Cal/Ecotox
Exposure Factors for Common Garter Snake (Thamnophis sirtalis)*

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Age at Sexual Maturity	1 yr, 273d			yr,d	F	Adult	Lab	a	1
Age at Sexual Maturity	2			yr	F	Adult	KS	b	2
Age at Sexual Maturity	2			yr	F	Adult	OR	c	3
Age at Sexual Maturity	1			yr	M	Adult	OR	d	3
Body Fat (total or %)			1.5 - 7.1	%	B	Adult	CANADA	e	4
Body Fat (total or %)			3.2 - 9.0	%	B	Adult	WI	f	5
Body Weight - Mean			17.8 - 48.7	g	B	Adult	CANADA	g	4
Body Weight - Mean			82.3 - 279.5	g	F	Adult	Lab	h	1
Body Weight - Mean			21 - 410	g	F	Adult	KS	i	2
Body Weight - Mean	BW = -137.32 + 3.73SVL			g	F	Adult	CANADA	j	6
Body Weight - Mean	BW = -201.07 + 4.78SVL			g	F	Adult	CANADA	k	6
Body Weight - Mean	BW = -211.59 + 5.08SVL			g	F	Adult	CANADA	l	6
Body Weight - Mean	BW = -254.33 + 5.75SVL			g	F	Adult	CANADA	m	6
Body Weight - Mean	94.2	10.2 SE		g	F	Adult	Lab	n	7
Body Weight - Mean	52.1	4.4 SE		g	F	Adult	Lab	o	7
Body Weight - Mean	52.5	1.8 SE		g	F	Adult	Lab	p	7
Body Weight - Mean			43.1 - 104.8	g	M	Adult	Lab	q	1
Body Weight - Mean			32.42 - 42.50	g	M	Adult	CANADA	r	8
Body Weight - Mean			14 - 110	g	M	Adult	KS	s	2
Body Weight - Mean	30.3	2.0 SE		g	M	Adult	Lab	t	7
Body Weight - Mean	41		2 - 113	g	B	Both Adult and Juv.	Sierra; CA	u	9
Body Weight - Mean	2.2	0.350 SD	1.22 - 3.34	g	B	Juvenile	Lab	v	10
Body Weight - Mean			2.0 - 3.2	g	NR	Neonate	Lab	w	1
Body Weight - Mean	1.88	0.029	0.7 - 2.5	g	NR	Neonate	Lab	x	2
Body Weight - Mean			1.4 - 3.0	g	NR	Neonate	CANADA	y	11
Body Weight - Mean	2.6	0.4 SD	0.95 - 3.80	g	NR	Neonate	Lab	z	12
Body Weight - Mean	1.66	0.07 SE		g	NR	Neonate	Lab	aa	7
Body Weight - Mean			25 - 50	g	B	NR	Lab	ab	13
Body Weight - Mean			15-35	g	B	NR	Lab	ac	13
Clutch or Litter Size	11.32	0.98	5 - 23	eggs/litter	F	Adult	CA; OR	ad	14
Clutch or Litter Size	17		9 - 25	young/female	F	Adult	Lab	ae	1
Clutch or Litter Size			4 - 29	eggs/female	F	Adult	Los Angeles; Mariposa; Tuolumne; CA	af	15
Clutch or Litter Size	14.5		4 - 29	young/litter	F	Adult	KS	ag	2
Clutch or Litter Size			7.6 - 23.0	young/litter	F	Adult	CANADA	ah	11
Clutch or Litter Size	12.5	4.95 (SD)	5 - 25	young/litter	F	Adult	Lab	ai	12
Clutch or Litter Size			11.27 - 23.38	young/litter	F	Adult	KS	aj	16
Clutch or Litter Size	8.2		5 - 23	young/litter	F	Adult	OR	ak	3
Clutch or Litter Size	12.9	6.1 SD		young/litter	F	Adult	NH	al	17
Clutch or Litter Size	18			young/litter	F	Adult	MI	am	18
Dietary Composition	Hyla (55.5%); Catostomus (21.8%); Microtus (5.4%); Rhinichthys (11.5%)			%	B	NR	Sierra; CA	an	9
Dietary Composition	Slug (1.4%); Earthworm (23.6%); Frog, Rana (6.9%); Toad, Bufo and Scaphiopus (30.5%); Tree Toad (20.8%); Leech (4.0%); Tadpole (10%); Minnow (1.4%); Unidentified fish (1.4%)			%	NR	NR	CA; OR	ao	19

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Dietary Composition	Anurans (67%); Fish (11%); Leeches (22%)			%	NR	NR	Lassen; CA	ap	20
Dietary Composition	amphibians (41); earthworms (24); birds (1); leeches (1); misc. invertebrates (4); unidentified (13); empty (100)			#	NR	NR	CANADA	aq	21
Dietary Composition	earthworms (80%); amphibians (5%); mammals, caterpillars and leeches (5%)			%	NR	NR	MI	ar	18
Duration of Incubation or Gestation			79 - 98	d	F	Adult	Lab	as	1
Duration of Incubation or Gestation	90			d	F	Adult	OR	at	3
Food Ingestion Rate	14		3 -22	%	B	Adult	Lassen; CA	au	22
Growth Rate	3.1		- 1.2 - 6.9	%	B	Adult	Lassen; CA	av	22
Growth Rate			0.017 - 0.025	g/d	NR	Juvenile	Lab	aw	23
Home Range	22.7			acres	F	Adult	KS	ax	2
Home Range	35.0			acres	M	Adult	KS	ay	2
Home Range	2.07			acres	B	NR	MI	az	18
Metabolic Rate	see citation			ml O2/g/hr	B	Adult	Lab	ba	8
Metabolic Rate	9.18			ml CO2/g/d	B	Adult	Lassen; CA	bb	22
Metabolic Rate	0.065	0.005 SE		cm3 O2 STP/hr/g	F	Adult	Lab	bc	7
Metabolic Rate	0.095	0.010 SE		cm3 O2 STP/hr/g	F	Adult	Lab	bd	7
Metabolic Rate	0.054	0.011 SE		cm3 O2 STP/hr/g	F	Adult	Lab	be	7
Metabolic Rate	0.059	0.001 SE		cm3 O2 STP/hr/g	M	Adult	Lab	bf	7
Metabolic Rate	3.15	0.845 SD	0.82 - 5.50	ml O2/hr	B	Juvenile	Lab	bg	10
Metabolic Rate	0.119	0.010 SE		cm3 O2 STP/hr/g	NR	Neonate	Lab	bh	7
Metabolic Rate	see citation			ml O2/g/hr	B	NR	Lab	bi	13
Metabolic Rate	see citation			ml O2/g/hr	B	NR	Lab	bj	13
Metabolic Rate	0.42			cal/g/d	B	NR	Lab	bk	24
Population Density	482			#/48 acres	B	Both Adult and Juv.	MI	bl	18
Population Density	18.7			#/ha	NR	NR	IL	bm	25
Survival/ Mortality			63 - 73	%	M	Adult	CANADA	bn	26
Time of Hatching or Parturition	late July - early Sept.				B	Embryo	OR	bo	3
Time of Mating/ Laying	Oct. - Nov.				B	Adult	San Mateo; CA	bp	27
Time of Mating/ Laying	Apr. - May				B	Adult	CANADA	bq	28
Time of Mating/ Laying	Apr. - May				B	Adult	CANADA	br	4
Time of Mating/ Laying	Feb. - Apr.				B	Adult	OR	bs	3
Time of Torpor or Hibernation	Sept. - Mar.				F	Adult	CANADA	bt	6
Time of Torpor or Hibernation	Nov. - Apr.				NR	NR	CANADA	bu	4

Notes

a N=1; Dallas and Ft. Worth Zoos

b	N=NR; Douglas and Jefferson Counties
c	N=NR; Willamette Valley
d	N=NR; Willamette Valley
e	% ether-extractable lipids of total body weight (wet wt); N=10-16/mo; Apr. - Oct.; Winnepeg, Manitoba; see citation for figure of seasonal changes in % lipid, water, ash and protein content
f	% lipid of whole animal (not including stomach contents); N=6; Pilot Island, Lake Michigan
g	range of monthly mean weights; N=10-16/mo; Apr. - Oct.; Winnepeg, Manitoba; snout-vent length range = 47.4 - 60.1 cm
h	N=6; Dallas and Ft. Worth Zoos; snout vent length = 58.1 - 75.5 cm
i	N=NR; Douglas and Jefferson Counties; snout-vent length range 504 - 950 mm
j	relationship between body weight (BW, g, 50-175g) and snout-vent length (SVL, cm, 55-75cm) for vitellogenic and non-vitellogenic females in 1987 (r2 = 0.698); N=110; spring; Manitoba
k	relationship between body weight (BW, g, 50-175g) and snout-vent length (SVL, cm, 55-75cm) for vitellogenic and non-vitellogenic females in 1985 (r2 = 0.874); N=32; spring; Manitoba
l	relationship between body weight (BW, g, 50-175g) and snout-vent length (SVL, cm, 55-75cm) for vitellogenic and non-vitellogenic females in 1983 (r2 = 0.899); N=34; spring; Manitoba
m	relationship between body weight (BW, g, 50-175g) and snout-vent length (SVL, cm, 55-75cm) for vitellogenic and non-vitellogenic females in 1984 (r2 = 0.905); N=42; spring; Manitoba
n	N=6; Condition=pregnant; captured in Michigan and Ohio
o	N=3; Condition=non-pregnant; captured in Michigan and Ohio
p	N=4; Condition=1 wk post-partum; captured in Michigan and Ohio
q	N=5; Dallas and Ft. Worth Zoos; snout-vent length = 46.5 - 55.2 cm
r	range of means; N=5 animals/6 sampling dates; Condition=1-24 d post-emergence; May - June
s	N=NR; Douglas and Jefferson Counties; snout-vent length range 387 - 678 mm
t	N=6; captured in Michigan and Ohio
u	N=160; July - Sept.; Kyburz Flat; average snout-vent length = 42 cm
v	N=245; Age=mean age, 31.6 d; range 11-58d
w	range of means from 6 breedings; N=6 groups of young; Dallas and Ft. Worth Zoos; snout-vent length = 167-169 mm
x	N=151; Age=newborn; average snout-vent length = 168 mm
y	range of site means; N=48 - 203/site
z	N=187; captured at Wood Buffalo National Park, Canada
aa	N=8; captured in Michigan and Ohio
ab	N=20; captured at Miami, Florida
ac	N=60; captured at Winnipeg, Manitoba
ad	based on embryo count; N=22
ae	N=6; Dallas and Ft. Worth Zoos
af	N=5
ag	N=132; Douglas and Jefferson Counties
ah	range of site means based on sum of live and dead young and undeveloped eggs at parturition; N=4 - 30/site
ai	N=23; captured at Wood Buffalo National Park, Canada
aj	minimum and maximum mean annual clutch size; N=158 over 9 yrs; National History Reservation; see citation for effect of wet/dry years and body size on clutch size
ak	determined by palpation; N=18; Willamette Valley; adult snout-vent length range = 435-890 mm
al	N=104; Hanover
am	N=20; Washtenaw County
an	% of total volume of stomach contents; N=<110; July - Sept.; Kyburz Flat; average stomach content volume = 2.5 cc
ao	% of total recorded food items; N=48
ap	% of stomachs containing prey item; N=36; June-July; Eagle Lake (elev., 1555m) [lat., 40^o33'24"N; long., 120^o47'5" W]
aq	number of stomach examinations yielding various food types; N=179; summer; Vancouver Island
ar	% frequency of occurrence in stomach contents; N=178; Washtenaw County
as	N=6; Dallas and Fort Worth Zoos, TX
at	N=NR; Willamette Valley
au	average % of their body mass in frogs ingested per day, estimated from field metabolic rate; N=72; June - July; Eagle Lake (elev., 1800 m); see citation for figure of energy assimilation rate vs body mass
av	average increase in % of mean body mass per day; N=78; June - July; Eagle Lake (elev., 1800 m); see citation for figure of growth rate vs body mass
aw	increase in body mass on earthworm or mosquitofish diets; N=13; Age=0 - 4 mo; captive-born to female from Humboldt County
ax	circular home range estimated from radius; N=102; Douglas and Jefferson Counties

ay	circular home range estimated from radius; N=39; Douglas and Jefferson Counties
az	N=1609; Washtenaw County
ba	figure of resting oxygen consumption; N=5-10; Condition=post-emergence
bb	field metabolic rate; N=72; June - July; Eagle Lake (elev., 1800 m); see citation for figure of field metabolic rate vs body mass
bc	resting oxygen consumption at 25C; N=4; Condition=1 wk post-partum; captured in Michigan and Ohio
bd	resting oxygen consumption at 25C; N=6; Condition=pregnant; captured in Michigan and Ohio
be	resting oxygen consumption at 25C; N=3; Condition=non-pregnant; captured in Michigan and Ohio
bf	resting oxygen consumption at 25C; N=6; captured in Michigan and Ohio
bg	maximal oxygen consumption at 30C; N=245; Age=mean age, 31.6 d; range 11-58 d; gravid adults captured near Lassen, CA; average body weight = 2.22 g; tested at a treadmill speed of 0.3 km/hr
bh	resting oxygen consumption at 25C; N=8; captured in Michigan and Ohio
bi	figure of oxygen consumption at 5-27C; N=20; captured at Miami, Florida; see citation for heart rate data
bj	figure of oxygen consumption at 5-27C; N=60; captured at Winnipeg, Manitoba; see citation for heart rate data
bk	estimated from changes in body composition; N=13; Condition=hibernating; captured in Portage County, WI; average body weight = 63.3 g
bl	N=NR; Washtenaw County
bm	N=NR; Apr. - Nov.; McDonough County
bn	range of probability of surviving from spring of one year to spring of next year; N=43 - 132/yr for 3 yrs; Wood Buffalo National Park (lat., 59^o49'N; long., 112^oW); snout-vent length >400mm
bo	N=NR; Willamette Valley
bp	N=2 mating masses; San Francisco Peninsula
bq	time of breeding; N=5/sampling time; Manitoba; see citation for hormone analysis results
br	time of breeding; N=NR; Winnepeg, Manitoba
bs	time of breeding; N=NR; Willamette Valley
bt	N=218; Manitoba
bu	N=NR; Winnepeg, Manitoba

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