor. 75:225-234.
17 Larsen, Caryla J. Aug. 1989. A status review of the Suisun song sparrow (Melospiza melodia maxillaris) in California. Sacramento, CA: California Department of Fish and Game, Department Candidate Species Status Report. No. 89-6 ed. 1-30 p.
18 Halliburton, Richard and Richard L. Mewaldt. 1976. Survival and mobility in a population of pacific coast song sparrows (Melospiza melodia gouldii). Condor. 78(4):499-504.
19 Basore, Nancy S., Louis B. Best, and James B. Wooley, Jr. 1986. Bird nesting in Iowa no-tillage and tilled cropland. J. Wildl. Manage. 50(1):19-28.
20 Jurek, R. M. 1974. Salt marsh song sparrow study. Sacramento, CA: California Department of Fish and Game, Special Wildlife Investigations. W-54-R-6 ed.
21 Collins, Joshua N., and Vincent H. Resh. 1985. Utilizationof natural and man-made habitats by the salt marsh song sparrow Melospiza melodia samuelis (Baird). Calif. Fish Game. 71(1):40-52.
22 Walton, Brian James. 1975. San Francisco Bay Region Salt Marsh Song Sparrow Survey, 1974. Sacramento, CA: California Fish and Game, Special Wildlife Investigations. 19 p.
23 Stewart, Robert E., and Harold A. Kantrud. 1972. Population estimates of breeding birds in North Dakota. Auk. 89:766-788.
24 DeGraaf, Richard M. 1989. Territory sizes of song sparrows, Melospiza melodia, in rural and suburban habitats. Can. Field Nat. 103:43-47.
25 Knapton, Richard W. and John R. Krebs. 1974. Settlement patterns, territory size, and breeding density in the song sparrow (Melospiza melodia). Can. J. Zool. 52:1413-1420.
26 Dhondt, Andre A. and James N. M. Smith. 1980. Postnuptial motl of the song sparrow on Mandarte Island in relation to breeding. Can. J. Zool. 58:513-520.

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