

FRENCH:
Buse de Swainson
SPANISH:
Aguilucho Langostero,
Gavilán Longostero,
Aguililla de Swainson
PORTUGUESE:
Gavião-papa-
gafanhoto

Swainson's Hawk

Buteo swainsoni

Each autumn, nearly the entire breeding population of the Swainson's Hawk migrates from the temperate zone of North America to "wintering" areas in South America. From prairie Canada, this migration is more than 10,000 km each way, a distance second among raptors only to that of the Arctic Peregrine Falcon (*Falco peregrinus tundrius*).

A highly gregarious species, the Swainson's Hawk forages and migrates in flocks sometimes numbering in the thousands. Its movement through Central America has been described as among "the most impressive avian gatherings in North America, since the demise of the Passenger Pigeon" (Brown and Amadon 1968). Nearly 350,000 Swainson's Hawks have been counted passing over a single point in Panama City in October and November, and up to 845,000 have been counted in a single autumn in Veracruz, Mexico.

**The
Birds of
North
America**
Life Histories for
the 21st Century

Although wide-ranging and common, the discovery and naming of this species did not come about until the 1820s. Dr. John Richardson, English surgeon and naturalist with the Franklin Arctic expeditions, collected the first Swainson's Hawk in 1827 at Fort Carlton near Saskatoon, Saskatchewan. The bird was illustrated by William Swainson and identified as *Buteo vulgaris* (now *Buteo buteo*, the Common Buzzard of Europe) in Richardson and Swainson's classic work *Fauna Boreali-Americana*. In 1838, Charles Lucien Bonaparte, realizing this was a different species, applied

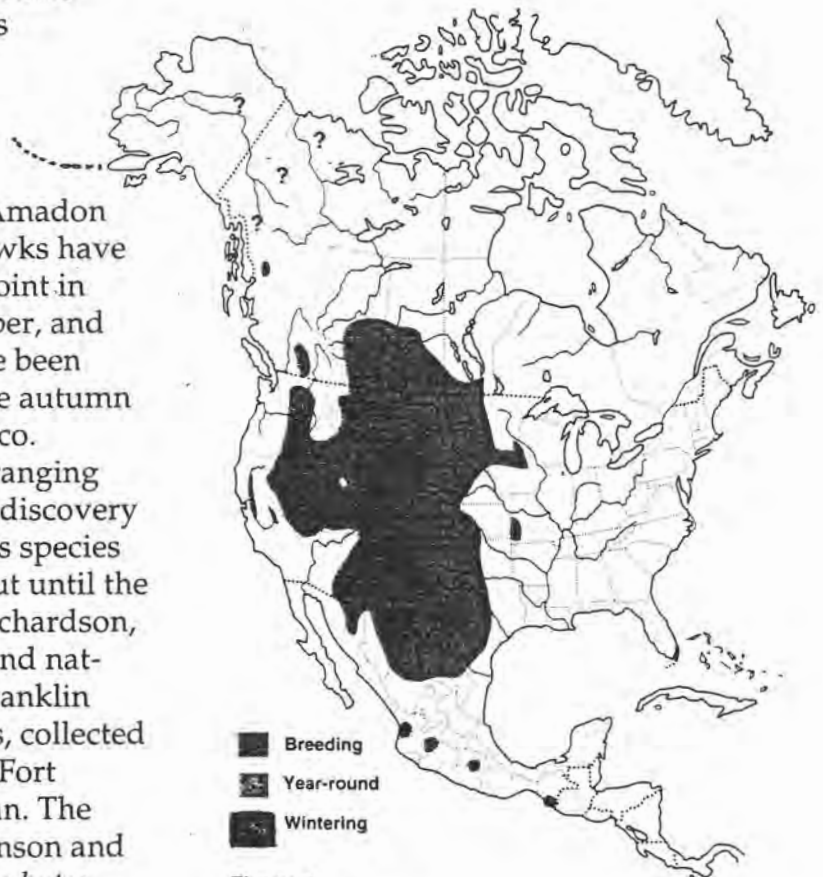


Figure 1. Distribution of Swainson's Hawk in North America. This species winters principally in South America; see text for details. Rare in winter along the Pacific slope of Middle America north to Nayarit, Mexico. Very rare in winter in the southern United States outside Florida and California.

Spring. Large concentrations in Argentina begin to disperse in mid-Feb and begin moving north in late Feb–mid-Mar (MJB, B. Woodbridge pers. comm.). Transients recorded Feb–Mar in Colombia (Hilty and Brown 1986); Mar–early Apr (occasionally late Feb–late Apr) in Panama (Ridgely and Gwynne 1989); Mar–Apr in Mexico (Howell and Webb 1995), typically peaking in Veracruz, Mexico, 10–13 Apr (Ruelas Inzunza et al. 1996); mid-Mar–May (occasionally early Mar), peaking first half of Apr, in s. California (Garrett and Dunn 1981); peak late Apr–early May (earliest date 7 Mar) in British Columbia (Campbell et al. 1990); early Apr (earliest 14 Mar), peaking mid–late Apr, in Missouri (Robbins and Easterla 1992); and peak late Apr (recorded late Mar–mid-May) in Minnesota (Janssen 1987). Most generally return to Alberta and Saskatchewan between late Apr and 10 May (CSH).

MIGRATORY BEHAVIOR

Migration is diurnal and timed to take advantage of rising thermals of hot air. In s. Texas, "the spectacular flights of fall migrants are, on sunny days, usually high in the air, where birds soar along, seldom flapping. They pass in long straggling lines or in clusters, which sometimes pause to wheel even higher on thermal updrafts" (Oberholser 1974: 234). May move in large flocks because thermal energy occurs in patches, zones, or waves (Smith 1985a). Hawks that were followed in a glider at 700 m entered early stages of developing thermal "streets" (i.e., lenticular zones of constant thermal uplift), then glided, largely out of sight from the ground, in lower 3 m of long, flat clouds (Smith 1985a). A hawk entering such a "street" may sail 60 km or more in straight line without losing altitude (Smith 1985b). Can also exploit lift along face of storm fronts, and slope- and wave-soar up and into the dry-season inversion zone to altitudes exceeding 6,000 m (Smith 1985a). Rarely fly over ocean, but in 1982, after unusually persistent northeast trade winds blew them onto the Azeuro Peninsula of Panama, they flew 30 km over Bay of Panama (Smith 1985a). At night, will roost in flocks of >100 and begin migration the following morning when thermals form (Smith 1980). During northward migration, late Feb–Apr, individuals tack in and out of mountains against and with northeast trade winds, often achieving very high speeds (Smith 1985a).

CONTROL AND PHYSIOLOGY

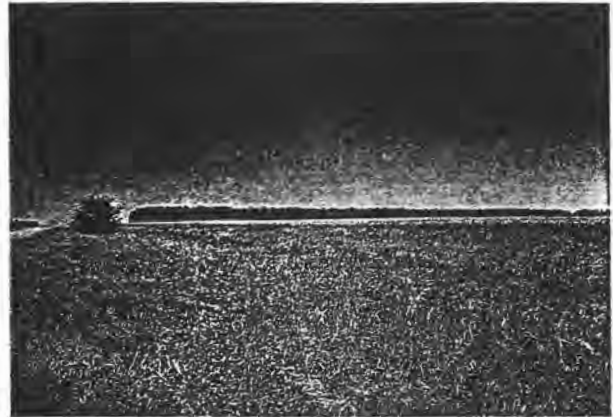
No information available on hormonal control of migration or physiological changes. Species is almost unique in switching from diet of primarily small mammals when raising young to insects when nonbreeding birds collect in midsummer flocks (Johnson et al. 1987), or when adults and immatures prepare to migrate. Body fat increases prior to

migration (Smith et al. 1986), but controversy persists about how far and how long Swainson's Hawks can travel using these fat stores without food (Goldstein and Smith 1991, Kirkley 1991). There are occasional places en route through Central America and n. South America where they can forage; e.g., one account documents Swainson's Hawks eating caterpillars on the ground in Costa Rica (P. Slud in Smith 1980). Where thousands of migrants roosted overnight in Panama, however, there were no excreta, suggesting that these were fasting birds at that location (Smith 1980). Migration from Mexico to Argentina can be covered in approximately 3 wk (see Migration: timing and routes of migration); given that some suitable foraging habitat does occur in Central and n. South America, extended periods of fasting may not be common. Report that some individuals arrive in Argentina so weak they can be picked up by hand (C. C. Olrog in Smith 1980) could be due to fasting, or alternatively could be result of birds that encounter bad weather which extends the migration period and prevents foraging, or possibly birds that encounter pesticides en route to Argentina (B. Woodbridge pers. comm.).

HABITAT

BREEDING RANGE

Historically and in existing native habitat, forages in open stands of grass-dominated vegetation, sparse shrublands, and small, open woodlands. In many parts of range today, has adapted well to foraging in agricultural areas (e.g., wheat and alfalfa), but cannot forage in most perennial crops or in annual crops that grow much higher than native grasses, making prey more difficult to find (Bechard 1982, Estep 1989, Woodbridge 1991). In Central Valley, CA, forages in row, grain, and hay crop agriculture, particularly during and after harvest, when prey are both numerous and conspicuous; also attracted to flood irrigation, primarily in alfalfa fields, when prey take refuge on field margins, and to field burning, which forces prey to evacuate (J. A. Estep pers. comm.). In ne. California, 42.5% of habitat within foraging radius of 12 radio-marked individuals was in active agriculture (Woodbridge 1991). In North Dakota, 75.4% of area within 1 km of nests ($n = 27$) was either pasture or hayland, and only 17.7% was cultivated crops; only 2 pairs nested where >60% was cultivated crops (Gilmer and Stewart 1984). In e. Washington, home ranges consist of 25.2% grassland, 50.4% wheat, 17.2% shrub vegetation, and 7.2% other (Bechard et al. 1990). In contrast, species appears to increase in density in Alberta as cultivation increases to 30% of home range, but there is no further change in



density with additional increases in cultivation (Schmutz 1989).

Typically nests in scattered trees within these grassland, shrubland, or agricultural landscapes (e.g., along stream courses or in open woodlands). In plains of w. Canada and northern states of U.S., in nineteenth century, major fires burned grasslands every few years, keeping trees to a minimum. An occasional pair nested on the ground, though such nests were subject to trampling by American bison herds (*Bos bison*), so surviving small willows (*Salix* spp.) and low aspen (*Populus* spp.), chiefly along and around water bodies, were used whenever available. In N. Dakota, large majority of nest trees found in planted shelterbelts (43%), wetland borders (22%), and abandoned farmsteads (11% [$n = 270$]; Gilmer and Stewart 1984). Today, in California's Central Valley, nests are typically at edge of narrow bands of riparian vegetation, in isolated oak woodland, and in lone trees, roadside trees, or farmyard trees, as well as in adjacent urban residential areas (Estep 1989, England et al. 1995). When coexisting with Red-tailed Hawk, Swainson's uses smaller trees in smaller clumps than does Red-tailed ($p \leq 0.001$; Murphy 1993). See also Breeding: nest site, and Food habits: feeding, below.

SPRING AND FALL MIGRATION

Birds rest and feed in grasslands and harvested fields, especially where grasshoppers are numerous, often perching on fence posts, telephone poles, and power poles. Large flocks may roost at night in trees (CSH, Smith 1980).

WINTER RANGE

Historically in Argentina during austral summer, inhabited native grasslands similar to those of n. Great Plains (Fig. 3). Now, as in much of breeding range, species has adapted to agriculture; in e. La Pampa region of Argentina, typically found where alfalfa is grazed by cattle and where sunflowers

Figure 3. Wintering habitat during the austral spring in Argentina. Left photo: native grassland habitat near Winfreda, La Pampa; right photo: agricultural landscape near General Pico, La Pampa. Photos by Brian Woodbridge.

and corn are abundant (Woodbridge et al. 1995b). In e. Buenos Aires Province, found in mosaic of salt marsh, freshwater marsh, and pampas (Rudolph and Fisher 1993). At night, perches in eucalyptus (*Eucalyptus* spp.) groves or "montes" planted as shelterbelts or windbreaks around farm sites (Woodbridge et al. 1995b, MJB).

Segregation on wintering grounds among age and/or sex classes. Needs study. In e. La Pampa Province, Argentina, foraging flocks are in pampas and agricultural areas and are dominated by adult birds (Woodbridge et al. 1995b, A. Lanussé pers. comm.). In contrast, flocks in e. Buenos Aires Province are in wet pampas dominated by juveniles (Jaramillo 1993, pers. comm.).

FOOD HABITS

FEEDING

Main foods taken. During breeding season, mainly vertebrates, including mammals, birds, and reptiles (Schmutz et al. 1980, Bednarz 1988); invertebrates (especially grasshoppers and dragonflies) at other times (McAtee 1935, Sherrod 1978, Jaramillo 1993).

Microhabitat for foraging. Forages in open grassland, shrub steppe, and agricultural areas in North American breeding range. Often forages exclusively in row, grain, and hay crop agriculture. Exploitation of prey maximized by farming operations such as disking, seeding, cultivating, swathing, and baling. Flood irrigation of alfalfa fields and burning of fields concentrates foraging at edges of fields (J. A. Estep pers. comm.). On wintering grounds, apparently eats exclusively insects such as grasshoppers (*Dichroplus* spp.), butterflies and moths (Lepidoptera), and leaf beetles (Coleoptera: Chrysomelidae) found abundantly in alfalfa fields and crops such as sunflowers and corn (White et al. 1989, Jaramillo 1993, Woodbridge et al. 1995b, Goldstein et al. 1996, Serracin Araujo and Tiranti 1996).

Table 1. Diet of Swainson's Hawks during breeding season in various locations. Data shown as frequency of occurrence of various prey species.

Location	Prey Items (% of items identified)							Source
	Rabbits ¹	Ground Squirrels ²	Other Rodents ³	Birds ⁴	Reptiles ⁵	Insects ⁶	Other	
Alberta	2.8	71.2	12.9	11.2	1.4	0.5	0.0	Schmutz et al. 1980
Arizona	2.8	2.8	10.1	14.7	42.2	11.0	16.4	Porton 1977
California	0.9	13.6	43.6	25.4	0.9	13.6	2.0	Woodbridge 1987
New Mexico	17.2	1.8	11.6	2.4	12.1	54.9	0.0	Bednarz 1988
N. Dakota	0.0	37.0	56.3	6.7	0.0	0.0	0.0	Gilmer and Stewart 1984
Saskatchewan	2.5	38.9	24.0	32.7	0.3	0.0	1.6	CSH
Utah	56.1	1.2	12.2	9.7	1.2	19.5	0.1	Smith and Murphy 1973
Washington	6.0	8.0	30.0	12.0	32.0	12.0	0.0	Fitzner 1980

¹Including *Lepus townsendii*, *L. californicus*, and *Sylvilagus auduboni*.

²Including *Spermophilus richardsonii*, *S. tridecemlineatus*, *S. columbianus*, and *S. townsendii*.

³Including *Peromyscus maniculatus*, *Microtus* sp., *Lagurus curtatus*, and *Ondatra zibethicus*.

⁴Including *Sturnella neglecta*, *Phasianus colchicus*, *Pica pica*, and *Perdix perdix*.

⁵Including *Pituophis melanoleucus*, *Phrynosoma* sp., *Cnemidophorus uniparens*, and *Sceloporus* sp.

⁶Including Locustidae, Carabidae, and Tenebrionidae.

Food capture and consumption. During breeding season, a soaring, open-country hunter. Sometimes hunts high in air (Bent 1937), but more frequently courses low over prairie (Palmer 1988). Rarely observed flying low at high speed as Ferruginous Hawk does (Schmutz et al. 1980). Often hunts from perches such as tree limbs, poles or posts, rocks, and elevated ground. Like other hawks, follows farm equipment ranging from horse-drawn implements to tractors and pesticide applicators to prey on rodents disturbed by these activities (Preston 1885, Clark and Wheeler 1987, Estep 1989, MJB). Groups of Swainson's Hawks will perch on the ground near ground squirrel (*Spermophilus* spp.) holes waiting for them to emerge, especially near dusk (Fisher 1893). When hunting pocket gophers (*Thomomys* spp.), perches near fresh mounds, waiting for gophers to push fresh dirt to surface; then pounces stiff-legged on mound and pulls out the gopher (MJB).

Nonbreeders hunt communally and eat wide variety of prey, from bats to flying insects. Can walk easily and run expertly; several accounts describe them pouncing at and running down grasshoppers and crickets in large groups like domestic turkeys do (Coues 1878, Fisher 1893, Bent 1937, Johnson et al. 1987). Catches flying insects in midair with talons and eats them in flight (May 1935, Bent 1937, Woodbridge et al. 1995b); may consume aerially caught insects at rate of up to 6/min (Woodbridge 1991). Described feeding on free-tailed bats (*Tadarida* spp.) in Oklahoma by snatching

them from a stream of bats; 1 hawk caught a bat, transferred it to its beak, then caught another in its talons and flew off (Harden 1972). Little information on hunting in Argentina in winter, but large groups do feed on local outbreaks of grasshoppers and dragonflies (Odonata) by walking on ground or catching them in their talons in air (White et al. 1989, Jaramillo 1993, Rudolph and Fisher 1993, Woodbridge et al. 1995b).

In central California, nesting pairs vigorously defend area surrounding nest, but away from nesting territory hunts communally in fields being harvested, disked, irrigated, or burned (Estep 1989). Then returns prey to nests. Foraging groups sometimes form in fields adjacent to nest sites during harvesting, even though fields previously defended by nesting pairs.

DIET

Major food items. Major rodent prey during breeding season include ground squirrels, pocket gophers, voles (*Microtus* spp.), and deer mice (*Peromyscus* spp.; Fisher 1893, Bent 1937). In n. Great Plains of w. Canada, Richardson's ground squirrel is major prey species. West of Rocky Mtns., routinely eats rabbits in Utah and New Mexico (Smith and Murphy 1973, Bednarz 1988); in California, voles are more frequent part of diet (Estep 1989). In Washington, frequently eats pocket gophers and snakes (Bechard 1980, Fitzner 1980); in Arizona and New Mexico, lizards and snakes (Bednarz 1988). Numerically, insects can account

for as much as 90% of diet, but they are far less important on biomass basis (Snyder and Wiley 1976, Estep 1989). Insects are only small portion of diet of breeding birds (Smith and Murphy 1973, Dunkle 1977, Fitzner 1978, Bechard 1980, Bednarz 1988).

Diet of nonbreeders in North and South America is dominated by insects (Snyder and Wiley 1976, Johnson et al. 1987, Jaramillo 1993, Rudolph and Fisher 1993). In North America, flocks of nonbreeding hawks can feed exclusively on insects. Invertebrates made up as much as 94% of 3,428 food items recovered from stomachs of nonbreeding Swainson's Hawks collected in North America (Snyder and Wiley 1976), and 1 Swainson's Hawk collected in Kansas had 98 crickets (*Acheta* spp.) in its crop and 132 in its stomach (White 1966). Pellet analysis has shown that a single hawk can consume an average of 100 grasshoppers/d (Johnson et al. 1987). In South America, flocks of as many as 12,000 hawks also feed almost exclusively on insects, especially grasshoppers while foraging on ground (Woodbridge et al. 1995b, Goldstein et al. 1996). Stomachs of dead hawks have been found to contain only insects (Serracin Araujo and Tiranti 1996, MJB), with as many as 40–50 grasshoppers in each stomach (Zotta 1931). Excluding 1 pellet containing rodent jaws, >400 pellets analyzed have contained grasshopper and beetle remains and grass.

Quantitative analysis. Dietary composition varies among regions (Table 1). Richardson's ground squirrels are key part of diet in Alberta, Saskatchewan, and N. Dakota (Schmutz et al. 1980, Gilmer and Stewart 1984, CSH). In Wyoming, 68% of vertebrates eaten are mammals, and up to 25% are birds (Dunkle 1977). In Washington, diet is 25% mammals, 20% reptiles, and 19% birds (Fitzner 1980); in Utah, >50% of diet is rabbits (Smith and Murphy 1973); in ne. California, diet is chiefly small rodents and birds (Woodbridge 1987); and in New Mexico, rabbits, reptiles, and insects make up nearly 85% of diet. No quantitative information on diet during migration, and very little information available for South American wintering grounds.

FOOD SELECTION AND STORAGE

Generally an opportunistic predator, focusing on prey that is most available. Food-caching not reported.

NUTRITION AND ENERGETICS

Nutrition poorly studied. Individuals apparently increase food intake following nesting and prior to migration in order to build up body fat reserves; such fattening may be necessary for migrating long distances without eating (Smith et al. 1986, Goldstein and Smith 1991, Kirkley 1991). Evidence concerning the extent of such fat deposition is still inadequate;

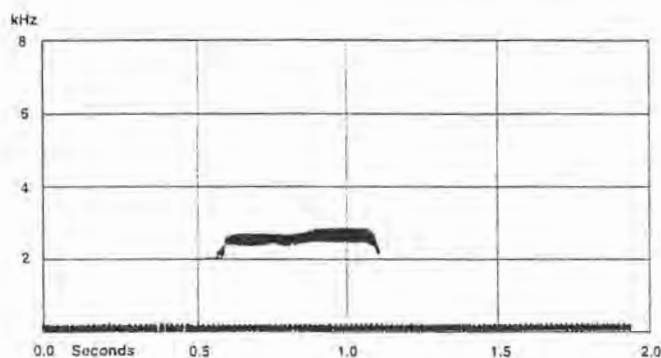


Figure 4. Adult Scream (Alarm Call) of Swainson's Hawk, typically given in flight or from perch. This call recorded from a female Swainson's Hawk at nest in Camas Co., ID, July 1994 (MJB). Prepared by the staff of the Borror Laboratory of Bioacoustics, The Ohio State University.

dozens necropsied in Argentina in Jan had noticeable fat deposits (MJB).

METABOLISM AND TEMPERATURE REGULATION

Metabolism not studied. At low ambient temperature, "fluffs" plumage and retracts 1 leg into feathers; at high temperatures seeks shade and becomes inactive, and gular flutters (CSH, ASE).

DRINKING, PELLET-CASTING, AND DEFECTION

Drinks in captivity (Johnson et al. 1987, MJB). Generally, casts 1 pellet/d. No information on defecation rates.

SOUNDS

VOCALIZATIONS

Development. On basis of female raised in captivity, first vocalizations similar to those of a kitten. At 7 wk, voice loud and shrill like that of a gull, but more piercing; at 8 wk, nestling made insistently repeated call of 4 notes; after 12 wk, gave very soft low whistle, but screamed when guarding food (Cameron 1913). Nestlings and postfledging birds frequently give begging call whenever they see adults carrying prey; also direct begging calls at siblings and at adult hawks of other species (Fitzner 1978). Younger chick usually more vocal than older sibling when adult delivers food (Porton 1977).

Vocal array. Adults reported to give 3 different calls (Fitzner 1978). Characteristic Adult Scream, or Alarm Call (Fig. 4), commonly given by both sexes either in flight or from a perch; described as a shrill, rather plaintive, *kreeeee* (Taylor and Shaw 1927), a plaintive whistled *kree-e-e* (Bent 1937), or a high-pitched *keeeoooooeee* or *keeeooooo* fading off toward the end (Fitzner 1978). This call is given by both sexes in response to intra- and interspecific intruders, including humans near nest, and by female in response to male at nest or delivering prey (Porton 1977, Fitzner 1978). Female's call shorter and lower-pitched than male's Adult Scream (Dunkle 1977). No geographic variation reported.