A bird of open country, Say’s Phoebe is similar in behavior, size, and breeding biology to the Black (Sayornis nigricans) and Eastern (S. phoebe) phoebes, although its voice, coloration, and habitat preferences are distinctive. Dawson (1923) described its melancholy call as the most despondent of all the “pewees.” Its drab gray brown back, black tail and cinnamon-colored belly fade into the sage brush plains, barren foothills, and rimrock country where this species resides. Say’s Phoebe breeds over much of western North America, from the Great Plains west nearly to the Pacific coast. And indeed it has one of the broadest latitudinal ranges among North American flycatchers, extending from central Mexico farther north than any other into the arctic tundra, apparently constrained only by lack of suitable nest sites.

In the fall, northern populations of Say’s Phoebe migrate south and winter in the southwestern United States and central Mexico, overlapping with southern residents. Spring migration begins early for this bird, compared to other western flycatchers. It contends with cold weather and the scarcity of flying prey by hover-gleaning insects from the ground. Primarily insectivorous, it captures wild bees and wasps most frequently, but also flies, beetles, and grasshoppers, generally foraging from perches within 1–2 meters of the ground.
Like other phoebes, this species shows strong nest-site tenacity. Typically monogamous and frequently double-brooded, it builds its nest (under a protective ceiling) on a rocky ledge or other supporting shelf, which often includes human-made structures. It frequently nests in abandoned buildings among prairie farms and western ranches. Its nest, typically constructed of grass, stems, moss, and other fibrous plant materials, differs from that of the Black and Eastern phoebes in that mud is rarely used in its construction. Nest completion and egg-laying typically occur in mid-March in Texas and late May in Alaska. The female incubates the clutch of 4 or 5 eggs for about 15 days, and young fledge about 17 days after hatching.

Say's Phoebe is the least studied of the Sayornis group. Anecdotal accounts make up a large portion of the literature concerning this species, but important work on the species' breeding biology and behavior has been undertaken in Texas (Ohlendorf 1971, 1976), Nevada (Ackerman 1988), and Kansas (Schukman 1974, 1993). The dietary preferences of this species have been studied in some detail by Beal (1912) rangewide, Ohlendorf (1976) in Texas, and Rosenberg et al. (1991) in Arizona, and its foraging biology has received limited study by Ackerman (1988) in Nevada. Behavior and vocal communication remain poorly understood; limited attention was devoted to this species by Smith (1970a, 1970b) in his studies of Sayornis communication and behavior. Almost no information is available on the population dynamics, demography, physiology, energetics, and nutritional requirements of this species.

**DISTINGUISHING CHARACTERISTICS**

Medium-sized flycatcher; length about 17 cm, body mass 21–22 g. Seasonally and sexually monomorphic. Adult upperparts pale brown gray, head and hindneck darker; tail brownish black, outer web of outer rectrix white; wings deep brownish gray; chin, throat, and upper breast buffy brownish gray. Cinnamon belly and undertail coverts of Say's Phoebe are unique among North American flycatchers. Male and female distinguished during breeding season (Feb–Aug) by cloacal protuberance and brood patch, respectively (Pyle 1997). Immatures in Basic I plumage similar to adults, but upperparts browner, and median and greater wing-coverts broadly tipped with cinnamon buff, forming 2 distinct wing-bars. The frequently observed Tail Wag (see Behavior: agonistic behavior, below), an intermittent depression and fanning of the tail while perched, coupled with fly-catchng behavior, are distinctive.

Although generally similar to Say's Phoebe, Eastern Phoebe is pale grayish to white below with darker grayish upperparts, and Black Phoebe is black, with contrasting white belly. Say's Phoebe is also slightly larger than Black and Eastern phoebes. Female or juvenile Vermilion Flycatcher (Pyrocephalus rubinus) usually has pale supercilium; throat and chest whitish, streaked dusky; lacks contrasting black tail and cinnamon belly. The larger Cassin's (Tyrannus vociferans) and Western (T. verticalis) kingbirds can appear similar in bright light, but both have dark mask, yellow belly, olive upperparts, and relatively heavier bill; Cassin's has contrasting whitish throat, Western has white sides of tail (Howell and Webb 1995).

**DISTRIBUTION**

**THE AMERICAS**

**Breeding range.** Western North America, from central Mexico to arctic Alaska and into Great Plains. Generally avoids coastal regions of Pacific and heavily forested areas, as demonstrated by distribution gap in central British Columbia (Fig. 1).

Breeds throughout much of Alaska (Gabrielson and Lincoln 1959), west to 166°20'W (Kessel 1989) and north to 69°45'N (Cade and White 1973), n. Yukon Territory, and nw. Mackenzie south through Yukon (except southeast; Godfrey 1986) to nw. British Columbia. In nw. British Columbia, restricted to areas north of 57°30'N and west of 128°W (Campbell et al. 1997). Northern and southern breeding populations in British Columbia separated by gap of at least 600 km in which species does not breed (Campbell et al. 1997). Breeds from interior areas of s. British Columbia south of Williams Lake (53°N; Campbell et al. 1997), w. and s. Idaho (Stephens and Sturts 1991), central and eastern portions of s. Alberta (Semenchuk 1992), and s. Saskatchewan (Smith 1996), south through the U.S. to central Mexico. Breeding range in U.S. extends west to eastern slopes of Cascades of Washington and Oregon; easternmost California, with range extending west to inner Coast Ranges in southern portion of California, and north through inner Coast Ranges to Contra Costa Co. (Small 1994); and northern third of Baja California (Howell and Webb 1995). Range in U.S. extends east to east-central portions of N. Dakota, S. Dakota, and Nebraska (Johnsgard 1979, Peterson 1995); n.-central and sw. Kansas (Thompson and Ely 1992); extreme w. Oklahoma (Black Mesa of w. Cimarron Co.; Baumgartner and Baumgartner 1992); and westernmost Texas, particularly in Trans-Pecos area (Oberholser 1974). Range extends south through Sonoran Zone of Arizona to ne. Sonora, Mexico.
and south through interior of Mexico to central Mexico (Guanajuato; Howell and Webb 1995). Rare summer resident in n.w. Oaxaca, Mexico (1 breeding record, 1952), but current status uncertain (Binford 1989). Also breeds sporadically in extreme nw. Iowa (Plymouth and Sioux Cos.; Jackson et al. 1996).

**Winter range.** Figure 1. Winters from n. California (Sonoma and se. Mendocino Cos. south through outer and inner Coast Ranges, and from n. Central Valley), w.-central Nevada (Carson City and Fallon areas), southernmost Nebraska, extreme sw. Utah, portions of Arizona south and west of Mogollon Rim (north to Utah border in west), central (rarely northern) New Mexico, and s.-central Texas, south to s. Mexico (Monson and Phillips 1981, Small 1994, Christmas Bird Count data). Winter range in Mexico extends south to s. Baja California, s. Sonora on Pacific slope, Oaxaca (rarely Chiapas) in interior, and Tamaulipas (rarely Veracruz) on Atlantic slope (Howell and Webb 1995). Also winters in Channel Is. (and rarely Farallon Is.) off coast of California (Small 1994). Recorded rarely north to British Columbia (Campbell et al. 1997), Idaho (Burleigh 1972), s. Nevada (Alcorn 1988), s. Colorado (Andrews and Righter 1992), sw. Kansas (Thompson and Ely 1992), and n. and e. Texas (Oberholser 1974).


OUTSIDE THE AMERICAS

Not recorded.

HISTORICAL CHANGES

Expansion or contraction of range limited; varies geographically and temporarily. Since 1960 in Alaska, breeding range has expanded north to foothills of Arctic slope from Brooks Range (Cade and White 1973); possibly since 1962 into Killbuck Mtn. region in sw. Alaska (Petersen et al. 1991). Gabrielson and Jewett (1940) listed species as breeder in valleys of interior w. Oregon, but no breeding attempts reported since then (Gilligan et al. 1994).

Along coastal California, nest found in 1976 is the only known record for Marin Co., the most northern and coastalward record for California coastline (Shuford 1993). Elsewhere in California, formerly (records from 1934 and 1941) a regular breeder in inner Coast Ranges of Santa Barbara Co.; recent records lacking (Lehman 1994); also an old nest record (1926) from Coyote Canyon in Orange Co. (Sexton and Hunt 1979). Probable nesting reported in Santa Lucia Range west of Salinas River in Monterey Co., where nesting has never been suggested, but this new information may be a result of better surveys rather than representing a true change in distribution (Roberson and Tenney 1993).

Expanded 100–150 km east to s.-central Manitoba in 1985–1986; 1 nest found in a stovepipe, another on a chimney ledge (Desmet 1987). More numerous records after 1950 in e. North Dakota (Stewart 1975). In nw. Iowa, first nesting record reported in 1960; nests found from 1960 to 1968 (23 locations in 1 yr) and from 1977 to 1983, possibly extending range eastward (Bryant and Youngworth 1962, Bryant 1969, 1977, 1984). Presence of this species usually increased during dry years and disappeared during wet ones; however, no nesting has been recorded since 1983 (Bryant 1977, Kent and Dinsmore 1996). This species was found on only 2 Iowa Breeding Bird Atlas blocks between 1985 and 1990, with no confirmation of nesting (Jackson et al. 1996). One pair nested in a shed in Beaver Co., OK, in 1983; this was the first known record outside (about 100 km east) Cimarron Co., at west end of panhandle (Dunn 1984). One old nest record (1932) east of Texas Panhandle, in Wilbarger Co. (Oberholser 1974).

FOSSIL HISTORY

Found in several late-Pleistocene/Holocene (Rancho La Brea North American Land Mammal Age, 400,000 yr B.P.) localities—e.g., Arizona, California, New Mexico, and Texas (see Brodkorb 1978 and Rea and Hargrave 1984).

SYSTEMATICS

GEOGRAPHIC VARIATION

Weak differences in coloration, with comparatively pale birds in arid areas of n. Baja and parts of n. Sonoran Desert. Individual variation in rest of range fairly broad, however. Bill longer and wider in pale birds (see Subspecies, below; see Browning 1976 and Rea 1983).

SUBSPECIES

Taxonomy not settled. Classification listed here follows Traylor 1979, who recognized 3 subspecies. At least 2 of these are generally agreed to be quite distinct. Excessive fading of plumage in life (often worn by Feb) and in museums confounds analysis; postbreeding dispersal in worn plumage and
mixing of populations in winter has further troubled investigation. More recently, Rea (1983) used specimens of early juveniles to work out differences over part of species’ range.

*S. s. saya* (Bonaparte, 1825). Breeds from n. Alaska and n. Mackenzie south to central Mexico in Durango and San Luis Potosi; winters from central California south over range of species. At least in juvénal plumage, dark crown contrasts distinctly darker than back, chest band broad and dark gray including most of throat. Populations from Alaska and nw. British Columbia said to be darker and more clearly gray above, less “scorched” below, with narrower pale edges on wing-coverts and secondaries, longer tail, and shorter, broader bill (“*yukonensis*”) described by Bishop (1900). Southern limit as originally described corresponds with disjunction in breeding populations found in British Columbia (Campbell et al. 1997; see Distribution, above). Nevertheless, J. W. Aldrich (in Jewett et al. 1953) extended range of “*yukonensis*” south to nw. Oregon, noting that breeding birds in Washington were darker than ones from Alaska. Specimens taken from various parts of Idaho during breeding were typical *saya* in respect to size and color, except for some transients taken from western edge of the state ascribed to “*yukonensis*” (Burleigh 1972). Significant individual variation in color and lack of appreciable mensural differences between these dark northern populations were cited by Browning (1976), who considered “*yukonensis*” a synonym of *saya*. Most authorities have not recognized “*yukonensis*,” citing the problem of wear in evaluating differences (Ridgway 1907, Godfrey 1986, Gibson and Kessel 1997). Study by Rea (1983) has reopened the question of how to divide the dark northern populations, and he suggests that further analysis of juveniles is needed.

*S. s. quiescens* Grinnell, 1926. Breeds in n. Baja California and probably central and s. Arizona, Sonora, and possibly extreme s. California; winters over much of this area, dispersing into s. California and central Arizona. Paler, more ashy gray rather than light brown; crown not distinctly darker than back; chest-band narrower; chin and throat whitish; bill longer and wider (nares to tip 10.5-12.4 mm, width at nares 5.1-6.1 mm; Pyle 1997). Desert breeding populations in se. California have not been ascertained with certainty; they could be this race or *saya*.

*S. s. pullida* (Swainson, 1827). Resident southern portion of Central Plateau of Mexico from Jalisco and Zacatecas across to Guanajuato and Hidalgo; southernmost breeding locality for species in nw. Oaxaca attributed to this race (Binford 1989). This race was synonymized under nominate *saya* by Ridgway (1907) and Cory and Hellmayr (1927).

**RELATED SPECIES**

Relationship among phoebes not known, but all probably closely related; only congeners are Eastern Phoebe and Black Phoebe, the latter of which is sometimes split into 2 species. *Sayornis* is placed in subfamily Fluvicolinae with *Contopus*, *Empidonax*, and *Pyrocephalus*, the other chiefly Central and North American genera. *Pyrocephalus* (Vermillion Flycatcher) closely resembles *Sayornis* in general form and cranial characters; these genera considered closely allied on this basis (Traylor 1977).


**MIGRATION**

**NATURE OF MIGRATION IN THE SPECIES**


**TIMING AND ROUTES OF MIGRATION**

**Spring**. Earliest flycatcher to arrive in Great Plains and w. North America, concurrent with Eastern Phoebe (Weeks 1994). Arrives mid-Mar (late Feb–early May) in Texas Panhandle (K. Seyffert unpubl.); late Mar in Oklahoma (Baugartner and Baugartner 1992); 12 Apr (4–22 Apr) in Kansas (Johnston 1965); 16 Apr (5–24 Apr) in Nebraska (Johnsard 1980); late Apr–early May in S. Dakota (Whitney 1978); late Apr in Alberta (Semenchuk 1992); early May (5–11 Mar) in Arizona (Brandt 1951, Phillips et al. 1964); mid–Feb–mid–Apr in nw. California and mid–Mar–mid–Apr in California east of Sierra Nevada crest (Small 1994); mid–Feb–Mar in Oregon (Gilligan et al. 1994); mid- to late Mar (some early migrants in Feb) in Washington (Jewett et al. 1953); late Mar–mid–Apr (begins late Feb and early Mar) in s. British Columbia and late Apr in n. British Columbia (Campbell et al. 1997); early to mid–May in Alaska (Kessel and Gibson 1978).

Routes. Little known. In California, may migrate from dry interior regions and Great Basin toward coast in fall (Dawson 1923, Small 1994). A banded bird from central Washington was recovered in coastal Santa Barbara Co., CA (Lehman 1994). Transients in Alberta (east of Rocky Mtns.) and Saskatchewan are suspected to have originated from Mackenzie Delta, Northwest Territories, Yukon Territory, Alaska, or N. British Columbia (Semenchuk 1992, Smith 1996). Seven birds observed between 5 and 7 Sep 1965 on South Farallon Is., CA (Tenaza 1967).

MIGRATORY BEHAVIOR

Little known. In spring, males appear to depart several days before females (Dawson 1923). Usually found singly, but loose aggregations occur; e.g., up to 50 individuals during fall migration (20 Sep) in panhandle of Texas (K. Seyffert pers. comm.). Diurnal migration probable; no reports of nocturnal movement.

CONTROL AND PHYSIOLOGY

No information.

HABITAT

BREEDING RANGE

Open country, prairie ranches, sagebrush plains, badlands, dry barren foothills, canyons, and borders of deserts; generally avoids watercourses, rich agricultural land, and heavily forested land (Bent 1942). In Alaska, near cliff faces or around ranch and farm buildings (Gabrielson and Lincoln 1959, Kessel 1989). In Canada, open, usually dry places where bushes, fences, buildings, or even low rocks and earth hummocks provide look-out perches (Godfrey 1986); in Alberta, particularly badlands, prairie coulees, riverbanks, and prairie farms (Semenchuk 1992); in British Columbia, semiarid areas, open forests, alpine cliffs, shrublands, rocky bluffs, and agricultural areas around buildings or other structures, occurs from sea level to 3,200 m (Campbell et al. 1997). In Washington, rimrock country, along streams and dry farms, sometimes in bunchgrass country (Jewett et al. 1953). In Great Basin, open areas in valleys and foothills, and where mouths of canyons open onto desert, sparsely treed localities with low scattered shrubs and bare ground (Ryser 1985). In California, interior valleys with grasses, shrubs, and occasional scattered trees; agricultural lands; grassy coastal bluffs; and typical xerophytic desert scrub in arid southwest; breeds from 60 m below sea level to 1,350 m (rarely to 2,550 m; Small 1994). Sagebrush plains or rocky hillsides sparsely vegetated with brush and a few scattered pifion (Pinus edulis) trees in New Mexico, nests up to 2,280 m (Bailey 1928). In Colorado, common on the prairie and in low country throughout, nests up to 2,850 m (Bailey and Niedrach 1965). Arid regions of Great Plains, especially rocky habitats that provide nest sites and open areas near buildings (Johnsgard 1979). In sw. North Dakota, rough, severely eroded badlands and steep dissected slopes of buttes; also in vicinity of abandoned or little-used buildings (farmhouses, sheds, and country schools) throughout range (Stewart 1975). In Oaxaca, Mexico, rare in arid subtropical scrub, nests up to 2,250 m (Binford 1989).

Rarely found in habitat favored by Eastern Phoebe—e.g., wood-bordered streams in Great Plains (Stewart 1975, Schukman 1993). Thus, not found in tallgrass prairie–forest mosaic of e. Great Plains, a limitation possibly related to lack of its preferred foraging niche in low, sparsely vegetated areas (Ryser 1985, Schukman 1993). See also Breeding: nest site, below.

SPRING AND FALL MIGRATION

In Colorado, found in all open habitats, including cultivated and riparian areas (Andrews and Righter 1992). In British Columbia, open rangeland; agricultural country; semiarid sites; benches along rivers; recently logged sites; natural clearings or burns; edges of lakes, ponds, or streams; rolling farmlands; edges of marshes and meadows; along rocky bluffs or canyons; and near mountain peaks above tree line (Campbell et al. 1997). In New Mexico, prefers deep valleys bordered by high hills, but also found on open plains, up to 3,600 m in fall (Bailey 1928).

WINTER RANGE

In California, widespread in open, lowland habitat, grassy bluffs, fields, scrub, and agricultural
areas (Garrett and Dunn 1981); lower parts of canyons in Orange Co. (Sexton and Hunt 1979). In Texas, groves along streams and prairies, but seldom in heavily forested areas (Oberholser 1974); also invaded fields, riparian bare grounds, often near cattle corrals in s-central Texas (Kutac and Caran 1994). In lower Colorado River valley, AZ, mainly agricultural and sparse riparian habitats (Rosenberg et al. 1991). In Mexico, arid to semiarid open country with scrub, fences, and scattered trees (Howell and Webb 1995. Although rare in Colorado, found usually around open water of streams and sewage ponds (Andrews and Righter 1992).

FOOD HABITS

FEEDING

Main foods taken. Primarily flying or terrestrial insects. Little vegetable matter.

Microhabitat for foraging. Typically forages within few meters of ground—in low, sparse vegetation such as sagebrush, short- or mixed-grass prairie, and rocky or barren ground. Early spring passage may be possible because foraging niche—sites on or close to ground, where warm temperatures result in increased insect activity—is positioned in warmer microclimate than that of other flycatchers (Ryser 1985). Forages frequently on ground and talus slopes of riverbanks for invertebrates (e.g., spiders or sluggish insects) during freezing and snowy spells in Alaska (Cade and White 1973). Rarely in or near sparsely vegetated riparian areas (Rosenberg et al. 1991).

Food capture and consumption. Few data. Aerial hawking is the most commonly observed foraging mode during spring and summer. Typically initiates flights from perch near ground; commonly uses bushes, weed stalks, rocks, fences, and buildings. Pursuits characterized by more or less direct flights from perch to aerial prey and back to same or different perch, where it consumes prey. Also frequently glean prey from various substrates by landing nearby, or hovering and snatchig prey from substrate (Grinnell and Linsdale 1936, Ryser 1985, Rosenberg et al. 1991).

At urban site in s. Nevada in mid–Apr, limited observations of foraging behavior (6 h) found that gleanning accounted for 50% of total captures, aerial pursuits 46%, and hover-gleaning 4% (n = 26 flights). Nearby, on beach at freshwater lake, aerial pursuits accounted for 68% of total captures, gleanning 26%, and hover-gleaning 7% (n = 31 flights; Ackerman 1988). During cold weather, or when aerial prey are scarce, Say's Phoebe frequently hovers 1–2 m over open ground searching for prey below (Fig. 2);

behavior similar to that of Mountain Bluebird (Sialia currucoides) and American Kestrel (Falco sparverius; Phillips et al. 1964).

Along lower Colorado River valley, AZ (season unknown), most flights were directed at terrestrial prey or involved hover-gleaning (Rosenberg et al. 1991).

DIET

Major food items. Diet consists of 99.8% animal matter (Beal 1912). Dominated by beetles, grasshoppers and crickets, and bees (but not honeybees; Dawson 1923; see also Wolf 1997) and wasps.

Quantitative analysis. See Appendix 1. Seasonal and distributional aspects of diet poorly known. Stomach content analyses by Beal (1912), collected throughout year range wide, found that Hymenoptera (primarily wild bees and wasps, and a few ants) were the most important food items, accounting for 30.7% of total food taken (n = 111). Flies (Diptera)—mostly houseflies (Muscidae), crane flies (Tipulidae), and robber flies (Asilidae)—were second most frequently taken prey, accounting for 16.7% of total. Beetles (Coleoptera) accounted for 15.7%; ground beetles (Carabidae) were consumed most often (see Feeding, above). Crickets and grasshoppers (Orthoptera) accounted for 15.4% and moths and caterpillars (Lepidoptera) accounted for 12.1% of total prey consumed. Little vegetable matter reported, but elderberries (Sambucus) found in 3 stomachs, black nightshade (Solanium) berries in 2, tarweeds (Matula) in 1, and fig (Ficus) in 1.

In Trans-Pecos, TX, stomach content analyses (n = 23) May–Aug, found 17 families in order Coleoptera, followed by prey in the orders Hemiptera (bugs; 7 families), Diptera (5), Hymenoptera (4), Odonata (dragonflies; 3), Lepidoptera (3), and Orthoptera (2). Study population overlapped in diet with sympatric Black Phoebe, 77.7% at ordinal level, but only 42.9% at family level. Nestling diet similar to that of adults (73.7% overlap, n = 57 food items from 9 nestlings; Ohlendorf 1976).

Diet from Jul to Oct in Colfax Co., NM: grasshoppers (37%), caterpillars and moths (12.2%); smaller numbers of spiders (Araneae), bugs, dragonflies, millipedes (Diplopoda), and isopods (Isopoda; Bailey 1928).

In lower Colorado River valley, AZ (season unknown), diet dominated by beetles, crickets, and grasshoppers; also flies, bees, wasps, butterflies, caterpillars, true bugs, dragonflies, and earwigs (Dermaptera). Birds taken from riparian areas ate bees, wasps, and bugs at higher frequency (Rosenberg et al. 1991).

FOOD SELECTION AND STORAGE

No information.
NUTRITION AND ENERGETICS
No information.

METABOLISM AND TEMPERATURE REGULATION
No information.

DRINKING, PELLET-CASTING, AND DEFECATION
Typically does not drink, even if water is available (Weathers 1983). Insectivorous diet provides water. One instance of drinking reported from desert in s. California (Smyth and Coulombe 1971).

Indigestible portions of prey form into pellets (Bendire 1895); no specific information (see Wolf 1997).

No information on defecation.

SOUNDS

VOCALIZATIONS

Development. No information on development or learning.


Primary Song. Consists of series of 2 Regularly Repeated Vocalizations (RRVs), pit-tsee-eur and pit eef (RR1 and RR2, respectively; see Fig. 3A), inter-

Figure 2. During cold weather, or when aerial prey are scarce, Say’s Phoebes frequently hover over open ground searching for insects below. More typically, this species forages from a perch. Drawing by N. John Schmitt.

spersed within matrix of Initially Peaked Vocalization (see below). Limited observations by Smith (1970b) indicate that song differs from that of other phoebe species in lacking regular alteration of RRV elements. The same RR1 elements are given in series, and RR2 elements are only occasionally inserted (Fig. 3A). Female occasionally gives RRVs, along with Chatter Vocalization, during Nest Site–Showing Display (see Behavior: sexual behavior, below). Used in station-calling (continuous, regular, and prolonged bouts of vocalization), particularly in extended predawn and early-morning song bouts in early spring and during breeding season, countersinging, and patrolling.

Initially Peaked Vocalization. Phee-eur call (Fig. 3B) is the most common vocalization; found in all recorded song bouts, and always more abundant than RRVs (see above). Sometimes intergrades with Chatter Vocalizations (see below). Also occurs in begging calls of nestlings and fledglings. Highly variable, employed in many situations by both sexes: during song bouts, as contact call, by approaching mates, to maintain contact with mate or young, in encounters with nest predators and humans, while foraging, during Nest Site–Showing Displays (see Behavior: sexual behavior, below), while mobbing, and as agonistic call. Various forms used throughout year by both sexes.

Chatter Vocalization. Say’s Phoebe has the most variable form of the Chatter Vocalization in the genus; given by both sexes, but more often by female (Smith 1970b) during Nest Site–Showing Displays (see Behavior: sexual behavior, below), in
flight while approaching mate, and during mounting attempts; delivered in rapid series (Fig. 3C). Sometimes given during early spring before pair formation, during pair formation, between nesting attempts, when settling to roost, and by female when settling to incubate.


Repertoire and delivery of songs. Predawn song rate for 2 males in Arizona varied from 28 to 39 calls/min, and no 2 RRV elements were given in succession. During 1 male’s 16-min predawn song bout, Smith (1970b) noted that calling rate started at 34–36 calls/min and declined to 28 calls/min near end of bout; during this period there were 411 Initially Peaked Vocalizations, 82 RR1s, and 7 RR2s, with no tendency for the RR elements to alternate.

Social context and presumed functions. See above.

NONVOCAL SOUNDS

Like other tyrantids, produces loud snapping sound by swiftly closing mandibles. Female occasionally snaps bill to drive off recently fledged young while incubating new clutch; bill-snapping sometimes heard during prey capture attempts (Grinnell and Linsdale 1936).

BEHAVIOR

LOCOMOTION

Generally moves via flight; may routinely perch on ground while foraging, but rarely hops. Transit flights direct, with regular wing-beats and no undulation in flight path. Frequently hovers while foraging and during Nest Site-Showing Display (see Sexual behavior, below). Foraging flights usually direct, but often erratic during extended pursuits.

SELF-MAINTENANCE

Preening, head-scratching, stretching, bathing, anting, etc. No information.

Sleeping, roosting, sunbathing. May roost on nest or adjacent structures (Calder 1926). Use of mine shafts also reported (Bailey 1928). Like Eastern Phoebe, roosting in nest or other protected areas may be an energy-conserving adaptation, especially during cold weather (Weeks 1994).

Daily time budget. No information.

AGONISTIC BEHAVIOR

Physical interactions. Needs study. Intraspecific interactions most intense early in breeding season, but little physical contact. Female may physically rebuff newly fledged young between broods (Smith 1970a); in Nevada, a female repeatedly hit an intruder with her feet while generally ignoring other species near nest (Ackerman 1988).

Communicative interactions. Little known. One female gave harsh bipeaked vocalizations when approached by male as fight initiated. When disturbed during breeding, individuals will give Initially Peaked Vocalizations (see Sounds; vocalizations, above), fans tail open on conspicuous downstroke, returns it slowly (tail wag), and sometimes raises crest (Smith 1970a).
SPACING

Territoriality. During nonbreeding season, individuals typically are solitary (Dawson 1923); no information on winter territoriality. Loose "flocks" observed during migration (see Migration: migratory behavior, above). Little aggression observed in or out of territories in Nevada; during breeding season, territorial displays by male rare and territorial calls usually absent (Ackerman 1988). No data on territory size. May routinely nest within 100 m of conspecific (Bendire 1895). In Trans-Pecos, TX, nests were at least 400 m apart (Ohlendorf 1976). Distance between pairs may be determined largely by number of and distance between suitable nest sites. Smith (1970b) speculated that lack of overlap in foraging areas between sexes may be adaptive for animals that inhabit arid environments with potentially scarce resources. Birds are less aggressive toward intrusions of conspecifics later in breeding season.

Individual distance. Little information; see above.

SEXUAL BEHAVIOR

Mating system and sex ratio. Little known. Apparently (socially) monogamous. No information on genetic parentage, polygyny, or sex ratio.

Pair bond. Needs study. Not known whether pair remains together throughout year, even in nonmigratory areas. In spring, male arrives before female, and pairs form soon thereafter (Dawson 1923, Johnsgard 1979). No data on longevity of pair bond. Behavior and timing suggest that Eastern Phoebe pair bond extends throughout a breeding season; 88% of marked Eastern Phoebes stayed at same site for second broods (Weeks 1994). When breeding, Say's Phoebe pairs are most obvious early in breeding season, but pair bond is weak and male often not seen (Smith 1970b); this behavior contrasts with mate-guarding reported in male Eastern Phoebe (Weeks 1994).

In Say's Phoebe, male and female engage in Nest Site–Showing Displays: Early in breeding season, during pairing and between nesting attempts; male visits potential nest sites or old nests accompanied by female. Male typically approaches potential site with wings fluttering in shallow arc, and hovers while repeating Chatter Vocalizations (see Sounds: vocalizations, above) or broken song. Female follows male and may land at site or on old nest, then sit in nest or crouch at potential nest site. Copulation not described. After fledging first brood, female also engages in Nest Site–Showing Displays in absence of male. In other phoebes and most other tyrannids, male tends to show more of such displays than female does. In Arizona, 3 females tended to avoid their fledglings, and even attack them occasionally, when performing Nest Site–Showing Displays (Smith 1970b). This behavior may serve to reattract a characteristically inattentive male or one that avoids foraging area of nesting female (see Spacing, above; Smith 1970b, Ackerman 1988). Nest Site–Showing Displays of Eastern and Black phoebes are similar in context and execution to that of Say's Phoebe.

Extra-pair copulations. No information.

SOCIAL AND INTERSPECIFIC BEHAVIOR

Degree of sociality. Typically solitary.

Play. No information.

Nonpredatory interspecific interactions. Occasional interactions near nest sites—with Black Phoebe in Texas and with Eastern Phoebe in Kansas (Ohlendorf 1976, Schukman 1993). A Say's Phoebe was building nest ≤15 m from a Black Phoebe nest in w. Texas (Waur 1973); 1 report of Black Phoebe defending territory repeatedly and successfully against Say's Phoebe (Ohlendorf 1976). In Arizona, also observed nesting within 75 m of Black Phoebes, with no obvious conflict (Bow). Say's Phoebe (nesting) seen chasing Eastern Phoebe from a site used the previous year by the latter (Schukman 1993; see Demography and populations: causes of mortality, below). Cassin's Kingbird observed chasing a juvenile Say's Phoebe (Ohlendorf 1976); Western Kingbird chased adult Say's Phoebes (Ackerman 1988); 1 report of Say's Phoebe forced out of nest by Barn Swallows (Hirundo rustica; S. Dakota Ornithol. Union 1991). Also observed chasing Chipping Sparrows (Passerina maniculata) and House Finches (Carpodacus mexicanus; Smith 1970a, 1970b). Tolerates nontyrannids nesting nearby: including swallows (see Breeding; nest site, below), raptors (Gyr falcon [Falco rusticolus], Prairie Falcon [F. mexicanus]), Barn Owl (Tyto alba), Mourning Dove (Zenaida macroura), House Wren (Troglodytes aedon), Gray Catbird (Dumetella carolinensis), and House Sparrow (Passer domesticus; Dawson 1923, McClure 1946, Cade and White 1973, JMS).

PREDATION

No information on adults. Few data on predation of eggs or young. Known or suspected predators of nests have included rattlesnake (Crotalus sp.), red squirrel (Tamiasciurus hudsonicus), chipmunk (Tamias sp.), Merlin (Falco columbarius), Clark's Nutcracker (Nucifraga columbiana), and domestic cat (Felis domesticus; Dawson 1923, Campbell et al. 1997).

BREEDING

PHENOLOGY

Pair formation. Poorly known. Males arrive before females; pairs form soon thereafter (Dawson

**Nest-building.** Nest-building may begin immediately (Gabrielson and Jewett 1940) or a week or more after arrival (Johnsgard 1979, Ackerman 1988, JMS). Nest construction initiated in Mar in Texas (Ohlendorf 1976), mid-Apr in Nevada (Ackerman 1988), late Apr in Kansas (JMS), and mid-May in N. Dakota (Stewart 1975).

**First brood per season.** Figure 4. In sw. Texas, early egg dates 20–24 Mar, fledging dates 29–30 Apr (Ohlendorf 1976). In s. Nevada, clutch initiation averages 14 Apr (range 18 Mar–12 May), hatching date 24 Apr (range 23–25 Apr, n = 5; Ackerman 1988). In w.-central Kansas, mean clutch initiation date 9 May (range 24 Apr–25 May, n = 9; JMS). Clutch initiation of Say’s Phoebe averages 2 wk later than that of Eastern Phoebe (Schukman 1993), since spring arrival is about 3 wk earlier for latter species in Kansas (Johnston 1965). Mean hatching and fledging dates for w.-central Kansas 31 May (range 13 May–14 Jun, n = 8) and 18 Jun (range 30 May–30 Jun, n = 6), respectively (JMS). In central Nebraska, most young banded between 10 and 25 Jun (McClure 1946). In British Columbia, earliest egg date 1 Apr, initiation of first clutches peaking in mid-May; earliest date for young 22 Apr (Campbell et al. 1997). Earliest egg date 13 May in S. Dakota (S. Dakota Ornithol. Union 1991), 25 May in N. Dakota (Stewart 1975), and 29 May in Alaska (Kessel 1989).

**Second/later broods per season.** In sw. Texas, 2 broods most common (rarely 3; Ohlendorf 1976). Mean clutch initiation date 15 May (range 16 Apr–13 Jun, n = 4); hatching 17 May (range 2 May–1 Jun, n = 2) in s. Nevada (Ackerman 1988). In Kansas, pairs average 1.53 broods/season (n = 15); mean initiation date for second clutch 19 Jun (range 10–25 Jun, n = 4); average hatching and fledging dates 8 Jul (range 27 Jun–14 Jul, n = 4) and 23 Jul (range 9 Jul–2 Aug, n = 4), respectively (JMS). In Nebraska, young reach banding age between 10 and 29 Jul; most young banded on 21 Jul (McClure 1946). In s. British Columbia, nests found after May are likely second clutches; peak in mid-Jun (Campbell et al. 1997). No information on multiple brooding in Alaska. Nestlings found 29 Jun in Oaxaca (Binford 1989). Young ready to leave nest in late Sep in Arizona (Phillips et al. 1964).


**NEST SITE**

**Selection process.** Nest Site—Showing Displays (see Behavior: sexual behavior, above) given shortly after pair forms (Smith 1970b, Gates 1980), and between broods by either sex (Smith 1970a). Pair investigate nest sites together; female may show nest-shaping movements (rotating from side to side) at potential sites (Ackerman 1988).

**Microhabitat; site characteristics.** Requires sheltered ledge or pocket on which to place a station (resting on horizontal ledge) nest. Unlike Eastern or Black phoebe, water near nest site is not a usual requirement, probably because mud is rarely used in nest construction. Natural sites include caves, pockets, or covered ledges on cliff faces or dirt banks; rarely cavities of trees or bushes (Bent 1942). Also uses nests of other species, such as Black and Eastern phoebes, Cliff (Petrochelidon pyrrhonota), Bank (Riparia riparia), and Barn swallows, and American Robin (Turdus migratorius; Bent 1942, Oberholser 1974, Ohlendorf 1976, Schukman 1976).

Human-made sites vary; nests commonly found in mines, abandoned buildings, bridges, barns, outhouses, wells, old cars (Ohlendorf 1976, Campbell et al. 1997, JMS), and a horse trailer (D. Stahlecker pers. comm.). Nests placed on rafters, girders, beams, shelves, electrical fixtures, ledges,
drainpipes, eaves, machinery, and a mailbox (Bent 1942, Campbell et al. 1997, JMS). Observed (and nesting suspected) along the Alaska pipeline superstructure (A. Poole pers. comm.).

In w.-central Kansas, nests placed on human-made structures averaged 1.9 m ± 0.4 SD (range 1.2–2.4, n = 20) from the ground (JMS); in w. Texas, 2.8 m ± 0.3 SD (range 1.2–12.2, n = 112; Ohlendorf 1976). In British Columbia, nest heights ranged from 2.4 m below ground to 24 m above ground, with 55% between 2–2.8 m (n = 199; Campbell et al. 1997).

**NEST**

**Construction process.** Like the Eastern and Black phoebe, nest presumably built by female but no direct observation of known sexed individuals (Johnsgard 1979, Ackerman 1988; see also Weeks 1994 and Wolf 1997). Little known about time required for nest construction. In s. Nevada, most activity observed during morning and early afternoon. Mean time for nest refurbishment (relining of old nest) 5.3 d (range 4–7, n = 6; Ackerman 1988). In Kansas, time from initiation of nest construction to laying of first egg was 14 d (n = 1; JMS).

**Structure and composition matter.** Base of nest consists of rocks, weed stems, wood, dry grasses, moss, plant fibers, dry sage bloom, wool, cocoons, spiderwebs, hair, and infrequently mud; often lined with wool, hair, human-made fibers, paper, and occasionally feathers (Bailey 1928, Cade and White 1973, Collias and Collias 1984, Ackerman 1988, Alcorn 1988, Campbell et al. 1997, JMS). In New Mexico, a nestling was unable to fledge, because its leg was entangled in horsehair (D. Stahlecker pers. comm.).

**Dimensions.** Nest cup is circular, but base may vary according to substrate. Nest base may be enlarged with repeated use, and cup dimensions may increase during breeding cycle with nest use; relining of nest between broods may return inside of cup to initial size. Measurements for 6 nests taken at end of breeding season in s. Nevada: average mass 62 g (range 33–102), height 79 mm (range 48–107), width 158 mm (range 133–197), length 186 mm (range 137–222), cup depth 23 mm (range 5–33), cup diameter 112 mm (range 67–134); each nest contained 1–4 sets of lining material (Dawson 1923, Ackerman 1988).

**Microclimate.** Nests are usually protected overhead from sunlight and precipitation. Differences between nest and ambient temperatures vary depending on time of day and season, and on nest contents (Ackerman 1988). Placement of nests on human-made structures such as on abandoned cars, under roofs, or on electrical devices may subject eggs or young to significant heat stress. For example, Weathers (1983) found that a nest placed under a tin roof routinely experienced nest-site temperatures exceeding 39°C; during these periods, young birds perched outside nest, drooped their wings, and panted to dissipate heat. In Nevada, 3 nests that were found on warm light fixtures failed, apparently because of increased temperatures and egg desiccation (Ackerman 1988).

**Maintenance and reuse of nests, alternate nests.** Often reuse old nests of their own or other species, behavior is similar to that of Eastern Phoebe (Weeks 1994). Usually adds new lining for both intra- and interseasonal reuse (Ackerman 1988, JMS). A nest in w.-central Kansas was used for 5 consecutive years (JMS). Determining age of nest by apparent number of layers may be problematic, since birds may remove lining between broods, reline a nest ≥1 times/yr, or add little new material and only rearrange existing materials (Ackerman 1988). A building in n.-central Nebraska was used as a nest site for 21 yr (Gates 1980).

**Nonbreeding nests.** Not constructed, but old nests sometimes used for roosts.

**EGGS**

**Shape.** Ovalte to short ovalte.

**Size.** Mean dimensions (mm): from Ackerman 1988 (s. Nevada), 20.50 (range 19.46–20.92) x 16.20 (range 16.34–16.92, n = 20); from Bent 1942, 19.5 (range 18.0–21.6) x 15.1 (range 14.0–15.6, n = 50); from Western Foundation of Vertebrate Zoology (WFVZ), 19.99 (range 19.85–20.30) x 15.41 (range 14.71–16.19, n = 86).

**Mass.** No direct measurements. Fresh-egg mass estimates (see Hoyt 1979): 2.53 g (Murphy 1989); 2.40 g (n = 50; Bent 1942); and in WFVZ collection, 2.56 g (n = 86) for S. s. sylviae, 2.58 g (n = 15) for yukonensis, and 2.96 g (n = 3) for quievescens. Egg mass about 12% of adult body mass.

**Color.** Usually pure white, with little or no gloss. Occasionally ≥1 egg may have reddish or dark brown spots (Bent 1942). In Eastern Phoebe, final egg laid in clutch has the most spots (Murphy 1994). Black Phoebe clutches show variable spotting, with later eggs spotted to increasing degree (Wolf 1997).

**Surface texture.** Smooth.

**Eggshell thickness.** No information.

**Clutch size.** See Table 1. Typically 4–5, occasionally 3 or 6, rarely 7 (1 and 2 reported, but may be partial clutches). In w.-central Kansas, mean clutch size for all clutches 4.54 ± 0.72 SD (range 4–6, n = 24), for first clutches 4.71 ± 0.80 SD (range 4–6, n = 14), and for second clutches 4.38 ± 0.48 SD (range 4–5, n = 8; JMS). In s. Nevada, clutch size averaged 3.82 (range 2–5, n = 11) for spring nests and 3.50 (range 3–4, n = 2) for fall nests (Ackerman
Table 1. Reproductive success of Say’s Phoebe in different parts of its range. Data shown as mean (n).

<table>
<thead>
<tr>
<th>Region</th>
<th>Source</th>
<th>Clutch size</th>
<th>Percent eggs hatching</th>
<th>Number eggs hatched/nest</th>
<th>Percent nests fledging &gt;1 young</th>
<th>Number of young fledged/nest</th>
<th>Number of young fledged/successful nest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Central Nebraska McClure 1946</td>
<td>82.0 (79)</td>
<td>4.54 (24)</td>
<td>3.76 (23)</td>
<td>2.62 (79)</td>
<td>4.12 (65)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W.-central Kansas JMS</td>
<td>52.0 (23)</td>
<td>75.0 (13)</td>
<td>3.23 (13)</td>
<td>4.08 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N. Colorado Strong 1971</td>
<td>4.31 (13)</td>
<td>2.76 (45)</td>
<td>66.7 (45)</td>
<td>2.62 (13)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. Texas Ohlendorf 1976</td>
<td>3.76 (45)</td>
<td>73.4 (45)</td>
<td>1.82 (45)</td>
<td>3.20 (30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S. Nevada Ackerman 1988</td>
<td>3.82 (11)</td>
<td>61.9 (11)</td>
<td>63.6 (11)</td>
<td>2.86 (7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>British Columbia Campbell et al. 1997</td>
<td>3.93 (121)</td>
<td>71.0 (55)</td>
<td>1.82 (11)</td>
<td>2.86 (7)</td>
<td></td>
</tr>
</tbody>
</table>

1≥1 young fledged.

1988). In W. Texas, clutch size averaged 3.76 ± 0.30 SD (range 1–6, n = 45; Ohlendorf 1976); in n.-central Colorado, 4.31 (n = 13; Strong 1971); in British Columbia, 3.93 (n = 121; Campbell et al. 1997); and in Alaska, 4.75 (n = 4; Kessel 1989).

Egg-laying. In s. Nevada, eggs laid typically in morning, before 08:00 (n = unknown; Ackerman 1988). Poorly known, limited observations indicate that 1 egg is laid each day; in s. Nevada population, 2-d interval between eggs was not uncommon (Ackerman 1988).

INeP AcTioN

Onset of broodiness and incubation in relation to laying. Onset of incubation unknown, but probably starts in the period from halfway through egg-laying (Kessel 1989) to day of clutch completion (see Weeks 1994).

Incubation period. In Kansas, mean incubation period 14.9 d ± 1.4 SD (range 12–18, n = 13; JMS); in Nevada, 14.3 d ± 1.2 SD (range 12–16, n = 6; Ackerman 1988). In British Columbia, incubation period ranged from 14 to 17 d (n = 5; Campbell et al. 1997). About 18 d in Alaska (Kessel 1989).

Parental behavior. No information.

Hardiness of eggs against temperature stress; effect of egg neglect. Little information; see Nest, above.

HATCHING

No observations; presumably similar to hatching in Eastern Phoebe (Weeks 1994) and Black Phoebe (Wolf 1997). In Kansas, most clutches hatch within 48 h (JMS). Eggshell remains removed by adult (Ackerman 1988).

YOUNG BIRDS

Condition at hatching. Young altricial; eyes closed; naked except for small amount of down.

Young have 319–349 neossoptiles in 21–22 tracts (Collins and Keane 1991). No data on mass.

Growth and development. No specifics on mass, body dimensions, and timing of homeothermy, but see Weeks 1994 for Eastern Phoebe and Wolf 1997 for Black Phoebe.

PARENTAL CARE

Brooding. Little information. Female broods more often during early nesting stage as compared to later stages (JMS).

Feeding. Few data. Insectivorous diet of nestlings is similar to that of adults (73.7% overlap; Ohlendorf 1976). In Colorado, a brood of 3- to 4-d-old young was fed by adults at about 5-min intervals (Bailey and Niedrach 1965).

Nest sanitation. Early in nesting period, adults routinely carry away fecal sacs after feedings, and nest is kept clean. Later in nesting period, young defecate over edge of nest (Bailey and Niedrach 1965, JMS).

COOPERATIVE BREEDING

Intraspecific cooperative breeding is not known to occur in phoebes. However, there was 1 unusual instance of interspecific cooperative breeding involving Say’s Phoebe and Barn Swallow (Kozma and Matthews 1995). In s.-central New Mexico, a pair of Barn Swallows and a pair of Say’s Phoebes were observed sharing same nest; these pairs alternated egg-laying, incubation, and feeding of young; 2 young of each species fledged. Say’s Phoebe shows some tolerance for encroachment by other species and has been observed with other species (see Behavior: social and interspecific behavior, above).

BROOD PARASITISM

Rarely parasitized by Brown-headed Cowbird (Molothrus ater); historically this brood parasite has
not occurred over much of Say’s Phoebe range (Lowther 1993). Eleven instances of parasitism reported: 7 from Kansas, 1 from Oklahoma, 1 from Arizona, 1 from Utah (Friedmann et al. 1977, Friedmann and Kiff 1985), and 1 of 169 nests from British Columbia (Campbell et al. 1997); includes 1 of 37 nests found parasitized in w.-central Kansas, whereas 6 of 66 nests of Eastern Phoebe were parasitized in same study area (Schukman 1974, Hill 1976). Eastern Phoebe nests are parasitized often by this cowbird (Weeks 1994); parasitism in Black Phoebe has not been reported (Wolf 1997).

FLEDGING STAGE

Departure from nest. In Kansas, young leave nest an average of 17.4 d ± 2.1 SD (range 14–21, n = 8) after hatching (IMS). In Nevada, young leave nest an average of 17.0 d ± 3.3 SD (range 13–21, n = 3); sample includes 13 and 17 d for spring nests and 21 d for a fall nest (Ackerman 1988). In British Columbia, fledging occurs at 17–21 d (n = 5; Campbell et al. 1997). Young leave nest area usually 2–3 d after fledging (IMS), but may remain close to nest while second brood is raised (Tyler and Dunn 1984). In Nebraska, young birds returned to nest for about a week after fledging (Gates 1980).

Association with parents or other young. Needs study. Only the male fed young near fledging (Weathers 1983); young capable of flying were still being fed by parents in Colorado (Bailey and Niedrach 1965).

Ability to get around, feed, and care for self. No information.

IMMATURE STAGE

No information.

MEASURES OF BREEDING ACTIVITY

Age at first breeding: intervals between breeding. Capable of breeding in first year; mean interval (for refurbishing existing nests) between first and second broods (from last nestling fledged to first egg laid) in w.-central Kansas averaged 8.7 d ± 3.5 SD (range 6–16, n = 6; IMS).

Clutch. See Breeding: eggs, above.

Annual and lifetime reproductive success. See Table 1; see also Causes of mortality, below. No data on geographic variation. One report of egg success using Mayfield’s (1975) method, 0.40 (daily survival rate during egg laying and incubation [0.9713], hatching [0.955], and nestling [0.9849] stage) from w.-central Kansas (Schukman 1995).

Clutch size and number of young fledged per nest are generally higher in grassland habitats (central Nebraska, w. Kansas, and n. Colorado) than in desert scrub (w. Texas and s. Nevada). Similar differences in clutch size for species nesting in grassland versus desert habitats were observed by Ricklefs (1980).

In w.-central Kansas, number of young fledged from each successful nest (≥1 young/nest) averaged 4.83 (n = 6) for first broods and 3.75 (n = 4) for second broods (IMS); in central Nebraska, 4.56 (n = 36) and 3.59 (n = 29), respectively (McClure 1946). These results parallel those of Murphy (1994) for Eastern Phoebe; first broods produced about 1 fledging more per nest than second broods did. As a result of hatching asynchrony in second broods, last-hatched young suffered highest mortality.

In w.-central Kansas (IMS), annual fecundity for all pairs was 7.07 eggs ± 2.52 SD (range 4–11, n = 15); multibrooded pairs produced average of 9.25 eggs/season ± 1.04 SD (range 8–11, n = 8). Annual fledging success for all breeding pairs averaged 3.27 young ± 3.38 SD (range 0–9, n = 15), and successful pairs fledged average of 6.13 young ± 1.96 SD (range 3–9, n = 8). Pair success (% pairs fledging ≥1 young/season) was 53.3%.

Number of broods normally reared per season. In Texas, frequently double-brooded, rarely triple-brooded (Ohlendorf 1976); in Kansas, 8 of 15 (53.3%) pairs were double-brooded, although some pairs thought to be single-brooded may have bred again in another location (IMS). In Nebraska, about 73% produced second broods (McClure 1946).

No information on lifetime reproductive success. Proportion of total females that rear at least one brood to nest-leaving or independence. In w.-central Kansas, 8 of 15 females reared at least 1 brood to nest-leaving (IMS). No information on independence.

LIFE SPAN AND SURVIVORSHIP

Little information. One individual 3 yr 11 mo (Bird Banding Laboratory, K. Klimkiewicz pers. comm.). A color-banded female nested at Deep Canyon, s. California, for >5 yr (Weathers 1983). No information on survivorship.

DISEASE AND BODY PARASITES

Diseases. No information.

Body parasites. Adults. None reported.

Nestlings. Argas tick larvae (Argas cooeyi) and dermanyssid mites (Ornithonyssus sylviarum) caused loss of 5 of 12 nestlings in w. Texas; 3 of the young were located in a nest located in close association with Cliff Swallow nests, and 2 young were in an old House Finch nest (Ohlendorf 1976).
CAUSES OF MORTALITY

Exposure and predation. In w.-central Kansas, predation was the major cause of mortality of eggs and young, accounting for 36.2% of all losses (n = 56) (Schukman 1993). Weather-related mortality resulted in 29.0% of all losses; 4 of 29 nests placed on steel I-beams near center of a bridge span were presumably blown off by strong gusts of wind (Schukman 1976). Of all losses, 14.5% were attributed to abandonment, 15.9% to unknown reasons, and 4.4% to failure of eggs to hatch.

In Texas, almost half (44.7%) of egg loss before hatching was attributed to human destruction, 19.5% to unknown reasons, and 7.1% to infertility of eggs; 4% of nestlings hatched were lost as result of heavy invertebrate infestation (Ohlendorf 1976).

In Eastern Phoebe, nesting success tends to be higher (in some instances significantly) for pairs using adherent nests (attached to vertical surface) as opposed to statant nests (placed on horizontal ledge; Weeks 1979, Hill and Gates 1988). No such data for Say’s Phoebe, but research is needed to determine whether uncemented statant nests are more prone to removal by predators or disturbance by weather (see above).

No data on postfledging mortality.

Competition with other species. Little information. In w.-central Kansas, Say’s and Eastern phoebes were found alternately at 2 of 45 nest sites (bridges), suggesting that these species may directly compete for nest sites, causing loss of eggs or young. In 1 instance, while an Eastern Phoebe was sitting on eggs in an old Barn Swallow nest, a Say’s Phoebe was flying about 0.5 km from the site. On inspection several days later, Eastern Phoebe had abandoned its eggs and a Say’s Phoebe was found in another nearby Barn Swallow nest (Schukman 1993). In w. Texas, 2 cases of nests that were known to have been abandoned by Black Phoebes (for unknown reasons) were used by Say’s Phoebes (Ohlendorf 1976).

RANGE

Initial dispersal from natal site. Little information available on natal philopatry. In Ellis Co., Kansas, near periphery of this species’ breeding range, 0 of 50 nestlings banded were found at 5 sites used for nesting in following years (Schukman 1993); a larger sample size, where bird densities are higher, might be more useful. However, natal philopatry is low in Eastern Phoebe (Schukman 1993, Weeks 1994).

Fidelity to breeding site and winter home range. Known to use same nest or nest site within years and in successive years (Ohlendorf 1976, Schukman 1993), but frequency unknown because of limited sample sizes. In w.-central Kansas, 9 adults were banded at 8 sites, 2 adults were recaptured at 5 sites where renesting occurred, one the following year and one 3 yr later (JMS).

No information on fidelity to winter sites.

Dispersal from breeding site or colony. No information.

Home range. No specific data. Females generally remain closer to nest site than males do, and latter are usually not seen late in nesting cycle (see Behavior: sexual behavior, above).

POPULATION STATUS

Numbers. Density comparisons may be of little value, because of irregular spacing (see Weeks 1994). At Deep Canyon in s. California, densities estimated at 1 bird/40 ha (Weathers 1983). In Nebraska and Kansas, prairie-farmland habitat, estimated densities of 1 pair/72 km² and 1 pair/104 km², respectively (McClure 1946, Schukman 1974).

Breeding Bird Survey (BBS) routes (1985–1991) that have the highest number of birds/route/yr (Fig. 5) include Torreon (near Sandoval), NM (13.3), and Boulder and Notom (near Garfield), UT (12.2 and 12.0, respectively; Price et al. 1995). Highest state averages for number of birds/route/yr are in New Mexico (3.38) and Wyoming (2.39), Arizona, Colorado, and Utah average >1 bird/route. Physiographic areas that have highest number of birds/route include Intermountain Grassland (3.37), piñon-juniper (Pinus-Juniperus) woodland (2.99), and Wyoming basin (2.40; BBS data, 1966–1994).

In early winter, highest concentrations occur in Salton Sea area of Imperial Valley in s. California (Root 1988). One of the most common species in lower Colorado River valley; high count of 244 seen in 1980 Christmas Bird Count (CBC; Rosenberg et al. 1991). Common along coastal areas of s. California south of Sonoma Co.; as many as 102 individuals seen in Santa Barbara CBC (Unit 1984, Lehman 1994, Small 1994).

Trends. BBS data from 1966–1991 showed strong declining trend in w. North America (states and provinces west of and including Rocky Mts.; DeSante and George 1994). More recent BBS data (1966–1996), however, show increasing trends of 1.9%/yr (p = 0.06) rangewise, 1.7%/yr (p = 0.09) in U.S., 7.5%/yr (p = 0.07) in Canada, and a 2.3% nonsignificant (p = 0.17) increase in Western BBS region. By state, significant increase in Utah (8.8%/yr, p = 0.02) and increasing trend (2.9%/yr, p = 0.10) in N. Dakota; recent (1980–1996) changes include increasing trend (6.0%/yr, p = 0.08) in N. Dakota and decreasing trend (-3.8%/yr, p = 0.08) in California. By physiographic area, significant increase in Dissected Rockies (9.3%/yr, p = 0.03) and increasing trend (19.3%, p = 0.06) in Basin and Range; recent (1980–1996) changes include significant increase (25.6%/yr, p = 0.05) in
Basin and Range, and increasing trends in Dissected Rockies (13.0%/yr, $p = 0.06$) and High Plains Border (5.6%/yr, $p = 0.10$; Sauer et al. 1997).

CBC data show rangewide increase of 0.8%/yr (nonsignificant), declining trend (~1.3%/yr, $p \leq 0.10$) in New Mexico, and significant increase (2.1%/yr, $p \leq 0.05$) in California (National Biological Service unpubl.).

**POPULATION REGULATION**

No information. In w. Texas, regulated by nest-site availability; a pair was feeding nestlings 21 Jul at a site where a pair had been collected 12 Jun (Ohlendorf 1976). However, many apparently suitable nest sites (bridges) are not used by this species in w.-central Kansas (JMS). Predation suspected to be primary cause of nest loss in w.-central Kansas (Schukman 1993). Mortality from climatic extremes may also be important in parts of species' range, but this needs study. Distributional limits may be defined by presence of preferred foraging habitat (low, sparsely vegetated ground) or other requirements, rather than by competition with Eastern Phoebe (Schukman 1993).

**CONSERVATION AND MANAGEMENT**

**EFFECTS OF HUMAN ACTIVITY**

Like other phoebes, Say's Phoebe has undoubtedly benefited from use of human-made structures that provide suitable nest sites. In Great Plains, use of such structures is common, but densities decline from west to east (BBS data), suggesting other population-regulating factors. In se. Idaho, livestock-grazing had no negative impact on population size (Reynolds and Trost 1981), but effects of urbanization and agricultural practices on this species remain unstudied.

**MANAGEMENT**

No specific management guidelines suggested. No known management effort directed at this species.

Research rank for potential of extirpation of Say's Phoebe for 12 western states is 2.64, based on scale of 1 to 5, with 5 indicating a high degree of uncertainty (Carter and Barker 1993). Research rank is derived from the following criteria (and score): global abundance (3), threats on breeding ground (2), uncertainty about threats on breeding ground (3), threats on wintering ground (3), uncertainty about threats on wintering ground (4), breeding distribution (2), and winter distribution (2).

**APPEARANCE**

**MOLTS AND PLUMAGES**

*Hatchlings.* From Collins and Keane 1991. Down is light gray. Hatchlings have 319–349 neossoptiles (average 340) in 21–22 tracts ($n = 2$). Comparatively,
Black and Eastern phoebes average slightly fewer neossoptiles (254 and 337, respectively) and tracts (20). In Say’s Phoebe (and 1 Black Phoebe), a distinct unpaired row of neossoptiles (at anterior end of mid-dorsal region) represents newly recognized tract termed interscapular region of spinal tract. In addition, lateral pelvic neossoptiles, well developed in other species and thus far not reported in Tyrannidae, are sparsely distributed in Sayornis. Generally, number of neossoptiles found in Sayornis, a niche-nesting genus, is intermediate between numbers found in open-cupped nesters (500–600) and in closed-cupped nesters (none or very few).

Juvenile plumage. From Ridgway 1907. No information on timing or sequence of prejuvenile molt. Juvenile plumage similar to Definitive Basic (adult) plumage (see below), except upperparts browner, particularly on back. Median and greater upperwing-coverts tipped with cinnamon or cinnamon buff, forming 2 distinct wing-bars. Juvenile rectrices more tapered than adult rectrices and tipped buff (Pyle 1997).

Basic I plumage. Prebasic I molt partial. Occurs Jul–Sep; includes contour feathers, 5–10 inner greater upperwing-coverts (in about 4% of individuals), 1–3 tertials (33% of individuals replace no tertials), but no remiges or rectrices (Pyle 1997).

Basic I plumage similar to Definitive Basic (adult) plumage (see below), except for retained Juvenile remiges and rectrices (Oberholser 1974), and retained outer upperwing-coverts, which are paler and tipped cinnamon (when fresh), contrasting with newer inner wing-coverts, which are darker and tipped whitish (Pyle 1997).

Definitive Basic plumage. Definitive Prebasic molt complete; occurs Jul–Sep (see Fig. 4; Bent 1942). Cycle of molts and plumages poorly known; some evidence for partial Prealternate molt (Bent 1942). Prealternate molt may occur in occasional birds and may include tertials; more study needed (Pyle 1997).

Based on Ridgway 1907, unless otherwise noted. Upper surface of head brown or brownish gray; pyleum and hindneck darker; upper back-feathers, scapulars, and uppertail-coverts dusky grayish, usually margined paler. Tail brownish black; outer web of outermost pair of rectrices more or less edged whitish. Rectrices truncate in shape (Pyle 1997). Wing-feathers deep brownish gray, with pale brownish gray edgings; edgings broaden and approach dull whitish on inner secondaries and terminal portions of greater-coverts. Outer primary-coverts broad and lacking buff tips (Pyle 1997). Sides of head and neck similar to upperparts, changing gradually below into pale buffy brownish gray of chin and throat; chest and sides of breast light buffy brownish gray, median portion of chest usually more strongly tinged with buff; belly and undertail-coverts cinnamon buff; axillaries and underwing-coverts pale buff or cream buff; inner webs of remiges edged with buffy whitish. Sexes similar.

Aberrant plumages. One instance of partial albinism reported from s. British Columbia; complete except for flight-feathers, which were brown to dark brown, as they are in most individual Say’s Phoebes (P. Jones pers. comm.).

Bare Parts

Bill and gape. Bill black; lower mandible sometimes chaetura black or paler; gape reddish orange; in young, edges of bill yellowish (Oberholser 1974).

Iris. Brown.

Legs and feet. Black; claws black.

MEASUREMENTS

Linear

See Appendix 2. Total length of males 158–182 mm (mean 174, n = 54); of females 164–182 mm (mean 173, n = 48; Browning 1976). Wing-chord, tail, and bill slightly longer in males than in females; bill slightly wider in females. Comparison of samples taken in Alaska, w. British Columbia, central California, Idaho, Arizona, Rocky Mtns. (Montana, Wyoming, and Colorado), and Baja California reveals no differences in wing-chord; tail length greatest in Rocky Mtns. for males and females; bill length smallest for males and bill width smallest for females in Alaska; slightly shorter wing and tail, and slightly longer and broader bill in Baja California.

Mass

Mean body mass (sexes combined) 22.3 g (Murphy 1989); 21.2 g in New Mexico (range 17.5–24.1, n = 8; Dunning 1993). No data on seasonal change in mass.

Priorities for Future Research

Despite this species’ extensive breeding range, most aspects of its biology remain poorly known. Future research could profitably focus on population dynamics, migration and habitat requirements, and foraging ecology. In addition, we have only a basic sketch of the breeding biology, behavior, and vocal communication of Say’s Phoebe. Future research on autumnal breeding, noted by Ackerman (1988), and the circumstances of its occurrence could provide insight into cues that trigger or facilitate bimodal breeding activity. Finally, as with many other species of birds, there are no data on population regulation, polymodal breeding activity, and nutritional requirements of Say’s Phoebe.

Acknowledgments

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Appendix 1. Dietary analyses of Say’s Phoebe.

<table>
<thead>
<tr>
<th>Insect order</th>
<th>Rangewide 1 (Beal 1912) % occurrence</th>
<th>Texas (Ohlendorf 1971) % occurrence</th>
<th>% individuals</th>
<th>% volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hymenoptera</td>
<td>30.72</td>
<td>21.8</td>
<td>26.6</td>
<td>17.0</td>
</tr>
<tr>
<td>Hemiptera</td>
<td>4.45</td>
<td>6.3</td>
<td>5.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Diptera</td>
<td>16.67</td>
<td>10.9</td>
<td>10.3</td>
<td>13.6</td>
</tr>
<tr>
<td>Lepidoptera</td>
<td>12.12</td>
<td>4.6</td>
<td>3.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Orthoptera</td>
<td>15.36</td>
<td>11.8</td>
<td>11.0</td>
<td>46.4</td>
</tr>
<tr>
<td>Neuroptera</td>
<td>0.9</td>
<td>0.7</td>
<td>trace</td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td>15.67</td>
<td>39.1</td>
<td>38.4</td>
<td>17.0</td>
</tr>
</tbody>
</table>

*Trace arachnid and 0.22% vegetable matter in this sample.

Appendix 2. Mass (g) and linear measurements (mm) of Say’s Phoebe. Data (from museum specimens) shown as mean (range, n).

<table>
<thead>
<tr>
<th>Source</th>
<th>Dunning 1993</th>
<th>Browning 1976</th>
<th>Ridgway 1907</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both sexes</td>
<td>21.2 (17.5-24.1, 8)</td>
<td>104.0 (96.5-108.8, 54)</td>
<td>20.4 (18.5-22.0, 22)</td>
</tr>
<tr>
<td>Wing-chord</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>98.9 (91.6-110.4, 48)</td>
<td>19.6 (18.5-21.0, 17)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>82.5 (71.0-89.4, 54)</td>
<td>11.9 (11.5-13.0, 22)</td>
</tr>
<tr>
<td>Rectrix</td>
<td></td>
<td>79.4 (73.8-86.2, 48)</td>
<td>11.6 (10.5-12.0, 17)</td>
</tr>
<tr>
<td>Tarsus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td>20.4 (18.5-22.0, 22)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td>19.6 (18.5-21.0, 17)</td>
</tr>
<tr>
<td>Middle toe</td>
<td></td>
<td></td>
<td>11.9 (11.5-13.0, 22)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td>11.6 (10.5-12.0, 17)</td>
</tr>
<tr>
<td>Exposed culmen</td>
<td></td>
<td></td>
<td>15.7 (14.5-17.0, 22)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td>14.4 (13.5-18.0, 17)</td>
</tr>
</tbody>
</table>

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